



Adam W. Fowler, P.E., P.S. | Franklin County Engineer

Final Hearing Mando Drainage Improvement Petition per Ohio Revised Code Chapter 6131 Brown Township August 27, 2026

This report has been prepared for the Final Hearing on a drainage improvement petition filed by Frank Mando on February 24, 2021.

The general location and course of the requested improvements are as follows:

In Franklin County, Brown Township, generally bounded by Morris Road, Patterson Road, and Big Darby Creek generally following, but not limited to the course and termini of the existing improvements known as Burt Ditch and Patterson Ditch with adjustments to meet the current needs of petitioners and the current land use.

The following is the nature of the petitioned work:

To generally improve the drainage, both surface and subsurface, to a good and sufficient outlet, by replacing, repairing or altering the existing improvements as required and/or creating new surface and subsurface drainage mains or laterals as requested by this petition.

Petition Process

This petition has been submitted pursuant to Chapter 6131 of the Ohio Revised Code (O.R.C.), which authorizes The Board of Commissioners to act on behalf of benefited property owners to make drainage improvements. If the Board of Commissioners decides to proceed with this project, the costs related to the improvements and the development of plans, reports, schedules, and construction are assessed to the landowners in the watershed according to the benefit received to their watershed acreage. These special construction assessments will be added to the property taxes for each property and can be spread over a maximum of a 15-year period. Property owners may also choose to pay their construction assessment in a lump sum payment prior to placement on their property taxes. Additionally, the improvements

will be placed in the Franklin County drainage maintenance program in perpetuity, per O.R.C. Chapter 6137, and the annual maintenance assessment will appear on property tax statements as a special assessment in the same manner as the construction assessments. These annual maintenance assessments are generally two percent of the construction assessment.

It should be noted that property owners are only assessed for those improvements that benefit their property. The public agencies that own rights-of-way for public roads and other public lands are also assessed for both construction and maintenance costs in the same manner as private property owners.

The decision to approve a drainage improvement petition project is a 3-step process. First, a viewing of the proposed improvement is conducted for the Commissioners to familiarize themselves with the watershed and general conditions. The Commissioners conducted the viewing for this project on May 5, 2021. Then, the first hearing was held on June 8, 2021. At the first hearing, the Commissioners voted to advance the petition. They directed the Franklin County Engineer to proceed with the development of engineering plans and specifications and the schedule of assessments. It is this information that is before the Commissioners for consideration at this second and final hearing.

Existing Conditions

The Franklin County Engineer's Office has made the following observations of the watershed using onsite field evaluation and a review of available aerial photography, topographic mapping, and soils mapping.

The Mando Ditch watershed is approximately 643 acres. The predominant land uses within the watershed are agricultural and rural residential. The primary soils within the watershed are Crosby silt loam and Kokomo silty clay loam, both poorly drained soils with seasonal high-water tables at or near the surface, making the surface overly saturated if not artificially drained. The drainage problems are particularly noticeable after several consecutive days of rainfall, as the absence of artificial drainage systems keeps the soil saturated and prevents rainwater from infiltrating, causing it to accumulate on the ground surface.

The Mando Ditch watershed comprises two previously petitioned drainage systems: Patterson Ditch and Burt Ditch. These systems currently converge at the point where Burt Ditch discharges into Patterson Ditch on Parcel ID 120-000564 (8396 Morris Road). Both systems were originally constructed in the 1870s, prior to the enactment of statutory maintenance provisions under Ohio drainage petition law and have not undergone comprehensive maintenance since that time. The recent conversion of

substantial watershed acreage to residential land use has increased runoff volumes and imposed additional hydraulic loading on the system. Since the drainage system's construction, residential development has occurred in the area, at times altering the original drainage pathways or disrupting the tile. Additionally, unmanaged vegetation growth has led to tree root intrusion into portions of the clay tile system. Approval of the petition before us would formally consolidate these systems under a unified maintenance program, ensuring long-term operational integrity and compliance with Ohio Revised Code Chapter 6137.

The Burt Ditch, Patterson Ditch, and associated private drainage systems are operating significantly below design capacity due to prolonged absence of maintenance and structural deterioration of the piped system. The open-channel segment of Burt Ditch exhibits excessive vegetative encroachment and includes multiple undersized driveway culverts that reduce hydraulic conveyance in the ditch, causing the water to bottle neck and slow down. Additionally, non-uniform surface grading has resulted in extensive ponding across multiple areas, indicating compromised surface drainage. These deficiencies reflect an aging and overburdened system that has not been rehabilitated to meet current hydrologic demands.

Project Scope

The proposed project has been divided into 4 distinct sections as seen in this image.

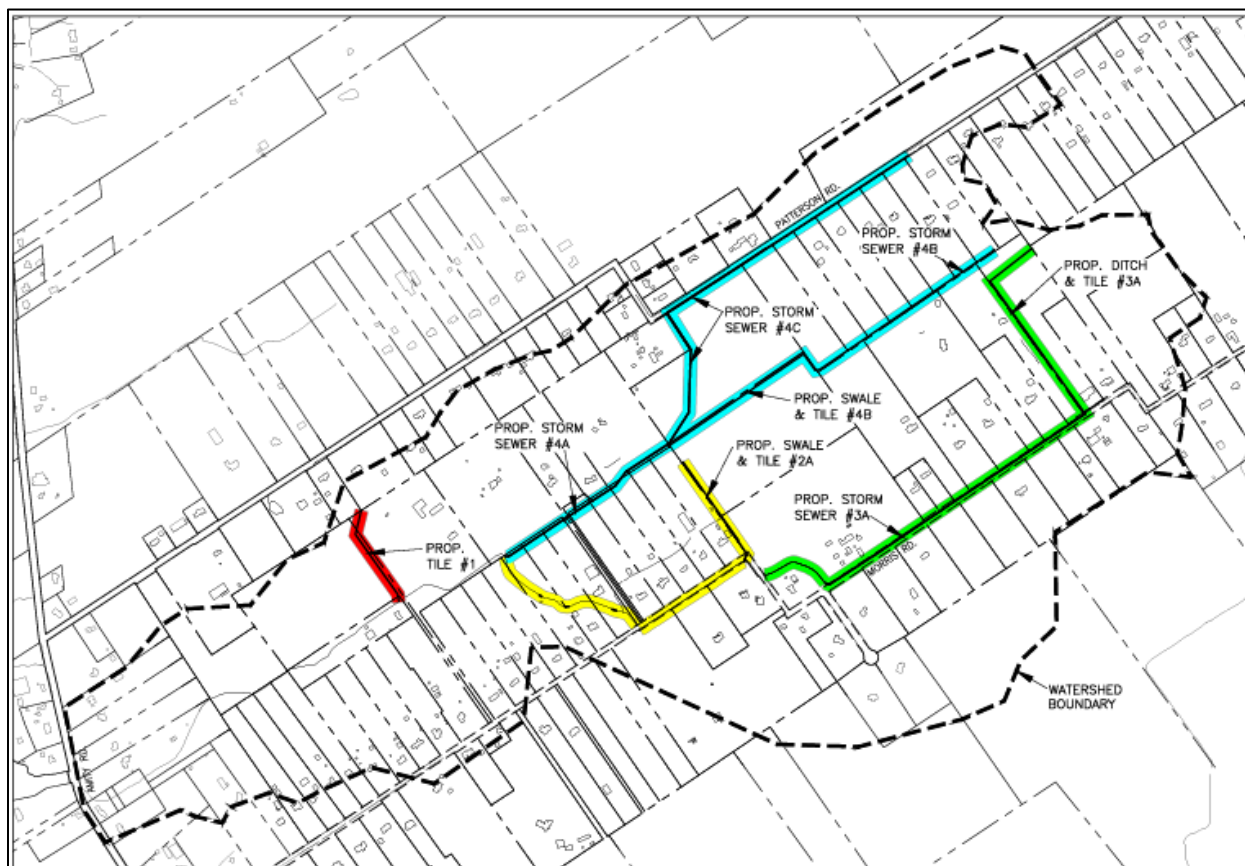


Figure 1: Mando Ditch Watershed Drainage Improvement Overview Map

Area 1 involves the installation of 1,400 feet of drainage tile in the northwest portion of the watershed. This drainage tile will outlet to the existing Patterson Ditch on Parcel ID 120-001028. The Area 1 sub-basin watershed is approximately 48.2 acres.

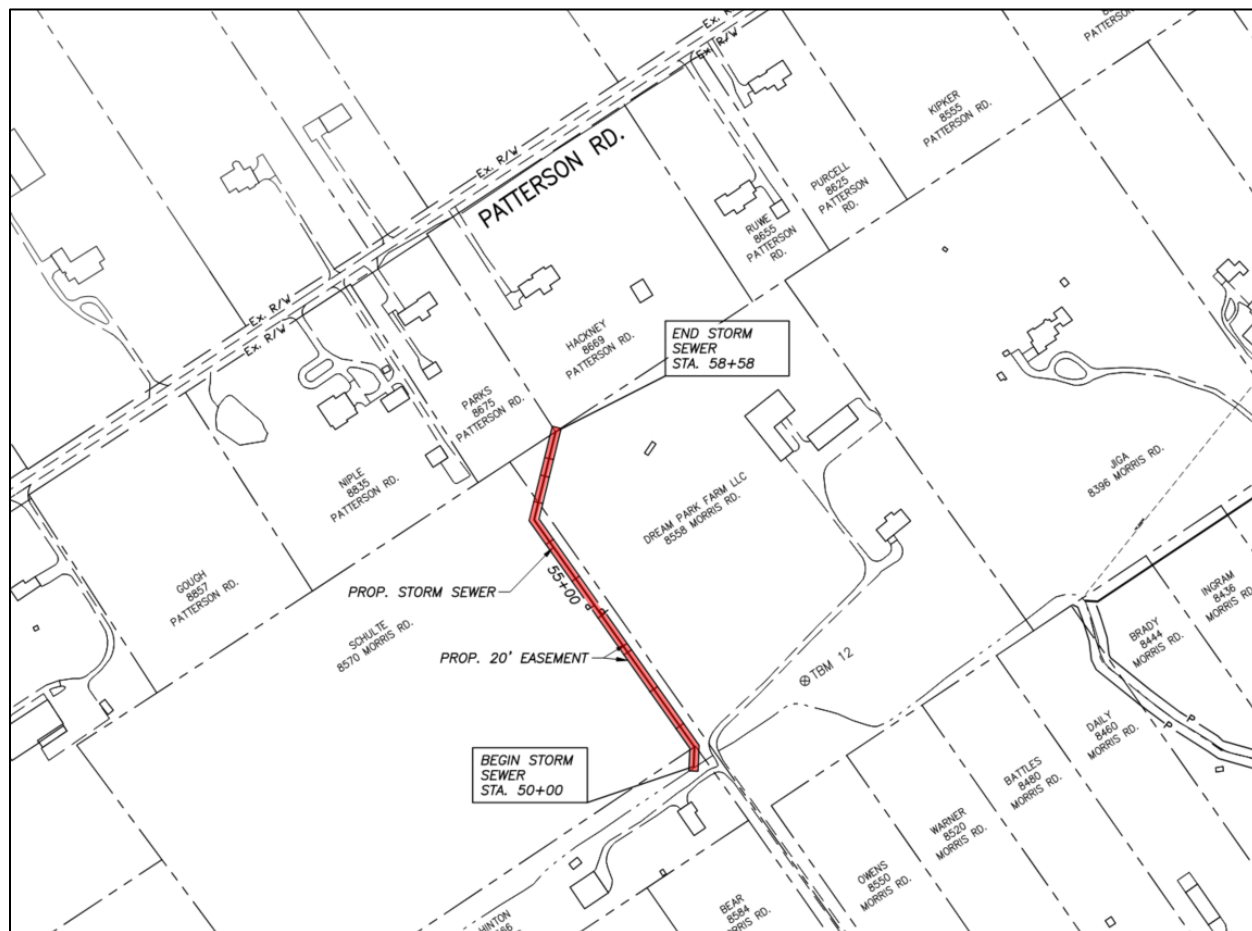


Figure 2: Area 1 proposed drainage improvements

Area 2 involves the construction of 780 feet of open ditch, the installation of 984 feet of storm sewer, and 2,367 feet of restoration of existing open ditch. These proposed improvements will also improve the road drainage along a portion of Morris Road. Area 2 is focused in the southwest portion of the watershed. The Area 2 sub-basin watershed is approximately 142.7 acres.

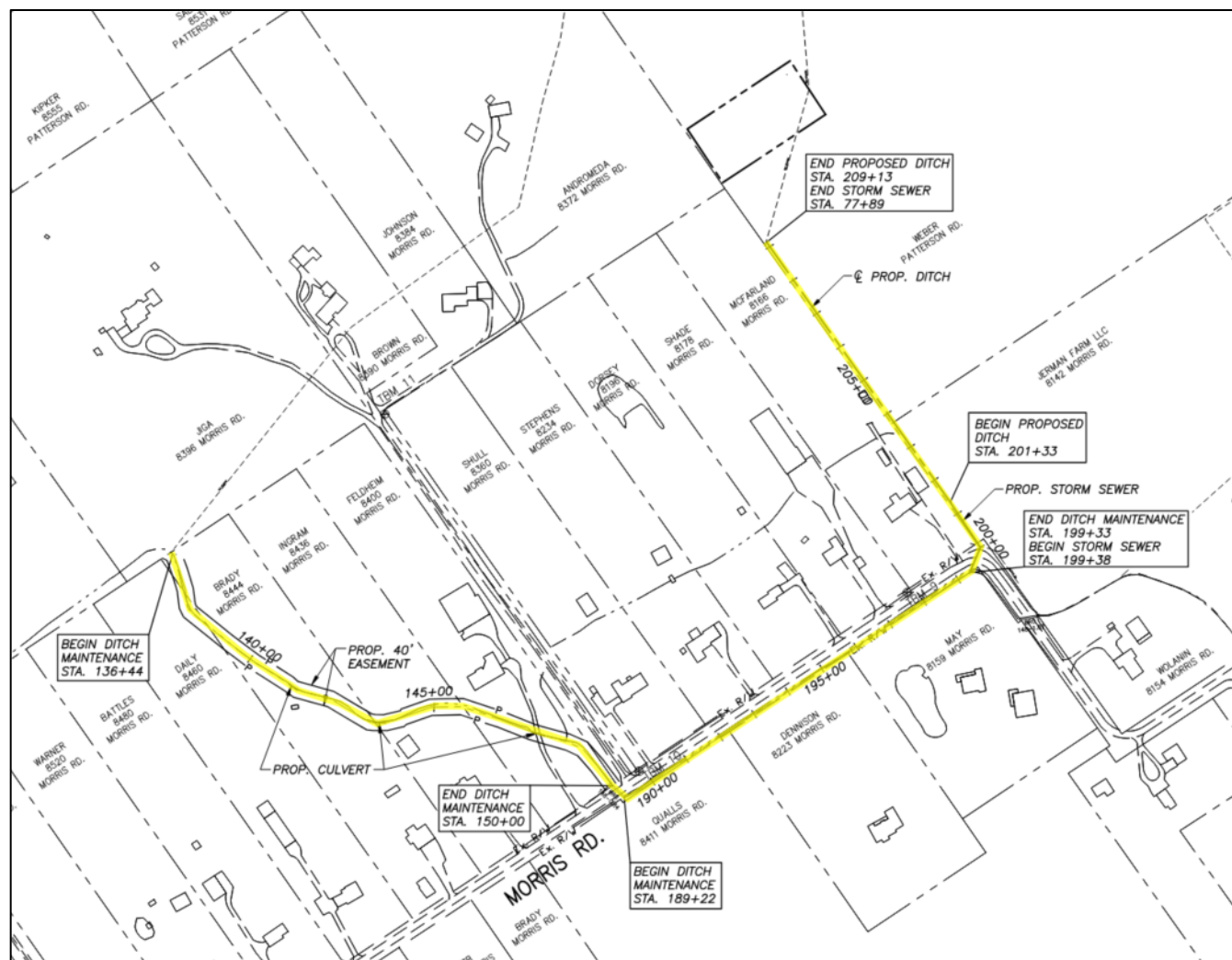
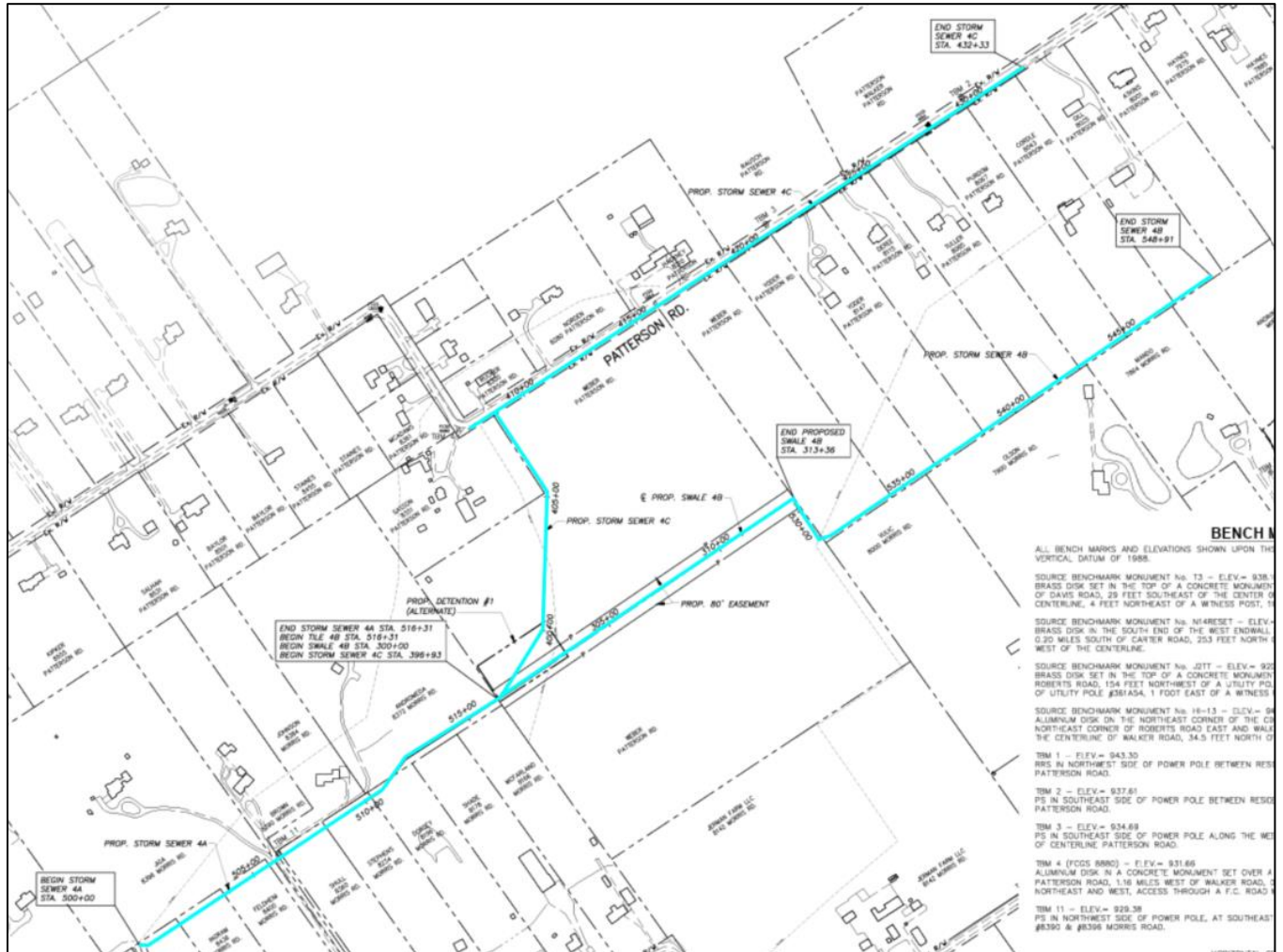


Figure 3: Area 2 proposed drainage improvements

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Area 4, in the northeast portion of the watershed, involves the construction of 2,929 feet of drainage swale, 1,745 feet of drainage ditch, 2,843 feet of storm sewer, and 3,241 feet of drainage tile. Area 4 also includes an optional detention basin, referred to as Detention #4 in the plans, and it is included as an Alternate. It is located on Parcel ID 120-000982. Area 4 is located in the northeast portion of the Mando watershed. The Area 4 sub-basin watershed is approximately 127.2 acres.

Figure 5: Area 4 proposed drainage improvements



All disturbed areas will be returned to the pre-construction condition or seeded and mulched.

Environmental Impact

The total number of trees proposed for removal includes 5 in Area 1, 2 trees and 4 stumps in Area 2, none in Area 3, and 2 in Area 4. This does not include any trees that may be removed within the ditch maintenance limits. Tree removal in the sections of ditch maintenance would be limited to what is necessary to increase the hydraulic

capacity of the ditch, mainly trees growing with the bed or banks of the ditch or as needed to install the proposed driveway culverts. Ohio Department of Natural Resources recommended planning tree cutting activities between October 1 and March 31 for the protection of the Indiana bat (*Myotis sodalis*), a state endangered and federally endangered species, the northern long-eared bat (*Myotis septentrionalis*), a state endangered and federally endangered species, the little brown bat (*Myotis lucifugus*), a state endangered species, and the tricolored bat (*Perimyotis subflavus*), a state endangered species. To the extent possible, the Franklin County Engineer's Office will plan construction to best align tree cutting within this window.

In its review of the Mando Ditch Drainage Improvement plans, Ohio Department of Natural Resources stated that due to the no in-water work proposed in a perennial stream, the project is not likely to impact state and federal endangered mussel and fish species.

A full watershed-scale analysis was performed of the Big Darby Creek from the point where the existing Patterson Ditch enters the Big Darby Creek. The total Big Darby Creek watershed upstream of the convergence with Patterson Ditch is 232 square miles, according to Stream Stats. The Mando Ditch watershed is approximately 1 square mile, or 0.43% of the total Big Darby Creek Watershed up to that point.

Increased runoff due to artificial drainage has the potential to increase flow rates downstream and decrease base flow rates during dry periods. However, in some cases, surface runoff and erosion may be reduced due to artificial drainage systems that more efficiently remove water from the soil profile. By lowering the water table, these systems allow the soil to dry out more effectively between precipitation events, resulting in reduced antecedent moisture conditions. With the soil being less saturated prior to rainfall, its capacity for water infiltration increases when precipitation occurs. This limits the amount of water available for overland flow during these high precipitation events, thereby reducing surface runoff volumes and the potential for soil erosion.

Optional Dry Detention Basins

At the recommendation of the Ohio Department of Natural Resources following its review of the Mando Ditch Drainage Improvement plans, the Franklin County Engineer's Office evaluated the feasibility of incorporating dry detention basins into the project. Since no improvements are proposed that alter the impervious area in the watershed, there are no regulations addressing the release rate for the proposed basins and are therefore no requirements by current development standards to

reduce the release rate. Two potential locations were identified on Parcel IDs 120-001040 and 120-000982. The estimated construction costs for the basins in Area 3 and Area 4 are approximately \$173,000 and \$184,000, respectively. This estimate includes excavation, topsoil, concrete channel work, and related items, but did not include land acquisition costs, which would be an additional cost on the project. The Franklin County Engineer's Office requested funding support from the Ohio Department of Natural Resources; however, the request was declined. Given the high construction costs that would ultimately be assessed to private property owners, along with the limited anticipated benefit due to minimal elevation change within the watershed, the basins are shown in the plan set but are not recommended by the Franklin County Engineer's Office and not included in the proposed assessment schedule. A full analysis of the detention basins can be found in Appendix A.

Cost Estimate

Project Estimate: Area 1

Engineering Design	\$8,943.82
Area 1 Construction	\$155,927.00
Construction Administration and Inspection	\$7,796.35
Drainage Maintenance (ORC 6137 – First Year Start Up)	\$3,898.18
TOTAL PROJECT ESTIMATE	\$176,565.34

The cost for the proposed improvements in Area 1 is distributed as approximately \$3,663.18 per acre.

Project Estimate: Area 2

Engineering Design	\$19,100.95
Area 2 Construction	\$333,007.00
Construction Administration and Inspection	\$16,650.35
Drainage Maintenance (ORC 6137 – First Year Start Up)	\$8,325.18
TOTAL PROJECT ESTIMATE	\$377,083.47

Of the total estimated cost, \$36,920.00 will be directly assessed to Brown Township for the work within the Morris Road right-of-way in Area 2. The total assessments for parcels benefiting from Area 2 improvements, not including the direct assessments listed above, are estimated at \$340,163.47. The cost for the proposed improvements in Area 2 is distributed as approximately \$1,208.99 per acre when considering sub-basin Areas 2 and 3 benefit.

Project Estimate: Area 3

Engineering Design	\$67,470.52
Area 3 Construction	\$1,176,285.00
Construction Administration and Inspection	\$23,525.70
Drainage Maintenance (ORC 6137 – First Year Start Up)	\$29,407.13
TOTAL PROJECT ESTIMATE	\$1,296,688.35

Of the total estimated cost, \$621,800.00 will be directly assessed to Brown Township for the work within the Morris Road right-of-way in Area 3. The total assessments for parcels benefiting from Area 3 improvements, not including the direct assessments listed above, are estimated at \$674,888.35. The cost for construction and land acquisition for the optional dry detention basin has been omitted from the estimate. The cost for the proposed improvements in Area 3 is distributed as approximately \$7,663.64 per acre.

Project Estimate: Area 4

Engineering Design	\$109,795.72
Area 4 Construction	\$1,914,185.00
Construction Administration and Inspection	\$38,283.70
Drainage Maintenance (ORC 6137 – First Year Start Up)	\$47,854.63
TOTAL PROJECT ESTIMATE	\$2,110,119.04

Of the total estimated cost, \$574,690.00 will be directly assessed to Franklin County for the work within or directly improving Patterson Road right-of-way in Area 4. The total assessments for parcels benefiting from Area 4 improvements, not including the direct assessments listed above, are estimated at \$1,535,429.04. The cost for construction and land acquisition for the optional dry detention basin has been omitted from the estimate. The cost for the proposed improvements in Area 4 is distributed as approximately \$16,588.98 per acre.

Calculation of Assessments

The Ohio Revised Code instructs the County Engineer to calculate the assessments to individual property owners based on the benefits received from the improvements for the various properties within the watershed. The Ohio Revised Code further defines benefits as:

Advantages to land and owners, to public corporations as entities, and to the state resulting from drainage, conservation, control and management of water, and environmental, wildlife, and recreational improvements.

Assessments to individual parcels have been calculated using the following formula, a rationale that is widely used throughout the state of Ohio:

- $(\text{Acres Benefited}) \times (\text{Land Use Factor}) \times (\text{Percent of Improvement Used}) \times (\text{Remote Factor}) = (\text{Individual Parcel Assessment Factor})$

Each parcel's assessment is then determined by:

$(\text{Individual Parcel Assessment Factor}) \div (\text{Total of all Individual Assessment Factors}) \times (\text{Total Construction Cost}) = (\text{Individual Parcel Assessment})$

The project is divided into four sub-basin watershed areas based on the proposed improvements. Assessments were calculated separately for each area, using only the parcels that would benefit from the improvements in that area. Some parcels cross sub-basin boundaries and are therefore included in more than one area's assessment calculation. As a result, both the individual area assessments and the parcel's total assessment should be reviewed. Additionally, because the proposed improvements in Area 3 flow into the proposed improvements in Area 2, the parcels within the Area 3 watershed were included in the calculation of assessments for Area 2.

Explanation of Factors:

- Acres Benefited
 - Total number of acres within a given parcel that contribute drainage to the watershed.
- Land Use Factor
 - The relative benefit to parcels of drainage is based on the amount of increased stormwater runoff resulting from the land use of the parcel. For these calculations, land use is classified as one of the following: Agricultural, Residential, Residential Residual, Industrial / Commercial / Right of Way, or Wooded.
- Percent of Improvement Used
 - The point at which drainage from a given parcel enters the proposed improvement. Parcels that are further upstream of the improvement are weighted more than parcels downstream because the upstream parcels use more of the improvement.
- Remote Factor
 - The remote factor is based upon a parcel's proximity to the improved section of the drainage course and have been established in 0.1-mile increments. Parcels that are most "remote" from the actual improvement receive the greatest reduction on their assessment.

Drainage Maintenance Assessments in Perpetuity

Per Ohio Revised Code Section 6137.03, the improvements will be placed on the Franklin County drainage maintenance program in perpetuity. An annual assessment will be placed on the tax duplicates of the benefiting parcels identified in the schedule of assessments. The Franklin County Engineer's Office recommends an annual maintenance assessment of 3% of the total construction cost, distributed in the same manner as the construction assessments.

Cost-Benefit Analysis

One of the primary factors set forth for consideration in the approval or dismissal of a petition request is the benefit of the proposed improvements to the watershed in question. The following analysis examines this factor from the standpoint of the value of drainage to residential parcels, health and safety for residents in the area, and land productivity for the agricultural acres.

The increased value or benefit for residential parcels is typically found in two ways: the increased marketability of the home and the functionality of the home sewage treatment system and associated drainage needs. Approximately 246 acres in the sub-basin watersheds are residential in nature. When evaluating the cost of providing adequate drainage outlets for residential properties, we find that for new construction, developers or homebuilders spend on average \$3,700.00 per lot to attain adequate drainage infrastructure within a development. With 52 residential parcels in the watershed, the potential total benefit is \$192,400.00. While this analysis does not consider many potential variables, it could aid in the decision-making process.

Our records indicate that the watershed contains eight discharging home sewage treatment systems (HSTS). The flooding of any HSTS is problematic because it prevents the aerobic processes from taking place and break down the pathogens in the waste. If the system floods, there are significant risks involved with human sewage contaminating the land, groundwater, and surface water. Human sewage contains high levels of bacteria and viruses that when released untreated, pollute nearby watercourses, affect aquatic life, contaminate land used for food production, and risk infection and disease to humans and animals from contact with the sewage. According to a study completed by J. C. Lance and C. P. Gerba in 1983, pathogens are able to travel much further in saturated soil than in unsaturated soil, allowing more opportunity for the pathogens to reach groundwater.

The aerobic treatment units present require mechanical aeration, which uses an electric-powered motor. When there is flooding near the HSTS, the motor is tripped to run more frequently to process the additional water, causing the motor to run until failure. When it fails and the soil is too saturated, the water levels will continue to rise, possibly leading to the wastewater backflow to the lowest plumbing fixture in the house. Locally, the cost to construct an alternate sewage treatment system, should the existing system fail, is approximately \$30,000 on average.

It would also be reasonable to consider the cost of environmental degradation due to residential sewage treatment systems that may not be functioning properly. Those flows include wastewater from discharging home sewage treatment systems. The improvement would reduce the amount of sediment, nutrients, and bacteria entering the Big Darby Creek resulting from malfunctioning HSTS units and agricultural crop field surface runoff erosion.

The proposed drainage improvement will improve the agricultural drainage, reducing tile blowouts in the field and improving farming conditions. A publication by The Ohio State University Extension titled "Returns to Farm Drainage" details several studies conducted by Ohio State researchers on the effects of drainage on crop yields. The

studies show that fields with good drainage will produce higher yields than fields that have poor drainage. A 25-year study showed that subsurface drainage increased corn yields by 24%-39% and increased soybean yields by 13%-46%. This produces average yield increases of 31% and 29% respectively. The benefits of drainage will then equal this increased yield multiplied by the market price.

Approximately 357.6 acres of the sub-basin watersheds are used for agricultural purposes. The 2025 average market price for corn and soybeans in Ohio, as reported by the USDA National Agricultural Statistics Service is \$4.25 per bushel for corn and \$10.60 per bushel for soybeans. The average estimated yield increases for the soil types present in the watershed, with appropriate drainage improvements in place, is about 50 bushels per acre for corn and 15 bushels per acre for soybeans.

Crop Production Benefit examples:

Corn

(50 Bushel per acre increase in yield) X (\$4.25 per bushel) X (357.6 acres) = \$75,990.00 increase annually.

Soybeans

(15 Bushel per acre increase in yield) X (\$10.60 per Bushel) X (357.6 acres) = \$56,858.40 increase annually.

For this example, we will assume that cropland acres are distributed equally between corn and soybeans, for a potential average annual increase of \$66,424.20. If this potential annual return is multiplied over a 15-year period, the benefit equals \$996,363.00. While this example does not take into consideration individual farm management practices, it does illustrate the fact that good agricultural drainage is a key factor in farm profitability and would reflect positively when considering a cost/benefit analysis for this project.

The benefits of this proposed project will be realized well beyond the construction repayment term. As previously stated, the construction assessments would be placed on the property tax bills of the benefited landowners and can be spread over a maximum of fifteen years. Alternatively, assessments can be paid in full within thirty days after the close of the final hearing without paying interest. The long-term benefits will be realized by virtue of this project being placed on the Franklin County Drainage Maintenance Program in perpetuity per Ohio Revised Code Chapter 6137, which requires maintenance funds to be collected semi-annually or as needed, similar to

the construction costs. These maintenance funds are applied to the annual inspection and maintenance of this specific project.

Aside from the monetary costs associated with this project, other costs include temporary land use disruption during construction and vegetation removal in some areas. If the Alternate plans are approved with the basins included, there will be a cost associated with land acquisition due to the property owner fully losing function of their property.

If this petition is dismissed at the final hearing and the project is not constructed, the existing agricultural tile used as an outlet will continue to deteriorate and will eventually fail completely. When it fails, surface flooding on the residential properties will continue to occur. Failure to construct the improvements in Area 4 would leave upstream drainage problems unaddressed, resulting in stormwater being conveyed to Area 2 and increasing the potential for flooding of properties within that area.

Alternative Funding Options

The Franklin County Engineer's Office considered applying for H2Ohio funding when the grant program was extended to include all of Ohio. However, the H2Ohio grant would be to fund conservation ditches. The proposed plan does not include the use of conservation ditches because the improvements are either within the road right of way or on private property – majority residential, neither of which are suitable locations for overwide conservation ditches.

Conclusion

A decision to move forward with Areas 1, 2, and 4 can be made independent of any other area of the proposed project. However, the approval of Area 3 is contingent on the approval of Area 2 because Area 3 flows into Area 2. Thus, a decision to deny Area 2 will necessitate the denial of Area 3. Additionally, the Alternate plans (addition of dry detention basins) for both Area 3 and 4 can be included in the approval, however the schedule of assessments would need to be amended to reflect the added cost of basin construction and land acquisition.

The Franklin County Engineer's Office has hosted multiple public informational meetings regarding the Mando Petition, most recently meetings held for each project section between the dates of April 28 – May 7, 2026. The comment forms submitted to the County after these meetings have been provided to the Board for consideration.

Based on all information gathered and analyses completed for this project, the Franklin County Engineer's Office believes the proposed improvement is technically

feasible and would adequately address the drainage needs within the project area. The estimated parcel assessments for Areas 1, 2, and 4 are within the range that can reasonably be expected for a project of this scope. However, Area 1, 3 and 4 are associated with comparatively high projected assessment values and has generated significant opposition from affected landowners. Therefore, the Franklin County Engineer's Office recommends approval of Area 2 and dismissal of Areas 1, 3 and 4. The testimony provided to the Board of Commissioners by the landowners regarding whether the benefits of the proposed improvement outweigh its costs should be given significant consideration when determining whether to proceed with the project.

A resolution affirming the order to proceed detailing the approved areas of work, confirming the schedule of assessments, and ordering the project to be advertised for competitive bid per Ohio Revised Code Chapter 6131 will be necessary. The resolution by the Board of Commissioners shall also determine how long a period of time, in semiannual installments as taxes are paid, shall be given to the owners of land benefited to pay the construction assessments.

Prepared by,



8/27/2026

James Ramsey, P.E.
Riparian and Environmental Engineer
Franklin County Engineer's Office

Approved by,



8/27/2026

Adam W. Fowler, P.E., P.S.
Franklin County Engineer
Franklin County Drainage Engineer

Appendix A

Mando Ditch Petition Preliminary Engineering Study

Appendix B

Mando Ditch Petition Exhibits