



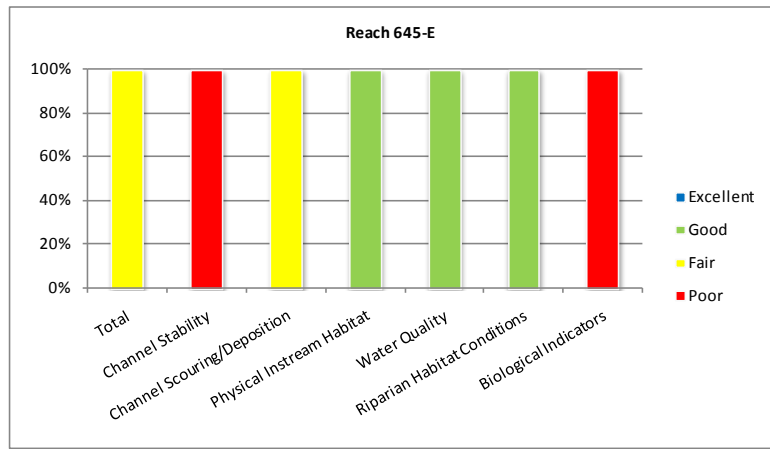
Reach Name: 645-E

Coordinates (NAD 83, Virginia State Plane North):
11814129.76, 6885719.81 to 11814304.21, 6885726.87

Average RSAT Score: 22

General Description:

Reach 645-E is a fair quality stream, with an average total RSAT score of 22. Channel incision is responsible for low channel stability scores and bed and bank erosion along nearly 50% of the reach. Channel scouring/deposition scores are fair, with an increase in deposition, increased embeddness of riffle material, and few deep pools. Physical instream habitat scores are good, with a mix of riffle, run and pool habitat, and a varied velocity and depth regime.



Riparian habitat is in good condition, with a forested buffer of at least 100ft on either side of the channel, and dense canopy cover, providing more than 60% shading. Biological indicators are absent along this reach (resulting in a score of 0), but water quality is good, with light substrate fouling, moderate TDS, and a depth of visibility of up to 3ft.

Problem Areas:

- None.

Recommendations:

- None.



Basin 650, Middle Little Creek - Project Reach Descriptions

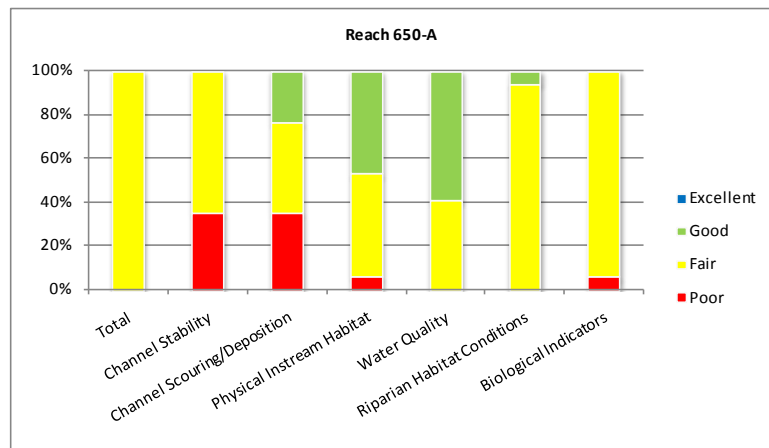
Reach Name: 650-A

Coordinates (NAD 83, Virginia State Plane North):
11817805.92, 6882818.38 to 11823028.71, 6878665.37

Average RSAT Score: 22

General Description:

Reach 650-A is a fair quality stream, with an average total score of 22. Channel stability scores along Reach 650-A are influenced significantly by systemic channel widening, with approximately 50% of the streambanks experiencing sloughing or scour. Bank erosion is particularly severe on the outside of bends, in areas where riparian vegetation is sparse, and in the lower portion of the reach where fresh sand and gravel bars are common. Channel scouring/deposition and physical instream habitat scores were fair, with an increasing number of depositional features, increased embeddness of riffle material, few deep pools and a shallow riffle and run dominated morphology. Scores for channel stability, scouring/deposition, and physical instream habitat all tended to decrease in the lower portion of the reach, in the vicinity of the golf course.



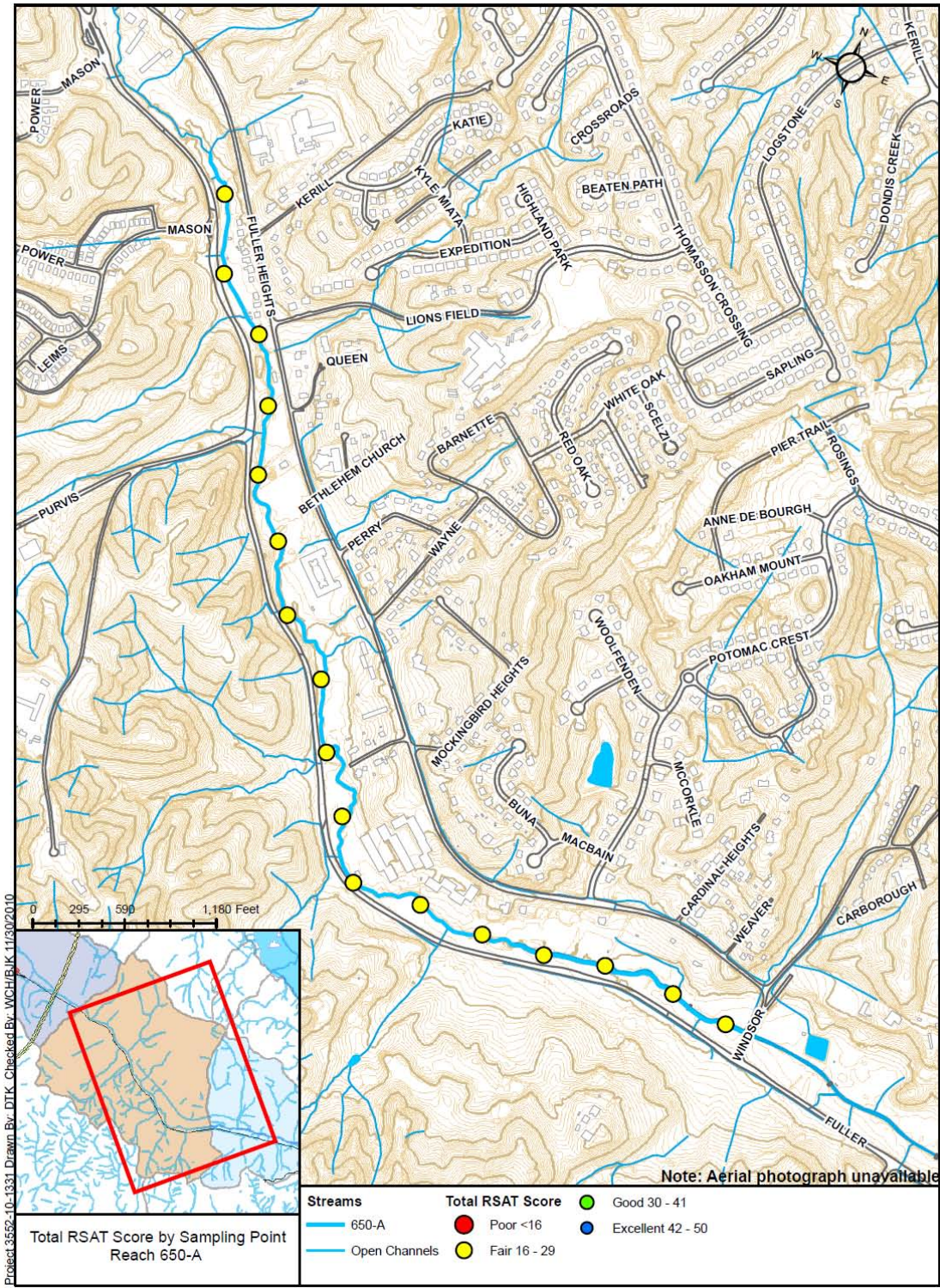
Riparian habitat is in fair condition, with only a narrow band of trees and woody vegetation through the golf course, and only 50% canopy coverage. Despite the level of channel degradation, biological indicators remain in fair condition, with a number pollution-tolerant species, including caddisflies and midgeflies. Water quality is fair, with a moderate level of substrate fouling, increased TDS, and a depth of visibility no more than 1ft.

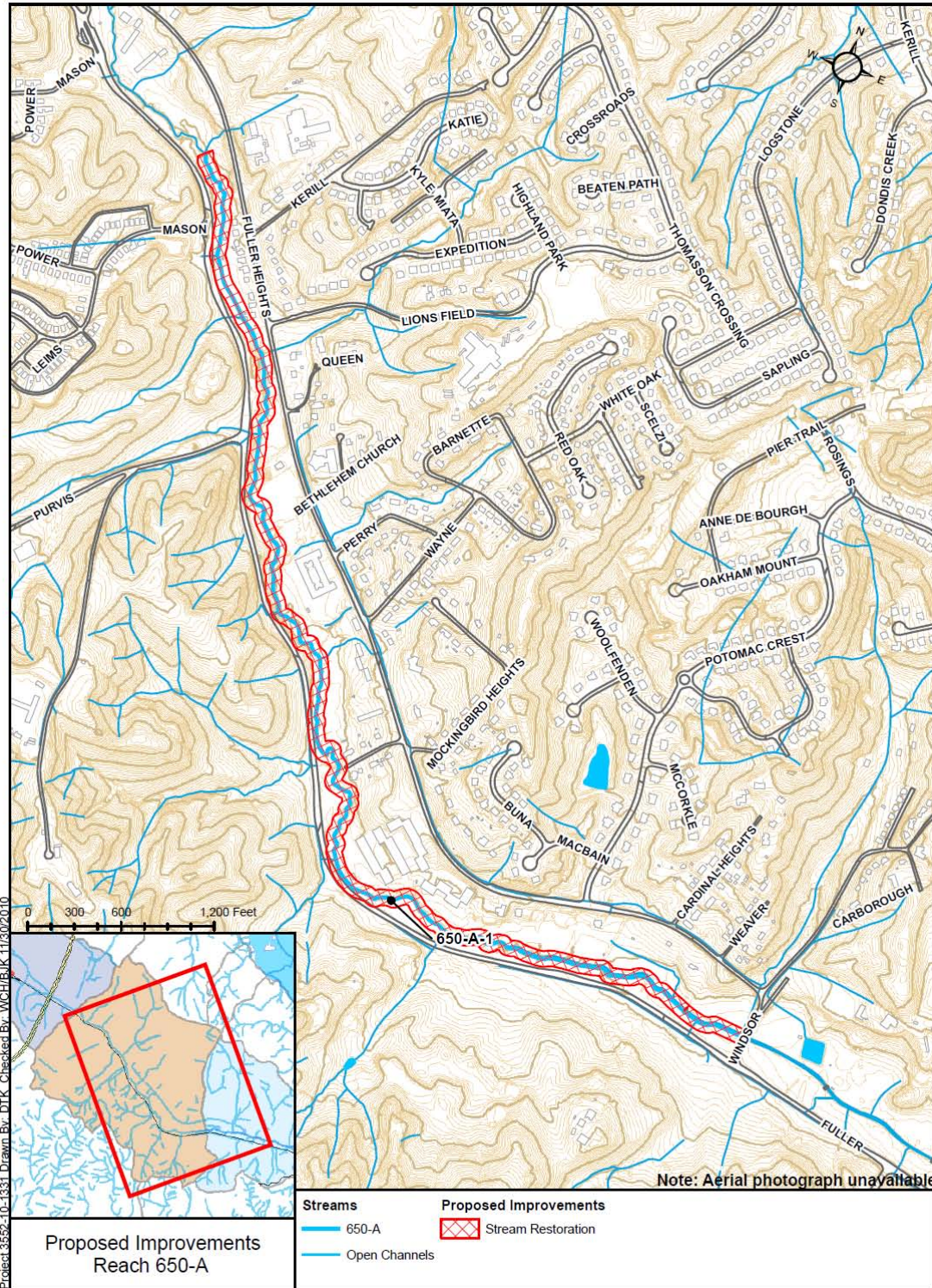
Problem Areas:

- Channel incision and widening has resulted in widespread, systemic streambank erosion and loss of property from Old Triangle Road to Windsor Road.
 - Removal of riparian forest, encroachment on the stream corridor, and dumping of rubble and debris have exacerbated erosion problems locally.
 - Fence lines and residential outbuildings have been undermined by ongoing bank erosion. Failure appears imminent behind properties along Fuller Heights Road, between Kerill and Lionsfield Roads, and again near Belleau Wood Drive.

Recommendations:

Restore approximately 8300ft of stream, from Old Triangle Road to Windsor Road, using fabric and plant bank treatment, rock toe, and gravel or earth wraps to stabilize eroding streambanks, and up to 22 rock riffles for permanent grade stabilization.





Project 3552-10-1331 Drawn By: DTK Checked By: WCH/BAK 11/30/2010

Basin 665, Swans Creek - Project Reach Descriptions

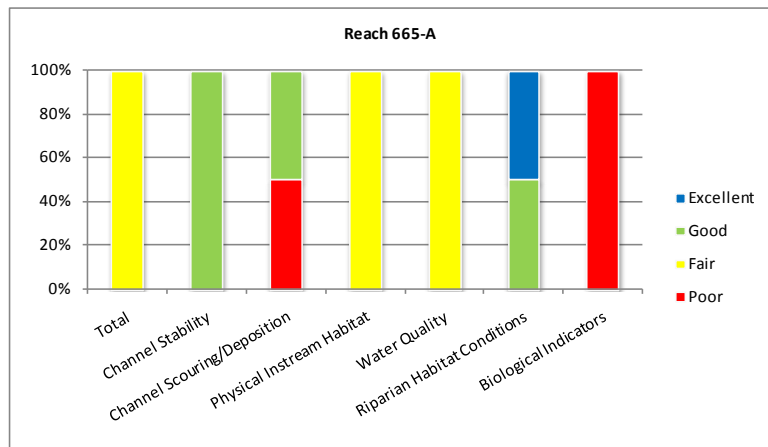
Reach Name: 665-A

Coordinates (NAD 83, Virginia State Plane North):
11825862.93, 6889065.09 to 11825727.90, 6887811.99

Average RSAT Score: 24

General Description:

Reach 665-A is a fair quality stream, with an average total score of 24. Reach 665-A has good channel stability, with relatively stable streambanks, little bank sloughing or erosion, and resistant bed and bank materials. Channel scouring/deposition and physical instream habitat scores were fair, with an increasing number of depositional features, particularly in the lower portion of the reach, where deposition of sand and sediment has increased embeddness of riffle material and filled in most pools, resulting in a slow and shallow velocity/depth regime.



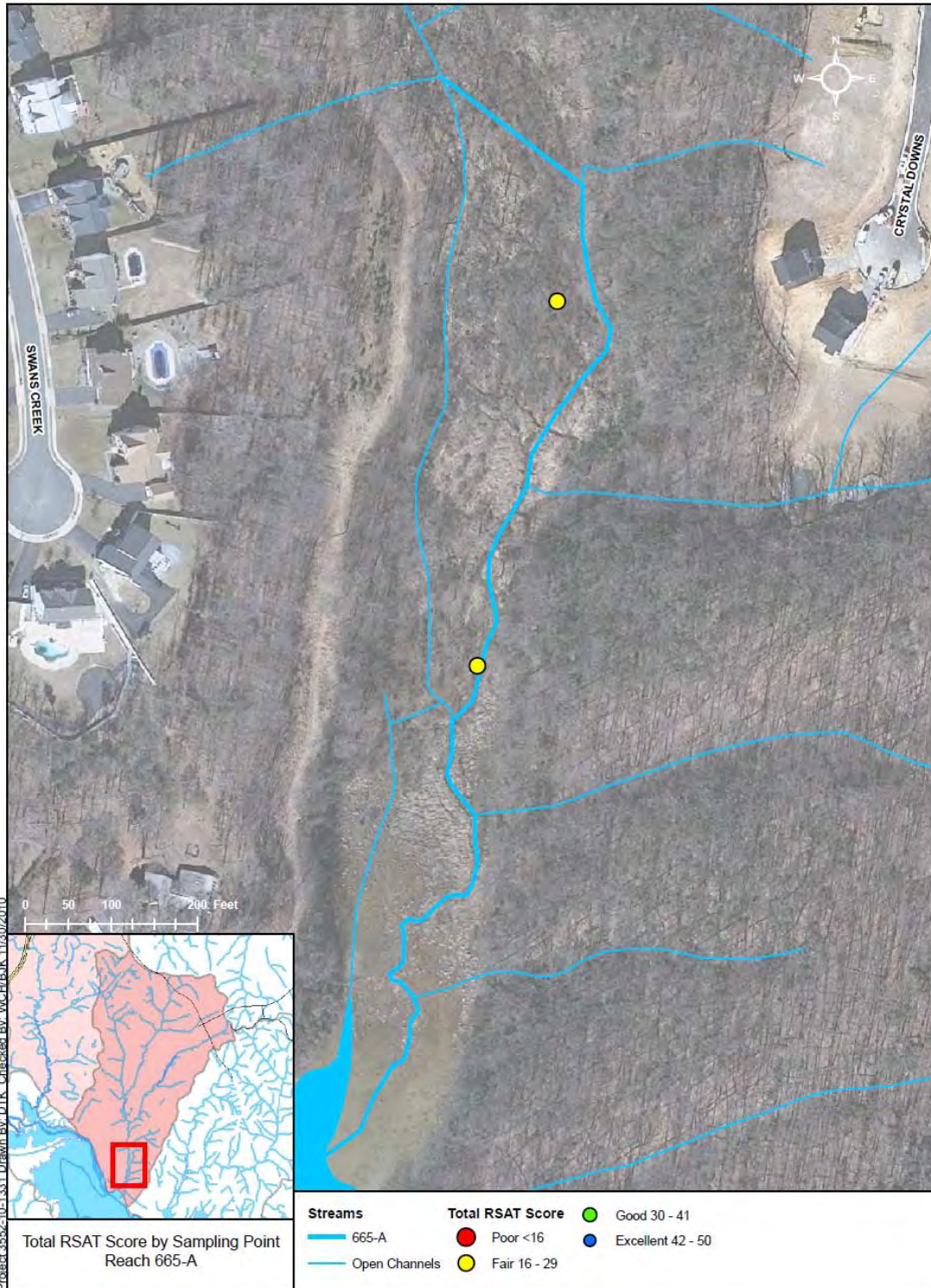
Riparian habitat is in excellent condition, with a wide forested buffer in excess of 200ft on either side of the channel, and canopy cover is dense, providing approximately 80% shading. However, biological indicators are absent along this reach (resulting in a score of 0). Water quality is fair, with a moderate level of substrate fouling (21-50%), increased TDS, and reduced depth of visibility.

Problem Areas:

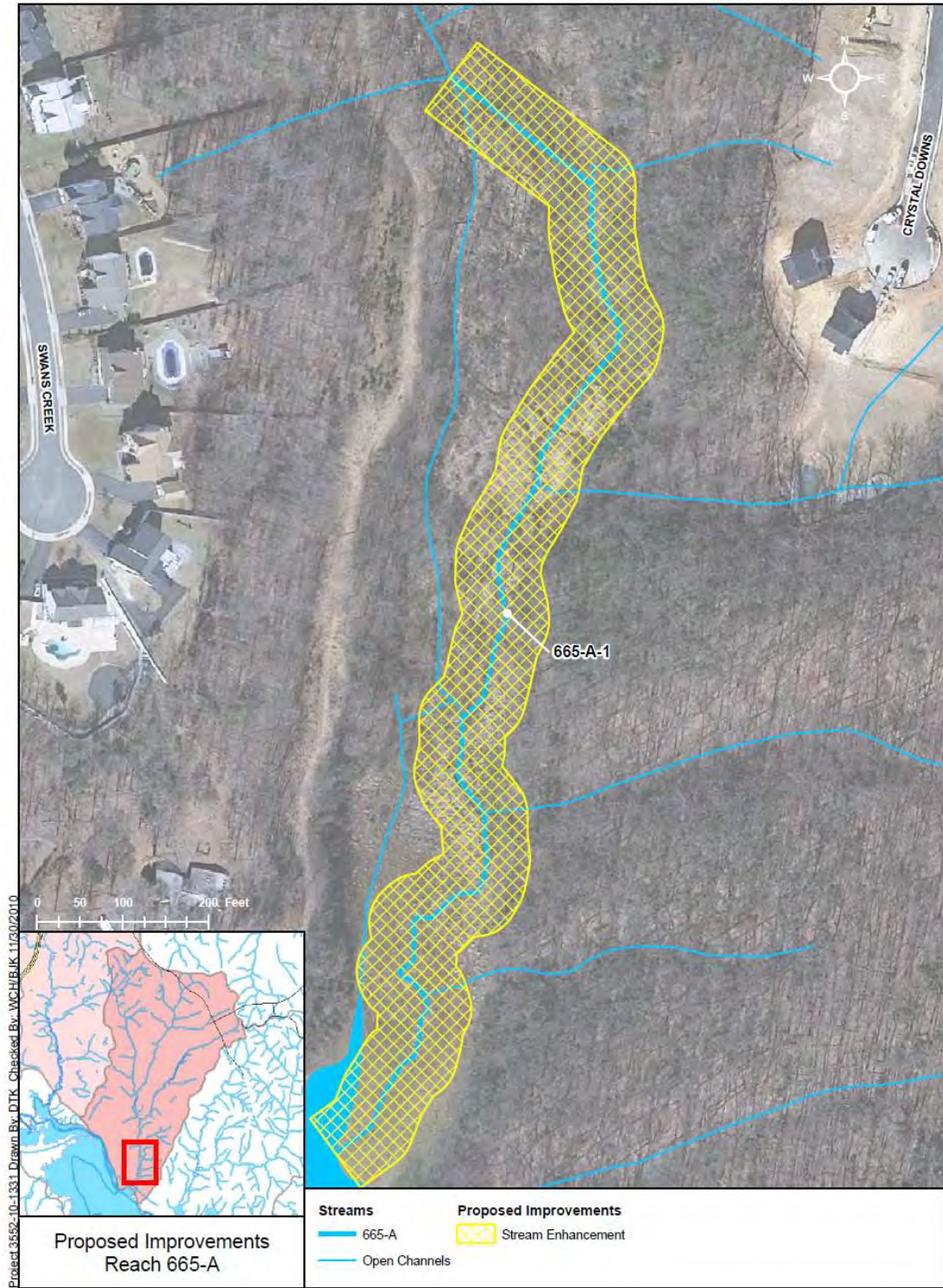
- Moderate channel incision has resulted in streambank erosion, between Swans Creek Lane and Crystal Downs Terrace. The extent and severity of erosion has been limited, due to influence of a wide riparian buffer.

Recommendations:

- Enhance more than 1500ft of degraded stream, between Swans Creek Lane and Crystal Downs Terrace, using fabric and plant bank treatment and up to 5 rock weirs or wing deflectors.



Project 3552-10-133-1 Drawn By: DTK Checked By: WCH/BJK 11/20/2010



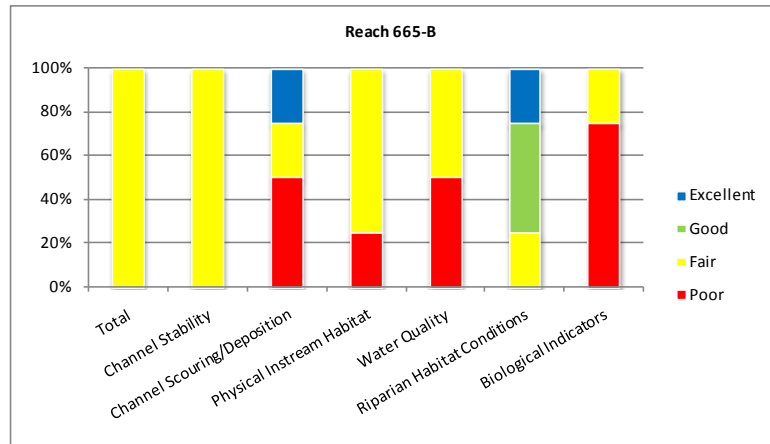
Reach Name: 665-B

Coordinates (NAD 83, Virginia State Plane North):
11826427.47, 6890793.80 to 11825862.93, 6889065.09

Average RSAT Score: 21

General Description:

Reach 665-B is a fair quality stream, with an average total RSAT score of 21. Reach 665-B has good channel stability, with relatively stable streambanks, little bank sloughing or erosion, and resistant bed and bank materials. Channel scouring/deposition and physical instream habitat scores were fair, with an increasing number of depositional features, increased embeddness of riffle material, and few deep pools.



Riparian habitat is in good condition, with a 100ft wide forested buffer providing greater than 60% canopy coverage. Biological indicators are poor, with only a handful of pollution tolerant species found throughout the reach. Water quality is fair, with a moderate level of substrate fouling, increased TDS, and a depth of visibility to approximately 1ft.

Problem Areas:

- Deposition and widening has prompted localized erosion between Desert Palm and Oyster Bay Courts.
 - Sedimentation of an inline basin, east of Oyster Bay Court, has clogged the outlet structure, resulting in a loss of sediment transport competency and capacity to downstream reaches.

Recommendations:

- Purchase, preserve and monitor the existing riparian corridor with a permanent deed restriction or conservation easement, along more than 2400ft of stream, between Desert Palm and Oyster Bay Courts.
 - Remove and dispose of sediment, retrofit existing inline structure with multi-stage outlet, and enhance 200ft of degraded stream east of Oyster Bay Court using fabric and plant bank treatment and 2 rock weirs or wing deflectors.





Reach Name: 665-C

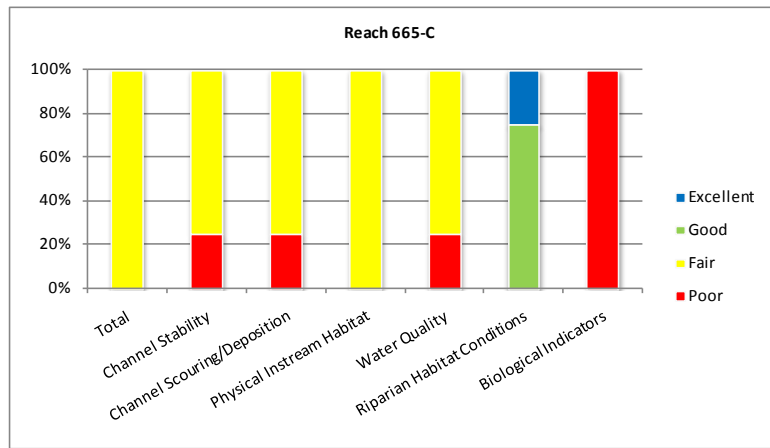
Coordinates (NAD 83, Virginia State Plane North):
11827538.98, 6892250.56 to 11826427.47, 6890793.80

Average RSAT Score: 18

General Description:

Reach 665-C is a fair quality stream, with an average total RSAT score of 18. Channel incision is responsible for low channel stability scores and bed and bank erosion along nearly 50% of the reach. Channel scouring/deposition and physical instream habitat scores were fair, with an increasing number of depositional features, increased embeddness of riffle material, and few pools.

Riparian habitat is in good condition, with a forested buffer of at least 100ft on either side of the channel, and dense canopy cover, providing more than 60% shading. Biological indicators are absent along this reach (resulting in a score of 0), but water quality is fair, with a moderate level of substrate fouling, increased TDS, and a depth of visibility to approximately 1ft.



Problem Areas:

- Moderate channel incision has been slowed by woody debris jams and bank stabilization, provided by the existing riparian forest, between Medford Drive and Avenel Lane.

Recommendations:

- Purchase, preserve and monitor the existing riparian corridor with a permanent deed restriction or conservation easement, along more than 2000ft of stream, between Medford Drive and Avenel Lane.





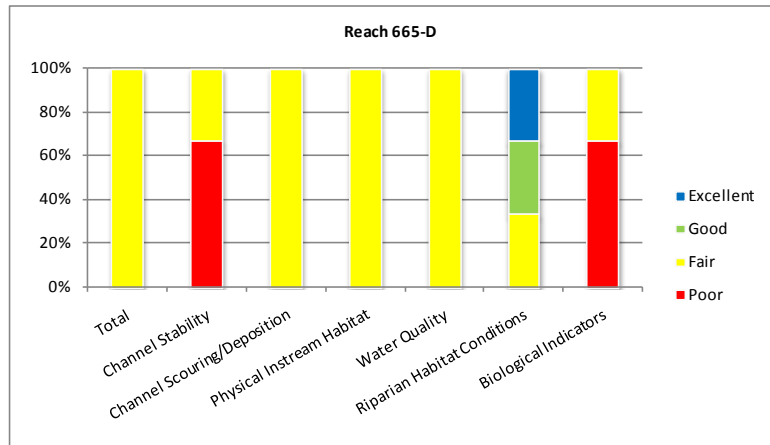
Reach Name: 665-D

Coordinates (NAD 83, Virginia State Plane North):
11825615.90, 6891301.60 to 11825917.76, 6889886.35

Average RSAT Score: 19

General Description:

Reach 665-D is a fair quality stream, with an average total RSAT score of 19. Channel incision and widening is responsible for low channel stability scores and bed and bank erosion along nearly 50% of the reach. Channel scouring/deposition and physical instream habitat scores were fair, with an increasing number of depositional features, increased embeddness of riffle material, and few pools.



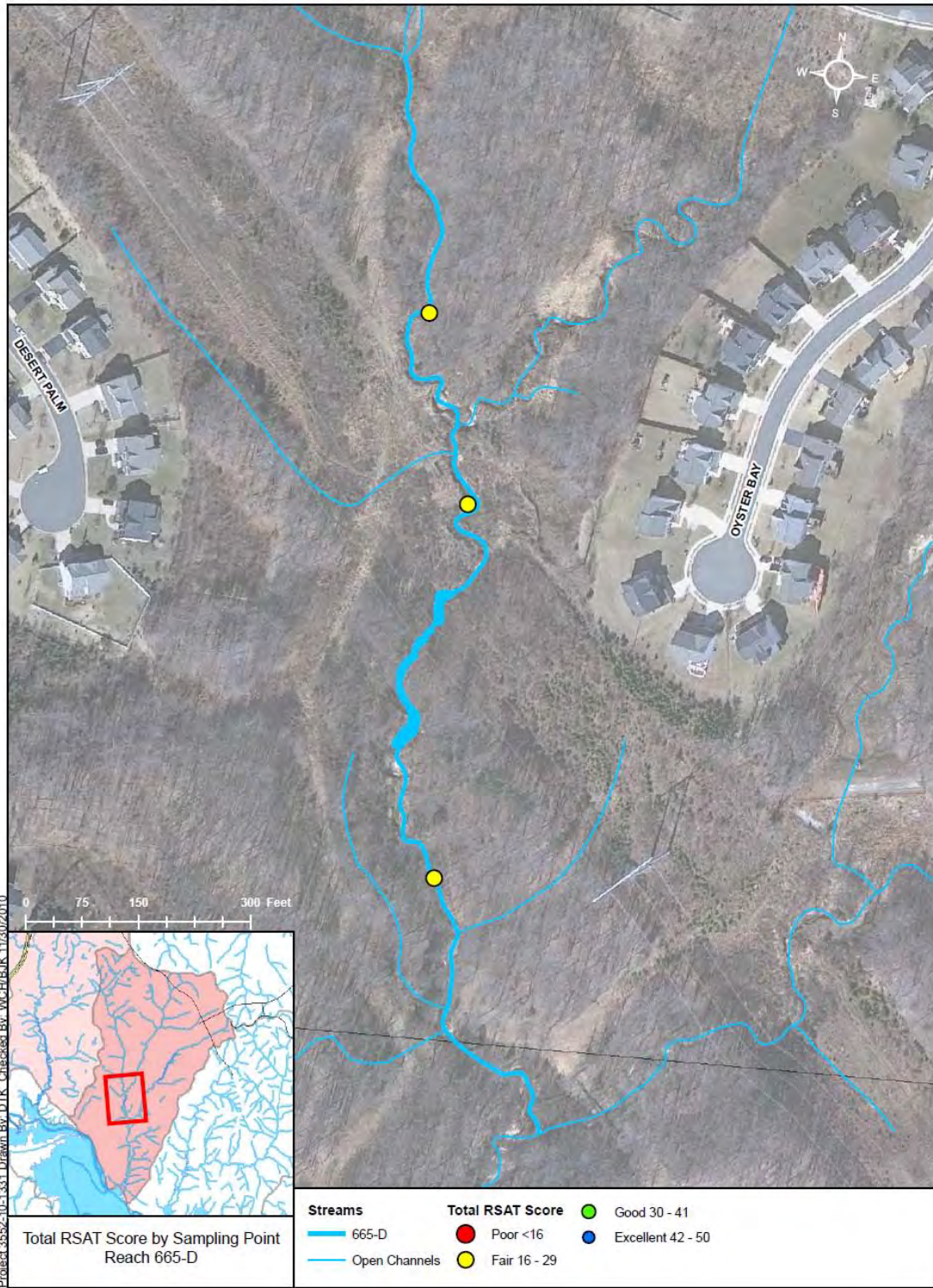
Riparian habitat is in good condition, with a forested buffer of at least 100ft on either side of the channel, and dense canopy cover, providing more than 60% shading. Biological indicators are poor, with only a handful of pollution tolerant species found throughout the reach. Water quality is fair, with a moderate level of substrate fouling, increased TDS, and a depth of visibility to approximately 1ft.

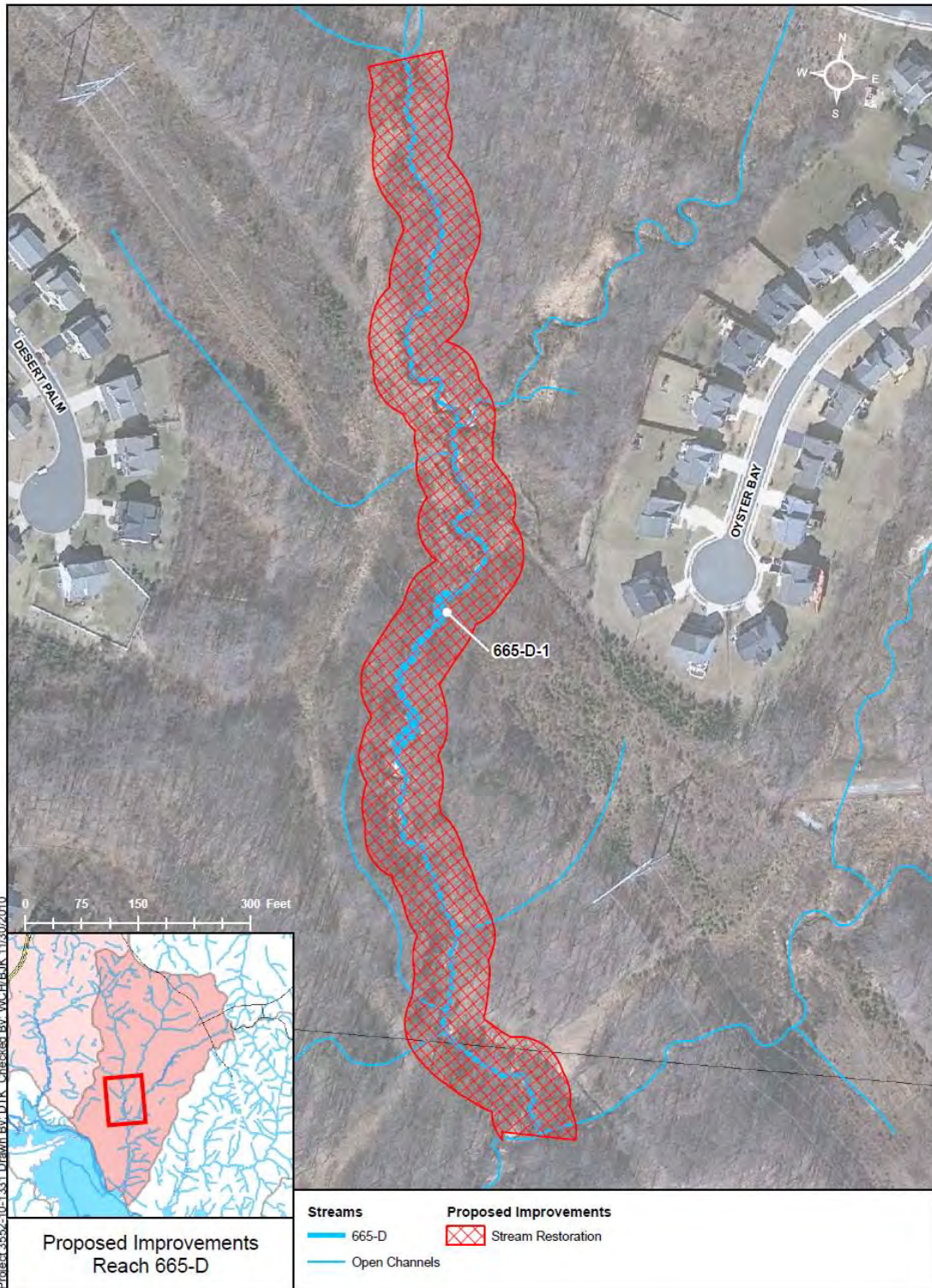
Problem Areas:

- Channel incision and widening, has resulted in systemic streambank erosion, from Medford Drive to the confluence with Reach 665-B.
 - Removal of riparian forest and encroachment on the stream corridor, underneath the power lines, has exacerbated the erosion problems.
 - Channel incision has exposed a previously buried sewer line, approximately 500ft downstream from Medford Drive.

Recommendations:

- Restore more than 1700ft of stream, from Medford Drive to the confluence with Reach 665-B, using fabric and plant bank treatment with live fascines or brush mattress to provide immediate vegetative cover, and up to 5 rock riffles for permanent grade stabilization.





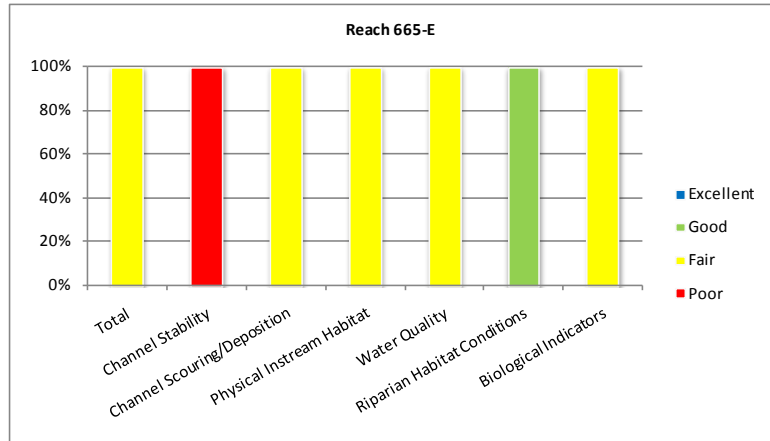
Reach Name: 665-E

Coordinates (NAD 83, Virginia State Plane North):
11825439.59, 6892965.69 to 11825686.75, 6891959.49

Average RSAT Score: 21

General Description:

Reach 665-E is a fair quality stream, with an average total RSAT score of 21. Channel incision is responsible for low channel stability scores and bed and bank erosion along nearly 50% of the reach. Channel scouring/deposition and physical instream habitat scores were fair, with an increasing number of depositional features, increased embeddness of riffle material, and few pools.



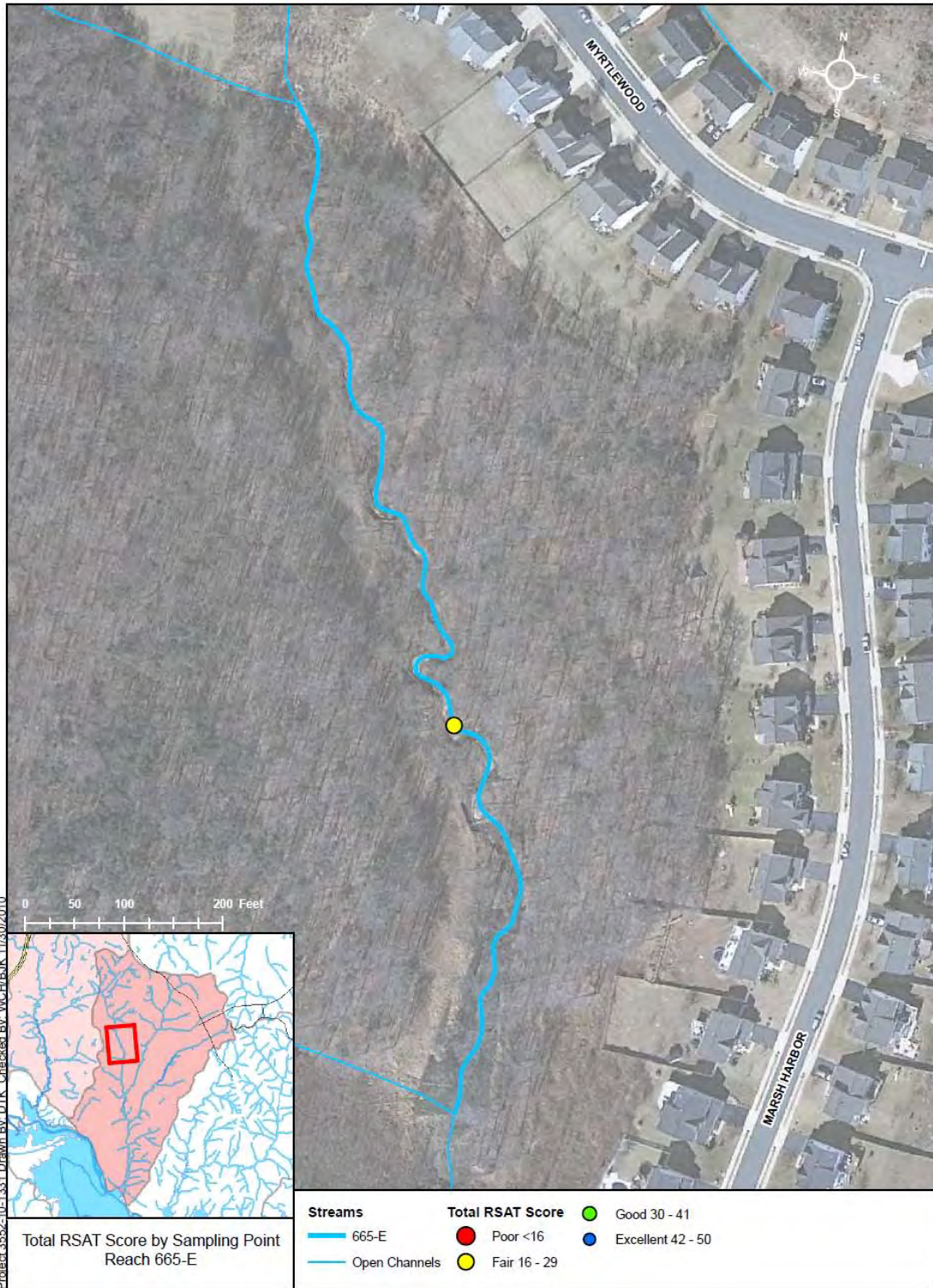
Riparian habitat is in good condition, with a forested buffer of at least 100ft on either side of the channel, and dense canopy cover, providing approximately 75% shading. Biological indicators remain in fair condition, with a number pollution-tolerant species, including caddisflies and midgeflies. Water quality is fair, with a moderate level of substrate fouling, increased TDS, and a depth of visibility no more than 1ft.

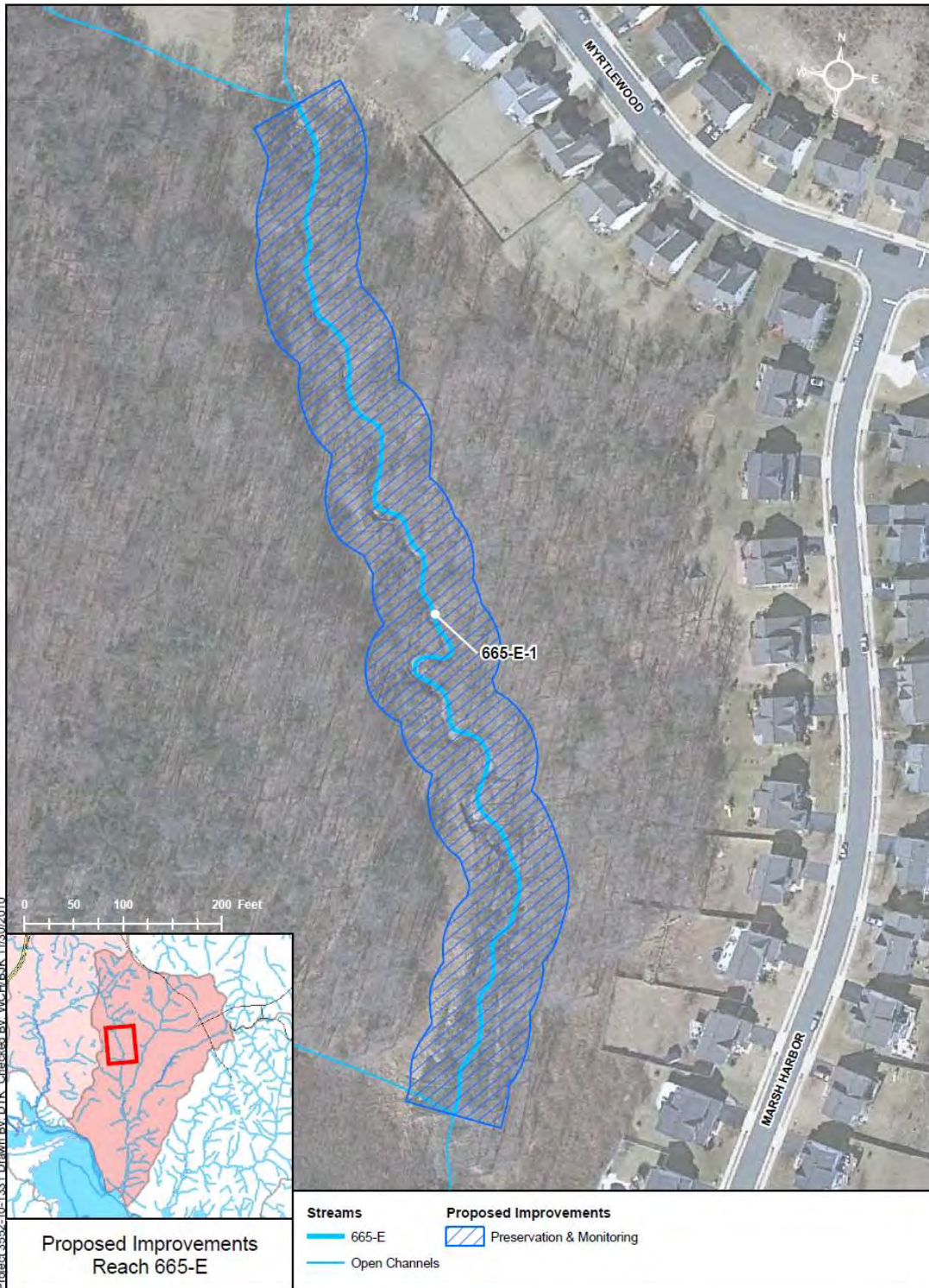
Problem Areas:

- Moderate channel incision has been slowed by woody debris jams and bank stabilization, provided by the existing riparian forest, from Myrtlewood to Medford Drive.

Recommendations:

- Purchase, preserve and monitor the existing riparian corridor with a permanent deed restriction or conservation easement, along 1200ft of stream, from Myrtlewood to Medford Drive.





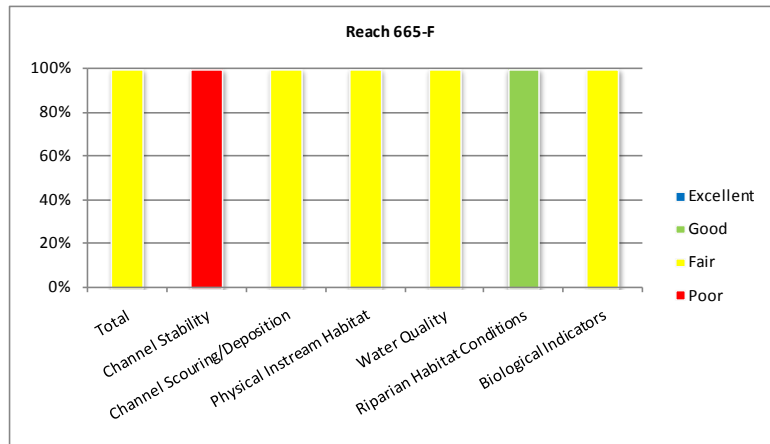
Reach Name: 665-F

Coordinates (NAD 83, Virginia State Plane North):
11826084.60, 6891268.25 to 11825727.04, 6890817.62

Average RSAT Score: 20

General Description:

Reach 665-F is a fair quality stream, with an average total RSAT score of 20. Channel incision and widening is responsible for low channel stability scores and bed and bank erosion along nearly 50% of the reach. Channel scouring/deposition and physical instream habitat scores were fair, with an increasing number of depositional features, increased embeddness of riffle material, and few pools.



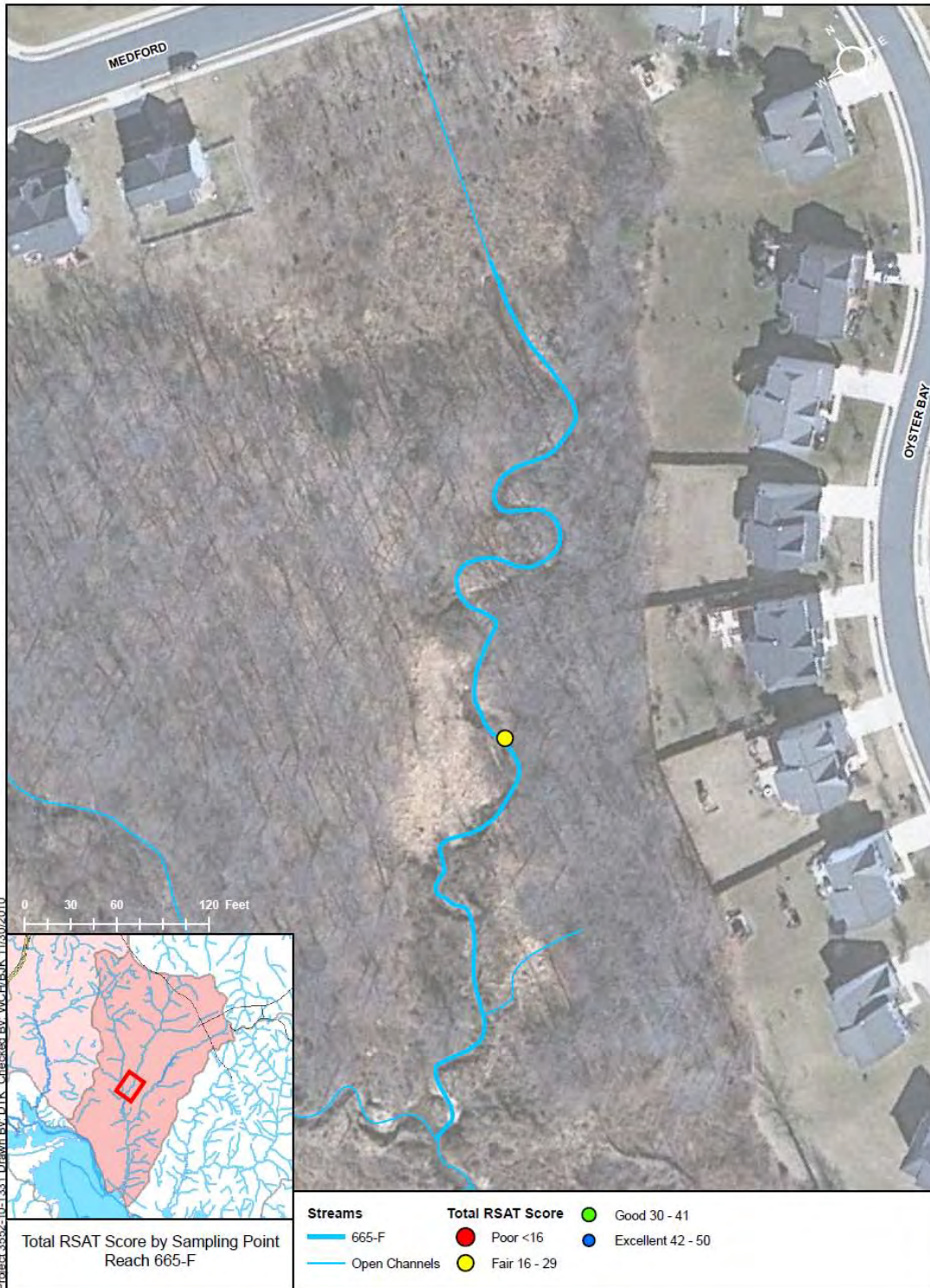
Riparian habitat is in good condition, with a forested buffer of at least 100ft on either side of the channel, and dense canopy cover, providing approximately 75% shading. Biological indicators are absent along this reach (resulting in a score of 0), but water quality is fair, with a moderate level of substrate fouling, increased TDS, and a depth of visibility to approximately 1ft.

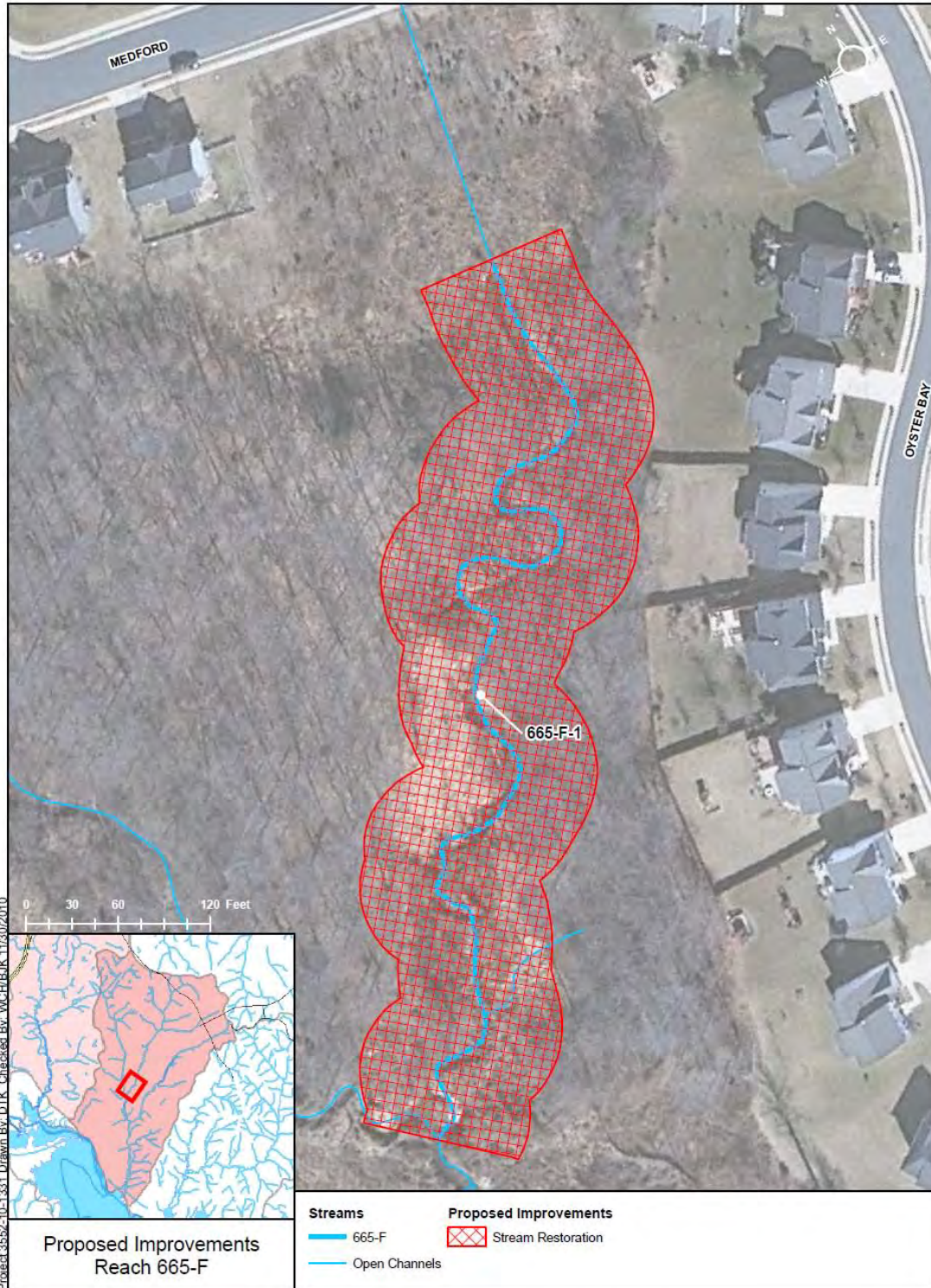
Problem Areas:

- Channel incision has resulted in systemic streambank erosion, downstream from Medford Drive to the confluence with Reach 665-D.

Recommendations:

- Restore 800ft of stream, from Medford to the confluence with Reach 665-D, using fabric and plant bank treatment with rock toe to stabilize eroding streambanks, and 2 rock riffles for permanent grade stabilization.





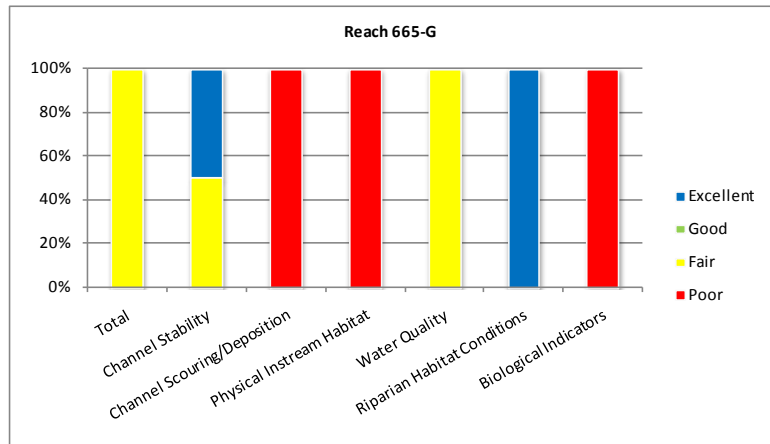
Reach Name: 665-G

Coordinates (NAD 83, Virginia State Plane North):
11826556.02, 6892575.31 to 11826178.21, 6891604.06

Average RSAT Score: 20

General Description:

Reach 665-G is a fair quality stream, with an average total RSAT score of 20. Reach 665-G has good channel stability, with relatively stable streambanks, little bank sloughing or erosion, and resistant bed and bank materials. However, channel scouring/deposition and physical instream habitat scores were poor, with a significant increase in deposition, sand and sediment bars, nearly 75% embeddness of riffle material, and a lack of pool habitat.



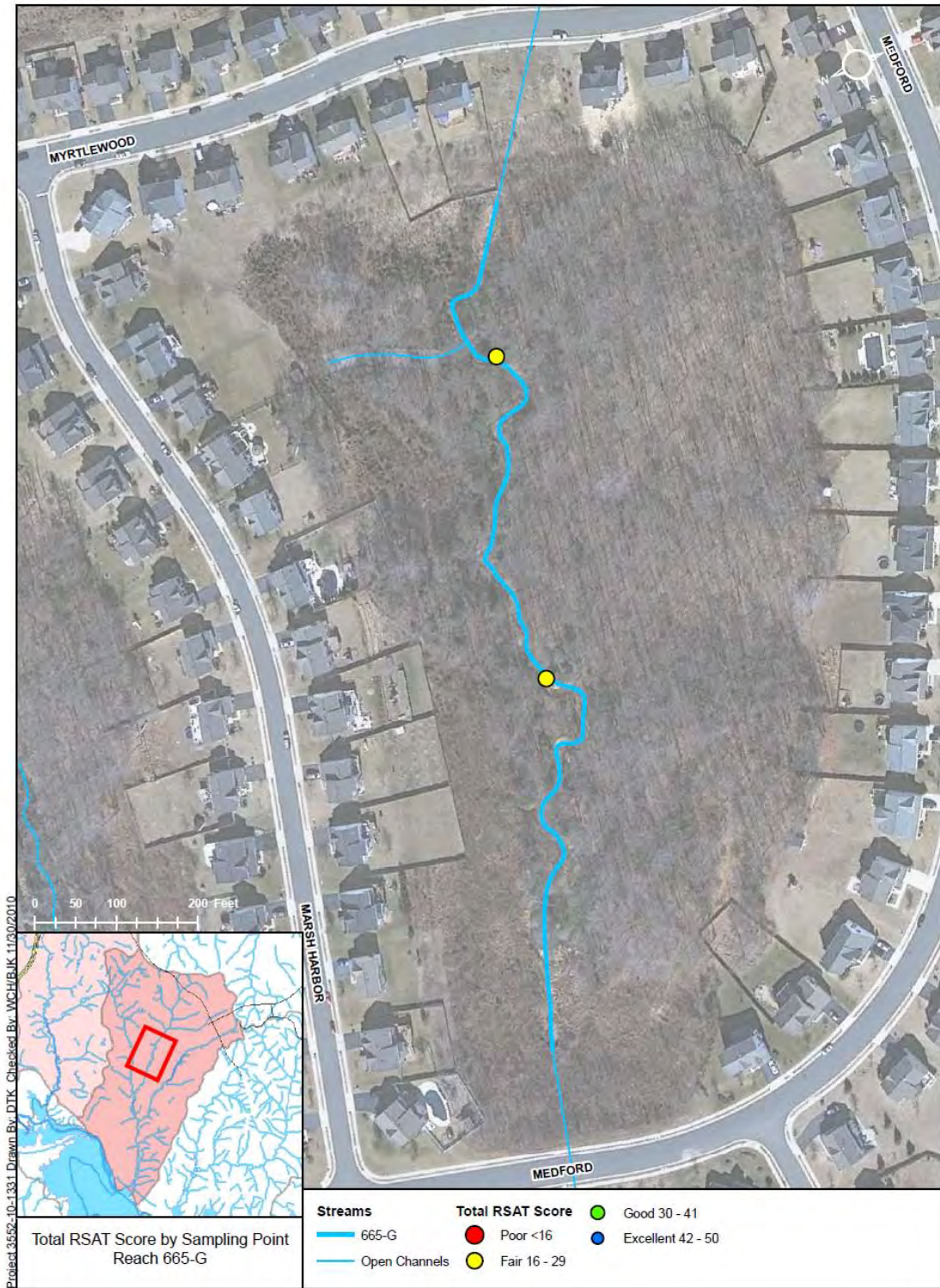
Riparian habitat is in good condition, with a 100ft wide forested buffer providing greater than 60% canopy coverage. However, biological indicators are absent along this reach (resulting in a score of 0). Water quality is fair, with a moderate level of substrate fouling, increased TDS, and a depth of visibility to approximately 1ft.

Problem Areas:

- Channel widening and subsequent deposition of silt and sediment has resulted in localized bank erosion and mass wasting, between Myrtlewood to Medford Drives.

Recommendations:

- Purchase, preserve and monitor the existing riparian corridor with a permanent deed restriction or conservation easement, along more than 1230ft of stream, between Myrtlewood to Medford Drives.





Reach Name: 665-H

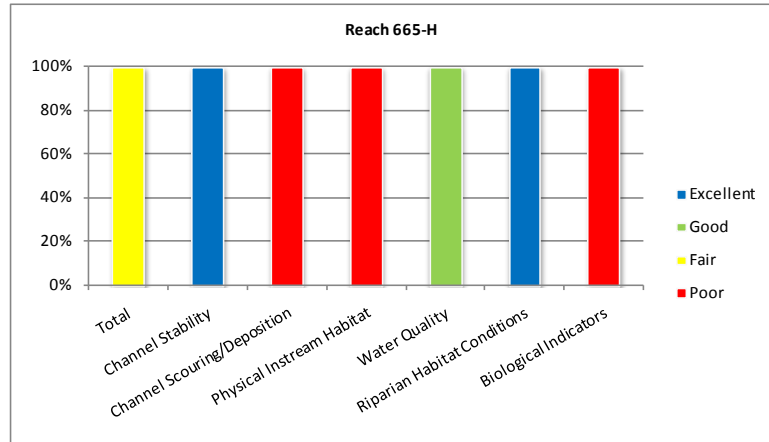
Coordinates (NAD 83, Virginia State Plane North):

11827021.48, 6893573.08 to 11826851.80, 6892960.46

Average RSAT Score: 25

General Description:

Reach 665-H is a fair quality stream, with an average total RSAT score of 25. Reach 665-H has excellent channel stability, with stable streambanks, a lack of bank erosion, and resistant bed and bank materials. However, channel scouring/deposition and physical instream habitat scores were poor, with a significant increase in deposition, sand and sediment bars, nearly 75% embeddness of riffle material, and a lack of pool habitat.



Riparian habitat is in good condition, with a 100ft wide forested buffer providing approximately 75% canopy coverage. However, biological indicators are absent along this reach (resulting in a score of 0). Water quality is good, with only light substrate fouling, moderate TDS, and a depth of visibility to approximately 2ft.

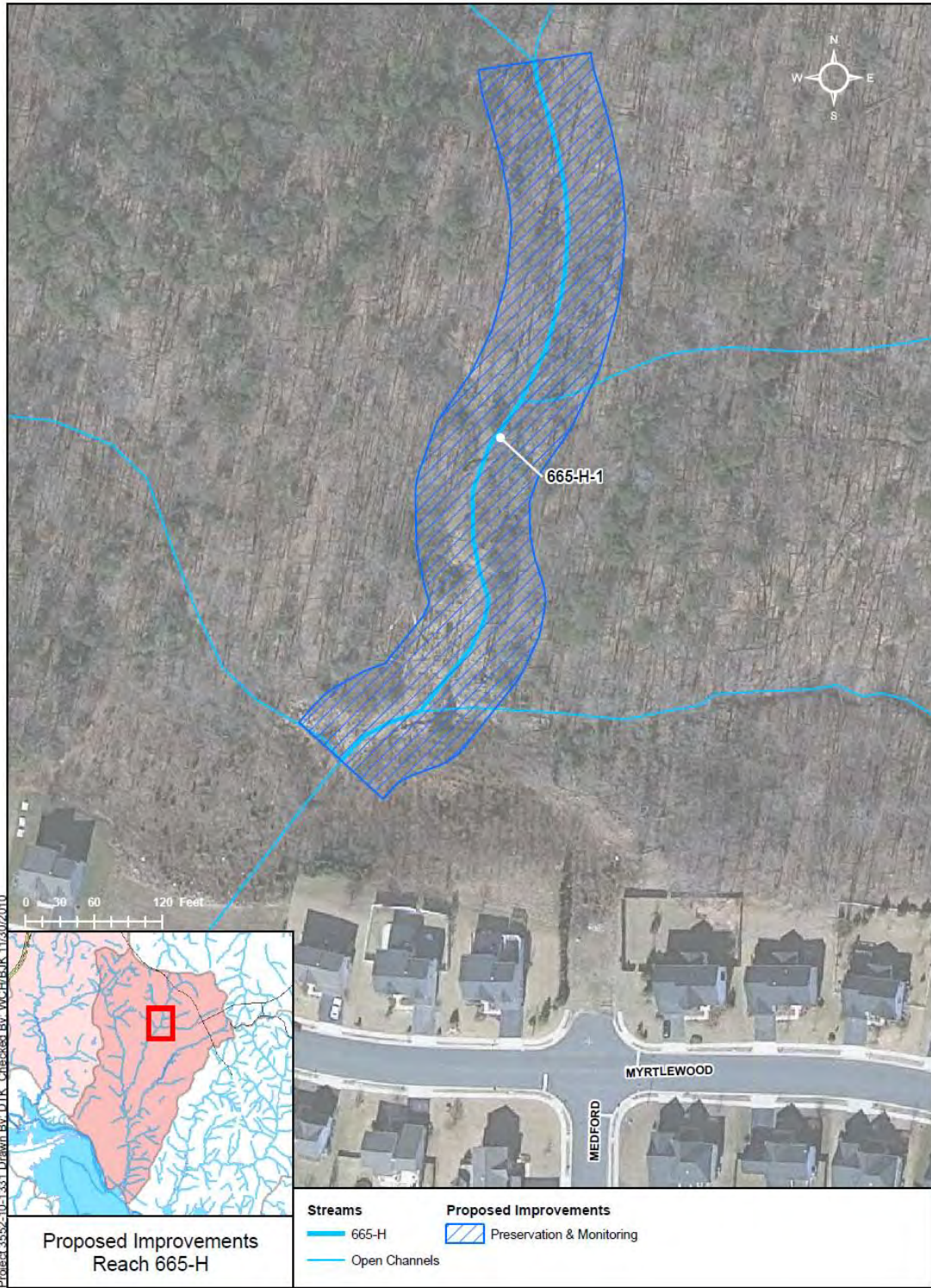
Problem Areas:

- Channel widening and deposition of sediment, upstream of Myrtlewood Drive, has resulted in localized bank erosion.

Recommendations:

- Purchase, preserve and monitor the existing riparian corridor with a permanent deed restriction or conservation easement, along 700ft of stream, upstream of Myrtlewood Drive.





Reach Name: 665-I

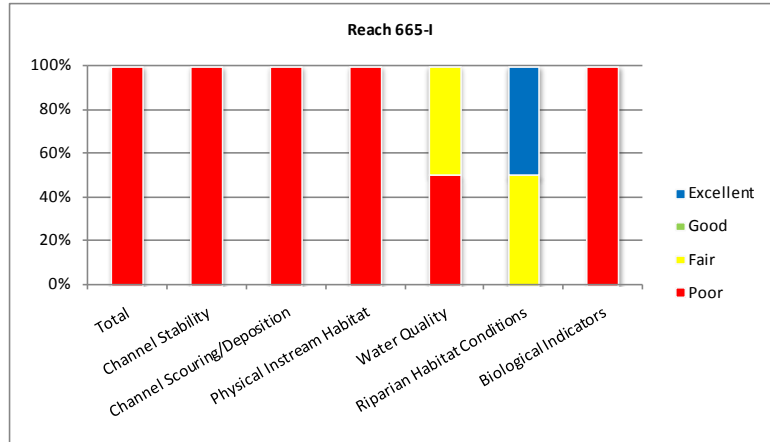
Coordinates (NAD 83, Virginia State Plane North):

11826523.69, 6894458.21 to 11827021.47, 6893573.15

Average RSAT Score: 9

General Description:

Reach 665-I is a poor quality stream, with an average total RSAT score of only 9. The low score is due to systemic channel erosion, coupled with large amounts of sand and sediment deposition in the lower portion of the reach, and no available biological indicators. Channel stability along Reach 665-I had an average score of 1, with more than 75% of the streambanks experiencing sloughing or scour, undercut streambanks, and frequent tree falls. Channel scouring/deposition and physical instream habitat scores were poor, with a dramatic increase in depositional features in the lower portion of the reach, nearly 75% embeddness of riffle material, and minimal pool habitat.



Channel scouring/deposition and physical instream habitat scores were poor, with a dramatic increase in depositional features in the lower portion of the reach, nearly 75% embeddness of riffle material, and minimal pool habitat.

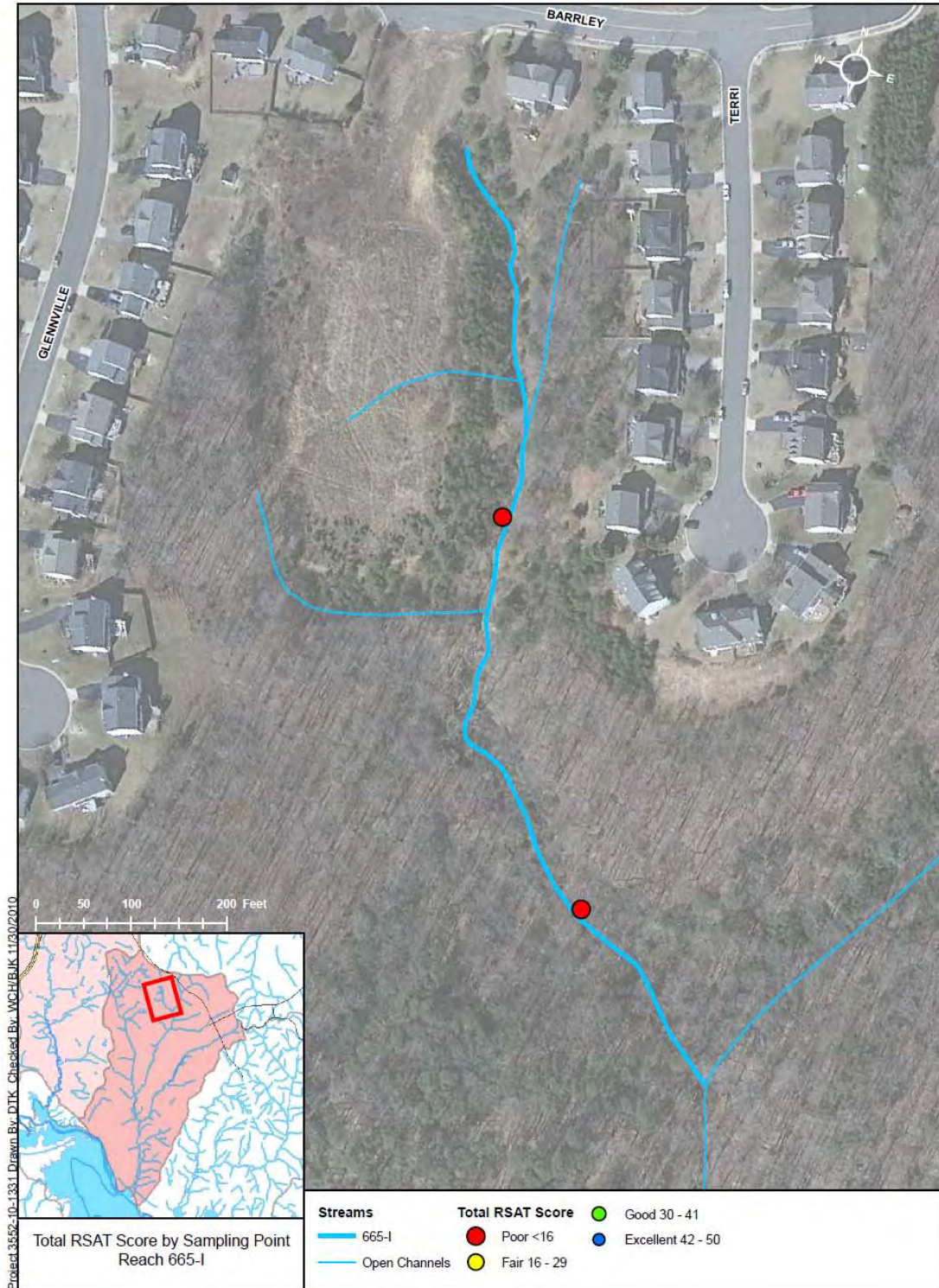
Riparian habitat is in good condition, with a predominantly 100ft wide wooded corridor. Biological indicators are absent along this reach (resulting in a score of 0). Water quality is poor, with a high level of substrate fouling, increased TDS, and a depth of visibility no more than 1ft.

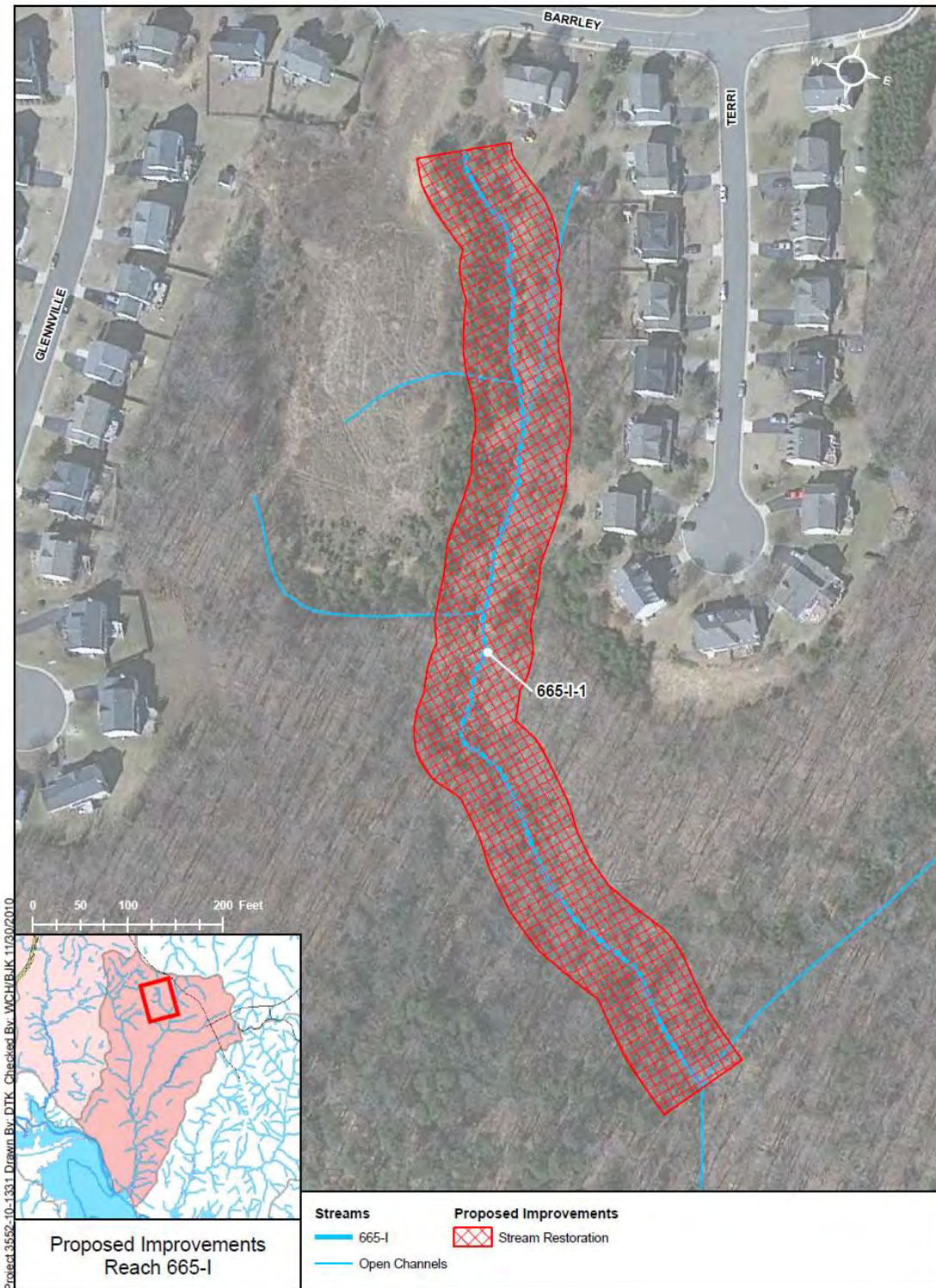
Problem Areas:

- Severe channel incision has resulted in systemic erosion, mass wasting, and imminent loss of property along the *Swan’s Creek Reach*, downstream of Barrley Drive to the confluence with Reach 665-H. Near-vertical, eroded banks stand approximately 12ft high, posing a significant risk to public safety.

Recommendations:

- Restore 1100ft of stream, along the *Swan’s Creek Reach*, downstream of Barrley Drive to the confluence with Reach 665-H, using fabric and plant bank treatment with rock toe to stabilize eroding streambanks, and up to 3 rock riffles for permanent grade stabilization.





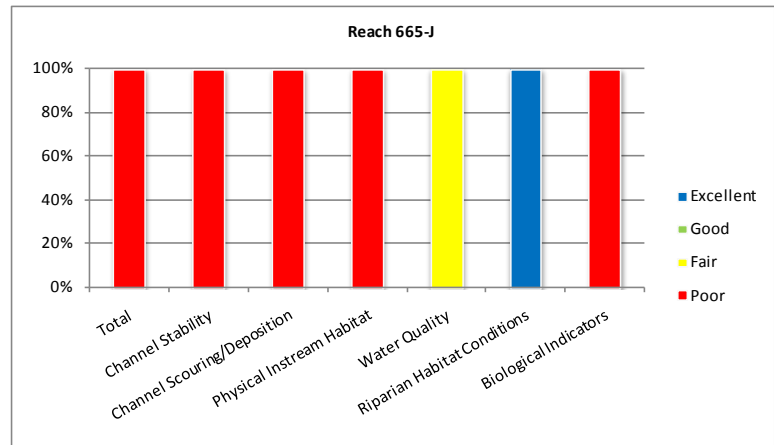
Reach Name: 665-J

Coordinates (NAD 83, Virginia State Plane North):
11828099.19, 6893091.61 to 11826919.44, 6893003.02

Average RSAT Score: 14

General Description:

Reach 665-J is a poor quality stream, nearly identical in condition to Reach 665-I, with an average total RSAT score of only 14. The low score is due to systemic channel erosion, large amounts of sand and sediment deposition in the lower portion of the reach, and no available biological indicators. Channel stability along Reach 665-J had an average score of 1, with more than 75% of the streambanks



experiencing sloughing or scour, undercut streambanks, and frequent tree falls. Bank erosion is particularly severe on the outside of bends, in areas where riparian vegetation is sparse, and alongside freshly deposited sand bars. Channel scouring/deposition and physical instream habitat scores were poor, with a dramatic increase in depositional features in the lower portion of the reach, nearly 75% embeddness of riffle material, and minimal pool habitat.

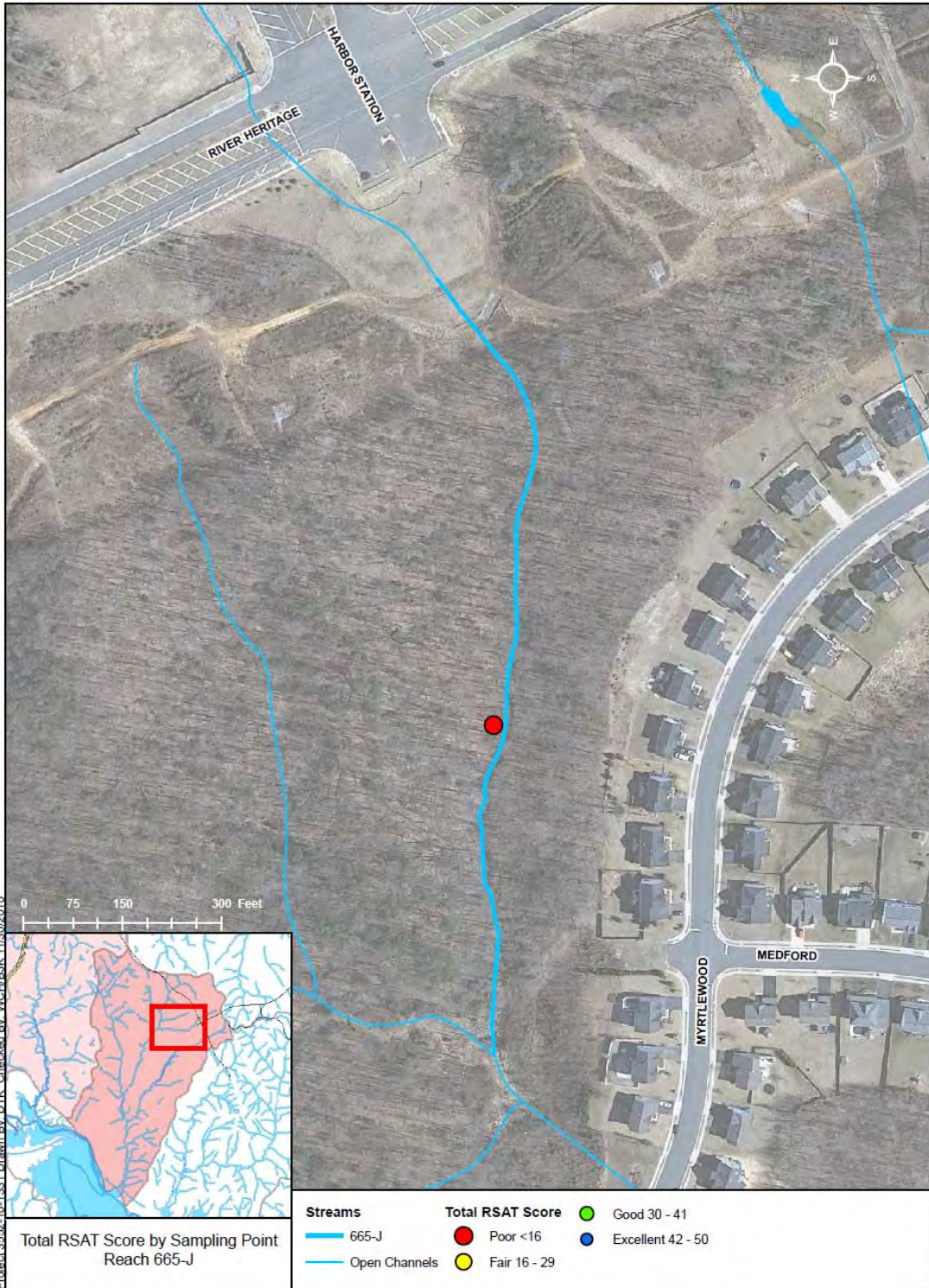
Riparian habitat is in good condition, with a predominantly 100ft wide wooded corridor. Biological indicators are absent along this reach (resulting in a score of 0). Water quality is fair, with a moderate level of substrate fouling, increased TDS, and a depth of visibility of approximately 1.5ft.

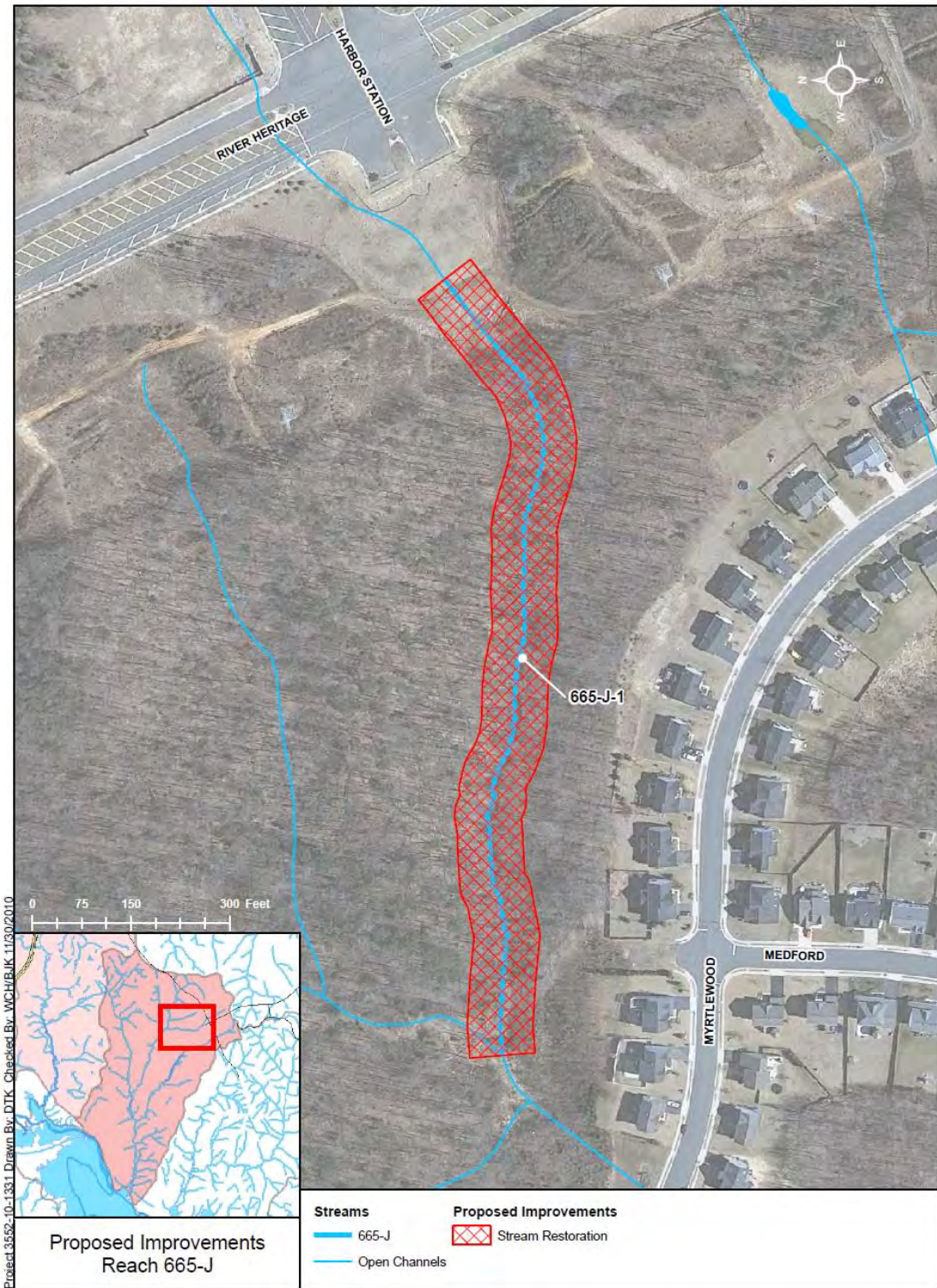
Problem Areas:

- Severe channel incision, from River Heritage Boulevard to the confluence with Reach 665-H, has resulted in systemic erosion and loss of property.

Recommendations:

- Restore approximately 1250ft of stream, from River Heritage Boulevard to the confluence with Reach 665-H, using fabric and plant bank treatment with rock toe to stabilize eroding streambanks, and up to 3 rock riffles for permanent grade stabilization.





Basin 690, Lower Little Creek - Project Reach Descriptions

Reach Name: 690-A

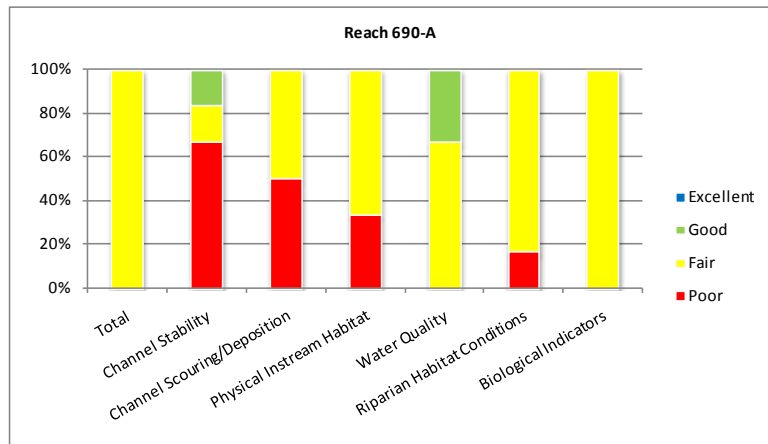
Coordinates (NAD 83, Virginia State Plane North):
11823030.51, 6878665.26 to 11827315.24, 6877563.49

Average RSAT Score: 19

General Description:

Reach 690-A is a fair quality stream, with an average total score of 19. Channel stability scores along Reach 690-A are influenced significantly by systemic channel widening, with approximately 50% of the streambanks experiencing sloughing or scour. Bank erosion is particularly severe on the outside of bends, in areas where riparian vegetation is sparse, and alongside sand and gravel point bars. Channel scouring/deposition and physical instream habitat scores were fair, with an increasing number of depositional features, increased embeddness of riffle material, few deep pools and a shallow riffle and run dominated morphology.

Riparian habitat is in fair condition, with only a narrow band of trees and woody vegetation through the golf course, and only 50% canopy coverage. Despite the level of channel degradation, biological indicators remain in fair condition, with a number pollution-tolerant species, including caddisflies and midgeflies. Water quality is fair, with a moderate level of substrate fouling, increased TDS, and a depth of visibility no more than 1ft.

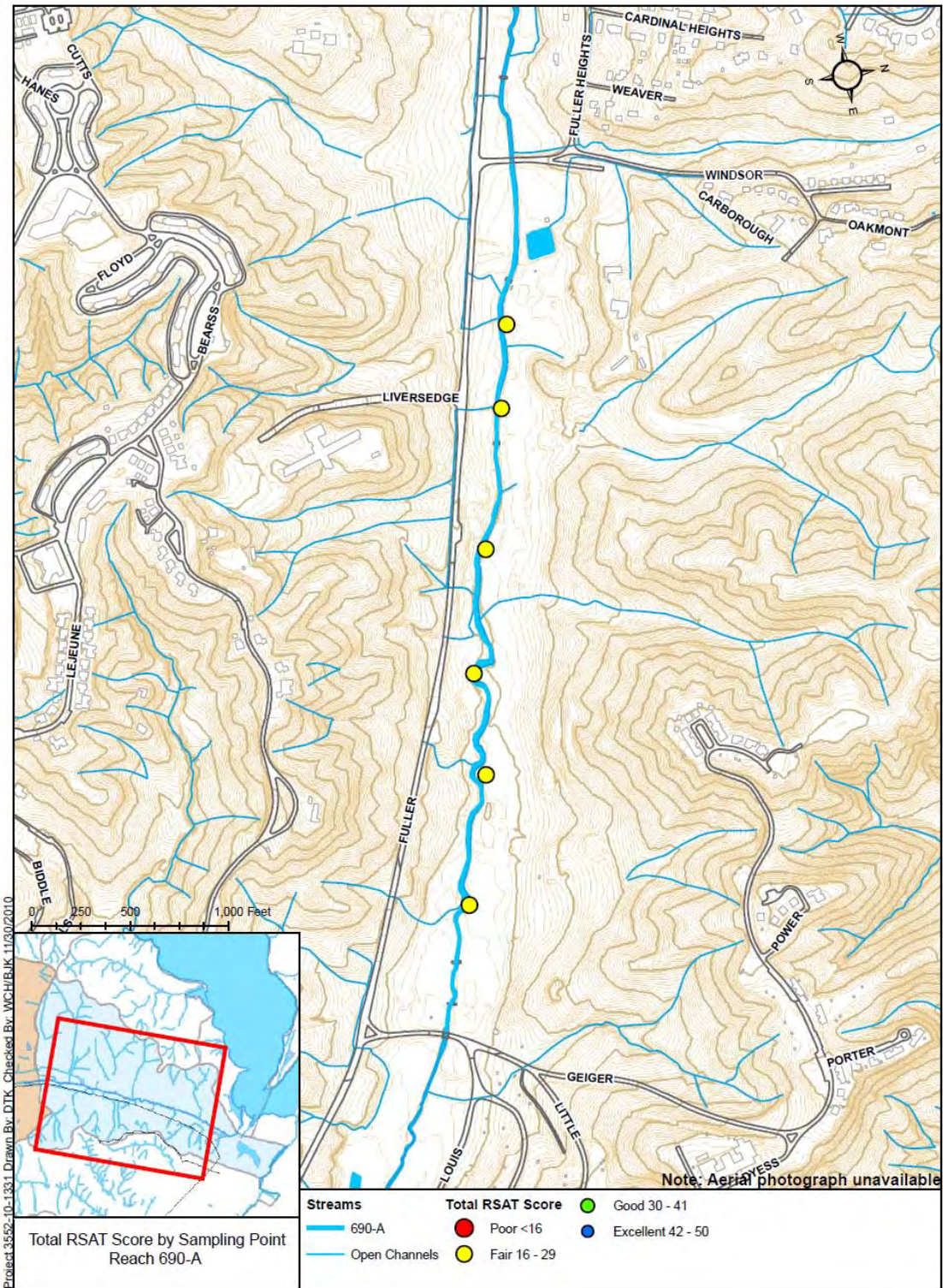


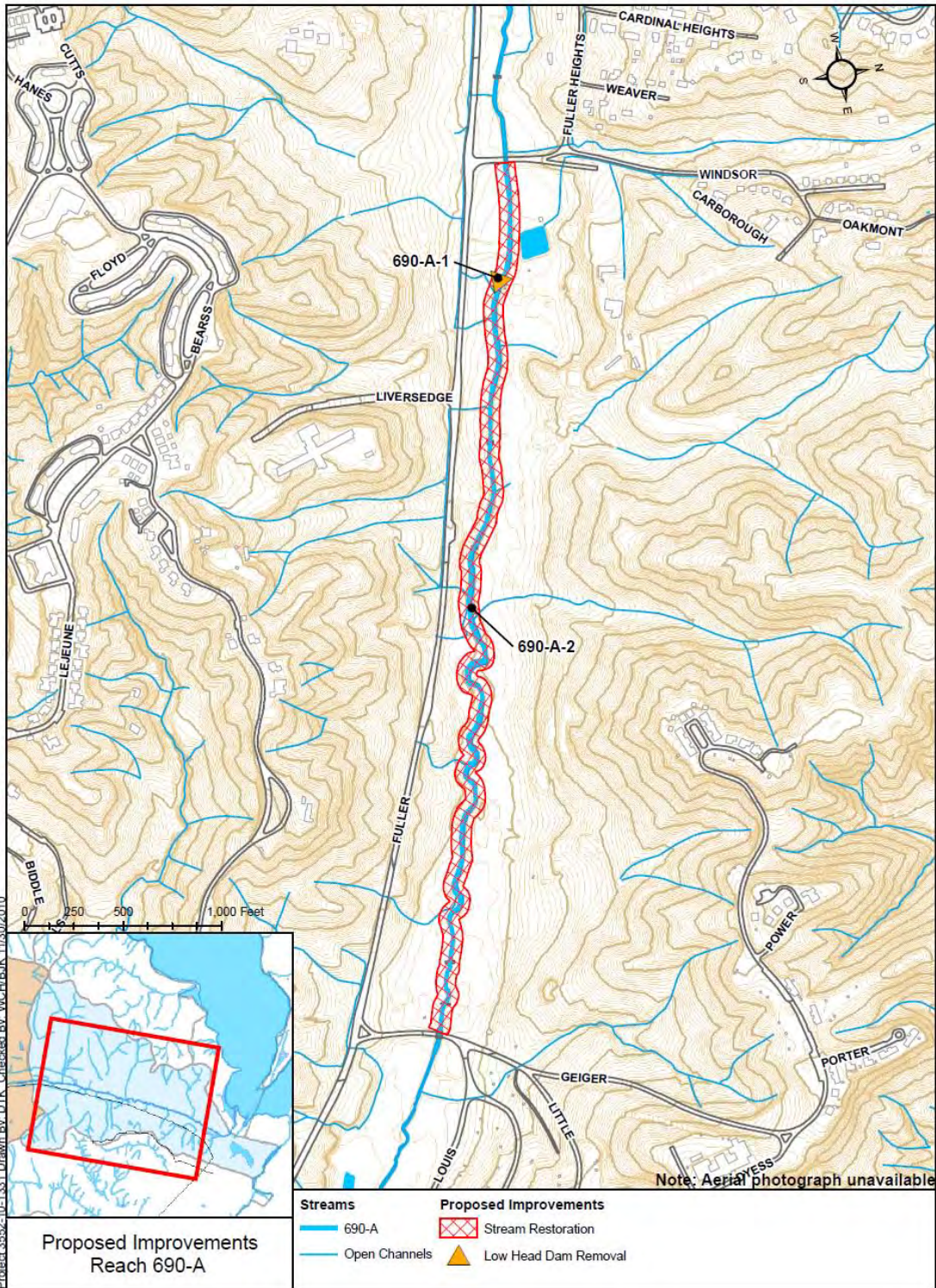
Problem Areas:

- Active channel widening, coupled with the loss of a riparian buffer zone and continued removal of woody vegetation (associated with golf course maintenance), has resulted in systemic streambank erosion from Windsor Road to Geiger Road.
 - A low head dam on the Medal of Honor Golf Course, near the intersection of Fuller Heights and Windsor Road, has impaired sediment transport, thereby exacerbating deposition and channel widening upstream of the dam.

Recommendations:

- Restore approximately 4750ft of stream, from Windsor Road to Geiger Road, using fabric and plant bank treatment, rock toe, and gravel wraps to stabilize eroding streambanks, and up to 12 rock riffles for permanent grade stabilization.
 - Remove the low head dam at the Medal of Honor Golf Course, restore up to 100ft of streambank using fabric and plant bank treatment and 2 rock weirs or wing deflectors to restore sediment transport competency and to alleviate deposition and widening upstream.





Project 3556-10-1331 Drawn By: DTK Checked By: WCH/BJK 1/10/2010