March 6th, 2018

Rural Municipality of Whitehead
Attention: Cindy Izzard
Chief Administrative Officer
Box 107
Alexander, MB
R0K 0A0

Sent via email: caowhitehead@mymts.net

Re: **Kemnay Woods Drainage Study**

This letter is written to provide a summary of the work that has been performed for the above project, a summary of our findings and a re-cap of our discussions during the February 23rd, 2018 meeting in the Municipal office. Attached are cost estimates for various options available for construction. This package is meant to be the final submission for this project.

The Municipality retained the services of the undersigned to prepare a drainage plan for managing water levels in the Kemnay Woods Development and surrounding area. A topographical survey was conducted along the proposed drainage route established from Ed McKay's previous studies. The data was analyzed to determine the existing grade and the alterations that would be required to allow drainage.

Our findings, as well as a package of drawings illustrating the proposed work, were submitted to the Municipality on February 12th, 2018. These findings were discussed with the Municipality during a meeting on February 23rd, 2018. A summary of the key items discussed are as follows:

- The cause of the flooding issues was relayed to the undersigned, by the Municipality, to be surface water. The possible role of high groundwater table in causing the flooding issues was not assessed as part of the study.
    - The proposed ditch is meant to help alleviate flooding issues by providing a means for surface water to drain away from site. The proposed ditch will have minimal effect on lowering the groundwater table. Therefore, if the flooding issues are caused by high water table, the proposed ditch will not solve the issue.
- Due to restrictions imposed by the existing CP culvert at the end of the proposed drainage route, the grade of the proposed drainage ditch will be quite flat at 0.05 – 0.14%. At such flat grades, there will be minimal flow within the ditch. Therefore, it is not known how effective the proposed ditch will be at alleviating the flooding issues in the Kemnay Woods area.
- The flat grade of the proposed ditch will require a high level of maintenance to ensure that the ditch does not silt in over time and impede flow.
- Constructing the proposed ditches will require significant earth movement. Please see the attached cost estimate for the estimated earthwork volumes.
- In order to achieve the necessary side slope for the proposed ditch, the ditch will have to extend into private property.

- Where hydro poles exist along Glencarnock Road, the existing ditch cannot be lowered to the proposed grade. Culverts will need to be installed to the proposed ditch grade to protect the hydro poles while still allowing flow through the proposed ditch.

During the meeting, the Municipality expressed that the proposed drainage ditch project would be cost prohibitive. Therefore, it was concluded that there is no reason to proceed with submitting a final report to the railway or Manitoba Water Stewardship. Instead, the undersigned was asked to submit a cost estimate for discussion and budgetary purposes to wrap-up the project.

The attached cost estimates are for three different options:

- **Option 1**
  This is the design as shown in the drawings of our previous submission, dated February 12th, 2018. The design uses drainage ditches with 4:1 side slopes.

- **Option 2**
  This design is similar to Option 1 but the side slopes of the drainage ditch is steeper at 3:1. The overall width of the ditch is smaller than in Option 1 and therefore, less excavation is required. However, ditches with 3:1 slopes are less stable and more prone to sloughing in than 4:1 slopes. Thus, increasing long term maintenance costs.

- **Option 3**
  This design uses a combination of ditches and piping to convey surface water away from the site. Piping is proposed to be used along the alignment D to F. This avoids having a large open ditch which encroaches into private property. Along the rest of the drainage route from A to D and in Aljomac Drive, drainage ditches will be used, as per Option 1.

Please note that the costs provided do not include lifetime maintenance costs. Maintenance costs should be considered when comparing ditch drainage (Options 1 and 2) vs. ditch and piped drainage (Option 3).

It should also be noted that any costs related to moving shallow utilities to allow installation of culverts, piping or ditches (if required) are additional.

Should the Municipality wish to proceed with the project or wish to receive a detailed analysis of other options (ie. pump stations) as part of separate new study, please don't hesitate to let contact the undersigned.

Respectfully submitted,

Glen Newton, P.Eng.

G.D. Newton and Associates Inc.
R.M. of Whitehead
Kemnay Woods Drainage
COST ESTIMATE
Mar-18

OPTION 1 - ENTIRELY DITCH DRAINAGE WITH 4:1 SIDE SLOPES

Description	Quantity	Unit of Measure	Unit Price	Total	
450mm culvert	605	lineal metre	250.00	151,250.00	
Earthwork for ditch with 4 to 1 side slopes	45,000	cubic metres	15.00	675,000.00	
Subtotal - Construction				826,250.00	
Engineering - design	4	percent		33,050.00	
Engineering - management	4	percent		33,050.00	
			5% GST	44,617.50	
			Option 1 Total:		$936,967.50

OPTION 2 - ENTIRELY DITCH DRAINAGE WITH 3:1 SIDE SLOPES

Description	Quantity	Unit of Measure	Unit Price	Total	
450mm culvert	605	lineal metre	250.00	151,250.00	
Earthwork for ditch with 3 to 1 side slopes	36,000	cubic metres	15.00	540,000.00	
Subtotal - Construction				691,250.00	
Engineering - design	4	percent		27,650.00	
Engineering - management	4	percent		27,650.00	
			5% GST	37,327.50	
			Option 2 Total:		$783,877.50

OPTION 3 - DITCH DRAINAGE (ALIGNMENT A TO D & ALIOMAC) AND PIPED DRAINAGE (ALIGNMENT D TO F)

Description	Quantity	Unit of Measure	Unit Price	Total	
450mm culvert	100	lineal metre	250.00	25,000.00	
Earthwork for ditch with 4 to 1 side slopes	6,000	cubic metres	15.00	90,000.00	
300mm LDS piping	2,100	lineal metre	225.00	472,500.00	
1200mm Manhole	44	vertical metre	2,100.00	92,400.00	
Subtotal - Construction				679,900.00	
Engineering - design	4	percent		27,196.00	
Engineering - management	4	percent		27,196.00	
			5% GST	36,714.60	
			Option 3 Total:		$771,006.60