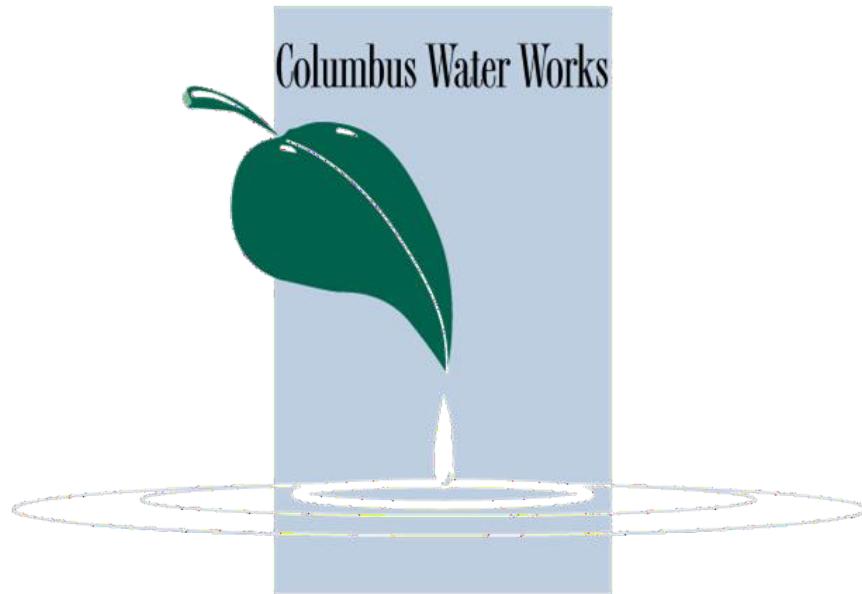


LAWSON ARMY AIRFIELD STORMWATER ASSESSMENT AND CAPITAL IMPROVEMENT PLAN



Prepared for: **Columbus Water Works**

File: 3577421
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3.0 RECOMMENDATIONS

The following recommendations for replacement and repairs are based on the visual condition assessment previously described, hydraulic capacity analysis, and ground surface depressions throughout the study area.

3.1 CONDITION

Repairs were recommended for structures and storm drains with Grades 4 and 5 due to the imminent or current failure. Several different issues contributed to Grade 4 assets depending on the storm drain material. As mentioned previously, a combination of the following defects often led to the assignment of a Grade 4 asset: holes, settled deposits, infiltration with sinkholes, joint separation, missing coating, and rusted surfaces (Figure 18). Additionally, multiple headwalls need to be repaired due to cracking or other various issues, as shown in Figure 19.



Figure 18: Rusted CMP



Figure 19: Defective Headwall



Figure 20: Sinkhole

Grade 5 was most often assigned to assets that had failed, classified by collapse, holes, etc. Additionally, Grade 5 was assigned when pipes are bricked up, but infiltration is causing above ground sinkholes as shown in Figure 20 above. These pipes need to be removed or filled. In addition to storm drains, structures that were categorized as Grade 5 included inlets which need to be removed and replaced (Figure 21), and headwalls which need to be rebuilt (Figure 22).

Some assets were unable to be evaluated in this phase of the project for a variety of reasons including: sand in the invert of the pipe, difficulty opening manholes, unable to locate, etc. were assigned the Grade “Incomplete.” Assets such as open channel sections were given a Grade “Other” because their condition was not assessed within the scope of this project.



Figure 21: Inlet Full of Asphalt to Pipe Crown



Figure 22: Cracked Headwall

3.2 HYDRAULIC CAPACITY

Of the 212 pipes that were evaluated, 84 exceeded capacity, indicated by surcharging under the 25-year, 24-hour design criteria. Of the 84 pipes that surcharged, 10 pipes back up into open channels which provide adequate storage for the excess volume and therefore do not require any modification or replacement. The pipes with this backwater storage condition were typically located under roadways and connected one open channel to another. 64 of the surcharging pipes have structures in areas that allow ponding to occur, which assists in reducing downstream peak flows by allowing temporary detention. At these locations, the maximum hydraulic grade line was compared to the outer elevation of the depression within the runways. For the purposes of this evaluation, it was determined that if a structure was to overflow onto the runway, road, or aircraft storage area, then the pipe needed to be

replaced with a larger pipe. 10 pipes met this criteria and it is therefore recommended that these pipes be replaced with larger diameter pipes as proposed in Table 2. Attached in Appendix E, Figures A-E show the improvements when the pipe was upsized based on sizes in the table. The recommended improvements either eliminated or minimized overflows to appropriate ponding elevations in suitable areas for the 25-year, 24-hour design storm considered in this analysis.

Table 2: Hydraulic Analysis Improvements

PIPE SEGMENT	EXISTING SIZE	RECOMMENDED SIZE
SDGM-033	60"	72"
SDGM-052	10"	30"
SDGM-287	18"	36"
SDGM-289	24"	36"
SDGM-290	24"	36"
SDGM-446	30"	36"
SDGM-469	24"	36"
SDGM-470	30"	36"
SDGM-503	18"	36"
SDGM-512	24"	36"

3.3 DEPRESSED AREAS

Figure 23 illustrates the depressed areas identified during our field work within the study area. When compared with the condition assessment of the storm drain pipes, it was discovered that the depressed areas were not largely due to pipe collapses, but rather infiltration in pipe joints or poorly compacted soils which have consolidated over time. Due to these findings, depressed areas throughout LAAF are recommended to be addressed according to three different criteria:

1. In situations where there is a depressed area above a pipe with no detectable infiltration of sediment into the pipe, remove the soil above the pipe and replace the soil in compacted lifts (imported soil will be utilized to match adjacent grades as necessary).
2. In situations where there is a sinkhole present over pipes with significant infiltration of sediment into the pipe and for instances in which the pipe diameter is large enough for man entry, the recommended repair is to either wipe the joints with mortar, use internal mechanical joint sealants, or Spraycast. Then, remove the soil above the pipe and replace

- the soil in compacted lifts (imported soil will be utilized to match adjacent grades as necessary).
3. In situations where there is a sinkhole present over pipes with significant infiltration of sediment into the pipe and for instances in which the pipe diameter is **not** large enough for man entry and Spraycast is not possible, the recommended repair is CIPP. Then, remove the soil above the pipe and replace the soil in compacted lifts (imported soil will be utilized to match adjacent grades as necessary).

Detailed maps of the depressed areas can be found in Appendix H.

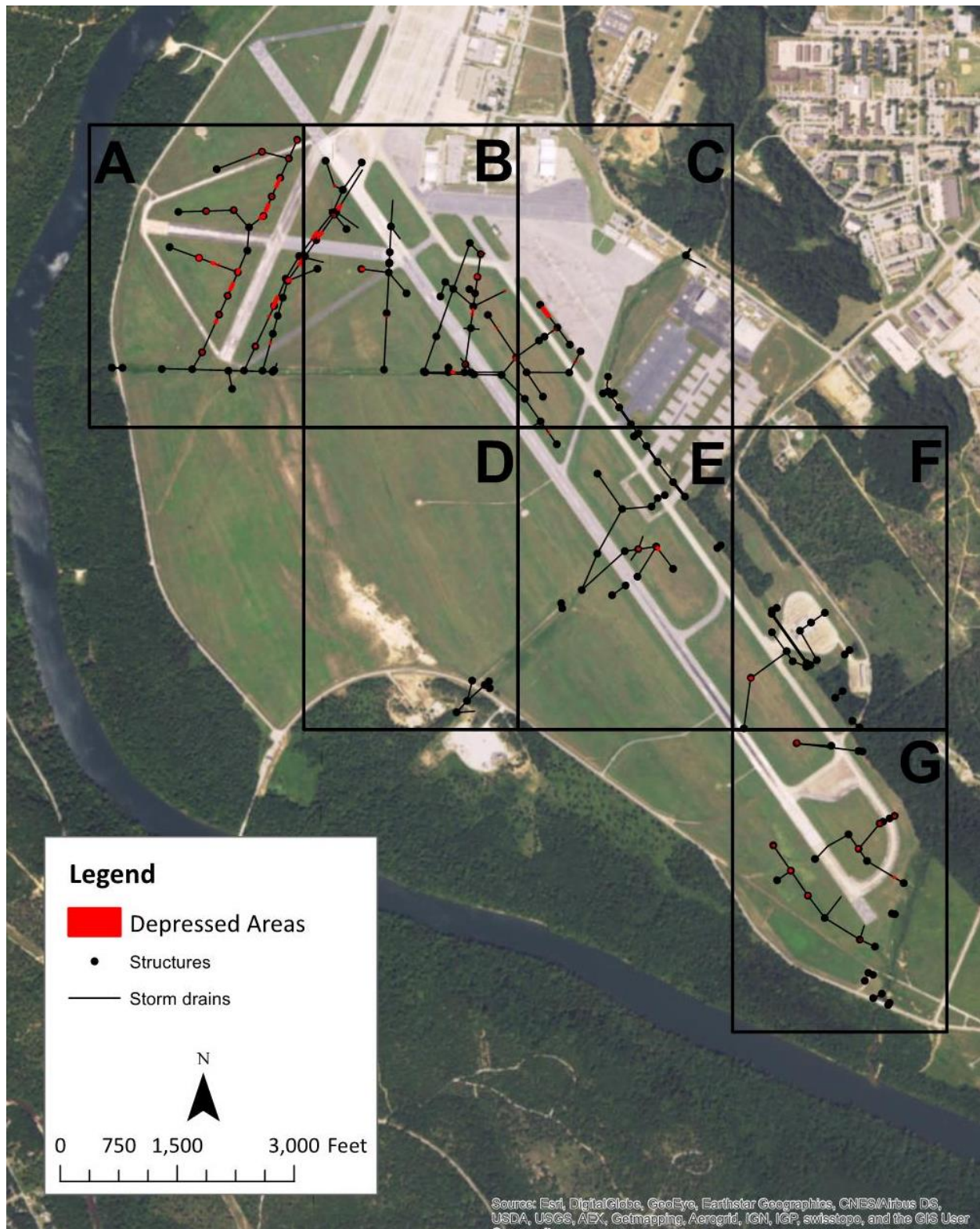


Figure 23: Lawson Army Airfield Depressed Areas

4.0 SUMMARY

The following is a summary of the work completed and recommendations for subsequent work.

4.1 OBSERVATIONS

When compiled, there are surprisingly few instances in which an asset was unsatisfactory in more than one of the 3 assessments (condition, hydraulic analysis, and depressed areas). Most of the depressed areas lie above storm drain pipes that received a Grade of 1-3 in the condition assessment and most of the undersized pipes received a Grade of 1 or 2, while it was previously thought that they were caused by collapsed pipes. While that is the case for some sinkhole instances, it is the vast minority. Additionally, it was expected that illicit connections between the storm and sanitary sewer systems would be discovered. However, this was not the case, likely because most of the pipes within the Priority 1 study area were located away from buildings. It is more likely that if these illicit connections are present that they will be found in a subsequent phase of this project which will be focused on the portion of LAAF nearer buildings.

4.2 NEXT STEPS

With the possibility of illicit connections being found, unassessed assets, and visible sinkholes, it is necessary to complete the second phase of this project which includes the Priority 2 area. Additionally, it is recommended that all assets in Priority 1 be re-inspected in 10 years in order to evaluate their condition and address any required maintenance and repairs. Last, it is thought to be crucial that the recommended repairs be completed in a timely manner due to the risk of failure for Grade 4 assets and the lack of function for the Grade 5 assets, which could potentially lead to severe and urgent problems in the near future.

4.3 REPAIRS

Storm structures and storm drains which received a Grade 4 or 5 in the condition assessment (see Figure 24), pipes which need to be upsized as indicated by the hydraulic capacity analysis, and the identified depressed areas are recommended for repair. The recommended repairs have been broken down into two recommended projects based on the type of work required:

1. Open trench replacement and earthwork

2. Trenchless rehabilitation

Again, these repairs have been recommended based on the condition assessment, hydraulic capacity analysis, and the depressed area observations because of operational issues on the airfield, flooding, and lawn maintenance. Detailed maps of recommended repairs for each asset can be found in Appendix G.

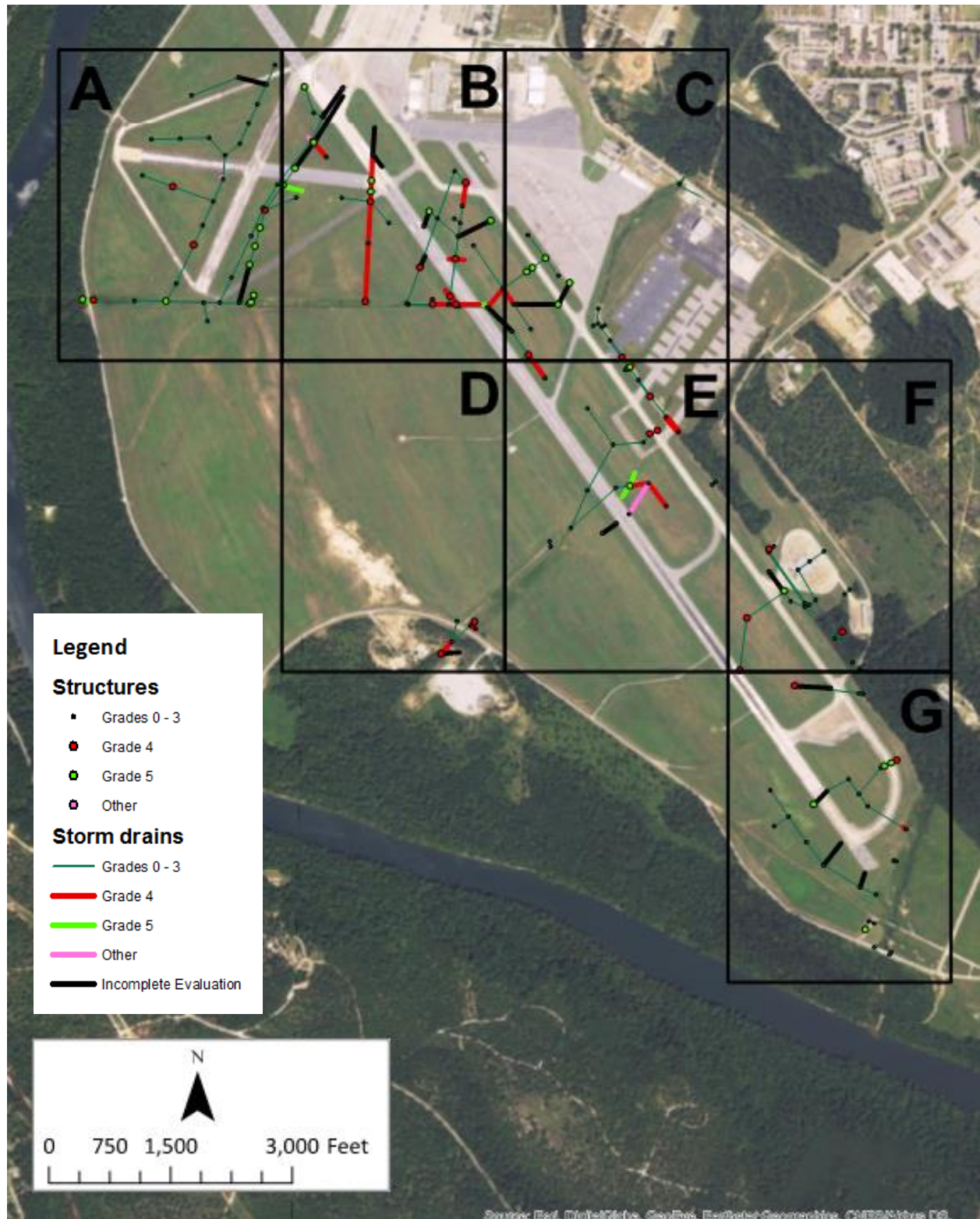
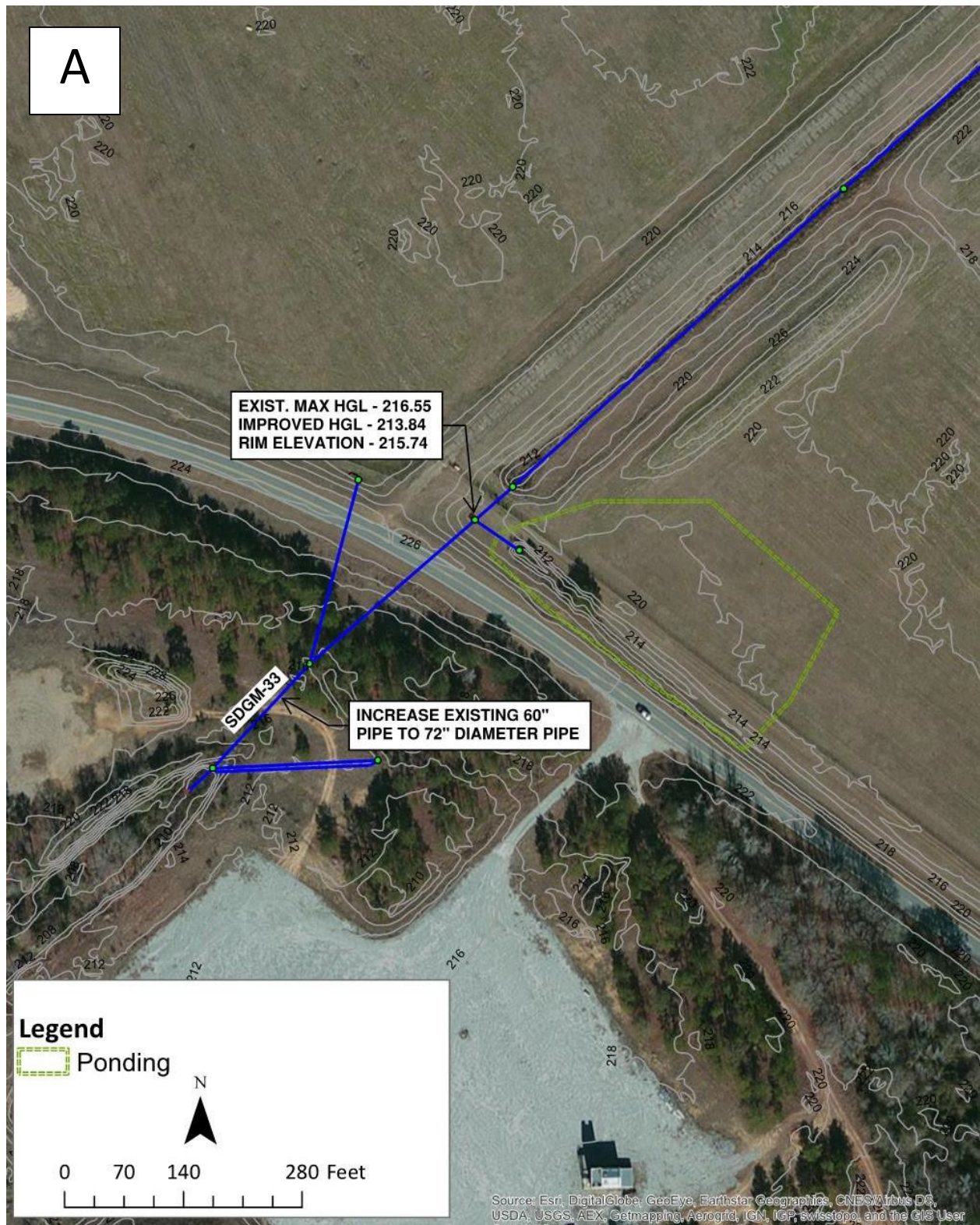
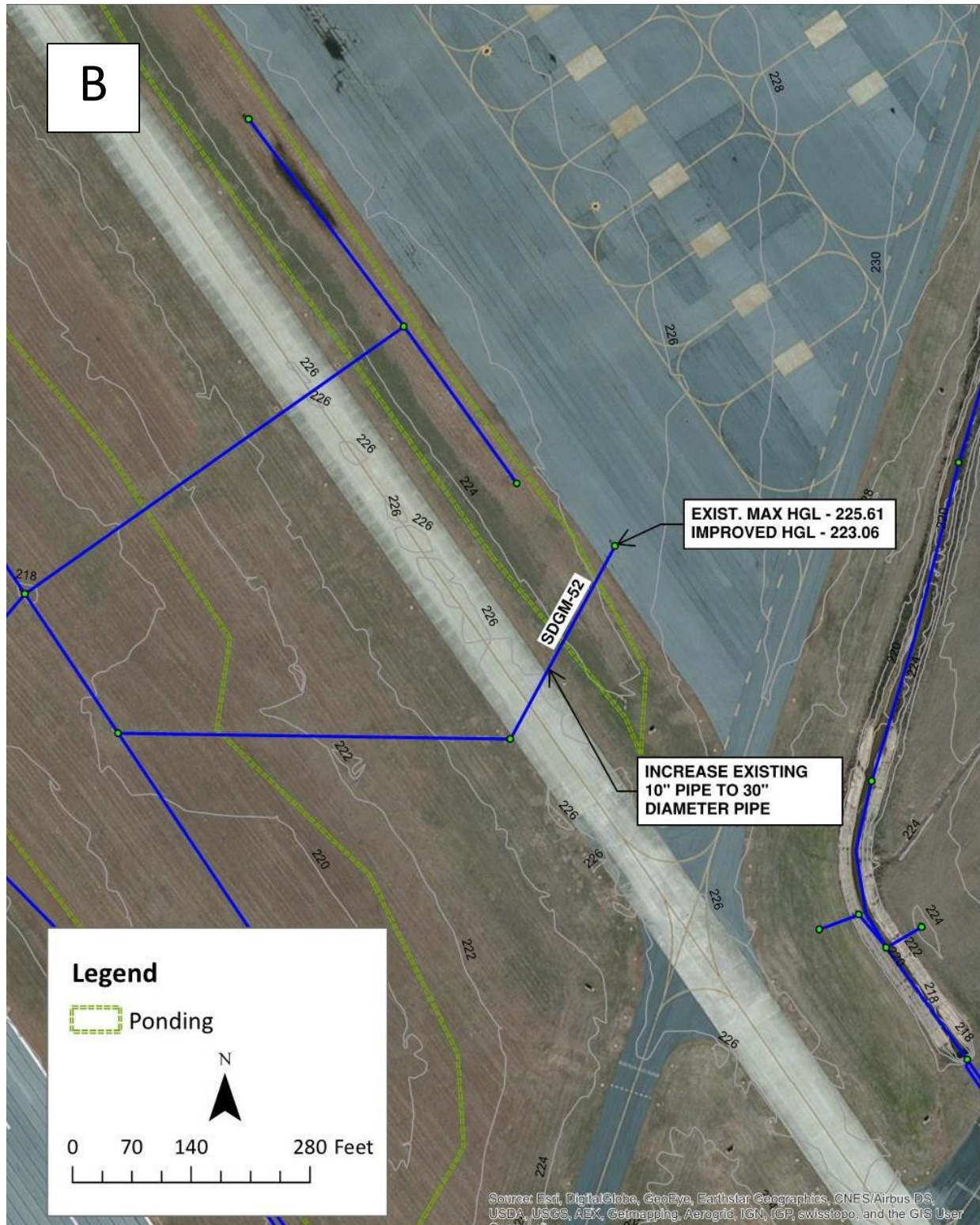
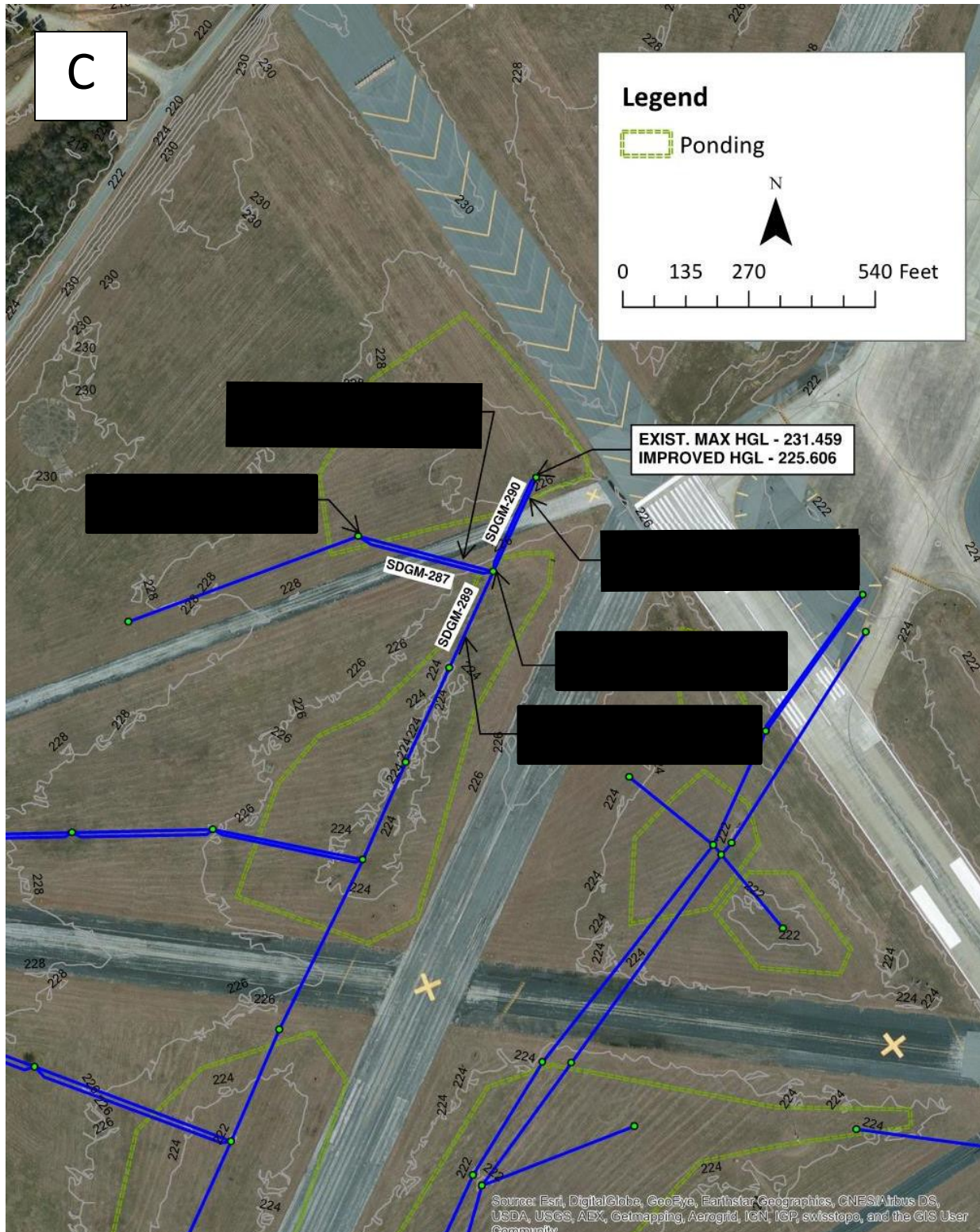


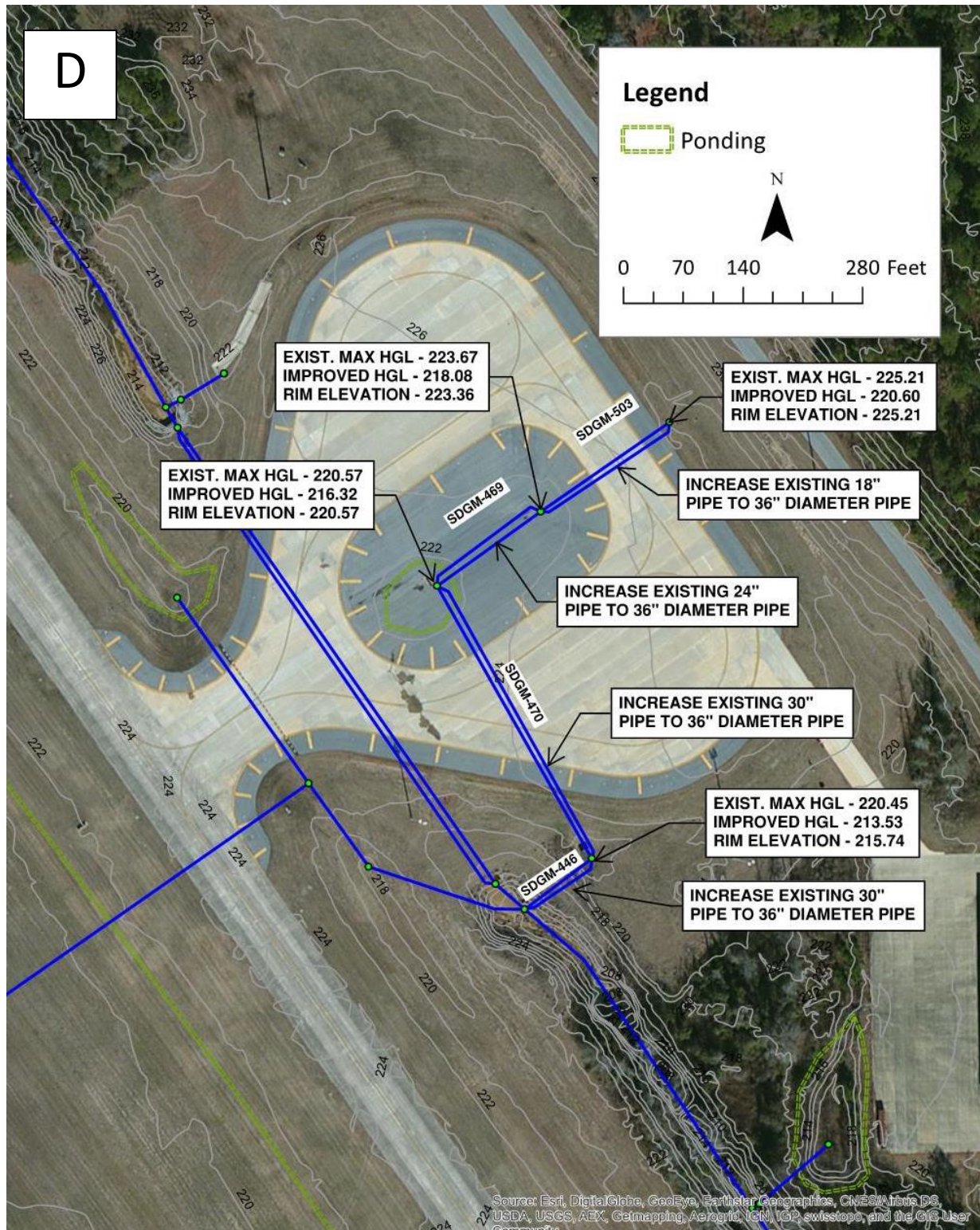
Figure 24: Overview of Assets with Recommended Repairs

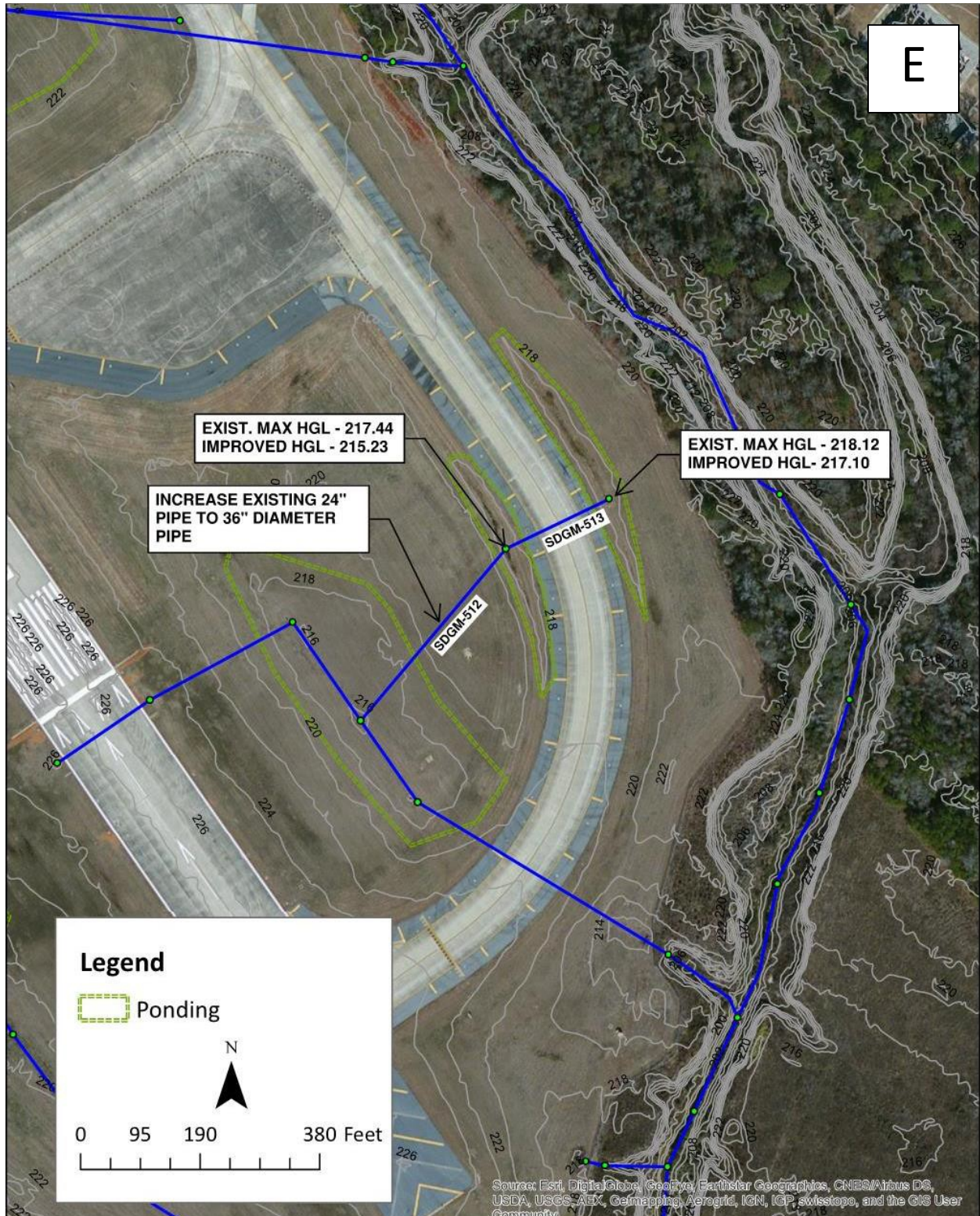
APPENDIX E: HYDRAULIC CAPACITY IMPROVEMENTS A-E



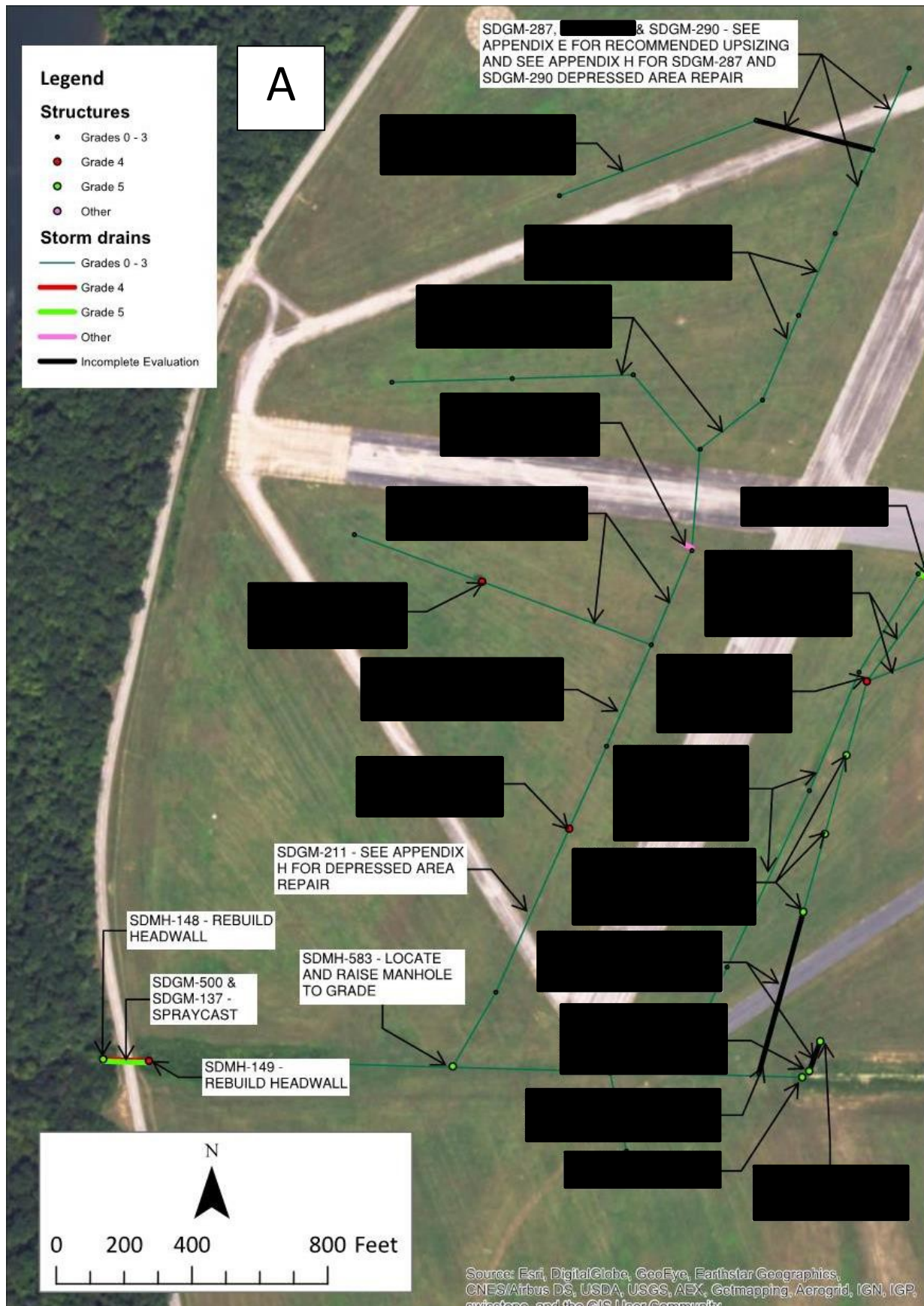


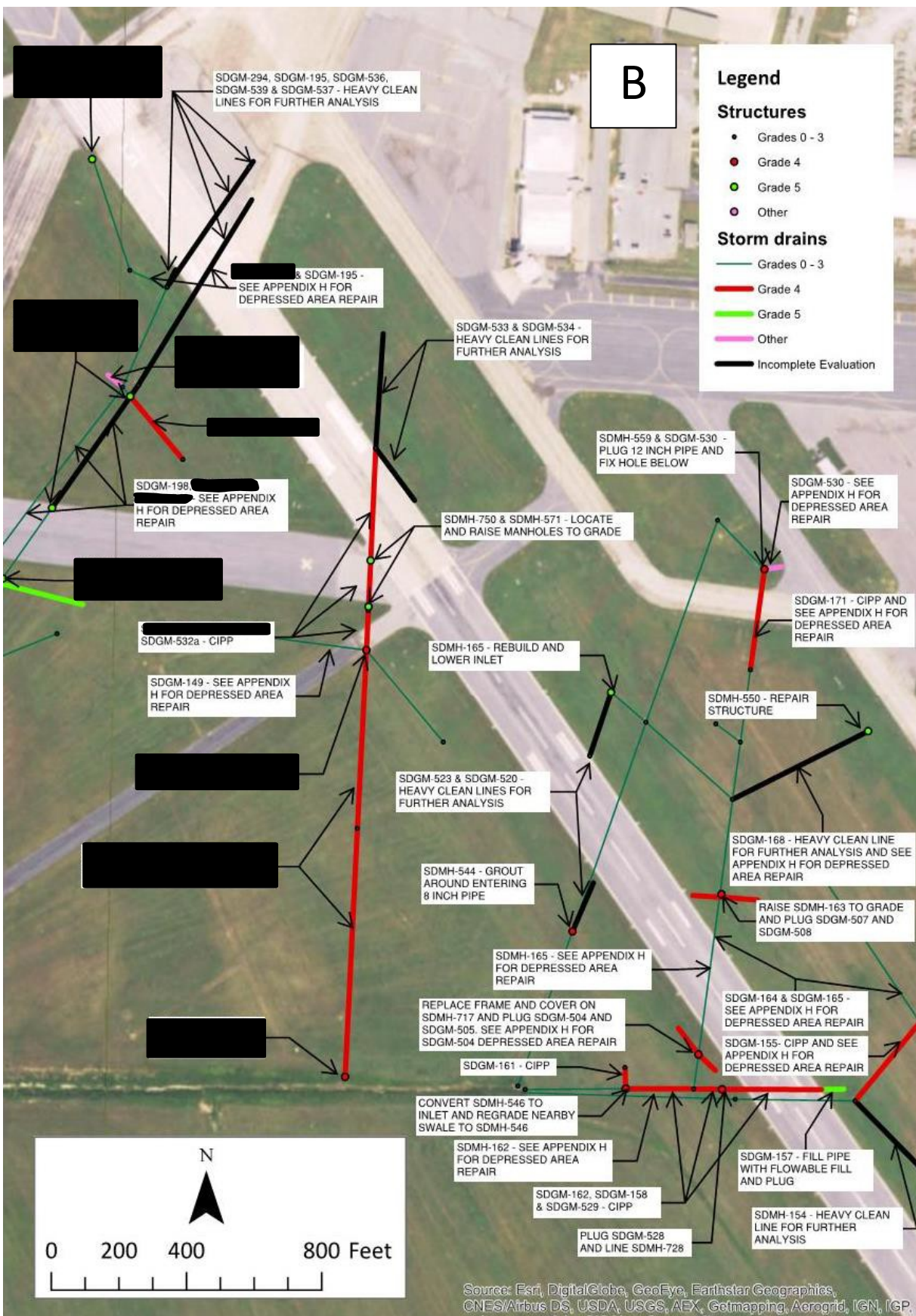


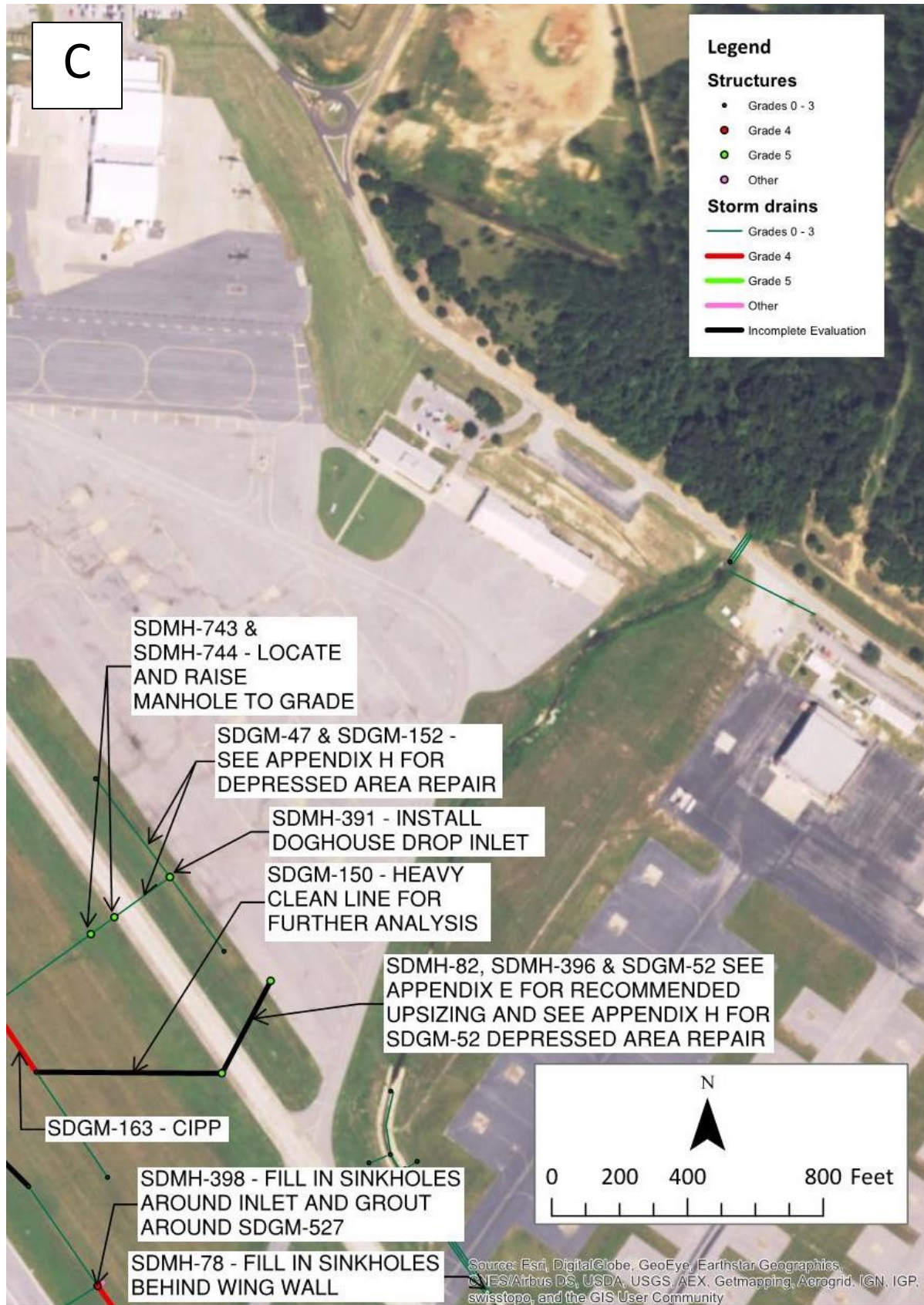


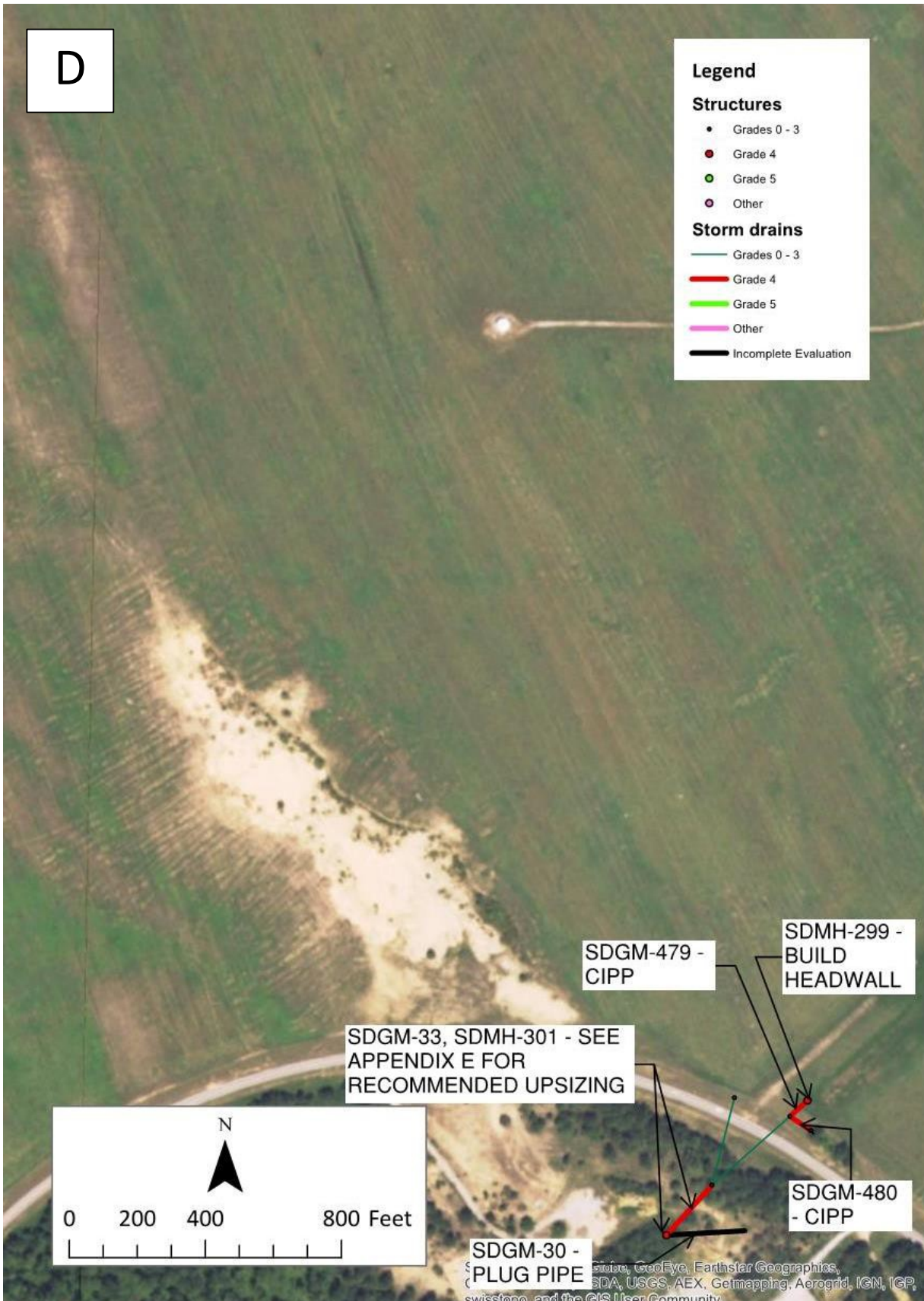


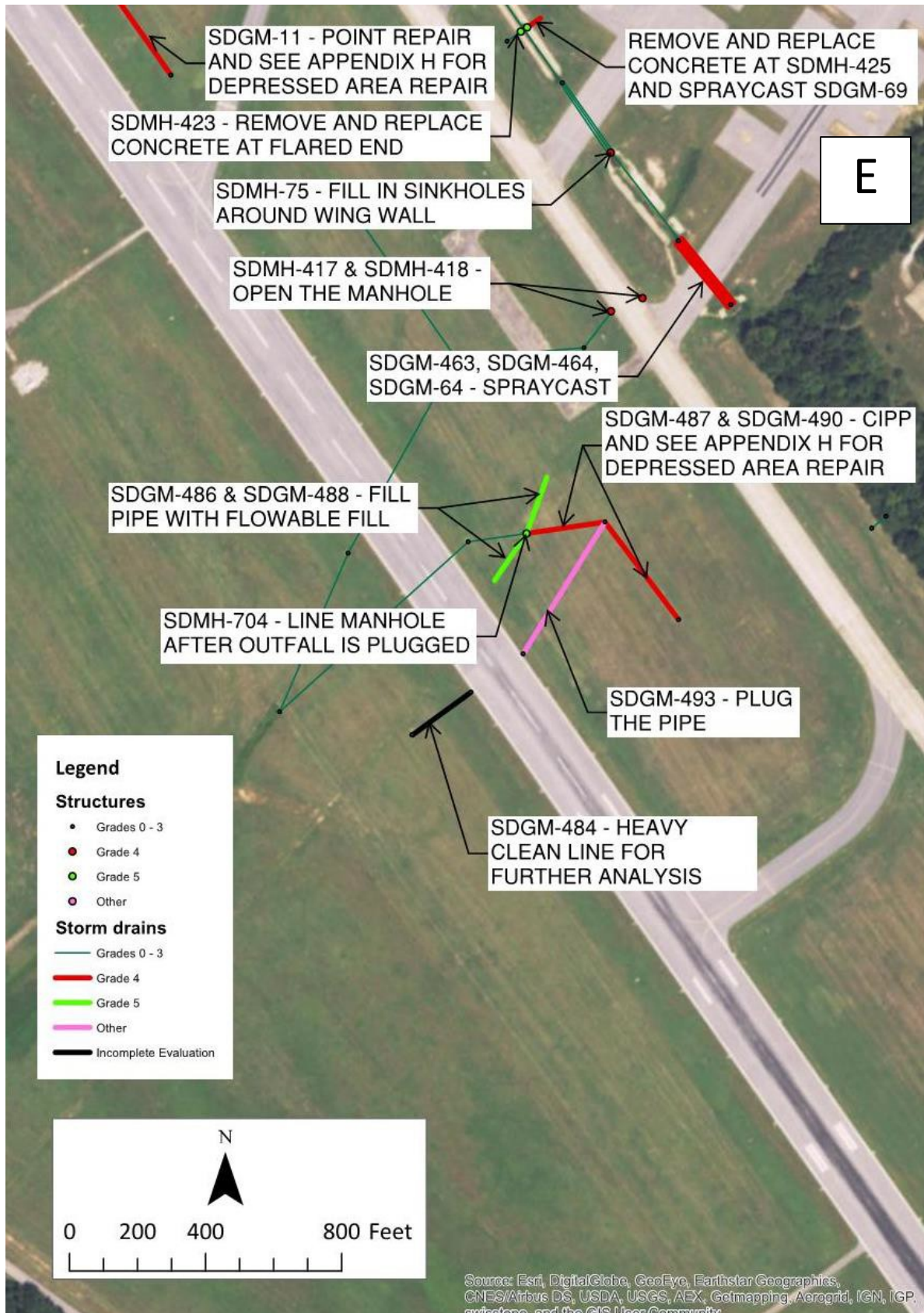
APPENDIX G: DETAILED MAPS OF RECOMMENDED REPAIRS A-G

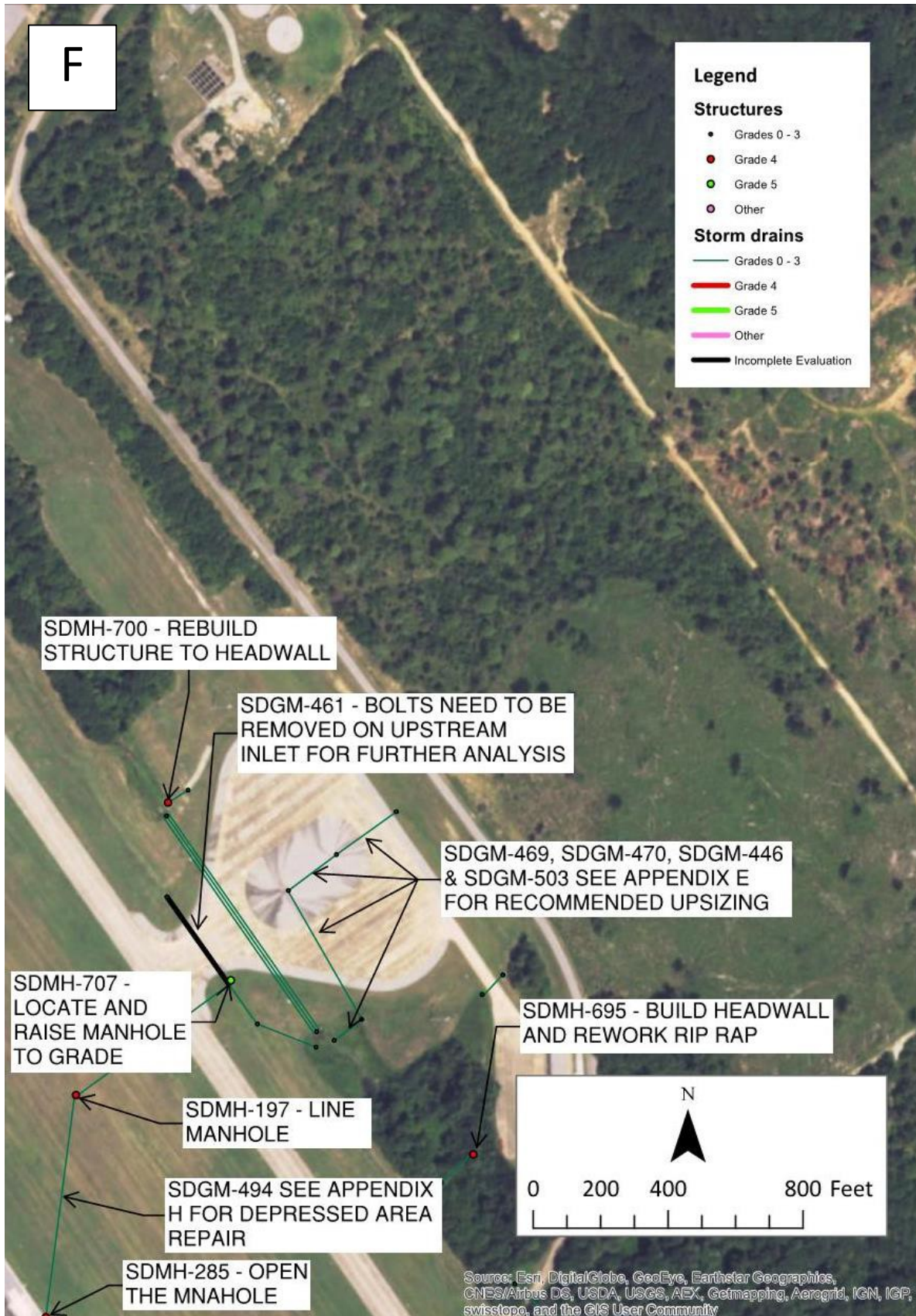


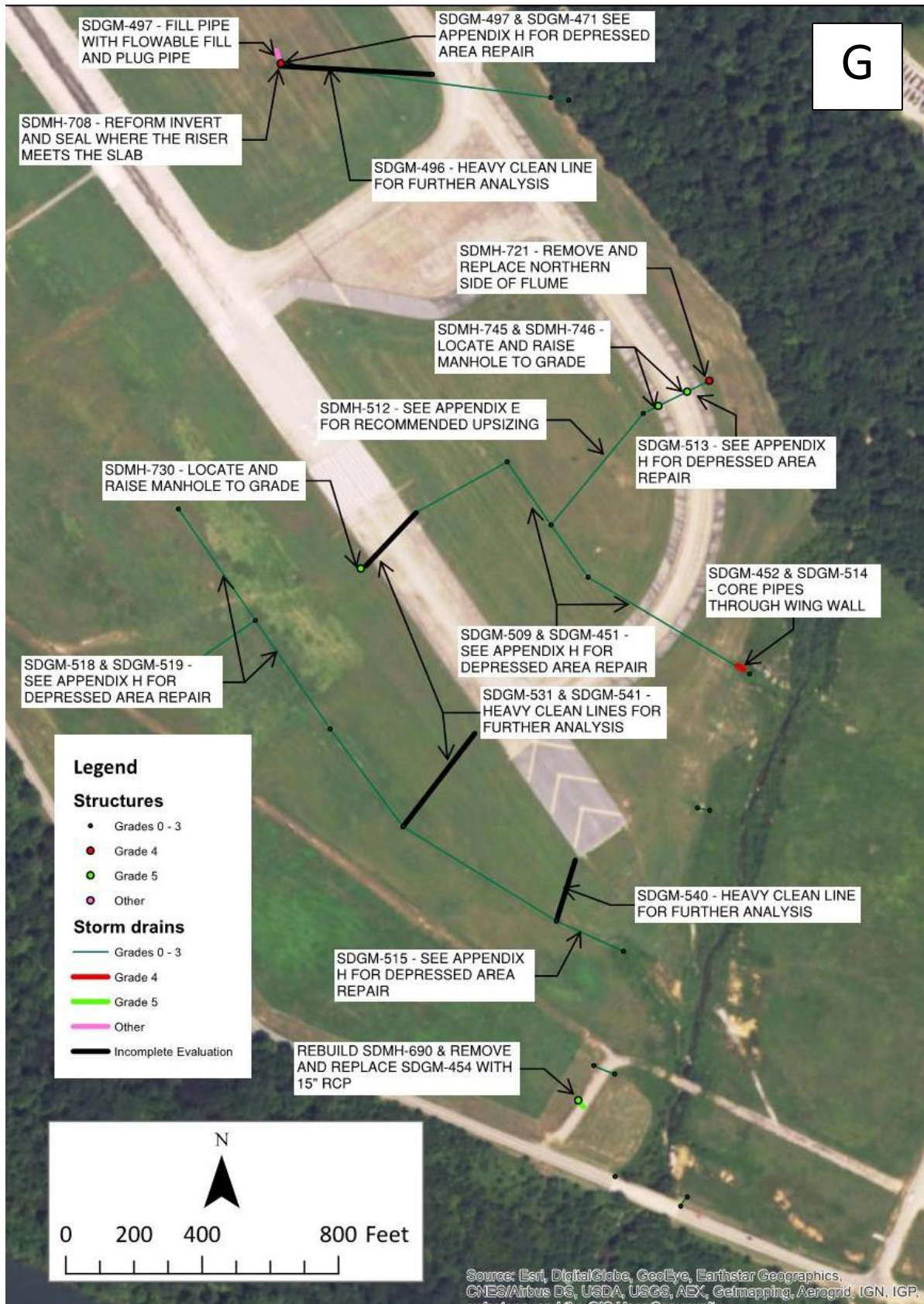




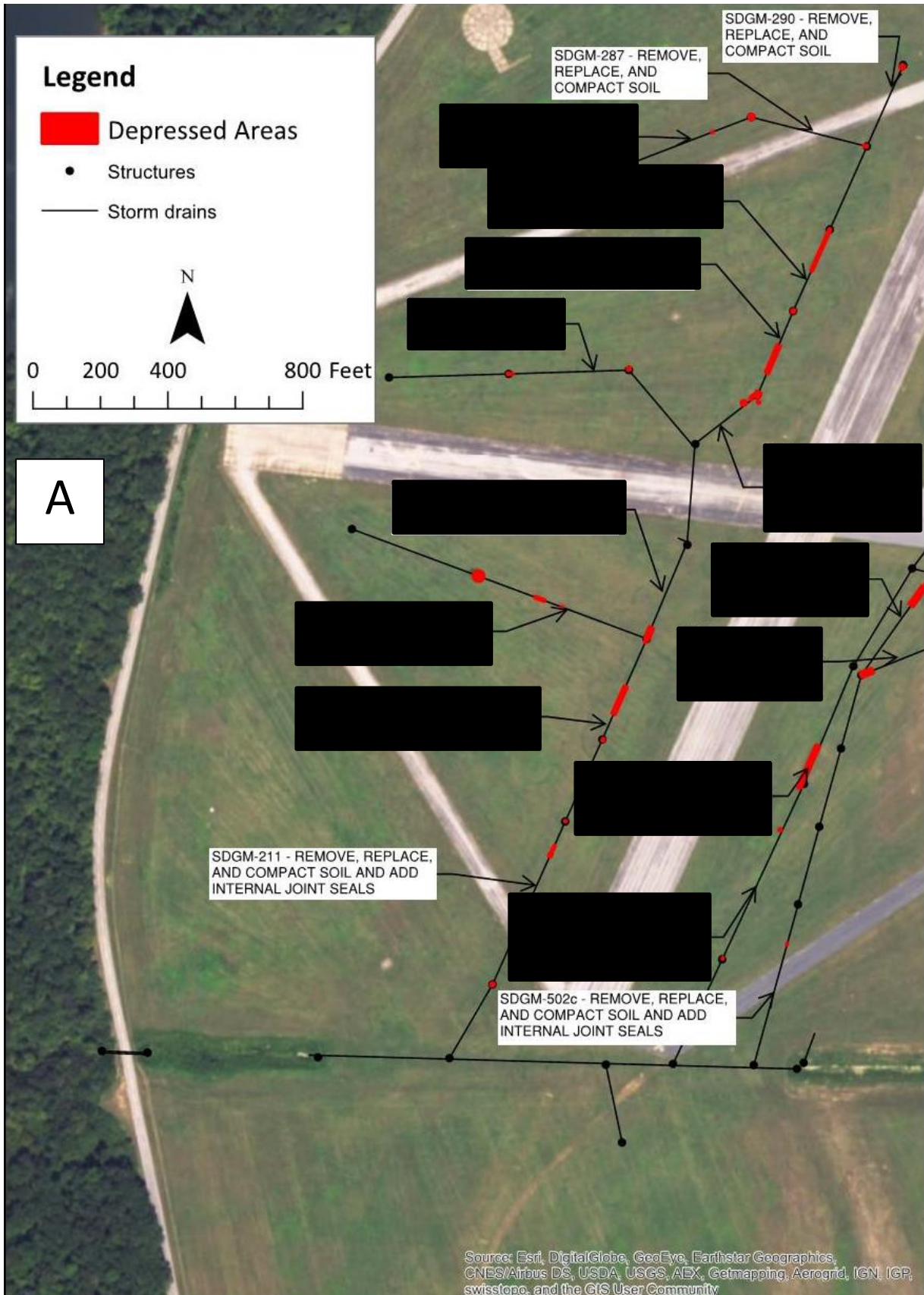


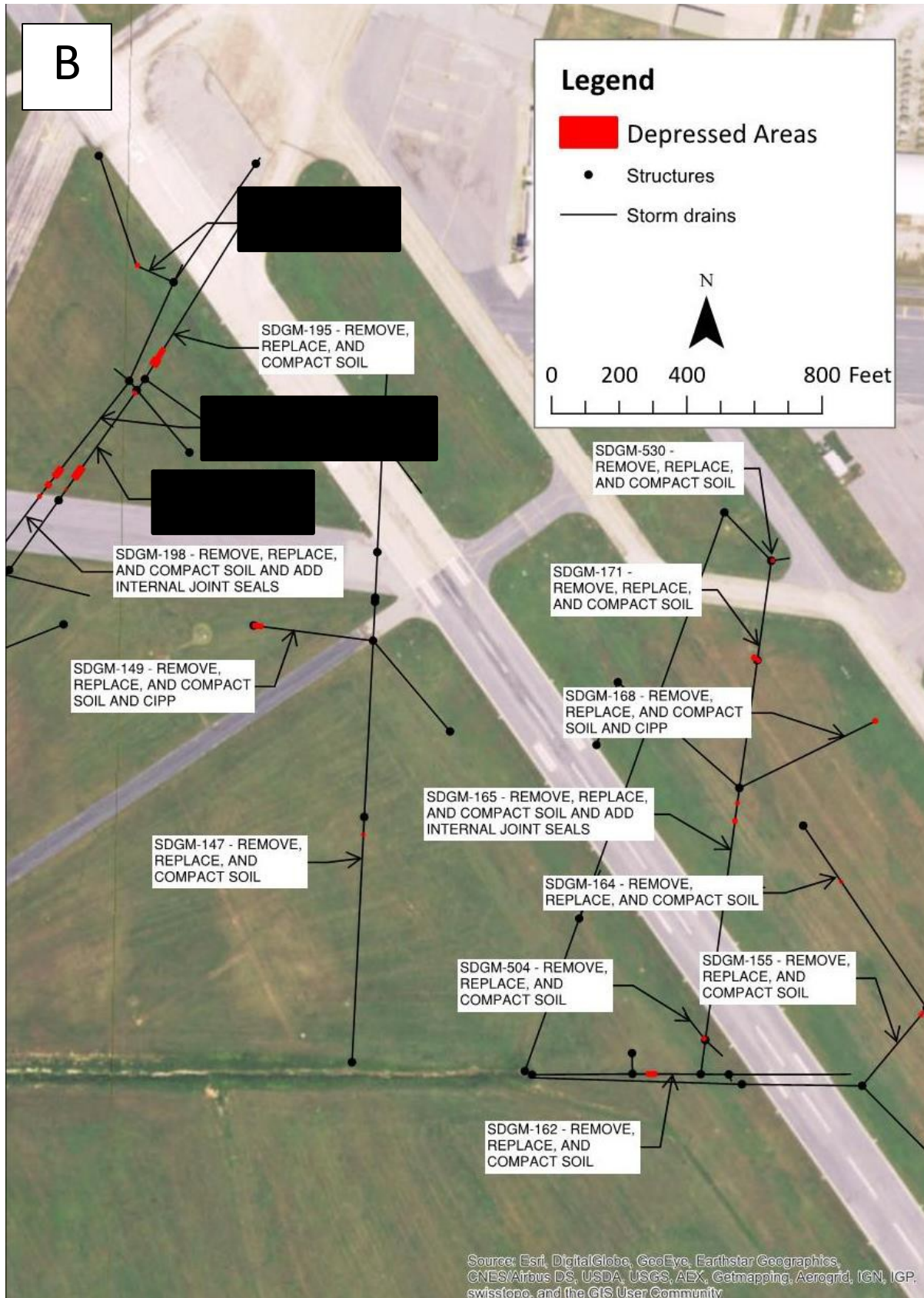


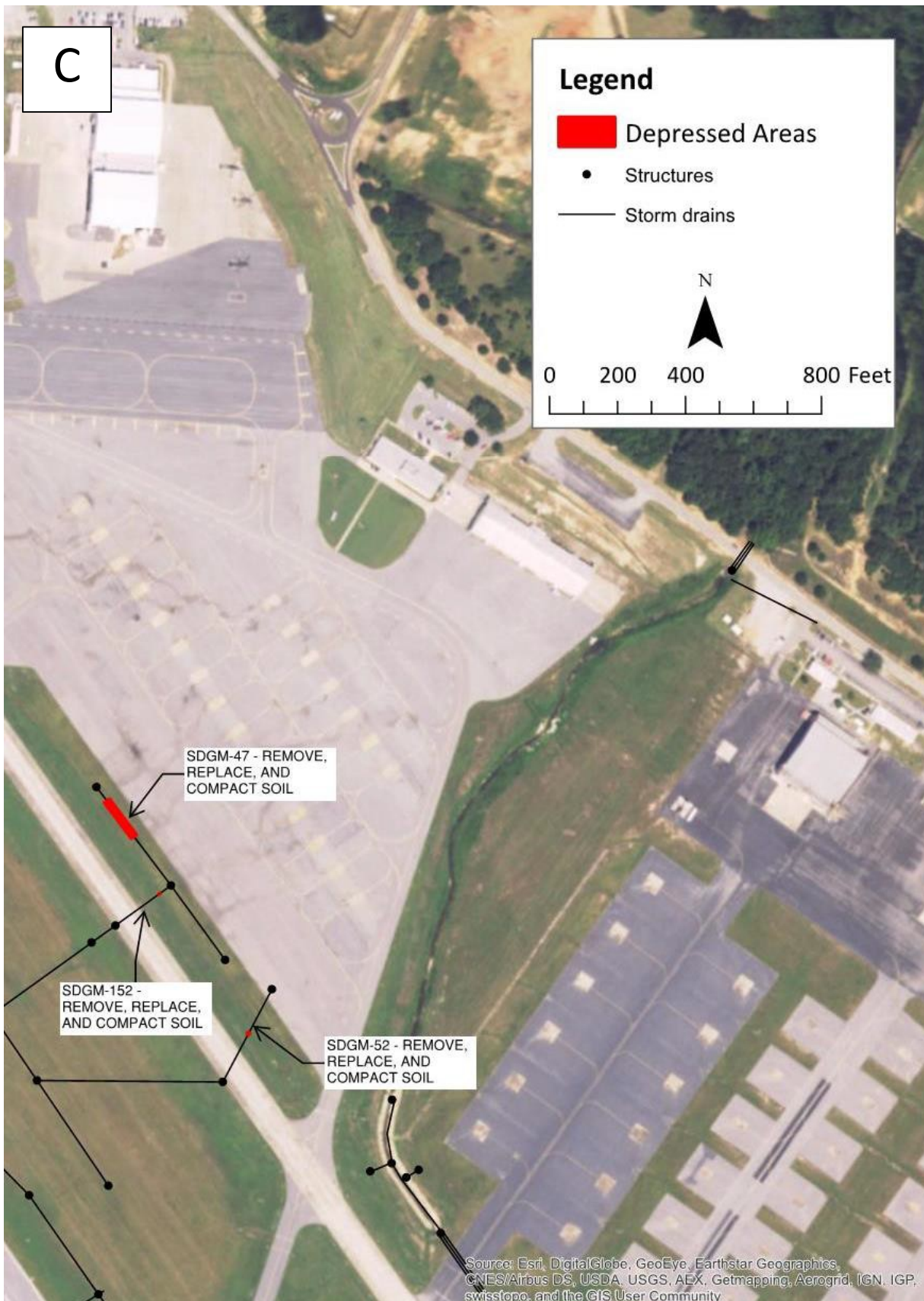




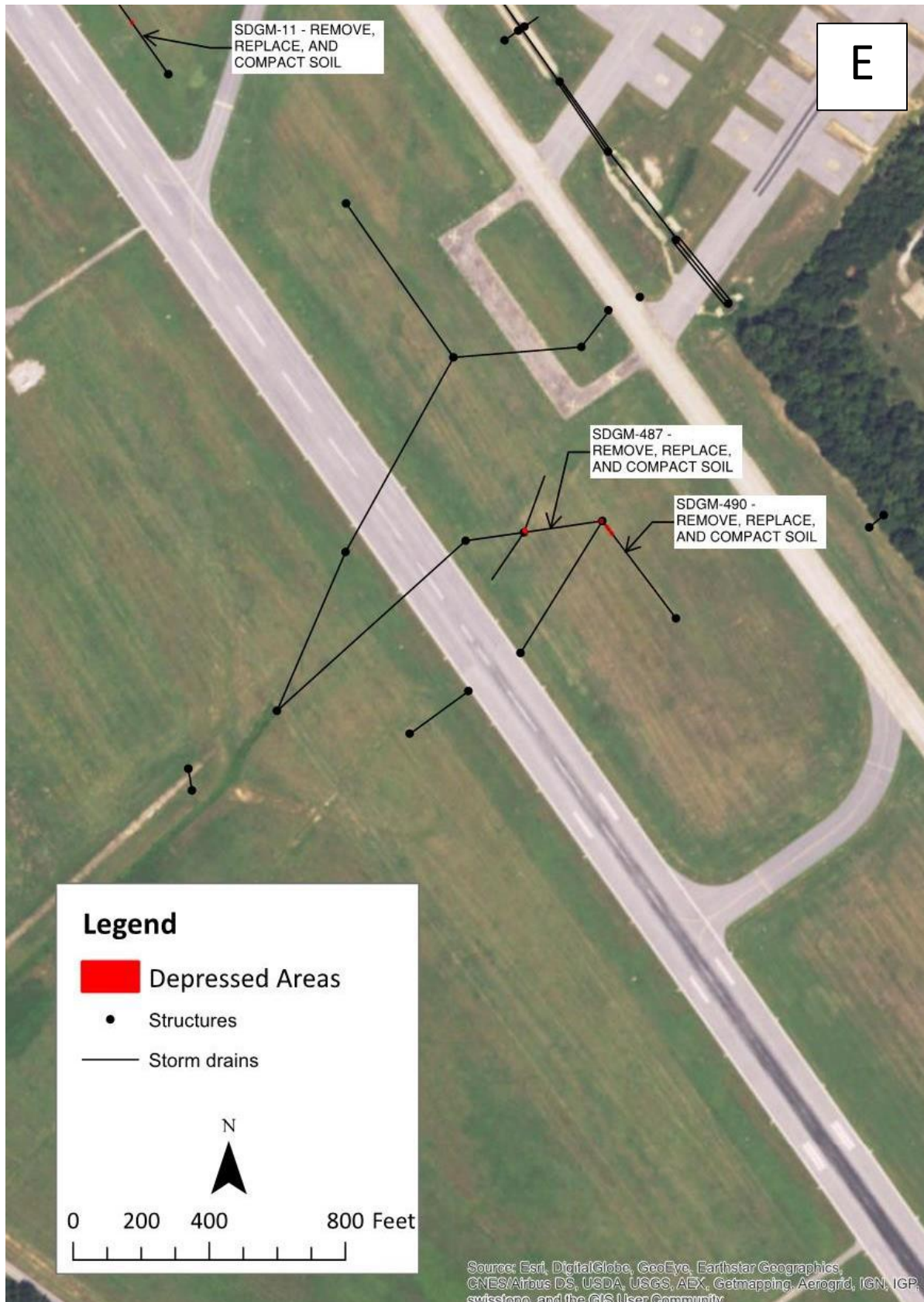
APPENDIX H: DETAILED MAPS OF DEPRESSED AREAS A-G

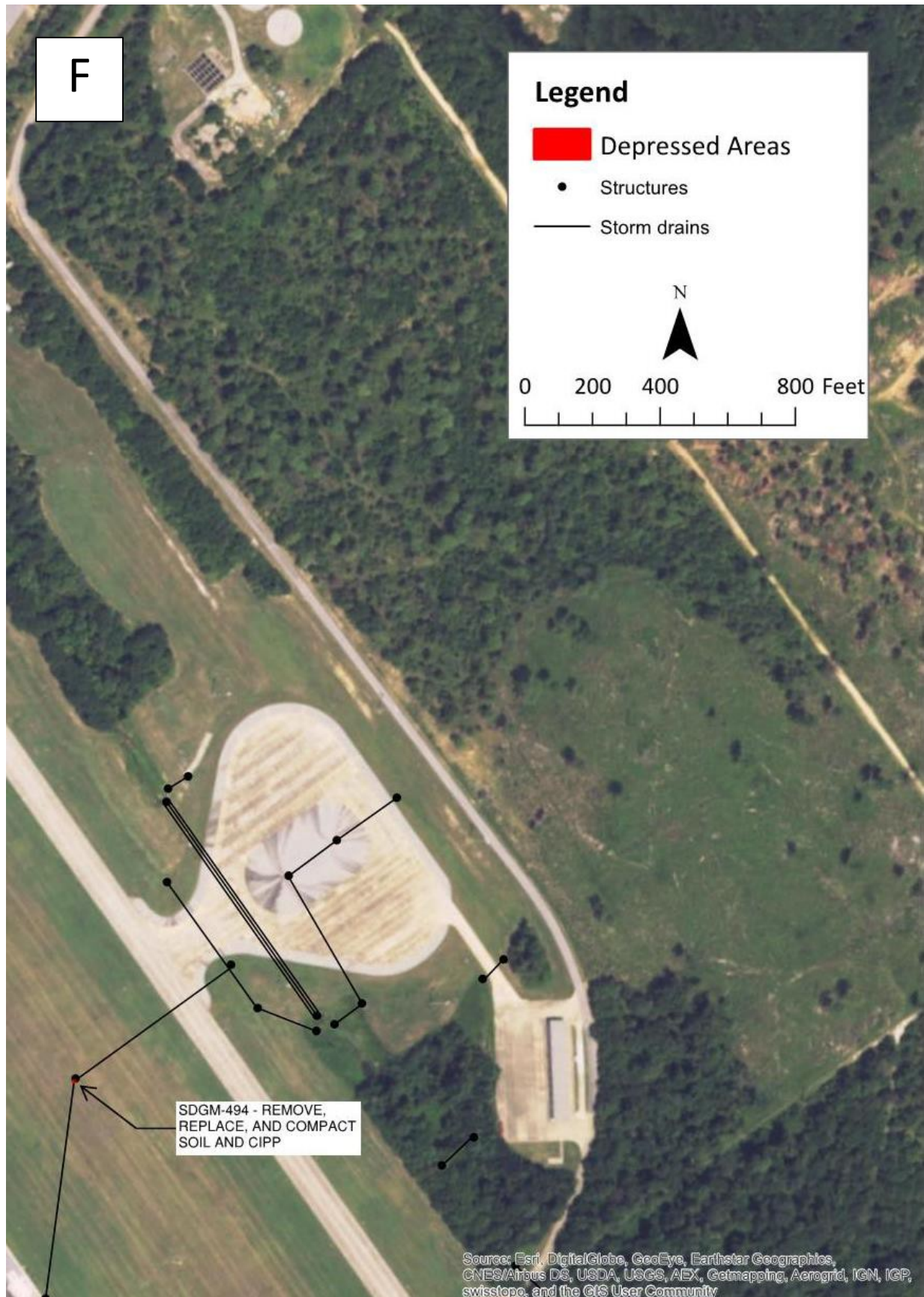


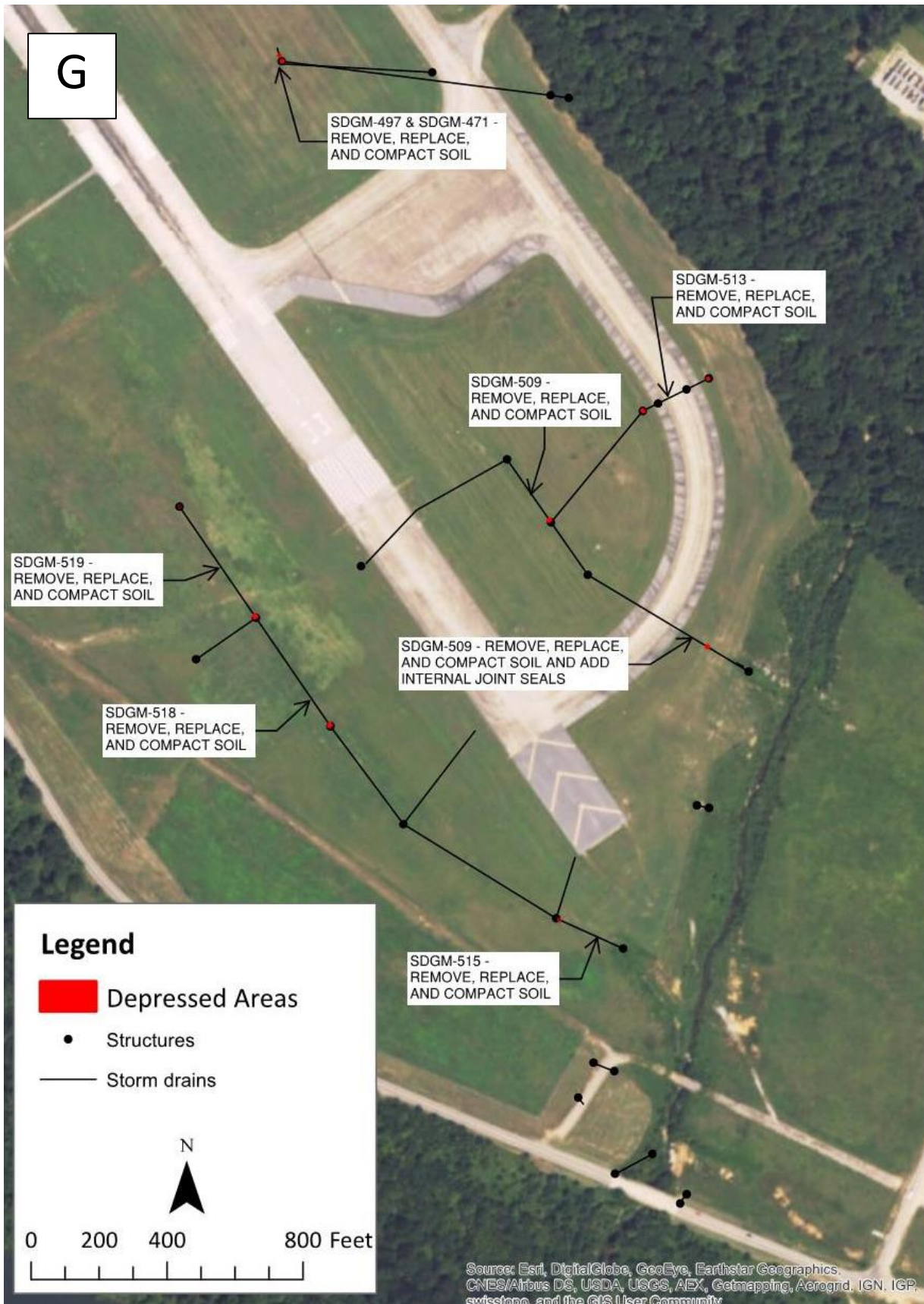












LAWSON ARMY AIRFIELD ADDITIONAL RECOMMENDED REPAIRS

