

**Headwater Drainage Feature Assessment
Phoenix Homes -
Old Montreal Road**

July 31, 2021



TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 HEADWATER DRAINAGE FEATURES.....	2
2.1 OVERVIEW.....	2
2.2 ASSESSMENT METHODOLOGY.....	4
2.3 GENERAL REACH DESCRIPTIONS.....	4
2.4 COMPONENT CLASSIFICATIONS	5
2.5 REACH SUMMARY	7
3.0 MANAGEMENT RECOMMENDATIONS	7
3.1 MANAGEMENT RECOMMENDATIONS FOR REACHES	8
3.1.1 East Side Reaches.....	Error! Bookmark not defined.
4.0 CLOSURE	8

List of Tables

Table 1. Hydrology Classification	5
Table 2. Riparian Classification.....	6
Table 3. Fish and Fish Habitat Classification.....	6
Table 4. Terrestrial habitat classification	6
Table 5. Reach dimensions.....	7

List of Figures

Figure 1. Site context	1
Figure 2. HDF reaches.....	3
Figure 3. Headwater Drainage Feature Assessment (HDFA) flow chart providing direction on management options	7

List of Appendices

Appendix A: Reach Photos



1.0 INTRODUCTION

This report is a Headwater Drainage Feature Assessment written by Kilgour & Associates Ltd. (KAL) on behalf of Phoenix Homes in support of their proposed development of a cluster of properties (herein the “Site” on the south side of Old Montreal Road, west of Cardinal Creek, in the east end of Ottawa, Ontario.

The Site is situated on properties located at 1154, 1172, 1176, 1180, and 1208 Old Montreal Road (Cumberland; CON 1 PT LOT 27, 28 OS; PIN 145260027, 145260023, 145260026, 145260024, 145260025; Figure 1). The parcel at 1208 Old Montreal Road is significantly deeper than the other parcels, extending ~900m south of Old Montreal Road to include a natural ravine and active agricultural lands. The Site, as it is defined for this project, however, excludes the ravine and any areas south of it. The proposed development area covers ~5.3 ha.



Figure 1. Site context

This report provides a detailed description of the headwater drainage features (HDFs) crossing and/or near to the Mattamy property following the field methodologies identified with the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* (CVC & TCRA, 2014), herein the HDF Guidelines.

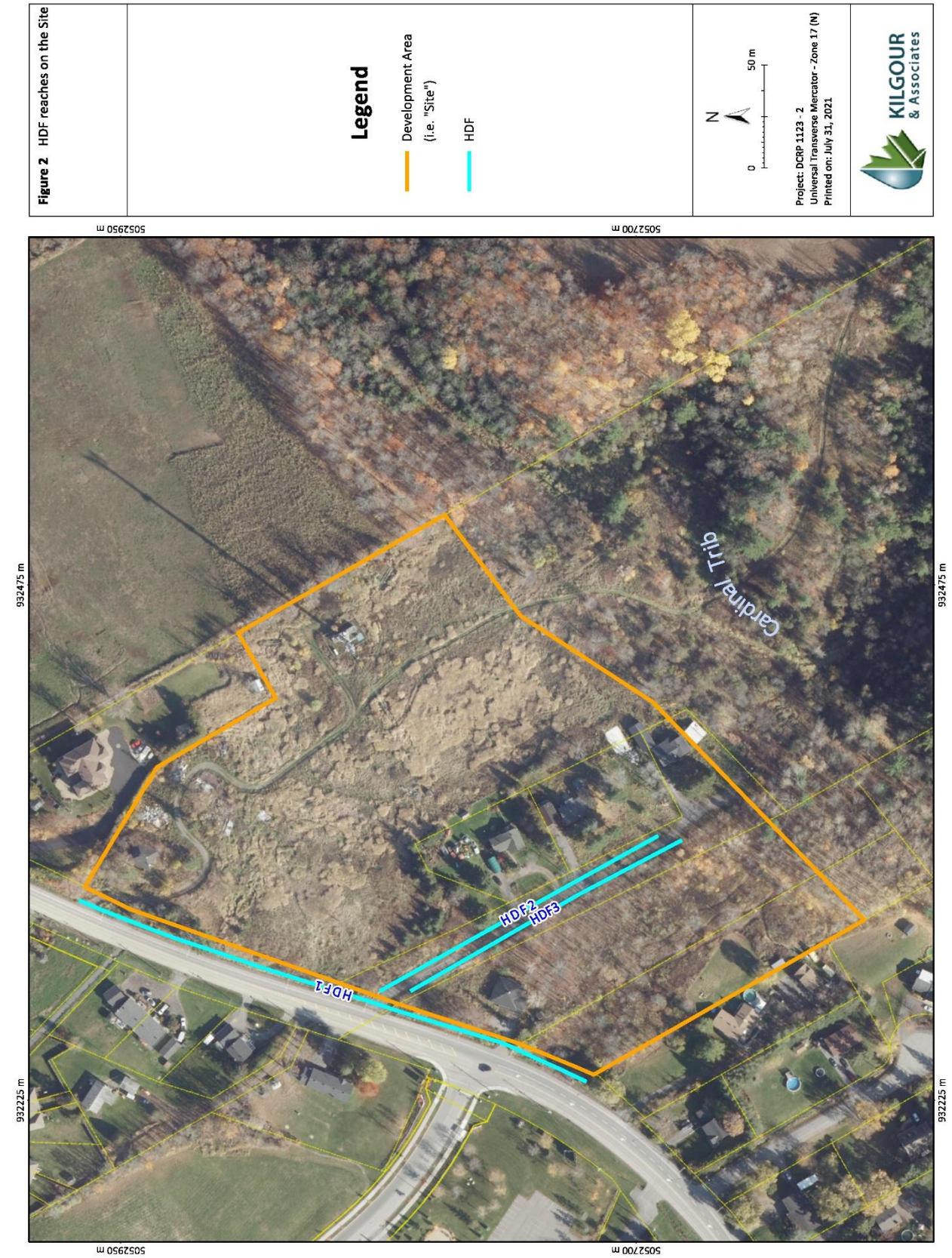


2.0 HEADWATER DRAINAGE FEATURES

2.1 Overview

HDFs were reviewed on the Site initially in 2018, then again in 2021. A total of three HDFs were identified and are described in this report (Figure 2). All three features are/were located at the north end of the Site. The southern edge of the Site corresponds with the top of a ravine crossing the Site properties that conveys a tributary to Cardinal creek to the west. The tributary, as a permanent stream, does not meet the definition of an HDF under the HDFA Guidelines. Moreover, it is located outside of the Site area and no HDFs conveyed flows from the rear of the Site flows to that stream. Proposed future development on the Site will adhere to setback requirements as required based on floodplain limits, buffer distances from top-of-bank and/or normal high water mark, and hazard limits. The Cardinal Creek tributary is therefore not addressed further within this report.





2.2 Assessment Methodology

The Standard level of assessment follows Ontario Stream Assessment Protocol (OSAP) methodologies for descriptions of flow conditions, riparian vegetation and site features that are important components of habitat (headwater sampling protocol OSAP S4.M10), and includes an electrofishing survey to describe fish and fish habitat (OSAP S4.M10). Additionally, an ecological land classification (ELC) was applied to the riparian zone.

The initial OSAP investigation of the HDFs was conducted on April 4, 2018, by KAL biologist Tyler Peat and was repeated on April 6, 2021, by KAL biologist Rob Hallett. Follow-up surveys on June 14, 2018, and June 9, 2021, by Terry Hams and Rob Hallett respectively found the entire Site to be dry with no fish surveys either required or possible.

Given the lack of aquatic habitat on site, neither turtle nor frog surveys were warranted there.

2.3 General Reach Descriptions

Images of Site HDFs are available in Appendix A.

HDF1

HDF1, the roadside ditch along Montreal Road, conveys road runoff and spring meltwater from the Site and surrounding area to Cardinal Creek ~250 m to the west. The feature has bankfull width of 5.4 m with a wetted width of 100 to 115 cm at the peak of the spring freshet a maximum depth of 17 cm. Flow was 0.32 m/s in the spring of 2018 but was barely detectable in the spring of 2021. No water was observed in the feature beyond the spring freshet. The substrate is muddy with significant grass growth. The left upstream bank (north) is the gravel shoulder to Montreal Road. The right upstream bank is a mix of yards and fields with some trees and shrubs along its length.

HDF2 and HDF3

HDF2 and HDF 3 were small swales in 2018 located along the east and west sides respectively of the driveway running up the center of 1180 Old Montreal Road. They conveyed spring runoff norward down the slope. In 2018, both features were both very shallow with no definable banks and both flattened out completely before they reach HDF1 (i.e., had no discernible connection to HDF1). During the spring freshet in 2018, HDF2 had a wetted width of 55 to 110cm with a depth of 1 to 3 cm as it ran south down the length of the driveway. Water from the feature spread out at the bottom end with no detectable depth before, presumably, percolating into the HDF1. The feature was fully grassed with lawn through it and extending to the east. The west edge was the gravel driveway. In 2021 the shape of the feature was still evident though it was completely dry.

During the spring freshet 2018, HDF3 had a wetted width of 40 cm with a depth of 4 to 8 cm (in pockets) as it ran south down the length of the driveway. Water from the feature again spread out at the bottom end with no detectable depth. The feature had a mud and gravel substrate with some portions grassed. Shrubby vegetation grew along the west side; the east edge was the gravel driveway. By the spring of



2021, the length of the feature was inundated with new shrub growth, the channel form along most of its length was no longer evident and no water was present.

2.4 Component Classifications

The following tables summarize the functions provided by the 15 reaches.

Table 1. Hydrology Classification

Drainage Feature	Hydrology Classification					
	Assessment Period	Flow Conditions		Flow Classification	Modifiers	Hydrological Function
		Description	(OSAP Code)			
HDF1	April 4, 2018 April 6, 2021 June 14, 2018 June 9, 2021	Surface flow Surface flow Dry Dry	2	Ephemeral	Roadside ditch	Contributing Functions
HDF2	April 4, 2018 April 6, 2021 June 14, 2018 June 9, 2021	Surface flow Dry Dry Dry	3	Ephemeral	Disconnected feature	Limited Functions
HDF3	April 4, 2018 April 6, 2021 June 14, 2018 June 9, 2021	Surface flow Dry Dry Dry	4	Ephemeral	Disconnected feature	Limited Functions

The initial OSAP investigation of the HDFs was conducted on April 4, 2018, by KAL biologist Tyler Peat and was repeated on April 6, 2021, by KAL biologist Rob Hallett. Follow-up surveys on June 14, 2018, and June 9, 2021, by Terry Hams and Rob Hallett respectively found the entire Site to be dry with no fish surveys either required or possible.



Table 2. Riparian Classification

Drainage Feature	Riparian Classification			
	OSAP Descriptions	OSAP Riparian Codes	ELC Codes	Riparian Conditions
HDF1	RUB – Lawn LUB – Road	RUB – 6 LUB – 2	- -	Contributing Functions
HDF2	RUB – Road LUB – Lawn	RUB – 1 LUB – 2	- CUM	Contributing Functions
HDF3	RUB – Scrubland LUB – Road	RUB – 6 LUB – 1	CUT -	Important Functions

RUB – right upstream bank

LUB – left upstream bank

Table 3. Fish and Fish Habitat Classification

Drainage Feature	Riparian Classification		
	Fish Observation • Fishing effort	Fish & Fish Habitat Designation*	Modifiers/Notes
HDF1	Dry following spring freshet • no fishing possible • no fish or SAR presence expected	Contributing Functions	None
HDF2	Dry following spring freshet • no fishing possible • disconnected feature • no fish or SAR presence	Contributing Functions	None
HDF3	Dry following spring freshet • no fishing possible • disconnected feature • no fish or SAR presence	Contributing Functions	None

*Fish and Fish Habitat Designation is constrained by the HDF Guidelines definitions. “Modifiers” provides significant caveats to those designations.

Table 4. Terrestrial habitat classification

Drainage Feature	Description	Amphibians	Terrestrial Classification
HDF1	No adjacent wetland areas. Roadside ditch with no corridor functionality.	No frogs were noted or anticipated in the area	Limited Functions
HDF2	No adjacent wetland areas. Roadside ditch with no corridor functionality.	No frogs were noted or anticipated in the area	Limited Functions
HDF3	No adjacent wetland areas. Roadside ditch with no corridor functionality.	No frogs were noted or anticipated in the area	Limited Functions



2.5 Reach Summary

Dimensions of the HDF reaches are summarized in Table 5.

Table 5. Reach dimensions

Drainage Feature	Length (m)	Mean Bankfull Width (m)	Mean Wetted Width (m)	Mean Depth (m)
HDF1	261	5.4	1.15	0.10
HDF2	154	No defined banks	0.80	0.02
HDF3	150	No defined banks	0.40	0.06

3.0 MANAGEMENT RECOMMENDATIONS

The classification categories identified in Section 2 provide the basis of the management recommendations provided here. The following flow chart (Figure 2) combines and translates the classification results to management recommendations.

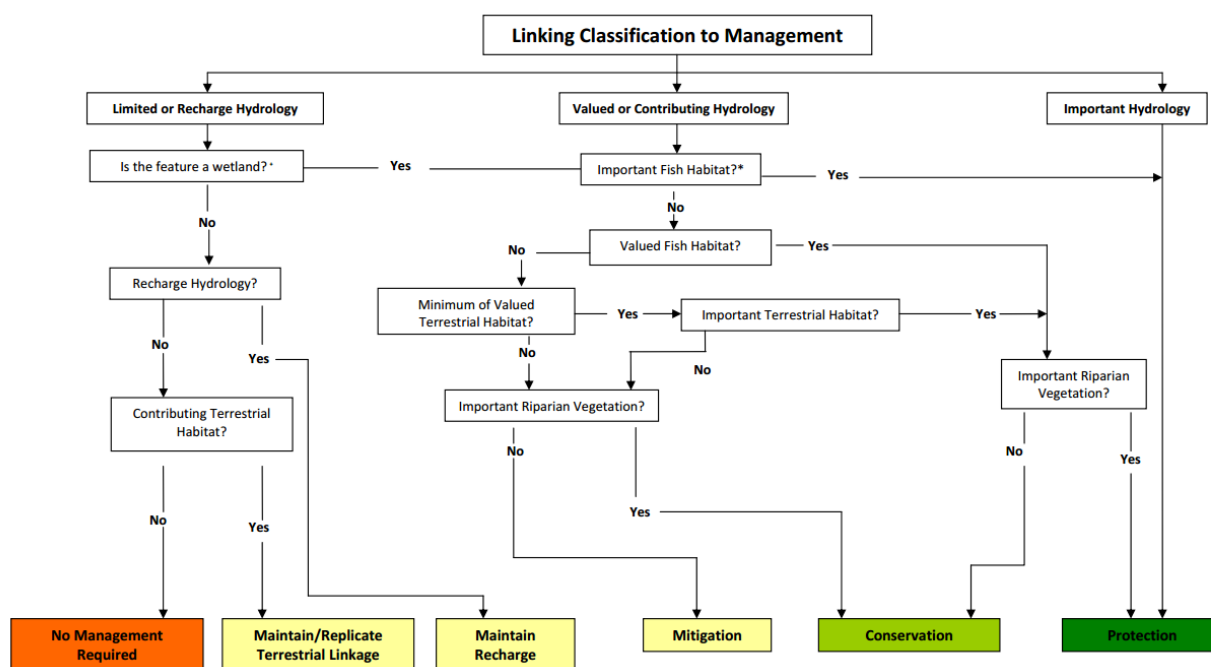


Figure 3. Headwater Drainage Feature Assessment (HDFa) flow chart providing direction on management options



3.1 Management Recommendations for Reaches

HDF1

This feature is a simple roadside ditch with ephemeral hydrology. Its primary function is to collect and convey road runoff. The feature has negligible biological functionality. This feature is likely to remain in place in its current location. Following the HDFA Guide flow chart linking component classification to management directives (Figure 2), this reach:

1. Provides Contributing Hydrology;
2. Does not provide Important or Valued Fish Habitat;
3. Does not provide Valued Terrestrial Habitat; and
4. Does not provide Important Riparian Vegetation.

This chain of classification descriptors leads to a management directive of **Mitigation**. The feature is not required to be maintained per se but if it is to be removed, its functionality must be replicated or enhanced through lot level conveyance measures as part of the site stormwater management system. Any replacement features/systems should be vegetated to mimic online wet vegetation pockets to the extent possible and must convey water to the same final receiver (i.e. Cardinal Creek). As a roadside ditch for a major arterial road, neither this feature nor a future replacement feature/system requires setbacks or a natural channel design.

HDF2 and HDF3

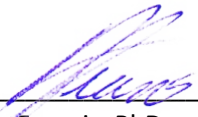
These reaches do not connect directly to HDF1 may but may direct some spring runoff generally towards that feature and/or provide some opportunity for infiltration Following the HDFA Guide flow chart linking component classification to management directives (Figure 3), these reaches:

1. Provide Limited Hydrology;
2. Are not wetlands; but
3. May provide recharge hydrology.

This chain of classification descriptors leads to a management directive of **Maintain Recharge**. There is no requirement to retain the feature per se, but the overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

4.0 CLOSURE

This report provides detailed descriptions of the HDFs on and/or near to the Site, as well as management recommendations to direct future development near those features. Points of clarification can be addressed to the undersigned.



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Appendix A: Site Photos

HDF1 - Roadside ditch along Old Montreal Road



HDF2 (right side) and HDF3 (left side)

