



4 Environment

The following provides an existing conditions and constraints analysis for the Kleinburg-Nashville Secondary Plan study area. The information contained herein is drawn from the Vaughan Natural Heritage In The City and Existing Conditions Reports (AECOM, Draft – July 2009), the Humber River Watershed Plan and Implementation Guide (TRCA 2008), and the TRCA Terrestrial Natural Heritage System Strategy (TRCA 2004). Field reconnaissance was completed on accessible properties within the Rural Focus Areas to document existing conditions, confirm limits of development and buffer/setback requirements, and identify restoration/enhancement opportunities.

4.1 Environmental Overview

4.1.1 Physical Features

The predominant physical feature within the study area is the Main Branch and East Branch of the Humber River. Both river systems occupy well-incised valleys with steep side slopes and variable width floodplains. A tributary of Purpleville Creek is located in the northeast portion of the study area and occupies a shallow but well defined valley.

From a physiographic perspective, the study area (including Focus Areas 1 and 2) is mainly located within the Peel Plain physiographic region of Southern Ontario (Chapman and Putnam 1984). The northeast portion of the study area, (comprising Focus Areas 4, 5, 6 and 7) is situated within the South Slope region of Southern Ontario. The topography of the tableland areas ranges from flat to gently sloping in Focus Area 2 to rolling/undulating in Focus Areas 5, 6 and 7.

The soils within the study area are mainly comprised of well drained sandy loams and clay loams (Hoffman and Richards 1955 – Soil Survey of York County, Report No. 19 of the Ontario Soil Survey). Focus Area 2 is overlain by well drained Brighton sandy loam soil derived from well sorted, grey calcareous sand or stratified sand and gravel. These soils occupy the tableland areas in Focus Area 2, including portions of the adjacent Humber River valley slopes and bottomland. Focus Areas 5 and 6 are overlain by King clay loam of good drainage derived from brown, calcareous gritty clay till loam. A band of well drained Pontypool sandy loam soils derived from poorly sorted calcareous sandy outwash is located in the centre of Focus Areas 5 and 6, in association with the upper slopes of the rolling topography. Bottomland alluvial soils with variable drainage are associated with Main Humber, East Humber and Purpleville Creek bottomlands. Shallow organic soils occur within wetland areas and portions of the valley bottomlands.

Shallow water table levels occur within the valleylands and in association with intermittent drainage courses and wetlands. Shallow groundwater conditions also occur on the tablelands within Focus Area 2 (Pers. Comm. Mr. Jim Maw - local resident and historian). Groundwater seepage zones were observed along the uppermost portion of the Humber River valley wall that flanks Focus Area 2. Similar seepage zones were noted in the middle to lower slopes of the East Humber River valley, in association with cedar swamps. Sand, silty sand and gravelly sand deposits which occur within the overburden till serve as a shallow overburden aquifer for local wells (e.g. Focus Area 2). These lenses also discharge groundwater to the Humber River and related slope and bottomland wetlands.

Moderate to high levels of groundwater infiltration are reported to occur within the study area with recharge values ranging from 51 mm to 200 mm/yr. The overall pattern and volume of groundwater recharge and discharge is critical for the maintenance of stream baseflow and wetland hydrology within the study area.

4.1.2 Natural Features

Aquatic

The main Humber River and the East Humber River support a permanent warmwater and coldwater fishery, respectively. The Purpleville Creek system supports an intermittent and permanent coldwater fishery. A total of 38 species of fish have been reported from the main Humber River and 39 species have been reported from the East Humber River (AECOM, July 2009).

Target fish species within the main Humber, as described in the Humber River Fisheries Management Plan (OMNR 2005) include: reddsides dace (an Endangered species),

rainbow darter, blackside darter, rainbow trout and smallmouth bass. Redside dace and rainbow darter are also identified as target species within the East Humber River. Target species within Purpleville Creek (Focus Area 5 and 6) include brook trout, reddsides dace, and rainbow trout. Management practices, including stormwater management and groundwater management, should focus on protecting and enhancing the habitat for these specific target species.

Water quality within the Humber River system through the study area is reported to be generally poor due to high levels of nutrients, heavy metals, suspended solids, turbidity and E. coli (TRCA 2008).

The main Humber and East Humber River, as well as Purpleville Creek, are identified as sensitive fisheries areas on the basis of the thermal regime, presence of species at risk and/or locally uncommon species, and high fish species diversity. Species at risk within the study area include reddsides dace and northern brook lamprey. Uncommon fish species include blackside darter and sand shiner (TRCA 2008).

Seventeen species of fish have been identified by TRCA as species of local concern as they are rare or in decline. The loss/decline of these species is due to a combination of factors including specialized habitat requirements, habitat degradation, declining water quality and in-stream barriers.

Given the sensitivity and significance of the fisheries resources within the Humber River system, a high level of protection will be required for future development within the Study Area.



Wildlife

Both branches of the Humber River support a variety of intact, high quality vegetation communities (i.e. meadow, shrub thicket, woodland, forest, wetlands) that provide habitat for a diverse assemblage of birds, mammals, reptiles and amphibians. The valleylands also provide an important corridor function for the dispersal of wildlife between the Oak Ridges Moraine to the north and remnant natural areas and the Lake Ontario shoreline to the south.

The Humber River valleylands (both the main branch and east branch) are reported to support concentrations of area sensitive bird species, amphibian breeding areas and species at risk (amphibian/reptile). Area sensitive birds such as ovenbird, wood thrush, ruffed grouse, long-eared owl, black-billed cuckoo, and black and white warbler occur in the larger, intact habitat patches associated with the Humber valleylands. Cedar swamps and meadow marsh habitats within the valleylands occur in groundwater discharge areas and support breeding areas for a variety of amphibians including wood frog (TRCA 2008).

Given the diversity of habitats within the valley systems and their connectivity to other habitat patches within the landscape, the study area also supports a typical assemblage of common, mammal species often found in rural/urban fringe areas. The natural vegetation associated with the valleylands and the aquatic habitats (river, wetlands) provide specific habitat conditions that are well suited to support a variety of species. The agricultural dominated tableland areas also provide a limited amount of habitat for mammals tolerant of human presence.

The main Humber and East Humber River valleylands and the riparian habitats associated with the Purpleville Creek system provide a corridor for species dispersal through the landscape. The landscape connectivity function is primarily

in a north-south direction however there are opportunities to restore/enhance an east-west linkage connection between the East Humber River valleylands and the Purpleville Creek system, within Focus Area 5 and 6 (i.e. in association with the intermittent tributary and tableland woodlot). The Greenbelt Plan Natural Heritage System at the southern end of Focus Area 6 also provides an opportunity for reconnecting habitat patches within the landscape through naturalization of the agricultural fields.

Although outside the scope of this study, the woodlots located immediately to the south of the village of Nashville would benefit from being reconnected (i.e. between Scott's Bush to the southwest and the woodlot/wetlands along the railway line to the southeast).

Vegetation

The Humber River valleylands support a mosaic of terrestrial, wetland and cultural vegetation communities, including deciduous and mixed forest associations, coniferous swamp and meadow marsh wetlands, old field meadow, conifer plantations, and shrub thickets. The terrestrial and wetland communities support an intact, rich native plant community, including habitat for provincially, regionally and locally rare/uncommon species. For example, groundwater seepage zones within the Humber River valleylands are reported to support habitat for plant species of concern such as marsh pennywort, goldthread and golden saxifrage. The Kortright Centre and Boyd Conservation Area also support species and vegetation communities of conservation concern. The sugar maple and black maple forest associations that occur within the main Humber River valley system are considered to be regionally rare by the OMNR NHIC.

The Purpleville Creek system located in the northeast corner of the study area (i.e. Focus Areas 5 and 6) supports meadow marsh, thicket swamp and deciduous swamp communities within the riparian zone.

Tableland woodlots in the study area are limited to a small deciduous forest block located in proximity to the East Humber River valley (i.e. Focus Area 5).

The balance of the study area is comprised of active agricultural land with field border hedgerows, coniferous shelterbelts and planted native/non-native trees and shrubs associated with farmsteads and rural residences.

4.1.3 Natural Area Designations

Wetlands

Both the main Humber River and the East Humber River valleylands contain wetland communities that have not yet been evaluated by OMNR following the Ontario Wetland Evaluation System. The wetlands associated with the Purpleville Creek system in the northeast corner of the study area have been identified by OMNR as a "draft" Provincially Significant Wetland Complex (i.e. East Humber River PSW).

Areas of Natural and Scientific Interest (ANSI)

The East Humber River valleylands are designated as a Regionally Significant Life Science ANSI. The



basis for the designation is the variety and quality of terrestrial and wetland vegetation features associated with the bottomland and valley slopes.

Environmentally Significant Areas (ESA)

The East Humber River valleylands are identified by TRCA as a Life Science ESA #32 (Glassco) that fulfills 3 out of a possible 7 ESA designation criteria. The basis for the ESA designation is the presence of regionally rare species (e.g. Thinleaf Sedge) and high quality, mature deciduous and mixed forest communities that support a rich and diverse assemblage of plant and avian species.

Woodlands

The forest communities associated with the Humber River valleylands are identified as Significant Woodlands in the Region of York Official Plan and are mapped as part of the Regional Greenlands System. The Significant Woodlands designation encompasses the deciduous and mixed forest communities within the valleylands as well as the large coniferous plantation blocks that occur throughout the bottomland areas.

4.2 Environmental Policy Regime and Natural Heritage System

In order to establish an environmental protection framework (Natural Heritage System) for the Kleinburg-Nashville Secondary Plan area, the following legislation, policies and plans were reviewed and taken into account:

- Federal Species at Risk Act;
- Federal Fisheries Act;
- Provincial Policy Statement (Natural Heritage Policies);

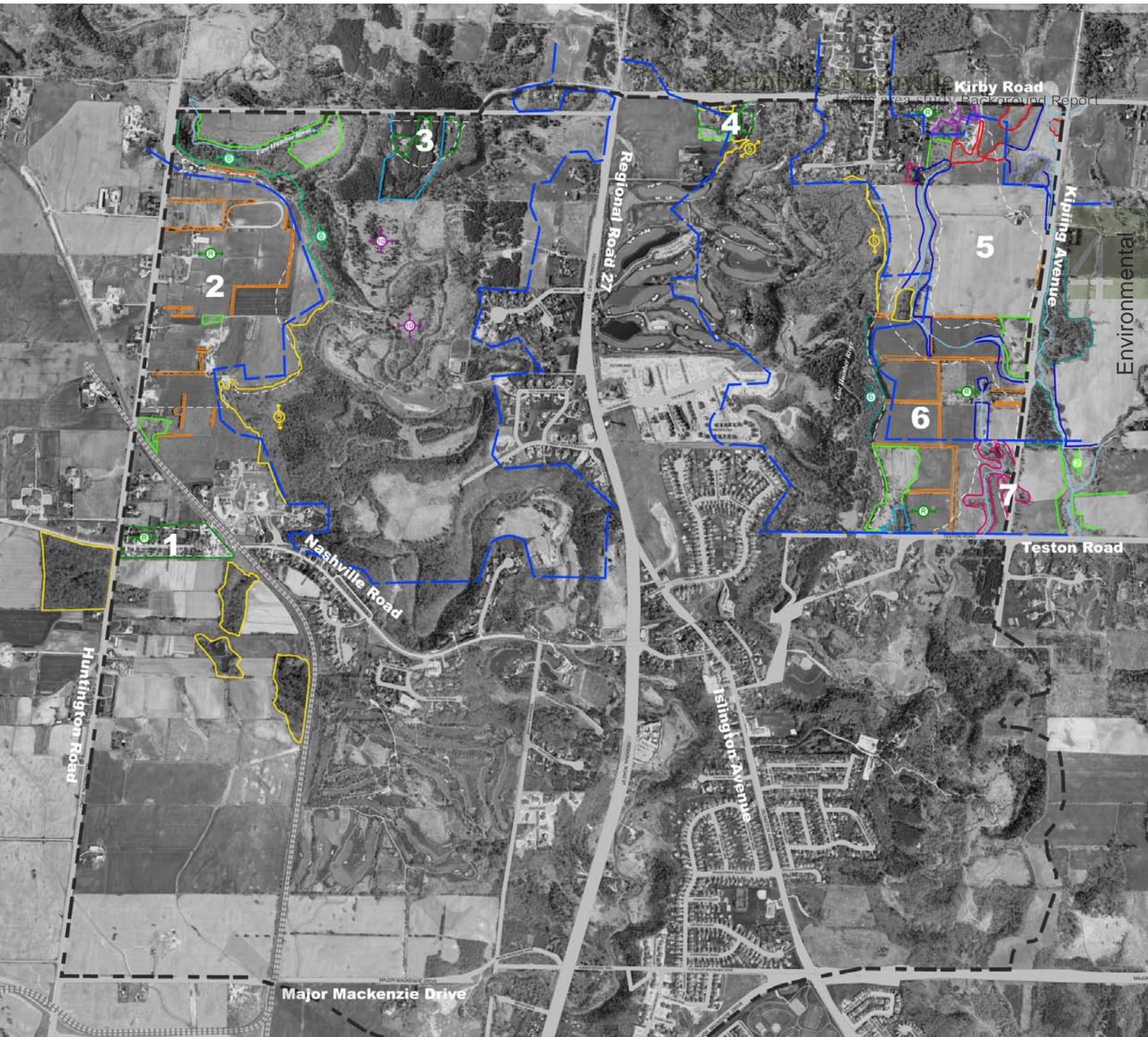
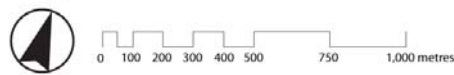


Figure 4. Map of Existing Vegetation Communities



- | | | |
|-------------------------------|--------------------------------|---|
| 1 - Field Border Hedgerows | 6 - Mixed Forest | 10 - Cultural Meadow/
Woodland Mosaic
(Humber River Bottomland) |
| 2 - Cultured Old Field Meadow | 7 - Marsh (Riparian) | R - Ornamental Plantings
(Residences/Farmsteads) |
| 3 - Plantation | 8 - Deciduous Swamp (Riparian) | F - Fill |
| 4 - Cultural Woodland | 9 - Thicket Swamp | |
| 5 - Deciduous Forest | | |

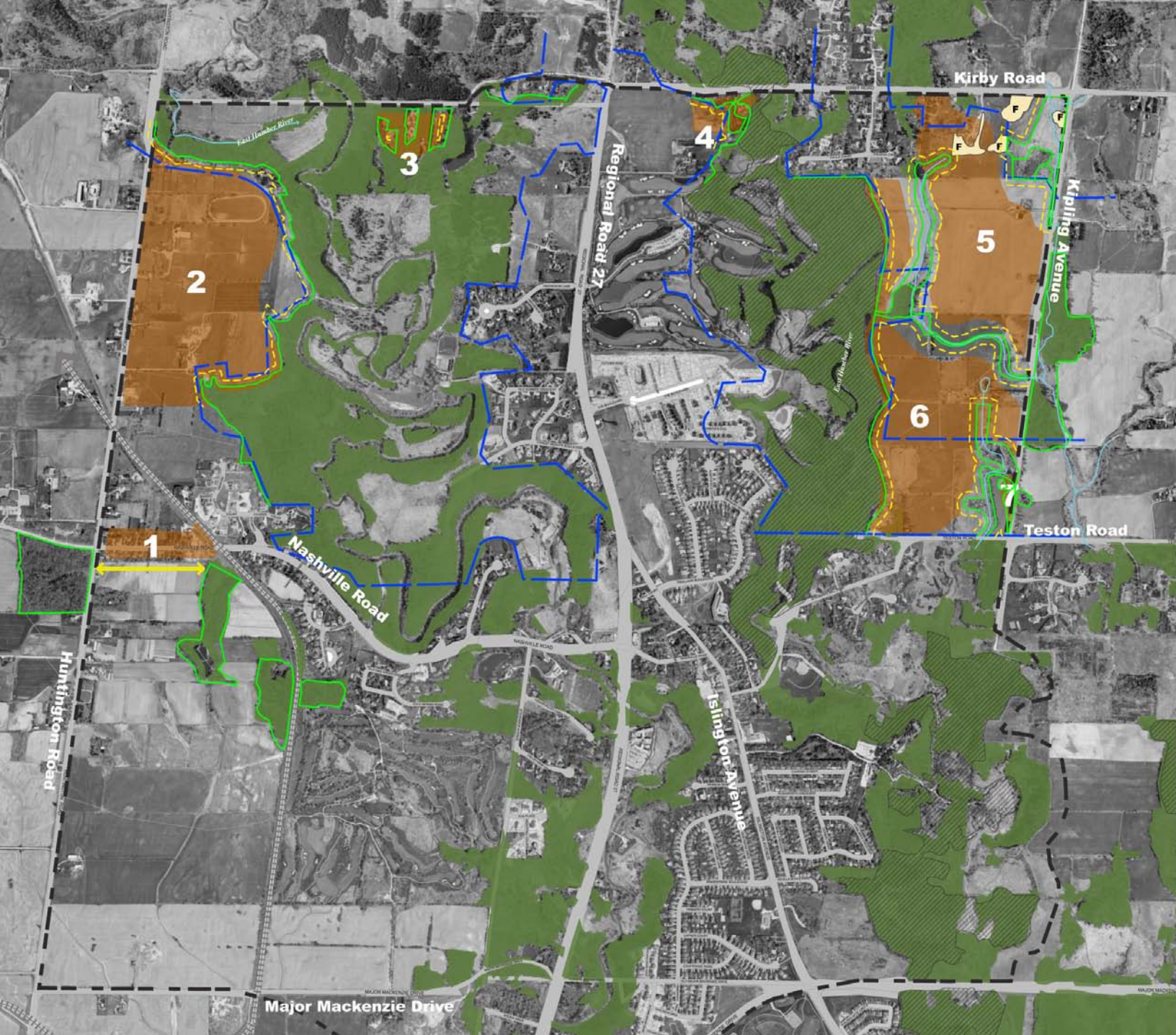







Figure 5. Map of Opportunities and Constraints



0 100 200 300 400 500 750 1,000 metres

- | | |
|---|---|
|  Focus Area |  Natural Heritage System (NHS) |
|  Significant Forest |  30m NHS Buffer |
|  Environmentally Significant Area (TRCA) |  Linkage Opportunity |
|  Fill |  Watercourse & Direction of Flow |
| |  Greenbelt Boundary (approx) |

- Greenbelt Act – Greenbelt Plan NHS and related policies;
- Provincial Endangered Species Act;
- Ontario Regulation 166/06 – Development, Interference with Wetlands and Alterations to Shorelines and Watercourses;
- TRCA Terrestrial Natural Heritage System Strategy;
- TRCA Valley and Stream Corridor Management Program;
- York Region Official Plan (Significant Forests and Greenlands System); and,
- City of Vaughan OPA 600 (Woodlands, Natural Heritage Framework).

Based on a review of the available background information summarized above and field reconnaissance of accessible properties, a Natural Heritage System (NHS) was established as a “framework” for the preparation of land use alternatives for the Kleinburg-Nashville Secondary Plan Area. Since the majority of the natural features within the study area are part of the Greenbelt Plan and Protected Countryside Natural Heritage System, the minimum 30 metre vegetation protection zone or buffer requirement for woodlands, wetlands, watercourses and environmental policy areas such as ANSI’s and ESA’s was applied.

The NHS presented in Figure 5 (Map of Opportunities and Constraints) defines the limits of the natural features (i.e. valleylands, woodlot, wetlands, and watercourses) plus a

30 metre buffer. Refinements to the NHS boundary and buffers will be addressed during subsequent phases in the planning process when more detailed information is available. For example, meander belt width and/or geotechnical stable slope line plus an appropriate setback may extend beyond the 30 metre NHS buffer shown on Figure 5 for the Humber River valleylands. Floodline analysis of the Purpleville Creek system in the northeast corner of the study area (i.e. Focus Area 5 and 6) may also result in refinements to the limits of the NHS and buffer/setback requirements.

The NHS outlined in Figure 3 is consistent with the Natural Heritage Framework (i.e. Category 1 lands) identified in the City of Vaughan’s report, Natural Heritage in the City – Background for the Official Plan (AECOM – Draft July 2009). Category 1 lands contain natural features that are protected under the current environmental legislation and policy regime, as noted above.

4.3 Rural Focus Areas – Existing Conditions and Constraints Overview

The following section provides an overview description of the existing environmental conditions within the six Rural Focus Areas located in the Kleinburg-Nashville Secondary Plan study area. A description of each of the six focus areas is provided below in bullet format. The overview is based on a review of available background mapping and field reconnaissance completed in late May and early June 2009. The existing conditions and environmental constraints are presented in Figures



4 and 5, respectively.

4.3.1 Focus Area 1

- Existing hamlet of Nashville
- Manicured/landscaped grounds associated with existing residences and commercial properties
- Mixture of planted native and non-native deciduous/coniferous trees and shrubs (Norway maple, Norway spruce, white cedar, Manitoba maple, sugar maple)
- Scott's Bush located to the southwest – deciduous woodlot dominated by sugar maple interspersed with mixed hardwoods and white pine
- Deciduous forest/swamp located to the southeast (adjacent to railway line)
- Potential linkage connection between woodlots to the southwest and southeast along the southern edge of the hamlet (i.e. along north edge of adjacent lands, incorporate native plantings in rear lots and/or open space block)

4.3.2 Focus Area 2

- Mainly comprised of agricultural land interspersed with field border hedgerows and shelter belt plantings
- Hedgerows are narrow, patchy in character and have limited wildlife habitat/linkage value
- Typical hedgerow species present include white elm, basswood, sugar maple, Manitoba maple, white ash, Norway spruce, white spruce apple/pear, hawthorn, buckthorn, brambles and honeysuckle
- Typical mixture of species associated with farmsteads and residences (Norway spruce, Manitoba maple, lilac,

apple, cedar, sugar maple)

- Level to gently undulating tableland with well drained sandy loam soils
- Humber River Valley flanks the focus area on the east and north
- Valleyland supports a mosaic of deciduous, mixed and coniferous forest associations with seepage slope and bottomland wetland communities (cedar swamp, meadow marsh). Floodplain mainly comprised of former farm fields and pastureland in varying stages of plant succession – cultural old field meadow, plantation, cultural thicket and woodland communities present
- Intact valley slopes support mature, forest vegetation with rich overstorey, understorey and groundcover layers. Mature trees in excess of 75 cm in diameter present
- Evidence of groundwater seepage, soil erosion and slumping on steep valley walls
- Majority of Humber River Valley designated as ESA (TRCA), Significant Woodland, and part of Greenbelt Plan Natural Heritage System (Key Natural Heritage and Hydrologic Feature)
- Majority of valleylands owned and managed by the TRCA
- Valley provides an important corridor function at the local and regional level and provides a linkage between the Lake Ontario shoreline to the south and

the Oak Ridges Moraine to the north

- Habitat for rare flora and fauna as well as species with restricted habitat requirements occurs within the intact, less disturbed portions of the valley
- Humber River – permanent system that supports a variety of warmwater baitfish and sportfish species

4.3.3 Focus Area 3

- Existing residential lots associated with conifer plantations (red/white pine, white spruce)
- Residual conifer plantations identified as Significant Woodland and ESA (TRCA)
- Plantations are part of a larger block that extends north and south of Kirby Road
- Part of the Greenbelt Plan Natural Heritage System

4.3.4 Focus Area 4

- Existing residential lots
- Properties flank forested valley slopes
- Cultural old field meadow and cultural woodland on tableland
- Deciduous forest associated with adjacent Humber River Valley slopes (part of Greenbelt Plan NHS)



- Slope constraints along Kirby Road

4.3.5 Focus Area 5

- Mainly comprised of agricultural land with minor field border hedgerows
- Rolling, undulating topography with well drained clay loam and sandy loam soils
- Meadow marsh and thicket swamp wetland (willow, dogwood, meadowsweet) communities associated with seasonal watercourses along the west and east edge of the Focus Area (i.e. tributaries to Purpleville Creek – coldwater system)
- Fill placed along the edges of the wetland in the northeast corner
- Small mixed woodlot associated with westerly watercourse – hedgerow provides connection between woodlot and the East Humber River Valley to the west – linkage restoration/enhancement opportunity
- Wetland communities in northeast corner and small mixed woodlot identified as part of Greenbelt Plan Natural Heritage System.
- Hydro corridor (N-S) and gas pipeline easement (E-W) traverse the focus area
- Seasonal watercourse with riparian wetland vegetation separates Focus Area 5 and 6
- Ornamental plantings associated with residences along Kirby Road and Kipling Avenue frontage.

4.3.6 Focus Area 6 and 7

- Mainly comprised of agricultural land
- Deciduous swamp and marsh wetland associated with seasonal watercourse and closed depressions in southeast corner
- Rolling, undulating topography with well drained sandy loam and clay loam soils
- Cultural old field meadow, coniferous hedgerows, Manitoba maple, and lilac associated with farmsteads
- East Humber River Valley flanks focus area on the west. Steep valley walls support a mosaic of deciduous, mixed and coniferous forest associations with rich, intact vegetation. Seepage slope wetland communities present (coniferous/mixed swamp). Floodplain supports a bottomland forest and wetland associations, cultural old field meadow and a manicured/landscaped golf course.
- Humber River Valleyland and watercourse in the southeast corner designated as part of the Greenbelt Plan NHS
- ESA (TRCA) and Significant Woodland designation associated with the valleylands
- Valley system provides an important linkage function as well as habitat for rare flora and fauna, and species with restricted habitat requirements
- Restoration/enhancement opportunity associated

with seasonal watercourse located between Focus Area 5 and 6 (i.e. east-west linkage connection between Purpleville Creek system and East Humber River)

- East Humber River system supports a coldwater fishery

4.4 Recommendations

The following environmental management and mitigation measures are recommended for future urban growth in the Kleinburg-Nashville Secondary Plan study area.

Due to environmental considerations, Areas 3, 4 and 7 have not been included in the Secondary Plan area. Area 3 supports large, coniferous plantation blocks that are designated as part of the Greenbelt Plan NHS, and are also identified as significant woodlands. Area 4 is located adjacent to the Humber River valley and includes a tableland woodlot, forested valley, and steep, sloping topography. These features are also identified as part of the Greenbelt Plan NHS. The presence of environmental features combined with their buffer/setback requirements would preclude future development within Area 3 and 4. Area 7 is entirely located within the Greenbelt Plan NHS, and includes natural areas associated the Humber River valley and Purpleville Creek tributary.

The recommendations outlined below have been drawn from the Humber River Watershed Plan and Implementaion Guide (TRCA 2008) and the City of Vaughan Natural Heritage in the City Report



(AECOM - Draft July 2009).

- Utilize lot level, conveyance and end-of-pipe stormwater management measures that enhance the collection, infiltration and polishing of runoff and reduce impacts on stream baseflow, erosion and water quality;
- Plant native trees and shrubs in existing developments (i.e. streetscape, front/rear yards), including around stormwater management ponds, NHS buffers, schools, parks and other open space areas;
- Minimize impacts of passive recreational use and companion animals in the NHS through implementation of various environmental stewardship measures, public education/awareness, and habitat restoration;
- Create and enhance natural cover within the TRCA Target Terrestrial NHS to improve biodiversity, strengthen habitat resilience, restore a natural water balance, protect groundwater recharge/discharge zones that contribute to stream baseflow and wetland hydrology and mitigate potential impacts of urbanization on erosion and water quality. These efforts should be focused on the NHS in future growth areas, Greenbelt NHS and significant recharge areas;
- Enhance infiltration and harvesting of runoff in new and existing developments to improve water quality and reduce erosion;
- Restore wetlands to improve populations of targeted sensitive species and restore natural water balance;
- Increase public awareness of the cultural and natural heritage of the Humber River with emphasis on the

Kleinburg-Nashville Historic District; and,

- Close unsuitable informal trails and formalize trails where appropriate to reduce impacts of human use and companion animals on natural habitats.

Strategies to achieve environmentally sustainable urban growth within the Humber River Watershed and the Kleinburg-Nashville Secondary Plan study area are as follows:

- Protect groundwater recharge/discharge zones;
- Increase natural vegetation cover;
- Improve the environmental sustainability of urban development design (e.g. greenroof technology, rainwater harvesting, constructed wetlands, engineered infiltration solutions);
- Improve and monitor erosion and sediment control measures during construction phases and site restoration;
- Implement stormwater management retrofit;
- Conduct performance monitoring and regular maintenance of stormwater infrastructure;
- Prevent air, water and soil pollution;
- Protect stream channel form; and,
- Conduct on-going monitoring of the natural environment and make adjustments to the resource management and mitigation measures, as required.