



LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN

Leadership in Energy and Environmental Design (LEED) Green Building Rating System® is a third-party certification for the design, construction and operation of environmentally friendly buildings. To attain certification a facility is assessed based on strategies implemented for Sustainable Site Development, Water Efficiency, Energy Efficiency, Materials Selection and Indoor Environmental Quality. The assessment of a building's performance in all five areas reinforces a whole-building approach to sustainable or "green" building design.



LEED CANADA **NEW CONSTRUCTION**

Four Certification Levels

Total Possible Points:	70
LEED Platinum	52+
LEED Gold	39 - 51
LEED Silver	33 - 38
LEED Certified	26 - 32

INTENT OF LEED STRATEGIES



SUSTAINABLE SITES

Minimize the facility's impact on its surrounding environment.



WATER EFFICIENCY

Reduce the facility's burden on municipal water supply and wastewater infrastructure.

Increase levels of energy performance to reduce environmental impacts associated with energy use.

MATERIALS AND RESOURCES

INNOVATION AND DESIGN

Achieve innovative or exceptional environmental performance above the requirements set by the rating system.





ENERGY AND ATMOSPHERE

INDOOR ENVIRONMENTAL QUALITY

Enhancing the indoor air quality of the facility ensures the comfort and well-being of the occupants.

Reduce impacts resulting from extraction and process of new virgin material as well as reduce waste generated both from construction and by building occupants.

SS c 4 Alternative Transportation

SS c 6 Stormwater Management

SS c 7 Heat Island Effect

SS c 8 Light Pollution Reduction

EROSION AND SEDIMENTATION CONTROL

Construction processes can often be destructive, especially during the initial phases when land is cleared of vegetation in order to create a proper surface for construction. Removal of natural vegetation and topsoil makes the area more susceptible to erosion. The soil removed due to erosion transforms the existing drainage area and may lead to the disturbance of sensitive areas such as sediment deposits in natural waterways. The accumulation of sediments leads to a declining water quality and biodiversity in downstream waterways.

During construction of this project an erosion and sedimentation control plan was implemented in order to reduce negative impacts on water and air quality of the site. Strategies such as silt fencing, sediment traps and dust control measures were implemented.









ENERGY & ATMOSPHERE ##P



SS p 1 **Erosion and Sedimentation Control**

SS c 4 **Alternative Transportation**

SS c 6 **Stormwater** Management

SS c 7 Heat Island Effect

SS c 8 **Light Pollution** Reduction

ALTERNATIVE TRANSPORTATION

In order to reduce environmental impact due to automobile use by building occupants, various alternative transportation strategies are implemented:



The building is located within 2 public bus lines offering frequent service.



facilities are provided for building occupants.



3



8 parking stalls are provided with plug-ins for alternative fuel cars.



SS c 4 Alternative Transportation

SS c 6 Stormwater Management

SS c 7 Heat Island Effect

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STORMWATER MANAGEMENT

Disruption and pollution of natural water flows are limited by managing stormwater runoff rate and increasing on-site infiltration to eliminate contaminants.

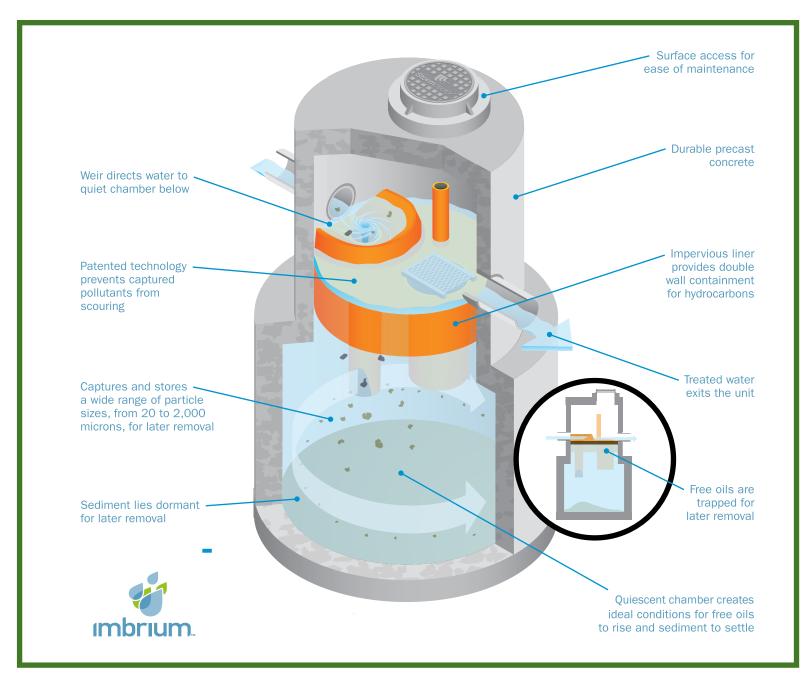


Illustration Source: Imbrium Systems Inc.

A Stormceptor System removes pollutants from stormwater runoff by gravity separation.







SS c 4 Alternative Transportation

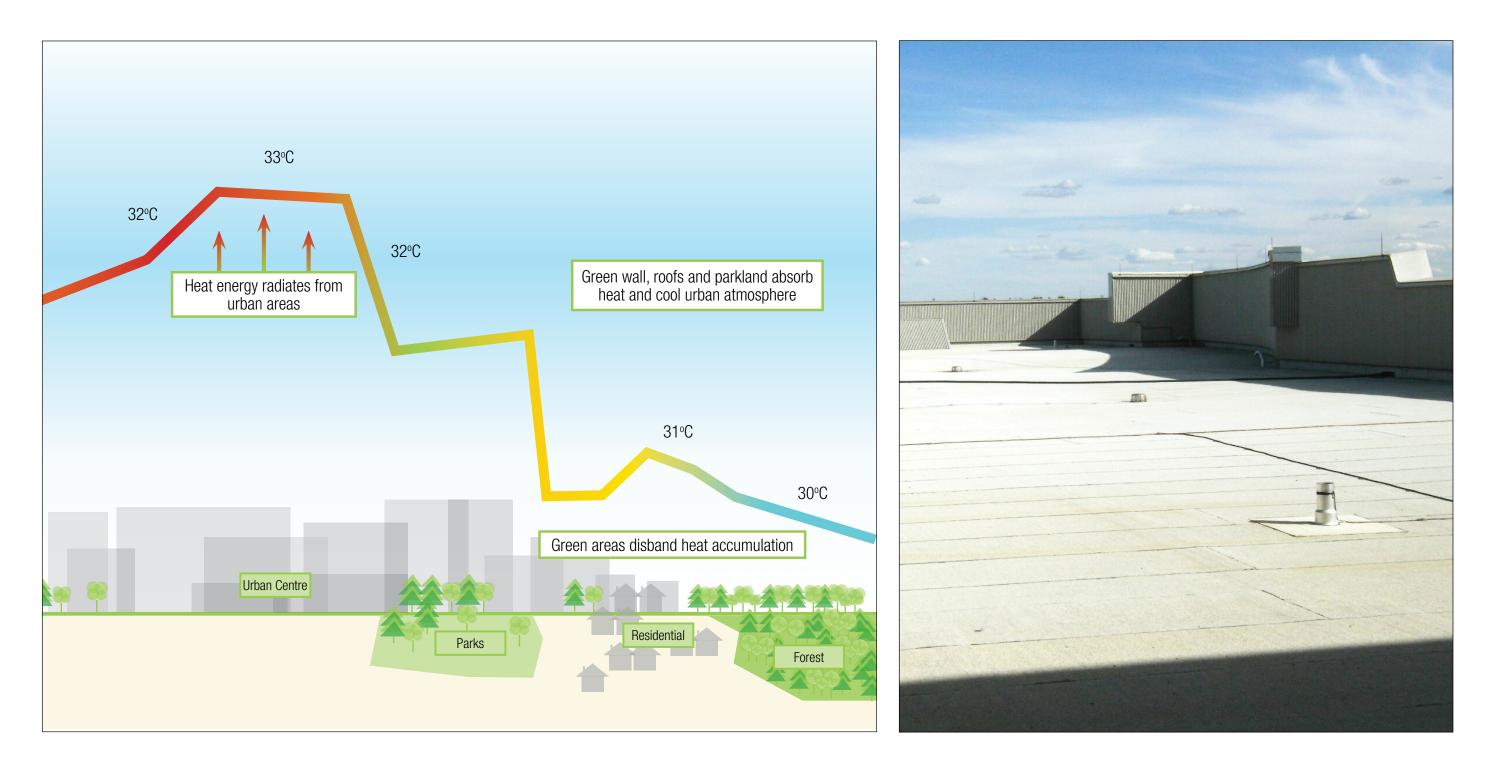
SS c 6 Stormwater Management

SS c 7 Heat Island Effect

SS c 8 Light Pollution Reduction

HEAT ISLAND EFFECT

Built up areas can be hotter than nearby rural areas creating a "heat island." This can have an impact on microclimates and human and wildlife habitat. For this facility, a roof with high solar reflectance helps reflect sunlight and heat away from the building, reducing roof temperatures.









SS c 4 **Alternative Transportation**

SS c 6 Stormwater Management

SS c 7 Heat Island Effect

SS c 8 **Light Pollution** Reduction

LIGHT POLLUTION REDUCTION

Light trespass from the building and site is eliminated to improve night sky access and reduce development impact on nocturnal environments.











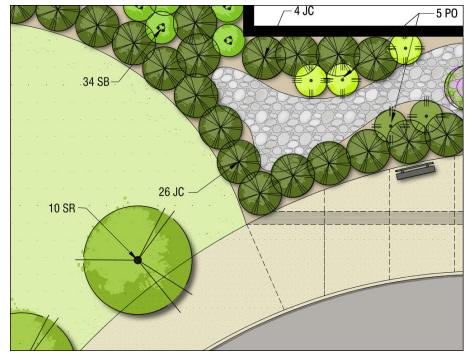


WE c 1 Water Efficient Landscaping

WE c 3 Water Use Reduction

WATER EFFICIENT LANDSCAPING

Water use is reduced by using a combination of plant stock that is either native or does not require irrigation once established.



Sustainable Initiatives - Planting Graphic



Lodgepole Pine Photo source: Rocky Mountain National Park



Cherry Bomb Japanese Barberry Photo source: All Season Plants



Skandia Juniper Photo source: Conservation Garden Park







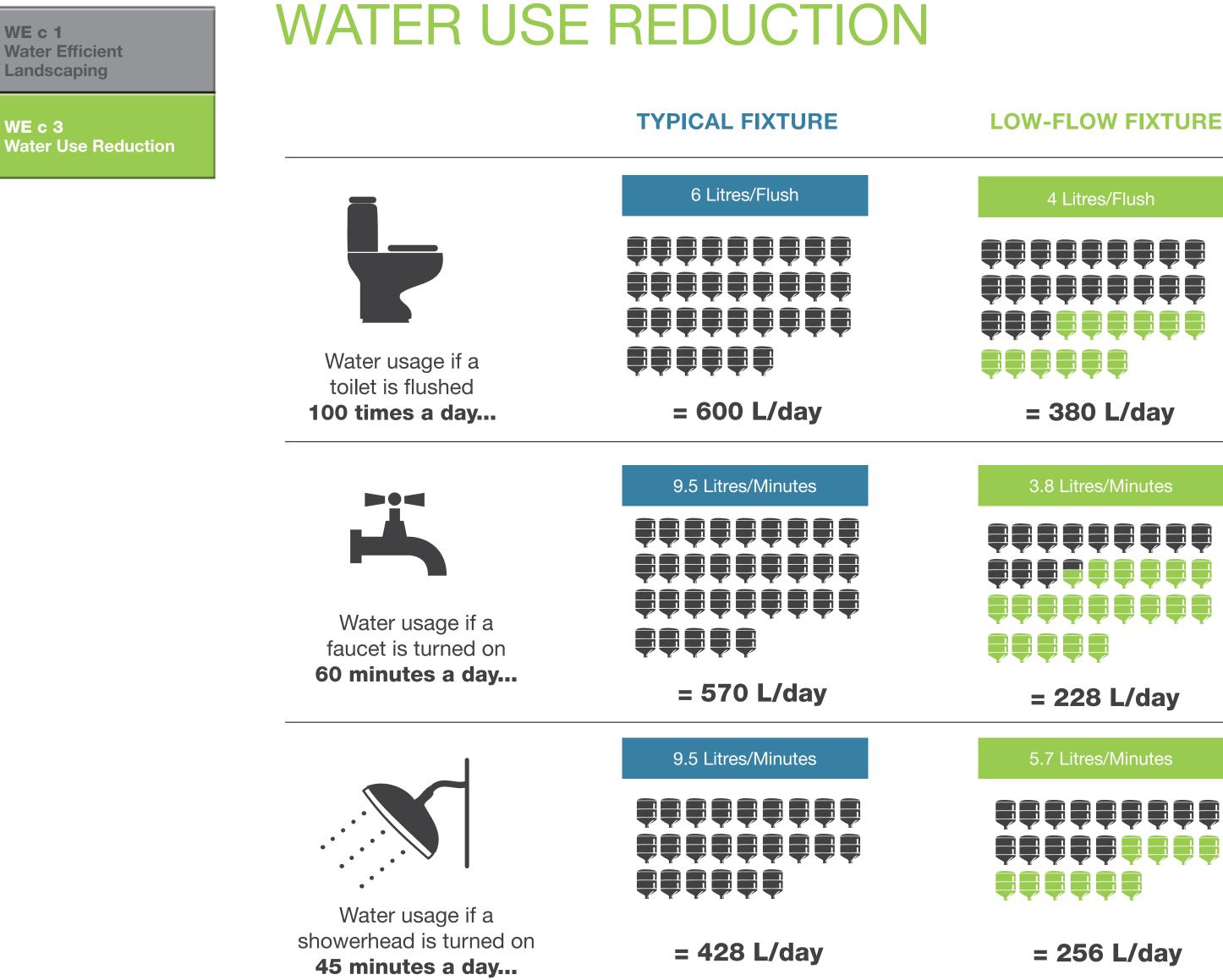
Patmore Green Ash Photo source: Countryside Landscape & Garden Centre



Colorado Blue Spruce Photo source: Baldwin Nurseries





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LOW-FLOW FIXTURE USED IN THIS FACILITY

A water-saving toilet saves about **12 water** cooler jugs of drinking water or 220 L.

A water-saving faucet saves about 19.5 water cooler jugs of drinking water or 342 L.

A water-saving shower head saves about **10** water cooler jugs of drinking water or 172 L.



EA p1 Fundamental Building Systems Commissioning

EA p2 and EA c1 Energy Performance

EA p3 CFC Reduction in HVAC & R Equipment

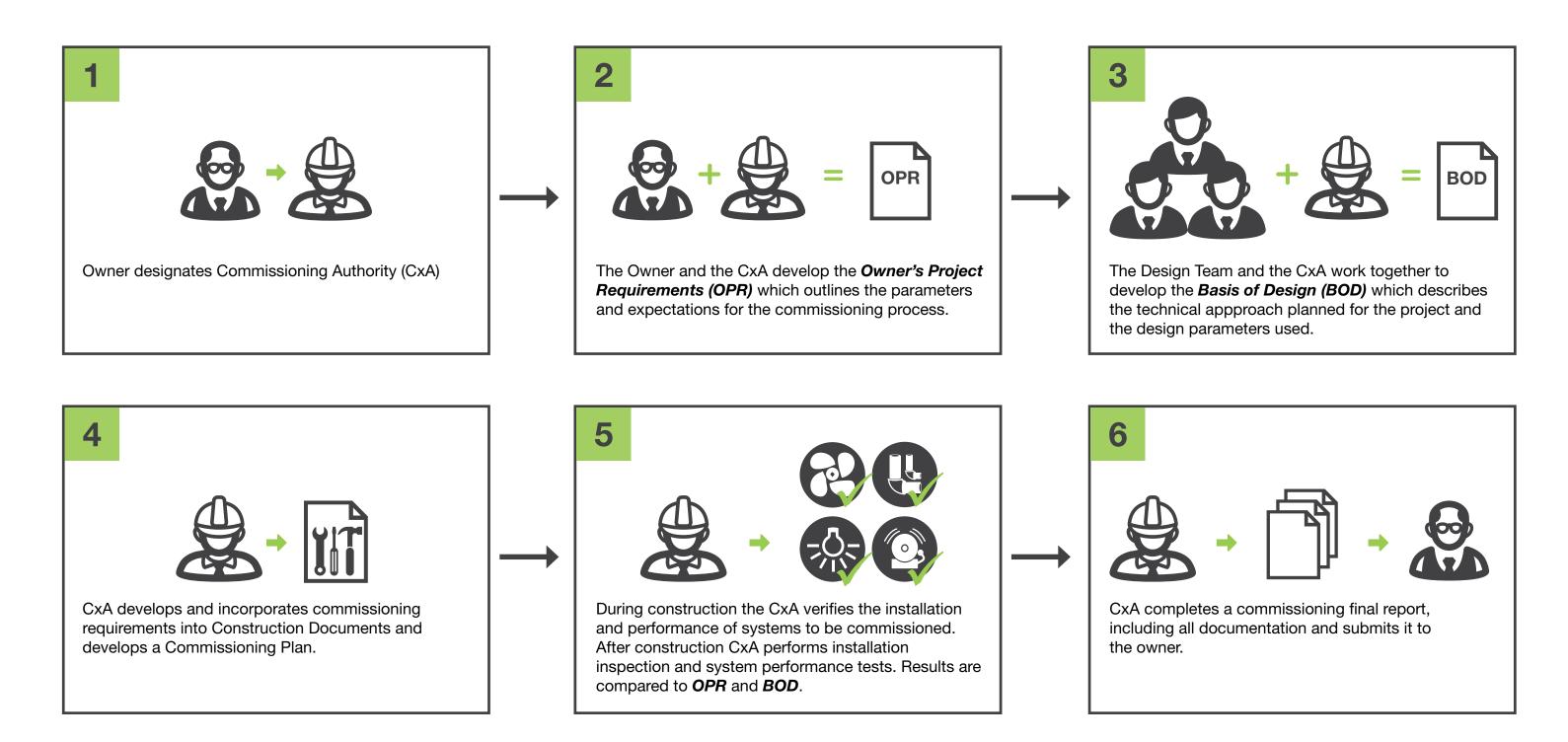
EA c4 Ozone Protection

EA c5 Measurement & Verification

FUNDAMENTAL BUILDING SYSTEMS COMMISSIONING

Building commissioning is a vital component of a new construction as it helps ensure that the building systems are designed, installed and calibrated to operate as intended. Such building systems may include heating and air conditioning, plumbing, electrical, safety equipment and security systems.

Building Commissioning Process:













EA p1 Fundamental Building Systems Commissioning

EA p2 and EA c1 Energy Performance

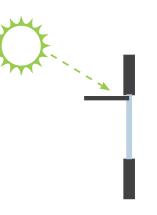
EA p3 CFC Reduction in HVAC & R Equipment

EA c4 Ozone Protection

EA c5 Measurement & Verification

ENERGY PERFORMANCE

This facility was able to reduce energy costs by employing a variety of architectural and mechanical systems.



Solar and Daylight Shading Controls



Highly Insulated Windows and Walls **Equipment Scheduling** and Vacancy Control









Heat Recovery System

EA p1 **Fundamental Building Systems Commissioning**

EA p2 and EA c1 **Energy Performance**

EA p3 CFC Reduction in HVAC & R Equipment

EA c4 **Ozone Protection**

EA c5 **Measurement &** Verification

CFC REDUCTION IN HVAC&R EQUIPMENT AND OZONE PROTECTION



Buildings, homes and industry release chlorofluorocarbons (CFCs) and halons.

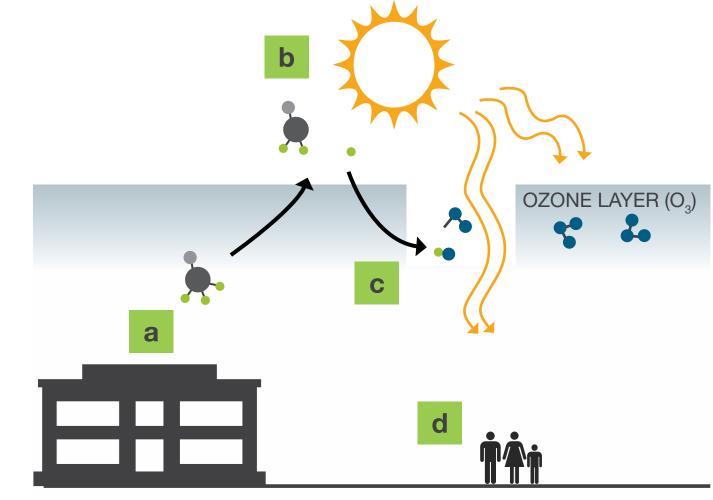
CFCs and halons rise up into the stratosphere. Sunlight breaks CFCs up, releasing chlorine.



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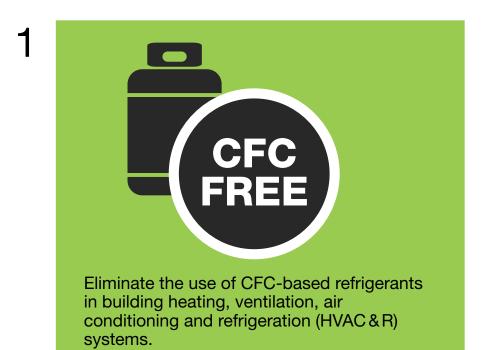
The **ozone layer** which helps filter dangerous ultraviolet rays from the sun, gets destroyed by the reaction of chlorine with the ozone.

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- Ozone depletion results in increased ultraviolet rays near the earth's surface, increasing human risk of skin cancer.



IN ORDER TO REDUCE OZONE DEPLETION, THE FOLLOWING STRATEGIES **ARE IMPLEMENTED:**

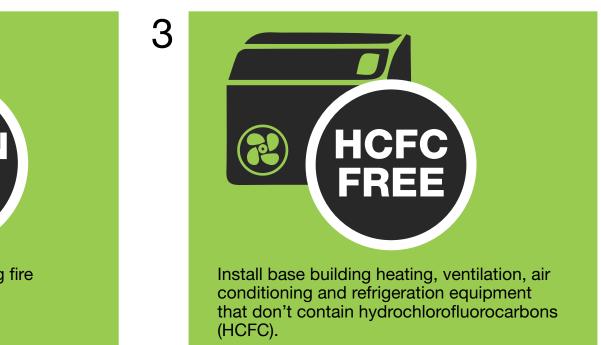
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Eliminate use of halons in building fire suppression equipment.









EA p1 **Fundamental Building Systems Commissioning**

EA p2 and EA c1 **Energy Performance**

EA p3 CFC Reduction in HVAC & R Equipment

EA c4 **Ozone Protection**

EA c5 **Measurement &** Verification

MEASUREMENT AND VERIFICATION

Continuous metering equipment is installed to provide ongoing accountability and optimization of building energy and water consumption performance over time.

Continuous metering equipment is installed for the following end-uses:

- Lighting systems and controls \bullet
- Constant and variable motor loads
- Variable Frequency Drive (VFD) operation \bullet
- Chiller efficiency at variable loads (kW/ton)
- Cooling load
- Air and water economizer and heat recovery cycles lacksquare
- Air distribution static pressures and ventilation air volumes
- **Boiler efficiencies**
- Building-related process energy systems and equipment
- Indoor water risers









IEQ p2 **Environmental Tobacco Smoke (ETS) Control**

IEQ c1 **Carbon Dioxide** Monitoring

IEQ c2 Ventilation **Effectiveness**

IEQ c3 **Construction IAQ Management Plan**

IEQ c4 **Low-Emitting Materials**

IEQ c5 **Indoor Chemical & Pollutant Source Control**

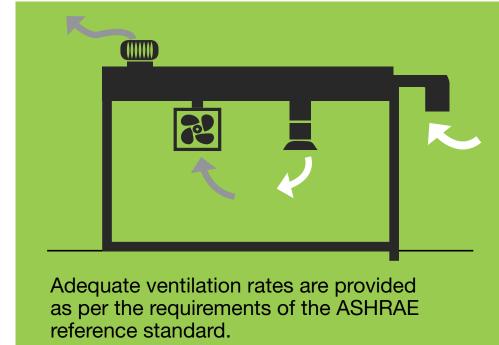
IEQ c6 **Thermal Comfort**

MINIMUM INDOOR AIR QUALITY PERFORMANCE

Indoor Air Quality (IAQ) performance affects occupant comfort, well-being and productivity. The following strategies were implemented to provide minimum indoor air quality:



Fresh air intakes were designed to be away from sources of contamination.



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Potentially harmful contaminants from occupant activities such as smoking are restricted and contaminates from building materials were minimized by specifying low volatile organic compound products.









IEQ p2 Environmental Tobacco Smoke (ETS) Control

IEQ c1 Carbon Dioxide Monitoring

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IEQ c6 Thermal Comfort

ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL

A strong linkage between smoking and various health risks have been documented. In order to minimize exposure of Environmental Tobacco Smoke to building occupants, indoor surfaces and systems, the following measures are taken:

- Smoking is prohibited in the building
- Exterior designated smoking areas are at **least 7.5 metres (25 feet) away** from entries, outdoor air intakes and operable windows.







IEQ p2 Environmental Tobacco Smoke (ETS) Control

IEQ c1 Carbon Dioxide Monitoring

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CARBON DIOXIDE MONITORING

High indoor carbon dioxide (CO₂) levels are generally an indication of poor indoor air quality. CO_2 monitoring systems are installed to provide feedback on space ventilation performance. The CO_2 sensors make it easy to adjust the amount of outdoor air required based on the number of occupants so CO_2 levels stay below the American Society of Heating, Refrigerating and Air conditioning Engineers (ASHRAE) 62 recommended levels.







SUSTAINABLE

SITES

WATER

EFFICIENCY



IEQ p1 Minimum IAQ Performance

IEQ p2 Environmental Tobacco Smoke (ETS) Control

IEQ c1 Carbon Dioxide Monitoring

IEQ c2 Ventilation Effectiveness

IEQ c3 Construction IAQ Management Plan

IEQ c4 Low-Emitting Materials

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VENTILATION EFFECTIVENESS

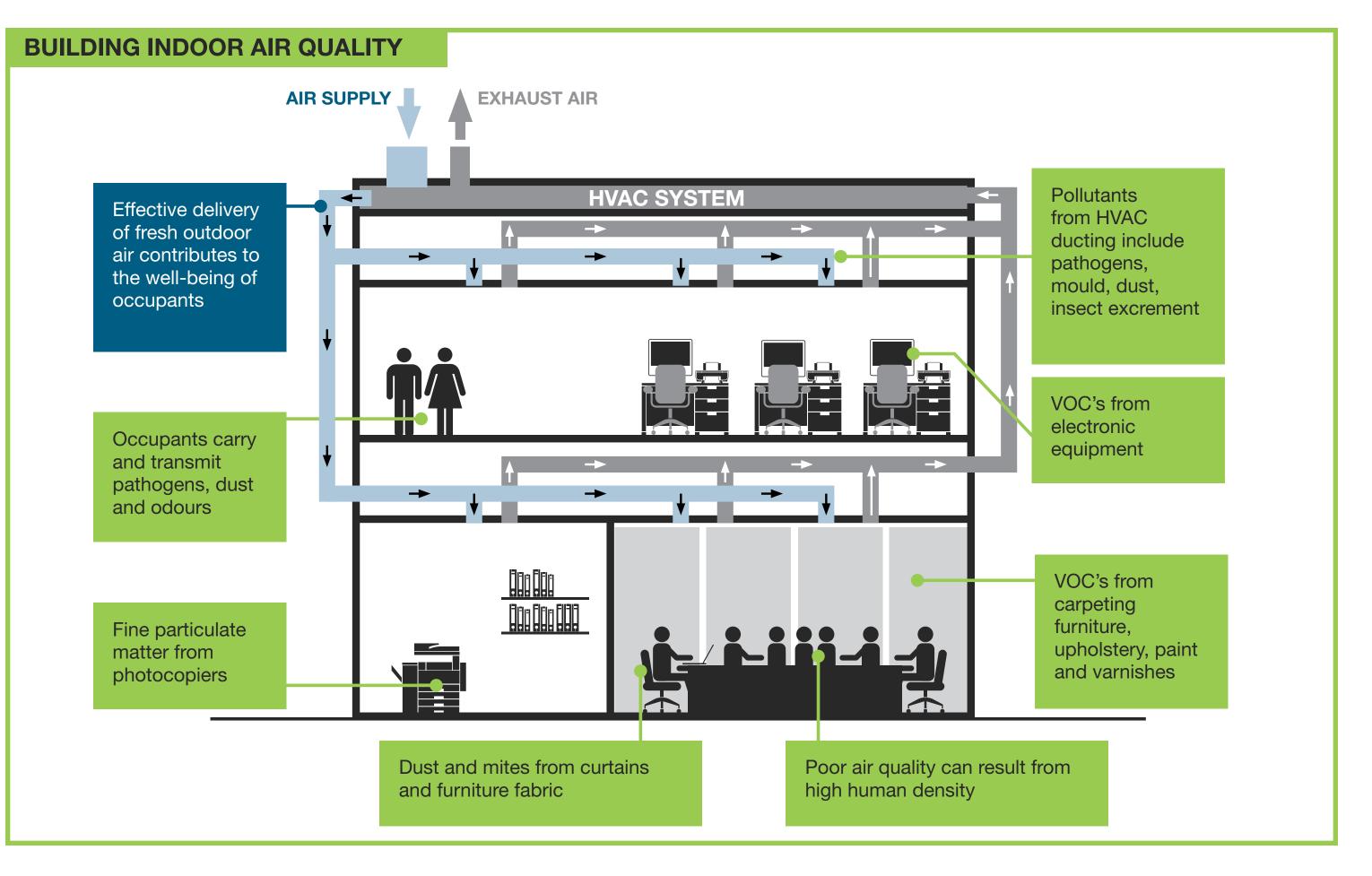
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ENERGY &

ATMOSPHERE

Indoor air can contain many chemical and biological pollutants, many of which are known to have significant health impacts such as asthma. Providing effective delivery and mixing of supply air benefits the health and well-being of occupants.



MATERIALS & RESOURCES







IEQ p2 **Environmental Tobacco Smoke (ETS) Control**

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IEQ c6 **Thermal Comfort**

CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

Construction processes can contaminate the building HVAC systems resulting in poor indoor air quality. The poor indoor air quality can affect construction workers and often results in residual building contamination that may adversely affect occupants.

DURING CONSTRUCTION

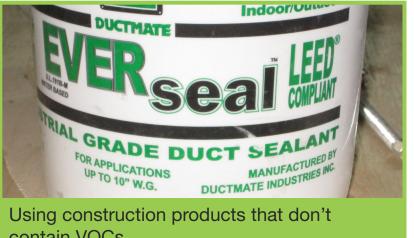
Strategies for managing indoor air quality during construction include the following:



HVAC Equipment Protection from debris and dust during construction



Keeping construction site clean and using vacuums with HEPA filter for clean up.



contain VOCs.



Sequencing construction activities so that carpets are installed after painting is complete.



TESTING BEFORE OCCUPANCY

Building flush out with outside air is conducted before occupancy to remove contaminants related to construction activities.







Barrier installed to isolate construction areas from clean or occupied areas.



IEQ p2 Environmental Tobacco Smoke (ETS) Control

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LOW – EMITTING MATERIALS

Indoor environmental quality is important, as there are materials that are odorous, irritating, and/or harmful to the comfort and well-being of installers and occupants.

Indoor Air Pollutants:

Volatile Organic Compounds (VOC)

Chemicals that easily become gases at room temperatures, some of which may have short and long-term adverse health effects.

Urea-Formaldehyde

Contained in glues and, at room temperature, may result in emission of formaldehyde, a human carcinogen.



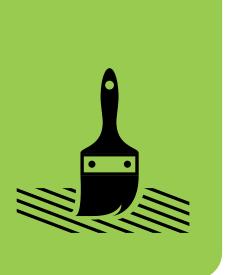




Solution:

Specify the following materials to have low VOC and no urea-formaldehyde

- Adhesives & Sealants
 Points and Costings
- Paints and Coatings
- Carpet
- Composite Wood and
 - Laminate Adhesives



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INDOOR POLLUTANT SOURCE CONTROL

Strategies for controlling harmful airborne chemicals and particulate that can affect the well-being of building occupants include:

1 PERMANENT ENTRYWAY SYSTEMS (FLOOR GRATES)

ENERGY &

ATMOSPHERE

Entryway systems that reduce the amount of contaminants tracked into occupied spaces have been installed in all high traffic exterior to interior access points.

2

SUSTAINABLE

SITES

WATER

EFFICIENCY

JANITORIAL STORAGE AREA

In order to contain the potential for airborne contamination from chemicals, the janitorial storage area is located away from occupant work areas and has been completely separated in a self-contained room equipped with an exhaust fan.







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THERMAL COMFORT

Providing a thermally comfortable environment supports the productivity and well-being of building occupants. The building systems are designed to comply with ASHRAE standards including humidity levels. These are all maintained within accepted established ranges.

MATERIALS & RESOURCES







MR c1 Construction Waste Management

MR c4 Recycled Content

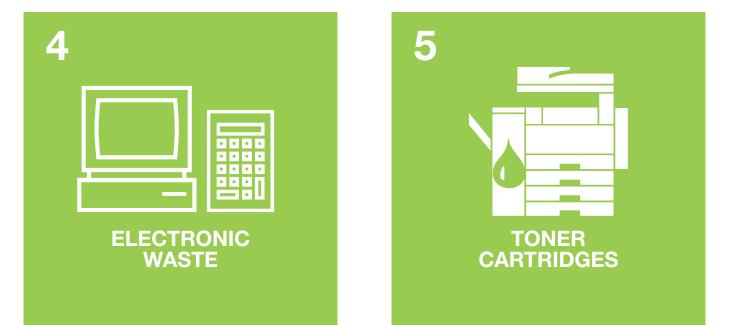
MR c5 Regional Materials

MR c7 Certified Wood

STORAGE AND COLLECTION OF RECYCLABLES

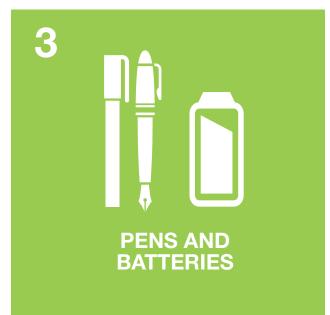
Designating areas for workplace recycling facilitates the reduction of waste generated by building occupants that are hauled to and disposed of in landfills. Designated areas are provided throughout the facility for separation and collection of the following items:











SUSTAINABLE SITES

ENERGY & ATMOSPHERE

MR p1 Storage and Collection of Recyclables

MR c1 Construction Waste Management

MR c4 Recycled Content

MR c5 Regional Materials

MR c7 Certified Wood

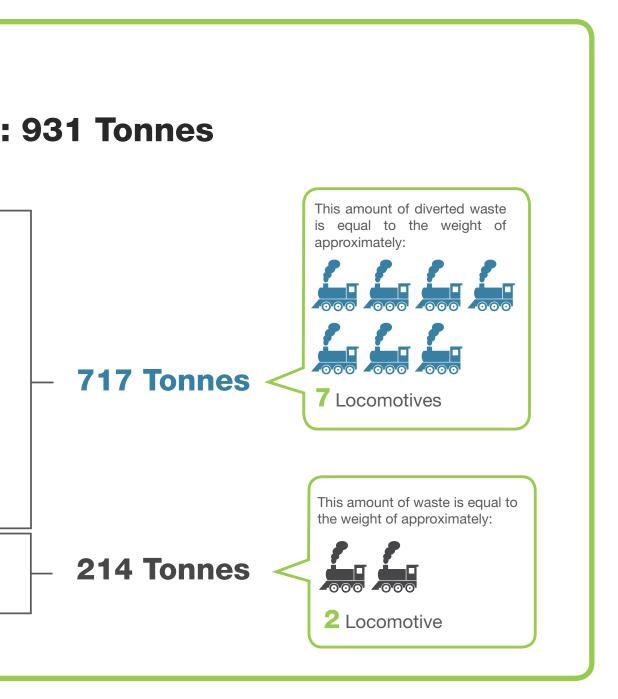
CONSTRUCTION WASTE MANAGEMENT

Approximately seventy-eight percent (77.5%) of the construction waste from this project was diverted for recycling. The success rate at which the construction waste was diverted is attributed to the education of personnel on site, and on proper measures to minimize waste. It was important to ensure unacceptable items that contained contaminates or could not be recycled were separated from recyclable materials. The presence of unacceptable items in the recycle bin could deem the entire bin unrecyclable.

Total Construction Waste: 931 Tonnes Image: State of the state of the









MR c1 Construction Waste Management

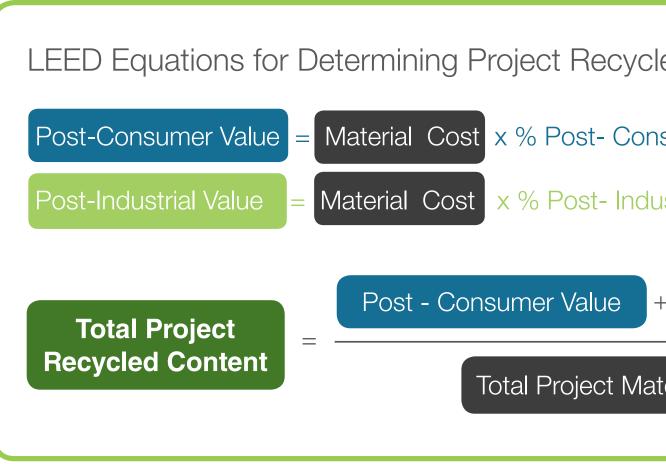
MR c4 Recycled Content

MR c5 Regional Materials

MR c7 Certified Wood

RECYCLED CONTENT

Incorporating building products that contain recycled content reduces impacts resulting from extraction and processing of new virgin materials.



Total Project Recycled Content = 14.6%





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MR c1 **Construction Waste** Management

MR c4 **Recycled Content**

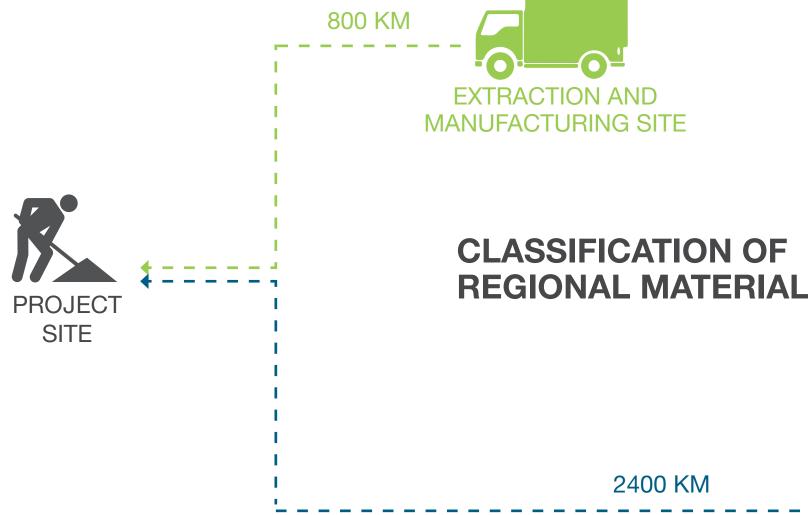
MR c5 **Regional Materials**

MR c7 **Certified Wood**

REGIONAL MATERIALS

Incorporating building materials that are extracted and manufactured within the region helps support the use of indigenous resources and reduces the environmental impact resulting from transportation.

Materials are classified as regional if they were extracted, harvested or recovered, as well as manufactured within 800 km by truck or 2,400 km by rail of the project site. For this project, approximately 20% of materials (based on cost) were sourced regionally.







2400 KM





MR c1 Construction Waste Management

MR c4 Recycled Content

MR c5 Regional Materials

MR c7 Certified Wood

CERTIFIED WOOD

Specifying wood-based materials and products that are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria helps encourage environmentally responsible forest management. Approximately 70% of the wood-based material specified on this project is FSC certified. These materials include but are not limited to: framing, flooring, finishes, furnishings, bracing, and concrete form work.









ID Green Cleaning

ID Sustained IAQ

ID Water Use Reduction

GREEN CLEANING

Green cleaning practices help reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants. The green cleaning program implemented in this facility is composed of the following strategies:



SUSTAINABLE CLEANING PRODUCTS

Purchase of sustainable cleaning products and materials such as as janitorial paper and trash bag products, cleaning products, disinfectant, and hand soaps. These products meet or are certified by Green Seal's Industrial and Institutional Cleaners Standard.



EMPLOYEE TRAINING

Proper training of maintenance personnel in the hazards, use, maintenance and disposal of cleaning chemicals, dispensing equipment and packaging.









ID **Green Cleaning**

ID **Sustained IAQ**

ID Water Use Reduction

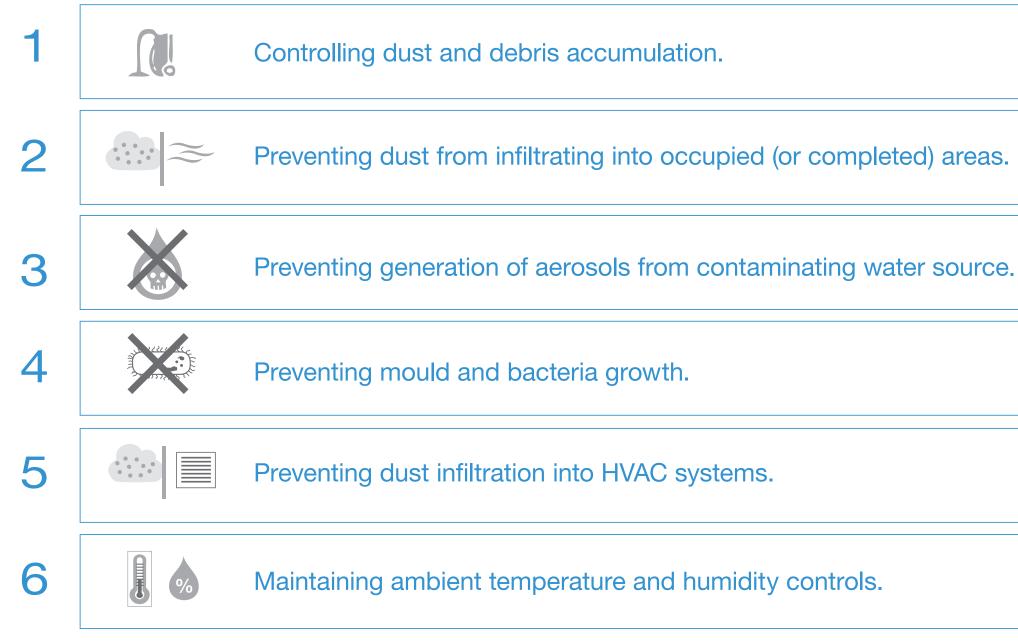
SUSTAINED INDOOR AIR QUALITY (IAQ)

The importance of establishing infection and climate control strategies in **Healthcare Facility construction**

- Published data identifies over 90,000 deaths annually due to infections
- A significant portion is attributable to airborne pathogens exacerbated during demolition, construction and maintenance activities
- Primary cause dust particles created during these activities act as transmitters of fungal spores throughout the facility.

Strategies

Limit the future generation of fungal spores and bacteria as a result of construction practices and procedures by:













ID Green Cleaning

ID Sustained IAQ

ID Water Use Reduction

WATER USE REDUCTION EXCEPTIONAL PERFORMANCE

This facility achieves approximately 47% water use reduction compared to a baseline condition if the building were to use conventional fixtures. The water reduction is achieved through design strategies such as high-efficiency fixtures and occupant sensors to reduce the potable water demand.



