

Appendix F – Road Crossings

Road crossings, identified on the subwatershed Candidate Site maps by an “F”, are locations in the watershed where Difficult Run or one of its tributaries flows under a road. Using HEC-RAS, it was determined if each crossing was at risk of overtopping. Projects were then developed based on the results, identified on the subwatershed project maps by “DF94XX”.

Unnamed culvert

Impairment: The culvert under the northernmost outlet road east of Leigh Mill Road in catchment DFCH0005 has caused considerable stream erosion downstream to the unnamed tributary draining this catchment. The stream is deeply incised downstream.

Improvement Goals: Culvert reconstruction or energy dissipation to regulate flows downstream and prevent high velocity discharges.

Site Investigation and Projects: This site was identified in the field after discussions with local residents during the site investigations of adjacent catchment DFCH9701.

DF9401 (Road Crossing Improvement) The project would consist of reconstruction of the culvert profile and grade to reduce flows downstream. If sufficient area upstream is available, storage and release should be provided for 1-year extended detention.

F03

Impairment: The bridge carrying Stuart Mill Road over the Mainstem of Little Difficult Run overtops for all events except the 1-year storm. It is required to pass the 25-year event.

Improvement Goals: Improvements are needed to allow the bridge to pass the 25-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9403 (Road Crossing Improvement) This project would consist of reconstructing the bridge and approaches to raise the roadway to a level above the 25-year water surface elevation. It is possible that stormwater management retrofits upstream in sites D39 and D58 may help to change flow frequencies and eliminate the need for this project.

F04

Impairment: The crossing of Fox Mill Road overtopped for 10-year and greater events. Since it is classified as a primary road, the culvert should pass the 25-year event.

Improvement Goals: Improvements are needed to allow the culvert to pass the 25-year event.

Site Investigation and Projects: The field investigation found that the roadway is low, the culvert is undersized, and there are plunging flows causing massive scour and sediment export downstream. One project was identified:

DF9404 (Road Crossing Improvement) There are a number of choices for project improvements at this site. First would be to raise the road grade and upgrade the culvert to prevent overtopping. A second choice would be to keep the

roadway and culverts as is and construct an upstream redundant embankment to provide detention volume to reduce peaks to a lower level. This alternative would have secondary water quality benefits for the watershed also.

F06

Impairment: The culvert conveying Mainstem of Little Difficult Run under Colt Run Road overtops for all events. It is required to pass the 10-year event.

Improvement Goals: Improvements are needed to allow the culvert to convey the 10-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9406 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 10-year event is below the road surface. It is possible that stormwater management retrofits upstream in sites D39 and D58 may help to change flow frequencies and eliminate the need for this project.

F10

Impairment: The culvert at Hunters Den Lane overtopped for all events except the one-year storm. This is a local road, so it must pass 10-year event.

Improvement Goals: The goals for this site are to reduce overtopping frequency to meet the level of service of a local road.

Site Investigation and Projects: No field investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9410 (Road Crossing) This project would rebuild the culvert to accommodate higher flood flows without overtopping.

F11

Impairment: The bridge on Hunter Station Road overtops for all events. Hunter Station Road is a primary road, which should pass the 25-year event.

Improvement Goals: The goals for this site are to reduce overtopping frequency to meet the level of service of a local road.

Site Investigation and Projects: No field investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9411 (Road Crossing) This project would be designed to reconstruct the bridge to accommodate higher flood flows without overtopping.

F13

Impairment: The culvert conveying a tributary of Little Difficult Run under Fox Mill Road overtops for all events except the 1-year storm. It is required to pass the 25-year event.

Improvement Goals: Improvements are needed to allow the culvert to convey the 25-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9413 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 25-year event is below the road surface. Upstream stormwater management improvements are not anticipated to mitigate conditions at this crossing.

F15B

Impairment: The culvert conveying Little Difficult Run under Stuart Mill Road overtops for all events except the 1-year and 2-year storms. It is required to pass the 25-year event.

Improvement Goals: Improvements are needed to allow the culvert to convey the 25-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9415B (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 25-year event is below the road surface. It is possible that stormwater management retrofits upstream in sites D39 and D58 may help to change flow frequencies and eliminate the need for this project.

F16

Impairment: The culvert conveying a tributary of Little Difficult Run under Fox Mill Road overtops for all events except the 1-year and 2-year storms. It is required to pass the 25-year event.

Improvement Goals: Improvements are needed to allow the culvert to convey the 25-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9416 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 25-year event is below the road surface. It is possible that stormwater management retrofits upstream in sites D39 and D58 may help to change flow frequencies and eliminate the need for this project.

F-17

Impairment: The culvert carrying the flow from the western tributary of Rocky Branch under Miller Road overtopped for events more frequent than the 5-year storm. Miller Road is classified as a local road, so the culvert should pass the 10-yr event.

Improvement Goals: Improvements are needed to allow the culvert to pass the 10-year event.

Site Investigation and Projects: The site was investigated as part of regional pond site D-36. There are three existing stormwater management facilities immediately upstream of the culvert. It is anticipated that improvements to stormwater management in this area will allow the culvert to function at its appropriate level of service, so no other projects are proposed.

F19

Impairment: This culvert overtops with existing conditions for all rainfall events from 2-yr to 100-yr; however, it should pass beneath it the 25-year event to meet county standards.

Improvement Goals: The goals for this site are to reduce overtopping frequency to meet the level of service of a primary road.

Site Investigation and Projects: The site inspection showed that the existing culvert is both undersized and creating hazardous conditions. The low point of the road is only a few feet above the stream bottom, and the culvert capacity is only slightly above baseflow. Overtopping flows are contributing to stream erosion that is threatening to wash out Lawyer's Road.

DF9419 (Road Crossing Improvement) This project is designed to raise the road grade to prevent overtopping and rebuild the culvert to safely convey higher flows. Very little space exists to provide upstream detention, and any potential benefits would be secondary compared to improvements to public safety.

F25A

Impairment: The crossing of Lawyers Road overtopped for 25-year and greater events. Since it is classified as a primary road, the culvert should pass the 25-year event.

Improvement Goals: Improvements are needed to allow the culvert to pass the 25-year event.

Site Investigation and Projects:

DF9425 (Road Crossing Improvement) This project would consist of one of a few choices. The first would be modifying the embankment on the upstream side of the trail next to Lawyers Road to allow more backwater detention. Another choice would be to raise the level of the roadway and adjust the embankment to reduce the potential for overtopping.

F27

Impairment: The culvert carrying the mainstem under Hunter Mill Road overtopped for all events. Since Hunter Mill Road is a primary road, the bridge must pass the 25-year event.

Improvement Goals: Improvements are needed so the bridge meets the required level of service.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9427 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 25-year event is below the road surface. It is possible that stormwater management retrofits upstream may help to change flow frequencies and eliminate the need for this project.

F28

Impairment: The bridge on Beulah Road that passes over Wolftrap Creek overtops for all events. Beulah Road is classified as a primary road, so it must pass the 25-year event

Improvement Goals: Improvements are needed so the bridge meets the required level of service.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9428 (Road Crossing Improvement) This project would consist of raising the roadway so that the water surface elevation for the 25-year event is below the road surface. The bridge would be replaced with either a new bridge or a box culvert that can pass the required flow.

F-29

Impairment: The Browns Mill Road Bridge overtops for all events. Since it is classified as a local road, the bridge should pass the 10-year event.

Improvement Goals: Improvements are needed so the bridge meets the required level of service.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9429 (Road Crossing Improvement) This project would consist of reconstructing the bridge so that the water surface elevation for the 10-year event is below the road surface. It is possible that stormwater management retrofits upstream may help to change flow frequencies and eliminate the need for this project.

F30

Impairment: The culvert conveying a tributary of Little Difficult Run under Thoroughbred Road overtops for all events except the 1-year and 2-year storms. It is required to pass the 20-year event.

Improvement Goals: Improvements are needed to allow the culvert to convey the 20-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9430 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 10-year event is below the road surface. It is possible that stormwater management retrofits upstream in sites D39 and D58 may help to change flow frequencies and eliminate the need for this project.

F31

Impairment: The culvert under Pine Tree Drive overtopped for all events. Since this is a local road, the culvert is required to pass the 10-year event.

Improvement Goals: Improvements are needed so the culvert meets the required level of service.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9431 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 10-year event is below the road surface.

F32

Impairment: This culvert overtopped for all events except the one and two-year. As Waples Mill Road can be considered a primary road, it must pass the 25-year event.

Improvement Goals: Improvements are needed so the culvert meets the required level of service.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9432 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 25-year event is below the road surface. It is possible that stormwater management retrofits upstream may help to change flow frequencies and eliminate the need for this project.

F33

Impairment: This culvert was overtopped for the 25, 50, and 100-year events. Again, Waples Mill Road is considered a primary road, used for through traffic flow. It must pass the 25-year event.

Improvement Goals: Improvements are needed so the culvert meets the required level of service.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9433 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 25-year event is below the road surface. It is possible that stormwater management retrofits upstream may help to change flow frequencies and eliminate the need for this project.

F34

Impairment: The culvert under Valley Road overtopped for all events except the one-year. Valley Road is a local road, so the culvert must pass the 10-year event.

Improvement Goals: Improvements are needed so the culvert meets the required level of service.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9434 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 10-year event is below the road surface. It is possible that stormwater management retrofits upstream may help to change flow frequencies and eliminate the need for this project.

F40

Impairment: The bridge carrying Hunter Mill Road over Colvin Run overtops with existing conditions for the 25-year event. As a primary road, it should pass the 25-year event to meet County standards.

Improvement Goals: The goals for this site are to reduce overtopping frequency to meet the level of service of a primary road.

Site Investigation and Projects: No field investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9440 (Road Crossing) This project is designed to rebuild the bridge with a wider span to allow more of the floodplain under the bridge to accommodate flood flows.

F41

Impairment: The culvert carrying Colvin Run under Lake Fairfax Drive overtops with existing conditions for all the modeled events. The road provides local access to Lake Fairfax Park and is required to pass the 10-year event.

Improvement Goals: The goals for this site are to reduce overtopping frequency to meet the level of service of a local road.

Site Investigation and Projects: No field investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9441 (Road Crossing) This project would rebuild the culvert with additional barrels to accommodate higher flood flows without overtopping.

F47

Impairment: The bridge carrying Northern Neck Drive over the mainstem of Old Courthouse Spring Branch overtops for all events except the 1 and 2-year storms. It is required to pass the 10-year event.

Improvement Goals: Improvements are needed to allow the bridge to pass the 10-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9447 (Road Crossing Improvement) If modeling shows that upstream stormwater management improvements do not improve flooding conditions, this culvert should be replaced.

F48

Impairment: The culvert that passes Wolftrap Creek under Creek Crossing Road overtops for all events. Creek Crossing is a primary road, so it must pass the 25-year event.

Improvement Goals: Improvements are needed so the culvert meets the required level of service.

Site Investigation and Projects: The site was investigated as part of the fieldwork for catchment site C31. Project DF9531B is a culvert retrofit at this site to provide stormwater detention. The project analysis should take into account the overtopping frequency and correct this condition as part of the design.

F49

Impairment: The culvert at Old Courthouse Road overtops for all events. Old Courthouse Road is classified as a primary road, so it must pass the 25-year event

Improvement Goals: Improvements are needed so the culvert meets the required level of service.

Site Investigation and Projects: The site was investigated as part of the fieldwork for catchment site C58. Project DF9558 is a culvert retrofit at this site to provide stormwater detention. The project analysis should take into account the overtopping frequency and correct this condition as part of the design.

F57

Impairment: The culvert carrying Colvin Run under Carpers Farm Way overtops with existing conditions for all the modeled events. The road is provides local access and is required to pass the 10-year event.

Improvement Goals: The goals for this site are to reduce overtopping frequency to meet the level of service of a local road.

Site Investigation and Projects: No field investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9457 (Road Crossing) This project would raise the roadway or rebuild the culvert with additional barrels to accommodate higher flood flows without overtopping.

F58

Impairment: The crossing along Leesburg Pike overtopped for all modeled events. From the photos, this culvert appears to be under a gravel drive, possibly a driveway or access road, and will be classified as a local road. Local roads are required to pass the 10-year event.

Improvement Goals: Improvements are needed to allow the culvert to pass the 10-year event.

Site Investigation and Projects: No field investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9458 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 10-year event is below the road surface.

F59

Impairment: The bridge on Leesburg Pike overtopped for all modeled events. Leesburg Pike is a primary road and is required to pass the 25-year event.

Improvement Goals: Improvements are needed to allow the bridge to pass the 25-year event.

Site Investigation and Projects: No field investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9459 (Road Crossing Improvement) This project would consist of reconstructing the bridge so that the water surface elevation for the 25-year event is below the road surface.

F65

Impairment: Based on hydraulic modeling results, this culvert overtops under existing conditions for all rainfall events from 1-yr to 100-yr.

Improvement Goals: Culvert reconstruction or other projects should reduce flooding to the 10-year and less frequent event, consistent with the roadway classification.

Site Investigation and Projects: The site investigation found evidence of frequent overtopping of this culvert and of damage to the gravel roadway adjacent to it. It appears the culvert was recently reconstructed. In lieu of raising the height of the road and culvert, which would be required to reduce flooding, upstream stormwater management facilities may bring about improvements. Project DF9006A includes a berm to redirect flows and create storage, which may mitigate some of the overtopping.

F67B

Impairment: This culvert overtopped for events less frequent than the two-year event. As Springvale Road can be considered a primary road, it must pass the 25-year event.

Improvement Goals: Improvements are needed so the culvert meets the required level of service.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9467B (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 25-year event is below the road surface. It is possible that stormwater management retrofits upstream may help to change flow frequencies and eliminate the need for this project.

F72

Impairment: The Lehigh Mill Road bridge overtopped for all modeled events. Lehigh Mill Road carries through traffic, being a primary road, and is required to pass the 25-year event.

Improvement Goals: Improvements are needed to allow the bridge to pass the 25-year event.

Site Investigation and Projects: No field investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9472 (Road Crossing Improvement) This project would consist of reconstructing the bridge so that the water surface elevation for the 25-year event is below the road surface.

F75

Impairment: The culvert carrying Bellview Road over Rocky Run overtops for the 5-year and greater events. It is required to pass the 25-year event.

Improvement Goals: Improvements are needed to allow the bridge to pass the 25-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9475 (Road Crossing) There are two parts to this project. The first involves raising Bellview Road in conjunction with the new development to help prevent flooding of the road and the new development. Second, some regional stormwater management could be included into the new development to reduce the potential problems it might have in the future.

F76

Impairment: The culvert at Towlston Road over Rocky Run overtops for all events except the 1-year. It is required to pass the 25-year event.

Improvement Goals: Improvements are needed to allow the bridge to pass the 25-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9476 (Road Crossing) This project involves using the existing roadway embankment and a dry detention facility design to provide some detention storage for a large drainage area.

F77

Impairment: This culvert overtopped for events less frequent than the five-year event. Springvale Road is a primary road, so it must pass the 25-year event.

Improvement Goals: Improvements are needed so the culvert meets the required level of service.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9477 (Road Crossing Improvement) This project would consist of reconstructing the culvert and/or raising the road way so that the water surface elevation for the 25-year event is below the road surface. It is possible that stormwater management retrofits upstream may help to change flow frequencies and eliminate the need for this project.

F79

Impairment: The culvert that passes flow under Old Dominion Drive and over Rocky Run overtops for events less frequent than the 10-year. It is required to pass the 25-year event.

Improvement Goals: Improvements are needed to allow the bridge to pass the 25-year event.

Site Investigation and Projects: No site investigation was conducted. The improvement project is recommended based on photos and modeling results.

DF9479 (Road Crossing) If upstream stormwater management improvements are not effective at reducing damaging flows, reconstruction of the culvert may be necessary.

F80

Impairment: The culvert carrying the flow of Sharpers Branch under Belleview Road overtopped for events more frequent than the 2-year storm. Belleview Road is classified as a primary road, so the culvert should pass the 25-yr event.

Improvement Goals: Improvements are needed to allow the culvert to pass the 25-year event.

Site Investigation and Projects: No site investigation was conducted. Improvements will be incorporated into project DF9020A (described above).