Western
UNIVERSITY · CANADA

Sustainable Design Guidelines

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Sustainable Design Guidelines

SUSTAINABLE DESIGN GUIDELINE REQUIREMENTS

1.0 INTRODUCTION

Western University is committed to improving the performance of buildings across its campus to reduce greenhouse gas (GHG) emissions, improve human health, quality of space, and support thriving ecosystems. The objective of the Sustainable Design Guidelines (herein the Guidelines or SDG) is to establish minimum performance criteria for buildings and sites, strengthen best practices of sustainable design, and encourage advanced building performance over time.

Aligned with Ontario's Climate Change Action Plan, Western is targeting a reduction of 80% of its GHGs, based on 1990 levels, by the year 2050.

The Guidelines have been developed by Western's Facilities Development and Engineering Department with contributions from Facilities Management staff, and builds upon:

- The Campus Master Plan 2015,
- Campus Sustainability Plan,
- Low Carbon Utilities & Infrastructure Study
- Sustainable Procurement Policy & Sustainable Purchasing guide, and
- Western's 2014-2019 Conservation and Demand Management Plan.

The Guidelines were informed by a study of past sustainable design strategies applied on campus and a review of best practices at other leading institutions and organizations. To streamline the effort with current campus processes, the Guidelines reference existing programs and policies, and connect to third party green building rating systems such as the LEED Green Building Rating System where relevant and applicable.

Western recognizes that strong performance requirements must be supported by a shift in design, construction and operation processes in order to improve long-term performance of its building portfolio. The University understands that a holistic approach to designing and retrofitting buildings on campus is required to optimize performance, and that consideration should be given to life cycle costing to understand long-term trade-offs between capital costs, operational cost savings and meeting campus performance goals. As such, in addition to minimum performance criteria, the Guidelines require a set of practices to be implemented as part of every project process to support strong project outcomes and ongoing performance.

As a research-intensive, educational institution, Western University will take the Guidelines as an opportunity to create teaching, learning & research opportunities for graduate and undergraduate students in all faculties. When designing new buildings, the Facilities Development & Engineering team will work closely with the respective faculties to identify mechanisms through which students, staff and faculty could get engaged in research activities with components, systems and information that is being generated through the daily operations of said building. If possible,

research, teaching & learning activities shall also be considered for people outside of the Western community.

All projects, as described herein, are expected to conform to the Sustainable Design Guidelines, unless special direction or exemption is granted in the form of a variance by the Facilities Development and Engineering Department. The Guidelines are supported with supplementary resources, a project delivery checklist, and LEED v4 scorecard, which are found in the Appendices A—C.

All projects shall also consider current and future building needs, to ensure that subsequent renovations and retrofittings are also aligned with the original intent of the building, maintaining a coherent approach towards sustainable design on campus.

1.1 Western University and LEED Compliance

Western may require projects to attain certification under the LEED Rating system. The selection of appropriate LEED rating system and level of certification will be established during project initiation in collaboration with the Facilities Development and Engineering Department. These Guidelines are intended to supplement the LEED compliance approach by identifying additional mandatory credits that reflect Western's environmental and sustainability priorities. The Guidelines reference the LEED Rating System Version 4.0, the latest version of the system. A base LEED v4 scorecard is provided in Appendix C. This base scorecard showcases the activities required to achieve a comparable LEED Silver certification, as a minimum. Western University will make the decision to target LEED Gold or Platinum certification considering financial, environmental and operation factors associated with each specific project (e.g., Life-Cycle Cost Analysis, Building type, Budget, etc.)

1.2 Guidelines Updates

Western's Sustainable Design Guidelines will be reviewed and updated by the Facilities Development and Engineering Department on a regular basis to reflect changes in code, best practices and overall Campus performance goals.

1.3. Professional Standards

Western's Sustainable Design Guidelines do not exempt consultants from liability or the need for due diligence, and it is expected that project teams use professional judgement when executing projects on Campus and referencing these Guidelines. Western's Facilities Development and Engineering Department should be consulted when issues arise in relation to the compliance with the Guidelines.

2.0 HOW TO APPLY THE SUSTAINABLE DESIGN GUIDELINES

Step 1 – Classify the Project

In order to accommodate the wide range of new buildings, renovations, alterations and landscape projects that will be developed across the campus, the Guidelines have defined performance criteria for three project categories. At the project outset, the Facilities Development and Engineering (FDE) Department will determine and confirm a project's classification as per the project definitions below and assign a department Project Manager to oversee the process and liaise with a project team throughout the project delivery.

Table 1 – Project Classification

PROJECT TYPE		PROJECT DESCRIPTION
1	**MAJOR CAPITAL PROJECTS**	All new building construction projects and major renovations that include mechanical and electrical system upgrades or replacement, envelope improvements, and room reconfiguration.
2	**MINOR CAPITAL PROJECTS***	Project examples may include minor space renovation, alteration or system upgrade or replacement (i.e., replacement of a single mechanical, electrical, or furniture system).
3	**SITE PROJECTS**	Project examples may include stormwater management, soft and hard landscaping, irrigation, or exterior lighting.

* All minor capital projects in LEED-certified buildings or buildings designed in accordance with the SDG must conform to the Guidelines, regardless of the cost.

In general, it is recognized that a certain degree of flexibility in interpretation will be required when applying the Guidelines to the range and diversity of minor capital projects, and variances will be directed and approved by the Facilities Development and Engineering Department on a case by case basis.

Step 2 – Apply Process + Performance Requirements

For each project type, the Guidelines are structured according to mandatory process and performance requirements.

Process Requirements are to apply across project scopes, and include all or some of the following:

- Integrated Design Process
- Climate Change Adaptation
- Energy Modeling
- Commissioning
- Performance Metering

Performance Requirements are structured around six categories that best reflect and align with Western's commitments to greenhouse gas reduction, human health and wellness, healthy ecosystems and optimized operations. Mandatory performance requirements are described within each category. Additional guidance on strategies, resources, and tools that are relevant to these Guidelines are consolidated in Appendix A. In some cases, specific stretch goals have been identified for explicit consideration. However, project teams are strongly encouraged to strive for the highest performance achievable for each project beyond the mandatory requirements.

Performance areas include:

- **Energy + Greenhouse Gas Emissions:** states minimum performance goals for building energy performance, greenhouse gas emissions, and implementation of best practices related to building commissioning and metering.
- **Water Use:** establishes minimum performance goals for building and landscape water use.
- **Health + Wellness:** establishes minimum performance criteria for indoor environmental quality.
- **Site Considerations:** outlines best practices for hard and soft landscapes, storm water management, and exterior lighting.
- **Constructability:** establishes construction best practices, considers material sourcing, and waste streams.
- **Operations + Maintenance:** connects design to user experience and best practices in operation.

Conformance with the Guidelines is defined accordingly:

- **Mandatory (●)**—requirement must be met by the project.
- **Mandatory when applicable (◑)**—requirement will be determined mandatory by FDE and will be dependent on the project scope.
- **Optional when applicable (○)**—depending on the scale and scope of the project, the requirement may be optional and will be confirmed by the FDE.
- **Not applicable (–)**—requirement does not apply to the project.

Step 3 – Accountability + Verification

All projects must confirm conformance with the Guidelines at various stages throughout design, construction, occupancy and operation. At each milestone, project teams should undertake a design review to ensure the SDG requirements are integrated into the building design, and must submit the following information in addition to the specific requirements listed in the preceding sections:

- A completed Sustainable Design Guidelines (SDG) Checklist (see Appendix B);
- A narrative of the project's sustainable design approach and conformance with the SDG requirements; and
- When applicable, a LEED scorecard.

Project teams are required to retain all applicable supporting documentation (e.g., documents, drawings, CCOs, photos, etc.). Facilities Development and Engineering Department may request supporting documentation to verify conformance with the Guidelines.

Step 4 – Conform with LEED or other Rating System

Projects selected to certify through the LEED Rating Systems (v4) will determine the appropriate LEED rating system and level of certification in collaboration with the Facilities Development and Engineering Department. LEED projects must conform to the Process and Performance Requirements outlined within these Guidelines. In addition, specific LEED credits are identified under each performance category and are **mandatory** for all projects pursuing LEED certification. These credits are highlighted within purple boxes (see example, "LEED v4 Credit Compliance"). Appendix C includes a base LEED v4 score card.

Project teams should complete milestone LEED reviews to ensure prerequisite and credit requirements are integrated into the building design and specifications. The following four milestone reviews are recommended at a minimum:

- 90% Schematic Design
- 90% Design Development
- 50% and 90% Construction Documents
- Monthly LEED reviews during construction

Step 5 – Variances

Where a project team determines any part of the Sustainable Design Guidelines to exceed the scope of the project, be overly onerous or not applicable, the team may apply to the Facilities Development and Engineering Department for a variance. Variance requests must be submitted no later than the end of Schematic Design and are not applicable to LEED prerequisites for projects certifying under LEED.

This box identifies mandatory LEED Credits for projects selected to certify

LEED v4 CREDIT COMPLIANCE:

☐ WE: Credit [1-3 points]

☐ EA: Credit [1 points]

Required points

Credit description

Category (see legend below)

LEED v4 CATEGORY LEGEND:

IP: Integrative Process

LT: Location & Transportation

SS: Sustainable Sites

WE: Water Efficiency

EA: Energy & Atmosphere

MR: Materials & Resources

IEQ: Indoor Environmental Quality

IN: Innovation

3.0 PROCESS REQUIREMENTS

Integrated Design

Requirements:

Conduct integrated design charrettes (workshops) as part of the schematic design process.

	MAJOR	MINOR	SITE
PROJECT CONFORMANCE	●	–	○

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

The intent of the charrettes is for the University and project team to explore a range of strategies and to understand the synergies between them with the goal of improving the project's performance. Charrettes should address project goals, explore design strategies, and include full representation from the design team, relevant University stakeholders, including Operations and Maintenance staff and additional experts such as an ecologist, energy modeler or academic researchers. The number of charrettes will be dependent on the project scope, and will be specified at the project outset by the Facilities Development and Engineering Department.

Milestone Steps and Documentation:

Upon completion of individual charrettes, project teams are responsible for issuing charrette minutes to document the range of goals and strategies discussed.

A project's schematic design report submission should include a summary of the integrated design charrette, the project's sustainable design goals and range of strategies explored to meet the Guidelines.

LEED V4 CREDIT COMPLIANCE:

☐ IP: Integrative Process [1 point]

Climate Change Adaptation

Requirements:

Examine publicly available current and future weather and climate data to assess project design opportunities associated with potential vulnerabilities.

	MAJOR	MINOR	SITE
PROJECT CONFORMANCE	●	○	○

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

Analysis may include, but is not limited to, precipitation and temperature data, humidity, solar radiation, wind speed and direction, and long-term climate projections. Weather and climate analysis should inform design strategies related to rainwater capture and reuse, renewable energy technologies and campus resiliency planning as it relates to floods, winter storms and catastrophic weather events. This information can also be used to inform the development of an energy model. It is recommended that project teams consult publicly available data from common sources such as local weather stations or US Department of Energy's Energy Efficiency and Renewable Energy Weather Data site. See Appendix A for additional resources.

Project teams may wish to consider the following questions as part of the climate change adaptation analysis:

- What are the results of the climate model data?
- What are the vulnerabilities of the site?
- How has design of this new project responded to these vulnerabilities and climate data?

Milestone Steps and Documentation:

A project's schematic design report submission should include a summary of the climatic metrics and how these have informed the building design (i.e., orientation) and potential integration of design strategies such as solar shading, rainwater harvesting, natural ventilation etc.

Energy Modeling

Requirements:

Conduct energy analysis and modeling at various stages to inform the building design through detailed analysis.

	MAJOR	MINOR	SITE
PROJECT CONFORMANCE	●	○	–

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

Engage an experienced energy modeling professional, who is competent in using energy modeling tools and software such as IES VE, eQuest, Energy Plus, or other compatible tools. These tools can be used to model proposed energy conservation measures and determine the potential building energy performance and greenhouse gas emissions savings. An energy model can facilitate understanding the life-cycle performance of building components, mechanical and electrical systems, and facilitate measurement and verification practices.

Coordinate the energy modeling results with the project's cost consultant to inform the Class C cost estimate and life cycle cost analysis of key sustainable design measures (i.e., mechanical/electrical systems, envelope improvements).

Consult the CaGBC's Experienced Modellers list for a list of qualified energy modelling consultants if this skillset does not exist on a project's mechanical engineering team.

Milestone Steps and Documentation:

Provide the following documentation at each design milestone as noted:

SCHEMATIC DESIGN	• Develop initial model analysis of massing, orientation, and/or major HVAC systems with proposed energy conservation measures (ECMs), summary of energy savings per measure, and ensure compliance with ASHRAE 90.1 2010, Ontario Building Energy Code or LEED compliance requirements (project dependent).Coordinate energy modeling results with cost consultant.
DESIGN DEVELOPMENT	• Update energy model with multiple parametric runs comparing design options of systems and strategies.
CONSTRUCTION DOCUMENTS	• Complete the energy model based on IFC documents for design and baseline case for LEED and/or code compliance verification.
OCCUPANCY	• Submit as-built energy model summary report to FDE documenting the ECMs and associated savings.

LEED V4 CREDIT COMPLIANCE:

☐ EA: Enhanced Commissioning [2-6 points]

Commissioning

Requirements:

Conform to the requirements of LEED v4 Prerequisite: Fundamental Commissioning.

	MAJOR	MINOR	SITE
PROJECT CONFORMANCE	●	○	○

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

Western is committed to the commissioning and ongoing commissioning of its building systems. All major capital projects must follow best practice commissioning procedures as outlined by the LEED Rating System. Optional applicability to site is related to storm water management, exterior litghting and other open space and landscape related features. The role of a Commissioning Authority is to represent the interests of the owner. The Commissioning Authority should assess design documents against the Owner's Project Requirements, and ensure the building will be able to operate as intended. A Commissioning Authority should be engaged no later than the start of the Construction Documents phase.

In order to ensure the systems continue to operate as designed and intended over time, monitoring of the system is highly recommended. In cases where a system's performance is found to have deviated from the values it was commissioned to, corrective action should be undertaken by Operations and Management staff (or consultants, as applicable). The goal is to maintain good designs performing at their best for the life of the system.

Milestone Steps and Documentation:

CONSTRUCTION DOCUMENTS	• Hire a Commissioning Authority. • Submit Commissioning Authority report documenting peer review of construction documents.
CONSTRUCTION ADMINISTRATION	• Complete commissioning process and submit final commissioning report to FDE.
OCCUPANCY	• Update O+M Manuals and submit to FDE. • Conduct training of operating staff.

Performance Metering

Requirements:

Install permanent sub-meters for energy and water systems. Refer to the respective Performance Requirements section for detailed metering direction.

	MAJOR	MINOR	SITE
PROJECT CONFORMANCE	●	◑	◑

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

To support the ongoing metering, monitoring and optimization of building performance, the installation of energy and water meters will facilitate tracking and optimizing building performance. In the event that a Minor Project is located within a building that does not have a BAS system, it is recommended that meters are installed in an effort to future proof the building and enable the University to connect the project to a campus-wide metering system at a later date.

Project teams should work in conjunction with the Facilities Development and Engineering Department to develop a metering strategy that meets the project's program requirements and aligns with the University's operations protocols for monitoring building performance. All installed meters must be connected to existing control systems.

Opportunities for innovation in data acquisition, transmission, storage and analysis must be considered both for hardware and software, to enhance Western's Big Data capabilities.

Special consideration should be given to projects that may, for example, have energy intense program requirements (i.e., research labs). Project teams must consult Operations and Maintenance staff and confirm with Facilities Development and Engineering when developing this strategy.

Milestone Steps and Documentation:

CONSTRUCTION DOCUMENTS

- Submit metering and verification strategy that outlines which loads are to be metered, types of meters to be specified, and calibration certificates as part of CD submission package.
- Confirm conformance with Western's Utility Metering Requirements.

CONSTRUCTION ADMINISTRATION

- Include all metering devices and BAS system in the commissioning process.
- Submit the final commissioning report.

OCCUPANCY

- Compile regular metering reports summarizing energy and water usage. Where possible, provide the amount of energy or water consumed per end use identified during design.

LEED V4 CREDIT COMPLIANCE:

☐ WE: Water Metering [1 point]

☐ EA: Advanced Energy Metering [1 point]

4.0 PERFORMANCE REQUIREMENTS

Energy + Greenhouse Gas (GHG) Emissions

Goal: *Projects must be designed to optimize energy performance and minimize greenhouse emissions in support of meeting Western's reduction of GHG's 80% based on 1990 levels, by 2050, aligned with Ontario's Climate Change Action Plan*

LEED V4 CREDIT COMPLIANCE:

☐ EA: Optimize Energy Performance 14%-29% [5-12 points]

REQUIREMENTS*		MAJOR	MINOR	SITE
ENERGY	All new buildings and major renovations will be moving towards a low temperature heating water. The building should be equipped with heat pumps sized for the entire heating load. The integration of renewable energy technologies into the building should be assessed, helping further reduce the building energy and, therefore, greenhouse gas emissions associated with its operations	●	◑	–
LIGHTING: INTERIOR	Demonstrate a minimum lighting power density reduction of 30% better than ASHRAE 90.1—2010 using the space by space methodology or by applying the whole building lighting power density allowance.*	●	●	–
METERING	Meet the requirements of LEED v4 EA credit: Advanced Energy Metering for 1 point.	●	◑	○
COMMISSIONING	Meet the requirements of LEED v4 EA Prerequisite: Fundamental Commissioning and Verification.	●	○	○
APPLIANCES	Install ENERGY STAR Appliances for all new eligible products.	●	●	–

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

*Note: The targets specified in the table serve as minimum mandatory requirements. Project teams should be aware of targets established by applicable programs such as the upcoming provincial cap and trade program. The project team is required to set energy targets that are both appropriate to the existing market environment and address applicable greenhouse gas reduction targets. Targets to be confirmed with FDE.

Residential projects to confirm percent reduction with FDE during Design Development.

Guidance:

Align GHG and energy targets for the project with the campus goals as part of the integrated design process. Use the target to inform energy conservation measures and overall efficiency of the building.

Use the following methodology to explore design strategies and energy conservation measures:

- First, reduce loads through passive strategies;
- Then, design high performance, efficient systems;
- Finally, consider renewable energy systems.

Recover energy using the existing chilled water network (e.g., laboratories' exhaust, IT equipment, etc.)

Heating equipment (e.g., heating coils, heat exchangers) should be designed or converted to use low temperature water (45C)

Where feasible, humidifiers should be adiabiatic (high pressure water). In critical applications such as laboratories, humidifiers should be electrical.

When applicable, a total energy recovery wheel should be used on fresh air intakes to reduce humidification loads.

Use of heat recovery on exhaust air for fresh air pre-heating.

Airflow requirements must be according to ASHRAE 62.1.

When applicable, convert all existing building perimeter heating systems to low temperature heating water (45C). Alternatively, increase the percentage of heating load with existing reheat coils to minimize use of peripherial heating equipment.

Improve the efficiency of the envelope when applicable, and feasible.

Consult Western's Design Guidelines and Western University Exterior Lighting Standards and Specifications for performance specifications for building envelope, mechanical and electrical systems and exterior lighting requirements.

Assess the feasibility (cost and performance) of integrating renewable energy technologies into the building. Present findings of renewable energy analysis in Schematic Design workshops.

Where possible, explore the feasibility and benefits of Passive House certification or pursuing a net zero energy approach to the building envelope and systems design.

Documentation:

Provide the following documentation at each design milestone:

SCHEMATIC DESIGN	• Submit a narrative describing the energy conservation approach (i.e., energy conservation measures and potential savings) and SDG Checklist as part of the SD deliverable.
DESIGN DEVELOPMENT	• Update and submit a narrative describing the energy conservation approach and SDG Checklist as part of the DD deliverable.
CONSTRUCTION DOCUMENTS	• Submit summary report from final OBC or LEED compliant energy model.
CONSTRUCTION ADMINISTRATION	• Submit final energy model report. • Submit final commissioning report. • Submit measurement and verification report.
OCCUPANCY	• Submit a final SDG Checklist confirming the project's performance and final strategies integrated into the building. • For LEED Compliance, submit documentation for the LEED application.

LEED V4 CREDIT COMPLIANCE:

- ☐ WE: Indoor Water Use Reduction—35% [3 points]
- ☐ WE: Water Metering [1 point]
- ☐ WE: Cooling Tower Water Use [1-2 points]

*Note: LEED Projects must comply with fixture performance rates as per the LEED Credit requirements.

Water Use

Goal: *Projects must be designed to conserve and optimize potable water use for building and landscape loads in support of meeting Western's water use performance goals.*

REQUIREMENTS					MAJOR	MINOR	SITE
WATER USE REDUCTION	Meet the requirements of LEED v4 WE credit: Indoor water use reduction for 3 points (35%).				●	●	–
FIXTURE PERFORMANCE RATES*	Fixture performance rates not to exceed maximum flow and pressure rates outlined below.						
	Fixture	Maximum Flow		Pressure			
		gpm	lpm				
	Water Closet	1.06	4.8		●	●	–
	Urinal	0.132	0.5		●	●	–
	Dual Flush—Solids	1.06	4.8		●	●	–
	Dual Flush—Liquids	0.66	2.5		●	●	–
	Lavatory faucet—Suites	0.5	5.7	60psi (413kPa)	●	●	–
	Lavatory faucet—Public	0.5	1.9		●	●	–
	Kitchen faucet	1.5	5.7	60psi (413kPa)	●	●	–
	Shower head	1.5	5.7	80psi (550kPa)	●	●	–
	Kitchenette	1.0	3.8		●	●	–
APPLIANCES	Where applicable, install ENERGY STAR Appliances for all eligible water-consuming products.				●	●	–
METERING	Meet the requirement of LEED v4 WE credit: Water Metering for 1 point.				●	●	–
COOLING TOWER QUALITY	Perform cooling tower quality testing to meet the requirement of LEED v4 WE Credit: Cooling Tower Water Use for 1 point.				◑	○	○

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

Consult the campus water use intensity reduction targets, and establish a water use reduction plan for the project that aligns with the campus goals as part of the integrated design process.

Consider design strategies that conserve potable water and reduce demand on all systems. Where possible, explore the feasibility of rainwater, condensate recovery, or stormwater capture, treatment and

reuse within the building as a strategy to support conserving potable water supplies.

Consult Western's Landscape Management Plan for landscape planting and irrigation best practices that are in support of conserving potable water.

Implement water metering and monitoring systems in compliance with the LEED v4 credit Water Metering in each project to support Western's efforts to meter, monitor and improve upon its potable water use reduction targets.

Documentation:

Provide the following documentation at each design milestone:

SCHEMATIC DESIGN	• Submit a narrative describing the water conservation approach and SDG Checklist as part of the SD deliverable.
DESIGN DEVELOPMENT	• Update and submit a narrative describing the water conservation approach and SDG Checklist as part of the DD deliverable.
CONSTRUCTION DOCUMENTS	• Complete and submit final water use calculations to demonstrate conformance with water performance target. • Finalize and submit a narrative describing the water conservation approach and SDG Checklist as part of the CD deliverable.
CONSTRUCTION ADMINISTRATION	• Track and retain evidence (documents, cut sheets, invoices, photos, etc.) to prove SDG conformance to FDE.
OCCUPANCY	• Submit a final SDG Checklist confirming the project's performance and final strategies integrated into the building. • For LEED Compliance, submit documentation for the LEED application.

LEED V4 CREDIT COMPLIANCE:

- ☐ IEQ: Thermal Comfort [1 point]
- ☐ IEQ: Low Emitting Materials [2-3 points]
- ☐ IEQ: Construction Indoor Air Quality Management Plan [1 point]
- ☐ IEQ: Indoor Air Quality Assessment [1-2 points]

Health + Wellness

Goal: *Projects must be designed to support the long-term health and well-being of Western's students, faculty and staff.*

REQUIREMENTS		MAJOR	MINOR	SITE
ENVIRONMENTAL TOBACCO SMOKE CONTROL	Comply with the requirements of LEED v4 IEQ Prerequisite: Environmental Tobacco Smoke Control.	●	●	●
VENTILATION	Comply with ASHRAE 62.1—2010 sections 4-7.	●	◑	–
THERMAL COMFORT	Meet the comfort criteria described in ASHRAE 55—2010.	◑	○	–
CONTROLLABILITY OPERABLE WINDOWS	Where possible, install operable windows for regularly occupied perimeter spaces.	●	◑	–
CONTROLLABILITY COMFORT	For projects with office program requirements, provide for individual control of systems to address thermal comfort needs of building occupants. Controllable temperature range should adhere to Western's requirements and be agreed upon with FDE.	●	◑	–
LOW EMITTING MATERIALS	Meet the requirements of LEED v4 IEQ credit: Low Emitting Materials for the following categories at a minimum: interior paints and coatings; interior adhesives and sealants; flooring; composite wood; and ceilings, walls, thermal and acoustic insulation.	●	◑	–
INDOOR AIR QUALITY—CONSTRUCTION MANAGEMENT	Meet the requirements of LEED v4 IEQ credit: Construction Indoor Air Quality Management Plan for 1 point.	●	◑	–
INDOOR AIR QUALITY FLUSH	Meet the requirements of LEED v4 IEQ credit: Indoor Air Quality Assessment, Option 1 for 1 point.	●	◑	–

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

Adopt best practices during construction to minimize indoor air quality problems and ensure the construction schedule accounts for adequate time to accommodate a flush out of the building prior to occupancy. If scheduling conflicts arise, this should be brought to the attention of the FDE Project Manager.

Design for thermally comfortable spaces that are healthy and provide for adequate ventilation rates. Consult the latest ASHRAE Standards for thermal comfort (ASHRAE 55) and ventilation performance (ASHRAE 62.1).

Consult Western's Facilities Development and Engineering Department regarding the applicability of operable windows. Direction for operable window requirements will be determined on a project-by-project basis to ensure there are no conflicts with the Ministry of the Environment and Climate Change's (MOECC) requirements.

When possible, explore the feasibility of pursuing the following LEED v4 Material Credits in an effort to transform the building material market place with regards to building greater transparency and supporting occupant health within the built environment:

- LEED-NCv4 Building Product Disclosure and Optimization Environmental Product Declarations: Option 2—Multi- Attribute Optimization
- LEED-NCv4 Building Product Disclosure and Optimization—Sourcing of Raw Materials: Option 2—Leadership Extraction Practices
- LEED-NCv4 Building Product Disclosure and Optimization—Material Ingredients: Option 2—Material Ingredient Optimization
- LEED-NCv4 Building Product Disclosure and Optimization—Material Ingredients: Option 3—Product Manufacturer Supply Chain Optimization

When possible, design spaces to maximize natural daylight, integrate elements that support good acoustic performance, and foster occupant health and well-being. Consider consulting the Centre for Active Design Active Design Guidelines or the International WELL Building Institute's WELL Building Standard for additional best practices.

Documentation:

Provide the following documentation at each design milestone as noted:

SCHEMATIC DESIGN	• Submit a narrative describing the health and wellness approach and SDG Checklist as part of the SD deliverable.
DESIGN DEVELOPMENT	• Update and submit a narrative describing the health and wellness approach and SDG Checklist as part of the DD deliverable.
CONSTRUCTION DOCUMENTS	• Finalize and submit a narrative describing health and wellness approach and SDG Checklist as part of the CD deliverable.
CONSTRUCTION ADMINISTRATION	• Track and retain evidence (documents, cut sheets, invoices, photos, etc.) to prove SDG conformance to FDE. • Submit report to FDE documenting building flush out prior to occupancy.
OCCUPANCY	• Submit a final SDG Checklist confirming the project's performance and final strategies integrated into the building. • For LEED Compliance, submit documentation for the LEED application.

LEED V4 CREDIT COMPLIANCE:

- ☐ WE: Outdoor Water Use Reduction [1-2 points]
- ☐ SS: Rainwater Management [2-3 points]
- ☐ SS: Heat Island Reduction [1-2 points]
- ☐ SS: Light Pollution Reduction [1 point]

Site Considerations

Goal: *Projects must be designed, constructed, and operated to have a minimal impact on the natural campus ecology while being mindful of the campus-wide master plan and sustainability objectives.*

REQUIREMENTS		MAJOR	MINOR	SITE
EROSION AND SEDIMENTATION CONTROL	Conform to Western's Landscape Management Plan's requirements for 100% compliance with Erosion and Sedimentation Control procedures.	●	◑	◑
NATIVE LANDSCAPING	Conform to Western's Landscape Management Plan's requirements for use of native and adaptive species for 100% of new project landscaping.	●	◑	◑
BICYCLE FACILITIES	Provide bicycle parking and shower facilities as per the LEED v4 LT credit: Bicycle Facilities requirements, or demonstrate that facilities exist within 163 m of the building. Bicycle storage capacity may not be double counted. Storage that is fully allocated to occupants of non-project facilities, cannot also serve project occupants. *This approach is recommended and is to be confirmed on a project-by-project basis.	◑	◑	–
IRRIGATION	Do not install a permanent landscape irrigation system as per requirements for LEED v4 WE credit: Outdoor Water Use Reduction.	●	◑	◑
STORMWATER	Comply with LEED v4 WE credit: Rainwater Management for 2 points.	●	◑	◑
HEAT ISLAND	Meet the requirements of LEED v4 SS credit: Heat Island Reduction for 2 points.	●	◑	◑
SITE LIGHTING	Where applicable, comply with Western University's Exterior Lighting Standards and Specification and/or lighting requirements provided in LEED v4 SS credit: Light Pollution Reduction.	●	◑	◑

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

Consult Western's Landscape Management Plan and the 2015 Master Plan for requirements and best practices relating to landscape design and support multiple objectives of conserving potable water, managing stormwater on-site, minimizing the urban heat island effect, and erosion

and sedimentation control requirements. For example, projects should explore the use of green roofs to help manage stormwater onsite and to reduce daytime roof surface temperatures. Nonroof measures, such as shading with plants and structures, can help reduce the heat island effect on buildings.

Additional consideration should be given to how the project's landscaping design and stormwater management approach align with goals and strategies identified in the City of London's *The London Plan - Urban Forest Strategy*, the City of London's *Tree Protection By-law,* and Western's Utilities and Infrastructure Plan.

Projects are encouraged to consult best practices such as City of Toronto's Green Standard requirements for bird friendly design to minimize and reduce bird strikes (collisions), given the highly vegetative nature of the Western Campus.

Documentation:

SCHEMATIC DESIGN	• Submit a narrative describing the sustainable site measures and SDG Checklist as part of the SD deliverable.
DESIGN DEVELOPMENT	• Update and submit a narrative describing the sustainable site measures approach and SDG Checklist as part of the DD deliverable.
CONSTRUCTION DOCUMENTS	• Finalize and submit a narrative describing sustainable site measures and SDG Checklist as part of the CD deliverable.
CONSTRUCTION ADMINISTRATION	• Track and retain evidence (documents, cut sheets, invoices, photos, etc.) to prove SDG conformance to FDE.
OCCUPANCY	• Submit a final SDG Checklist confirming the project's performance and final strategies integrated into the building. • For LEED Compliance, submit documentation for the LEED application.

LEED V4 CREDIT COMPLIANCE:

- ☐ MR: Storage and collection of recyclables (prerequisite)
- ☐ MR: Construction and Demolition Waste Management [2 points]
- ☐ MR: Building Product Disclosure and Optimization - Material Ingredients (1 point)
- ☐ MR: Building Product Disclosure and Optimization—Environmental Product Declarations [1 point]

Constructability

Goal: *Projects must be designed and constructed to optimize the building performance while using material resources efficiently and sustainably.*

REQUIREMENTS		MAJOR	MINOR	SITE
CONSTRUCTION AND LANDSCAPE WASTE	Projects must divert a minimum of 75% construction and demolition waste from local landfills.	●	●	●
	Project must divert 100% of landscape waste, by weight, from landfill as per Western's Landscape Management Plan.	●	●	●
BUILDING DURABILITY	Develop and implement a Building Durability Plan in compliance with the CSA Building Durability Standard S478-95 (R2007).	●	◑	–
SOURCING MATERIALS	Source locally and regionally available materials.	●	◑	○
OPERATIONS WASTE	Provide adequate and convenient storage space for recycling and composting facilities.	●	●	○

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

When selecting building materials and building systems, consider specifying materials that balance performance objectives of durability, local and regional availability, and healthy and sustainable harvesting.

Explore the feasibility of providing a flexible and adaptable design (e.g., demountable partitions) as a means of future proofing the building.

When possible, consider the use of Forest Stewardship Council (FSC) certified wood for wood components in an effort to support sustainable forestry best practices.

At the outset of the construction process, host a contractor workshop to review the project's sustainable design goals, conformance with the Guidelines, and reporting requirements for the construction administration phase. Contractors should be made aware that documentation (i.e., documents, invoices, photos etc.) will need to be retained to prove conformance with the SDG requirements.

Consult Western's Landscape Management Plan for guidance and requirements pertaining to landscape and construction waste diversion best practices.

Operations Waste should be considered in two different ways: how waste is collected in the building, and how waste is collected from the building to off-site. Considerations should be made to include the following infrastructure to support waste diversion in new buildings:

- *Indoor waste collection*: waste stations should be installed throughout the building that allow occupants to separate waste into four different streams: Composting (Organics), Recycling (Paper, Containers) and Landfill. Waste stations should use metallic bins with self-closing flaps, to comply with Fire Safety requirements at Western, should include proper signage for all four streams and should be no larger than 32 gallons per stream.

- *Waste removal to off-site:* the building must provide adequate facilities for the sorting and temporary storage of all waste streams, including Organics, Recycling, Landfill, Cardboard, Lamps & Lightbulbs and Electronic Waste. This space should be allocated as close to an exit at the main level as possible, near or within a dock, to ensure proper access for for caretaking staff to move materials to outdoor bins, as well as for waste management services companies providing pick-up services for Western.

Outdoor underground bins (Moloks) should be installed for at least the following streams: Landfill, Recycling (paper, containers) and Cardboard, for a total of four units per building. Landfill, Containers and Cardboard should be stored in a 6.5 cubic yard bin (5000 series), while the Paper stream can fit in a 4.5 cubic yard bin (3000 series). These will be serviced by Western's waste management service company.

Documentation:

SCHEMATIC DESIGN	• Submit narrative describing constructability measures and SDG Checklist as part of the SD deliverable.
DESIGN DEVELOPMENT	• Update and submit narrative describing constructability measures approach and SDG Checklist as part of the DD deliverable.
CONSTRUCTION DOCUMENTS	• Finalize and submit narrative describing constructability measures and SDG Checklist as part of the CD deliverable.
CONSTRUCTION ADMINISTRATION	• Track and retain evidence (documents, invoices, photos, etc.) to prove SDG conformance to FDE.
OCCUPANCY	• Submit a final SDG Checklist confirming the project's performance and final strategies integrated into the building. • For LEED Compliance, submit documentation for the LEED application.

LEED V4 CREDIT COMPLIANCE:

☐ IN: Innovation [1-5 points]

Operations + Maintenance

Goal: *Projects must integrate best operations and maintenance practices to ensure the sustainable design goals are maintained throughout the life of a project.*

REQUIREMENTS		MAJOR	MINOR	SITE
GREEN CLEANING	Conform to Western's Green Cleaning Policy.	●	◑	○
EXTERIOR HARDSCAPE MANAGEMENT	Conform to Western's Landscape Management Plan's requirements exterior hardscape management.	●	◑	◑
WASTE MANAGEMENT—LANDSCAPE	Conform to Western's Landscape Management Plan's requirements for landscape waste management.	●	◑	◑
EQUIPMENT AND CONSUMABLES PROCUREMENT	Conform to Western's Sustainable Procurement Policy requirements for procuring equipment that will be purchased after project completion.	◑	◑	◑
GREEN EDUCATION	Integrate signage into the building that communicates the sustainability features and performance targets. Consult Western's Facilities Development and Engineering Department on education program requirements.	●	●	○
QUALITY ASSURANCE DURING CONTINUOUS OPERATION	Implement corrective action when a system's performance is found to have deviated from the values it was commissioned to.	●	◑	○

● *Mandatory,* ◑ *Mandatory when applicable,* ○ *Optional when applicable,* – *Not applicable*

Guidance:

Compliance with each of the above mandatory items will ensure that materials installed or used to clean the project post-occupancy do not jeopardize the intended sustainable performance targets of the project. Integration of an education component will also be a critical part of ensuring the building meets its long-term performance targets.

In instances where a project meets the criteria of the LEED Existing Building Operations and Maintenance rating system, compliance with this system should be explored.

Documentation:

CONSTRUCTION DOCUMENTS	• Submit green education plan and demonstrate how educational components will be integrated into the building design as part of the CD deliverable.
CONSTRUCTION ADMINISTRATION	• Track and retain evidence (documents, invoices, photos, etc.) to prove SDG conformance to FDE.
OCCUPANCY	• Submit a final SDG Checklist confirming the project's performance and final strategies integrated into the building. • For LEED Compliance, submit documentation for the LEED application.

APPENDICES

APPENDIX A. RESOURCES

The following resources, categorized by performance area, are intended to serve as best practices and/or have directly been referenced in the Sustainable Design Guidelines. A consolidated list of Western's policies is provided.

Integrated Design Process

BC Green Building Roundtable. 2007. *Roadmap for the Integrated Design Process:*
www.greenspacencr.org/events/IDProadmap.pdf

Climate Change Adaptation

Natural Resources Canada Climate and Climate-Related Trends and Projections
www.nrcan.gc.ca/environment/resources/publications/impacts-adaptation/reports/assessments/2008/10261

The Rockefeller Foundation: Climate Change
www.rockefellerfoundation.org/our-work/topics/climate-change/

US Department of Energy, Energy Efficiency and Renewable Energy Weather Data
apps1.eere.energy.gov/buildings/energyplus/weatherdata_about.cfm

Metronorm (Database of 8325 meteorological stations worldwide)
meteonorm.com/en/features

Energy Modeling

CaGBC Experienced Modellers List
www.cagbc.org/cagbcdocs/CaGBCs_Experienced_Modellers_List-EN.pdf

Commissioning

ASHRAE Guideline 0 - 2013 – The Commissioning Process
www.ashrae.org

ASHRAE Standard 202 - 2013 – Commissioning Process for Buildings and Systems
www.ashrae.org

Canadian Standards Association Z320 - 11 – Building Commissioning Standard and Check Sheets
www.csagroup.org/

Performance Metering

International Protocol for Measurement and Verification – Core Concepts 2014
www.evo-world.org/

Energy Performance

Canadian Passive House Institute
www.passivehouse.ca/

Environmental Protection Agency ENERGY STAR Target Finder
www.energystar.gov/buildings/service-providers/design/step-step-process/evaluate-target/epa's-target-finder-calculator

National Research Council Canada. Adaptation Guidelines for the National Energy Code of Canada for Buildings 2011
www.nrc-cnrc.gc.ca/eng/publications/codes_centre/necb_2011_adaptation_guidelines.html

Water Performance

Energy Policy Act (Epact) 2005
eere.energy.gov/femp/regulations/epact1995.html

Health and Wellness

ASHRAE 62.1 – 2010 Ventilation for Acceptable Indoor Air Quality
www.ashrae.org

AHSRAE 55 – 2010 Thermal Comfort Conditions for Human Occupancy
www.ashrae.org

Center for Active Design: Active Design Guidelines
centerforactivedesign.org

International WELL Building Institute: WELL Building Standard
www.wellcertified.com/

Declare
www.declareproducts.com

Health Product Declaration Collaborative
www.hpd.collaborative.org

Cradle to Cradle Products Innovation Institute
www.c2ccertified.org

International Living Future Institute - Living Building Challenge
www.living-future.org/lbc

Site Considerations

The London Plan: City of London's Urban Forest Strategy and Implementation Plan
thelondonplan.ca/

City of Toronto Green Standard Bird Friendly Design requirements
www1.toronto.ca/city_of_toronto/city_planning/developing_toronto/files/pdf/mr_hr_tech.pdf

Constructability

CSA Building Durability Standard S478-95 (R2007)

Western Policies and Resources

Western University's Campus Master Plan
1drv.ms/1OliAvS

Western University's Design Guidelines

Western University's Exterior Lighting Standards and Specifications

Western University's Landscape Management Plan

Western University's Green Cleaning Plan

Western University's Sustainable Procurement Policy
sustainability.uwo.ca/initiatives/sustainable_procurement/index.html

Western University's Sustainability Plan
sustainability.uwo.ca/

Western University's Utility Metering Requirements

Western University's Utilities and Infrastructure Plan

LEED Resources

Canada Green Building Council
www.cagbc.org

CaGBC Experienced Modellers' List
www.cagbc.org/cagbcdocs/CaGBCs_Experienced_Modellers_List-EN.pdf

US Green Building Council
www.usgbc.org

USGBC Credit Library
www.usgbc.org/credits/new-construction/v4

APPENDIX B.
WESTERN SUSTAINABLE DESIGN GUIDELINES CHECKLIST

WESTERN SUSTAINABLE DESIGN GUIDELINES	Introduction	Western UNIVERSITY · CANADA

Please use this checklist tool to summarize and document a project's conformance with Western's Sustainable Design Guidelines at the end each design phase. Questions or requests for SDG variances should be directed to Western's Facilities Development and Engineering (FDE) Department.

Please use the comments box to 1) explain any areas of non-compliance with the Guideline or the required deliverables, and 2) highlight any areas of innovation or unexpected results.

Please consult the Western Sustainable Design Guidelines document for greater detail pertaining to specific process and performance requirements.

An electronic version of this Checklist is available from Western's Facilities Development and Engineering (FDE) Department.

Project Name:	Sample Project 1						
Project Manager:	Sample Project Manager						
Project Typology:	**Major Capital Project**						
Design Start:	**1-Jul-15**	**End:**	**1-Dec-15**	**Construction Start:**	**1-Feb-16**	**End:**	**2-Sep-16**
Milestone Report:	**Schematic Design**						
Variance Request							

General Comments:

Signature of Applicant: **Date:**

WESTERN SUSTAINABLE DESIGN GUIDELINES — Process Requirements

Please complete the following checklist to summarize and confirm the project's conformance with Western's Sustainable Design Guideline process requirements.

Project:	Sample Project 1	**Project Typology**	Major Capital Project	**Design Start/End:**	1-Jul-15 to 1-Dec-15
Project Manager:	Sample Project Manager	**Milestone Report:**	Schematic Design	**Construction Start/End:**	1-Feb-16 to 2-Sep-16

THIRD PARTY RATING SYSTEM	**Process Completed**	**Documentation Attached**	**Comments/Description**
Is a third party rating system (i.e., LEED) required and being pursued?			Describe which rating system will be pursued
Is the project registered?	**Yes**		
Has a LEED scorecard been submitted?	**Yes**		

INTEGRATED DESIGN PROCESS Mandatory	**Process Completed**	**Documentation Attached**	**Comments/Description**
Was an integrated design charrette held during Schematic Design? If so, have minutes been distributed?			
Does the Schematic Design deliverable include a narrative summarizing the sustainable design strategies explored during the integrated design workshops?			

CLIMATE CHANGE ADAPTATION Mandatory	**Process Completed**	**Documentation Attached**	**Comments/Description**
Has the project examined relevant climate and weather data as part of Schematic Design Process?			
Has the project assessed key vulnerabilities of the site and considered strategies to make the project more resileint to climate change or unforeseen events?			

ENERGY MODELING Mandatory	**Process Completed**	**Documentation Attached**	**Comments/Description**
Was an energy model developed in Schematic Design? Was a summary of energy conservation measures and savings included in the SD deliverable package?			
Was energy model updated in Design Development? Was a summary of energy conservation measures and savings included in the SD deliverable package?			
Was a final compliance model completed and summary report delivered documenting energy and greenhouse gas emission results?			

COMMISSIONING Mandatory	**Process Completed**	**Documentation Attached**	**Comments/Description**
Was a Commissioning Authority hired?			
Did the Commissioning Authority conduct a review of the drawings and specifications prior to 50% Construction Documents?			
Did the Commissioning Authority complete final commissioning review and submit commissioning report to FDE?			
Did the Commissioning Authority create a training manual for operations and maintenance staff?			

PERFORMANCE METERING Mandatory	**Process Completed**	**Documentation Attached**	**Comments/Description**
Has a Measurement and Verification (M&V) plan been developed in collaboration with Facilities Development and Engineering Department. ?			
If a building management system exists, are meters tied into the building management system?			

Date:

General Comments:

WESTERN SUSTAINABLE DESIGN GUIDELINES

Performance Requirements

Please use this checklist tool to summarize and document a project's conformance with Western's Sustainable Design Guidelines at the end each design phase. Questions or requests for SDG variances should be directed to Western's Facilities Development and Engineering (FDE) Department. Please use the comments box to 1) explain any areas of non-compliance with the Guideline or the required deliverables, and 2) highlight any areas of innovation or unexpected results. Please consult the Western Sustainable Design Guidelines document for greater detail pertaining to specific process and performance requirements.

Project:	Sample Project 1	**Project Typology**	Major Capital Project	**Design Start/End:**	1-Jul-15 to 1-Dec-15
Project Manager:	Sample Project Manager	**Milestone Report:**	Schematic Design	**Construction Start/End:**	1-Feb-16 to 2-Sep-16

ENERGY + GREENHOUSE GAS EMISSIONS		**Demonstrated Mininum Performance**	**Documentation attached**	**Provided documentation / Comments**
Indicate the energy reduction below ASHRAE 90.1-2010	Mandatory			
New construction: Minimum 15% below ASHRAE 90.1-2010 Major renovation: Minimum 10% below ASHRAE 90.1-2010	Performance % below ASHRAE:	**30%**		
Indicate the lighting power density reduction below ASHRAE 90.1 – 2010	Mandatory			
Major: 30% below ASHRAE / Minor projects: 5% below ASHRAE Using the space by space methodology or by applying the whole building lighting power	Performance % below ASHRAE:	**10%**		
Does the project connect to the Campus District Energy System? If Yes, please continue below	Mandatory			
Has FDE department been consulted?				
Has the energy performance of the centralized system been accounted for in energy model				
Meet the requirements of LEED v4 EA: Advanced Energy Metering [1 point]	Mandatory			
Meet the requirements of LEED v4 EA Prerequisite: Fundamental Commissioning and Verification	Mandatory			
Have ENERGY STAR Appliances been installed for all new eligible products.	Mandatory			

WATER USE		**Demonstrated Mininum Performance**	**Documentation attached**	**Provided documentation / Comments**
Demonstrate a minimum of 30% indoor potable water use reduction?	Mandatory			
• *Meet LEED v4 WE: Indoor Potable Water Use Reduction for 2 points* • *Baseline fixture rates to follow LEED v4 WE: Indoor Water Use Reduction Credit* • *Ensure no fixtures exceed Western Water Use Requirements for maximum flow rate*	Baseline Annual Water use (m^3 per year) :	**456.0**	**Percent Reduction: 78.07%**	
	Design Annual Water use (m^3 per year) :	**100.0**		
Energy Star Appliances for all eligible products	Mandatory			
Meet the requirements of LEED v4 WE Prerequisite: Building-Level Water Metering	Mandatory			

HEALTH + WELLNESS		**Demonstrated Mininum Performance**	**Documentation attached**	**Provided documentation / Comments**
Does the project comply with the requirements of LEED v4 IEQ Prerequisite: Environmental Tobacco Smoke Control.	Mandatory			
Does the project comply with ASHRAE 62.1 – 2010 sections 4-7.	Mandatory			
Does the project meet the comfort criteria described in ASHRAE 55 – 2010.	Mandatory			
Where possible, install operable windows for regularly occupied perimeter spaces.	Mandatory			
For projects with office program requirements, provide for individual control of systems to address thermal comfort needs of building occupants.	Mandatory			
Meet the requirements of LEED v4 IEQ: Low Emitting Materials for the following categories at a minimum: Interior paints and coatings; Interior adhesives and sealants; Flooring; Composite wood; and Ceilings, walls, thermal and acoustic insulation	Mandatory			
Meet the requirements of LEED v4 IEQ: Construction Indoor Air Quality Management Plan [1 point]	Mandatory			
Meet the requirements of LEED v4 IEQ: Indoor Air Quality Assessment, Option 1 [1 point]	Mandatory			

SITE CONSIDERATIONS		**Demonstrated Mininum Performance**	**Documentation attached**	**Provided documentation / Comments**
Does the project conform to Western's Grounds Management Plan's requirements for 100% compliance with Erosion and Sedimentation Control procedures.	Mandatory			
Does the project conform to Western's Grounds Management Plan's requirements for use of native and adaptive species for 100% of new project landscaping.	Mandatory			
Provide bicycle parking and shower facilities as per the LEED v4 LT: Bicycle Facilities requirements, or demonstrate that facilities exist within 163m of the building.	Recommended			
Bicycle storage capacity may not be double counted. Storage that is fully allocated to occupants of non-project facilities, cannot also serve project occupants.	Required spaces:	**50**		
	Provided spaces:	**70**		
Do not install a permanent landscape irrigation system as per requirements for LEED v4 WE: Outdoor Water Use Reduction.	Mandatory			
Comply with LEED v4 SS: Rainwater Management [2 points]	Mandatory			
Meet the requirements of LEED v4 SS: Heat Island Reduction. [1 point]	Mandatory			
Where applicable, comply with Western University's Exterior Lighting Standards and Specification and/or lighting requirements provided in LEED v4 SS: Light Polution Reduction	Mandatory			

CONSTRUCTABILITY		**Demonstrated Mininum Performance**	**Documentation attached**	**Provided documentation / Comments**
Projects must divert a minimum of 75% construction and demolition waste from local landfills.	Mandatory			
	CWM Diversion rate (%):	**83%**		
Project must divert 100% of landscape waste, by weight, from landfill as per Western's Grounds Management Plan.	Mandatory			
Develop and implement a Building Durability Plan in compliance with the CSA Building Durability Standard S478-95 (R2007).	Mandatory			
Source locally and regionally available materials.	Mandatory			
Provide adequate and convenient storage space for recycling and composting facilities	Mandatory			

OPERATIONS + MAINTENANCE		**Demonstrated Mininum Performance**	**Documentation attached**	**Provided documentation / Comments**
Conform to Western's Green Cleaning Policy.	Mandatory			
Conform to Western's Grounds Management Plan's requirements exterior hardscape management.	Mandatory			
Conform to Western's Grounds Management Plan's requirements for landscape waste management.	Mandatory			
Conform to Western's Green Procurement Policy requirements for procuring equipment that will be purchased after project completion.	Mandatory when applicable			
Integrate signage into the building that communicates the sustainability features and performance targets. Consult Western's Facilities Development and Engineering Department on education program requirements.	Mandatory			

Date:

General Comments:

APPENDIX C.
LEED V4 SCORECARD

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Western University: Baseline LEED Score Card of Mandatory Credits

Selected baseline points would be enough to reach a LEED Silver certification

Western baseline	*Projects targeting LEED® Gold or Platinum*	*Not pursuing*			
1			Credit 1	Integrative Process	1
2	**14**	**0**	**Location and Transportation**	Possible Points	**16**
			Credit 1	LEED for Neighborhood Development Location	
	1		Credit 2	Sensitive Land Protection	
	2		Credit 3	High Priority Site	
	5		Credit 4	Surrounding Density and Diverse Uses	
1	4		Credit 5	Access to Quality Transit	
1			Credit 6	Bicycle Facilities	
	1		Credit 7	Reduced Parking Footprint	
	1		Credit 8	Green Vehicles	
5	**5**	**0**	**Sustainable Sites**	Possible Points	**10**
Y			Prereq 1	Construction Activity Pollution Prevention	
	1		Credit 1	Site Assessment	
	2		Credit 2	Site Development--Protect or Restore Habitat	
	1		Credit 3	Open Space	
2	1		Credit 4	Rainwater Management	
2			Credit 5	Heat Island Reduction	
1			Credit 6	Light Pollution Reduction	
7	**4**	**0**	**Water Efficiency**	Possible Points	**11**
Y			Prereq 1	Outdoor Water Use Reduction	
Y			Prereq 2	Indoor Water Use Reduction	
Y			Prereq 3	Building-Level Water Metering	
2			Credit 1	Outdoor Water Use Reduction	
3	3		Credit 2	Indoor Water Use Reduction	
1	1		Credit 3	Cooling Tower Water Use	
1			Credit 4	Water Metering	

26	7	0	**Energy and Atmosphere**	Possible Points	33
Y			Prereq 1	Fundamental Commissioning and Verification	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Building-Level Energy Metering Fundamental	
Y			Prereq 4	Refrigerant Management	
6			Credit 1	Enhanced Commissioning	
18			Credit 2	Optimize Energy Performance	
1			Credit 3	Advanced Energy Metering	
1	1		Credit 4	Demand Response	
	3		Credit 5	Renewable Energy Production	
	1		Credit 6	Enhanced Refrigerant Management	
	2		Credit 7	Green Power and Carbon Offsets	

4	9	0	**Materials and Resources**	Possible Points	13
Y			Prereq 1	Storage and Collection of Recyclables	
Y			Prereq 2	Construction and Demolition Waste Management Planning	
0	5		Credit 1	Building Life-Cycle Impact Reduction	
1	1		Credit 2	Building Product Disclosure and Optimization - Environmental Product Declarations	
	2		Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials	
1	1		Credit 4	Building Product Disclosure and Optimization - Material Ingredients	
2			Credit 5	Construction and Demolition Waste Management	

7	9	0	**Indoor Environmental Quality**	Possible Points	16
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke Control	
1	1		Credit 1	Enhanced Indoor Air Quality Strategies	
2	1		Credit 2	Low-Emitting Materials	
1			Credit 3	Construction Indoor Air Quality Management Plan	
1	1		Credit 4	Indoor Air Quality Assessment	
1			Credit 5	Thermal Comfort	
1	1		Credit 6	Interior Lighting	
	3		Credit 7	Daylight	
	1		Credit 8	Quality Views	
	1		Credit 9	Acoustic Performance	

5	1	0	**Innovation**	Possible Points	6
4	1		Credit 1	Innovation	
1			Credit 2	LEED Accredited Professional	

2	2	0	**Regional Priority**	Possible Points	4
1			Credit 1	Regional Priority: Specific Credit	
1			Credit 2	Regional Priority: Specific Credit	
	1		Credit 3	Regional Priority: Specific Credit	
	1		Credit 4	Regional Priority: Specific Credit	

59	51	0	**TOTAL**	Possible Points	110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110 points

APPENDIX D.
ACRONYMS

ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers

BAS - Building Automation System

CaGBC - Canada Green Building Council

CCO - Contract Change Order

CSA - Canadian Standards Association

ECM - Energy Conservation Measures

FDE - Facilities Development and Engineering

FSC - Forest Stewardship Council

GHG - Greenhouse Gas

HVAC - Heating, Ventilation and Air Conditioning

IFC - International Finance Corporation

LEED - Leadership in Energy and Environmental Design

MOECC - Ministry of Environment and Climate Change

OBC - Ontario Building Code

Western
UNIVERSITY · CANADA

Facilities Development & Engineering
Western University
1393 Western Road, Room 2350
London, Ontario, Canada, N6G 1G9
Tel: 519-661-2111, ext 89300
mary.quintana@uwo.ca