# INCORPORATING NUTRIENT OFFSET BANKING INTO LOCAL GOVERNMENT STORMWATER STRATEGY

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Rebecca Stubbs, PE | McAdams

# BACKGROUND

## NORTH CAROLINA RULES

- State Stormwater regulations require all **NEW** development to be treated for **TSS**
- NC DEQ defines new development as any proposed impervious or built-upon area (BUA) approved after 1988
- BUA can be treated with approved Stormwater Control Measures (SCMs) that provide various amounts of nutrient removal

# BACKGROUND

## NORTH CAROLINA RULES CONT'D....

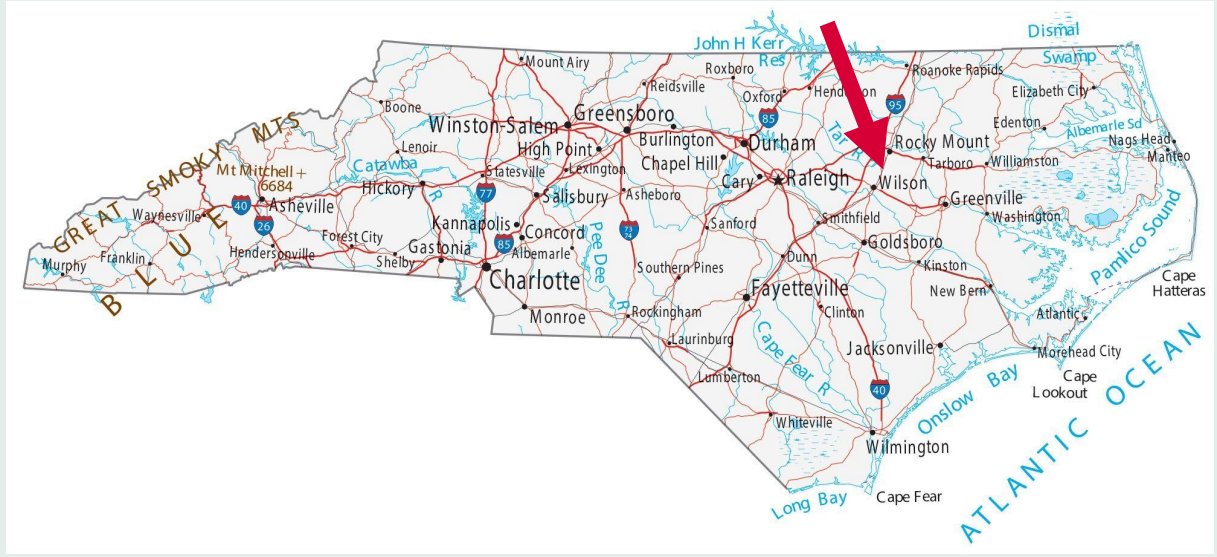
- Nutrient Trading Rule (.0703) was codified and opened door for non-compensatory SCMs to generate nutrient credits to be banked and sold
- Historically only Riparian Buffer Mitigation could generate nutrient credits

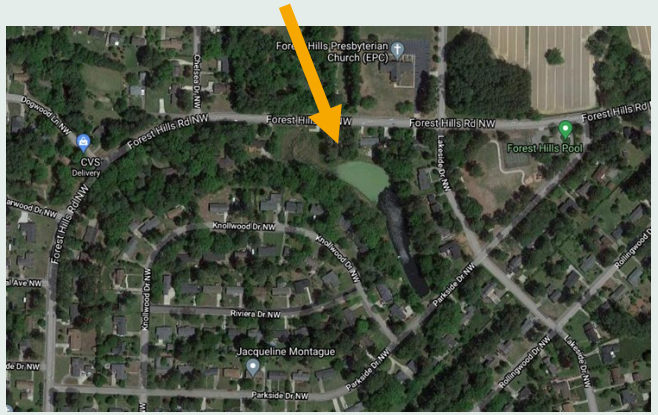
# BACKGROUND

## NORTH CAROLINA RULES CONT'D....

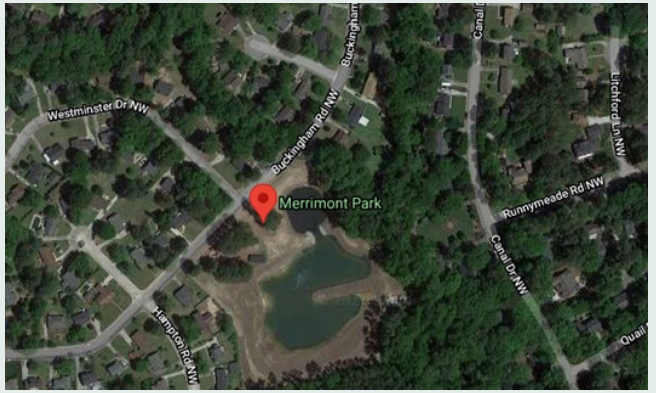
- City of Wilson had a history of funding non-compensatory SCMs out of their own stormwater utility

- City envisioned possibility for nutrient credit sales to:
  - > Perpetuate funding of future SW projects
  - > Incentivize economic development




FOREST HILLS POND RETROFIT

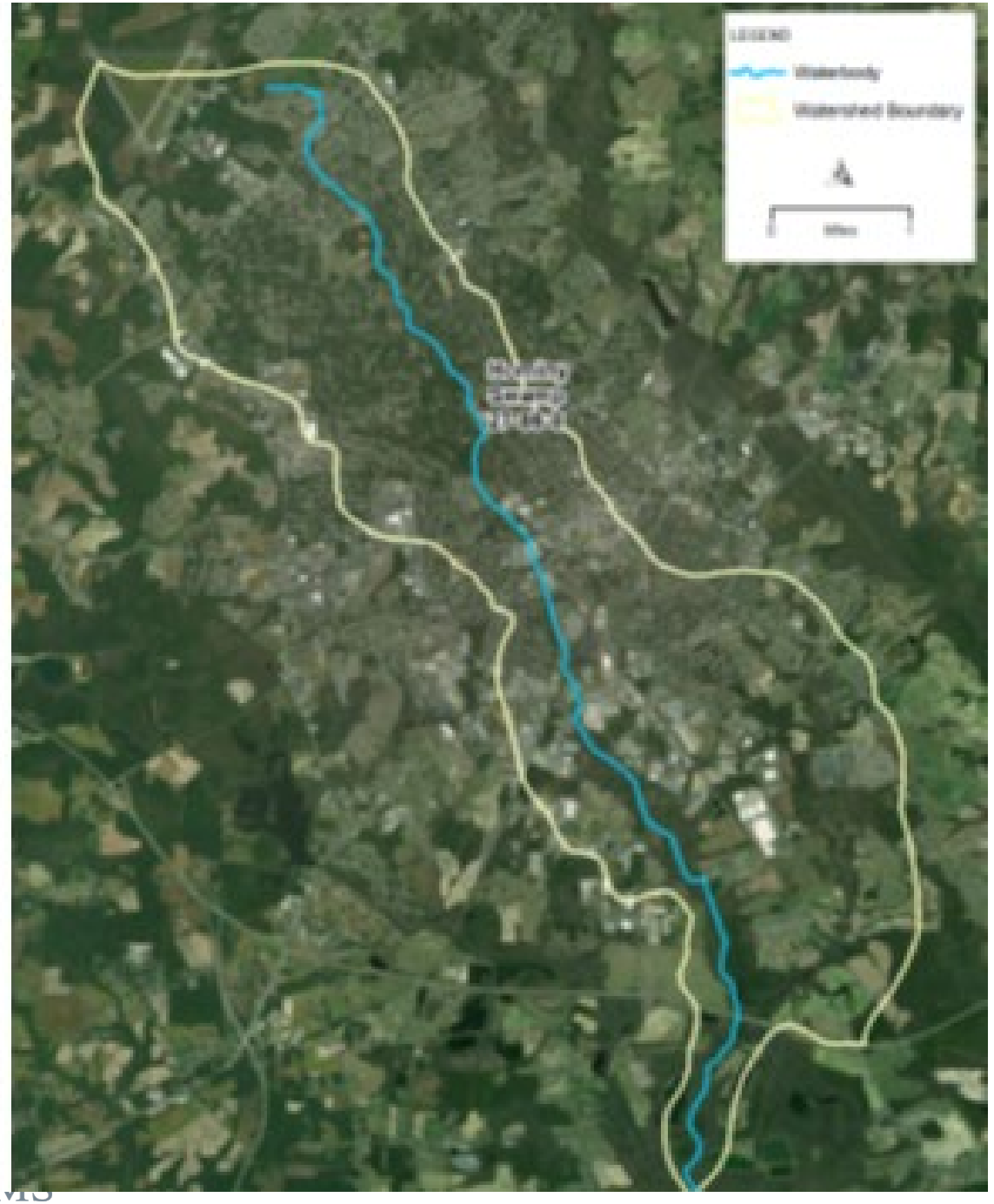



MERRIMONT PARK POND

# Hominy Swamp

- Main stressors (from NC DWQ Report, 2004)
  - **Impervious area** contributing to significant fluctuations from base flow to peak flow
  - **Loss of riparian buffers**
  - **Channelization** of the water body resulting in erosion, sedimentation, and decline in benthic habitat

**WATERSHED AREA = 16 SQ. MI.**



# WITH NEW DEVELOPMENT...

- increase capacity
- incentivize redevelopment
- "ammenitize"
- create multi-use areas

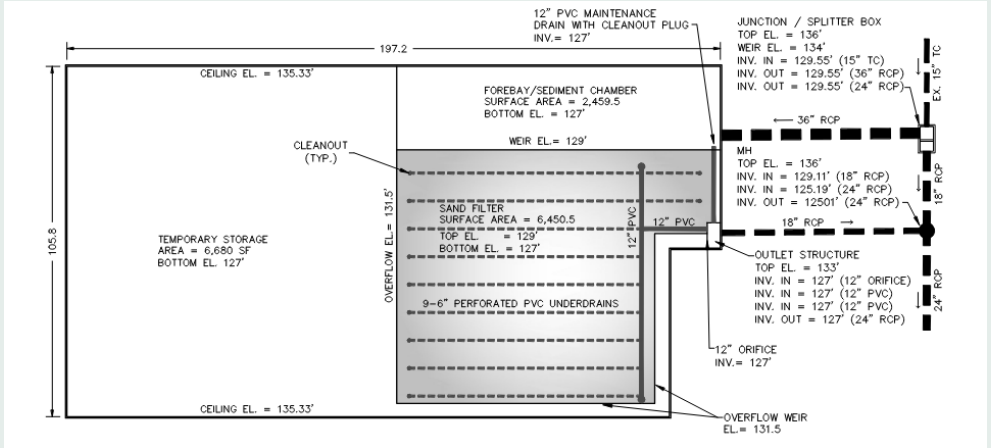
MUNICIPAL NUTRIENT OFFSET BANKING

# WHIRLIGIG STATION NUTRIENT OFFSET BANK

**Nitrogen Credits Generated = 1,900 lbs-TN**

## UNDERGROUND SAND FILTER

- Drainage Area = 8.61 ac
- Impervious Area = 8.61 ac
- Designed to treat first 1” of rainfall
- Located in Hominy Swamp watershed



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## MUNICIPAL NUTRIENT OFFSET BANKING

# WHIRLIGIG STATION NUTRIENT OFFSET BANK

Site Data:

| | |
|---|---|
| Site Area | 1.84+/- acres |
| Total onsite + offsite drainage area | 375,066 sf (8.61+/-) acres |
| Total Built Upon Area | 375,066 sf (8.61+/-) acres |
| Percent Impervious | 100% |
| Proposed SCM | Underground Storage with Sand Filter |

WHIRLIGIG STATION PARKING LOT

| EQUIVALENT IMPERVIOUS AREAS | | | | |
|---|---|---|---|---|
| STORM EVENT | CURRENT CONDITION | | WITH SCM | |
| | FLOW | IMPERVIOUS AREA | FLOW | EQUIV. IMPERVIOUS |
| 1-YR | 29.82 CFS | 8.66 AC | 8.15 CFS | 4.89 AC |
| 10-YR | 56.48 CFS | 8.66 AC | 11.19 CFS | 2.32 AC |
| 25-YR | 70.70 CFS | 8.66 AC | 12.38 CFS | 1.37 AC |
| 100-YR | 97.22 CFS | 8.66 AC | 18.66 CFS | 0.42 AC |

DRAINAGE BASIN SUMMARY

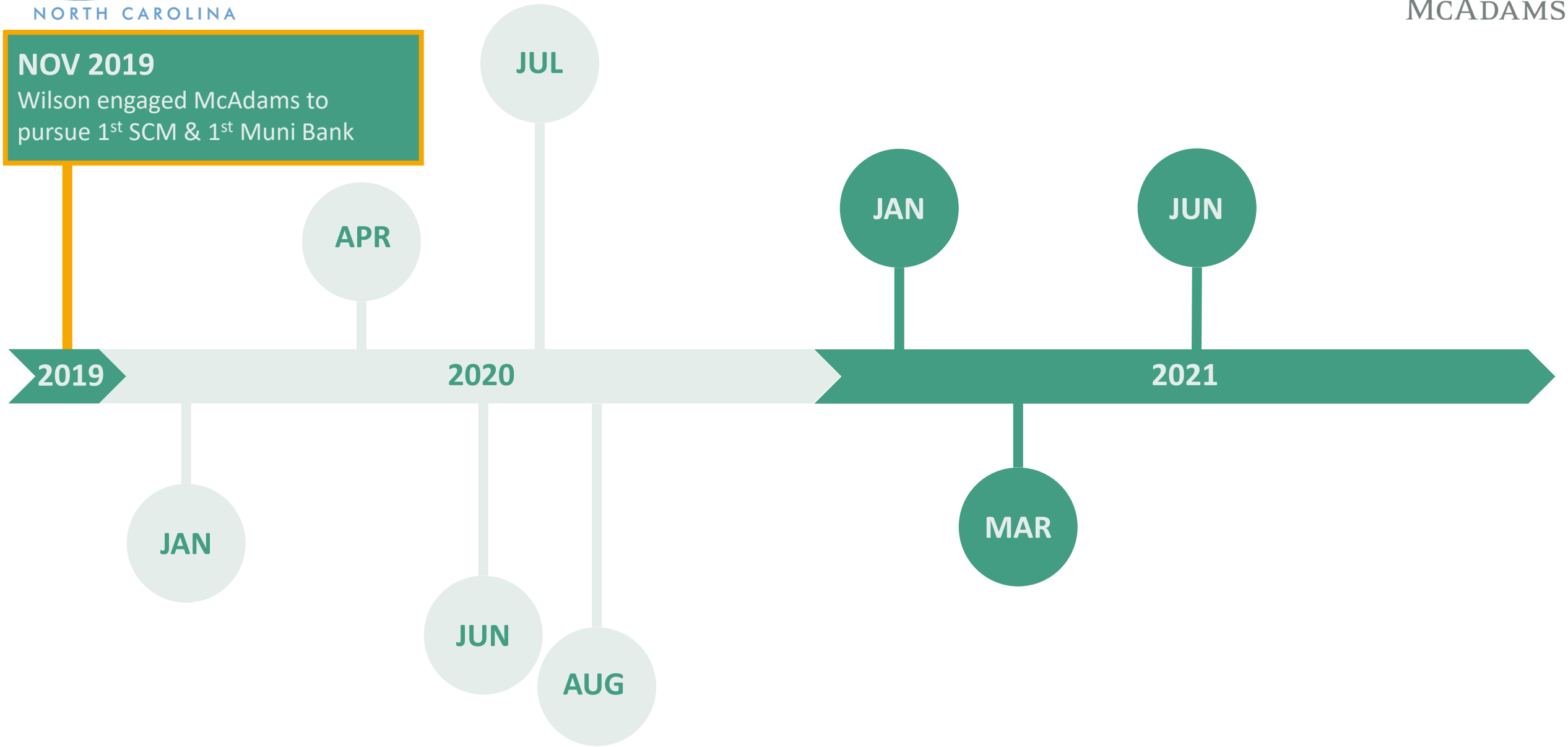
| STORM EVENT | EXISTING CONDITIONS | POST DEV'T W/O SCM | POST DEV'T WITH SCM | REDUCTION % | SCM WS EL | SCM OUTLET FLOW | POST DEV'T EQUIV. CN |
|---|---|---|---|---|---|---|---|
| 1-YR | 29.82 CFS | 29.82 CFS | 8.15 CFS | 73% | 129.82 | 8.13 CFS | 71.0 |
| 10-YR | 56.48 CFS | 56.48 CFS | 11.19 CFS | 80% | 131.82 | 11.15 CFS | 52.6 |
| 25-YR | 70.70 CFS | 70.70 CFS | 12.38 CFS | 82% | 132.95 | 12.33 CFS | 45.8 |
| 100-YR | 97.22 CFS | 97.22 CFS | 18.66 CFS | 81% | 134.91 | 18.59 CFS | 39.0 |

**Nutrient Export Summary**

| | Pre-Project Whole Site Conditions | Post-Project Whole Site without SCMs | Post-Project Whole Site with SCMs | Post-Project SCM-Treated Area | Post-Project Untreated Area |
|---|---|---|---|---|---|
| Percent Impervious (for runoff calculation) (%) | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Percent Built-Upon Area (BUA) (%) | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Annual Runoff Volume ($ft^3$/yr) | 1,273,878 | 1,273,878 | 1,273,878 | 1,266,692 | 7,187 |
| Annual Runoff % Change (relative to pre-D) | 0% | 0% | 0% | | |
| Total Nitrogen EMC (mg/L) | 1.40 | 1.40 | 1.22 | 1.22 | 1.42 |
| Total Nitrogen Load Leaving Site (lb/yr) | **111.32** | **111.32** | **96.98** | 96.34 | 0.64 |
| *Total Nitrogen Loading Rate (lb/ac/yr)* | *12.86* | *12.86* | *11.20* | *11.19* | *13.04* |
| Total Nitrogen % Change (relative to pre-D) | 0% | 0% | -13% | | |
| Total Phosphorus EMC (mg/L) | 0.19 | 0.19 | 0.13 | 0.13 | 0.18 |
| Total Phosphorus Load Leaving Site (lb/yr) | **15.36** | **15.36** | **10.15** | 10.07 | 0.08 |
| *Total Phosphorus Loading Rate (lb/ac/yr)* | *1.77* | *1.77* | *1.17* | *1.17* | *1.65* |
| Total Phosphorus % Change (relative to pre-D) | 0% | 0% | -34% | | |

MUNICIPAL NUTRIENT OFFSET BANKING

# THE PROCESS



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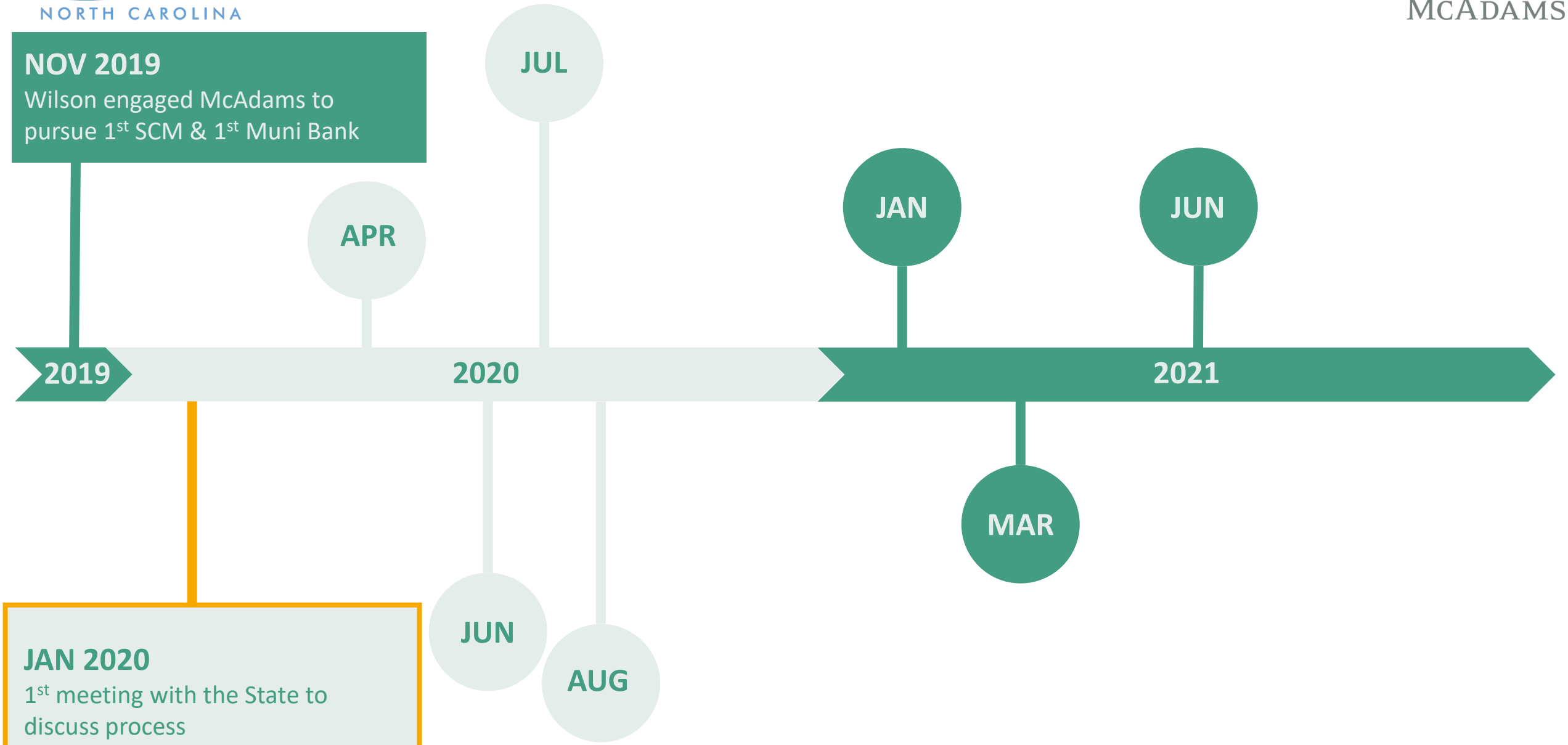

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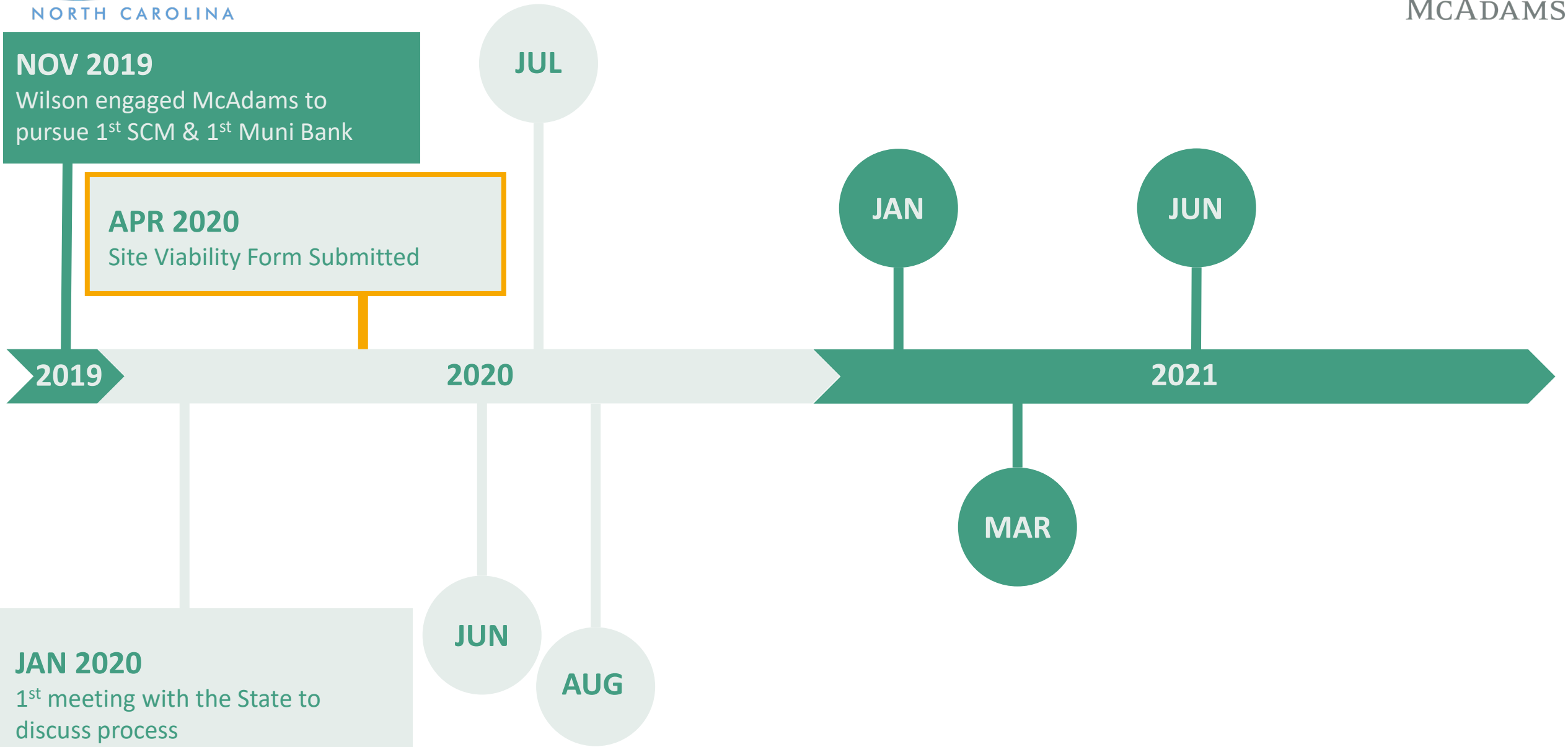

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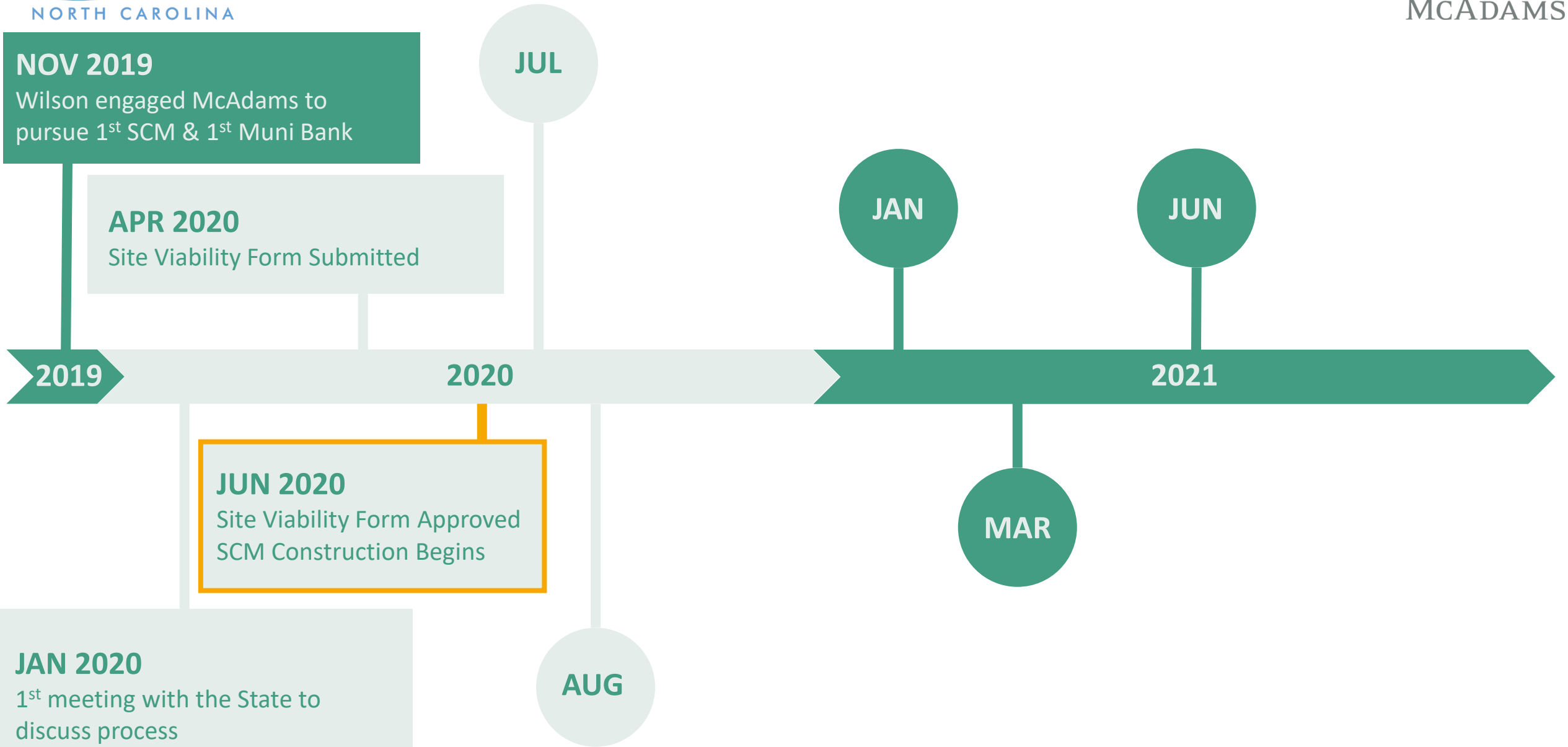

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# MUNICIPAL NUTRIENT OFFSET BANKING

## THE PROCESS

**NOV 2019**
Wilson engaged McAdams to pursue 1st SCM & 1st Muni Bank

**APR 2020**
Site Viability Form Submitted

**JUL 2020**
SCM Construction Completed

**JAN 2020**
1st meeting with the State to discuss process

**JUN 2020**
Site Viability Form Approved
SCM Construction Begins

**AUG**

**MAR**

**JAN**

**JUN**

2019 | 2020 | 2021

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**MAR**

# THE PROCESS

## TYPICAL NUTRIENT ~~MITIGATION~~ OFFSET BANKING INSTRUMENT COMPONENTS

1. GEOGRAPHIC SERVICE AREA

2. ~~MITIGATION~~ STORMWATER MANAGEMENT PLAN

3. CALCULATION OF ~~MITIGATION~~ NUTRIENT OFFSET CREDITS

4. POST CONSTRUCTION DOCUMENTATION
   - REPORTING REQUIREMENTS
   - FINANCIAL ASSURANCES
   - LONG-TERM MANAGEMENT

5. CREDIT RELEASE SCHEDULE

6. CREDIT TRANSACTIONS

7. BANK CLOSURE

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**MAR 2021**
2nd meeting with the State
Focus on Financial Assurance from a Municipality

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# MUNICIPAL NUTRIENT OFFSET BANKING
# THE PROCESS

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**JUL 2020**
SCM Construction Completed

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**JUN 2021**
2nd Submittal of NOBI + MOA

TODAY

2019 | 2020 | 2021

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1st meeting with the State to discuss process
[PRE-APPLICATION MEETING]

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Site Viability Form Approved
SCM Construction Begins

**AUG 2020**
1st Submittal of Draft MBI

**MAR 2021**
2nd meeting with the State
Focus on Financial Assurance from a Municipality

# LOOKING AHEAD

- Defined process for future municipal nutrient offset banks
- Eye on large-scale WQ Goals
  - Offsetting existing dense downtown development
  - Funding strategy for local stormwater programs
  - Avenue to address environmental justice issues

# THANK YOU!


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