

DATE: 10-13-05

Long Road near Georges Creek Stormwater, Sanitary and Water Study

October 2005

Prepared for:

City of Pickerington, Ohio

Prepared by:

**Hartman Engineering
150 South Parkway Drive
Delaware, Ohio 43015
and**

**W.E. Stilson Consulting Group
355 E. Campus View Boulevard, Suite 250
Columbus, Ohio 43235**

RECORD OF ORDINANCES

Ordinance No. 2005-87

Passed December 6, 2005

AN ORDINANCE ADOPTING THE LONG ROAD NEAR GEORGES CREEK STORMWATER, SANITARY, AND WATER STUDY PREPARED BY HARTMAN ENGINEERING

WHEREAS: Service Committee requested Hartman Engineering expand the Long Road near Georges Creek Stormwater Study prepared in August 2004 to include additional storm sewers further east along Long Road; and

WHEREAS: Service Committee further requested Hartman Engineering prepare a design memorandum as required by the Corps of Engineers in order to potentially acquire funds through Section 594 for improvements along Long Road; and

WHEREAS: Service Committee, at their October 13, 2005, regular meeting recommended Council adopt the Long Road near Georges Creek Stormwater, Sanitary, and Water Study prepared by Hartman Engineering.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF PICKERINGTON, FAIRFIELD-FRANKLIN COUNTIES, OHIO A MAJORITY OF ITS MEMBERS CONCURRING:

SECTION 1: Council hereby adopts the Long Road near Georges Creek Stormwater, Sanitary, and Water Study, dated October 2005

SECTION 2: This ordinance shall become effective at the earliest period authorized by law.

APPROVED BY: 

David Shaver, Mayor


DATE OF APPROVAL: December 6, 2005

EFFECTIVE DATE: January 5, 2006

ATTEST: 
Lynda D. Yartin, Municipal Clerk

SPONSOR: HACKWORTH

APPROVED AS TO FORM
& LEGALITY OF PURPOSE:


Philip K. Hartmann, Interim Law Director

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**Long Road near Georges Creek
Stormwater, Sanitary, and Water Study**

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Long Road near Georges Creek Stormwater, Sanitary, and Water Study

1.0 Introduction

Hartman Engineering was authorized in July 2005 by the City of Pickerington to perform a stormwater, sanitary and water study for residential areas along Long Road near Georges Creek that have experienced ongoing flooding problems and do not currently have access to public water supply or sanitary treatment facilities. The study area extended from the west Pickerington corporate boundary near Georges Creek to approximately 3000 feet east of Georges Creek.

The purpose of the stormwater portion of this study was to analyze the storm runoff to the study area along Long Road, determine the reasons for the flooding, and make recommendations to alleviate these flooding problems. The purpose of the sanitary and water portion of the study was to determine the size and location of the water distribution lines and sanitary sewers required to service the existing residential area as well as areas that would potentially be serviced by the extension of water and sewer facilities to the existing residential area.

W.E. Stilson Consulting Group of Columbus, Ohio assisted Hartman Engineering in performing the water and sanitary portion of the study.

A description of the existing conditions, proposed recommendations to improve the flooding conditions and provide water and sanitary facilities to the service area, and construction cost estimates for the recommended improvements are summarized in the following paragraphs. The cost estimates include the design and construction costs and also the cost of obtaining required easements.

2.0 Existing Conditions.

2.1 General.

The Ohio Utilities Protection Service was contacted to locate existing utilities, and field survey data were obtained along Long Road to verify existing storm drainage structures and tributary areas to the various structures. A field reconnaissance was made to note existing conditions, and aerial mapping and GIS data were also obtained from the City of Pickerington, Franklin County, Fairfield County, and the Columbus and Franklin County Metro Parks to help define tributary areas for the storm sewer system, and to define existing and future service areas for the water and sanitary facilities.

There are currently overhead fiber optic, power, and cable lines located on the north side of Long Road in the eastern portion of the study area and along the south side of Long Road from near the Fairfield County/Franklin County to the west corporation boundary. An underground telephone line is also located on the south side of the road throughout the entire study area.

The land within the Long Road study area currently consists of residential property, farmland, wetlands and open space. The area south of Long Road and east of the Franklin County/Fairfield County line was recently developed by the Columbus and Franklin County Metropolitan Park District into a wetlands area as a Department of Agriculture, Natural Resources Conservation Service, Wetland Reserve Program (WRP) project. General existing land use in the area is shown on the portion of the City of Pickerington Existing Land Use Map on Sheet 1 in the Appendix.

2.2 Stormwater Issues.

Drainage problems exist at nearly all residential properties along Long Road in the study area, but only the areas that have the most significant flooding problems are described in the following paragraphs.

Significant flooding occurs in the front lawn area at 8173 Long Road and the front lawn area immediately north and across Long Road at 8200 Long Road. As shown on Sheet 3 in the Appendix, existing catch basins are located in these lawn areas and a 10" tile extends from the north catch basin at 8200 Long Road to Georges Creek. This tile is undersized for the overall associated tributary area, which is approximately 59.5 acres, as shown on Sheet 3. Thus runoff to these catch basins that exceeds the capacity of the 10" storm sewer ponds in the adjacent lawn areas. At times the level of ponding at 8173 Long Road is such that some of the runoff flows to the south between 8173 and 8165 Long Road instead of to the north as it does during less severe storm events. The sanitary leach field for 8173 Long Road is located in the front lawn area and the flooding in this area impacts the operation of the leach field.

Ponding also occurs in the front lawn areas of 8195 and 8201 Long Road. This ponding results from inadequately sized drainage ditches and drive pipes in these areas, as well as undersized drive pipes at 8173 Long Road and at the vacant lot just east of 8173 Long Road.

Another area of significant flooding is at 8325 Long Road. The tributary area to this location under normal conditions includes approximately 19.3 acres along the south side of Long Road. At times, however, during severe storm events, runoff from the 9.2 acre tributary area north of Long Road exceeds the capacity of the existing drainage ditches and storm sewer pipe along the north side of Long Road and runoff crosses the road to the south side and flows to the west toward 8325 Long Road. Due to the topography of the land at 8301 Long Road, the first property downstream of 8325 Long Road, nearly all runoff from the above tributary area is directed to the roadside ditch. Inadequately sized ditches and downstream culvert or drive pipe restrictions limit the discharge in the ditch and thus ponding occurs upstream in adjacent low areas, which is primarily the lawn area of 8325 Long Road.

As noted above, another problem area is in the lawn areas of 9906, 10950, 10970, and 10990 Long Road. Runoff that exceeds the capacity of the roadside ditches ponds in the lawn areas of these residences and then flows over Long Road to the south. Some of the runoff from this area used to flow to the east to a low area in the field immediately east of 10950 Long Road. This low area does not appear to have a natural drainage

outlet, but runoff would pond in this area and the low area did provide some storage capacity for excess runoff from these residences, primarily 10950 Long Road. According to adjacent residents, some fill has recently been added in this low area, which has reduced its storage capacity. Thus increased ponding has occurred in the lawn areas since the fill was placed, and flow over the road has increased as well.

2.3 Sanitary and Water Issues.

None of the residential homes in the study area has access to a public water supply or sanitary system, and each home has its own water well and private sanitary treatment facility such as a septic tank and leach field system. As noted above, inadequate drainage in the study area and associated ponding in the lawn areas impact the residential leach field systems and potentially contaminate the aquifers of the residential water wells in the area.

The closest existing City of Pickerington water and sewer facilities to the study area are located along Long Road east of the study area. As shown on Sheet 9 in the Appendix, an existing 12" water line located on the south side of Long Road terminates about 1500' east of the east end of the study area, and an existing 24" sanitary line is located on the north side of Long Road near the east end of the study area.

3.0 Design Alternatives.

3.1 Stormwater

As noted above, the existing drainage structures are undersized and do not meet current design standards for the size of the area tributary to the structures. Drainage in this area could be improved by either installing a storm sewer system or excavating open ditches along Long Road, or a combination of the two. These alternatives are discussed in more detail in the following paragraphs.

Alternative 1 - Storm Sewer System. A preliminary layout for a storm sewer system is shown on Sheet 4 in the appendix. As shown on this sheet, the storm sewer would extend along the south side of Long Road from Georges Creek to approximately 2400 feet east of Georges Creek. Laterals with catch basins would be extended to the north side of Long Road at three locations, one near the locations of the existing catch basins at 8200 Long Road and 9906 Long Road, and the third at the east end of the property at 10950 Long Road, which would also help drain the existing low area just east of this property.

This storm sewer could be placed on the north side of Long Road as well, either for a small section of the sewer, say from 9906 Long Road to 10950 Long Road, or for its entire length, with laterals extending to the south where necessary to pick up runoff on the south side. For the purposes of this report, though, it was decided to place the storm sewer entirely along the south side as that would require less laterals across Long Road than one entirely on the north side of Long Road, and having the storm sewer on one side only may more readily facilitate future widening of Long Road.

Catch basins would also be provided adjacent to each driveway, and the existing roadside ditches and lawn areas near the road would be regraded to drain to the inlets. The storm sewer would be sized to ensure that the water surface elevation at the inlets would not exceed the top of grate elevation up to the 5-year storm event.

As shown on Sheet 4 in the Appendix, the storm sewer was assumed to be located approximately 5 – 10 feet inside the existing right-of-way line in order to minimize interference between the storm sewer and existing utilities and any future roadway widening of Long Road. This location of the storm sewer line, along with the proposed 10-foot water line easement discussed in Section 3.2, would allow for installation of the storm sewer and for minor regrading within the lawn areas as required to reshape the existing roadside ditches and direct the flow in the ditches to the storm inlets without the need to acquire additional easements other than temporary construction easements.

The storm sewer would be placed along the south side of Long Road but inlets would be provided on the north side as well at several locations, as noted above. In order to direct existing runoff to these proposed inlets on the north side, some cleaning of the existing ditches and drive pipes would also be required. A drive pipe with some associated ditch shaping and clearing would be required at 8200 Long Road, in order to direct runoff that ponds on the west side of the drive to the proposed inlet at the east side of the drive.

Other than at a few locations as noted above, no extensive reshaping of the ditches along the north side of Long Road would be recommended at this time. Much of the drainage from Long Road flows north from the road and thus roadside ditches are not as necessary along this side of the road to direct runoff to Georges Creek. However, additional drainage ditches or storm sewer inlets along the north side of Long Road should be incorporated into any future roadway widening plans for Long Road.

Alternative 2 - Open Ditch System. An open ditch could be placed along the south side of Long Road in lieu of a storm sewer. This alternative is shown on Sheet 5. Laterals with catch basins would be extended to the north side of Long Road at the same locations indicated for the storm sewer system, and drive pipes would be provided at each driveway. The open ditch would also be sized to contain runoff from the 5-year storm within the ditch.

As for the storm sewer, this ditch could also be placed on the north side of Long Road, but for similar reasons provided above for the storm sewer, for this report it was shown on the south side of Long Road only.

Also, as for the storm sewer alternative, the open ditch was assumed to be located near the south right-of-way line to facilitate future roadway widening. Based on this location of the ditch and the depth of cut required, and assuming a 2-foot bottom width and 4H:1V side slopes on the ditch to facilitate mowing and maintenance by adjacent homeowners, the proposed ditch construction would extend beyond the existing right-of-way. Approximately 15 feet of additional right-of-way or drainage easement beyond the proposed 10-foot waterline easement would be required from all properties adjacent to the ditch along the south side of Long Road in order to construct the open ditch. The inlets on the north side could be placed within the existing right-of-way, and any ditch shaping or clearing required along the north side could be confined to the right-of-way as

well. Thus no additional right-of-way or drainage easements would be required along the north side of Long Road, just the south side.

The invert of the ditch along the south side of Long Road would be about 1.5 feet above the invert of Georges Creek at the ditch outlet, and the slope of the ditch would vary from approximately 0.40% to 0.45% along the length of the ditch. The depth of cut for the ditch would vary from about 1.5 feet to 4.5 feet, with an average depth of about 2.5 feet. Because of the grade required for the ditch and the topography of the existing ground, the deepest cuts for the ditch would be along the properties at 8145, 8155 and 8301 Long Road, and along the vacant lot between 8173 and 8195 Long Road.

Alternative 3 - Combination of Open Ditch and Storm Sewer System. Another alternative would be to use a combination of an open ditch and a storm sewer in order to minimize the cost of the improvements and the depth of cut in the lawn areas of some properties. One such combination would be to extend the storm sewer from Georges Creek to the catch basin in front of 8173 Long Road, as indicated on the storm sewer plan shown on Sheet 4, and from there extend the open ditch to the east as shown on the open ditch plan on Sheet 5. This would require an open inlet to a 36" pipe to be placed in the lawn area of 8173 Long Road, however, which may not be very aesthetically attractive. An open inlet could also be a safety issue if no trash rack were provided at the inlet, and a maintenance issue if a trash rack were installed. These issues must be considered if a combination of a storm sewer and open ditch are planned.

Estimated Cost. The cost to install the storm sewer system described above and as shown on Sheet 4 would be approximately \$320,000, and the cost for the open ditch and drive pipes shown on Sheet 5 would be approximately \$229,000, including the cost of acquiring drainage easements required. A detailed cost estimate is included in Table 1 in the Appendix for the storm sewer system alternative and in Table 2 for the open ditch alternative. No cost estimate was provided for the combination of an open ditch and a storm sewer system, as there are many different possibilities for such a combination, but the cost for any such combination would be between the costs of the two alternatives provided.

Recommended Alternative. The storm sewer system presented as Alternative 1 above is the recommended alternative. Although this alternative is initially more costly than the other alternatives, it provides a safer and much more aesthetically attractive solution to the drainage problems currently encountered in the study area. The open ditch would required more ongoing maintenance and cleaning and could be a safety hazard to neighborhood children with significant water flowing in the ditch during major flood events. Thus the storm sewer system is the recommended alternative, and this alternative is shown on Sheets 8 and 9, which also show the proposed water and sanitary lines.

3.2 Sanitary and Water

General. Based on the location of the study area along Long Road and the potential for future development around the area, it is recommended that any extension of the sanitary and water facilities to the study area be sized to accommodate anticipated future development in the area that would potentially be serviced by these extensions. As

shown on the portion of the City Future Land Use Map With included on Sheet 2 in the Appendix, the projected future land use in the area is primarily residential. Only the area south of Long Road and east of the Franklin County/Fairfield County line is projected to remain as park land or open space. As noted above, this area was recently developed by the Columbus and Franklin County Metropolitan Park District into a wetlands area and is thus expected to remain a wetland or undeveloped area indefinitely.

The service area thus assumed for the water line is shown on Sheet 6 in the Appendix, and the assumed tributary area for the sanitary sewer is shown on Sheet 7 in the Appendix. Both service areas primarily include the area north of Long Road to the Conrail Railroad from the existing terminus of each facility to the western City of Pickerington corporate boundary, as well as the existing residential area south of Long Road in the study area.

Thus to service the study area, it is proposed to extend the existing water and sewer facilities from the existing terminal or location points noted above and provide adequately sized facilities to service not just the immediate study area but adjacent areas that would be expected to be serviced by the proposed utility extensions in the future.

Sanitary. The existing 24" sanitary line is only 9' deep at the proposed tie-in point of the proposed sewer extension, where the sanitary line turns north from Long Road. Since the ground slopes to the west from this location towards Georges Creek, a gravity sewer draining to the east to the existing 24" line would not have adequate depth along the entire length of the sewer to service the existing residential homes or the projected future tributary area. Therefore, it is recommended that a combination of a gravity sanitary line and a force main with a pump station be installed to serve this area.

The proposed system would include a gravity sewer line that would slope to the west, as does the general topography of the ground, from near the existing 24" sewer to near Georges Creek. The gravity sewer would discharge into a pump station and a 6" force main would then extend from the pump station back to the existing 24" sanitary line. This system would include the installation of SDR 35 pipe, manholes, and a pump station.

Both the gravity line and the force main would be located in a 20-foot sanitary easement located along the north side of the Long Road right-of-way line. A detailed plan view of the proposed sanitary line is included on Sheets 8 and 9 in the Appendix, and calculations for the recommended pipe sizes and pump station capacity are provided in the Appendix.

Water. As noted above, it is recommended that the existing 12" water line along the south side of Long road be extended to the west to the City of Pickerington corporation line to provide adequate pressures and water supply for the existing residents and any future development along this portion of Long Road. The water line service area for the proposed 12" water line is shown on Sheet 6 in the appendix.

The water line would include the installation of ductile iron pipe, gate valves, and fire hydrants. A detailed plan view of the proposed water line is included on Sheets 8 and 9 in the Appendix.

Estimated Cost: The cost to install the gravity sanitary sewer line, pump station, and force main would be approximately \$600,000, and the cost to install the 12" water line from the location of the existing 12" plug just past Monebrake Drive to the west City of Pickerington corporation line would be approximately \$395,000. A detailed cost estimate for the sanitary improvements is included in Table 3, and a detailed cost estimate for the water line is included in Table 4 in the Appendix.

3.3 Total Estimated Cost

Based on the estimated costs summarized above for stormwater Alternative A and the sanitary sewer and water line, the total estimated cost for all components of the project is approximately \$1,315,000.

Appendix

Cost Estimates

Table 1. – Stormwater Alternative 1 - Storm Sewer Cost Estimate -

| Item No. | Description | Estimated Quantity | Unit | Unit Price | Total Price |
|---|--|--------------------|-----------|------------|-----------------|
| 201 | Clearing and Grubbing | 1 | Lump Sum. | \$8,000.00 | \$8,000 |
| 202 | 8", 10" and 12" Pipe Removed | 640 | L.F. | \$5.00 | \$3,200 |
| 202 | Catch Basin Removed | 2 | Each | \$250.00 | \$500 |
| 202 | Pavement Removed and Disposed Of | 70 | S.Y. | \$15.00 | \$1,050 |
| 203 | Excavation | 100 | C.Y. | \$15.00 | \$1,500 |
| 252 | Permanent Pavement Replacement, Type I | 15 | C.Y. | \$200.00 | \$3,000 |
| 304 | Aggregate Base | 20 | C.Y. | \$40.00 | \$800 |
| 603 | 12" Drive Pipe, w/ Type I Bedding | 30 | L.F. | \$40.00 | \$1,200 |
| 604 | ODOT 2-2-B Catch Basin | 1 | Each | \$2,000.00 | \$2,000 |
| 604 | ODOT 2-3 Catch Basin | 12 | Each | \$2,200.00 | \$26,400 |
| 604 | ODOT 2-4 Catch Basin | 4 | Each | \$2,400.00 | \$9,600 |
| 604 | Endwall | 1 | Each | \$1,000.00 | \$1,000 |
| 614 | Maintaining Traffic | 1 | Lump Sum | \$5,000.00 | \$5,000 |
| 659 | Seeding and Mulching | 12,000 | S.Y. | \$3.00 | \$36,000 |
| 901 | 15" Pipe, w/ Type I Bedding | 40 | L.F. | \$45.00 | \$1,800 |
| 901 | 24" Pipe, w/ Type I Bedding | 1,850 | L.F. | \$55.00 | \$101,750 |
| 901 | 36" Pipe, w/ Type I Bedding | 615 | L.F. | \$70.00 | \$43,050 |
| Construction Total | | | | | \$245,850 |
| Contingency | | | | | \$24,600 |
| Engineering Design & Construction Observation | | | | | <u>\$49,200</u> |
| Total Cost | | | | | \$319,650 |

Table 2. — Stormwater Alternative 2 – Open Ditch Cost Estimate

| Item No. | Description | Estimated Quantity | Unit | Unit Price | Total Price |
|---|--|--------------------|-----------|-------------|-----------------|
| 201 | Clearing and Grubbing | 1 | Lump Sum. | \$10,000.00 | \$10,000 |
| 202 | 8", 10" and 12" Pipe Removed | 640 | L.F. | \$5.00 | \$3,200 |
| 202 | Catch Basin Removed | 2 | Each | \$250.00 | \$500 |
| 202 | Pavement Removed and Disposed Of | 70 | S.Y. | \$15.00 | \$1,050 |
| 203 | Excavation | 3,500 | C.Y. | \$15.00 | \$52,500 |
| 252 | Permanent Pavement Replacement, Type I | 15 | C.Y. | \$200.00 | \$3,000 |
| 304 | Aggregate Base | 20 | C.Y. | \$40.00 | \$800 |
| 603 | 12" Drive Pipe, w/ Type I Bedding | 30 | L.F. | \$40.00 | \$1,200 |
| 603 | 24" Drive Pipe, w/ Type I Bedding | 180 | L.F. | \$55.00 | \$9,900 |
| 603 | 36" Drive Pipe, w/ Type I Bedding | 90 | L.F. | \$70.00 | \$6,300 |
| 604 | ODOT 2-2-B Catch Basin | 1 | Each | \$2,000.00 | \$2,000 |
| 604 | ODOT 2-3 Catch Basin | 2 | Each | \$2,200.00 | \$4,400 |
| 604 | Headwall | 20 | Each | \$1,200.00 | \$24,000 |
| 614 | Maintaining Traffic | 1 | Lump Sum | \$5,000.00 | \$5,000 |
| 659 | Seeding and Mulching | 14,000 | S.Y. | \$3.00 | \$42,000 |
| Spec | Easement Acquisition | 1 | Acre | \$10,000.00 | \$10,000 |
| Construction Total | | | | | \$175,850 |
| Contingency | | | | | \$17,600 |
| Engineering Design & Construction Observation | | | | | <u>\$35,200</u> |
| Total Cost | | | | | \$228,650 |

Table 3. – Sanitary Sewer Cost Estimate

| Item No. | Description | Estimated Quantity | Unit | Unit Price | Total Price |
|---|--------------------------|--------------------|----------|-------------|-----------------|
| 201 | Clearing and Grubbing | 1 | Lump Sum | \$15,000.00 | \$15,000 |
| 604 | Type 'C' Manhole | 6 | Each | \$3,500.00 | \$21,000 |
| 614 | Maintaining Traffic | 1 | Lump Sum | \$5,000.00 | \$5,000 |
| 659 | Seeding and Mulching | 4,700 | S.Y. | \$3.00 | \$14,100 |
| 901 | 12" SDR 35 Sanitary Line | 1,700 | L.F. | \$55.00 | \$93,500 |
| 901 | 8" SDR 35 Sanitary Line | 800 | L.F. | \$48.00 | \$38,400 |
| 901 | 6" Sanitary Force Main | 2,760 | L.F. | \$20.00 | \$55,200 |
| 918 | Sanitary Service | 18 | Each | \$7,000.00 | \$126,000 |
| Special | Pump Station | 1 | Each | \$75,000.00 | \$75,000 |
| Special | Emergency Generator | 1 | Each | \$8,000.00 | \$8,000 |
| Special | Easement Acquisition | 1.2 | Acre | \$10,000.00 | \$10,000 |
| Construction Total | | | | | \$461,200 |
| Contingency | | | | | \$46,100 |
| Engineering Design & Construction Observation | | | | | <u>\$92,200</u> |
| Total Cost | | | | | \$599,500 |

Table 4. – Water Line Cost Estimate

| Item No. | Description | Estimated Quantity | Unit | Unit Price | Total Price |
|---|-----------------------|--------------------|----------|-------------|-----------------|
| 201 | Clearing and Grubbing | 1 | Lump Sum | \$10,000.00 | \$10,000 |
| 614 | Maintaining Traffic | 1 | Lump Sum | \$5,000.00 | \$5,000 |
| 659 | Seeding and Mulching | 9,470 | S.Y. | \$3.00 | \$28,410 |
| 801 | 12" C-900 Water Line | 4,260 | L.F. | \$40.00 | \$170,400 |
| 802 | 12" Valve | 5 | Each | \$2,500.00 | \$12,500 |
| 805 | Water Service Tap | 18 | Each | \$2,500.00 | \$45,000 |
| 809 | Fire Hydrant | 9 | Each | \$2,500.00 | \$22,500 |
| Special | Easement Acquisition | 1 | Acre | \$10,000.00 | \$10,000 |
| Construction Total | | | | | \$303,810 |
| Contingency | | | | | \$30,400 |
| Engineering Design & Construction Observation | | | | | <u>\$60,800</u> |
| Total Cost | | | | | \$395,010 |

Calculations

2-Yr Design Storm
Roughness Coefficient = 0.013

[illegible]

5-Yr Design Storm (Hydraulic Grade Line)
Roughness Coefficient = 0.013

[illegible]

Sanitary Sewer Calculations

"Design from City of Columbus Sanitary Design Manual and
10 State Recommended Standards for Wastewater Facilities."

Startup Flows

| # of Services | Average Gallons/Service | Total Gallons |
|---------------|-------------------------|---------------|
| 18 | 400 | 7200 |

Design Flows

| Total # of Acres | Houses per Acre | Total Houses | Gallons per House per Day | Average Gallons per Day |
|------------------|-----------------|--------------|---------------------------|-------------------------|
| 160 | 2 | 320 | 400 | 128000 |

Design = Average Gallons per Minute * 3.5 Peak Factor + Infiltration (0.27 * Tributary Acreage)

Design = (Average GPD/24/60) * 3.5 =
Infiltration = Acres * 0.27 GPM/A =

312 Peak Flow per Minute
44 Infiltration flow per Minute
356 Total Gallons per Minute Design

Minimum Design using Mannings Equation
Pipe Design, n=.013

12" pipe flowing 1/2 full @ 0.22% = 375 GPM
Minimum slope for 12" = 0.22%

Pump Station Design $hf = f * ((L * V^2) / (D * 2g))$

| # Pumps | Pump GPM | RPM | TDH |
|---------|----------|------|-----|
| 3 | 250 | 1750 | 67 |

Force Main

| Diameter | Elevation Difference | Friction Loss | TDH | Length | Velocity | Friction Factor |
|----------|----------------------|---------------|-----|--------|----------|-----------------|
| 0.5 | 22 | 45 | 67 | 2726 | 5.99 | 0.0145 |

Emergency Generator - 1

Design Flows

| Acres for Sta 1+00 to Sta 10+00 | Houses per Acre | Total Houses | Gallons per House per Day | Average Gallons per Day |
|---------------------------------------|--------------------|-----------------|---------------------------------|-------------------------------|
| 147 | 2 | 294 | 400 | 117600 |

Design = Average Gallons per Minute * 3.5 Peak Factor + Infiltration (0.27 * Tributary Acreage)

Design = (Average GPD/24/60) * 3.5 =
Infiltration = Acres * 0.27 GPM/A =

286 Peak Flow per Minute
40 Infiltration flow per Minute
326 Total Gallons per Minute Design

Minimum Design
Pipe Design, n=.013

12" pipe flowing 1/2 full @ 0.22% = 375 GPM
Minimum slope for 12" = 0.22%

| Acres for Sta 10+00 to Sta 18+00 | Houses per Acre | Total Houses | Gallons per House per Day | Average Gallons per Day |
|--|--------------------|-----------------|---------------------------------|-------------------------------|
| 100 | 2 | 200 | 400 | 80000 |

Design = Average Gallons per Minute * 3.5 Peak Factor + Infiltration (0.27 * Tributary Acreage)

Design = (Average GPD/24/60) * 3.5 =
Infiltration = Acres * 0.27 GPM/A =

195 Peak Flow per Minute
27 Infiltration flow per Minute
222 Total Gallons per Minute Design

Minimum Design
Pipe Design, n=.013

12" pipe flowing 1/2 full @ 0.22% = 375 GPM
Minimum slope for 12" = 0.22%

| Acres for Sta 18+00 to Sta 26+00 | Houses per Acre | Total Houses | Gallons per House per Day | Average Gallons per Day |
|--|--------------------|-----------------|---------------------------------|-------------------------------|
| 27 | 2 | 54 | 400 | 21600 |

Design = Average Gallons per Minute * 3.5 Peak Factor + Infiltration (0.27 * Tributary Acreage)

Design = (Average GPD/24/60) * 3.5 =
Infiltration = Acres * 0.27 GPM/A =

53 Peak Flow per Minute
8 Infiltration flow per Minute
61 Total Gallons per Minute Design

Minimum Design
Pipe Design, n=.013

8" pipe flowing 1/2 full @ 0.45% = 180 GPM
Minimum slope for 8" = 0.45%

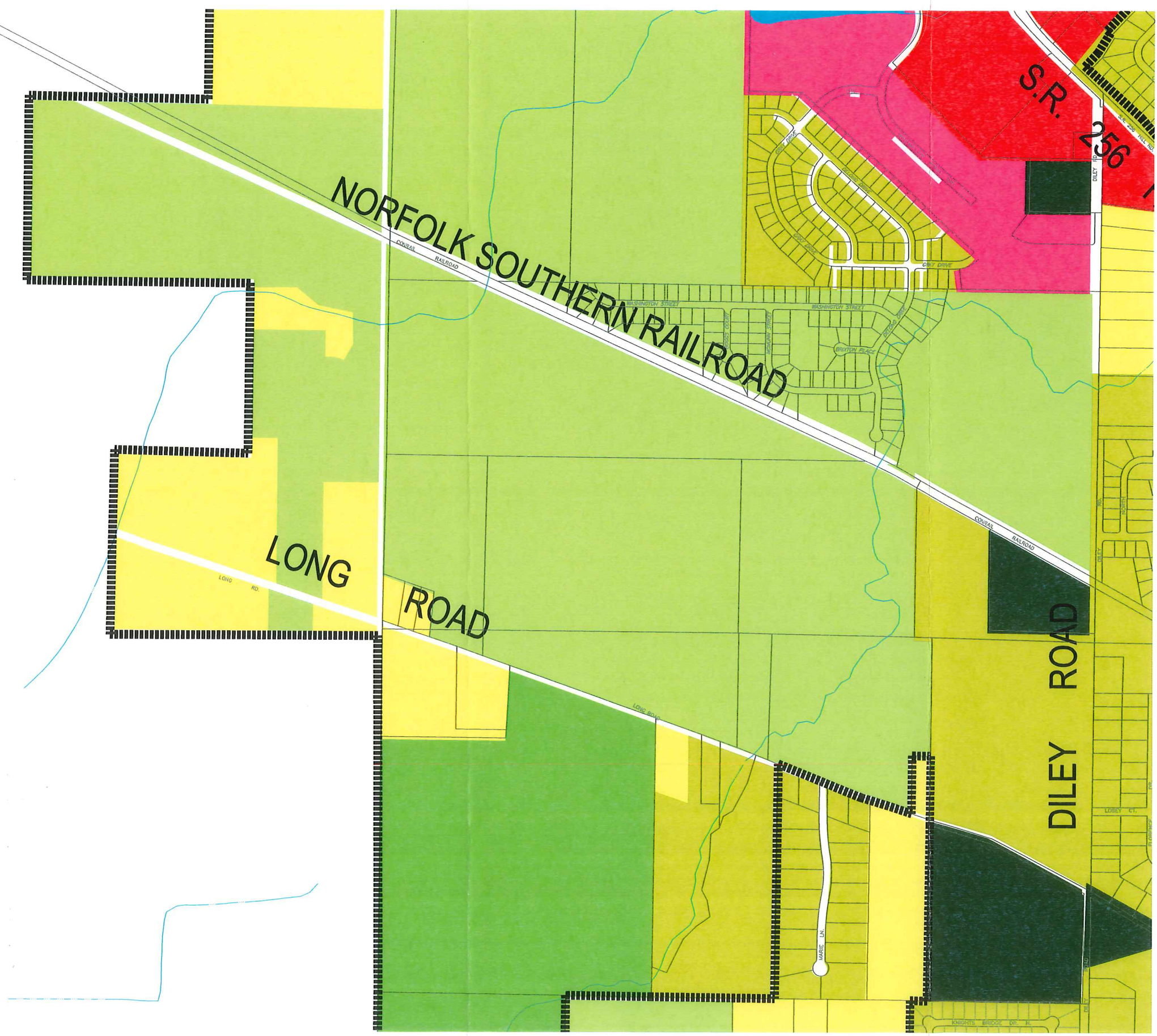
Drawings

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LEGEND

- AGRICULTURE
- PARK/FLOODPLAIN
OPEN SPACE
- GOVERNMENT /
INSTITUTIONAL
- RURAL
RESIDENTIAL
- RESIDENTIAL
- CONDOMINIUM/APART-
MENT RESIDENTIAL
- MIXED USE / PUD
(COMM. / RES. / OFFICE)
- NEIGHBORHOOD
COMMERCIAL
- COMMUNITY
COMMERCIAL / OFFICE
- INDUSTRIAL



PROJECT
LONG ROAD NEAR GEORGES CREEK
STORMWATER, SANITARY AND WATER STUDY

OWNER
CITY OF PICKERINGTON

| REVISIONS | | MARK | | DATE | DESCRIPTION |
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PROJECT NO: 05379.00
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DESIGNED BY: KMS
CHECKED BY: JAF
DATE: SEPT 2005
SCALE: 1"=800'

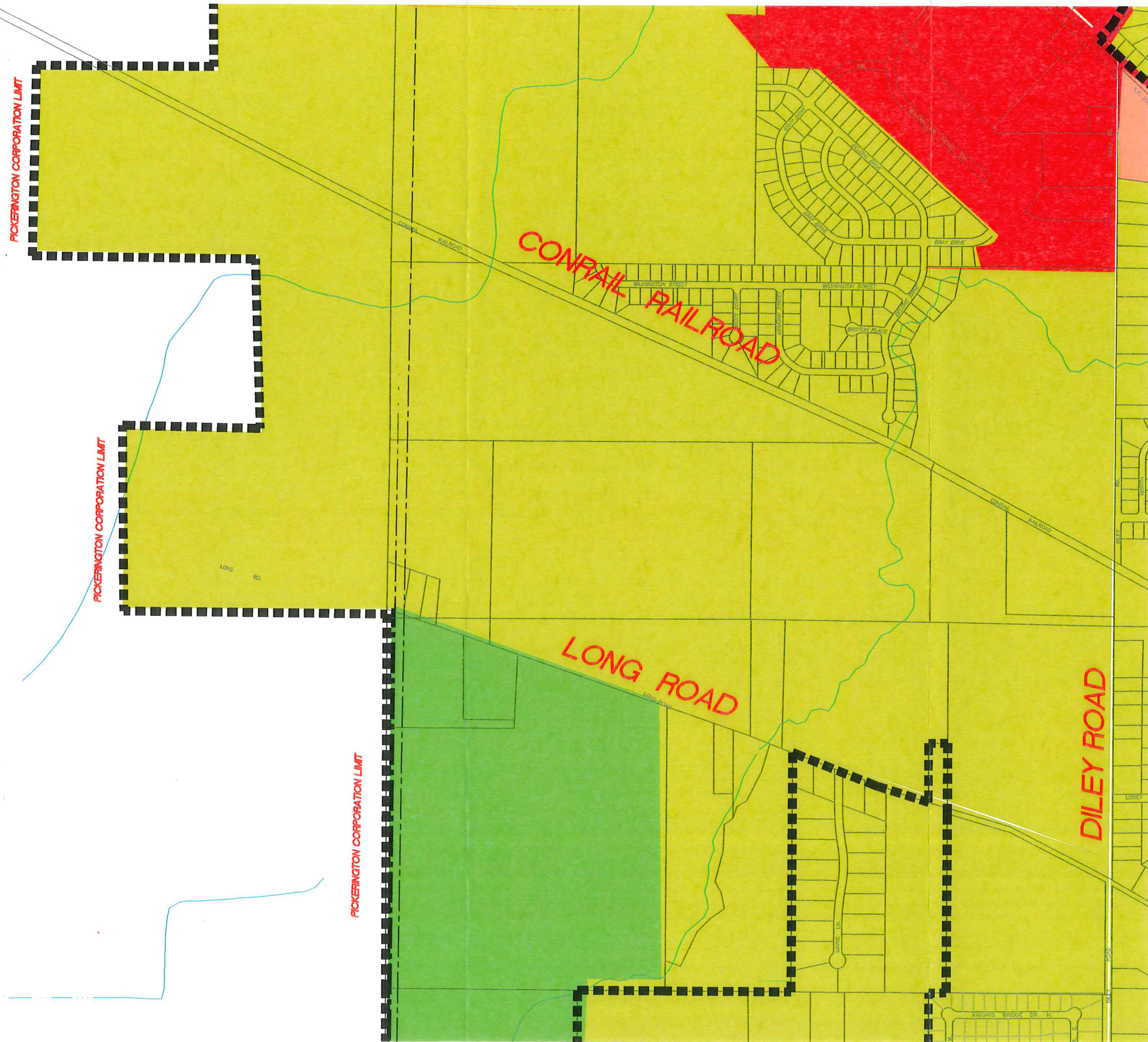
SHEET TITLE
EXISTING LAND
USE MAP

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LEGEND

- AGRICULTURE
- PARK/FLOODPLAIN
OPEN SPACE
- GOVERNMENT /
INSTITUTIONAL
- RURAL
RESIDENTIAL
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COMMERCIAL
- COMMUNITY
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- INDUSTRIAL
- SPECIAL
DISTRICT



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LONG ROAD NEAR GEORGES CREEK
STORMWATER, SANITARY AND WATER STUDY

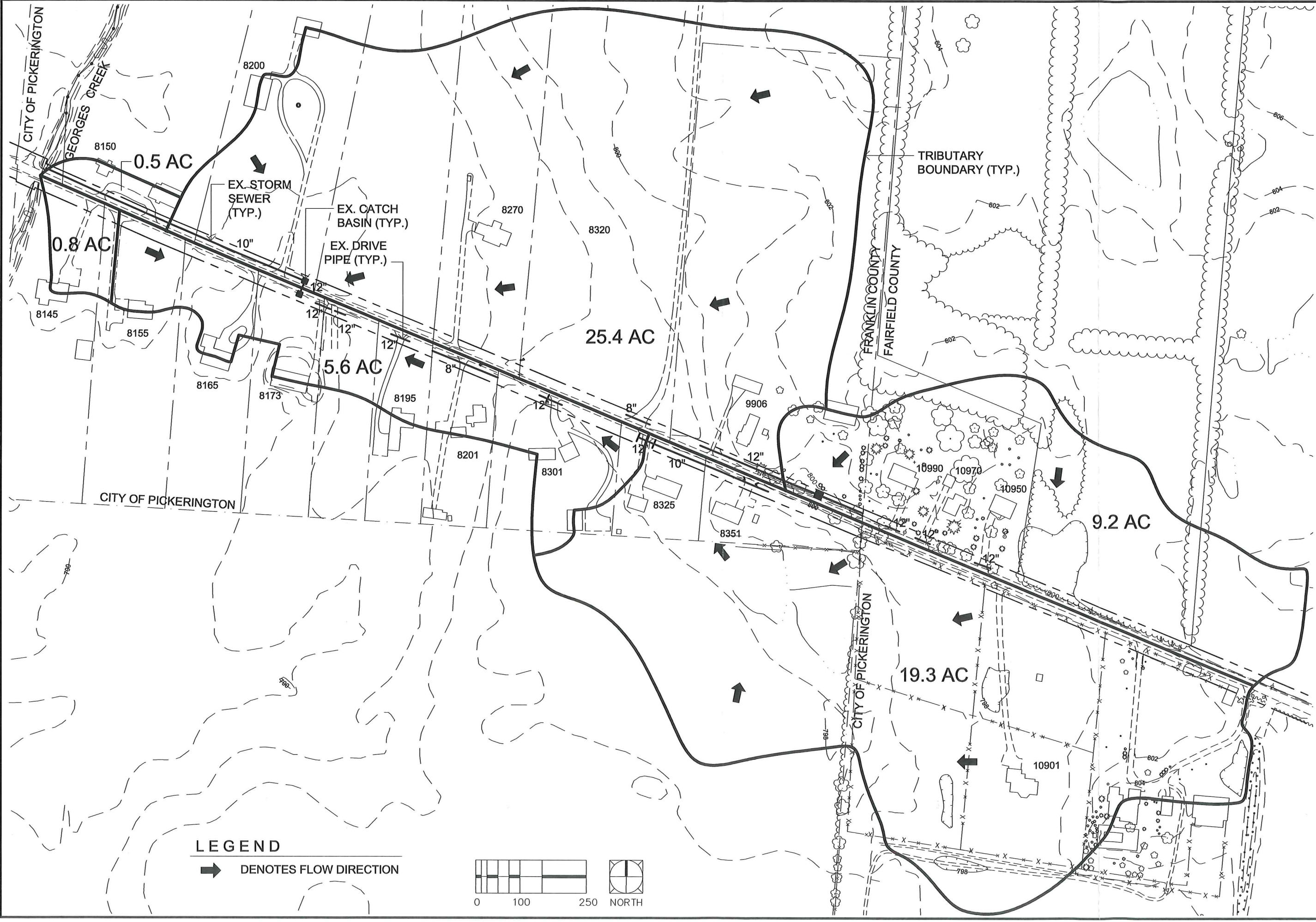
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PROJECT NO: 05379.00
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DATE: OCT 2005
SCALE: 1"=800'

SHEET TITLE
FUTURE LAND
USE MAP

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LONG ROAD NEAR GEORGES CREEK
STORMWATER, SANITARY AND WATER STUDY

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CITY OF PICKERINGTON

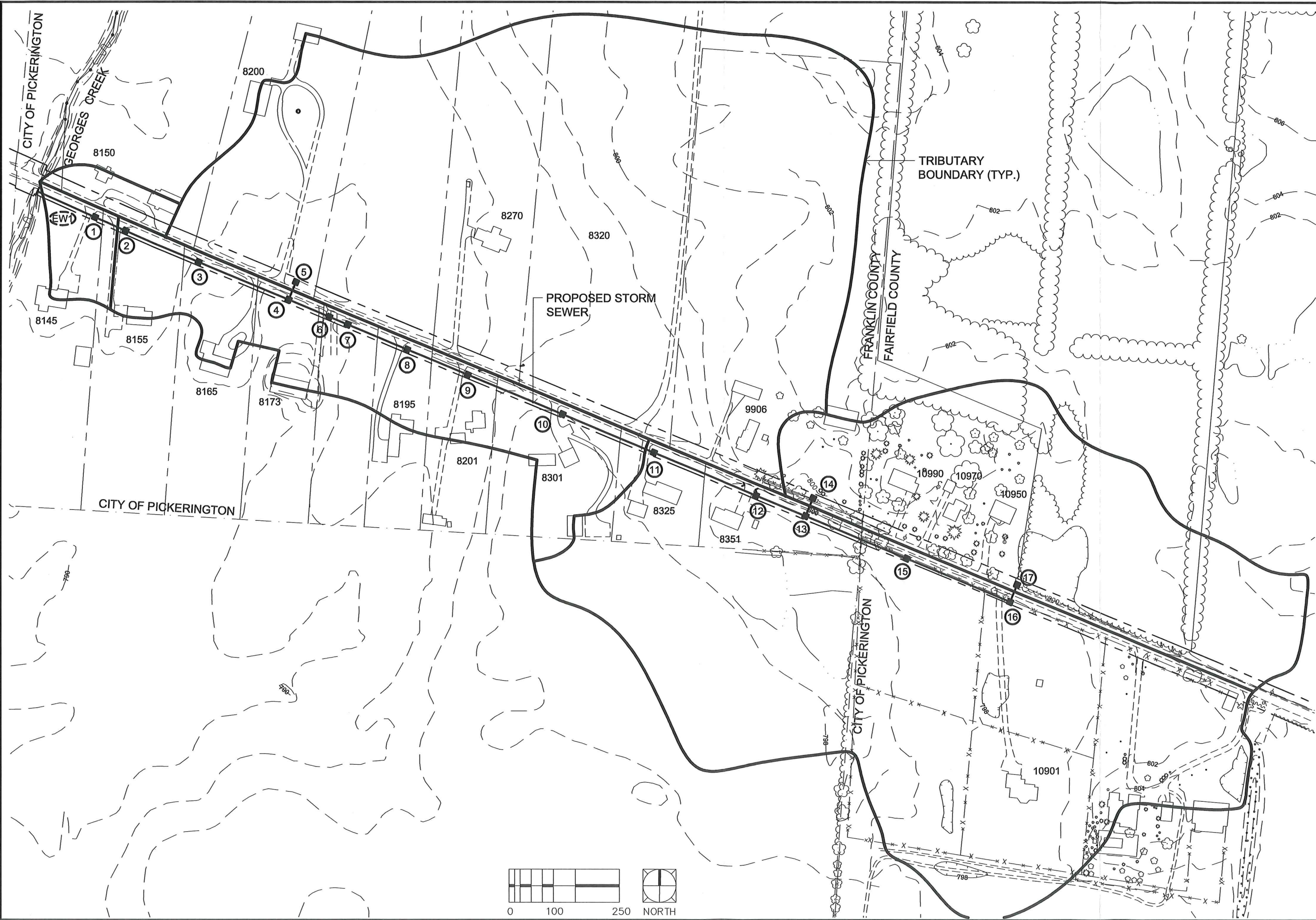
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DRAWN BY: PH
DESIGNED BY: DEH
CHECKED BY: DEH
DATE: OCT 2005
SCALE: 1"=200'


SHEET TITLE
STORMWATER
TRIBUTARY AREA
AND EXISTING
DRAINAGE
STRUCTURES

3
SHEET 3 OF 9

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**W.E. STILSON**
CONSULTING GROUP

PROJECT
LONG ROAD NEAR GEORGES CREEK
STORMWATER, SANITARY AND WATER STUDY

OWNER
CITY OF PICKERINGTON

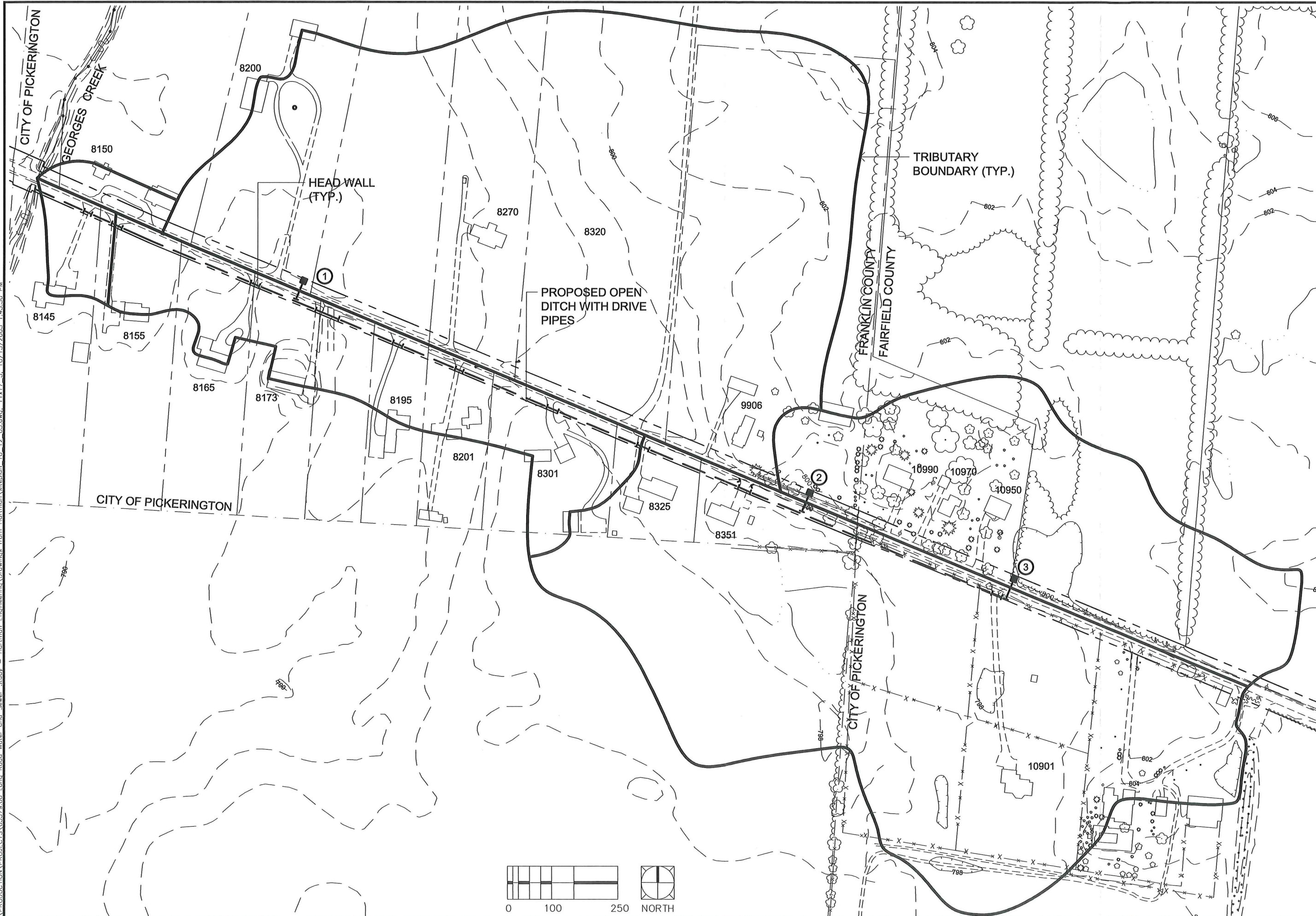
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PROJECT NO: 05379.00
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DESIGNED BY: DEH
CHECKED BY: DEH
DATE: OCT 2005
SCALE: 1"=200'

SHEET TITLE

STORMWATER
ALTERNATIVE 1 -
STORM SEWERS

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PROJECT
**LONG ROAD NEAR GEORGES CREEK
STORMWATER, SANITARY AND WATER STUDY**

OWNER
CITY OF PICKERINGTON

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DESIGNED BY: DEH
CHECKED BY: DEH
DATE: OCT 2005
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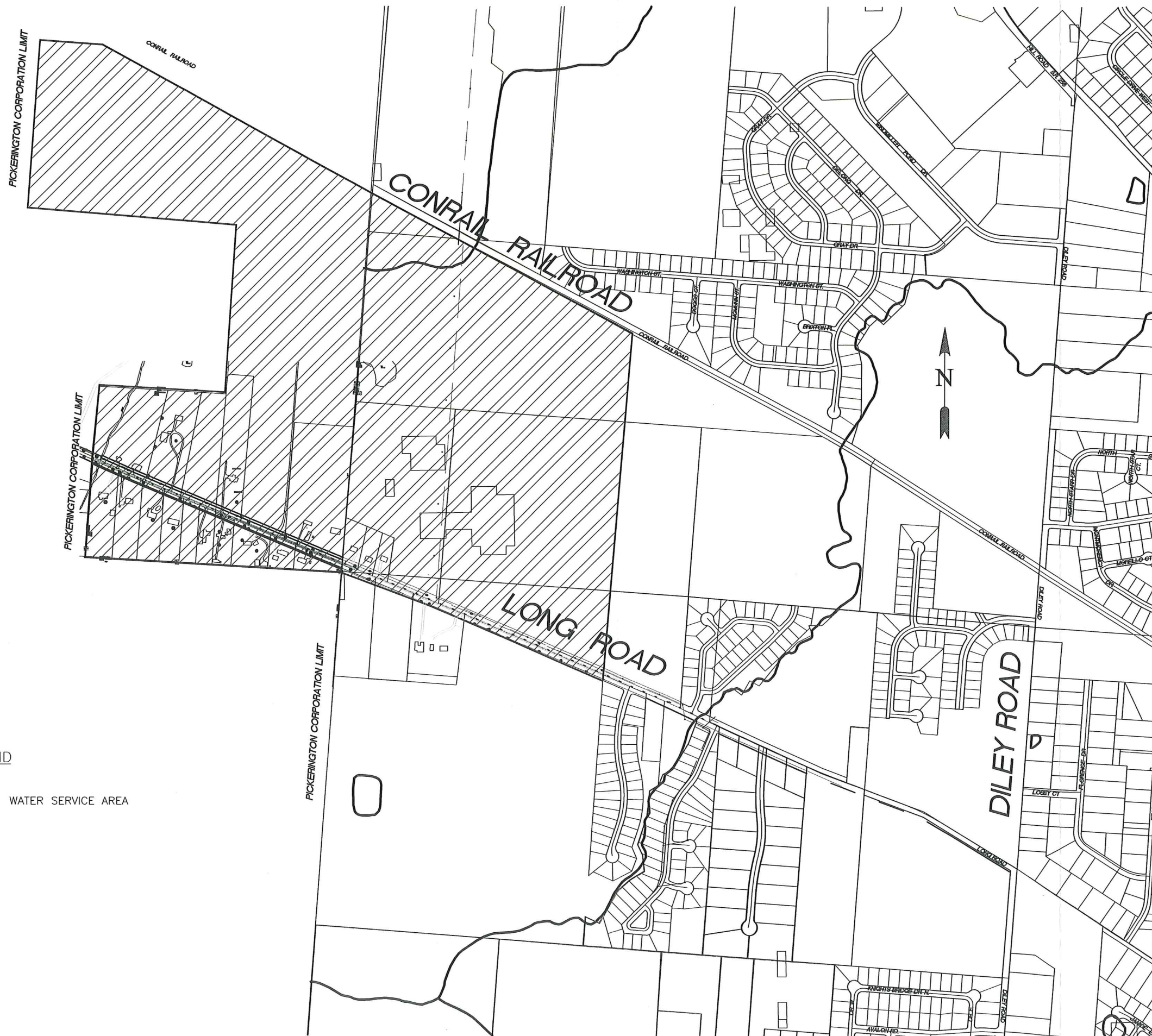
SHEET TITLE
**STORMWATER
ALTERNATIVE 2 -
OPEN DITCH**

5
SHEET 5 OF 9



LEGEND

WATER SERVICE AREA



PROJECT
LONG ROAD NEAR GEORGES CREEK
STORMWATER, SANITARY AND WATER STUDY

CITY OF PICKERINGTON

| REVISIONS | | |
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| PROJECT NO: | 05379.00 |
| DRAWN BY: | KMS |
| DESIGNED BY: | KMS |
| CHECKED BY: | JAF |
| DATE: | OCT 2005 |
| SCALE: | 1"=800' |

SHEET TITLE

WATERLINE
SERVICE AREA

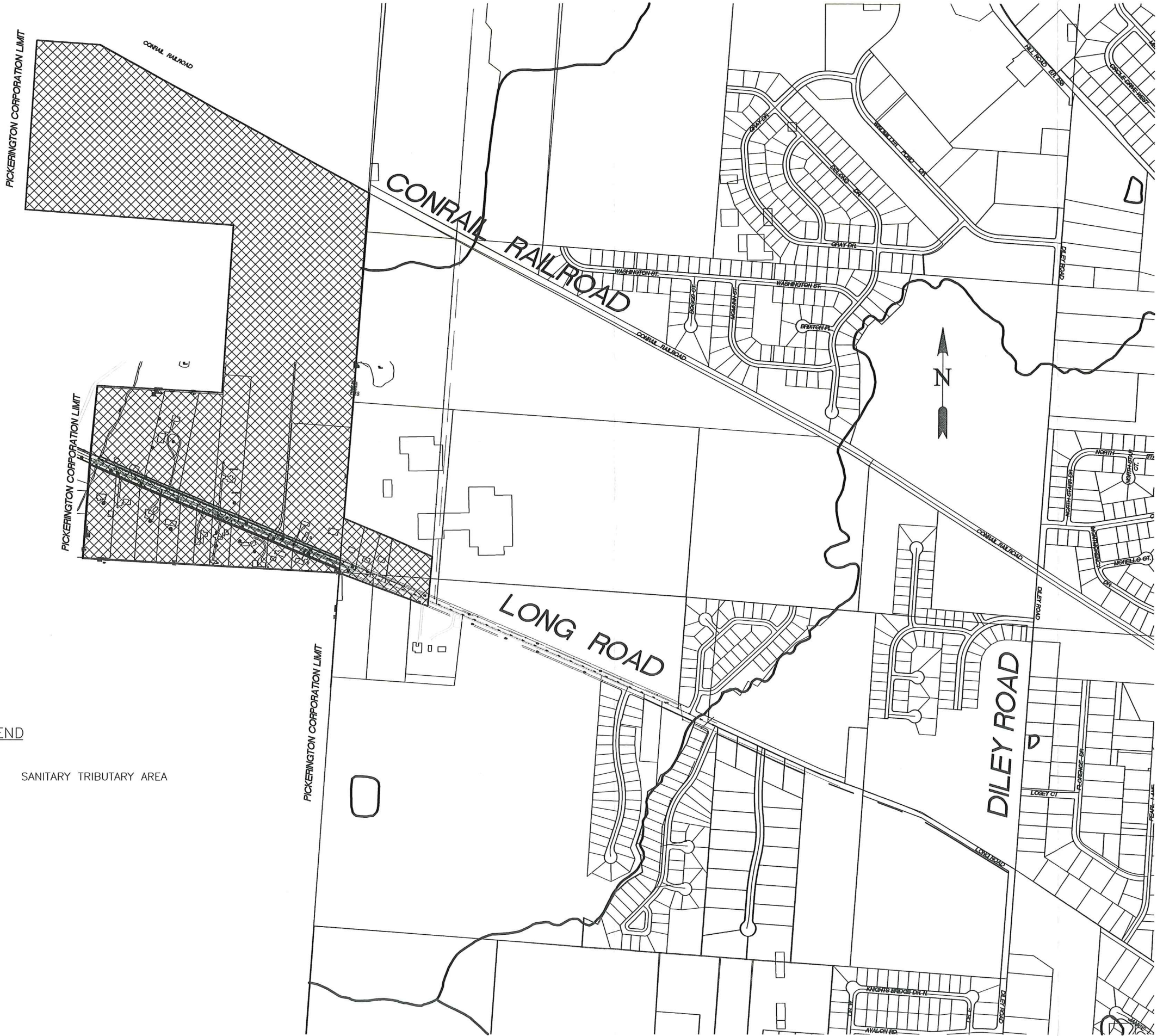
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LEGEND

SANITARY TRIBUTARY AREA



PROJECT

LONG ROAD NEAR GEORGES CREEK
STORMWATER, SANITARY AND WATER STUDY

OWNER

CITY OF PICKERINGTON

REVISIONS

| MARK | DATE | DESCRIPTION |
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PROJECT NO: 05379.00
DRAWN BY: KMS
DESIGNED BY: KMS
CHECKED BY: JAF
DATE: OCT 2005
SCALE: 1"=800'

SHEET TITLE

SANITARY
TRIBUTARY AREA

7

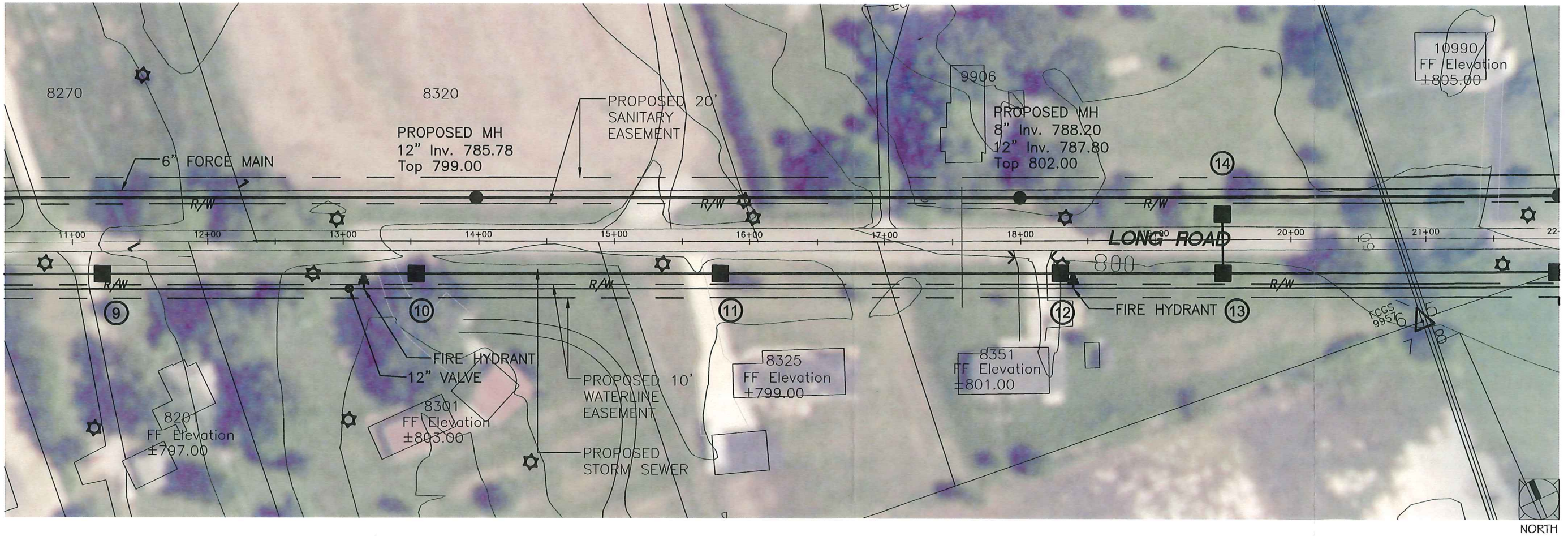
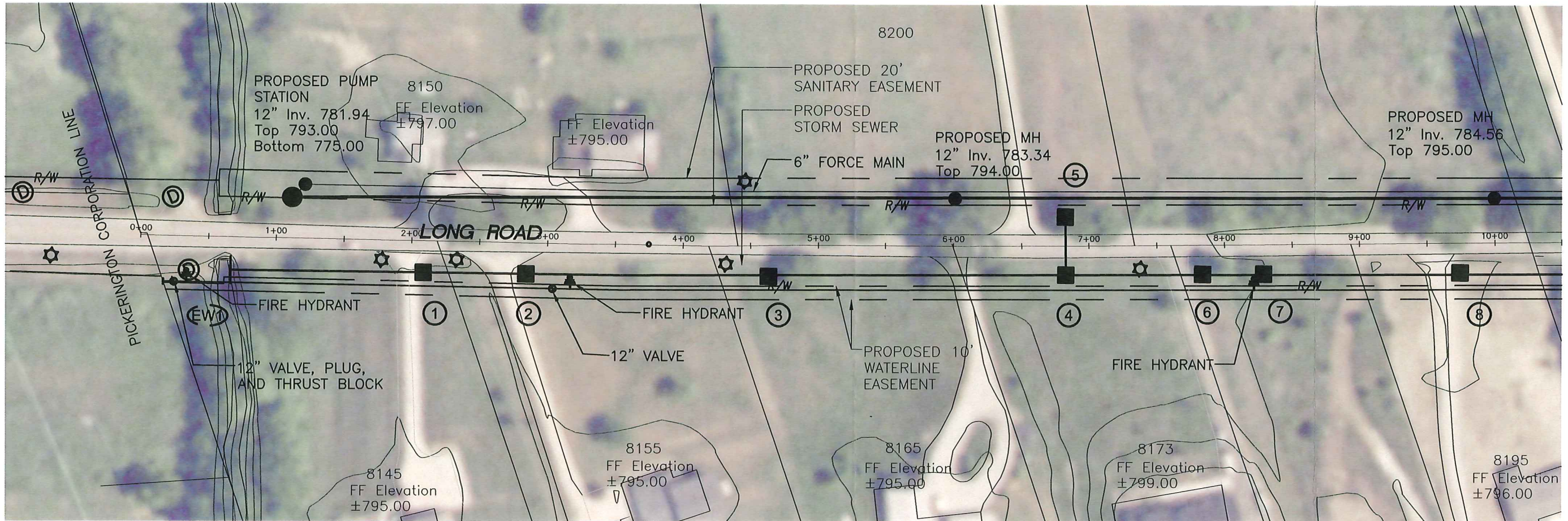
SHEET 7 OF 9



HARTMAN ENGINEERING

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CONSULTING GROUP

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LONG ROAD NEAR GEORGES CREEK
STORMWATER, SANITARY AND WATER STUDY

CITY OF PICKERINGTON

PROJECT

OWNER

REVISIONS

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DATE

DESCRIPTION

PROJECT NO: 05379.00
DRAWN BY: KMS
DESIGNED BY: KMS
CHECKED BY: JAF
DATE: OCT 2005
SCALE: 1"=80'

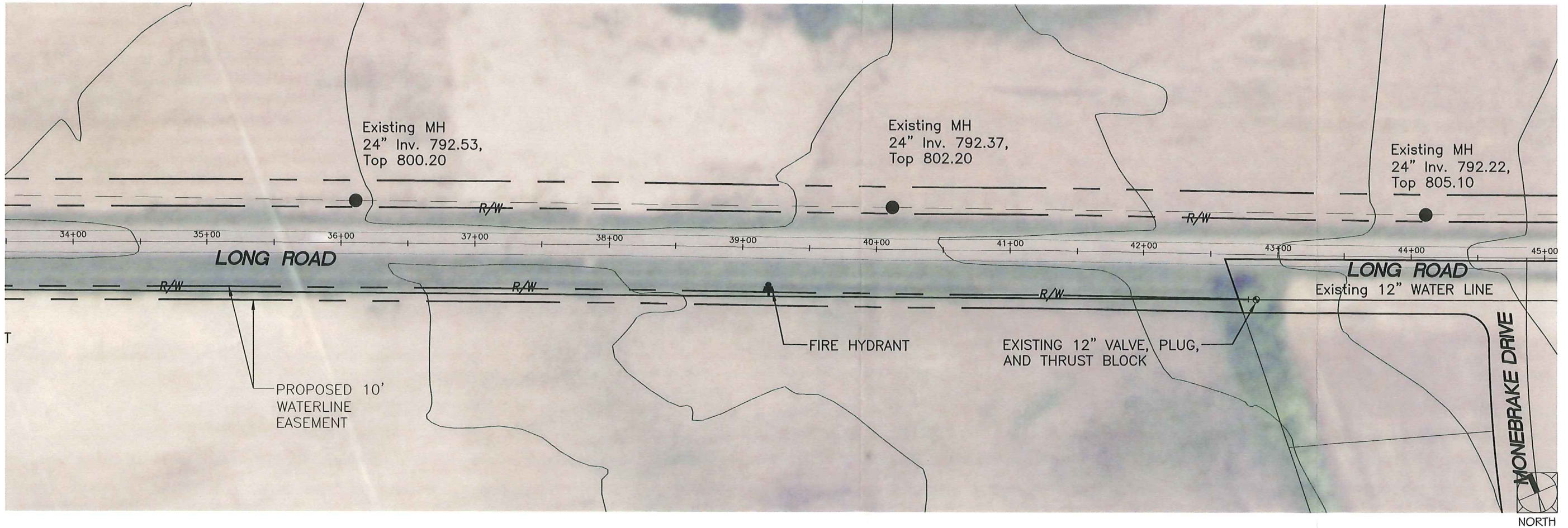
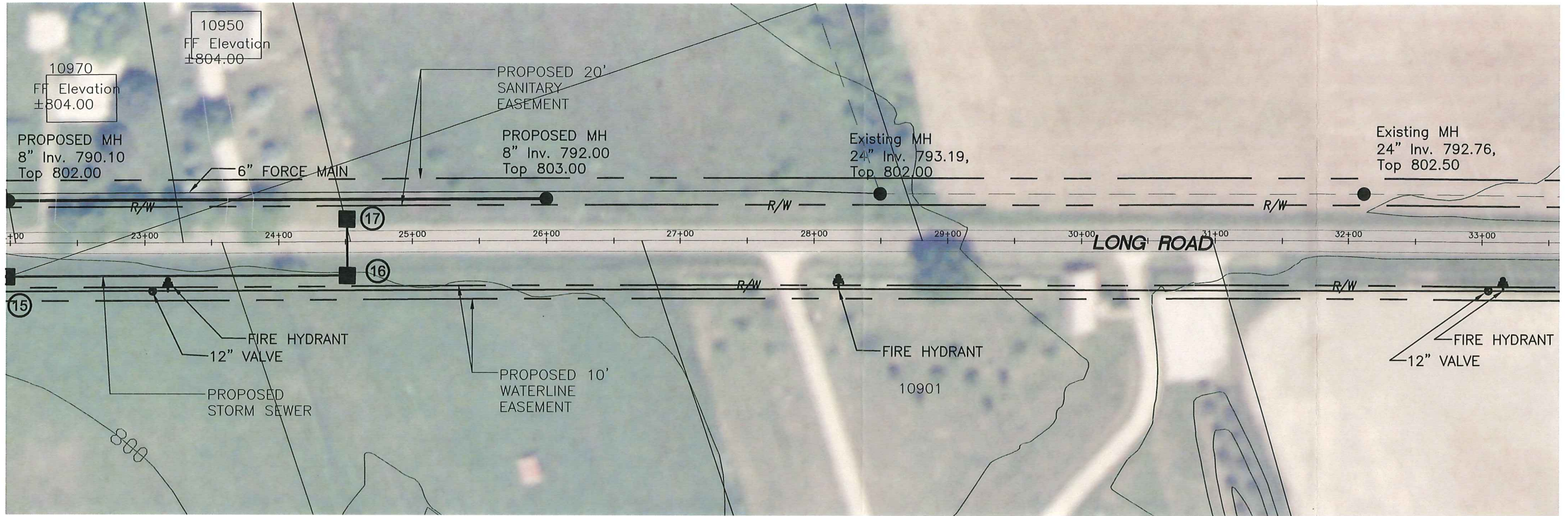
SHEET TITLE

PROPOSED
STORMWATER,
SANITARY AND
WATER PLAN

8

SHEET 8 OF 9

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PROJECT
LONG ROAD NEAR GEORGES CREEK
STORMWATER, SANITARY AND WATER STUDY

OWNER
CITY OF PICKERINGTON

| REVISIONS | MARK | DATE | DESCRIPTION |
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PROJECT NO: 05379.00
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SHEET TITLE
PROPOSED
STORMWATER,
SANITARY AND
WATER PLAN

9
SHEET 9 OF 9