



McArthur Municipal Drain 2024

March 8, 2024

Prepared for:



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Kitchener, Ontario
March 8, 2024

To the Mayor and Members of Council:

**Re: McArthur Municipal Drain
Municipality of Morris-Turnberry
Our Reference No. MT-004**

Headway Engineering is pleased to provide its report for the **McArthur Municipal Drain 2024** in the Municipality of Morris-Turnberry (Morris Ward).

The preparation of this report was authorized by a resolution of the Council of the Municipality of Morris-Turnberry on November 21, 2023, per Section 78 of the Drainage Act.

The primary objective of this report is to enclose the existing open ditch on the Huether Holdings Ltd. Property (Roll No. 9-050), and on the Hydro One Networks Inc. property (Roll No. 10-900), by means of the installation of a new tile drainage system, designed to today's standards of drainage.

A summary of the assessments for this project are as follows:

| | |
|------------------------------------|------------------|
| Municipal Lands | \$360 |
| Privately Owned Non-Agricultural | \$16,321 |
| Privately Owned Agricultural | \$112,319 |
| Total Estimated Assessments | \$129,000 |

Yours truly,

Stephen Brickman, P.Eng.
Project Engineer and Manager

Michel Terzian
Project Coordinator
HEADWAY ENGINEERING

SB/





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SPECIFICATIONS FOR THE CONSTRUCTION OF MUNICIPAL DRAINAGE WORKS

1.0 INTRODUCTION AND LOCATION

The Council of the Municipality of Morris-Turnberry has appointed Headway Engineering to investigate a request for drainage improvements, specifically to enclose a section of the existing McArthur Municipal Drain (Open) . The project services parts of Lots 22 to 25, Concession 9, and parts of Lots 23 and 24, Concession 10, in the Municipality of Morris-Turnberry, Morris Ward.

The drainage area comprises of approximately 91.5 hectares, and land uses within the watershed include agricultural, woodlots, roads, and some residential.

The attached Plans, Profiles and Details; Drawing Numbers 1 to 3, show and describe in detail the location and extent of the work to be completed and the lands which are affected.

2.0 PROJECT AUTHORIZATION

Authority to prepare this report was obtained by a resolution of the Council of the Municipality of Morris-Turnberry at its November 21, 2023, meeting to appoint Headway Engineering to prepare an Engineer's Report under Section 78 of the Drainage Act.

3.0 DRAINAGE HISTORY

3.1 McArthur Municipal Drain (1924)

The McArthur Municipal Drain was originally constructed under the authority of a report prepared by John Roger, O.L.S., dated March 24, 1924. This report authorized the deepening and widening of approximately 2,500m of existing open ditch (Main Drain Open), the installation of approximately 1,200m of 150mm to 350mm diameter tile on the Main Drain (Closed), the installation of approximately 420m of 150mm to 250mm diameter tile for Branch 1, and 178m of 150mm diameter tile for Branch 2.

3.2 McArthur Municipal Drain (1965)

The McArthur Municipal Drain report, prepared by James A. Howes, O.L.S., dated December 15, 1965, authorized the cleanout of approximately 3,670m of existing open ditch and the replacement of the culvert through the Canadian Pacific Railway crossing with a 600mm diameter corrugated steel pipe (CSP).

3.3 McArthur Municipal Drain (1986)

A third report was prepared by David G. Johnson, P.Eng, dated August 14, 1986, authorizing the cleanout of the Main Drain (Open) from the Murray-Lamb Municipal Drain in Lot 34, Concession 14, in the Municipality of Huron East (McKillop Ward) upstream approximately 2,442m to the upper end of the drain in Lot 22, Concession 9, in the Municipality of Morris-Turnberry (Morris Ward).



3.4 McArthur Municipal Drain (2003)

The latest drainage report was prepared by W. J. Dietrich, P.Eng., dated February 10, 2003, authorizing the cleanout of approximately 327m of Main Drain (Open), beginning on Lot 22, Concession 9, and extending to the downstream end of the existing culvert through Walton Road. The report also called for the installation of approximately 837m of 300mm to 500mm diameter tile on Main Drain (Closed), replacing the existing culvert through Walton Road with a new 1200mm diameter corrugated metal pipe, installing approximately 495m of 200mm to 350mm diameter tile on Branch 1, and approximately 30m of 200mm diameter pipe road crossing on a new Branch 2, through Walton Road.

4.0 PUBLIC MEETINGS AND ENGAGEMENTS

4.1 On-Site Meeting

In accordance with Section 9(1) of the Drainage Act, an on-site meeting was held on February 1, 2024, at the Council Chambers of the Municipality of Morris-Turnberry Municipal Office (41342 Morris Road, Brussels). Persons in attendance were:

| | |
|--------------------------|---|
| Stephen Brickman, P.Eng. | Headway Engineering |
| Michel Terzian | Headway Engineering |
| Kirk Livingston | Municipality of Morris-Turnberry, Drainage Superintendent |
| Trevor Hallam | Municipality of Morris-Turnberry, Clerk |

Landowners included:

| | | |
|----------------------|---------------------------|-------------------------|
| John Huether | Breanna Rozon (Hydro One) | Matey Matev (Hydro One) |
| Fred & Heidi McClure | Greg Gowan (Hydro One) | Paul Kirby |

Prior to the on-site meeting, discussions with the landowner who made the request under Section 78 to initiate the project, provided information on what the landowner would specifically like to improve on the existing drainage system. As a result, some preliminary design work, associated cost estimates and proposed distributions of those costs were prepared ahead of the meeting, and presented to those who attended the On-site meeting.

The information provided at the meeting included preliminary details on the proposed enclosure of the existing open ditch and installation of a new tile drain system on part of Lot 22, Concession 9.

All meeting materials were posted to the Headway Engineering website following the meeting, and all parties invited to attend the meeting were provided with access instructions to the meeting materials.

5.0 FINDINGS

The following summarizes Headway Engineering’s findings based on the information collected during field investigations, surveys, public engagements, and review of documentation:

5.1 Watershed Condition (Hydrology):

- The watershed was established through the analysis of tile drainage maps, previous engineers’ reports for surrounding systems, field investigations, surveys, and data analysis



of the Southwestern Ontario Orthophotographic Project (SWOOP). The drainage area comprises of approximately 91.5 hectares.

- Land uses within the watershed are as follows:
 - Agricultural: 70.9 hectares (77.5%)
 - Woodlot: 18.6 hectares (20.3%)
 - Roads: 1.4 hectares (1.5%)
 - Residential: 0.6 hectares (0.7%)
- The Ontario Ministry of Agriculture, Food and Rural Affairs' Agricultural Information Atlas describes the soil types within the watershed and along the route of the drain as loam.

5.2 Existing Drainage System:

- The existing open ditch affected by the proposed enclosure, was last cleaned out under the authority of a report prepared by W. J. Dietrich, P.Eng., dated February 10, 2003.
- The existing Main Drain (Closed), Branch 1 and Branch 2, were constructed under the authority of a report prepared by W. J. Dietrich, P.Eng., dated February 10, 2003.
- According to the 2003 report, the design standard for the closed portions of the McArthur Municipal Drain (2003) is 25mm of rainfall per 24 hours drainage coefficient.
- The existing 1200mm diameter CSP culvert through Walton Road, installed under the authority of the 2003 drain report, is of sufficient size and depth to drain upstream lands at today's standard of drainage.

5.3 Outlet:

- The outlet for the proposed tile drainage system is into the McArthur Municipal Drain (Open), on the north side of Walton Road.
- The eventual outlet for the McArthur Municipal Drain (Open) is the Murray-Lamb Municipal Drain in Lot 34, Concession 14, in the Municipality of Huron East.

5.4 Other noted findings:

- Approximately 142m of the 299m of ditch to be enclosed is on the Hydro One Networks Inc. property (Roll No. 10-900-00).
- The hydro tower located at Sta. 0+125 is straddling the open drain with tower legs on both the north and south banks of the ditch.
- Historical aerial photography indicates that the open ditch in this location pre-dates the hydro tower.
- Hydro One has requested that the ditch enclosure below and around their tower be completed by their forces, and/or under their procurement.



5.5 Environmental Requirements:

- The Maitland Valley Conservation Authority (MVCA) has indicated that a permit to alter a watercourse is required.
- The Department of Fisheries and Oceans (DFO) has provided a Letter of Advice, dated June 19, 2023, authorizing the proposed enclosure of the existing open ditch upstream of Walton Road.

6.0 DESIGN CONSIDERATIONS

The proposed drainage system is sized using the Drainage Coefficient method contained in the OMAFRA Publication 29 - 'Drainage Guide for Ontario'. The Drainage Coefficient describes a depth of water to be conveyed by the drainage works per a 24-hour period and is expressed in millimeters per 24 hours. The drainage coefficient design standard used for the works proposed in this report is 38mm per 24-hour period. This design standard is sufficient in conveying flows from the existing upstream drainage system constructed under the authority of the 2003 report. The existing tile drainage system installed under the 2003 report, was designed using a 25mm per 24 hour drainage coefficient.

The existing open ditch configuration forms an 'L' shape containing a north-south and an east-west segment, while the proposed tile drain alignment shall consist of one segment from the north road limit of Walton Road, directly to the upstream end of the existing open ditch.

Pipe materials were selected based on location and intended land uses adjacent to the drainage system.

Surface water inlets have been placed purposefully to receive surface flow and allow for subsurface tile connections. Likewise, the elevation of the pipe system is designed to provide for subsurface tile connections at, and between surface water inlets.

7.0 ENVIRONMENTAL CONSIDERATIONS AND PERMITTING

7.1 Department of Fisheries and Oceans (DFO)

The work proposed under this report primarily consists of the enclosure of an existing open ditch and the new construction of a closed drainage system.

The affected portions of the existing open ditch are classified as 'Not Rated' according to the DFO's drain classification system.

A Request for Review application was submitted to the DFO on May 17, 2023 by Headway Engineering. The application proposed the enclosure of the open ditch with a more direct configuration of a proposed tile drainage system.

Upon DFO's completion of their review, DFO provided correspondence on June 19, 2023, in the form of a Letter of Advice indicating that authorization under the Fisheries Act was not required, provided that the project incorporates the mitigation measures noted in DFO correspondence.



7.2 Ministry of Natural Resources and Forestry (MNR)

Headway Engineering completed a review of the Natural Heritage Information Centre mapping for Species At Risk in Ontario. Provincial Species at Risk requiring special consideration were not identified in the working area.

7.3 Maitland Valley Conservation Authority (MVCA)

The MVCA has been included on the circulation list for this report and has been invited to all public engagements. Upon review of the design drawings, the MVCA forwarded correspondence dated February 23, 2024 that indicates that a permit to alter a watercourse is required.

A permit application was submitted on March 6, 2024.

8.0 RECOMMENDATIONS

Headway Engineering recommends the following:

1. Approximately 299m of Main Drain (Open) on Lot 22, Concession 9, north of Walton Road, be enclosed.
2. A new municipal tile drainage system be installed from an outlet into the Main Drain (Open) from approximately the north road limit of Walton Road, upstream approximately 225m, through the Hydro One Networks Inc. property (Roll No. 10-900-00) and the Huether Holdings Ltd. Property (Roll No. 9-050-00), to where the existing Main Drain (Closed) enters Main Drain (Open), on Lot 22, Concession 9.
3. The tile drainage system consists of approximately 225m of 600mm diameter concrete tile and HDPE pipe.
4. No new construction through Walton Road is required, aside from the placement of rip-rap erosion protection within the road allowance.
5. No work is required on the existing Main Drain (Open) downstream of Walton Road.
6. The section of new tile drain through the Hydro One Networks Inc. property, approximately 42 metres in length, shall consist of high density polyethylene pipe (HDPE) per Hydro One's request.
7. The proposed tile drainage system shall be designed to convey flows from the watershed using a design standard of 38mm per 24-hour period Drainage Coefficient.
8. After the construction of the new tile drainage system, approximately 299 metres of the existing Main Drain (Open) on the Hydro One Networks Inc. property (Roll No. 10-900-00) and the Huether Holdings Ltd. property (Roll No. 9-050-00), on Lot 22, Concession 9, shall be abandoned under Section 19 of the Drainage Act.
9. This new tile drainage system shall be known as part of the **McArthur Municipal Drain 2024**.



9.0 SUMMARY OF PROPOSED WORKS

The proposed work consists of:

1. The installation of approximately 42m of 600mm diameter HDPE pipe through the Hydro One Networks Inc. property, and the installation of approximately 183m of 600mm diameter concrete field tile on the Huether Holdings Ltd. property.
2. The installation of a 1200mm x 2000mm concrete catch basin at Sta. 0+225.
3. Connect the existing tile drainage system installed under the 2003 McArthur Drain report and the existing 600mm diameter CSP culvert into the proposed catch basin at Sta. 0+225.
4. The enclosure of approximately 299m of Main Drain (Open) on Lot 9, Concession 22.

10.0 WORKING AREA AND ACCESS

Access to the working area shall be from Walton Road.

The working area for the installation of the tile drainage system shall be an average width of 25m for construction purposes and an average width of 10m for maintenance purposes along the alignment of the proposed closed drain.

The working area for the enclosure of Main Drain (Open) shall be an average width of 10m on the primary working side of the existing ditch, and an additional 5m on the opposite side.

11.0 SCHEDULES

Four schedules are attached and form part of this report.

11.1 Schedule A – Schedule of Allowances

In accordance with Sections 29 and 30 of the Drainage Act, allowances are provided to Landowners for Right-of-Way and Damages to Lands and Crops. Schedule A contains a table of the applicable allowances to Landowners.

11.2 Schedule B – Schedule of Estimated Construction Costs

An itemized cost estimate of the proposed construction work is included in detail in Schedule B.

11.3 Schedule C – Schedule of Assessment for Construction

Schedule C provides details of the distribution of the total estimated costs of the construction of the municipal drain.

11.4 Schedule D – Schedule of Assessment for Maintenance

Schedule D provides details of the distribution of future maintenance costs for the municipal drain. Maintenance assessments are expressed as a percentage of the total maintenance. Lands located upstream of the maintenance shall be determined by the Drainage Superintendent and assessed according to this schedule.



12.0 ALLOWANCES

In accordance with Sections 29 and 30 of the Drainage Act, Allowances payable to Landowners are described below.

12.1 Allowances for Right-of-Way (Section 29)

The Right-of-Way allowance compensates the lands for the right to enter onto the land at various times for the purpose of inspecting the drainage system and conducting maintenance activities. The land value used for the Right-of-Way calculation is adjusted to account for the continued use of the land after construction.

The values used for calculating allowances for Right-of-Way are as follows:

| Land Use | Land Value | Adjustment Factor for Drainage Act Right-of-Way | Adjusted Land Value for Drainage Act Right-of-Way Allowance |
|--------------|-------------|---|---|
| Agricultural | \$60,000/Ha | 25% | \$15,000/Ha |

12.2 Allowances for Damages to Lands and Crops (Section 30)

Allowances for Damages to Lands and Crops under Section 30 of the Drainage Act, were primarily calculated to compensate landowners for crop losses, and land damages due to the construction of the drain and enclosure of the existing open ditch, including access to the working area.

It is anticipated that the working area will experience a complete crop loss in the year of construction, and a reduction in crop productivity for the following two years.

Area values used for calculating allowances for Damages are \$6,000/Ha.

Allowances for damages were provided to affected properties for the installation of the new tile drainage system as well as for the enclosure of the existing open ditch.

Allowances payable to Landowners are shown in Schedule A.

Total Allowances, under Sections 29 and 30 of the Drainage Act are \$9,450.

Allowances will be deducted from the total assessments in accordance with Section 62(3) of the Drainage Act.

13.0 ESTIMATED CONSTRUCTION COSTS

Headway Engineering has made an estimate of the cost of the proposed construction work. A detailed description of the construction costs can be found in Schedule B of this report.

| | | |
|--|-----------|---------------|
| Part A – McArthur Drain (including tile drain installation and open ditch enclosure) | \$ | 67,170 |
| Part B - Provisional Items | \$ | 7,030 |
| Total Estimated Construction Costs | \$ | 74,200 |



14.0 SUMMARY OF ESTIMATED PROJECT COSTS

The total estimated project costs are as follows:

| | |
|---|-------------------|
| Allowances under Sections 29 and 30 of the Drainage Act (Refer to Schedule A) | \$ 9,450 |
| Total Estimated Construction Costs (Refer to Schedule B) | \$ 74,200 |
| Hydro One – Engineering and administration related to Hydro One approval, including \$1,500 review fee | \$ 7,500 |
| Public engagements, survey, design and drafting, preparation of preliminary cost estimates and assessments, preparation of final drainage report, consideration of report | \$ 22,500 |
| Environmental Agency Consultations and Approvals, including permit fees | \$ 750 |
| Preparation of contract documents, contract administration, supervision and inspection of construction | \$ 7,500 |
| Contingencies, Interest and net H.S.T. | \$ 7,100 |
| TOTAL ESTIMATED PROJECT COSTS MCARTHUR MUNICIPAL DRAIN 2024 | \$ 129,000 |

The estimated cost of the work in the Municipality of Morris-Turnberry is \$129,000.

The above costs are estimates only. The final costs of construction, engineering and administration cannot be determined until the project is completed.

The above cost estimate does not include costs associated with defending the drainage report should appeals be filed with the Court of Revision, Drainage Tribunal and/or Drainage Referee. Should additional costs be incurred, unless otherwise directed, the additional costs would be distributed in a pro-rata fashion over the assessments contained in Schedule C and as may be varied under the Drainage Act.

15.0 ASSESSMENT

Headway Engineering assesses the cost of this work against the Lands and Roads as shown in Schedule C - Assessment for Construction.

Assessments were determined using the principles included in the 'Drainage Assessment Revisited' paper prepared by E.P. Dries and H.H. Todgham. These principles of assessment are recognized to be fair and equitable for determining cost distributions among those affected.

15.1 Benefit (Section 22)

Benefit assessment is applied to those properties receiving a benefit as defined in Section 1 of the Drainage Act which is extracted below:

Benefit means the advantages to any lands, roads, buildings or other structures from the construction, improvement, repair, or maintenance of a drainage works such as will result in a higher market value or increased crop production or



improved appearance or better control of surface or sub-surface water, or any other advantages relating to the betterment of lands, roads, buildings or other structures.

Typically, properties which have direct, or near direct access to the proposed drain receive Benefit as defined above.

15.2 Outlet Liability (Section 23)

Outlet Liability is distributed to all properties within the watershed area on an adjusted area basis. The areas are adjusted to accurately reflect equivalent run-off rates relative to other lands and roads within the watershed. Due to development, roads have been assessed higher Outlet Liability rates relative to agricultural lands.

15.3 Special Benefit (Section 24)

The Special Benefit instrument of assessment was used to assess the increased costs of enclosing the open ditch and installing a new tile drainage system to the property who requested that the open ditch be enclosed. This assessment tool is used to separate the increased costs to enclose the drain and the installation of a new tile drainage system from the normal costs, approximately equivalent to cleaning out the same segment of open ditch to be enclosed, twice under the maintenance program.

15.4 Special Assessment (Section 26)

Special Assessments apply to public utilities and roads which directly cause increased costs to the drainage works due to the existence and operation of the public utility or road.

Construction and administration costs, which are required solely because of the existence of the hydro utility, are fully assessed to Hydro One Networks Inc. The Special Assessment is calculated based on the actual construction costs of the proposed works, plus an allowance for administration as described below.

| Utility Name | Construction Costs | Plus Engineering Costs and Review Fee | Less Equivalent Drain Costs (Fixed) | Plus Interest, and Net HST | Special Assessment |
|-------------------------|--------------------|---------------------------------------|-------------------------------------|----------------------------|--------------------|
| Hydro One Networks Inc. | \$8,690 | \$7,500 | \$4,460 | \$1,035 | \$12,765 |

Hydro One Networks Inc. shall be assessed the actual increased costs of administration and of the work due to the presence of the Hydro One Tower and construction and operation of the new tile drainage system within the Hydro One Networks Inc. property as a Special Assessment.

16.0 GRANT ELIGIBILITY

The Province of Ontario provides grants towards assessments to eligible properties for drainage improvements which meet specified criteria. The provision of these grants for activities under the Drainage Act is called the Agriculture Drainage Infrastructure Program (ADIP).



The proposed works consist of enclosing an existing open ditch municipal drain and replacing it with a new tile drain that has more capacity than a single 300mm diameter corrugated plastic pipe.

As a result, the proposed works are not eligible for a grant according to the ADIP Part III: Policies, 2.3 f), therefore grants under the ADIP program are not available for the project.

17.0 ABANDONMENT OF EXISTING MUNICIPAL DRAINS

In accordance with Section 19 of the Drainage Act, the section of the existing open ditch to be enclosed, Sta. 0+000 to Sta. 0+299, existing ditch chainage (Drawing 3 of 3), shall be abandoned after the new closed drain is constructed.

18.0 MAINTENANCE

After completion, the portions of Main Drain (Closed) residing in the Municipality of Morris-Turnberry shall be maintained by the Municipality of Morris-Turnberry.

Maintenance of Main Drain (Closed) will be at the expense of all the lands and roads assessed in accordance with the attached Schedule D – Assessment for Maintenance, and in the same relative proportions until such time as the assessment is changed under the Drainage Act.



Schedule A

Allowances

Schedule of Allowances McArthur Municipal Drain 2024

| McArthur Municipal Drain | Property Details | | | | Drainage Act Allowances | | |
|-----------------------------|--------------------------------------|------------|-------------------------|-----------|-------------------------|--------------------|--------------------|
| | Part | | | Roll | Right of Way | Damages | |
| | Lot | Concession | Landowner | Number | (Sec. 29) | (Sec. 30) | Total Allowances |
| | 22 | 9 | Hydro One Networks Inc. | 10-900-00 | \$ 630.00 | \$ 1,910.00 | \$ 2,540.00 |
| | 22 | 9 | Huether Holdings Ltd. | 9-050-00 | \$ 2,750.00 | \$ 4,160.00 | \$ 6,910.00 |
| | Total Allowances | | | | | | |
| | McArthur Municipal Drain 2024 | | | | \$ 3,380.00 | \$ 6,070.00 | \$ 9,450.00 |



Schedule B

Estimated Construction Costs

Schedule of Estimated Construction Costs

We have made an estimate of the cost of the proposed work which is outlined in detail as follows:

Part A - McArthur Municipal Drain

| Description | Estimated Quantity | \$/Unit | Total |
|---|-----------------------|------------------------|------------------------------|
| <u>Existing Ditch Enclosure</u> | | | |
| 1) Cleanout existing ditch of all available topsoil and stockpile | 299 m | \$ 8.00 | \$ 2,392.00 |
| 2) Supply fill material for enclosure | 1,400 m ³ | \$ 10.00 | \$ 14,000.00 |
| 3) Placement of fill to backfill existing ditch (approx. 1,400m ³) | 299 m | \$ 13.00 | \$ 3,887.00 |
| 4) Place and grade topsoil on enclosed ditch | 299 m | \$ 15.00 | \$ 4,485.00 |
| Sub-Total - Ditch Enclosure | | | <u>\$ 24,764.00</u> |
| <u>Main Drain (Closed)</u> | | | |
| 5) Topsoil stripping (10m width) Sta. 0+000 to Sta. 0+091 | 91 m | \$ 10.00 | \$ 910.00 |
| 6) Supply 600mm diameter HDPE outlet pipe complete with rodent grate Installation including quarry stone rip-rap protection and geotextile filter material (Sta. 0+000 to Sta. 0+006) | 6 m l.s. | \$ 110.00 | \$ 660.00 \$ 3,000.00 |
| 7) Supply 600mm diameter HDPE pipe Installation (Sta. 0+006 to Sta. 0+042) | 36 m 36 m | \$ 110.00 \$ 105.00 | \$ 3,960.00 \$ 3,780.00 |
| 8) Supply 600mm diameter concrete field tile Installation (by wheel machine) (Sta. 0+042 to Sta. 0+225) | 183 m 183 m | \$ 65.00 \$ 45.00 | \$ 11,895.00 \$ 8,235.00 |
| 9) Supply and install 1200mm X 2000mm concrete catch basin at Sta. 0+225 (inline type) | l.s. | | \$ 6,966.00 |

| Description | Estimated Quantity | \$/Unit | Total |
|---|-----------------------|----------|---------------------|
| 10) Connect existing 600mm dia. laneway crossing and 500mm dia. CSP to new catch basin at Sta. 0+225, including the removal and off-site disposal of existing lower pipe lengths (approximately 6m per connection) and connections with new 600mm dia. HDPE pipes | l.s. | | \$ 2,000.00 |
| 11) Supply and place approved additional fill material over drain for increased cover (Sta. 0+012 to Sta. 0+091) | 100 m ³ | \$ 10.00 | \$ 1,000.00 |
| Sub-Total - Main Drain (Closed) | | | \$ 42,406.00 |

Total Estimated Construction Costs

Part A - McArthur Municipal Drain **\$ 67,170.00**

Part B - Provisional Items

A Provisional Item is an item that may or may not be required as a part of the Contract. The decision as to whether a Provisional Item will form part of the Contract will be at the discretion of the engineer at time of construction. Payment for Provisional Items will only be made for work authorized in writing by the Engineer. Payment for work performed under a Provisional Item shall be based on the Unit Price bid in the Scope of Work below.

- 1) Additional costs associated with installation of tile drain on 19mm diameter crushed clear stone bedding. This includes the supply and placement of all stone, and additional labour and equipment required for installation in accordance with the Typical Pipe Installation on wrapped Stone Bedding Detail.

| Description | Estimated Quantity | \$/Unit | Total |
|---------------------|-----------------------|----------|-------------|
| 600mm diameter pipe | 50 m | \$ 75.00 | \$ 3,750.00 |

- 2) Additional costs associated with installation of tile drain on 19mm diameter crushed clear stone bedding. This includes the supply and placement of all stone, and additional labour and equipment required for installation in accordance with the Typical Pipe Installation on Stone Bedding Detail (un-wrapped bedding).

| Description | Estimated Quantity | \$/Unit | Total |
|---------------------|-----------------------|----------|-------------|
| 600mm diameter pipe | 25 m | \$ 60.00 | \$ 1,500.00 |

| Description | Estimated Quantity | \$/Unit | Total |
|--|-----------------------|-----------|-------------|
| 3) Wheel machine lift outs due to stony conditions | 2 ea. | \$ 500.00 | \$ 1,000.00 |

4) Tile connections:

| Description | Estimated Quantity* | \$/Unit | Total |
|----------------|------------------------|-----------|-----------|
| 100mm diameter | 5 ea. | \$ 90.00 | \$ 450.00 |
| 150mm diameter | 2 ea. | \$ 100.00 | \$ 200.00 |
| 200mm diameter | 1 ea. | \$ 130.00 | \$ 130.00 |

*The Contractor shall be paid for the actual quantity of tile connections at the above fixed unit prices.

Total Estimated Construction Costs

Part B - Provisional Items \$ 7,030.00

Summary of Estimated Construction Costs

Part A - McArthur Municipal Drain \$ 67,170.00
Part B - Provisional Items \$ 7,030.00

Total Estimated Construction Costs \$ 74,200.00

Total Estimated Materials \$ 33,521.00
Total Estimated Labour and Equipment \$ 40,679.00

Total Estimated Construction Costs
McArthur Municipal Drain 2024 \$ 74,200.00



Schedule C

Assessment for Construction

**Schedule of Assessment for Construction
McArthur Municipal Drain 2024**

| | Property Details | | | | Drainage Act Instruments of Assessment | | | | For Information | | | | |
|--------------------------------------|-----------------------------------|------------|-----------------------------------|-------------|--|-------------------|----------------------------|---------------------------|------------------------------|------------------|-----------------|-----------------------|---------------|
| | Part Lot | Concession | Landowner | Roll Number | Approx. Ha. Affected | Benefit (Sec. 22) | Outlet Liability (Sec. 23) | Special Benefit (Sec. 24) | Special Assessment (Sec. 26) | Total Assessment | Less Allowances | Net Estimated Expense | |
| McArthur Municipal Drain | 22 | 9 | Hydro One Networks Inc. | 10-900-00 | | \$ 3,494.00 | \$ - | | \$ 12,765.00 | \$ 16,259.00 | \$ 2,540.00 | \$ 13,719.00 | |
| | 22 | 9 | Huether Holdings Ltd. | 9-050-00 | 12.5 | \$ 4,306.00 | \$ 627.00 | \$ 104,275.00 | | \$ 109,208.00 | \$ 6,910.00 | \$ 102,298.00 | |
| | 23 | 9 | David & Brenda Linton | 9-051-00 | 28.8 | \$ - | \$ 1,170.00 | | | \$ 1,170.00 | \$ - | \$ 1,170.00 | |
| | 24 | 9 | Huether Farms Inc. | 9-052-00 | 28.5 | \$ - | \$ 1,255.00 | | | \$ 1,255.00 | \$ - | \$ 1,255.00 | |
| | 24 | 9 | Kenneth Huether & Sarah Devereaux | 9-052-05 | 0.6 | \$ - | \$ 62.00 | | | \$ 62.00 | \$ - | \$ 62.00 | |
| | 25 | 9 | Ronald & Nicole Stevenson | 9-053-00 | 10 | \$ - | \$ 514.00 | | | \$ 514.00 | \$ - | \$ 514.00 | |
| | 23 | 9 | Fred & Heidi McClure | 10-016-00 | 6.1 | \$ - | \$ 131.00 | | | \$ 131.00 | \$ - | \$ 131.00 | |
| | 24 | 10 | Matthew & Julie Shortreed | 10-017-00 | 3.6 | \$ - | \$ 41.00 | | | \$ 41.00 | \$ - | \$ 41.00 | |
| | Total Assessments on Lands | | | | | | \$ 7,800.00 | \$ 3,800.00 | \$ 104,275.00 | \$ 12,765.00 | \$ 128,640.00 | \$ 9,450.00 | \$ 119,190.00 |
| | Walton Road | | Municipality of Morris-Turnberry | | | 1.4 | \$ - | \$ 360.00 | | | \$ 360.00 | | \$ 360.00 |
| Total Assessments on Roads | | | | | | \$ - | \$ 360.00 | | \$ - | \$ 360.00 | | \$ 360.00 | |
| Total Assessments | | | | | | \$ 7,800.00 | \$ 4,160.00 | \$ 104,275.00 | \$ 12,765.00 | \$ 129,000.00 | \$ 9,450.00 | \$ 119,550.00 | |
| McArthur Municipal Drain 2024 | | | | | | \$ 7,800.00 | \$ 4,160.00 | \$ 104,275.00 | \$ 12,765.00 | \$ 129,000.00 | \$ 9,450.00 | \$ 119,550.00 | |

Notes:

- 1 The Special Benefit Assessment (Sec. 24) is the increased estimated costs of enclosing the existing ditch and replacing it with a tile drainage system, less the Special Assessment under Section 26, and less the equivalent cost of two ditch cleanouts.
- 2 The Special Assessments (Sec. 26) shall be non-proratable assessments. All other assessments are proratable.
- 3 The Net Estimated Expense is the Total Assessment less allowances (if applicable).



Schedule D

Assessment for Future Maintenance

Schedule of Assessment for Future Maintenance McArthur Municipal Drain 2024

| McArthur Municipal Drain | Property Details | | | | | Portion of Maintenance Assessment |
|--|-----------------------------------|----------------------------------|-----------------------------------|-------------|----------------------|-----------------------------------|
| | Part Lot | Concession | Landowner | Roll Number | Approx. Ha. Affected | |
| | 22 | 9 | Huether Holdings Ltd. | 9-050-00 | 12.5 | 15.07% |
| | 23 | 9 | David & Brenda Linton | 9-051-00 | 28.8 | 28.13% |
| | 24 | 9 | Huether Farms Inc. | 9-052-00 | 28.5 | 30.17% |
| | 24 | 9 | Kenneth Huether & Sarah Devereaux | 9-052-05 * | 0.6 | 1.49% |
| | 25 | 9 | Ronald & Nicole Stevenson | 9-053-00 | 10 | 12.36% |
| | 23 | 9 | Fred & Heidi McClure | 10-016-00 | 6.1 | 3.15% |
| | 24 | 10 | Matthew & Julie Shortreed | 10-017-00 | 3.6 | 0.99% |
| | Total Assessments on Lands | | | | | 91.35% |
| Walton Road | | Municipality of Morris-Turnberry | | 1.4 | 8.65% | |
| Total Assessments on Roads | | | | | 8.65% | |
| Total Maintenance Assessments McArthur Municipal Drain 2024 | | | | | 100.00% | |

Notes:

- 1 '*' Denotes Lands not eligible for ADIP Grants.
- 2 All maintenance activities on road right-of-ways shall be completed at the expense of the road authority having jurisdiction over the road.
- 3 Lands located upstream of the maintenance shall be determined by the Drainage Superintendent.



Specifications for the Construction of Municipal Drainage Works

DIVISION A – General Conditions
DIVISION C – Specifications for Tile Drains
DIVISION H – Special Provisions



DIVISION A

General Conditions



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DIVISION A – GENERAL CONDITIONS

A.1. Scope

The work to be done under this contract consists of supplying all labour, equipment and materials to construct the drainage work as outlined in the Scope of Work, Drawings, General Conditions and other Specifications.

A.2. Tenders

Tenders are to be submitted on a lump sum basis for the complete works or a portion thereof, as instructed by the Municipality. The Scope of Work must be completed and submitted with the Form of Tender and Agreement. A certified cheque is required as Tender Security, payable to the Treasurer of the Municipality.

All certified cheques, except that of the bidder to whom the work is awarded will be returned within ten (10) days after the tender closing. The certified cheque of the bidder to whom the work is awarded will be retained as Contract Security and returned when the Municipality receives a Completion Certificate for the work.

A certified cheque is not required if the Contractor provides an alternate form of Contract Security such as a Performance Bond for 100% of the amount of the Tender or other satisfactory security, if required/permitted by the Municipality. A Performance Bond may also be required to insure maintenance of the work for a period of one (1) year after the date of the Completion Certificate.

A.3. Examinations of Site, Drawings, and Specifications

The Tenderer must examine the premises and site to compare them with the Drawings and Specifications in order to satisfy himself of the existing conditions and extent of the work to be done before submission of his Tender. No allowance shall subsequently be made on behalf of the Contractor by reason of any error on his part. Any estimates of quantities shown or indicated on the Drawings, or elsewhere are provided for the convenience of the Tenderer. Any use made of these quantities by the Tenderer in calculating his Tender shall be done at his own risk. The Tenderer for his own protection should check these quantities for accuracy.

The standard specifications (Divisions B through G) shall be considered complementary and where a project is controlled under one of the Divisions, the remaining Divisions will apply for miscellaneous works.

In case of any inconsistency or conflict between the Drawings and Specifications, the following order of precedence shall apply:

- Direction of the Engineer
- Special Provisions (Division H)
- Scope of Work
- Contract Drawings
- Standard Specifications (Divisions B through G)
- General Conditions (Division A)



A.4. Payment

Progress payments equal to 87±% of the value of work completed and materials incorporated in the work will be made to the Contractor monthly. An additional ten per cent (10±%) will be paid 45 days after the final acceptance by the Engineer, and three per cent (3±%) of the Contract price may be reserved by the Municipality as a maintenance holdback for a one (1) year period from the date of the Completion Certificate. A greater percentage of the Contract price may be reserved by the Municipality for the same one (1) year period if in the opinion of the Engineer, particular conditions of the Contract requires such greater holdback.

After the completion of the work, any part of this reserve may be used to correct defects developed within that time from faulty workmanship and materials, provided that notice shall first be given to the Contractor and that he may promptly make good such defects.

A.5. Contractor's Liability Insurance

Prior to commencement of any work, the Contractor shall file with the Municipality evidence of compliance with all Municipality insurance requirements (Liability Insurance, WSIB, etc.) for no less than the minimum amounts as stated in the Purchasing Procedures of the Municipality. All insurance coverage shall remain in force for the entire contract period including the warranty period which expires one year after the date of the Completion Certificate.

The following are to be named as co-insured:

- Successful Contractor
- Sub-Contractor
- Municipality
- Headway Engineering

A.6. Losses Due to Acts of Nature, Etc.

All damage, loss, expense and delay incurred or experienced by the Contractor in the performance of the work, by reason of unanticipated difficulties, bad weather, strikes, acts of nature, or other mischances shall be borne by the Contractor and shall not be the subject of a claim for additional compensation.

A.7. Commencement and Completion of Work

The work must commence as specified in the Form of Tender and Agreement. If conditions are unsuitable due to poor weather, the Contractor may be required, at the discretion of the Engineer to postpone or halt work until conditions become acceptable and shall not be subject of a claim for additional compensation.

The Contractor shall give the Engineer a minimum of 48 hours notice before commencement of work. The Contractor shall then arrange a meeting to be held on the site with Contractor, Engineer, and affected Landowners to review in detail the construction scheduling and other details of the work.

If the Contractor leaves the job site for a period of time after initiation of work, he shall give the Engineer and the Municipality a minimum of 24 hours notice prior to returning to the project. If any work is commenced without notice to the Engineer, the Contractor shall be fully responsible for all such work undertaken prior to such notification.



The work must proceed in such a manner as to ensure its completion at the earliest possible date and within the time limit set out in the Form of Tender and Agreement.

A.8. Working Area and Access

Where any part of the drain is on a road allowance, the road allowance shall be the working area. For all other areas, the working area available to the Contractor to construct the drain is specified in the Special Provisions (Division H).

Should the specified widths become inadequate due to unusual conditions, the Contractor shall notify the Engineer immediately. Where the Contractor exceeds the specified working widths without authorization, he shall be held responsible for the costs of all additional damages.

If access off an adjacent road allowance is not possible, each Landowner on whose property the drainage works is to be constructed, shall designate access to and from the working area. The Contractor shall not enter any other lands without permission of the Landowner and he shall compensate the Landowner for damage caused by such entry.

A.9. Sub-Contractors

The Contractor shall not sublet the whole or part of this Contract without the approval of the Engineer.

A.10. Permits, Notices, Laws and Rules

The Contractor shall obtain and pay for all necessary permits or licenses required for the execution of the work (but this shall not include MTO encroachment permits, County Road permits permanent easement or rights of servitude). The Contractor shall give all necessary notices and pay for all fees required by law and comply with all laws, ordinances, rules and regulations relating to the work and to the preservation of the public's health and safety.

A.11. Railways, Highways, and Utilities

A minimum of 72 hours' notice to the Railway or Highways, exclusive of Saturdays, Sundays, and Statutory Holidays, is required by the Contractor prior to any work activities on or affecting the applicable property. In the case of affected Utilities, a minimum of 48 hours' notice to the utility owner is required.

A.12. Errors and Unusual Conditions

The Contractor shall notify the Engineer immediately of any error or unusual conditions which may be found. Any attempt by the Contractor to correct the error on his own shall be done at his own risk. Any additional cost incurred by the Contractor to remedy the wrong decision on his part shall be borne by the Contractor. The Engineer shall make the alterations necessary to correct errors or to adjust for unusual conditions during which time it will be the Contractor's responsibility to keep his men and equipment gainfully employed elsewhere on the project.

The Contract amount shall be adjusted in accordance with a fair evaluation of the work added or deleted.

A.13. Alterations and Additions

The Engineer shall have the power to make alterations in the work shown or described in the Drawings and Specifications and the Contractor shall proceed to make such changes without causing delay. In



every such case, the price agreed to be paid for the work under the Contract shall be increased or decreased as the case may require according to a fair and reasonable evaluation of the work added or deleted. The valuation shall be determined as a result of negotiations between the Contractor and the Engineer, but in all cases the Engineer shall maintain the final responsibility for the decision. Such alterations and variations shall in no way render the Contract void. No claims for a variation or alteration in the increased or decreased price shall be valid unless done in pursuance of an order from the Engineer and notice of such claims made in writing before commencement of such work. In no such case shall the Contractor commence work which he considers to be extra before receiving the Engineer's approval.

A.14. Supervision

The Contractor shall give the work his constant supervision and shall keep a competent foreman in charge at the site.

A.15. Field Meetings

At the discretion of the Engineer, a field meeting with the Contractor or his representative, the Engineer and with those others that the Engineer deems to be affected, shall be held at the location and time specified by the Engineer.

A.16. Periodic and Final Inspections

Periodic inspections by the Engineer will be made during the performance of the work. If ordered by the Engineer, the Contractor shall expose the drain as needed to facilitate inspection by the Engineer.

Final inspection by the Engineer will be made within twenty (20) days after he has received notice from the Contractor that the work is complete.

A.17. Acceptance By the Municipality

Before any work shall be accepted by the Municipality, the Contractor shall correct all deficiencies identified by the Engineer and the Contractor shall leave the site neat and presentable.

A.18. Warranty

The Contractor shall repair and make good any damages or faults in the drain that may appear within one (1) year after its completion (as dated on the Completion Certificate) as the result of the imperfect or defective work done or materials furnished if certified by the Engineer as being due to one or both of these causes; but nothing herein contained shall be construed as in any way restricting or limiting the liability of the Contractor under the laws of the Country, Province or Locality in which the work is being done. Neither the Completion Certificate nor any payment there under, nor any provision in the Contract Documents shall relieve the Contractor from his responsibility.

A.19. Termination of Contract By The Municipality

If the Contractor should be adjudged bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should refuse or fail to supply enough properly skilled workmen or proper materials after having received seven (7) days notice in writing from the Engineer to supply additional workmen or materials to commence or complete the works, or if he should fail to make prompt payment to Sub-Contractors, or for material, or labour, or persistently disregards laws, ordinances, or the instruction of the Engineer,



or otherwise be guilty of a substantial violation of the provisions of the Contract, then the Municipality, upon the certificate of the Engineer that sufficient cause exists to justify such action, may without prejudice to any other right or remedy, by giving the Contractor written notice, terminate the employment of the Contractor and take possession of the premises, and of all materials, tools and appliances thereon, and may finish the work by whatever method the Engineer may deem expedient but without delay or expense. In such a case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract price will exceed the expense of finishing the work including compensation to the Engineer for his additional services and including the other damages of every name and nature, such excess shall be paid by the Contractor. If such expense will exceed such unpaid balance, the Contractor shall pay the difference to the Municipality. The expense incurred by the Municipality, as herein provided, shall be certified by the Engineer.

If the Contract is terminated by the Municipality due to the Contractor's failure to properly commence the works, the Contractor shall forfeit the certified cheque bid deposit and furthermore shall pay to the Municipality an amount to cover the increased costs, if any, associated with a new Tender for the Contract being terminated.

If any unpaid balance and the certified cheque do not match the monies owed by the Contractor upon termination of the Contract, the Municipality may also charge such expense against any money which may thereafter be due to the Contractor from the Municipality.

A.20. Tests

The cost for the testing of materials supplied to the job by the Contractor shall be borne by the Contractor. The Engineer reserves the right to subject any lengths of any tile or pipe to a competent testing laboratory to ensure the adequacy of the tile or pipe. If any tile supplied by the Contractor is determined to be inadequate to meet the applicable A.S.T.M. standards, the Contractor shall bear full responsibility to remove and/or replace all such inadequate tile in the Contract with tile capable of meeting the A.S.T.M. Standards.

A.21. Pollution

The Contractor shall keep their equipment in good repair. The Contractor shall refuel or repair equipment away from open water.

If polluted material from construction materials or equipment is caused to flow into the drain, the Contractor shall immediately notify the Ministry of the Environment, and proceed with the Ministry's protocols in place to address the situation.

A.22. Species and Risk

If a Contractor encounters a known Species at Risk as designated by the MNR or DFO, the Contractor shall notify the Engineer immediately and follow the Ministry's guidelines to deal with the species.

A.23. Road Crossings

This specification applies to all road crossings (Municipality, County, Regional, or Highway) where no specific detail is provided on the drawings or in the standard specifications. This specification in no way limits the Road Authority's regulations governing the construction of drains on their Road Allowance.

A.23.1. Road Occupancy Permit



Where applicable, the Contractor must submit an application for a road occupancy permit to the Road Authority and allow a minimum of five (5) working days for its review and issuance.

A.23.2. Road Closure Request and Construction Notification

The Contractor shall submit written notification of construction and request for road closure (if applicable) to the Road Authority and the Engineer for review and approval a minimum of five (5) working days prior to proceeding with any work on the road allowance. The Contractor shall be responsible for notifying all applicable emergency services, schools, etc. of the road closure or construction taking place.

A.23.3. Traffic Control

The Contractor shall supply flagmen, and warning signs and ensure that detour routes are adequately signed in accordance with no less than the minimum standards as set out in the Ontario Traffic Manual's Book 7.

A.23.4. Weather

No construction shall take place during inclement weather or periods of poor visibility.

A.23.5. Equipment

No construction material and/or equipment is to be left within three (3) metres of the travelled portion of the road overnight or during periods of inclement weather.

If not stated on the drawings, the road crossing shall be constructed by open cut method. Backfill from the top of the cover material over the subsurface pipe or culvert to the under side of the road base shall be Granular "B". The backfill shall be placed in lifts not exceeding 300mm in thickness and each lift shall be thoroughly compacted to 98% Standard Proctor. Granular "B" road base for County Roads and Highways shall be placed to a 450mm thickness and Granular "A" shall be placed to a thickness of 200mm. Granular road base materials shall be thoroughly compacted to 100% Standard Proctor.

Where the road surface is paved, the Contractor shall be responsible for placing HL-8 Hot Mix Asphalt patch at a thickness of 50mm or of the same thickness as the existing pavement structure. The asphalt patch shall be flush with the existing roadway on each side and without overlap.

Excavated material from the trench beyond 1.25 metres from the travelled portion or beyond the outside edge of the gravel shoulder may be used as backfill in the trench in the case of covered drains. The material shall be compacted in lifts not exceeding 300mm.

A.24. Laneways

All pipes crossing laneways shall be backfilled with material that is clean, free of foreign material or frozen particles and readily tamped or compacted in place unless otherwise specified. Laneway culverts on open ditch projects shall be backfilled with material that is not easily erodible. All backfill material shall be thoroughly compacted as directed by the Engineer.

Culverts shall be bedded with a minimum of 300mm of granular material. Granular material shall be placed simultaneously on each side of the culvert in lifts not exceeding 150mm in thickness and compacted to 95% Standard Proctor Density. Culverts shall be installed a minimum of 10% of the



culvert diameter below design grade with a minimum of 450mm of cover over the pipe unless otherwise noted on the Drawings.

The backfill over culverts and subsurface pipes at all existing laneways that have granular surfaces on open ditch and closed drainage projects shall be surfaced with a minimum of 300mm of Granular “B” material and 150mm of Granular “A” material. All backfill shall be thoroughly compacted as directed by the Engineer. All granular material shall be placed to the full width of the travelled portion.

Any settling of backfilled material shall be repaired by or at the expense of the Contractor during the warranty period of the project and as soon as required.

A.25. Fences

No earth is to be placed against fences and all fences removed by the Contractor shall be replaced by him in as good a condition as found. Where practical the Contractor shall take down existing fences in good condition at the nearest anchor post and roll it back rather than cutting the fence and attempting to patch it. The replacement of the fences shall be done to the satisfaction of the Engineer. Any fences found in such poor condition where the fence is not salvageable, shall be noted and verified with the Engineer prior to commencement of work.

Fences damaged beyond repair by the Contractor’s negligence shall be replaced with new materials, similar to those materials of the existing fence, at the Contractor’s expense. The replacement of the fences shall be done to the satisfaction of the Landowner and the Engineer.

Any fences paralleling an open ditch that are not line fences that hinder the proper working of the excavating machinery, shall be removed and rebuilt by the Landowner at his own expense.

The Contractor shall not leave fences open when he is not at work in the immediate vicinity.

A.26. Livestock

The Contractor shall provide each landowner with 48 hours notice prior to removing any fences along fields which could possibly contain livestock. Thereafter, the Landowner shall be responsible to keep all livestock clear of the construction areas until further notified. The Contractor shall be held responsible for loss or injury to livestock or damage caused by livestock where the Contractor failed to notify the Landowner, or through negligence or carelessness on the part of the Contractor.

A.27. Standing Crops

The Contractor shall be responsible for damages to standing crops which are ready to be harvested or salvaged along the course of the drain and access routes if the Contractor has failed to notify the Landowners 48 hours prior to commencement of the work on that portion of the drain.

A.28. Surplus Gravel

If as a result of any work, gravel or crushed stone is required and not all the gravel or crushed stone is used, the Contractor shall haul away such surplus material.

A.29. Iron Bars

The Contractor is responsible for the cost of an Ontario Land Surveyor to replace any iron bars that are altered or destroyed during the course of the construction.

A.30. Rip-Rap



Rip-rap shall be quarry stone rip-rap material and shall be the sizes specified in the Special Provisions. Broken concrete shall not be used as rip-rap unless otherwise specified.

A.31. Clearing, Grubbing and Brushing

This specification applies to all brushing where no specific detail is provided on the drawings or in the Special Provisions.

The Contractor shall clear, brush and stump trees from within the working area that interfere with the installation of the drainage system.

All trees, limbs and brush less than 150mm in diameter shall be mulched. Trees greater than 150mm in diameter shall be cut and neatly stacked in piles designated by the Landowners.

A.32. Restoration of Lawns

This specification applies to all lawn restoration where no specific detail is provided on the drawings or in the Special Provisions and no allowance for damages has been provided under Section 30 of the Drainage Act RSO 1990 to the affected property.

The Contractor shall supply “high quality grass seed” and the seed shall be broadcast by means of an approved mechanical spreader. All areas on which seed is to be placed shall be loose at the time of broadcast to a depth of 25mm. Seed and fertilizer shall be spread in accordance with the supplier’s recommendations unless otherwise directed by the Engineer. Thereafter it will be the responsibility of the Landowner to maintain the area in a manner so as to promote growth

END OF DIVISION



DIVISION C

Specifications for Tile Drains



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DIVISION C – SPECIFICATIONS FOR TILE DRAINS

C.1. Pipe Materials

Concrete Tile

Concrete drain tile shall conform to the requirements of the most recent A.S.T.M. specification for Heavy-Duty Extra Quality drain tile. All tile with diameters less than 600mm shall have a pipe strength of 1500D. All tile with diameters 600mm or larger shall have a pipe strength of 2000D.

All tile furnished shall be subject to the approval of the Engineer. All rejected tile are to be immediately removed from the site.

High Density Polyethylene (HDPE) Pipe

All HDPE pipe shall be dual-wall corrugated drainage pipe with a smooth inner wall. HDPE pipe shall have a minimum stiffness of 320 kPa at 5% deflection.

Unless otherwise noted, all sealed HDPE pipe shall have a water tight gasketed bell and spigot joining system meeting the minimum requirements of CSA B182.8. Perforated HDPE pipe shall have a soil tight joining system, and shall be enveloped in non-woven geotextile filter sock.

C.2. Alignment

The Contractor shall contact the Engineer to establish the course of the drain. Where an existing drain is to be removed and replaced by the new drain, or where the new drain is to be installed parallel to an existing drain, the Contractor shall locate the existing drain (including repairing damaged tile caused by locating) at intervals along the course of the drain. The costs of locating shall be included in the tender price.

The drain shall run in as straight a line as possible throughout its length, except that at intersections of other watercourses or at sharp corners, it shall run on a curve of at least 15 metres radius. The new tile drain shall be constructed at an offset from and parallel with any ditch or defined watercourse in order that fresh backfill in the trench will not be eroded by the flow of surface water.

The Contractor shall exercise care not to disturb any existing tile drain or drains which parallel the course of the new drain, particularly where the new and existing tile act together to provide the necessary capacity. Where any such existing drain is disturbed or damaged, the Contractor shall perform the necessary repair at his expense.

C.3. Profile

Benchmarks have been established along the course of the drain which are to govern the elevations of the drain. The location and elevations of the benchmarks are shown on the drawings. Tile is to be installed to the elevation and grade shown on the profiles. Accurate grade control must be maintained by the Contractor at all times.

When installing a drain towards a fixed point such as a bore pipe, the Contractor shall uncover the pipe and confirm the elevation a sufficient distance away from the pipe in order to allow for any necessary minor grade adjustments to be made.



C.4. Excavation

Wheel machine

Unless otherwise specified, all trenching shall be carried out with a wheel machine approved by the Engineer. The wheel machine shall shape the bottom of the trench to conform to the outside diameter of the pipe. The minimum trench width shall be equal to the outside diameter of the pipe plus 100mm on each side of the pipe, unless otherwise specified. The maximum trench width shall be equal to the outside diameter of the pipe plus 300mm on each side of the pipe, unless otherwise specified.

Scalping

Where the depths of cuts in isolated areas along the course of the drain as shown on the profile exceed the capability of the Contractor's wheel machine, he shall lower the surface grade in order that the wheel machine may trench to the correct depth. Topsoil is to be stripped over a sufficient width that no subsoil will be deposited on top of the topsoil. Subsoil will then be removed to the required depth and piled separately. Upon completion, the topsoil will then be replaced to an even depth over the disturbed area. The cost for this work shall be included in his tender price.

Excavator

Where the use of an excavator is used in-lieu of a wheel machine, the topsoil shall be stripped and replaced in accordance with Item C.4.2. All tile shall be installed on 19mm clear crushed stone bedding placed to a minimum depth of 150mm which has been shaped to conform to the bottom of the pipe. The Contractor shall include the costs of this work in his tender price.

C.5. Installation

Concrete Tile

The tile is to be laid with close joints and in regular grade and alignment in accordance with the drawings. The tiles are to be bevelled, if necessary to ensure close joints. The inside of the tile is to be kept clear when laid. The sides of the tile are to be supported by partial filling of the trench (blinding) prior to inspection by the Engineer. No tile shall be backfilled until inspected by the Engineer unless otherwise permitted by the Engineer. The tile shall be backfilled such that a sufficient mound of backfill is placed over the trench to ensure that no depression remains after settling occurs in the backfill.

Where a tile connects to a catch basin or similar structure, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone under areas backfilled from the underside of the pipe to undisturbed soil. Where a tile drain passes through a bore pit, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone from the underside of the pipe down to undisturbed soil with the limits of the bore pit.

The Contractor shall supply and wrap all concrete tile joints with Mirafi 160N geotextile filter material as part of this contract. The width of the filter material should be:

- 300mm wide for tile sizes 150mm diameter to 350mm diameter.
- 400mm wide for tile sizes 400mm diameter to 750mm diameter.
- 500mm wide for tile sizes larger than 750mm diameter.

The filter material shall completely cover the tile joint and shall have a minimum overlap of 300mm. The type of filter material shall be.



HDPE Pipe

HDPE pipe shall be installed using compacted Granular 'A' bedding or 19mm clear crushed stone bedding from 150mm below the pipe to 300mm above the pipe. All granular material shall be compacted using a suitable mechanical vibratory compactor. Granular bedding and backfill shall be placed in lifts not exceeding 300mm and compacted to at least 95% Standard Proctor Maximum Dry Density (SPMDD).

Where a pipe connects to a catch basin or similar structure, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone under areas backfilled from the underside of the pipe to undisturbed soil. Where a pipe passes through a bore pit, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone from the underside of the pipe down to undisturbed soil with the limits of the bore pit.

As determined by the Engineer, unsuitable backfill material must be hauled off-site by the Contractor and Granular "B" shall be used as replacement backfill material.

C.6. Trench Crossings

The Contractor shall not cross the backfilled trench with any construction equipment or vehicles, except by one designated crossing location on each property. The Contractor shall ensure that the bedding and backfill material at this designated crossing location is properly placed and compacted so as to adequately support the equipment and vehicles that may cross the trench. The Contractor may undertake any other approved work to ensure the integrity of the tile at the crossing location. The Contractor shall ensure that no equipment or vehicles travel along the length of the trench. The Contractor shall be responsible for any damage to the new tile caused by the construction of the drain.

C.7. Outlet Protection

A tile drain outlet into a ditch shall be either HDPE pipe or corrugated steel pipe and shall include a hinged grate for rodent protection. The maximum spacing between bars on the rodent grate shall be 40mm. All corrugated steel outlet pipes shall be bevelled at the end to generally conform to the slope of the ditch bank.

Quarry stone rock rip-rap protection and geotextile filter material (Mirafi 160N), shall be installed around the outlet pipe and extended downstream a minimum distance of three metres, unless otherwise specified. The protection shall extend to the top of the backfilled trench and below the pipe to 300 mm under the streambed. The protection shall also extend 600mm into undisturbed soil on either side of the backfilled trench. In some locations, rip-rap may be required on the bank opposite the outlet.

Where the outlet occurs at the upper end of an open ditch, the rip-rap protection will extend all around the end of the ditch and to a point 800mm downstream on either side. Where heavy overflow is likely to occur, sufficient additional rip-rap and filter material shall be placed as directed by the Engineer to prevent the water cutting around the protection.

C.8. Catch Basins and Junction Boxes

Unless otherwise noted, catch basins shall be in accordance with OPSD 705.010 and 705.030. The catch basin grate shall be a "Birdcage" type substantial steel grate, removable for cleaning and shall be inset into a recess provided around the top of the structure. The grate shall be fastened to the catch basin with bolts into the concrete. Spacing of bars on grates for use on 600mmX600mm



structures shall be 65mm centre to centre. Spacing of bars on grates for use on structures larger than 600mmX600mm shall be 90mm.

All catch basins shall be backfilled with compacted Granular 'A' or 19mm clear crushed stone placed to a minimum width of 300mm on all sides. If settling occurs after construction, the Contractor shall supply and place sufficient granular material to maintain the backfill level flush with adjacent ground. The riser sections of the catch basin shall be wrapped with filter cloth.

Quarry stone rip-rap protection shall be placed around all catch basins and shall extend a minimum distance of one (1) metre away from the outer edge of each side of the catch basin, and shall be placed so that the finished surface of the rip-rap is flush with the existing ground.

If there are no existing drains to be connected to the catch basin at the top end of the drain, a plugged tile shall be placed in the upstream wall with the same elevations as the outlet tile.

Junction boxes shall have a minimum cover over the lid of 450mm.

The Contractor shall include in his tender price for the construction of a berm behind all ditch inlet structures. The berm shall be constructed of compacted clay keyed 300mm into undisturbed soil. The top of the spill way of the earth berm shall be the same elevation as the high wall of the ditch inlet catch basin. The earth berm shall be covered with 100mm depth of topsoil and seeded with an approved green seed mixture. The Contractor shall also include for regrading, shaping and seeding of road ditches for a maximum of 15 metres each way from all catch basins.

The Contractor shall clean all catch basin sumps after completion of the drain installation. Catch basin markers shall be placed beside each catch basin.

C.9. Tributary Drains

Any tributary tile encountered in the course of the drain is to be carefully taken up by the Contractor and placed clear of the excavated earth. If the tributary drains encountered are clean or reasonably clean, they shall be connected into the new drain in accordance with the typical tile drain connection detail. Tributary tile drain connections into the new drain shall be made using high density polyethylene agricultural drain tubing installed on and backfilled with 19mm clear crushed stone. All tile drain connections into the new drain shall be either a cored hole with an insert coupler or a manufactured tee.

Where the existing drains are full of sediment, the decision to connect the tributary drain to the new drain shall be left to the Engineer. The Contractor shall be paid for each tributary drain connection as outlined in the Form of Tender and Agreement.

The Contractor shall be responsible for all tributary tile connections for a period of one year from the date of the Completion Certificate. After construction, any missed tile connections required to be made into the new drain shall be paid at the same rate as defined in the Form of Tender and Agreement. The Contractor will have the option to make any subsequent tile connections or have the Municipality make the required connections and have the cost of which deducted from the holdback.

Where an open ditch is being replaced by a new tile drain, existing tile outlets entering the ditch from the side opposite the new drain shall be extended to the new drain.

Where the Contractor is required to connect an existing tile which is not encountered in the course of the drain, the cost of such work shall constitute an extra to the contract.



C.10. Clearing, Grubbing and Mulching

The Contractor shall clear, brush and stump trees from within the working area.

All trees or limbs 150mm or larger, that is necessary to remove, shall be cut, trimmed and neatly stacked in the working width for the use or disposal by the Landowner. Brush and limbs less than 150mm in diameter shall be mulched.

Clearing, grubbing and mulching shall be carried out as a separate operation from installing the drain, and shall not be completed simultaneously at the same location.

C.11. Roads and Laneway Sub-Surface Crossings

All roads and laneway crossings may be made with an open cut. The Contractor may use original ground as backfill to within 600mm of finished grade only if adequate compaction and if the use of the original ground backfill has been approved beforehand by the Engineer.

C.12. Filling In Existing Ditches

The Contractor shall backfill the ditch sufficiently for traversing by farm equipment. If sufficient material is available on-site to fill in the existing ditch, the topsoil shall be stripped and the subsoil shall be bulldozed into the ditch and the topsoil shall then be spread over the backfilled waterway. The Contractor shall ensure sufficient compaction of the backfill and if required, repair excess settlement up to the end of the warranty period.

C.13. Construction of Grassed Waterways

Where the Contractor is required to construct a grassed waterway, the existing waterway shall be filled in, regraded, shaped and a seed bed prepared prior to applying the grass seed. The grass seed shall be fresh, clean and new crop seed, meeting the requirements of the MTO.

- 55% Creeping Red Fescue
- 15% Perennial Rye Grass
- 27% Kentucky Bluegrass
- 3% White Clover

Grass seed shall be applied at the rate of 100 kg/ha.

C.14. Unstable Soil

The Contractor shall immediately contact the Engineer if unstable soil is encountered. The Engineer shall, after consultation with the Contractor, determine the action necessary and a price for additions or deletions shall be agreed upon prior to further drain installation.

C.15. Rocks

The Contractor shall immediately contact the Engineer if boulders of sufficient size and number are encountered such that the Contractor cannot continue trenching with a wheel machine. The Engineer shall determine the action necessary and a price for additions or deletions shall be agreed upon prior to further drain installation.



If only scattered large stone or boulders are removed on any project, the Contractor shall either excavate a hole to bury same adjacent to the drain, or he shall haul the stones or boulders to a location designated by the Landowner.

C.16. Broken or Damaged Tile

The Contractor shall remove and dispose of all broken (existing or new), damaged or excess tile off site.

C.17. Recommended Practice For Construction of Sub-Surface Drainage Systems

Drainage Guide for Ontario, Ministry of Agriculture, Food and Rural Affairs, Publication 29 and its amendments, dealing with the construction of Subsurface Drainage Systems, shall be the guide to all methods and materials to be used in the construction of tile drains except where superseded by other Specifications of the Contract.

END OF DIVISION



SPECIAL PROVISIONS

McArthur Municipal Drain 2024



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Special Provisions means special directions containing requirements particular to the work not adequately provided for by the standard or supplemental specifications. Special provisions shall take precedence and govern over any standard or supplemental specification.

H.1. GENERAL

The Contractor shall notify the Landowner, the Drainage Superintendent, and the Engineer 48 hours prior to construction.

The Contractor shall arrange a pre-construction meeting and shall invite the Engineer, Drainage Superintendent, and the Landowners on whose property the work will take place, including all affected road authorities.

The Contractor shall verify the location of the new drainage system with the Engineer and Landowner prior to construction.

The Contractor shall check and verify all dimensions and elevations and report any discrepancies to the Engineer prior to proceeding with the work.

The Contractor must maintain access to all driveways along the route of the drain as well as always maintain access for all emergency vehicles during the construction.

The Contractor shall be responsible for settlement within the warranty period.

H.2. UTILITIES

All utilities shall be located and uncovered in the affected areas by the Contractor prior to construction.

The locations and elevations of all utilities shown on the drawings are approximate locations. Actual locations and elevations of all utilities must be verified by the Contractor prior to construction.

The Contractor shall arrange to have a representative of the utility owner on site during construction if it is a requirement by the utility owner.

H.3. WORKING AREA AND ACCESS

Access to the working area shall be from Walton Road.

The working area for the tile drain installation shall be an average width of 25m for construction purposes along the alignment of the proposed drain.

The working area for the enclosure of the existing open ditch shall be an average width of 10m on the primary working side of the existing ditch, and an additional 5m on the opposite side.

H.4. TOPSOIL STRIPPING

4.1 Tile Drain Installation

The Contractor shall strip the topsoil along the alignment of the tile drain to a width of 10m from Stat 0+000 to Sta. 0+091. From Sta. 0+091 to Sta. 0+225, where the drain is to be installed by means of an approved wheel trencher, the Contractor shall strip the topsoil for a minimum of 4m, centred on the trench.



Where the drain is to be installed by means of an approved hydraulic excavator (due to poor soil conditions), the Contractor shall strip the topsoil for a width equal to the top width of the trench, or the specified width, whichever is greater.

The Contractor shall stockpile the topsoil and later spread it over the backfilled trench. The Contractor shall ensure that the topsoiled trench is left in a condition such that the landowner can perform final restoration using nothing more than farm equipment. The Contractor will not attempt to place frozen topsoil over the backfilled trench.

4.2 Existing Ditch Enclosure

The Contractor shall strip the topsoil along the primary working side of the existing open ditch for a width of six metres. The Contractor shall stockpile the topsoil and later spread it over the backfilled ditch. The Contractor shall ensure that the topsoiled enclosed ditch is left in a condition that the Landowner can perform final restoration using nothing more than farm equipment.

H.5. PIPE AND INSTALLATION

5.1 Concrete Field Tile

An approved wheel trencher shall be used to install the concrete field tile whenever possible.

All concrete tile shall be Heavy-Duty Extra Quality Concrete Drain Tile 2000D.

Concrete field tile installed by means of a wheel machine shall be backfilled using suitable native material. The backfill shall not be compacted but a sufficient mound shall be left over the trench by the Contractor to allow for settlement flush with adjacent lands.

Concrete field tile installed by means of an approved hydraulic excavator shall be installed using 19mm crushed stone bedding from a minimum of 150mm below the pipe to the springline of the pipe. Suitable native material shall be used as backfill from the springline to the underside of the topsoil.

The Contractor shall supply and wrap all concrete joints with geotextile filter material.

The filter material shall completely cover the tile joint.

The Contractor shall be responsible for all trench settlement within the warranty period.

5.2 High Density Polyethylene Pipe (HDPE)

All HDPE pipe shall be CSA B182.8 with soil tight (couplers) jointing systems unless otherwise stated.

All HDPE pipe shall be installed using 19mm crushed stone bedding (or approved equivalent) from a minimum of 150mm below the pipe to 150mm above the pipe. Suitable native material shall be used as backfill from 150mm above the pipe to the underside of the topsoil.

The Contractor shall be responsible for all trench settlement within the warranty period.

5.3 Poor Soil Conditions

The Contractor shall submit a unit price for installation of the pipe per the detail on wrapped crushed stone bedding as a provisional item. The provisional amount for installation on wrapped



crushed stone bedding shall include the supply and installation of all additional labour, equipment and materials required for the installation of the pipe by this method.

If poor soil conditions are encountered, the Contractor shall install the pipe in accordance with the detail for wrapped crushed stone bedding and shall be entitled to the provisional tender amount, in addition to the tendered standard installation price. The Contractor shall be paid for the actual lengths installed in this condition.

H.6. EXISTING DRAINS/TILE CONNECTIONS

The Contractor shall make all tributary tile drain connections in accordance with the Typical Tile Connection Detail found in the drawing set.

All existing drains cut off during the installation of the new drainage system that will be connected to the new drainage system shall be flagged or marked by the Contractor prior to the connection being made.

Existing tile outlets into the ditch to be enclosed shall be connected to the new drain or redirected to the outlet by others, except for the 150mm diameter CSP outlet on the east bank of the ditch at Sta. 0+003, which shall be connected to the new tile drain by the Contractor in accordance with the Typical Tile Connection Detail found in the drawing set.

The Contractor shall connect the existing 500mm diameter CSP outlet and the existing 600mm diameter CSP surface culvert at Sta. 0+225 into the new 1200mm x 2000mm catch basin. The Contractor shall cut off the necessary length of each existing drain and use 600mm diameter HDPE pipe to connect the drains into the new catch basin.

The Contractor shall be responsible for all tile connections for a period of one year after the issuance of the completion certificate. Tile connections required to be made within this warranty period shall be made at the expense of the Contractor. After construction, the Contractor will be given the option to make any subsequent tile connections or have the Municipality make said connections and have the costs of which deducted from the maintenance holdback.

The Contractor shall supply all necessary materials to complete the connections of the existing drains to the new drain. The type of materials used to make the tributary drain connections shall be verified with the engineer.

H.7. EXISTING DITCH ENCLOSURE

The Landowner of the Huether Holdings Ltd. Property (Roll No. 9-050-00), Lot 22, Concession 9, shall import all the required approved fill material to enclose the ditch.

The Contractor shall strip all available topsoil from the sideslopes and streambed of the ditch prior to the enclosure and shall stockpile it adjacent to the ditch. Additionally, the Contractor shall strip the topsoil for a minimum width of 6m along the working side of the ditch.

The Contractor shall later spread the topsoil over the backfilled ditch and working side of the ditch.

Hydro One shall be responsible to enclose the section of ditch around the hydro tower approximately from 15m west of the tower to a point 15m east of the tower, approximate Sta. 0+102 to Sta. 0+144.



Hydro One and the Contractor shall coordinate their activities to ensure that the enclosure of the open ditch occurs such that there will be no significant time delays between segments of enclosure.

H.8. CATCH BASINS AND JUNCTION BOXES

All catch basins shall be precast concrete catch basins and shall have a 300mm sump.

All catch basin grates shall be fastened to the new catch basin and shall be hot dipped galvanized bird cage grates. Catch basin marker signs shall be erected at all catch basins.

The catch basin grate elevations shall be set to the satisfaction of the Engineer. Lifts shall be placed by the Contractor on all catch basins if necessary to achieve the desired elevation when field setting the structures.

All catch basins shall be installed using 19mm crushed stone bedding from 150mm below the structure to 150mm above the top of the highest pipe entering or exiting the structure. Structures on private property shall be backfilled using approved native material up to the underside of the topsoil layer. All backfill material shall be placed and thoroughly compacted evenly around each structure in lifts not exceeding 300mm to minimize settlement around the structures.

The Contractor shall be responsible for all settlement around catch basins. Should the area around the catch basin settle after construction, the Contractor shall be responsible for providing additional rip-rap required so that the top of the rip-rap is flush with the surrounding ground.

The Contractor shall place quarry stone rip-rap material around all sides of the catch basins and shall be placed on geotextile filter material in accordance with the attached set of drawing plans.

All holes for catch basin pipe connections to be cored by the manufacturer. All pipes entering or exiting a catch basin shall be installed such that the face of the pipe is flush with the inside wall of the structure.

The Contractor shall be responsible to repair or reapply mortar for all damaged mortared connections into any catch basin for a period of one year after the completion certificate has been issued, as determined by the Engineer.

H.9. RIP-RAP

All stone rip-rap material shall be quarry stone 150mm to 300mm diameter and placed to a depth of 450mm, unless otherwise noted. All rip-rap material shall be placed on geo-textile filter material.

The Contractor shall not use broken concrete tile as rip-rap protection.

H.10. EROSION AND SEDIMENT CONTROL

The Contractor shall provide adequate erosion and sediment control for the duration of the construction including monitoring and maintenance of the control measures put in place. The Contractor shall inspect the erosion and sediment control measures regularly, and specifically before predicted rainfall events, and after rainfall events.

H.11. SEEDING

The Contractor shall supply and spread an approved seed mixture (OPS 804 – Standard Roadside Mix) over the disturbed areas of the road right-of-way.



All seed mixtures are to be applied using the manufacturer's application recommendations.



McARTHUR MUNICIPAL DRAIN 2024

Watershed Plan

NOTES:

1. THIS MAP WAS CREATED USING COUNTY OF HURON GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA. THIS MAP IS A SECONDARY PRODUCT WHICH HAS NOT BEEN VERIFIED BY THE COUNTY OF HURON.
2. THE CONTOURS WERE CREATED USING IMAGERY DERIVED DIGITAL DATA (2015) FROM LAND INFORMATION ONTARIO.

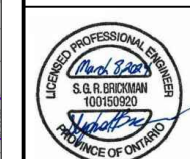
BENCHMARK DESCRIPTIONS

BENCHMARK No. 1 ELEV.=337.51
 TOP CENTRE UPSTREAM END OF 1200mmØ CSP ROAD CULVERT AT STA. 0+000

LEGEND

- LOT/CONCESSION LINE
- PROPERTY LINE
- MAJOR WATERSHED BOUNDARY
- MINOR WATERSHED BOUNDARY
- OVERHEAD HYDRO LINE
- HYDRO TOWER
- BENCHMARK LOCATION
- BENCHMARK No.
BENCHMARK ELEVATION
- LANDOWNER NAME(S)
- ASSESSMENT ROLL No. (ABBREVIATED)
- AREA WITHIN WATERSHED

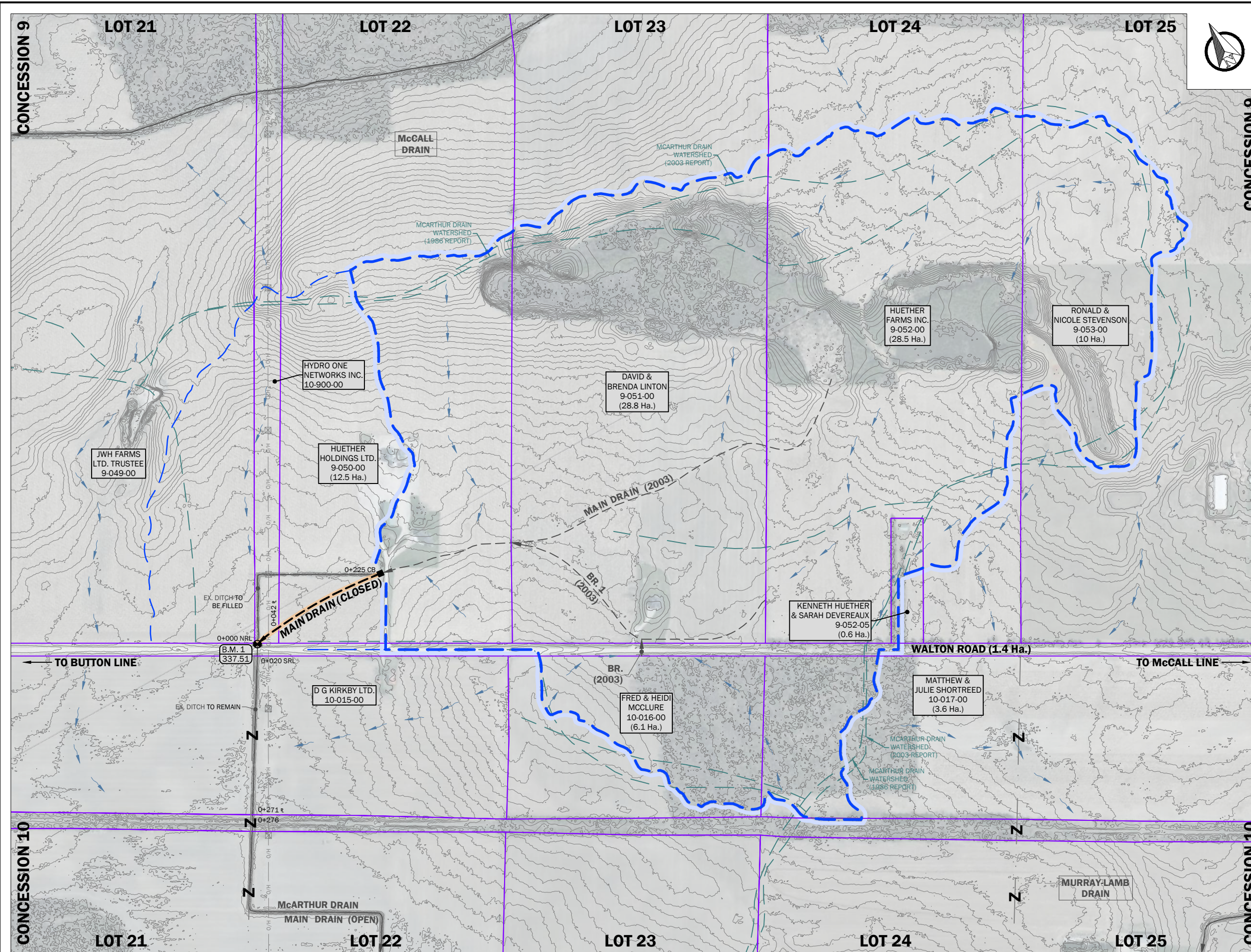
- EXISTING FEATURES:
- DRAIN NAME (---) OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
 - DRAIN NAME (---) CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION
 - OVERLAND FLOW PATH
- PROPOSED FEATURES:
- DRAIN NAME (—) OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
 - DRAIN NAME (—) CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION



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|-----|-------------------|-----------------|
| 3 | REPORT SUBMISSION | 24-03-08 |
| 2 | MVCA SUBMISSION | 24-03-05 |
| 1 | ONSITE MEETING | 24-02-01 |
| No. | REVISION | DATE (YY-MM-DD) |



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| DRAWN BY: R.U. | DESIGNED BY: R.U. | CHECKED BY: M.T. |
| DATE: 2024-03-08 | REFERENCE No. MT-004 | DRAWING No. 1 OF 3 |



PLAN SCALE





McARTHUR MUNICIPAL DRAIN 2024

Work Area Plan

NOTES:

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BENCHMARK DESCRIPTIONS

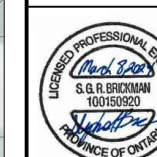
BENCHMARK No. 1 ELEV.=337.51
 TOP CENTRE UPSTREAM END OF 1200mmØ CSP ROAD CULVERT AT STA. 0+000

LEGEND

- LOT/CONCESSION LINE
- PROPERTY LINE
- MAJOR WATERSHED BOUNDARY
- MINOR WATERSHED BOUNDARY
- OVERHEAD HYDRO LINE
- HYDRO POLE WITH GUY WIRE
- BENCHMARK LOCATION
- BENCHMARK No.
BENCHMARK ELEVATION
- LANDOWNER NAME(S)
ASSESSMENT ROLL No. (ABBREVIATED)
- AREA WITHIN WATERSHED

- EXISTING FEATURES:
- DRAIN NAME** OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
 - DRAIN NAME** CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION
 - OVERLAND FLOW PATH

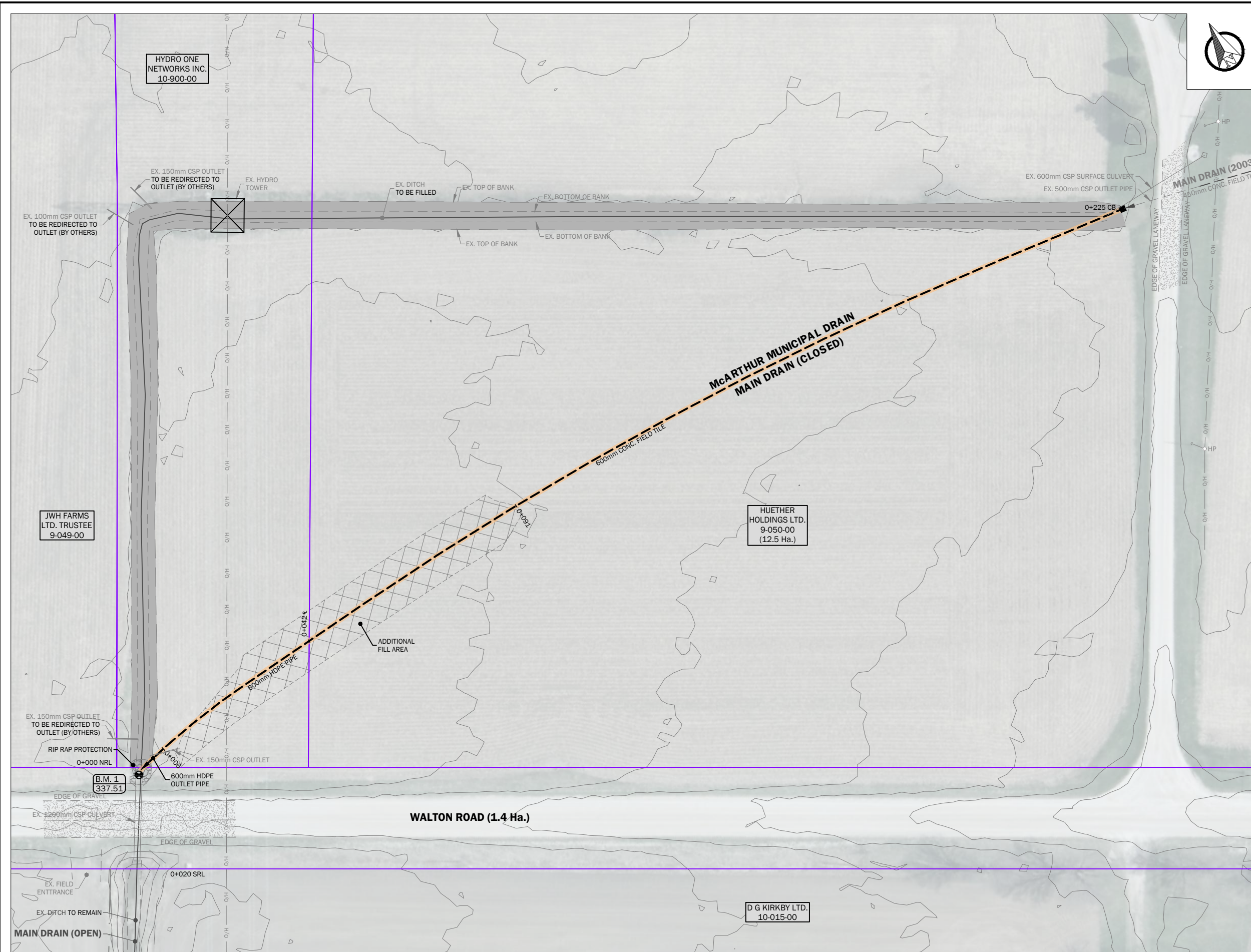
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- DRAIN NAME** OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
 - DRAIN NAME** CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION



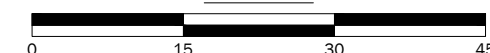
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| No. | REVISION | DATE (YY-MM-DD) |
| 3 | REPORT SUBMISSION | 24-03-08 |
| 2 | MVCA SUBMISSION | 24-03-05 |
| 1 | ONSITE MEETING | 24-02-01 |



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PLAN SCALE



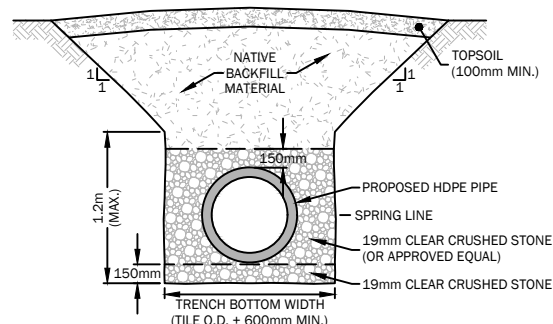


McARTHUR MUNICIPAL DRAIN 2024

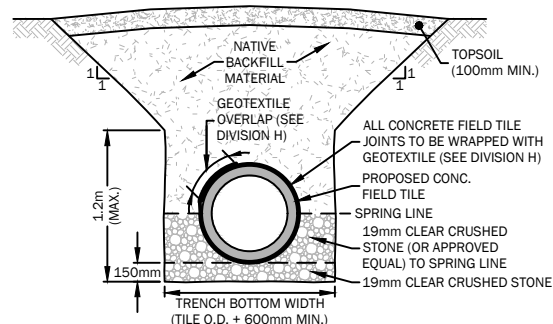
Profiles & Details

BENCHMARK DESCRIPTIONS

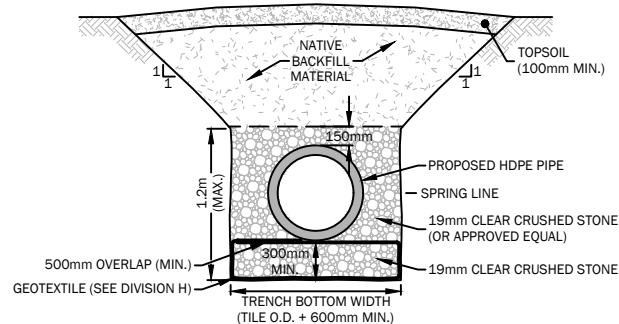
BENCHMARK No. 1 ELEV.=337.51
TOP CENTRE UPSTREAM END OF 1200mmØ CSP ROAD CULVERT AT STA. 0+000



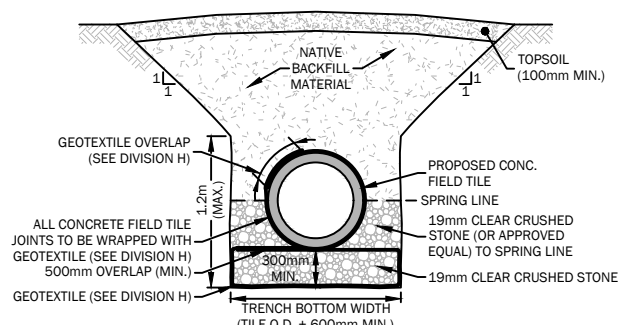
TYPICAL HDPE PIPE INSTALLATION ON STONE BEDDING DETAIL
N.T.S.



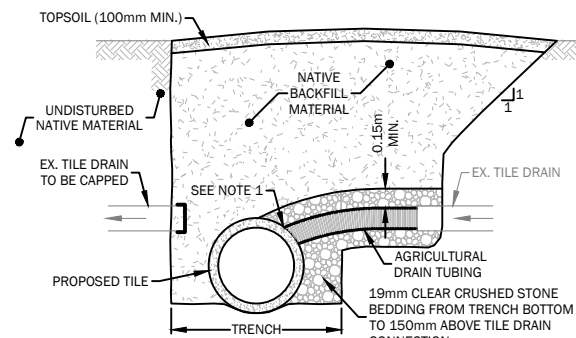
TYPICAL CONCRETE TILE INSTALLATION ON STONE BEDDING DETAIL (PROVISIONAL)
N.T.S.



TYPICAL HDPE PIPE INSTALLATION ON WRAPPED STONE BEDDING DETAIL (PROVISIONAL ITEM)
N.T.S.

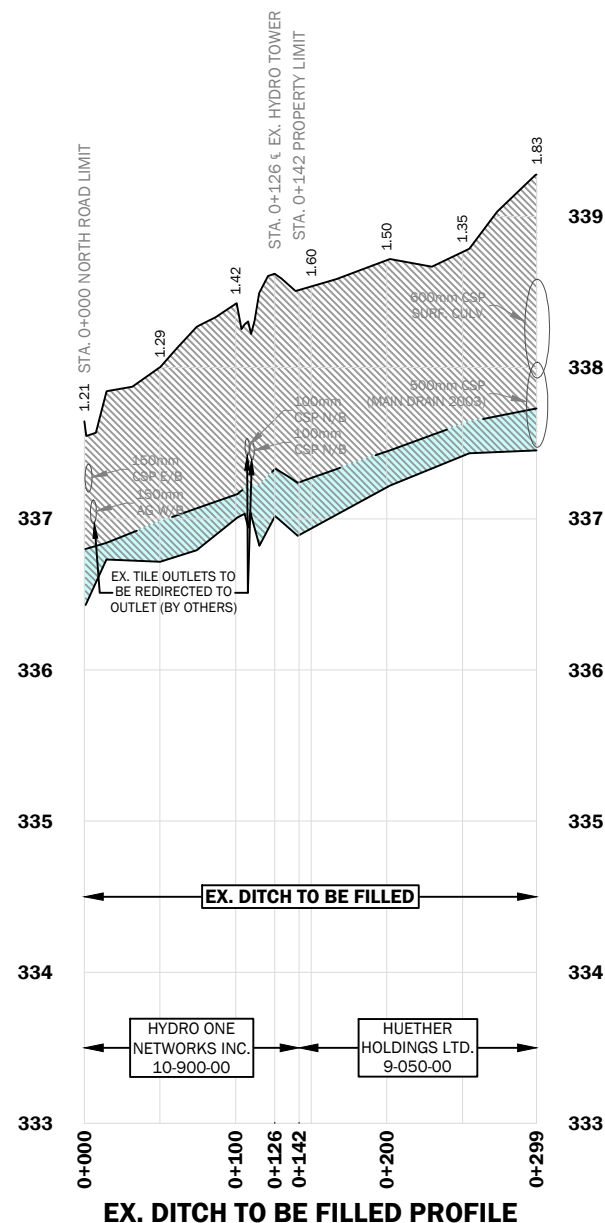


TYPICAL CONC. TILE INSTALLATION ON WRAPPED STONE BEDDING DETAIL (PROVISIONAL ITEM)
N.T.S.

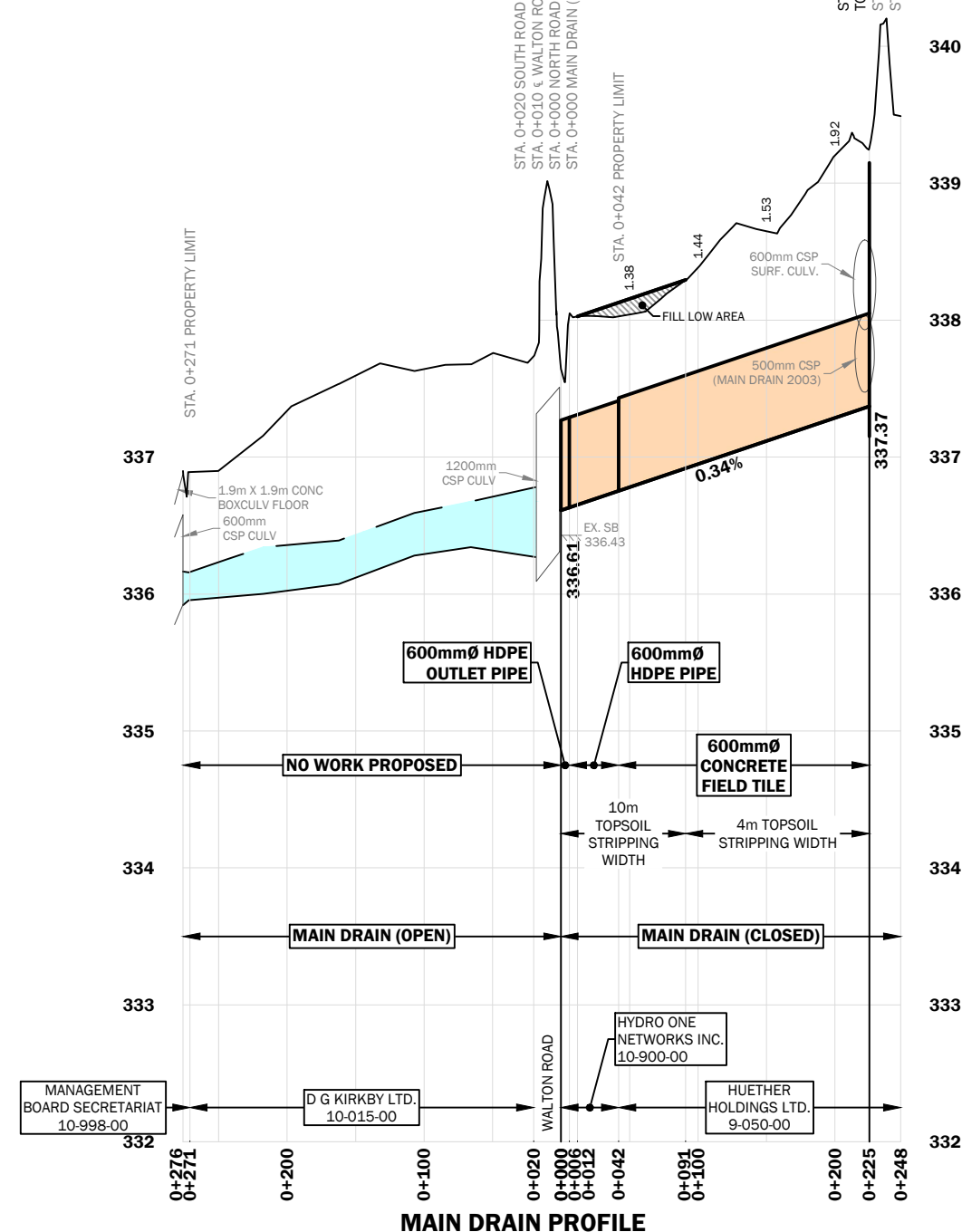


- NOTE:
1. ALL TILE CONNECTIONS TO BE EITHER A CORED HOLE WITH AN INSERT COUPLER, OR A MANUFACTURED TEE.
 2. CLEAR CRUSHED STONE BEDDING NOT REQUIRED IF DUAL WALL H.D.P.E. PIPE IS USED FOR THE CONNECTION.

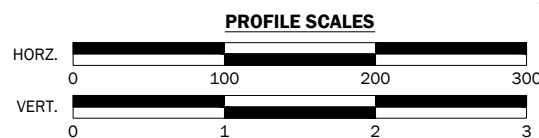
TYPICAL TILE CONNECTION DETAIL
N.T.S.



EX. DITCH TO BE FILLED PROFILE

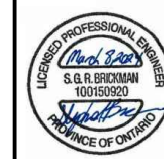


MAIN DRAIN PROFILE



SCHEDULE OF PIPE MATERIALS

| MATERIAL | DIAMETER (mm) | STATION RANGE | LENGTH (m) |
|--|---------------|---------------|------------|
| 1. HIGH DENSITY POLYETHYLENE OUTLET PIPE | 600 | 0+000 - 0+006 | 6 |
| 2. HIGH DENSITY POLYETHYLENE PIPE | 600 | 0+006 - 0+042 | 36 |
| 3. CONCRETE FIELD TILE | 600 | 0+042 - 0+225 | 183 |



| No. | REVISION | DATE (YY-MM-DD) |
|-----|-------------------|-----------------|
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| 2 | MVCA SUBMISSION | 24-03-05 |
| 1 | ONSITE MEETING | 24-02-01 |



| DRAWN BY: | DESIGNED BY: | CHECKED BY: |
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| R.U. | R.U. | M.T. |
| DATE: | REFERENCE No. | DRAWING No. |
| 2024-03-08 | MT-004 | 3 OF 3 |