

ALTERNATIVES ANALYSIS

Highland Ridge and Highland Estates Drainage Improvements Project
Harris County UPIN 19102MF13001
Highlands, Harris County, Texas 77562

A key provision of the 404 (b) (1) guidelines is the “practicable alternative test” which requires that “no discharge of fill material shall be permitted if there is a practicable alternative to the proposed fill which would have less adverse impact on the aquatic ecosystem.” As a result, the Applicant has investigated available alternatives, including the No Build Alternative, in order to demonstrate that there are no less damaging alternative sites available and that all onsite impacts to waters of the U.S. have been avoided and/or minimized to the maximum extent practicable.

The purpose and need of the proposed project is to reduce the risk of flooding and to reduce flood duration by providing an increase in stormwater volume conveyance from the Highland Ridge and Highland Estates Subdivisions to the Harris County Flood Control District Unit O119-00-00 and to increase stormwater volume storage capacity of the O119-00-00 channel by 28.9 acre-feet. Studies conducted by the County indicate that the construction of the proposed project would reduce the risk of flooding and reduce future flood losses and damage to properties within the Highland Ridge and Highland Estates community.

Alternatives were evaluated to avoid and minimize impacts to waters of the U.S., including wetlands, while meeting the need and purpose of the proposed project. Alternatives were evaluated using the following environmental impact criteria:

- Stormwater Storage Capacity Increase
- Ditch Regrading
- Replacement and Upsizing of Culverts
- Property Buy-outs
- Wetlands Impact
- Waterbody Excavation
- Total Waters of the U.S. Impact
- Archeological Impact

The Preferred Alternative was chosen based on its ability to best fulfill the purpose and need of the proposed project while avoiding and minimizing impacts to natural resources to the extent practicable. None of the proposed alternatives would satisfy the need of the proposed project without impacting waters of the U.S. The No Build Alternative and Build Alternative 2 are the alternatives considered that do not impact waters of the U.S.; however, both of these alternatives fail to meet the purpose and need for the proposed project.

The footprint of the proposed project evaluated at an onsite (Build Alternative 3) and alternative offsite location (Build Alternative 1) could not entirely avoid impacts to waters of the U.S. due to the location of the subdivisions in the landscape, configuration of existing infrastructure, hydraulic constraints to meet the purpose and need of flood reduction, and proximity of the project area to surrounding properties containing wetlands and waters of the U.S. Therefore, avoidance measures to avoid impacts to waters of the U.S. were considered in the site and design alternatives analysis. During the design phase, the footprint of the project was reduced to minimize impacts to wetlands and waters of the U.S. to the maximum extent practicable.

Table 1 below summarizes the project alternatives and environmental impacts associated with each alternative. The analysis includes the Build Alternative 1 (Preliminary Design Alternative), Build Alternative 2 (Off Site Alternative), Build Alternative 3 (Preferred Alternative), and the No Build Alternative. A description of each alternative considered during the selection of the Preferred Alternative is provided below the table.

Table 1. Summary of Alternatives

Parameter	Build Alternative 1	Build Alternative 2	Build Alternative 3 (Preferred Alternative)	No Build Alternative
Stormwater Storage Capacity Increase	Yes	No	Yes	No
Volume Storage Capacity (acre-feet)	25.0	0	28.9	0
Ditch Regrading	Yes	Yes	Yes	No
Replacement and Upsizing of Culverts	Yes	Yes	Yes	No
Property Buy-outs	No	No	No	No
Wetlands Impact (acres)	0	0	1.39	0
Linear Waterbody Excavation (linear feet)	0	0	1,402	0
Total Waters of the U.S. Impact	Low	Low	Low-Moderate	None
Archeological Impact	Low Potential	Low Potential	Low Potential	None
Flood Reduction Benefit	None	Low	High	None
Summary of Impacts	Low	Low	Low-Moderate	None (with No Benefit)

Build Alternative 1 (Offsite Detention Alternative)

This initial design alternative analyzed during the planning phase of the project was designed utilizing desktop data and included excavation and removal activities for the installation of a stormwater detention basin. Alternative 1 involves installing approximately 25 acre-feet of detention north of Barbers Hill Road, west of Laurie Lane. This is one of the few open areas available for detention on this project. The project also includes storm sewer upgrades and existing ditch reconstruction to alleviate flooding within the subdivisions. Ultimately, this alternative was determined to be ineffective, as the site for the detention pond was not able to adequately mitigate the increased flows to the HCFCD channel. The site is not hydraulically connected in an efficient way that helps to lower water surface elevations within the channel. Therefore, the project would increase flood risk on the south side of Barbers Hill Road and would not achieve the purpose and need of the project. Alternative 1

would have likely not resulted in wetland impacts, however the alternative was deemed ineffective prior to conducting environmental field studies of the site.

Build Alternative 2 (Restrictor Alternative)

This initial design alternative included the same storm sewer upgrades and existing ditch reconstruction to alleviate flooding within the subdivisions as Alternative 1 and 3. However, it was attempted to place restrictors on the pipes crossing Barbers Hill Road to limit the peak flow entering the HCFCD channel to the south. This would eliminate the need for detention and any wetland impact. However, it was determined that by placing restrictors on the outfall pipes through the roadway, all flood risk reduction benefits to the residents disappeared. Therefore, the alternative was deemed ineffective as it did not achieve the goal of the project.

Build Alternative 3 (Preferred Alternative)

This alternative design was developed using detailed survey and hydraulic analysis to refine the plan for increasing the stormwater volume storage capacity of the O119-00-00 channel. Alternative 2 includes the excavation of the existing O119-00-00 channel to a width of approximately 245 feet and depth of 8 feet and the installation of a 6-foot-high levee along the south side of the channel which will place 13,455 CY of fill dirt within 1.39 acres of PEM wetlands within the project area. The excavation of the O119-00-00 channel and the installation of the levee will avoid impacts to archeological sites and minimizes the total impacts to wetlands to within the footprint of the linear detention basin located along the northern perimeter of wetlands in the Highland Reservoir. Therefore, since Alternative 3 will meet the purpose and need of the project to provide the necessary flood reduction benefits with an increase in stormwater conveyance from the Highland Ridge and Highland Estates Subdivisions and increase stormwater volume storage capacity, does not impact any archeological sites, and minimizes impacts to wetlands, it was chosen as the Preferred Alternative.

No Build Alternative

The No Build Alternative was considered, and it would entail no improvements to existing ditches or upgrades to culverts within the subdivisions and would not include increased stormwater storage capacity for flood reduction. The No Build Alternative would avoid all disturbance and impacts to wetlands and would not impact any archeological sites. However, this alternative would not meet the stated need of reducing flooding and the subdivision would continue to be flood prone. Therefore, the No Build Alternative does not meet the purpose and need of providing critical flood reduction in the Highland Ridge and Highland Estates subdivisions; as a result, the No Build Alternative was not selected.

Summary

The Applicant has selected Build Alternative 3 as the Preferred Alternative because it meets the purpose and need of the project and is the Least Environmentally Damaging Alternative (LEDA). The alternative is LEDA because it results in the lowest amount of impact to wetlands and cultural resources.