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CITY OF ROCHESTER HILLS

Inventories & Baseline Assessments of Physical Features of Green Space Properties

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I. INTRODUCTION

In 2004, Niswander Environmental completed a comprehensive field evaluation of all accessible natural features within the City of Rochester Hills (City) as part of a City-wide Natural Features Inventory (NFI). Natural features assessment data were collected at 725 survey points and photographs were taken at 671 locations. A preliminary NFI map was generated by integrating the field data into the GIS initial base map. GIS coverages were then developed for each natural feature category (*i.e.*, steep slopes, floodplains, wetlands, watercourses, woodlands, and Natural Areas). Attribute data, including feature type, size, quality, restorability, and other pertinent information, were linked to each individual natural feature category.

The natural features were then analyzed for significance to the City by developing qualitative criteria for site ranking. Determining significance to the City was based on evaluation of not only the quality of the natural resource, but also the site's need for protection, threat of destruction, and relationship to surrounding land use. Criteria for ranking was based on the Natural Features Inventory analysis done by the MNFI for Oakland County (*2004 Oakland County Potential Conservation/Natural Areas Report*). The criteria were modified for the Rochester Hills NFI analysis and included total size of the Natural Area, size of core area, presence of stream corridors, connectivity to other Natural Areas (including existing City open space), restorability, vegetative quality, and the number of parcels involved in protecting the Natural Area. This NFI is a valuable tool for directing land protection and evaluating land use from a landscape perspective. The City has used the NFI for the past 5 years to direct the City's natural features protection and land acquisition programs.

In April 2010, the City contracted Niswander Environmental to complete a floristic inventory and baseline assessment of four green space properties located along the Clinton River Trail (Trail) in Section 15 of Rochester Hills, Oakland County, Michigan (T3N, R11E). Please refer to Figure 1 (Site Location Map). The City, as part of its park master plan and as a result of the NFI findings, has acquired the following four vacant properties along the Trail for preservation and management purposes:

- Rivercrest (1.74 acres);
- Childress (5.31 acres);
- Harding (26.81 acres); and,
- Cloverport (7.42 acres)

Each of the four Properties, or at least portions of each Property, was identified as a critical natural area (Priority I) in the aforementioned Natural Features Inventory (Figure 2 – Natural Areas Map). Natural Areas are public and private land that are primarily undeveloped and include lands devoted to active or passive recreational use or lands retained for visual or natural resource protection purposes. Natural Areas typically contain wetlands, woodlands, watercourses, floodplains, or active recreation areas. Individually, each Property provides wildlife habitat, water quality benefits, visual buffers, and improved air quality. As a whole, these Properties are part of the Clinton River riparian corridor and provide passive recreational opportunities, flood storage, critical habitat linkages, and connectivity of valuable greenspace.

II. METHODS

The Natural Features Inventory completed in 2004 proved to be a valuable tool in assessing the four greenspace Properties. Prior to May 2010 field investigations, Niswander Environmental utilized the NFI and overlaid existing natural features data to generate a base map for each site that included information on wetlands, woodlands, floodplains, topography, and soils information. Potential natural features were preliminarily examined and mapped in the office before being verified in the field.

In May and June 2010, Niswander Environmental conducted detailed field evaluations that identified specific habitats (*i.e.*, upland forest, scrub-shrub wetland, fen community, etc.). Each habitat type was assessed, characterized, and mapped according to its type, significance, and vegetative quality as it relates to the remainder of the property, immediate surrounding area, and the City as a whole. Representative digital photographs were taken of all assessed natural features and habitat types at each of the four Properties.

In addition to habitat assessments, a vegetative inventory was performed at each Property. These inventories identified all observed plant species through meander searches to determine relative dominance as it relates to each habitat type and the property as a whole. All species of plants encountered within the properties were documented and evaluated according to the Floristic Quality Assessment (FQA), as managed by the Michigan Department of Natural Resources and Environment. The FQA aids in evaluating the overall floristic quality of each habitat type and the site as a whole from a vegetative perspective. Each species in Michigan has been assigned a C value, or "coefficient of conservatism" ranging from 0-10 representing an estimated likelihood that a given plant is likely to occur on a site unaltered from pre-settlement conditions. In general, higher quality species such as rare orchids receive high ratings, while common species such as cattail receive low ratings. Adventive, or non-native, plants are not scored and are noted with an asterisk. Once a comprehensive species list for a given site was comprised, the mean C value of the plant list was multiplied by the square root of the total number of species present on that site to yield the Floristic Quality Index (FQI). The FQI gives a better indication of how significant a site is from a natural quality perspective more so than simply a FQA, and allows for stronger comparisons between large sites with many species and smaller sites with fewer species. By completing a FQA for habitat types within each Property, recommendations can be made for future use and management of the properties (Section IV of this report). This approach gives the City the tools and baseline data necessary for developing a plan to not only protect and manage the most valuable natural areas, but also to identify restoration goals and areas suitable for active use.

While evaluating each site in the field, particular attention was paid to potential restoration and/or stewardship opportunities, which include (but are not limited to) active management of invasive vegetation, streambank stabilization, habitat enhancement, and general maintenance.

Detailed information regarding each site's natural features, floristic quality, and natural significance as it relates to the general area is included in Section III.

III. BASELINE HABITAT ASSESSMENT

Each of the four Properties was qualitatively assessed in the Spring and early Summer 2010. A discussion of each Property follows:

Rivercrest Site

The Rivercrest site is a 1.74-acre Property located at the northeast corner of Livernois Road and Avon Road (Figure 1). The Clinton River, which is armored with concrete and riprap, creates the eastern property boundary as it flows under Avon Road. The Property is comprised of upland old field habitat (primarily scrubland) and scrub-shrub wetland (Appendix A; Figure 3). The southern portion of the Property is an open field with a small cattail wetland surrounded by a variety of upland grasses and forbs (Appendix A; Photo 1). The small wetland is a result of a stormwater culvert that discharges into the river. Heading north, the Property becomes densely vegetated with non-native shrubs before "opening up" into a scrub-shrub wetland (Appendix A; Photos 2 and 3).

The upland old field component is generally of low quality and is dominated by non-native forbs and shrubs such as garlic mustard (*Alliaria petiolata*), tartarian honeysuckle (*Lonicera tartarica*), autumn olive (*Elaeagnus umbellatus*), and common buckthorn (*Rhamnus cathartica*) (Point 1 on Figure 3). Despite the presence of these species, spring wildflowers such as wild geranium (*Geranium maculatum*), woodland phlox (*Phlox divaricata*), starry false solomon's seal (*Smilacina stellata*), and early meadow rue (*Thalictrum dioicum*) are abundant (Appendix A; Photo 4).

Although the on-site wetland is characterized as scrub-shrub, it does include mature trees, an emergent opening, and pockets of standing water (Appendix A; Photos 5-8). The wetland is moderately high quality, and is an important natural feature in terms of the functions and values it provides (*i.e.*, flood control, groundwater recharge, erosion control, etc.). A vast majority of the wildlife (specifically songbirds and amphibians) observed during site visits inhabited the wetland portions of the Property. In addition, there is evidence that this area is also used by deer, muskrat, and beaver (Appendix A; Photo 9). Unlike many urbanized wetlands that become degraded by surrounding development practices, this area is very diverse for its size and features a variety of quality wetland species such as lakebank sedge (*Carex lacustris*), water horsetail (*Equisetum fluviatile*), marsh horsetail (*Equisetum palustre*), joe-pye weed (*Eupatorium maculatum*), swamp buttercup (*Ranunculus hispidus*), skunk cabbage (*Symplocarpus foetidus*), burreed (*Sparganium eurycarpum*), and highbush cranberry (*Viburnum opulus americanum*).

Two vegetative inventories were conducted for this site in May and June 2010, and a Floristic Quality Index was calculated from the Floristic Quality Assessment in order to determine the relative quality of the Property. The Rivercrest site, despite its relatively small size and location within a highly developed community, is fairly diverse. Of the 73 total plant species observed in the Spring and early Summer assessments, 52 (71%) are native to Michigan. The Mean C Value of the site is 2.45, which is relatively low, and the site received a FQI Score of 20.93. Most of the remaining undeveloped land in Michigan registers an FQI of less than 20, indicating that the Rivercrest site has minimal significance from a natural quality perspective. It should be noted, however, that a complete three-season inventory should be conducted to accurately quantify and qualify this and any other Property since many late-emerging species may not have been present during the May and June assessments. Please refer to the Floristic Quality Assessment for the Rivercrest Property (Appendix A) for additional detail pertaining to on-site vegetation.

Although the Rivercrest site contains considerable non-native vegetation, especially within the upland old field section (Point 1 on Figure 3), the Property offers greenspace connectivity, valuable wildlife habitat, and harbors a significant wetland feature directly adjacent to the Clinton River, providing a critical riparian buffer (Appendix A; Photo 10). There is strong potential for habitat restoration if garlic mustard can be adequately controlled, and woody invasives such as autumn olive, honeysuckle, and buckthorn can be removed and replanted with native trees and shrubs. Removing these non-native species would greatly increase the quality of this site and increase the biological diversity.

Childress Site

The Childress site is comprised of two parcels totaling 5.31 acres. Located along Childress Avenue (north of Cloverport Avenue), this site primarily consists of upland hardwood forest, although a small amount of forested wetland is present at the toe-of-slope (Appendix B; Figure 4). The southern limits of the site are bound by Childress Road and numerous residential properties, while the western end connects to the Cloverport Property. The land immediately north of the site is vacant and primarily consists of forested wetland. A majority of this Property is steeply sloped (Appendix B; Photo 1) and features several deep gullies that transport precipitation and overland flow north towards the forested wetland, and eventually to the adjacent Clinton River (Appendix B; Photo 2), which passes along the northwestern tip of the site.

Mature hardwood trees such as sugar maple (*Acer saccharum*), black maple (*Acer nigrum*), walnut (*Juglans nigra*), hop hornbeam (*Ostrya virginiana*), black cherry (*Prunus serotina*), white oak (*Quercus alba*), red oak (*Quercus rubra*), and basswood (*Tilia americana*) dominate the canopy on the upland slopes of the Childress site (Appendix B; Photo 3), while woody species such as musclewood (*Carpinus caroliniana*), witch hazel (*Hamamelis virginiana*), and young hop hornbeam and black cherry are common in the understory. Although there are large areas were very little vegetation is present, as is often the case in more mature woodlands, the herbaceous understory vegetation is fairly diverse (Appendix B; Photo 4). Spring wildflowers such as wood anemone (*Anemone quinquefolia*), trout lily (*Erythronium americanum*), Canada mayflower (*Maianthemum canadense*), common trillium (*Trillium grandiflorum*), mayapple (*Podophyllum peltatum*), and wild geranium were present in considerable quantities (Appendix B; Photos 5 and 6), especially in the lower elevations. The southwestern portion of the site, which is relatively flat, is dense in areas and of moderately low quality due to the abundance of non-native forbs and shrubs such as garlic mustard, honeysuckle, common privet (*Ligustrum vulgare*), barberry (*Berberis thunbergii*), Oriental bittersweet (*Celastrus orbiculatus*), and common buckthorn (Appendix B; Photo 7). Despite small quantities of each, several higher quality species such as flowering dogwood (*Cornus florida*), Indian grass (*Sorghastrum nutans*), bloodroot (*Sanguinaria canadensis*), and early meadow rue are also present on site.

The small forested wetland located at the toe-of-slope contains primarily wetland forbs and sedges (Appendix B; Photos 8 and 9), but extends beyond the Property limits where it becomes a significant natural feature as it buffers the Clinton River. Species such as box elder (*Acer negundo*), silver maple (*Acer saccharinum*), American elm (*Ulmus americana*), agrimony (*Agrimonia parviflora*), jewelweed (*Impatiens capensis*), avens (*Geum aleppicum*), late goldenrod (*Solidago gigantea*), and various sedges (*Carex* spp.) are common within the on-site portions of the wetland. Off-site, the

wetland is fairly diverse and features a vernal pool that provides valuable breeding habitat for a variety of amphibians.

A total of 81 plant species were observed on the Childress Property during four vegetative survey dates in May and June 2010. Considering the size of the Property and lack of interspersion and habitat types, 81 species is considered diverse. The site exhibited a Mean C Value of 2.51 and received a FQI score of 22.59. Of the 81 species observed, approximately 74% are native to Michigan. Please refer to the enclosed Floristic Quality Assessment for the Childress Property for additional detail pertaining to on-site vegetation

Much of the Childress site is disturbed as exhibited by the presence of man-made debris such as scrap metal, concrete, glass, bottles/cans, lawn clippings, and household furnishings scattered throughout, especially along the southern portions of the site near Childress Road (Point 1 on Figure 4), and within the steep gullies (Appendix B; Photo 10) (Point 2 on Figure 4). Restoration efforts are warranted and should concentrate on removal of artificial debris and control of exotic species, particularly honeysuckle. Although this site is not particularly significant in terms of vegetative quality, it is an important parcel to the City in that it offers additional greenspace and a habitat linkage to surrounding properties such as the larger Cloverport site to the west. Preservation and stewardship of the Childress Property will not only protect its steep slopes and associated natural features from erosion and further degradation, but will also continue to serve as a critical natural buffer to the Clinton River.

Harding Site

The Harding site is a 26.8-acre, primarily forested property that consists of four separate parcels located in the northeast quadrant of Avon Road and Livernois Road, south of Harding Avenue (Figure 1). Harding Avenue constitutes the northern boundary, with the Clinton River Trail demarcating the southern boundary (Appendix C; Photo 1). Rolling topography and historic management practices have resulted in a collection of diverse plant communities and excellent interspersion in terms of increases and decreases in plant diversity, plant density, horizontal and vertical complexity, and the abundance of different plant species. The site contains upland hardwood forest of varying age classes and densities, pine groves, old field habitat, a small pond, and forested wetland. In addition, a small (on-site) wet meadow is located south of the Trail (north of the Clinton River), comprising the southeastern corner of the site (Appendix C; Figure 5). This wet meadow exhibits characteristics and contains high-quality vegetation commonly associated with fen communities, which are locally rare.

Forested sections of the Harding Property are characterized as upland hardwood, evergreen, and bottomland hardwood. A trail network transects much of the Property and appears to receive regular foot traffic (Appendix C; Photo 2). The upland hardwood portions of the site contain a diverse mix of mature canopy trees and younger second growth trees (Appendix C; Photos 3-6) such as red maple (*Acer rubrum*), box elder, sugar maple, shagbark hickory (*Carya ovata*), white ash (*Fraxinus americana*), black walnut, hop hornbeam, black cherry, white oak, red oak, slippery elm (*Ulmus rubra*), and basswood. Non-native vegetation is abundant throughout this section of forest, particularly tartarian honeysuckle, Oriental bittersweet, garlic mustard, dame's rocket (*Hesperis matronalis*), and common buckthorn (Appendix C; Photo 7). Despite the presence of these species, there are also a number of woodland wildflowers present such as trillium, mayapple, jack-in-the-

pulpit (*Arisaema triphyllum*), Solomon's seal, wild geranium, and wood violet (*Viola palmata*) (Appendix C; Photo 8).

Unlike the hardwood portions of the site, the pine groves on the Property are less diverse and are dominated by non-native Scotch pine (*Pinus strobus*), although sapling oaks and maples are present as well. The understory within these stands generally lacks vegetation with the exception of garlic mustard, Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), and various upland grasses.

With the exception of the wet meadow and pond, most of the wetland present on the Property is forested, although even these systems differ in terms of quality, composition, and function. A walking trail extending from the end of River Bend Drive bisects a moderate-quality forested wetland (Point 1 on Figure 5) that is generally dominated by box elder, green ash (*Fraxinus pennsylvanica*), cottonwood (*Populus deltoides*), silver maple, and elm. Much of the understory consists of forbs such as swamp agrimony, rough bedstraw (*Galium asprellum*), jewelweed, and several avens species (*Geum* spp.), at least in early summer. It is assumed that many more late emerging species are present later in the summer. Pockets of bare soil are present within this wetland as well, suggesting that this area is inundated during the spring (Appendix C; Photos 9 and 10). Areas such as these are vital to the amphibian community which requires vernal pools for reproduction.

The forested wetland in the southern portions of the Property (Point 2 on Figure 5), north of the Clinton River Trail, is significant from a vegetative quality, function, and value perspective. Portions of this wetland are within the floodplain of the Clinton River, and play a crucial role in retaining flood water, trapping sediments, and recharging groundwater. In addition, there is evidence that this area serves as a large vernal feature in the spring, which as mentioned benefits amphibians and other wildlife (Appendix C; Photos 11 and 12).

Similar to the other forested wetland on the site, much of the canopy vegetation within the southern forested wetland consists of silver maple, red maple, elm, cottonwood, swamp white oak (*Quercus bicolor*), and black willow (*Salix nigra*). However, in this region the herbaceous understory is considerably more diverse and there is greater interspersion, likely due to hydrologic fluctuations and periodic inputs from the adjacent river. Sedges and rushes such as lakebank sedge (*Carex lacustris*), porcupine sedge (*Carex hystericina*), oval sedge (*Carex scoparia*), fox sedge (*Carex vulpinoidea*), path rush (*Juncus tenuis*), and woolgrass (*Scirpus cyperinus*) are present in openings where a number of trees have fallen (Appendix C; Photo 13). In addition, species such as jack-in-the-pulpit, water hemlock (*Cicuta maculata*), red-osier dogwood (*Cornus stolonifera*), silky dogwood (*Cornus amomum*), fowl manna grass (*Glyceria striata*), jewelweed, sensitive fern (*Onoclea sensibilis*), skunk cabbage (*Symplocarpus foetidus*), marsh fern (*Thelypteris palustris*), and highbush cranberry were common during the vegetative inventories in May and June 2010.

Scattered amongst the various forested communities are several openings that are generally dominated by upland grasses and forbs (Appendix C; Photos 14 and 15). Old field, which primarily consists of meadow with individual shrubs distributed throughout, offers key habitat for a variety of wildlife, particularly songbirds and rodents, and the predatory birds and mammals that rely on them as a source of food. In addition, they create valuable edge habitat required by a number of wildlife species. Most of the old field habitat present at the Harding Property consists of various grasses

(both native and non-native), but also harbors forb species such as Indian hemp (*Apocynum cannabinum*), milkweed (*Asclepias syriaca*), butterfly weed (*Asclepias tuberosa*), pasture rose (*Rosa carolina*), and a variety of asters (*Aster* spp.) and goldenrods (*Solidago* spp.) (Appendix C; Photo 16). Due to timing of the surveys, it is likely that many more warm-season prairie grasses and forbs that were not observed will emerge as summer extends.

A shallow, 1.5-acre pond is located in the eastern section of the Property, just north of the Clinton River Trail (Appendix C; Photo 17). This pond is home to a variety of frogs, turtles and aquatic invertebrates, as well as sunfish and bass. Fallen logs and other woody structures within the pond provide loafing areas for turtles and waterfowl such as mallards, wood ducks, and Canada geese. With the amount of frogs, tadpoles, aquatic insects, and small fish observed the pond also provides excellent hunting opportunities for great blue herons, egrets, and green herons. A narrow band of mature trees and shrubs encircles the perimeter of the pond (Appendix C; Photo 18), providing valuable shelter. The pond itself contains a large amount of algae and chara.

Despite its small size, at least within the boundaries of the Property, the wet meadow (Appendix C; Photos 19 and 20) is perhaps the most critical natural feature present on the Harding site due to its diversity, unique vegetation, and possible status as a fen, which is an increasingly rare natural community, especially within an urbanized setting. This wet meadow, located along the southern side of the Clinton River Trail (Point 3 on Figure 5), is very diverse for its size and contains numerous high quality wetland species, including angelica (*Angelica atropurpurea*), crested oval sedge (*Carex cristatella*), lakebank sedge, water sedge (*Carex tetanica*), beaked sedge (*Carex utriculata*), wood reedgrass (*Cinna arundinacea*), small lady's slipper orchid (*Cypripedium calceolus*), seedbox (*Ludwigia alternifolia*), ninebark (*Physocarpus opulifolius*), swamp buttercup (*Ranunculus hispidus*), swamp rose (*Rosa palustris*), mountain blue eyed grass (*Sisyrinchium montanum*), golden alexanders (*Zizia aurea*), and meadow parsnip (*Thaspium trifoliatum*) (Appendix C; Photos 21-23). Portions of the wet meadow closer to the Trail were saturated during the May and June inspections, while the interior of the meadow was considerably wetter and contained species commonly associated with marsh habitat such as cattail (*Typha latifolia*), joe pye weed (*Eupatorium maculatum*), blue flag iris (*Iris versicolor*), vervain (*Verbena hastata*), water horehound (*Lycopus americana*), sedge, and bulrush (*Scirpus* spp.). Several non-native species such as scotch pine, autumn olive, purple loosestrife (*Lythrum salicaria*), and reed canary grass (*Phalaris arundinacea*) are present within the wet meadow as well, and should be removed to retain the meadow's quality.

As mentioned, the Harding Property is very diverse due to several distinct habitat types. A total of 170 plant species were observed on the Harding Property during three vegetative survey dates in May and June 2010. Of the 170 species observed, approximately 75% (128 of 170) are native to Michigan. Within wetland portions of the Property, approximately 87% of the species are native. The site overall exhibited a Mean C Value of 2.76 and received a FQI score of 35.99. According to the *Floristic Quality Assessment for Michigan* (Michigan Department of Natural Resources and Environment), FQI scores of 35 or higher are floristically important from a statewide perspective. Please refer to the enclosed Floristic Quality Assessment for the Harding Property for additional detail pertaining to on-site vegetation

The Harding site is a prized natural resource to the City due to its quality, diversity, and large size. The different ecosystems within the Property offer significant habitat to a variety of wildlife, and the Property itself offers an excellent opportunity for passive recreation in the form of hiking, biking,

bird watching, and nature study. Furthermore, the sheer size of contiguous open space it offers, especially in conjunction with the nearby Rivercrest, Childress, and Cloverport parcels, is priceless to an urban community such as Rochester Hills. Especially because of the unique features this site offers, stewardship of the site in the form of invasive species management is crucial in preserving the quality and significance of this Property.

As mentioned, the wet meadow exhibits fen characteristics, whose unique biological and geographical features offer specific ecological conditions favorable to supporting rare plants and animals. Although no state-listed species were observed during the three surveys conducted in May and June 2010, it is certainly possible that threatened and/or endangered species are present within the on-site wet meadow community. Due to its proximity to the Clinton River Trail, the wet meadow may be subject to bike and foot traffic in addition to collectors harvesting uncommon showy species such as the small yellow lady's slipper orchid, Canada anemone, or mountain blue-eyed grass. Furthermore, the presence of invasive vegetation threatens the vegetative quality of this area. It is Niswander Environmental's professional opinion that this area should be managed by the City to rid the area of invasive vegetation (particularly non-native shrubs such as autumn olive) in addition to posting signage along the Trail detailing the natural significance of this wet meadow while prohibiting users from access.

In addition to preserving the wet meadow area, Niswander Environmental feels the old field habitat is an important environment within the Harding site (Point 4 on Figure 5). Successional old field environments are often underrated in terms of the habitat they provide to wildlife; stewardship of this habitat type at the Harding Property should be a priority. Areas of grasses and forbs are beneficial in that they provide cover, nesting, food, and brood rearing opportunities for wildlife. Pheasant, turkey, woodcock, and songbirds use old field habitat for nesting and to raise their young as they provide an abundance of insects that supply young with food. Deer and rabbits will also use these areas for spring and summer browse, as birthing sites, and as bedding areas. Rodents were commonly observed using old field habitat during the site visits in May and June 2010, and these in turn provide a valuable source of food for hawks, owls, fox, coyotes, and snakes. Periodic disturbance (*i.e.*, mowing, selective cutting, burning, etc.) is key to preventing eventual succession from field to a forested community. Properly planned management techniques and stewardship can enhance the remaining on-site old field habitat for wildlife.

Cloverport Site

The Cloverport site offers high quality upland and bottomland forest, with great restoration potential. Located along the rolling and often steep banks of the Clinton River (Appendix D; Figure 6), the 7.42-acre Cloverport Property is a significant natural feature due in part to the functions and values it provides. Rich woodlands are considered important ecosystems since they provide wildlife habitat, critical habitat linkages, visual buffers, and improved air quality. Forested floodplain wetlands are of particular importance due to their ability to trap silt and sediment, filter pollutants, and slowly release floodwater.

This Property is different from the previous three greenspace parcels in that it once contained a single-family home. As such, evidence of residential landscaping is apparent in what is otherwise a high quality, natural parcel. A majority of the Property exhibits an impressive assortment of hardwood trees of varying size, age class, and density (Appendix D; Photos 1-4). The rolling nature

of this Property enhances its natural beauty. However, there are also significant areas of dense, non-native groundcovers such as periwinkle (*Vinca minor*), lily-of-the-valley (*Convallaria majalis*), and pachysandra (*Pachysandra terminalis*) in addition to escaped landscape trees and shrubs (Appendix D; Photos 5 and 6) (Point 1 on Figure 6).

The predominant canopy vegetation is red oak (*Quercus rubra*), white oak (*Quercus alba*), black maple (*Acer nigrum*), and sugar maple, but a number of other species such as shagbark hickory, red maple, silver maple, elm, black walnut, hop hornbeam, cottonwood, basswood (*Tilia americana*), and black cherry are also common throughout. The understory vegetation varies considerably in terms of type, species composition, and density. Species such as witch hazel (*Hamamelis virginiana*), muslcewood (*Carpinus caroliniana*), hop hornbeam, and sapling trees are abundant throughout, and spring wildflowers such as trillium, mayapple, jack-in-the-pulpit, wood anemone, wild geranium, dame's rocket (*Hesperis matronalis*), bloodroot (*Sanguinaria canadensis*), solomon's seal, and early meadow rue carpeted the forest floor during vegetative inventories in May 2010 (Appendix D; Photos 7 and 8). In addition to these higher-quality shrubs and wildflowers, however, is the presence of invasives such as garlic mustard, Oriental bittersweet, and tartarian honeysuckle.

The forested wetland located along the banks of the Clinton River and in the southwestern sections of the Property has the potential to be high quality if not for the presence of excessive silt (Appendix D; Photos 9 and 10) (Point 2 on Figure 6). The wetland offers a diverse variety of trees, shrubs, grasses, sedges, and forbs, but is somewhat degraded due to inputs of silt from a commercial development south of the Property. The development is located at a higher elevation and silt travels down gullies and settles into the wetland below, creating large patches of unvegetated soil. In addition, it has the ability to enter the river during any precipitation event, causing further sedimentation and pollution. Areas that are not impacted by the silt deposits are of moderately high quality and contain desirable wetland vegetation such as swamp agrimony, fringed brome (*Bromus ciliatus*), blue joint grass (*Calamagrostis canadensis*), lakebank sedge, Bebb's oval sedge (*Carex bebbi*), silky dogwood, horsetail (*Equisetum* spp.), fowl manna grass, ninebark, willow, and highbush cranberry.

A total of 110 plant species were observed on the Cloverport Property during three vegetative surveys conducted in May and June 2010. Similar to the other greenspace properties assessed by Niswander Environmental, the Cloverport site exhibited a Mean C Value of 2.59, and received a FQI score of 27.16. Of the 110 species observed, approximately 71% are native to Michigan. Please refer to the enclosed Floristic Quality Assessment for the Cloverport Property for additional detail pertaining to on-site vegetation. Restoration efforts to enhance the natural beauty of this site should focus on removal of invasive groundcover vegetation near the former home site and understory species such as garlic mustard, Oriental bittersweet, and tartarian honeysuckle. Eradicating or at least controlling these species will result in native vegetation reclaiming these areas. In addition to invasive species control, other restoration activities are necessary.

The Clinton River in this section of the City is clear, fast moving, and offers excellent aquatic habitat for fish and macroinvertebrates in the form of submergent cover, riffle habitat, pools, and varying substrates. The Cloverport site provides an excellent natural riparian buffer to the river while performing critical functions that benefit both the river and surrounding parcels. Despite these attributes, the site also contributes to the river's sedimentation issues. In addition to the excessive

silt buildup that enters the river during each storm, portions of the higher banks are severely eroded and in need of stabilization (Appendix D; Photos 11 and 12) (Point 3 on Figure 6).

CONCLUSIONS AND RECOMMENDATIONS

In May and June 2010, Niswander Environmental conducted site evaluations of four City-owned greenspace properties that included quantitative and qualitative vegetative inventories, natural community assessments, and mapping of on-site habitat types in order to provide the City with potential management strategies that will preserve and enhance the natural features of Rochester Hills. Based on the findings of the 2004 Natural Features Inventory and the May/June 2010 comprehensive assessments, Niswander Environmental has determined that each of the four parcels – the Rivercrest, Childress, Harding, and Cloverport Properties – are all worthy of protection and management. None should be characterized as low quality, and each has valuable attributes that could be enhanced through stewardship. Results from the Floristic Quality Assessments are represented in Table 1 below.

Table 1. Results from May/June 2010 Floristic Quality Assessments

Site	FQI Score	Mean C Value	Total Species*	Native Species
Rivercrest	20.93	2.45	73	52 (71%)
Childress	22.59	2.51	81	60 (74%)
Harding	35.99	2.76	170	128 (75%)
Cloverport	27.16	2.59	110	78 (71%)

* Vegetation surveys conduct in May and June 2010; additional species that do not typically emerge by early summer were likely not accounted for.

The Rivercrest site is an important parcel despite its small size (just under 2 acres) due to its proximity to the Clinton River and subsequent water quality functions it provides. Although the upland old field portions of the Property contain significant amounts of non-native shrubs that should be controlled (primarily through cut-and-treat applications), the scrub-shrub wetland is of moderate high quality. This wetland provides sediment and pollution filtering as well as flood retention, groundwater recharge, and habitat for wildlife. In addition, it is a protected property that that links vacant natural land with the nearby Harding Property.

The steeply sloped Childress site is a forested property that links with the Cloverport Property to the southwest. Together, these adjacent properties provide almost 13 contiguous acres of wooded greenspace in a highly developed section of Rochester Hills. Similar to the other Properties, the Childress site contains a diverse forested community that could benefit from the removal of invasive non-native vegetation, primarily garlic mustard, bittersweet, and tartarian honeysuckle. Man-made debris that has been discarded into this Property for years should be removed. In addition, several areas of steep slope (primarily gullies) have erosion and should be stabilized.

The Harding Property is the most diverse site of the four assessed by Niswander Environmental. Although a vast majority of the site is forested, the different age classes, interspersion, topographic

changes, and community types result in a truly unique property. A trail network is already established through much of the site, and it appears to offer recreational opportunities on a regular basis. The site offers important habitat variations in the form of upland hardwood forest, successional old field, shallow pond, and forested wetland, some of which includes forested floodplain habitat. In addition, a small but diverse wet meadow natural community is the highlight of the Property and warrants absolute protection because of its potentially sensitive nature. Management of the wet meadow and old field habitat is necessary to ensure these ecosystems remain intact. Niswander Environmental recommends a stewardship plan to remove invasive species such as garlic mustard, tartarian honeysuckle, common buckthorn, and Oriental bittersweet throughout the Property to preserve the quality, diversity, and natural beauty of this site. Furthermore, the Property is located immediately adjacent to the Clinton River Trail and therefore would be an excellent location for interpretive signs promoting the quality and natural significance of this site.

Preserving and restoring the 7.42-acre Cloverport Property should be of primary importance to the City based not only on its existing and potential quality, but also because of the functions and values it provides. Located along the Clinton River, this Property more so than the others provides significant functions in terms of water quality enhancement and protection. Not only does this Property act as a significant direct buffer to the river, the forested floodplain wetlands along the banks and in the southern portion of the site provide critical pollution filtration, flood storage, and groundwater recharge. As mentioned, when combined with the adjacent Childress parcel, almost 13 acres of undisturbed forest provides great benefit to the river.

As the City of Rochester Hills is confronted with increasing development, especially within this section of the City, preserving four unique open space parcels of this ecological value is of utmost importance.

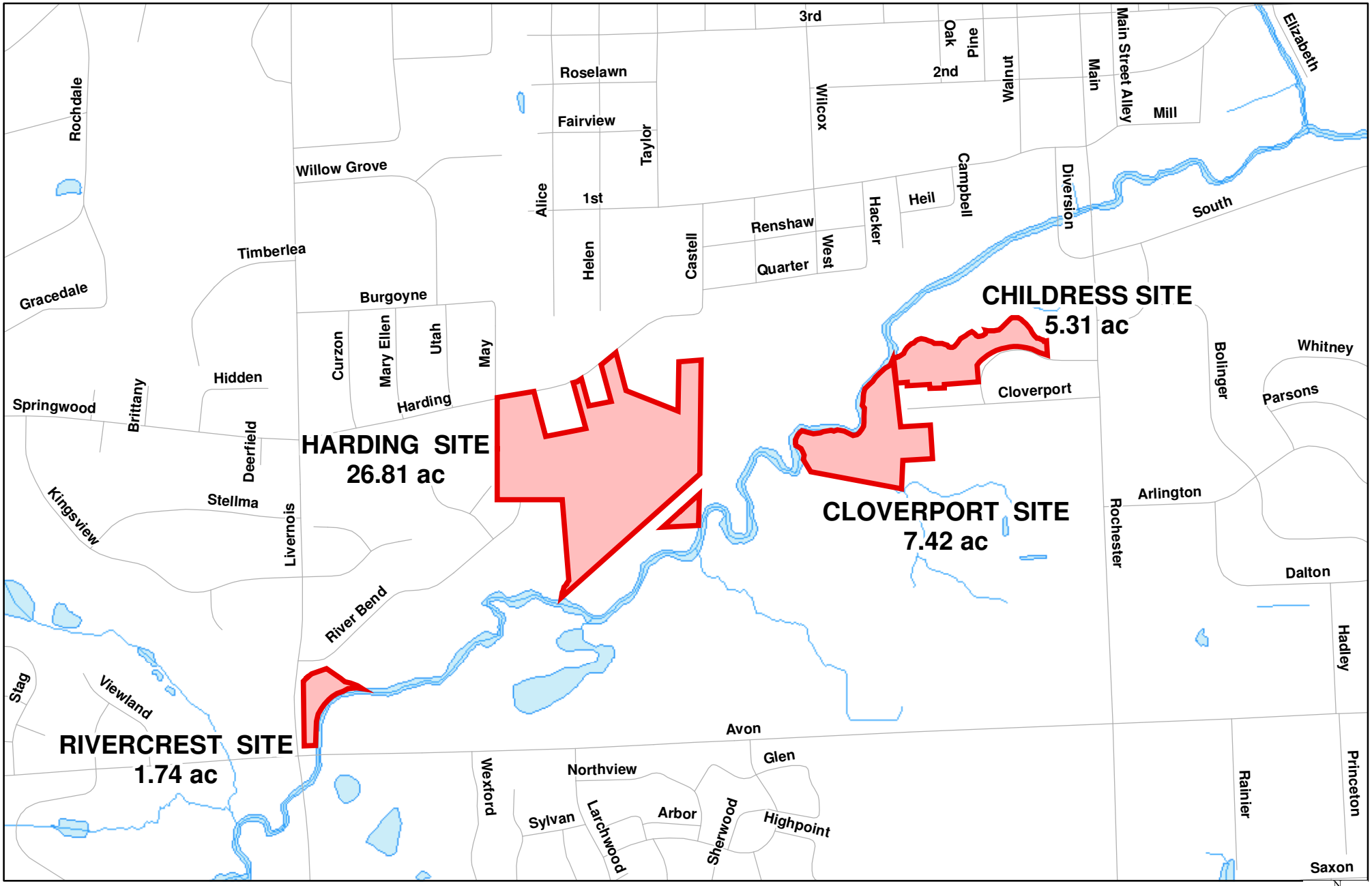

Figure 1. Site Location Map

NE 1210 Rochester Hills Greenspace Inventoy
Four Properties along Clinton River Trail
Section 15 of Rochester Hills, Oakland, Co., MI
Source: MiGDL, City of Rochester Hills GIS Dept.
Habitat Asessment: May and June 2010
Map Created: June 28, 2010

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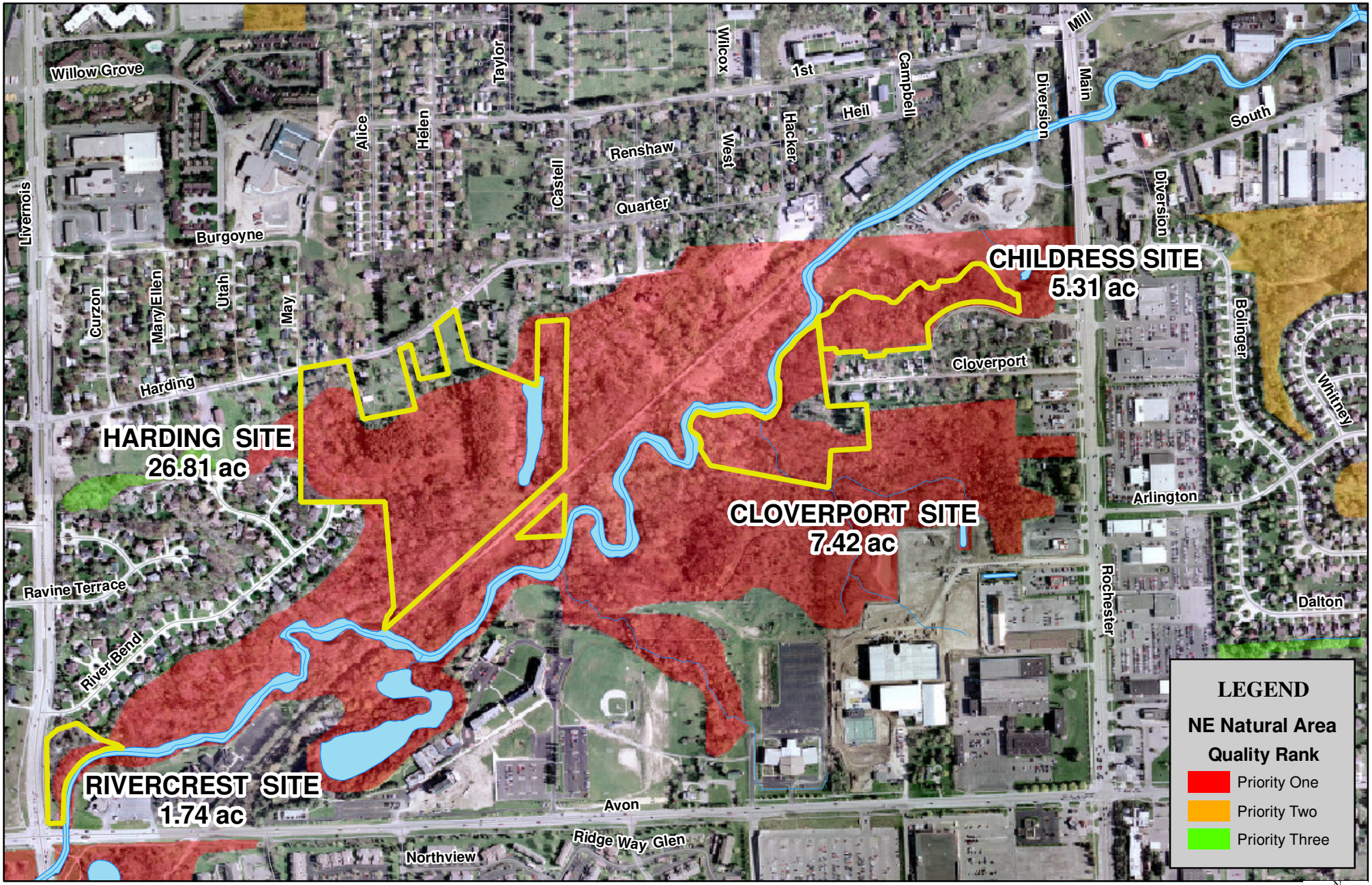

Figure 2. Natural Areas Map

NE 1210 Rochester Hills Greenspace Inventoy
Four Properties along Clinton River Trail
Section 15 of Rochester Hills, Oakland, Co., MI
Source: MiGDL, City of Rochester Hills GIS Dept.
Habitat Asessment: May and June 2010
Map Created: June 21, 2010

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