

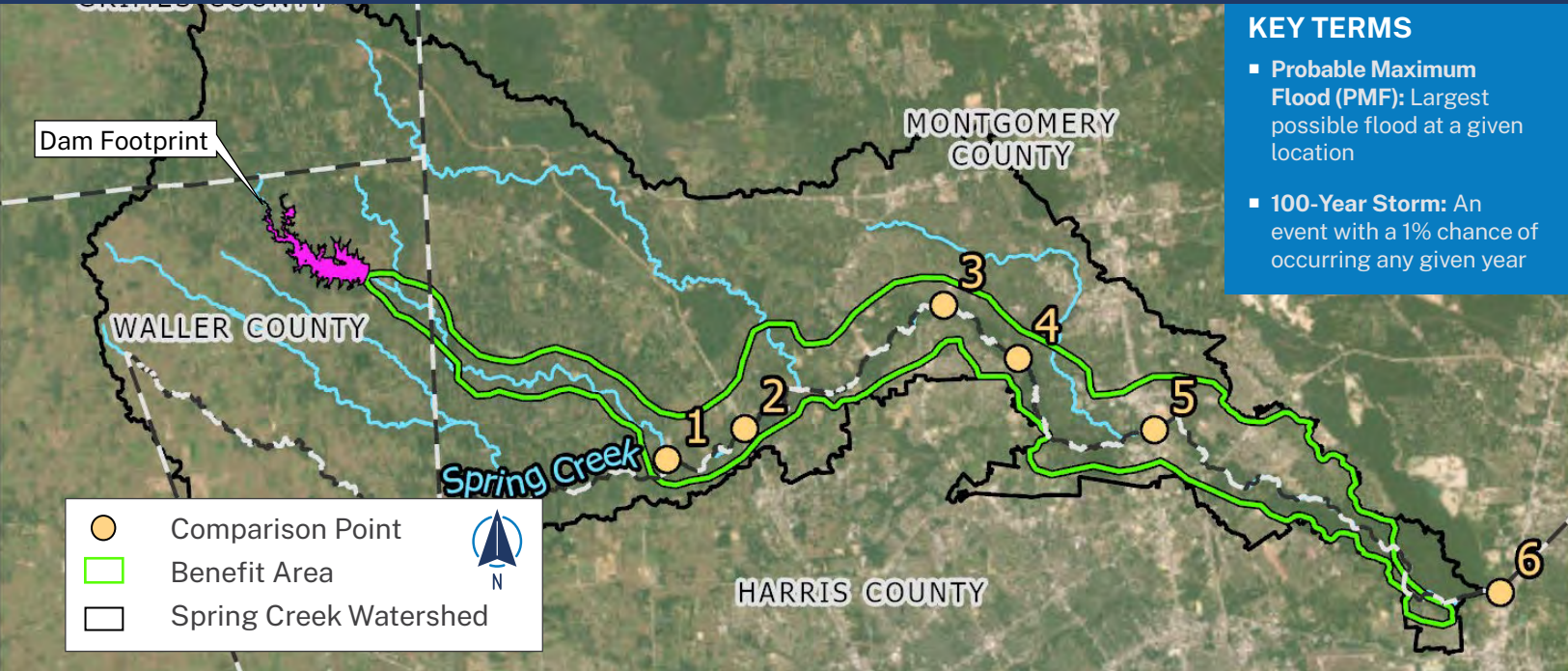
Exhibit 1

Fact Sheets

Walnut Creek Detention

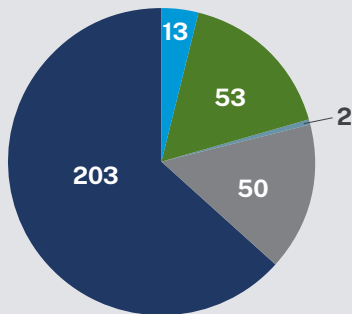
<https://springcreekstudy.com/>

A proposed dry bottom dam facility located on Walnut Creek

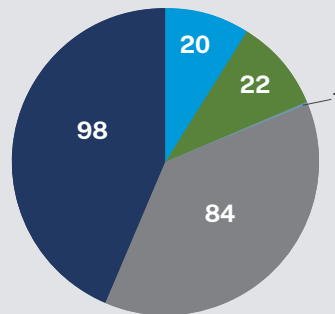


ESTIMATED BENEFITS

Structures Anticipated to No Longer Flood
Hurricane Harvey



Structures Anticipated to No Longer Flood
100-Year Storm



- Waller County Precinct 2
- Harris County Precinct 3
- Harris County Precinct 4
- Montgomery County Precinct 2
- Montgomery County Precinct 3

ADDITIONAL BENEFITS

- Reduced flooding for 9,032 structures in 500-Year event
- Removed 484 structures from flooding in 500-Year

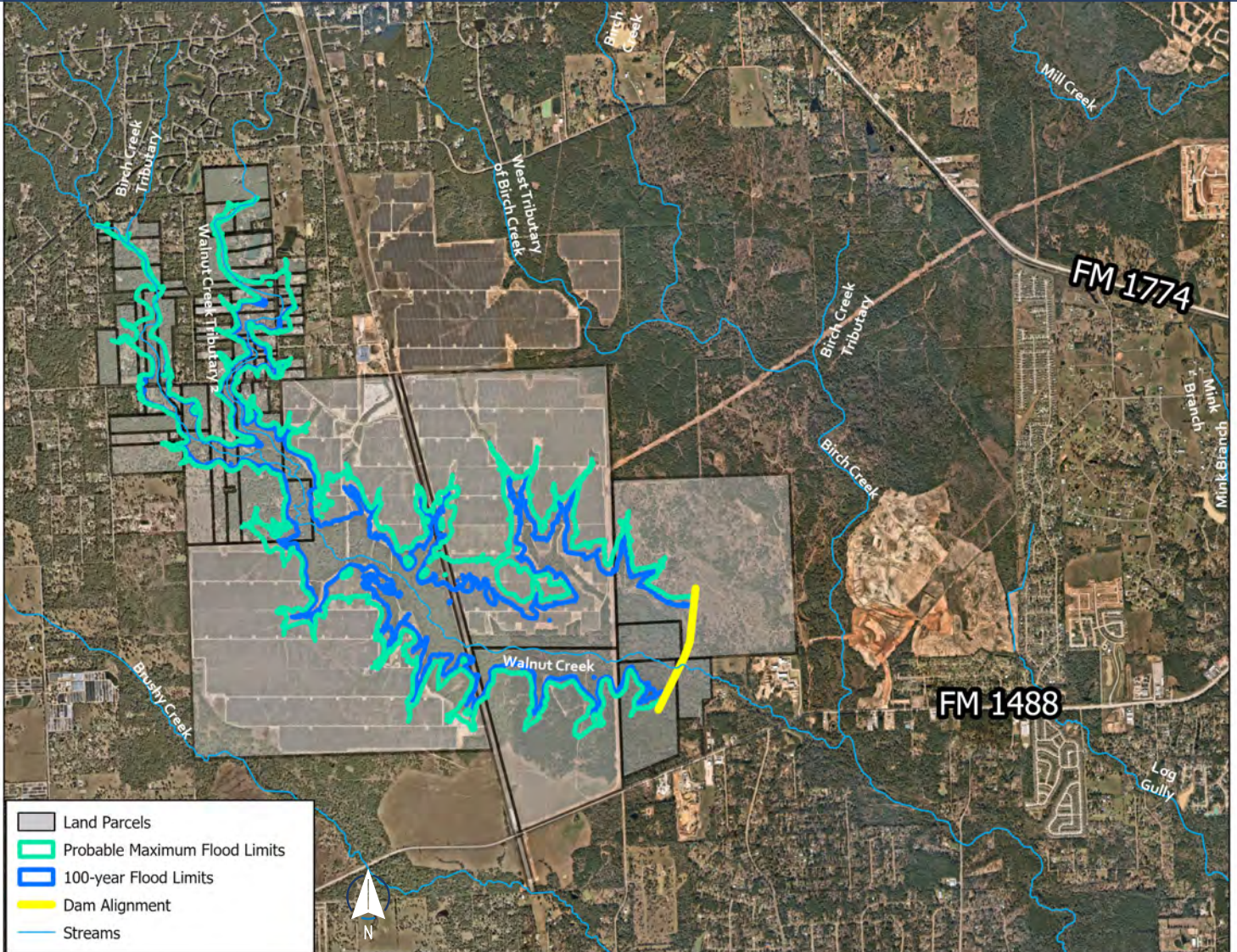
ESTIMATED COSTS

Design Cost.....	\$12M
Environmental Cost	\$2M
Construction Cost	\$83M
Land Cost.....	\$95M
TOTAL COSTS	\$193M
TOTAL BENEFITS	\$202M

PROJECT BENEFIT-COST RATIO: 1.05

Reduction in Flood Elevations After Project Construction

Comparison Point	Location	100-YR (ft)
1	On Walnut Creek	-2.80
2	SH 249	-0.77
3	Kuykendahl	-0.54
4	Gosling	-0.50
5	I-45	-0.38
6	West Fork Confluences	-0.22



PROJECT DETAILS

- Type: Dry dam detention facility
- 100-year volume provided: 7,300 acre-feet
- Maximum height: 39.1 feet
- Dam Length: 3,373 feet
- Maximum inundation area: 1,370 acre
- 100-year inundation area: 940 acre
- Spillway Elevation: 254.7 feet
- Top of Dam Elevation: 263.6 feet

CHALLENGES

- Current solar farm overlaps portions of the proposed facility
- USACE coordination required due to minor environmental stream and wetland impacts
- Private land owners within project footprint

POTENTIAL PARTNERS

- | | | |
|------------------|---------|---------------------------------|
| ■ Montgomery Co. | ■ HCFCD | ■ USACE |
| ■ MUDs | ■ TWDB | ■ Future Flood Control District |
| ■ SJRA | ■ GLO | ■ Waller County |
| ■ The Woodlands | ■ FEMA | |

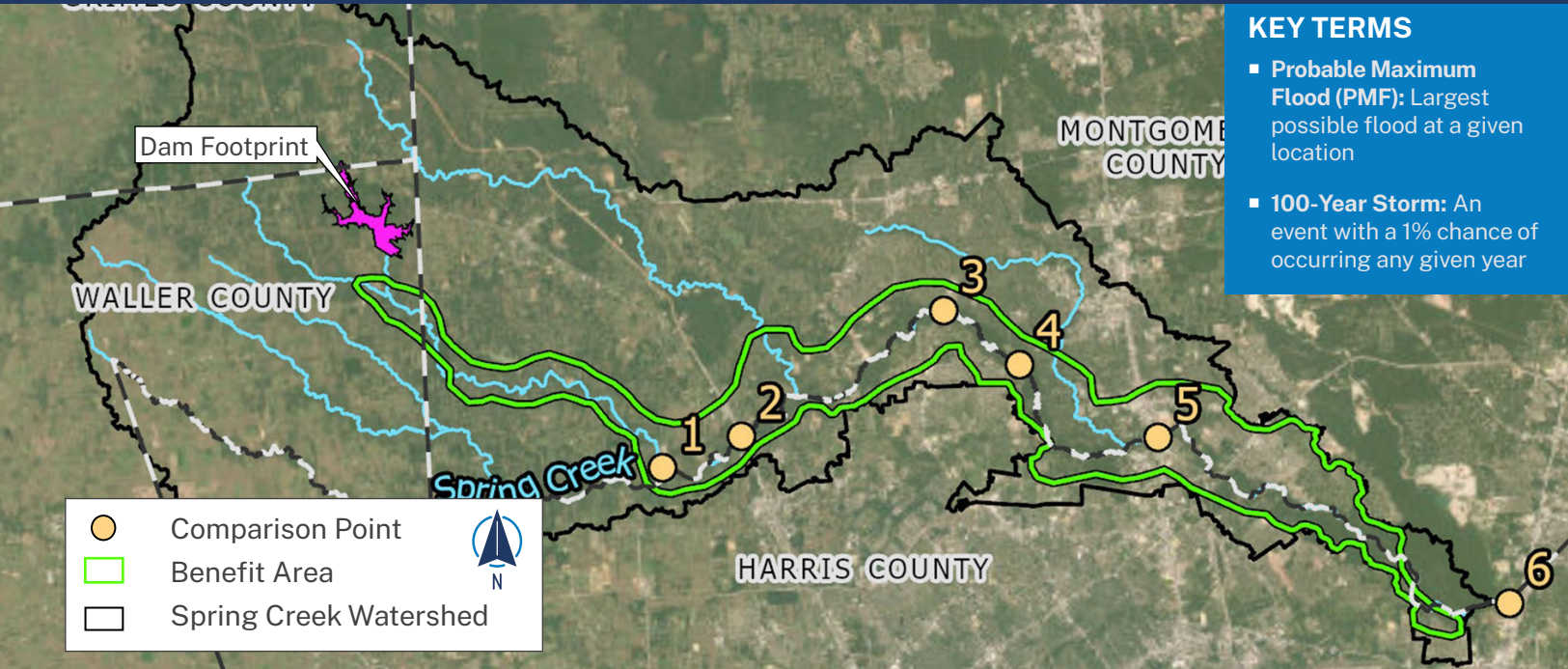
NEXT STEPS

- Coordinate with the solar farm for potential shared project
- Identify potential dam owner and operator
- Identify funding partners
- Seek funding for land acquisition, design and construction
- Acquire land using local and other funding sources
- Final engineering and design of proposed facility
- Construction and operation of dam facility

Birch Creek Detention

<https://springcreekstudy.com/>

A proposed dry bottom dam facility located on Birch Creek



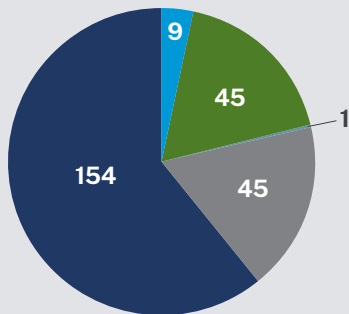
KEY TERMS

- **Probable Maximum Flood (PMF):** Largest possible flood at a given location
- **100-Year Storm:** An event with a 1% chance of occurring any given year

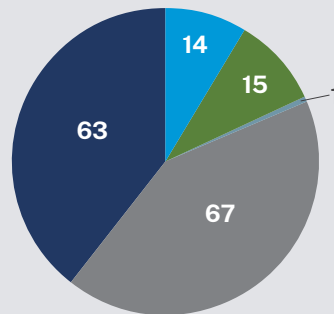
- Comparison Point
- Benefit Area
- Spring Creek Watershed

ESTIMATED BENEFITS

Structures Anticipated to No Longer Flood
Hurricane Harvey



Structures Anticipated to No Longer Flood
100-Year Storm



- Waller County Precinct 2
- Harris County Precinct 3
- Harris County Precinct 4
- Montgomery County Precinct 2
- Montgomery County Precinct 3

ADDITIONAL BENEFITS

- Reduced flooding for 9,207 structures in 500-Year event
- Removed 303 structures from flooding in 500-Year

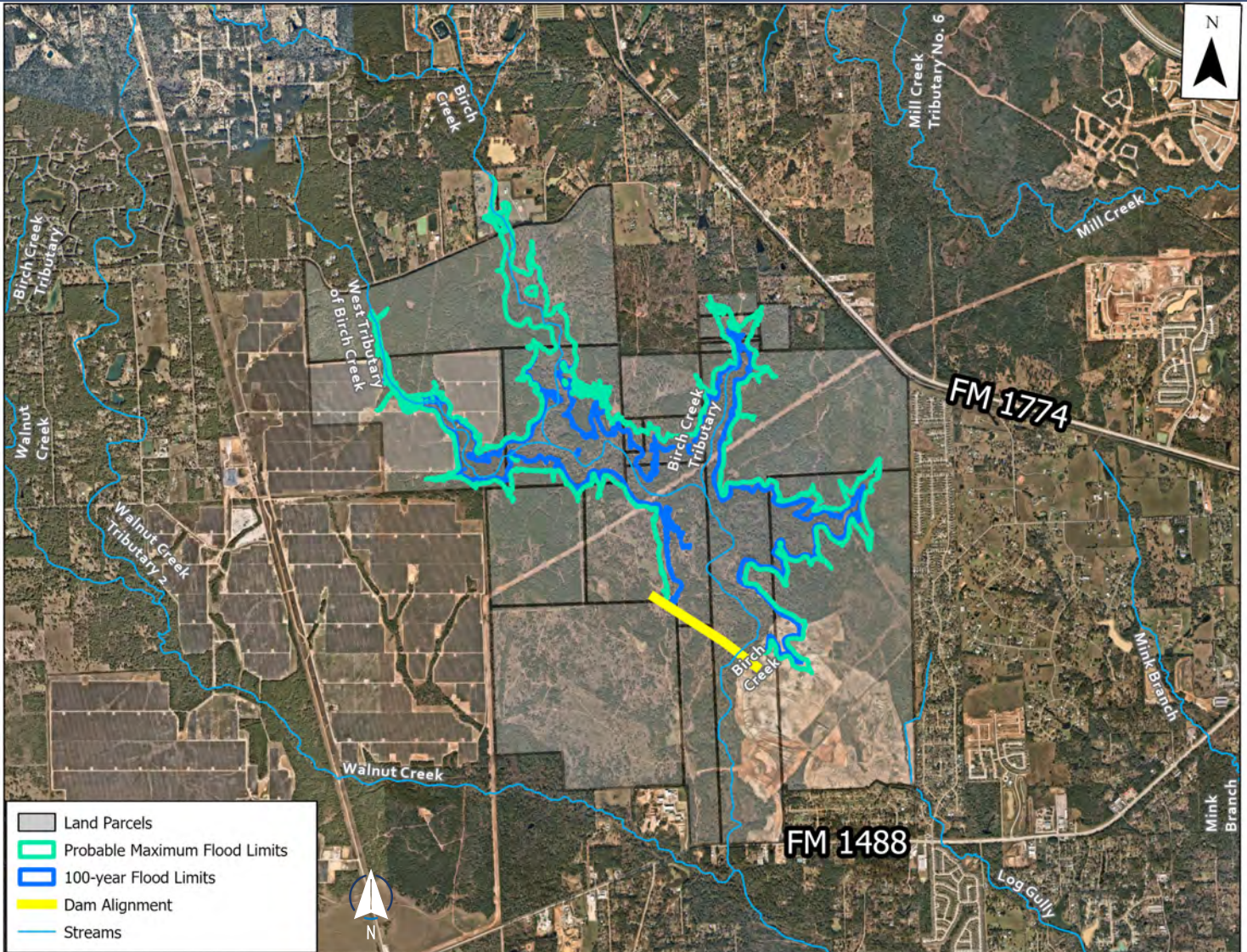
ESTIMATED COSTS

Design Cost	\$10M
Environmental Cost	\$1M
Construction Cost	\$64M
Land Cost	\$31M
TOTAL COSTS	\$105M
TOTAL BENEFITS	\$185M

PROJECT BENEFIT-COST RATIO: 1.76

Reduction in Flood Elevations After Project Construction

Comparison Point	Location	100-YR (ft)
1	On Walnut Creek	-1.99
2	SH 249	-0.54
3	Kuykendahl	-0.36
4	Gosling	-0.33
5	I-45	-0.23
6	West Fork Confluences	-0.14



PROJECT DETAILS

- Type: Dry dam detention facility
- 100-year volume provided: 4,800 acre-feet
- Maximum height: 35.4 feet
- Dam Length: 3,168 feet
- Maximum inundation area: 920 acre
- 100-year inundation area: 690 acre
- Spillway Elevation: 251.2 feet
- Top of Dam Elevation: 259.1 feet

CHALLENGES

- Future Woodhaven Development overlaps portions of the proposed facility
- USACE coordination required due to minor environmental stream and wetland impacts
- Private land owners within project footprint

POTENTIAL PARTNERS

- | | | |
|------------------|---------|---------------------------------|
| ■ Montgomery Co. | ■ HCFCD | ■ USACE |
| ■ MUDs | ■ TWDB | ■ Future Flood Control District |
| ■ SJRA | ■ GLO | ■ Waller County |
| ■ The Woodlands | ■ FEMA | |

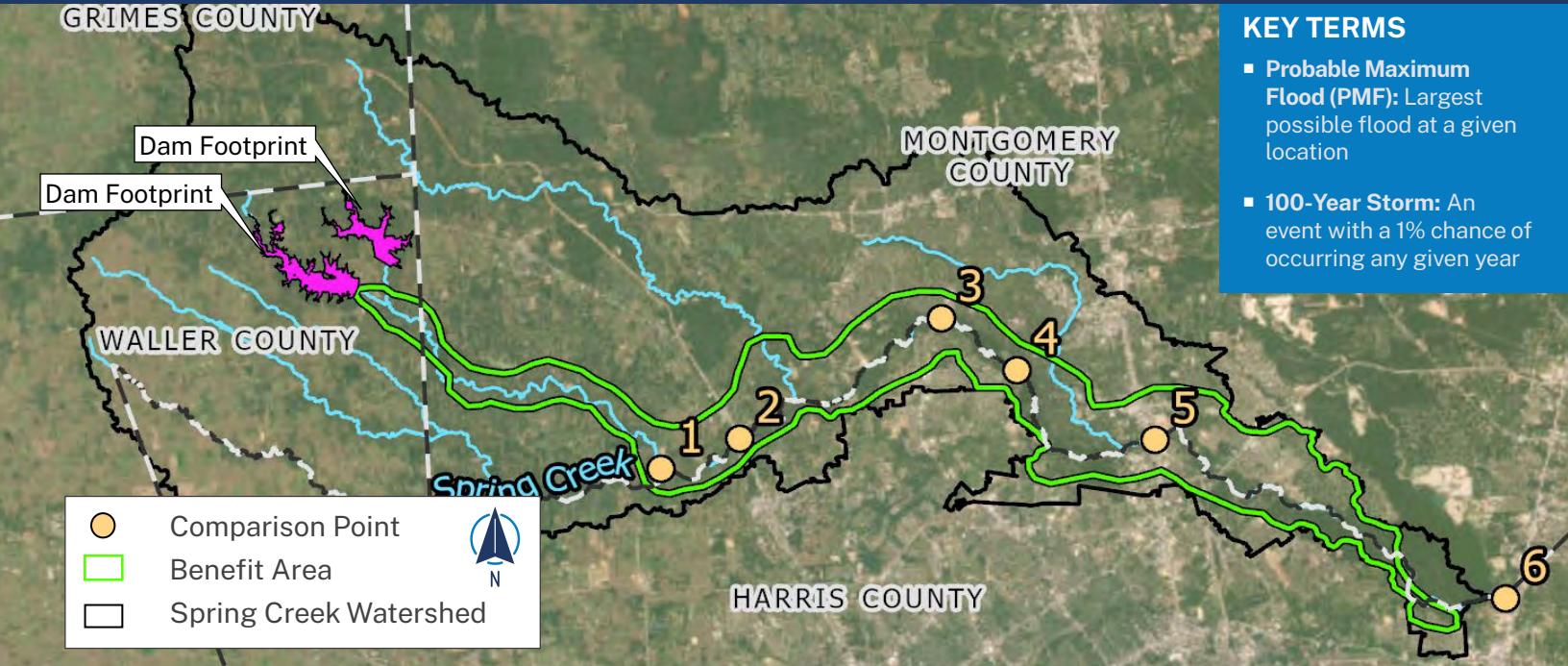
NEXT STEPS

- Coordinate with developers for potential shared project
- Identify potential dam owner and operator
- Identify funding partners
- Seek funding for land acquisition, design and construction
- Acquire land using local and other funding sources
- Final engineering and design of proposed facility
- Construction and operation of dam facility

Walnut Creek & Birch Creek Detention

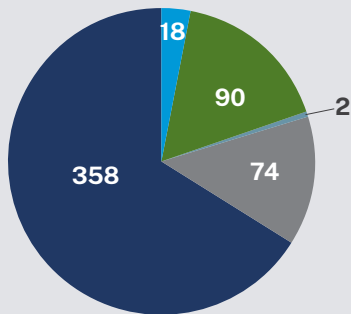
<https://springcreekstudy.com/>

A proposed dry bottom dam facility located on Walnut and Birch Creek

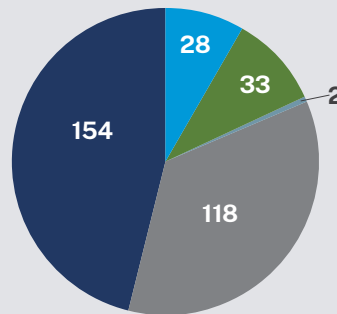


ESTIMATED BENEFITS

Structures Anticipated to No Longer Flood
Hurricane Harvey



Structures Anticipated to No Longer Flood
100-Year Storm



- Waller County Precinct 2
- Harris County Precinct 3
- Harris County Precinct 4
- Montgomery County Precinct 2
- Montgomery County Precinct 3

ADDITIONAL BENEFITS

- Reduced flooding for 8,762 structures in 500-Year event
- Removed 795 structures from flooding in 500-Year

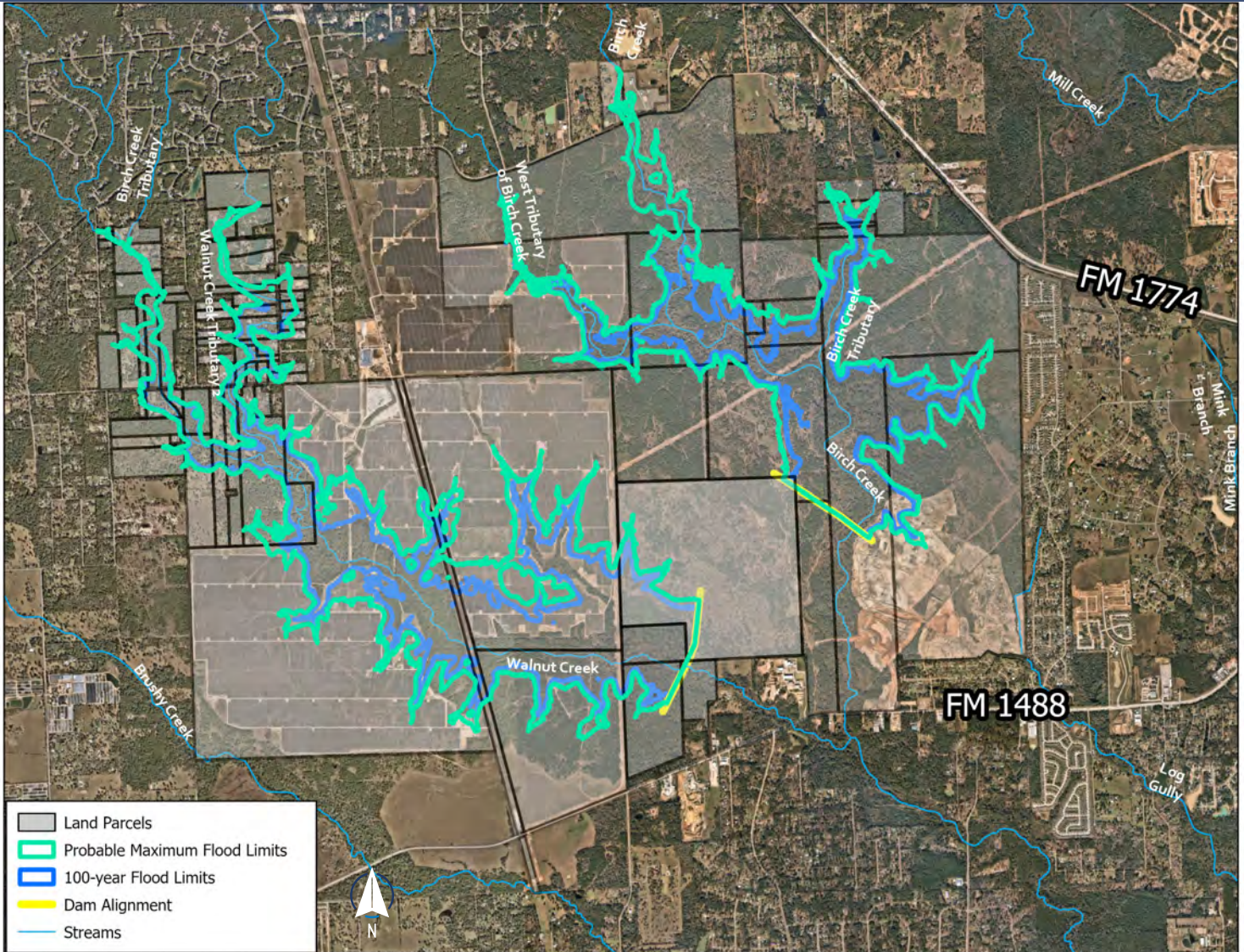
ESTIMATED COSTS

Design Cost	\$22M
Environmental Cost	\$3M
Construction Cost	\$147M
Land Cost	\$126M
TOTAL COSTS	\$298M
TOTAL BENEFITS	\$212M

PROJECT BENEFIT-COST RATIO: 0.71

Reduction in Flood Elevations After Project Construction

Comparison Point	Location	100-YR (ft)
1	On Walnut Creek	-3.64
2	SH 249	-1.2
3	Kuykendahl	-0.88
4	Gosling	-0.82
5	I-45	-0.67
6	West Fork Confluences	-0.36



PROJECT DETAILS (BIRCH / WALNUT)

- Type: Dry dam detention facility
- 100-year volume provided: 12,100 acre-feet
- Maximum height: 35.4 feet / 39.1 feet
- Dam Length: 3,168 feet / 3,373 feet
- Maximum inundation area: 920 acre / 1,370 acre
- 100-year inundation area: 690 acre / 940 acre
- Spillway Elevation: 251.2 feet / 254.7 feet
- Top of Dam Elevation: 259.1 feet / 263.6 feet

CHALLENGES

- Future Woodhaven Development and solar farm overlaps portions of the proposed facilities
- USACE coordination required due to minor environmental stream and wetland impacts
- Private land owners within project footprint

POTENTIAL PARTNERS

- | | | |
|------------------|---------|---------------------------------|
| ■ Montgomery Co. | ■ HCFCD | ■ USACE |
| ■ MUDs | ■ TWDB | ■ Future Flood Control District |
| ■ SJRA | ■ GLO | ■ Waller County |
| ■ The Woodlands | ■ FEMA | |

NEXT STEPS

- Coordinate with developers and the solar farm for potential shared project
- Identify potential dam owner and operator
- Identify funding partners
- Seek funding for land acquisition, design and construction
- Acquire land using local and other funding sources
- Final engineering and design of proposed facility
- Construction and operation of dam facility

Exhibit 2: QAQC Forms

MODEL REVIEW SUBMITTAL

Y - Yes
 N - No
 N/A - Not Applicable
 NC - Not Checked

AVO: 42682
 Project Title: Spring Creek - Birch/Walnut DAM

I. HYDROLOGY	QC Complies Y/N or N/A or *NC	QC Initials	Comment	Modeler Complies Y/N or N/A or *NC	Modeler Initials	Modeler Response
Existing hydrologic model included with submittal? (HMS v4.2)						
Was Atlas 14 rainfall used?						
Is documentation or backup calculations provided for TC+R calculations? Do these calculations follow Section 3 of HCFCD PCPM guidelines?						
Is there documentation provided that indicates how drainage areas have been proportioned and assigned to HEC RAS model cross sections?						
II. EXISTING CONDITIONS HYDRAULIC MODEL	QC Complies Y/N or N/A or *NC	QC Initials	Comment	Modeler Complies Y/N or N/A or *NC	Modeler Initials	Modeler Response
General						
Is the project name appropriate for the study?						
Does the project include a description? Consultant name, date of final submittal, which stream are modeled, storm event being modeled, existing conditions vs alternatives, brief description for the alternative, etc.						
Is the terrain file loaded and connected correctly within the model?						
Does the model have an appropriate projection file included?						
Is the aerial imagery loaded into the model?						
Is the model free from extraneous files for clarity of which plans need to be reviewed?						
Simulation Details						
Is simulation time sufficiently long? (Start and end dates)						
Does the model run subcritical conditions? If other approach was needed, please explain.						
Is the computation interval for unsteady flow analysis reasonable?						
Is the output results interval for unsteady flow analysis reasonable?						
Cross sections						
Are cross sections aligned perpendicular to flow path? Is spacing appropriate?						
Are channel, LOB, and ROB reach lengths appropriate?						
For 1D/2D models are cross sections widths set to a short distance outside of the top of bank?						
Are bank station reasonable?						
Are Manning's n-values reasonable?						
Are ineffective areas reasonable? - location; elevation; permanent vs non-permanent						
Are levees or obstructed areas reasonable? - location; elevation						
Do cross sections match to terrain file? If different, a note in the XS description should be included explaining why. Some examples of cross section modifications that are reasonable include areas with survey data or where terrain picks up water surfaces in channels.						
Are HTab values set appropriately?						
If used, are pilot channels reasonable?						
Bridges						
Is bridge geometry consistent with aerial images, survey, and other available data?						
Is bridge geometry reasonable? - low chord elevations, pier placements, abutments, culvert elevations						
Is bridge width appropriate? Is the distance from the upstream cross section reasonable?						
Does bridge have a name or description editor window?						
Are bridge deck stations align with bounding XS stations?						
If multiple crossings combined into one crossing, is a note placed to explain the data entered?						
Are appropriate HTab values set? Max WSE required at minimum.						
Review bridge modeling method. Is multiple opening analysis used appropriately, if used?						
2D Areas and Storage Areas						
Does mesh provide sufficient coverage for inundation?						
Does the 2D mesh roughness vary or is it uniform? Are Manning's n values used consistent with HCFCD modeling guidelines and landuse?						
Is mesh cell size appropriate?						
Are 2D breaklines used and are they reasonable?						
Are 2D boundary conditions placed to prevent water from building along edge of 2D mesh?						
Are there any overflows out of the 2D mesh? Are 2D connectors used and appropriate?						
Are there any gaps/slivers between 1D and 2D portions of the model?						
Are refinement regions used appropriately, if used?						

AVO: 42682

Project Title: Spring Creek - Birch/Walnut DAM

MODEL REVIEW SUBMITTAL

Y - Yes
N - No
N/A - Not Applicable
NC - Not Checked

Are N-value regions appropriate, if used?						
Are storage areas connected to 1D or 2D portions of the model appropriately?						
Is the elevation-volume curve filled out appropriately? How was the curve developed?						
Lateral Structures						
Are the lateral structures correctly linking the 1D to the 2D/storage area?						
Are lateral structures set at logical break in grades? - highpoints and banks, incoming tributaries						
Are weir coefficients set correctly?						
Are stability factors set?						
Flow Inputs and Boundary Conditions						
Are the correct DSS file paths are being used in RAS and linked correctly?						
Are all drainage areas from the HEC-HMS model are accounted for in the unsteady flow data?						
Are flow multipliers used? Are they applied correctly? Multiplier must add up to one for each applied basin.						
Are flow types correct? - Flow hydrograph; uniform lateral inflows; lateral inflow						
Are initial conditions set appropriately? - Minimum flows, initial flow, initial elevations in storage areas						
Does the hydrologic data used for the downstream boundary condition match the given frequency event?						
Is downstream boundary condition appropriate?						
Are boundary conditions conditions needed on 2D mesh?						
Are assumptions documented?						

AVO: 42682
 Project Title: Spring Creek - Birch/Walnut DAM

MODEL REVIEW SUBMITTAL

Y - Yes
 N - No
 N/A - Not Applicable
 NC - Not Checked

III. EXISTING RESULTS	QC Complies Y/N or N/A or *NC	QC Initials	Comment	Modeler Complies Y/N or N/A or *NC	Modeler Initials	Modeler Response
Is the plan named appropriately and plan descriptions included?						
Is simulation time sufficiently long?						
Are water surface elevation profiles reasonable and have consistent rise and falls along the system?						
Any crossing profiles for the design storms?						
Any sudden rises or falls in profile?						
Any significant unexplained changes in WSEL through the entire model run?						
Any issues with profiles at bridge crossings?						
Is the resultant model stable for all storm events?						
Are there unstable hydrographs?						
Are hydrographs of lateral structures, storage area connectors, and bridges/culverts stable?						
Does mapping show for velocity spikes that could cause model stability issues in 2D?						
What are some areas of instability?						
Do the instabilities affect the overall results of the analysis?						
Is the continuity error appropriate? (continuity error of less than or equal to +/- 2%)						
Is volume lost from the calculations?						
IV. OTHER COMMENTS						

Originator Signature: _____

Date:

Reviewer Signature: _____

Date:

BIM PM Signature: _____

Date:

MODEL REVIEW SUBMITTAL

Y - Yes
 N - No
 N/A - Not Applicable
 NC - Not Checked

AVO: 42682
 Project Title: Spring Creek - Birch/Walnut DAM

VIII. PROPOSED CONDITIONS MODEL	QC Complies Y/N or N/A or *NC	QC Initials	Comment	Modeler Complies Y/N or N/A or *NC	Modeler Initials	Modeler Response
Hydrology						
Are there changes to the drainage areas? If so, please explain.						
Are there changes to the hydrologic parameters? If so, please explain.						
Was Atlas 14 rainfall used?						
Is documentation or backup calculations provided for TC+R calculations? Do these calculations follow Section 3 of HCFCD PCPM guidelines?						
Does the model include 50%, 10%, and 1% AEP storm events?						
Hydraulic Model						
General						
Have any channels been changed, added, or removed? If so, please explain.						
Is the project name appropriate for the study?						
Does the project include a description? Consultant name, date of final submittal, which stream are modeled, storm event being modeled, existing conditions vs alternatives, brief description for the alternative, etc.						
Is the terrain file loaded and connected correctly within the model?						
Does the model have an appropriate projection file included?						
Is the aerial imagery loaded into the model?						
Is the model free from extraneous files for clarity of which plans need to be reviewed?						
Simulation Details						
Is simulation time sufficiently long? (Start and end dates)						
Does the model run subcritical conditions? If other approach was needed, please explain.						
Is the computation interval for unsteady flow analysis reasonable?						
Is the output results interval for unsteady flow analysis reasonable?						
Cross sections						
Are cross sections aligned perpendicular to flow path? Is spacing appropriate?						
Are channel, LOB, and ROB reach lengths appropriate?						
For 1D/2D models are cross sections widths set to a short distance outside of the top of bank?						
Are bank station reasonable?						
Are Manning's n-values reasonable based on most recent aerial imagery?						
Are ineffective areas reasonable? - location; elevation; permanent vs non-permanent						
Are levees or obstructed areas reasonable? - location; elevation						
Do cross sections match to terrain file? If different, a note in the XS description should be included explaining why. Some examples of cross section modifications that are reasonable include areas with survey data or where terrain picks up water surfaces in channels.						
If model is 1D only, do cross sections contain 500yr event?						
Are HTab values set appropriately?						
If used, are pilot channels reasonable?						
Bridges						
Is bridge geometry consistent with aerial images, survey, and other available data?						
Is bridge geometry reasonable? - low chord elevations, pier placements, abutments, culvert elevations						
Is bridge width appropriate? Is the distance from the upstream cross section reasonable?						
Does bridge have a name or description editor window?						
Are bridge deck stations align with bounding XS stations?						
If multiple crossings combined into one crossing, is a note placed to explain the data entered?						
Are appropriate HTab values set? Max WSE required at minimum.						
Review bridge modeling method. Is multiple opening analysis used appropriately, if used?						
2D Areas and Storage Areas						
Does mesh provide sufficient coverage for inundation?						
Does the 2D mesh roughness vary or is it uniform? Are Manning's n values used consistent with HCFCD modeling guidelines and landuse?						
Is mesh cell size appropriate?						
Are 2D breaklines used and are they reasonable?						
Are 2D boundary conditions placed to prevent water from building along edge of 2D mesh?						
Are there any overflows out of the 2D mesh? Are 2D connectors used and appropriate?						
Are there any gaps/slivers between 1D and 2D portions of the model?						
Are refinement regions used appropriately, if used?						
Are N-value regions appropriate, if used?						
Are storage areas connected to 1D or 2D portions of the model appropriately?						
Is the elevation-volume curve filled out appropriately? How was the curve developed?						
Lateral Structures						
Are the lateral structures correctly linking the 1D to the 2D/storage area?						
Are lateral structures set at logical break in grades? - highpoints and banks, incoming tributaries						
Are weir coefficients set correctly?						
Are stability factors set?						
Flow Inputs and Boundary Conditions						
Are the correct DSS file paths are being used in RAS and linked correctly?						

AVO: 42682

Project Title: Spring Creek - Birch/Walnut DAM

MODEL REVIEW SUBMITTAL

Y - Yes

N - No

N/A - Not Applicable

NC - Not Checked

Are all drainage areas from the HEC-HMS model accounted for in the unsteady flow data?						
Are flow multipliers used? Are they applied correctly? Multiplier must add up to one for each applied basin.						
Are flow types correct? - Flow hydrograph; uniform lateral inflows; lateral inflow						
Are initial conditions set appropriately? - Minimum flows, initial flow, initial elevations in storage areas						
Does the hydrologic data used for the downstream boundary condition match the given frequency event?						
Is downstream boundary condition appropriate?						
Are boundary conditions conditions needed on 2D mesh?						
Are assumptions documented?						

AVO: 42682
 Project Title: Spring Creek - Birch/Walnut DAM

MODEL REVIEW SUBMITTAL

Y - Yes
 N - No
 N/A - Not Applicable
 NC - Not Checked

Alternative Design						
Is a revised schematic layout provided?						
Does the modeling match the documentation for the proposed alternative?						
Does the alternative perform as intended?						
Check hydraulic criteria in PCPM. (sized to prevent WSE or flow impacts, appropriate n-values)						
Check structural criteria in PCPM. (structure accomdates channel design)						
Do the proposed stormwater detention basins meet HCFCF design criteria? (Sections 6 of HCFCF PCPM)						
Check basin location consideration. Is there anything in this location that can cause an issue? Such as environmental issues, subsurface utilities, property owndership, etc.						
Check layout (depth, sides slopes, pilot channel slopes, etc.) in Section 6.4 of PCPM						
Check water surface elevations and freeboard requirements in Section 6.3 of PCPM						
Check inflow/outflow structure requirements in Sections 6.6 and 6.7 of PCPM						
Check drain time requirements in Section 6.3 of PCPM						
Check wet bottom features/dry bottom feature requirements in Section 6.4 of PCPM						
Check ROW/maintenance berm width requirements in Section 6.5 of PCPM						
IX. PROPOSED CONDITIONS MODEL RESULTS	QC Complies Y/N or N/A or *NC	QC Initials	Comment	Modeler Complies Y/N or N/A or *NC	Modeler Initials	Modeler Response
Are water surface elevation profiles reasonable and have consistent rise and falls along the system?						
Any crossing profiles for the design storms?						
Any sudden rises or falls in profile?						
Any significant unexplained changes in WSEL through the entire model run?						
Any issues with profiles at bridge crossings?						
Are there any profile lines used to assess results?						
Is the resultant model stable for all storm events?						
Are there unstable hydrographs?						
Are hydrographs of lateral structures, storage area connectors, and bridges/culverts stable?						
Does mapping show for velocity spikes that could cause model stability issues in 2D?						
What are some areas of instability?						
Do the instabilities affect the overall results of the analysis?						
Is the continuity error appropriate? (continuity error of less than or equal to +/- 2%)						
Is volume lost from the calculations?						
Does the system have capacity for determined LOS?						
Are flows increased to the receiving drainage system?						
Is mitigation proposed to offset adverse impacts?						
Is the mitigation included in the hydraulic model?						
Has impact analysis been performed to ensure no flow or WSE impacts are experienced downstream of project (on receiving system)?						
Is the tailwater condition having affecting modeling results and potential impacts?						
Are there no WSE impacts 0.01' or greater in the 2-, 10-, 100- and 500-year storm events?						
Are there no WSE impacts in the 2D 0.01' or greater in the 2-, 10-, 100- and 500-year storm events?						
Compare flow hydrographs at cross sections to check for potential impacts.						
For 1D/2D models use a profile line in RAS Mapper to check for potential impacts.						
Check WSEL grid comparison for potential impacts.						
IV. OTHER COMMENTS						

AVO: 42682
Project Title: Spring Creek - Birch/Walnut DAM

MODEL REVIEW SUBMITTAL

Y - Yes
N - No
N/A - Not Applicable
NC - Not Checked

Originator Signature: _____

Date:

Reviewer Signature: _____

Date:

BIM PM Signature: _____

Date: