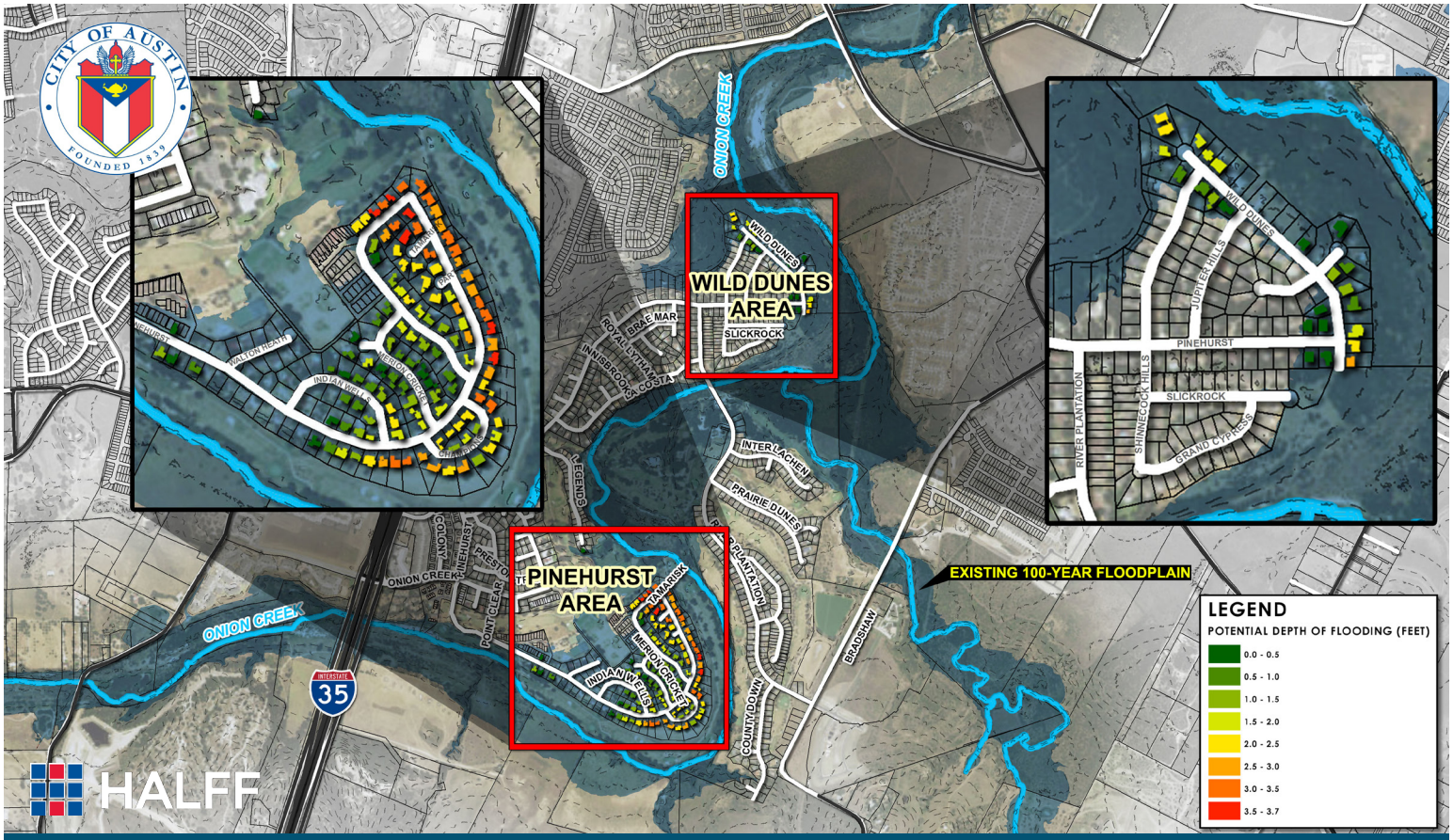
City of Austin Onion Creek Study Flood Mitigation Alternatives

EXISTING CONDITIONS



PROJECT DESCRIPTION:

The Onion Creek watershed encompasses approximately 344 square miles. Onion Creek generally flows easterly, from the headwaters in Blanco County, through Hays County, to the confluence with the Colorado River in Travis County. In response to the October 2013 flood along Onion Creek, the City of Austin initiated a re-evaluation of Onion Creek with the goal of updating flood risk information as well as the identification of potential flood mitigation alternatives. In October 2015, Onion Creek once again experienced a significant flooding event which further demonstrated the importance of this evaluation. To validate the updated hydrologic and hydraulic analysis, the study team simulated three historical events (October 2013, May 2015, and October 2015) using City provided gage-adjusted radar rainfall and gage records. Once validated, the updated analysis was used to redefine computed peak discharges and water surface elevations along Onion Creek. Based on this study, the City was able to re-evaluate flood risk within the Pinehurst and Wild Dunes neighborhoods and evaluate potential flood mitigation alternatives.

QUICK FACTS

Within the Upper Onion neighborhoods

Number of Structures Inundated by 100-year Flood:
116 in Pinehurst
23 in Wild Dunes

Average Depth in Home in the 100-year Flood:
1.9 feet in Pinehurst
1.0 feet in Wild Dunes

Number of Structures within 100-year Floodplain Footprint:
174 in Pinehurst
45 in Wild Dunes

Number of Structures Inundated by Simulated October 2015 Flood:
139 in Pinehurst
21 in Wild Dunes

Average Depth in Home in the Simulated October 2015 Flood:
2.1 feet in Pinehurst
1.2 feet in Wild Dunes

Onion Creek Website: www.austintexas.gov/onioncreekstudy

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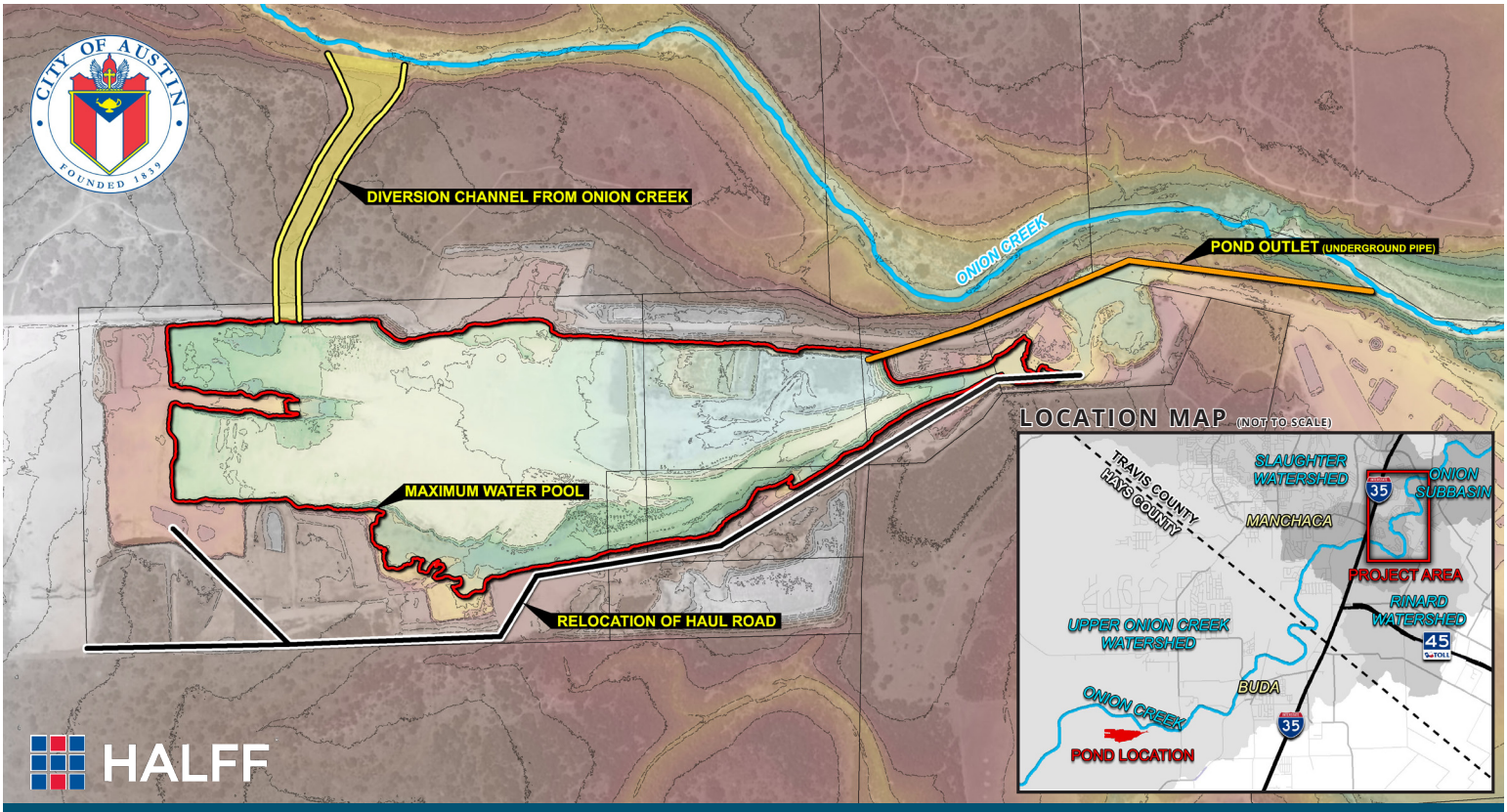
CENTEX WEST REGIONAL DETENTION POND



PROJECT DESCRIPTION:

The Centex West Regional Detention Pond would utilize the active Centex quarry as an offline detention pond. Since the existing quarry is essentially a large excavated reservoir, the only additional excavation required would be a diversion channel from Onion Creek to the quarry. Flood waters would be diverted from Onion Creek main stem into the Centex West Pond and then slowly released back into Onion Creek. Construction of an offline detention pond at this location would require extensive negotiations with the property owner and the quarry operator to allow for disruptions to mining operations during and after flood events. Agreements would also need to be established regarding the property and detention pond once mining operations are eventually complete.

BENEFITS

- Benefits to multiple jurisdictions
- Utilize existing quarry
- Potential aquifer recharge opportunity

CONSTRAINTS

- Multi-stakeholder coordination
- Property purchase
- Permitting
- Environmental impacts to water quality protection land
- Flood mitigation benefits depend on rainfall location
- Long timeline for implementation

QUICK FACTS

Pond Volume:
5,700 acre-feet

Surface Area:
135 acres

Project Cost Estimate:
$50,700,000

Estimated Annual O&M Cost
$40,000

Within the Pinehurst & Wild Dunes neighborhoods

Average/Max Depth Decrease in Structure:
1.2 / 2.5 feet in Pinehurst
0.4 / 1.5 feet in Wild Dunes

Average Flow Decrease:
11%

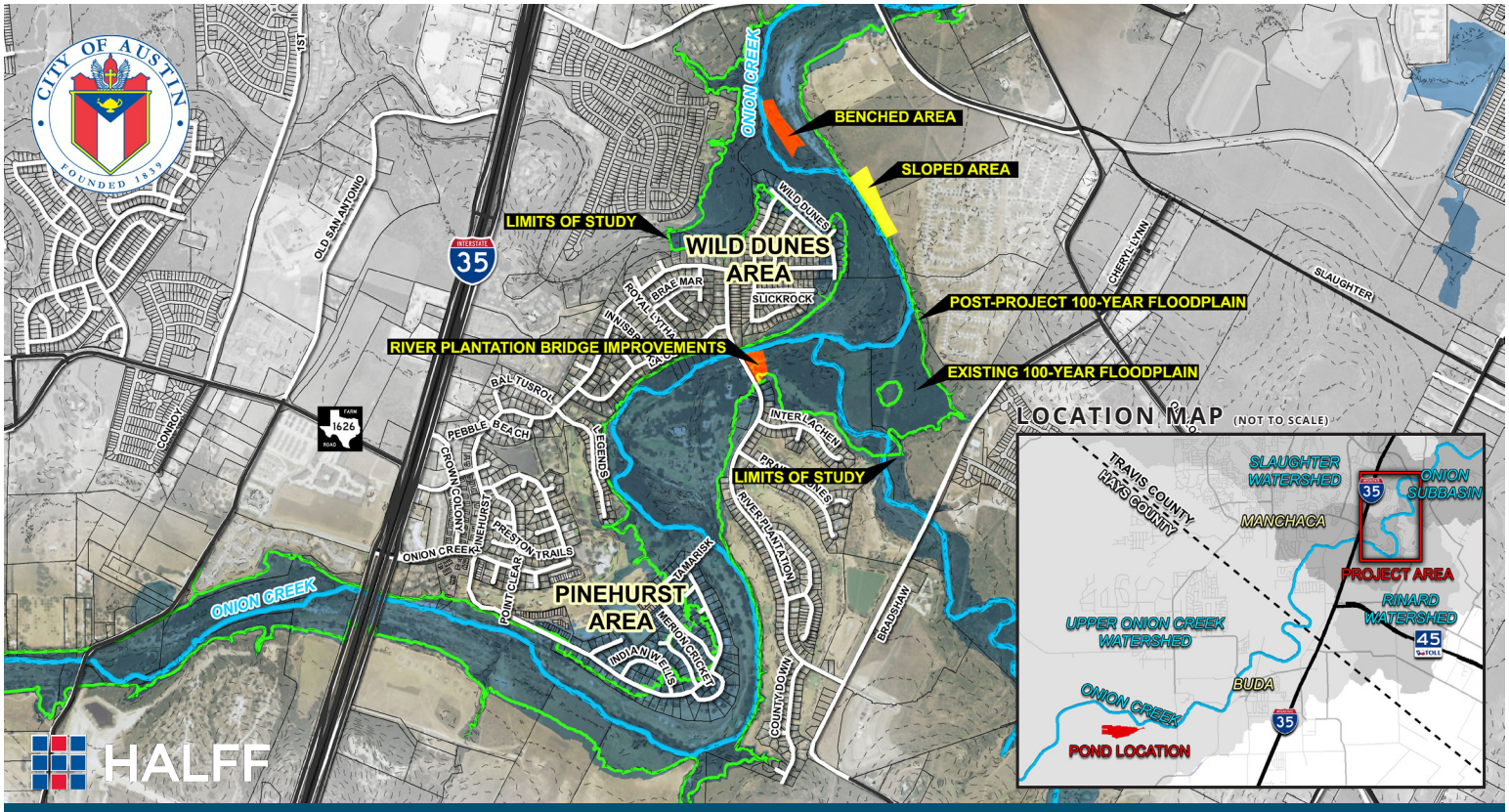
Number of Structures Protected from the 100-Year Flood:
79 out of 139

Limited or no flood mitigation benefits if rainfall occurs down stream of facility.

Onion Creek Website: www.austintexas.gov/onioncreekstudy

City of Austin Onion Creek Study Flood Mitigation Alternatives

CENTEX WEST DETENTION POND WITH CHANNEL MODIFICATIONS



PROJECT DESCRIPTION:

This alternative includes the combination of the Centex West Regional Detention Pond, River Plantation Drive bridge improvements, as well as channel modifications downstream of River Plantation Drive. Increases in water surface elevation along a creek can be caused by channel constrictions that reduce the flow area of a channel. The proposed River Plantation Drive bridge improvements would include excavating the channel to add flow area under the River Plantation Drive bridge. Similar to constriction removal, channel benching can be used to increase the area of a channel. To minimize permitting requirements, channel benching was evaluated above Onion Creek's estimated ordinary high water elevations. This alternative would require significant efforts to maintain the "cleared" channel and would significantly impact the riparian corridor along Onion Creek.

BENEFITS

- Benefits to multiple jurisdictions
- Utilize existing quarry
- High level of protection for Pinehurst and Wild Dunes neighborhoods
- Potential aquifer recharge opportunity

CONSTRAINTS

- Multiple projects required
- Multi-stakeholder coordination
- Property purchase
- Permitting
- Environmental impacts
- Flood mitigation benefits depend on rainfall location
- Long timeline for implementation
- Perpetual channel maintenance

QUICK FACTS

- Centex West Pond Volume: **5,700 acre-feet**
- Channel Benching: **410,000 yd³ of excavation**
- Bridge Improvements: **210,000 yd³ of excavation**
- Project Cost Estimate: **$70,200,000**
- Estimated Annual O&M Cost: **$88,000**

Within the Pinehurst & Wild Dunes neighborhoods

- Average/Max Depth Decrease in Structure: **1.4 / 3.4 feet in Pinehurst** **0.7 / 1.8 feet in Wild Dunes**
- Number of Structures Protected from the 100-Year Flood: **111 out of 139**
- Limited or no flood mitigation benefits if rainfall occurs downstream of facility

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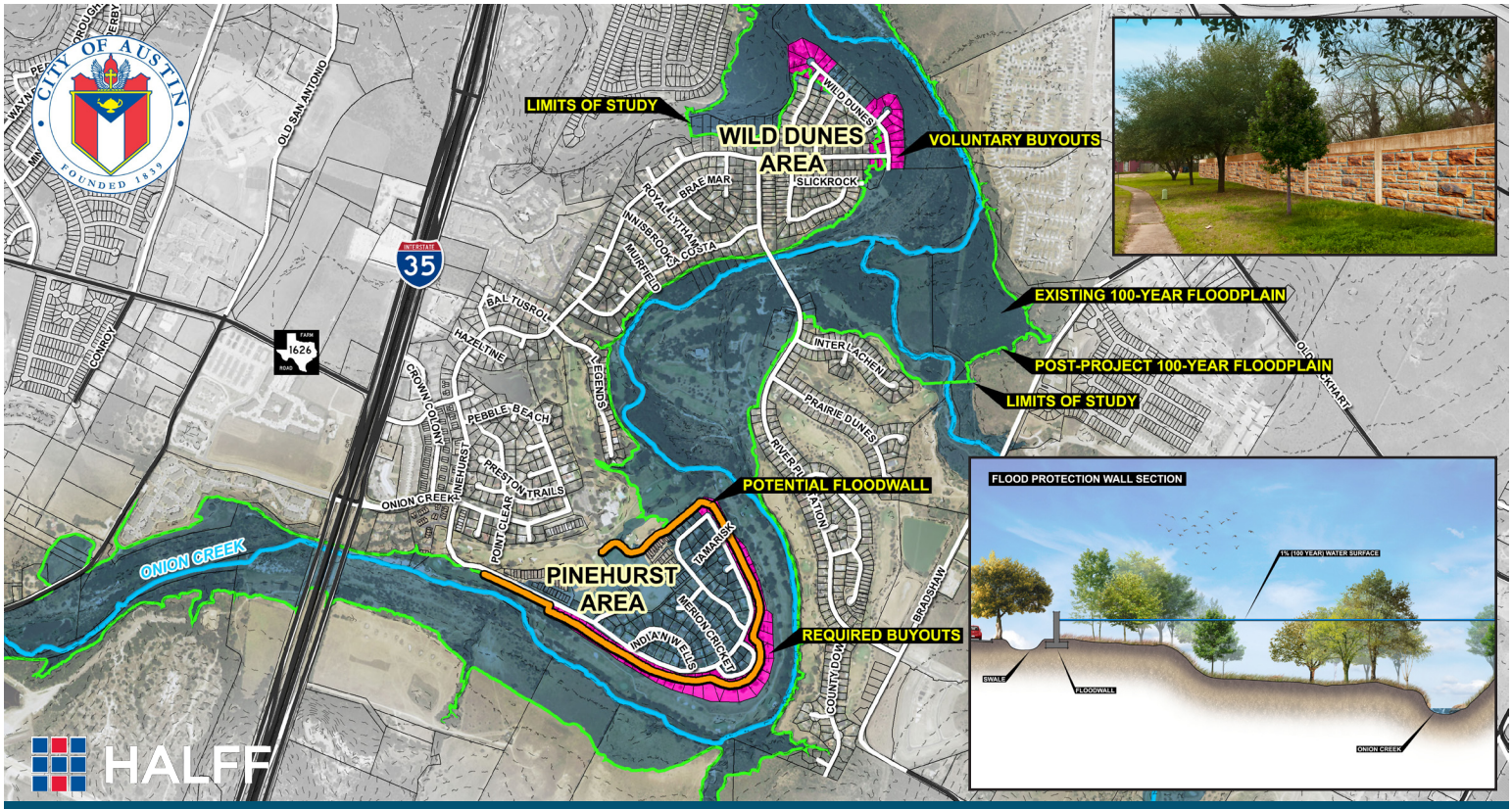
City of Austin Onion Creek Study Flood Mitigation Alternatives

PINEHURST FLOOD PROTECTION WALL WITH VOLUNTARY BUYOUTS



PROJECT DESCRIPTION:

Flood protection walls provide high levels of protection to flood prone areas. FEMA requires the flood protection walls to have a minimum freeboard (height above the 100-year water level) of at least 3 feet for the entire wall and 3.5 to 4.0 feet of freeboard at the upstream and downstream tie-in locations. In addition, an internal drainage system would be required to drain approximately 77 acres of neighborhood drainage behind the wall. The purchase of 48 properties in the Pinehurst area will be required for the construction of the flood protection wall. The height of the proposed wall is on average 5.5 feet and would be similar to the height of a standard privacy fence. The appearance of the wall could be constructed to match current architecture in the neighborhood. This flood protection wall's alignment would allow for the full function of the golf course as it is today.

Because the flood protection wall would only provide limited benefits to the Wild Dunes area, this option is presented in combination with voluntary buyouts for the houses at risk of 100-year flooding in the Wild Dunes area.

BENEFITS

- High level of protection for Pinehurst neighborhood
- Lower environmental impact
- Moderate timeline for implementation
- Fully addresses properties most at risk

CONSTRAINTS

- Property purchase
- Levee compliance/permitting
- Internal drainage challenges
- Impact to community

QUICK FACTS

Flood Protection Wall Length:
7,200 feet

Flood Protection Wall Average/Max Height:
5.5/14 feet

Required Property Acquisition for Floodwall:
48 Homes

Project Cost Estimate:
$61,800,000

Estimated Annual O&M Cost:
$68,000

Within the Pinehurst & Wild Dunes neighborhoods

Number of Structures Protected from the 100-Year Flood:
139 out of 139

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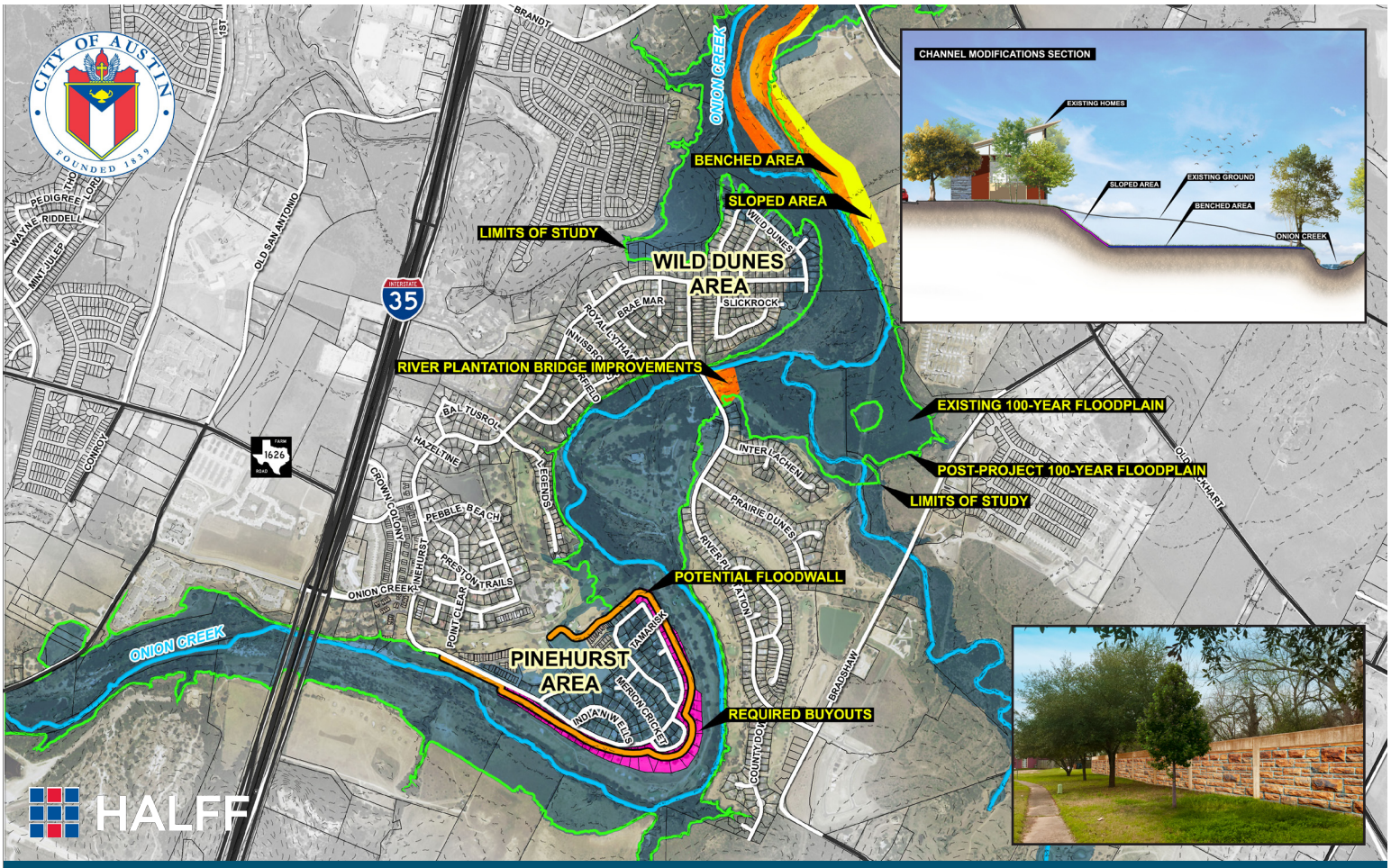
City of Austin Onion Creek Study Flood Mitigation Alternatives

PINEHURST FLOOD PROTECTION WALL WITH CHANNEL MODIFICATIONS



PROJECT DESCRIPTION:

This alternative includes the combination of the Pinehurst Flood Protection Wall, River Plantation Drive bridge improvements, as well as channel modifications downstream of River Plantation Drive. Increases in water surface elevation along a creek can be caused by channel constrictions that reduce the flow area of a channel. The proposed River Plantation Drive bridge improvements would include excavating the channel to add flow area under the River Plantation Drive bridge. Similar to constriction removal, channel benching can be used to increase the area of a channel. To minimize permitting requirements, channel benching was evaluated above Onion Creek's estimated ordinary high water elevations. Channel modifications in the Wild Dunes area would include a large benched section on the eastern bank of Onion Creek from Wild Dunes Drive to Slaughter Lane. This alternative would require significant efforts to maintain the "cleared" channel and would significantly impact the riparian corridor along Onion Creek.

BENEFITS

- High level of protection for Pinehurst and Wild Dunes neighborhoods
- Moderate timeline for implementation

CONSTRAINTS

- Multiple projects required
- Property purchase
- Levee compliance/permitting
- Environmental impacts
- Internal drainage challenges
- Impact to community
- Perpetual channel maintenance

QUICK FACTS

- Flood Protection Wall Length: **7,200 feet**
- Flood Protection Wall Avg/Max Height: **5.5/14 feet**
- Channel Benching: **210,000 yd³ of excavation**
- Project Cost Estimate: **$87,600,000**
- Estimated Annual O&M Cost: **$159,000**
- Required Property Acquisition for Floodwall **48 Homes**

Within the Pinehurst & Wild Dunes neighborhoods

- Average/Max Depth Decrease in Structure: **1.0 / 3.0 feet in Wild Dunes**
- Number of Structures Protected from the 100-Year Flood: **139 out of 139**

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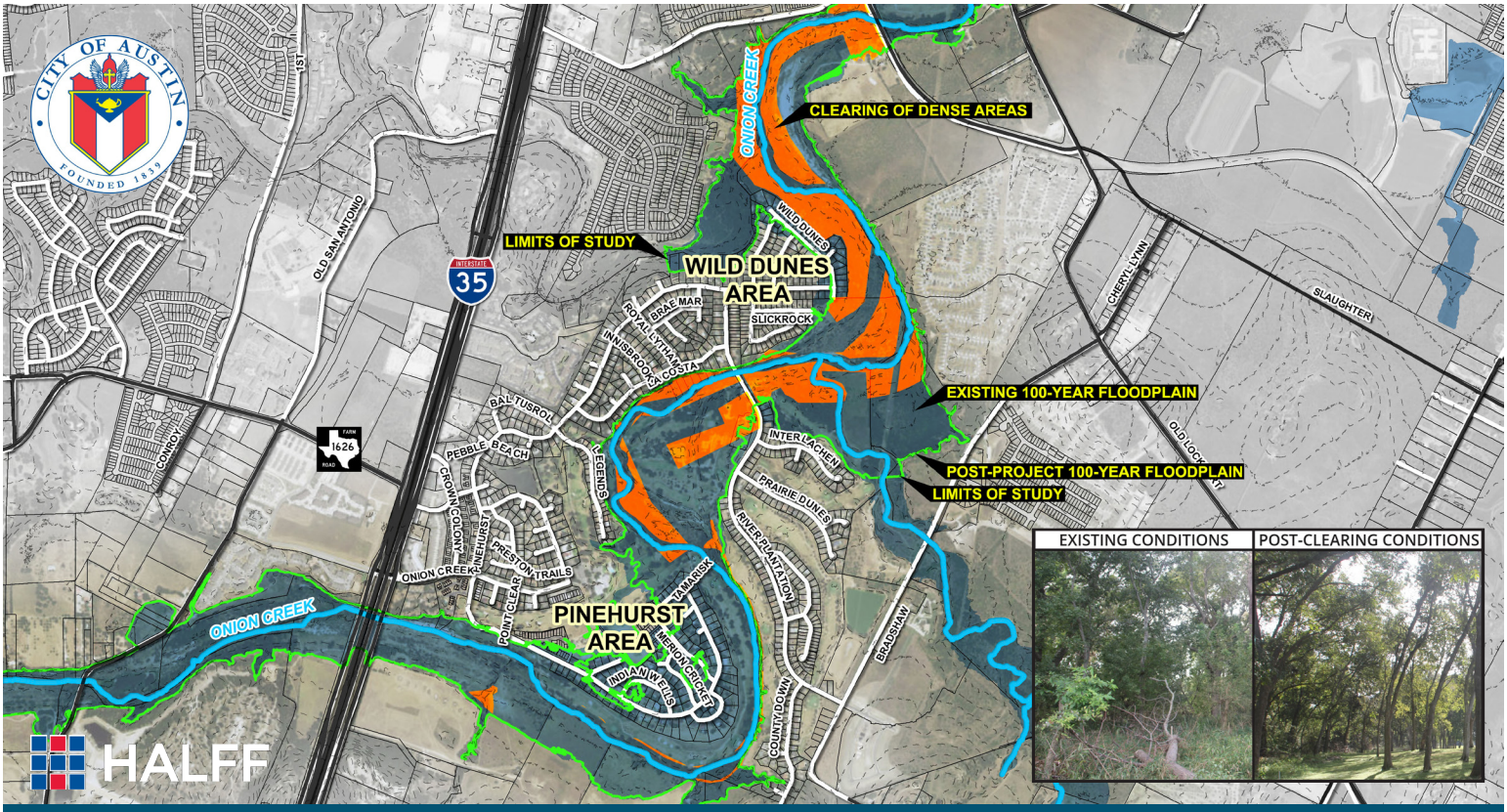
City of Austin Onion Creek Study Flood Mitigation Alternatives

CHANNEL CLEARING



PROJECT DESCRIPTION:

Reducing the friction losses within a channel and immediate overbanks can be an effective alternative to reduce flood elevations. Friction losses can be reduced by selective clearing of the channel and overbanks, including the removal of debris, underbrush, and small trees. However, such clearing can have significant environmental impacts and require high maintenance and mitigation costs. Although this alternative is somewhat effective it does not have the impact necessary to provide relief to most properties at risk in the 100-year floodplain. In addition, this alternative would require great efforts to maintain the "cleared" channel and would significantly impact the riparian corridor along Onion Creek. It is expected that intensive vegetation maintenance would be needed at least twice a year in order to maintain the project's design conditions. Since the channel clearing alternative impacts water quality, creek stability, wildlife, and trees, this mitigation alternative is contrary to the City of Austin goal of natural channel preservation.

BENEFITS

- Moderate timeline for implementation

CONSTRAINTS

- Perpetual channel maintenance
- Easement acquisition
- Significant long-term environmental impacts
- High tree mitigation costs
- Less flood protection

QUICK FACTS

Clearing Area:
126 acres

Project Cost Estimate:
$35,300,000

Estimated Annual O&M Cost:
$448,000

Removal of all underbrush and over 50% of all trees, including potential impact to Heritage Trees

Within the Pinehurst & Wild Dunes neighborhoods

Average/Max Depth Decrease in Structure:
1.0 / 2.4 feet in Pinehurst
0.5 / 1.9 feet in Wild Dunes

Number of Structures Protected from the 100-Year Flood:
52 out of 139

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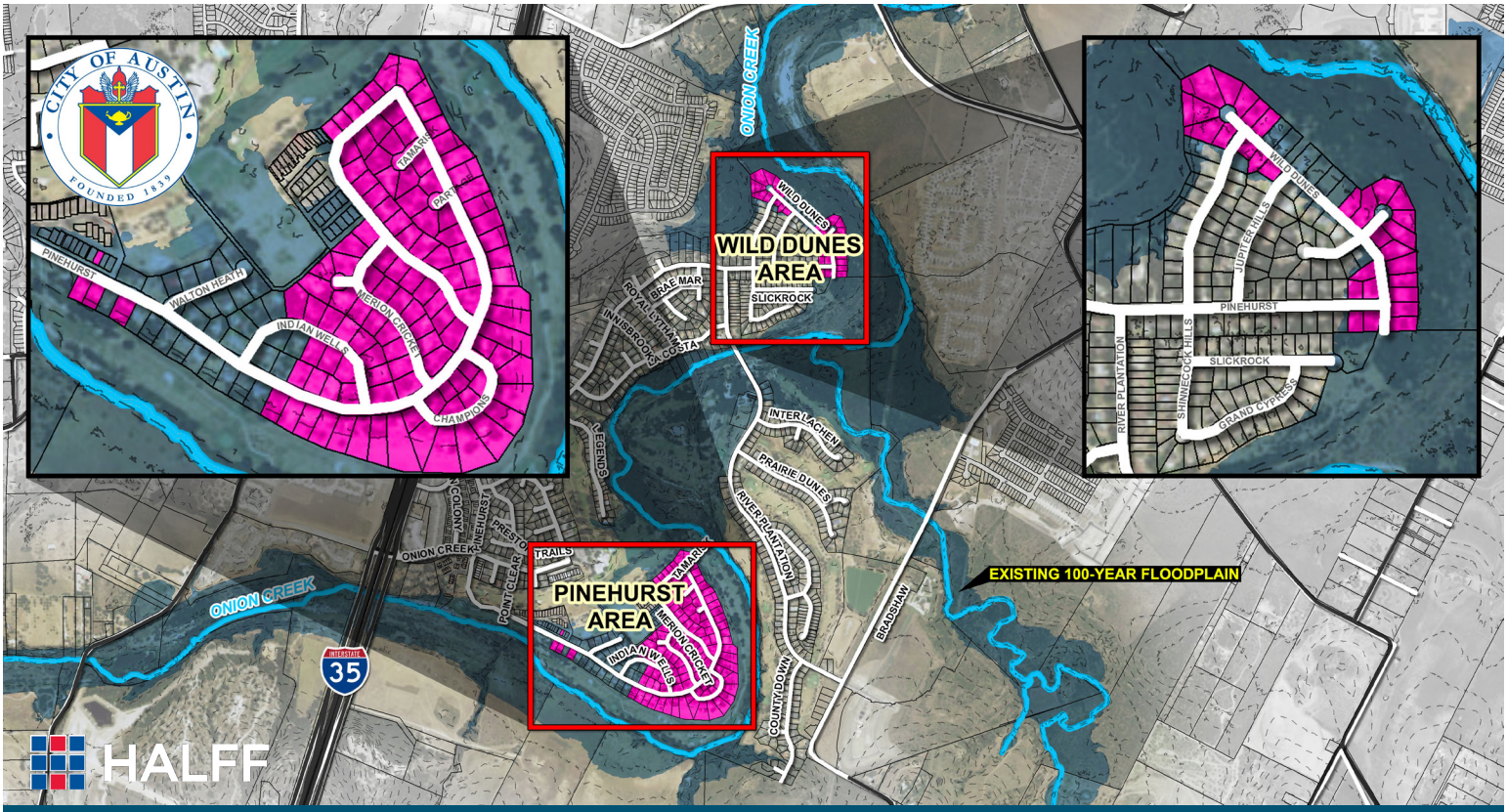
City of Austin Onion Creek Study Flood Mitigation Alternatives

VOLUNTARY BUYOUTS



PROJECT DESCRIPTION:

The most effective means of reducing flood damages and improving public safety in previously developed floodplain areas is property acquisition. When people and structures are removed from the floodplain, risk is eliminated indefinitely. For this evaluation, the estimated cost of property acquisition includes real estate services, appraisals, acquisition costs, relocation/moving expenses, asbestos testing/abatement, demolition, and property management for the acquisition of all single family residential structures expected to be inundated by the 100-year flood. All property acquisition for this project would be implemented on a voluntary basis unless directed otherwise by the Austin City Council. In order to avoid isolating properties, the cost estimate for this project includes estimates to offer voluntary buyouts to a handful of properties that aren't at risk of structural flooding in a 100-year event, but that are located between properties that are at risk.

BENEFITS

- Highest level of flood protection
- Least environmental impact
- Shortest timeline for implementation
- Can be implemented as funding becomes available
- Fully addresses properties most at risk

CONSTRAINTS

- Voluntary property purchase
- Impact to community

QUICK FACTS

Total Area of Property Buyouts:
44 acres in Pinehurst
10 acres in Wild Dunes

Project Cost Estimate:
$82,700,000 in Pinehurst
$16,100,000 in Wild Dunes

Voluntary Property Acquisition:
119 Homes in Pinehurst
29 Homes in Wild Dunes

Estimated Annual O&M Cost:
$86,000 in Pinehurst
$19,000 in Wild Dunes

Within the Pinehurst & Wild Dunes neighborhoods

Number of Structures Protected from the 100-Year Flood:
139 out of 139

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