LIVING LANDSCAPES

Sustainable + Resilient Residential Landscapes:
a Comprehensive Design Checklist

This document is intended to be used as a tool throughout the landscape design process, to hold ourselves accountable to designing sustainable and resilient landscapes.

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SCOPE + USE

This checklist intends to be a companion tool to the SITES rating system and the Climate Positive Path Finder tool. It draws on information from these quantitative rating systems but is curated to be a qualitative measure relating specifically to Donohoe's own values and work in a residential setting. It focuses solely on the design process and is intended to be used as a device from concept through to construction design.

While final decisions lie in the hands of clients, we are responsible for advocating for and proposing sustainable and resilient options in all aspects of the design. Our commitment to creating healthy ecosystems does not sacrifice design aesthetic but instead enhances it. The scope of this checklist is limited to the business of landscape design and does not include factors outside our control, such as project teams, architecture, site selection, neighborhood value or access to transit networks.

Construction and maintenance practices are not covered in this design checklist; however, we strive to communicate our values and design intent and encourage contractors to follow the standards in the below resources:

Construction: SITES V2 Rating System - Section 7. Construction
Maintenance: SITES V2 Rating System - Section 8. Maintenance

OUR APPROACH

Do less

Our designs intend to be minimal yet impactful. This means striving to minimize our disturbance to existing ecologies, habitat and soils. It's about retaining a beautiful oak tree or protecting an embankment that's never been turned. It's celebrating the existing conditions of the site, framing a granite rock face or capturing an ocean view. It's giving an existing pool a new life, salvaging old bricks, using the leftovers of the neighbour's mulch or introducing a piece of beautiful recycled timber.

Our designs intend to be a fusion of art and function with minimal material mass. The aim is to reduce the specification of virgin materials and instead look at how we might repurpose, salvage or recycle. We strive to do more with less.

Let it breathe

We want our landscape to breathe! We like our soils permeable and our finishes raw. This means we avoid landscape fabrics and try to repair soil health so it is absorbent. It's about selecting materials that aren't plastic and those without paints, glosses or sealants.

Keep it local

Community and carbon impacts are at the forefront of our designs. We seek to work with materials and products that are as close to site as possible to keep our transport miles low. Local basalt will trump imported rock, and nearby nurseries are the first stop when sourcing seedlings. We want to involve those in the community as much as possible. It's about working with local artists, makers and craftspeople, or recommending contractors who's workforce is made up of local laborers.

Make it last

Our designs aim to consider the lifecycle of the landscape from material longevity to ecological health, all while embracing the art of aging. We want our bolts to be reversible and our designs to be undoable so the next generation can use the same timber again and again. We see value in a stone bench that will never need to be replaced, and in high quality timber that gains character as a family ages with it. We approach design with the intention of protecting the health of the landscape and supporting longevity. This is achieved by looking after the soils, protecting the trees, creating habitat, controlling heat, managing water and protecting against natural disasters so that people, plants and animals can continue to call the site home for generations to come.

DESIGN CHECKLIST

1) SITE

1.1 Flood Plains

Aim: To protect floodplain functions such as storage, habitat and water quality.

Does the design:

- ☐ Limit development and disturbance within the 100 year flood plain?
- ☐ Comply with local flood plain by-laws, policies, standards and permits?
- ☐ Protect floodplain functions, mitigate potential risk, and improve existing floodplain conditions? Some considerations might include:
    - Increasing existing floodplain storage
    - Improving water quality
    - Designing to mitigate possible flood damage
    - Ensuring that flood elevations are *not* increased
    - Protecting or improving existing habitat
    - Avoiding erosion and directing sediment and potential contaminant from storm water runoff into receiving water

1.2 Aquatic Ecosystems

Aim: To support the healthy functioning of aquatic ecosystems for fish, wildlife and people by restoring and protecting ecological function, integrity and resiliency of aquatic ecosystems.

Note: This section of the checklist is relevant **only** to properties that are located within an aquatic ecosystems listed below *and* that are currently damaged or destroyed:

- *Marine/Estuarine*—Tidal wetlands, mudflats, shorelines, reefs, seagrass beds
- *Riverine*—Streams, rivers (associated floodplains and their riparian buffer)
- *Lacustrine*—Lakes, ponds (associated shorelines and their riparian buffer)
- *Palustrine*—Non-tidal wetlands, seeps, springs, vernal pools, seasonal wetlands

- ☐ Are restoration strategies informed by historical reference conditions, natural processes, natural materials, and reestablishment of native vegetation communities?
- ☐ Are site stressors that are causing degradation and damage designed to be removed?
- ☐ Are biotic, geochemical, hydrological, morphological, and vegetative processes reintroduced to the site?

2) SOIL

Aim: To reduce carbon emissions and resource consumption, while protecting and supporting existing ecosystem function to improve ecological health through soil management practices.

- ☐ Is soil testing proposed as the project commences?
- ☐ Is soil disturbance minimized?
- ☐ Does the site give preference to developing previously disturbed soils over undeveloped soils?

- ☐ Is the use of existing site soils prioritized?
- ☐ Are imported brownfield soils considered over imported clean fill and remediated where necessary?
- ☐ Is fencing and protection of soils clearly communicated?
- ☐ Are disturbed soils restored? Some examples include:
    - Stockpiling and reusing existing site topsoils, incorporating organic amendments if needed.
    - Amending site soils with organic matter in place and mechanically correcting compaction, if needed.
    - Importing a topsoil or soil blend designed to serve as topsoil.
- ☐ Are soil restoration strategies specific to site use? (i.e.: soil used for planting will be remediated differently to soil used to support paving)
- ☐ Are soils planned to be used for their original function (e.g.: topsoil used exclusively as topsoil)?
- ☐ Is large planting limited under tree canopies to reduce the risk of damage to tree roots and soil chemistry?
- ☐ Is the root zone of trees protected in order to protect soil structure and health?
- ☐ If weed control is a concern, can landscape fabrics be replaced for more breathable alternatives such as, hessian, cardboard, ground covers or mulch?

3) FLORA + FAUNA

3.1 Biodiversity

Aim: To protect and enhance ecosystem functions for plant and animal species significant to the site.

- ☐ Are significant existing ecologies and habitat preserved?
- ☐ Does the design protect or enhance flora and fauna species that are of significance to the site? These might include (but are not limited to): endangered, endemic or existing ecologies.
- ☐ Is species connectivity supported through to adjacent sites?
- ☐ Are invasive species and pests managed or controlled through the design?
- ☐ Does the site maintenance plan avoid negative impacts to significant species?
- ☐ Are native plants given preference?
- ☐ Are pollinator plants considered?

3.2 Plants

Aim: To improve landscape performance, reduce resource use and carbon emissions by incorporating plants that are appropriate for site conditions, climate, and design intent.

- ☐ Do the plants selected thrive in the conditions of the site?
- ☐ Are site salvaged plants given preference?
- ☐ Are turf grasses regionally appropriate and minimize post-establishment requirements for irrigation, pesticide, fertilizer, and maintenance?
- ☐ Are a variety of species, genus and family proposed to provide resistance to pests?
- ☐ Are cover crops given preference where soils would otherwise be exposed?
- ☐ Is the root system of new trees considered in interaction with proposed or existing hardscapes?

3.3 Plant Production

Aim: To support sustainable practices in plant production by purchasing plants, sod, and seed from providers whose practices increase energy efficiency, reduce resource consumption and waste, and minimize negative effects on human health and the environment.

- ☐ Are plants selected from nurseries that actively implement better business practices to reduce damage to the environment and conserve resources?
- ☐ Are plants legally harvested or nursery grown?

4) MATERIAL

4.1 Materials

Aim: To extend the life cycle of materials, conserve resources, reduce the consumption of virgin material and reduce waste through the reuse and recycling of materials.

- ☐ Are onsite structures and paving prioritized for retention?
- ☐ Are salvaged materials and plants given preference over new materials and products?
- ☐ Are recycled materials given preference over new materials and products?
- ☐ Are construction details designed to allow for disassembly without damage to the materials?
    - **Use**: Reversible connections, friction-fit or other mechanical connections that use lateral or vertical forces, high quality materials,
    - **Don't use**: Mortar adhesive, welded connections, difficult to remove nail connections, coatings or composites that can't be recycled.

4.2 Sourcing

Aim: To reduce energy use for transportation, increase demand for regional materials, plants, and soils; to promote regional identity by supporting the use of local resources.

- ☐ Are plants, soils and other landscape materials regionally sourced?
- ☐ Can connections be made with developments in the area to share resources or repurpose waste?

4.3 Raw Inputs

Aim: To responsibly extract raw materials in order to protect ecosystems, respect cultural and community values and improve land use.

The following should be considered when selecting raw material suppliers:

- ☐ Do they disclose sustainable extraction practices?
- ☐ Do they report environmental performances?
- ☐ Do they provide sustainability statements that disclose efforts to achieve sustainable practices?
- ☐ Is wood sourced from sustainably managed forests?

4.4 Manufacturing

Aim: To support sustainability in materials manufacturing by selecting products from manufacturers whose practices increase energy efficiency, reduce resource consumption and waste, and minimize negative effects on human health and the environment.

- ☐ Do the manufacturers actively implement better business practices to reduce negative impacts to human health and the environment?

5) WATER

5.1 Precipitation

Aim: To mimic natural hydrologic conditions of site and retain precipitation on site in order to reduce the impact to aquatic ecosystems, channel morphology and dry weather base flow.

- ☐ Does the design prioritize water retention and infiltration on site over discharge from site?
- ☐ Does the design reduce precipitation runoff volumes, peak flows and pollutant discharges?
    - Does the design prioritize permeable surfaces and minimize impervious surfaces?
    - Does the design allow hard surface run off to drain into localized landscape areas?
    - Does the design provide infiltration opportunities in the landscape such as rain gardens or bioswales
    - Where runoff conveyance systems are needed, does the design use vegetated channels in place of pipes, culverts and underground channels? Or when not possible are hard non-erosive materials used?
    - Does the design use landscape features such as green roofs, walls or facades to manage runoff?
    - Does the design use vegetation that assists in run off and reducing pollutant loadings? For example, sunflowers to reduce PAH soil levels or Indian mustard for removal of metals in soils.
- ☐ Does the design improve the water-retention capacity of the soil by increasing the organic matter content such as compost or organic soil amendments?
- ☐ Does the design use rain water harvesting systems to reduce run off?
- ☐ Is the use of materials that could be a source of pollutants in stormwater avoided? Eg. Copper and zinc roofs, roof gutters, downspouts, and sidings, galvanized materials and treated lumber.
- ☐ Is the use of fertilizers minimized and nutrient run off managed?
- ☐ Are soil and vegetation based controls used to reduce pollutant loadings through evapotranspiration and phytoremediation.

5.2 Water Use

Aim: To conserve water resources and minimize energy use by reducing the use of potable water, natural surface water and groundwater withdrawals for landscape irrigation after the establishment period.

- ☐ Is the site designed to maximize the use of captured stormwater for landscape elements?
- ☐ Is the planting and soils self-sustaining with natural precipitation only?
- ☐ Is planting proposed at the optimal season to reduce or eliminate the need for watering for establishment?
- ☐ Are turf grasses regionally appropriate and minimize post-establishment requirements for irrigation?
- ☐ Is the irrigation designed in hydro zones to allow water to be turned off or discontinued as plants establish?
- ☐ Are high efficiency irrigation equipment and climate based controllers specified?
- ☐ Is greywater, captured rainwater, HVAC blowdown or condensate water used for irrigation?
- ☐ Has greywater or wastewater been chemically tested?
- ☐ Does the design incorporate a water meter?

6) CLIMATE + ENERGY

6.1 Heat

Aim: To reduce heat islands that impact microclimates, wildlife habitat and human health.

- ☐ Is existing plant material that provides shade retained?
- ☐ Is shade provided over paved areas?
- ☐ Do the proposed paving materials have a high solar reflectance value?
- ☐ Is an open grid pavement system used (e.g.: permeable paving)?
- ☐ Are large trees of a collection of smaller trees proposed to create significant shaded areas?

If architectural shade structures are proposed:

- ☐ Are these shade structures covered in energy generation systems such as solar panels, photovoltaics or wind turbines?
- ☐ Do these shade structures have a high solar reflectance value (e.g.: light colours)?
- ☐ Are these structures vegetated?

6.2 Climate Control

Aim: To place vegetation or vegetated structures in strategic locations around regularly occupied buildings to reduce energy consumption and costs associated with indoor climate control.

- ☐ Is vegetation or vegetated structures used to shade buildings to reduce energy consumption?
- ☐ Are trees or shrubs used to create windbreaks for buildings?

6.3 Energy
Aim: To reduce carbon by offering renewable energy sources in the residential landscape.

- ☐ Does the design incorporate infrastructure for electric vehicle charging?
- ☐ Does the design consider solar, wind or other forms of small-scale renewable energy?

7) HAZARD REDUCTION

7.1 Natural Disasters
Aim: To decrease the risk of harm to occupants and the landscape from natural disaster.

- ☐ Does the design respond to local climate risks, such as fires or floods?
- ☐ Are local guidelines for fire, flood or other natural disasters taken into consideration for appropriate local mitigation?

7.2 Chemicals
Aim: To decrease harmful health and environmental impacts from chemical leaching or other related hazards.

- ☐ Are materials without finishes (e.g.: dyes, paints or gloss) given preference?
- ☐ Are products with chemical certifications given preference?

8) HUMAN HEALTH + QUALITY OF LIFE

8.1 Access
Aim: To provide connection to outdoor spaces for improved well-being.

- ☐ Are outdoor spaces easily accessible and connected to the main living areas?

8.2 Mental Restoration
Aim: To improve human health and well-being by providing visual and physical connections to restorative outdoor spaces.

- ☐ Are multiple quiet, mentally restorative spaces provided within the site?
- ☐ Are mentally restorative spaces, such as window views or internal courtyards, integrated into interior spaces?
- ☐ Is noise thoughtfully considered when designing restorative spaces?
    - Are restorative spaces located away from distractions like mechanical systems, building or facility operations, or traffic?
    - Are noise buffering elements incorporated into the design? Some examples might include: dense foliage, earth berms, barriers or screens.
- ☐ Is a sense of enclosure created in the restorative space, through the use of low walls, fences, vegetation, or topography?
- ☐ Is a variety of seating provided in a variety of microclimates?
- ☐ Are the restorative spaces protected from wind, sun, traffic, or other potentially distracting elements?
- ☐ Are amenities provided to enhance the sensory experience? These might include: water features, specific favourite flowers or foliage, art pieces, etc.

8.3 Social Connection

Aim: To strengthen community and encourage social connections by providing outdoor gathering spaces that facilitate group meals, and shared spaces for work and play.

- ☐ Are social spaces provided throughout the site that align with the clients' lifestyle?
- ☐ Are a variety of sizes in various microclimates provided?

8.4 Physical Activity

Aim: To improve mental health by providing on site opportunities for outdoor physical activity.

- ☐ Are any preferred physical activities considered and incorporated in the design? Some items to consider might include:
  - A storage space for bicycles, kayaks or other equipment
  - A pool designed for laps, or a hot tub or outdoor sauna for relaxing
  - A designated area for yoga, pilates, or meditation
  - A designated area for games or sports
  - An outdoor gym
- ☐ Are the physical activity areas in locations that encourage use?
- ☐ Does the design promote pedestrian access from functional entries to the street sidewalk?

8.5 Food Production

Aim: To improve human health and well-being through designing and managing food production on site.

- ☐ Are historical uses of the site understood to determine the risk of unground or airborne contaminants?
- ☐ Does the design encourage organic gardening methods (i.e.: reduced need for pesticides through considered plant spacing and selection)?
- ☐ Are sustainable water harvesting methods proposed for irrigation?
- ☐ Is a composting system incorporated into the design?
- ☐ Is animal husbandry proposed?

8.6 Light Pollution

Aim: To minimize the negative effects on nocturnal environments and human health and functioning, reduce sky-glow, and increase nighttime visibility by reducing light trespass on site.

- ☐ Can the core design function and aesthetic intent of the site be met with a reduced lighting footprint?
- ☐ Does the lighting plan direct light solely to the areas it is needed, and the lighting selected equipped with elements such as light guards?
- ☐ Can lighting glare be avoided or reduced?
- ☐ Are warm coloured lights used to avoid or minimize disturbance to local wildlife?

9) OTHER IMPACTS + MAINTENANCE

9.1 Economy

Aim: To provide economic and social benefits to the local community during site construction by providing employment opportunities and purchasing local materials and services.

- ☐ Are we providing recommendations to the client to use contractors that support the local workforce?
- ☐ Can local artists, makers or craftspeople be engaged to work on the project?
- ☐ Are local businesses and suppliers engaged to provide materials and products for the project?
- ☐ Can neighbours be engaged to identify options for sharing social benefits of the site development? Have opportunities been explored or interest identified in developing shared spaces with neighbours?

9.2 Waste

Aim: To facilitate recycling and reduce waste generation and disposal in landfills by providing space for recyclable materials collection in outdoor areas.

- ☐ Are spaces provided for recycling paper, glass, plastics and metals?

Aim: To prevent disruptions to local wildlife's natural food supply and to protect residents from wildlife attacks.

- ☐ Do the proposed waste spaces prevent bears or other wildlife from accessing waste?

Aim: To support nutrient cycling, improve soil health, and reduce transportation costs and materials going to landfills by recycling vegetation trimmings or food waste to generate compost and mulch.

- ☐ Is a composting system proposed on site?
- ☐ Are areas for municipal organic waste bins provided?
- ☐ Are food waste storage facilities provided to feed into neighbourhood organic matter facilities?

9.3 Maintenance

Aim: To reduce carbon emissions and other inputs by designing landscapes that require low maintenance.

- ☐ Does the design minimize the need for fossil fuel powered maintenance to care for lawns or hedges that require constant trimming?
- ☐ Is a low maintenance planting scheme proposed to reduce the need for fertilizers, water and pesticides?
- ☐ Does the planting design minimize the need for pruning?
- ☐ Does soil and plant selection reduce the need for fertilizers?
- ☐ Are wood mulches suggested over gravel mulches?

RESOURCES

SITES v2 Rating System For Sustainable Land Design and Development - Green Business Certification Inc.
https://www.usgbc.org/resources/sites-rating-system-and-scorecard

Climate Positive Design - Design Toolkit
https://climatepositivedesign.com/resources/design-toolkit/

The Canadian Landscape Standard
https://www.csla-aapc.ca/standard

Low Carbon Resilience: Best Practices For Professionals - ACT
https://www.sfu.ca/act/reports/bestpractices.html

Creating Resilient Communities V3, PG. 45 ‘Preparing the Home Ground’ - Colleen S.L Mercer Clarke https://www.csla-aapc.ca/mission-areas/primers

Climate positive design action plan for Australian landscape architects - AILA
https://www.aila.org.au/Web/Web/Values/Climate-Positive-Design.aspx