

Memorandum



**DATE:** August 3, 2018  
**TO:** Doug Frost – Phoenix Planning and Development  
Adam Miller – Phoenix Planning and Development  
**FROM:** W. Scott Ogden, P.E., CFM  
**RE:** Desert View Planning Area – Rawhide Wash Improvement Projections  
Project No. 8591000000; Contract No. 144007

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The following memo has been prepared by JE Fuller Hydrology and Geomorphology, Inc. (JE Fuller) to provide a very preliminary analysis of costs and benefits associated with the construction of potential Rawhide Wash improvements in the northeastern portion of the City of Phoenix, that could be used for an initial review of the need/justification for a drainage impact fee or alternative funding/financing vehicle in affected areas of the Desert View Village Planning Area. The ultimate Rawhide Wash improvements are represented herein as two distinct phases of construction. Phase 1 will be the implementation of the Rawhide Wash Flood Hazard Mitigation Project (Rawhide FHMP) as currently being proposed and conceptualized by the Flood Control District of Maricopa County in partnership with the City of Scottsdale and City of Phoenix. Phase 2 will extend the Rawhide FHMP improvements from the downstream end of Phase 1 at Scottsdale Road, through the Paradise Ridge master planning area to the pool area of the USBR Reach 11 Dike No. 2 (USBR Dike). Each of these segments and the referenced planning areas are shown on Figure 1. Further discussion for each phase is provided below.

**PHASE 1: Rawhide Wash Flood Hazard Mitigation Project:**

The Rawhide FHMP currently proposes improvements along Rawhide Wash from Pinnacle Peak Road to approximately a half-mile north of Happy Valley Road. The design concept is to provide a system of levees primarily comprised of floodwalls and some embankments, to provide containment of the Rawhide Wash alluvial fan apex. South of Pinnacle Peak Road and through Scottsdale Road, Rawhide Wash is channelized with bridge crossings at both arterials. The current design of the Rawhide FHMP is at a concept level with project costs estimated to be between \$15 and \$19 million. The ultimate project costs are expected to be closer to the \$15 million figure, but current planning and budgeting has been performed assuming a \$19 million cost. The project costs are expected to be split between the City of Phoenix, City of Scottsdale and Flood Control District of Maricopa County (FCDMC), but the share for each of the funding partners has not been formalized. Final IGA's will be negotiated once the construction costs have been refined with a current design concept work assignment that will be completed between late August and early September 2018. The City of Scottsdale has agreed to fund up to \$2 million and the FCDMC will fund up to 50% of project cost. Assuming a \$19 million total cost, the split would be \$2 million for Scottsdale, \$7.5 million for Phoenix and \$9.5 million for FCDMC. If the refined construction cost were to be \$15 million, the split would be \$2 million for Scottsdale, \$5.5 million for Phoenix, and \$7.5 million for FCDMC.



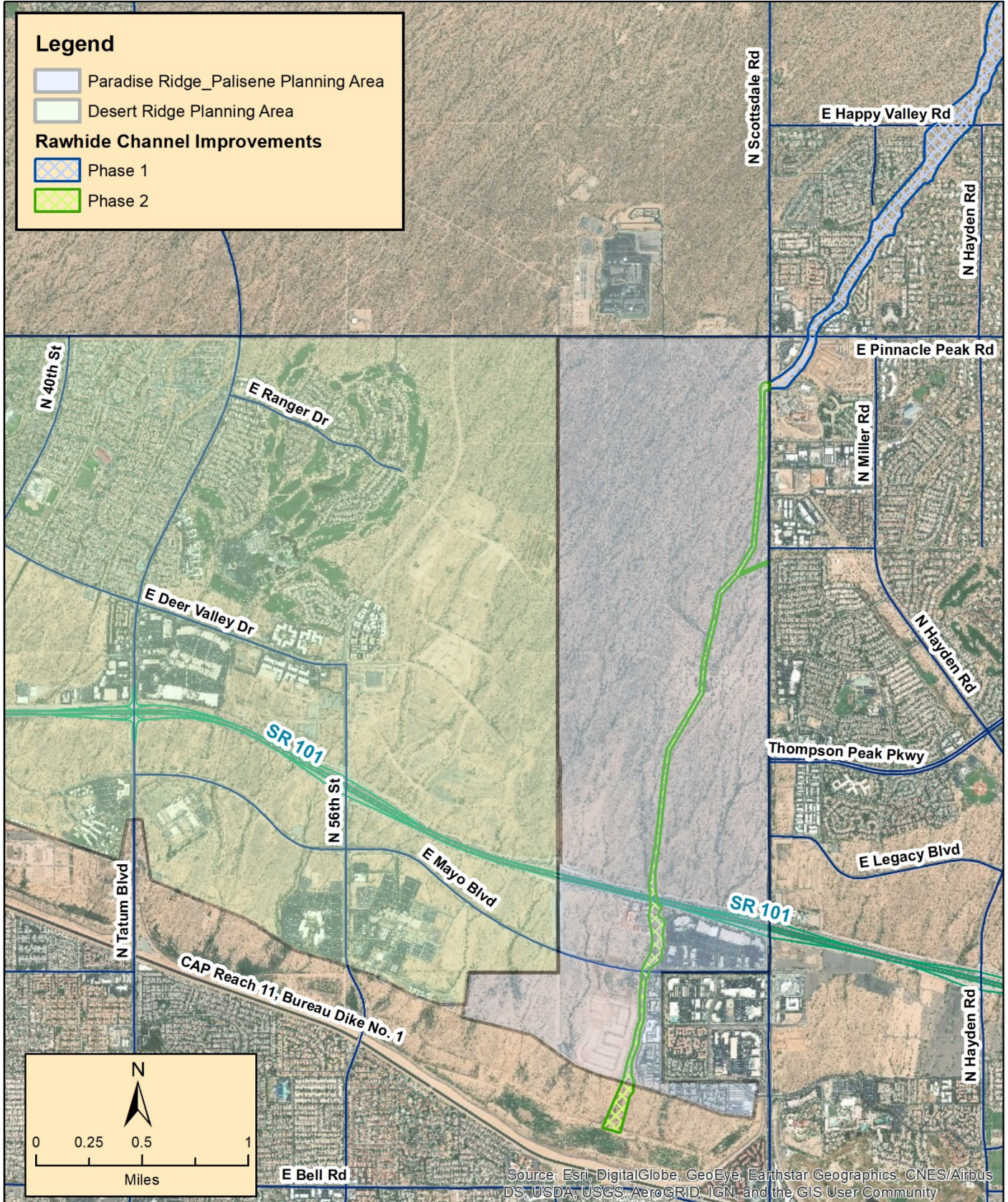


Figure 1 - Map of existing disturbed areas



## **PHASE 2: Rawhide Wash Extension Through Paradise Ridge:**

**SCENARIO A:** Paradise Ridge is currently master planned to allow conveyance of the Rawhide Wash flows through the site to the existing culverts at State Route Loop 101 North freeway. The master drainage plan is currently configured to: 1) accommodate the full Rawhide Wash apex discharge, and 2) to comply with the CWA Section 404 permit for Desert Ridge and Paradise Ridge, currently held by the Arizona State Land Department (ASLD). The current Paradise Ridge Master Drainage Plan<sup>1</sup> configuration splits the Rawhide Wash flows into two parallel corridors that convey the flows south to the SR 101 culverts and also provides distribution to CWA Section 404 corridors. Ultimately the Rawhide Wash flows are conveyed to the USBR Dike impoundment area. The drainage configuration, which is shown in Figure 2, is significantly influenced by the current CWA Section 404 permit for Desert Ridge and Paradise Ridge. For this memorandum, JE Fuller generated very preliminary, planning level construction costs for the currently proposed system. Cost elements and locations are shown on Figure 2, and generally include new construction for channels, bridges, and splitter structures. The channel unit costs allow for grading, bank scour protection, grade control structures, and landscape. Channels south of SR101 are assumed to require reconstruction, but the Mayo Boulevard culverts are assumed to be adequate. The total construction costs are estimated to exceed \$42 million.

**SCENARIO B:** As previously stated, the current master drainage design for the Paradise Ridge master planned development are significantly impacted by the current CWA Section 404 permit, as well as the need to intercept breakout flows from the Rawhide Wash apex that are expected to approach from the north along Scottsdale Road. Current momentum and work by ASLD may change the CWA Section 404 permitting requirements. The construction of the Rawhide FHMP Phase 1 improvements will alleviate the apex breakout flows and therefore eliminate the need for the improvements north of the Scottsdale Road bridge. The combination of these impacts will likely result in a redesigned, more efficient channel system that will convey the Rawhide Wash flows from Scottsdale Road to the USBR Dike in a single new channel (see Figure 3). The number of crossings will be predicated on any adjustments to the land use planning, but for this analysis, it is assumed that 3 crossings will occur – one each at Center Drive (Legacy Blvd), Deer Valley Drive (Thompson Peak Pkwy), and an extension of Grayhawk Drive. The splitter structure will also be assumed upstream of SR101 and new channels will be designed downstream. The culvert at Mayo Drive is assumed to have sufficient capacity. The overall cost of the new system is estimated to be approximately \$21 million.

Under both scenarios, the potential for cost-share with FCDMC or others in constructing the Phase 2 reach has yet to be discussed but may be a possibility. There is also another potential cost borne by the City of Phoenix in the construction of the Scottsdale Road bridge, as a portion of the bridge is located within City of Phoenix right-of-way. It is unknown if the City contributed funds toward constructing the bridge or not.

JE Fuller, under contract to FCDMC, prepared a technical memorandum<sup>2</sup> that summarized various scenarios of benefits gained by properties in the area through construction of the Phase 1 improvements. The primary benefit realized through the construction of both Phase 1 and Phase 2 Rawhide Wash improvements is the removal of flood risk associated with the alluvial fan. Figure 4 shows the area within Paradise Ridge and Desert Ridge that most directly benefits from the Rawhide Wash improvements.

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<sup>1</sup> Based on August 2006 Paradise Ridge-Palisene Conceptual Drainage Plan by URS (now AECOM).

<sup>2</sup> JE Fuller, 2017, *Rawhide Wash Flood Hazard Mitigation Study, Preliminary Benefit Data Analysis and Summary*. Technical Memorandum, FCD20015C008 – Work Assignment No. 6.



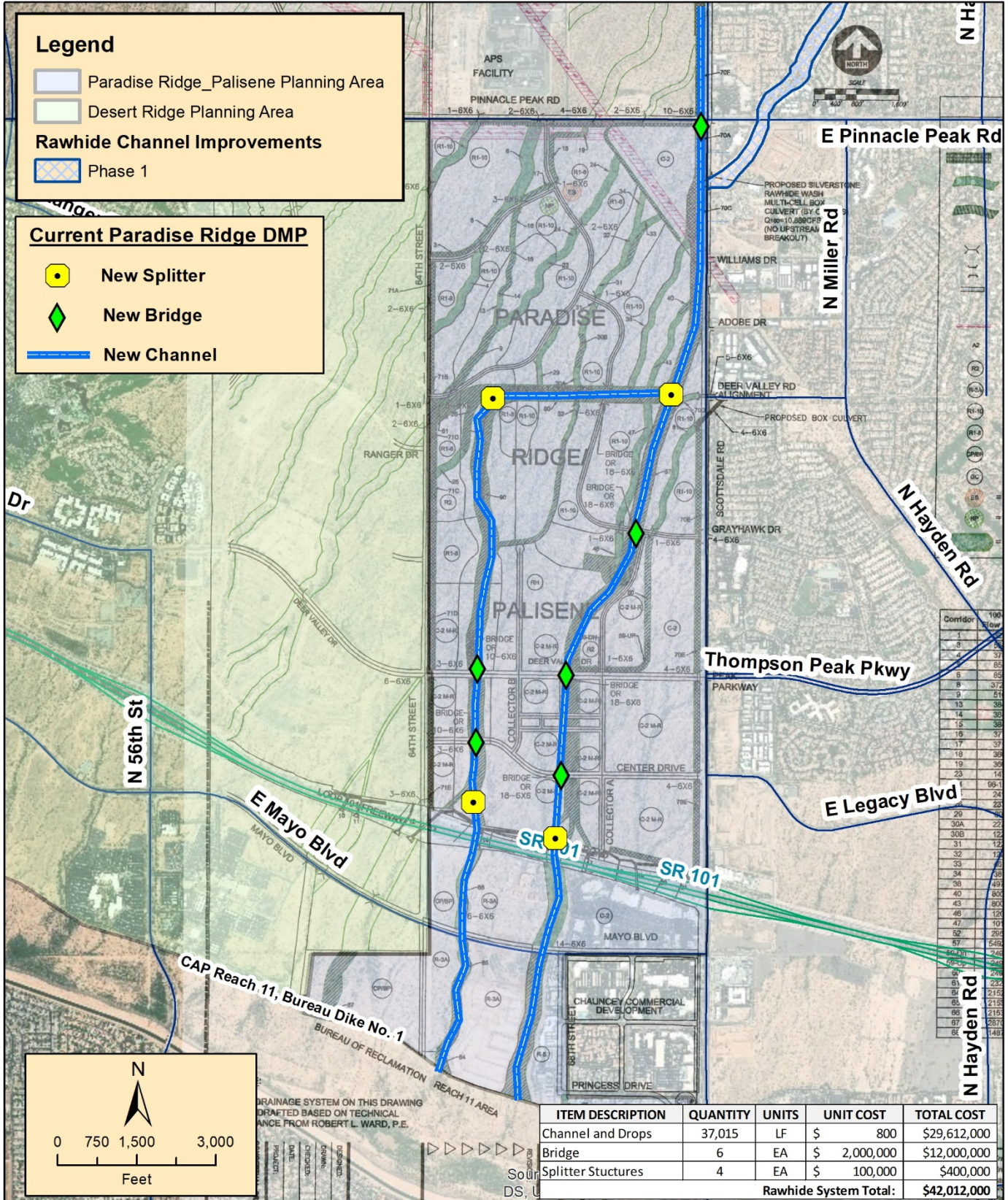


Figure 2 – Current Paradise Ridge-Palisene drainage master plan elements



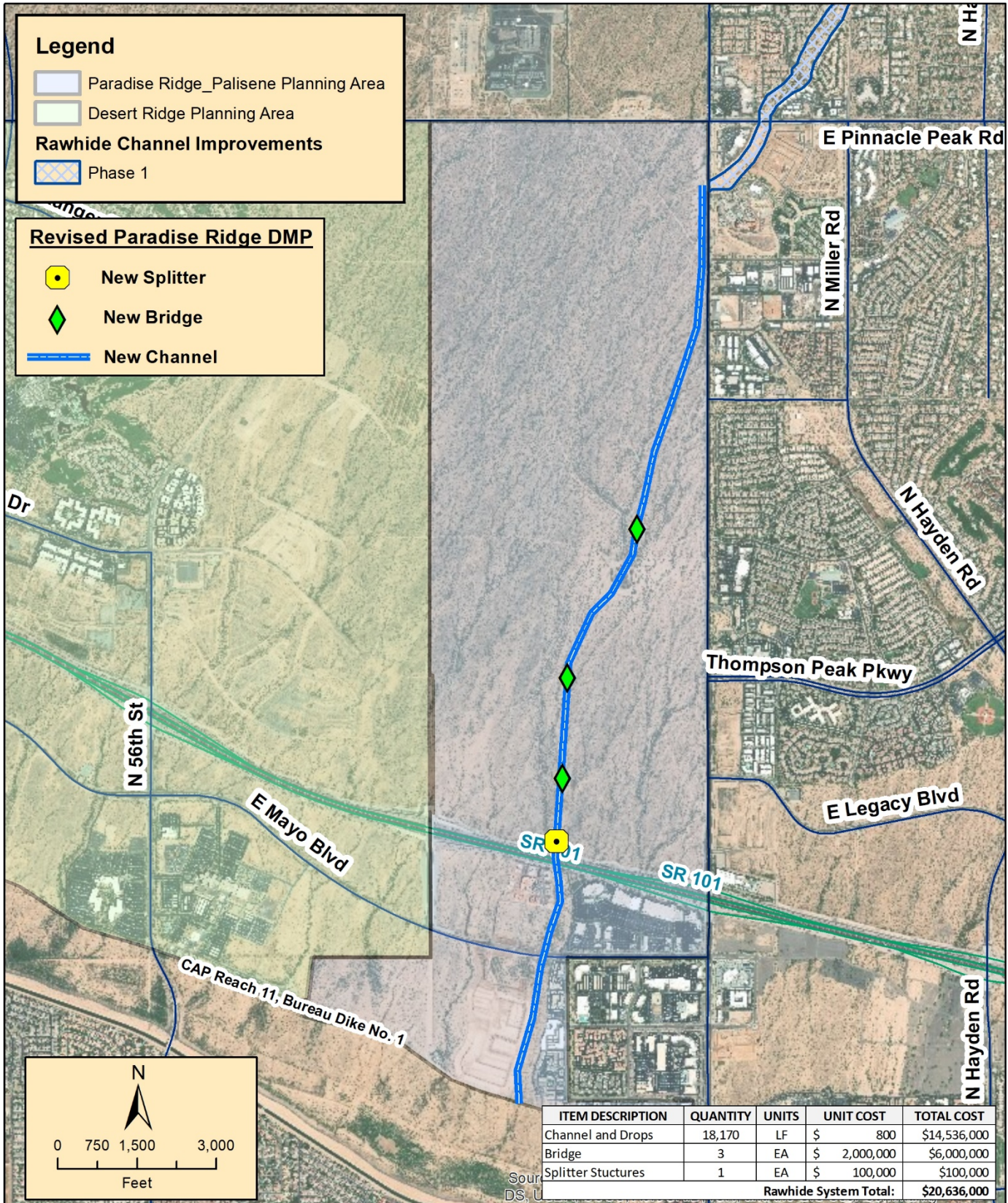


Figure 3 – Modified Paradise Ridge-Palisene drainage master plan elements



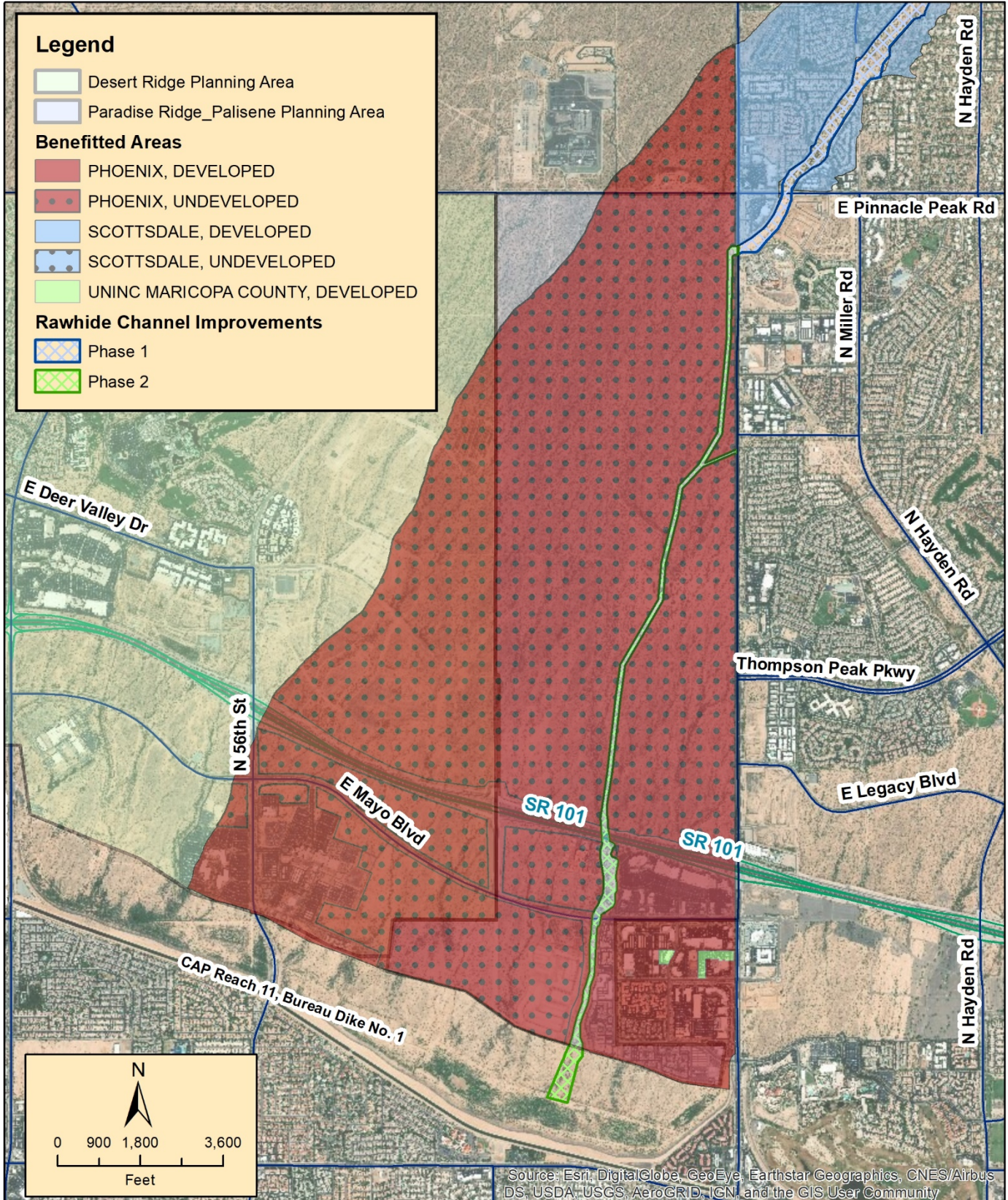


Figure 4 – Areas that benefit from the construction of the Rawhide Wash Phase 1 and 2 improvements



The total currently undeveloped area within the City of Phoenix that would benefit from construction of the Phase 1 and 2 Rawhide Wash improvements is approximately 2,670 acres of land with proposed land uses of single-family and multi-family residential, high and medium density commercial and resort-golf course.

On an incremental basis, construction of only the Phase 1 improvements will provide a permanent benefit to some of the properties within the City of Phoenix through the potential removal of the FEMA Zone AO alluvial fan special flood hazard area (SFHA) designation and the extra construction measures required to satisfy existing floodplain regulations for that type of SFHA, and the flood risk posed by breakouts of flow below the fan apex of Rawhide Wash. Figure 5 shows the areas that are reasonably expected to be removed from the SFHA with a successful FEMA Letter of Map Revision (LOMR) process that reflects Phase 1 fully implemented. The currently undeveloped land that will directly benefit from Phase 1 improvements is estimated to be approximately 960 acres. It is strongly cautioned that this acreage may vary with the actual LOMR and development status of properties in the area at the time of LOMR acquisition.

In conclusion, it is likely that enough information exists to produce very rough estimates of project costs and benefiting areas that could be used for either one or two drainage impact fees or community facility districts that would be assessed to fund the City of Phoenix share of the two phases of the Rawhide Wash improvements. More study will be needed to develop more refined cost estimates, delineate benefiting area boundaries, and identify project schedules and funding/financing options that would be required for the establishment of an actual drainage impact fee, community facility district, or other funding/financing vehicles. Other factors informing the final costs will include future disposition of CWA Section 404 permitting requirements and revised master planning of Paradise Ridge.

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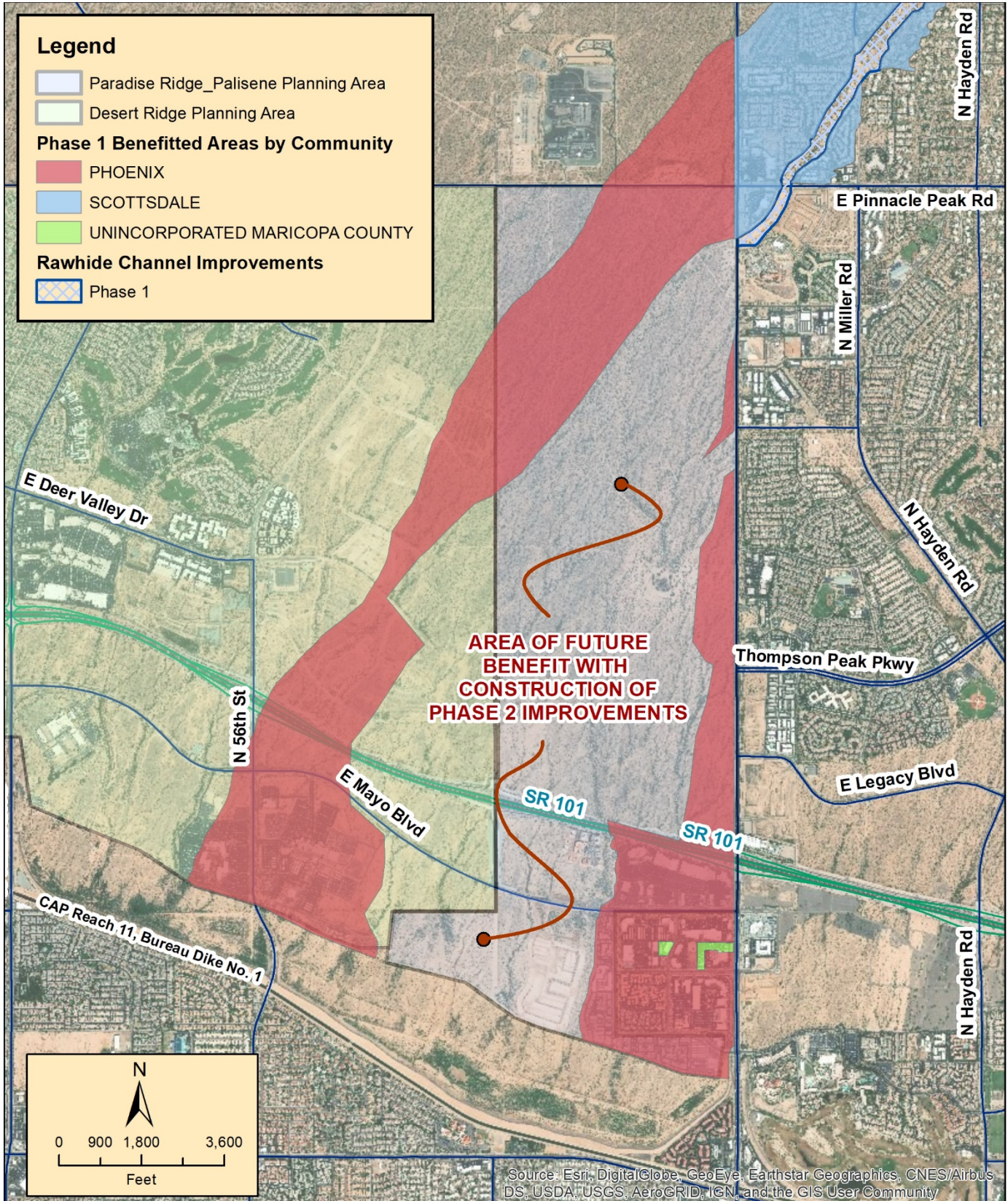


Figure 5 – Areas that may directly benefit from the construction of the Rawhide Wash Phase 1 improvements with successful LOMR