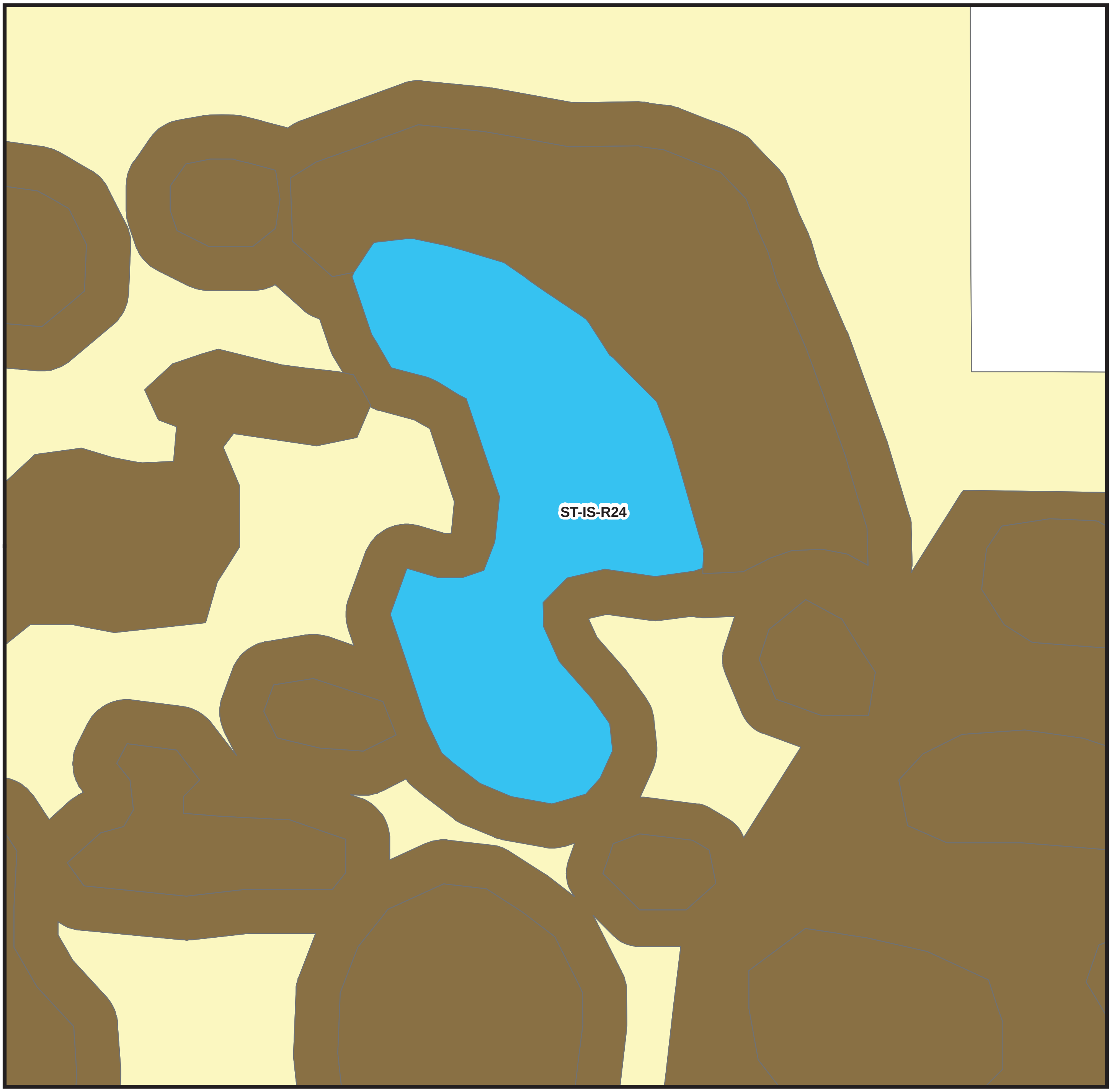
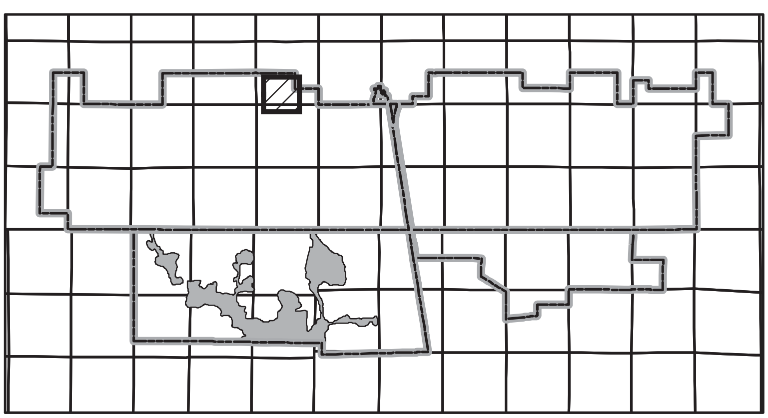
DA Permit SAJ-1993-01395

Attachment G - Compensatory Mitigation Plan
Attachment A, Part 3 - Mitigation Categories

Attachment A, Part 3



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

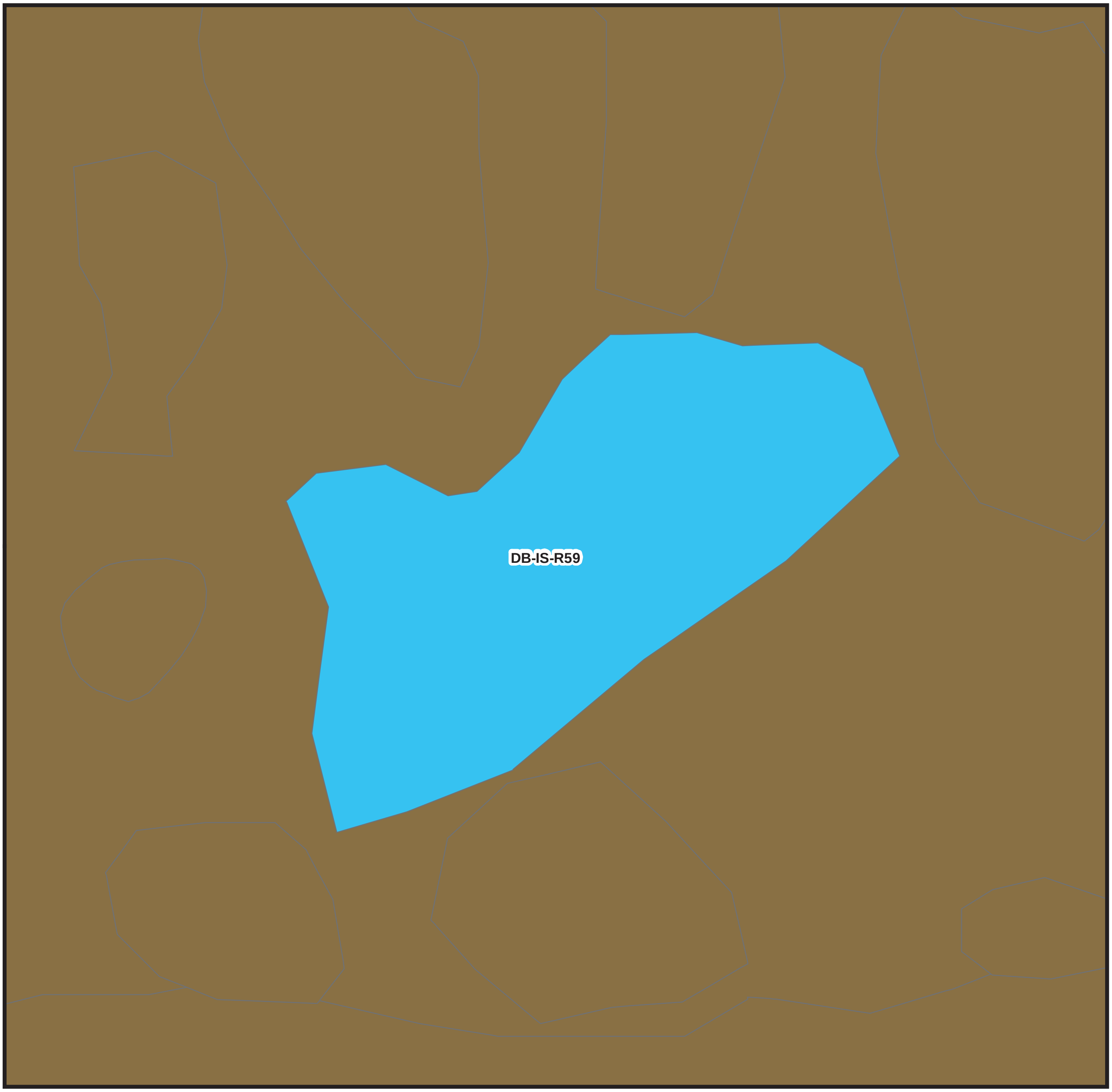
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

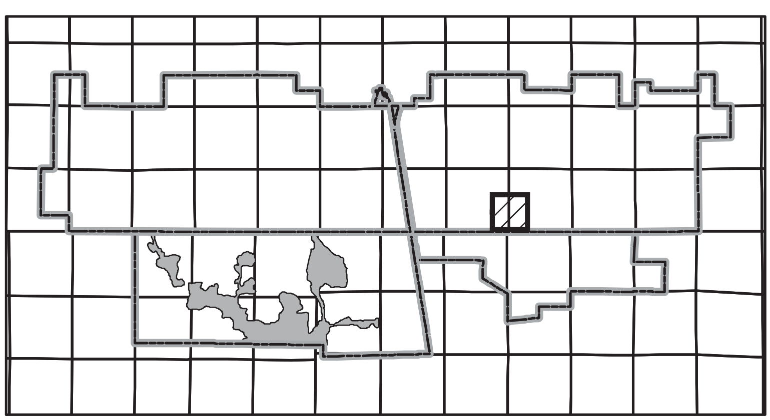
MITIGATION CATEGORIES

Sheet 1 of 56

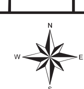
P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet



Sheet 2 of 56

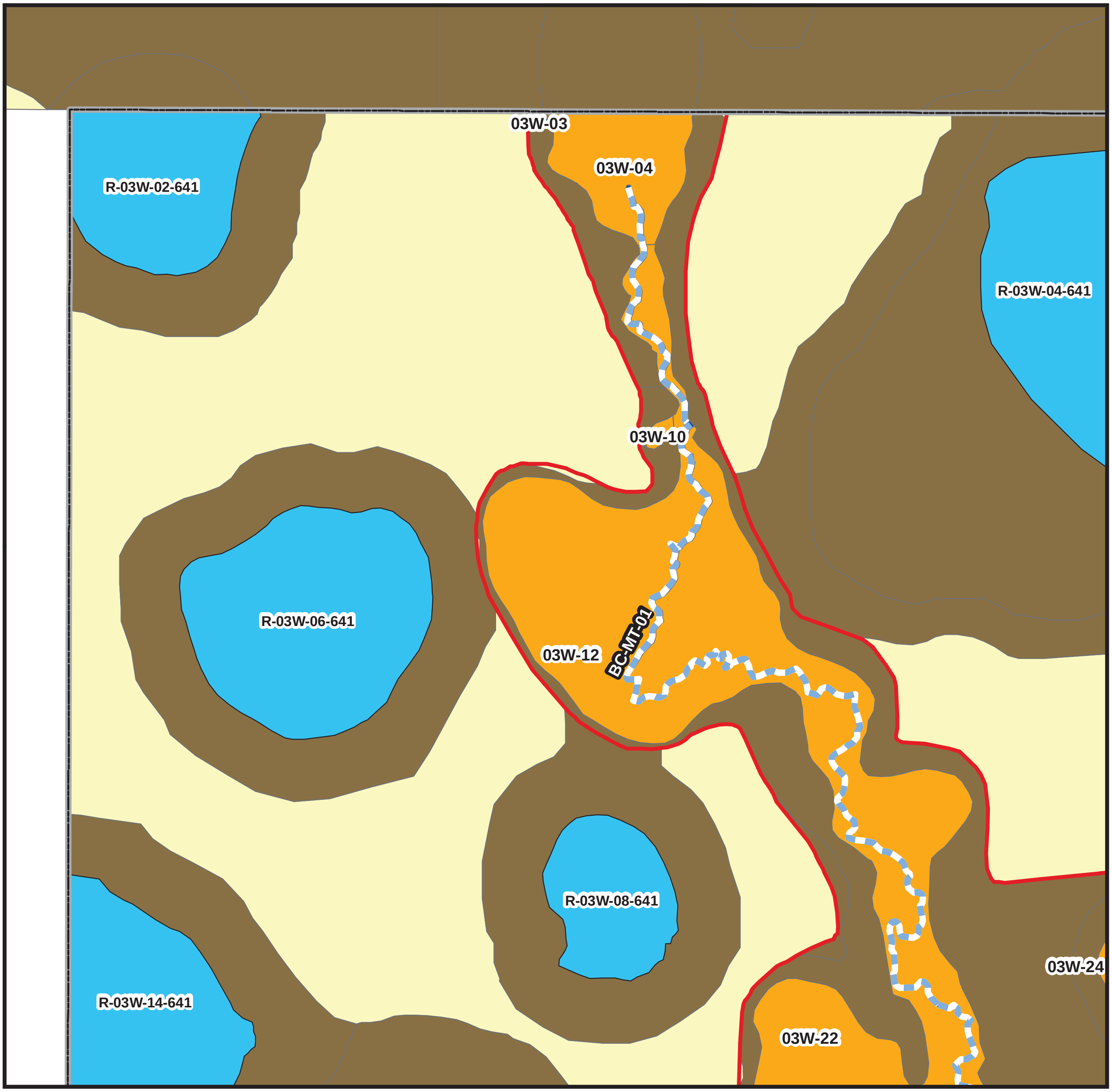
Mosaic

SOUTH PASTURE EXTENSION

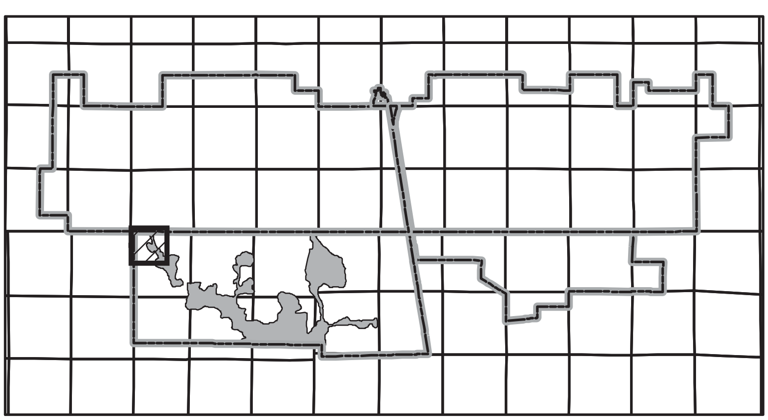
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

Sheet 3 of 56

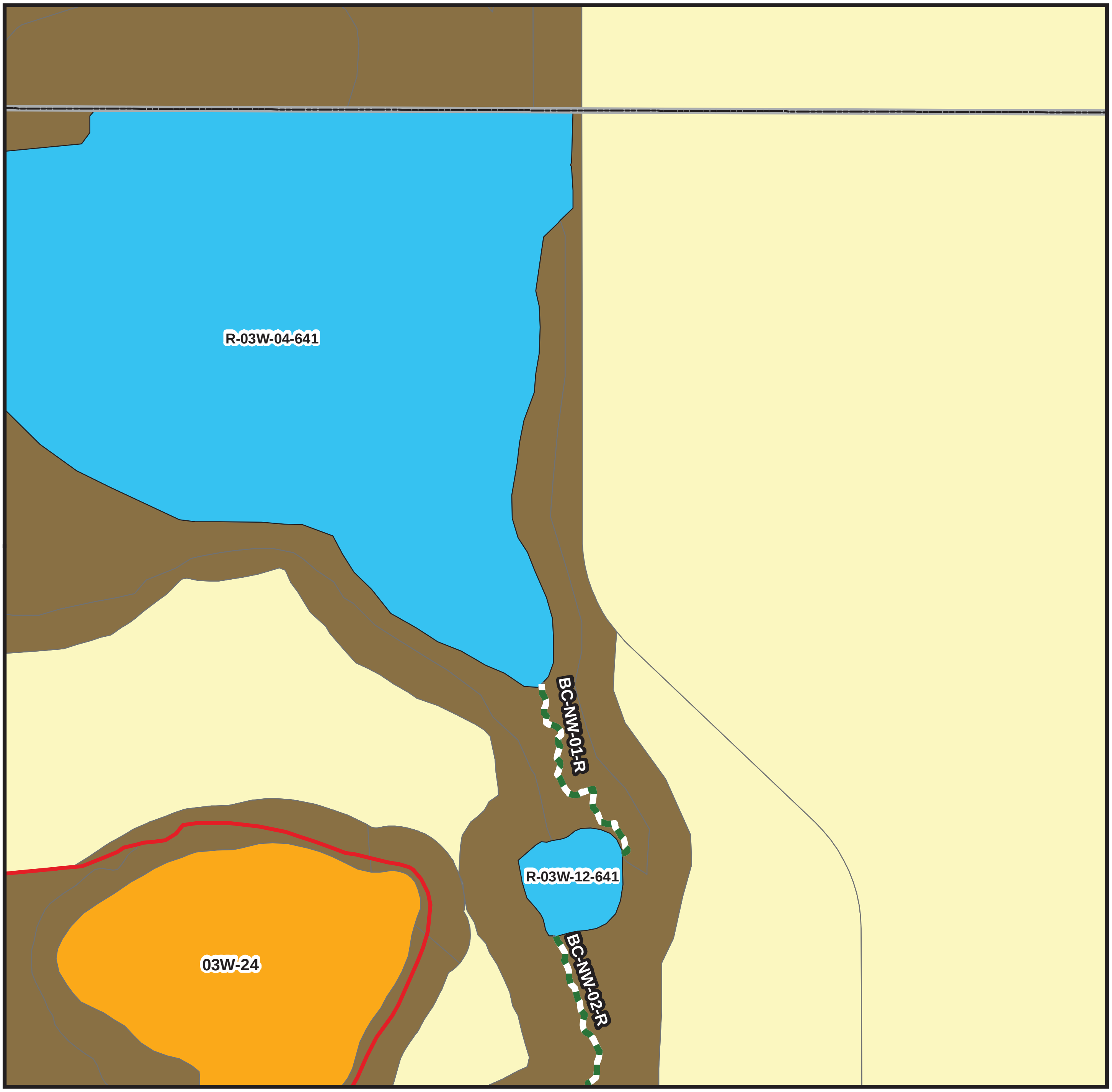
Mosaic

SOUTH PASTURE EXTENSION

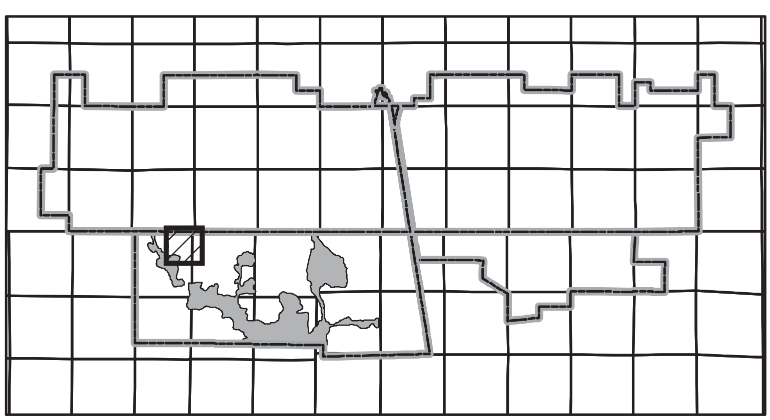
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

Mosaic

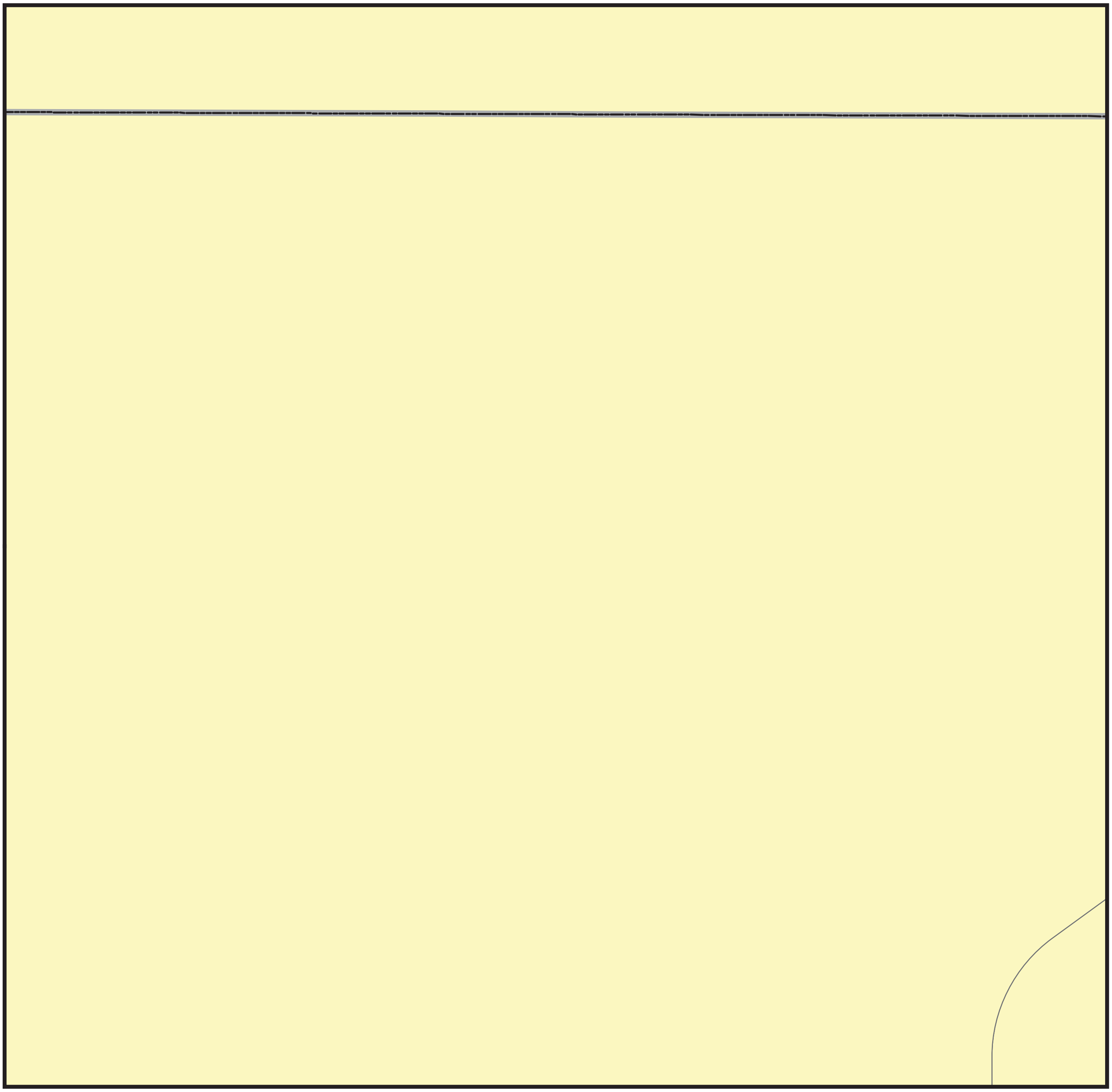
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

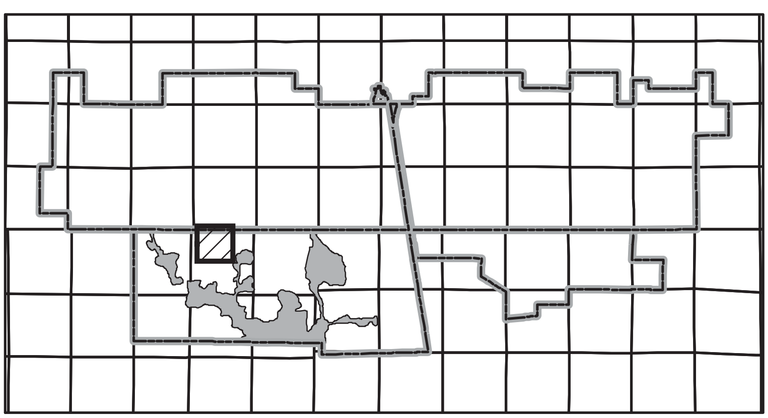
MITIGATION CATEGORIES

Sheet 4 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

Mosaic

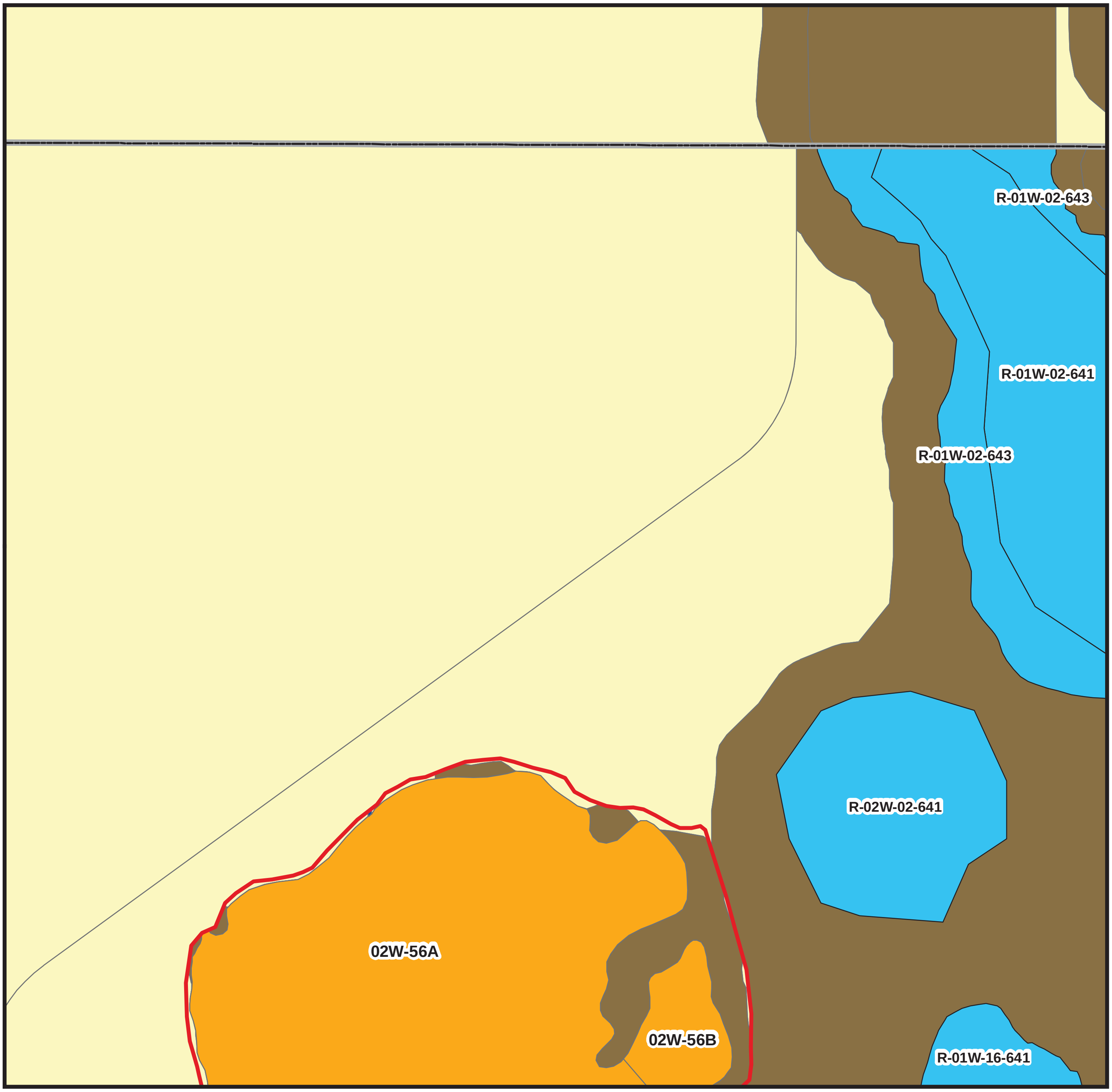
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

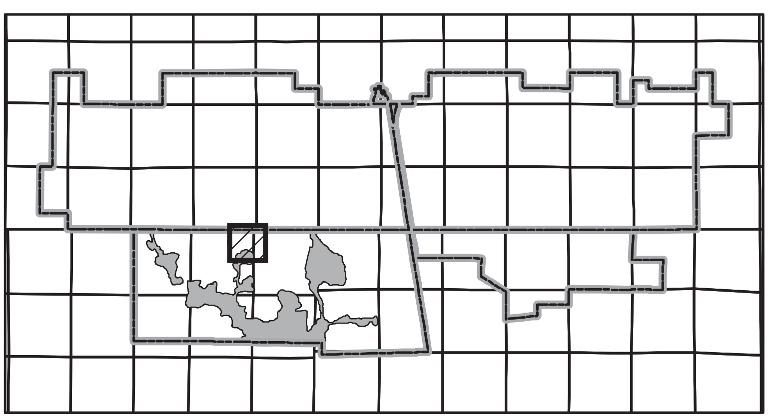
MITIGATION CATEGORIES

Sheet 5 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

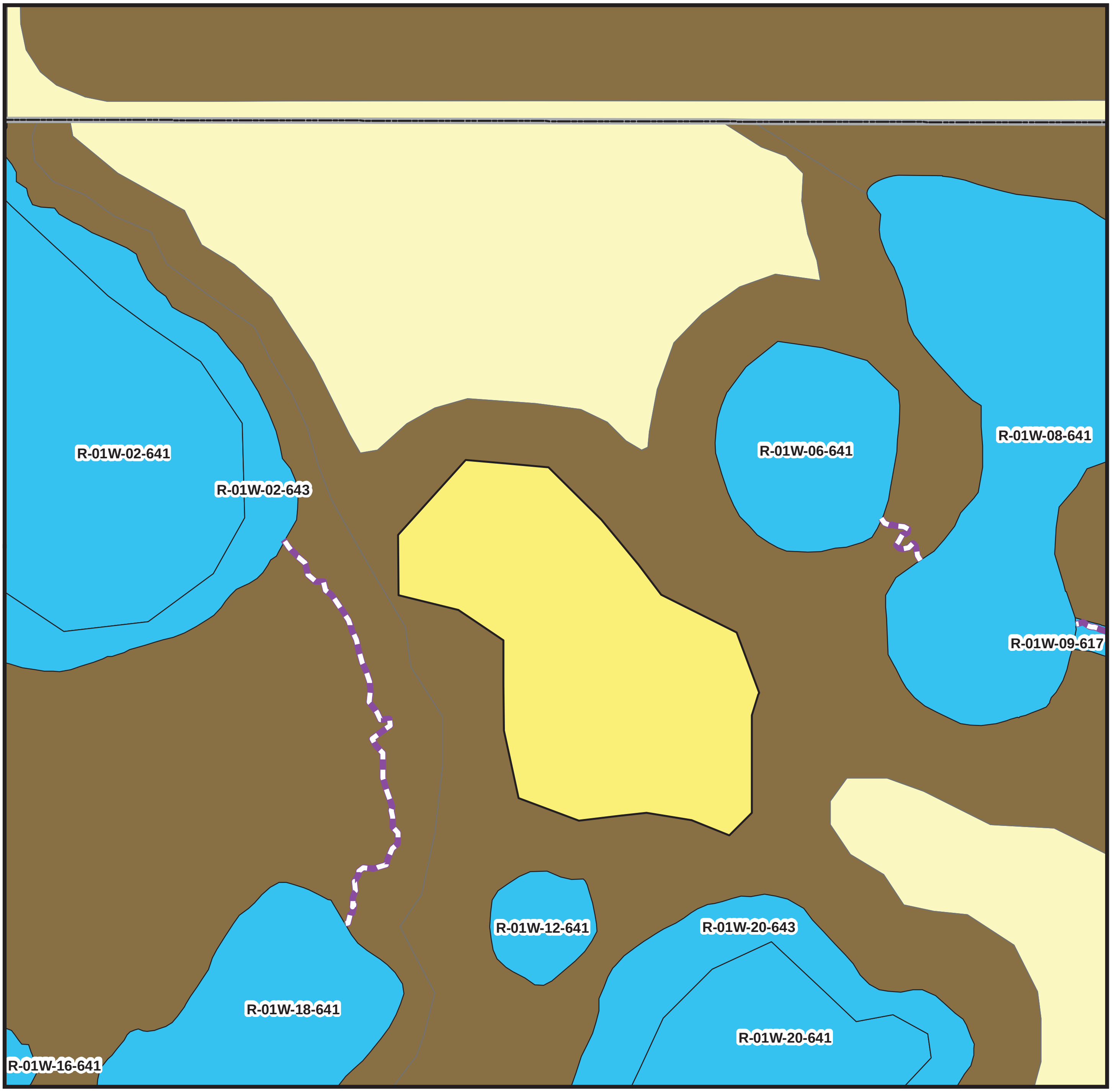
Mosaic

SOUTH PASTURE EXTENSION

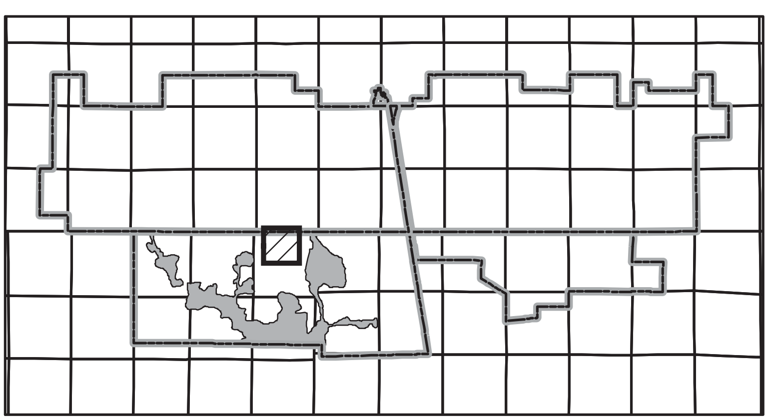
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

N W E S

Mosaic

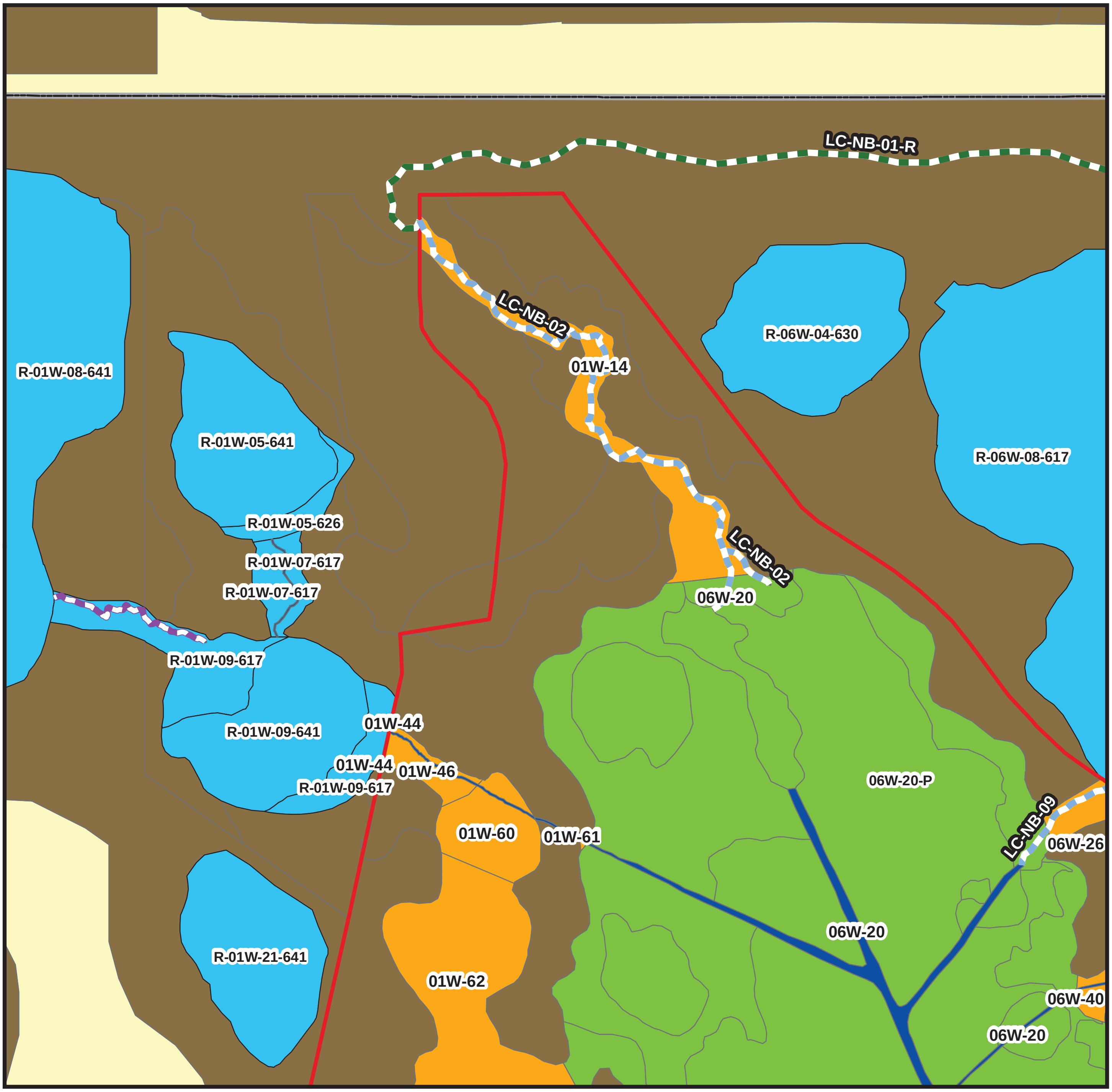
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

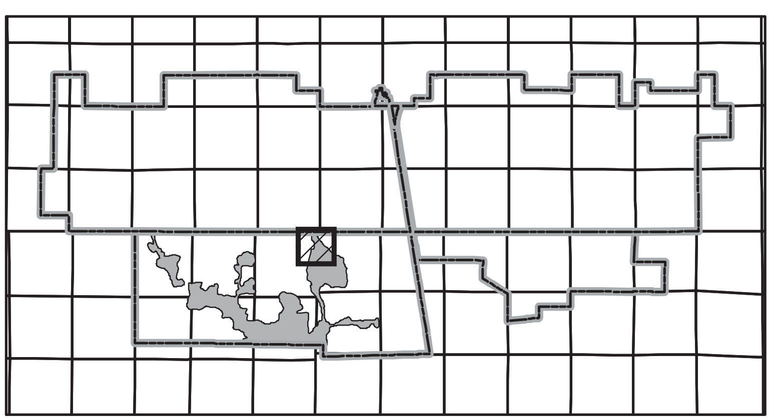
MITIGATION CATEGORIES

Sheet 7 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

Mosaic

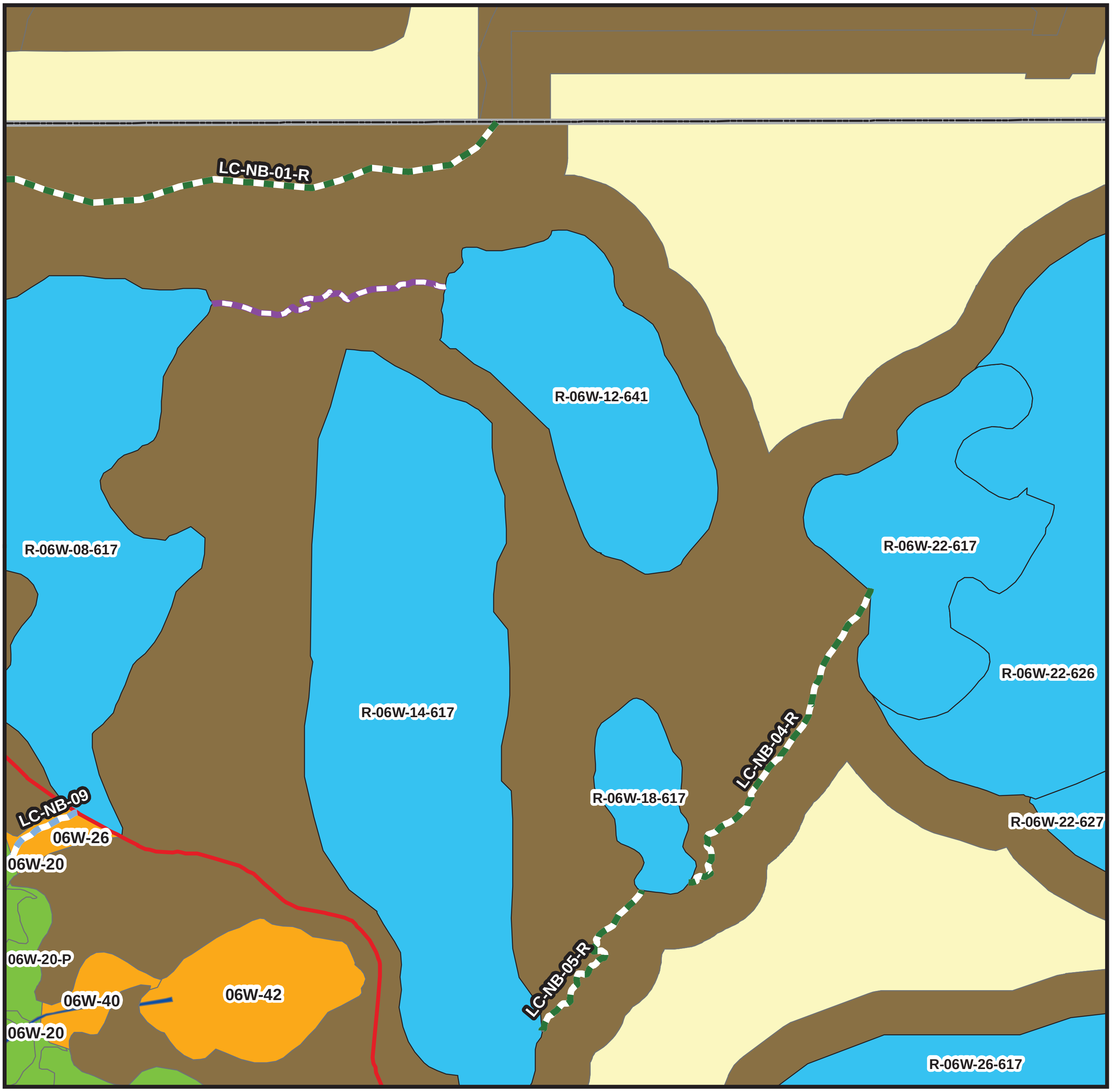
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

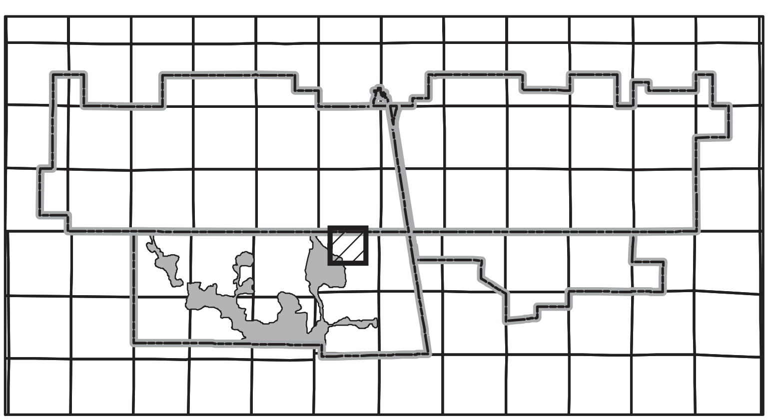
MITIGATION CATEGORIES

Sheet 8 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



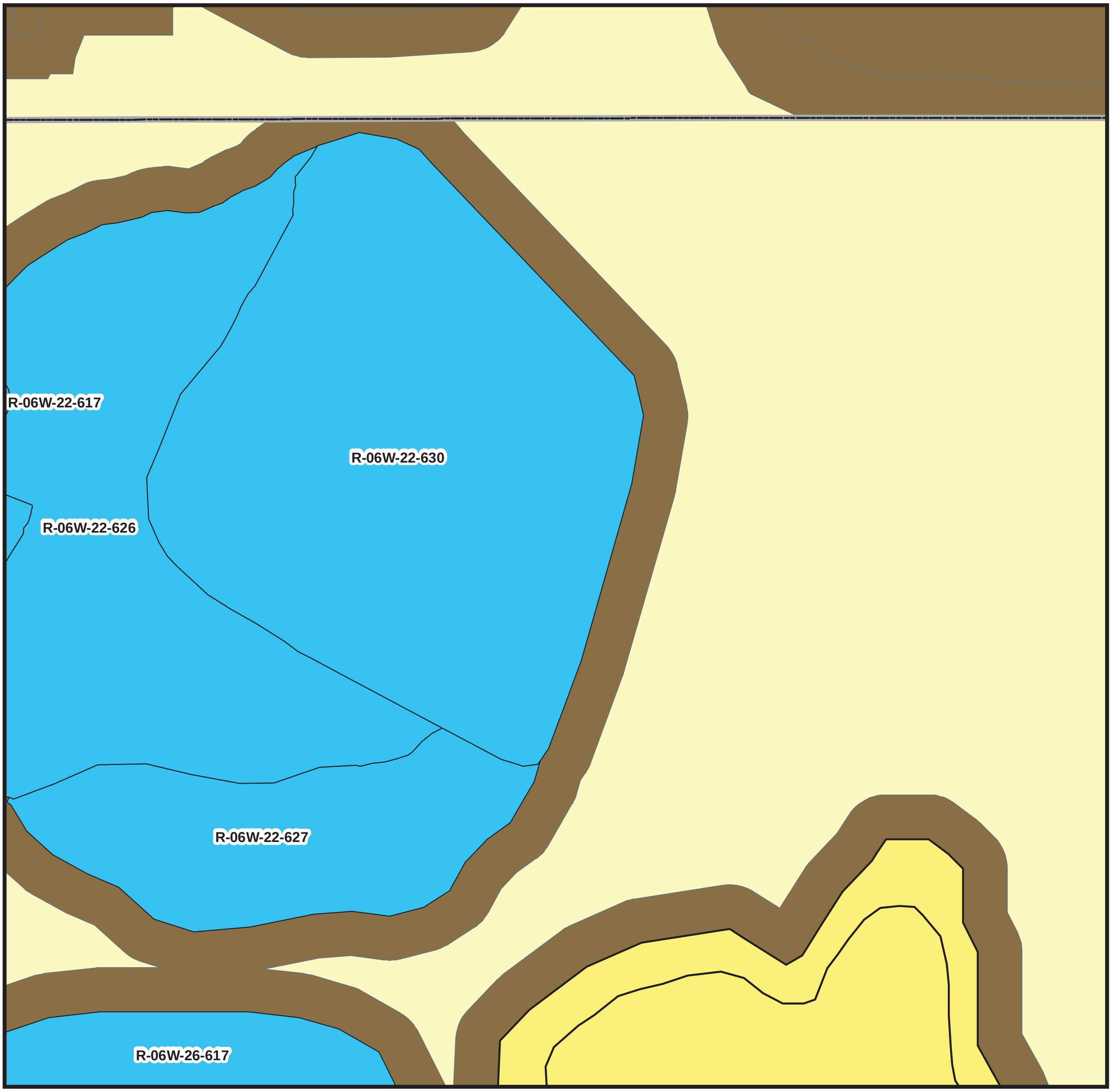
0 100 200 400 Feet
1 in = 400 feet

Mosaic

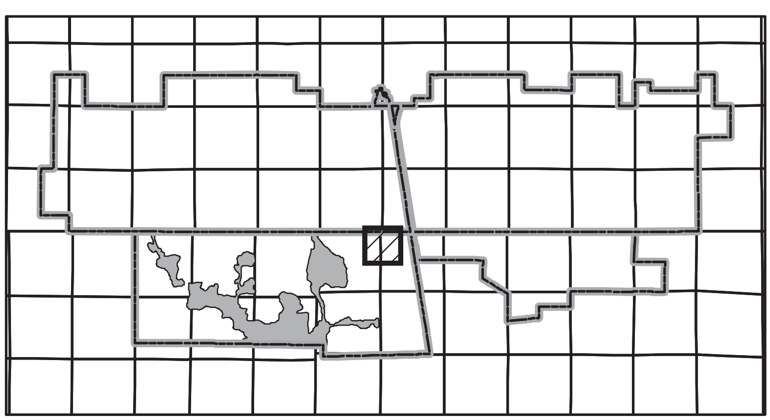
SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

Sheet 9 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

Mosaic

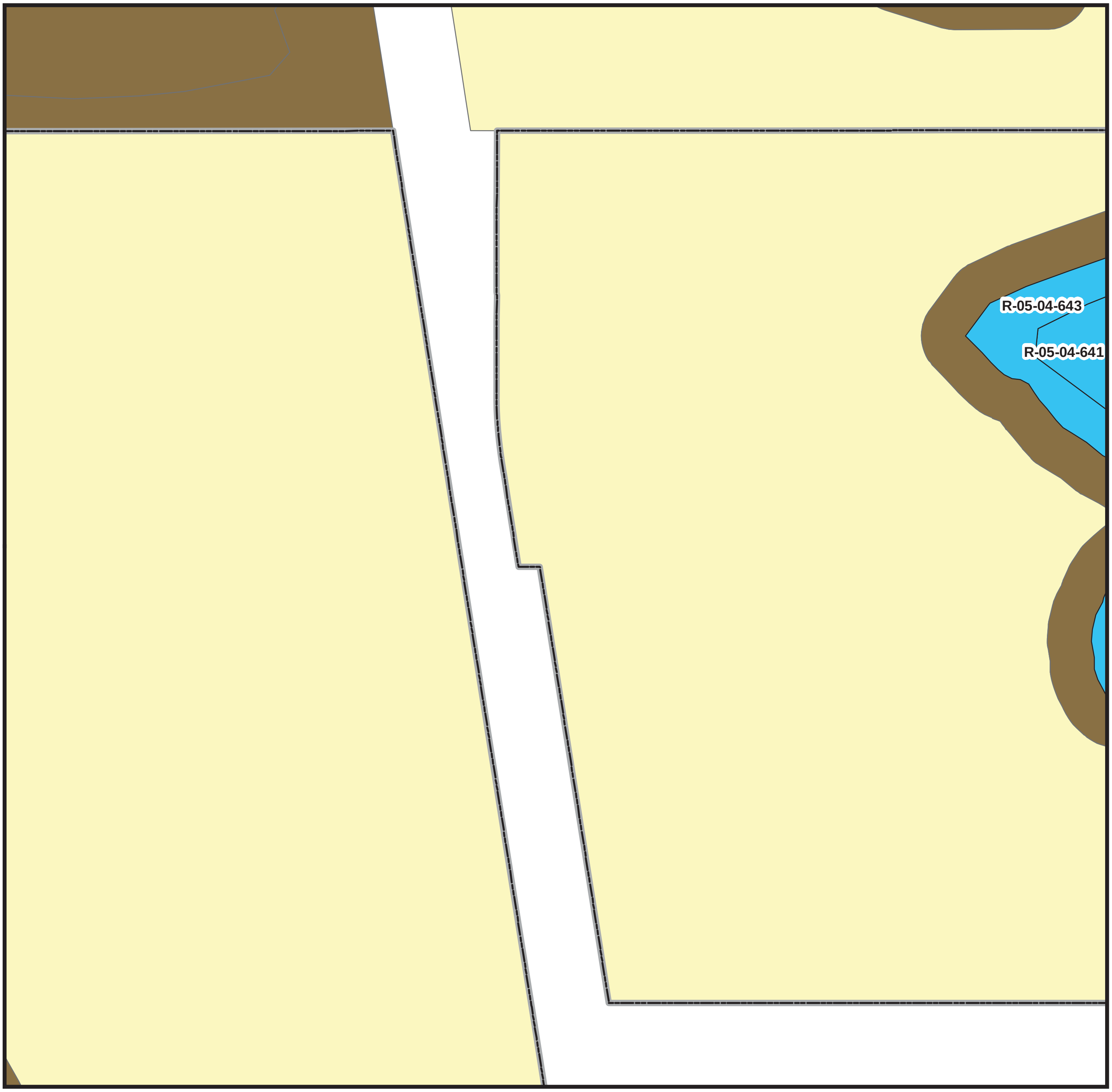
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

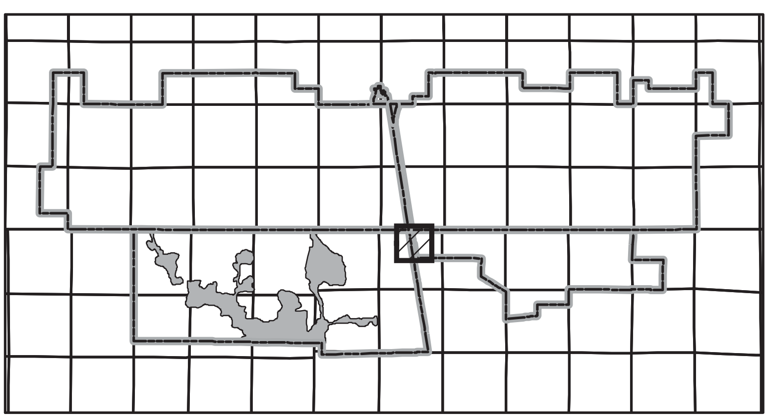
MITIGATION CATEGORIES

Sheet 10 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Mosaic

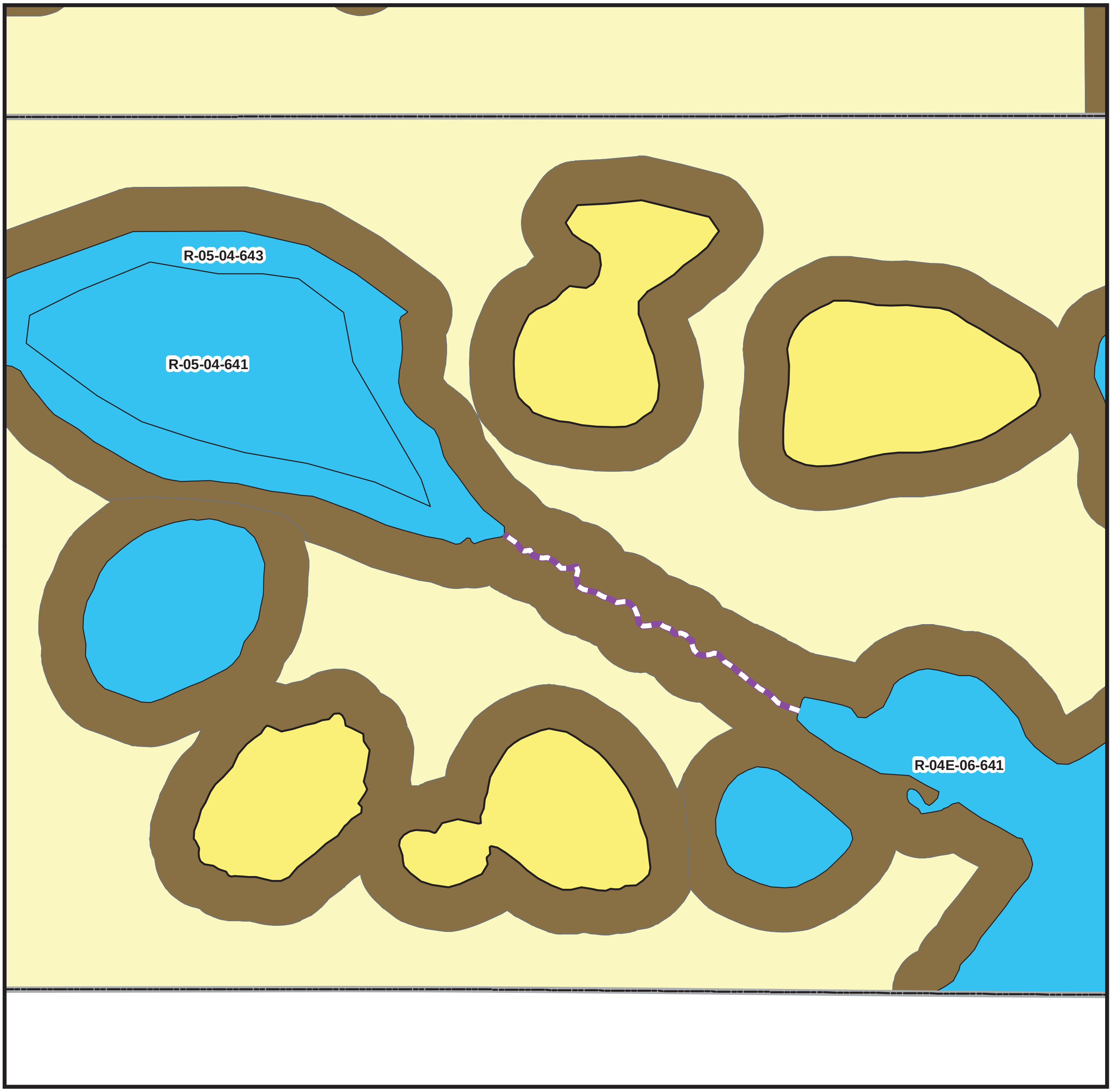
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

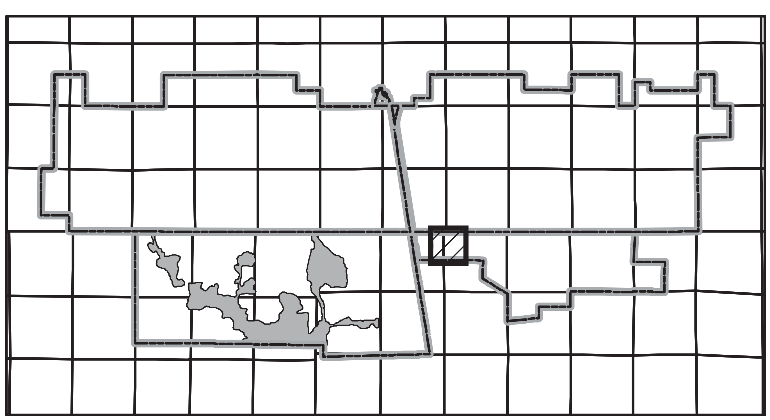
MITIGATION CATEGORIES

Sheet 11 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

N W E S

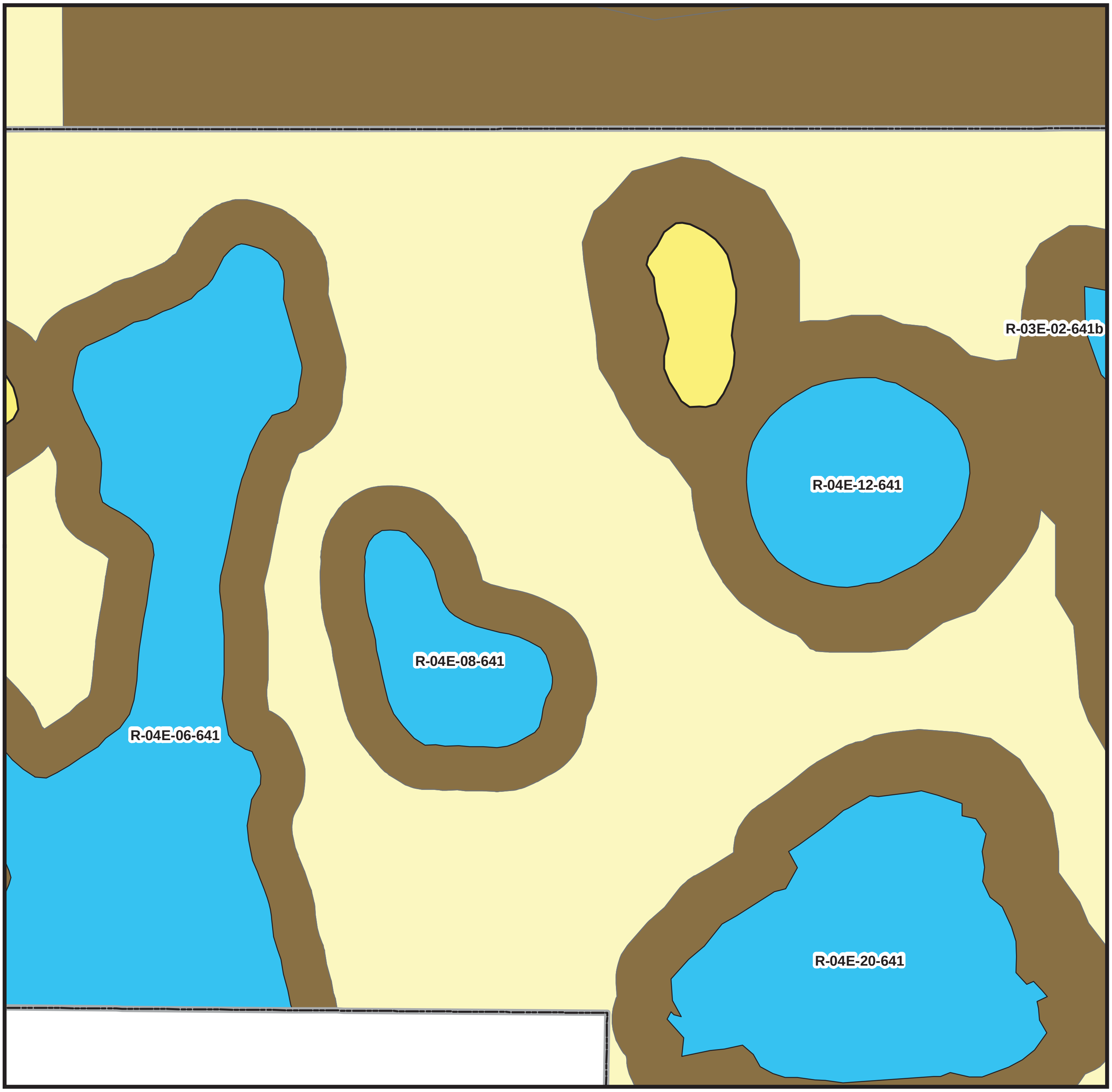
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

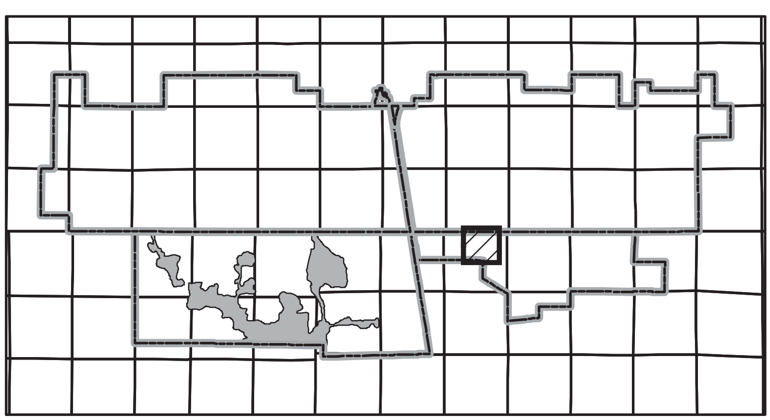
MITIGATION CATEGORIES

Sheet 12 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

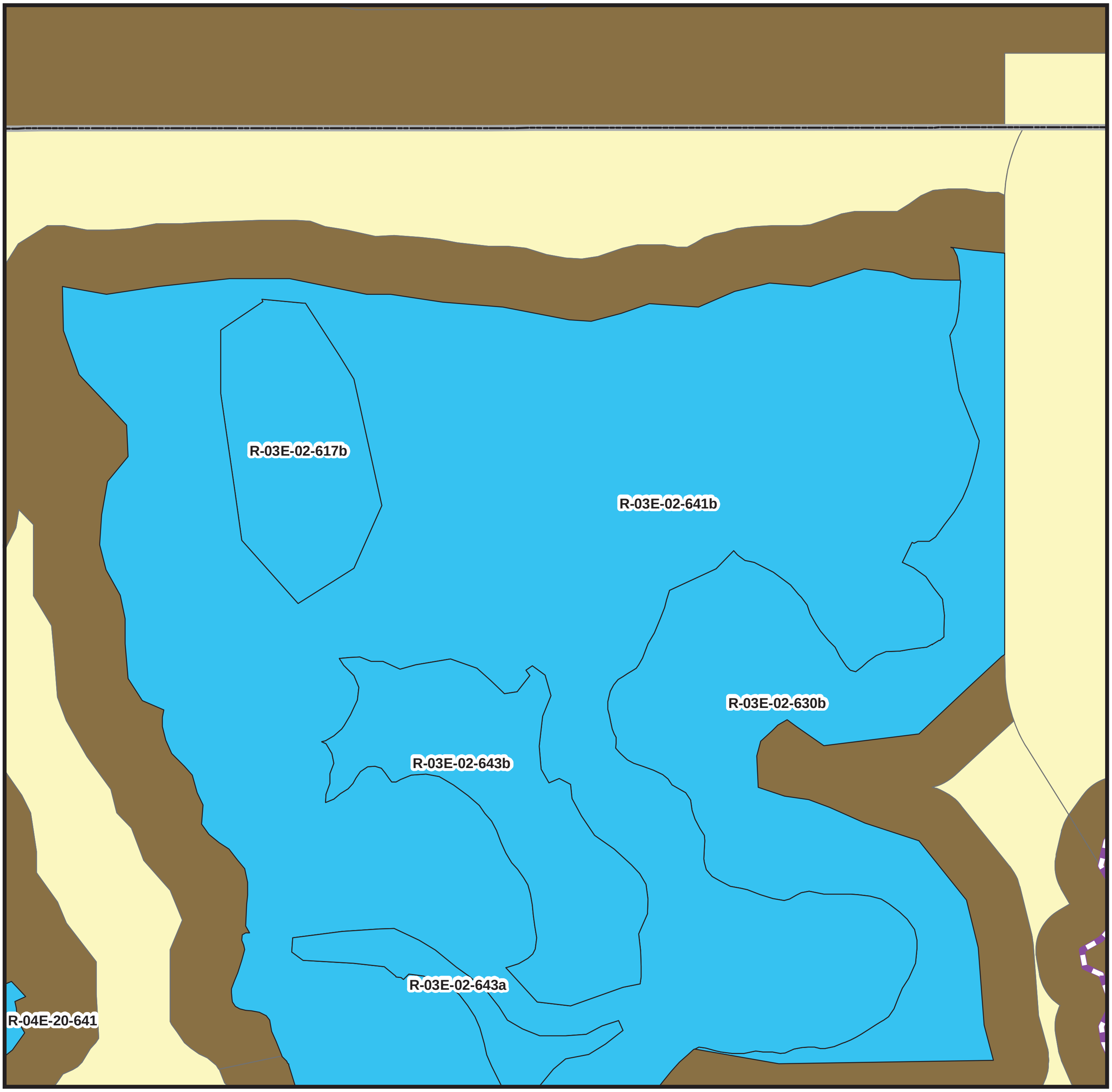
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

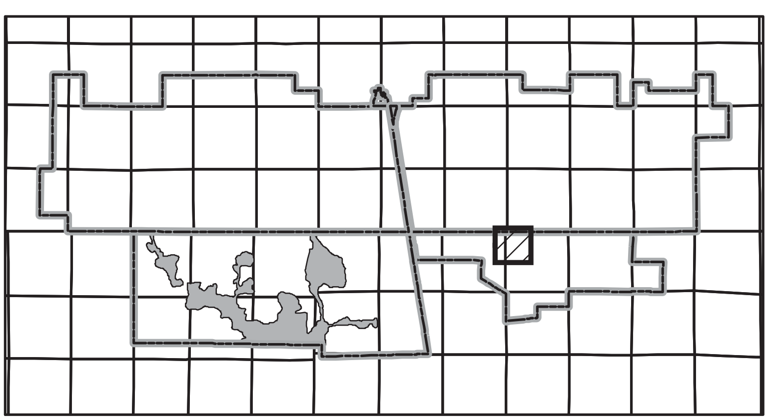
MITIGATION CATEGORIES

Sheet 13 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

N W E S

Sheet 14 of 56

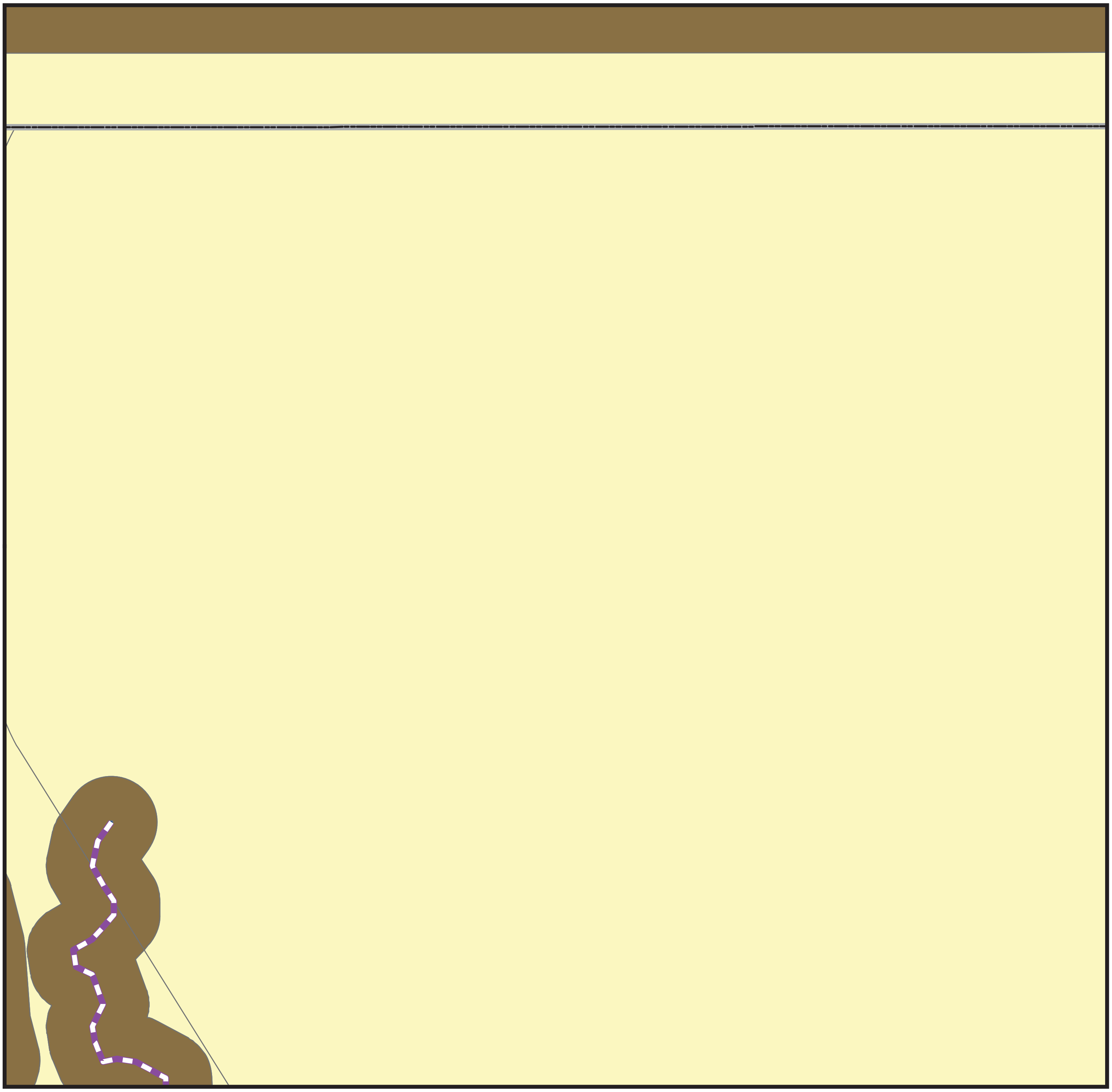
Mosaic

SOUTH PASTURE EXTENSION

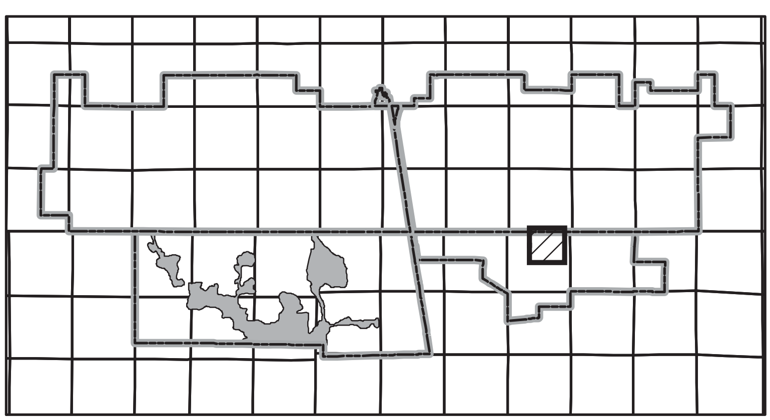
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

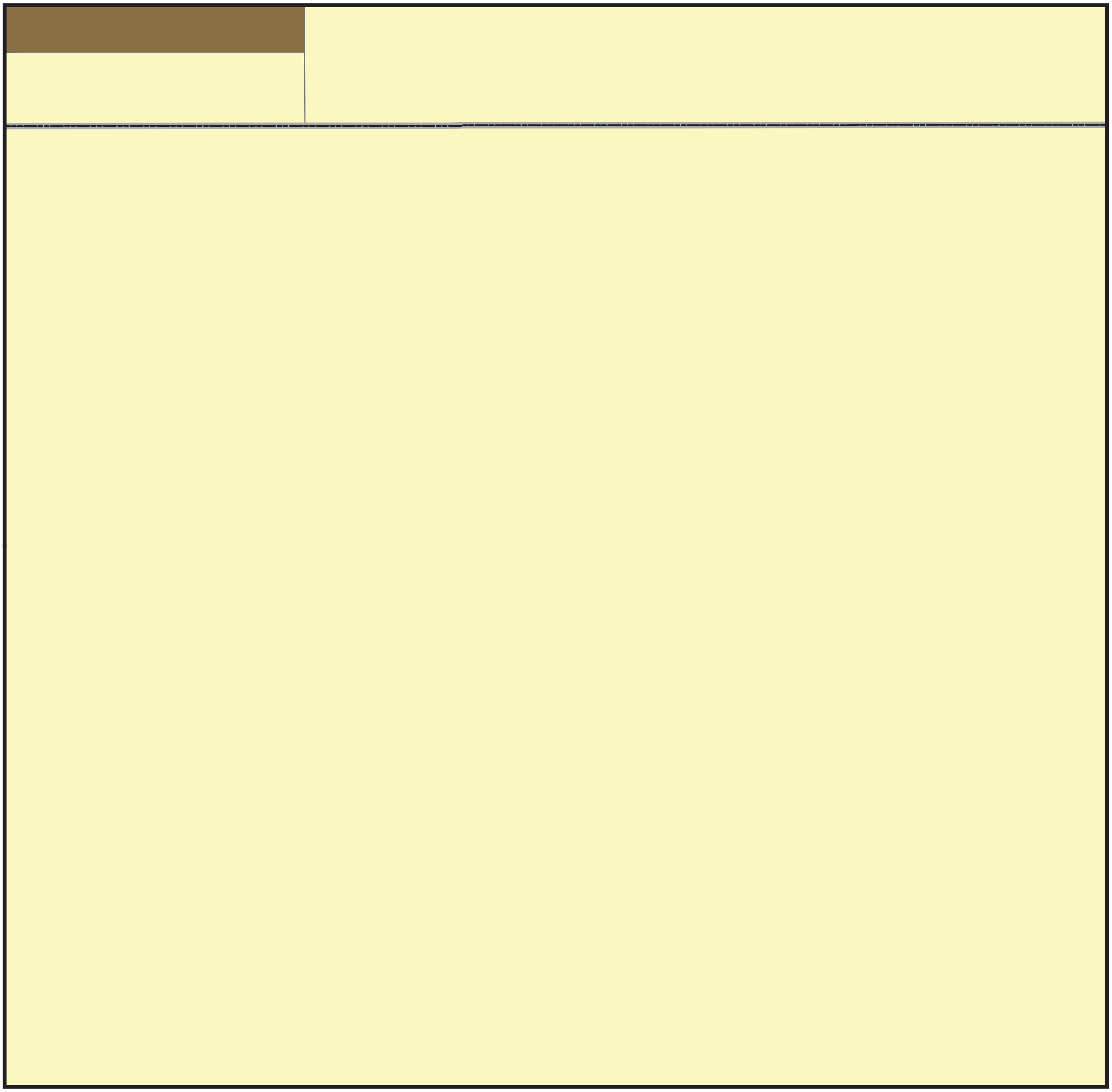
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

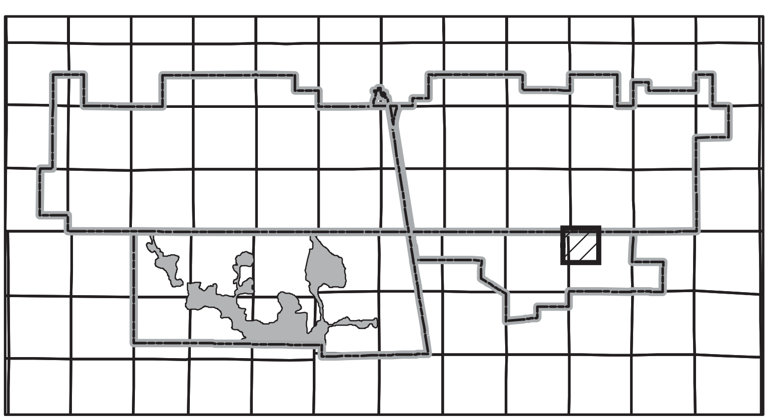
MITIGATION CATEGORIES

Sheet 15 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

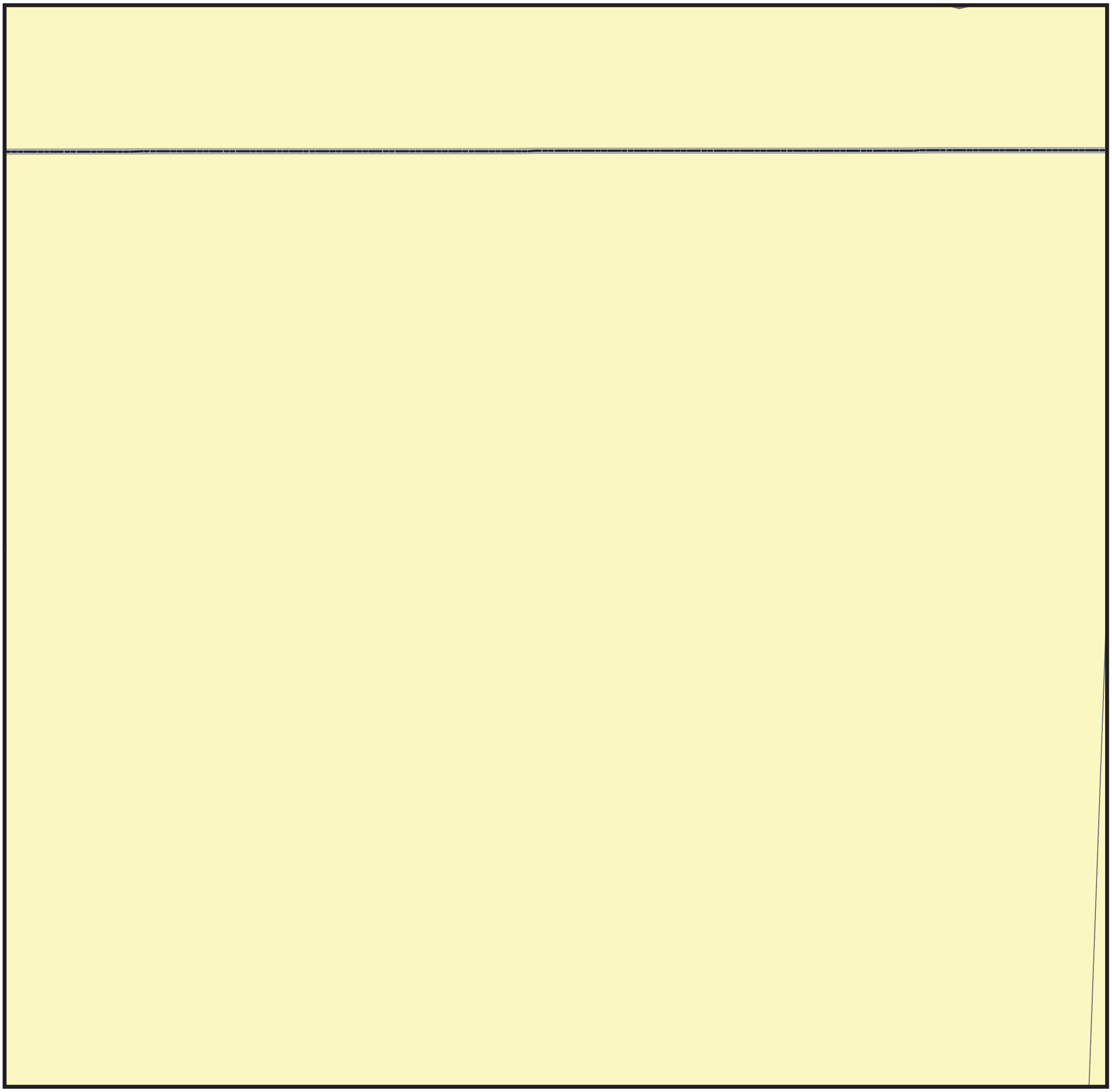
N W E S

Sheet 16 of 56

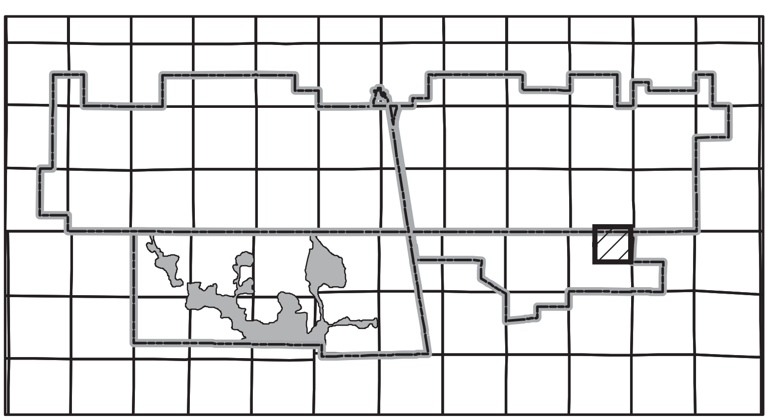
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

MITIGATION CATEGORIES



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Sheet 17 of 56

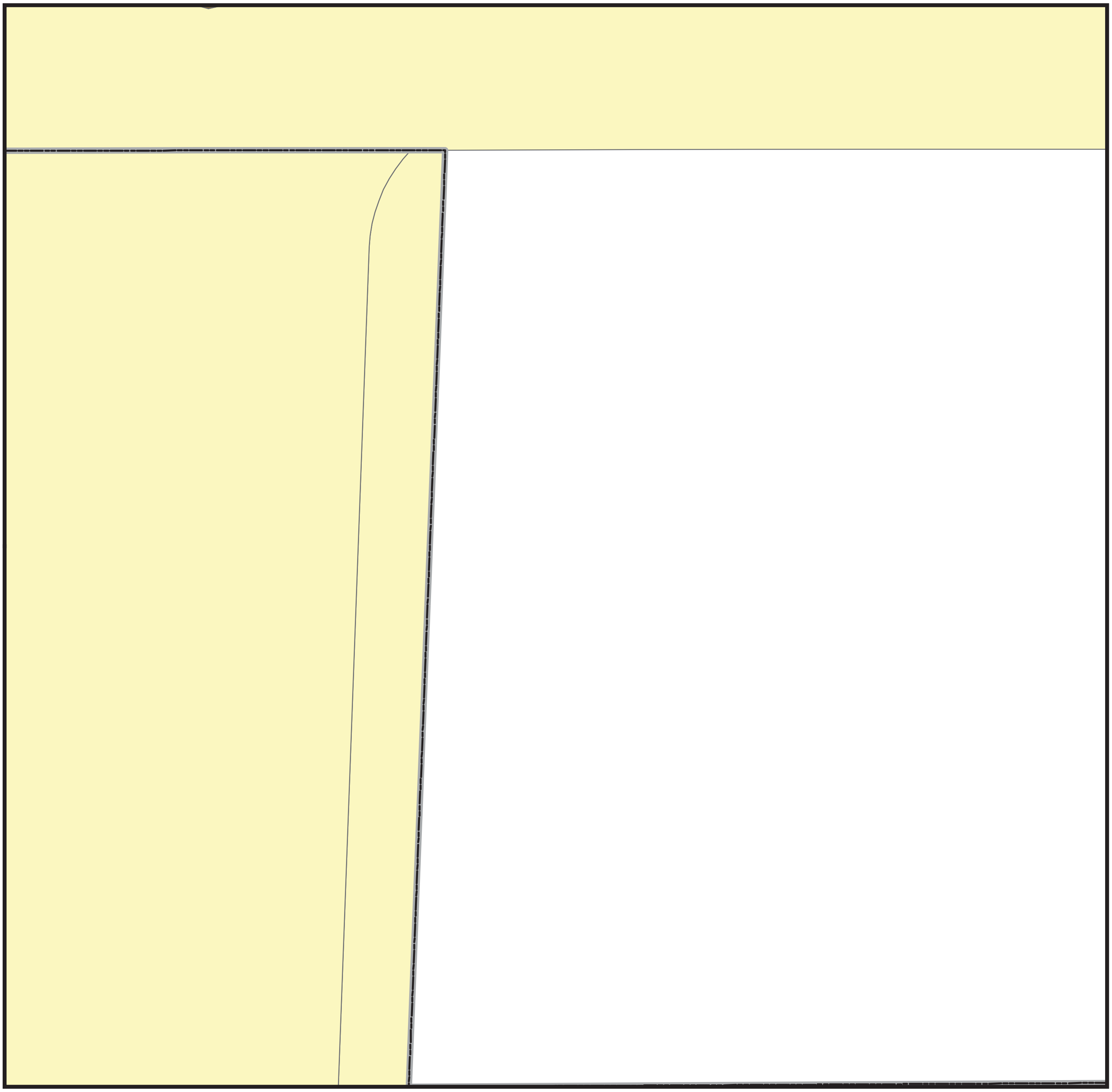
Mosaic

SOUTH PASTURE EXTENSION

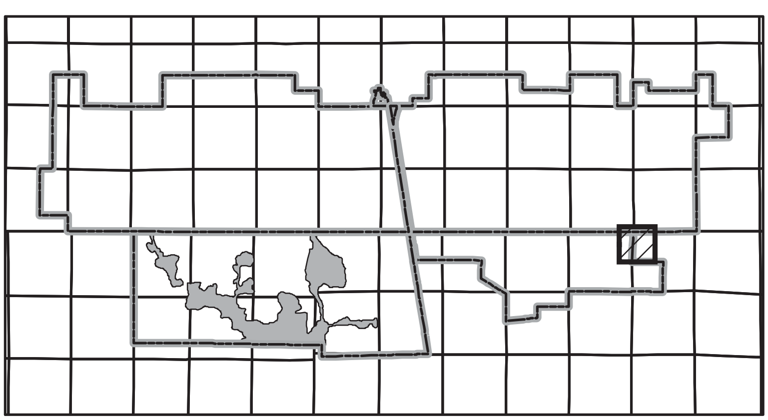
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

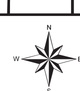
P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

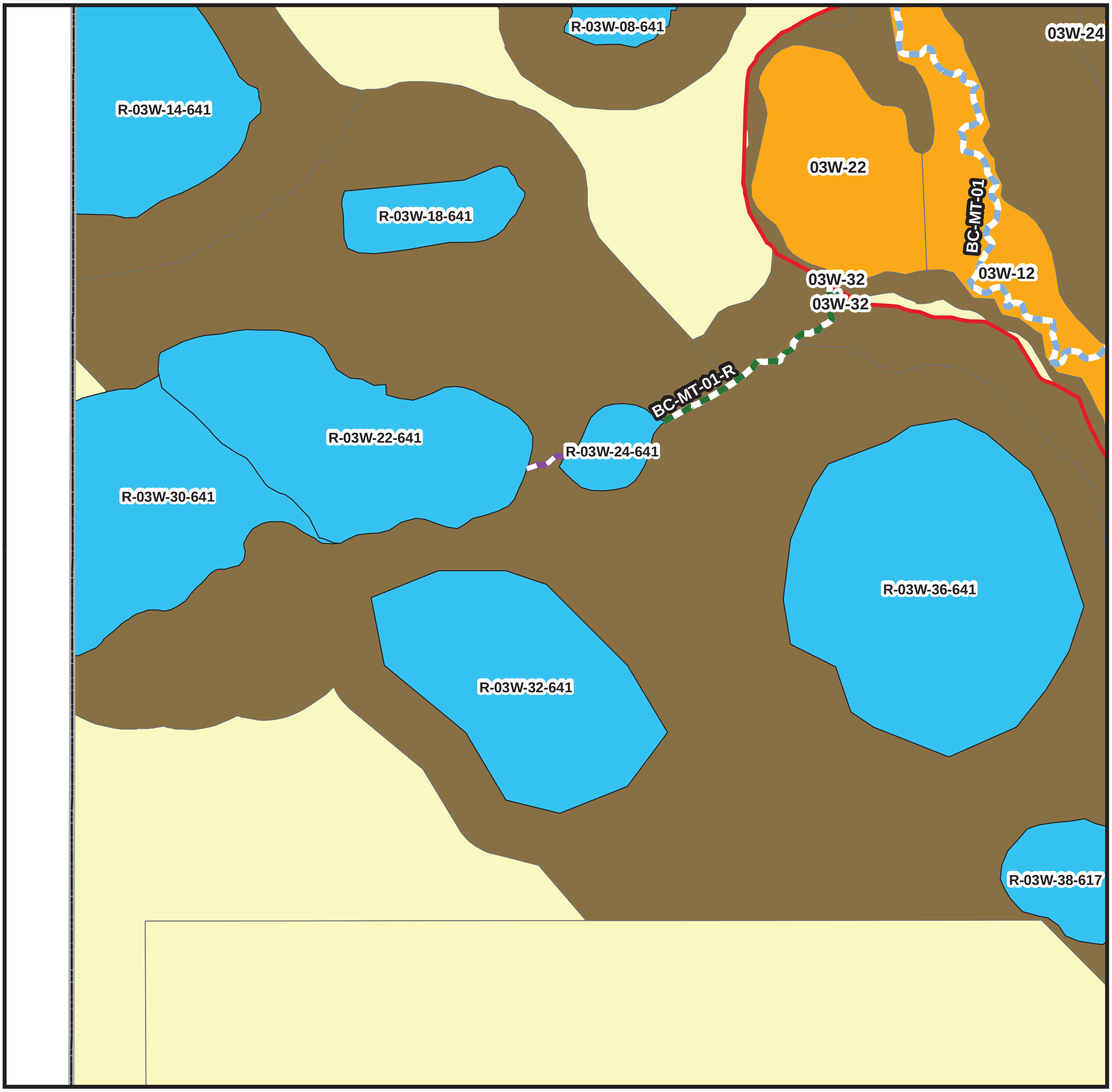


Mosaic

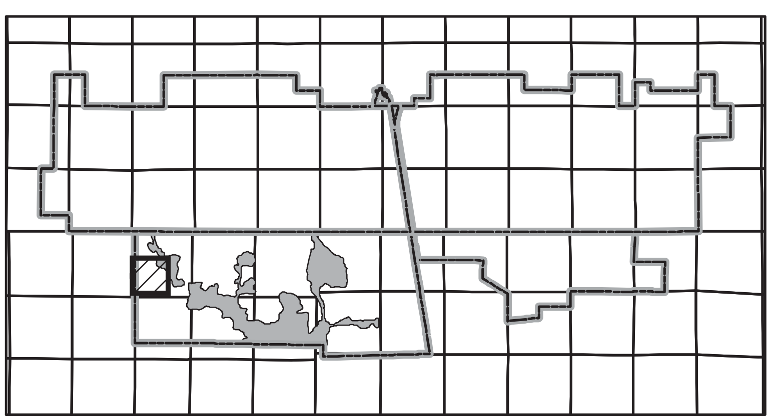
SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

Sheet 18 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



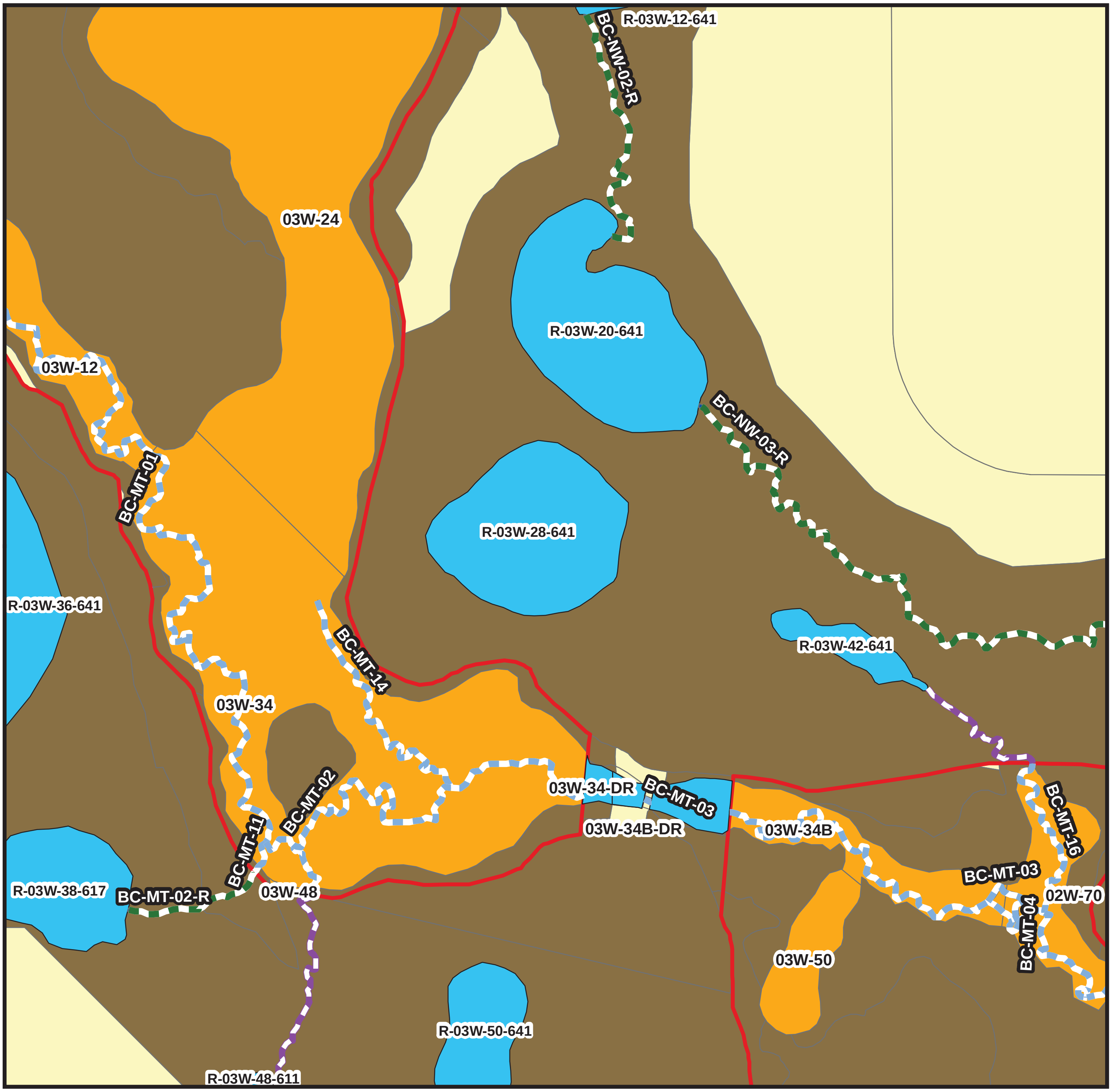
0 100 200 400 Feet
1 in = 400 feet

Sheet 19 of 56

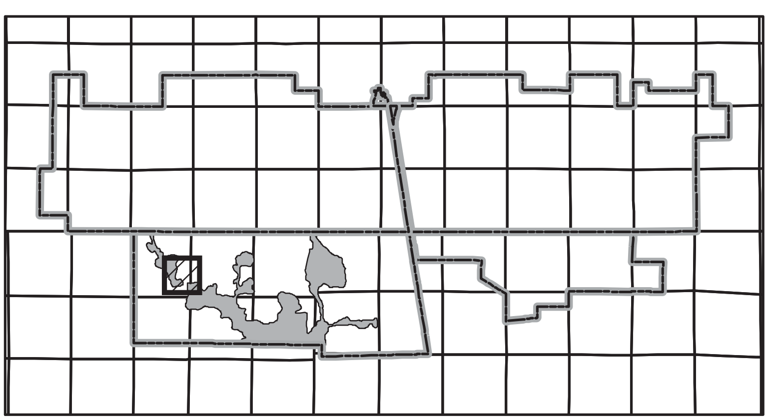
Mosaic

SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Mosaic

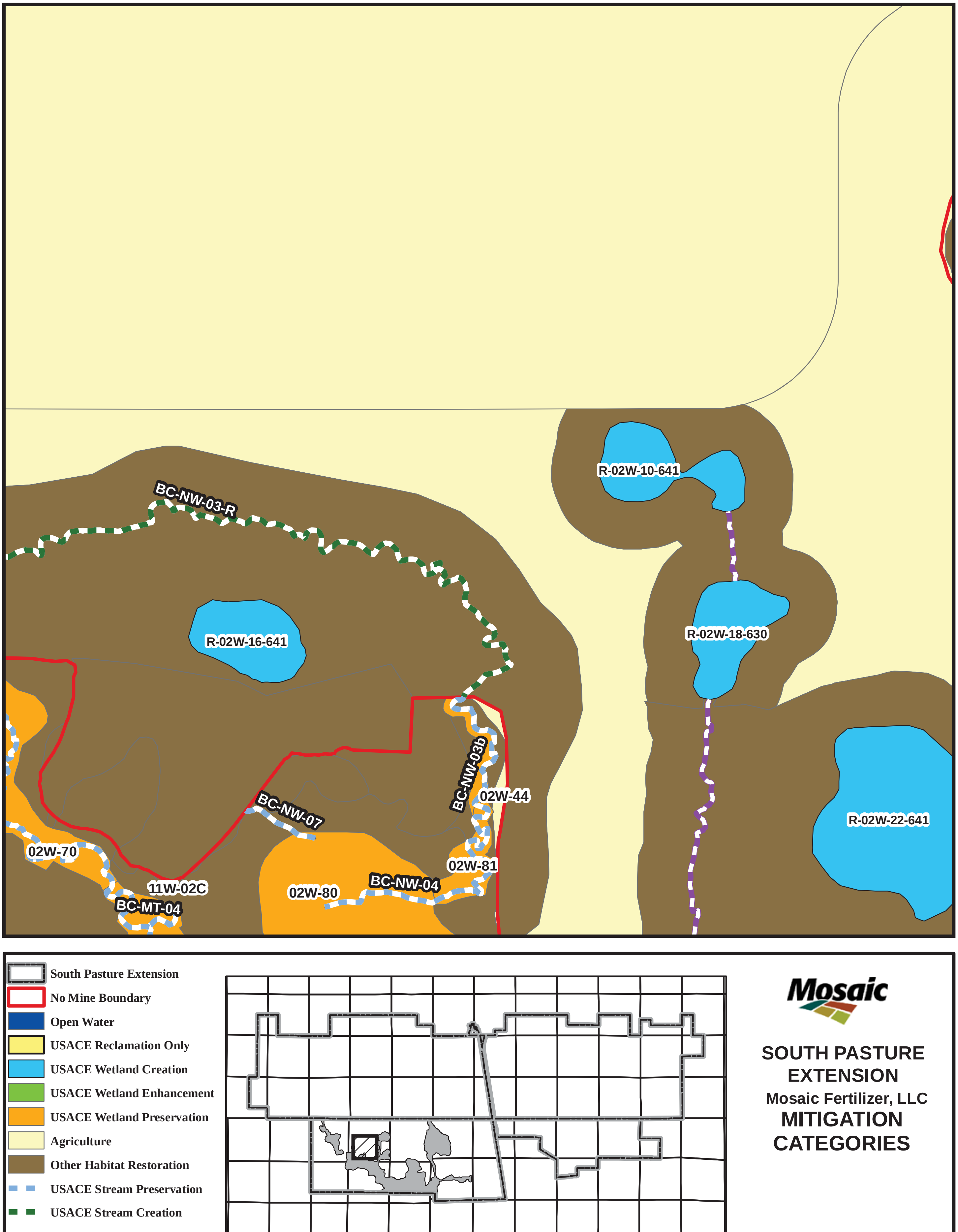
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

Sheet 20 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



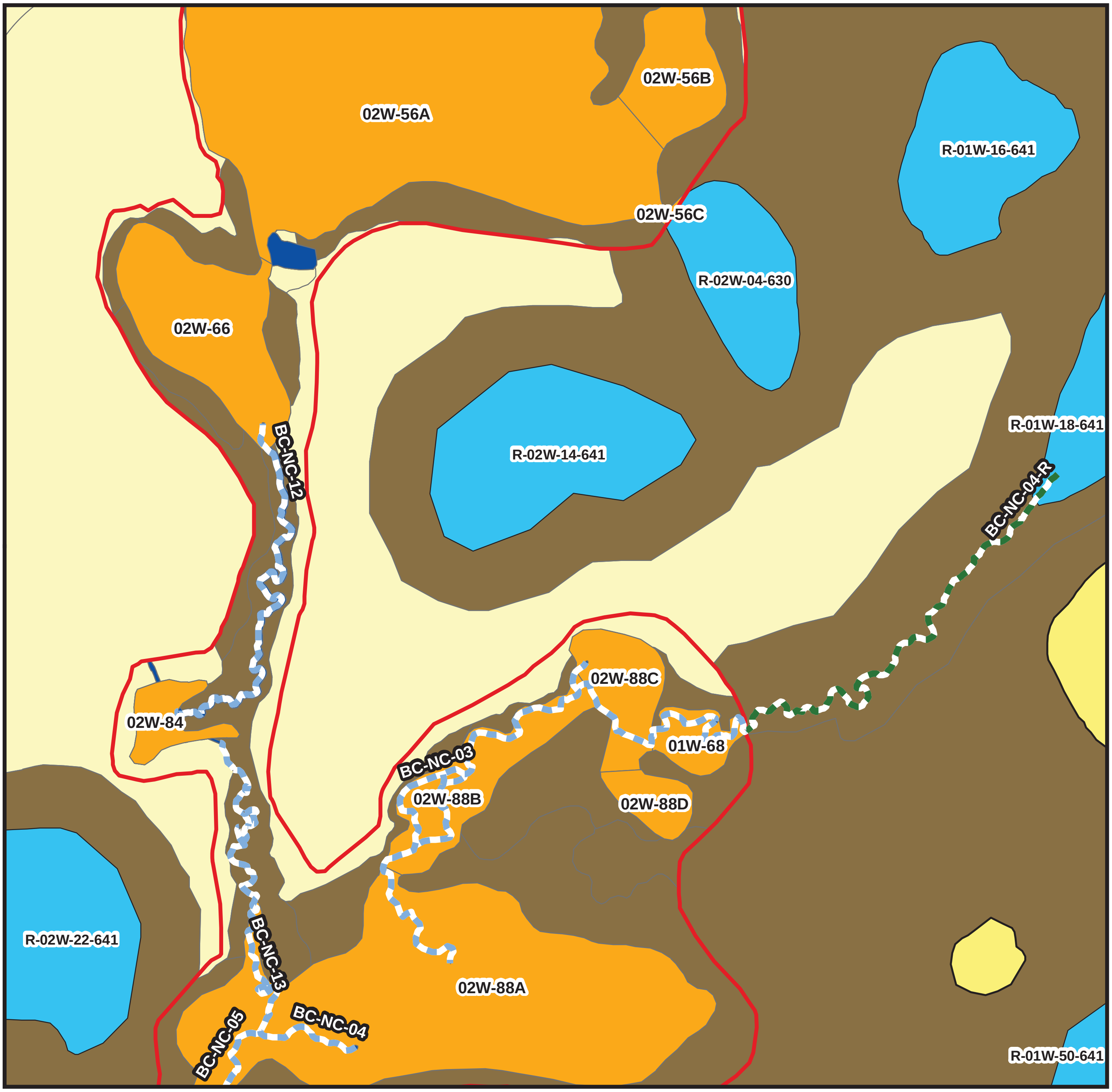
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

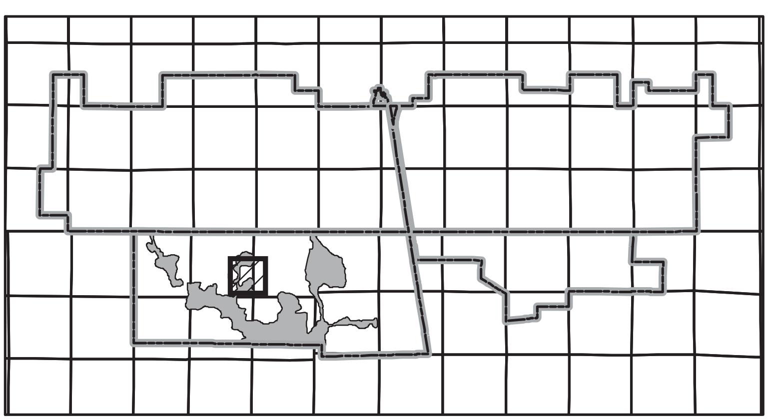
MITIGATION CATEGORIES

Sheet 21 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



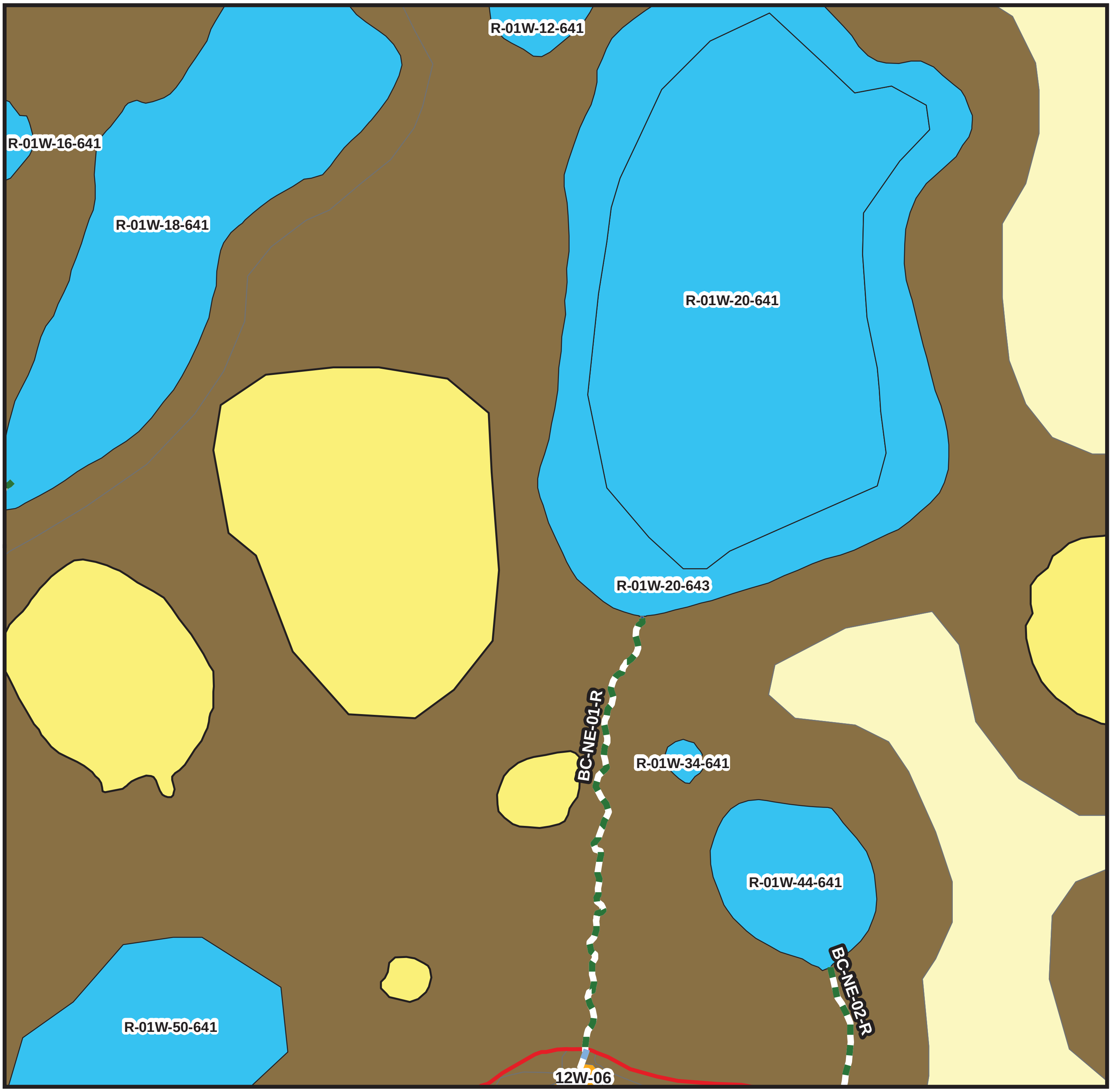
0 100 200 400
Feet
1 in = 400 feet

Sheet 22 of 56

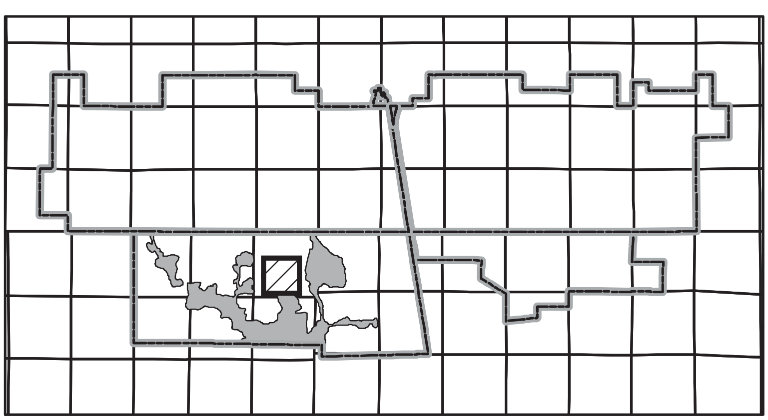
Mosaic

SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Mosaic

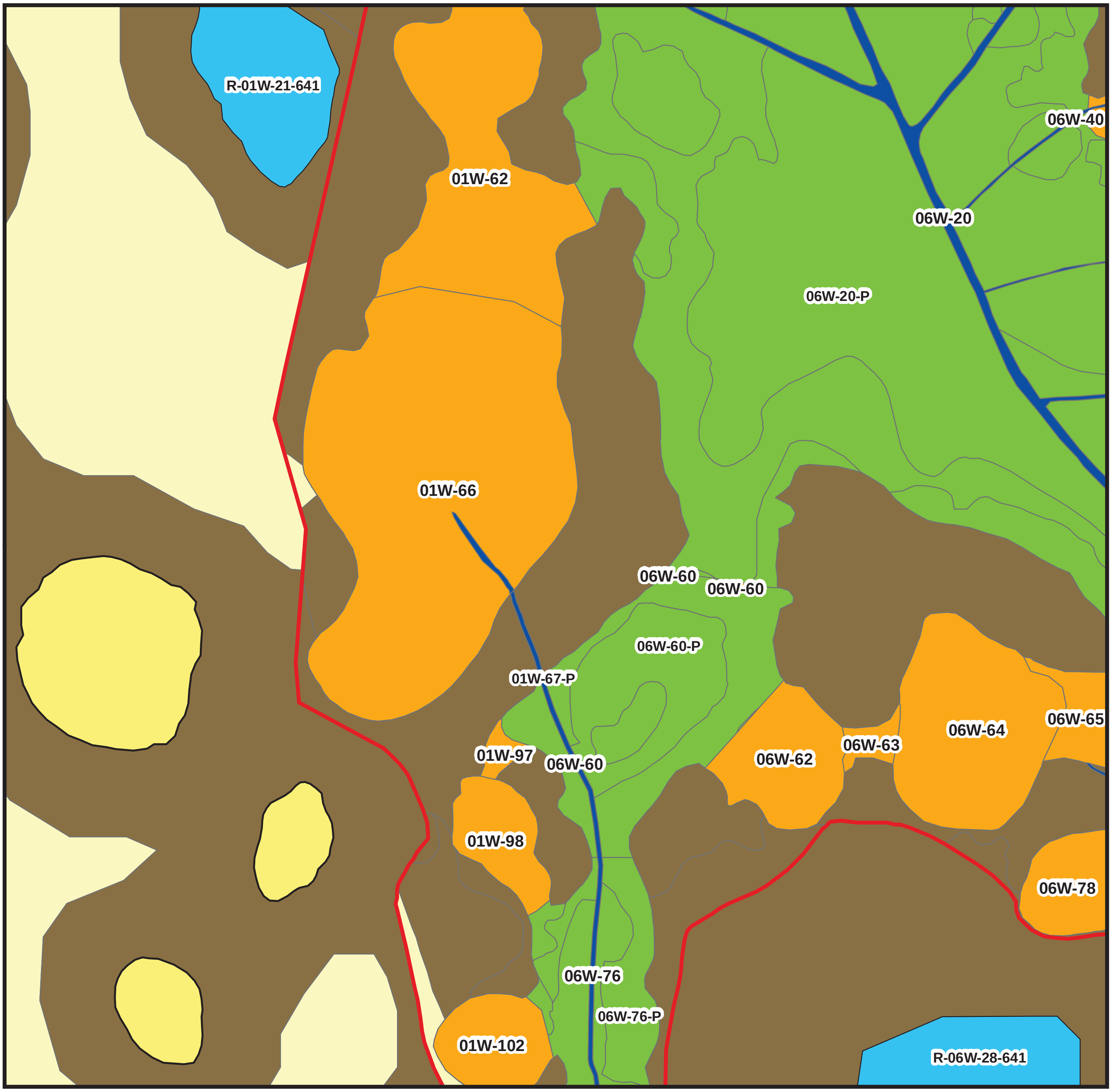
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

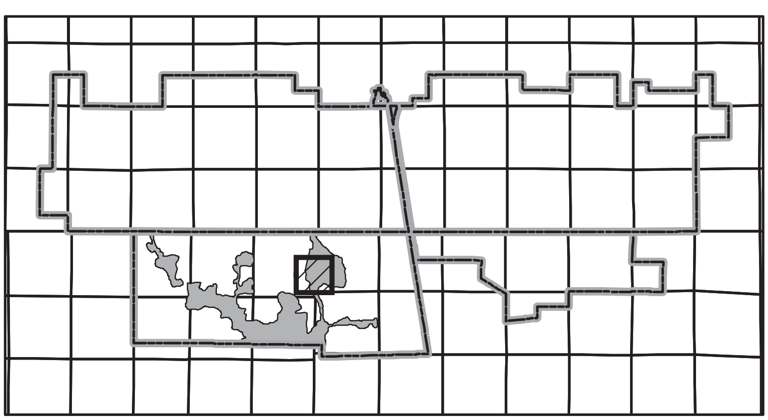
MITIGATION CATEGORIES

Sheet 23 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



Mosaic

SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

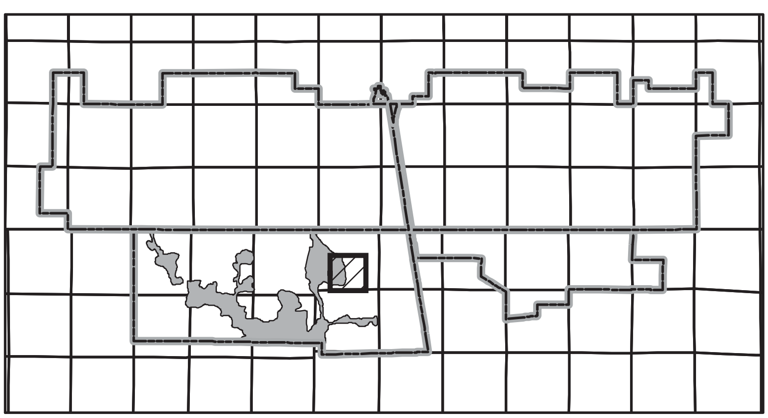
0 100 200 400 Feet

1 in = 400 feet

N W E S

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400

South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

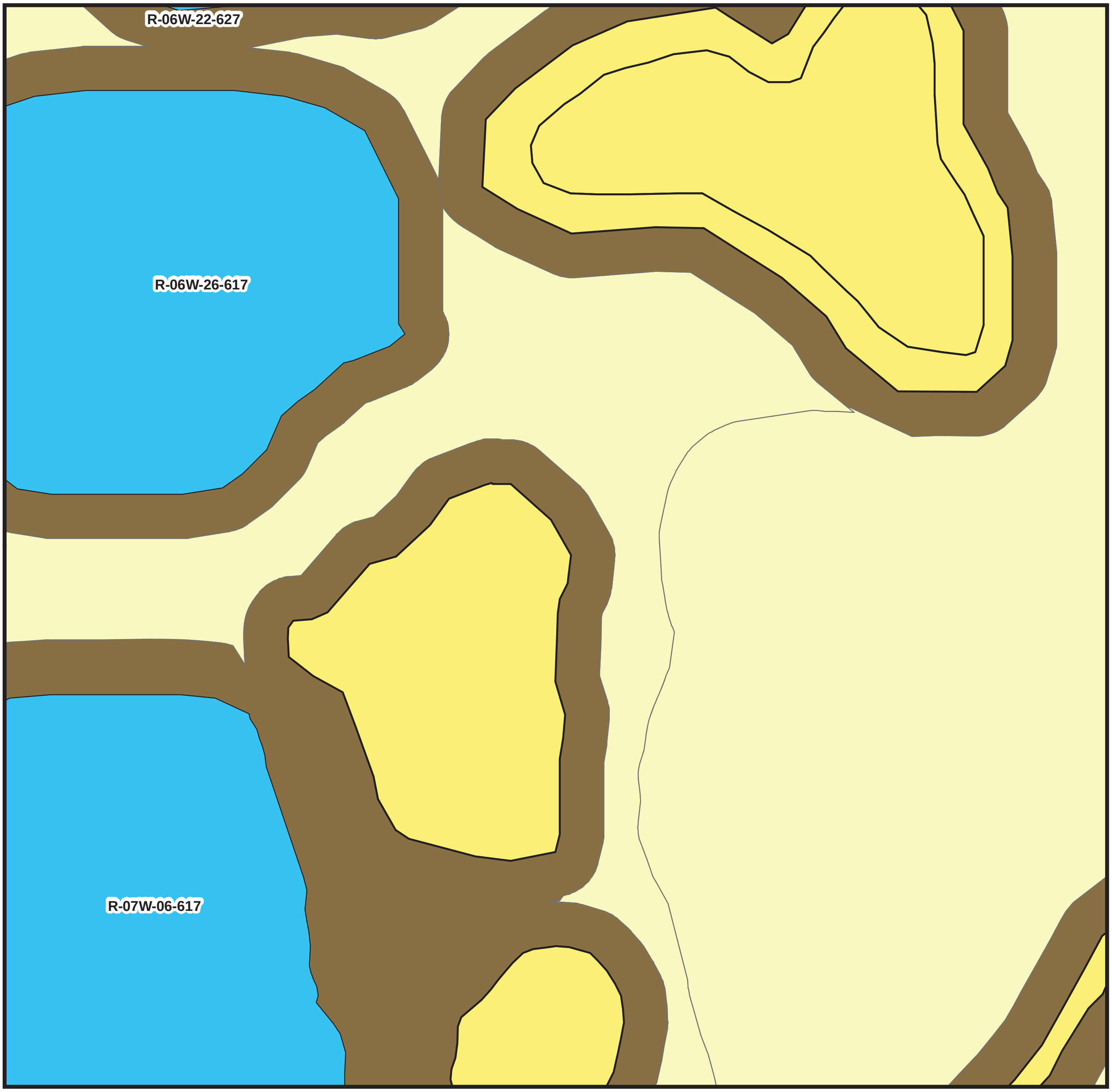
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

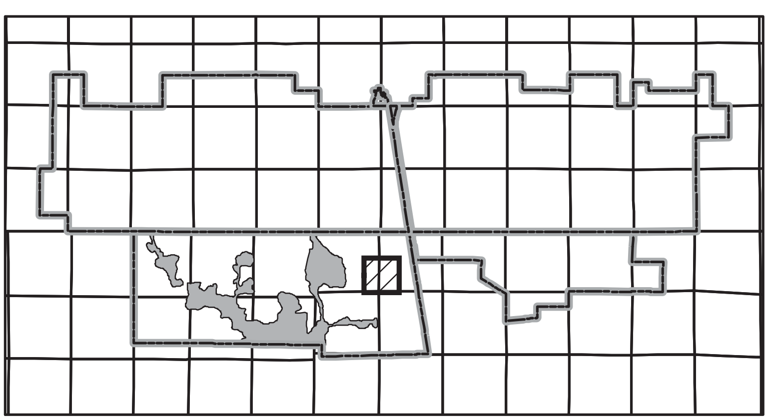
MITIGATION CATEGORIES

Sheet 25 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

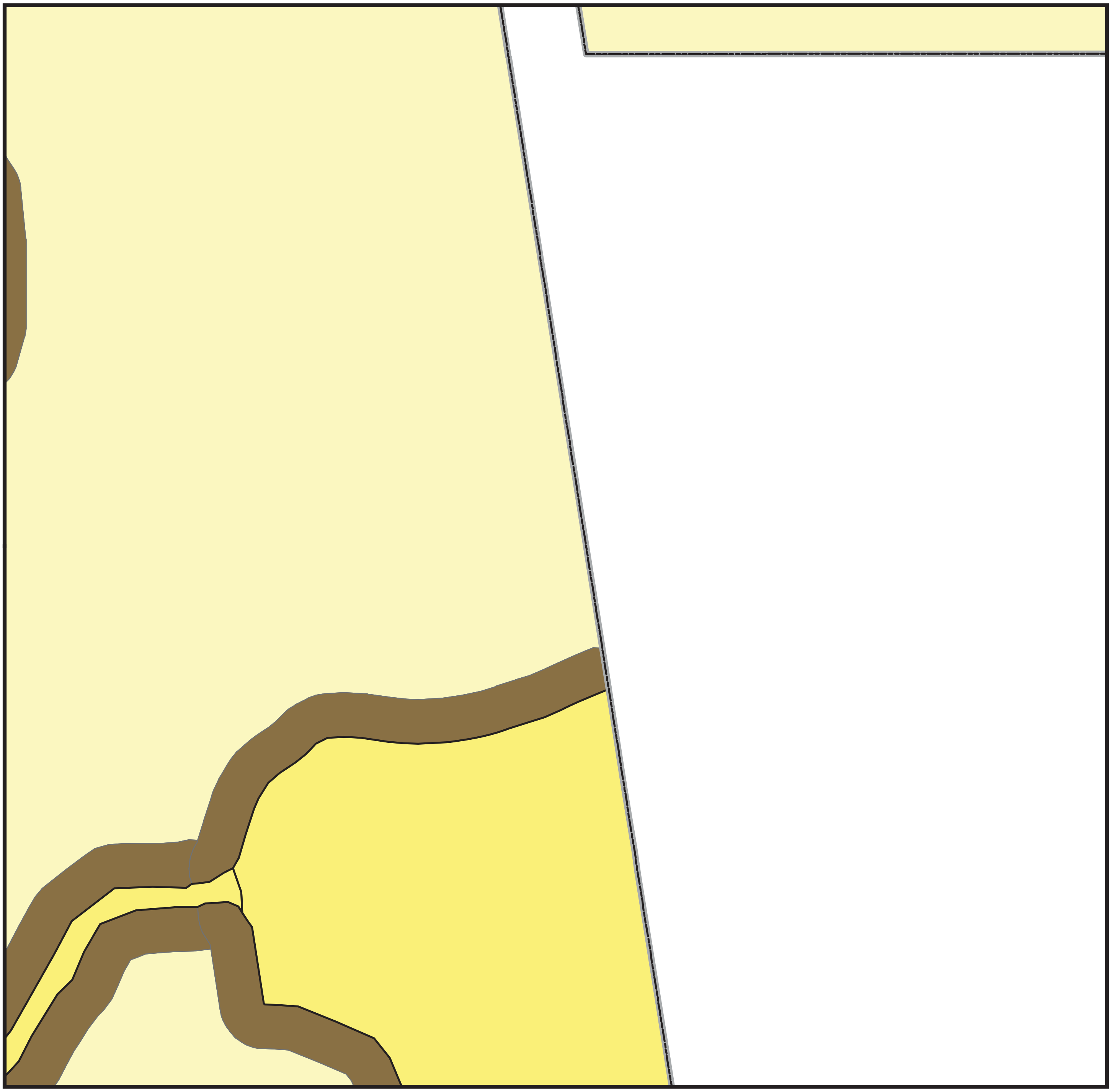
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

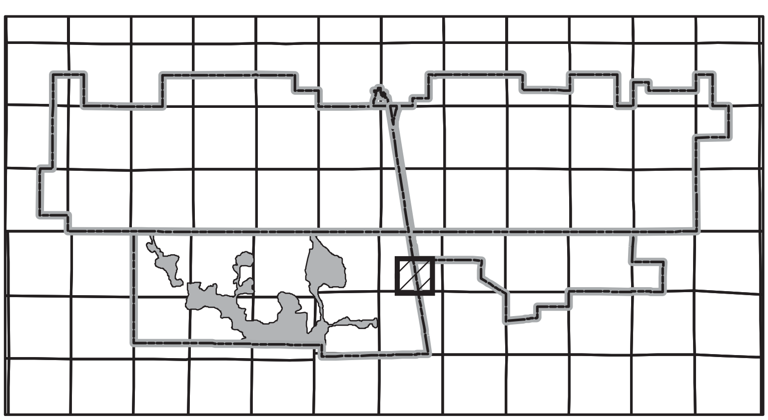
MITIGATION CATEGORIES

Sheet 26 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



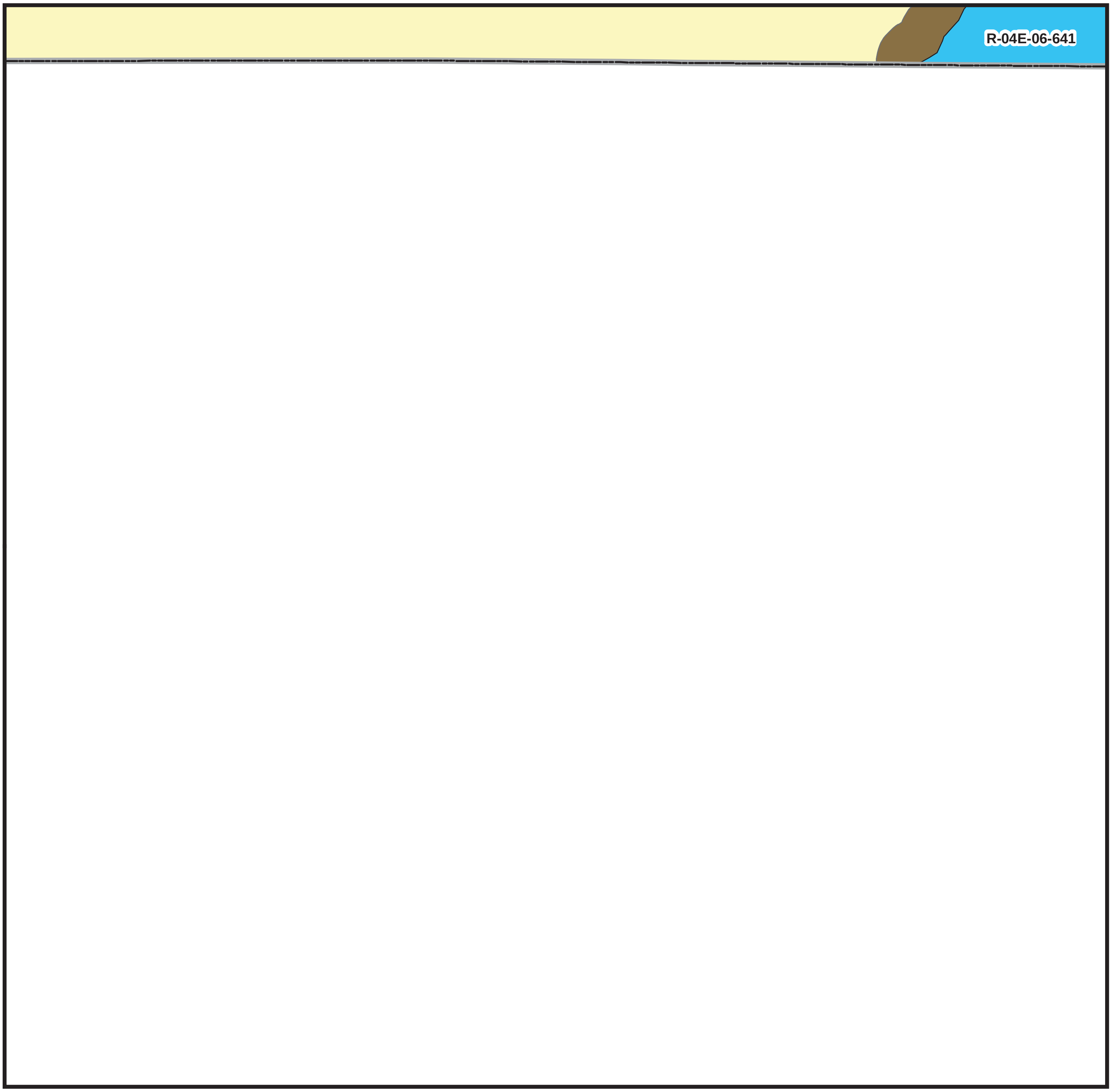
0 100 200 400 Feet
1 in = 400 feet

Sheet 27 of 56

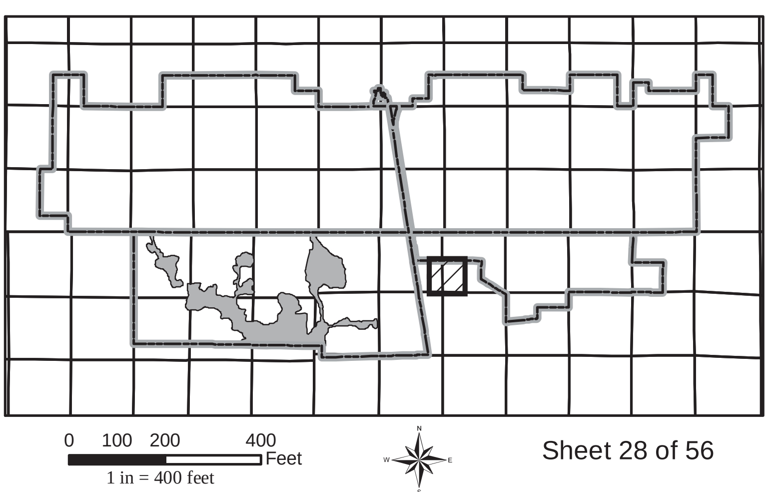
Mosaic

SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



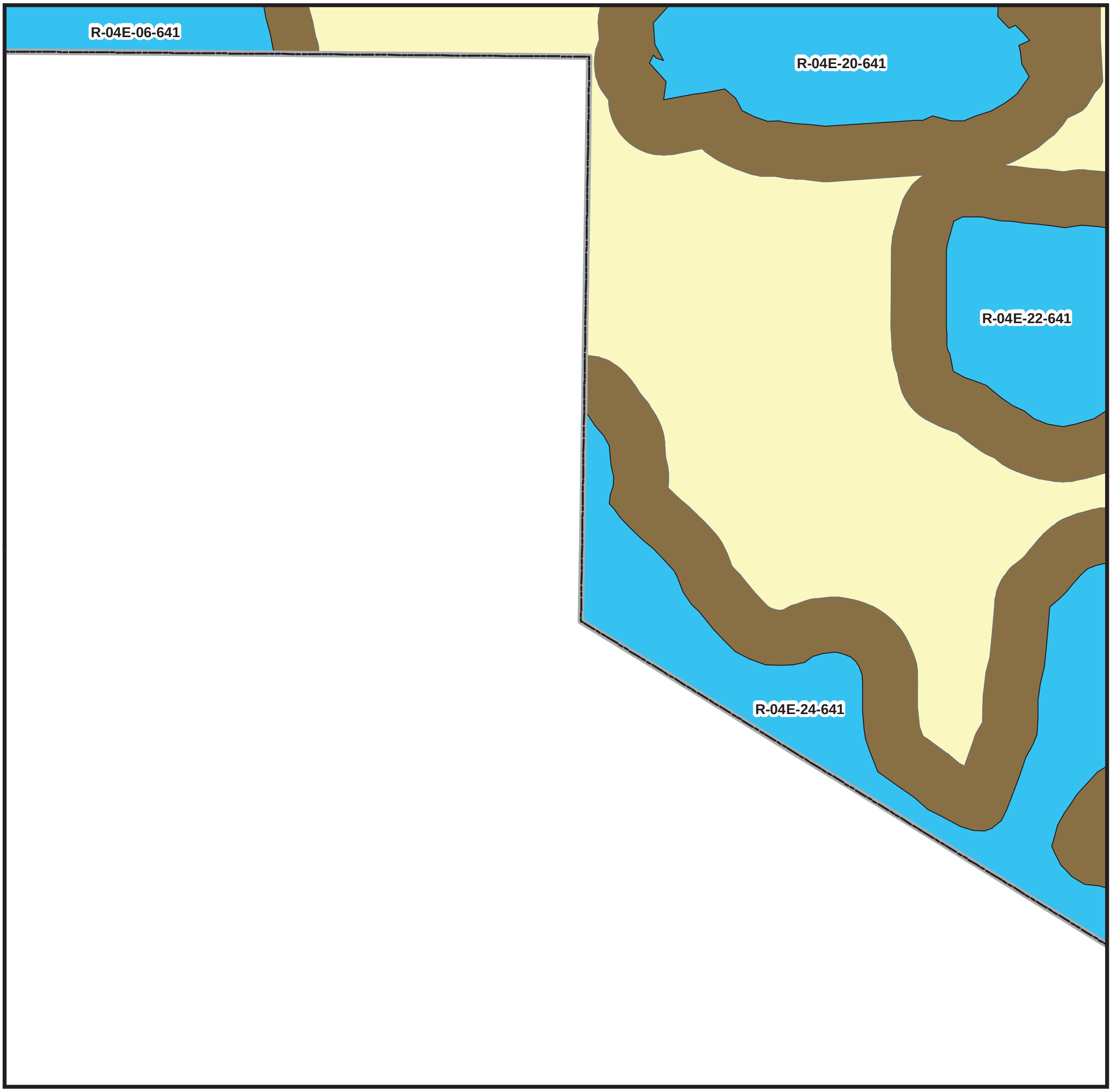
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

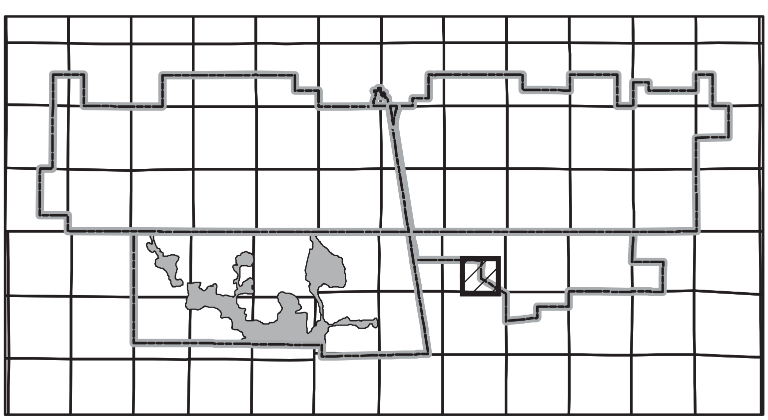
MITIGATION CATEGORIES

Sheet 28 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

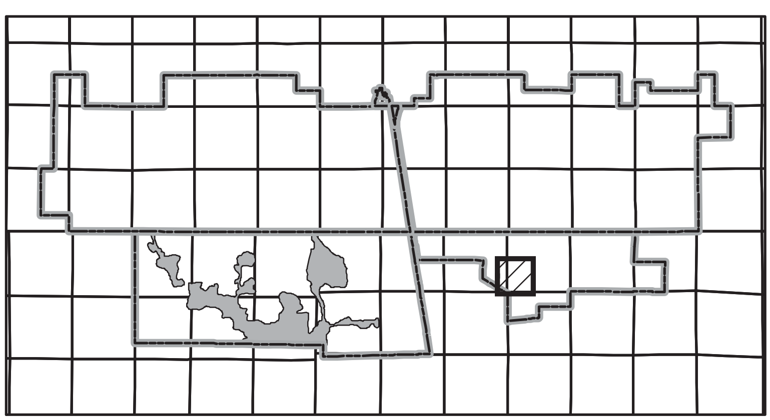
Mosaic

SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

Sheet 29 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400

South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Sheet 30 of 56

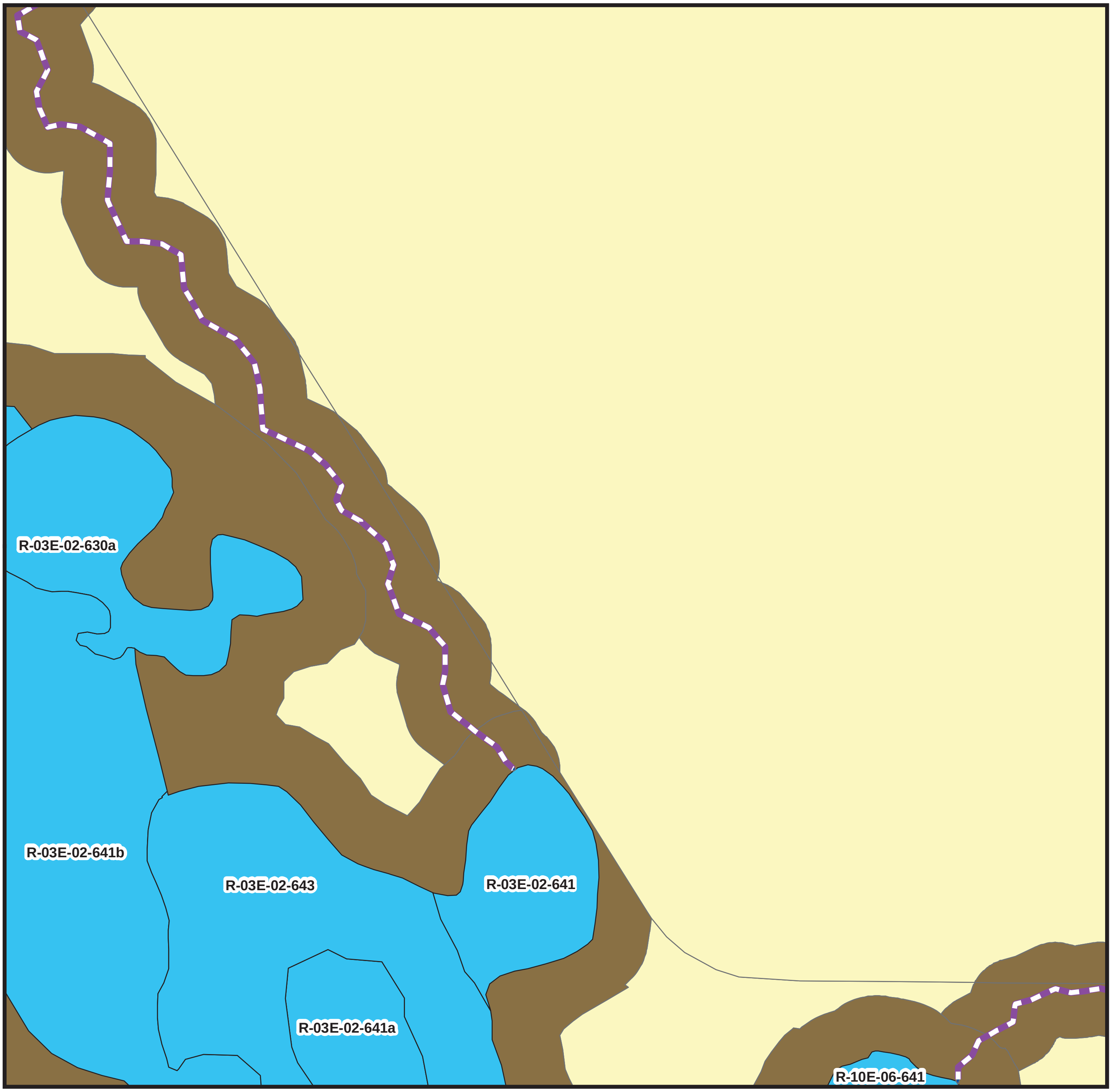
Mosaic

SOUTH PASTURE EXTENSION

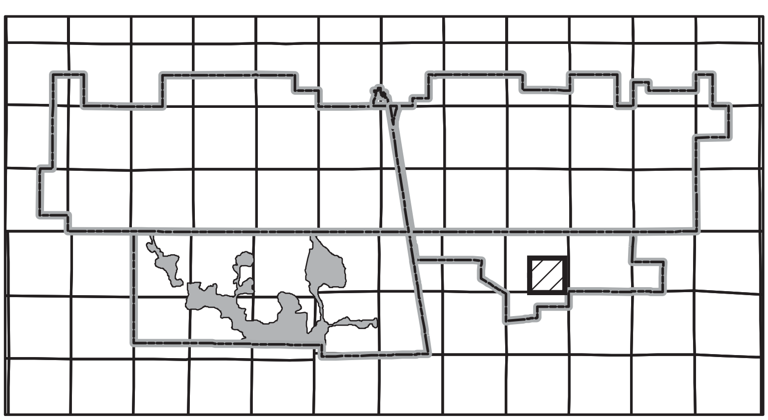
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Mosaic

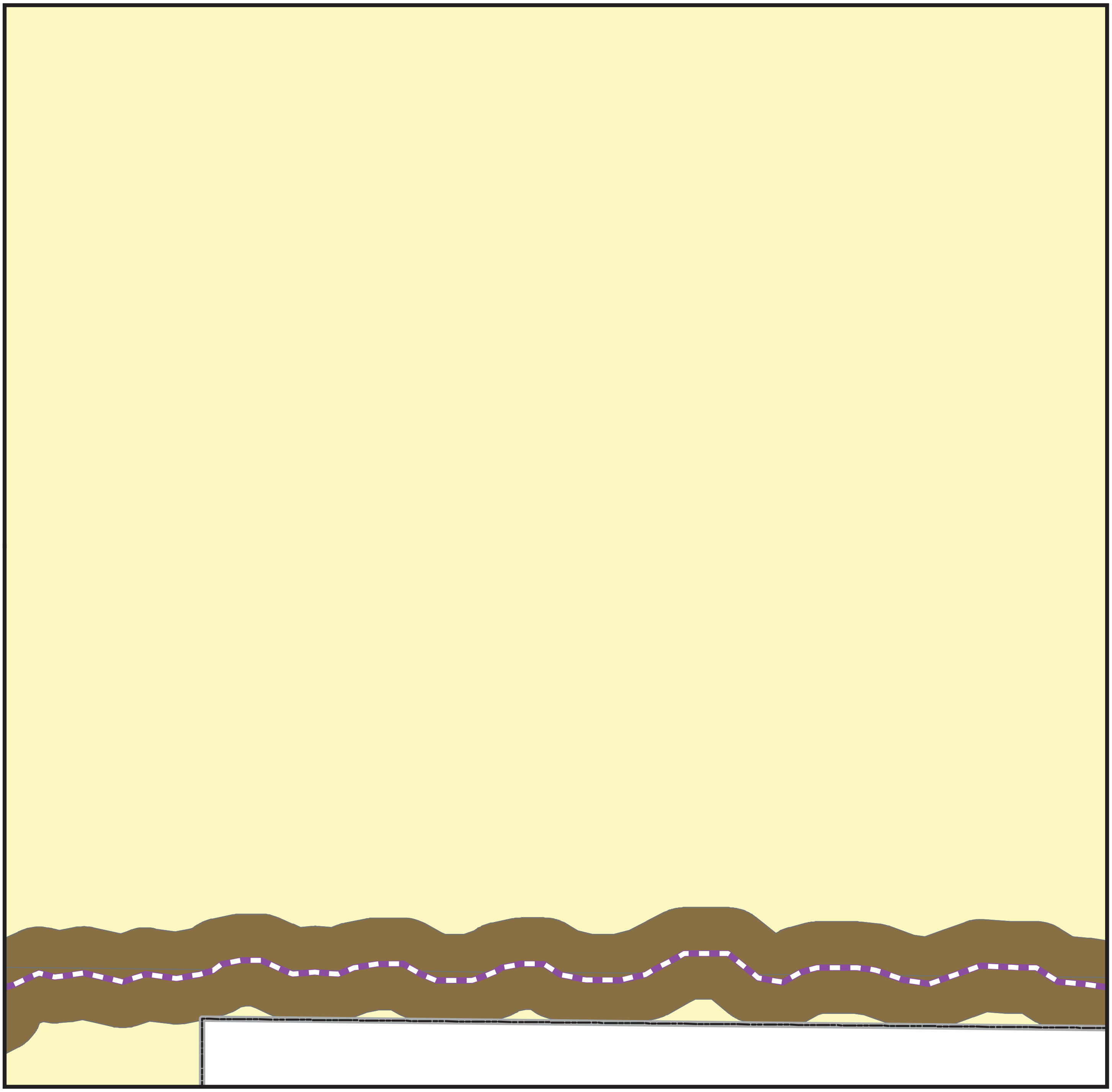
SOUTH PASTURE EXTENSION

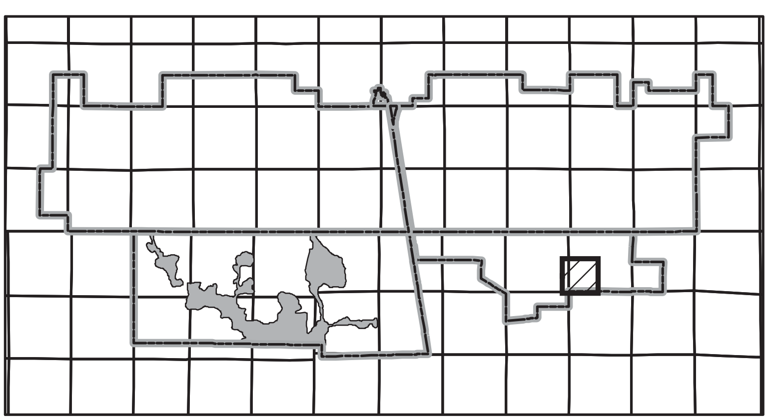
Mosaic Fertilizer, LLC

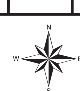
MITIGATION CATEGORIES

Sheet 31 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400







South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation

Mosaic

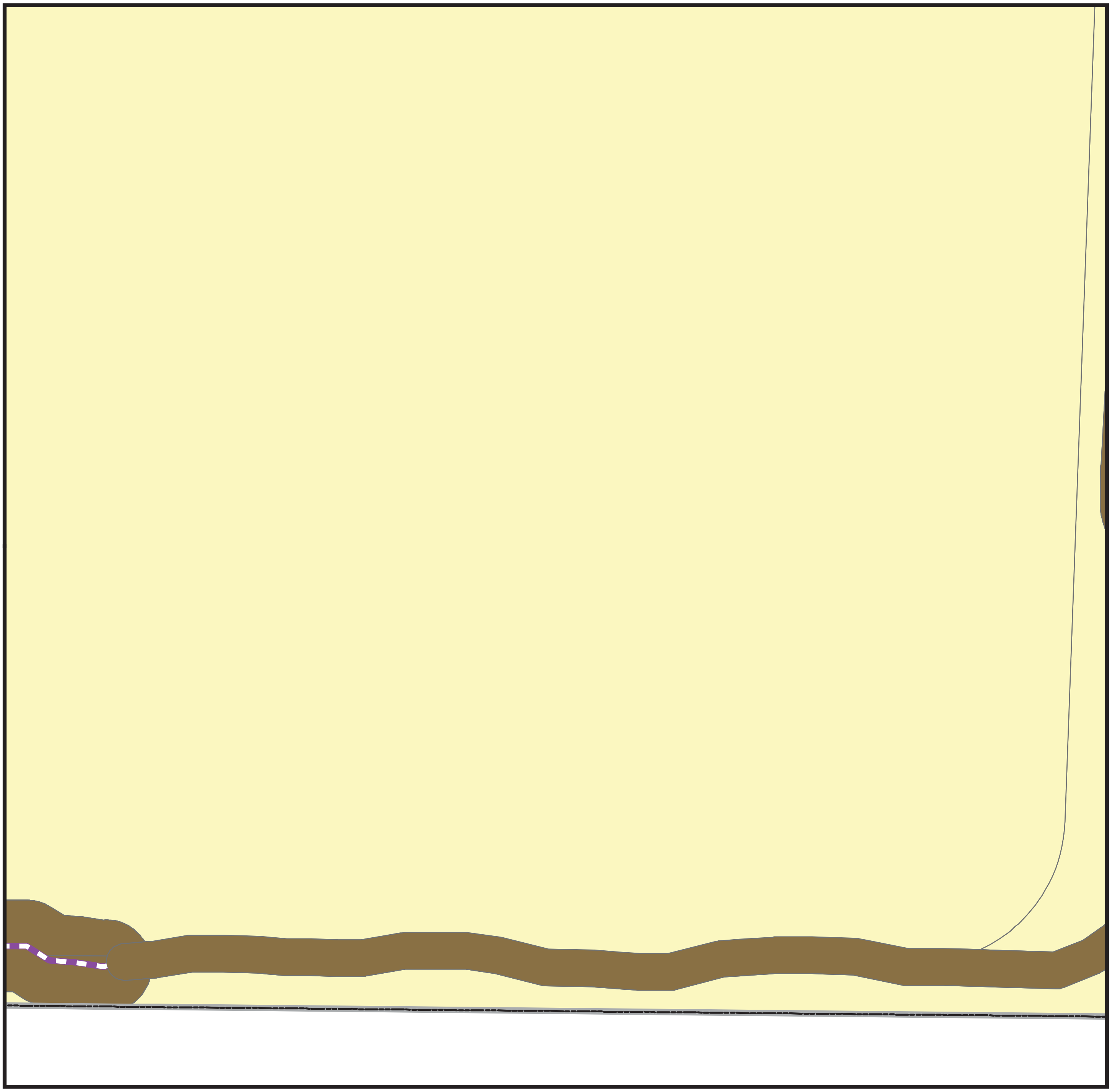
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

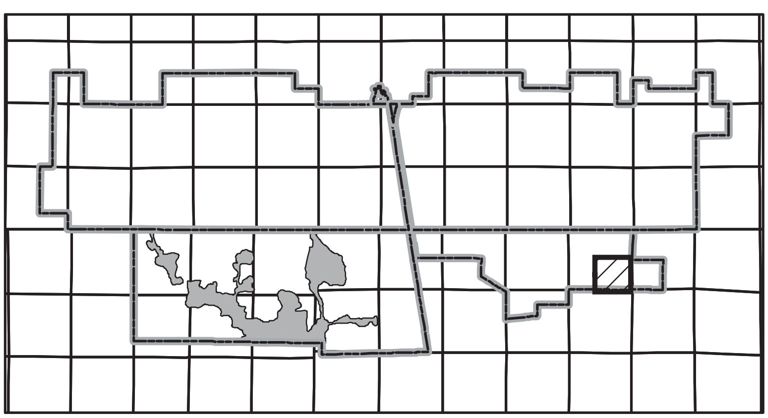
MITIGATION CATEGORIES

Sheet 32 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

Mosaic

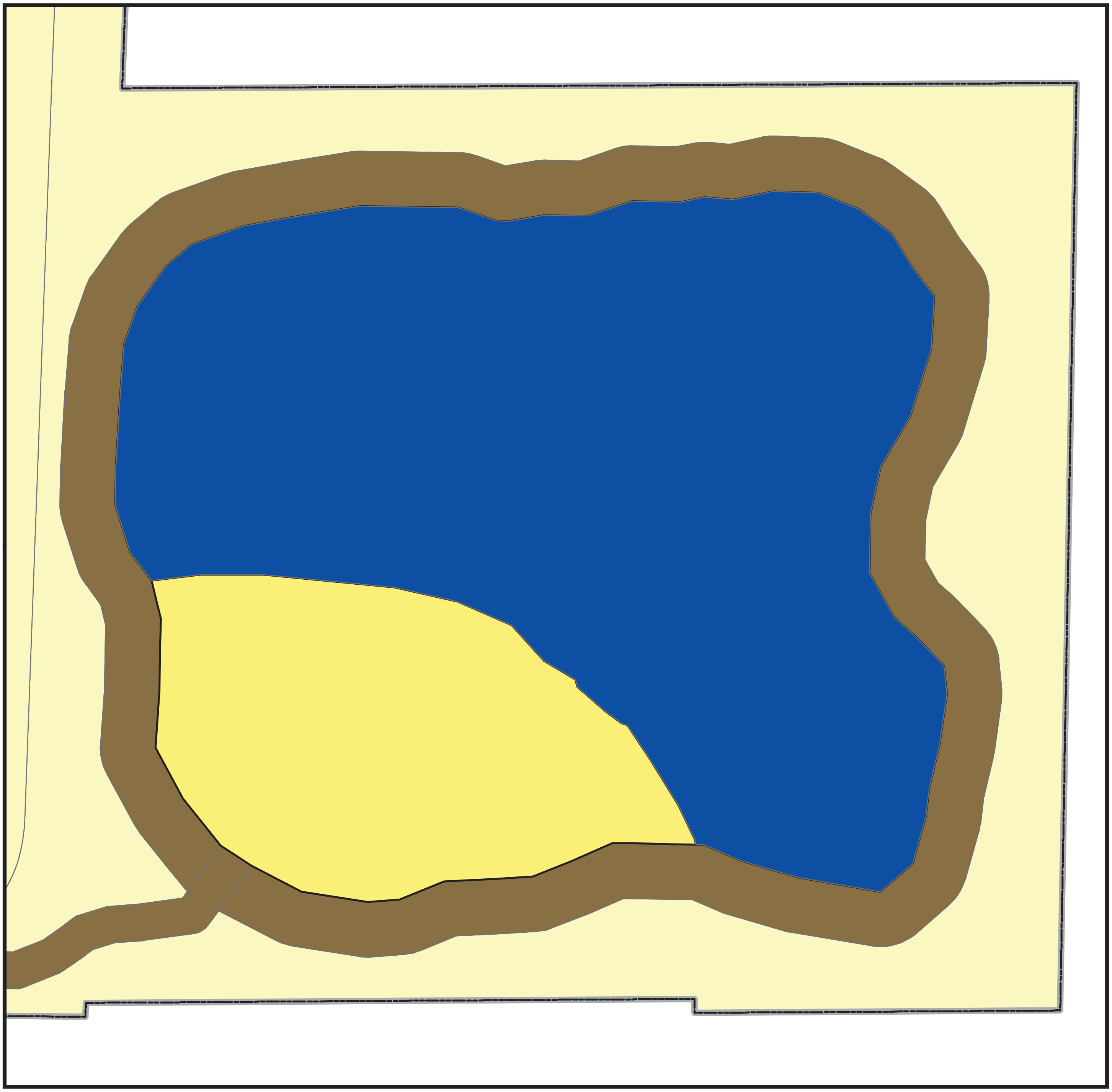
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

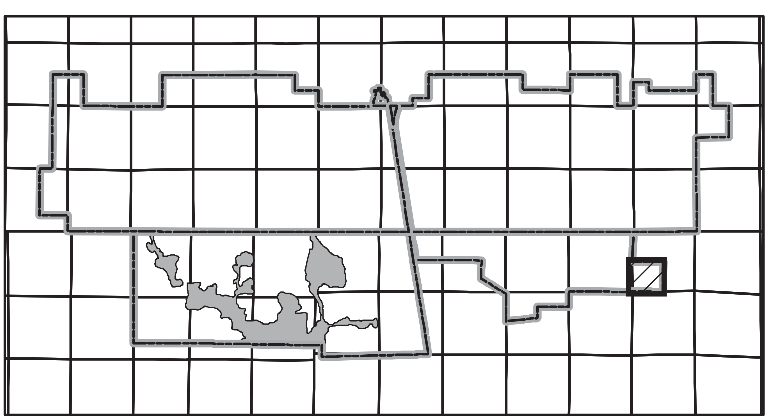
MITIGATION CATEGORIES

Sheet 33 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

Mosaic

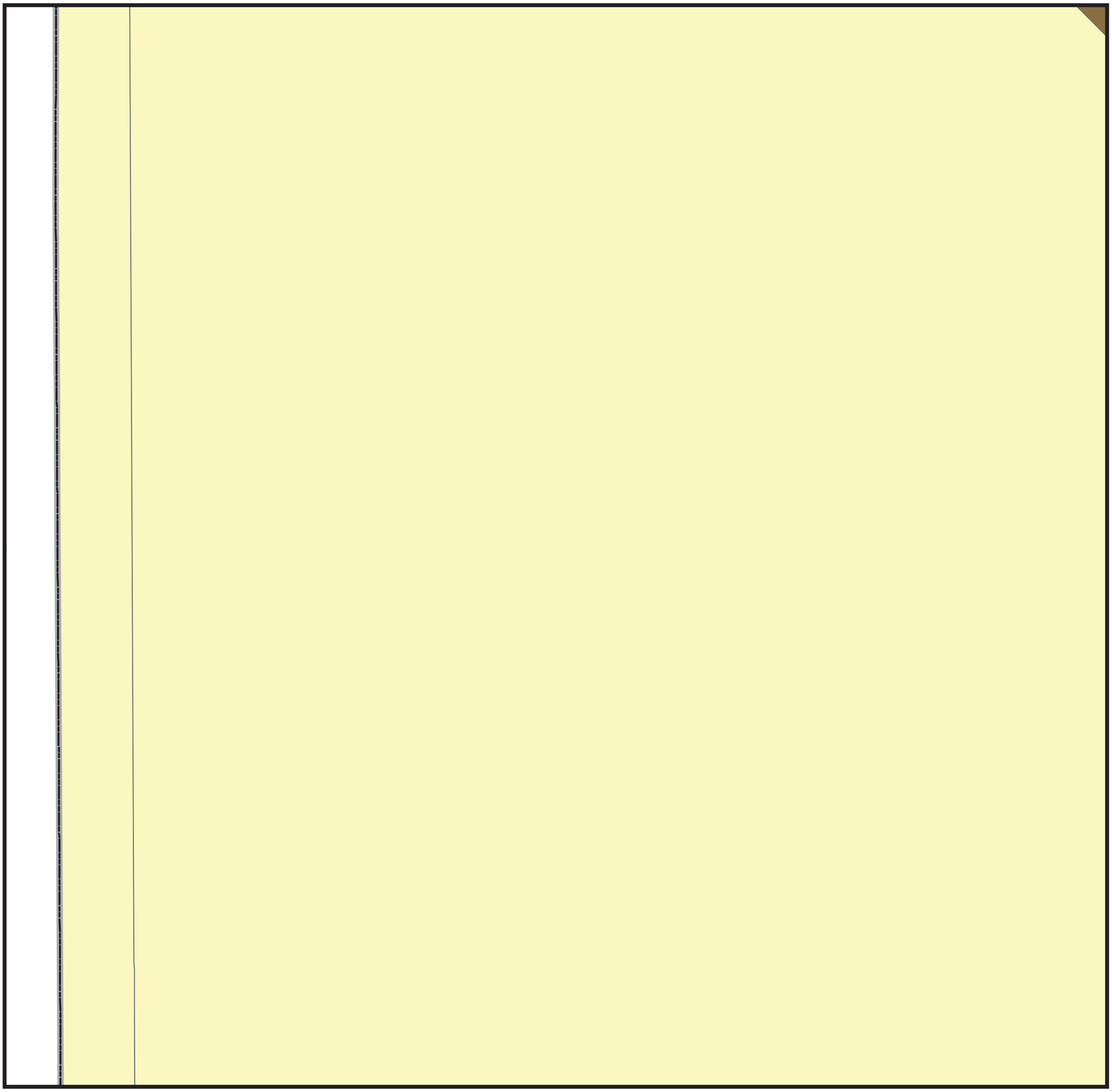
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

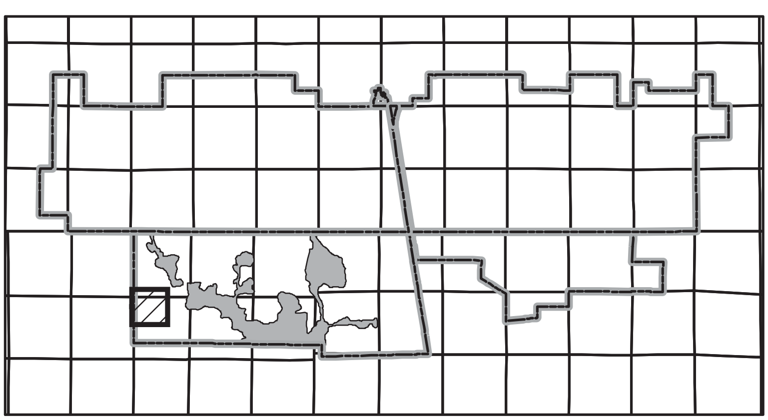
MITIGATION CATEGORIES

Sheet 34 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

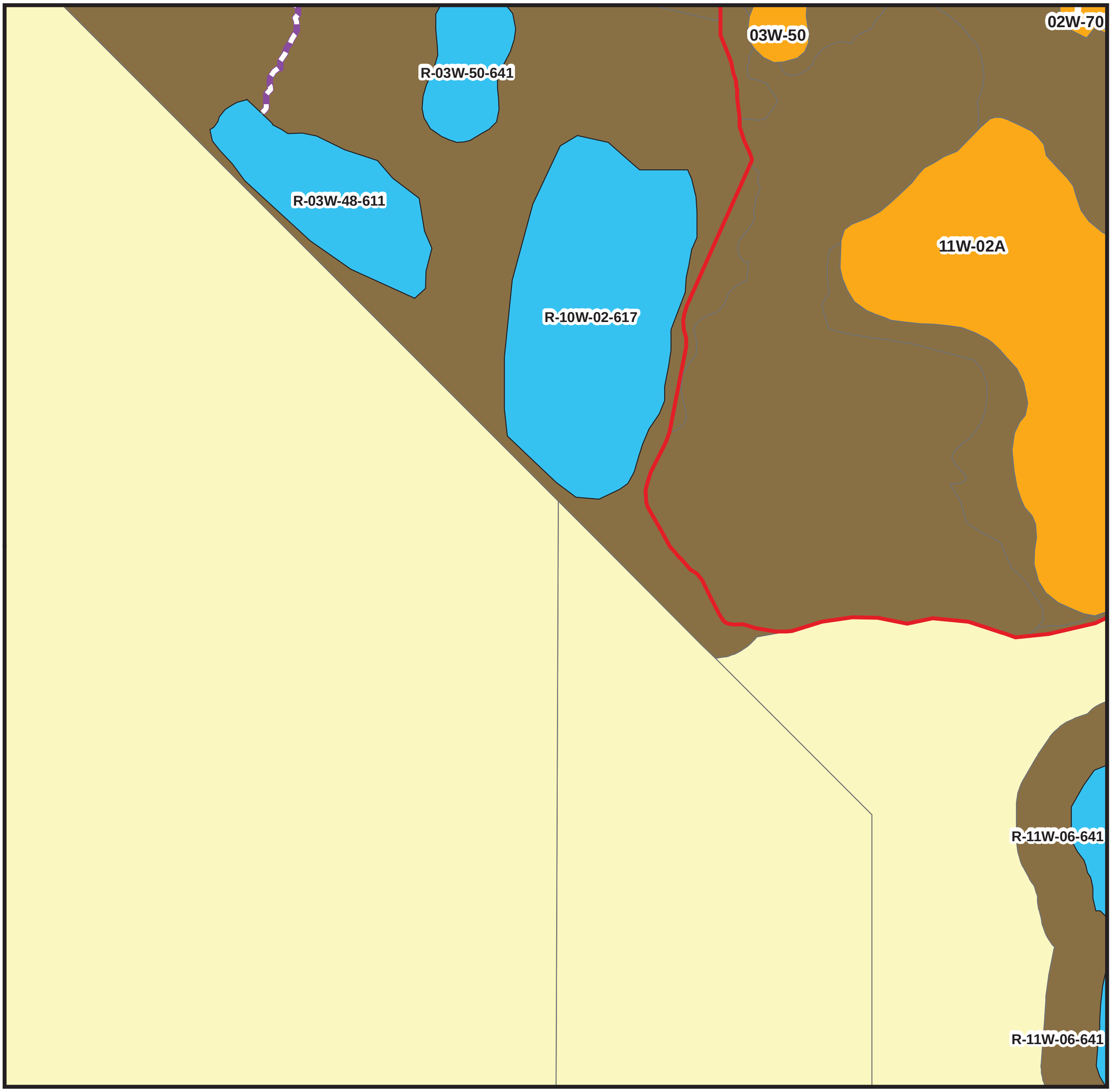
Sheet 35 of 56

SOUTH PASTURE EXTENSION

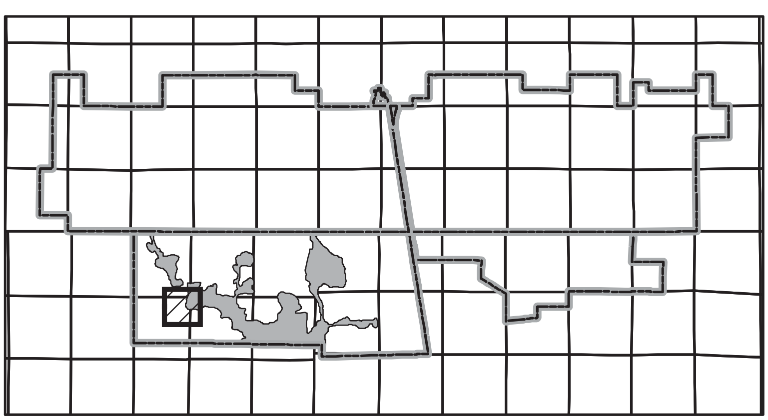
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

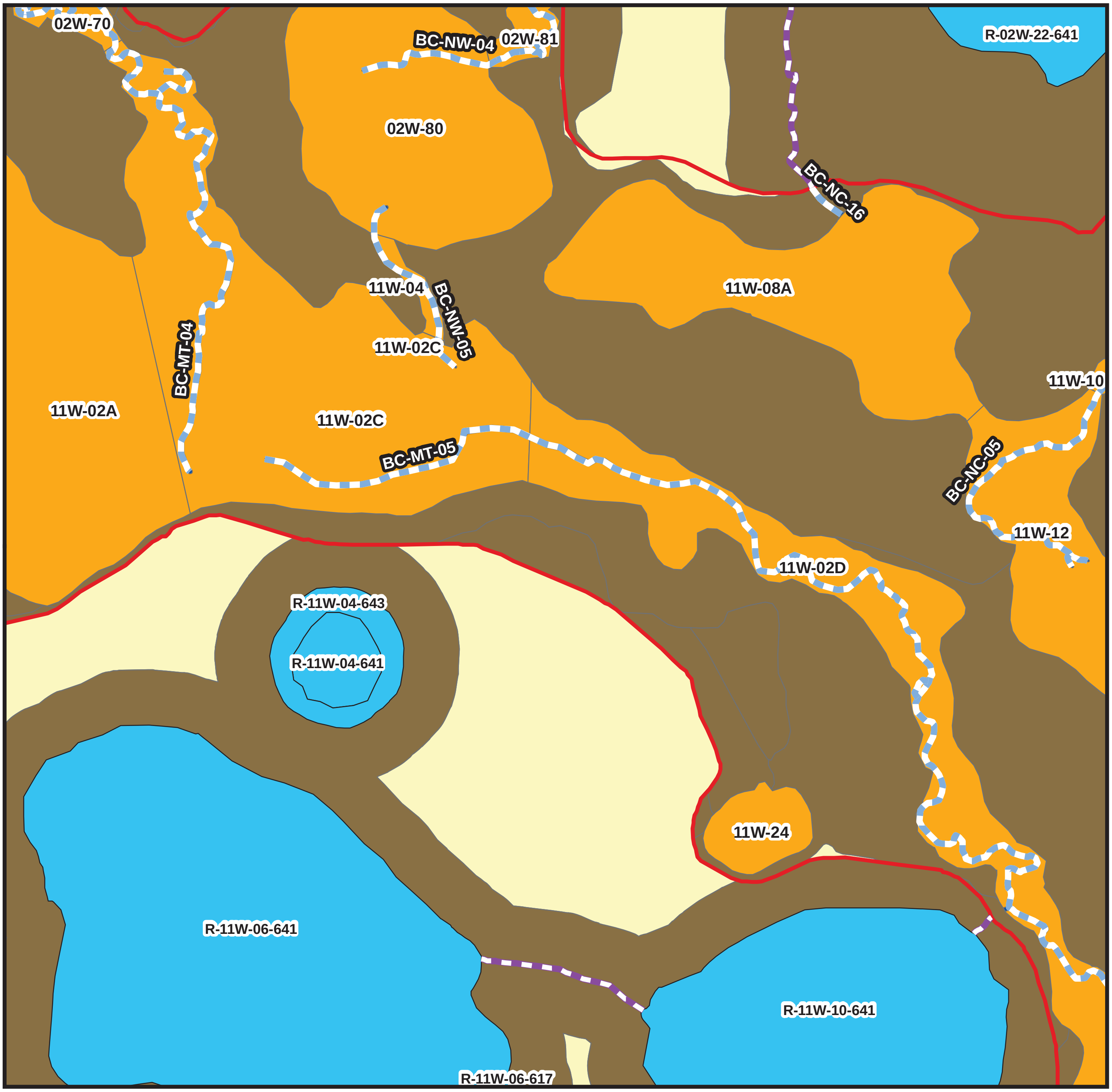
Mosaic

SOUTH PASTURE EXTENSION

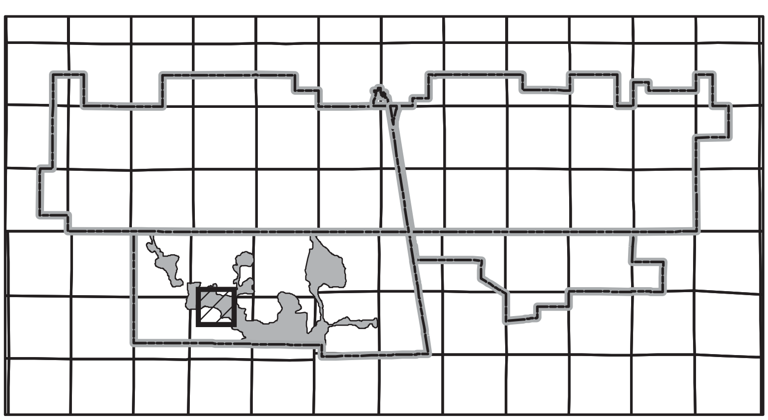
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

Mosaic

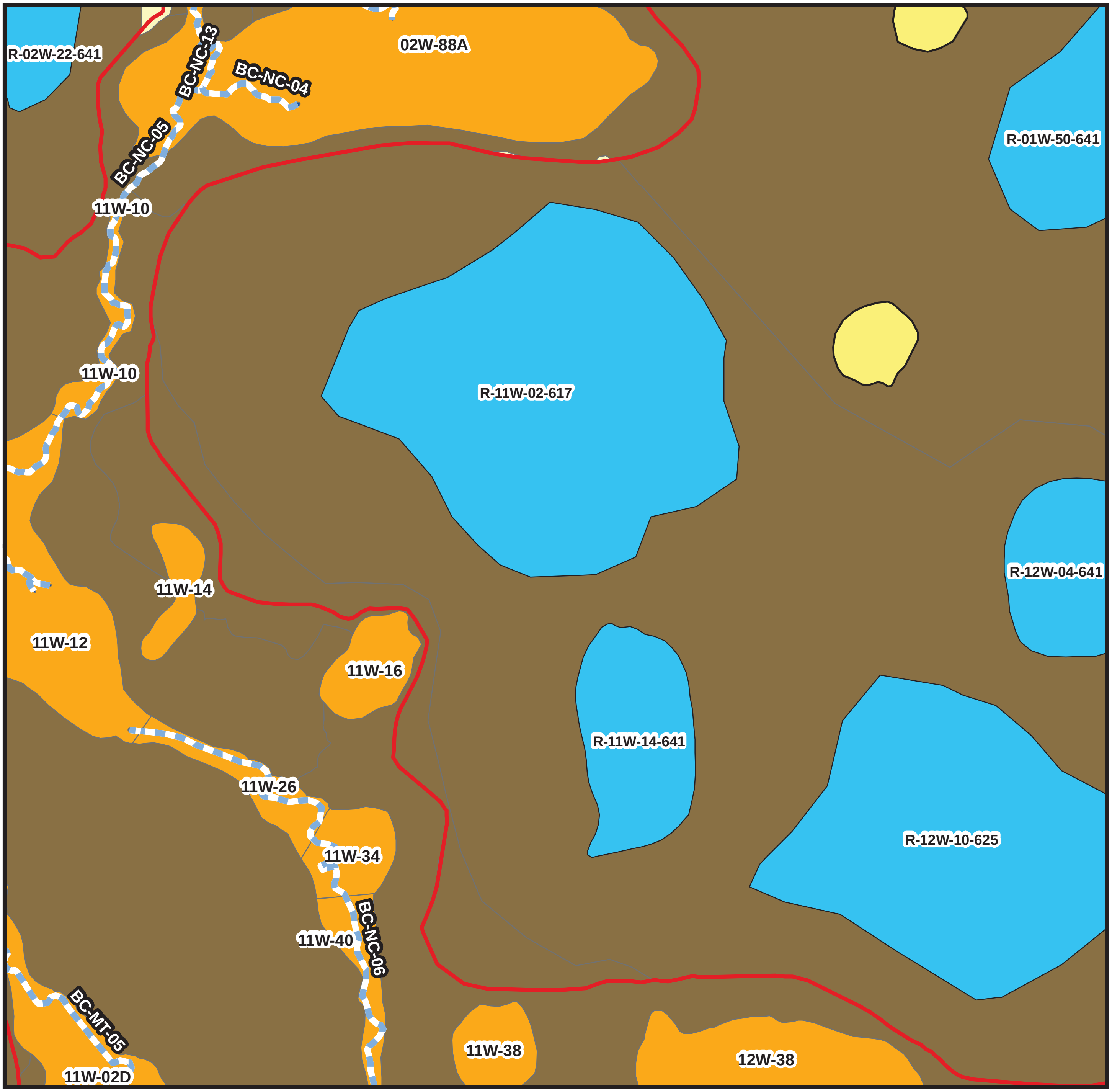
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

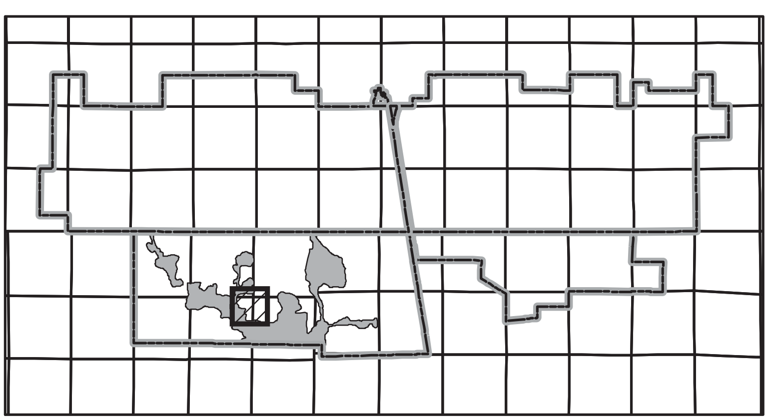
MITIGATION CATEGORIES

Sheet 37 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Mosaic

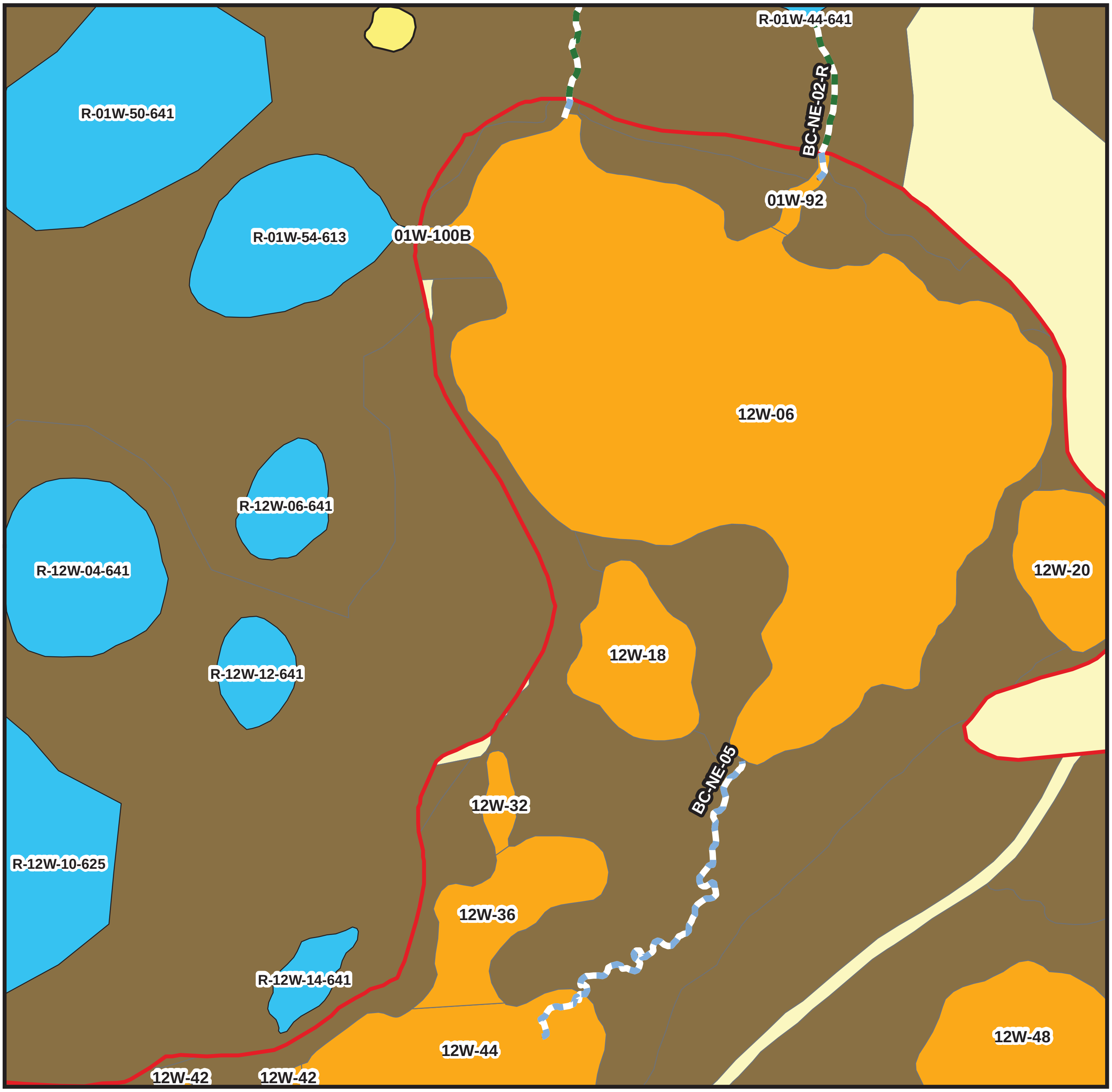
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

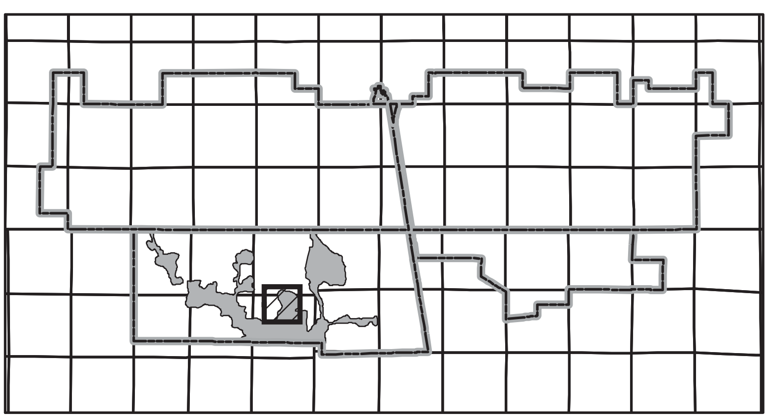
MITIGATION CATEGORIES

Sheet 38 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Sheet 39 of 56

Mosaic

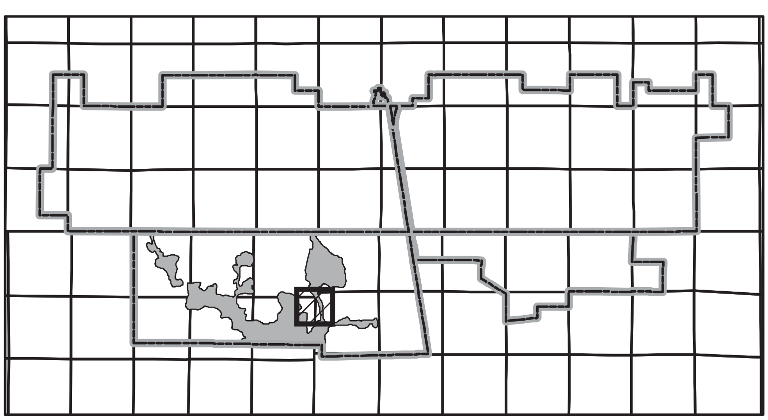
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400

South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Sheet 40 of 56

Mosaic

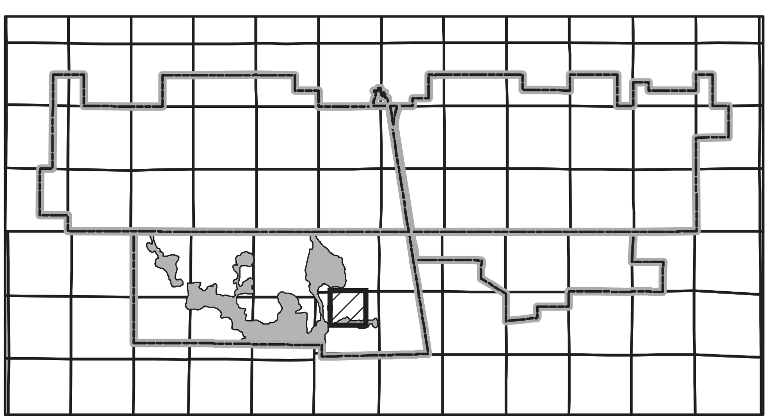
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400

- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

Sheet 41 of 56

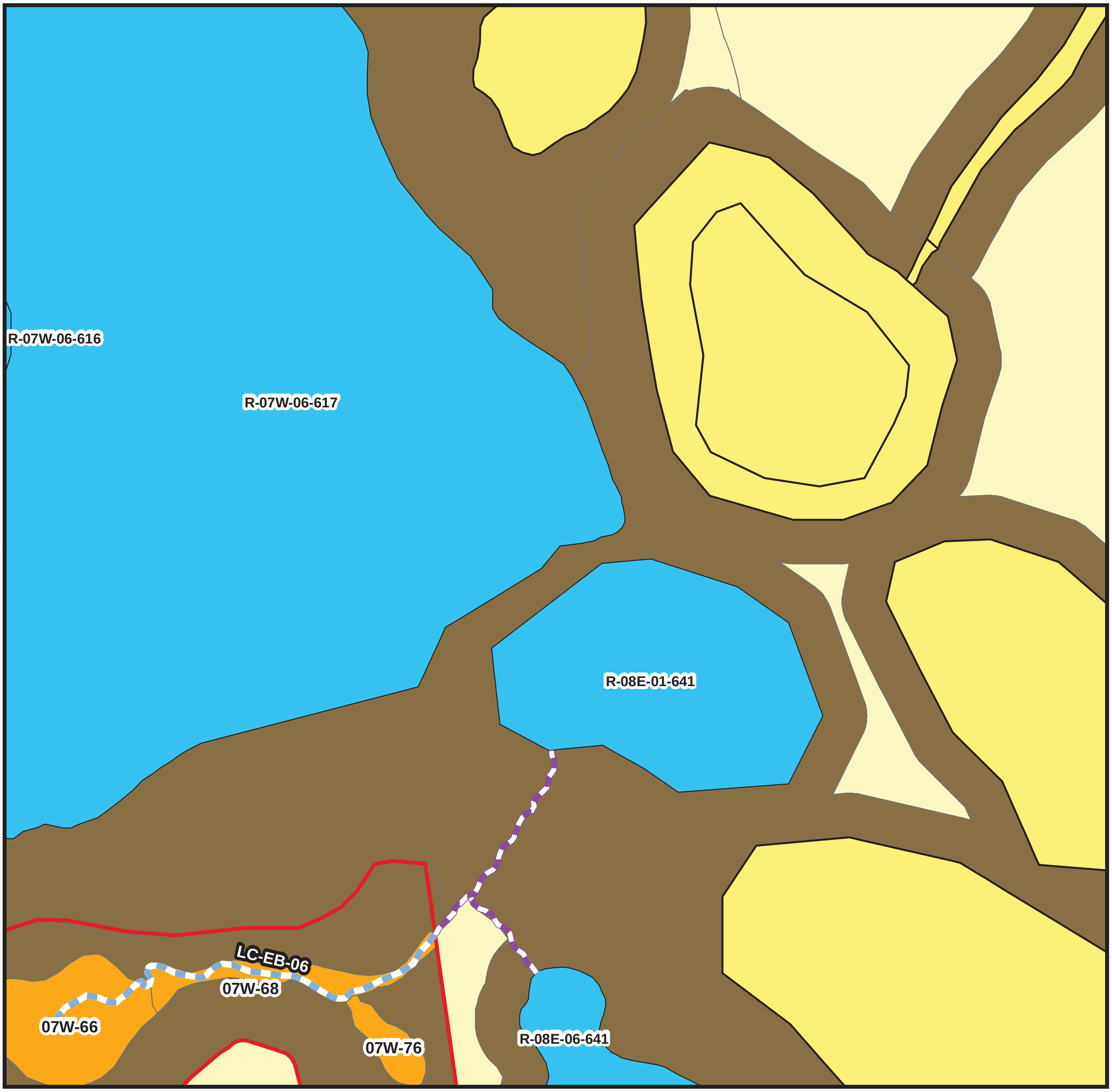
Mosaic

SOUTH PASTURE EXTENSION

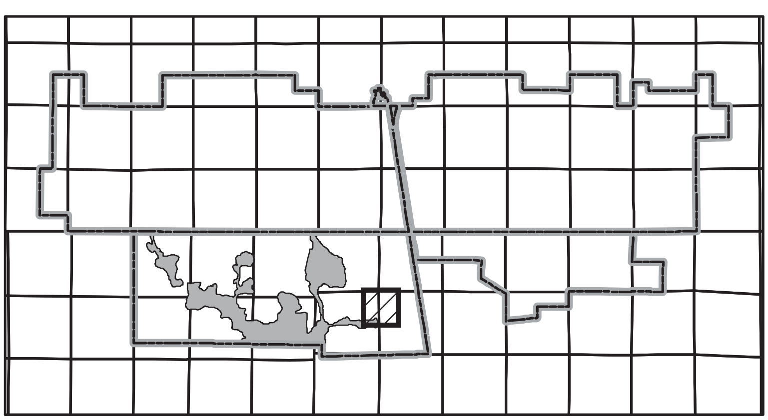
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

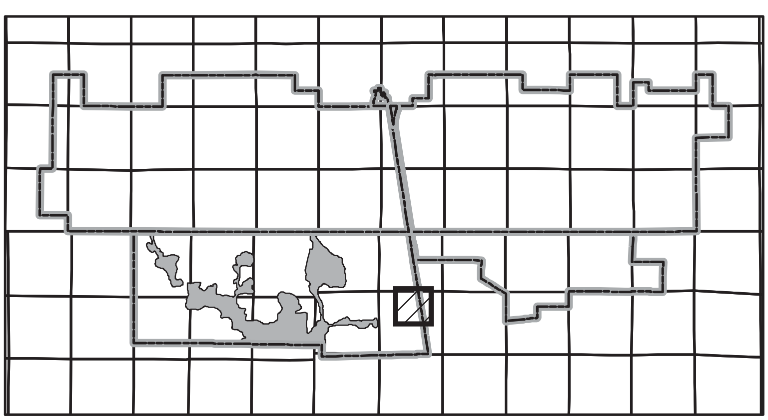
Mosaic

SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

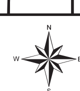
Sheet 42 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400

South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

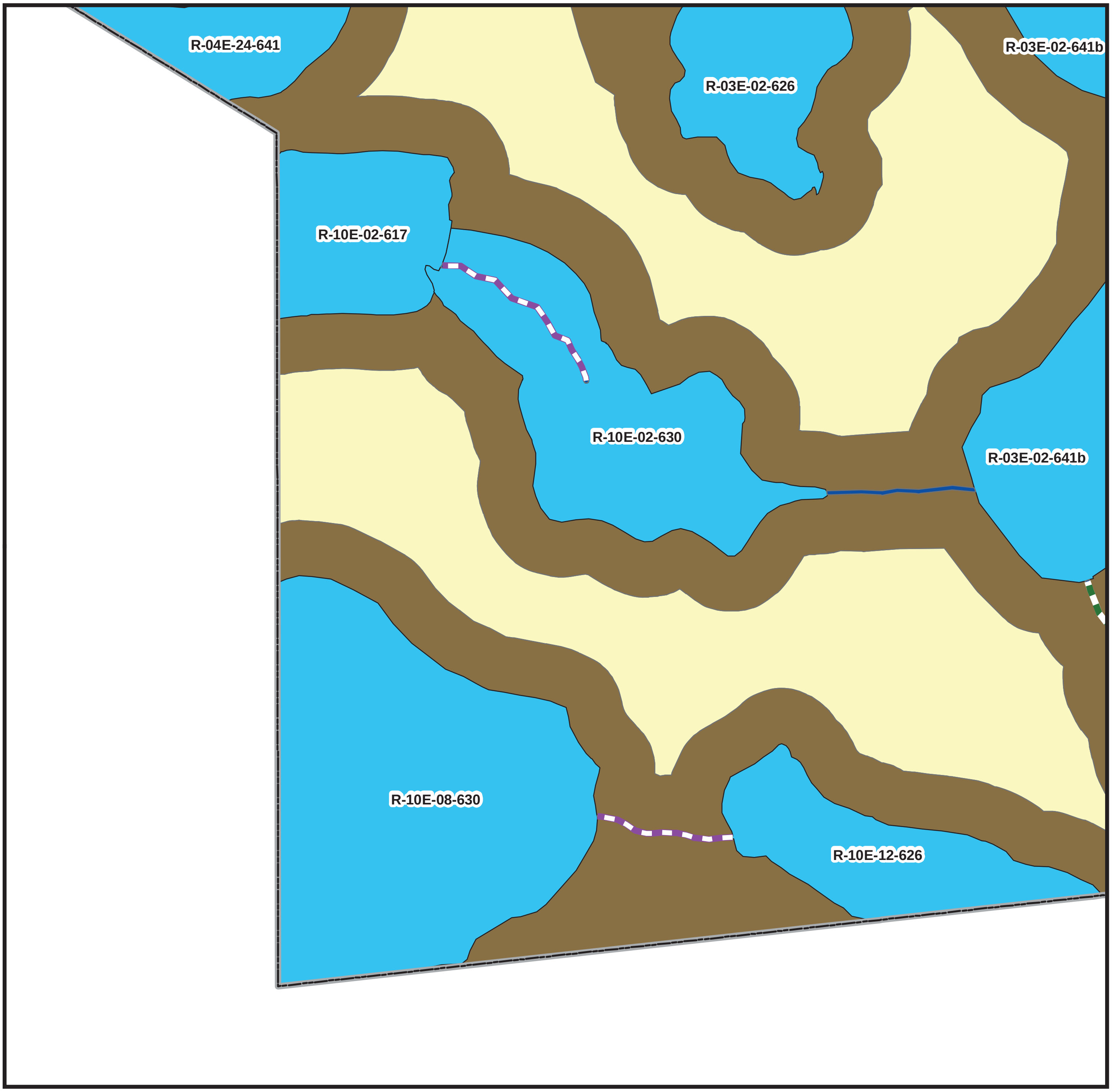


Sheet 43 of 56

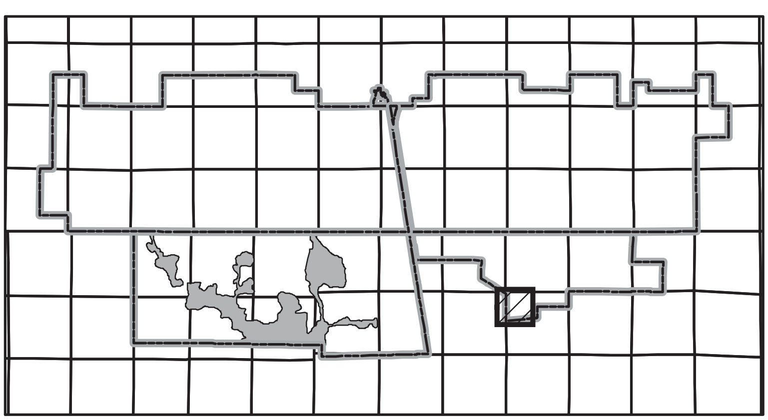
Mosaic

SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

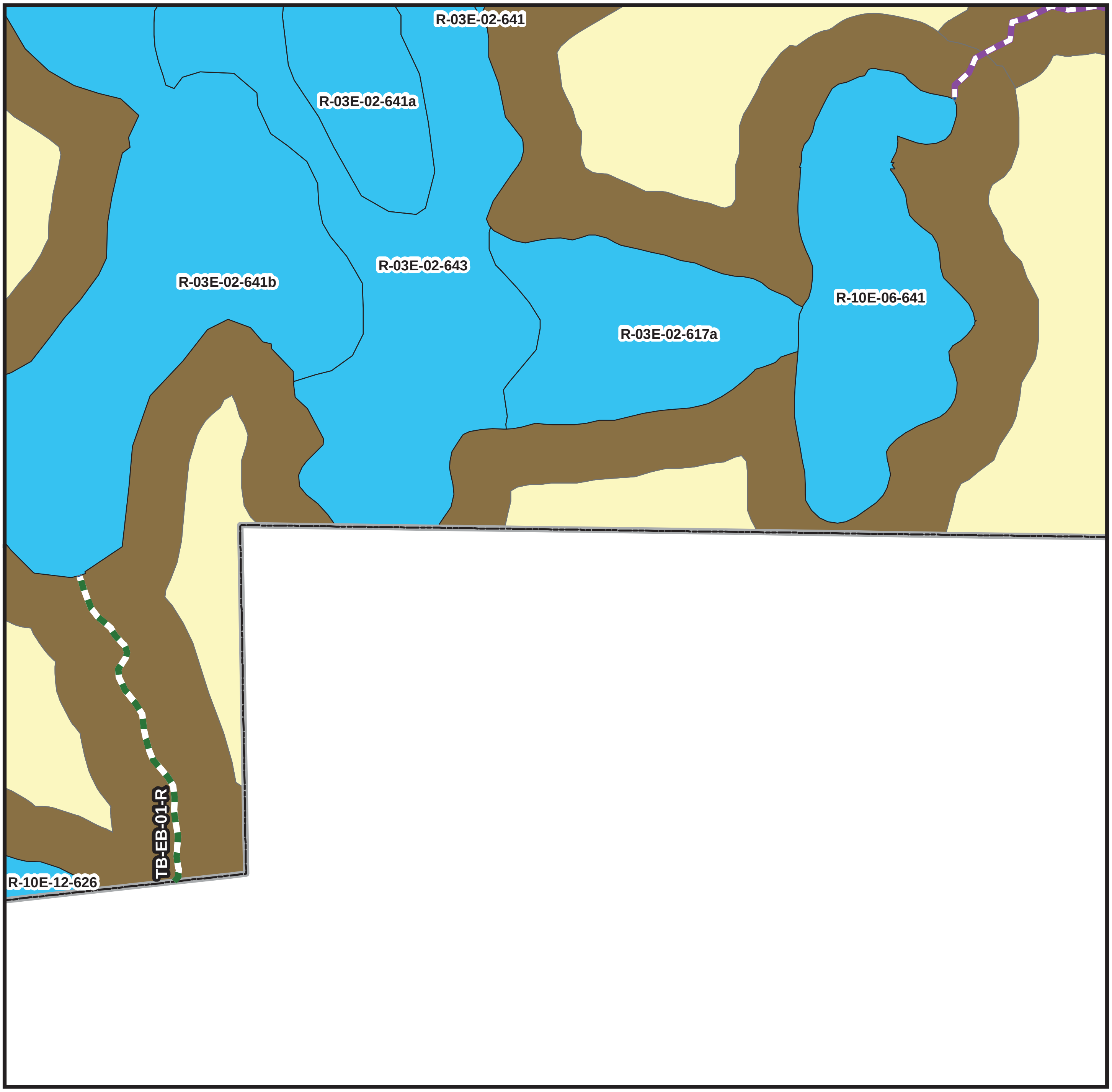
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

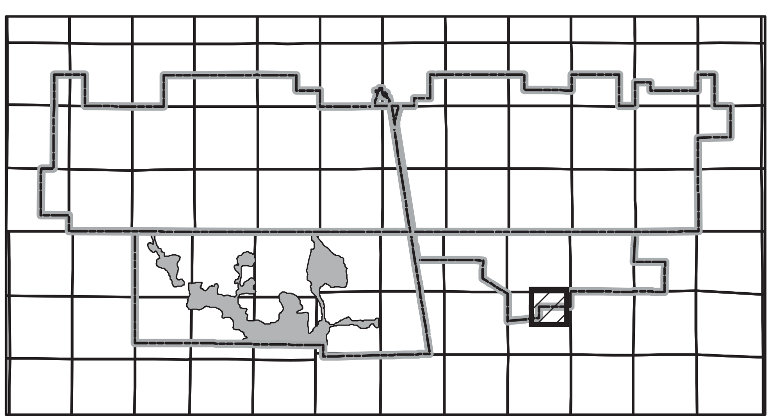
MITIGATION CATEGORIES

Sheet 44 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Mosaic

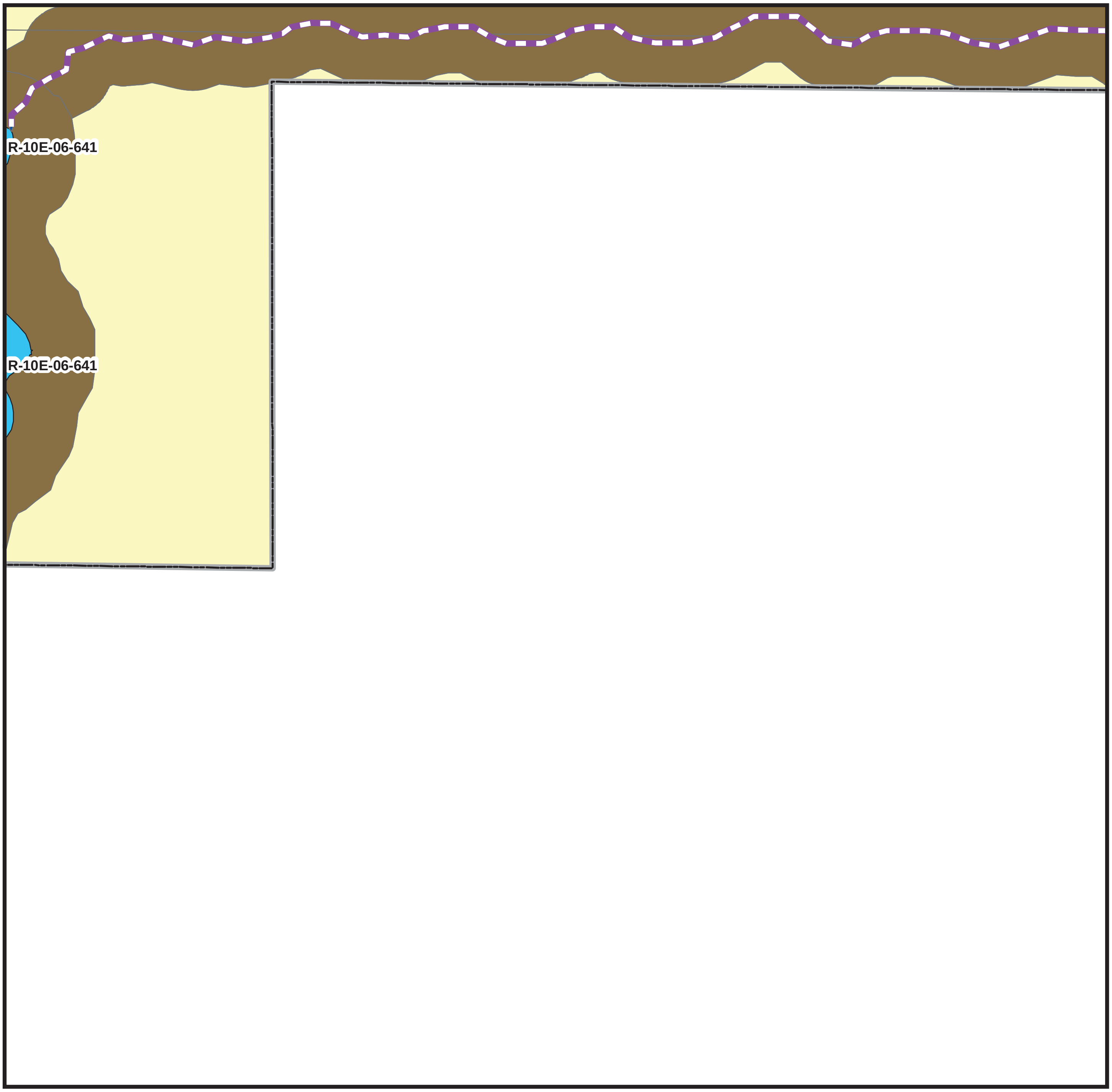
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

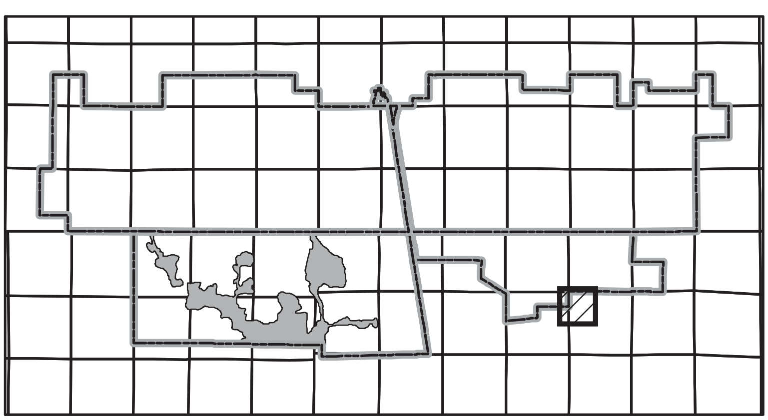
MITIGATION CATEGORIES

Sheet 45 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

N
W E
S

Sheet 46 of 56

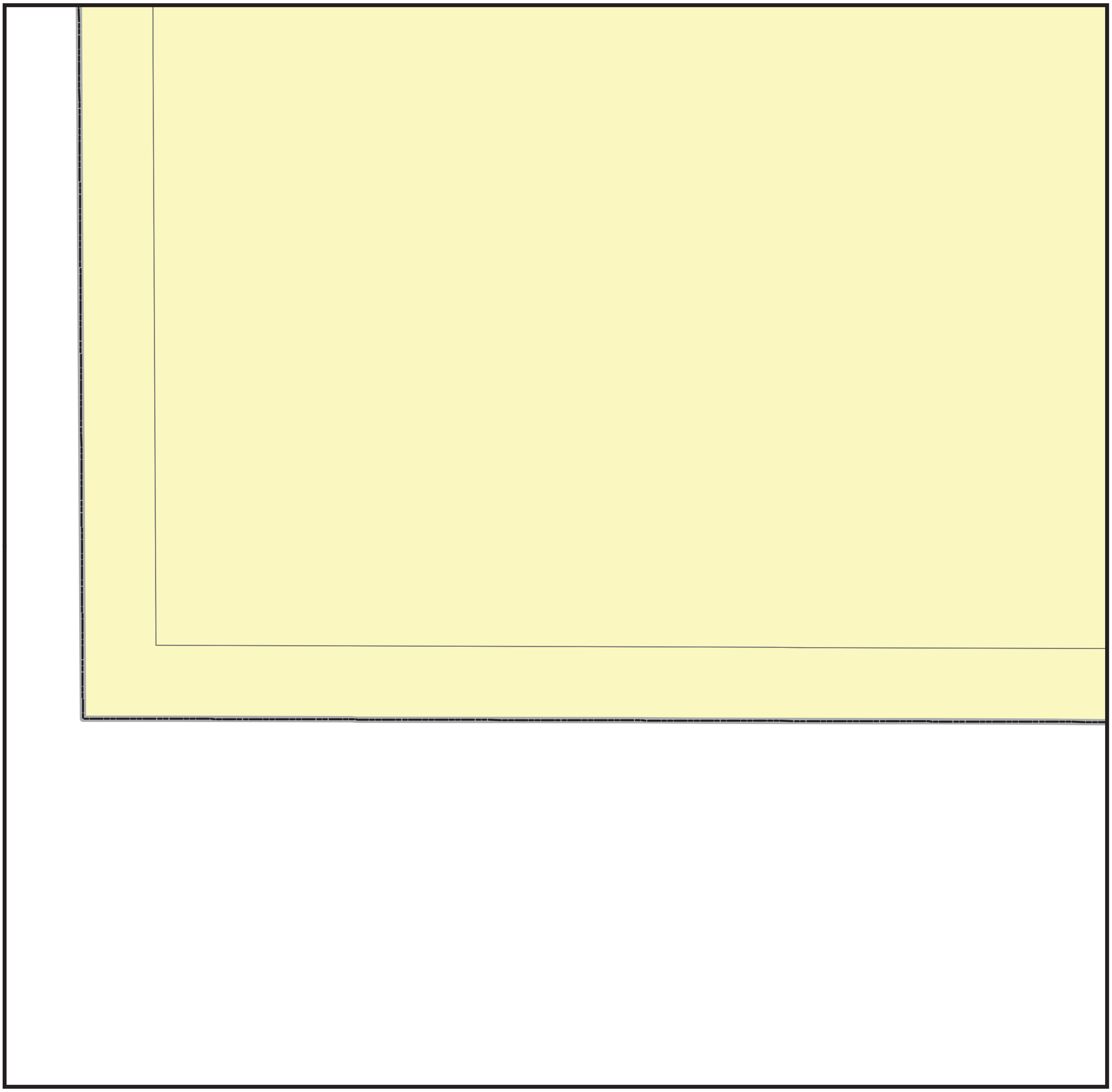
Mosaic

SOUTH PASTURE EXTENSION

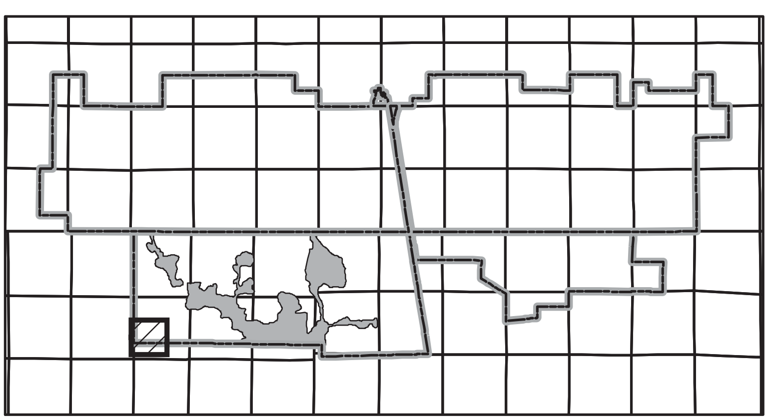
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

N W E S

Sheet 47 of 56

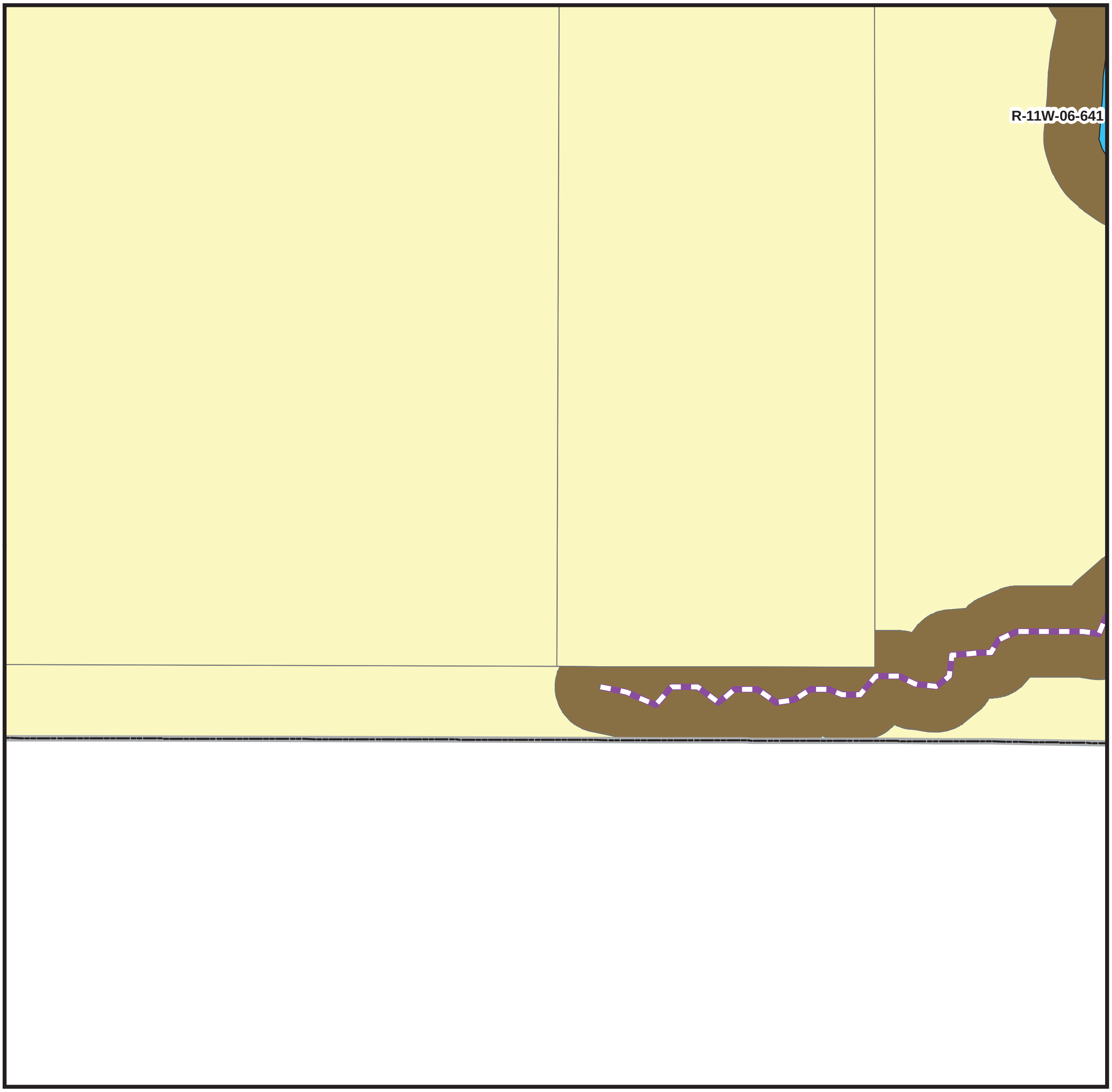
Mosaic

SOUTH PASTURE EXTENSION

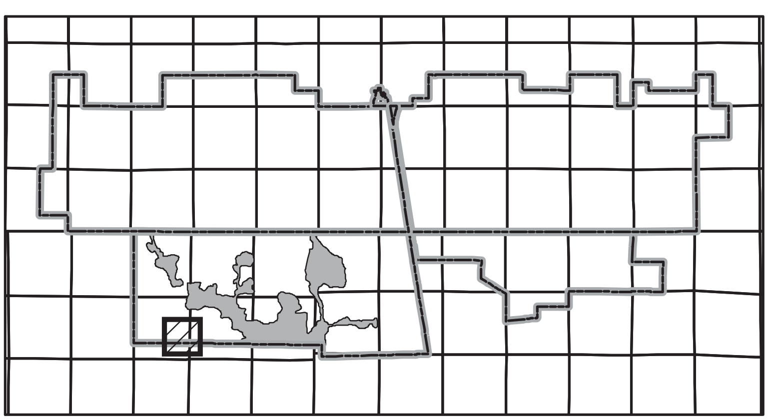
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



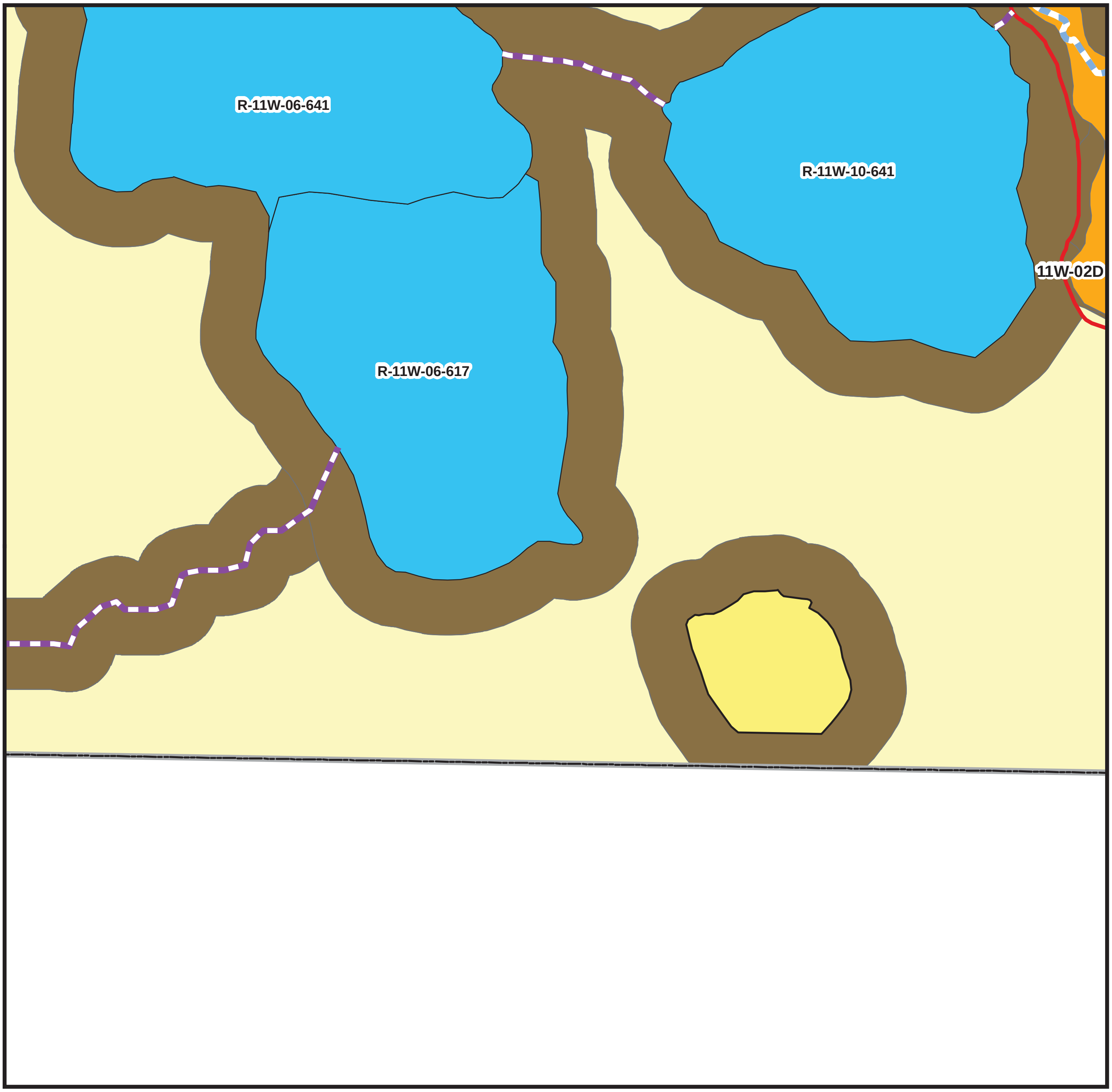
0 100 200 400 Feet
1 in = 400 feet

Mosaic

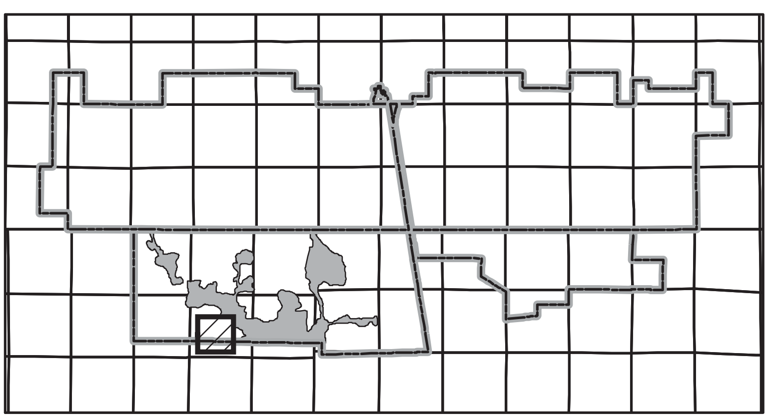
SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

Sheet 48 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Mosaic

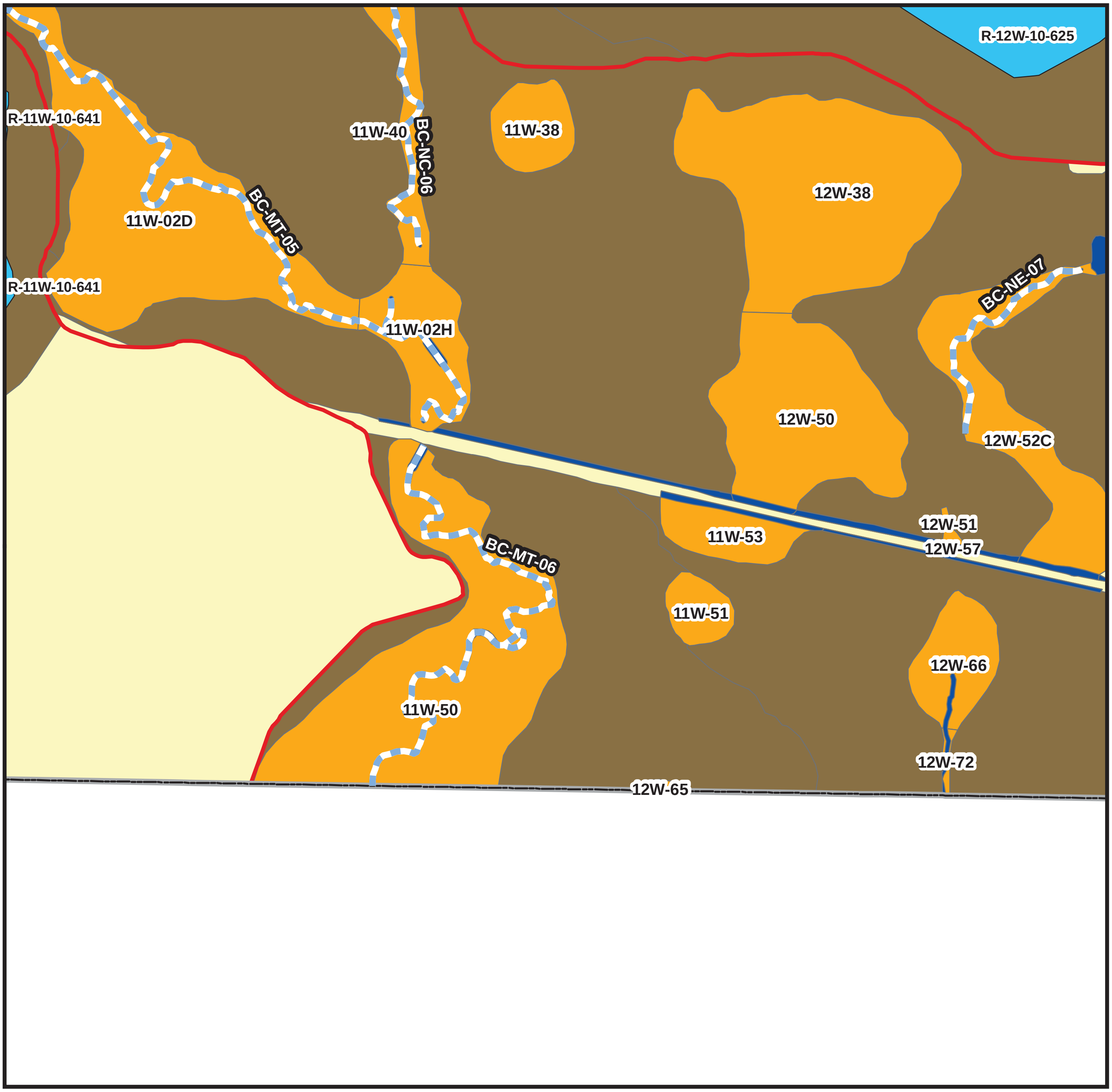
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

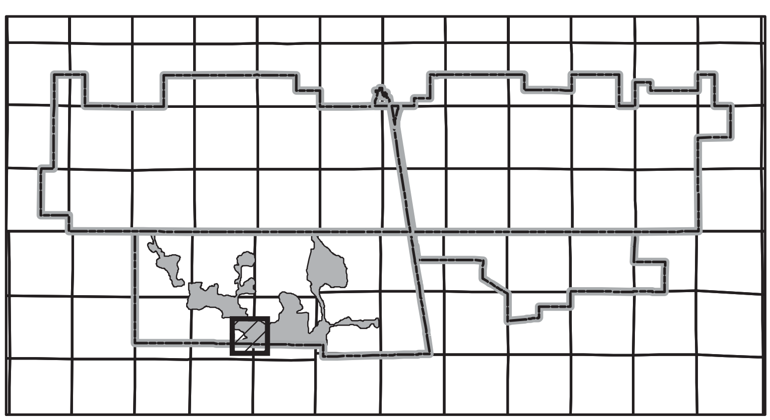
MITIGATION CATEGORIES

Sheet 49 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



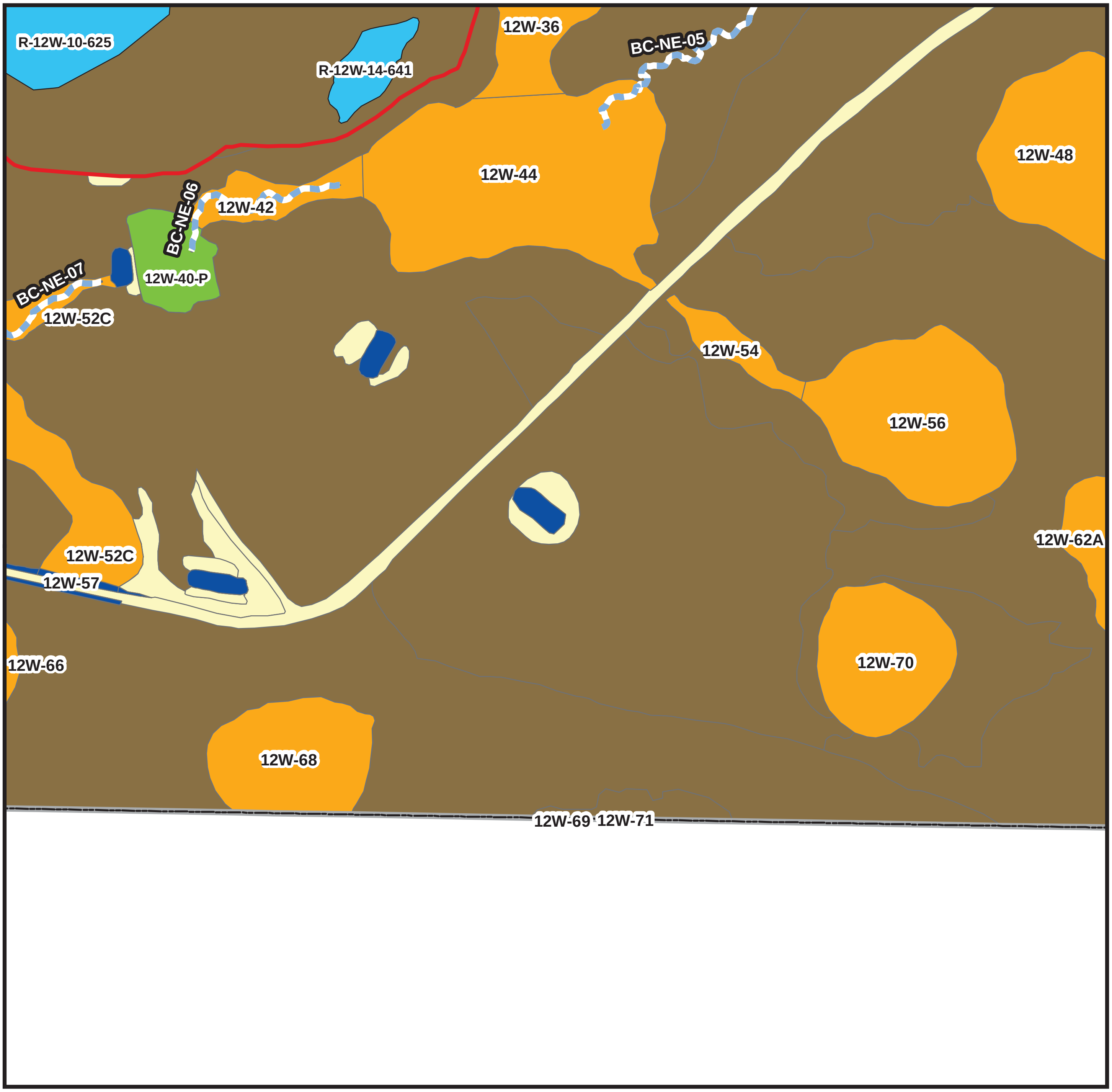
0 100 200 400 Feet
1 in = 400 feet

Sheet 50 of 56

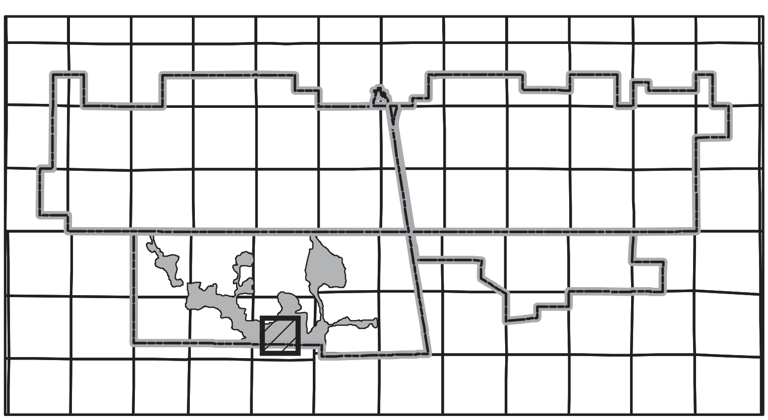
Mosaic

SOUTH PASTURE EXTENSION
Mosaic Fertilizer, LLC
MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

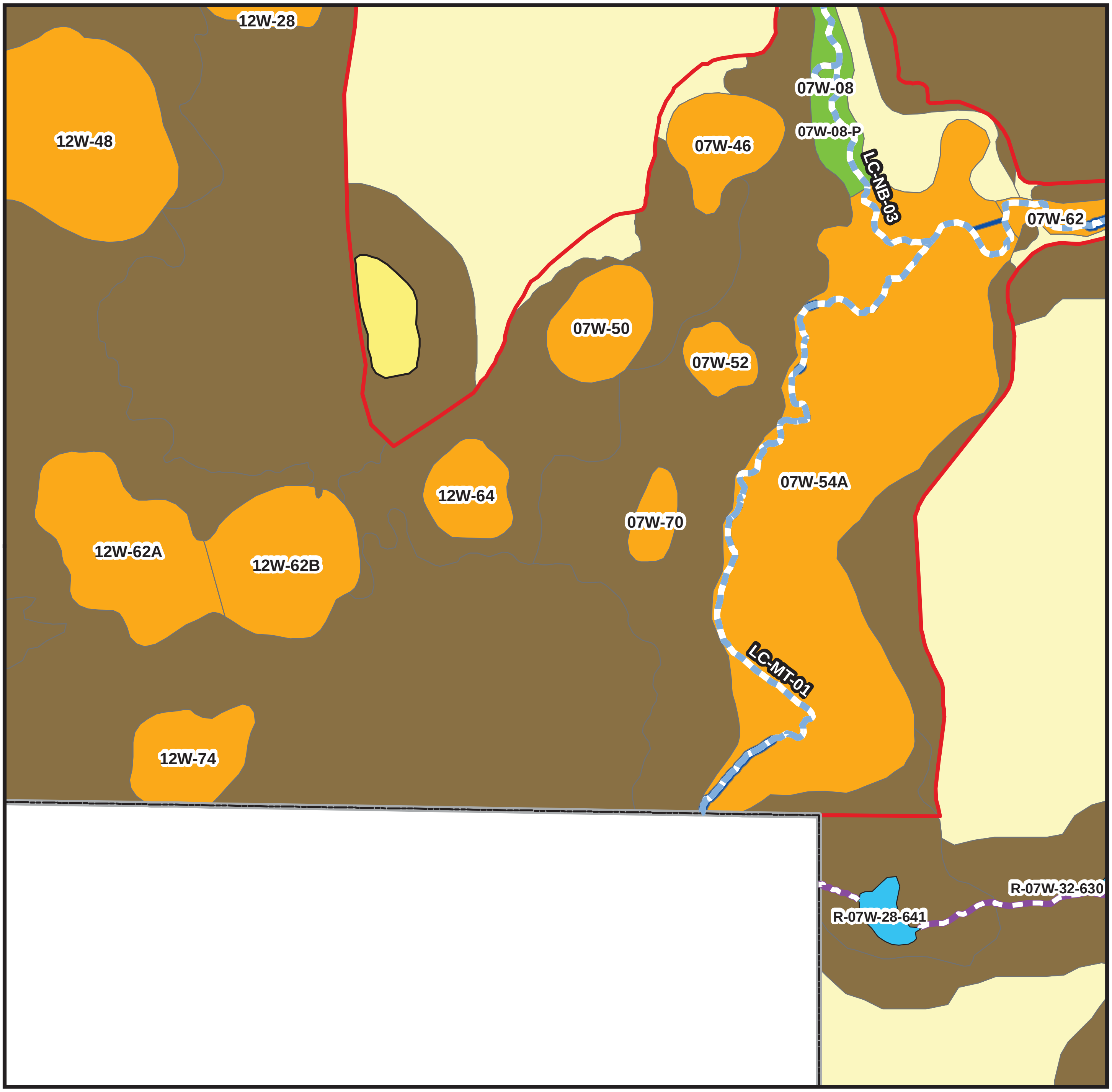
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

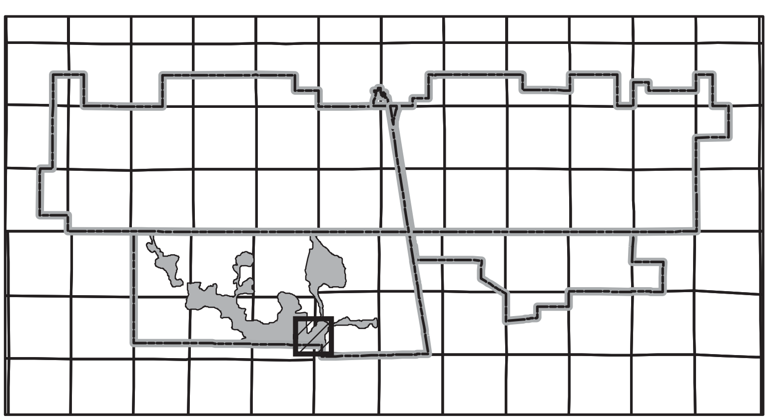
MITIGATION CATEGORIES

Sheet 51 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

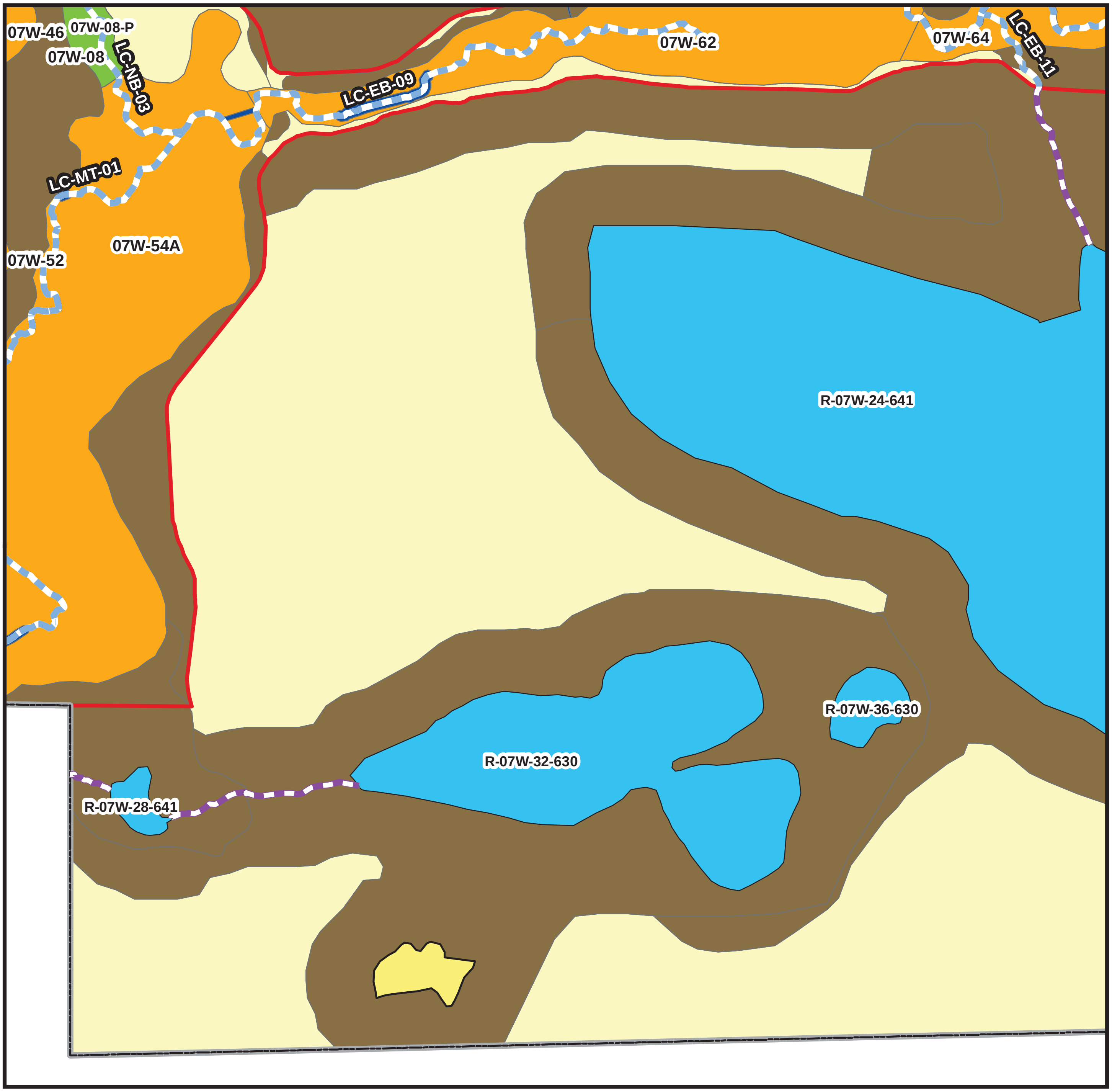
Mosaic

SOUTH PASTURE EXTENSION

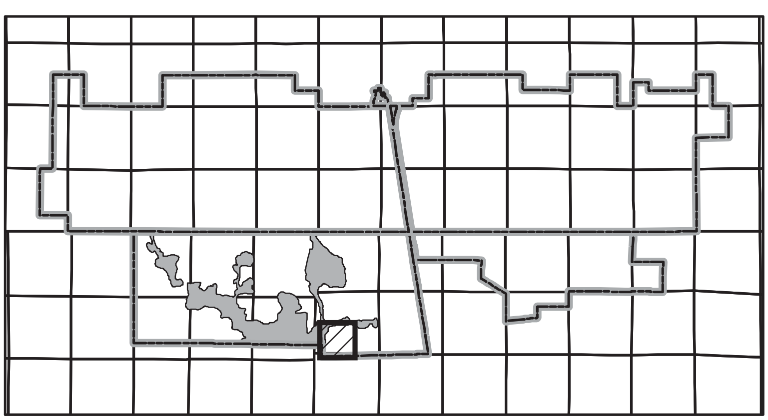
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400 Feet
1 in = 400 feet

Mosaic

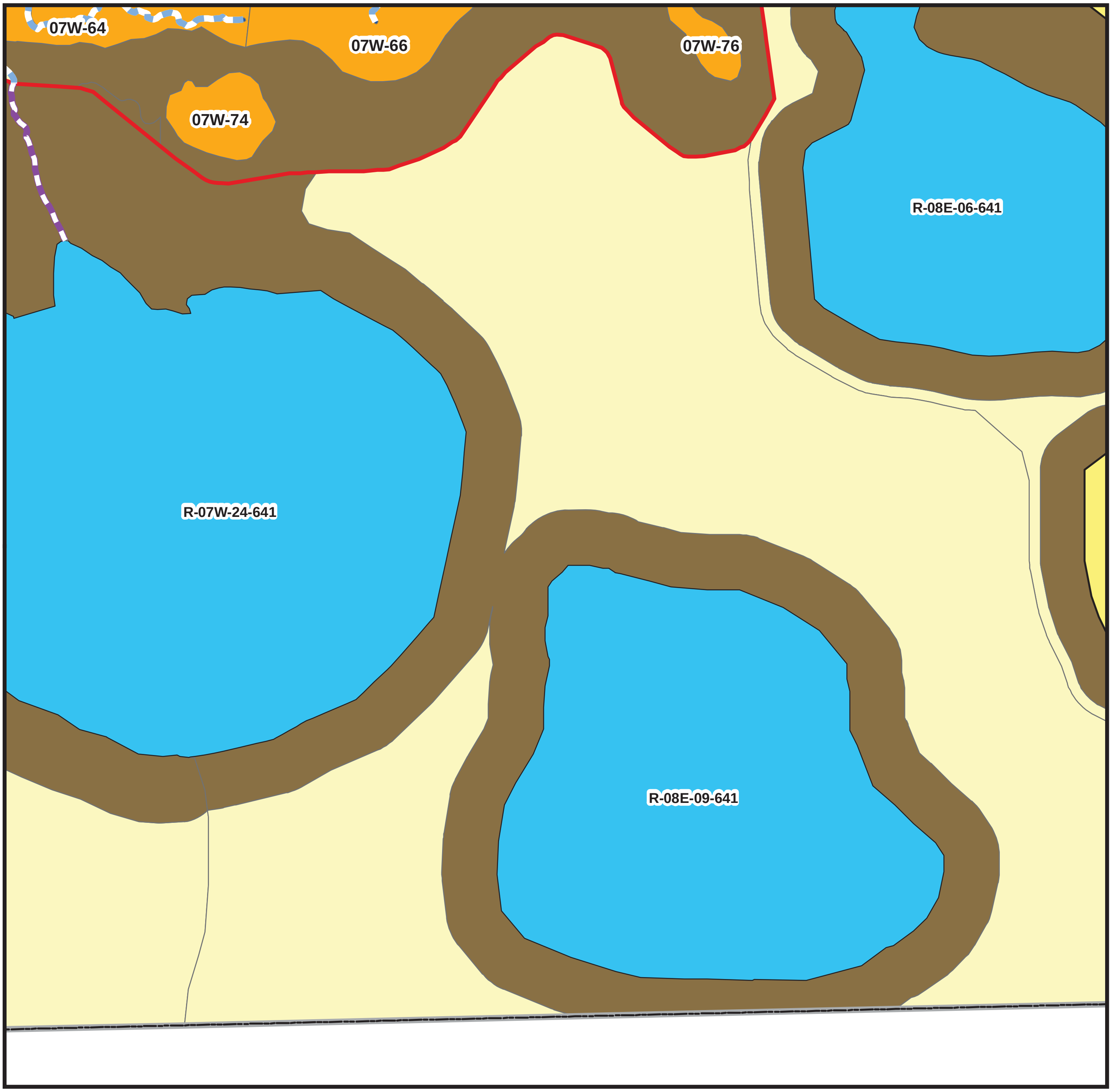
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

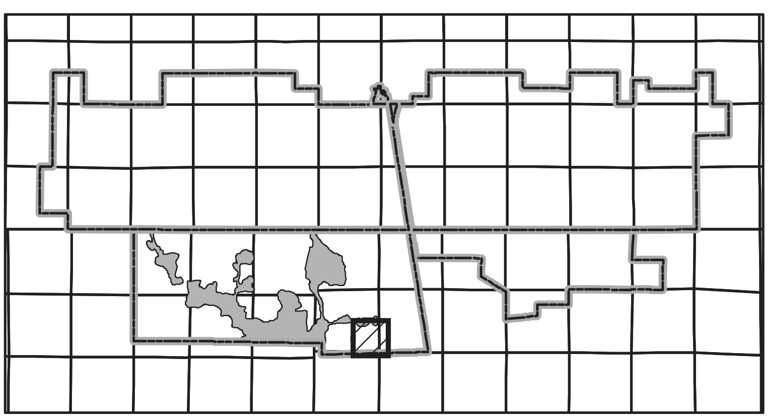
MITIGATION CATEGORIES

Sheet 53 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



South Pasture Extension
No Mine Boundary
Open Water
USACE Reclamation Only
USACE Wetland Creation
USACE Wetland Enhancement
USACE Wetland Preservation
Agriculture
Other Habitat Restoration
USACE Stream Preservation
USACE Stream Creation
FDEP Only Stream Creation



0 100 200 400
Feet
1 in = 400 feet

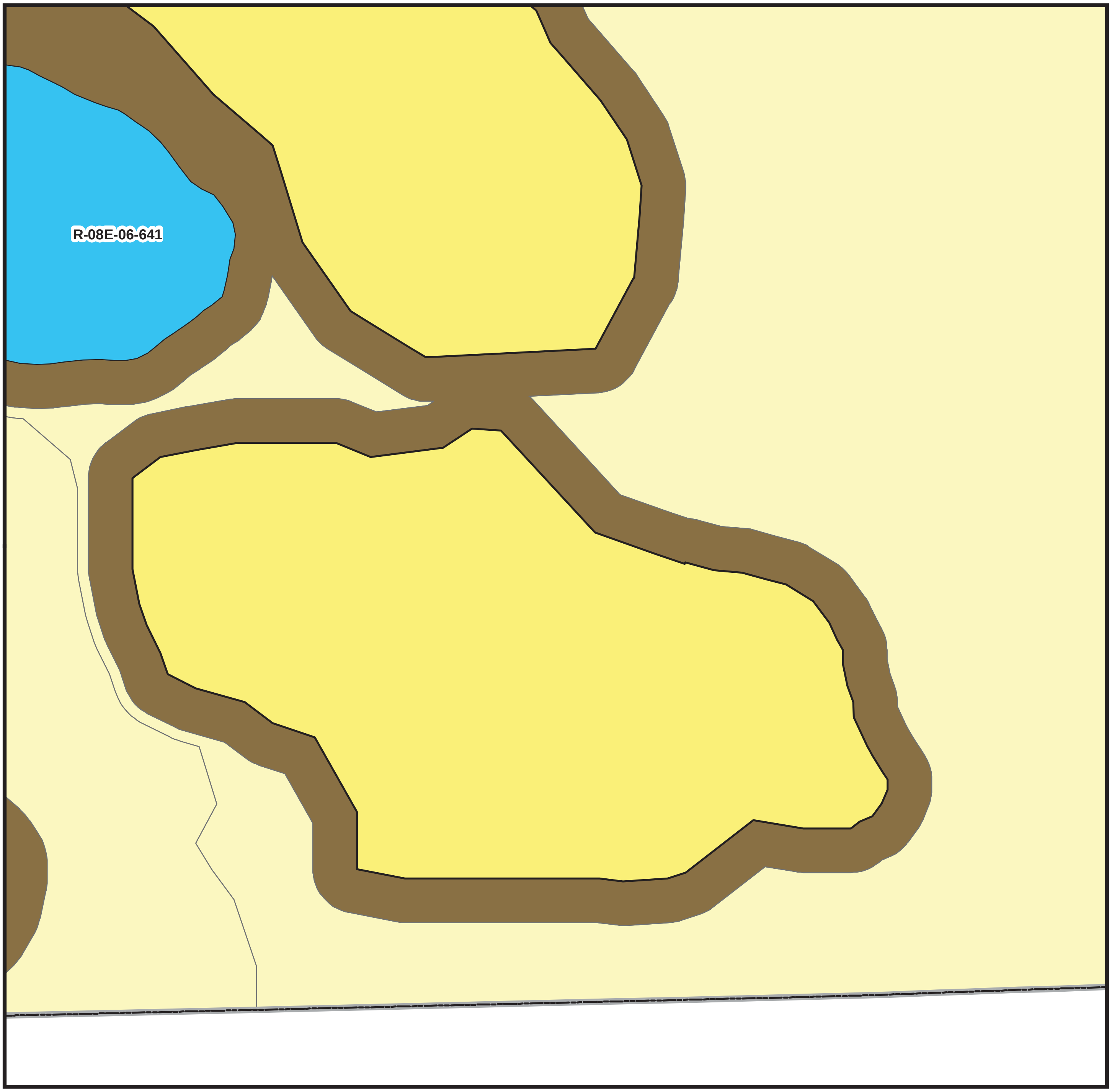
Mosaic

SOUTH PASTURE EXTENSION

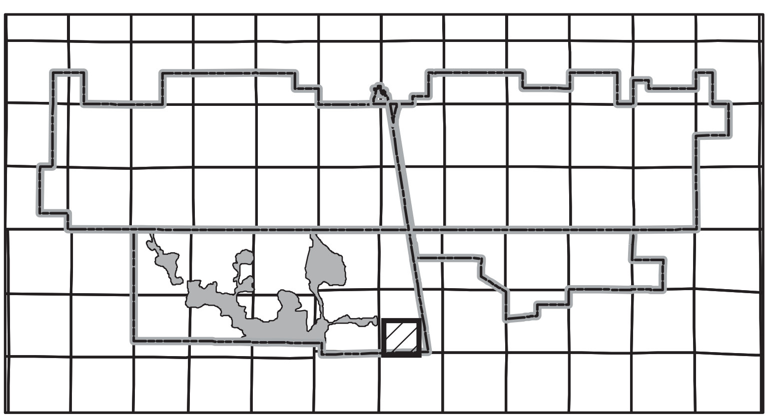
Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

Mosaic

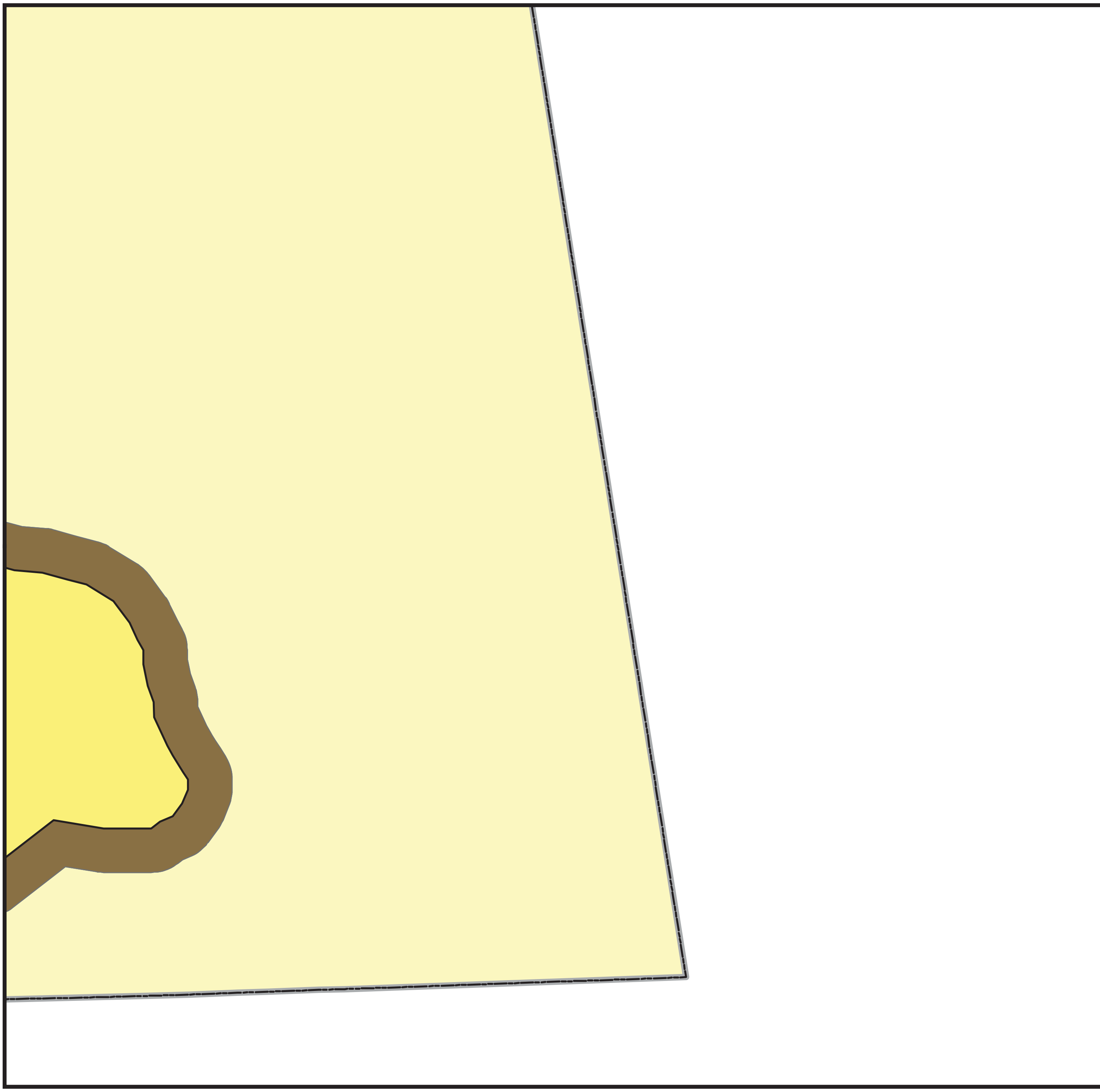
SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

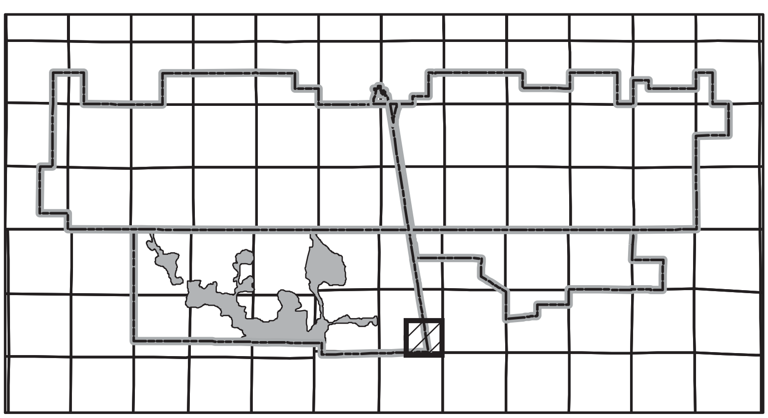
MITIGATION CATEGORIES

Sheet 55 of 56

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400



- South Pasture Extension
- No Mine Boundary
- Open Water
- USACE Reclamation Only
- USACE Wetland Creation
- USACE Wetland Enhancement
- USACE Wetland Preservation
- Agriculture
- Other Habitat Restoration
- USACE Stream Preservation
- USACE Stream Creation
- FDEP Only Stream Creation



0 100 200 400 Feet

1 in = 400 feet

N W E S

Sheet 56 of 56

Mosaic

SOUTH PASTURE EXTENSION

Mosaic Fertilizer, LLC

MITIGATION CATEGORIES

P:\0010CFI\005-South Pasture Misc. Services\GIS\MITIGATION CATEGORIES 8X11 400

DA Permit SAJ-1993-01395

Attachment G - Compensatory Mitigation Plan
Attachment B - Demonstration

Attachment B

Demonstration of Successful Land Reclamation and Habitat Enhancement

CF Industries, Inc.

CFIndustries™

Document Information

Prepared for	US Army Corps of Engineers
Project Name	South Pasture Extension
Date	December 2012

Prepared for:

US Army Corps of Engineers

US Army Corps of Engineers
Tampa Regulatory Office
10117 Princess Palm Drive
Suite 120
Tampa, FL 33610

Prepared by:

CFIndustries

CF Industries, Inc.
P.O. Box 1549, Wauchula, FL 33873
Tel 863 375 4321   Fax 863 375 2716

Table of Contents

Tables

Figures

Appendices

1 Introduction

CF Industries, Inc. (CF) owns and operates phosphate mining and beneficiation facilities in northwest Hardee County, Florida. Mining and beneficiation operations were initiated in 1978 at the North Pasture Mine, which continued until the mining operation was relocated in 1993 to the current location, referred to as the CF Industries Hardee Phosphate Complex, or South Pasture mine. All mining and land reclamation activities at the North Pasture Mine have been completed, while mining and land reclamation on the South Pasture are ongoing. CF is currently seeking regulatory approvals to extend its mining footprint adjacent to the South Pasture Mine into an area referred to as the South Pasture Extension.

In addition to the two mines, CF owns and operates a phosphate fertilizer manufacturing plant in northeast Hillsborough County, Florida (CF Industries Plant City Phosphate Complex). As a part of the approved expansion of the Plant City facility, CF initiated a large-scale ecological restoration plan in 1997 that has restored previously altered upland and wetland habitats.

This document provides a summary overview of CF's nearly 30 years of successful reclamation and enhancement efforts to demonstrate CF's legacy of creating functional ecological communities. The information provided in this document has been compiled through review of permitting submittals, monitoring reports, published Florida Industrial and Phosphate Research Institute (FIPR) studies, and direct field observations and data collection.

CF's strategy has long been to establish montages of wildlife habitat along combinations of preserved and reclaimed stream corridors and their adjacent uplands, linking these systems geographically and hydrologically to the even larger habitat networks formed by regional stream networks such as Payne Creek and Horse Creek, major tributaries to the Peace River in proximity to CF's mining operations. This approach is consistent with the Florida Department of Environmental Protection (FDEP) Integrated Habitat Network and the Charlotte harbor National Estuary Program (CHNEP) Comprehensive Management Plan objectives for the Peace River watershed. Some of the company's restoration efforts also include habitat corridor restoration efforts in the Hillsborough River watershed, consistent with the goals of the Upper Hillsborough River Greenway Task Force. To date, CF has committed over 11,000 acres of reclaimed and natural habitat on its Florida properties to permanent conservation easements, which further reinforce CF's commitment to excellence in the development of its restoration plans and diligence in its implementation and stewardship.

2 Habitat Reclamation and Enhancement

Reclaimed and enhanced wetland and upland habitats are designed by CF to meet or exceed the requirements of local, state, and federal reclamation and mitigation requirements, and those requirements have been steadily evolving toward more refined performance and success criteria over time. To the extent practicable, planned systems are analyzed, designed, and modeled to approximate the pre-mining, unaltered1 conditions of each habitat type (i.e., similar plant species, topography, water depth, and drainage patterns), with target communities based on extensive field mapping and vegetative descriptions that detail the site-specific conditions of the existing, on-site systems. To further improve the reclamation process and ensure that reclamation objectives are achieved, an adaptive management approach is undertaken to identify deficiencies and implement corrective actions in a timely manner.

[1] Often the pre-mining landscape has been previously altered through agriculture, drainage modification, or other anthropogenic activities.

In the following sections, the current state of reclamation and enhancement activities performed by CF to date is summarized according to type of reclamation. As indicated above, the data presented were obtained from a combination of direct observation, existing reports and/or site inspections.

2.1 Herbaceous and Forested Wetland Reclamation

Despite some of the wetland complexes having been created during past mitigation regulatory frameworks (with less evolved reclamation requirements) and others being constructed more recently without the opportunity to reach full maturity, a high level of success has been achieved throughout many created wetland systems. An effective tool for evaluating wetland function is the Uniform Mitigation Assessment Method (UMAM). This method is used to calculate the amount of required mitigation necessary to offset wetland impacts. The Florida Department of Environmental Protection (FDEP) recently used UMAM in a targeted study assessing the ecological value of phosphate mine permittee-responsible onsite mitigation previously released from reclamation requirements(unpublished evaluation). Although wetlands discussed in this section have yet to achieve regulatory release criteria, primarily because they are still being actively monitored and maintained, they currently exhibit high functional value, thus providing appropriate, effective mitigation for mining impacts. The average UMAM score of CF's reclamation wetlands is 0.63 (In comparison, the average UMAM score of wetlands proposed to be mined on South Pasture Extension is 0.52) and includes forested and herbaceous wetlands that were constructed and revegetated between 1991 and 2011. The highest scores are attributed to herbaceous wetlands, which generally mature faster and in which the latest reclamation technology was applied, as well as some of the forested systems that have matured over the last 20 years, which even though constructed with less evolved methods, still demonstrate high functionality. The latest technology proposed in the current application for CF's SPE is expected to achieve equal or better results in the same or less time than demonstrated herein, based on lessons learned as a result of the past reclamation work and the application of the latest reclamation methods. Maps of each complex illustrating the land use and wetland ID are included for reference (see Land Use Map Package- Appendix A, and Wetland Map Package – Appendix B, respectively).

2.1.1 <u>Hickey Branch Complex</u>

The reclaimed Hickey Branch system is one of the oldest examples of CF reclamation success. The wetlands (R-7 and R-10) within the Hickey Branch drainage area were constructed beginning in 1991 with sand tailings backfill and received muck application within the wetland footprint. The complex consists of deep and shallow marsh (FLUCFCS 641), a mixed hardwood forest (FLUCFCS 617), and a lake with littoral shelf communities (FLUCFCS 524) surrounded by an upland buffer (See Appendix A). Management activities included maintenance herbicide within the wetlands and uplands and supplemental plantings as needed to achieve required density and the area's eventual reclamation release. The UMAM scores in this complex range from 0.70 (21-year old herbaceous/open water system) to 0.77 (21-year old forested systems) with an overall wetland UMAM average score of 0.73, as shown in the table below. It should be noted that the FDEP also conducted a UMAM evaluation of these areas, which resulted in similar scores (unpublished evaluation).

Table 1 Hickey Branch Wetland Reclamation Summary Table

Wetland ID	Time Since Revegetation	Total UMAM Score
LRU-R-7		
Hickey Branch 524	21 years	0.70
Hickey Branch 617	21 years	0.77
Hickey Branch 641	21 years	0.73
Average		**0.73**
Total Average for Hickey Branch		***0.73***

Formal wildlife surveys were conducted at several locations within the Hickey Branch complex as part of the FIPR Wildlife Habitat and Wildlife Utilization of Phosphate-Mined Lands study (Durbin et al. 2008). The results of the two-year study documented presence of a combined total average of 34 species of vertebrates, representing all five classes of vertebrates, within the Hickey Branch complex, including ten amphibians and over 50 species of birds. Many species of fish, reptiles and mammals were also documented, providing evidence that these restored reclamation systems are used by a variety of species. A nesting colony consisting of several wading bird species has recently been documented as well.

Hickey Branch, R-7 - Forested Wetland/Herbaceous Marsh Complex, 2012

Hickey Branch, R-10 - Wading Bird Colony

2.1.2 Doe Branch Complex:

The wetlands that are isolated or connected within the Doe Branch drainage area were constructed between 1998-2007 with sand tailings backfill and received muck application within the wetland footprint. Consistent with the South Pasture Mine permit, this area was used briefly for additional operational stormwater storage in 2004, which stressed some of the wetland vegetation and necessitated some replanting. The complex consists of deep and shallow marsh (FLUCFCS 641), wet prairie (FLUCFCS 643), and mixed hardwood forest (FLUCFCS 617) communities surrounded by an upland buffer and adjacent preserve to the North (See Appendix A). One of the shallow wetland's hydroperiod was established by installation of a thin clay lens in the soil profile, and one forested wetland was contoured to have hummocks. The uplands were topsoiled, spaded with mature upland trees, and used as a permitted gopher tortoise relocation site. Management activities include prescribed burning in the uplands, maintenance herbicide within the wetlands and uplands, and supplemental plantings as needed to achieve required density. The UMAM scores in this complex range from 0.47 (seven-year old herbaceous system undergoing adaptive management) to 0.67 (several four-year old and ten-year old herbaceous systems), with an overall average UMAM score of 0.61, as shown in the table below. A summary of the permit success criteria and current condition of the Doe Branch reclamation sites is presented in Table 3.

Table 2 Doe Branch Wetland Reclamation Summary Table

Wetland ID	Time Since Revegetation	Total UMAM Score
DB-2		
DB-TR-R1	10 years	0.57
Average		**0.57**
DB-3		
DB-HW-R4	10 years	0.67
DB-HW-R5	10 years	0.67
Average		**0.67**
DB-4		
DB-IS-R74A	7 years	0.63
DB-IS-R74B	7 years	0.63
DB-IS-R74C	7 years	0.47
Average		**0.58**
DB-5		
DB-IS-R8	4 years	0.67
DB-IS-R9	4 years	0.67
DB-HW-R3	4 years	0.60
Average		**0.64**
Total Averages for BC		**0.61**

The DB-HW-R4 and DB-HW-R3 sites were designed to be forested, depressional headwater swamps, draining across short outlets to a preserved in-line swamp depression to the north. Over two years of hydrologic monitoring, upland wells exhibited a range of fluctuation that is within regional norms for natural ground in flatwoods and mesic-hammocks, and indicated positive lateral groundwater flow gradients to the reclaimed and preserved wetlands as designed. Fluctuations within the wetland piezometers also reflected natural norms during this same time period. The DB-IS-74 West and East sites form a headwater chain of wetlands designed to drain to a reclaimed strand (DB-TR-R1). Both sites show groundwater table fluctuations and gradients in accordance with design direction and land use objectives. A more detailed discussion of the groundwater hydrology for this system is presented in Appendix C.

Formal wildlife surveys were conducted at several locations within the Doe Branch complex as part of the FIPR Wildlife Habitat and Wildlife Utilization of Phosphate-Mined Lands cited above. These surveys were conducted over a two year period (2004 and 2005) and included various standard methods designed to capture and/or observe specific guilds of wildlife. The results of the two-year study documented that a combined total average of 37 species, representing all five classes of vertebrates, was observed within the Doe Branch complex. Species included nine amphibians, some of which are commonly used as barometers of ecosystem health because of their specific habitat needs and a biphasic life cycle that requires intact uplands and wetlands for survival and reproduction (Guzy et. al 2012). In addition, over 75 species of birds were observed within the Doe Branch complex. Several species of fish, reptiles and mammals were also documented in this study, providing evidence that these restored reclamation systems are used by a variety of species.

Table 3 Doe Branch Permit Success Criteria Status Based on 2011 Monitoring Reports

Permit Success Criteria	Current Site Conditions				
	DB-TR-R1	DB-HW-R4	DB-4	DB-5	Success Criteria Being Met
Macroinvertebrate and fish communities must have 75 percent of the species diversity and richness of a reference wetland of that vegetation community. All functional feeding guilds found within a reference of the appropriate type are present	Past monitoring has documented over 76 macroinvertebrate species representing 7 Classes, 17 Orders, and 32 Families, and 4 fish species	Past monitoring has documented over 53 macroinvertebrate species representing 6 Classes, 13 Orders, and 25 Families, and 2 fish species	Invertebrate sampling has not yet been conducted in this newly created wetland.	Past monitoring has documented over 30 macroinvertebrate species and 3 fish species	N/A - Success will be measured when sampling is conducted per note
	Note: Once reclaimed forested canopy is clearly trending towards success, additional samples will be taken to compare with reference wetlands.				
Cover by native wetland species listed in Rule 62-340.450, F.A.C., in the herbaceous and shrub layer of the forested wetland and in herbaceous wetlands shall be at least 80 percent. The wetland may be released if cover is within the range of cover values reported for the reference wetland of that community type. Open water areas shall not exceed 15 percent of the total acreage of the restored wetland and desirable ground cover plant species shall be reproducing naturally.	**2011 Avg. Percent Covers:** Native wetland herbaceous cover: 84 % Native wetland shrub cover: 13.7% Open Water/Bare Ground 13% Average Water Depth 0.75" The majority of native wetland species have been observed in fruit or flower	**2011 Avg. Percent Covers:** Native wetland herbaceous cover: 76% Native wetland shrub cover: 25% Open Water/Bare Ground 15% Average Water Depth <1inch The majority of native wetland species have been observed in fruit or flower	**2011 Avg. Percent Covers:** Native wetland herbaceous cover: 72% Native wetland shrub cover: 0.3% Open Water/Bare Ground 11% Average Water Depth <1inch The majority of native wetland species have been observed in fruit or flower	**2011 Avg. Percent Covers:** Total vegetation cover was 92%, while relative percent cover of native wetland species was 83% of ground cover Open Water/Bare Ground 7.5% The majority of native wetland species have been observed in fruit or flower	Yes (Trending to success DB-HW-R4) Yes Yes
Cover nuisance species, including, but not limited to cattail and primrose willow shall be limited to less than 10 percent of the total wetland area. Invasive exotic vegetation shall be limited to less than 0.1 percent of the total wetland area.	**2011 Avg. Percent Covers:** Non-native nuisance cover: 7% Invasive exotic cover: 1%	**2011 Avg. Percent Covers:** Non-native nuisance cover: 4% Invasive exotic cover: 0%	2011 Avg. Percent Covers: Non-native nuisance cover: 11% Invasive exotic cover: 3%	Currently, nuisance non-native species provide 6.76% cover. Invasive/exotic species provide 1% cover.	Yes Trending to success (DB-HW-R4 yes)
The wetland shall have a similarity of 0.6 for the forest and herbaceous components (as determined using a Morisita's Index based on the reference wetland for that vegetation community type).	To be determined once canopy matures	To be determined once canopy matures	To be determined once canopy matures	This will be addressed once the wetland has had time develop a mature canopy structure.	N/A - To be determined once canopy matures
Species richness, for both the herbaceous and forested vegetation, shall be equivalent to 75 percent of the undisturbed reference wetland for that wetland type. Reference wetland locations for each wetland type must be submitted for approval to FDEP as outlined in the Monitoring Required section of the permit.	Comparison to reference wetland(s) will be made once the canopy of the reclaimed wetland is clearly trending towards success	Comparison to reference wetland(s) will be made once the canopy of the reclaimed wetland is clearly trending towards success	Comparison to reference wetland(s) will be made once the canopy of the reclaimed wetland is clearly trending towards success	Comparison to reference wetland(s) will be made once the canopy of the reclaimed wetland in clearly trending towards success	N/A - To be determined once canopy matures
An average of at least 400 trees (> 4" Diameter at Breast Height (DBH) or > 15' tall) per acre, or if densities meet or exceed the range of native canopy trees for the reference wetland for that community type, is required.	There is currently an average of 179 trees (based on species) per acre, with an average tree height of less than six feet.	There is currently an average of 155 trees per acre (based on species), with an average tree height of 12± feet.	There is currently an average of 83 trees (based on species) per acre, with an average tree height of 7.3 ± feet.	There is currently an average of 331.6 trees and 22.8 shrubs (based on species) per acre, with an average height of less than eight feet.	No – Forested component is young, but trending toward success
The upper canopy stratum shall exceed 50 percent of the total forested area and in no area of one acre in size shall the tree shrub cover be less than 33 percent total cover. Cover measurements are restricted to woody species exceeding the herbaceous stratum in height (shrubs) or trees > 4" DBH or > 15' tall and those indigenous species that contribute to the overstory of the mature forest of Horse Creek/Payne Creek and their tributaries and that are wetland vegetation listed in Rule 62-340.450, F.A.C.	Currently Canopy cover averages 0.8%.	Currently Canopy cover averages 0.7%.	Currently Canopy cover averages 2.31%.	Currently canopy cover (based on tree species) averages 4.62%.	No - – Forested component is immature
The total acreage of the wetland shall be jurisdictional, pursuant to Chapter 62-301, F.A.C. The minimum jurisdictional acreage for each wetland type shall be as indicated in the permit drawings and tables	Total Acreage will be calculated upon other attainment of other success criteria. Wetland size, shape and location appear consistent with current permit documents.	Total Acreage will be calculated upon other attainment of other success criteria. Wetland size, shape and location appear consistent with current permit documents.	Total Acreage will be calculated upon other attainment of other success criteria. Wetland size, shape and location appear consistent with current permit documents.	Total Acreage will be calculated upon other attainment of other success criteria. Wetland size, shape and location appear consistent with current permit documents.	N/A - To be determined once remaining criteria are met

Doe Branch Wetland Reclamation, 2003

Doe Branch, DB-IS-R8 - Isolated Marsh, 2012

Doe Branch Upland Reclamation, Gopher Tortoise Burrow, 2012

2.1.3 Brushy Creek Complex

The isolated and connected wetlands within the Brushy Creek drainage area were constructed between 2009-2010 with sand tailings backfill and received muck application within the wetland footprint. The complex consists of deep and shallow marsh (FLUCFCS 641) and mixed hardwood forest (FLUCFCS 617) communities surrounded by a forested upland buffer and adjacent preserve to the West (See Appendix A). The uplands were topsoiled and spaded with mature upland trees. Management activities include prescribed burning in the uplands, maintenance herbicide within the wetlands and uplands, and supplemental plantings as needed to achieve required density. The UMAM scores in this complex range from 0.53 (three-year old forested system) to 0.70 (three-year old herbaceous system) with an overall wetland UMAM average score of 0.63, as shown in the table below.

Table 4 Brushy Creek Wetland Reclamation Summary Table

Wetland ID	Time Since Revegetation	Total UMAM Score
SP-BC-2		
BC-IS-R1	3 years	0.63
BC-IS-R16	3 years	0.70
BC-IS-R2	3 years	0.70
Average		0.67
SP-BC-3		
BC-HW-R1A	3 years	0.53
BC-HW-R1B	3 years	0.63
BC-HW-R2	3 years	0.63
BC-IS-R61	3 years	0.60
BC-IS-R63	3 years	0.63
Average		***0.60***
Total Averages for BC		***0.63***

The BC-HW-R2 and BC-HW-R1 sites are a mix of forested and non-forested wetlands reclaimed through initial revegetation during 2010. The sites were designed to be flow-through systems, functioning as sloughs or strands with sporadic, slowly flowing water. They are close to the headwater position of the watershed and were designed to occupy a transitional position between large headwater depressional wetlands and a downstream preserved riparian wetland and stream corridor. Over the past year, the upland and ecotone wells have exhibited less than 3.2 feet of annual fluctuation, which is within regional norms for natural ground in flatwoods. The upland piezometers also show good positive gradient toward the reclaimed wetlands, and the desired north to south gradient has been established. Similarly, water level fluctuations within the wetland piezometers also appear to be within natural seasonal norms during this time period. A more detailed discussion of the groundwater hydrology for this system is presented in Appendix C.

No formal wildlife surveys have been conducted within the reclaimed wetlands of the Brushy Creek complex; however, several species of waterfowl and wading birds were observed utilizing the area for refuge and foraging during recent mitigation monitoring events. These species include the yellow-crowned night heron (Nyctanassa violacea), woodstork (Mycteria americana), white ibis (Eudocimus albus), great blue heron (Ardea herodias), great egret (Ardea alba), snowy egret (Egretta thula), little blue heron (Egretta caerulea), tri-colored heron (Egretta tricolor), and green heron (Butorides virescens). A red shouldered hawk (Buteo lineatus) was observed perched atop a cabbage palm adjacent to one of the wetlands. One American alligator (Alligator mississippiensis) was observed in the deepest portion of BC-HW-R1A.

A variety of anurans was heard calling throughout the wetlands including pig frog (*Rana grylio*), bullfrog (*Rana catesbeiana*), green tree frog (*Hyla cinerea*), southern cricket frog (*Acris gryllus*), and southern leopard frog (*Lithobates sphenocephalus*). The presence of these native amphibians demonstrates the value of the assemblage of wetland and upland restored habitats on the site.

Table 5 Summary of Release Criteria Relative to Current Site Conditions Based on 2011 Monitoring Reports

Vegetative Monitoring Release Criteria for BC-3	Wetland Hardwood Forest Area		Non-Forested Wetland Area	
	Current site conditions	Success Criteria Being Met	Current site conditions	Success Criteria Being Met
Cover by non-nuisance, non-exotic wetland species listed in Rule 62-340.450, F.A.C., in the herbaceous and shrub layer of the forested wetlands and in each herbaceous wetland shall be at least 80%. Desirable ground cover plant species shall be reproducing naturally, either by normal vegetative spread or through seedling establishment, growth and survival	Cover by desirable vegetation was 81 percent. Desirable ground cover species are reproducing and recruiting naturally throughout BC-3.	Yes, this trend should continue with ongoing maintenance to control nuisance and exotic species.	Cover by desirable vegetation was 62 percent. Desirable groundcover species are reproducing and recruiting naturally throughout BC-3.	Not at this time, maintenance events will continue to focus efforts on controlling the nuisance and exotic species.
Open water areas shall not exceed 15% of the total acreage of the restored wetland.	Open water was at 3 percent cover.	Yes, desirable species are recruiting naturally into these areas.	Open water was at 8 percent cover.	Yes, desirable species are recruiting naturally into these areas.
Cover by nuisance vegetation species, including, but not limited to cattail (*Typha* spp.), and (*Ludwigia peruviana*), shall be limited to less than 10% of the total wetland area. Invasive exotic vegetation shall be limited to less than 0.1% of the total wetland area.	Nuisance vegetation species cover was at 15 percent.	Not at this time, maintenance events will continue to focus efforts on controlling the nuisance and exotic species.	Nuisance vegetation species cover was at 28 percent.	Not at this time, maintenance events will continue to focus efforts on controlling the nuisance and exotic species.
An average of at least 400 trees (~ 4 inches DBH or > 15 feet tall) per acre.	Not applicable at this time. While survival of newly planted trees is high, the height of the trees was not measured.		N/A in non-forested systems.	

Brushy Creek, BC-HW-R1 – Herbaceous Marsh, 2009

Brushy Creek, BC-HW-R1 – Herbaceous, Marsh, 2012

2.1.4 Horse Creek Complex

The isolated and connected wetlands within the Horse Creek drainage area were constructed in 2008 with sand tailings backfill and received muck application within the wetland footprint. The complex consists of deep and shallow marsh (FLUCFCS 641) and wet prairie (FLUCFCS 643) communities surrounded by an upland buffer and adjacent preserve to the West (See Appendix A).. Detailed hydrologic modeling was conducted in order to plan for and achieve shallow wetlands throughout the parcel. The uplands were topsoiled and spaded with mature upland trees. Management activities include maintenance herbicide within the wetlands and uplands, and supplemental plantings as needed to achieve required density. The UMAM scores for these two-year old herbaceous wetlands range from 0.53 to 0.70, with an overall wetland UMAM average score of 0.57, as shown in the table below.

Table 6 Horse Creek Wetland Reclamation Summary Table

Wetland ID	Time Since Revegetation	Total UMAM Score
SP-HC-1		
HC-IS-R10	2 years	0.53
HC-IS-R11	2 years	0.53
HC-IS-R13	2 years	0.53
HC-IS-R14	2 years	0.53
HC-IS-R5	2 years	0.70
HC-IS-R8	2 years	0.60
Average		***0.57***
Total Average for HC		***0.57***

No formal wildlife surveys have been conducted within the reclaimed wetlands of the Horse Creek complex, and monitoring has not yet been conducted, however anecdotal observations of wetland-dependent species using the site for forage and refugia have been made over the past year. Birds include the woodstork (*Mycteria americana*), white ibis (*Eudocimus albus*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), little blue heron (*Egretta caerulea*), and green heron (*Butorides virescens*). In addition to birds, a variety of anurans were heard calling throughout the wetlands including the pig frog (*Rana grylio*), green tree frog (*Hyla cinerea*), southern cricket frog (*Acris gryllus*), and southern leopard frog (*Lithobates sphenocephalus*). White-tailed deer (*Odocoileus virginianus*), nine-banded armadillo (*Dasypus novemcinctus*) and feral pigs (*Sus scrofa*) have also been observed in the Horse Creek complex.

Horse Creek HC-IS-R-11 - Wet Prairie, 2012

2.2 Stream Reclamation

Reclamation of stream channels impacted by mining activities is regulated primarily at the state level, with requirements to maintain or improve the biological functions of systems affected by surface mining operations (Chapter 378, Florida Statutes) and to restore impacted streams on a linear foot-for-foot basis (Chapter 62C-16.0051(4), F.S.). Over time in the mining industry, stream reclamation techniques have evolved from allowing channels to self-adjust via natural sediment erosion and transport processes to carefully constructing the stream and riparian system mechanically. CF Industries has been a leader in applying state-of-the-art techniques to construct stream channels, It is CF's intent to not only restore the value of systems impacted by mining operations, but to improve upon the ecologic function of these systems, particularly where impacted areas were previously altered by other land usage (such as agriculture) prior to mining.

This section documents the history and conditions of four reclaimed, low-order streams on CF's Hardee Mine property: R-7, R-10, DB-2, and DB-5. These systems vary in age, construction technique, and basin characteristics and each are described here.

2.2.1 <u>Background and Environmental Setting</u>

Each of the four streams addressed in this section (R-7, R-10, DB-2, and DB-5) are low-order tributaries to Payne Creek, situated on formerly mined lands within the CF Hardee Mine Complex. The Payne Creek basin lies within the Peace River watershed in west central Florida, ultimately draining to the Gulf of Mexico through Charlotte Harbor. Sites R-7 and R-10 are within the Hickey Branch sub-basin draining to Payne Creek from the north, and sites DB-2 and DB-5 are streams within the Doe Branch sub-basin draining to Payne Creek from the south (Figure 1).

Historic low-order streams that existed in the headwater portions of the Hickey Branch and Doe Branch sub-basins and in the vicinity of the stream sites addressed in this section, occurred within the Bone Valley Uplands physiographic province as mapped and described by H.K. Brooks in "Physiographic Divisions of Florida". The distribution of this data from H.K. Brooks was reproduced in geospatial mapping format by the St. Johns River Water Management District for the entire state (SJRWMD, 1997),

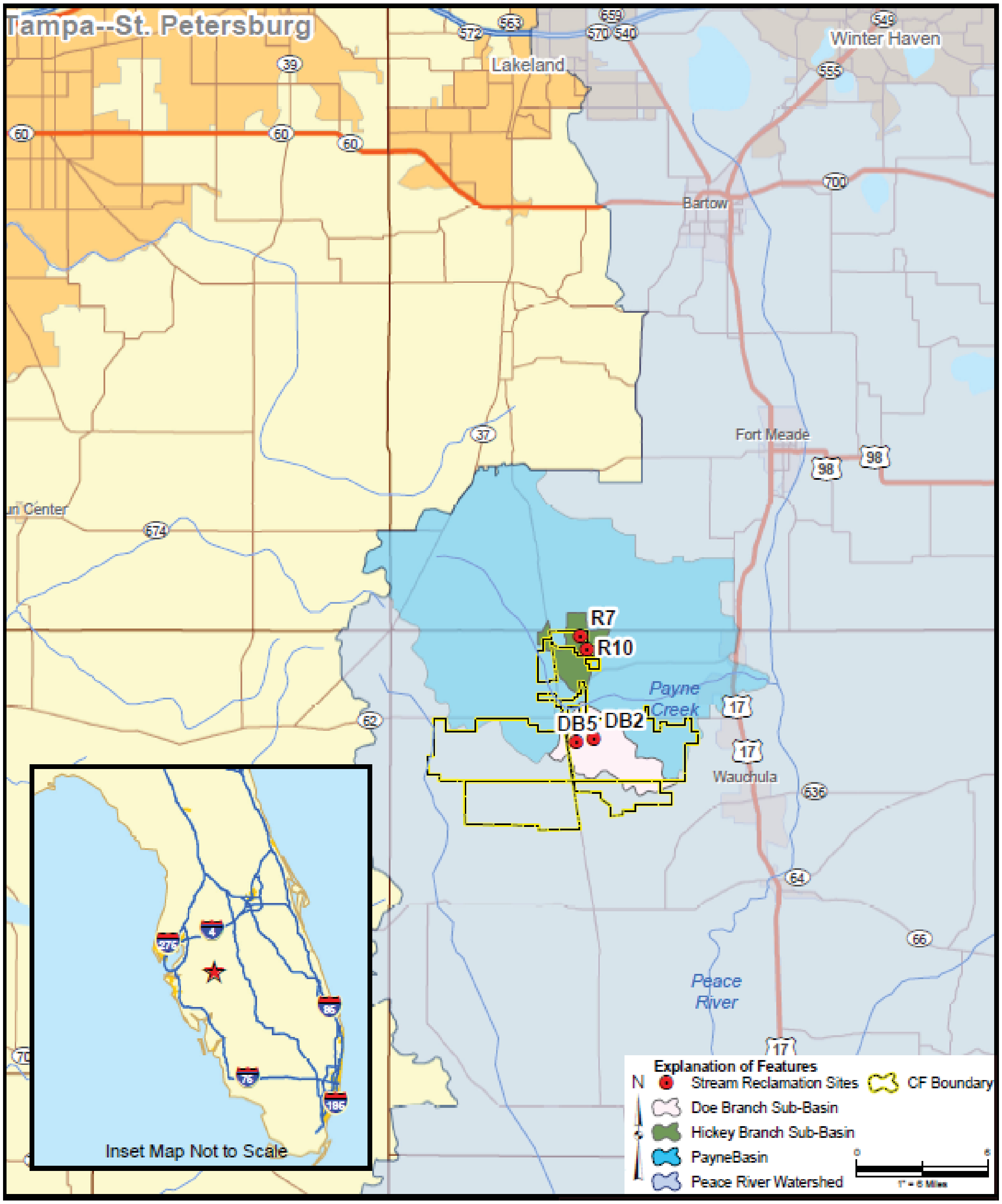


Figure 1 Watershed Location Map

and those maps depict the historic and reclaimed stream contributing areas as situated within the southwestern flatwoods regional landscape community.

2.2.1.1 Hickey Branch Reclamation Streams R-7 and R-10

Review of historic aerial photography indicates mining activity within the contributing basin for Hickey Branch since at least the early 1970s, if not prior. Mining activities are apparent in place of natural Hickey Branch tributaries in the vicinity of R-7 and R-10, as seen in aerials flown in late 1992; reclamation construction of the R-7 and R-10 stream valleys was completed by the late 1980s. The Hickey Branch reclamation project consisted of three phases. R-7 was the first phase and was completed in 1985, while R-10 was the third phase and was completed in 1989. The stream valleys were constructed using early stream reclamation techniques, i.e., by spreading overburden over sandy clay, and allowing the stream channels to be carved via natural hydraulic weathering processes. This technique allows the stream to self-adjust based on the valley slope and weather patterns. As early as 1995, a well-defined channel approximately 200 meters long had formed at the R-7 site (Biological Research Associates - BRA, 1995). Over time, R-7 and R-10 have developed well-defined banks lined with cypress and pop ash roots. While effective, because natural weathering can take up to 10 to 20 years to achieve channel size and shape akin to natural streams, this passive construction method is no longer endorsed by the FDEP to create stream channels.

R-7 Photographs

R-10 Photographs

Since reclamation activities were initiated in the Hickey Branch sub-basin, additional events have occurred that should be noted in this site description. A containment dam breach occurred off CF property at the adjacent property clay settling area just north of the R-7 contributing basin in October 1994. The breach resulted in sheet flow and some concentrated channel flow of clays to wetland communities and conveyances contributing to R-7 and R-10. Some of the resulting sediment still remains in these streams, surrounding wetlands, and ponds, albeit now largely covered by naturally deposited organic sediments. To further improve these systems and demonstrate more advanced reclamation techniques, several enhancement structures were installed in R-7 and R-10 in 2007 and 2012 to increase sinuosity, protect bends, and create habitat and pools. Further, to complete reclamation work in this portion of the formerly mined property, the strand of wetlands, ponds and stream habitats associated with R-7 and R-10 were reconnected at the southern end to the downstream Hickey Branch stream preservation area in 2009.

2.2.1.2 Doe Branch Reclamation Streams DB-2 and DB-5

Review of historic and recent aerial photography indicates that mining activities took place in the Doe Branch sub-basin during the late 1990s. Reclamation within areas surrounding the DB-2 and DB-5 streams, including DB-2 headwater wetland DB-TR-R1 and DB-5 headwater wetland DB-HW-R3, was well under way in the early 2000s. Construction to complete reclamation of the low order streams DB-2 and DB-5 occurred in 2007 and 2009, respectively, using more current stream construction techniques including hydraulic carving and mechanical construction.

<u>Hydraulic Carving</u>

The DB-2 stream reclamation effort was implemented as a direct hydraulic carving stream construction demonstration project. “Hydraulic carving” is a term used to describe an innovative technique whereby water is pumped through a reclaimed valley at the bankfull discharge (as determined from peninsular Florida regional curves) to form a channel equivalent to what would occur over a longer time frame in nature. The theory behind this approach is based on one of the fundamental concepts of fluvial geomorphology—effective discharge. Most streams have highly variable flow regimes dependent on rainfall patterns, with not all flow events doing equivalent amounts of work in forming and maintaining a channel. The flow quantity that does the most overall work is often referred to as the effective discharge.

Bankfull discharge, the flow that occurs just before flow enters its floodplain, is often assumed to be equivalent to the effective discharge in alluvial streams (Knighton, 1998). Under the concept of dominant discharge, if a system were to have constant flow rates at the effective discharge threshold, the channel cross-section would be very similar to what occurs over a very long time series of variable discharge rates. In other words, a stream could be fully dimensioned by applying a constant flow rate for a relatively short period of time at the effective discharge level.

The geomorphology of DB-2 was created using this technique to form a naturally meandering stream with appropriate channel size and riffle-pool spacing within a matter of two months. An approximate 1,100-foot long by 90-foot wide valley was first constructed, and large woody debris was placed throughout the valley to help guide the water. Infrastructure used to implement this project included a mechanical pump at the upstream end, a sink at the downstream end to accumulate the predicted sediment yield during the hydraulic carving period, and a return water ditch to recirculate the water back to the pump (Figure 2). Repeat surveys were conducted each week to document channel evolution (Figure 3). Once the channel had reached the predicted size, after a few weeks of pumping, additional large woody debris was installed throughout the channel to increase habitat diversity.

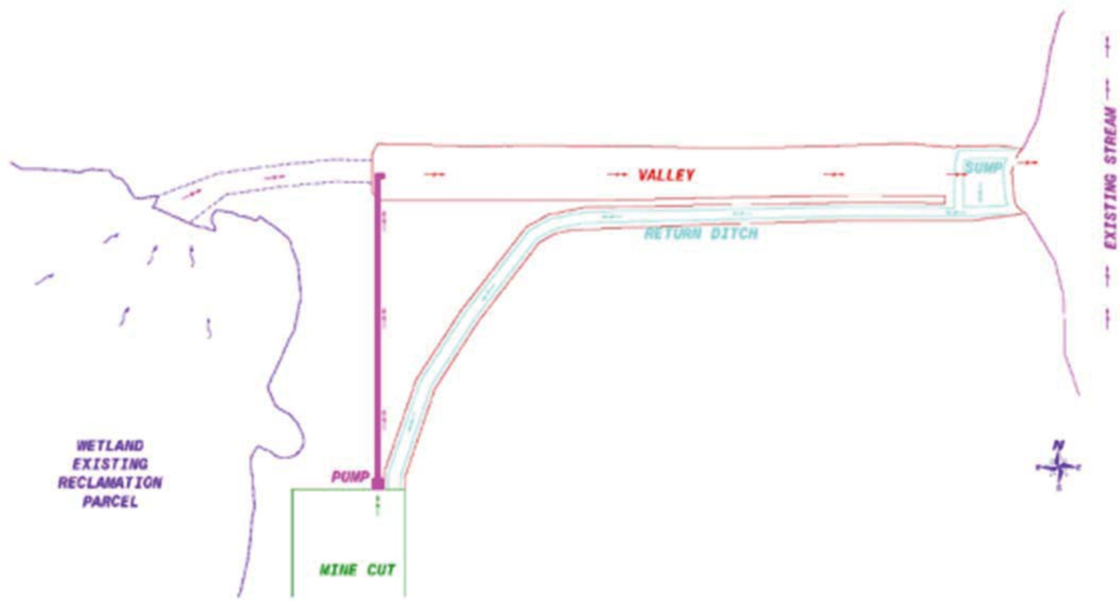


Figure 2 DB-2 Infrastructure

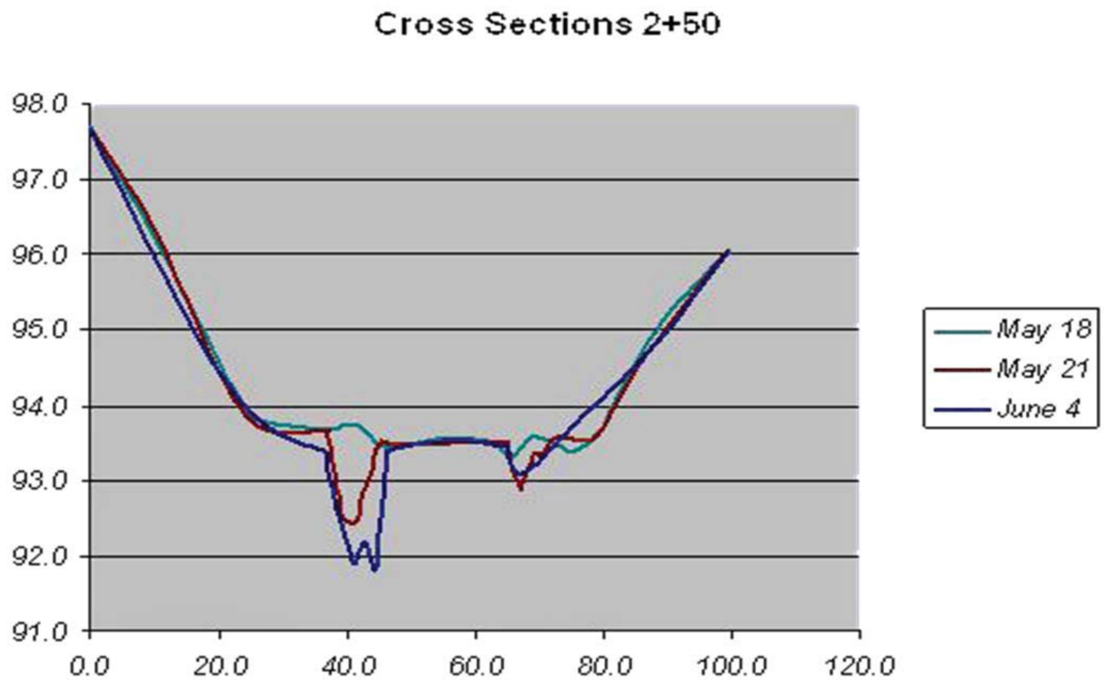


Figure 3 DB-2 Repeat Cross-Sectional Survey

Perhaps the greatest benefits to this approach are that the water "conditions" the site in a very natural way, and the processes serve to create open channels only where the valley slope can support them. This latter point is very important in peninsular Florida, which has many discontinuous open channels in a deranged network (e.g., lots of large in-line depressions scattered between open channels, arranged like beads on string). This technique also takes advantage of existing stormwater management infrastructure and can represent a savings over mechanical construction, especially for long reclaimed stream segments. The downstream sump, return water ditch, mechanical pump, and pipes infrastructure currently remain in place at DB-2, as it has not yet been connected to its contributing basin and downstream receiving wetland preservation area. As a result, the infrastructure remains in place to perform necessary flow maintenance flushes of the stream channel, but will ultimately be removed when the stream is released.

Mechanical Construction

The 1000-foot long DB-5 stream channel was created via mechanical construction in 2009 to replace an existing ditch with a naturally meandering stream channel of appropriate size and shape connecting the headwater wetland to the downstream receiving wetland preserve. Mechanical construction is a technique by which a stream is built in accordance with a detailed plan set outlining proper stream dimension (width and depth), bend geometry, and riffle-pool sequence. Design specifications for DB-5 were based on natural channel designs derived from regional data to ensure that the stream fit its watershed (Kiefer 2010, Blanton 2008). Natural channel design approaches make sense, in part, because CF's integrated groundwater-surface water modeling and hydrology monitoring data indicate that the surface and subsurface drainage characteristics of the post-reclamation landscape are within the natural seasonal range of fluctuations found in flatwoods-dominated physiographies typical of the region.

Soil bioengineering techniques were incorporated to approximate Florida's vegetative conditions. A bottom-up approach was taken, in which the valley flat was first constructed at a subgrade elevation to the series of desired pool depths along the valley's meander belt. Stream banks were then built by laying mucky mineral top soil to a height of two feet along the length of the meandering left and right banks. Constructed stream banks were then wrapped with erosion control blankets (ECB), and most of the bank length was backfilled with live saw palmetto root masses. Palmetto roots were installed not only to provide bank stability and to hold the soil together once the ECB decomposes, but also because natural Florida headwater streams often have saw palmetto along their banks. The remaining valley flat was then filled with native sandy top soil. Last, fine to medium sandy soil was placed at the riffles and blended towards the pools. Habitat amendments such as large woody debris, v-log weirs (to induce pools), and root wads were also installed. DB-5 was built in just three weeks (eight actual construction days) and clearly demonstrates CF's ability to get properly-dimensioned streams in the ground quickly. This method is likely to be more efficient and cost-effective than hydraulic carving for stream valleys less than 1,000 feet long.

DB-2 Photographs

2007

2012

DB-5 Photographs

2008

2012

2.2.2 Documentation of Conditions

2.2.2.1 Habitat Assessment

Habitat quality at CF's reclamation stream sites has been assessed using the FDEP Habitat Assessment (HA) methodology, in which eight attributes known to potentially affect stream biota are evaluated and scored, including:

- Substrate Diversity – Relative quantity and productivity of macroinvertebrate habitats;
- Substrate Availability – Relative habitat abundance;
- Water Velocity – suitability to support desired macroinvertebrate taxa;
- Habitat Smothering – sedimentation;
- Artificial Channelization – Sinuosity and connection with floodplain;
- Bank Stability – Sign of or potential for erosion;
- Riparian Buffer Zone Width – proximity to human activities or landscape alterations; and
- Riparian Zone Vegetation Quality – Native species, community structure, and zonation (FDEP, 2008b).

Hickey Branch reclamation streams R-7 and R-10 have been assessed using the HA over the last 14 and 11 years, respectively. R-7's HA scores have ranged from 99 to 120, falling within the Suboptimal category, while R-10s HA scores have ranged from 107 to 129, falling within both the Optimal and Suboptimal categories. Habitat types mapped at these sites include root mats, leaf packs, large woody debris, and aquatic vegetation. Some level of habitat smothering, however, has been an issue at both sites due to the previously mentioned off-site clay settling area dam failure in 1994, which has adversely affected the area by contributing fine sediment.

Doe Branch reclamation sites DB-2 and DB-5 are considerably younger in age (five and three years old, respectively) and have not yet been fully connected to their reclaimed watersheds. One HA has been performed at each site; however, the streams were dry at the time of sampling, and bankfull conditions were thus assumed for habitat mapping purposes. HA scores ranged from 122 to 130, falling in the Optimal category. Habitat types included snags and aquatic vegetation.

In a study comparing reclaimed streams to unmined streams, FDEP (2007) found that mean coverage of snags was more than twice as high in unmined streams than reclaimed streams and leaf pack coverage was three times higher in unmined streams. This is because tree canopy in reclaimed riparian forests can take years to fully develop and provide materials such as snags and leaves to the stream system. CF has thus taken steps in recent years to increase habitat diversity and availability in the older reclaimed sites (R-7 and R-10) by installing enhancement structures such as V-log weirs, J-hooks, wing deflectors, and random large woody debris that both encourage the formation of bends and pools and create instant habitat. One of the benefits of actively constructing stream channels such as DB-2 and DB-5 is that these types of habitat amendments can be prescribed and added to the stream during construction, thus providing instant habitat. This is a technique CF currently employs in its stream reclamation projects.

Although the HA method is a stream evaluation method to assess the physical health of a stream, it is also applied as the first step in the more intensive Stream Condition Index (SCI) sampling protocol described further in the section below. Because the HA is used as part of a macroinvertebrate sampling method, it requires specific flow conditions. The HA method can, however, be applied in a hypothetical manner to assess the physical functions of the stream (as was done in the case of DB-2 and DB-5), although the scoring results of such investigations may not be viewed as valid under the DEP Standard Operating Procedures because these low order streams rarely meet the requisite flow duration for a valid application.

2.2.2.2 Biota

Macroinvertebrates

The macroinvertebrate communities have been sampled and assessed using a variety of sampling protocols including Hester-Dendy, both the Bio-Recon, and Stream Condition Index (SCI) methodologies at Hickey Branch stream reclamation sites R7 and R10 for many years (Henslick, Seagle, Steinbaum & Associates 1991, BRA 1995 & 2001, FDEP 1999 & 2007). The Bio-Recon sampling collects invertebrates from multiple substrates using four discrete dip net sweeps. The community is then assessed based on the following three categories, two of which must meet a minimum species criterion in order to pass the BioRecon:

- Total Taxa - the total number of macroinvertebrate species at a site;
- Florida Index - assigns points to aquatic macroinvertabrates based on their sensitivity to pollution, with a higher Florida index considered healthy; and

  Ephemeroptera/Plecoptera/Trichoptera (EPT) Index - sums the number of mayfly/stonefly/caddisfly species present, with higher EPT values associated with healthier systems.

The SCI macroinvertebrate sampling technique involves collection of macroinvertebrates by performing 20 sweeps of representative major and minor aquatic habitat within a specified stream sampling reach. Macroinvertebrates are sorted in the laboratory, and the SCI stream performance score is developed based on the following ten metrics:

- Total taxa
- Ephemeroptera taxa
- Trichoptera taxa
- % filter feeder
- Long-lived taxa
- Clinger taxa
- % dominance
- % tanytarsini
- Sensitive taxa
- % very tolerant

Species richness of the macroinvertebrate communities at R-7 and R-10 has increased substantially over time, with 46 and 30 total taxa present, respectively, during the most recent sampling event in August 2011 (Tables 7 and 8). Various feeding guilds are present and the number of EPT species has increased over time. Both the total number of species and number of EPT species found within R-7 and R-10 fall within the range or exceed those observed in low-order, unmined streams (FDEP, 2007). In an older study of low-order stream systems in the area, R-7 and R-10 were the only sites to have caddisfly and mayfly species (other than the downstream unnmined portion of Hickey Branch), despite the fact that they were reclamation streams (or directly downstream of reclamation streams) (BRA, 2001).

Even so, neither R-7 nor R-10 have passed a BioRecon or SCI assessment. This is not surprising nor does it indicate that these reclamation streams are not healthy, as FDEP (2000b and 2007) and BRA (2001) found that nearly all the sites in their studies (which included both low-order reclaimed and unmined streams) failed the revised BioRecon, indicating that the criteria used in these assessments may not be appropriate for low-order streams with less than perennial flow that are in close association with wetland systems. However, FDEP (2007) found that taxa richness values and the number of EPT taxa were similar in both reclaimed and unmined streams, with reclaimed streams providing functions similar to those of unmined streams approximately 13 to 14 years after construction. FDEP (2007) suggested that this timeframe could be accelerated by increasing floodplain plantings and adding habitat structure such as woody debris within the channel, which CF has done at its stream reclamation sites.

Macroinvertebrates have not yet been sampled at Doe Branch reclamation stream sites DB-2 and DB-5 as these systems have not yet been tied to their entire watersheds and therefore do not meet the specific flow conditions necessary to perform these assessments.

Table 7 CF Reclamation Stream Macroinvertebrate Taxa

		5/28/1991	10/30/2001	8/26/2011
R-7	EPT Taxa*	1	2	2
	Other Taxa	10	12	44
	Total Taxa	**11**	**14**	**46**
R-10	EPT Taxa*	1	2	5
	Other Taxa	5	12	25
	Total Taxa	**6**	**14**	**30**

Table 8 CF Reclamation Stream Macroinvertebrate Species List

Phylum	Class	Order	Family	Genus Species	R-7			R-10		
					5/28/1991	10/30/2001	8/26/2011	5/28/1991	10/30/2001	8/9/2011
Annelida	Hirudinea	Arhynchobdellida	Erpobdellidae				X			
Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae	*Helobdella* sp.			X			
Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae	*Placobdella* sp.			X			
Annelida	Hirudinea	Rhynchobdellida	Glossiphoniidae	sp.		X	X		X	
Annelida	Hirudinea			sp.	X			X		
Annelida	Oligochaeta			sp.		X	X		X	X
Arthropoda	Arachnida			sp.					X	
Arthropoda	Insecta	Coleoptera	Chrysomelidae	sp.			X			
Arthropoda	Insecta	Coleoptera	Dryopidae	*Pelonomus obscurus*			X			
Arthropoda	Insecta	Coleoptera	Dryopidae	sp.			X			X
Arthropoda	Insecta	Coleoptera	Elmidae	*Dubiraphia vittata*			X			X
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus* sp.					X	X
Arthropoda	Insecta	Coleoptera	Elmidae	*Stenelmis* sp.			X			X
Arthropoda	Insecta	Coleoptera	Gyrinidae	*Gyretes iricolor*			X			
Arthropoda	Insecta	Coleoptera	Gyrinidae	*Dineutus* sp.	X	X			X	
Arthropoda	Insecta	Coleoptera	Haliplidae	*Peltodytes dietrichi*		X	X			
Arthropoda	Insecta	Coleoptera	Haliplidae	*Peltodytes* sp.	X		X			
Arthropoda	Insecta	Coleoptera	Hydrophilidae	*Derallus altus*			X			
Arthropoda	Insecta	Coleoptera	Hydrophilidae	*Hydrobiomorpha* sp.			X			
Arthropoda	Insecta	Coleoptera	Hydrophilidae	*Hydrophilus* sp.			X			
Arthropoda	Insecta	Coleoptera	Hydrophilidae	sp.	X	X	X			
Arthropoda	Insecta	Coleoptera	Noteridae	*Hydrocanthus* sp.			X			
Arthropoda	Insecta	Coleoptera	Noteridae	*Suphisellus* sp.			X			
Arthropoda	Insecta	Coleoptera	Scirtidae	sp.						X
Arthropoda	Insecta	Diptera	Chironomidae	*Ablabesymia mallochi*						X
Arthropoda	Insecta	Diptera	Chironomidae	*Larsia* sp.			X			X
Arthropoda	Insecta	Diptera	Chironomidae	*Lauterborniella* sp.			X			
Arthropoda	Insecta	Diptera	Chironomidae	*Pentaneura* sp.						X
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum halterale* grp.			X			
Arthropoda	Insecta	Diptera	Chironomidae	*Tanypus* sp.			X			
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus* sp.						X
Arthropoda	Insecta	Diptera	Chironomidae	*Tribelos fuscicorne*						X
Arthropoda	Insecta	Diptera	Chironomidae	sp.	X	X			X	
Arthropoda	Insecta	Diptera	Chironomidae	*Chironomus riparius*	X					
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum* sp.	X					
Arthropoda	Insecta	Diptera	Simuliidae	sp.						X
Arthropoda	Insecta	Diptera	Stratiomyidae	sp.			X			X
Arthropoda	Insecta	Diptera	Tabanidae	sp.			X			
Arthropoda	Insecta	Diptera (pupa)		sp.			X			X
Arthropoda	Insecta	Ephemeroptera	Caenidae	*Caenis* sp.	X		X			X
Arthropoda	Insecta	Ephemeroptera		sp.		X			X	X
Arthropoda	Insecta	Hemiptera	Belostomatidae	sp.			X			
Arthropoda	Insecta	Hemiptera	Naucoridae	*Pelocoris* sp.			X			
Arthropoda	Insecta	Lepidoptera	Crambidae	*Paraponyx* sp.						X
Arthropoda	Insecta	Odonata	Calopterygidae	*Calopteryx* sp.					X	
Arthropoda	Insecta	Odonata	Coenagrionidae	*Enallagma* sp.		X	X		X	
Arthropoda	Insecta	Odonata	Coenagrionidae	*Ishnura* sp.			X	X		
Arthropoda	Insecta	Odonata	Coenagrionidae	*Nehalennia* sp.			X			
Arthropoda	Insecta	Odonata	Coenagrionidae	*Telebasis byersi*			X			
Arthropoda	Insecta	Odonata	Coenagrionidae	sp.			X			
Arthropoda	Insecta	Odonata	Gomphidae	*Species A*						X
Arthropoda	Insecta	Odonata	Gomphidae	*Species B*						X
Arthropoda	Insecta	Odonata	Libellulidae	sp.		X	X			X
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche* sp.		X		X	X	X
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Oecetis* sp.						X
Arthropoda	Insecta	Trichoptera	Philopotamidae	*Wormaldia moesta*						X
Arthropoda	Insecta	Trichoptera		sp.			X			
Arthropoda	Malacostraca	Amphipoda	Hyalellidae	*Hyalella azteca*	X	X	X	X	X	X
Arthropoda	Malacostraca	Decapoda	Cambaridae	*Procambarus* sp.		X	X		X	
Arthropoda	Malacostraca	Decapoda	Cambaridae	sp.			X			X
Arthropoda	Malacostraca	Decapoda	Palaemonidae	*Palaemonetes* sp.		X	X			X
Arthropoda	Malacostraca	Isopoda	Asellidae	sp.			X			X
Mollusca	Bivalvia	Veneroida	Pisidiidae	*Pisidium* sp.			X			X
Mollusca	Bivalvia			sp.			X			
Mollusca	Gastropoda	Basommatophora	Ancylidae	*Hebetoncylus excentricus*				X		
Mollusca	Gastropoda	Basommatophora	Physidae	*Physella gyrina*			X			X
Mollusca	Gastropoda	Basommatophora	Planorbidae		X		X	X	X	
Mollusca	Gastropoda	Neotaenioglossa	Hydrobiidae							X
Mollusca	Gastropoda	Neotaenioglossa	Pleuroceridae	*Elimia* sp.			X			
Mollusca	Gastropoda	Neotaenioglossa	Thiaridae	*Melanoides tuberculata*		X			X	
Nemata				sp.	X					
				Total Taxa	**11**	**14**	**46**	**6**	**14**	**30**

<u>Fish and Wildlife</u>

Numerous fish and wildlife species have been observed utilizing CF's reclamation stream sites (Table 9). These observations have been general in nature, with the exception of a quantitative fish sampling event conducted at R-7 in late 1993 (BRA, 1995). The species assemblage found in R-7 at that time closely matches that of a typical Florida wetland, which is common for low-order streams. Quantitative wildlife surveys have been conducted in the headwater wetlands of these reclamation sites, and future monitoring events at the reclaimed stream sites will include a fish sampling component.

Table 9 CF Reclamation Stream Fish and Wildlife

Scientific Name	Common Name	R-7	R-10	DB-2	DB-5
Fish					
Clarias batrachus	Walking catfish	X			
Elassoma zonatum	Banded pygmy sunfish	X			
Etheostoma fusiforme	Swamp darter	X			
Gambusia affinis	Mosquitofish	X			
Heterandria formosa	Least killifish	X			
Lepomis gulosus	Warmouth	X			
Lepomis macrochirus	Bluegill	X			
Notropis petersoni	Coastal shiner	X			
Amphibians					
Rana grylio	Pig frog	X			
Rana sphenocephala	Southern leopard frog	X			
Reptiles					
American alligator	Alligator mississippiensis	X		X	X
Sternotherus odoratus	Musk turtle		X		
Birds					
Buteo lineatus	Red shoulder hawk	X			X
Cathartes aura	Turkey vulture	X			
Elanoides forticatus	Swallowtail kite				X
Mammals					
Sus scrofa	Feral hogs		X	X	
Sylvilagus floridanus	Cottontail rabbit			X	

<u>In-Stream and Floodplain Vegetation</u>

Previous quantitative vegetative monitoring has occurred on transects lying within the reclaimed streams' headwater wetlands, but not within the stream channels and adjacent floodplains. Qualitative monitoring was thus completed in May 2012 to document in-stream and floodplain vegetative species at CF reclamation stream sites R-7, R-10, DB-2, and DB-5 (Table 10). The reclamation sites boast a high diversity of plant species. The older reclamation sites, R-7 and R-10, have a more mature canopy providing shade to the streams, while younger DB-2 and DB-5 currently have a more open canopy allowing for the growth of more aquatic vegetation within the stream channel. Approximately 25 percent of DB-5's banks were lined with saw palmetto, demonstrating CF's ability to create palmetto-lined streams.

Table 10 CF Stream Reclamation In-Stream and Floodplain Vegetative Species

Scientific Name	Common Name	DB2	DB5	R7	R10
Acer rubrum	red maple	x	x	x	x
Alternanthera philoxeroides	alligator weed	x	x	x	x
Ambrosia artemisiifolia	ragweed	x	x	x	x
Ampelopsis arborea	pepper-vine			x	x
Andropogon glomeratus	bushy broom grass	x	x		
Andropogon virginicus var. glaucus	chalky bluestem	x			
Asimina reticulate	paw paw		x		
Baccharis halimifolia	saltbush	x	x		
Bacopa monnieri	smooth water hyssop	x	x		
Bidens alba	beggar ticks	x			
Boehmeria cylindrical	bog hemp			x	x
Callicarpa americana	beauty berry	x			
Celtis laevigata	hackberry			x	
Centella asiatica	spadeleaf	x			
Cephalanthus occidentalis	button bush	x		x	x
Chenopodium ambrosioides	Mexican tea	x			
Cicuta spp.	water hemlock			x	x
Cirsium nuttallii	Nutall's thistle	x	x	x	
Commelina diffusa	day flower	x		x	x
Coreopsis floridana	Florida tickseed	x			
Cuphea hyssopifolia	Florida heather	x			
Cynodon dactylon	Bermuda grass	x	x		
Cvperus spp.	flatsedge		x	x	x
Dichromena colorata	white top sedge	x			
Diospyros virginiana	persimmon	x	x		
Eclipta alba	false daisy		x	x	
Eragrostis spp.	love grass	x			
Erechtites hieraciifolia	fireweed	x	x	x	
Eupatorium capillifolium	dogfennel	x	x		x
Eupatorium leptophyllum	marsh thoroughwort		x		
Fraxinus caroliniana	pop ash			x	x
Hydrocotyle umbellata	dollarweed	x	x	x	x
Imperata cylindrica	cogon grass	x			
Iris virginica	blue flag iris				x
Juncus marginatus	rush	x			
Juncus spp.	soft rush	x	x		
Lepidium virginicum	pepper grass	x	x	x	
Liquidambar styraciflua	sweet gum	x	x	x	x
Ludwigia octovalvis	water-primrose	x			
Ludwigia peruviana	primrosewillow	x	x	x	
Ludwigia repens	red ludwigia	x	x	x	
Luziola fluitans (syn. Hydrochloa caroliniensis)	water grass	x	x		
Magnolia virginiana	sweet bay	x	x		
Mikania scadens	hemp vine	x	x		
Mimosa microphylla	sensitive vine		x		
Myrica cerifera	wax myrtle	x	x	x	x
Nephrolepis spp.	sword fern				x
Oxalis stricta	yellow sorrel	x			
Panicum hemitomon	maidencane		x	x	
Panicum repens	torpedo grass	x	x		
Panicum virgatum	switchgrass	x			
Parietaria spp.	pellitories	x	x		
Parthenocissus quinquefolia	Virginia creeper			x	

Scientific Name	Common Name	DB2	DB5	R7	R10
Phyla nodiflora	frog fruit	x	x		
Phytolacca americana	pokeweed	x	x	x	
Pinus eliottii	slash pine	x	x		
Pistia stratiotes	water lettuce			x	
Pluchea odorata	salt marsh fleabane	x	x	x	
Polygonum hydropiperoides	smart weed	x	x	x	
Pontederia cordata	pickerel weed	x		x	
Pterocaulon pycnostachyum	blackroot	x	x		
Quercus laurifolia	laurel oak	x			
Quercus virginiana	live oak	x	x		
Rhus copallinum	winged sumac		x		
Rubus spp.	blackberry		x		
Rumex obtusifolius	bitter dock (spurge)		x		
Sabal palmetto	cabbage palm	x			
Sagittaria graminea	grassy arrowhead	x			
Sagittaria lancifolia	duck potato	x	x		
Salix caroliniana	Carolina willow			x	x
Sambucus canadensis	elderberry		x		
Saururus cernuus	lizards tail			x	x
Schinus terebinthifolius	Brazilian pepper			x	
Serenoa repens	saw palmetto	x	x	x	
Setaria geniculata	knotproof bristlegrass		x		
Solanum viarum	tropical soda apple	x	x		
Spartina bakeri	sand cordgrass		x		
Sporobolus indicus	smut grass		x		
Taxodium distichum	bald cypress			x	x
Thelypteris spp.	shield fern			x	x
Toxicodendron radicans	poison ivy				x
Tripsacum dactyloides	fakahatchee grass	x	x		
Typha latifolia	cattail		x		
Ulnus Americana	American elm			x	x
Urena lobata	Caesarweed			x	
Vitis rotundifolia	muscadine		x		
Woodwardia virginica	Virginia chain fern				x

2.2.3 Hydrology

Staff gages equipped with continuously-recording pressure transducers were installed within the reclamation streams to document water levels over time at the Hickey Branch sites (R-7 and R-10) in December 2009 and the Doe Branch sites (DB-2 and DB-5) in February 2011. Water stages (gage height) over time are provided in Figures 4-7. Flows are not reported, as stage-discharge rating curves are currently being developed in order to relate gage height to flow. As can be seen in Figures 3 and 4, as well as observed in the field, R-7 and R-10 contain water the majority of the time; however, it is uncertain how many days per year the flow velocities represent ideal conditions for metrics such as the SCI. DB-2 is not yet connected to its entire watershed, and the spikes seen in the hydrograph likely represent times when the pump has been turned on to conduct maintenance flows through the system (Figure 5). DB-5 is clearly intermittent, receiving flow only when its headwater wetland overflows, as is typical in low-order Florida streams (Figure 6, Table 5).

Hickey Branch, which remains unmined south of CF's North Pasture, was also assessed to determine if its hydrology has been negatively impacted by mining and subsequent reclamation. Long-term monitoring of flow, macroinvertebrates, and water quality has been undertaken in this portion of the stream since the early 1990s and has shown that mining has not negatively impacted unmined Hickey Branch, which ultimately contributes to Payne Creek. Based on an analysis of the long-term flow record, the unmined portion of Hickey Branch was found to have fewer zero flow days per year than other low-order, flatwoods draining reference streams (all but one of which have been gaged and monitored by AMEC for the last three plus years) (Figure 7, Table 11). Hickey Branch's macroinvertebrate community also does not appear to be negatively impacted by upstream mining and subsequent reclamation, as indicated by sampling conducted by BRA (2001).

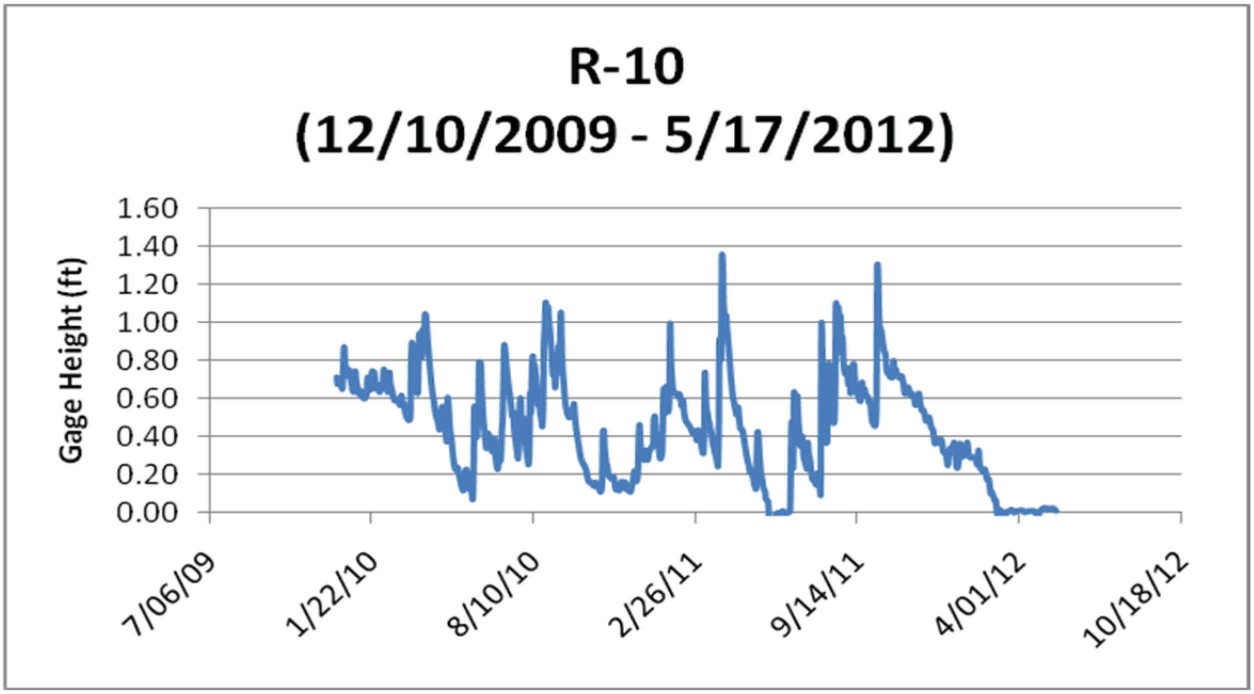


Figure 4 R-7 Hydrograph (12/10/2009 – 5/17/2012)

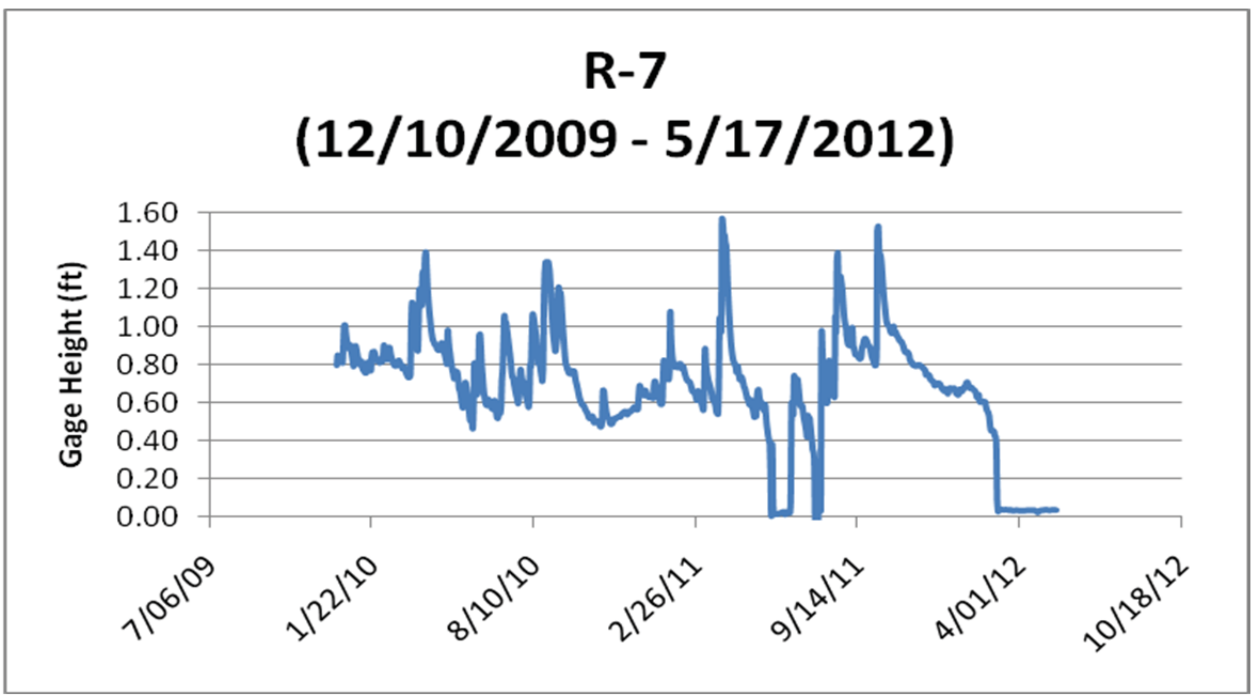


Figure 5 R-10 Hydrograph (12/10/2009 – 5/17/2012)

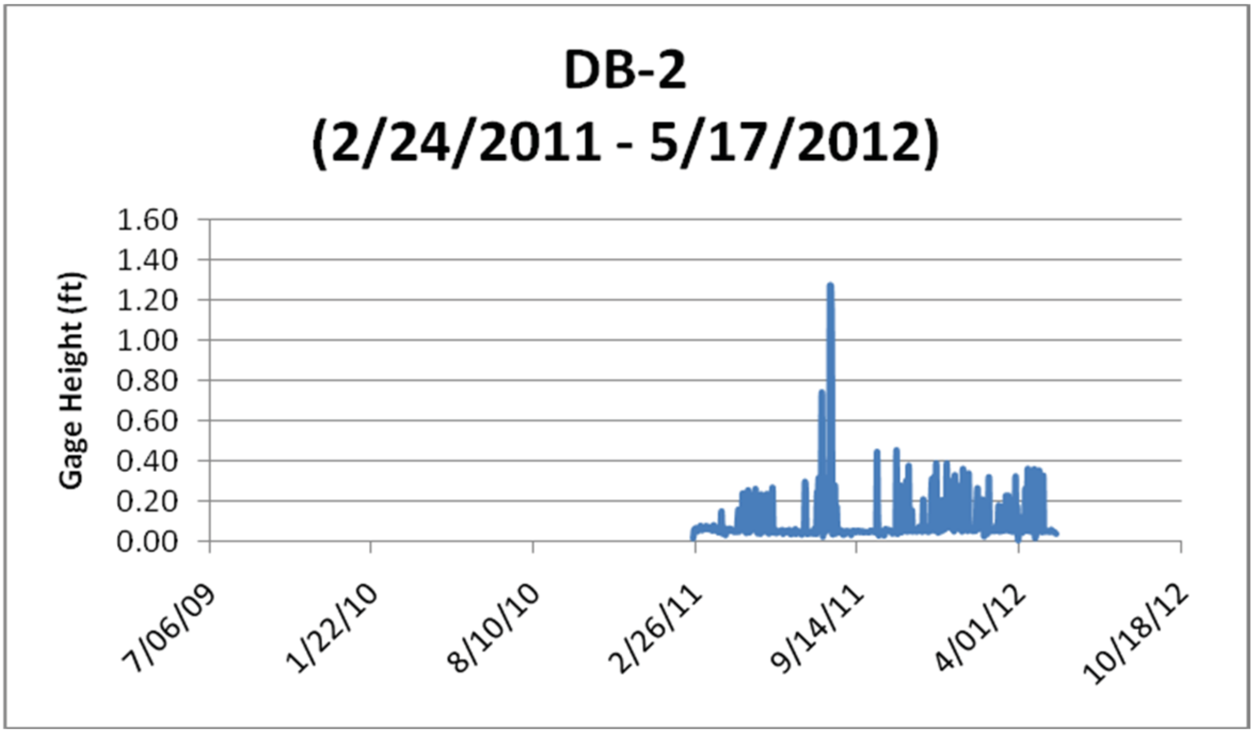


Figure 6 **DB-2 Hydrograph (2/24/2011 – 5/17/2012)**

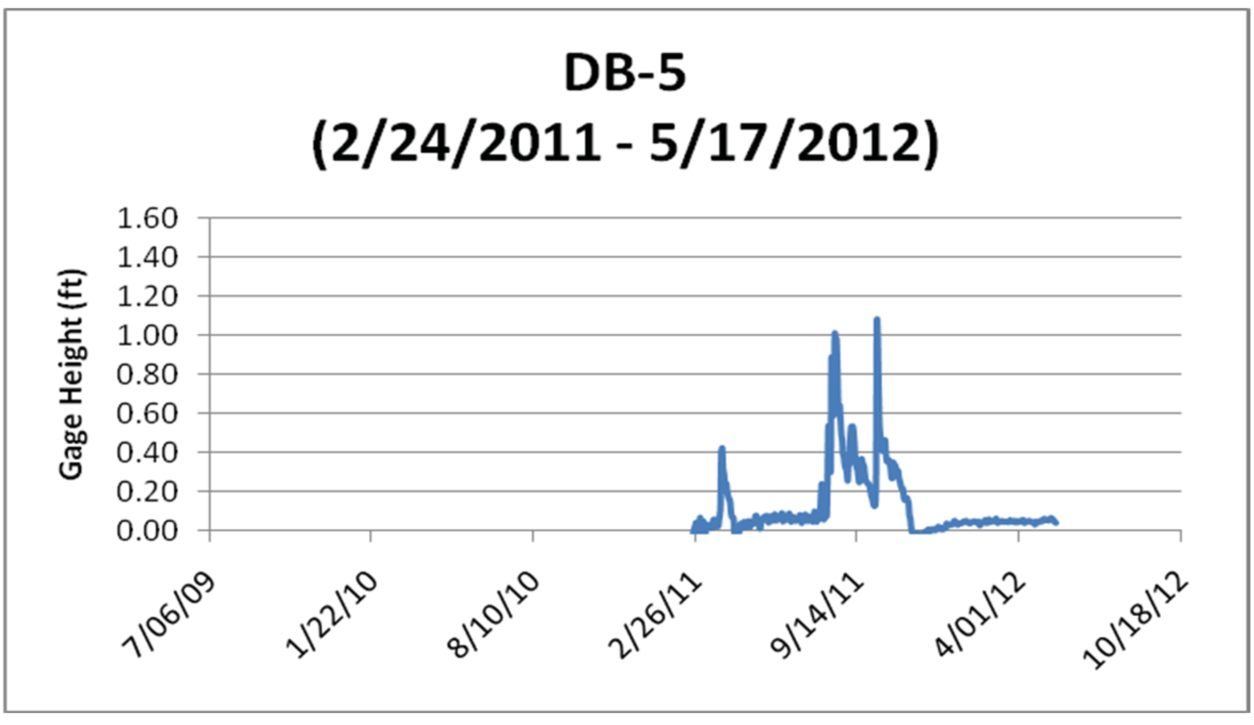


Figure 7 **DB-5 Hydrograph (2/24/2011 – 5/17/2012)**

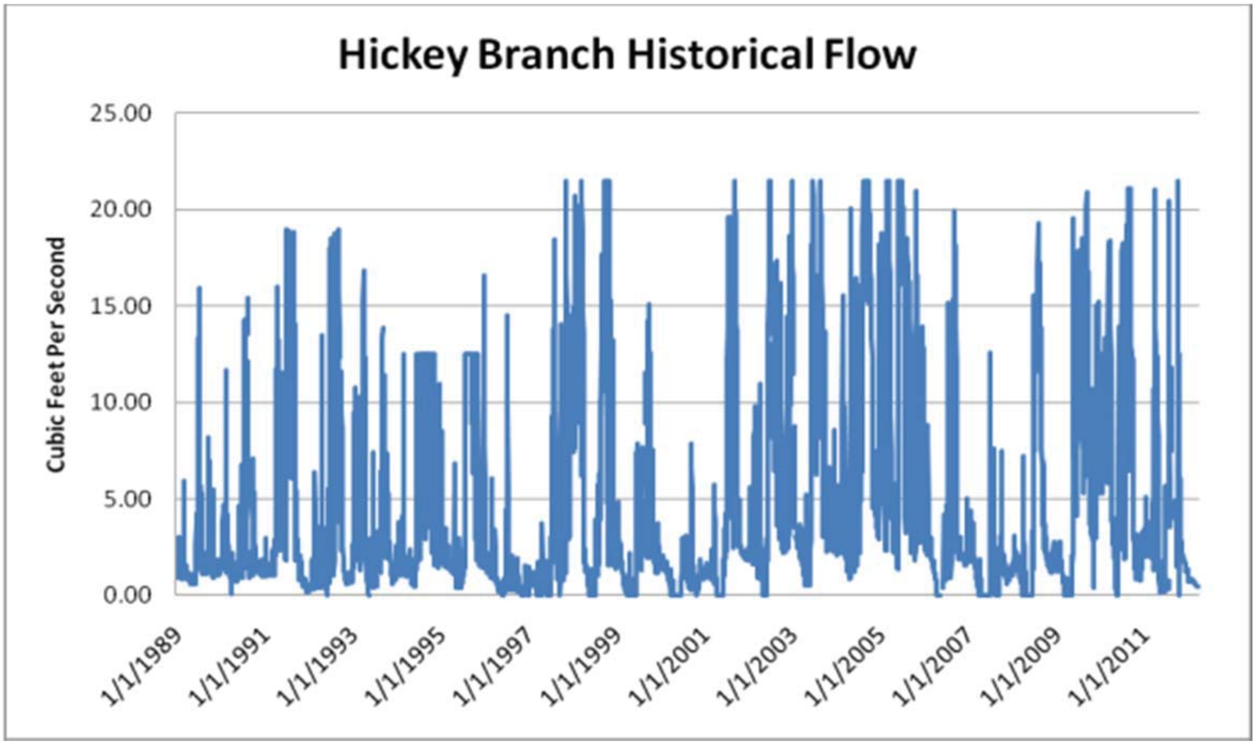


Figure 8 Hickey Branch Hydrograph (1/1/1989 – 3/31/2012)

Table 11 Zero Flow Days Comparison of Unmined Hickey Branch to Reference Sites

	Site Name	County	Physiography	Drainage Area (sq. mi)	Period of record	Average Zero Flow Days per Year
Comparison	Hickey Branch (unmined)	Hardee	Flatwoods	4.5	1989 – Present	25
Reference Sites (Peninsular Florida)	Cypress Slash UT	Polk	Highlands	0.37	Aug-08 - Present	322
	East Fork Manatee UT 2	Manatee	Flatwoods	0.39	Jul-08 – Present	252
	Grasshopper Slough Run	Highlands	Flatwoods	8.7	Jun-08 – Present	140
	Jack Creek	Highlands	Highlands	2.7	Jun-08 – Present	60
	Lower Myakka River UT 2	Sarasota	Flatwoods	2.7	Jun-08 – Present	242
	Lower Myakka River UT 3	Sarasota	Flatwoods	0.35	Oct-08 – Present	231
	Morgan Hole Creek	Polk	Flatwoods	11	Jun-08 – Present	104
	Moses Creek near Moultrie	St. Johns	Flatwoods	7.8	Apr-99 - Sept-02	13
	Tiger Creek UT	Polk	Highlands	0.93	Jul-08 – Present	6

2.2.4 Water Quality

Water quality parameters including temperature, pH, dissolved oxygen, conductivity, turbidity, nutrients, total organic carbon (TOC), total dissolved solids (TDS), total suspended solids (TSS), color, and iron concentration have been measured at R-7 and R-10 (FDEP, 2007) (Table 12). Dissolved oxygen (DO) measurements taken at both sites have shown values below the Class III minimum standard of 5.0 mg/L; however, this trend has also been observed at unmined sites (FDEP, 2007), as low-order systems generally have slower moving water and typically mimic and are often associated with headwater wetlands which can have naturally lower dissolved oxygen levels under healthy conditions. Further, FDEP (2007) found that temperature, DO, nitrate, total phosphorus, and iron concentration did not differ significantly in reclaimed versus unmined streams. Turbidity, pH, specific conductance, and TDS, while found to be higher in reclaimed sites, consistently met Class III water quality standards assuring an appropriate designated use, while Ammonia, TKN, TOC, and color were higher in unmined sites. Water quality parameters have not been collected at DB-2 and DB-5 as these sites are not yet connected to their watersheds.

Table 12 Water Quality Parameters

Site Name	Date Sampled	Temp (° C)	pH	DO (mg/L)	Conductivity (µmhos)	Turbidity (NTU)	NH3 (mg/L)	NO3/NO2 (mg/L)	TKN (mg/L)	TN (mg/L)	TP (mg/L)	TOC (mg/L)	TDS (mg/L)	TSS (mg/L)	Color (PCU)	Fe (ug/L)
R7	10/19/1998	24.6	7.09	3.5	356	7.7	ND	0.01	0.73	0.74	0.59	16	ND	9	80	ND
	10/10/2001	22.9	7.4	4.7	442	ND	0.015	0.016	0.67	0.701	0.77	11	ND	ND	ND	ND
	8/26/2003	28.5	7.34	3.7	301	8.5	0.021	0.025	0.62	0.666	0.76	13	188	8	100	460
R10	10/8/2001	27.6	7.4	7.4	446	1.9	0.023	0.037	0.64	0.7	0.87	14	278	4	30	ND
	8/26/2003	29.6	7.45	4.8	334	3.5	0.021	0.017	0.63	0.668	0.75	13	200	6	80	334
	1/19/2005	17.6	7.65	ND	387	2.2	0.021	0.037	0.6	0.658	0.32	12	204	4	40	187

2.2.5 Fluvial Geomorphology

Fluvial geomorphology is the study of water-shaped landforms and the processes that create them. As previously discussed, the older Hickey Branch reclamation sites (R-7 and R-10) were created via natural hydraulic weathering. A detailed geomorphic survey was completed for both stream systems to assess facets such as riffle and pool spacing, slope, and sinuosity. Survey results indicated that slope and sinuosity fell within the range of natural Florida streams (though the sinuosity was on the low end) and that pools could be enhanced. As a result, structures such as wing deflectors, v-log weirs, and random large woody debris were installed to encourage the formation of bends and pools. Stream banks in both systems are stable, though additional plantings have been recommended for the banks.

Doe Branch reclamation sites DB-2 and DB-5 were natural channel designs heavily based on the principles of fluvial geomorphology; thus, riffle and pool spacing, slope, and sinuosity all fall within the range of natural Florida streams. Monitoring events have found that the banks are stable, with the exception of some damage caused by hogs and cattle. Routine maintenance flows are run through DB-2 to maintain the system, as it is not yet connected to its watershed and the hydraulic carving infrastructure is still in place.

2.3 Habitat Enhancement

In 1997, the CF Plant City Phosphate Complex (northeast Hillsborough County) was issued a permit to expand the stacking capabilities of phosphogypsum (a by-product of phosphate fertilizer production). As a part of the permitting requirements, a “Detailed Restoration Plan” was developed and subsequently approved by Federal, State and local agencies to provide mitigation for the loss of wetland function lost within the expansion footprint of the facility. This plan provided the framework for a 1,900-acre ecological restoration plan, which included 1,400 acres of wetland (700 ac.) and upland enhancement (700 ac.).

In its former condition, the site was dominated by improved pasture (FLUCFCS 211) used for cattle grazing and contained a series of ditches that resulted in dewatering of the onsite wetlands (FLUCFCS 640 and 621). The wetland enhancement was primarily completed through the addition of ditch blocks to rehydrate the dewatered wetland systems, the removal of cattle as well as other non-native flora and fauna, and the implementation of a monitoring and maintenance program. The uplands enhancement efforts focused on restoring pine flatwoods (FLUCFCS 411) and mixed forest (FLUCFCS 434) communities at the site.

The initial steps in the upland enhancement effort concentrated on the elimination of pasture grasses through both mechanical means, such as harvesting sod and disking, and herbicide treatments of nuisance vegetation. Upon eradication of the pasture grasses, efforts focused on establishing native habitat, which was completed by a combination of seeding with native upland species of grasses and forbs and subsequent plantings of trees and woody shrubs.

As a part of the upland enhancement plan, CF implemented a combination of unique, intensive management efforts, including the aforementioned site preparation to eliminate pasture grasses prior to planting native ground cover seed. For the first year following seeding, the upland habitats were actively monitored and managed. Based on the results of the monitoring, the management plan requirements were adapted to address site specific needs, typically consisting of spot treatments to address non-native grasses. Once the upland groundcover became established, a management regime termed "light maintenance" was applied which focused on limited herbicide treatments and application of prescribed fire. The installation of trees and woody shrubs were delayed until a restoration site has reached the lighter maintenance stage, often 2 years post seeding and only after the site can successfully carry a growing season fire. Using this methodology, the upland enhancement efforts implemented by CF have been highly successful, with over 70 percent of the upland acreage released from further monitoring and maintenance requirements, and the remaining acreage, which was seeded in 2009, is scheduled to be released in 2013. A summary of the permit success criteria and the status of the enhancement efforts are presented in Table 13. Lessons learned during the conversion of upland habitats from improved pasture to pine flatwoods will be applied where appropriate in CF's mining operations and ultimately should reduce the time period associated with analogous enhancement efforts within the no-mine areas of the SPE site.

Ongoing wildlife monitoring has been conducted in the enhancement areas since 2001. The results of these surveys have documented up to 72 different species utilizing the enhanced habitats, including Anhinga (*Anhinga anhinga*), limpkin (*Aramus guarauna*), great egret (*Ardea alba)*, red shouldered hawk (*Buteo lineatus*), turkey vulture (*Cathartes aura*), northern bobwhite (*Colinus virginianus*), little blue heron (*Egretta caerulea*), white ibis (*Eudocimus albus*), common moorhen (*Gallinula chloropus*), sandhill crane (*Grus canadensis*), least bittern (*Ixobrychus exilis*), mourning dove (*Zenaida macroura*), northern cricket frog (*Acris crepitans*), green treefrog (*Hyla cinerea*), squirrel treefrog (*Hyla squirella*), bullfrog (*Rana catesbeiana*), and pig frog (*Rana grylio*). Several species of mammals were also noted including white-tailed deer (*Odocoileus virginianus*), nine-banded armadillo (*Dasypus novemcinctus*), and marsh rabbit (*Sylvilagus palustris*).

Table 13 Upland and Wetland Habitat Enhancement Success Criteria Status Based on 2012 Monitoring Report

Mitigation Type	Success Criteria	Total Acreage	Acres Released as of 2012	Projected Release Year
Wetland Enhancement	Enhancement area is dominated by native, desirable species and exotic and nuisance vegetation less than 10 percent.	700	700	completed/ released
Upland Enhancement	Enhancement area is dominated by native, desirable species representative of a pyrogenic community, ecologically significant increase in wildlife utilization, and exotic and nuisance vegetation less than 10 to 25 percent (varies by management unit).	700	500	140 acres in 2012, 60 acres in 2013
Total		1,400	1,200	

Upland enhancement, Plant City, 2012

Upland Enhancement, Plant City, 2012

White-tailed Deer, Plant City, 2012

3 Summary

CF Industries has a history of consistently improving wetland reclamation/mitigation and habitat creation and enhancement efforts beginning in the late1970s and still continuing today. CF employs proven modern, and in some cases innovative, scientific and technical methods, encompassing planning, ecological and engineering design, modeling, construction, maintenance and monitoring. As discussed above, these methods and the continuing reclamation refinements allow CF's mitigation wetlands to rapidly achieve functional replacement (as well as acreage replacement) of impacted wetlands. One indicator of this is the fact that the average UMAM score of wetlands reclaimed by CF, but not yet released from monitoring and maintenance requirements, is 0.63, which is a greater level of wetland function than the UMAM average of the areas proposed for impact in the South Pasture Extension (0.52). As these sites continue to mature, it is expected that their UMAM scores will continue to increase. For example, CF's oldest reclaimed wetlands in the Hickey Branch system provided an average score of 0.73, despite being designed prior to more modern approaches. The more modern approaches will help CF's future reclamation achieve their goals more quickly.

Reclamation of streams, including R-7, R-10, DB-2, and DB-5, clearly demonstrate CF's ability to create streams with habitat availability, biota, hydrology, water quality, and fluvial geomorphology functions analogous to natural Florida streams. On average, the streams proposed for impact on the SPE are of lower habitat quality than streams that will be preserved and lower than the aforementioned stream reclamation sites (Figure 8). Streams proposed for impact consist predominantly of small headwater streams that have been historically adversely impacted by agricultural practices such as ditching and grazing. CF's proposed stream reclamation plan will restore streams to a more pre-disturbance condition, thus providing an environmental benefit to the property and the local watershed. Finally, CF's demonstration of successful upland and wetland habitat enhancement provides additional support that these enhanced communities will act to protect and improve ecological function of the preserved stream systems and planned habitat corridors.

The widely-recognized expertise held by CF staff and its consultants in the hydrology and ecology of wetland and upland restoration on mined and preserved lands has been marshaled to achieve a consistent level of success in creating highly functional and permanently protected ecosystems on the company's property. CF has a proven track record of commitment to excellence in ecological stewardship, creating self-sustaining wildlands with water quality, hydrology, and habitat structure supportive of diverse native flora and fauna. The results are consistently thoughtful and quantitative planning, careful and creative construction techniques, and diligent management. On-site permittee-responsible mitigation within the industry is conducted on a watershed scale and serves to replace functions of lost wetlands, as well as improve functions of areas preserved within individual mines. The information compiled here demonstrates CF's exemplary record of creating successful mitigation, which can be expected to continue with further success and evolutionary improvements on the SPE.

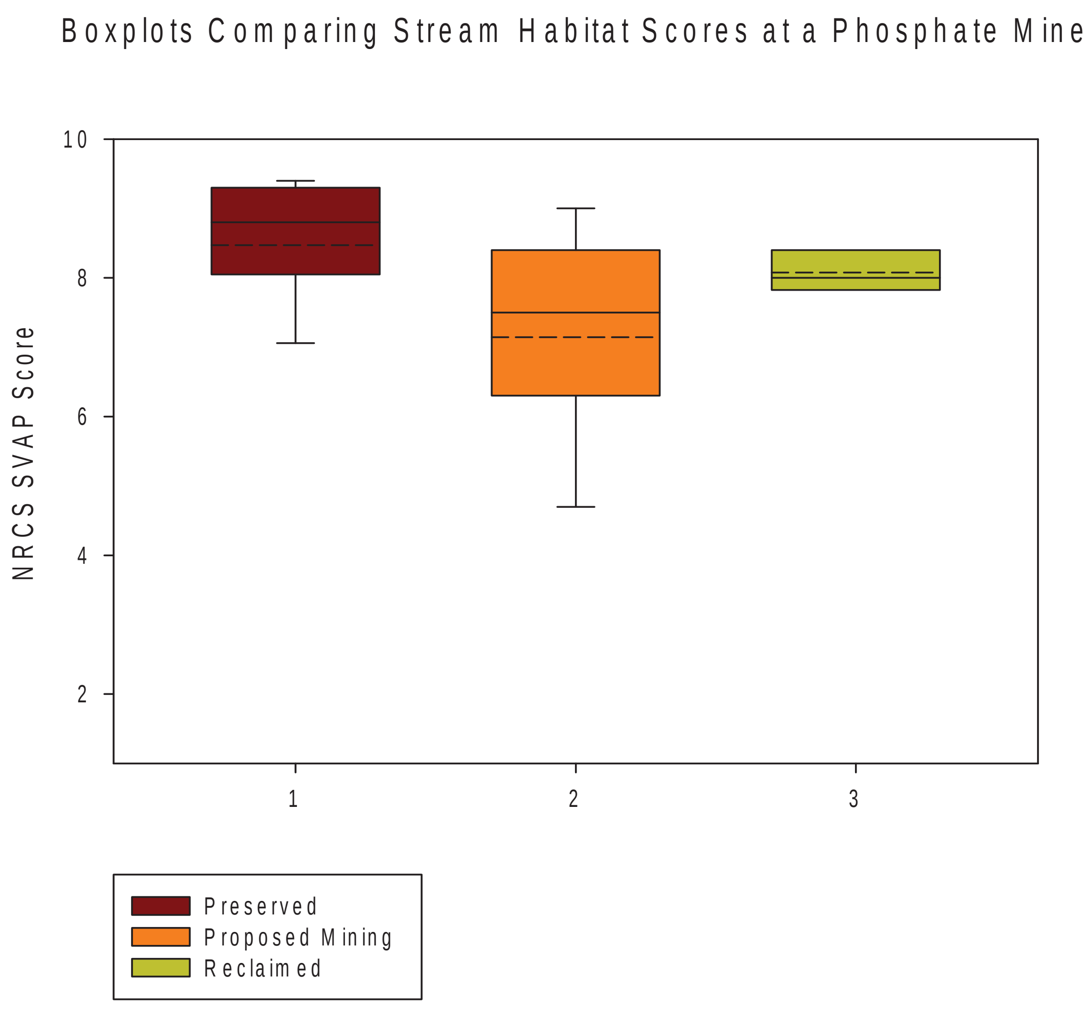


Figure 9 **Boxplots Comparing Stream Habitat Scores at CF's South Pasture Extension to CF's Reclaimed Streams**

4 Literature Cited

Blanton, K.M. (2008). Development of Bankfull Discharge and Channel Geometry Regressions for Peninsular Florida Streams. Masters Thesis. University of Florida. Gainesville, FL.

Biological Research Associates (1995). Faunal Investigation of Selected Reclaimed and Natural Aquatic Systems at the CF Industries, Inc. Hardee County Phosphate Complex.

Biological Research Associates (2001). Ecological Assessment of Representative Low-Order Streams in Hardee County, Florida Using the BioRecon Methodology.

Durbin, D., S. Gonzalez, K. Robbins, N. Halstead, H.R. Mushinsky and E.D. McCoy. 2008. Wildlife Habitat and Wildlife Utilization of Phosphate-Mined Lands, Florida Institute of Phosphate Research, 98pp.

FDEP (1999). Ecological Assessment of Reclaimed Streams, Hillsborough, Hardee and Polk Counties, Sampled October 1998. FDEP Bureau of Laboratories. 7 pp.

FDEP (2000a). Ecological Assessment of Reclaimed Streams, Polk, Hillsborough and Hardee Counties, Sampled August 1999. FDEP Bureau of Laboratories. 9 pp.

FDEP (2000b). Ecological Assessment of 1st Order Reference Streams, Manatee and Hardee Counties, Sampled November 1999. FDEP Bureau of Laboratories. 6 pp.

FDEP (2007). Riparian Wetland Mitigation: Development of Assessment Methods, Success Criteria and Mitigation Guidelines. FDEP Bureau of Mine Reclamation.

FDEP (2007). Sampling and Use of the Stream Condition Index for Assessing Flowing Waters: A Primer; FDEP Environmental Assessment Section Bureau of Laboratories; 25 pp.

Florida Statutes (2006). Ch 378, Land Reclamation. The Florida Legislature.

Guzy, J.C., E.D. McCoy, A.C. Deyle, S.M. Gonzalez, N. Halstead and H.R. Mushinsky, 2012. Urbanization interferes with the use of amphibians as indicators of ecological integrity of wetlands. Journal of Applied Ecology Volume 49, Issue 4, pages 941-952, August 2012.

Henslick, Seagle, Steinbaum & Associates (1991). Macroinvertebrate Monitoring Event Number 2, Reclaimed Hickey Branch, Hardee County, FL.

Kiefer, J.H. (2010). Hydrobiogeomorphology of Fluvial Systems in Peninsular Florida: Implications to Classification, Conservation, and Restoration. Doctoral Dissertation. University of Florida, Gainesville, FL.

Knighton, D. 1998. Fluvial Forms & Processes: A New Perspective. Arnold. NY. 383 p.

SJRWMD (1997). Physiographic Divisions Geospatial vector data representing the Physiographic Divisions of Florida polygons, reproduced from H.K. Brooks Physiographic Divisions of Florida.

APPENDIX

A

LAND USE MAP PACKAGE

Feet
0 400
1 in = 400 feet

CF INDUSTRIES INC.
NORTH PASTURE
R7/R10 RECLAMATION PARCELS

HARDEE COUNTY, FLORIDA

R7/R10 Reclamation Parcel Boundary
Post Reclamation Land Use

Source: 2011 SWFWMD Imagery

N W E S

LAND USE MAP

FLATWOODS Consulting Group

P:\0010CFI\005-South Pasture Misc. Services\GIS\NORTH PASTURE LANDUSE

Feet

0 500

1 in = 500 feet

FLATWOODS
Consulting Group

CF INDUSTRIES INC.
SOUTH PASTURE
DB RECLAMATION PARCELS

HARDEE COUNTY, FLORIDA

DB Reclamation Parcel Boundary

Post Reclamation Land Use

Source: 2011 SWFWMD Imagery

N
W E
S

LAND USE MAP

FLUCCS CODE	ACRES
411	51.1
641	19.8

Feet
0 400
1 in = 400 feet

FLATWOODS Consulting Group

CF INDUSTRIES INC.
SOUTH PASTURE
BC-2 RECLAMATION PARCELS

HARDEE COUNTY, FLORIDA

BC-2 Reclamation Parcel Boundary
Post Reclamation Land Use

Source: 2011 SWFWMD Imagery

N W E S

LAND USE MAP

P:\0010CFI\005-South Pasture Misc. Services\GIS\BC2 LANDUSE

FLUCCS CODE	ACRES
411	82.9
421	12.0
617	63.7
641	48.8

Feet
0 450
1 in = 450 feet

FLATWOODS Consulting Group

CF INDUSTRIES INC.
SOUTH PASTURE
BC-3 RECLAMATION PARCEL

HARDEE COUNTY, FLORIDA

BC-3 Reclamation Parcel
Post Reclamation Land Use

Source: 2011 SWFWMD Imagery

N W E S

LAND USE MAP

P:\0010CFI\005-South Pasture Misc. Services\GIS\BC3 LANDUSE 2

Feet 0 400 1 in = 400 feet	CF INDUSTRIES INC. SOUTH PASTURE HC-1 RECLAMATION PARCELS	HC-1 Reclamation Parcel Boundary	N W E S
FLATWOODS Consulting Group	HARDEE COUNTY, FLORIDA	Post Reclamation Land Use *Source: 2011 SWFWMD Imagery*	LAND USE MAP

P:\0010CFI\005-South Pasture Misc. Services\GIS\HC1 LANDUSE

APPENDIX

B

WETLAND MAP PACKAGE

Feet
0 500
1 in = 500 feet

FLATWOODS Consulting Group

CF INDUSTRIES INC.
SOUTH PASTURE
DB RECLAMATION PARCELS

HARDEE COUNTY, FLORIDA

DB Reclamation Parcel Boundary

Reclaimed Wetland Boundary

Source: 2011 SWFWMD Imagery

N
W E
S

WETLAND MAP

P:\0010CFI\005-South Pasture Misc. Services\GIS\DB WETLANDS

Feet

0 400

1 in = 400 feet

FLATWOODS Consulting Group

CF INDUSTRIES INC.
SOUTH PASTURE
BC-2 RECLAMATION PARCELS

HARDEE COUNTY, FLORIDA

BC-2 Reclamation Parcel Boundary

Reclaimed Wetland Boundary

Source: 2011 SWFWMD Imagery

N
W E
S

WETLAND MAP

P:\0010CFI\005-South Pasture Misc. Services\GIS\BC2 WETLANDS

Feet
0 450
1 in = 450 feet

FLATWOODS
Consulting Group

CF INDUSTRIES INC.
SOUTH PASTURE
BC-3 RECLAMATION PARCEL

HARDEE COUNTY, FLORIDA

BC-3 Reclamation Parcel
Reclaimed Wetland Boundary

Source: 2011 SWFWMD Imagery

N
W E
S

WETLAND MAP

P:\0010CFI\005-South Pasture Misc. Services\GIS\BC3 WETLANDS 2

Feet
0 400
1 in = 400 feet

FLATWOODS Consulting Group

CF INDUSTRIES INC.
SOUTH PASTURE
HC-1 RECLAMATION PARCELS

HARDEE COUNTY, FLORIDA

Reclaimed Wetland Boundary

HC-1 Reclamation Parcel Boundary

Source: 2011 SWFWMD Imagery

N W E S

WETLAND MAP

P:\0010CFI\005-South Pasture Misc. Services\GIS\HC1 LANDUSE

APPENDIX

C

DOE BRANCH AND BRUSHY CREEK RECLAIMED WETLAND HYDROLOGY ASSESSMENT

DOE BRANCH AND BRUSHY CREEK RECLAIMED WETLAND HYDROLOGY ASSESSMENT DECEMBER 2012

Prepared by CF Industries, Inc.

Monitoring Network Description and Purpose

Pursuant to South Pasture Mine WRP 252607909, Specific Condition 7(e), CF has implemented a Post-Contouring Hydrology Assessment Plan to determine whether the hydrology of reclaimed DEP jurisdictional wetlands is suitable to support the desired wetland type. The plan consists of installing piezometers in the uplands adjacent to the wetlands and installing a piezometer with data logger in the deepest portion of the wetland. The piezometers are installed in the uplands using a truck- mounted rotary drill rig to a depth of approximately 20 feet, are manually read on a weekly basis using a tape-type water level meter, and the readings are stored in an Access database. The piezometer/data logger is installed using a hand auger to a depth of approximately five feet, and the data logger is set to automatically record the water level in the piezometer twice a day, the data loggers are downloaded on a monthly basis, and the readings are stored in an Excel spreadsheet. For the purpose of this analysis, the data logger readings were averaged for the weekly period of Sunday through Saturday. Currently, CF has implemented the Post-Contouring Hydrology Assessment Plan for DEP jurisdictional wetlands BC-HW-R1 and BC-HW-R2 located in reclamation parcel BC-3; wetland DB-TR-R1 located in reclamation parcel DB-2; wetland DB-HW-3 located in reclamation parcel DB-4; wetland DB-HW-R4 located in reclamation parcel DB-3; and wetland DB-IS-R74 located in reclamation parcel DB-4. The Post-Contouring Hydrology Assessment Plan is not required by the Corps permit for the South Pasture Mine.

Period of Record and Rainfall

CF has collected onsite rainfall data since August 2000 using a standard rain gauge located at Latitude 81^{o}56’27.60” West, Longitude 27^{o}35’20.40” North. Historic data were obtained from the National Resource Conservation Service (NRCS) website for the Wauchula Weather Station, located in Wauchula, Florida. The weather station is located approximately 8 miles east of the South Pasture Mine. The data consist of monthly rainfall amounts for the years 1961 through 1997 and were used to calculate monthly averages for that time period.

Historic average monthly rainfall was compared with onsite average rainfall, and the accumulated deficit/excess rainfall calculated and is depicted in Figure 1-1. The accumulated deficit/excess in rainfall indicates that from July 2005 through September 2012, there was a deficit of approximately 66 inches of rainfall at the Hardee Phosphate Complex.

Site Descriptions and Results

The purpose of this data review was to determine the adequacy of groundwater support for several wetlands reclaimed in different hydrogeomorphic configurations and to support forested and non-forested communities at CF’s South Pasture Mine. The sites were constructed in accordance with three different approaches to hydrologic design. The seven sites represent a variety of times since reclamation, and vary in the status of their watershed completion.

Wherever possible, CF uses a conceptual analogue design approach. Such an approach first identifies the hydrogeomorphic setting of pre-mining wetlands (e.g. headwater depression, flow-through slough, chain-of-depressions, riparian (stream) corridor) as a stratifying variable for then seeking key topographic relationships between the wetland depression, its upland hillslopes, and outflow elevations. Ideally, the pre-mining topography would simply be re-established, but this ideal is rarely available. Therefore, key associations are identified by wetland type between wetland outflow elevations and seasonal-high water upstream of the wetland outlet, ratios of watershed to wetland acreage, depth below seasonal high water, and lateral land surface gradients between the upland hillslope and wetland edge. In other words, we identified topological and topographic associations with the gamut of pre-mining wetland types on the property and set to design systems with analogous associations as close as mining logistics and reclamation materials would allow. This procedure is described in detail in CF's original joint WRP/CRP Dredge and Fill application from 1994 and with its current refinements in CF's ERP/Dredge and Fill application currently under Federal review for the South Pasture Extension. Specifically, please refer to the SPE Stream Restoration Plan (Appendix EN-3 of the SPE Environmental Narrative) and the SPE Integrated Modeling Report (Appendix 3 of the Reclamation Plan) for the proposed design approach for SPE reclamation streams and wetlands.

In most cases, the design was also driven based on the results of integrated groundwater/surface water numerical modeling. The models were used to generate synthetic daily water elevation levels for a period of an approximately 20 years. The synthetic record was then used to calculate seasonal high water (SHW) as the terrestrial boundary at which a 15% percent exceedance of the long term daily water level record occurred. , This provides a water level with a hydroperiod of a little less than two months at the designed wetland edge. For systems not explicitly modeled, the design SHW was defined as the elevation prevailing along the wetland edge. Because none of the sites in this analysis were designed as seepage slopes, SHW was consistently viewed as the routine heights to which surface water rises during a normal wet season. For that reason, the seasonal high groundwater table (SHGWT) may or may not reach similar levels as SHW. For example, runoff from many wet-season storms will drive up surface water levels higher than the water table.

The adequacy of the hydrology was assessed by examining the water table fluctuations occurring during a period of record of one to two years in a network of shallow monitoring wells set in the surficial aquifer at positions within or near the wetlands. In addition to water table elevations, the network allows the general direction of the groundwater gradients from uplands to wetlands and between wetlands to be assessed. The monitoring well data represents SHGWT levels that are generally expected to range from several inches below SHW up to SHW. Because the monitoring record was of short duration, it could not be reliably assessed using the 15% exceedance approach used in design, which was based on a long-term record. Instead, we used the elevation concordant with the 85% exceedance level occurring during the wet season. That approach is similar to that used by the Southwest Florida Water Management District to assess potential groundwater threshold effects of mining at South Pasture Mine as part of its groundwater drawdown protocol (CF's approved South Pasture Environmental Monitoring Plan submitted to the Corps on December 22, 2011 as part of the ongoing DAEIS review). Furthermore, it provided SHGWT levels that gave good visual accord with the apparent central tendency of the wet season fluctuations on the hydrograph, particularly during the single non-drought wet season in the monitoring record.

Brushy Creek Flow-Through Wetlands

The BC-HW-R2 and BC-HW-R1 sites are montages of forested and non-forested wetlands reclaimed through initial revegetation during 2010. The sites were designed to be flow-through systems, functioning as sloughs or strands with sporadic, slowly flowing water. They are close to the headwater position of the watershed and were designed to occupy a transitional position between large headwater depressional wetlands and a downstream preserved riparian wetland and stream corridor. BC-HW-R2 forms the southern leg of a headwater wetland complex yet to be constructed, and it drains to the south into BC-HW-R1. BC-HW-R1 will ultimately drain to a downstream preserved wetland to the south, but is currently isolated from it by a perimeter ditch and berm. The subject wetlands are complete, but approximately 2 square miles of their watershed remain to be reclaimed. Both sites are currently ringed by a re-route ditch to their north and east, active mining to the north, an active sand-clay mix impoundment to the west, and natural ground to the south. The natural ground is downgradient (at lower elevation) of the reclamation.

Therefore, the current source water to the reclaimed groundwater table is predominantly rainfall interacting with reclaimed land. The general north-to-south drainage pattern is by design, and is analogous to that of the pre-mining landscape. Accordingly, the design groundwater gradient is generally from the north to the south, following the long axis of the reclaimed slough. Lateral groundwater movement is also expected to occur from the reclaimed uplands into the reclaimed wetlands.

The design SHW of BC-HW-R2 was 116.0 feet NGVD based on the results of an integrated groundwater-surface water model simulation using the MIKE SHE software package, published in 2009. The same simulation was used to predict SHW elevation of 114.2 feet NGVD for BC-HW-R1. The monitoring data shows SHGWT elevations of 116.2 feet and 113.6 feet NGVD for BC-HW-R2 and R1 respectively. These values compare quite favorably to the design objectives, especially considering that 86 percent of the sites' watershed has yet to be reclaimed and connected. The upland and ecotone piezometer show about 3 feet of annual fluctuation, which is within regional norms for natural ground in the flatwoods. The upland piezometers also show good positive gradient toward the reclaimed wetlands, and the desired north to south gradient has been established. Fluctuations within the wetland piezometers also appeared to be within natural seasonal norms[i].

Doe Branch Headwater Wetlands

The DB-HW-R4 and DB-HW-R3 sites were designed to be forested, depressional headwater swamps, draining across short outlets to a preserved in-line swamp depression to the north. The sites are approximately ten and four years old, respectively, since initial planting. Currently, water from DB-HW-R4 reaches the preserve via a temporary drop structure and culvert. The structure will be replaced by a vegetated, earthen sill mimicking natural wetland outlet geomorphology, with its crest dimension and width providing hydraulic equivalency to the existing temporary structure. DB-HW-R3 currently drains over just such a vegetated earthen sill into a reclaimed stream valley.

DB-HW-R4's watershed is complete and is comprised of 100% reclaimed land. It is bordered by reclaimed drainage divides to the west, south, and east, with a downgradient preserved wetland to the north. DB-HW-R3 is currently supplied by water from its 0.3 square mile reclaimed watershed, which is ringed by a return water ditch to the west, a reclaimed drainage divide to the south and east, and an NPDES outfall ditch to the north. The system was designed to receive an additional 0.2 square miles of contributing area, which has yet to be mined and is currently isolated from it by the NPDES ditch. Both systems receive water predominantly from rainfall interacting with reclaimed land, as designed. Further, both systems provide general drainage patterns and hydrogeomorphic associations analogous to those of the pre-mining landscape.

The design SHW of these sites was based on an integrated groundwater-surface water model using the ISGW software code. This code was an early derivative of what is now known as the FIPR Hydrology Model (FHM) administered by the University of South Florida. CF published the results of this modeling effort in its 1994 Dredge and Fill application for the South Pasture Mine. The model results were used to predict SHW of 97.5 feet NGVD for DB-HW-R4 and 103.3 feet NGVD for DB-HW-R3. Monitored SHGWT results were 97.3 feet NGVD and 103.1 feet NGVD for these sites, respectively. Upland piezometers exhibited a range of fluctuation that is within regional norms for natural ground in flatwoods and mesic-hammocks, and indicated positive lateral groundwater flow gradients to the reclaimed and preserved wetlands as designed. Fluctuations within the wetland piezometers also appeared to be within natural norms.

The DB-IS-74 West and East sites form a headwater chain of wetlands designed to drain to a reclaimed strand (DB-TR-R1). These sites were designed without the use of integrated modeling, relying entirely on geomorphic analogue tactics and were constructed during 2007. Basically, these wetlands occupy a position very similar to a premining system at the same location, and that system's topography was largely mimicked in the design. The pre-mining system was not pristine, with its drainage outlet altered by a ditch that was omitted from the final design. Accordingly, the system was constructed to provide a natural earthen sill and meandering stream channel at its outlet.

The predicted SHW (wetland edge) was 101.3 feet NGVD for the West lobe and 100.0 feet NGVD for the East lobe. The monitored SHGWT elevations are 101.4 feet NGVD and 99.7 feet NGVD respectively, well within expected ranges of the design. Both sites show groundwater table fluctuations and gradients in accordance with design direction and land use objectives.

Doe Branch Flow-Through Swamp

The DB-TR-R1 site was designed to provide a nearly mile long, semi-lotic strand with a rather gentle and constant land surface gradient from south to north. This strand was designed to join a reclaimed upland and headwater complex of about 3.8 square miles to a reclaimed stream valley connecting to the Doe Branch preserve. About 3.5 square miles of this watershed is currently under active mining operations and is yet to be reclaimed and reconnected. The system receives its water from rainfall interacting with reclaimed lands.

The design SHW was calculated using the same 1994 ISGW integrated model simulation as that used for DB-HW-R4 and R3. Design SHW was 94.0 feet NGVD at the system's outlet lobe adjacent to its receiving stream valley. The monitored SHGWT elevation is also 94.0 feet NGVD. The adjacent piezometers in reclaimed uplands show appropriate seasonal fluctuation with strong positive gradients laterally toward the reclaimed strand. The designed dominant south-to-north groundwater table gradient toward the wetland preserve also occurred as conceived. Water table fluctuations within the wetland are within acceptable ranges for the desired vegetative community.

Conclusions

The analogue design approach and integrated groundwater-surface water modeling provide a powerful design tool combination readily and consistently establishing groundwater table regimes supportive of wetland water table elevations under a variety of hydrogeomorphic settings, including depressional headwaters, semi-lentic sloughs, and semi-lotic strands, appropriate for both herbaceous and forested wetland types. The groundwater table is readily re-established, even in projects less than 2 years old and with only partial watershed completion. The only fully-completed project in the group (both the wetland and its surrounding watershed have been completely reclaimed) exhibited a rather exacting match between predicted and monitored wet season water table elevation. When all sites are considered in combination, the amount of inter-annual fluctuation during a combined drought and wet cycle suggests excellent and inherently rapid responsiveness of these reclaimed systems to adequate rainfall. All seven systems appear to be performing well and within tolerance levels indicative of the potential for long-term, self-sustaining success, based on their groundwater table data. Design assurances resting on an assumption that groundwater tables are recoverable through onsite reclamation appear to be robust and highly reliable. This finding is consistent with the results of CF's integrated surface water/groundwater modeling. Integrated modeling appears to provide a nice quantitative compliment to the company's conceptual design approach using hydrogeomorphic analogues to natural systems.

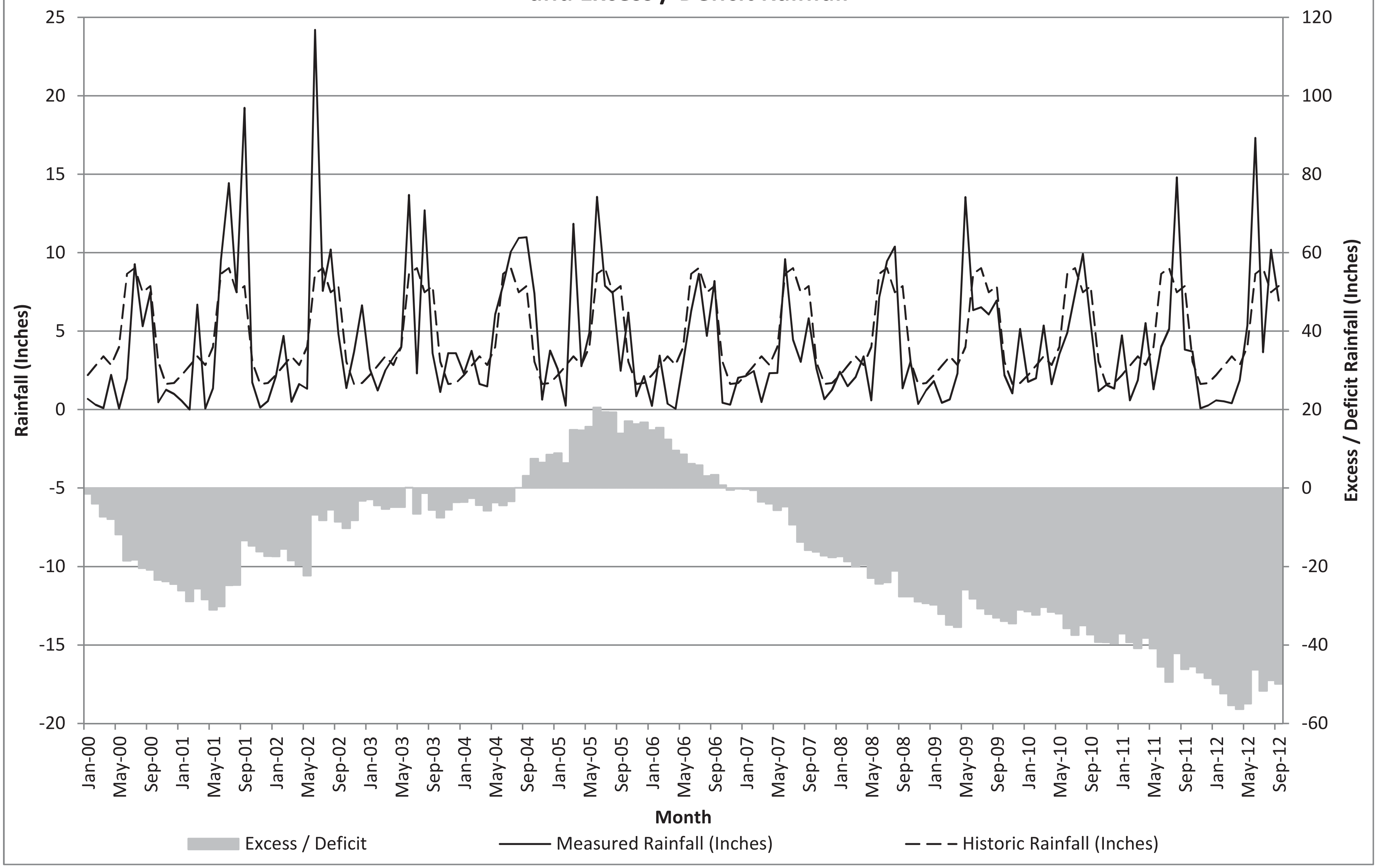
---

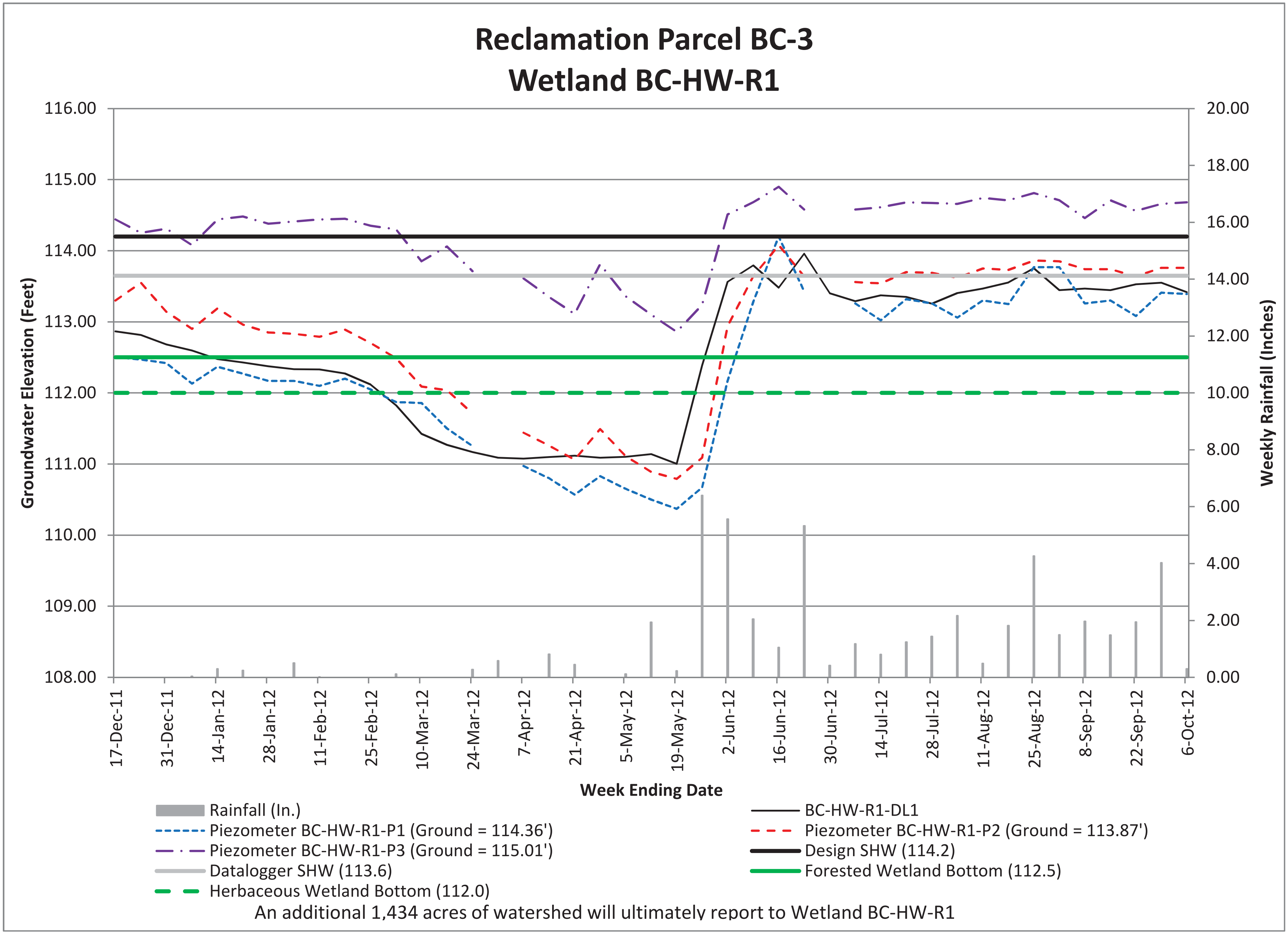
[i] Examples of regionally-applicable, natural-system water level fluctuations can be found in

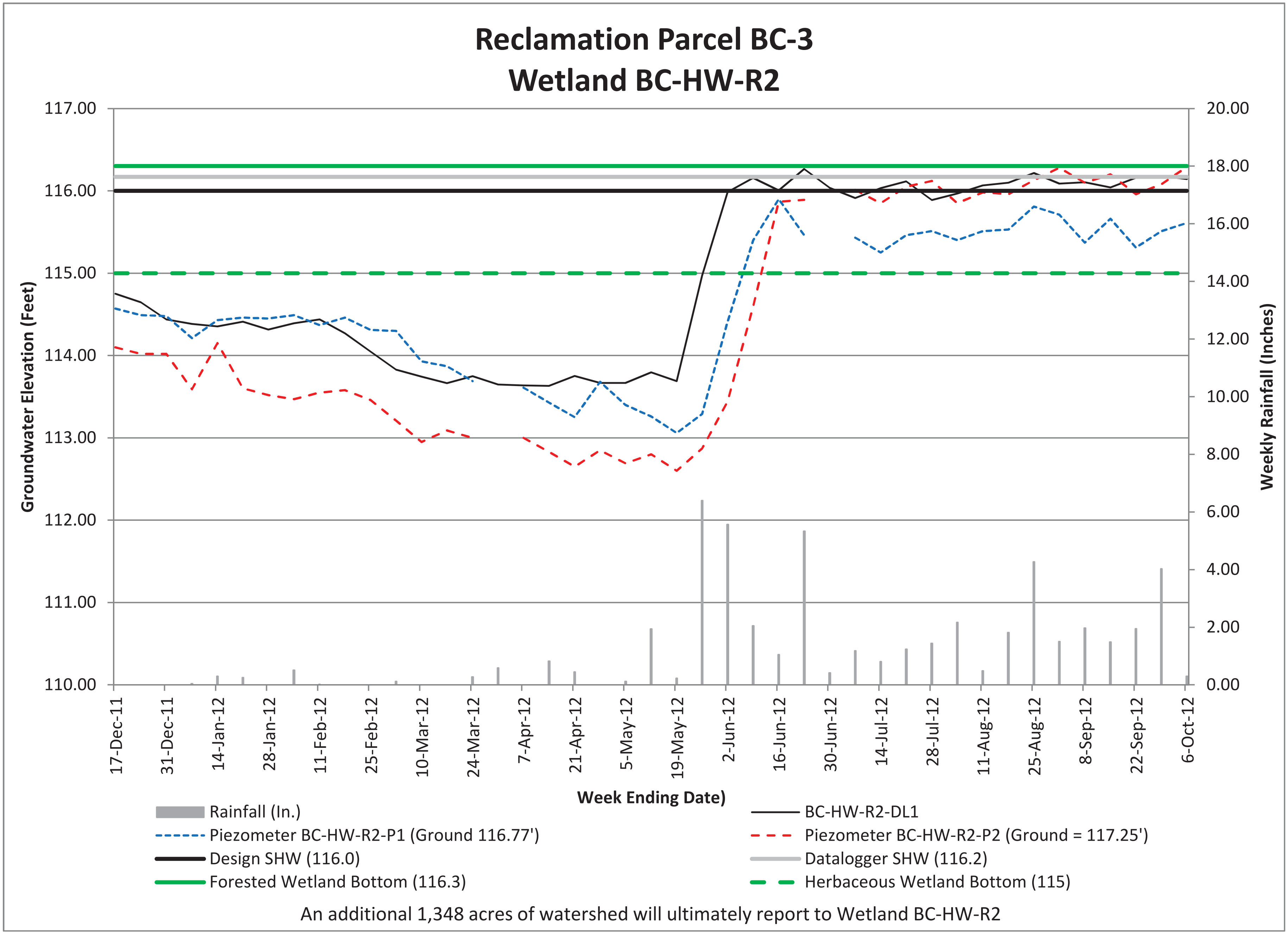
- Tighe, R.E. and M.T. Brown. 1991. *Hydrology of Native Florida Ecosystems*, in Brown, M.T. and R.E. Tighe (Eds) Techniques and Guidelines for Reclamation of Phosphate Mined Lands. Florida Institute of Phosphate Research Project #83-03-044. Bartow, FL. pp. 6:1-33.

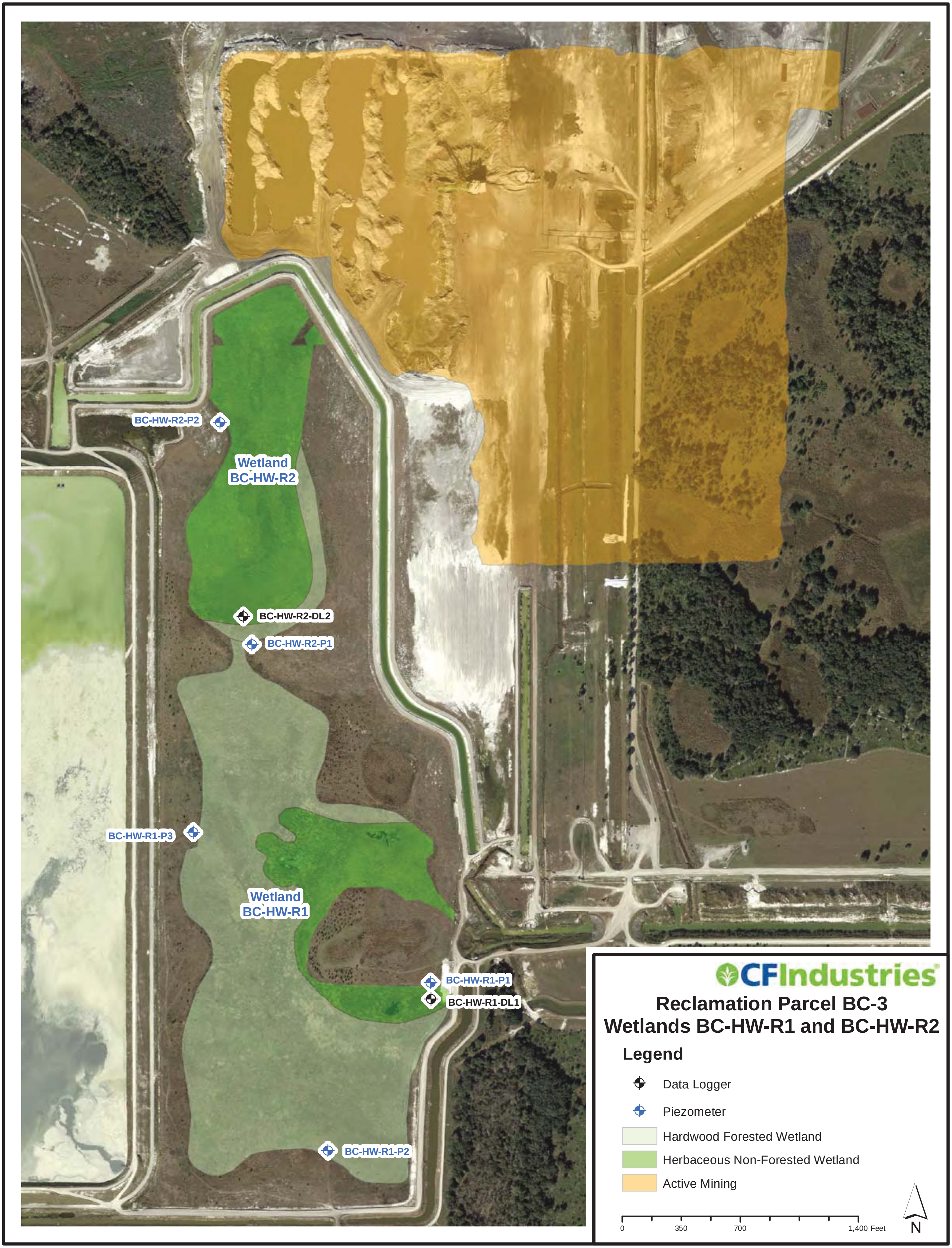
- Lewelling, B.R. 1997. *Hydrologic and Water-Quality Conditions in the Horse Creek Basin, West-Central Florida, October 1992-February 1995*. U.S. Geological Survey WRI Report 97-4077. Tallahassee, FL. 72 p.

Figure 1-1
Measured vs Historic Rainll
and Excess / Deficit Rainfall

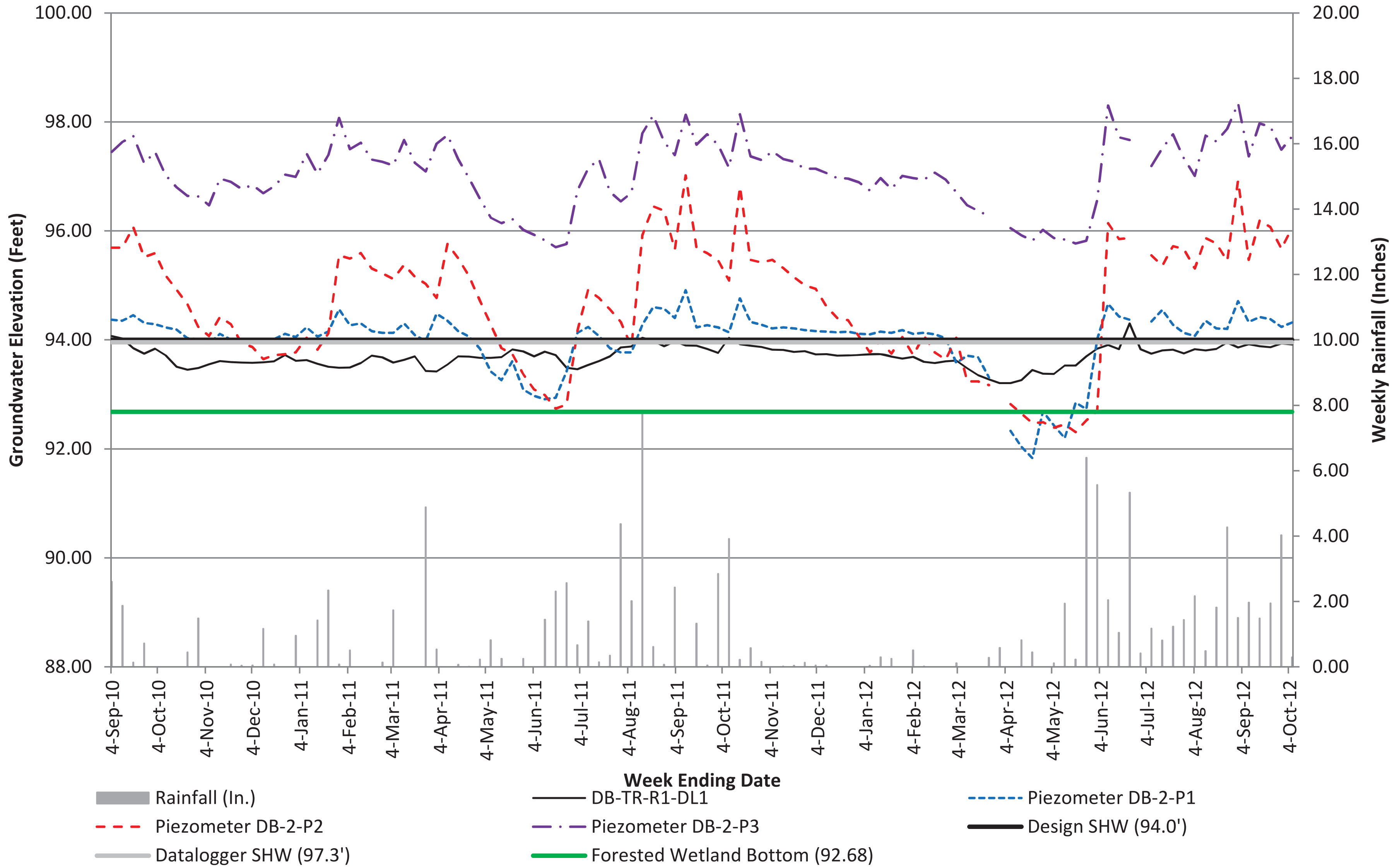



Reclamation Parcel BC-3
Wetland BC-HW-R1
Groundwater Elevation (Feet)
Weekly Rainfall (Inches)
116.00
115.00
114.00
113.00
112.00
111.00
110.00
109.00
108.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
17-Dec-11
31-Dec-11
14-Jan-12
28-Jan-12
11-Feb-12
25-Feb-12
10-Mar-12
24-Mar-12
7-Apr-12
21-Apr-12
5-May-12
19-May-12
2-Jun-12
16-Jun-12
30-Jun-12
14-Jul-12
28-Jul-12
11-Aug-12
25-Aug-12
8-Sep-12
22-Sep-12
6-Oct-12
Week Ending Date
Rainfall (In.)
Piezometer BC-HW-R1-P1 (Ground = 114.36')
Piezometer BC-HW-R1-P3 (Ground = 115.01')
Datalogger SHW (113.6)
Herbaceous Wetland Bottom (112.0)
BC-HW-R1-DL1
Piezometer BC-HW-R1-P2 (Ground = 113.87')
Design SHW (114.2)
Forested Wetland Bottom (112.5)
An additional 1,434 acres of watershed will ultimately report to Wetland BC-HW-R1

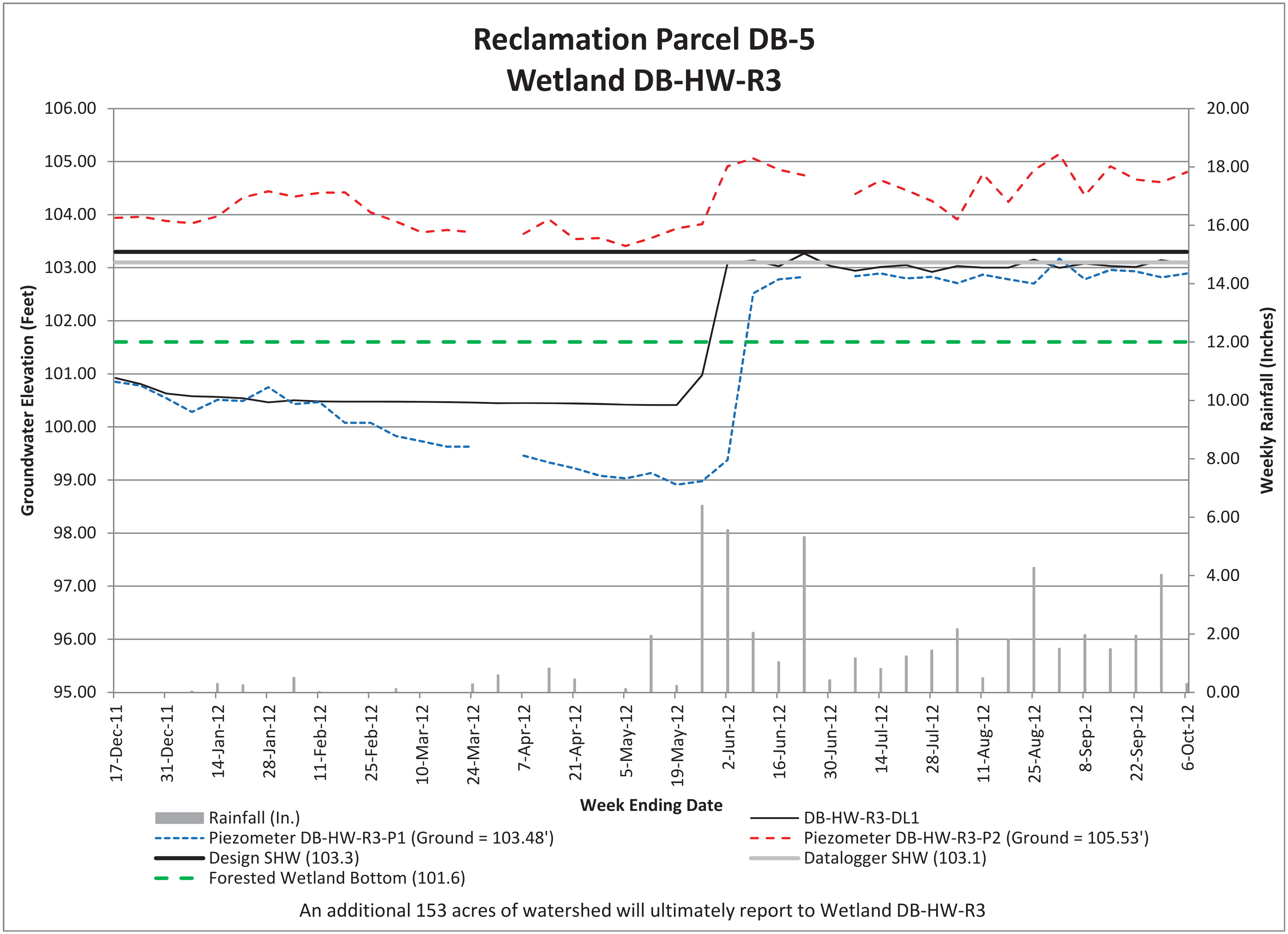

Reclamation Parcel BC-3
Wetland BC-HW-R2
Groundwater Elevation (Feet)
117.00
116.00
115.00
114.00
113.00
112.00
111.00
110.00
Weekly Rainfall (Inches)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
17-Dec-11
31-Dec-11
14-Jan-12
28-Jan-12
11-Feb-12
25-Feb-12
10-Mar-12
24-Mar-12
7-Apr-12
21-Apr-12
5-May-12
19-May-12
2-Jun-12
16-Jun-12
30-Jun-12
14-Jul-12
28-Jul-12
11-Aug-12
25-Aug-12
8-Sep-12
22-Sep-12
6-Oct-12
Week Ending Date)
Rainfall (In.)
BC-HW-R2-DL1
Piezometer BC-HW-R2-P1 (Ground 116.77')
Piezometer BC-HW-R2-P2 (Ground = 117.25')
Design SHW (116.0)
Datalogger SHW (116.2)
Forested Wetland Bottom (116.3)
Herbaceous Wetland Bottom (115)
An additional 1,348 acres of watershed will ultimately report to Wetland BC-HW-R2


BC-HW-R2-P2
Wetland
BC-HW-R2
BC-HW-R2-DL2
BC-HW-R2-P1
BC-HW-R1-P3
Wetland
BC-HW-R1
BC-HW-R1-P1
BC-HW-R1-DL1
BC-HW-R1-P2
CFIndustries
Reclamation Parcel BC-3
Wetlands BC-HW-R1 and BC-HW-R2
Legend
Data Logger
Piezometer
Hardwood Forested Wetland
Herbaceous Non-Forested Wetland
Active Mining
0
350
700
1,400 Feet
N

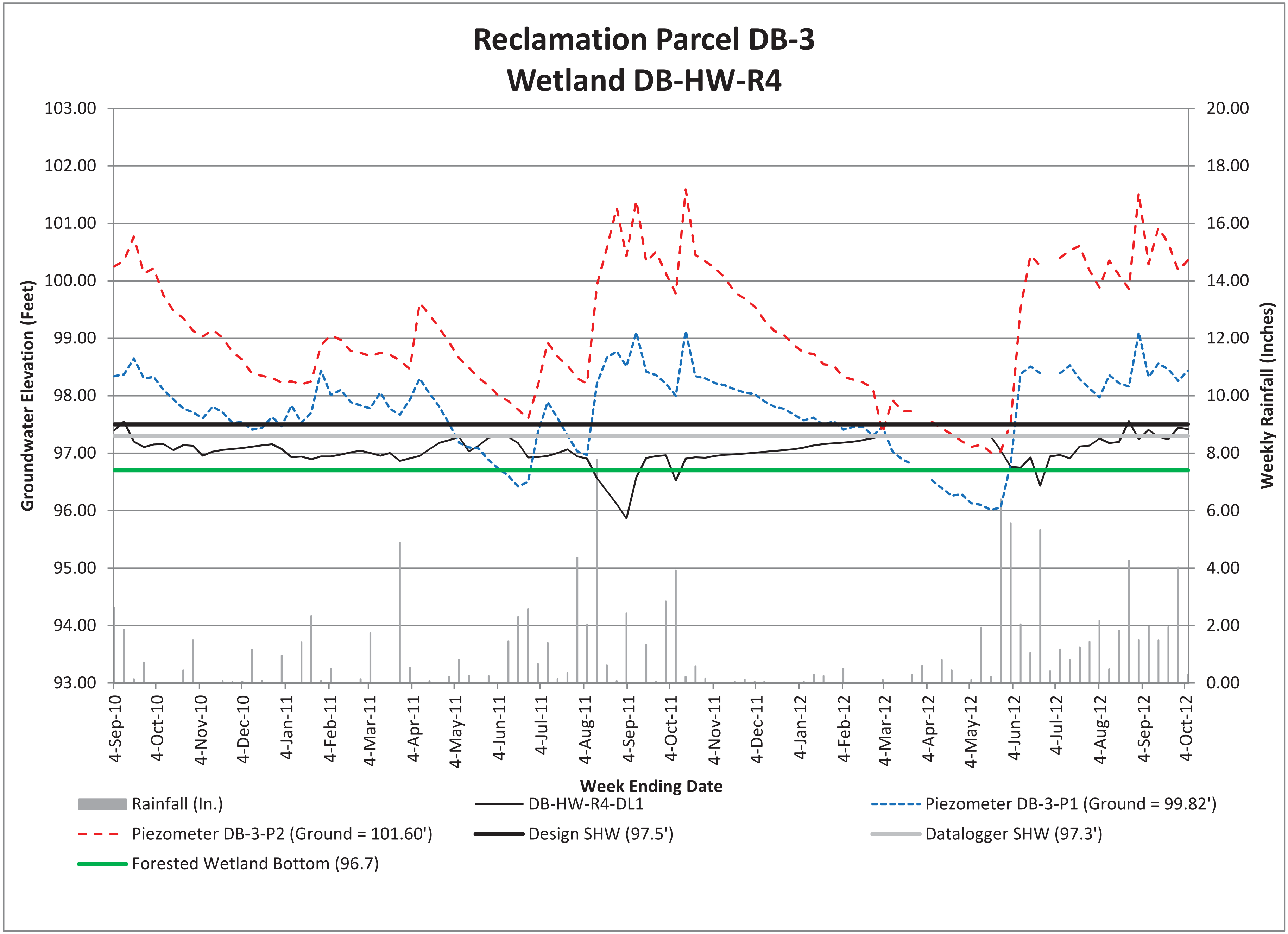
Reclamation Parcel DB-2
Wetland DB-TR-R1



An additional 1,877 acres of watershed will ultimately report to Wetland DB-TR-R1



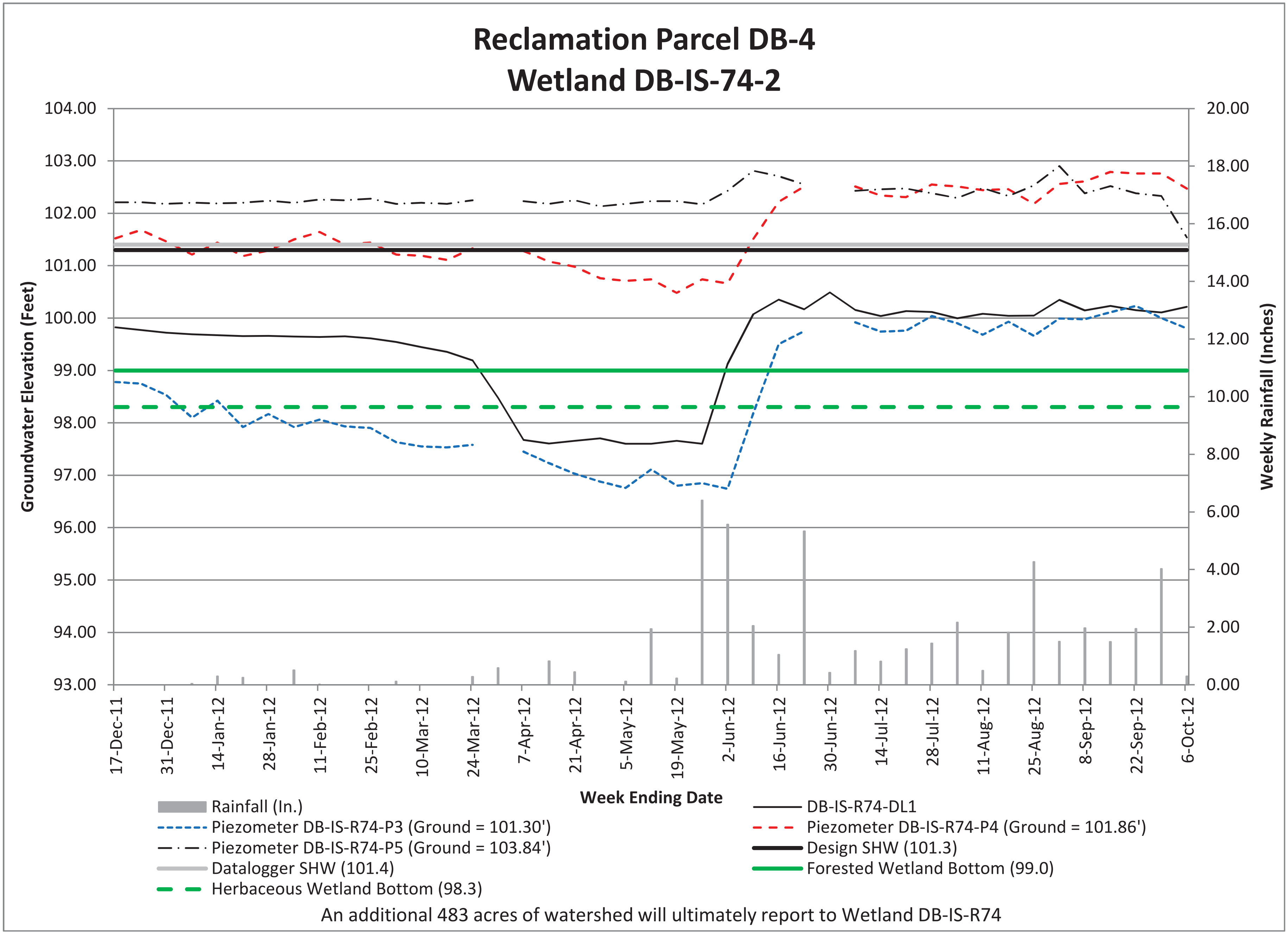
Reclamation Parcel DB-5
Wetland DB-HW-R3
Groundwater Elevation (Feet)
106.00
105.00
104.00
103.00
102.00
101.00
100.00
99.00
98.00
97.00
96.00
95.00
Weekly Rainfall (Inches)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
17-Dec-11
31-Dec-11
14-Jan-12
28-Jan-12
11-Feb-12
25-Feb-12
10-Mar-12
24-Mar-12
7-Apr-12
21-Apr-12
5-May-12
19-May-12
2-Jun-12
16-Jun-12
30-Jun-12
14-Jul-12
28-Jul-12
11-Aug-12
25-Aug-12
8-Sep-12
22-Sep-12
6-Oct-12
Week Ending Date
Rainfall (In.)
Piezometer DB-HW-R3-P1 (Ground = 103.48')
Design SHW (103.3)
Forested Wetland Bottom (101.6)
DB-HW-R3-DL1
Piezometer DB-HW-R3-P2 (Ground = 105.53')
Datalogger SHW (103.1)
An additional 153 acres of watershed will ultimately report to Wetland DB-HW-R3



Reclamation Parcel DB-3
Wetland DB-HW-R4
Groundwater Elevation (Feet)
Weekly Rainfall (Inches)
103.00
102.00
101.00
100.00
99.00
98.00
97.00
96.00
95.00
94.00
93.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
4-Sep-10
4-Oct-10
4-Nov-10
4-Dec-10
4-Jan-11
4-Feb-11
4-Mar-11
4-Apr-11
4-May-11
4-Jun-11
4-Jul-11
4-Aug-11
4-Sep-11
4-Oct-11
4-Nov-11
4-Dec-11
4-Jan-12
4-Feb-12
4-Mar-12
4-Apr-12
4-May-12
4-Jun-12
4-Jul-12
4-Aug-12
4-Sep-12
4-Oct-12
Week Ending Date
Rainfall (In.)
DB-HW-R4-DL1
Piezometer DB-3-P1 (Ground = 99.82')
Piezometer DB-3-P2 (Ground = 101.60')
Design SHW (97.5')
Datalogger SHW (97.3')
Forested Wetland Bottom (96.7)

Reclamation Parcel DB-4
Wetland DB-IS-74-1

An additional 483 acres of watershed will ultimately report to Wetland DB-IS-R74



Reclamation Parcel DB-4
Wetland DB-IS-74-2
Groundwater Elevation (Feet)
104.00
103.00
102.00
101.00
100.00
99.00
98.00
97.00
96.00
95.00
94.00
93.00
Weekly Rainfall (Inches)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
17-Dec-11
31-Dec-11
14-Jan-12
28-Jan-12
11-Feb-12
25-Feb-12
10-Mar-12
24-Mar-12
7-Apr-12
21-Apr-12
5-May-12
19-May-12
2-Jun-12
16-Jun-12
30-Jun-12
14-Jul-12
28-Jul-12
11-Aug-12
25-Aug-12
8-Sep-12
22-Sep-12
6-Oct-12
Week Ending Date
Rainfall (In.)
Piezometer DB-IS-R74-P3 (Ground = 101.30')
Piezometer DB-IS-R74-P5 (Ground = 103.84')
Datalogger SHW (101.4)
Herbaceous Wetland Bottom (98.3)
DB-IS-R74-DL1
Piezometer DB-IS-R74-P4 (Ground = 101.86')
Design SHW (101.3)
Forested Wetland Bottom (99.0)
An additional 483 acres of watershed will ultimately report to Wetland DB-IS-R74

CFIndustries

Reclamation Parcels DB-2, DB-3, DB-4 and DB-5 Wetlands DB-TR-1, DB-HW-3, DB-HW-R4 and DB-IS-R74

Legend

- Data Logger
- Piezometer
- Hardwood Forested Wetalnd
- Herbaceous Non-Forested Wetland

DA Permit SAJ-1993-01395

Attachment G - Compensatory Mitigation Plan
Attachment C - Conservation Easement Template

DEED OF CONSERVATION EASEMENT
THIRD PARTY BENEFICIARY RIGHTS TO USACE
FOR MOSAIC SOUTH PASTURE EXTENSION ON-SITE AREAS

Prepared by:

Hopping Green & Sams, P.A.
Attn: Amelia Savage
119 South Monroe, Suite 300
Tallahassee, FL 32301

Return original or certified recorded document to:
Department of Environmental Protection
Division of Water Resource Management
Mining and Mitigation Program
2600 Blair Stone Road, M.S. 3577
Tallahassee, FL 32399

THIS DEED OF CONSERVATION EASEMENT is given this ____ day of________________,20___, by South Ft. Meade Land Management, Inc., a Delaware corporation, ("Grantor") having an address at 3033 Campus Drive, Suite E490, Plymouth, MN 55441 to the State of Florida Department of Environmental Protection ("Grantee") whose address is Department of Environmental Protection, 2600 Blair Stone Road, Mail Station 3577, Tallahassee, Florida 32399-3000. As used herein, the term "Grantor" shall include any and all heirs, successors or assigns of the Grantor, and all subsequent owners of the "Conservation Easement Area" (as hereinafter defined) and the term "Grantee" shall include any successor or assignee of Grantee.

WITNESSETH

WHEREAS, the Grantor is the fee simple owner subject to the matters described herein of certain lands in Hardee County, Florida, and more specifically described on the location map in Exhibit "A" attached hereto and incorporated herein (the "Property"); and

WHEREAS, Permit No. 0294666-001 ("Permit") and any modifications thereto issued by the Grantee authorizes certain activities which could affect wetlands or other surface waters in or of the State of Florida; and

WHEREAS, the U.S. Army Corps of Engineers Permit No. 1993-01395 ("Corps Permit") authorizes certain activities in the waters of the United States and requires this site protection instrument over the lands identified in Exhibit B as mitigation for such activities; and

WHEREAS, the Grantor, in consideration of the consent granted by the Permit or other good and valuable consideration provided to Grantor, is agreeable to granting and securing to the Grantee a perpetual Conservation Easement as defined in Section 704.06, Florida Statutes (F.S.), over the area of the Property described on Exhibit "B" ("Conservation Easement Area"); and

WHEREAS, Grantor grants this Conservation Easement as a condition of the Permit and the Corps Permit, solely to off-set or prevent adverse impacts to natural resources, fish and wildlife, and wetland functions; and

WHEREAS, Grantor desires to preserve the Conservation Easement Area in perpetuity in its natural condition, or, in accordance with the Permit and the Corps Permit, in an enhanced, restored, or created condition; and

NOW, THEREFORE, in consideration of the issuance of the Permit and the Corps Permit to construct and operate the permitted activity, and as an inducement to Grantee in issuing the Permit, together with other good and valuable consideration provided to the Grantor, the adequacy and receipt of which are hereby acknowledged, Grantor hereby voluntarily grants, creates, conveys, and establishes a perpetual Conservation Easement for and in favor of the Grantee upon the Conservation Easement Area which shall run with the land and be binding upon the Grantor, and shall remain in full force and effect forever.

The scope, nature, and character of this Conservation Easement shall be as follows:

1. Recitals. The recitals hereinabove set forth are true and correct and are hereby incorporated into and made a part of this Conservation Easement.

2. Purpose. It is the purpose of this Conservation Easement to retain land or water areas in their existing, natural, vegetative, hydrologic, scenic, open or wooded condition and to retain such areas as suitable habitat for fish, plants, or wildlife in accordance with Section 704.06, F.S. Those wetland, stream and upland areas included in this Conservation Easement which are to be preserved, enhanced, restored, or created pursuant to the Permit or the Corps Permit (or any modification thereto) shall be retained and maintained in the preserved, enhanced, restored, or created condition required by the Permit or the Corps Permit (or any modification thereto). The existing conditions of the Conservation Easement Area are documented in the Baseline Condition Report attached hereto as Exhibit "C" or referenced therein. If any portion of the Conservation Easement Area is enhanced, restored, or created after the date hereof, a revised Baseline Condition Report will be developed by Grantor and approved by the Grantee to document the enhanced, restored, or created conditions, which approval by Grantee shall not be unreasonably withheld or delayed.

   To carry out this purpose, the following rights are conveyed to Grantee by this easement:

   a. Upon reasonable notice, to enter upon the Conservation Easement Area at reasonable times with any necessary equipment or vehicles to inspect, determine compliance with the covenants and prohibitions contained in this easement, and to enforce the rights herein granted in a manner that will not unreasonably interfere with the use and quiet enjoyment of the Conservation Easement Area by Grantor at the time of such entry; and

   b. To proceed at law or in equity to enforce the provision of this Conservation Easement and the covenants set forth herein, to prevent the occurrence of any of the prohibited activities set forth herein, and to require the restoration of such areas or features of the Conservation Easement Area that may be damaged by any activity or use that is inconsistent with this Conservation Easement.

3. <u>Prohibited Uses.</u> Except for activities that are permitted or required by the Permit or the Corps Permit (or any modification thereto) (which may include restoration, creation, enhancement, maintenance, and monitoring activities, or surface water management improvements), any activity on or use of the Conservation Easement Area inconsistent with the purpose of this Conservation Easement is prohibited. Without limiting the generality of the foregoing, the following activities are expressly prohibited in or on the Conservation Easement Area [except as authorized by the Permit or the Corps Permit (or any modification thereof)]:

   a. Construction or placing of buildings, roads, signs, billboards or other advertising, utilities, or other structures on or above the ground;

   b. Dumping or placing of soil or other substance or material as landfill, or dumping or placing of trash, waste, or unsightly or offensive materials;

   c. Removing, destroying or trimming trees, shrubs, or other vegetation, except:

      i. The removal of dead trees and shrubs or leaning trees that could cause damage to property is authorized;

      ii. The destruction and removal of noxious, nuisance or exotic invasive plant species as listed on the most recent Florida Exotic Pest Plant Council's List of Invasive Species is authorized;

      iii. Activities authorized by the Permit or the Corps Permit or described in the Management Plan (if any), or otherwise approved in writing by the Grantee are authorized; and

      iv. Activities conducted in accordance with a wildfire mitigation plan developed with the Florida Forest Service that has been approved in writing by the Grantee are authorized. No later than thirty (30) days before commencing any activities to implement the approved wildfire mitigation plan, Grantor shall notify the Grantee in writing of its intent to commence such activities. All such activities may only be completed during the time period for which the Grantee approved the plan;

   d. Excavation, dredging, or removal of loam, peat, gravel, soil, rock, or other material substance in such manner as to affect the surface;

   e. Surface use except for purposes that permit the land or water area to remain in its natural, restored, enhanced, or created condition;

   f. Activities detrimental to drainage, flood control, water conservation, erosion control, soil conservation, or fish and wildlife habitat preservation including, but not limited to, ditching, diking, clearing, and fencing;

   g. Acts or uses detrimental to such aforementioned retention of land or water areas; and

h. Acts or uses which are detrimental to the preservation of the structural integrity or physical appearance of sites or properties having historical, archaeological, or cultural significance.

4. Grantor's Reserved Rights. Grantor reserves all rights as owner of the Conservation Easement Area, including the right to engage, or to permit or invite others to engage, in all uses of the Conservation Easement Area that are not prohibited herein and which are not inconsistent with the Permit or the Corps Permit (or any modification thereto), or the intent and purposes of this Conservation Easement.

Grantor's reserved rights specifically include raising, pasturing and grazing of livestock in the Conservation Easement Area, provided those activities are conducted using the best management practices identified in the 2008 Edition of the "Water Quality Best Management Practices for Florida Cow/Calf Operations" manual published by the Florida Department of Agriculture and Consumer Services, Office of Water Quality (DACS-P-01280), for the protection of surface waters, wetlands, and other aquatic resources.

The Corps Permit prohibits cattle grazing as a secondary use to aquatic resource mitigation in the Conservation Easement Area unless and until there is a Corps-approved cattle grazing management plan, the Corps has determined that the Grantor has demonstrated that cattle grazing is consistent with the objectives of the compensatory mitigation plan, and the Conservation Easement Area is maintained in accordance with the conditions of the Corps Permit.

5. Rights of the U.S. Army Corps of Engineers ("Corps"). The Corps, as a third-party beneficiary, shall have the right to enforce the terms and conditions of this Conservation Easement, including:

a. The right to take action to preserve and protect the environmental value of the Conservation Easement Area;

b. The right to prevent any activity on or use of the Conservation Easement Area that is inconsistent with the purpose of this Conservation Easement, and to require the restoration of areas or features of the Conservation Easement Area that may be damaged by any inconsistent activity or use;

c. The right to enter upon and inspect the Conservation Easement Area in a reasonable manner and at reasonable times to determine if Grantor or its successors and assigns are complying with the covenants and prohibitions contained in this Conservation Easement Area; and

d. The right to enforce this Conservation Easement Area by injunction or proceed at law or in equity to enforce the provisions of this Conservation Easement and the covenants set forth herein, to prevent the occurrence of any of the prohibited activities set forth herein, and the right to require Grantor, or its successors or assigns, to restore such areas or features of the Conservation Easement Area that may be damaged by any inconsistent activity or use or unauthorized activities.

The Grantor, including their successors or assigns, shall provide the Corps at least 60 days advance notice in writing before any action is taken to amend, alter, release, or revoke this Conservation Easement. The Grantee shall provide reasonable notice and an opportunity to comment or object to the release or amendment to the U.S. Army Corps of Engineers. The Grantee shall consider any comments or objections from the U.S. Army Corps of Engineers when making the final decision to release or amend this Conservation Easement.

6. No Dedication. No right of access by the general public to any portion of the Conservation Easement Area is conveyed by this Conservation Easement.

7. Grantee's and Third Party Beneficiary's Liability. Grantee's liability is limited as provided in Subsection 704.06(10) and Section 768.28, F.S. Additionally, Grantee and Third Party Beneficiary shall not be responsible for any costs or liabilities related to the operation, upkeep, or maintenance of the Conservation Easement Area.

8. Enforcement. Enforcement of the terms, provisions and restrictions of this Conservation Easement shall be at the reasonable discretion of Grantee, and any forbearance on behalf of Grantee to exercise its rights hereunder in the event of any breach hereof by Grantor, shall not be deemed or construed to be a waiver of Grantee's rights hereunder. Grantee shall not be obligated to Grantor, or to any other person or entity, to enforce the provisions of this Conservation Easement.

9. Third Party Beneficiary's Enforcement Rights. The Third Party Beneficiary of this Conservation Easement shall have all the rights of the Grantee under this Conservation Easement, including third party enforcement rights of the terms, provisions and restrictions of this Conservation Easement. Third Party Beneficiary's enforcement of the terms, provisions and restrictions shall be at the discretion of the Third Party Beneficiary, and any forbearance on behalf of the Third Party Beneficiary to exercise its rights hereunder in the event of any breach hereof by Grantor, shall not be deemed or construed to be a waiver of Third Party Beneficiary's rights hereunder. Third Party Beneficiary shall not be obligated to Grantor, or to any other person or entity, to enforce the provisions of this Conservation Easement.

10. Taxes. When perpetual maintenance is required by the Permit or the Corps Permit, Grantor shall pay before delinquency any and all taxes, assessments, fees, and charges of whatever description levied on or assessed by competent authority on the Conservation Easement Area, and shall furnish the Grantee with satisfactory evidence of payment upon request.

11. Assignment. Grantee will hold this Conservation Easement exclusively for conservation purposes. Grantee will not assign its rights and obligations under this Conservation Easement except to another organization or entity qualified to hold such interests under the applicable state laws.

12. Severability. If any provision of this Conservation Easement or the application thereof to any person or circumstances is found to be invalid, the remainder of the provisions of this Conservation Easement shall not be affected thereby, as long as the purpose of the Conservation Easement is preserved.

13. Transfers. Grantor and each of Grantor's successors in title to the Conservation Easement Area shall include the book and page of the public records of Hardee County, Florida of this Conservation Easement in each deed or other legal instrument by which Grantor or any such successor in title hereafter transfers any interest in the Conservation Easement Area. However, the failure of Grantor or any such successor in title to comply with this provision shall not impair the validity of this Conservation Easement or limit its enforceability in any way and the terms of this Conservation Easement shall be deemed to be automatically included into such deed or other legal instrument.

14. Written Notice. All notices, consents, approvals or other communications hereunder shall be in writing and shall be deemed properly given if sent by United States certified mail, return receipt requested, addressed to the appropriate party or successor-in-interest.

15. Modifications. This Conservation Easement may be amended, altered, released or revoked only by written agreement between the parties hereto or their heirs, assigns or successors-in-interest, which shall be filed in the public records in Hardee County, Florida.

16. Recordation. Grantor shall record this Conservation Easement in timely fashion in the Official Records of Hardee County, Florida, and shall rerecord it at any time Grantee may require to preserve its rights. Grantor shall pay all recording costs and taxes necessary to record this Conservation Easement in the public records. Grantor will hold Grantee harmless from any recording costs or taxes necessary to record this Conservation Easement in the public records.

17. Acts Beyond Grantor's Control. Nothing contained in this conservation easement shall be construed to entitle Grantee to bring any action against Grantor for any injury to or change in the Property resulting from natural causes beyond Grantor's control, including, without limitation, fire, flood storm, and earth movement, or from any necessary action taken by Grantor under emergency conditions to prevent, abate or mitigate significant injury to the Property or to public health, safety or welfare resulting from such causes.

TO HAVE AND TO HOLD unto Grantee forever. The covenants, terms, conditions, restrictions and purposes imposed with this Conservation Easement shall be binding upon Grantor, and shall continue as a servitude running in perpetuity with the Conservation Easement Area.

Grantor hereby covenants with Grantee that Grantor owns or may claim an interest in said Conservation Easement Area; that, except for the matters listed on "Exhibit D" attached hereto, the Conservation Easement is free and clear of all encumbrances that are inconsistent with the terms of this Conservation Easement; all mortgages and liens on the Conservation Easement Area, if any, have been subordinated to this Conservation Easement; that Grantor has good right and lawful authority to convey this Conservation Easement; and that it hereby fully warrants and defends record title to the Conservation

Easement Area hereby conveyed against the lawful claims of all persons whomsoever.

IN WITNESS WHEREOF, the Grantor and Grantee have executed this Conservation Easement on the day and year last below written and intending same to be effective as of the date first set forth above.

GRANTOR:

By: ______________________________
Herschel E. Morris
Vice President, Minerals
South Ft. Meade Land Management, Inc.,
a Delaware corporation

Signed, sealed and delivered in our presence as witnesses:

By: ____________________________ (Signature)

By: ____________________________ (Signature)

Name:___________________________ (Print)

Name: __________________________ (Print)

STATE OF ______________
COUNTY OF ____________

On this______ day of_________, 201__, before me, the undersigned notary public, personally appeared **Herschel E. Morris**, the person who subscribed to the foregoing instrument, as the **Vice President, Minerals of South Ft. Meade Land Management, Inc.**, a Delaware corporation, and he was duly authorized to do so. He is personally known to me or has produced a _______________ (state) driver's license as identification.

IN WITNESS WHEREOF, I hereunto set my hand and official

seal. NOTARY PUBLIC, STATE OF

____
(Signature)

____
(Name)

My Commission Expires:_______

DEPARTMENT OF ENVIRONMENTAL PROTECTION:

By:______________________________

____
Director of Division of Water Resource Management
State of Florida
Department of Environmental Protection

Signed, sealed and delivered in our presence as witnesses:

By: ______________________________ By: ______________________________
(Signature) (Signature)

Name:____________________________ Name: __________________________
(Print) (Print)

STATE OF FLORIDA
COUNTY OF LEON

On this___ day of______________, 201___, before me, the undersigned notary public, personally appeared __________________________ the person who subscribed to the foregoing instrument, as the **Director of Division of Water Resource Management, State of Florida Department of Environmental Protection**, and he was duly authorized to do so. He is personally known to me or has produced a _____________________ (state) driver's license as identification.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

NOTARY PUBLIC, STATE OF FLORIDA

____
(Signature)

____
(Name)

My Commission Expires:________

EXHIBIT A

[LOCATION MAP]

EXHIBIT B

[LEGAL DESCRIPTION AND SKETCH OF CONSERVATION EASEMENT AREA]

EXHIBIT C

[BASELINE CONDITION REPORT]

EXHIBIT D

[EXISTING TITLE MATTERS]