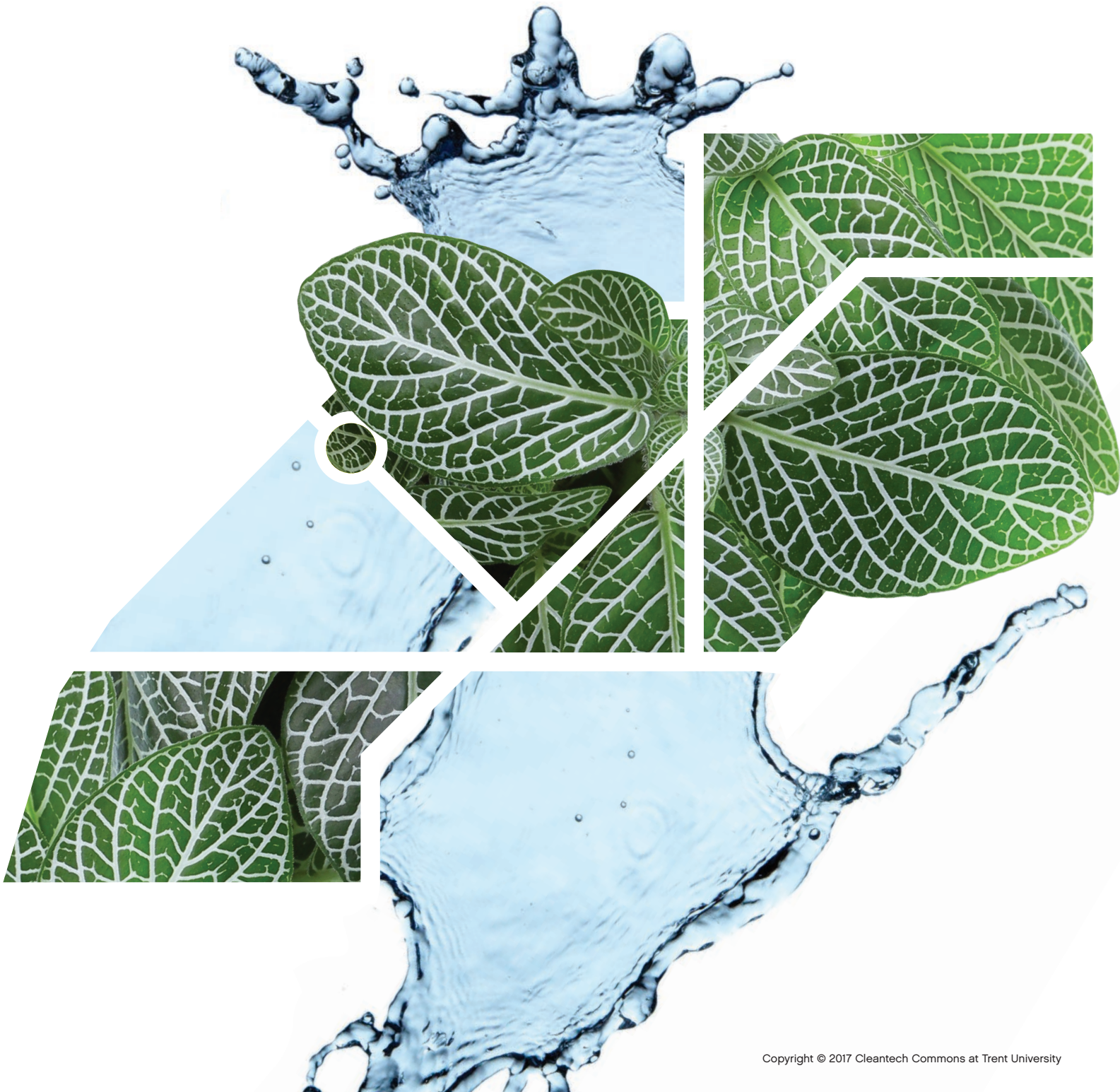

Master Plan



Cleantech
Commons
at TRENT UNIVERSITY



Territorial Acknowledgment

We respectfully acknowledge that we are on the traditional territory of the Mississauga Anishinaabeg. We offer our gratitude to our First Nations for their care for, and teachings about, our earth and our relations. May we honour those teachings.

Steering Committee

This Master Plan was prepared with guidance from the Steering Committee, including the following members:

Malcolm Hunt, Special Advisor to the CAO, City of Peterborough (Steering Committee Chair);
Ken Hetherington, Manager of Planning, City of Peterborough;
Tim Madill, Development Engineer, City of Peterborough;
Bruno Bianco, Manager, Infrastructure Planning, City of Peterborough;
Julie Davis, Vice-President, External Relations & Advancement, Trent University;
Steven Pillar, Vice President, Finance and Administration, Trent University;
Neil Emery, Vice President, Research & Innovation, Trent University;
Robert Ballarin, Project Manager, Department of Facilities Management, Trent University;
Lorne Kelsey, Strategic Partnerships & Projects, Peterborough Economic Development.

Prepared by:

BrookMcIlroy



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EXECUTIVE SUMMARY



THE VISION FOR THE CLEANTECH COMMONS AT TRENT UNIVERSITY

The Vision for the Cleantech Commons at Trent University is to become Canada's premier green technology research and innovation site, hosting a cluster of companies and start-up enterprises in the fields of clean technology, environmental services, advanced material sciences biotechnology, medical and health products, agri-food and agri-business, and information and communications technologies. The Commons will also seek out tenants who will foster connections between the business community and the University.

KEY DESIGN PRINCIPLES

The following Design Principles guide the development of the Master Plan and summarize the key objectives to be achieved through the implementation of the commons.

- 1** Cleantech Commons will be **integrated** with the Campus physically, visually and socially.
- 2** Cleantech Commons will foster an **innovation community culture** encouraging social interaction and collaboration in all seasons.
- 3** Cleantech Commons will be a leader in **sustainable design**.
- 4** Cleantech Commons will be based on a design strategy that is **landscape-led** to maintain natural features and existing topography.
- 5** Cleantech Commons will be **flexible** to accommodate a range of enterprises and uses in a unique setting.
- 6** Cleantech Commons will be **well-connected** to the City and Region.



ELEMENTS OF THE MASTER PLAN

The Cleantech Commons Master Plan will guide the long-term implementation of the site, providing an overall development plan, as well as detailed guidance on elements like streets, trails, development sites, landscaping and natural features. It should be used by the City of Peterborough and Trent University to develop the Commons and guide tenants in the design of individual lots and buildings. Tenants should also use this document to understand the overall vision for the Commons, and to identify design requirements for their own site.

The Master Plan includes:

- The overall Master Plan Concept;
- Details about each Design Principle
- A set of Guidelines that will direct overall site development in addition to the design of individual sites and buildings;
- A section that outlines sustainability requirements; and
- A summary of phasing implications.

EXISTING SITE CONDITIONS

There are a number of key existing site conditions that have shaped the configuration of the Cleantech Commons. The two most significant of these are: the wetland area along the western boundary of the property; and, a MTO designation along the eastern side of the property that protects for the Peterborough Bypass. These two existing site conditions are addressed and highlighted in the Master Plan drawing shown on the following page.

MASTER PLAN CONCEPT

PROPOSED CLEANTECH COMMONS STRUCTURE

1. Preserved Hedgerows
2. Proposed Primary Street
3. Proposed Local Streets
4. 3-Way Stop or Full Signal Intersections
5. Updated Pioneer Road
6. Shared Open Spaces
7. Street Connection to Campus (x2)
8. Stormwater Amenity Areas
9. Potential Block and Property Structure
10. Naturalized Landscaping (throughout)
11. Primary Trails to accommodate all travel modes
12. Secondary Trails to accommodate off-road activities












PROGRAMMING CONSIDERATIONS

13. T-LAB Commons (incubator and collaborative spaces)
14. Mixed-Use Integration Zone (MU)
15. Research/Innovation Lots (RI)
16. Preferred Area for Compatible Agricultural Research Enterprises
17. High Profiles Sites (requiring further architectural or landscape articulation)

EXISTING AREA FEATURES

18. Naturalized Area
19. Trent Campus
20. Trent Agricultural Research Plots
21. Camp Kawartha Environmental Centre

LEGEND

-  Primary Trails
-  Secondary Trails
-  Lot Lines
-  Building Frontages
-  Streets with Sidewalks & Street Trees
-  Stormwater Amenity Areas
-  Existing Hedgerows and Woodlots
-  Cleantech Commons Study Area
-  100m setback for future Peterborough Bypass
-  PSW Boundary
-  30m setback from PSW

LOT LABELS

- MU Mixed-Use Lots
- RI Research/Innovation Lots
- NBG Lots Reserved for NobleGen





1.0 INTRODUCTION

1.1 This Plan – October 2017 Update

The Cleantech Commons at Trent University Master Plan was first issued in April 2017. It was approved in draft by the City of Peterborough on July 31, 2017, pending the completion of the consultation process. This updated plan reflects and incorporates consultation feedback.

1.2 History of the Site and Environs

The Cleantech Commons site is located on the east side of Trent University at Ninth Line and Pioneer Road and includes 85 acres of land.

These lands were previously used for farming and have been continuously cultivated for over 50 years.

They are part of the native territory of the Anishinaabeg, who controlled the Great Lakes Basin since the late 1600s. The nearby Odenabe River, whose name means “river that beats like a heart” was a gathering place for indigenous people.

1.3 Study Scope

The Cleantech Commons was identified as a priority for Trent University and the City of Peterborough in the 2006 Trent University Endowment Lands Master Plan.

The site was chosen to take advantage of proximity to the University campus and regional road networks.

The Trent Lands Plan of 2013 confirmed this location and led to the development of a partnership between the City and the University to embark on implementation.

In 2015, the City hosted a collaborative Design Charrette to create a preliminary vision for the character of the Commons, as well as commissioning the Trent Research Park Servicing Study to better understand servicing needs and feasibility.

In October 2016, Brook McIlroy, DM Wills and Treescape were retained to complete a Master Plan for the overall site. This Master Plan was prepared under the guidance of a Steering Committee made up of representatives from the City of Peterborough and Trent University. At the same time, a Strategic Plan for the Cleantech Commons’ branding, governance and operations was prepared by Stiletto Consulting.

While work was underway on the Master Plan study, in April 2016 Trent University began the development of a curriculum and training program that aimed to address the concerns of First Nations, industry and government proponents’ with current “Duty to Consult” methods in the environmental assessments of major resource, energy, mining, and municipal infrastructure projects.

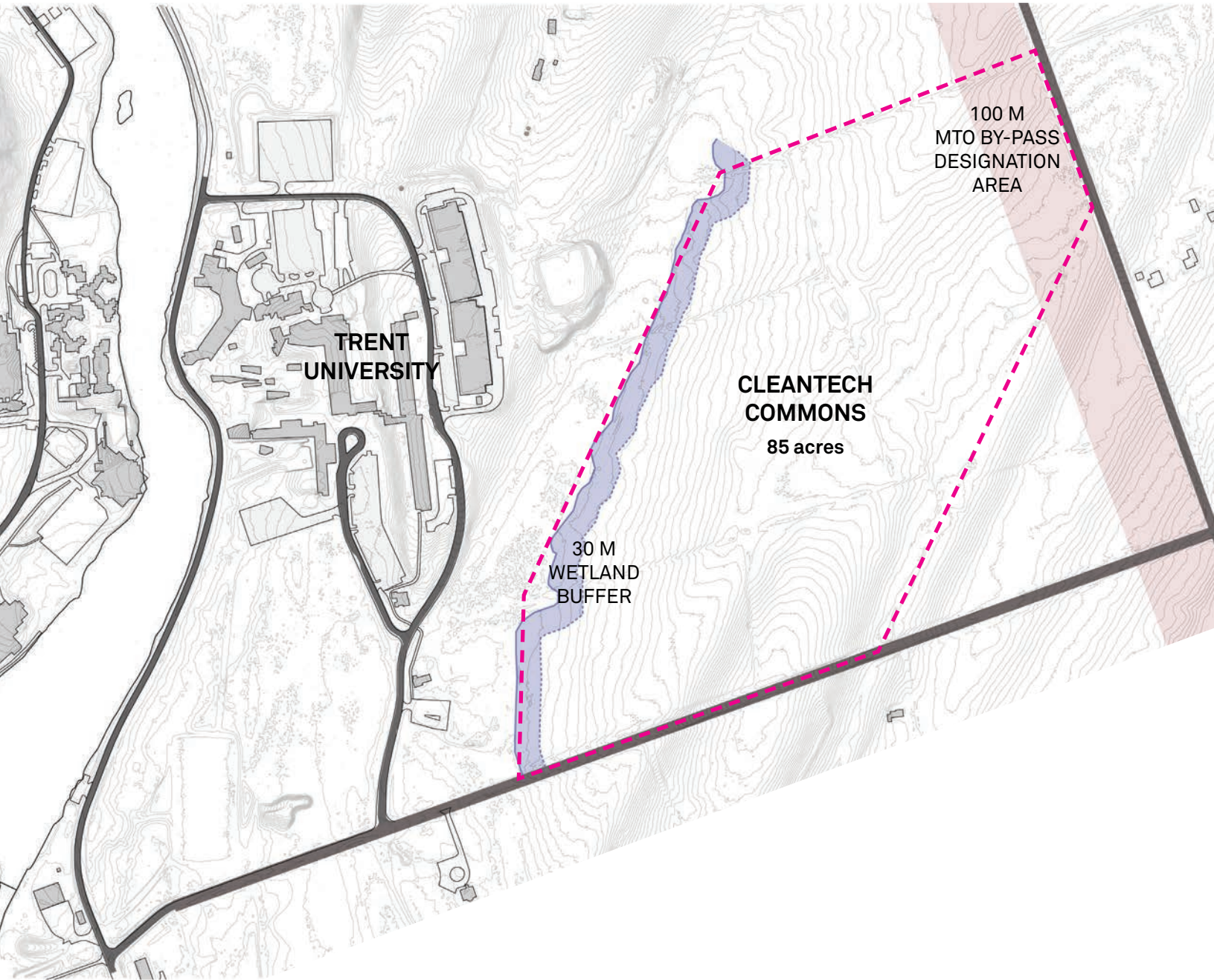
In January 2017, the City of Peterborough agreed that Trent University should apply its new model in the Indigenous Land Consultations for the Cleantech Commons and formally contracted the University to perform the Indigenous Consultation work on behalf of the City of Peterborough.

Acting on behalf of the City of Peterborough, the consultation team was led by Dawn Lavell-Harvard, the Director of the First Peoples House of Learning at Trent University and advised by Elder Doug Williams of the Mississauga Nation.

During the summer of 2017 engagement was conducted with local Anishnawbeg First Nations including Curve Lake, Hiawatha, Alderville and Scugog, and with the Mohawks of the Bay of Quinte in Tyendinaga, as well as with representatives of urban Indigenous community including the Peterborough and District Métis Council, Métis Nation of Ontario, and Nogojiwanong Friendship Center.

Feedback received through this consultation process has been integrated into this updated Master Plan document.

Moving forwards, Trent University intends to continue an open dialogue with local First Nations, Metis, and Urban Aboriginal Groups related to planning and development matters on university lands.



Plan showing the 100m MTO By-pass Designation Area and the 30 metres Wetland Buffer in the context of Trent University and The Cleantech Commons site.

1.4 Existing Site Conditions

There are a number of key existing site conditions that have shaped the configuration of the Cleantech Commons. The two most significant of these are: the wetland area along the western boundary of the property; and, a MTO designation along the eastern side of the property that protects for the Peterborough Bypass. These two existing site conditions are addressed and highlighted in the facing page.

THE PETERBOROUGH BYPASS

Through a 1970s study, the Ministry of Transportation (MTO) identified a route for a future Peterborough by-pass. The by-pass extends Highway 115 north of the 115/ Highway 7 intersection at Television Road. The protected Highway corridor runs east of Trent University crosses the Otonabee River and then hooks into the former Highway 28 south of Lakefield.

Within the Cleantech Commons area the Bypass route is located along the west side of Ninth Line and runs parallel to the eastern boundary of the Cleantech Commons site. To secure this highway corridor the Ministry has laid a designation on title that protects these lands as if a highway is in place. This designation make provisions for a 100m easement along the entire eastern length of the property.

The Ministry is in the process of considering the provincial transportation interest that the Peterborough by-pass route serves. In the review of the Draft Plan for the Commons they identified the following impacts:

- That a 100 metre section of the eastern Master Plan area be protected for the by-pass alignment. The 100 metres is taken from the property line and shown on the adjacent page.

- That Street A will not have direct access to the Highway Bypass, alternately Street A will need to connect to Ninth line via over/underpass or terminate in a cul-de-sac.

To address these requirements the 100 metre setback from the eastern property line has been highlighted on the Master Plan. It is anticipated that a future underpass to connect to Ninth Line will be required at such time that the highway is constructed. The ultimate resolution of the intersection design for Ninth Line and Street A will be coordinated with MTO through subsequent project phases.

THE WETLAND

Through the Draft Plan Process a wetland was identified along the western edge of the Master Plan area. This wetland is the northern end of a large wetland area that extends south of Pioneer Road. To adequately protect the wetland area the Master Plan has implemented a 30 metre buffer front the entire areas. This buffer allows for the protection of the wetland and the continued health of the ecosystems that exist there. In the future the Cleantech Commons will looks to create a series of sensitively designed trails that connect the Commons to the University. These trails will be important cycling and walking connections but are also essential to direct activity through the less sensitive areas of the wetland and wooded areas. Teaching and educational opportunities will also be explored to manage the long term ecological health of the area.



1.5 Vision

The Vision for the Cleantech Commons at Trent University is to become Canada's premier green technology research and innovation hub, hosting a cluster of companies and start-up enterprises in the fields of clean technology, environmental services, advanced material sciences biotechnology, medical and health products, agri-food and agri-business and information and communications technologies. The Commons will particularly seek out tenants who will foster connections between the business community and the University.

1.6 Using the Master Plan Document

Cleantech Commons will be developed through a partnership between the City of Peterborough and Trent University. This Master Plan document will guide the long-term implementation of the Commons, providing an overall development plan, as well as detailed guidance on elements like streets, trails, development sites, landscaping and natural features. The document will be used by the City of Peterborough and Trent University to develop the Commons and guide tenants in the design of individual lots and buildings. Tenants should also use this document to understand the overall vision for the Commons, and to identify design requirements for their own site.

In keeping with the Commons' strategic focus on clean technology, the Master Plan is guided by a vision for sustainability in site and building design.

While the Master Plan provides an overall vision and principles for the overall site, it is recognized that a wide range of enterprises and facilities are encouraged to make their home at Cleantech Commons. As a result, implementation of the plan should remain flexible, focusing on achieving the intent of each of the Design Principles and Guidelines, while accommodating variation where it is required.

The Cleantech Commons at Trent University Master Plan has been guided by a number of previously completed plans and studies. The relevant documents and their status in this Master Plan Process are summarized in Appendix A.

The Master Plan document consists of four parts:

1. The Master Plan (Section 2.0)

The Master Plan outlines the Vision for Cleantech Commons, as well as the **6 key Design Principles** that guide overall development of the site.

2. Design Guidelines (Section 3.0)

The Design Guidelines articulate specific guidance to help the City of Peterborough, Trent University and tenants to design streets, sites and buildings in keeping with the overall Master Plan Vision.

Each guideline contains integrated landscape and sustainability considerations, as these are critical to achieving the overall plan and must be considered from the earliest design stages.

3. Sustainability Requirements (Section 4.0)

Sustainability requirements are provided to give additional guidance on the minimum commitment to sustainability and performance for new sites and buildings.

4. Implementation and Phasing (Section 5.0)

The Implementation and Phasing section outlines key implementation and phasing considerations.

1.7 Partnerships and Learning Opportunities

The opportunity exists to take advantage of innovative partnerships with University researchers and students to create opportunities for experiential learning and a hands-on laboratory of sustainability best practices. Potential tenants should be encouraged to identify avenues of collaboration with University researchers, as well as opportunities for student learning and work experience. In addition, the Commons infrastructure and public space design may provide opportunities for studying the performance of low-impact development infrastructure, incorporation of indigenous landscapes and a focus on biodiversity, among other themes. Some potential University partners may include the Indigenous Environmental Studies program, Biology and Biochemistry Departments, Environmental Sciences/ Studies and the Water Sciences program; however, many others exist to be explored by Trent University, the City of Peterborough and individual tenants.

1.8 Phasing

The City of Peterborough will be responsible for providing services to the site and building common infrastructure. This will be done on a phased basis depending on the ultimate build out of the Commons.

2.0 CLEANTECH COMMONS MASTER PLAN

The vision for Cleantech Commons at Trent University is to foster innovation and collaboration, particularly in the field of clean technology. In keeping with this vision, the Commons itself will be designed to integrate sustainable development objectives, create spaces that encourage interaction, protect existing natural features, and promote design excellence.

2.1 Design Principles

The following Design Principles guide the development of the Master Plan and summarize the key objectives to be achieved through the development of the site.

1. Cleantech Commons will be **integrated** with the Campus physically, visually and socially.
2. Cleantech Commons will foster an **innovation community culture** encouraging social interaction and collaboration in all seasons.
3. Cleantech Commons will be a leader in **sustainable design**.
4. Cleantech Commons will be based on a design strategy that is **landscape-led** to maintain natural features and existing topography.
5. Cleantech Commons will be **flexible** to accommodate a range of enterprises and uses in a unique setting.
6. Cleantech Commons will be **well-connected** to the City and Region.

2.2 Core Master Plan Features

Key features of the Master Plan include a focus on sustainability, collaboration, connectivity to the Trent University campus and a unique design character for buildings and landscapes.

Sustainability

All new development within the Commons will be examined through three potential approaches to sustainability. The first approach is to seek tenants who align with Cleantech Commons' core thematic focus on clean technology. Secondly, tenants and site developers will be required to demonstrate sustainability in site and building design either by achieving a LEED Silver target or developing a Sustainability Knowledge Generation Project (see 4.0). Thirdly, the Commons itself should

become a research laboratory, with the University, tenants and the City collaborating to implement and test new approaches and technologies through site and building development.

Collaborative Uses

Cleantech Commons will provide learning opportunities for students and access to world class researchers and facilities for businesses. This synergistic relationship will be supported through the creation of an "Integration Zone" in the part of the Commons closest to the University to house multi-tenant development sites for small enterprises and a cluster of collaborative work and research spaces. This area is also the preferred location for publicly accessible uses, like food services, small-scale retail and recreational facilities.

Connected to the Campus

One road and three trail connections are recommended to link Cleantech Commons directly with the Trent University campus and encourage seamless transitions for Commons employees as well as university students and faculty. These connections will be carefully designed to reflect the natural character of the Commons and should be accessible in all seasons. Given their pedestrian focused character, the direct road connection to the campus will facilitate bus service but should discourage use by large trucks. Two alternative primary truck entrances will instead provide direct access to the wider City and County road network.

Design Character

Cleantech Commons will seek to develop a landscape character in keeping with the existing drumlins, rolling fields and naturalized spaces. Site development will retain existing grades to the greatest extent possible, while buildings should be designed to integrate with the landscape. A modern architectural character focusing on design excellence and sustainability will create a new international design standard for research and manufacturing facilities.

2.3 Design Principles

The following pages identify key Implementation Priorities that will help to achieve each of these Design Principles.

LOT LABELS

- MU Mixed-Use Lots
- RI Research/Innovation Lots
- NBG Lots Reserved for NobleGen

LEGEND

- Primary Trails
- Secondary Trails
- Public Open Spaces
- Lot Lines
- Building Frontages
- Streets with Sidewalks & Street Trees
- Stormwater Amenity Areas
- Existing Hedgerows and Woodlots
- Cleantech Commons Study Area



Design Principle #1

Cleantech Commons will be integrated with the Campus physically, visually and socially.

Implementation Priorities to achieve this Design Principle include the following:

- Cleantech Commons should encourage opportunities to foster experiential learning for Trent students and collaboration between Trent researchers and Cleantech Commons tenants.
- The western side of the Commons is within a 400 metre distance (5 minute walk) of campus, which makes it most accessible for people coming from campus. This area is identified as the Integration Zone, where facilities and uses should prioritize collaboration between Campus and Commons users.
- Three trails connect directly from Campus to the Commons, with a trail network and sidewalks creating pedestrian and cycling accessibility throughout.
- Buildings should reflect a modern architectural character, with heights similar to buildings on campus today.
- Naturalized landscaping throughout the Commons, including green roofs, will contribute to positive views from campus.



Pedestrian and cycling network connecting directly to campus



Modern architecture in keeping with building heights on campus



LEGEND

- 400 metre radius / Integration Zone
- Frontages facing campus
- Primary Trails
- Secondary Trails
- Existing Hedgerows and Woodlots

Design Principle #2

Cleantech Commons will foster an innovation community culture encouraging social interaction and collaboration in all seasons.

Implementation Priorities to achieve this Design Principle include the following:

- The Integration Zone includes Mixed-Use Lots, intended for multi-tenant office/research buildings and uses that serve both University and Commons users (for example, restaurants, daycare, fitness centre, shops, etc).
- The Integration Zone will also contain the T-Lab Commons, a community hub building that is envisioned to contain shared work and learning spaces (for example, a business incubator program, exhibit and event spaces, lecture theatres, shared labs and office space, etc). It is located adjacent to the naturalized area and a stormwater amenity area, and will include both indoor and outdoor space that can act as a central gathering place for Commons and campus users alike.
- Further east of the Integration Zone is the Research/Innovation Zone. Lots in this zone are generally identified for single tenant research and production uses, though they should also host or collaborate with students and/or University researchers. Within this zone, lots that are adjacent to the University's agricultural research plots may be appropriate for enterprises involved in agri-food / agri-business.
- Create shared gathering spaces that cluster complementary indoor and outdoor uses to foster interaction and a sense of community - in both winter and summer.
- Shared outdoor open spaces connected to natural features contribute to Cleantech Commons' unique identity.
- All shared open spaces should be co-designed with Trent University's indigenous population to create positive spaces for learning, teaching, exchange and the celebration of culture.



Indoor and outdoor cafe / retail spaces





LOT LABELS

- MU Mixed-Use Lots
- RI Research/Innovation Lots
- NBG Lots Reserved for NobleGen

LEGEND

- Mixed-Use Lots (Integration Zone)
- Potential T-Lab Commons
- Shared Outdoor Spaces
- Research/Innovation Lots
- Agricultural Enterprises

Design Principle #3

Cleantech Commons will be a leader in sustainable design.

Implementation Priorities to achieve this Design Principle include the following:

- Cleantech Commons will integrate sustainable elements and initiatives in site and building design, setting it apart from typical business parks.
- The overall design of the Commons incorporates a number of features to promote sustainability, including:
 - Streets that have a narrow hardscaped area and will incorporate enhanced grassed swales and bio-retention facilities
 - Retaining existing trees (and replacing trees where this is not possible) for shade, improved air quality and to reduce the heat island effect
 - Opportunity for energy co-generation facilities
 - A mandate to manage surface runoff at the source, through lot level stormwater management controls
- On each individual lot and on public spaces, the Master Plan recommends guidelines for the design and construction of buildings and sites that integrate sustainability measures (see Section 3.0).
- Implement a Sustainability Target Checklist for each new development site (see Section 4.0). This checklist provides some flexibility for individual tenants, while ensuring that each site achieves a LEED Silver or equivalent standard at minimum.
- Explore opportunities for collaborative demonstration or pilot projects focusing on sustainability.

Examples of Building Design Opportunities



Green roof



Solar-ready rooftops



Building orientation



Architectural sunshades

Examples of Site Design Opportunities



Rain gardens



Bio-swales



Permeable paving



Landscaping in parking lots



Co-generation facilities



Educational opportunities and pilot demonstration sites

Design Principle #4

Cleantech Commons will be based on a design strategy that is landscape-led to maintain natural features and existing topography.

Implementation Priorities to achieve this Design Principle include the following:

- Retain existing hedgerows and the naturalized area on the western edge of the site, to the greatest extent possible, while also achieving connectivity with the main campus. Streets have been located to disturb the fewest trees.
- Streets are also located to follow existing grade as closely as possible, while ensuring that the street maintains an appropriate slope. Changing natural grade would limit the ability to retain trees and natural site topography.
- Replace trees on a 3:1 ratio (plant 3 new trees for each tree removed). This will result in an overall net increase in the number of trees in the Cleantech Commons area.
- Stormwater management reflects the natural topography, which is expected to be maintained, reducing the need for site grading to manage run-off.
- The design of individual sites and buildings should work with the existing topography.
- Look for opportunities to reintroduce Black Oak Savanna ecotype in designated nature areas (See Section 3.6)



Existing topography and hedgerows






A building integrated with existing topography



LOT LABELS

- MU Mixed-Use Lots
- RI Research/Innovation Lots
- NBG Lots Reserved for NobleGen

LEGEND

-  Existing Hedgerows and Woodlots
-  Stormwater Amenity Areas
-  Contour lines

Design Principle #5

Cleantech Commons will be flexible to accommodate a range of enterprises and uses in a unique setting.

Implementation Priorities to achieve this Design Principle include the following:

- Research facilities and enterprises come in a variety of shapes and sizes. The Master Plan creates a pattern of lots, framed by well-defined streets and natural amenities. The size of each lot is appropriate for an office-type development (at approximately 1.0 hectare), while multiple lots can be combined to create larger sites for a wide range of facilities and needs.
- Primary building frontages should face streets and natural areas, while manufacturing and back-of-house uses should be located along shared lot lines.

Guidelines are provided in Section 3.0 to assist in the design of interfaces between buildings and hedgerows, streets or other lots.

- Some buildings will be stand-alone facilities, while others will have multiple tenants or collaborative working spaces. This range of options will allow small enterprises or start-ups to establish themselves and then grow in place.







Larger research and production facilities



Multi-tenant and mixed-use buildings



LEGEND

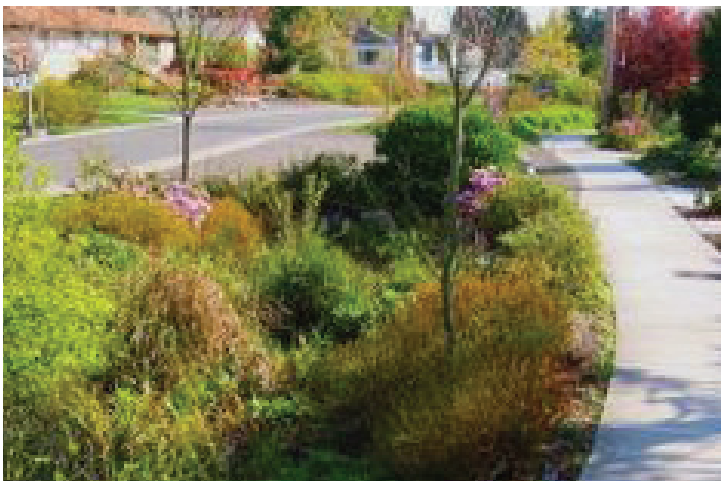
-  Building Frontages
-  Street Edge Lot Lines
-  Natural Feature Lot Lines
-  Shared Lot Lines

Design Principle #6

Cleantech Commons will be well-connected to the City and Region.

Implementation Priorities to achieve this Design Principle include the following:

- The Master Plan establishes a network of streets and trails that connect back to campus, as well as to Pioneer Road and Ninth Line.
- The site is served by a network of green streets that include bio-swales and continuous tree planting. The central street, Street A, connects directly to both Pioneer Road and Ninth Line, and it will be the main street to accommodate trucks. The other streets will primarily accommodate transit, pedestrians and private vehicles.
- A truck access strategy consisting of a series of shared drives ensures that trucks can access each lot from Street A, avoiding the need for truck movement on the other streets.
- A mix of trail typologies is recommended for the site, including multi-use trails on primary routes and secondary routes with a softer but stable surface for running and biking. These trails are generally located parallel to the hedgerows to provide a safe, off-road, and shaded experience.



Examples of green streets with bio-swales



- LEGEND**
- Streets
 - Primary Trails
 - Secondary Trails
 - Truck Access

3.0 DESIGN GUIDELINES

3.1 Public Spaces and Existing Natural Features

Rationale:

Peterborough's countryside includes a number of important drumlins, as well as rolling hills and valleys. This natural condition is an important component of the area's identity. The overall organization of the Cleantech Commons site endeavors to maintain as much of the existing grades as possible to retain the character of the countryside and the health of natural elements within and adjacent to the site. Prominent natural features including woodlots, trees and vegetation areas should be maintained and emphasized as key elements in the overall design of the Commons and the location and character of public spaces.

Design Guidelines:

- Locate streets to maintain existing topography with minimal changes to grading with the exemption of Street A where it connects to Pioneer Road. Ensure conformity with required design standards.
- The street and block layout should be oriented to maximize views to/from the surrounding natural areas and the main campus.
- Hedgerows should be substantially preserved where possible. Breaks for new streets and trail crossings are permitted. Where breaks will occur, they should be located to avoid significant and unique tree species. Clearing of hedgerow underbrush is also permitted to enhance visibility.
- Frame and protect the adjacent western naturalized area with a single loaded road and/or multi-use trail.
- Green buffers should be provided alongside natural features, stormwater management areas and hedgerows. Buffers should be sized to maintain the health of existing trees and vegetation.
- Recreational trails should be located alongside natural amenities wherever possible, to benefit from shade, a windbreak and the natural character. Trails may be permitted within green buffer areas, if necessary.
- Two shared open spaces are identified in the Master Plan, however, others may be created on individual lots. Open spaces should be located to integrate with natural features or to complement indoor public spaces and uses.
- Open spaces should be designed to encourage social interaction and recreation and should be usable at all times of the year.
- Open spaces should primarily consist of soft landscaping with pedestrian/cycling access. Where paved gathering spaces are provided, permeable materials should be considered. Design should consider accessibility requirements and winter maintenance.
- A combination of flexible and fixed seating, including tables and chairs, may be provided in open spaces.



Trail alongside hedgerows



Public outdoor spaces connected to natural features



Bottom row: Shared open spaces may include a range of seating



3.2 Stormwater Management Design

Rationale:

Two main approaches will be used to manage stormwater runoff. Low-Impact Development (LID) Infrastructure should be incorporated throughout the Commons to provide quality treatment and attenuate flows to reduce the burden of the storm drainage system. Two stormwater amenity areas will incorporate dry ponds facilities to manage overall peak flows, while also supporting biodiversity.

In general, stormwater flows should be managed to meet or exceed municipal and provincial objectives for water quality, water quantity, and water balance. Tenants should also provide for erosion and sediment control for surfaces disturbed during construction at the lot-level, rather than relying on the central stormwater amenity areas.

Design Guidelines for Low Impact Development:

- Consider opportunities for water re-use, such as rainwater harvesting.
- Consider incorporating Green Roof systems into the proposed building to help minimize runoff generated by the buildings.
- LIDs should be designed to capture the runoff generated during the a 30mm 6 hour design storm
- Paved areas such as streets, driveways and surface parking should be reduced to minimize the volume of runoff flowing into the storm drainage system and to maximize landscaped surfaces.
- Permeable paving should be used in parking areas, hardscaped forecourts/courtyards and for walkways, where possible.
- Impervious areas and snow storage areas should be graded to drain towards semi-permeable and permeable surfaces.

- Bioretention areas should be incorporated into the edges of walkways, parking lots and other paved areas to minimize the dependency on the stormwater drainage system. They should also be located to capture runoff from building roofs.
- Bioretention areas should contain native grasses and other plants that can thrive in a wet environment. Salt tolerant species should also be selected when planted near paved surfaces.
- Public education displays can be used to increase public awareness of LID infrastructure, as well as any monitoring or research activities related to innovative stormwater management approaches.
- To achieve the overall water balance, individual lots should provide a minimum of 30 cubic metres per hectare of storage in order to retain and infiltrate stormwater runoff, using a variety of LID techniques.

Design Guidelines for Stormwater Amenity Areas:

- Stormwater amenity areas should be designed to act as open space/recreational features both when wet and when dry.
- Stormwater amenity areas should be designed as bio-diversity landscapes, containing indigenous plants and creating habitats for local wildlife. They should be visually contiguous with adjacent natural features.
- Stormwater amenity areas may contain pathways for walking, wildlife viewing and resting, where this does not conflict with functional requirements.
- Fencing of stormwater amenities should be avoided. Safety issues should be addressed through shallow slope grading and buffer planting adjacent to wet areas.



Rain garden capturing runoff from building roof



Stormwater amenity area including wet pond



Bioretention area at the edge of a parking lot



Permeable paving

3.3 Street and Trail Design

Rationale:

Streets within Cleantech Commons should be designed as green streets - minimizing roadway width and including regular street tree planting and naturalized bio-swales to capture and infiltrate stormwater. Where adjacent to natural features, they should be designed to frame and buffer these features.

Streets should accommodate multiple modes of movement, with dedicated pedestrian and cycling routes and transit access. Establishment of a hierarchy of streets will ensure that truck movement is encouraged predominantly on the primary spine.

A connected trail network is provided throughout the Commons, linked with the two main shared open spaces. Trails should connect to the wider municipal and on-campus trail system, and they create a particularly critical connection between the Commons and the main campus. Trails are generally located adjacent to natural features so that users can enjoy the natural topography and the hedgerows.

Design Guidelines:

- Create a consistent and identifiable street character through landscape treatments, street furnishings, natural edges, lighting and signage.
- Opportunity to honour traditional Anishinaabeg culture through the naming of streets.
- The width and design of streets should encourage truck movement on the Primary Street (Street A), while limiting truck movement on Local Streets.
- Where the centre lane on Street A is not required for turning movements, it can be replaced with a landscaped centre median.
- Streets D should be designed with upgraded paving material and light standards to reflect the importance of their location between the Mixed-Use corridor (Integration Zone) and the western naturalized area.
- The ultimate alignment of Street B north of the Cleantech Commons site should be determined based on preferred tie-in location to existing street network and a detailed review of existing grades.
- On-street parking should not be provided to reduce the width of streets.
- Where streets intersect, a three or four-way stop or

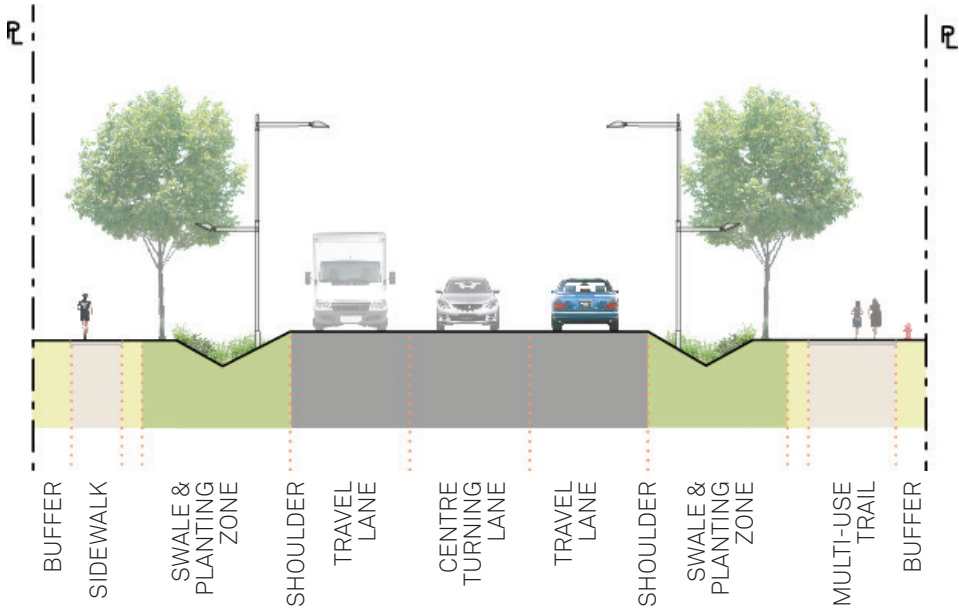
other appropriate treatment to slow traffic should be considered.

- Plan streets to accommodate transit services. An interim transit route and stops may be required prior to full completion of the road network.
- Transit stops should be made accessible with a curb at the location of the stop, and a direct connection over the bio-swale to the adjacent sidewalk or multi-use trail.
- Level crossings at bio-swales should be designed so that railings are not required. In addition to transit stops, bio-swale crossings should be provided where trails cross streets, at driveways and at intersections.
- Trails should cross streets at intersections or at highly visible locations. They should be marked with contrasting paint or other appropriate pedestrian crossing treatment.
- Sidewalks within the right-of-way should be a minimum of 1.5 metres in width.
- Bio-swales should be a minimum of 0.8 metres in depth, and they should be planted with indigenous grasses, salt tolerant plants and plants requiring minimal maintenance.
- Street trees should be planted at intervals of approximately 10 metres on centre, providing 20 to 30 cubic metres of soil per root zone.
- Trails should be located and designed to provide a minimal disturbance to natural features and existing trees.
- Individual lots are encouraged to create pedestrian/cycling linkages into the trail network.
- Primary Trails should connect to the wider municipal and on-campus trail system. They should be paved multi-use trails and should be a minimum of 3.0 metres in width.
- Secondary Trails should be designed as low-impact trails and should be located adjacent to existing hedgerows. They should be a minimum of 1.5 metres wide and be constructed of crusher fines or other stable but permeable material.
- Utilities should be incorporated in a joint utility trench underneath or beside the sidewalk.
- Joint light standards should accommodate both pedestrian and roadway lighting.

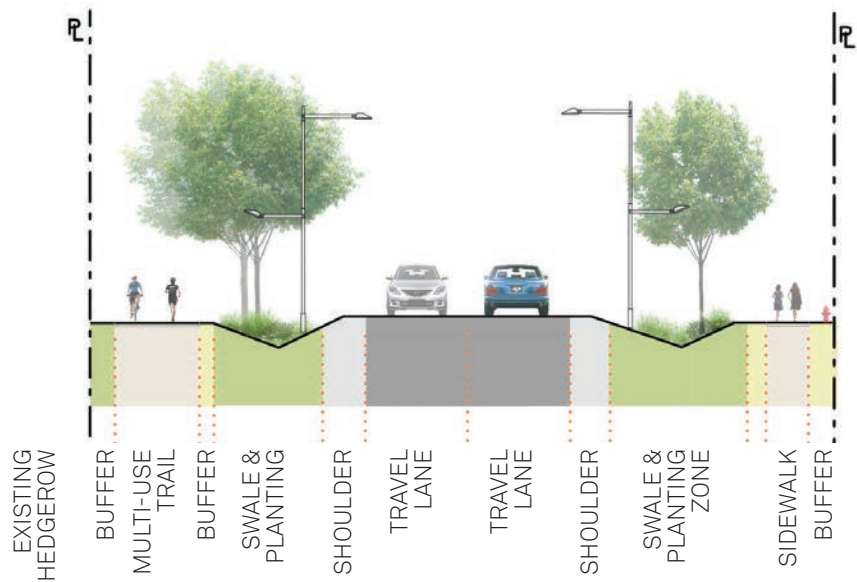
Key Map



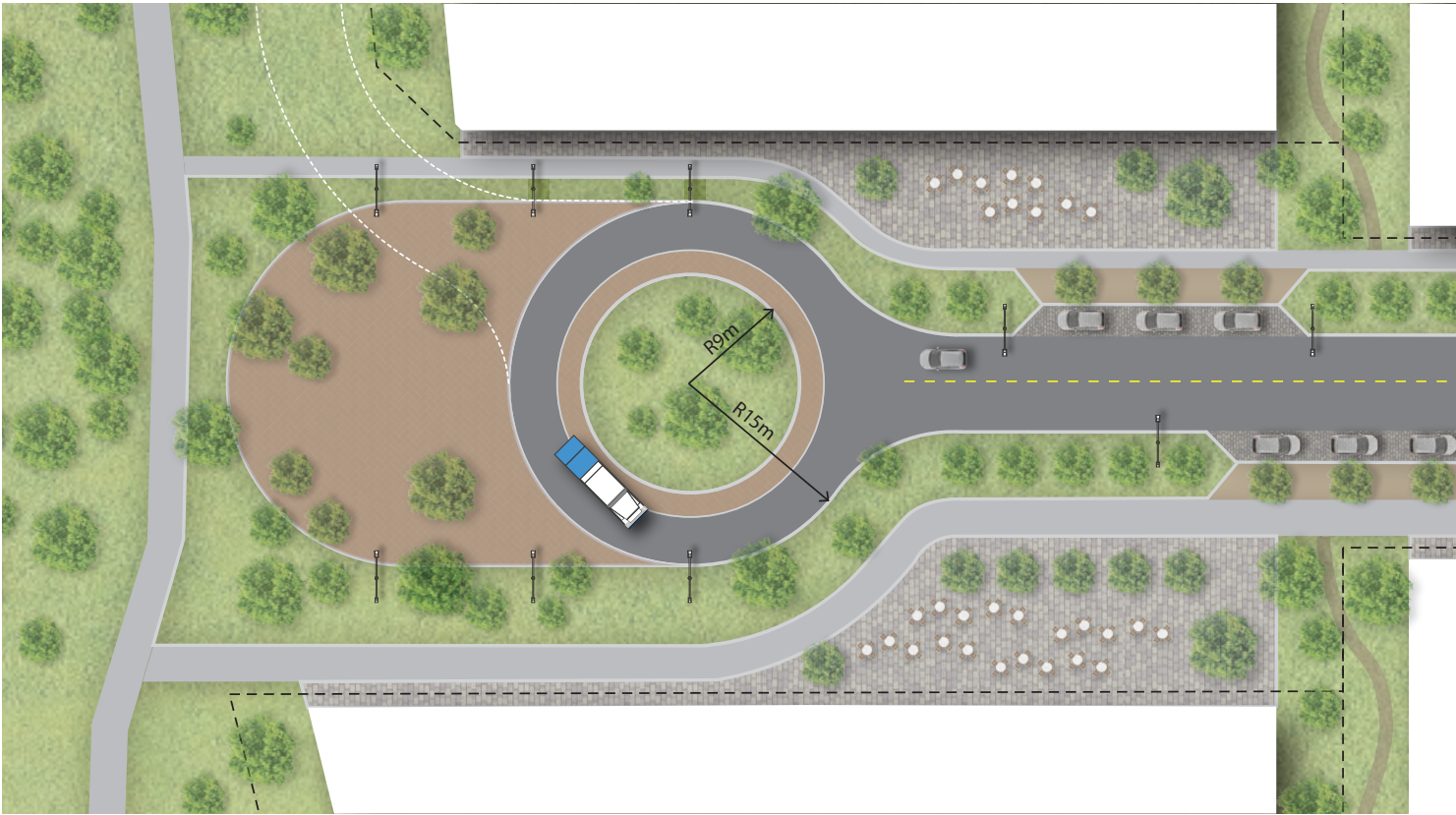
Primary Street A:
Primary truck route
and a continuous
multi-use trail



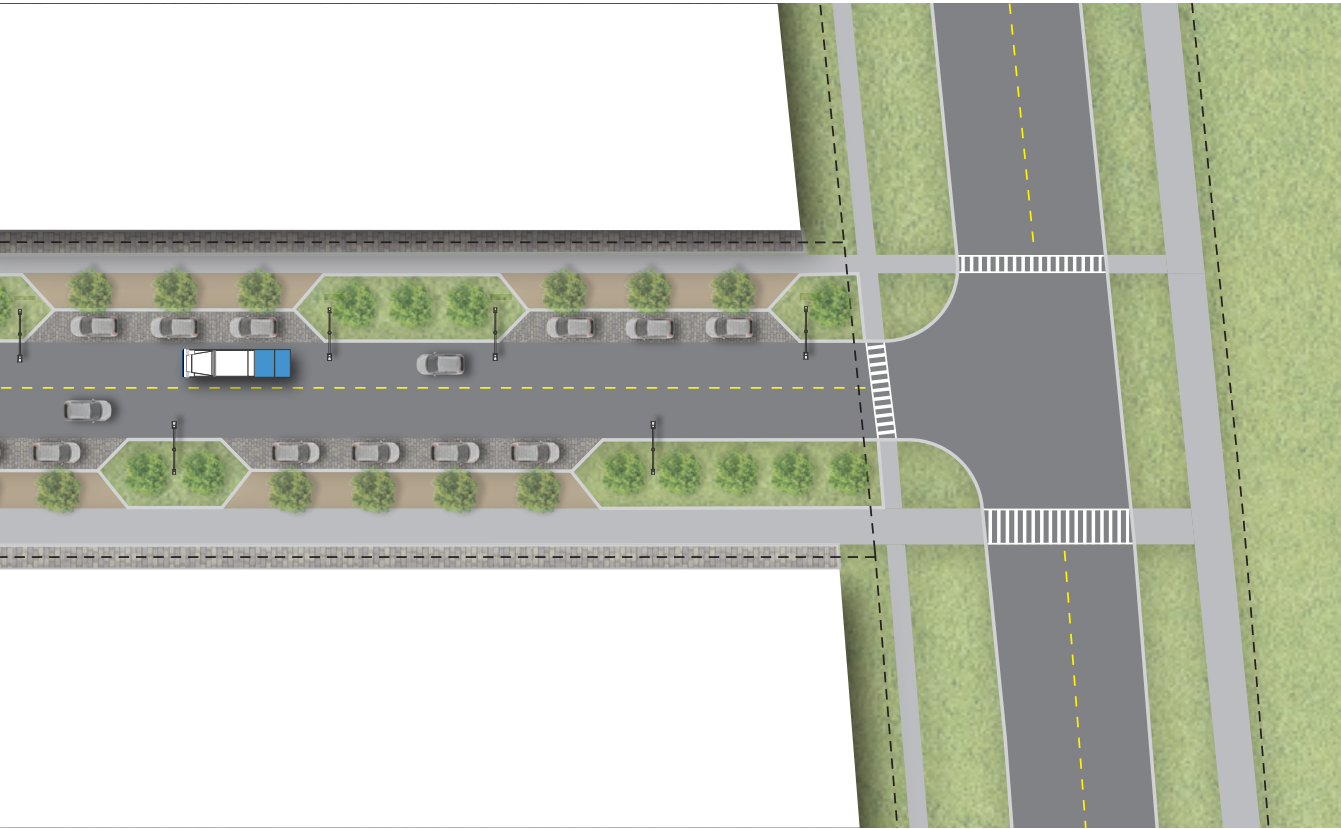
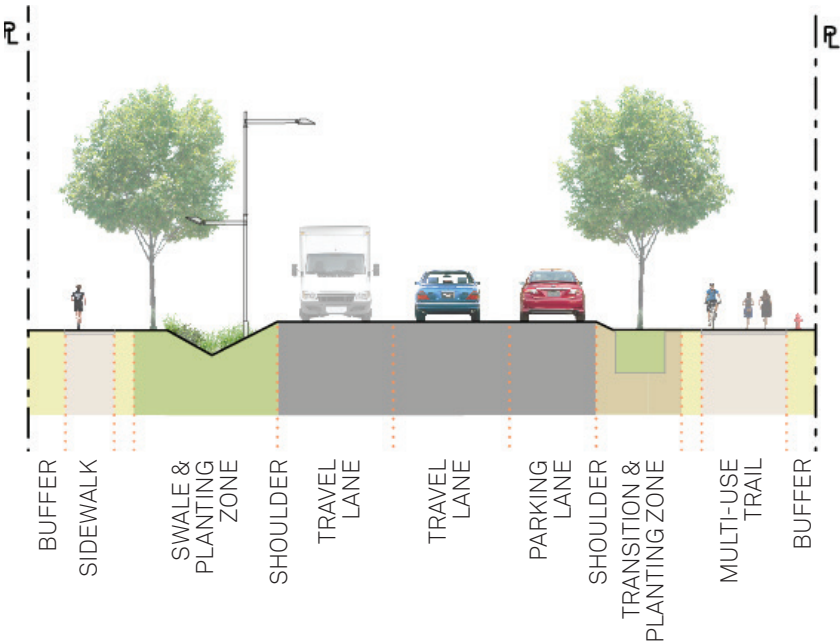
Local Street B: *Alignment of connection back to campus to be determined*



Local Street C (plan): *includes roundabout for buses and a shared gathering space overlooking the PSW to the west.*



Local Street C: includes a continuous multi-use trail and parallel parking lane.



3.4 Individual Lot Design

Rationale:

The diversity of individual lots within Cleantech Commons requires that each site plan is specific to its respective location. Individual lots should contribute to the overall vision for Cleantech Commons by minimizing lot grading, appropriately organizing buildings and servicing areas, and incorporating site landscaping.

A key element of each individual site plan will be landscape buffers, which are green planted areas that provide a visual barrier and assist in managing stormwater. Where landscape buffers are required, they should incorporate LID features and visually extend the green character of surrounding areas into the Commons. Landscape buffers should vary in size depending on the proposed site and adjacent uses; however, more generous buffers are required where the impacts of employment related development (i.e. industrial warehouses and loading/service areas) could impact more sensitive adjacent land uses such as mixed-use sites and natural features.

Design Guidelines for Lot Layout:

- In general, site plans should orient building frontages towards streets, natural features and the main campus, while locating functional and servicing uses towards the rear of the site or shared lot lines. These “back-of-house” uses should be screened from view from public streets and natural features with landscaping, topography, architecture features or building placement.
- Lot development should retain the existing grade on the site. In cases where this is not feasible, a clear case for making substantial grade changes must be demonstrated.
- Changes in grade over a lot should be used to maximize views to and from buildings, create buildings that uniquely integrate with the landscape, and minimize the visual impact of multi-storey buildings by locating them in lower points of the site.
- The layout of buildings should create accessible outdoor open spaces like forecourts and courtyards for employees and visitors.

- High profile sites, located at the main entrances to the Commons, should include additional architectural and landscape articulation.

Design Guidelines for Edge Conditions:

- On lot lines adjacent to a public street:
 - Provide a minimum 3 metre wide landscaped buffer from the edge of the right-of-way. Landscape materials should include a combination of salt tolerant ground cover, low shrubs and deciduous trees.
 - No outdoor storage is allowed along street edges.
 - Accent planting and coordinated signage should be provided within the front yard at main building entrances and driveway entrances, but these elements should not obstruct sightlines.
 - Fencing along a street edge is not permitted.
 - On the Mixed-Use lots facing Street D, a minimum 6 metre setback from the edge of the right-of-way should be provided.
 - Front yard parking is not permitted on Mixed-Use lots. On Research/Innovation lots, small convenience parking areas may be provided between the building and the street. The majority of parking should be provided to the side or rear of buildings.
- On lot lines adjacent to a hedgerow, stormwater amenity area or other natural feature:
 - Where possible, orient active building facades towards natural features and create outdoor amenity spaces for employees that are an extension of these natural areas.
 - Provide a minimum 5 metre wide landscaped buffer between the lot line and any buildings or vehicle circulation, loading and storage areas.
 - Integrate a bioretention area or other LID feature to capture and treat stormwater run-off from adjacent paved areas before infiltrating into natural areas.

- Where the trail network runs alongside a lot, provide at least one direct pedestrian connection from the building to the adjacent trail.
- On lot lines shared by multiple developable lots:
 - Side yard parking may be provided along shared lot lines, however, it must be located behind the front building façade.
 - Landscape strips with bioretention areas, high branching trees, low shrubs and/or low fencing may be used to delineate lot lines between properties and enhance edge conditions.
 - Where feasible, driveways and servicing entrances should be shared between neighbouring properties to minimize the disruption of the public sidewalk.

Edge Conditions and Recommended Building Frontages



3.5 Lot-Level Circulation, Parking and Servicing

Rationale:

Access into, and circulation within, individual lots should provide safe and well-defined routes for vehicles and pedestrians. The use of landscaping, grade changes, paving materials, lighting, signs and other distinct treatments to define these areas will contribute to the overall safety, quality and sense of orientation within each lot.

Vehicular and service areas should be designed to minimize paved areas and visual impact and maximize landscaping and LID opportunities.

Design Guidelines:

- Servicing and loading entrances should be provided off of Street A, and should be avoided on all other streets. Public driveways may be provided from all streets.
- Reduce the impact of impervious surfaces through narrowed paved areas, use of permeable paving materials where possible and generous landscaping at the edges.
- Large expanses of unbroken surface parking within each lot should be avoided, and elements including landscaping, paved traffic islands, lighting and signage should be used to define smaller parking courts within surface lots.
- Clearly defined pedestrian walkways should connect directly to building entrances through surface parking areas. Pedestrian walkway surfaces should differ in material and appearance from vehicular routes. A variety of materials may be used, including permeable paving, patterned concrete, unit brick pavers, crushed limestone and asphalt.
- Pedestrian walkways should also be provided between main building entrance(s) and the public sidewalk, adjacent trails, and on-site open spaces.
- Pedestrian walkways should be landscaped, well-lit and a minimum width of 1.5 metres.
- Where pedestrian and vehicular crossings merge, pedestrian routes should have priority. Continuous pedestrian paving materials should be used across driveways.
- Light standards in the parking lot should be provided at the pedestrian level along walkways and at higher levels for security and vehicular circulation.
- Where appropriate, both short-term and long-term secure bicycle parking facilities should be provided in convenient locations.
- Preferential parking and charging stations should be provided for electric vehicles and carpool vehicles. This would include allocating 5% of spaces for carpooling and 2% of spaces for electric or green vehicles.
- Ramps or entrances to service areas should not detract from the façade or landscaping of the building.
- Service and outside storage enclosures should be constructed of materials to match or complement the main building material. Gates and/or access doors may be constructed of materials different from the actual enclosure material to facilitate operation of the gates or access doors. Refuse enclosures should encompass an area large enough to accommodate the peak needs of potential users of the building.



Landscaping around the edges of a parking area



Distinctive and continuous pedestrian walkway through parking area



Parking area broken up with landscaped aisles and permeable parking stalls



Service and storage area screened with materials that complement the main building

3.6 Indigenous Placemaking

Rationale:

Reaching Beyond Duty to Consult includes the creation of spaces that respect and celebrate First Nations Culture - especially the special relationship First Peoples have with the surrounding natural environment. Many traditional tenets related to environmental design are in fact mirrored by First Peoples philosophy of interdependence with nature and the transformative process of creating these spaces invites us to make the most of the people, energy and resources already present at Trent University.

Indigenous place-making at this site should include the fabrication of a co-design process with Trent University's indigenous population for creating spaces that welcome all, both indigenous and non-indigenous peoples. It should also include the utilization of the adjacent PSW as an opportunity for ecological restoration and education. Important consideration should be given to all interstitial spaces for use as native plant and animal habitat.

Design Guidelines:

- Locate trails and pathways to maintain existing topography as much as possible with minimal disturbance to the nearby Wetland.
- Wherever development occurs, it should be located to preserve significant and unique tree species.
- Include education markers throughout the Commons trail system that focus on telling the story of the land, demonstrating appreciation of the traditional Anishinaabe culture and highlight traditional knowledge.
- Green buffers should be provided alongside natural features, stormwater management areas and hedgerows. Buffers should consist of native plant species (some outlined in the following section) and be sized to maintain the health of existing trees and vegetation. Re-introduce the Black Oak Savanna ecotype wherever possible (see Section 3.6).
- All shared open spaces identified in the Master Plan,

and those arising throughout the development of the site represent opportunities to create positive spaces for learning, teaching, exchange and the celebration of culture. As the Plan is implemented Trent University's indigenous population should be consulted on open space design.

- On-site areas used to capture and treat stormwater run-off should include educational markers highlighting the processes and significance of stormwater management and water purification.
- Food sovereignty is a common concern for many indigenous communities in Canada and abroad. The experimental garden programming at Trent University should be allowed to infiltrate and colour Cleantech Commons as a leader in innovative agricultural practices wherever possible. This may take the form of rooftop gardens or greenhouses.
- All archaeological assessments and subsequent phases should involve Trent University's local indigenous partners. Archaeological training programs should be provided for all Williams Treaty nations.
- Streets names within the Commons present an opportunity to honour traditional culture. 'Story boards' should be included throughout the Commons highlighting indigenous history of the area.
- Look for opportunities to reintroduce the Black Oak Savanna Ecotype. Less than 3% of the original tallgrass prairies and oak Savannas remain in Southern Ontario, most of which have disappeared in the past 200 years due to agriculture, urbanization and fire suppression. The few that remain are badly fragmented and overgrown with non-native species. The re-introduction of the globally rare Black Oak Savanna ecotype aims to preserve the natural heritage of the site, provide a diverse research site for education and save many rare species at risk of becoming extinct due to the loss of their tallgrass habitat.



Mohawk College HOOP Dance Indigenous Gathering Space



RBG Indigenous Discovery Trail entrance map indicating trail markers and location of significant species.



At the Jardin Elliptique a poetry installation links the viewer to the profound importance of this site to the Red Sky Métis.

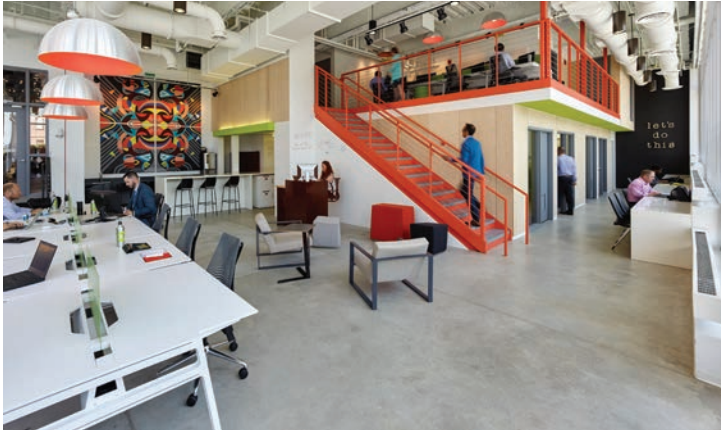
3.7 Building Design, Height, and Massing

Rationale:

Buildings should be designed to fit within the existing character of Trent University and the natural setting of the Commons. The most transparent and engaging building facades should face streets and natural features, to take advantage of these amenities for indoor uses and provide visual interest when viewed from public spaces and circulation networks. Building design should embody the Commons' goal for sustainability through the use of materials, construction techniques and building operations. Buildings should also be designed to create spaces that encourage interaction, collaboration and innovation.

Design Guidelines:

- Architecture should be contemporary and should seek to embody the spirit of design associated with the University's most treasured buildings.
- Sustainability should be designed into buildings from the earliest stages and should be considered from a life-cycle perspective.
 - Buildings must achieve LEED Silver certification or equivalent, at a minimum, but should be encouraged to achieve LEED Gold, based on the targets outlined in Section 4.0.
 - Buildings should reduce dependence on non-renewable resources by using appropriate recycled materials and low-flow/energy efficient fixtures.
 - The opportunity for energy co-generation facilities should be explored and their location should be finalized based on consideration of phased lot development and tenant needs.
 - Buildings should be oriented to take advantage of passive solar heating, cooling and daylighting.
 - Roofs should be designed to be ready to install solar panels.
 - Low slope roofs are recommended to accommodate green roofs, to the greatest extent possible.
 - Roof drainage should flow, in part or fully, into landscaped areas on site where size and soil conditions are adequate to absorb such runoff. Opportunities for water re-use should also be considered.
- Multi-storey development is preferred over single storey buildings with the same total floor area to reduce the building footprint and water runoff impact on the site.
- Developments should vary in building massing and style to reflect the individual nature of each lot and topography of the site.
 - Buildings should be designed to fit into existing topography where appropriate.
 - Views from campus should be considered when locating building components and green roofs. Rooftop mechanical equipment should be screened from view with materials that are complementary to the building.
 - Building height should generally be in keeping with the heights of existing buildings on campus (up to 5 storeys)
 - Taller research or manufacturing elements are permitted but should consider locating in low points on the site, locating away from streets, minimizing the visual impacts on the University and streets (considered on a case by case basis), the creative use of signage and creation of a visual connection from outside to interior uses.
 - Minimum building heights should be no less than two storeys, unless it can be demonstrated that a lower building height is more appropriate for the site. In some cases, buildings can incorporate clerestory glazing or mezzanine levels in place of a second storey.
- Buildings should offer variety and flexibility, both throughout the Commons and within the building (where appropriate).
 - Flexibility of office, mixed-use and multi-tenant buildings, in particular, should be maximized to satisfy the varied demands of current and future users.
 - Raised access flooring, modular partitions, a consistent structural grid and non-centralized HVAC systems should be considered to contribute to building flexibility over time.
- The most transparent and detailed facades should face streets and natural features.
 - Work spaces and active uses such as offices,



Shared work space in the Johns Hopkins Fast Forward Innovation Hub



Janssen Labs, San Diego - shared lab space in life science innovation centre



Building integrated into a rolling landscape



Orient primary facades towards streets and natural spaces

labs and common areas should face streets and natural features. These facades should incorporate significant amounts of glazing to provide views and natural light for those working inside, and interest for those outside.

- False façades for upper storeys should not be allowed.
- Blank walls facing streets or natural features should be discouraged. Blank walls in other locations that are visible to the public should incorporate additional architectural detailing including articulation of the building wall or changes in building material or colour.
- Landscaping should be provided along blank building façades in the form of clustered trees or other forms of planting.
- Entrances to buildings should be prominent and visible, and should be coordinated with the placement of public uses and pedestrian walkways.
 - Mixed-use buildings with publicly accessible uses may incorporate individual entrances to retail / commercial uses which are directly accessed from the street or adjacent public spaces.

- Multi-tenant buildings should incorporate shared lobby or gathering spaces that can be used by all tenants of the building. Such spaces may include amenities like a cafe or meeting rooms.

The T-Lab Commons:

The Master Plan envisions a feature building that will house a number of programs and shared services for the Commons. This space could accommodate, for example, a business incubator program, lecture hall, meeting rooms, exhibit spaces or other gathering spaces that could be used by Commons and Campus users alike. It may also contain mixed-uses like food services, retail uses, and offices for environmental management and staff.

Though additional shared spaces should be provided elsewhere throughout the Commons, it is envisioned that this building will act as a central hub and gathering space, due to its location between the campus and the majority of lots within the Commons, and its location adjacent to two major natural amenities, the western naturalized area and a stormwater amenity area. The design of the building and associated site should, therefore, be integrated with these features, providing complementary indoor and outdoor space.

3.8 Plant Species Selection

Rationale:

Landscaping is a critical component of the vision for Cleantech Commons. The selection of plant species should prioritize native plants, though non-native species may be integrated in smaller numbers, where appropriate. Ultimate selection of species should consider soil structure, pH, composition, fertility and moisture, as well as the tolerance of the species for wetness and salt, depending on planting location. In general, species selected should have minimal maintenance requirements. Species that contribute to visual interest throughout the year should also be considered.

Tree selection should refer to the City of Peterborough's Tree Planting Installation and Establishment Specifications (revision date January 2017).

Consultation with Trent University faculty and researchers related to recommended plantings to encourage bio-diversity and to improve Low Impact Development (LID) function should be undertaken.

Recommended Plant Species for LID Infrastructure:

- **Native Shrubs:** Smooth Serviceberry, Red-osier Dogwood, Ninebark, Pasture Rose, Maple-Leaf

Viburnum, Nannyberry, Arrow Wood

- **Native Ferns, Grasses and Wildflowers:** Big Bluestem, White Wood Aster, Dense Blazing-star, Indian Grass, Switch Grass (see section 3.6)

Recommended Tree Species:

- **Species found on-site today:** Arborvitae/White Cedar, Eastern White Pine, Scot's Pine, Eastern Hemlock, Redmond American Linden, Greenspire Linden, Sterling Silver Linden, Emerald Sunshine Elm, Prospector Elm
- **Native Species:** Red Point Maple, Silver Queen Maple, Green Mountain Sugar Maple, Endowment Sugar Maple, Apollo Sugar Maple, Tatarian Sugar Maple, Autumn Blaze Maple, Northern Catalpa, Butternut Hickory, Common Hackberry, Chicagoland Hackberry, Prairie Sentinel Hackberry
- **Non-Native Species:** Kentucky Coffee Tree, Princeton Sentry Gingko, Maidenhair Gingko, Magyar Gingko, Common Horse Chestnut, Ruby-Red Horse Chestnut, Tulip Tree, Black Gum



Water tolerant plants



Autumn Blaze Maple Trees

4.0 SUSTAINABILITY REQUIREMENTS

The design, construction and management of new enterprises within Cleantech Commons will employ best practices in sustainability and strive for excellence and innovation in green building and site design.

Two alternative approaches to demonstrating a commitment to sustainability are available to Cleantech Commons developments. Tenants must select one of the two approaches and meet its intent to the satisfaction of the Cleantech Commons governing body to obtain site plan approval. The objective of these sustainability requirements is to establish a minimum threshold for all Cleantech Commons tenants, while offering flexibility and recognizing that different types of enterprises have different needs.

Option 1: Sustainability Target Checklist

The first option is to achieve the requirements of a Sustainability Target Checklist based on the LEED rating system. Tenants should target LEED Gold and must ultimately achieve LEED Silver through site and building design using an adapted checklist provided on page 35 - 36. Tenants are not required to formally certify their development through LEED, but must demonstrate that they have met the minimum requirements.

A checklist is provided on the following pages that can be used by the Cleantech Commons governing body to work with new tenants or development partners through the site and building design process. It identifies some required credits for items that are considered to be most important for achieving the overall vision for Cleantech Commons. Additional credits may be achieved through a wide range of options, offering tenants the opportunity to distinguish themselves by exceeding the minimum threshold.



Green roof and solar panels at Humber College

Option 2: Sustainability Knowledge Generation

An alternative approach to satisfying sustainability requirements is to develop and implement a sustainability demonstration project that advances knowledge or understanding in the field of sustainable site and building development. Projects should be designed or implemented as a partnership with University faculty/staff, other tenants or the City, where possible. Eligible projects must not simply utilize existing, proven green building techniques or approaches. Instead, they must either demonstrate the application of new approaches or technology, or further test or evaluate an existing approach to contribute to the understanding of its functionality and performance. The minimum scale and significance of eligible projects is up to the discretion of the Cleantech Commons governing body.

Implementation

Opportunities to publicly recognize those that have exceeded the minimum targets should be explored by the Cleantech Commons governing body. Options for recognition may include prioritization on Commons signage, a Cleantech Commons-specific accreditation scheme or a larger web presence, among others.

Over time, sustainability targets for new developments should be increased to recognize that standards are continuing to evolve and that new technologies will make more advanced targets more achievable.

All tenants should be encouraged to exceed targets, and the ultimate goal for the Commons will be to eventually have a net-zero facility that showcases sustainable design and building technologies for industry, the University and the City.



Landscaped parking lot with rain gardens

4.1 Sustainability Target Checklist

The Sustainability Target Checklist for Cleantech Commons is based on LEED® version 4 (2014), as this is one of the most well-known and commonly used standards for sustainable design. In support of Cleantech Commons’ focus on clean technology, sustainability targets focus most heavily on achieving LEED® credits in the areas of Water Efficiency and Energy and Atmosphere.

The following points outline the approach to applying LEED® v4 requirements at Cleantech Commons.

- All Cleantech Commons new construction is recommended to be designed to LEED New Construction (NC) / Core and Shell (CS) Gold design level and must at minimum demonstrate design and construction criteria that achieves a LEED NC/CS

Silver design level.

- To standardize the sustainable design process and set common, evolving and achievable targets, Cleantech Commons requires all projects to be designed as per the Integrative Process outlined in LEED v4.
- To take advantage of congruence in LEED NC and the Master Plan, it is possible that multiple LEED credits can be attained through a single design decision.

CHECKLIST LEGEND

Cleantech Commons Required Credit	
Cleantech Commons Enhanced Target	1

Cleantech Commons ENHANCED TARGETS

- 1 - Bike Parking and Facilities within easy access to planned trail network
- 2 - Support MP green space network
- 3- 50% Green Roofs of Admin, Offices and Lab Facilities
- 4 - LIDs required around Loading Areas to treat runoff
- 5 - Educational Component Required
- 6 - Visual Connection with University
- 7 - Solar Ready Development

SUSTAINABILITY TARGET CHECKLIST CLEANTECH COMMONS AT TRENT UNIVERSITY

Credit 1	Integrative Process		
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LOCATION AND TRANSPORTATION

Credit 1	LEED for Neighborhood Development Location		
Credit 2	Sensitive Land Protection		
Credit 3	High Priority Site		
Credit 4	Surrounding Density and Diverse Uses		
Credit 5	Access to Quality Transit		
Credit 6	Bicycle Facilities		1
Credit 7	Reduced Parking Footprint		
Credit 8	Green Vehicles		

SUSTAINABLE SITES

Prereq 1	Construction Activity Pollution Prevention		
Credit 1	Site Assessment		
Credit 2	Site Development - Protect or Restore Habitat		2
Credit 3	Open Space		
Credit 4	Rainwater Management		4
Credit 5	Heat Island Reduction		3
Credit 6	Light Pollution Reduction		

WATER EFFICIENCY

Prereq 1	Outdoor Water Use Reduction		
Prereq 2	Indoor Water Use Reduction		
Prereq 3	Building-Level Water Metering		4
Credit 1	Outdoor Water Use Reduction		
Credit 2	Indoor Water Use Reduction		
Credit 3	Cooling Tower Water Use		
Credit 4	Water Metering		4

ENERGY AND ATMOSPHERE

Prereq 1	Fundamental Commissioning and Verification		
Prereq 2	Minimum Energy Performance		

ENERGY AND ATMOSPHERE (continued)

Prereq 3	Building-Level Energy Metering		
Prereq 4	Fundamental Refrigerant Management		
Credit 1	Enhanced Commissioning		
Credit 2	Optimize Energy Performance		
Credit 3	Advanced Energy Metering		4
Credit 4	Demand Response		
Credit 5	Renewable Energy Production		7
Credit 6	Enhanced Refrigerant Management		
Credit 7	Green Power and Carbon Offsets		

MATERIALS AND RESOURCES

Prereq 1	Storage and Collection of Recyclables		
Prereq 2	Construction and Demolition Waste Management Planning		
Credit 1	Building Life-Cycle Impact Reduction		
Credit 2	“Building Product Disclosure and Optimization - Environmental Product Declarations”		
Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials		
Credit 4	Building Product Disclosure and Optimization - Material Ingredients		
Credit 5	Construction and Demolition Waste Management		

INDOOR ENVIRONMENTAL QUALITY

Prereq 1	Minimum Indoor Air Quality Performance		
Prereq 2	Environmental Tobacco Smoke Control		
Credit 1	Enhanced Indoor Air Quality Strategies		
Credit 2	Low-Emitting Materials		
Credit 3	Construction Indoor Air Quality Management Plan		
Credit 4	Indoor Air Quality Assessment		
Credit 5	Thermal Comfort		
Credit 6	Interior Lighting		
Credit 7	Daylight		
Credit 8	Quality Views		6
Credit 9	Acoustic Performance		

INNOVATION IN DESIGN

Credit 1	Innovation		5
Credit 2	LEED® Accredited Professional		

REGIONAL PRIORITY

Credit 1	Durable Building		
Credit 2	Regional Priority		

5.0 IMPLEMENTATION & PHASING

Implementation Considerations

The City of Peterborough will be responsible for providing services to the Commons and for building common infrastructure. However, implementation of many elements of the Master Plan will require coordination between tenants, the City and the University. To ensure that implementation and maintenance responsibilities are clear, the Cleantech Commons governing body may need to consider a process to manage issues such as:

- Monitoring and annual maintenance reviews for LID infrastructure on individual lots and in public spaces;
- Construction, maintenance and use agreements for shared driveways;
- Partnerships with tenants to design and/or fund common infrastructure.

Phasing Implications

Cleantech Commons will be constructed on a phased basis depending on the ultimate allocation of sites and tenancy agreements. It is expected that the first phase of construction will include development of the southernmost properties flanking Pioneer Road. Initial infrastructure requirements, therefore, include construction of Street A to provide access to the first developable lot; construction of the stormwater amenity area in the southwestern corner of the site; and the extension of sanitary and other services to the first set of lots.

Given that the ultimate tenant composition and phasing of Cleantech Commons is currently unknown, the progression of site and infrastructure development should continue based on tenant site preferences and needs. However, there are phasing implications related to completing some elements of the Master Plan.

Key Phasing Considerations:

- Incoming tenants should be encouraged to develop

sites in close proximity to existing lots to reduce the up-front costs of constructing and operating infrastructure throughout the Commons prior to full occupancy.

- In the first phase, completion of Street A from Pioneer Road to Ninth Line may not be necessary. If the complete connection is not created, it should be ensured that trucks are able to turn around to exit onto Pioneer Road as an interim condition.
- At least one trail connection should be constructed in earlier phases of site development. This will facilitate cycling and transit access directly between campus and Cleantech Commons.
- The construction of Street B connecting to the north end of the campus may not be completed until the northernmost lots are developed; however, completing this connection may be required ahead of time to facilitate a feasible loop for transit vehicles.
- Development of any of the sites on the eastern side of Street A will require completion of servicing on the eastern edge of the Cleantech Commons site, including the eastern stormwater pond.
- The location, size and function of co-generation facilities should be considered on an ongoing basis as the site develops. Synergies between tenants in the use of heating and cooling inputs and by-products should be maximized.
- MTO's Peterborough Bypass should be evaluated through formal process with MTO to determine its ultimate location and necessity.

APPENDIX A

SUPPORTING/BACKGROUND STUDIES AND RELATED PROJECTS

Cleantech Commons Supporting Studies

Several complementary studies are ongoing to support the implementation of the Master Plan, including:

- Tree Inventory and Preservation Plan
- Geotechnical and Hydrogeological Studies
- Well monitoring and soil testing
- Species at Risk Survey
- Natural Heritage Report

The findings of these technical studies will inform detailed design.

Related Projects

Related projects currently being undertaken in the vicinity of Cleantech Commons include:

- **Development of the Arena Complex:** The City of Peterborough is currently in the design phase to develop a new twin-pad arena, with the potential for future expansion to include a swimming pool. The Arena is located on the south side of Pioneer Road east of Nassau Mills Road, on lands owned by Trent University.
- **Pioneer Road Reconstruction:** The City of Peterborough is currently undertaking reconstruction of Pioneer Road. This work will provide services to the Cleantech Commons site, as well as the nearby Arena Complex.

Background Studies and Plans

There are a number of supporting studies and plans, both from the City of Peterborough and Trent University, which have provided direction to the Master Plan process. The following section provides an overview of the relevant documents and their status in this Master Plan process.

City of Peterborough

Zoning By-Law 97-123: Section 23A

The City of Peterborough's Zoning By-Law has been recently updated to accommodate the development of Cleantech Commons within the University and College Enhanced District 1 (UC.1). This zoning category:

- Permits primarily university / college uses and employment uses
- Permits library and recreation uses, as well as dwelling units and commercial uses associated with other permitted uses

It also outlines overall requirements for the Commons, including:

- A maximum 40% site coverage for buildings and 25% for driveways, parking and vehicle movement areas;
- A maximum floor area per commercial purpose of 140 square metres; and
- Parking requirements for each use.

Stage 1 & 2 Archaeological Assessment (2016)

A Stage 1 and 2 Archaeological Assessment were completed in 2016 for the lands which are intended to be developed in the first phase of implementation of the Master Plan. This study found no archaeological indications of settlement and no further archaeological work was recommended.

Trent Research Park Servicing Study (2015)

A servicing study was completed in 2015 to review the municipal and servicing requirements necessary to develop the Cleantech Commons lands. The study recommends a servicing approach and identifies the estimated cost to provide services to the site.

North End - Trent University Area Transportation and Wastewater Management Class Environmental Assessment (ongoing)

This study is ongoing and is investigating a number of issues that affect the area around Cleantech Commons. It will examine the realignment and reconstruction of several roads and bridges in the area, as well as producing a long-term traffic management plan and a stormwater and sanitary sewage servicing plan.

Trent University

Endowment Lands Master Plan (2006)

The Endowment Lands Master Plan (2006) originally identified an 85 acre parcel of land at the northwest corner of Ninth Line and Pioneer Road for a University Village for Research and Innovation. Its objective was to support research, innovation, enterprising and related activities and industries that enhance Trent's academic and research profile, provide student employment and generate potential synergies with its close proximity to the Core Campus.

Development principles and objectives identified in this Master Plan for the University Village (Research and Innovation) include:

- Organize the site in a campus pattern centered on open spaces and linked back to the campus.
- The architecture is to be contemporary and should seek to embody the spirit of design associated with the University's most treasured buildings.
- Enable a vibrant, safe and pedestrian environment by framing, facing and animating streets and open spaces.
- Development adjacent to Nature Areas, Green Buffers and Corridors should be sensitive to potential environmental impacts.

- Development should seek to maintain and incorporate significant heritage landscapes such as hedgerows.
- Hedgerows and natural features should be incorporated into open spaces that link into the larger open space network and trails.

Trent Lands Plan (2013)

In 2013, Trent University completed the Trent Lands Plan which further clarified a location, objectives and design vision for the Commons.

Key components of the Trent Lands Plan relevant to the Cleantech Commons site include:

- Development of a Commons to support commercialization, innovation and community economic development.
- Space for faculty and student research, in particular for sustainable agriculture and biology programs.
- Expansion of nature areas with the addition of 'buffer zones' between proposed developments/ land uses and existing nature areas.

The Land Use Framework Plan that was prepared as part of the Trent Lands Plan includes:

- Mix of research and employment uses
- Trail network through the site
- Green buffers and corridors at edges of site
- Street connections through the site including east-west link to East Bank Road

In addition to undertaking planning and design studies for Cleantech Commons and the Arena Complex, Trent University has been implementing other identified projects, including the development of sports fields on the east side of Nassau Mills Road and west side of East Bank Drive and the Campus Heights Residences.



**Cleantech
Commons**
at TRENT UNIVERSITY

The Cleantech Commons Master
Plan was prepared for:

**City of
Peterborough**

in partnership:



Prepared by:

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NOVEMBER 2017