

Committee of the Whole Meeting Agenda

Consolidated as of January 11, 2019

Monday, January 14, 2019 – 1:30 p.m.
Council Chambers, Guelph City Hall, 1 Carden Street

Please turn off or place on non-audible all electronic devices during the meeting.

Please note that an electronic version of this agenda is available on guelph.ca/agendas.

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Changes to the original agenda have been highlighted.

Call to Order – Mayor

Disclosure of Pecuniary Interest and General Nature Thereof

Authority to move into Closed Meeting

That the Council of the City of Guelph now hold a meeting that is closed to the public, pursuant to The Municipal Act, to consider:

Correspondence Received by Council Relating to FOI Request 2018-060

Section 239(b) and (f) of the Municipal Act relating to personal matters about an identifiable individual, including municipal or local board employees; and advice that is subject to solicitor-client privilege, including communications necessary for that purpose.

IDE-2019-12

Water Services Operational Plan Endorsement (Section 8)

Section 239 2(a) of the Municipal Act relating to the security of city property.

IDE-2019-04

Hanlon Creek Business Park Phase I – Updated Development Strategy and Financials

Section 239 2(c) of the Municipal Act relating to a proposed or pending acquisition or disposition of land by the municipality or local board.

Open Meeting - 2:00 p.m.

Mayor in the Chair

Closed Meeting Summary

Staff Recognitions

1. Municipal Law Enforcement Officer Certified Designation
Jennifer Jacobi, Zoning Inspector/Legal Process Coordinator
 2. Voting Member of the Radon Mitigation Committee for the Canadian General Standards Board (CGSB), Government of Canada
Appointment of Nicholas Rosenberg, Building Inspector III
 3. Association of Municipal Managers, Clerks and Treasurers of Ontario
Executive Diploma in Municipal Management
Antti Vilkkö, General Manager, Facilities Management
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Ten-Minute Break for Service Area Change

Consent Agenda – Infrastructure, Development and Enterprise

Chair – Councillor Gibson

The following resolutions have been prepared to facilitate Council's consideration of various matters and are suggested for consideration. If Council wishes to address a specific report in isolation of the Consent Agenda, please identify the item. It will be extracted and dealt with separately as part of the Items for Discussion.

IDE-2019-11 Water Services Operational Plan Endorsement

Recommendation:

That City Council endorse the Water Services Operational Plan, as required as part of the Ontario Municipal Drinking Water Licencing Program.

IDE-2019-05 Sign By-law Variances – 160 Chancellors Way

Recommendation:

1. That the request for variances from Section 2(2) and Section 7(1)(f) of the City of Guelph Sign By-law (1996)-15245, as amended, to permit one (1) illuminated freestanding sign with a sign face area of .77m² and a height of 1.77m above the adjacent roadway within a 7m by 5m driveway sightline triangle at west driveway of 160 Chancellors Way, be approved.

2. That the request for variances from Section 2(2) and Section 7(1)(f) of the City of Guelph Sign By-law (1996)-15245, as amended, to permit one (1) illuminated freestanding sign with a sign face area 3.79m² (changeable copy of 1.08m²) with a height of 2.6m above the adjacent roadway at 160 Chancellors Way, be approved.
3. That the request for variances from Section 2(2) and Section 7(1)(f) of the City of Guelph Sign By-law (1996)-15245, as amended, to permit one (1) illuminated freestanding sign with a sign face area of .77m² and a height of 1.83m above the adjacent roadway within a 7m by 5m driveway sightline triangle at east driveway of 160 Chancellors Way, be approved.

IDE-2019-06

Sign By-law Variances – 32 Clair Road East

Recommendation:

1. That the request for variances from Table 2, Row 1 of Sign By-law Number (1996)-15245, as amended, to permit one (1) illuminated freestanding with a sign face area of 6.99m² to be located 1m away from an adjacent property line at 32 Clair Road East, be approved.
2. That the request for a variance from Table 1, Row 6 of Sign By-law Number (1996)-15245, as amended, to permit one (1) illuminated building sign with a sign face area of 3.5m² to be located on the first storey of a building face fronting an adjacent property at a distance of .82m from the property line at 32 Clair Road East, be approved.

Items for Discussion – Infrastructure, Development and Enterprise

The following items have been extracted from Consent Agenda and will be considered separately. These items have been extracted either at the request of a member of Council or because they include a presentation and/or delegations.

IDE-2019-03

Farm Barn at 2093 Gordon Street – Proposed Removal from Municipal Register of Cultural Heritage Properties

Delegation:

Susan Ratcliffe, Architectural Conservancy of Ontario

Recommendation:

That Council approve the removal of all references to 2093 Gordon Street from the Municipal Register of Cultural Heritage Properties as presented in report IDE-2019-03.

IDE-2019-01**Comprehensive Zoning Bylaw Review – Project Initiation****Presentation:**

Natalie Goss, Project Manager, Comprehensive Zoning Bylaw Review

Recommendation:

That the Comprehensive Zoning Bylaw Review project charter attached to Infrastructure, Development and enterprise Services Report (IDE-2019-01), dated Monday, January 14, 2019 be approved.

IDE-2019-13**Red Light Camera Program Review****Presentation:**

Steve Anderson, Supervisor, Traffic Engineering

Recommendation:

1. That staff be directed to formalize a Community Road Safety Program that includes mitigation measures to reduce the likelihood of frequent traffic infractions as well as red light violations and that funding support for this program be referred to in the 2019 budget process.
2. That the City of Guelph not proceed with implementation of the Red Light Camera program at this time.

CAO-2019-05**Bill 66, Restoring Ontario's Competitiveness Act, City of Guelph Response****Presentation:**

Melissa Bauman, Senior Policy Advisor, Policy and Intergovernmental Relations (presentation)

Delegations:

Steve Dyck, Guelph Solar

Hugh Whiteley

Karen Rathwell on behalf of Wellington Water Watchers

Pamela Richardson

Correspondence:

John Ambrose, Christopher Campbell, Sean Fox, Clare Irwin and Sue Rietschin, Guelph Urban Forest Friends Steering Committee

Pamela Richardson

Recommendation:

1. That Report CAO-2019-05 dated January 14, 2019 regarding Bill 66, Restoring Ontario's Competitiveness Act be received.

2. That the City of Guelph identifies it will not support the Proposed Amendments to the Planning Act as set out in Bill 66, Restoring Ontario's Competitiveness Act, based on the information currently available and the perceived threat to the City's drinking water.
3. That Committee of the Whole recommends the province remove from the proposed Bill 66 amendments to the Planning Act in regards to exemptions from water quality and quantity protection under the Clean Water Act, 2006 and that all relevant sections of the Clean Water Act continue to apply to all municipal development applications.
4. That the response prepared by staff, dated January 9, 2019 and included in Attachment 1, be endorsed and submitted to the Ministry of Economic Development, Job Creation and Trade and the Ministry of Municipal Affairs and Housing for consideration.
5. That the comments received by City of Guelph residents and stakeholders received and/or presented at the Council meeting be forwarded to the Province of Ontario for consideration.
6. That the City request to meet with provincial staff to further discuss the City of Guelph's comments regarding Bill 66 and become a partner in any further review and amendments of the Bill.
7. That the province engage in a formal consultation with municipalities and hold a public consultation in Guelph on potential changes to the Act.

Service Area Chair and Staff Announcements

Please provide any announcements, to the Chair in writing, by 12 noon on the day of the Council meeting.

Ten-Minute Break for Service Area Change

Items for Discussion – Public Services

Chair – Councillor Hofland

The following items have been extracted from Consent Agenda and will be considered separately. These items have been extracted either at the request of a member of Council or because they include a presentation and/or delegations.

PS-2019-01 Parkland Dedication By-law

Presentation:

Luke Jefferson, Manager, Open Space Planning

Delegations:

Susan Watson
Scott Hannah on behalf of GWDA and GDHBA
John Parkyn
Emily Grant
Hugh Whiteley
Christopher Campbell on behalf of Guelph Urban Forest Friends
Barbara Mann
Sandy Clipsham
Stan Kozak
Lin Grist
Maya LaRose
Ian Panabaker, Coldpoint Holdings Ltd.
Brad Schlegel
Hugh Handy
Donna Jennison
Pamela Richardson
Pia Muchaal
Mike Marcolongo

Correspondence:

Susan Watson
Mary Peirson
Kathryn Folkl
Laura Hacker
Ted Bangay
Elizabeth Macrae
Dr. Christine Main
Mike Darmon
Clover Woods
Mervyn Horgan
Matt Saunders
Carson Reid, GWDA and Kevin Brousseau, GDHBA
Sue Rietschin, John Ambrose, Christopher Campbell, Sean Fox and Clare Irwin,
Guelph Urban Forest Friends Steering Committee
Ian Panabaker, Coldpoint Holdings Ltd.
Susan Ratcliffe, Architectural Conservancy of Ontario
Hugh Handy, GSP Group Inc.
Pamela Richardson
John Parkyn

Recommendation:

That Council approve the proposed parkland dedication bylaw included as ATT-1 to Report # PS-2019-01 dated January 14, 2019.

Service Area Chair and Staff Announcements

Please provide any announcements, to the Chair in writing, by 12 noon on the day of the Council meeting.

Adjournment

Staff Report



Service Area Office of the Chief Administrative Officer

Date Monday, January 14, 2019

Subject **Bill 66, Restoring Ontario's Competitiveness Act, City of Guelph Response**

Report Number CAO-2019-05

RECOMMENDATION

1. That Report CAO-2019-05 dated January 14, 2019 regarding Bill 66, Restoring Ontario's Competitiveness Act be received.
2. That the City of Guelph identifies it will not support the Proposed Amendments to the Planning Act as set out in Bill 66, Restoring Ontario's Competitiveness Act, based on the information currently available and the perceived threat to the City's drinking water.
3. That Committee of the Whole recommends the province remove from the proposed Bill 66 amendments to the Planning Act in regards to exemptions from water quality and quantity protection under the Clean Water Act, 2006 and that all relevant sections of the Clean Water Act continue to apply to all municipal development applications.
4. That the response prepared by staff, dated January 9, 2019 and included in Attachment 1, be endorsed and submitted to the Ministry of Economic Development, Job Creation and Trade and the Ministry of Municipal Affairs and Housing for consideration.
5. That the comments received by City of Guelph residents and stakeholders received and/or presented at the Council meeting be forwarded to the Province of Ontario for consideration.
6. That the City request to meet with provincial staff to further discuss the City of Guelph's comments regarding Bill 66 and become a partner in any further review and amendments of the Bill.
7. That the province engage in a formal consultation with municipalities and hold a public consultation in Guelph on potential changes to the Act.

Executive Summary

Purpose of Report

The purpose of this report is to provide members of Council with an overview of the changes proposed under Bill 66, Restoring Ontario's Competiveness Act, 2018, and staff's comments on these changes for members of Council's consideration and endorsement. The deadline to provide these comments to the province on this Bill is January 20, 2019.

Key Findings

On December 6th, 2018 Todd Smith, the Minister of Economic Development, Job Creation and Trade introduced Bill 66, Restoring Ontario's Competiveness Act, 2018. If passed, the proposed legislation would make changes to a number of pieces of legislation. Of these changes includes amendments to the Planning Act to allow municipalities to apply to the province for permission to pass "open for business" By-laws. With permission from the Minister of Municipal Affairs and Housing, these By-laws are meant to attract employers and accelerate development approvals. Such development could be made exempt from the conformity provisions of a number of pieces of legislation including the Greenbelt Act and the Clean Water Act. The By-law would not have to conform or to be consistent with these Acts (amongst others) or any upper tier or local municipal Official Plan.

The Bill has been posted to the Environmental Registry for comment until January 20th.

In reviewing the legislation, staff do not support the changes to the Planning Act in Schedule 10 as proposed by Bill 66 based on the information currently available and the perceived threat to the City's water supply. While City staff recognize the merits of an expedited review process for major employment uses, staff have significant concerns regarding the proposed process. The concerns include the potential risks to health and the safety of municipal water supply and environment; the lack of prescribed consultation and notification requirements; the lack of detail on the nature of the criteria or conditions that can be imposed; the non-applicability of Provincial and Municipal Plans as they relate to planning matters; and the potential impact to existing economic development initiatives.

The full summary of staff's proposed comments to the province are included in Attachment 1.

Financial Implications

The potential financial implications of any future proposed changes under Bill 66 are being reviewed and are unknown at this time. However, Finance staff have indicated that the Bill could have an impact on the collection of Development Charges and other revenue streams that are modelled on certain assumptions for growth/population density. If changes occur as to where development can occur, there is risk that the rates the City is charging are no longer sufficient and this could put the organization at financial risk.

Report

Background

On December 6th, 2018 the Province introduced Bill 66, Restoring Ontario's Competitiveness Act. If passed, the Bill would make changes to a number of pieces of legislation that impact municipalities directly including the Planning Act, Pawnbrokers Act, Ontario Energy Board Act, Labour Relations Act and the Long-Term Care Homes Act.

The Bill would also allow municipalities to apply to the province for permission to pass an "open for business" By-law meant to attract employers and accelerate development approvals. With permission from the Minister of Municipal Affairs and Housing, such "open for business" development could be made exempt from the conformity provisions from legislation including:

- Clean Water Act;
- Great Lakes Protection Act;
- Lake Simcoe Protection Act, the Greenbelt Act;
- Metrolinx Act;
- Oak Ridges Moraine Conservation Act;
- Places to Grow Act;
- Resource Recovery and Circular Economy Act;
- Ontario Planning and Development Act; and
- as well as aspects of the Planning Act that apply to site plan control areas.

Process to Implement an Open for Business Bylaw

The draft legislation outlines the order of obtaining an "open for business" By-law as follows, presumably after a planning application is received and evaluated by the municipality. The municipality must receive approval from the Minister to pass the "open for business" By-law. Below is the process for a municipality to obtain the "open for business" By-law:

1. The municipality passes the By-law;
2. An agreement between the land use proponent and municipality regarding site plan type conditions is signed and registered against the land to which it applies;
3. It comes into effect within 20 days of passing and is sheltered from LPAT appeal;
4. Notice is provided to the Minister within 3 days of passing and to others within 30 days;
5. The Minister may modify or revoke the By-law; and
6. The municipality can amend or revoke the By-law.

The above process would allow municipalities to circumvent many traditional legislative requirements. The process would:

- Allow municipalities to permit the use (i.e., zone lands) without having to strictly adhere to existing local requirements (e.g., official plan and zoning);
- Remove the application of a separate approval process for site plan control;
- Remove ability to use density bonusing (community benefits in exchange for height or density) and holding by-law provisions;
- Allow the municipality to impose limited planning-related conditions that may help to facilitate the proposal [e.g., approval of plans and drawings that show site plan matters (transportation access, lighting, parking, etc.)] and enter into agreements to ensure development conditions are secured;
- Allow public consultation at the discretion of the municipality, while requiring public notice after the by-law is passed (at a minimum);
- Remove the requirement for decisions to strictly adhere to provincial policies and provincial plans (but allow the Minister of Municipal Affairs and Housing to impose conditions to protect matters like public health and safety when endorsing the use of the tool); and
- Provide that decisions are final and cannot be appealed to the Local Planning Appeal Tribunal (but allow the Minister of Municipal Affairs and Housing to intervene before the by-law comes into effect, 20 days after its passing).

More information on the implications of the proposed changes under Bill 66 are listed in later sections of this report and in Attachment 1.

The Bill has been posted to the Environmental Registry for stakeholder comment until January 20th, 2019. No formal consultation document has been provided by the province. At the time of writing this report only a description of the proposed Regulation regarding the "open for business" By-law has been posted on the Environmental Registry, therefore, it is difficult to fully evaluate the proposed changes without the benefit of the specific details, or the regulation to review.

Impacts of the Proposed Legislation

Due to the limited amount of time available to assess the implications of the Bill, staff representatives from Planning, Finance, Legal Services, Engineering, Environmental Services, Economic Development and Intergovernmental Relations met to assess the perceived implications to the Bill. Accordingly, staff have prepared a summary of a high-level understanding of the proposed legislative changes in the Bill that impact municipalities and the potential identified implications of the proposed changes.

City staff have also reached out to their respective professional associations and to the Association of Municipalities of Ontario (AMO) to gain additional insight into the implications the Bill may have on municipalities. AMO has indicated that it is continuing to review the Bill in more detail and will be bringing forward a comprehensive analysis to its Board in the coming weeks.

Schedule 2- Repeal of the Pawnbrokers Act

Overview of Proposed Change: Schedule 2 of Bill 66 repeals the Pawnbrokers Act in its entirety. Created in the early 1900s, the Act regulates pawnshops and second hand stores.

Implications: Municipal governments would retain the authority to create bylaws and business licenses regulating pawnshops, however, the repeal would eliminate law enforcement tools aimed at enforcing against theft and enabling the search and return of stolen goods.

Schedule 3- Child Care and Early Years Act, 2015 and Education Act

Overview of Proposed Change: Changes to the number of children allowable by a care giver and offering programs starting at 4 years old instead of 6 years.

Implications: The changes to this program would increase the number of spaces available for child care. The County is responsible for childcare in the City of Guelph and the City provides \$3.5M in funding annually to the County for childcare services. As a result in the proposed changes in Bill 66, there could potentially be a financial impact with an increase in the availability of spaces. However, it is challenging to comment on this without analysis and a fulsome consultation, which would be the responsibility of the County of Wellington as the childcare provider for the City.

The City has discussed the proposed change with the County and they are currently reviewing and assessing Bill 66 and will be submitting comment by the January 20th deadline with respect to the Child Care Act changes.

Schedule 4 — Amendments to the Ontario Energy Board Act, 1998 (Sub-metering)

Overview of Proposed Change: The proposed change deletes references to 'unit sub-metering' from the Ontario Energy Board Act, and replaces it with references to smart meters.

Implications: The changes outlined in the Bill may impact individual homeowners for energy used if residences are not permitted to have smart meters in their homes. Studies show that lack of individual meters can raise energy use over 30%, which will bring financial impacts to residences without smart meters. As well, it is unclear if it would have any impact on secondary suites or inclusionary zoning initiatives. More information is required to better assess the implications of this change.

Schedule 8 — Amendments to the Long-Term Care Homes Act, 2007

Overview of Proposed Change: Proposed changes for long-term care homes' licences include that the Director, as appointed by the Minister, may determine the need and how public consultations shall be conducted.

Implications: Under the proposed changes, the Ministry would have added flexibility to issue licenses for temporary beds for a longer duration of time. Municipal homes have licences subject to Minister's approval with no designated term.

There is a need for more discussion to develop a less prescriptive, outcomes-based framework that reduces burden while prioritizing patient care and well-being. The proposed amendments would potentially result in a reduction in the frequency of attendance by long term care licensees at public meetings. However, the proposed amendments to improve the timeliness and process for issuing long-term care emergency licenses may help to support the operation of the long term care home.

Staff at the Elliott Community will conduct their own review of the proposed legislation and will be providing comments to the province through their professional associations.

Schedule 9 — Amendments to the Labour Relations Act, 1995 (Construction Employer Designation) and Employment Standards Act, 2000

Overview of Proposed Change: Bill 66 would clarify that municipal governments are not construction employers. Construction employer designation reduces the number of eligible bidders for municipal construction projects and increases municipal capital costs by eliminating competition. Construction is not considered a core municipal function and it has been argued that municipal governments should not be treated as construction employers.

Further, changes are also included to to remove the Director's approval for employers to make agreements that allow their employees to exceed 48 hours of work in a work week. These changes also include removing the Director's approval for employers to make agreements that allow them to average their employee's hours of work for the purpose of determining the employee's entitlement to overtime pay.

Implications: The changes to the Labour Relations Act are positive for the City by deeming municipalities to be non-construction employers. Although the City of Guelph was not previously designated a non-construction employer, the City could be designated and that would have affected our costs.

Further, the removal of the requirement to seek Director approval for working over 48 hours of work in a work week and overtime entitlement would be a positive change for the City and create efficiencies. However, more time is required to better understand the risks and benefits of these changes and how they may impact the safety of workers.

Schedule 10 — Amendments to the Planning Act ('Open For Business' Tool)

Overview of Proposed Change: The proposed legislation introduces a new planning tool called an "open for business" Bylaw. The provincial government has

indicated that this tool would be available to all local municipalities, if certain prescribed criteria are met, to ensure they can act quickly to attract businesses seeking development sites.

The posted description of the scope of the regulation indicates that a proposal to use this tool would require a minimum job creation threshold (e.g. 50 jobs for municipalities with a population of less than 250,000 people, or 100 jobs for municipalities with a population of more than 250,000 people). It would appear that the tool, like a Minister's Zoning Order (MZO) would be for a specific land use application, however, additional clarification from the province is required as to this process.

The following provisions do not apply to an open-for-business By-law:

- Clean Water Act;
- Great Lakes Protection Act;
- Lake Simcoe Protection Act, the Greenbelt Act;
- Metrolinx Act;
- Oak Ridges Moraine Conservation Act;
- Places to Grow Act;
- Resource Recovery and Circular Economy Act;
- Ontario Planning and Development Act; and
- as well as aspects of the Planning Act that apply to site plan control areas.

The By-law would not have to conform or to be consistent with the above Acts the local municipal Official Plan. In addition, the municipality would not be required to consult with the public or notify upper tier municipalities or other agencies, and there is no ability to appeal the By-law to the Local Planning Appeals Tribunal.

Under the current legislation, when an opportunity for a major employment use arises and the need to locate outside of an area designated and zoned for such purposes the Province has the option to use its powers and implement a Minister's Zoning Order (MZO). The Planning Act provides for Ministerial Zoning Orders that permit the Minister to directly impose zoning by-laws, interim control by-laws and temporary use controls on any land in Ontario without adhering to the normal zoning process set out in the Planning Act such as the giving of notice or holding a hearing before making a zoning order. Similarly, there is no automatic appeal or review of the Minister's decision.

Given that a By-law as proposed under Bill 66 would require Minister's approval, it is unclear as to why a new planning tool is being proposed as opposed to modifying the existing Minister's Zoning Order provisions of the Planning Act.

Implications: It appears that the proposed amendments to the Planning Act create a new development approval process that would allow municipalities to impose both zoning By-law amendment related requirements and site plan control related conditions and requirements within the same process through the Open for Business By-law. The requirements and conditions that can be imposed are subject

to certain restrictions and significant exemptions from provincial policies and plans outlined in the Bill. Not outlined in the Bill itself, but based on the description of the proposed future regulations, it appears that an open for business By-law could only be used for a major employment use.

Environmental and Source Water Protection

Clean Water Act

As proposed, Bill 66 aims to remove source water protection policies that were developed under the Clean Water Act, 2006, which use the Planning Act as the implementation tool. Staff have serious concerns regarding the province reducing the drinking water quality and quantity protections in communities across the province to support employment growth.

The scientific, evidence-based policies, which were approved by the Province of Ontario, were developed to manage drinking water threats and provide sustainable development for the future, while protecting municipal drinking water sources (i.e. not prohibiting growth or freezing development). The City of Guelph has 17 policies in effect that would be removed from the City's Source Protection Plan if Bill 66 is implemented as proposed. These include polices regarding septic systems, storage and handling of fuels and chemicals in close proximity to municipal drinking water supply wells. Based on the potential outcomes of Bill 66, important tools for protecting the City's municipal drinking water takings would also be removed. Circumventing the source water protection process in an area where significant drinking water threats have been identified would put the City's water supply.

The City has wellhead protection areas (groundwater takings) and intake protection zones (surface water takings), which extend into the County of Wellington (Township of Puslinch, Guelph/Eramosa and Erin), Region of Waterloo (Woolwich Township), and Halton Region (Milton). Bill 66 may provide municipalities outside the City with the ability to side step current planning checks provided under the Clean Water Act in the siting and approval of new industry. Therefore, Bill 66 as proposed may provide surrounding municipalities with the ability to pass individual by-laws supporting new industry within the City's wellhead protection areas without consultation, creating a new, significant, potential risk to the City's drinking water.

In summary with respect to water issues, staff are concerned that the approval of Bill 66 may result in the loss of protection that the Clean Water Act specifically affords the City with respect to current and future municipal drinking water supplies.

Toxics Reduction Act

Also included within Bill 66 is the proposed repeal of the Toxics Reduction Act. This Act identifies accountabilities and qualifications of responsible parties, is aimed at prevention and protection of public health, and is intended to inform Ontarians about toxic substances specifically.

There are a number of concerns from staff as to whether the adoption of a Federal Toxics Plan instead of a Provincial Plan will be capable of enforcing issues such as

corporate accountability and sewer and waste discharges in communities with a heavy manufacturing base. More information is required to understand the implications of this change and its influence on how it would influence the increase in use of toxins by manufacturers.

Planning Provisions

It appears that the proposed amendments to the Planning Act under Bill 66 create a new development approval process that would allow municipalities to impose both zoning by-law amendment related requirements and site plan control related conditions and requirements within the same process through the open for business bylaw. The requirements and conditions that can be imposed are subject to certain restrictions and significant exemptions from provincial policies and plans outlined in the Bill. Not outlined in the Bill itself, but based on the description of the proposed future regulations, it appears that an open for business by-law could only be used for a major employment use needs to be defined in the legislation.

Economic Development

The perceived intention of Section 10 of Bill 66 is to support the reduction of regulatory process or “red tape” in order to make it easier for businesses to be established in Ontario communities. However, despite the intent of Section 10, in addition to the environmental concerns it presents, City Economic Development staff believe that the implementation of the schedule would in fact create the opposite effect of what it is intending.

By way of analysis of the Bill, staff agree that Schedule 10 of Bill 66 would create economic hardship for municipalities, would negate thoughtful and long-term vision planning policies, would erode collaborative regional economic efforts (e.g. Innovation Corridor, two-way-all-day GO) and would spur on a ‘race to the bottom’ as neighbouring municipalities seek short-term economic gains that put municipal regions around them at a competitive disadvantage.

In Guelph, we work with partners across the region and beyond. We seek to bring economic growth to the region, recognizing that success breeds success. Work force planning initiatives, transportation and transit advocacy, trade missions and expos, environmental initiatives, affordable housing round tables, policies and collaborations, etc. With the implementation of Schedule 10, these efforts to work collaboratively would be negatively impacted and longer-term effects would include economic hardships for Guelph and our neighbours.

Public Consultation

Lastly, City staff are concerned with the removal of consultation requirements through the open for business By-law. It is understood that Schedule 10 would allow for the municipality to still have a public process at their discretion. While a streamlined public process may be supportable in some instances, the City of Guelph does not support the potential exemption of the planning and development of major employment uses from any public process prior to a decision being made.

Next Steps

In assessing next steps, at the direction of the Committee of the Whole, staff will be providing comments to the province on Bill 66 by the January 20th deadline.

The Bill is still in first reading and will transition into second reading on February 19th. Second reading allows for amendments to be made to the legislation prior to receiving Royal Assent and coming into force. Staff will continue to monitor the progression of the Bill and provide an update to Council once the legislation has been passed.

Staff have also recommended that Committee communicate to the Province that we are willing to consult further with the province on our comments regarding the Bill and the development of subsequent regulations.

Financial Implications

The potential financial implications of any future proposed changes under Bill 66 are being reviewed and are unknown at this time. However, Finance staff have indicated that the Bill could have an impact on the collection of Development Charges and other revenue streams that are modelled on certain assumptions for growth/population density. If these assumptions are altered significantly, there is risk that the rates the City is charging are no longer sufficient and this could put the organization at financial risk.

The financial implications to municipalities related to implementation of various elements of Bill 66 continue to be a key area of concern for many municipalities.

Consultations

The following service areas/ departments were involved in the preparation of the staff response dated January 9th, 2019:

CAO's Office: Corporate Communications, Intergovernmental Affairs

Corporate Services: Legal Services, Clerks, Human Resources, Finance

Infrastructure, Development and Enterprise Services: Economic Development, Water and Wastewater Services, Planning, Engineering

Public Services: Responsible for the Elliot Community

Corporate Administrative Plan

Overarching Goals

Service Excellence

Financial Stability

Service Area Operational Work Plans

Our Resources - A solid foundation for a growing city

Attachments

ATT-1 Draft Response to the Province of Ontario, Bill 66

Report Author

Melissa Bauman
Senior Policy Advisor



Approved By

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Recommended By

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January 15, 2019

The Honourable Todd Smith
Minister of Economic Development, Jobs and Trade
900 Bay Street, Hearst Block
Toronto ON M6H 4L1
Canada

To whom it may concern,

RE: **Bill 66, Restoring Ontario's Competiveness Act**

Thank you for the opportunity to comment on the proposed Bill 66, Restoring Ontario's Competiveness Act. On January 14th, 2019 the Committee of the Whole at the City of Guelph passed the following resolution:

1. That Report from Intergovernmental Relations dated January 14, 2019 regarding Bill 66, Restoring Ontario's Competiveness Act be received.
2. That The City of Guelph not support the Proposed Amendments to the Planning Act as set out in Bill 66, Restoring Ontario's Competitiveness Act, based on the information currently available and the perceived threat to the City's drinking water.
3. That Committee of the Whole recommends that the province remove from the proposed Bill 66 amendments to the Planning Act in regards to exemptions from water quality and quantity protection under the Clean Water Act, 2006 and that all relevant sections of the Clean Water Act continue to apply to all municipal development applications.
4. That the response prepared by staff, dated January 8, 2019 and included in Attachment 1, be endorsed and submitted to the Ministry of Economic Development, Job Creation and Trade and the Ministry of Municipal Affairs for consideration.
5. That the comments received by City of Guelph residents and stakeholders received and/or presented at the Committee of the Whole meeting be forwarded to the Province of Ontario for consideration.

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6. That the City request to meet with provincial staff to further discuss the City of Guelph's comments regarding Bill 66 and become a partner in any further review and amendments of the Bill.
7. That the province engage in a formal consultation with municipalities and hold a public consultation in Guelph on potential changes to the Act.

Staff Comments on Bill 66

In reviewing the legislation, staff do not support the changes to the Planning Act in Section 10 as proposed by Bill 66 based on the information currently available. Below is a comprehensive summary of staff comments regarding Bill 66, including areas of the legislation in which staff require additional clarification from the province as to the proposed implementation of the Bill.

Schedule 3- *Child Care and Early Years Act, 2015* and *Education Act*

While the intent of this is to make more spots available, from the City's perspective, we are responsible for funding financial assistance for child care and the current annual budget for this is \$3.5M. There could potentially be a financial impact with an increase in the availability of spaces but it is challenging to comment on this without analysis and a fulsome consultation, which would be the responsibility of the County of Wellington as the childcare provider for the City.

The City has reached out to the County and they are currently reviewing and assessing Bill 66 and will be submitting comment by the January 20th deadline with respect to the Child Care Act changes.

Schedule 8 — Amendments to the *Long-Term Care Homes Act, 2007*

Under the proposed changes, the Ministry would have added flexibility to issue licenses for temporary beds for a longer duration of time. Municipal homes have licences subject to Minister's approval with no designated term.

There is a need for more discussions to develop a less prescriptive, outcomes-based framework that reduces burden while prioritizing patient care and well-being. In discussions with staff at the Elliott, the proposed amendments would potentially result in a reduction in the frequency of attendance by long term care licensees at public meetings. Further, the proposed amendments to improve the timeliness and process for issuing long-term care emergency licenses may help to support the operation of the long term care home.

Staff at the Elliott Community are continuing their review of the proposed legislation and will be providing comments to the province and their professional associations.

Schedule 9 — Amendments to the *Labour Relations Act, 1995 (Construction Employer Designation)* and *Employment Standards Act, 2000*

The changes to the Labour Relations Act are positive for the City by deeming municipalities to be non-construction employers. Although the City of Guelph was not

previously designated a non-construction employer, the risk was always there that similar to the Region of Waterloo, we could be designated and that would have affected our costs. However, more time is required to better understand the risks and benefits of these changes and how they may impact the safety of workers. Further, the removal of the requirement to seek Director approval for working over 48 hours of work in a work week and overtime entitlement would be a positive change for the City and create efficiencies. However, more time is required to better understand the risks and benefits of these changes and how they may impact the safety of workers.

Schedule 10- Changes to the Planning Act

Environment and Source Water Protection

Water Quality

The City of Guelph is a groundwater-based community with unique challenges with regards to growth and economic development policies and planning. To date, careful water supply management and planning within the current robust planning regime has allowed for sustainable growth for the City. This growth is currently managed to match available water capacity to meet our current planning targets, while protecting the existing water resources we rely on each day. The Clean Water Act enables municipalities, through watershed based Source Protection Committees, to develop policies that would protect municipal drinking water from both water quality and quantity threats after the completion of science-based characterization and modelling exercises.

For example, if Bill 66 was in place, and a subsequent by-law was passed by Council, current source water quality protection policies would be removed, as they cannot be implemented. The City of Guelph has 17 policies in effect that would be removed from the City's Source Protection Plan. These include policies regarding septic systems, storage and handling of fuels and chemicals (DNAPLS and organic solvents) in close proximity to municipal drinking water supply wells. Further, City staff are currently working with the Grand River Conservation Authority and Wellington County on the development of water quantity policies. Based on the potential outcomes of Bill 66, important tools for protecting water quantity (i.e., City's municipal drinking water takings) would also be removed. This could affect the City's ability to continue to service existing industrial customers as well as meet Places to Grow targets.

A key challenge when looking at groundwater management for municipal drinking water supply is that the flow of groundwater does not respect municipal boundaries. Therefore, the City has wellhead protection areas (groundwater takings) and intake protection zones (surface water takings), which extend into the County of Wellington (Township of Puslinch and Guelph/Eramosa), Region of Waterloo (Cambridge), and Halton Region (Milton). The wellhead protection areas and intake protection zones were delineated as a key component of the Source Protection Program work completed after the Walkerton tragedy and subsequent proclamation of the Clean Water Act, 2006.

Bill 66 may provide municipalities with the ability to side step current planning checks provided under the Clean Water Act in the sighting and approval of new industry. As the City's wellhead protection areas and intake protection zones extend beyond Guelph's municipal border, as noted above. Therefore, Bill 66 as proposed may provide surrounding municipalities with the ability to pass individual by-laws supporting new industry within these areas without consultation, creating a new, significant, potentially unacceptable risk to the City's drinking water.

In summary, staff are highly concerned that the approval of Bill 66 may result in the loss of protection that the Clean Water Act specifically affords the City with respect to current and future municipal drinking water supplies. The City has delineated vulnerable areas in which policies are required to protect water resources, and therefore ensure that sustainable development can occur in the future and growth targets are met. Circumventing this process in an area where significant drinking water threats have been identified would put the City's water supply at risk, jeopardize the City's ability to meet Places to Grow growth targets and long term economic viability.

Waste and Toxins

The proposed repeal of the Toxics Reduction Act, which identifies accountabilities and qualifications of responsible parties, is aimed at prevention and protection of public health and is intended to inform Ontarians about toxic substances specifically, will be addressed if the Federal Plan is the focus of plan. There are a number of concerns from staff as to whether the adoption of a Federal Toxics Plan instead of a Provincial Plan will be capable of enforcing issues such as corporate accountability, sewer and waste discharges in communities with a heavy manufacturing base. More information is required to understand the implications of this change and its influence on how it would influence the use of toxins by manufacturers.

Planning Provisions

Schedule 10 of Bill 66 presents the City of Guelph with both risks and opportunities to consider. Additional time to undertake a coordinated staff review to better understand the implications of the proposed changes, as well as more robust public consultation on the proposed changes, is requested.

It appears that the proposed amendments to the Planning Act create a new development approval process that would allow municipalities to impose both zoning by-law amendment related requirements and site plan control related conditions and requirements within the same process through the Open for Business bylaw. The requirements and conditions that can be imposed are subject to certain restrictions and significant exemptions from provincial policies and plans outlined in the Bill. Not outlined in the Bill itself, but based on the description of the proposed future regulations, it appears that an open for business by-law could only be used for a major employment use needs to be defined in the legislation.

The City of Guelph does not support exempting development from any part or all of (including any prescribed provision) the following:

- a. Provincial Policy Statement, 2014 and other Provincial Plans
- b. Official Plan conformity for Public Works and by-laws
- c. Clean Water Act, 2006
- d. Great Lakes Protection Act, 2015
- e. Greenbelt Act, 2005
- f. Lake Simcoe Protection Act, 2008
- g. Metrolinx Act, 2006
- h. Oak Ridges Moraine Conservation Act, 2001
- i. Ontario Planning and Development Act, 1994
- j. Resource Recovery and Circular Economy Act, 2016 and
- k. Places to Grow Act, 2005

If the above-listed exemptions continue to form part of the proposed legislation, the Bill should allow for municipalities to choose whether or not to apply these exemptions to open for business bylaws within their jurisdiction. With respect to the Clean Water Act, the City's position is that it should not be included on the list of potential exemptions as it is vital that our community's water quality is not put at risk in order to expedite development approvals. However, if it remains on the list of potential exemptions, a requirement to coordinate, consult or obtain approvals from adjacent municipalities that rely on the same groundwater and/or are subject to the same source water protection plans, prior to the open for business by-law being used must be incorporated.

The decisions that are not consistent with or do not conform to the Growth Plan can impact the City's overall growth strategy; have implications with respect to the municipalities long-term infrastructure and servicing plan. This may also impact the City's master planning; and, isn't consistent with the City's approach of integrating planning for employment with building complete communities. These implications may result in additional costs to the municipality and a less desirable community to live in. It also has the potential to create land use conflicts by allowing major employment uses in areas that are not already planned to permit those uses.

Further, additional clarification is required as to whether 'major employment use' should be more clearly defined and should not include residential, retail or commercial uses (even as non-primary uses). Further, clarification should be provided as to whether the proposed exemptions in Section 34.1 (6) apply in all instances or if municipalities can choose to require conformity with any/all of the exempted provisions.

Lastly, the City is also concerned for the potential for development outside of settlement areas or planned employment areas that would detract from or negatively impact the viability of existing employment areas or create land use conflicts. We are concerned that while the changes proposed may result in additional employment uses in the immediate term, with all of the potential exemptions, the changes may not provide long-term economic benefit to the municipality.

The proposed regulation should also be clarified to ensure that an open for business by-law cannot be passed to permit development where municipal services are not

adequate and available.

Economic Development

The perceived intention of section 10 of Bill 66 is to support the reduction of regulatory process or “red tape” in order to make it easier for businesses to be established in Ontario communities. However, despite the intent of section 10, in addition to the environmental concerns it presents, City Economic Development staff believe that the implementation of the schedule would in fact create the opposite effect of what it is intending.

In Guelph, we work with partners across the region and beyond. Work force planning initiatives, transportation and transit advocacy, trade missions and expos, environmental initiatives, affordable housing round tables, policies and collaborations, etc. With the implementation of Schedule 10, these efforts to work collaboratively could be negatively impacted and longer-term effects would include economic hardships for Guelph and our neighbours.

Public Consultation

While a streamlined public process may be supportable in some instances, the City of Guelph does not support the potential exemption of the planning and development of major employment uses from any public process prior to a decision being made. It is understood that Schedule 10 would allow for the municipality to still have a public process at their discretion, however, it is suggested that the minimum requirement to give notice after a decision is made is not sufficient in any instance.

Potential Financial Implications

The potential financial implications of any future proposed changes under Bill 66 are being reviewed and are unknown at this time. However, Finance staff have indicated that the Bill could have an impact on the collection of Development Charges and other revenue streams that are modelled on certain assumptions for growth/population density. If changes occur to where development can occur, there is risk that the rates the City is charging are no longer sufficient and this could put the organization at financial risk.

The City’s overall position is that Schedule 10 of Bill 66 is not in the best interests of planning for employment uses and should not proceed as drafted because it disregards important policies, principles and legislation that are intended to protect the health, safety and well-being of Ontario residents.

Thank you again for the opportunity to comment Bill 66. As demonstrated above, the City has highlighted a number of concerns regarding the proposed Bill that we would like the province to consider in its review. Further, the City would be happy to engage with the province as they review comments regarding the Bill and any subsequent programs and regulations. Please do not hesitate to contact me if you have any questions regarding the City of Guelph's feedback.

Sincerely,

A handwritten signature in blue ink, appearing to read "Scott Stewart".

Scott Stewart
Deputy CAO, Infrastructure, Development and Enterprise

T **519-822-1260 x 3445**

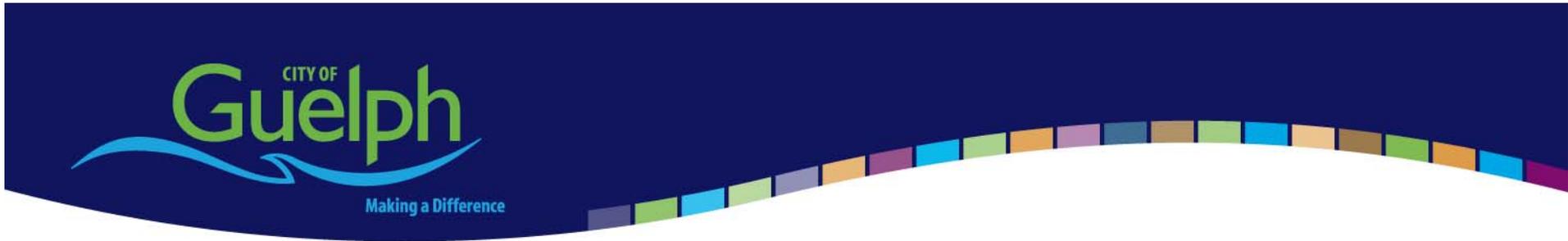
E scott.stewart@guelph.ca

Cc' Derrick Thomson, CAO, City of Guelph

Cc' Association of Municipalities of Ontario

Cc' Steve Clark, Minister of Municipal Affairs and Housing

Cc' County of Wellington



Bill 66 Overview

Committee of the Whole | January 14th, 2019

Key Facts

- Bill 66, Restoring Ontario's Competitiveness Act was introduced Dec. 6
- Includes Planning Act changes intended to attract employers and accelerate development approvals
- Number of other changes proposed including amendments to the Labour Relations Act, Long Term Care Homes Act and Child Care and Early Years Act
- Staff have reviewed and prepared comments to the province
- Comments due to the province by Jan. 20
- Bill moves to second reading in February

Summary of Changes

- Repeal of the **Pawnbrokers Act**
 - Repeals regulation of pawnshops and second hand stores entirely
- **Child Care and Early Years Act**, 2015 Education Act
 - Changes the number of children cared for by a care giver and starts programs at 4 years rather than 6
- Amendments to the **Ontario Energy Board Act, 1998** (Sub-metering)
 - Replaces references to unit sub-metering with smart meters

Summary of Changes

- Amendments to the **Long-Term Care Homes Act, 2007**
 - Directors of licensed long-term care homes to determine public consultation need and process
- Amendments to the **Labour Relations Act, 1995** (Construction Employer Designation)
 - Clarifies that municipal governments are not construction employers
- Amendments to the **Planning Act**
 - A new planning tool called the “Open for Business” By-law
 - Must create a minimum of 50 jobs
 - Several acts no longer applicable if By-law enacted e.g. Clean Water Act

Potential Impacts of Open for Business By-law

Environmental and Water Source Protection

- As proposed, Bill 66 removes Clean Water Act source water protection policies that rely on the Planning Act
- Staff concerns on the reduction of drinking water protections across the province
- City has 17 Source Protection Plan policies that would be removed – policies on septic systems and storage and handling of fuels and chemicals
- Water quantity policies currently under development would also be removed
- Municipalities outside of the City but within the City's wellhead and intake protection areas may pass Bill 66 bylaws which would reduce protections of the City's drinking water

Potential Impacts

Planning

- Challenges in coordinating, consulting or obtaining approvals from adjacent municipalities that rely on the same groundwater
- Decisions that are not consistent with or do not conform to the Growth Plan can impact the City's overall growth strategy, impacts to master planning
- Concerned for the potential for development outside of settlement areas or planned employment areas

Economic Development

- Economic growth is part of a holistic integrated set of factors. Guelph's Official Plan account for those factors and their interplay. To put a bylaw in place that contradicts those efforts is nonsensical and detrimental to the CoG
- Regional partnerships and progress in workforce planning, transit, affordable housing, negatively impacted by the bill
- Impedes on regional economic efforts by pitting municipalities against each other in a race to the bottom



Position Statement

Staff do not support the changes to the Planning Act in Section 10, as proposed by Bill 66

While an expedited review process for major employment uses has merit, staff have significant concerns about the potential risks to the:

- Health and safety of the municipal water supply and environment;
- Lack of prescribed consultation and notification requirements;
- Lack of detail regarding the criteria or conditions that can be imposed;
- The non-applicability of Provincial and municipal plans as they relate to planning matters; and
- Impacts to existing economic development initiatives

Recommendations

- Receive report
- That the City not support Bill 66
- That Council recommends that the province remove from the proposed Bill 66 amendments to the Planning Act in regards to exemptions from water quality and quantity protection
- Endorse and submit staff response, along with delegates' comments, to the Province for consideration
- Discuss our comments with the Province, propose formal public engagement and offer to participate in further review and amendment opportunities



Questions?



Date: January 10, 2019

To: Mayor Cam Guthrie and members of Council

Re: Bill 66

We are encouraged, Mayor Guthrie, that you have spoken against Bill 66, especially Schedule 10 which would allow municipalities to get around our many environmental laws and the need for public consultation. We are further encouraged that many councillors have also voiced disapproval of this bill.

After years of effort by provincial legislators, citizen input through massive consultations, and organizational input for the various environmental acts that protect our water and natural systems, we must be alert and continue to protect them. Ontario's natural landscapes of diverse forest systems and wildlife provide ecosystem services that make human settlements livable and pleasant. They help protect us from wild swings in flood and drought cycles. After the summer of 2018 we especially need to be more diligent about protecting our environment, not less!

We think it is vital to send a strong message to Premier Ford that not only does Guelph not intend to use this option if it were passed but also that it should not be passed into legislation, which would allow other less scrupulous municipalities to take advantage of this breach of good environmental planning. Schedule 10 is an affront to all of us and the Premier must know that this is not an appropriate way to promote the economy and development.

John Ambrose, Christopher Campbell, Sean Fox, Clare Irwin, Sue Rietschin
Guelph Urban Forest Friends, Steering Committee
guffguelph@gmail.com

Delegation by Pamela Richardson

~ Supporting Documents ~

To Guelph City Council

For Committee of the Whole

Meeting on January 14, 2018

Regarding:

- A. Agenda Item PS-2019-01- Parkland Dedication Bylaw Review
- B. Bill 66

Time in Nature Provides a Host of Health Benefits

STORY AT-A-GLANCE

- › A massive study involving data from more than 140 studies and 290 million people revealed that exposure to greenspace, defined as open, undeveloped land with natural vegetation, led to significant health benefits
- › Reductions in diastolic blood pressure (the bottom number), salivary cortisol (a physiological marker of stress) and heart rate, along with significant decreases in Type 2 diabetes and mortality from all causes and those specifically related to the heart were noted
- › Exposure to greenspace was linked to a lower risk of premature birth and increases in good self-reported health
- › Increased greenspace exposure may even improve outcomes for neurological disorders, cancer and respiratory mortality

By Dr. Mercola

There's a reason why being outdoors in nature feels so good — it's great for your health on multiple levels. A massive study involving data from more than 140 studies and 290 million people revealed that exposure to greenspace, defined as open, undeveloped land with natural vegetation, led to significant reductions in diastolic blood pressure (the bottom number), salivary cortisol (a physiological marker of stress) and heart rate, along with significant decreases in Type 2 diabetes and mortality from all causes and those specifically related to the heart.¹

The risk of premature birth also declined in pregnant women, as did the risk of having a baby small in size for their gestational age. Incidences of good self-reported health, meanwhile, rose among those lucky enough to have greenspace exposure. When other health outcomes were factored in, between 66 percent and 100 percent of the studies showed that increased greenspace exposure was associated with better health, including improved outcomes for neurological disorders, cancer and respiratory mortality.

'Green Prescriptions' Could Improve Your Health

Wouldn't it be a breath of fresh air (literally!) if your doctor prescribed you a "green prescription" instead of a prescription drug? According to the featured study, "Green prescriptions involving greenspace use may have substantial benefits." It's not a new idea; quite to the contrary, the benefits of spending time in nature have been recognized since the early 1800s, when open spaces and parks started to be created in growing cities like London.²

Modern cities, too, are increasingly seeking to incorporate green space into their planning. As the World Health Organization (WHO) notes, parks, woods, wetlands, meadows and other green spaces contribute oxygen to the air while filtering out air pollution. They also help to moderate temperatures and cool cities, while providing areas where people can safely exercise and interact socially.

"Green spaces also are important to mental health," WHO states. "Having access to green spaces can reduce health inequalities, improve well-being, and aid in treatment of mental illness. Some analysis suggests that physical activity in a natural environment can help remedy mild depression and reduce physiological stress indicators."³

You may also have heard of the "Healthy Parks, Healthy People" movement put out by the U.S. National Park Service (NPS), which encourages people to spend time in parks and public lands to create healthy societies. The benefits of park time shared by NPS include:⁴

- Improved your mood
- Improved physical, mental and spiritual health
- Increased social connections, which add to community cohesion
- Encouraging active play in children, which is linked to physical, cognitive and social benefits
- Improved social well-being

There's even a ParkRx, or Park Prescriptions, movement, created via a collaboration between the Institute at the Golden Gate, the National Recreation and Park Association and NPS, which involves just what its name suggests: a health or social services provider giving a patient or client a "prescription" to spend more time in nature in order to improve their physical health and well-being. Professor Andy Jones of the University of East Anglia (UAE) in England, who co-wrote the featured study, stated:⁵

"We often reach for medication when we're unwell but exposure to health-promoting environments is increasingly recognized as both preventing and helping treat disease. Our study shows that the size of these benefits can be enough to have a meaningful clinical

impact."

Why 'Forest Bathing' Is so Good for You

In Japan, a practice known as Shinrin-yoku, or forest bathing, which is another term for spending time in nature, is incredibly popular. In a study that compared the health effects of spending time in a forest versus spending time in a city, the forest environment was found to promote lower concentrations of cortisol, lower pulse rate, **lower blood pressure**, greater parasympathetic nerve activity and lower sympathetic nerve activity.⁶

Forest bathing has also been shown to offer relaxation effects while decreasing symptoms of **depression**, fatigue, **anxiety** and confusion in middle-aged men.⁷

It's even been found that visiting a forest increases the activity of natural killer cells, a part of the immune system, as well as the expression of anticancer proteins — beneficial effects that persisted for at least seven days after the visit to the forest.⁸ Volatile compounds called phytoncides, such as alpha-pinene and beta-pinene, are released from trees and found in forest air.⁹

They've been shown to reduce stress hormones and anxiety while improving blood pressure and immunity, according to Dr. Eva Selhub, a lecturer in medicine at Harvard Medical School and a clinical associate of Massachusetts General Hospital.¹⁰

It's thought that phytoncides released from trees, as well as reductions in stress hormone, may be partly responsible for the increased activity of killer cells.¹¹ When nearly 500 volunteers spent time in a forest, they experienced significant reductions in stress levels, including lower scores in feelings of hostility and depression.

The researchers described forests as "therapeutic landscapes" and said they could be extremely advantageous for dealing with acute emotions, especially for people with chronic stress.¹² It could be that this reconnection to nature is helping to solve the disconnect many people feel when they're removed from nature. According to researchers in the International Journal of Environmental Research and Public Health:¹³

"Humans have evolved into what they are today after the passage of 6 to 7 million years. If we define the beginning of urbanization as the rise of the industrial revolution, less than 0.01 percent of our species' history has been spent in modern surroundings. Humans have spent over 99.99 percent of their time living in the natural environment.

The gap between the natural setting, for which our physiological functions are adapted, and

the highly urbanized and artificial setting that we inhabit is a contributing cause of the 'stress state' in modern people ... We believe that nature therapy will play an increasingly important role in preventive medicine in the future."

It's also possible that exposure to microbes in the natural environment are providing some of the protective effects. Ambient bacteria, such as *Mycobacterium vaccae*, for instance, has been shown to reduce anxiety-related behavior and improve learning in mice,¹⁴ and it's possible people inhale such mood-boosting hormones when they're outside playing or working in the dirt.

"[E]xposure to a diverse variety of bacteria present in natural areas may also have benefits for the immune system and reduce inflammation," said featured study author Caoimhe Twohig-Bennett, from UEA's Norwich Medical School.¹⁵

Will Nature Therapy Take Off?

Increasingly, researchers are leaning toward nature-based therapies as a way to improve public health, with impressive results. In one systematic review of both controlled and observational studies, nature-assisted therapy led to significant improvements in a variety of health conditions ranging from **obesity** to **schizophrenia**.¹⁶ Benefits have also been documented for cancer survivors, including:¹⁷

- Dragon boat racing, conducted on natural bodies of water, may enhance quality of life in breast cancer survivors
- Natural environment may counteract attentional fatigue in newly diagnosed breast cancer survivors
- Outdoor adventure programs foster a sense of belonging and self-esteem for children and adolescent cancer survivors
- Therapeutic landscapes may decrease anxiety, improving health

Even exposure to a virtual reality forest, which included the sounds of nature, was beneficial for people recovering from physiological stress,¹⁸ while exposure to indoor nature environments in a work environment (such as plants and fountains) was also linked to less job stress and less absence due to sickness.¹⁹ While exposure to the real outdoors is best, this suggests that even bringing nature indoors may offer noticeable benefits for office-strapped workers (or those otherwise stuck in indoor environments, such as hospital).

Grounding: Another Reason to Get Outdoors

The concept of grounding was initially developed by Clint Ober, who began studying it in an effort to heal himself. As a retired cable television executive, Ober noticed that when cables are “grounded” to the Earth, it eliminates interference from the signal. All electrical systems are stabilized in this way, which led Ober to wonder whether the human body, also a bioelectrical, signal-transmitting organism, should also be grounded.²⁰

He describes the invention of synthetic materials, which in turn allowed synthetic soles to be put onto our shoes, as a key part of the problem, as it effectively insulates us from the Earth. It’s not unusual for Americans to spend their entire days, from sun up to sun down, indoors, without being grounded. But though it has become the norm, it’s also completely unnatural. We depend on the Earth to survive, but we’ve become entirely disconnected from it, such that we’re completely separate.

When you put your bare feet on the ground, however, you absorb large amounts of negative electrons through the soles of your feet. In today's world, this is more important than ever, yet fewer people than ever connect with the Earth in this way anymore. Free radical stress from exposure to pollution, **cigarettes, pesticides, processed foods** and radiation, just to name a few, continually deplete your body of electrons.

But the Earth is always electron-rich and can serve as a powerful and abundant supply of antioxidant free radical-busting electrons. One study found that grounding produces measurable differences in the concentrations of molecules, including white blood cells and cytokines, involved in the inflammatory response.

The report also found that grounding “reduces pain and alters the numbers of circulating neutrophils and lymphocytes, and also affects various circulating chemical factors related to inflammation.”²¹ To reap the rewards, all you need to do is walk barefoot in the grass, a sandy beach or a forest floor — even hugging a tree can be an excellent form of grounding, even helping to filter out **dirty electricity**.

Tips for Spending More Time in Nature

You needn’t wait for a “park prescription” to make spending time in nature a priority. Try getting up 30 minutes earlier and going for a walk in a park or forest preserve, or use your lunch break to meditate under a tree or listen to the sounds of nature or flowing water. When you have more time, take a hike in the woods or escape to the mountains or a beach. You can also combine your exercise time with nature by doing your workouts outdoors.

Also, remember the importance of grounding, and seek to stay **grounded to the Earth** as much as possible. All you need to do is place your bare feet on the ground, whether it be dirt, grass, sand or

unsealed, unpainted concrete (especially when humid or wet). When you're indoors, a grounding pad can be used while working or sleeping.

Finally, don't underestimate the significance of adding natural features to your indoor environment, especially plants, and choose a room with a natural view whenever possible (when it's not, add photos of nature to your indoor space). Another way to enjoy nature is by planting your own flowerbeds and vegetable garden, which allows you to spend time cultivating the soil and also enjoying the harvest — eating natural homegrown foods is another way you can connect with and benefit from nature.

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The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes



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ARTICLE INFO

Keywords:

Greenspace
Greenness
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Health
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ABSTRACT

Background: The health benefits of greenspaces have demanded the attention of policymakers since the 1800s. Although much evidence suggests greenspace exposure is beneficial for health, there exists no systematic review and meta-analysis to synthesise and quantify the impact of greenspace on a wide range of health outcomes.

Objective: To quantify evidence of the impact of greenspace on a wide range of health outcomes.

Methods: We searched five online databases and reference lists up to January 2017. Studies satisfying *a priori* eligibility criteria were evaluated independently by two authors.

Results: We included 103 observational and 40 interventional studies investigating ~100 health outcomes. Meta-analysis results showed increased greenspace exposure was associated with decreased salivary cortisol -0.05 (95% CI $-0.07, -0.04$), heart rate -2.57 (95% CI $-4.30, -0.83$), diastolic blood pressure -1.97 (95% CI $-3.45, -0.19$), HDL cholesterol -0.03 (95% CI $-0.05, < -0.01$), low frequency heart rate variability (HRV) -0.06 (95% CI $-0.08, -0.03$) and increased high frequency HRV 91.87 (95% CI 50.92, 132.82), as well as decreased risk of preterm birth 0.87 (95% CI 0.80, 0.94), type II diabetes 0.72 (95% CI 0.61, 0.85), all-cause mortality 0.69 (95% CI 0.55, 0.87), small size for gestational age 0.81 (95% CI 0.76, 0.86), cardiovascular mortality 0.84 (95% CI 0.76, 0.93), and an increased incidence of good self-reported health 1.12 (95% CI 1.05, 1.19). Incidence of stroke, hypertension, dyslipidaemia, asthma, and coronary heart disease were reduced. For several non-pooled health outcomes, between 66.7% and 100% of studies showed health-denoting associations with increased greenspace exposure including neurological and cancer-related outcomes, and respiratory mortality.

Conclusions: Greenspace exposure is associated with numerous health benefits in intervention and observational studies. These results are indicative of a beneficial influence of greenspace on a wide range of health outcomes. However several meta-analyses results are limited by poor study quality and high levels of heterogeneity. Green prescriptions involving greenspace use may have substantial benefits. Our findings should encourage practitioners and policymakers to give due regard to how they can create, maintain, and improve existing accessible greenspaces in deprived areas. Furthermore the development of strategies and interventions for the utilisation of such greenspaces by those who stand to benefit the most.

1. Introduction

The idea that greenspaces are beneficial for the health of the population became a generally accepted principle as early as the 1800s, when various London-based organisations including the Commons Preservation Society and the National Health Society called for the preservation, creation, and accessibility of open spaces and parks within crowded residential areas, referring to them as the “lungs” of the town or city (Hickman, 2013). More recent Healthy City guidelines from the WHO support this view, defining a healthy city as “one that continually creates and improves its physical and social environments

and expands the community resources that enable people to mutually support each other in performing all the functions of life and developing to their maximum potential” (World Health Organisation, 2016a). However, increasing urbanicity and modern lifestyles can mean that opportunities for human contact with nature become less frequent.

The term greenspace is typically defined as open, undeveloped land with natural vegetation (Centres for Disease Control, 2013), although it also exists in many other forms such as urban parks and public open spaces as well as street trees and greenery. Recognition of the health benefits of greenspace exposure was one of the motivations of Oxford General Practitioner William Bird MBE in establishing the UK's first

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health walk scheme at his practice in 1995, leading to the foundation of the English Walking for Health programme (WfH) (Walking for Health, 2016). Collaborations between health care providers and local nature partnerships are becoming increasingly common across the UK (Bloomfield, 2014; Kent Nature Partnership, 2014; Naturally Healthy Cambridgeshire, 2016; West of England Nature Partnership, 2016) and further afield (New Zealand Ministry of Health, 2016), and aim to better capitalise on ways the health of the natural environment is intrinsically linked to human health, striving for “healthy communities in healthy environments” (Naturally Healthy Cambridgeshire, 2016). Yet a challenge is to ensure those who might benefit the most have sufficient opportunities for exposure to greenspace.

Socioeconomic health inequalities have consistently commanded the attention of researchers and policymakers, with evidence that inequalities are currently increasing (Townsend et al., 1982). Environmental factors form one of the many potential explanations as to their cause (World Health Organisation, 2016b). Research has shown that low income neighbourhoods have reduced greenspace availability (Thomas Astell-Burt et al., 2014a, 2014b), and residents of more deprived neighbourhoods are less likely to use those greenspaces that exist (Jones et al., 2009). Park quality and frequency of park use have both been found to be higher amongst high-socioeconomic status (SES) residents (Leslie et al., 2010). It should also be noted that living in a greener neighbourhood has been linked with stronger greenspace-health associations (Fuertes et al., 2014; McEachan et al., 2015; Mitchell and Popham, 2007) and that income-related health inequalities have been shown to be lower in greener neighbourhoods (Mitchell and Popham, 2008). Greenspace may currently be overlooked as a resource for health and as part of a multi-component approach to decrease health inequalities.

Several hypotheses have been suggested to explain the relationship between nature and health and well-being. The first, is that natural and green areas promote health due to the opportunities for physical activity that they present. The health benefits of physical activity are well understood, with literature suggesting that exercising in a green environment may be more salutogenic than exercising in an indoor gym environment (Thompson Coon JB et al., 2011). Secondly, public greenspaces have been associated with social interaction, which can contribute towards improved well-being (Maas et al., 2009). Thirdly, exposure to sunlight, which is thought to counteract seasonal affective disorder (Rosenthal et al., 1984) and a source of vitamin D (van der Wielen RdG et al., 1995) has been suggested as a causative pathway for this relationship. A fourth is the “Old friends” hypothesis, which proposes that use of greenspace increases exposure to a range of micro-organisms, including bacteria, protozoa and helminths, which are abundant in nature and may be important for the development of the immune system and for regulation of inflammatory responses (Rook, 2013). Further potential mechanisms include the cooling influence of bodies of greenspace on surface radiating temperature (SRT), which has been documented as beneficial for health (Shin and Lee, 2005), as well as the mitigation of greenspace against environmental hazards such as air (Dadvand et al., 2012a; Yang et al., 2005) and noise pollution (De Ridder et al., 2004; Wolch et al., 2014).

Whilst there is a growing body of literature attempting to quantify the links between nature and improved health and well-being, systematic reviews in this area have largely focused on the association between greenspace and a specific health outcome or behaviour such as mortality (Gascon et al., 2016; van den Berg et al., 2015), obesity (Lachowycz and Jones, 2011), birth weight (Dzhambov et al., 2014), physical wellbeing (Thompson Coon JB et al., 2011) as well as the acute health benefits of short term exposure to greenspace (Bowler et al., 2010). Associations have been reported with improved perceived general health, perceived mental health, as well as linking quality of neighbourhood greenness with improved general health (van den Berg et al., 2015). Physical activity in a natural outdoor environment has been associated with reduced negative emotions and fatigue, increased

energy (Bowler et al., 2010; Thompson Coon JB et al., 2011), improved attention, as well as greater satisfaction, enjoyment and a greater intent to repeat the activity (Bowler et al., 2010). Additionally, meta-analyses have shown increased residential greenspace to be significantly associated with reduced cardiovascular and all-cause mortality (Gascon et al., 2016), and increased birth weight (Dzhambov et al., 2014). Yet no systematic review has attempted to determine the impact of greenspace on a wide range of health outcomes.

With this systematic review, we aim to address a major gap in the evidence by identifying a set of health outcomes that have been investigated as being potentially associated with exposure to greenspace. Health outcome terms were taken from the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), a medical classification list produced by the World Health Organisation (World Health Organisation, 2015), with greenspace terms taken from a previous systematic review (Lachowycz and Jones, 2011). The clarification of the magnitude of associations facilitates the investigation of potential underlying mechanisms in the relationship between nature and health. Furthermore, clinicians may use these findings to make recommendations to patients, which may convey health benefits or assist in tackling socio-economic health inequalities.

2. Methods

This systematic review followed Cochrane systematic review guidelines (Deeks et al., 2011), requirements of the NHS National Institute of Health Research Centre for Reviews and Dissemination (PROSPERO, 2015) and the PRISMA statement for reporting studies that evaluate healthcare interventions (Liberati et al., 2009; Moher et al., 2009). Methods of the analysis and inclusion criteria were specified in advance and documented in a protocol registered as CRD42015025193 (PROSPERO, 2015) available on the PROSPERO database <http://www.crd.york.ac.uk/prospero/>.

2.1. Data sources

We searched electronic databases including MEDLINE (US National Library of Medicine, Bethesda, Maryland, U.S.), EMBASE (Reed Elsevier PLC, Amsterdam, Netherlands), AMED (Wolters Kluwer, Leicestershire, UK), CINAHL (EBSCO Publishing, Massachusetts, U.S.) and PsycINFO (American Psychological Association, Washington D.C., U.S.) from inception to the end of September 2015, using specific search terms. The search was then updated to include studies published until mid-January 2017. Databases were selected to best represent source material in health, allied health and human science. Additionally, reference lists from included studies and previous systematic reviews on greenspace and health were hand searched.

2.2. Search strategy

Search terms associated with greenspace were developed with reference to a previous systematic review on greenspace and obesity (Lachowycz and Jones, 2011). For this review, we defined ‘greenspace’ as open, undeveloped land with natural vegetation as well as urban greenspaces, which included urban parks and street greenery. Health outcomes were taken from ICD-10 and then expanded to include the relevant metrics, for example “diabetes” was expanded to include “blood glucose” and glycated haemoglobin, commonly referred to as “HbA1c.” To limit the scope of work, mental health and communicable diseases were excluded from this review due to the volume of literature after including them in initial scoping searches. Outcomes associated with weight status and birth weight were also excluded, as systematic reviews investigating them have recently been published (Dzhambov et al., 2014; Lachowycz and Jones, 2011; Thompson Coon JB et al., 2011).

The search strategy identified studies that contained at least one

Table 1
Inclusion and exclusion criteria.

Inclusion criteria for this review are:	Exclusion criteria
Empirical studies testing the relationships between greenspace and physical health outcomes	Studies that do not look at empirical evidence.
Studies that use human participants.	Studies that do not use human participants.
The study reports a physical health outcome other than BMI/physical activity/mental health/communicable disease/birth weight.	Studies where BMI/mental health/communicable disease/birth weight are the only outcome(s) or the study does not report a health outcome.
Papers and documents written in English.	Papers and documents not written in English.

keyword or Medical Subject Heading (MeSH) from each list of search terms. The search was piloted to ensure known studies were identified and search syntax terms were adapted to suit each database. The electronic database search terms are detailed in the [online supplementary table S2 \(Appendix A\)](#). The search strategy also incorporated limits to studies conducted on humans and studies written in English.

2.3. Study selection

All empirical studies where the outcome could be directly attributable to greenspace were included, including both intervention and observational studies. Titles and abstracts were examined by the primary reviewer (CB) to assess eligibility for the review using PICO criteria:

- **Participants:** Male and female, no age restrictions
- **Intervention:** Exposure to greenspace
- **Comparators:** There is no comparator restriction
- **Outcomes:** Any health outcome

Further details of the inclusion and exclusion criteria can be found in [Table 1](#), below.

Reviewer (CB) initially screened titles and abstracts to remove obviously irrelevant articles, and then two reviewers screened all full text articles independently (CB & AJ) to identify studies for inclusion in the systematic review. Discrepancies were resolved by discussion. Frequently abstracts used terms such as “neighbourhood environment”, “built environment” or “neighbourhood facilities” and did not specify the definition of these terms or if greenspace was investigated. These studies were retrieved as full texts and screened for greenspace as an outcome to ensure that none were excluded erroneously.

2.4. Data extraction

A data extraction sheet was developed by both authors to record the study type, population, type of greenspace under investigation, greenspace measurement tool used, health outcome under investigation and the outcomes. This was piloted on four manuscripts and refined accordingly. Data was extracted into a coding frame using Microsoft Excel, synthesised and tabulated. All studies underwent methodological critical appraisal using one of two checklists. For intervention studies, we used a risk of bias tool employed by Hanson and Jones ([Hanson and Jones, 2015](#)) and Ogilvie et al. ([Ogilvie et al., 2007](#)), ([Table 3](#)) which was adapted for purpose. For observational studies the Lachowycz and Jones ([Lachowycz and Jones, 2011](#)) quality checklist ([Table 2](#)) was adapted and used. Publication bias across studies within the meta-analysis was tested with funnel plots using SE as the measure of study size on the vertical axis and mean difference on the horizontal.

2.5. Narrative synthesis and meta-synthesis

Following critical review of each study, a narrative synthesis was compiled. In order to be considered for meta-analysis, authors needed to present either 1) mean difference, standard deviation (SD) and sample size for both the highest and lowest greenspace categories, or 2)

number of cases of the reported condition/disease as well as sample size for both highest and lowest greenspace categories. If the required data was not reported in the paper, authors were contacted for this information. In total, 92 authors were contacted of which 32 responded with the data required for meta-analysis. In order for a specific health outcome to be considered for meta-analysis data from a minimum of two studies was required. Where data was given for different sub-groups, each was input separately and combined in meta-analyses using the RevMan software package. All results are presented as forest plots with 95% confidence intervals. The I^2 statistic was calculated to quantify the degree of heterogeneity between studies ([Higgins et al., 2003](#)). A rough guide to interpreting heterogeneity is provided in the Cochrane handbook and gives I^2 values of 30–60% to represent moderate heterogeneity and values of 50–90% to represent substantial heterogeneity ([Deeks et al., 2011](#)). In cases of high heterogeneity, the known heterogeneity was assessed (i.e. populations, study design, exposure etc) to ensure that a meta-analysis was appropriate. A random effects model was employed for all meta-analyses as it is considered to represent a more conservative approach, suitable for cases of high heterogeneity ([Higgins and Green, 2011](#)).

Sensitivity analysis was then undertaken, which included studies which only scored 9 or above (out of a total of 11) in either the risk of bias tool or quality appraisal checklist, meaning that all but 2 risk of bias/quality checklist criteria had been met.

3. Results

The initial database search yielded 10,430 studies, of which 8986 were removed as duplicates or as clearly irrelevant after reviewing titles. A further 6 studies were retrieved from reference lists of review articles. The abstracts of 1444 studies were screened and any that did not provide enough information were retrieved for full text examination. A total of 247 papers were read as full texts to be assessed for eligibility. After independent assessment by the second reviewer (AJ), 143 studies met the inclusion criteria and were eligible to be included in the synthesis. The review flow chart is detailed in [Fig. 1](#). The characteristics and synthesised results for all 143 papers are detailed in [supplementary table S1 \(Appendix A\)](#).

3.1. Study characteristics

Although there was no date restriction on the search, 96% of the articles were studies from the past 10 years, illustrating recent growth in interest in greenspace and health, with no papers prior to 1984 meeting the inclusion criteria. Studies were in 20 different countries. Although 50% of studies were in Europe, the country with the highest frequency of included studies was Japan with 24. The populations under investigation varied greatly in size, with the smallest an intervention study of 9 participants ([Ochiai et al., 2015](#)), the largest study using primary data collection presented results for 2593 primary schoolchildren ([Dadvand et al., 2015](#)), and the largest study using routinely collected data used 2011 UK census data with a population of > 63 million ([Wheeler et al., 2015](#)). In some papers, the number of participants was not reported.

Eleven different types of greenspace exposure were measured, the

Table 2
Adapted Lachowycz and Jones quality appraisal checklist for observational studies.

Item	Description	Scale
Methodological quality		
1. Population - Selection bias	Are the individuals selected to participate in the study likely to be representative of the target population?	1: Likely to be representative 0: Unlikely to be representative N: Insufficiently described
2. Population –Inclusion bias	Is there evidence of bias in the percentage of selected individuals who provided data for inclusion in the analysis?	1: No evidence of bias 0: Evidence of bias N: Insufficiently described
3. Outcome measure	Was the outcome objectively measured or self- reported?	1: Objectively measured outcome 0: Self reported N: Insufficiently described
4. Green space measure - derivation	Was derivation of the green space variable well described?	1: Derivation of green space measure well described 0: Derivation of green space measure not well described
5. Green space measure - type	Did the green space measure include information on type of green space?	1: Green space measure included information on type of green space 0: Green space measure did not include information on type of green space N: Insufficiently described
6. Use of green space	Use of green space was measured and included in analysis	1: Measured use of green space 0: Did not measure use of green space N: Insufficiently described
7. Statistical methodology	Was an appropriate statistical methodology used?	1: Evidence of appropriate methodology 0: No evidence of appropriate methodology N: Insufficiently described
8. Effect size	Was an effect size reported for green space variable?	1: Effect size reported for green space 0: Effect size not reported for green space N: Insufficiently described
9. Multiplicity	Was green space the main exposure being measured or one of many variables being tested?	1: Green space variable main exposure 0: Green space variable one of many variables being tested N: Insufficiently described
10. Level of analysis	Was analysis of green space in relation to outcome carried out at individual level or at ecological (area) level	1: Individual level 0: Ecological level N: Insufficiently described
11. Green space measure	Was greenspace exposure objectively measured or self-reported?	1: Objectively measured 0: Self-reported N: Insufficiently described

most common of which was neighbourhood greenspace (including residential greenspace, street greenery and tree canopy) measured by 56 studies, followed by greenspace-based interventions and proximity to a large greenspace. Several randomised studies compared a known green environment (i.e. a park or forest) with an urban or indoor environment. One study examined whether viewing trees through a hospital window had any association with post-operative recovery time when compared with a window view of a wall with no trees (Ulrich, 1984). One included study investigated both green and blue (water) space (Burkart et al., 2016). Studies investigating blue space alone with no investigation of greenspace exposure were excluded at the full text screening stage. A variety of greenspace measurement tools were used, including Normalised Difference Vegetation Index (NDVI), the Centre for Ecology and Hydrology (CeH) land cover map, and tree canopy and street tree data, as well as subjective measures of greenness such as self-reported quality of neighbourhood greenspace and self-reported frequency of walking in a green area.

Within the 143 studies, 40 were interventional and the remainder observational. Out of the 40 interventional studies, 27 were investigating the association between shinrin-yoku and various health outcomes. Shinrin yoku, or “forest bathing” is a popular practice in Japan and neighbouring countries, and is defined as “taking in the atmosphere of the forest” (Park et al., 2010). It is said to have health-promoting properties and to reduce stress (Park et al., 2010). Participants of shinrin-yoku spend time in the forest either sitting or lying down, or walking through the forest. In studies investigating forest bathing, a control group carried out the same activity in an urban environment. These studies typically had small numbers of participants (between 9 and 280 participants).

Of the 103 observational studies, 35 were cohort studies and 69

cross-sectional, including 18 large scale ecological studies investigating environmental influences on health amongst the population using census data. Almost 100 health outcomes were investigated, with most manuscripts investigating more than one outcome. The most frequently investigated health outcomes were cardiovascular, including cardiovascular mortality, blood pressure, heart rate and incidence of angina and myocardial infarction. Other commonly reported health outcomes included pregnancy outcomes, self-reported health, mortality (all-cause, respiratory and intentional self-harm), and diabetes, as well as various blood biomarkers. The individual health outcomes investigated by each study are detailed in the table of study characteristics, [supplementary table S1 \(Appendix A\)](#).

3.2. Study quality

All 143 articles were assessed for quality using adapted versions of the Lachowycz and Jones checklist (Lachowycz and Jones, 2011) for observational studies (Table 2) and the Hanson and Jones and Ogilvie et al. risk of bias tool (Hanson and Jones, 2015; Ogilvie et al., 2007) for interventional studies (Table 3). No study was excluded due to a low quality score. Assessments of quality were initially made by the first reviewer (CB) and then all studies were cross-checked by one other (AJ, SH or EC) for discrepancies.

An inter-rater reliability analysis using the κ statistic was performed and found κ 0.937, $p < 0.001$ representing substantial agreement. Full consensus was reached after discussion. In the case that a checklist item consistently brought up discrepancies, clarification of the definition of the item was discussed. Individual quality analysis scores can be found in the [supplementary tables S5](#) (observational studies) and [S6](#) (intervention studies) (Appendix B).

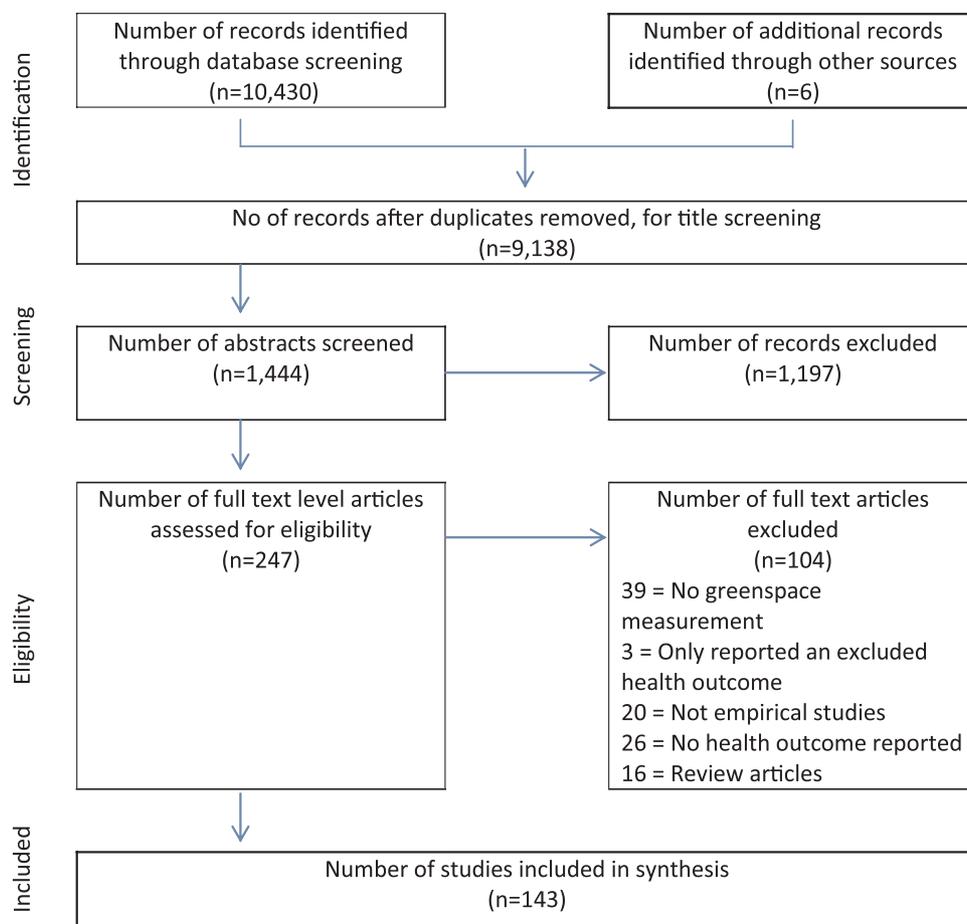


Fig. 1. Flow chart of studies.

Table 3
Adapted Hanson and Jones and Ogilvie et al. risk of bias tool for intervention studies.

Item	Description	Scale
Methodological quality		
1. Reporting: hypothesis	Is the hypothesis/aim/objective of the study clearly described?	1: Yes – clearly described 0: No
2. Reporting: outcome(s)	Are the main outcomes to be measured clearly described in the introduction or methods section? (if the main outcomes are first mentioned in the results section, this question should be answered no)	1: Yes – clearly described in introduction/methods 0: No – not clearly described/first mentioned in results
3. Reporting: intervention	Are the interventions of interest (greenspace and control or otherwise) clearly described?	1: Yes – clearly described 0: No
4. Randomisation	Was there sufficient description of a randomisation process or statistical test to show that comparability between the two groups has been adjusted for (no explanation scores zero)?	1: Yes – description of a randomisation process 0: No – no explanation
5. Exposure	Did the authors show that there was no evidence of a concurrent intervention which could have influenced the results (no explanation scores zero)?	1: Yes 0: No – no explanation N: Insufficiently described
6. Representativeness	Were the study samples shown to be representative of the study population?	1: Yes – shown to be representative 0: No – shown not to be representative N: Insufficiently described
7. Comparability	Were baseline characteristics of the intervention comparable with the control or were potential confounders at baseline approximately adjusted for in analysis?	1: Yes 0: No N: Insufficiently described
8. Attrition	Were numbers of participants at follow-up identifiable as at least 80% of the baseline?	1: Yes 0: No N: Insufficiently described
9. Outcome assessment: tools	Were valid and reliable tools used to assess participant outcomes?	1: Yes 0: No N: Insufficiently described
10. Follow-up time scale	Was the length of time to follow up assessment appropriate for the intervention?	1: Yes 0: No N: Insufficiently described
11. Precision of the results	Were confidence intervals or p-values given?	1: Yes 0: No

For the 103 observational studies assessed using the Lachowycz and Jones checklist (Lachowycz and Jones, 2011) detailed in Table 2, scores ranged from 4 (one study) to 11 (one study), out of a total of 11 criteria. Only 12.6% of studies scored ≤ 7 , with 39.8% of studies scoring 9 out of 11. The two checklist criteria which were the most recurrently missing from were “5. Did the green space measure include information on type of greenspace?” and “6. Use of greenspace was measured and included in the analysis”.

For the 40 interventional studies assessed using the Hanson and Jones and Ogilvie et al. risk of bias tool (Hanson and Jones, 2015; Ogilvie et al., 2007) detailed in Table 3, scores ranged from 5 (one study) to 11 (one study) out of a total of 11 criteria. Only 7.7% of studies scored ≤ 7 , with 66.7% of studies scoring 9 out of 11. The two checklist criteria which were the most recurrently missing from studies were “5. Did the authors show that there was no evidence of a concurrent intervention which could have influenced the results?” and “6. Were the study samples shown to be representative of the study population?”

3.3. Meta-analysis

When extracting information from papers for meta-analysis, ‘high’ and ‘low’ greenspace exposure was defined based on the highest and lowest exposure categories provided in each paper. These were typically the highest or lowest quartile or quintile of exposure.” Commonly reported outcome measures enabled meta-analysis of 24 health outcomes, summarised in Table 4 and presented in full in supplementary Figs. S2-S25 (Appendix B). Statistically significant health denoting associations between high versus low greenspace exposure groups were identified for self-reported health, type II diabetes (Fig. 2), all-cause and cardiovascular mortality, diastolic blood pressure (Fig. 3), salivary cortisol, heart rate, heart rate variability (HRV), and HDL cholesterol as well as preterm birth and small size for gestational age births. Reductions were also found for incidence of stroke, hypertension, dyslipidaemia, asthma, and coronary heart disease, as well as improvements in systolic blood pressure, fasting blood glucose, and gestational age. However these results were not statistically significant.

Zero heterogeneity was reported for 8 of the analyses, 6 reported moderate heterogeneity (30–60%) with 9 having substantial heterogeneity ($> 60\%$). This suggests substantial heterogeneity between studies for heart rate, diastolic and systolic blood pressure, self-reported health, preterm birth, diabetes, all-cause mortality, small size for gestational age, hypertension and asthma. The I^2 score for the good self-reported health meta-analysis was 100%, indicating very high levels of inconsistency between studies. Using funnel plots, all studies were identified as visually symmetrical with a narrow spread at the top of the funnel indicating precision with results close to the pooled estimate and without bias towards smaller studies. Supplementary Fig. S1 (Appendix B) shows an example funnel plot.

To test whether significant meta-analysis results were due to

inclusion of poor quality studies, sensitivity analysis was conducted where possible. Meta-analysis was repeated with only studies that scored ≥ 9 in either the quality appraisal checklist or risk of bias tool. This was only possible for heart rate, which showed a stronger effect size -3.46 (95% CI $-4.05, -2.88$) (2 studies removed), systolic blood pressure, which decreased in effect size and remained statistically non-significant -0.49 (95% CI $-1.20, 0.22$) (2 studies removed), and self-reported good health, which decreased in effect size and lost significance 1.06 (95% CI $0.96, 1.18$) (6 studies removed). Table 6 shows the results from this sensitivity analysis. Fasting blood glucose, cholesterol, HbA1c, asthma, and triglycerides meta-analyses were not possible to include as there was only one remaining high quality study. The remaining meta-analyses consisted only of studies scoring ≥ 9 , and so sensitivity analysis was not possible.

3.4. Non-pooled health outcomes

Meta-analysis was not possible for a number of health outcomes including cancer, respiratory mortality, neurological outcomes, and various biomarkers, as no two studies presented results on comparable outcomes. Three studies reported on cancer outcomes and found that living in the highest quartile of greenspace was associated with a significantly reduced risk of prostate cancer (Demoury et al., 2017), OR 0.82 (95% CI 0.72, 0.92), as well as reduced incidence of overall cancer mortality HR 0.87 (95% CI 0.78, 0.97) (James et al., 2016), whilst an Australian study found a significant increased risk of skin cancer for participants living in the highest greenspace quartile OR 1.07 (95% CI 1.01, 1.14) Astell-Burt et al., 2014a, 2014b). One study found living in the highest quartile of greenspace to be associated with reduced incidence of respiratory mortality (James et al., 2016) HR 0.66 (95% CI 0.52, 0.84). In terms of neurological outcomes, one study found that living in a neighbourhood with a low % of greenspace was associated with deficits in motor development in children (Kabisch et al., 2016), whilst another found no association between greenspace and cognitive development (Ward et al., 2016). A number of studies investigated a variety of biomarkers including natural killer cells (Kim et al., 2015), C-reactive protein (Mao et al., 2012b), and perforin (Jia et al., 2016). Individual study results can be found in the table of study characteristics, supplementary table S1 (Appendix A).

4. Discussion

This systematic review and meta-analysis of 143 studies provides evidence that exposure to greenspace is associated with wide-ranging health benefits. Meta-analyses results have shown statistically significant health-denoting associations for salivary cortisol -0.06 (95% CI $-0.07, -0.04$), heart rate -3.47 (95% CI $-4.04, -2.90$), diastolic blood pressure -1.97 (95% CI $-3.45, -0.49$), HDL cholesterol -0.03 (95% CI $-0.05, < -0.01$), and significant improvements in the HF

Table 4

Summary meta-analysis results table: mean difference (MD) between highest and lowest greenspace exposure groups.

Outcome	N (participants)	Effect MD (95% CI)	Heterogeneity I^2	P-value
Salivary cortisol	7 (954)	$-0.05 (-0.07, -0.04)$	0%	$P < 0.001$
Heart rate	10 (1058)	$-2.57 (-4.30, -0.83)$	78%	$P0.004$
HDL cholesterol	2 (3474)	$-0.03 (-0.05, < -0.01)$	0%	$p = 0.02$
Diastolic blood pressure	12 (9695)	$-1.97 (-3.45, -0.49)$	82%	$p = 0.009$
Systolic blood pressure	13 (9791)	$-1.50 (-3.43, 0.44)$	78%	$p = 0.13$
Change in HF power of HRV	7 (826)	$91.87 (50.92, 132.82)$	49%	$p < 0.001$
LF/(LF+HF)	6 (266)	$-0.06 (-0.08, -0.03)$	0%	$p < 0.001$
HbA1c	2 (174)	$-0.77 (-1.86, 0.32)$	54%	$P = 0.16$
Fasting blood glucose	2 (3474)	$-0.01 (-0.08, 0.07)$	0%	$p = 0.84$
Total cholesterol	2 (3474)	$0.03 (-0.05, 0.10)$	0%	$p = 0.48$
LDL cholesterol	2 (3474)	$0.04 (-0.03, 0.11)$	0%	$p = 0.23$
Triglycerides	2 (3474)	$0.06 (-0.01, 0.12)$	0%	$p = 0.07$
Gestational age	3 (22911)	$< -0.01 (-0.05, 0.05)$	0%	$P = 0.94$

Table 5
Summary meta-analysis results table: odds ratios of disease incidence difference between high and low greenspace areas.

Outcome	N (participants)	Odds ratio (95% CI)	Heterogeneity I ²	P-value
Good self-reported health	10 (41873103)	1.12 (1.05, 1.19)	100%	p < 0.001
Preterm birth	6 (1593471)	0.87 (0.80, 0.94)	68%	p < 0.001
Type II diabetes	6 (463220)	0.72 (0.61, 0.85)	73%	p < 0.001
All-cause mortality	4 (4001035)	0.69 (0.55, 0.87)	96%	P = 0.002
Hypertension	4 (11228)	0.99 (0.81, 1.20)	62%	P = 0.91
Small for gestational age	4 (1576253)	0.81 (0.76, 0.86)	65%	p < 0.001
Cardiovascular mortality	2 (3999943)	0.84 (0.76, 0.93)	54%	p < 0.001
Stroke	3 (256727)	0.82 (0.61, 1.11)	59%	P = 0.20
Dyslipidaemia	2 (5934)	0.94 (0.75, 1.17)	57%	P = 0.56
Asthma	2 (2878)	0.93 (0.57, 1.52)	68%	P = 0.78
Coronary heart disease	2 (255905)	0.92 (0.78, 1.07)	48%	P = 0.26

power 91.87 (95% CI 50.92, 132.82) and LF/(LF + HF) −0.06 (95% CI −0.08, −0.03) of heart rate variability. As well as statistically significant reductions in the incidences of type II diabetes 0.72 (95% CI 0.61, 0.85), all-cause mortality 0.69 (95% CI 0.55, 0.87), cardiovascular mortality 0.84 (95% CI 0.76, 0.93), as well as pregnancy outcomes preterm birth 0.87 (95% CI 0.80, 0.94), and small size for gestational age 0.81 (95% CI 0.76, 0.86). A significant increase in incidence of reporting good health was also found 1.12 (95% CI 1.05, 1.19). Some of the meta-analyses results had high levels of heterogeneity (Tables 4, 5), and should therefore be interpreted with caution. Included studies investigating non-pooled health outcomes also reported salutogenic associations for health outcomes such as cancer outcomes, respiratory mortality, sleep duration, various biomarkers, and neurological outcomes.

This review has comprehensively sought out empirically-reported studies investigating the association between greenspace and a wide range of health outcomes across five databases, covering a large number of relevant international journals. It has extensively analysed 143 different studies with the combined population size of > 290 million. It has also extracted information for 24 novel meta-analyses to provide evidence of health benefits. A further major strength of this review is its inclusivity; studies were not excluded based on study design or type of greenspace, and as a result a broad range of greenspace exposures and health outcomes were identified by the 143 included studies. However, the inclusivity of this study can also be viewed as a limitation due to high heterogeneity across studies, and difficulties in comparing results from small-scale intervention studies and much larger ecological cross-sectional studies or in comparing studies that used objective measurements of greenspace with those that did not.

A number of studies reported stronger associations between greenspace exposure and self-reported health, birth outcomes and morbidity for those from low socioeconomic status (SES) groups and the most deprived areas (Agay-Shay et al., 2014; Dadvand et al., 2012b; Mitchell and Popham, 2008; Roe et al., 2016). Similar stronger associations were reported for birth outcomes and self-reported health for those with < 10 years in education. Increased neighbourhood greenness was also reported to decrease the effect of income deprivation on both all cause and cardiovascular mortality by one study (Mitchell and Popham,

2008). However results by SES group were only presented by a small number of studies so it was not possible to conduct a formal subgroup analysis, or to determine if this was the case for other health outcomes. Greenspaces may form part of the arsenal for combatting health inequalities, and our findings should encourage practitioners and policymakers to give due regard to how they can create, maintain and improve existing accessible greenspaces in deprived areas. Furthermore, the development of strategies and interventions for the utilisation of such greenspaces by those of low SES status who stand to benefit the most is needed.

Whilst previous systematic reviews have examined the relationship between greenspace and specific health outcomes or behaviours, this review investigated the potential impact of greenspace on a broad range of health outcomes. Our findings are consistent with previous systematic review results that suggest that greenspace is beneficial for health. Lachowycz and Jones (Lachowycz and Jones, 2011) found that 68% of papers included in their systematic review found a positive or weak association between greenspace and obesity-related health indicators, although findings were inconsistent and mixed. Thompson Coon et al. investigated the association between exercising in outdoor natural areas and health, and found physical activity in natural environments to be associated with increased energy, improved mental wellbeing and higher levels of intent in repeating the activity at a later date (Thompson Coon JB et al., 2011). However, consistent with our systematic review, poor methodological quality of the available evidence and the heterogeneity of outcome measures hamper the interpretation and extrapolation of these findings (Thompson Coon JB et al., 2011). Bowler et al. looked at studies comparing measurements of health in outdoor natural and synthetic environments such as indoor or outdoor built environments (Bowler et al., 2010). Findings suggest that a walk or run in a natural environment may convey greater health benefits than the same activity in a synthetic environment. This is consistent with the findings of Hanson and Jones, who conducted a systematic review and meta-analysis on outdoor walking groups (Hanson and Jones, 2015). Outdoor walking groups were found to significantly improve systolic and diastolic blood pressure, heart rate, body fat percentage, BMI, cholesterol, V02 max, depression and physical functioning, with no adverse side effects reported (Hanson and

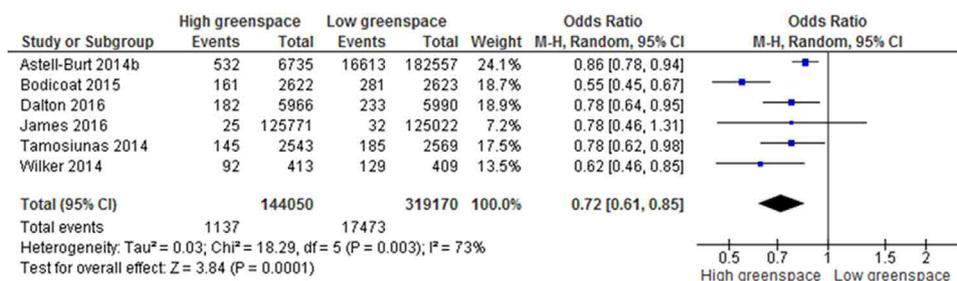


Fig. 2. Meta-analysis of the effects of greenspace exposure on incidence of type II diabetes.

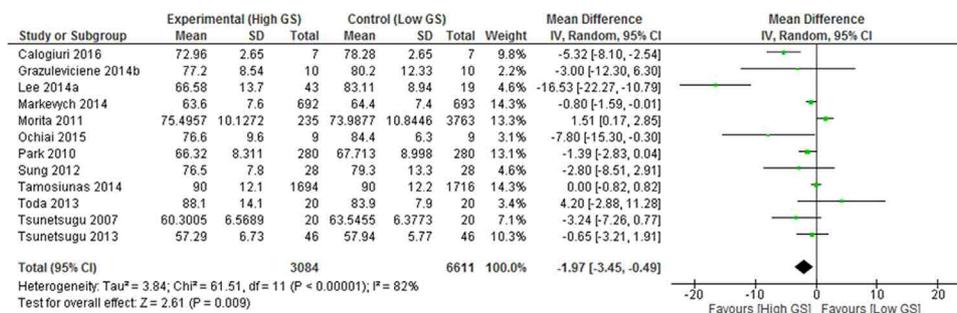


Fig. 3. Meta-analysis of the effects of greenspace exposure on diastolic blood pressure.

Table 6

Summary results table of sensitivity analysis meta-analysis consisting of only studies which scored ≥9 in quality checklist or risk of bias tool.

Outcome	N (participants)	Effect MD or odds ratio (95% CI)	Heterogeneity I ²	P-value
Heart rate	8 (842)	- 3.46 (- 4.05, - 2.88)	83%	P < 0.00001
Systolic blood pressure	11 (9681)	- 0.49 (- 1.20, 0.22)	79%	p = 0.17
Good self-reported health	4 (6577)	1.06 (0.96, 1.18)	88%	P = 0.26

Jones, 2015). As with Bowler’s systematic review and our findings, the evidence suggests that walking in a greenspace or natural area may offer health benefits above walking in an urban environment or on a treadmill (Bowler et al., 2010). Putting aside the health benefits of physical activity, which have been widely documented (Bize et al., 2007; Janssen and LeBlanc, 2010; Lawlor and Hopker, 2001; Penedo and Dahn, 2005; Warburton et al., 2006), the associations between greenspace and health found in this study suggests that “green exercise” may have additional health benefits. In combination with the findings of our systematic review, it can be seen that there is a convincing body of evidence to suggest that greenspace is beneficial for health, and also that greenspace may be currently undervalued as a resource for health. Studies consistently reported that there are several substantial gaps in knowledge remaining in this field, most commonly the mechanisms underlying the relationship between greenspace and health.

A high proportion of studies included in meta-analyses investigated Shinrin-yoku or forest-based interventions. Although 27 studies investigated the association between forest-based environments and health, only 5 looked at levels of street trees and tree canopy, with mixed results. It remains to be seen if the health benefits associated with forest bathing can be replicated in an urban environment by increasing street greenery and urban greenspace. Research in this field may inform national guidelines on the recommended number of trees necessary in urban and deprived areas to convey health benefits to the local populations.

A strength of this review is that all papers underwent rigorous critical appraisal using one of two carefully chosen tools; the Lachowycz and Jones checklist (Lachowycz and Jones, 2011) for observational studies and the Hanson and Jones and Ogilvie et al. risk of bias tool (Hanson and Jones, 2015; Ogilvie et al., 2007) for intervention studies. Both tools were tailored for the purposes of this review and every study underwent quality appraisal by two reviewers, with a high level of inter-rater agreement. However, 58.3% of the observational studies and 77% of the interventional studies scored ≥9 out of 11 in their respective quality appraisal tools. This limited heterogeneity in study quality may suggest that the tools may not have been sensitive enough to capture certain aspects of quality of the studies reviewed and differentiate between studies. Sensitivity analysis was conducted using only high quality studies (studies scoring ≥9). This cut-off point was chosen priori to balance the need to retain some studies with a need to understand how sensitive the results were to the inclusion of weaker studies. A limitation of this cut off point is that it implied that all quality appraisal criteria were of equal value, which may not be the case. Results remained consistent for heart rate and systolic blood pressure,

however self-reported good health had a reduced effect size and lost statistical significance, with the drop in statistical significance being possibly explained by the lower power of this sub-analysis. Furthermore, the self-reported good health meta-analysis had an I² of 100%, indicating a high risk of statistical heterogeneity. This result should therefore be interpreted cautiously.

A limitation of this review is that the search was restricted to manuscripts published in the English language. Furthermore, several health outcomes were only investigated in one or two studies, limiting comparability of results, for example, for respiratory mortality and various cancers. There were many differences between study populations; for example the largest and smallest study populations were > 63 million (Wheeler et al., 2015) and 9 participants (Ochiai et al., 2015) respectively. The exclusion of mental health and communicable disease outcomes, whilst done pragmatically, is also a limitation of this review.

One key area for further research is how health professionals and policymakers might encourage patients to increase their exposure or even time spent in green spaces, and in particular to target those from lower SES areas. A number of included studies in this review reported a stronger relationship between greenspace and health outcomes for participants who were from low SES neighbourhoods, had lowest education levels, or those who were from areas with the lowest surrounding neighbourhood greenness. However, results were often not presented according to SES, meaning that formal subgroup analysis by SES level was not possible. Therefore it is not known if this may be the case for other health outcomes. Evidence has shown increased odds of higher psychosocial distress in residents of low SES areas (Kessler, 1982). Our meta-analysis results suggest that greenspace exposure may reduce salivary cortisol, a physiological marker of stress. Further studies investigating greenspace and health but with a focus on SES groups and subsequent health inequalities are required to fill this gap in the literature.

From the quality appraisal, it was evident that there were two criteria recurrently missing from both observational and intervention studies. For the 103 studies assessed using the observational study quality checklist (Lachowycz and Jones, 2011) (Table 2), these were “5. Did the green space measure include information on type of greenspace?” and “6. Use of greenspace was measured and included in the analysis”. For the 40 intervention studies assessed using the risk of bias tool (Hanson and Jones, 2015; Ogilvie et al., 2007) (Table 3), these were “5. Did the authors show that there was no evidence of a concurrent intervention which could have influenced the results?” and “6. Were the study samples shown to be representative of the study population?” Future research should take this into consideration, with observational studies aiming to include

data on type of greenspace under investigation and the participants' use of greenspace. Intervention studies should also aim to report on whether a concurrent intervention is in place, as well as commenting on the representativeness of the population.

Although this systematic review has uncovered a large body of research on the relationship between greenspace and health, there is a paucity of literature on the mechanisms underlying this relationship. Currently there are several suggested hypotheses. Greenspaces offer opportunities for physical activity, social cohesion, and stress reduction (Hartig et al., 2014), which each carry their own numerous health benefits. Exposure to the diverse variety of bacteria present in natural areas may convey immunoregulatory benefits and reduce inflammation (Rook, 2013). Much of the literature on forest bathing suggests that phytoncides (volatile organic compounds with antibacterial properties) released by trees may explain the salutogenic properties of shinrin yoku (Li et al., 2009; Tsunetsugu et al., 2010). Further research should build on the findings of this systematic review by hypothesising and testing the potential mechanisms underlying the relationship between greenspace and health. The associations between greenspace and mental health outcomes and communicable diseases, both outcomes that were not considered here, should also be explored further.

5. Conclusions

This review suggests that greenspace exposure is associated with wide ranging health benefits, with meta-analyses results showing statistically significant associations with reduced diastolic blood pressure, heart rate, salivary cortisol, incidence of type II diabetes and stroke, all-cause and cardiovascular mortality, as well as health-denoting associations with pregnancy outcomes, HRV, and HDL cholesterol, and self-reported health. However some meta-analyses results are limited by poor study quality and high levels of heterogeneity and should therefore be interpreted with caution. Increased greenspace exposure was also associated with non-pooled outcomes including neurological outcomes, respiratory mortality, and increased sleep duration. The findings of this systematic review suggest that the creation, regeneration and maintenance of accessible greenspaces and street greenery may form part of a multi-faceted approach to improve a wide range of health outcomes.

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Contributors

CB and AJ designed the protocol and the search strategy which was executed by CB. CB screened the initial results and extracted data. CB led quality appraisal which was then cross-checked by AJ. CB drafted the original manuscript which was critically revised by AJ.

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Competing interests

The authors declare they have no actual or potential competing financial interests.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.envres.2018.06.030>.

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Research Paper

Stress recovery in forest or handicraft environments – An intervention study



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ABSTRACT

In modern society stress is a major problem, causing lack of mental and social well-being as well as potential vulnerability to problems at work. Previous studies have found natural environments to be relaxing. In this intervention study, performed in Northern Sweden, the hypothesis was that an outdoor forest environment would be more relaxing than an indoor handicraft environment. Forty-six participants with high stress levels (PSQ ≥ 0.4) (33 women, 13 men, average age 48 years) were randomly assigned to visit either the forest environment (n = 27) or the handicraft environment (n = 19). The participants visited their assigned environment twice a week during three months, either in autumn or spring. During each visit they spent two hours performing, simple and undemanding activities. Psychological health outcomes were measured by the questionnaires CIS, PSQ, SCQ, SMBQ, SF-36 before and after the three months interventions. Sleeping patterns were monitored by an Actiwatch and sleep diary. The participants' mood before and after each visit were estimated by a questionnaire. The results show that the participants' health had improved after the interventions in both the forest and handicraft environments. The sleep latency increased slightly among participants in the handicraft environment. For participants in both environments the levels of fatigue, stress and burnout were all lower. They felt less limitation due to physical problems and did not feel so tired. Also their mental health had improved. From start to end of a visit to either environments the participants' mood was improved, and they felt more relaxed, alert, happy, harmonious, peaceful and clearheaded. Over time during the intervention, they also felt significantly more clearheaded. We conclude that the health of all participants improved, irrespective of the environment visited.

1. Introduction

1.1. Stress and its consequences

In developed countries generally, and Sweden specifically, people are increasingly exposed to stress. Prolonged stress, without opportunities for restoration, can cause chronic fatigue and various other adverse physiological and psychological symptoms (Danielsson et al., 2012). Consequently, mental exhaustion and negative feelings are increasing, people have less energy and are becoming increasingly unhappy, as reported for instance by the Directorate General for Communication of the European Commission (2010). At young age stress can even cause changes in brain morphology and affect functions like learning (Hollis et al., 2013).

Symptoms of stress may include reductions in memory capacity and ability to concentrate, insomnia, and increases in heart rate, headaches and muscular aches (De Vente et al., 2003; Anon., 2003; Anon., 2009; Dahlgren et al., 2005, 2006; Potter et al., 2009). Exposure to stress may also have persistent effects, for example some functional limitations and

disabilities at old age may be linked to stress exposure 30 years previously (Kulmala et al., 2013). Consequences of the symptoms may include reductions in functionality both socially and at work (Anon., 2003). Hence, stress is frequently related to people's employment (Lindholm et al., 2005; Milczarek et al., 2009; Anon., 2013), and sick-leave due to mental illness (commonly linked to inability to cope and severe stress) is also increasing among the Swedish population (Anon., 2010; Försäkringskassan 2013). Frequencies of stress-related physical symptoms (severe pain in neck and shoulders, constant fatigue, moderate or severe anxiety and nervousness) are also increasing. Furthermore, recovery from stress-associated fatigue syndromes takes a long time (Vercoulen et al., 1996), and people who have had time off due to stress usually remain more sensitive to stress after returning to work (Anon., 2003). Hence, mental ill-health and musculoskeletal disorders (both of which may be strongly associated with stress) are the two main classes of diagnoses entitling people to disability pensions in Sweden (Danielsson et al., 2012).

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1.2. Theory

Humans evolved in natural environments and it is only in recent centuries that we have lived in towns (Hartig et al., 2011). In that short time we have developed highly mobile, dense, high-tech societies packed with tools that enable us to move through large crowds and execute tasks much more rapidly than before, driving demands for everything to be done faster. We must constantly perform more rapidly, and constantly make quick decisions. However, our brains and physiological systems have not evolved at the same pace as our technology, and we become exhausted when we constantly have to make decisions and perform at our best. This exhaustion can be related to the distinction between spontaneous and directed attention (Kaplan and Kaplan 1989). Focused attention is used when making decisions and requires tiring concentration. It must be used constantly even when moving through busy urban environments simply (for instance) to avoid being knocked down or knocking down someone else. Spontaneous attention refers to noticing something without any need to make decisions, for instance when looking at a view, or simply taking in our surroundings. It is used in natural environments, which are both restful and restorative because they provide precisely the amount of stimuli that we are evolved to handle. Hence, we respond positively to our “original environment”, in which everything is understandable, predictable and manageable, we get a sense of coherence and feel safe, and so the environment provides support and is restorative.

1.3. Effects of nature in the neighborhood

In recent years contact with nature has received increasing attention as a way of reducing stress. Green environments offer urban populations opportunities for restoration, and the more time people spend in contact with nature, the less they are affected by stressful events (Hartig et al., 2003; Grahn and Stigsdotter 2003; Ottosson and Grahn 2008). There is also a clear correlation between distances to green areas and people's levels of stress; the further away a green area is situated the higher risk for people to get high stress levels (Hörnsten and Fredman 2000; Nielsen and Hansen 2007; Stigsdotter et al., 2010). Thus, green areas in the neighborhood provide havens from life crises and stress, providing people with places where they can quickly recuperate and prepare for the next challenge (Wells and Evans 2003; Grahn and Stigsdotter 2003). Simply viewing nature from the office window make us more positively disposed towards our work, resulting in less negative reactions towards stressful situations (Kaplan and Kaplan 1989). Similarly, the ability to view nature through a window has highly beneficial effects for patients in hospitals (Ulrich 1984; Raanas et al., 2011), reducing the length of their stays, and requirements for both care from the personnel and analgesics (Ulrich 1984; Kline 2009).

1.4. Effects of nature on stress recovery

People recover from stress, both physiologically and psychologically, more rapidly in green areas than in urban environments (Ulrich et al., 1991; Berto 2005). Similarly, visiting a natural area results in a slower heartbeat, lower blood pressure and cortisol levels in the saliva, more positive thinking, less aggression and fear, more calmness and feelings of refreshment than visiting an urban environment (Ulrich et al., 1991; Juyoung et al., 2009). For people suffering from exhaustion disorder (also known as fatigue or burnout) visits to forest environments are perceived as significantly more restorative, more mood-enhancing and better for restoring attention capacity than city visits (Sonntag-Öström et al., 2014). Furthermore, visiting a natural environment improves people's ability to cope with everyday life by providing better perspectives of what is manageable, and what should be valued (and hence prioritized) in life (Talbot and Kaplan 1986; Nordh et al., 2009; Sonntag-Öström et al., 2014). Pensioners' ability to concentrate also increases, and they feel healthier, if they can spend

time out in nature (Ottosson and Grahn 2005).

In addition, the therapeutic and restorative effects of nature are positively correlated with the severity of crises people have experienced (Ottosson and Grahn 2008). Hence, patients suffering from exhaustion disorder are frequently offered garden therapy (Tenngart Ivarsson and Grahn, 2010), in which several “rooms” with different characteristics, activities and atmospheres may be provided (Stigsdotter and Grahn, 2002). Some “rooms” offer peace and quiet, with no activity, while others encourage activities. In the beginning of the treatment many patients prefer to stay in the wildest and woodiest part of the garden (Tenngart Ivarsson and Grahn, 2010). Heavily exhausted patients also choose the most forested parts with no activities. The trees fascinate and give a sense of safety that is lacking in everyday life. Regular visits to boreal forest environments may also enhance the mood of patients with exhaustion disorder. For example, after a two hour forest visit in solitude, patients who participated in studies presented by Sonntag-Öström et al. (2015a) felt more relaxed, alert, clear-headed, peaceful, happier and more harmonious.

Nature based therapy includes green nature, physiotherapy, conventional therapy, socializing, stress management, relaxation and creative activities as handicraft and gardening (Sahlin et al., 2015a, 2015b; Pálsdóttir et al., 2014). This mix of activities in a green environment has been found to be successful in rehabilitation from stress (Adevi and Lieberg, 2012).

1.5. Creative environments

Environments can support restoration by absence of demands (i.e. emotional demands, noise or crowds) or contain qualities that support restoration (von Lindern et al., 2017). Environments that are not natural can support restoration and offer relaxation, particularly those that promote creative engagement, which reduces stress, anxiety and mood disturbances (Stuckey and Nobel 2010). For example, when people work with clay they not only physically create objects and feel the clay in their hands, but also mentally plan what to do next and observe the object being produced and finished. Thus, it activates people's body and minds (Sholt and Gavron 2006), without making excessive demands. Anthroposophical art therapy reduced cancer patients' depression levels (Bar-Sela et al., 2007), and increased levels of well-being, confidence, motivation self-care and social relationships of persons with mental illness (Allan et al., 2015). Participating in community arts programs increased mental health and well-being for persons from disadvantaged backgrounds (Kelaher et al., 2014). Some regarded the creative activities as improving the self-management of mental health (Lawson et al., 2014). A collaborative art-making task reduced stress levels and increased social support in a group of hospice caregivers (Salzano et al., 2013). Consequently, several kinds of environment other than nature can have helpful effects for people suffering from stress, based on the activities performed in them. However, it has been argued that human beings have preference for nature environments and that this preference has evolutionary origin and therefore is innate (Appleton 1975; Orians 1980; Wilson 1984). Physical activities in natural outdoor environment improves restoration and mental health better than indoor activities (Mitchell 2012; Weng and Chiang 2014; Rogerson et al., 2016). Therefore, we hypothesized that nature in the form of an outdoor forest environment would promote recovery from stress better than an indoor environment.

Our aim was to examine if two different environments, an outdoor forest and an indoor handicraft environment, have unique effects on stress recovery in addition to comparable activities performed in them; and if so, the possible reason to this. The aim was also to study if there were any differences in the environments where the activities were performed.

2. Materials and methods

2.1. Study population

The study population was recruited through advertisements in daily papers, on public billboards at the University and in supermarkets and by recommendations from the human resources managers at the University and the municipality of Umeå. After presentation of verbal and written information regarding the study, 101 persons registered their interest to participate and were screened for participation between the years 2009 and 2012. The inclusion criteria were: a) level of stress ≥ 0.4 according to the PSQ-scale (Perceived Stress Questionnaire) (Levenstein et al., 1993), and b) age between 18 and 65 years. The age span was chosen to correspond with what is considered working age in Sweden. The exclusion criteria were: a) known alcohol or drug abuse, b) other previous or ongoing participation in intervention studies, or c) mobility impairment. Eighty-four persons met the criteria and were randomly assigned either to an outdoor group visiting a green forest environment or an indoor group visiting a non-green handicraft environment. Thirty-eight of them declined to participate just before the start or during the early part of the intervention for work or personal reasons. According to new rehabilitation rules (which coincided with the start of the project) persons on sick leave were in some cases forced to participate in certain activities which could not be combined with participation in the research project. The study was approved by The Research Ethics Committee of Umeå University (Dnr 2010-74-32 (Dnr 08–110 M)).

2.2. Final study population

The final study population consisted of 46 participants, of whom 27 visited the forest environment and 19 visited the handicraft environment. As shown in Table 1, the participants included 33 women and 13 men, with an average age of 48 years. All of them had finished secondary school and 23 had a university degree. Nine were working, eight were unemployed and three were students. Employers of those at work were not registered. Twenty-six were on part-time or full time sick leave. A prerequisite for participation in the study was that participants could allocate two half days per week to the study. This resulted in the high amount of participants on sick leave.

2.3. Experimental design

The intervention lasted for 12 weeks with 3–4 h visits, twice a week during either autumn or spring (usually from the middle of September to the middle of December, or from the middle of March to the middle of June). In each of these seasons, a group of 2–7 participants visited the forest environment and another group visited the handicraft environment, accompanied by a group leader, in the middle (brightest part) of the day. The participants in the forest group were picked up in the center of Umeå by the group leader and brought to the forest by car. In this way it was ensured that both the forest and handicraft group put as little effort as possible to make their way to the environment and that the effort was comparable between groups. In both environments, each visit started with a small meal followed by a simple breathing relaxation exercise, designed to foster a calm but alert state and, if necessary, avoid potential anxiety attacks during the stay in the environment. The meal and exercise were taken around a fire in the forest environment, and in a ring of chairs around a table in the handicraft environment. The participants then spent two hours engaged in simple activities in their environments. Examples of activities in the forest environment were walks, relaxation by the fire, woodcutting, gathering twigs and branches after forest clearance or relaxation in solitude in a preferred place. Activities in the handicraft environment included wood carving, varnishing and painting the resulting carvings, and simply relaxing in solitude in a secluded corner with a relax chair. All activities were

Table 1

Background of the participants (n = 46), with numbers and percentages of indicated groups (classified by gender, living conditions, highest education and occupation) who visited the forest and handicraft environments. Unemployed includes participants who were not working and some on work-practice. Sick leave includes participants who had retired early.

	Forest		Handicraft		Total	
	n	%	n	%	N	%
Number of participants	27	59	19	41	46	100
Sex						
Women	21	78	12	63	33	
Men	6	22	7	37	13	
Total	27	100	19	100	46	
Living conditions						
Living alone	6	22	6	32	12	
Living together with another adult	12	44	3	16	15	
Living together with another adult and children	3	11	8	42	11	
Living together with children	4	15	2	11	6	
Living together with someone else	2	7	0	0	2	
Total	27	99 ^b	19	101 ^b	46	
Highest education						
Secondary school	14	52	9	47	23	
University	13	48	10	53	23	
Total	27	100	19	100	46	
Occupation						
Sick leave	17	63	9	47	26	
Unemployed	5	19	3	16	8	
Working	3	11	6	32	9	
Studying	2	7	1	5	3	
Total	27	100	19	100	46	
Age						
	Years		Years		Years	
	47 (13) ^a		50 (11) ^a		48 (12) ^a	

^a Standard deviation.

^b Differs from 100% due to rounding errors.

voluntary, placing no demands on the participants. The main focus was on relaxation and restoration, rather than doing or producing. The fireplace in the forest environment and the coffee table in the handicraft environment provided focal meeting points where food and thoughts could be shared. At the end of every session the participants gathered and each had 2 min to talk about their experience of the day without interruptions from the other participants.

The forest and handicraft environments were respectively visited 8–22 and 7–23 times by individual participants (mean number of visits, 17, in both cases). A group leader was enrolled to provide support and qualified information about each environment. The group leader in the forest environment was a trained forester who had previous experience of working with people suffering from exhaustion disorder. The group leader in the handicraft environment had a background as an occupational therapist, teacher in a Rudolf Steiner nursery school and wood-carving teacher.

2.4. Outcome measures

Psychological outcomes of the interventions were measured using a set of standard questionnaires (the Perceived Stress Questionnaire, Shirom-Melamed Burnout Questionnaire, Checklist Individual Strength questionnaire and Self-Concept and Short Form 36 survey, described below) and questions regarding medicine consumption, symptoms and sleeping patterns. The questionnaires were filled in at the start and end (after 3 months) of the intervention. In addition, immediate effects of the environments on mood, representing the restorative quality of the environments, were estimated by a short questionnaire before and after each visit.

2.5. Measurements at start and end of the study

2.5.1. Psychological outcomes

Fatigue: The Checklist Individual Strength (CIS) questionnaire estimates individuals' level of fatigue during the last 2 weeks. It consists of 20 statements designed to assess the subjective experience of fatigue, concentration, motivation, and level of physical activity on a 7-point scale from 1 to 7 where 1 represents the lowest level and 7 the highest. The composite total score represents the overall index. Low scores indicate low degrees of fatigue and concentration problems, with high levels of motivation and activity (Vercoulen et al., 1994). The CIS can discriminate persons with fatigue from persons with non-fatigue in a working population (Berurksen et al., 2000).

Stress: The Perceived Stress Questionnaire (PSQ) estimates an individual's level of perceived generalized stress. It is composed of 30 statements with 4-grade response scales from 1 (almost never) to 4 (almost always). An index is calculated by subtracting 30 from the total score then dividing by 90, thus it ranges from 0 (no stress) to 1 (maximal stress) (Levenstein et al., 1993). Indices of 0.34–0.46 and > 0.46 are regarded as indicating moderately high and high stress levels, respectively (Bergdahl and Bergdahl 2002).

Self-esteem: The Self-Concept Questionnaire (SCQ) estimates people's level of self-esteem. Measures are significance, worthiness, competence, resilience and determination, appearance and social acceptability, control over personal destiny, and the value of existence. The questionnaire consists of 30 items scored from 0 (completely disagree) to 7 (completely agree). The composite total score was calculated. Higher total scores indicate higher self-esteem (Robson 1989).

Burnout: The Shirom-Melamed Burnout Questionnaire (SMBQ) consists of 22 items — rated from 1 (never or almost never) to 7 (always or almost always) — designed to estimate individuals' level of burnout, in terms of four subscales: emotional and physical fatigue, cognitive weariness, tension and listlessness. The result was calculated as mean values. (Melamed et al., 1999).

Self-reported health: The Short Form Health Survey 36 (SF-36) questionnaire consists of 36 questions, in several distinct sets intended to gauge individuals' self-reported health in terms of: physical functioning, role limitations due to physical health problems, bodily pain, social functioning, general mental health, role limitations due to emotional problems, vitality and general health (Ware and Sherbourne, 1992). A score on a scale from 0 (worst possible health state) to 100 (best possible health state) is calculated for each of these eight aspects (Sullivan et al., 1995). The result was calculated as mean values.

General disease symptoms were estimated by the numbers of self-reported symptoms of dizziness, headache, ache in neck and shoulders, ache in hands and arms, backache and ache in legs. The number of medicines used by the group in each environment was also estimated.

2.5.2. Physiological outcomes

Sleeping pattern of each participant was monitored using a wrist-worn Actiwatch from CamNtech Ltd (Cambridge, UK) and self-recorded in a sleep diary during three consecutive days and nights at the start and the end of the 3-month study period. The data were analyzed using

Actiwatch Activity & Sleep Analysis software version 7.23 (Cambridge Neurotechnology). Four sleep parameters: total time in bed (from trying to fall asleep until getting out of bed); sleep latency (the time taken to fall asleep); total sleep duration (excluding periods of wakefulness during the night); and sleep efficiency (the percentage of time in bed spent sleeping) were derived from the Actiwatch recordings and sleep diary.

2.6. Measurements during the study period

2.6.1. Psychological outcomes

The mood of participants was estimated before and after each visit to their assigned environments in terms of perceived tension (tense-relaxed), fatigue (exhausted-alert), happiness (sad-happy), irritability (irritated-harmonious), restlessness (restless-peaceful) and clear-headedness (mentally divided-clearheaded) on a scale from 1 (negative) to 7 (positive). For these assessments we used a questionnaire based on the validated Profile of Mood States (POMS) and Zuckerman Inventory of Personal Reactions (ZIPERS) (McNair et al., 1971; Zuckerman 1977) instruments, which has been previously used in a rehabilitation study (Sonntag-Öström et al., 2011, 2015a).

2.6.2. Environmental outcomes

Perception of the environment: After each visit to their assigned environments, the participants also registered how they perceived the environment at that occasion. They answered twelve statements on a scale from 1 = completely disagree to 7 = completely agree. The statements were derived from the PRS scale (Hartig et al., 1996) and modified into the following simple statements: Here; is bright, all fits together naturally, I am protected from visibility, I have an overview, I feel safe, I release thoughts about routines, I can just be, I am a part of the whole, is space, something captures my attention, it is secretive and mysterious, it is simple and undramatic.

2.7. Environment descriptions

The forest environment was located in the boreal zone (Ahti et al., 1968) near lake Bäcksjön (coordinate system WGS 84: 63°58' N, 20°21' E) about 17 km from the city of Umeå in northern Sweden. The lake is approximately 3 km long, 1 km wide and surrounded by various types of forest and natural features with no settlements. The site where the participants spent most of their time was in boreal forest, managed according to standard practices in the area, dominated by pine (*Pinus sylvestris*), spruce (*Picea abies*) and scattered broadleaves, mostly birch (*Betula pubescens*). Light was measured at each visit with a Model 1300 light meter (Clas Ohlson, Sweden). The mean light intensity in the forest during the two intervention periods were 2780 lx (stand. dev. 3422 lx) in the autumn and 13734 lx (stand. dev. 8222 lx) in the spring. A “base camp” was established by a windshield with a hearth surrounded by big birch stumps that were used as seats during the meals and the breathing exercises (Fig. 1). The participants were given warm clothes, rubber boots, rain gear and a sleeping mat so they could be comfortable regardless of the weather and sit down on the ground to



Fig. 1. A: the ‘basecamp’ used for eating, breathing exercises and gathering at the end of each visit in the forest environment. B: view from the forest towards lake Bäcksjön.



Fig. 2. A: view from the coffee-table into the room in the handicraft environment. B: the corner for relaxation. C: carving fresh twigs. D: hangers resulting from the carving.



C



D

rest if they wanted.

The handicraft environment was located in a basement in Umeå, with a grey concrete floor and primrose walls (Fig. 2). Four windows were located close to the ceiling and cloths were used to divide the room into smaller areas. The mean light intensity in the room was 206 lx (standard deviation, 31 lx). It was sparsely furnished with a bench for sawing and drilling, a table for colouring, a storage shelf, a chopping block, and a circular table and chairs that were used during the meals and breathing exercises. The innermost part, separated by a cloth, was a place for rest with a comfortable chair. There was access to a toilet and a small kitchen.

2.8. Statistics

A power analysis before the study indicated that approximately 50 patients per group were needed for 90% power to detect a statistically significant difference ($P < 0.05$) in stress level indicated by mean PSQ scores between the forest and handicraft environment groups, assuming a mean difference in PSQ scores of 0.08 and a standard deviation of 0.12. Thus, with an expected dropout rate of 25%, 130 randomly assigned patients would be needed. However, due to new rehabilitation rules for people on sick leave there were difficulties in recruiting participants for the study since the tested interventions have not been accepted as proven rehabilitation methods. Eventually, 101 participants

were recruited and 46 completed the entire program.

2.8.1. Measurements at start and end of the study

The psychological outcomes: A non-parametric design for repeated measures, with “before/after” and occasion as within-subject factors and environment as a between-subject factor, was used in the statistical analyses of the participants’ psychological outcomes. The analyses were performed using the%F1_LD_F2 SAS macro (Brunner et al., 2002; Shah and Madden 2004) in SAS version 9.3 (SAS Institute Inc., Cary, NC).

Physiological outcomes: The sleep data were analyzed by ANOVA with repeated measures, with time as a within-subject variable and location as a between-subject variable assuming that the data were normally distributed.

2.8.2. Measurements during the study period

Psychological outcomes – Mood: A non-parametric design for repeated measures, with “before/after” and occasion as within-subject factors and environment as a between-subject factor, was used in the statistical analyses of the participants’ mood. The analyses were performed using the%F1_LD_F2 SAS macro (Brunner et al., 2002; Shah and Madden 2004) in SAS version 9.3 (SAS Institute Inc., Cary, NC).

2.8.3. Environmental outcomes

Perception of the environment: Differences in psychological outcome measures were analyzed using an ordinal logistic regression model, implemented in SPSS statistics software version 21 (SPSS Inc., Chicago, IL, USA), with a first-order autoregressive correlation structure to adjust for correlations within individuals over time.

Mean values and standard deviations of light in the forest environment during autumn and spring, as well as all presented graphs, were generated using Microsoft Excel 2010.

3. Results

3.1. Measurements at start and end of the study

3.1.1. Psychological outcomes

Fatigue, stress, self-esteem and burnout: The psychological tests showed that participants’ health had improved after the interventions, i.e. visits to either the forest or handicraft environment (Table 2). More specifically, their levels of fatigue (CIS score), stress (PSQ score) and burnout (SMBQ score) were all lower. However, there was no

Table 2

Participants’ fatigue (CIS) total scores, stress (PSQ) index scores, self-esteem (SCQ) total scores and burnout (SMBQ) mean scores registered in psychometric tests before and after the 3-month intervention period with visits to the forest or handicraft environments (scores with standard errors in parentheses). P-values indicate significance of differences in scores between forest and handicraft environments (E), before and after the visits (BA), and interaction between E and BA (E*BA), respectively. n = 24 and 16 for participants who visited the forest and handicraft environments, respectively.

	Environment				p-values		
	Forest		Handicraft				
	Before	After	Before	After	E	BA	E*BA
Fatigue	98.13 (4.38)	82.75 (4.68)	88.81 (6.90)	80.63 (6.51)	0.51	0.00***	0.37
Stress	0.60 (0.03)	0.46 (0.04)	0.56 (0.04)	0.44 (0.04)	0.60	0.00***	0.81
Self-esteem	#129.68 (4.46)	132.17 (5.04)	#118.00 (5.52)	121.06 (6.67)	0.14	0.21	0.94
Burnout	4.97 (0.21)	4.46 (0.25)	4.69 (0.30)	4.37 (0.27)	0.47	0.00**	0.76

** = significant at p < 0.01, *** = significant at p < 0.001, #n = 21, n = 22, n = 14.

Table 3

Mean values before and after the 3-month intervention and statistical analyses are presented for the eight self-reported health concepts in SF-36; physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional and mental health. P-values indicate significance of differences between mean values where E = environment (forest and handicraft), BA = before and after the intervention period and E*BA is the covariance between E and BA.

	Environment				p-values		
	Forest		Handicraft				
	Before	After	Before	After	E	BA	E*BA
Physical functioning	86.25	86.04	86.56	85.31	0.73	0.76	0.28
Role physical	34.36	61.46	64.06	68.75	0.16	0.03*	0.07
Bodily pain	47.50	52.96	57.75	55.13	0.33	0.36	0.23
General health	47.92	54.04	55.50	59.00	0.33	0.01**	0.63
Vitality	27.29	40.21	34.36	41.25	0.50	0.00***	0.44
Social functioning	44.27	56.77	60.94	66.41	0.06	0.03*	0.29
Role emotional	37.50	48.61	54.16	54.17	0.40	0.38	0.38
Mental health	47.00	61.33	50.50	60.75	0.88	0.00***	0.51

* ** and *** indicate significant differences at p < 0.05, p < 0.01 and p < 0.001, respectively.

significant improvement in their level of self-esteem (SCQ score).

Self-reported health: Several improvements in the health of participants who visited either environment were also detected, i.e. scores for several health aspects were significantly higher (p < 0.05) after the intervention (Table 3). More specifically, they felt less limitation in their daily life due to physical problems, considered their general health to have improved, did not feel so tired and worn out, noted that physical and emotional problems interfered less with normal social activities, and their mental health had improved so they felt happier and calmer.

We also tested for differences in general disease symptoms between participants who visited the forest and handicraft environments. A significant result was found only in number of medicines consumed, with fewer medicines after as compared to before the intervention period in both environments (Table 4).

3.1.2. Physiological outcomes

Sleep pattern: Sleep latency increased slightly (by 9 min, p = 0.01) among participants who visited the handicraft environment during the intervention, but it remained the same for those who visited the forest environment, and no significant effects of the visits were detected on any of the other sleep parameters (Table 5).

3.2. Measurements during the study period

3.2.1. Psychological outcomes

Mood: After a visit to either environment, the participants felt more relaxed, alert, happy, harmonious, peaceful and clearheaded than before the visit. Over time, they also felt significantly more clearheaded (Fig. 3 and Table 6).

Aggregated mood: A visit to either environment improved the participants’ aggregated mood (measured using the instrument described above, as a combined value for the relaxed, alert, happy, harmonious, peaceful and clearheaded dimensions for all participants), as shown in Fig. 4. The aggregated mood increased from before, to after, each visit (BA) to the environment (p < 0.001). No difference in aggregated mood could be found for participants assigned to either the forest or the handicraft environments (E), nor was there a change in aggregated mood for them over time during the three months intervention (VN) (Table 7).

Table 4

Number of participants who suffered from stress-related symptoms (dizziness, headache, ache in neck and shoulders, ache in hands and arms, backache and ache in legs) during the last three months and the total number of medicines used by the group in each environment. P-values for the variables E = environment, BA = before compared to after the intervention period, and E*BA = interactions between the two variables.

Environment	Number of participants (n)							Tot no. of group Medicines
	Diz-ziness	Head-ache	Ache neck, shoulder	Chest ache	Ache hand, arm	Back-ache	Ache leg	
Forest before	16	19	20	14	14	19	14	68
Forest after	12	18	18	12	16	17	12	60
Handicraft before	6	14	14	5	6	9	8	40
Handicraft after	7	13	15	7	7	8	10	30
<i>p</i> -values								
E	0.23	0.54	0.28	0.14	0.14	0.11	0.88	0.93
BA	0.48	0.28	0.81	0.91	0.30	0.39	0.83	0.005*
E*BA	0.12	0.83	0.095	0.44	0.88	0.90	0.28	0.059

** significant difference, *p*-value < 0.01, n in forest = 24, n in handicraft = 14.

Table 5

Differences in participants' sleep parameters derived from Actiwatch recordings and a sleep diary before and after the 3-months intervention period with visits to the forest or handicraft environments. P-values indicate significance of differences in scores between forest and handicraft environments (E), before and after the visits (BA), and interaction between E and BA (E*BA), respectively.

	Environment (minutes)		(p-values)		
	Forest (n = 24)	Handicraft (n = 12)	E	BA	E*BA
Time in bed	+00:22:58	+00:15:18	0.59	0.06	0.39
Actual sleep time	+00:08:17	-00:12:12	0.44	0.50	0.96
Sleep efficiency	-1.04	-1.55	0.51	0.49	0.89
Sleep latency	+00:05:05	+00:09:11	0.01*	0.63	0.02*

* significant at *p* < 0.05.

3.2.2. Environmental outcomes

Perception of the environment: The participants perceived that everything fitted together more naturally in the forest than in the handicraft environment, and the forest was more secretive and mysterious (Table 8). However, they felt equally safe in both environments.

4. Discussion

The participants in the present study visited either an outdoor forest or an indoor handicraft environment to alleviate stress symptoms. Both environments included similar activities, starting with a gathering with a small meal, followed by a short breathing relaxation exercise, two hours of voluntary activities or just relaxation, and ended with a gathering.

The forest environment has earlier, in comparison to the city, been shown to be more undemanding and restorative already after a short visit and thereby contributing more to restoration and lower heart rate for persons with chronic fatigue syndrome (Sonntag-Öström et al., 2014). Persons with chronic fatigue did not recover enough to return to work after a three-month period of visits to forest environments. However, they were able to take hold of their lives and begin to plan for the future (Sonntag-Öström et al., 2015a,b). In line with these findings, the results in the present study show that spending time in the forest during a three-month period has restorative effects for people suffering from high stress. However, the handicraft environment offered similar restorative effect. After the intervention period participants in both environments had lower levels of fatigue, stress and burnout. Obviously the green forest environment was not better than the indoor environment at reducing stress. This conflicts with our hypothesis that nature in the form of an outdoor forest environment would promote recovery from stress better than an indoor environment, in accordance with previous findings that forest visits have strong restorative qualities (e.g. Kaplan and Kaplan 1989; Grahn and Stigsdotter 2003). However, many studies compared visits to forests (and other natural environments)

with visits to urban environments, rather than other potentially restorative environments (Sonntag-Öström et al., 2014; Ulrich et al., 1991).

We hypothesized that the activities in the indoor environment, which offered voluntary simple woodcarving, and the activities in the forest environments were equally restorative. Leisure and meaningful occupation are restorative experiences (Newman et al., 2014) which may have influenced the result. However, many of the participants had such a high stress level that an extra activity (as participating in the study) was hardly seen as a leisure activity. The participants in the handicraft environment, as well as those in the forest environment, were not obliged to perform any activities at all. They could just sit and rest if they so wished. When designing the study our objectives were to characterize the restorative potential of a green boreal forest and compare its effects with a non natural environment with similar characteristics. We were not interested in having a control group consisting of patients receiving standard care with medication for their stress symptoms, or spending the same amounts of time in an environment known to be non-restorative and more stressful (such as most urban environments). Thus, we chose a non-green indoor environment as the control, and included voluntary similar activities in both environments. Therefore, study was designed to compare the two different restorative environments. As far as we know, no previous study has explicitly compared a forest and a handicraft environment and their restorative effect on people with high stress levels.

Although there were no significant between-environment differences, it is important to note that both groups, regardless of environment, improved their health. The participants' self-reported health (physical role functioning, general health, vitality, social functioning and mental health measured by SF-36) as well as their general and mental health (level of fatigue, stress and burnout) improved during the 3-month intervention, showing that the visits to the forest or the handicraft environments improved almost all dimensions of the participants' health.

The intervention had little apparent effect on the participants' sleeping patterns. The only significant difference detected was that the sleep latency of those who visited the handicraft environment significantly increased, by 9 min on average. Longer sleep latency is indicative of increased stress, poor sleep overall and (hence) lower quality of life (LeBlanc et al., 2007; Andruskiene et al., 2008; Åkerstedt et al., 2014). However, we consider the 9 min increase to have been of minor importance in the context of the wider improvements in participants' health and mood, particularly as there were no other indications that the intervention impaired sleeping patterns.

The results thus show that regular visits to a forest improved the mood of people with high stress levels, in accordance with previous findings that visits to forests and other natural environments enhance both psychological and physiological recovery (e.g., Korpela et al., 2014; Sonntag-Öström et al., 2014). However, similar improvements in

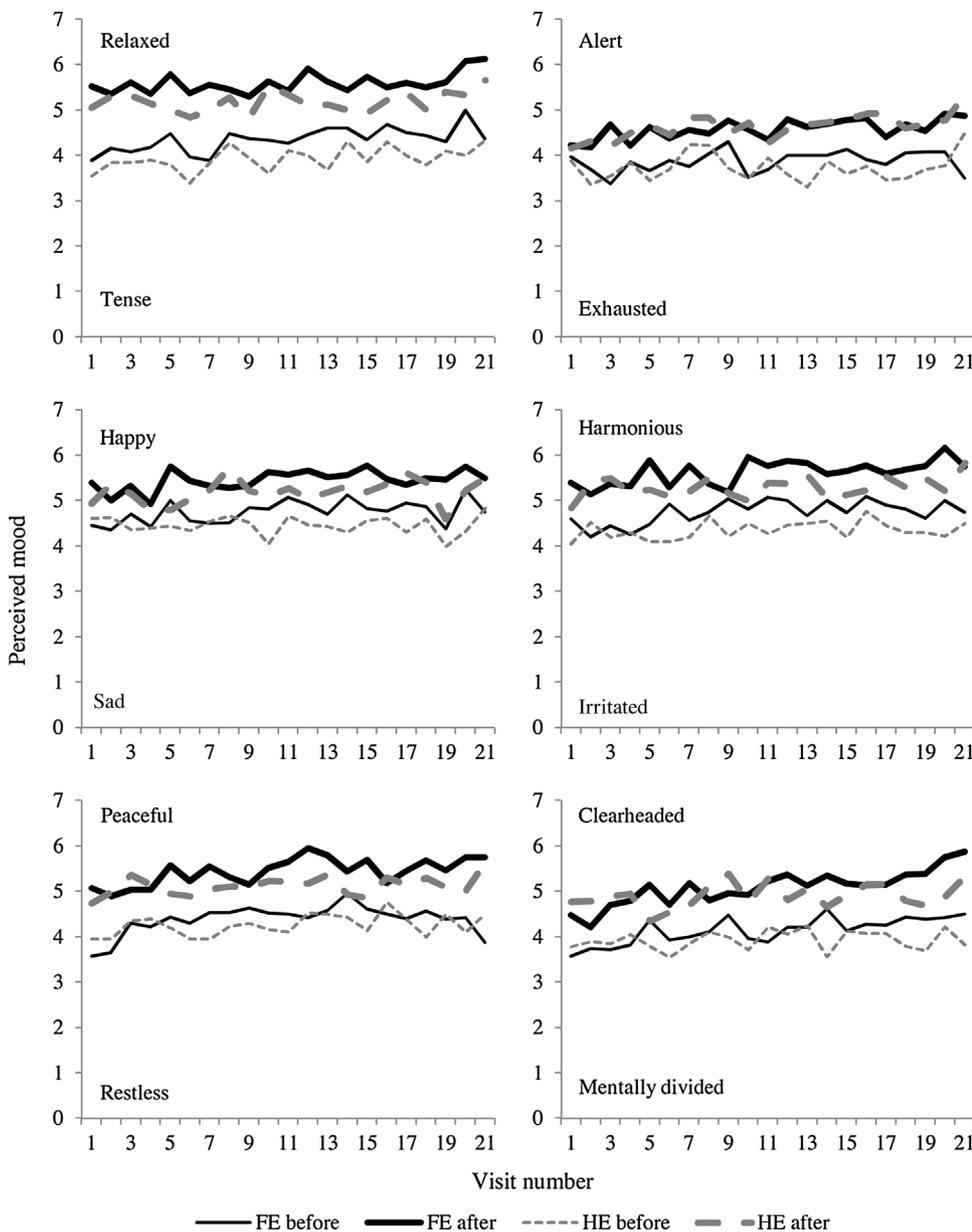


Fig. 3. The participants' perceived mood before and after visits to the forest (FE) or the handcraft environment (HE), where 1 indicate the worst possible mood and 7 indicate the best possible mood. The mood was registered in questionnaires at each visit. n = 46.

Table 6
Significance of differences of participants' perceived mood, registered in questionnaires at visits to the two environments, where E = Forest or Handcraft environment, VN = number of visit, and BA = mood before and after each visit. E*BA, E*BA, VN*BA and E*VN*BA indicate interactions between these variables. N = 46.

	Relaxed	Alert	Happy	Harmonious	Peaceful	Clearheaded
<i>p</i> -values						
E	0.10	0.97	0.16	0.08	0.39	0.32
VN	0.21	0.51	0.72	0.64	0.19	0.05
BA	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
E*VN	0.94	0.73	0.73	0.64	0.60	0.26
E*BA	0.95	0.50	0.82	0.89	0.56	0.80
VN*BA	0.16	0.37	0.96	0.36	0.13	0.56
E*VN*BA	0.77	0.72	0.50	0.83	0.79	0.64

* significant at $p < 0.05$.
*** significant at $p < 0.001$.

mood were observed among the participants who visited the handcraft environment. The simple instrument used for measuring mood was constructed by the research team, and has earlier been applied in

studies on forest rehabilitation of persons with exhaustion disorder (m et al., 2011, 2014, 2015a; m et al., 2011, 2014, 2015a; m et al., 2011, 2014, 2015a). It is based on validated instruments such as Profile of Mood, POMS, (McNair et al., 1971) and Zuckerman Inventory of Personal Reactions, ZIPERS, (Zuckerman, 1977), and is short and simple in order to minimize the mental effort of participants with exhaustion disorder.

The health indicators (CIS, PSQ, SMBQ and 5 health concepts in SF-36) and mood (clearheaded) of the participants who visited the two environments improved equally well during the intervention period, with extremely few significant differences (9 min in sleep latency and two variables in perceptions of the environment) between the two groups. Since we recruited fewer participants than the threshold for statistical power calculated before the study it is possible that greater differences may have emerged if the sample size (number of participants) had been larger. It is also possible that the intervention should have been longer as, e.g., Karlson et al. (2010) have shown that people suffering from burnout need substantial time to recover before they can successfully return to work. In the cited study only 73% of the participants had returned to work (partially or fully) after 18 months of

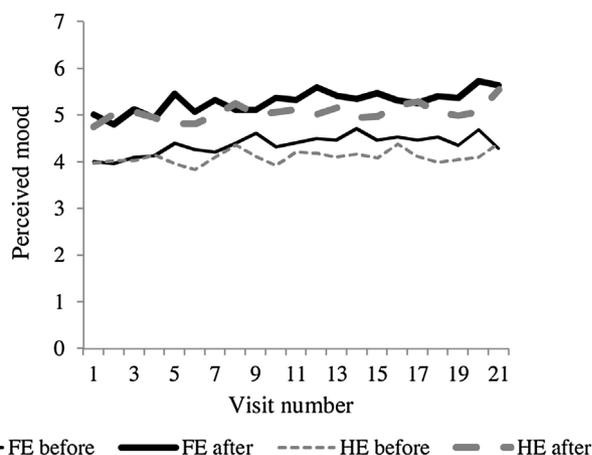


Fig. 4. Mean values of the participants' aggregated perceived mood before and after visits to the forest (FE) and handicraft environments (HE), where 1 indicate the worst possible mood and 7 indicate the best possible mood. The aggregated mood is calculated as a combined value for the relaxed, alert, happy, harmonious, peaceful and clearheaded dimensions. N = 46.

Table 7

Significance of differences in participants' aggregated perceived mood after visits to the two environments and interactions between variables. The aggregated mood is calculated as a combined value for the relaxed, alert, happy, harmonious, peaceful and clearheaded dimensions.

	Aggregated mood (p-values)
E Forest or Handicraft environment	0.27
VN Number of visit	0.15
BA Mood before and after each visit	0.00***
Interaction between E and VN	0.81
Interaction between E and BA	0.84
Interaction between VN and BA	0.49
Interaction between E and VN and BA	0.83

*** significant at $p < 0.001$.

Table 8

Mean scores of participants' perceptions of the forest and handicraft environments registered in questionnaires at each visit to the environment, where 1 = completely disagreed and 7 = completely agreed. P-values indicate the significance of differences in perceptions between the two environments.

	Environment		p-values
	Forest	Handicraft	
How the environment is perceived	mean values		
It is bright	5.8	5.0	0.100
All fits together naturally	6.2	5.4	0.008**
Protected from visibility	5.3	5.7	0.283
I have an overview	5.6	5.9	0.383
I feel safe	6.1	6.1	0.934
I release thoughts about routines	5.3	5.7	0.097
I can just be	6.3	6.2	0.227
I am a part of the whole	6.1	5.6	0.064
Here is space	6.4	6.0	0.076
Something captures my attention	5.7	6.0	0.280
It is secretive and mysterious	4.4	2.7	0.002**
It is simple and undramatic	6.0	6.1	0.941

** = significant at $p < 0.01$.

intervention. It should also be noted that participants in the present study included people who were moderately stressed, rather than solely those who were severely stressed, according to the PSQ-scale. Nevertheless, the indications that the two environments were approximately equally restorative seem robust, and are the most intriguing results.

The findings indicate that both environments fulfilled the four

criteria listed by Kaplan and Kaplan (1989) for an environment to be restorative: giving a feeling of being away, having extent, creating fascination, and being compatible with the participants' intentions. The first criterion, being away, represents an escape from everyday life through separation by either geographic distance or psychological distinctions from a person's normal environment. In the forest the participants probably felt being away since they experienced a different environment, offering simple activities, while the participants in the handicraft environment may have felt being away by the undemanding wood carving. In the same way the effortless activities in both environments provided extent. Extent refers to an environment offering a context where people feel they belong and inducing a desire to explore, accompanied by an effortless and soft fascination that allows their thoughts to wander away. We consider that the two environments with their undemanding comparable activities were not imposing obstacles to the participants intentions (Kaplan 1995). Both environments were considered to be restorative and to foster positive emotions in the beholder (van den Berg et al., 2003). To sum up; both the studied environments, including the similar activities provided in our intervention, presumably fulfilled these criteria and signalled coherence, recognition and safety, all of which contributed to the restorative effect.

4.1. Limitations of the study

We can't ignore, though, that natural recovery over time could be responsible for the participants health changes from the first to the last session of the interventions. It can be as simple as to be included in a social context contributes to recovery from stress. There is also a possibility that the two group leaders could have influenced the participants and thereby the results of the study. The participants may, e.g., have been motivated to 'reward' the leaders by rating their well-being more highly at the end of each visit. We can't ignore this fact, but we think that the impact of the leaders was of minor importance as they were instructed to be passive and interfere with the participants as little as possible. However, we could not prohibit the participants to interact with each other and therefor the social support by the group may have had some influence on the results.

The sample size was smaller than required by the power analyses, which may have affected reliability of the result. The small sample size was the result of newly imposed governmental rules for sick leave and rehabilitation which entailed problems for us to find the desired number of participants.

In an earlier study where patients with exhaustion disorders spent time in different forest settings (Sonntag-Öström et al., 2015a), the control condition implied care-as-usual. Thereby we did not know the participants daily activities. It was found that patients in the control group participated in alternative treatments at a larger degree compared to the intervention group which may have influenced the result. In the present study we found it necessary to find control conditions comparable to the forest conditions. However, a control condition, in addition to the forest and the handicraft environments, implying care-as-usual would probably have given more reliable results.

The leaders were told to keep a low profile and not initiate discussions. Even though the group was not encouraged to socialise, the social aspect, like the support the participants gave to each other, could not be controlled for. However, in a similar project the participants reported that the time in solitude in a chosen forest environment was more important to them than the gatherings around the fire (Sonntag-Öström et al., 2015b). Those findings would indicate that the time spent in the environment with the selected activities would have been of larger importance to the results of the present study as compared to the social aspect.

However, characteristics of environments that promote calmness and restoration among the rising numbers of persons with high stress levels clearly require further elucidation as provision of a good restorative environment may be a highly cost- and time-effective

rehabilitation and/or prevention solution. More long-term studies are also needed, for instance on the participants' health status in years following the intervention.

Qualitative research to uncover participants' own views of e.g. the benefits derived from the environments, their accompanying set of activities and the impact of the social support by the group has been performed. The results will be presented in a coming paper which will then give further information to the questions addressed in the study.

5. Conclusion

The health of the participants who visited either the outdoor forest environment or the indoor handicraft environment significantly improved during the intervention period. Whether an environment, including activities, is indoors or outdoors appears to be less important for restoration than other aspects, such as coherence, appeal and/or the degree and nature of demands. Even an indoor environment with suitable activities can act restorative. However, the key restoration-promoting features require further elucidation.

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Nature-assisted therapy: Systematic review of controlled and observational studies:

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Abstract

Background: Nature's potentially positive effect on human health may serve as an important public health intervention. While several scientific studies have been performed on the subject, no systematic review of existing evidence has until date been established. **Methods:** This article is a systematic evaluation of available scientific evidence for nature-assisted therapy (NAT). With the design of a systematic review relevant data sources were scrutinised to retrieve studies meeting predefined inclusion criteria. The methodological quality of studies and abstracted data were assessed for intervention studies on NAT for a defined disease. The final inclusion of a study was decided by the authors together. **Results:** The included studies were heterogeneous for participant characteristics, intervention type, and methodological quality. Three meta-analyses, six studies of high evidence grade (four reporting significant improvement), and 29 studies of low to moderate evidence grade (26 reporting health improvements) were included. For the studies with high evidence grade, the results were generally positive, though somewhat ambiguous. Among the studies of moderate to low evidence grade, health improvements were reported in 26 cases out of 29. **Conclusions:** This review gives at hand that a rather small but reliable evidence base supports the effectiveness and appropriateness of NAT as a relevant resource for public health. Significant improvements were found for varied outcomes in diverse diagnoses, spanning from obesity to schizophrenia. Recommendations for specific areas of future research of the subject are provided.

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Green spaces and cognitive development in primary schoolchildren

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Exposure to green space has been associated with better physical and mental health. Although this exposure could also influence cognitive development in children, available epidemiological evidence on such an impact is scarce. This study aimed to assess the association between exposure to green space and measures of cognitive development in primary schoolchildren. This study was based on 2,593 schoolchildren in the second to fourth grades (7–10 y) of 36 primary schools in Barcelona, Spain (2012–2013). Cognitive development was assessed as 12-mo change in developmental trajectory of working memory, superior working memory, and inattentiveness by using four repeated (every 3 mo) computerized cognitive tests for each outcome. We assessed exposure to green space by characterizing outdoor surrounding greenness at home and school and during commuting by using high-resolution (5 m × 5 m) satellite data on greenness (normalized difference vegetation index). Multilevel modeling was used to estimate the associations between green spaces and cognitive development. We observed an enhanced 12-mo progress in working memory and superior working memory and a greater 12-mo reduction in inattentiveness associated with greenness within and surrounding school boundaries and with total surrounding greenness index (including greenness surrounding home, commuting route, and school). Adding a traffic-related air pollutant (elemental carbon) to models explained 20–65% of our estimated associations between school greenness and 12-mo cognitive development. Our study showed a beneficial association between exposure to green space and cognitive development among schoolchildren that was partly mediated by reduction in exposure to air pollution.

neurodevelopment | greenness | cognition | built environment | school

Contact with nature is thought to play a crucial and irreplaceable role in brain development (1, 2). Natural environments including green spaces provide children with unique opportunities such as inciting engagement, risk taking, discovery, creativity, mastery and control, strengthening sense of self, inspiring basic emotional states including sense of wonder, and enhancing psychological restoration, which are suggested to influence positively different aspects of cognitive development (1–3). Beneficial effects of green spaces on cognitive development might accrue from direct influences such as those above, with green space itself exerting the positive influence or through indirect, mediated pathways. The ability of green spaces to mitigate traffic-related air pollution (TRAP) (4) could lead to a beneficial impact of green spaces on cognitive development, because exposure to TRAP has been negatively associated with cognitive development in children (5). Further to TRAP, green spaces can also reduce noise (6), which itself too has been negatively associated with cognitive development (7). Moreover, proximity to green spaces, particularly parks, has been suggested to increase physical activity (8), and higher levels of physical

activity are related to improved cognitive development (9). Outdoor surrounding greenness has also been reported to enrich microbial input from the environment (10), which may positively influence cognitive development (10). Through these pathways, exposure to green space, including outdoor surrounding greenness and proximity to green spaces, could influence cognitive development in children, yet the available population-based evidence on the association between such exposure and cognitive development in children remains scarce.

The brain develops steadily during prenatal and early postnatal periods, which are considered as the most vulnerable windows for effects of environmental exposures (11). However, some cognitive functions closely related with learning and school achievement—such as working memory and attention—develop across childhood and adolescence as an essential part of cognitive maturation (12–14). We therefore hypothesized a priori that exposure to green space in primary schoolchildren could enhance cognitive development. Accordingly, our study aimed to assess the association between indicators of exposure to green space and measures of cognitive development, including working memory (the system that holds multiple pieces of transitory information in the mind where they can be manipulated), superior working memory (working memory that involves continuous updating of the working memory buffer), and inattentiveness in primary schoolchildren. As a secondary aim, we also evaluated the mediating role of a reduction in air pollution as one of the potential mechanisms underlying this association.

Significance

Green spaces have a range of health benefits, but little is known in relation to cognitive development in children. This study, based on comprehensive characterization of outdoor surrounding greenness (at home, school, and during commuting) and repeated computerized cognitive tests in schoolchildren, found an improvement in cognitive development associated with surrounding greenness, particularly with greenness at schools. This association was partly mediated by reductions in air pollution. Our findings provide policymakers with evidence for feasible and achievable targeted interventions such as improving green spaces at schools to attain improvements in mental capital at population level.

Author contributions: P.D., M.J.N., X.Q., and J. Sunyer designed research; M.J.N., J.F., M.A.-P., I.R., M.L.-V., M.D.C.P., X.Q., and J. Sunyer performed research; M.E., X.B., J. Su, and M.J. contributed new reagents/analytic tools; P.D., M.E., and X.B. analyzed data; and P.D. and J. Sunyer wrote the paper.

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Methods

Study Setting. We undertook this study in Barcelona, Spain, a port city situated on the northeastern part of the Iberian Peninsula. It has a Mediterranean climate characterized by hot and dry summers, mild winters, and maximum precipitation and vegetation during autumn and spring. This study was conducted in the context of the brain development and air pollution ultrafine particles in school children (BREATHE) project. Of the 416 schools in Barcelona, 37 schools were initially selected to obtain maximum contrast in TRAP levels (i.e., nitrogen dioxide: NO₂), of which 36 accepted to participate and were included in the study (*SI Appendix, Fig. S1*). Participating schools were similar to the remaining schools in Barcelona in terms of the neighborhood socioeconomic vulnerability index (0.46 versus 0.50, Kruskal–Wallis test $P = 0.57$) and NO₂ levels (51.5 versus 50.9 μg/m³, Kruskal–Wallis test $P = 0.72$).

All schoolchildren ($n = 4,562$) without special needs in the second to fourth grades (7–10 y) of these schools were invited to participate by letters or presentations in schools for parents, of which 2,623 (58%) agreed to take part in BREATHE. All children had been in the school for more than 6 mo (and 98% more than 1 y) before the beginning of the study. All parents or guardians signed the informed consent and the study was approved (No. 2010/41221/I) by the Clinical Research Ethical Committee of the Parc de Salut Mar, Barcelona.

Outcome: Cognitive Development. Cognitive development was assessed through 12-mo change in developmental trajectory of working memory and attention. We selected these functions because they grow steadily during preadolescence (15, 16). We used computerized *n*-back test for assessing working memory (15) and computerized attentional network test (ANT) (17) for evaluating attention.

From January 2012 to March 2013, children were evaluated every 3 mo over four repeated visits by using computerized tests in sessions lasting ~40 min in length. Groups of 10–20 children wearing ear protectors were assessed together and supervised by one trained examiner per 3–4 children. For the *n*-back test, we examined different *n*-back loads (up to three-back) and stimuli (colors, numbers, letters, and words). For analysis here, we selected both two-back and three-back loads for number and word stimuli because they showed a clear age-dependent slope in the four measurements (4). The two-back predicts general mental abilities (i.e., working memory) whereas the three-back also predicts superior functions such as fluid intelligence (i.e., superior working memory) (18). All sets of *n*-back tests started with colors as a training phase to ensure participants' comprehension of the test. The *n*-back parameter analyzed was *d* prime (*d'*), a measure of detection subtracting the normalized false alarm rate from the hit rate [(Z hit rate – Z false alarm rate) × 100]. A higher *d'* indicates more accurate test performance. Given that our final findings for numbers and words were similar, here we only show results for numbers. Among the ANT measures, we chose hit reaction time standard error (HRT-SE) (SE of RT for correct responses), a measure of response speed consistency throughout the test (19), because it showed a clear growth during the 1-y study period. A higher HRT-SE indicates highly variable reactions related to inattentiveness.

Exposure to Green Space. Our assessment of exposure to green space was based on a comprehensive characterization of outdoor surrounding greenness (photosynthetically active vegetation) encompassing greenness surrounding home, greenness surrounding commuting route between home and school (hereafter referred to as commuting greenness), and greenness within and around school boundaries.

To assess outdoor surrounding greenness we applied normalized difference vegetation index (NDVI) derived from RapidEye data at 5 m × 5 m resolution. NDVI is an indicator of greenness based on land surface reflectance of visible (red) and near-infrared parts of spectrum (20). It ranges between –1 and 1, with higher numbers indicating more greenness. The RapidEye Imagery is acquired from a constellation of five satellites 630 km above ground in sun-synchronous orbits. We generated our NDVI map by using the image obtained on July 23, 2012, that was available for our study region during our study period (*SI Appendix, Fig. S1*).

Residential surrounding greenness. Residential surrounding greenness was abstracted as the average of NDVI in a buffer of 250 m (21, 22) around the home address of each study participant. For 174 children (5.9%) who shared two homes, we used the address where the child spent most of her/his time.

Commuting greenness. Data on the main mode of commute to and from school was obtained from parents via questionnaires. Approximately 60% of participants reported walking as the main mode of commuting, whereas the 38% reported commuting by motor vehicles (private car, bus, motorcycle, or tram). The remaining 2% reported the underground metro train as the main mode of transport, for whom we assumed no exposure to greenness during

commuting. For participants reporting walking as the main mode of commuting, we identified the shortest walking route to school and for participants reporting motor vehicles as the main mode of commuting, we identified the shortest driving route to school, based on street networks (network distance) by using network analyst extension from ArcGIS software v10. We defined commuting greenness as the average of NDVI in a 50-m buffer around the commuting route.

School greenness. To assess greenness within school premises, we first digitized the school boundaries and then averaged NDVI values within those boundaries. To assess greenness surrounding schools, we averaged NDVI values across a 50 m buffer around the school boundaries.

Total surrounding greenness index. We developed a total surrounding greenness index by averaging residential surrounding greenness (250-m buffer), commuting greenness, and greenness within school boundaries weighted by the daytime (12 h a day) that children were assumed to spend at home (3 h), commuting (1 h), and school (8 h). To avoid double-counting in developing this index, we abstracted as the average NDVI over commute corridor beyond the 250-m home buffer and 50-m school buffer.

Main Analyses. Data on 9,357 tests from 2,593 (99%) children were available for analysis. Because of the multilevel nature of the data (i.e., multiple visits for each child within schools), we used linear mixed effects models with the four repeated cognitive parameters as outcomes (one test at a time), each measure of exposure to green space (one at a time) as fixed effect predictor, and child and school as random effects (5). An interaction between age at each visit and the indicator of exposure to green space was included to capture changes in 12-mo progress in cognitive trajectory associated with greenness exposure (5). The main effect of exposure to green space, which was also included in the model, captured the baseline (visit 1) differences in cognitive function that were associated with exposure to green space before the first visit. This model was further adjusted for potential confounders identified a priori: age (centered at visit 1), sex, and indicators of socioeconomic status (SES) at both individual and area levels. Maternal education (no or primary/secondary/university) was used as the indicator of individual-level SES and Urban Vulnerability Index (23), a measure of neighborhood SES at the census tract (median area of 0.08 km² for the study region) was applied as the indicator of area-level SES. Linearity of the relation between exposure to green space and cognitive tests was assumed because generalized additive mixed models did not show any nonlinearity of associations. We estimated the change in average outcome scores associated with one interquartile range (IQR) increase (based on all study participants) in average NDVI. Statistical significance was set at $P < 0.05$. R statistical package was used to carry out the analyses.

Mediating Role of Traffic-Related Air Pollution. We hypothesized that reduction in TRAP levels could be one of the potential mechanisms underlying the association between greenness exposure and cognitive development. To quantify such a mediating role, we calculated the percent of the associations between greenness and cognitive development explained by TRAP as $[1 - (\beta_{gm}/\beta_g)] \times 100$, where β_{gm} was the regression coefficient for the greenness exposure in a fully adjusted model including the mediator (i.e., TRAP) and β_g was the regression coefficient in the fully adjusted model without including the mediator (24).

We focused on the associations between school greenness and cognitive development because they were the strongest among our evaluated associations (*Results*) and also because of the availability of data on levels of air pollutants at BREATHE schools that were monitored as part of the BREATHE project. Such a high-quality monitored data were not available for TRAP levels at homes or during commuting. Among the TRAPs monitored in the BREATHE framework, we chose indoor levels of elemental carbon (EC) for this mediation analyses. EC is mainly generated by fossil fuel combustion and is considered as a tracer of road traffic emissions in Barcelona (25). In other BREATHE analyses, we had observed that indoor EC was associated with adverse impacts on cognitive development (5) and EC levels were reduced in schools with higher greenness (4). Detailed description of TRAP sampling methodology at the BREATHE schools has been published (25, 26).

Results

Children were on average 8.5 y old at baseline and 50% were girls. Regarding maternal education, 13% of mothers had no or only primary school, 29% secondary school, and 58% university education. Further characteristics of the study participants are presented in *SI Appendix, Table S1*. Average working memory increased by 22.8%, superior working memory by 15.2%, and

inattentiveness decreased by 18.9% during the follow up (Table 1). At baseline, higher maternal education was associated with better cognitive function (*SI Appendix, Table S2*). For 12-mo progress, whereas higher maternal education was associated with larger reduction in inattentiveness, improvements in working memory and superior working memory were not associated with maternal education (*SI Appendix, Table S2*). The median (IQR) of our estimated surrounding greenness for all participants and across strata of maternal education are presented in Table 2 and *SI Appendix, Table S2*, respectively. The Spearman's correlation coefficient among residential, school, and commuting surrounding greenness varied from 0.46 (between surrounding greenness at home and greenness within school boundaries) to 0.80 (between commuting and school surrounding greenness) (*SI Appendix, Table S3*).

Main Analyses. We observed an enhanced 12-mo progress in working memory and superior working memory and a greater 12-mo reduction in inattentiveness associated with greenness within and surrounding school boundaries and with the total surrounding greenness index (Table 2, Fig. 1, and *SI Appendix, Fig. S2*). Commuting greenness was also associated with improved 12-mo progress in working memory and superior working memory, although the association for superior working memory was only marginally statistically significant. We did not observe any association between residential surrounding greenness and cognitive measurements (Table 2). None of the indicators of outdoor greenness were associated with baseline cognitive measurements (Table 2).

The findings for *n*-back tests with “word” stimuli were consistent with the aforementioned results for “number” stimuli (*SI Appendix, Table S4*). The association between commuting greenness and 12-mo progress in superior working memory, which had borderline statistical significance for the three-back test using number stimuli, was statistically significant for the test using word stimuli.

To explore the possibility of an impact of green space exposure on other ANT measures than inattentiveness, we repeated the main analyses by using alerting, orienting, and executive processing (one at a time) abstracted from ANT as outcome. We did not observe any statistically significant association for these outcomes with any of indicators of green space exposure (*SI Appendix, Table S5*), which was consistent with our observation that these measures did not show any clear growth during the study period.

We conducted a number of sensitivity analyses as described in *SI Appendix* that showed the robustness of our findings to alternative definition of total surrounding greenness index and commuting greenness and to including a range of relevant covariates in models (e.g., socioeconomic indicators and condition of venue at the time of cognitive tests).

Mediating Role of Traffic-Related Air Pollution. The Spearman's correlation coefficients between school EC levels and greenness within and surrounding school boundaries were -0.62 and -0.66 ($P < 0.01$), respectively. Adding EC to models explained 20–65% of associations between school greenness and 12-mo progress in

cognitive functions (Table 3). Including EC reduced effect sizes in all models. EC made the associations between school surrounding greenness and superior working memory and between greenness within and surrounding school boundaries and inattentiveness much smaller and statistically nonsignificant (Table 3).

Discussion

To our knowledge, this is the first epidemiological study to report on the impact of exposure to green space on cognitive development in schoolchildren. School and total surrounding greenness index were associated with enhanced 12-mo progress in indicators of working memory and superior working memory and greater 12-mo reduction in inattentiveness. Commuting greenness was also associated with better 12-mo progress in working memory. Adding EC to our models explained 20–65% of our estimated associations between green spaces and 12-mo cognitive development.

Interpretation of Results. Over a 12-mo period, we observed that an IQR exposure increment in total surrounding greenness index was associated with a 5% increase in the progress of working memory, a 6% increase in the progress of the superior working memory, and a 1% reduction of inattentiveness. Among our assessed exposure measures, we observed the strongest associations for greenness within or surrounding school boundaries. Children spend a considerable part of their active daily time at schools and “green exercise” has been related to better mental health (27). Furthermore, the combination of physical activity in school with daily peaks of TRAPs in urban areas that often coincide with school time could result in a considerable inhaled dose of air pollutants at school. Consistently, in our other BREATHE analysis of the impact of TRAPs on cognitive development using the same measures of cognitive development as in this study, we also observed stronger associations for levels at school compared with those at home (5). Therefore, the ability of school greenness in reducing pollutant levels (4) might explain, in part, why we observed the strongest associations for school greenness.

We found some indications for an enhanced 12-mo progress in working memory associated with commuting greenness. Because of the strong correlation between greenness surrounding school boundaries and commuting greenness, it was not possible to determine the independent impact of commuting greenness (i.e., whether commuting greenness is a surrogate for school surrounding greenness). Therefore, our findings for commuting greenness should be interpreted with caution. To the best of our knowledge, this study is the first reporting on the potential impact of commuting greenness on health in general and on cognitive development in particular. We hypothesize that green exercise and visual access to greenness might underlie such an association, if any.

The beneficial associations for 12-mo progress in cognitive functions were stronger than those at baseline. Baseline estimates reflected the association between cognitive test scores at the first visit and the cumulative green space exposure preceding the study period, whereas our exposure assessment was based

Table 1. Description of the cognitive outcomes in children [median (25th–75th %)]

Visit	<i>n</i>	Age (mean), y	Working memory (WM) (two-back numbers), <i>d</i> '*	Superior WM (three-back numbers), <i>d</i> '*	Inattentiveness (ANT HRT-SE) [†] , ms
First visit	2,278	8.5	206 (129, 360)	112 (53, 171)	271 (205, 338)
Second visit	2,425	8.7	221 (129, 392)	112 (59, 190)	250 (186, 321)
Third visit	2,347	9.1	234 (129, 392)	128 (59, 190)	247 (183, 317)
Fourth visit	2,307	9.4	253 (152, 392)	129 (64, 210)	228 (165, 294)

*The *n*-back *d*' is a measure of detection subtracting the normalized false alarm rate from the hit rate [(Z hit rate – Z false alarm rate) \times 100].

[†]Hit reaction time SE (HRT-SE), SE of reaction time for correct responses as a measure of response speed consistency throughout the test.

Table 2. Adjusted difference (95% confidence interval) in baseline and 12-mo progress of working memory, superior working memory, and inattentiveness per one interquartile range (IQR) change in greenness

Surrounding greenness	Median (IQR)	Working memory [†] (2-back number stimuli, d')		Superior working memory [†] (3-back number stimuli, d')		Inattentiveness [†] (HRT-SE, ms)	
		Baseline	Progress	Baseline	Progress	Baseline	Progress
Home	0.091 (0.053)	0.2 (-3.8, 4.2)	0.7 (-2.6, 4.1)	0.6 (-2.5, 3.7)	-0.1 (-2.7, 2.6)	2.0 (-1.4, 5.4)	-0.7 (-3.1, 1.7)
School							
Within	0.094 (0.085)	0.3 (-6.8, 7.4)	9.8 (5.2, 14.0)*	0.9 (-5.0, 6.8)	6.9 (3.4, 10.0)*	-4.0 (-12.0, 4.0)	-3.4 (-6.6, -0.2)*
Surrounding [‡]	0.100 (0.120)	3.2 (-4.3, 11)	9.5 (4.5, 15.0)*	1.5 (-4.8, 7.8)	6.3 (2.3, 10.0)*	-5.1 (-14.0, 3.6)	-3.7 (-7.3, -0.1)*
Commuting	0.100 (0.062)	1.5 (-3.5, 6.6)	4.9 (1.0, 8.8) *	3.5 (-0.6, 7.5)	3.1 (0.0, 6.1)	0.2 (-4.5, 4.9)	-1.2 (-4.0, 1.7)
Total surrounding greenness index	0.094 (0.073)	0.0 (-6.9, 6.5)	9.8 (5.0, 15.0)*	1.7 (-4.4, 7.8)	6.7 (2.8, 11.0)*	-2.4 (-9.8, 4.9)	-3.9 (-7.4, -0.4)*

* $P < 0.05$.

[†]Difference adjusted for age, sex, maternal education, and residential neighborhood socioeconomic status with school and subject as nested random effects.

[‡]Fifty-meter buffer around school boundaries.

on the home address of participants and the school they were attending during the study period, not including potential prior different addresses or schools to their current ones. Part of our observed larger estimates for 12-mo progress might therefore reflect better characterization of exposure, but it could also be due to the window of vulnerability for these high executive functions that develop significantly during the primary school age (12–14). This window of vulnerability might also explain why we observed the strongest associations for 12-mo progress in superior working memory that develops considerably during this period.

We did not observe any statistically significant difference in 12-mo progress in working memory and superior working memory (for which we found associations with green space exposure) between strata of maternal education. Moreover, further adjustment of our analyses for other indicators of SES like parental employment, marital status, and ethnicity (*SI Appendix, SI Methods*) did not change the interpretation of our findings notably. Furthermore, removing SES indicators (maternal education and neighborhood SES) from our fully adjusted models did not result in a considerable change in the interpretation of our findings (*SI Appendix, Table S6*). Additionally, we did not observe any statistically significant effect modification by maternal education or neighborhood SES for our associations ($P > 0.1$). These observations might suggest that our results were unlikely to have been affected by residual SES confounding.

Available Evidence and Potential Underlying Mechanisms. We are not aware of previous epidemiological studies on the impact of green space exposure on cognitive development in schoolchildren; therefore, it is not possible to compare our findings with those of others. Our findings, however, are consistent with several previous observations. Residential surrounding greenness has been related to better mental health including lower risk of depression and anxiety in children (28). Higher school greenness has been associated with better student performance at schools (29). Experimental studies have shown walking in nature or watching photos of nature could improve directed-attention abilities in adults (30) and have “therapeutic effects” on attention deficit hyperactivity disorder symptoms in children (31–34). Our previous cross-sectional analysis of BREATHE participants showed a protective impact of home and school greenness on behavioral problems including hyperactivity and inattention (35). That analysis was based on behavioral screening questionnaires rated by teachers and parents. In those questionnaires behavioral aspects that characterized hyperactivity/inattention were modestly correlated (Spearman’s correlation coefficients ranging between 0.18 and 0.23) with the ANT inattentiveness score (at baseline) used in this study. A study by Wells (2000) reported that relocation to residences with higher “naturalness” improved cognitive function in a sample of 17

children (36). In an analysis of BREATHE schools, we observed that higher greenness inside and surrounding school boundaries was associated with lower TRAPs levels at schools (5), in line with our other study showing lower levels of personal exposure to TRAPs (based on personal monitors) associated with higher residential surrounding greenness in Barcelona (22). Another BREATHE analysis, using the same cognitive measures as the current study, demonstrated that higher levels of TRAPs at school were associated with diminished 12-mo cognitive progress (5). Thus, reduction of exposure to TRAPs associated with higher greenness could have partly underlain our observed associations. Consistently, in the current analysis we observed that including a TRAP (EC) in our models could explain one-fifth to two-thirds of the associations, suggesting that our observed beneficial associations between greenness exposure and cognitive development could have been partly mediated by reduction in exposure to TRAPs. These findings could also suggest that other mechanisms may account for 35–80% of our observed associations that was not explained by reduction in TRAP exposure. Higher ambient noise has been related with adverse impacts on cognitive development (7). The ability of green spaces to

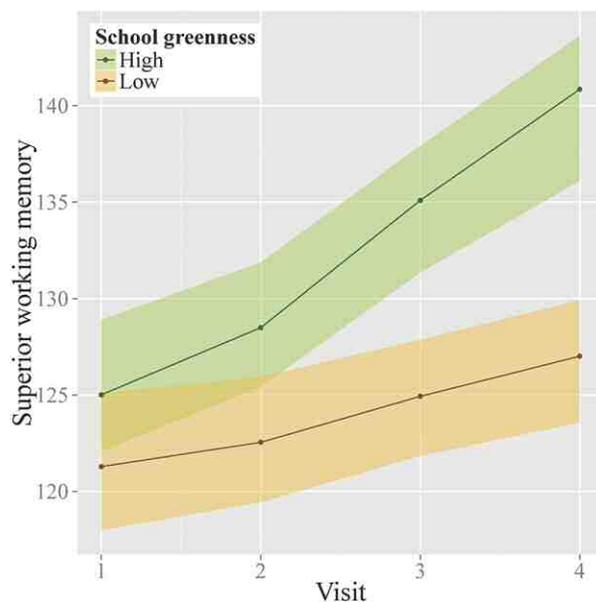


Fig. 1. Twelve-month progress (with 95% confidence bands) in superior working memory for participants with the first (low greenness) and third (high greenness) tertiles of greenness within the school boundaries.

Table 3. Difference (95% confidence interval) in 12-mo cognitive trajectory per one interquartile range change in greenness estimated by main analyses and models further including school indoor elemental carbon (EC) interaction with age

Outcomes/exposures	Main analyses ^{†,‡}	Further adjusted for EC [‡]	% explained
Working memory			
Within school	9.8 (5.2, 14.0)*	8.7 (2.5, 15.0)*	20.4
Surrounding school	9.5 (4.5, 15.0)*	6.9 (0.9, 13.0)*	27.4
Superior working memory			
Within school	6.9 (3.4, 10.0)*	4.9 (0.1, 9.8)*	29.0
Surrounding school [§]	6.3 (2.3, 10.0)*	3.3 (-1.5, 8.1)	47.6
Inattentiveness			
Within school	-3.4 (-6.6, -0.2)*	-1.2 (-5.6, 3.2)	64.7
Surrounding school	-3.7 (-7.3, -0.1)*	-1.8 (-6.1, 2.5)	51.4

* $P < 0.05$.

[†]Adjusted for age, sex, maternal education, and residential neighborhood socioeconomic status with school and subject as nested random effects.

[‡]Estimates per 0.085 and 0.120 change respectively in greenness within and surrounding school boundaries (i.e., 1-interquartile change).

[§]Fifty-meter buffer around school boundaries.

reduce noise (6) might therefore explain a part of our observed associations (37). Moreover, proximity to green spaces has been reported to increase physical activity (38), and physical activity has been associated with better cognitive function in children (9). Furthermore, parental psychological stress and depression have been reported to be adversely associated with cognitive development in their children (39) and exposure to green space has been associated with evidence of stress restorative effects and reduced depression in adults (3, 28). A growing body of evidence also suggests that a failure of the immunoregulatory pathways due to a reduced exposure to macroorganisms and microorganisms in Westernized populations might play a role in impairment of brain development (10, 40) with childhood as a particular window of vulnerability (41). Therefore, the ability of outdoor surrounding greenness to enhance immunoregulation-inducing microbial input from the environment (10) could have been another mechanism underlying our observed association between greenness exposure and cognitive development.

Implications for Policymakers. Approximately one-half of the world population lives in cities, and it is projected that by 2030, three of every five persons will live in urban areas worldwide (42). Urban areas are characterized by a network of nonnatural built-up infrastructures with increased pollutant levels and less green environments (43). Children's exposure to these pollutants such as air pollution and noise has been associated with detrimental impacts on their cognitive development. Our findings suggest for a beneficial impact of green space exposure on cognitive development, with part of this effect resulting from buffering against such urban environmental pollutants. This impact was more evident for surrounding greenness at school and for working memory and superior working memory, which are predictors of learning and academic attainment (44). Schoolchildren with a superior working memory progress of less than one-10th of a percentile (45) of the distribution can be classified as impaired superior working memory progress. Our results suggest that if schools increased greenness within their boundaries by the observed IQR (Fig. 1), then 8.8% of children with impaired superior working memory progress would move out of this category. Our findings, therefore, hold importance for policymakers when translating evidence into feasible and achievable targeted interventions such as improving greenness at schools, given that improved cognitive development in children attending schools with more greenness could result in an advantage in mental capital, which, in turn, would have lasting effects through the life-course.

Strengths and Limitations of Study. This study was based on repeated computerized tests of cognitive development to quantify different aspects of cognitive development in study participants. These tests have been reported to have acceptable internal consistency, reasonable factorial structure, and good criterion validity and statistical dependencies for use in general population (46). We applied one of the most comprehensive approaches to date to assess exposure to green space by characterizing the outdoor surrounding greenness at home and school and during commuting by using high-resolution (5 m × 5 m) satellite data on greenness, enabling us to account for small-area green spaces (e.g., home gardens, street trees, and green verges) in a standardized way.

Our study also faced some limitations. The generalizability of our findings might have been affected by selection bias in that those participants participated in BREATHE were different from those not participated with respect to SES. Approximately 58% of mothers in our study population had a university degree, which was higher than the regional average of 50% among women between 25 and 39 y old living in Barcelona (47). We did not, however, observe any indication of effect modification by maternal education in our associations. Moreover, the Urban Vulnerability Index of the schools was not associated with school participation rate (Spearman's correlation coefficient = -0.09, $P = 0.61$); these observations might suggest that the socioeconomic status was less likely to be a major predictor of participating in the study. Similarly, school greenness was not associated with participation rate at schools (Spearman's correlation coefficients of -0.06 with P value = 0.72 for greenness within school boundaries and 0.13 with P value = 0.43 for greenness surrounding schools). Our exposure assessment focused on exposure during the school age, overlooking other potential windows of susceptibility such as prenatal and preschool periods. Investigating these windows of susceptibility presents an opportunity for future studies. By using an NDVI map obtained at a single point in time (2012), we effectively assumed that the spatial distribution of NDVI across our study region remained constant over the study period (2012). The findings of our previous studies support the stability of the NDVI spatial contrast over seasons and years (21, 48). Finally, data were not available for some potentially relevant confounders, such as parental mental health status.

Conclusions

Exposure to outdoor surrounding greenness was associated with a beneficial impact on cognitive development in schoolchildren.

These associations were only partly mediated by reduction in TRAP levels, suggesting that other mechanisms likely underlie this association. Our observed beneficial associations were consistent for working memory, superior working memory, and inattentiveness and were more evident for greenness at school. Further studies are warranted to replicate our findings in other settings with different climates and to investigate other cognitive functions with different windows of susceptibility such as prenatal and preschool periods.

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6 Brain Benefits of Exercise — Including Staving Off Alzheimer's

Scientists have discovered that a hormone called irisin, which is released during exercise, may protect the brain against Alzheimer's disease, [New Scientist reports](#). The findings, learned from tests with mice, add to a growing body of knowledge pointing to how physical activity can benefit the brain.

While researchers said they hoped to eventually find a drug that could target irisin in the brain of humans and possibly reverse dementia and Alzheimer's, why wait for a drug? Here are six reasons to exercise now, whether you're trying to stave off brain diseases like dementia and Alzheimer's, or possibly reverse them now:

- 1. Exercising your legs improves the neurological health of your brain.** New research shows that the signals between your brain and leg muscles form a two-way street, and that improving leg muscle strength and particularly load-bearing strength can help the part of the brain that deals with stress and everyday challenges. Interestingly, in one study, [leg strength was found to be a better predictor for brain health](#) than any other lifestyle factor researchers reviewed.
- 2. Weight-bearing exercise helps** mitochondrial health and function, which improves your body's ability to fight off chronic disease as well as neurodegeneration of the brain. Indeed, weight-bearing against gravity itself is a crucial component of life that allows the human body and brain to function optimally. This has been clearly elucidated by Joan Vernikos, Ph.D., former director of NASA's Life Sciences Division, in her book "[Sitting Kills, Moving Heals](#)."
- 3. Previous research has shown that exercise in any form is a key way to protect,** maintain and improve your cognitive capacity, including fighting dementia. There are a number of different mechanisms behind this body-brain link. One, perhaps key, factor is related to how exercise affects [brain-derived neurotrophic factor \(BDNF\)](#), which is found in both your muscles and your brain.

4. **Exercise also helps protect and improve your brain function by:**

- Improving and increasing blood flow (oxygenation) to your brain
- Increasing production of nerve-protecting compounds
- Reducing damaging plaques in your brain
- Altering the way these damaging proteins reside inside your brain, which appears to slow the development of Alzheimer's disease

5. **Exercise improves blood flow** and oxygenation to your brain, which helps explain why what is good for your heart and cardiovascular system is also good for your brain. The increased blood flow that results from exercise allows your brain to almost immediately function better. As a result, you tend to feel more focused after a workout, which can improve your productivity.

6. **Exercise also helps reduce plaque formation** of beta-amyloid peptides, associated with Alzheimer's. By altering the way damaging proteins reside inside your brain, exercise may help slow neurodegeneration.

The good news is it's never too late to begin an exercise program. Even nonexercise movement, such as just getting up out of your seat once an hour while you work at your desk can help. And speaking of work, one solution that can work for many is to get a standup desk. Simply bearing weight on your two legs produce a biochemical cascade that cuts your risk of insulin resistance and diabetes.

Another solution is, rather than opting for convenience, take every opportunity you can to walk (or bicycle) rather than drive. Park further away; take the stairs rather than the elevator.

No matter your age, you can begin a movement program that will benefit you all over. Remember, those who exercise the most tend to have the least amount of brain shrinkage over time. Not only that, but exercise actually causes your brain to grow in size.

So, get moving and keep moving for best results. To get the most out of your workouts, I recommend a comprehensive program that includes high-intensity interval exercise and strength training (especially super slow workouts) stretching, and core work, along with walking about 10,000 steps a day.

Most Americans Suffer From Nature Deficiency Syndrome

STORY AT-A-GLANCE

- › Spending time outdoors can significantly lift your mood, and outdoors activities such as gardening and nature hikes have been found to be good therapy
- › Americans spend 80 to 99 percent of their lives indoors — a trend that has led to “nature deficit disorder,” a term used to describe a lifestyle deficit that contributes to poor psychological and physical health
- › Ecotherapy employs methods that cultivate the health benefits of being in nature. Research shows nature therapy lowers anxiety and depression, improves self-esteem, reduces blood pressure and more

By Dr. Mercola

Spending time outdoors can significantly lift your mood, so it's no surprise that outdoors activities such as **gardening** and nature hikes¹ have been found to be good therapy. In one survey,² 80 percent of gardeners reported being "happy" and satisfied with their lives, compared to 67 percent of non-gardeners, and the more time spent in the garden, the greater their life satisfaction.

Among volunteers at an outdoor conservation project, a whopping 100 percent said participation improved their mental health and boosted their confidence and self-esteem.³ This general well-being among gardeners is typically attributed to the "recharging" you get from sticking your hands into soil and spending time in nature.

According to Craig Chalquist,⁴ a depth psychologist and chair of the East-West Psychology Department at California Institute of Integral Studies, who also happens to be certified in

permaculture design: "If you hold moist soil for 20 minutes, the soil bacteria begin elevating your mood. You have all the antidepressant you need in the ground."⁵

In Japan, the practice known as "forest bathing" (Shinrin-yoku) has been part of the national health program since 1982, and its benefits are now starting to become more widely recognized in the U.S. As explained by The Atlantic:⁶

"The aim was to briefly reconnect people with nature in the simplest way possible. Go to the woods, breathe deeply, be at peace. Forest bathing was Japan's medically sanctioned method of unplugging before there were smartphones to unplug from. Since Shinrin-yoku's inception, researchers have spent millions of dollars testing its efficacy; the documented benefits to one's health thus far include lowered blood pressure, blood glucose levels and stress hormones."

The Importance of Slowing Down

Being in nature has the effect of winding you down because nature's pace is so much slower than our man-made environment. There's a pulse and rhythm in nature, and when you start to observe it and take it in, you find that everything takes time. Change is not immediate. It's a process. With "lightning speed" internet and 24/7 connectivity, we tend to forget this. We get so used to instant results and immediate gratification. You could say observing nature leads to greater tolerance for slowness, otherwise known as patience.

This feeling of well-being can have more far-reaching implications for your physical health too. According to research from Johns Hopkins,⁷ having a cheerful temperament can significantly reduce your odds of suffering a **heart attack** or **sudden cardiac death**. As noted by lead author Lisa R. Yanek:⁸

"If you are by nature a cheerful person and look on the bright side of things, you are more likely to be protected from cardiac events. A happier temperament has an actual effect on disease and you may be healthier as a result."

Nature Deficit Disorder — A Rampant Malady

A recent article in The Atlantic⁹ highlights the growing field of ecotherapy, referring to "methods of cultivating the **health benefits of being in nature**."¹⁰ As noted by Florence Williams, author of "The Nature Fix: Why Nature Makes Us Happier, Healthier, and More Creative," "Intuitively, many of us believe ... we feel better in nature. But it's only recently that we've been able to see biomarkers of this change."¹¹

In the video above, The Atlantic senior editor Dr. James Hamblin investigates these benefits and interviews mental health therapists using ecotherapy in their practice. Other terms^{12,13} used for this kind of therapy include green therapy, nature therapy and earth-centered therapy.

Ecotherapy as an umbrella term also covers horticultural therapy, animal-assisted therapy, wilderness therapy, farm therapy, time stress management and "ecoanxiety"¹⁴ management — stress, **depression**, **anxiety**, grief and despair attributed specifically to trauma related to climate disruptions. An example would be depression or grief following the loss of a loved one in a hurricane or flash flood.

Estimates suggest the average American spends anywhere between 80 and 99 percent of their life indoors — a lifestyle trend that has led to what some now refer to as "nature deficit disorder."¹⁵ This is not an actual psychological diagnosis, but rather a term used to describe a lifestyle deficit that contributes to poor psychological and physical health. Ecotherapy, which basically involves a prescription to go out and spend time in a natural setting, has been shown to:¹⁶

- Decrease anxiety and depression
- Improve self-esteem
- Improve social connections
- Decrease fatigue in cancer patients
- Improve blood pressure

Spending time outdoors also boosts your vitamin D level (provided you're showing enough bare skin) and, if you **walk barefoot**, helps you ground (also known as **Earthing**).

Ecotherapy for Depression

Seven years ago, I interviewed medical journalist and Pulitzer Prize nominee Robert Whitaker about his extensive research and knowledge of **psychiatric drugs and alternative treatments for depression**. He mentioned an interesting study conducted at Duke University in the late 1990s, which divided depressed patients into three treatment groups: exercise only, exercise plus **antidepressant**, and antidepressant drug only.

After six weeks, the drug-only group was doing slightly better than the other two groups. However, after 10 months of follow-up, it was the exercise-only group that had the highest remission and stay-well rate. According to Whitaker, some countries are taking these types of research findings very seriously, and are starting to base their treatments on the evidence at hand.

In the U.K., for example, doctors can write out a prescription to see an exercise counselor instead under the "exercise on prescription program."¹⁷ Part of the exercise can be tending to an outdoor garden, taking nature walks, or repairing trails or clearing park areas, as discussed in the BBC video above.

Within the first few years of the introduction of this ecotherapy¹⁸ program in 2007, the rate of British doctors prescribing exercise for depression increased from about 4 percent to about 25 percent. According to a 2009 report on ecotherapy by U.K.-based Depression Alliance:¹⁹

"... [Ninety-four] percent of people taking part in a MIND survey commented that green exercise activities had benefited their mental health ... Furthermore, the National Institute for Clinical Excellence asserts that for 'patients with depression ... structured and supervised exercise can be an effective intervention that has a clinically significant impact on depressive symptoms.'"

Nature as a Healing Agent

People are increasingly starting to recognize that nature deficits play a significant role in health and well-being, and this recognition can even be seen in literature. As noted by The Telegraph,²⁰ "nature writing" is a relatively novel literary genre, in which memoir is comingled with "the author's experience of nature." In other words, books describing the healing influence of nature.

"In 'H is for Hawk,' Helen Macdonald tells of the unexpected loss of her father in her late [30]s. To distract herself from her grief, she attempts to tame a hawk ... Similarly, Amy Liptrot, in her book 'The Outrun: [A Memoir],' describes her return to the isle of Orkney, where she took long walks and rebuilt a stone wall as a way of recovering from alcohol addiction and the breakup of a relationship. These are but two of many recent examples," The Telegraph writes.

The Three-Day Effect

While many artists will tell you that nature can have a tremendous influence on the creative process, it can also have a profound effect on an intellectual's capacity to reason and think clearly and deeply. In "This Is Your Brain on Nature,"²¹ National Geographic delves into the healing powers of nature from a psychologist's point of view:

"... David Strayer ... [a] cognitive psychologist at the University of Utah who specializes in attention ... knows our brains are prone to mistakes, especially when we're multitasking and dodging distractions ... Strayer is in a unique position to understand what modern life does to us. An avid backpacker, he thinks he knows the antidote: Nature.

On the third day of a camping trip in the wild canyons near Bluff, Utah, Strayer is ... explaining what he calls the 'three-day effect' to 22 psychology students. Our brains, he says, aren't tireless [3]-pound machines; they're easily fatigued. When we slow down, stop the busywork, and take in beautiful natural surroundings, not only do we feel restored, but our mental performance improves too ...

Strayer has demonstrated as much with a group of Outward Bound participants, who performed 50 percent better on creative problem-solving tasks after three days of wilderness backpacking.

The three-day effect, he says, is a kind of cleaning of the mental windshield that occurs when we've been immersed in nature long enough ... 'If you can have the experience of being in the moment for two or three days, it seems to produce a difference in qualitative thinking.'"

Nature Walks Decrease Negative Thoughts

Indeed, recent research²² shows spending time in nature helps reduce depression and anxiety specifically by reducing rumination, i.e., obsessive negative thoughts that just go round and round without ever getting to any kind of resolution. Ruminating thoughts light up a region in your brain called the subgenual prefrontal cortex, an area that regulates negative emotions.

When rumination continues for extended periods of time, depression can result. To assess the effect of nature walks on rumination, 38 psychologically healthy city dwellers were divided into two groups. One group took a 90-minute walk through a scenic area while the other strolled along El Camino Real, a busy four-lane road in Palo Alto.

As expected, those walking along the traffic-logged street had no decrease in rumination, while the nature walkers experienced a significant decrease in subgenual prefrontal cortex activity.

City Living Linked to Anxiety and Mood Disorders

Researchers looking at stress have found city dwellers are more likely to suffer from mood and anxiety disorders in general, compared to those living in more rural environments — an effect thought to be due to chronically increased stress levels.²³

Using functional magnetic resonance imaging (fMRI), researchers at the Douglas Mental

Health University Institute at McGill University in Canada showed that the environment in which you live can alter your neural processes, thereby raising or lowering your risk of psychological problems.

Thirty-two healthy adults were asked to complete a difficult, timed math problem while simultaneously hearing negative verbal responses. Those who lived in urban environments had increased activity in the amygdala area of the brain, which is involved in emotions such as fear and responses to threats. Those who lived in cities during the first 15 years of their life also had increased activity in the pregenual anterior cingulate cortex, which helps to regulate the amygdala.

In short, those who grew up in an urban environment had a greater sensitivity to stress. In an accompanying editorial,²⁴ Daniel Kennedy, Ph.D., and Ralph Adolphs, Ph.D., both of the California Institute of Technology, explained that your level of autonomy may play a role in how stressful city living is for you:

"There are wide variations in individuals' preferences for, and ability to cope with, city life: Some thrive in New York City; others would happily swap it for a desert island.

Psychologists have found that a substantial factor accounting for this variability is the perceived degree of control that people have over their daily lives. Social threat, lack of control and subordination are all likely candidates for mediating the stressful effects of city life, and probably account for much of the individual differences seen."

Nature Sounds Help You Relax

Other recent research shows that the mere sounds of nature have a distinct effect on your brain, lowering fight-or-flight instincts and activating your rest-and-digest autonomic nervous system.^{25,26,27} Here, participants listened to two different types of sound — nature sounds and sounds from a man-made artificial environment — while lying in an fMRI scanner. During each five-minute soundscape, they also performed tasks designed to

measure attention and reaction time.

Nature sounds produced brain activity associated with outward-directed focus, whereas artificial sounds created brain activity associated with inward-directed focus. The latter, which can express itself as worry and rumination about things related to your own self, is a trait associated with anxiety, depression and post-traumatic stress disorder.

Nature sounds also produced higher rest-digest nervous system activity, which occurs when your body is in a relaxed state. External attentional monitoring tasks and mental concentration also improved. Overall, nature sounds had the greatest effect on those who were the most stressed. Previous research has also demonstrated that listening to nature sounds help you recover faster after a stressful event. Lead author Cassandra Gould van Praag, Ph.D., said:

"We are all familiar with the feeling of relaxation and 'switching-off' which comes from a walk in the countryside, and now we have evidence from the brain and the body which helps us understand this effect.

This has been an exciting collaboration between artists and scientists, and it has produced results which may have a real-world impact, particularly for people who are experiencing high levels of stress ...²⁸ I would definitely recommend a walk in natural surroundings to anyone, whether they're currently feeling frazzled or not. Even a few minutes of escape could be beneficial."²⁹

Taking Advantage of Nature's Remedy

The take-home message here is that spending time in nature can have profound benefits for your physical and psychological health. In fact, nature deficits may even be at the heart of many people's anxiety and general malcontent — they just don't know it. Indoor living has become such a norm, many give no thought to the fact they haven't been more than a few feet away from concrete in weeks, months or even years.

The key is to be proactive. You have to actually plan your escapes — schedule nature time into your calendar as you would any other important activity. If your free time is limited, you

may need to get creative. My situation requires me to read many books and studies to stay on top of the latest health advancements. In years past, I would spend hours reading indoors every day. I solved my need for reading and walking outdoors by reading on my Kindle during my beach walks, nailing two birds with one stone, so to speak.

Keeping a garden is another simple way of getting closer to nature without having to go far. In addition to increasing your sense of well-being, keeping a garden can also reduce your grocery bill and improve your health by providing you with fresh, uncontaminated food (provided you grow them organically).

On days when you cannot get out, consider using an environmental sound machine or a CD with nature sounds. Another alternative that doesn't cost anything is to bookmark a few YouTube videos of nature sounds. Many are several hours long. Should you happen to need professional help, consider seeking out an ecotherapist. Most practicing ecotherapists are trained and licensed in some form of conventional counseling or psychotherapy, and use nature therapy as an adjunct in their practice.

If you're in the U.K., check out Mind's ecotherapy page (mind.org)³⁰ for various program resources. In the U.S., finding a nature-based therapist is a bit trickier, as the field is still fairly new. One way to locate an ecotherapist might be to contact schools that teach ecotherapy, and ask them for recommendations of people who have passed the course.

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Gardening Can Help Beat Depression

STORY AT-A-GLANCE

- › Depression affects 10 percent of Americans at some time in their life, and the number of Americans diagnosed with depression increases by about 20 percent annually
- › There's a growing acceptance that maintaining good physical health and spending time outdoors can significantly lower your risk of developing depression in the first place
- › 80 percent of gardeners report being "happy" and satisfied with their lives, compared to 67 percent of non-gardeners; 87 percent of those who garden more than six hours a week report feeling happy, compared to those spending less time in their gardens
- › 100 percent of volunteers interviewed during an outdoor conservation project agreed that participation benefited their mental health, boosted self-esteem and improved confidence
- › Fitness researchers have also found that when you exercise outdoors, you exercise harder but perceive it as being easier than when exercising indoors, which can have significant health benefits

By Dr. Mercola

Every year, some 230 million prescriptions for antidepressants are filled, making them one of the most-prescribed drugs in the United States.

Despite this, the incidence of all forms of **depression** is now at 10 percent, according to 2012 statistics¹, and the number of Americans diagnosed with depression increases by about 20 percent per year².

Such statistics are a strong indication that what we're doing is simply not working, and that instead, these drugs are contributing to other serious health problems. Fortunately, there are other, safer, more effective ways to address depression—including something as simple as spending more time outdoors.

Gardeners Are Happier Than Most Others

According to a recent survey for *Gardeners World* magazine³, 80 percent of gardeners reported being “happy” and satisfied with their lives, compared to 67 percent of non-gardeners.

And the more time spent in the garden, the higher their satisfaction scores—87 percent of those who tend to their gardens for more than six hours a week report feeling happy, compared to those spending less time in their gardens.

Monty Don⁴, a TV presenter and garden writer, attributes the well-being of gardeners to the “recharging” you get from sticking your hands in the soil and spending time outdoors in nature.

I can personally confirm this as over the past year I have started a major interest in high performance agriculture and biodynamic gardening, and have been busy applying it to my edible and ornamental landscape. I hope to soon teach all that I have learned.

Interestingly, fitness researchers have also found that when you exercise outdoors, you exercise harder but *perceive* it as being easier than when exercising indoors, which can have significant health benefits.

This feeling of well-being can have more far-reaching implications for your physical health too. According to recent research from Johns Hopkins⁵, having a cheerful temperament can significantly reduce your odds of

suffering a heart attack or sudden cardiac death. According to lead author Lisa R. Yanek, M.P.H., an assistant professor in the Division of General Internal Medicine at the Johns Hopkins University School of Medicine⁶:

"If you are by nature a cheerful person and look on the bright side of things, you are more likely to be protected from cardiac events. A happier temperament has an actual effect on disease and you may be healthier as a result."

What the Research Says About Exercise and 'Ecotherapy' for Depression

Three years ago, I interviewed medical journalist and Pulitzer Prize nominee **Robert Whitaker** about his extensive research and knowledge of psychiatric drugs and alternative **treatments for depression**. He mentioned an interesting study conducted by Duke University in the late 1990's, which divided depressed patients into three treatment groups:

1. Exercise only
2. Exercise plus antidepressant
3. Antidepressant drug only

After six weeks, the drug-only group was doing slightly better than the other two groups. However, after 10 months of follow-up, it was the *exercise-only* group that had the highest remission and stay-well rate. According to Whitaker, some countries are taking these types of research findings very seriously, and are starting to base their treatments on the evidence at hand.

The UK, for example, does not routinely recommend antidepressants as the first line of therapy for mild to moderate depression anymore, and doctors there can write out a prescription to see an exercise counselor instead under the "exercise on prescription programme⁷."

Part of the exercise can be tending to an outdoor garden, taking nature walks, or repairing trails or clearing park areas—as discussed in the BBC video above. According to Dr. Alan Cohen, a British general practitioner with a special interest in mental health⁸:

“[W]hen people get depressed or anxious, they often feel they're not in control of their lives. Exercise gives them back control of their bodies and this is often the first step to feeling in control of other events.”

Within the first few years of the introduction of this so-called “Green Gym” or “Ecotherapy⁹” program in 2007, the rate of British doctors prescribing exercise for **depression** increased from about four percent to about 25 percent.

Studies on exercise as a treatment for depression also show there’s a strong correlation between improved mood and aerobic capacity. So there’s a growing acceptance that the mind-body connection is very real, and that maintaining good physical health can significantly lower your risk of developing depression in the first place. According to a 2009 report on Ecotherapy by the British Depressionalliance.org¹⁰:

“94 percent of people taking part in a MIND survey commented that green exercise activities had benefited their mental health; and 100 percent of volunteers interviewed during an outdoor conservation project agreed that participation benefited their mental health, boosted self-esteem and improved confidence. Furthermore, the National Institute for Clinical Excellence asserts that for ‘patients with depression... structured and supervised exercise can be an effective intervention that has a clinically significant impact on depressive symptoms.’”

Ready, Set, Garden!

Aside from increasing your sense of well-being, keeping a garden can also improve your health by providing you with fresher, uncontaminated food, and cutting your grocery bill. And you don't need vast amounts of space either. You don't even have to have a backyard. Apartment dwellers can even create a well-stocked edible garden.

There are tons of creative solutions that will allow you to make the most of even the tiniest space, and engaging your own creativity to solve space limitations can be part of your therapy. You can also start **growing sprouts** which is rapidly rewarding as, unlike gardens, in about one week you will have food that you can harvest and eat.

In her book *The Edible Balcony*, Alex Mitchell details how to grow fresh produce in small spaces. Filled with beautiful color photographs throughout, the book helps you determine what might work best for you, depending on your space and location, and guides you through the design basics of a bountiful small-space garden. For example, those who live in a high-rise apartment will undoubtedly have to contend with more wind than those who live on the bottom floor. There are solutions for virtually every problem, and in this case, wind-tolerant plants can be used, or you could construct some sort of protective screening.

You can use virtually every square foot of your space, including your lateral space. Hanging baskets are ideal for a wide variety of foods, such as strawberries, leafy greens, runner beans, pea shoots, tomatoes, and a variety of herbs. And instead of flowers, window boxes can hold herbs, greens, radishes, **scallions**, bush beans, strawberries, chard, and chiles, for example. Just start small, and as you get the hang of it, add another container of something else. Before you know it, large portions of your meals could come straight from your own edible garden.

To learn more, please see my previous article on creating **edible gardens in small spaces**. I garden both outdoors and indoors. As I mentioned previously,

sprouts are one of my favorite tight-space crops, as they provide so much nutrition, which is another critical factor for beating the blues and they give you far more immediate feedback than growing a garden.

Six Additional Strategies That Can Help You Address Depression

The following five strategies are important to consider if you are facing depression. These strategies have nothing but positive effects and are generally very inexpensive to implement:

- 1. Optimize Your Gut Flora.** Mounting research indicates that the bacterial colonies residing in your gut may play *key roles* in the development of brain, behavioral and emotional problems—from depression to ADHD, autism and more serious mental illness like schizophrenia. A recent proof-of-concept study found that probiotics (beneficial bacteria) actually altered participants' brain function¹¹. Compared to the controls, the women who consumed probiotic yogurt had decreased activity in two brain regions that control central processing of emotion and sensation. The implications are particularly significant in our current era of rampant depression and emotional “malaise.”

In a very real sense you have *two brains*, one inside your skull and one in your gut, and each needs its own vital nourishment. It's important to realize that you have neurons both in your brain *and* your gut -- including neurons that produce neurotransmitters like serotonin. In fact, the greatest concentration of serotonin, which is involved in mood control, depression and aggression, is found in your *intestines*, not your brain! Perhaps this is one reason why **antidepressants**, which raise serotonin levels in your *brain*, are often ineffective in treating depression, whereas proper dietary changes often help.

Fermented foods are the best route to optimal digestive health, as long as you eat the traditionally made, unpasteurized versions. Some of the beneficial bacteria found in fermented foods are also excellent **chelators of heavy metals and pesticides**, which will also have a beneficial health effect by reducing your toxic load. Healthy choices include **fermented vegetables**, lassi (an Indian yoghurt drink, traditionally enjoyed before dinner), fermented milk, such as kefir, and natto (fermented soy). If you do not eat fermented foods on a regular basis, taking a high-quality probiotic supplement is definitely recommended.

- 2. Do a Bit of Emotional Housekeeping.** It is helpful to view depression as a sign that your body and life are out of balance, rather than as a disease. What you need to do is regain your balance. One of the key ways to do this involves addressing negative emotions that may be trapped beneath your level of awareness. My favorite method of emotional cleansing is **Emotional Freedom Technique (EFT)**, a form of psychological acupressure.

If you have severe depression, it would be best to consult with a mental health professional who is also an EFT practitioner. But for most of you with **depression symptoms**, this is a technique you can learn to do effectively on your own. In fact, it's so easy that children are learning it.

There are other effective stress-management methods you could try as well, such as meditation, journaling, breathing exercises, yoga, or simply sharing your feelings with a close friend. Experiment with a number of approaches, and then pick the methods you find most helpful, but please remember that although it is very easy to learn EFT and far less expensive to use it yourself, it is nearly always better to seek a professional to perform EFT with you as it truly is an art that takes many years of refined practice to maximize its effectiveness.

In the videos below, EFT practitioner Julie Schiffman shows how you can

use EFT to relieve your physical pain and depression.

- 3. Get Regular Exercise.** Regular exercise is one of the "secret weapons" to overcoming depression. It works by helping to normalize your insulin levels while boosting the "feel good" hormones in your brain. For more information, please [review my article about the many ways exercise can benefit your brain](#). As **Dr. James S. Gordon, MD**, a world-renowned expert in using mind-body medicine to heal depression, said:

"What we're finding in the research on physical exercise is that exercise is at least as good as antidepressants for helping people who are depressed... physical exercise changes the level of serotonin in your brain. And it increases your endorphin levels, your 'feel good hormones.'

And also—and these are amazing studies—exercise can increase the number of cells in your brain, in the region of the brain called the hippocampus. These studies were first done on animals, and they're very important because sometimes in depression, there are fewer of those cells in the hippocampus. But you can actually change your brain with exercise. So it's got to be part of everybody's treatment, everybody's plan."

- 4. Improve Your General Nutrition.** Another factor that cannot be overlooked is your diet. Foods have an immense impact on your body and your brain, and eating whole foods as described in my [nutrition plan](#) will best support your mental and physical health.

Avoiding sugar (particularly fructose) and grains will help normalize your insulin and leptin levels, which is another important aspect of depression. Sugar causes chronic inflammation, which disrupts your body's normal immune function and can wreak havoc on your brain. Sugar also suppresses a key growth hormone called BDNF (brain derived

neurotrophic factor), which promotes healthy brain neurons and plays a vital role in memory. BDNF levels are critically low in people with depression, which animal models suggest may actually be causative.

- 5. Supplement Your Diet with Omega-3 Fatty Acids.** I strongly recommend taking a **high-quality, animal-based omega-3 fat**, like krill oil. This may be the single most important nutrient for optimal brain function, thereby preventing depression. DHA is one of the omega-3 fatty acids in fish and krill oil, and your brain is highly dependent on it. **Low DHA levels** have been linked to depression, memory loss, schizophrenia, and Alzheimer's disease.
- 6. Let the Sun Shine Down on You.** Have you ever noticed how great it can feel to spend time outdoors on a sunny day? Well, it turns out that getting safe sun exposure, which allows your body to produce vitamin D, is great for your mood. One study even found that people with the lowest levels of vitamin D were **11 times more prone to depression** than those who received adequate vitamin D. You can **optimize your vitamin D** either by sunlight exposure or by using a safe tanning bed, or by taking a high-quality vitamin D3 supplement.

Your Lifestyle Can Significantly Impact Your Emotional Well-Being

I strongly believe that **energy psychology** is one of the most powerful tools for resolving emotional issues, but the importance of connecting with nature through a gardening project or other outdoor activity simply cannot be ignored. The evidence clearly points to the fact that activities like gardening can have a significantly beneficial impact on depression, and **exercise** in any form is one of the best-kept secrets to preventing depression in the first place.

Strengthening your **spiritual faith** can be another important aspect of mental

and emotional health, as discussed in a recent article.

In terms of diet, dramatically decreasing your consumption of sugar (particularly fructose), grains, and processed foods is very important, as is getting adequate vitamin B12. In fact, **vitamin B12 deficiency can contribute to depression** and affects one in four people. **Vitamin D** and omega-3 fats are also very important for your mood and brain health. You may also want to evaluating your salt intake. **Sodium deficiency** actually creates symptoms that are very much like those of depression. Make sure you do NOT use processed salt (regular table salt), however. You'll want to use an all natural, unprocessed salt like Himalayan salt, which contains more than 80 different micronutrients.

All in all, your lifestyle may be one of the most fundamental contributors to depression, so you'd be well advised to address the factors discussed in this article before resorting to **drug treatment**—which science has shown is no more effective than placebo, while being fraught with potentially dangerous side effects.

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Trees Actually Lower Your Risk of Dying

STORY AT-A-GLANCE

- › Trees and forests in the US removed 17.4 million tons of air pollution in 2010, with human health effects valued at \$6.8 billion
- › Although this pollution removal equated to an average air quality improvement of less than 1 percent, its effects on human health were significant, especially in urban areas
- › The health impacts of trees on air pollution resulted in the avoidance of more than 850 deaths, 670,000 cases of acute respiratory symptoms, 430,000 incidences of asthma exacerbation, and 200,000 school days lost
- › Trees remove air pollution primarily by uptake of pollutants via leaf stomata (pores on the outer “skin” layers of the leaf)
- › Houseplants can be living air purifiers for your home; NASA recommends using 15 to 18 “good-sized” houseplants in 6- to 8-inch diameter containers for an 1,800-square-foot house

By Dr. Mercola

Outdoor air pollution is a serious environmental health risk linked to both chronic and acute health conditions, including stroke, [heart disease](#), lung cancer, asthma, chronic obstructive pulmonary disease, and respiratory infections.

According to the World Health Organization (WHO), ambient (outdoor) air pollution in both cities and rural areas caused an estimated 3.7 million premature deaths worldwide in 2012, the majority of which were due to heart disease and strokes.¹

As WHO noted:²

“Most sources of outdoor air pollution are well beyond the control of individuals and demand action by cities, as well as national and international policymakers in sectors like transport, energy waste management, buildings and agriculture.”

This is largely true, but there is one environmental change that could have a dramatic influence on air pollution, and its effects on human health, independent of these other factors, and that is planting more trees (especially in urban areas).

A new study actually quantified the benefits to human health from trees' impacts on outdoor air pollution, and they were quite remarkable.

Trees Save Close to 1,000 Lives, and Billions in Health Costs, Each Year

In the first broad-scale estimate of air pollution removal by US trees nationwide, researchers found that trees and forests in the US removed 17.4 million tons of air pollution in 2010, with human health effects valued at \$6.8 billion.³

Although this pollution removal equated to an average air quality improvement of less than 1 percent, its effects on human health were significant, especially in urban areas. The health impacts included the *avoidance* of more than:

- 850 deaths
- 670,000 cases of acute respiratory symptoms
- 430,000 incidences of asthma exacerbation
- 200,000 school days lost

As you might suspect, most of the pollution removal occurred in rural areas (where tree cover can be as high as 88 percent) but most of the health impacts were within urban areas (where air pollution tends to be worse and population levels are higher).

Previous research has also shown that pollution removal by trees impacts human health. One study found that a 10-by-10 kilometer space (approximately 6-by-6 miles) with 25 percent tree cover in London could remove more than 90 tons of particulate matter annually, which would lead to the avoidance of two deaths and two hospital admissions per year.⁴

Trees remove air pollution primarily by uptake of pollutants via leaf stomata (pores on the outer "skin" layers of the leaf). Some gaseous pollutants are also removed via the plant surface.

Once inside the leaf, the gases "diffuse into intercellular spaces and may be absorbed by water films to form acids or react with inner-leaf surfaces." According to the researchers:

"Trees affect air quality through the direct removal of air pollutants, altering local microclimates and building energy use, and through the emission of volatile organic compounds (VOCs), which can contribute to... [air pollution] formation."

Adding trees to urban areas was deemed to be particularly important, given the trees' close proximity to people. The researchers added:

"...96.3 percent of pollution removal from trees occurred on rural land. However, as

human populations are concentrated in urban areas, the health effects and values derived from pollution removal are concentrated in urban areas with 68.1 percent of the \$6.8 billion value occurring with urban lands.

Thus in terms of impacts on human health, trees in urban areas are substantially more important than rural trees due to their proximity to people. The greatest monetary values are derived in areas with the greatest population density (e.g., Manhattan)."

'Living Air Purifiers': Harnessing the Power of Plants to Improve Your Air Indoors

Most people spend as much as 90 percent of their time indoors, where indoor air quality can be up to *five times worse* than outdoor air, which can have a very detrimental impact on your health. For example, according to the US Environmental Protection Agency (EPA), poor indoor air quality can cause or exacerbate:

- Asthma, allergies, and other respiratory problems
- Headaches
- Eye and skin irritations
- Sore throat, colds, and flu
- Memory loss, dizziness, fatigue, and depression

Long-term effects from exposure to toxic airborne particles include heart disease, respiratory disease, reproductive disorders, sterility, and even cancer. I've previously discussed how to **lower your health risks from air pollution** in detail, but one way to do so is to add some houseplants to your home. Similar to trees outdoors, indoor houseplants can naturally remove toxins from your home's (or office) air.

It was NASA, along with the Associated Landscape Contractors of America (ALCA), that conducted the classic study on the benefits of plants on indoor air, and they reported that houseplants were able to remove up to 87 percent of air toxins in 24 hours.

They recommended using 15 to 18 "good-sized" houseplants in 6- to 8-inch diameter containers for a 1,800-square-foot house. NASA at Stennis Space Center has also constructed a BioHome that uses bioregenerative technology with the ultimate goal of providing a life support system for permanent human habitation of space.

And inside the structure are common houseplants, which NASA says "serve as living air purifiers" to "absorb chemical pollutants resulting from synthetic materials in the living area."⁵ If

houseplants are capable of cleansing air in the BioHome, imagine what they can do in your home!
According to *The New Ecologist*, the top 10 anti-pollutant houseplants are:⁶

The Feston Rose plant
Devil's Ivy
Phalaenopsis
English Ivy
Parlor Ivy
African Violets
Christmas Cactus
Yellow Goddess
Garlic Vine
Peace Lily

Nature Is Teeming With Health Benefits

The fact that trees help to absorb and mediate some of the chemicals humans add into the environment is but one example of our intricate ties with nature, and of nature's power to impact health and healing. Human DNA actually contains much of the same material found in the plant

world, so perhaps that's why living closer to nature can help you to live longer, and hospital patients who have a view of nature recover from illness and surgery more quickly than those who don't.

Most synthetic medications are based on mimicking the action of compounds found in plants. Scientists cannot create these substances but must, rather, try to make copies. But in their synthetic models they often end up with compounds that your body doesn't recognize and doesn't know how to handle.

A plant, however, is a complex of thousands of biomolecules, many of which are countervailing, so if there's one effective compound that may have a toxic effect, it usually contains a countervailing compound so that it doesn't harm your liver, for example. It's the interplay of chemicals that make the plant work, which is why you can't study herbal medicine by isolating a certain element; you've got to study the whole plant. (This is what conventional medicine is largely missing.)

When I interviewed Donnie Yance, a clinical master herbalist, he explained that foods and herbs share quite a few similarities, including being pleiotropic -- which means they produce more than one effect. Herbs can help support your health from a very basic level, just as foods do. Of course, the ultimate "herbalism" is the food that you eat on a daily basis. Dark green leafy vegetables, herbs, and spices are excellent sources of antioxidants, anti-inflammatories, and anti-cancer substances that can dramatically influence your health. All of this is part of our intrinsic connection to nature.

This connection continues when you use plants for healing, including when you prepare tinctures or teas from herbs, which you can do in your own kitchen. It continues in your garden, when you grow food or plant a flower, and via trees, whether a new sapling is planted in an urban area or you tend to a decades-old tree in your backyard. According to many herbal experts, this relationship with plants and nature is nearly as important as the herbal medicine itself.

Do You Want to Plant Trees in Your Backyard?

Every tree planted helps the environment, and trees around your home can **increase your property value** by more than 15 percent and improve your odds of a sale. Trees also do the following wonderful things for you and the environment:

- Decrease carbon dioxide and increase oxygen levels in the atmosphere
- Improve water quality and reduce erosion
- Give songbirds a home, and provide food for all kinds of wildlife

- Provide shade in summer and a windbreak in winter, thereby reducing your cooling and heating costs
- Beautifying your home and neighborhood, and adding curb appeal

If you want to plant some trees but are not sure how to go about it, organic arborist and author Howard Garrett (aka, the Dirt Doctor) can end your ambivalence with his simple, straightforward steps to tree planting.⁷ Planting a tree the right way involves six basic steps:

1. Dig a wide rough-sided hole
2. Run a "perk test" for drainage
3. Prepare the root ball
4. Set the root ball in the hole with backfilled soil
5. Settle the soil with water
6. Mulch the surface

According to Garrett, almost all trees planted today are being planted incorrectly. The most serious problem is that they are planted too deep. When the top of the root ball and the root flare are buried under the ground, hidden roots can circle and "girdle" the trunk, choking off nutrients and weakening the tree, which makes it susceptible to blowing over. Another problem is, when soil comes up too high on a trunk, the covered bark tissue stays moist all the time and plant growth is dramatically slowed or even stopped. The **health of your soil** is also of crucial importance.

One of the most important steps for the long-term success of your tree would be to create as large a ring as possible around the tree, a minimum of three feet but as large as 10 feet, and cover the area with wood chips. If there is grass, there is no need to remove it, merely lay cardboard over the grass and pour the chips over the cardboard. Ideally, put 12-24 inches of wood chips. It is okay to put the chips next to the tree; they won't damage the trunk. You typically can get the chips for free from a local tree cutter. The chips are an earthworm magnet and one of the best additions to increase soil fungi.

Plants have a highly complex **underground communication network**, formed by a type of fungi called mycorrhizae. Mycorrhizae attach to the roots of plants, sending out fine thread-like filaments to the roots of other plants and forming an underground web that can stretch dozens of meters in a virtual "plant Internet."

These filaments not only increase nutrient uptake 100 to 1,000 times, but also serve as an early warning system to connected plants so they can build up their defenses when a threat presents

itself. But in order for these networks to exist, the soil must be undisturbed. Erosion, tillage, cultivation, compaction, and other human activities destroy these beneficial fungi, and they are slow to colonize once disrupted. Therefore, intensively farmed plants don't develop mycorrhizae and are typically less healthy as a result.

Can Outdoor Air Pollution Be Avoided?

If you happen to live in a heavily polluted area, the *best* option is to move, but I realize that isn't always a practical option. If you can't move, pay attention to the Air Quality Index (AQI), released by the EPA to calculate five major air pollutants:

- Ground-level ozone
- Particulate matter
- Carbon monoxide
- Sulfur dioxide
- Nitrogen dioxide

If the AQI in your area is high, it may be best to stay indoors as much as possible. At the very least, avoid exercising outdoors when air pollutants are high (such as during rush-hour traffic). The truth is, however, that you can't always escape outdoor air pollution, so it's better to focus your attention on your immediate environment, which you have more, if not full, control over. The most effective way to improve your indoor air quality is to control or eliminate as many sources of pollution as you can first, before using any type of air purifier.

This includes accounting for **molds**, tobacco smoke, volatile organic compounds from paints, aerosol sprays, and household cleaners, pesticides, phthalates from vinyl flooring and personal care products, pollutants from pressure-treated wood products, radon gas, and more. The next step to take is free—simply open some windows. Of course, this can only take you so far, and works better if your outdoor air isn't heavily polluted, but it's an important and simple step.

Next, since it is impossible to eliminate *all* air contaminants, one of the best things you can do is incorporate a high-quality air purifier. My recommendations for air purifiers have changed over the years, along with the changing technologies and newly emerging research. There are so many varieties of contaminants generated by today's toxic world that air purification manufacturers are in a constant race to keep up with them, so it pays to do your homework. At present, and after much careful review and study, I believe air purifiers using **Photo Catalytic Oxidation (PCO)** seem to be the best technology available.

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Living Near Trees Is Good for Your Health

STORY AT-A-GLANCE

- › An extra 11 trees per street lowers the risk of heart disease, diabetes, and obesity
- › Those living near a greater density of public trees also reported significantly improved self-perception of health
- › Trees and forests in the US removed 17.4 million tons of air pollution in 2010, with human health effects valued at \$6.8 billion

By Dr. Mercola

It has long been suggested that spending time in natural outdoor environments may enhance human health, but researchers from the University of Chicago took this notion a step further by *quantifying* just how beneficial it is.

After reviewing a database of public trees and health records in Toronto, they revealed that living around an extra 11 trees per street lowers the risk of heart disease, **diabetes**, and **obesity**.¹

The health benefits were equated to receiving an annual salary increase of \$20,000, and those living near a greater density of public trees also reported significantly improved self-perception of health (how healthy a person perceives himself to be).² According to the study:³

“We find that having 10 more trees in a city block, on average, improves health perception in ways comparable to an increase in annual personal income of \$10,000 and moving to a neighborhood with \$10,000 higher median income or being 7 years younger.

We also find that having 11 more trees in a city block, on average, decreases cardio-metabolic conditions in ways comparable to an increase in annual personal income of \$20,000 and moving to a neighborhood with \$20,000 higher median income or being 1.4 years younger.”

Why Is Living Near Trees Healthy?

Spending time in green spaces has psychological and physical benefits. Simply taking a walk in a natural area has been shown to decrease the pattern of negative thinking known as rumination, which is linked to an increased risk of depression.⁴ Those researchers noted:

“This study reveals a pathway by which nature experience may improve mental well-being and suggests that accessible natural areas within urban contexts may be a critical resource for mental health in our rapidly urbanizing world.”

Indeed, more than 80 percent of Americans live in urban areas,⁵ which can limit access to green spaces and potentially worsen public health. In addition to improving well-being, those living in a greener environment report fewer health complaints and better mental health.⁶

All types of green space – city parks, agricultural areas, forest, etc. – were equally beneficial. Cognitive function may also improve. In a study of 2,600 children between the ages of 7 and 10, those with greater exposure to green spaces, particularly while at school, had improved working memory and decreased inattentiveness.⁷

A 2014 study similarly found that children attending schools with greater amounts of vegetation scored higher on academic tests in both English and math.⁸ Not to mention, older adults who spend more time outdoors have less pain, sleep better, and have less functional decline in their ability to carry out their daily activities.⁹

Trees Reduce Air Pollution

From a practical perspective, another reason why increasing trees is good for your health has to do with their role in air pollution. According to the World Health Organization (WHO), ambient (outdoor) air pollution in both cities and rural areas caused an estimated 3.7 million premature deaths worldwide in 2012, the majority of which were due to heart disease and **strokes**.¹⁰

Trees have the potential to change that. Trees remove air pollution primarily by uptake of pollutants via leaf stomata (pores on the outer “skin” layers of the leaf).

Some gaseous pollutants are also removed via the plant surface. Once inside the leaf, the gases “diffuse into intercellular spaces and may be absorbed by water films to form acids or react with inner-leaf surfaces.”¹¹

In a broad-scale estimate of air pollution removal by US trees nationwide, researchers found trees and forests in the US removed 17.4 million tons of air pollution in 2010, with human health effects valued at \$6.8 billion.¹²

Although this pollution removal equated to an average air quality improvement of less than 1 percent, its effects on human health were significant, especially in urban areas. The health impacts included the *avoidance* of more than:

- 850 deaths
- 670,000 cases of acute respiratory symptoms
- 430,000 incidences of asthma exacerbation
- 200,000 school days lost

As you might suspect, most of the pollution removal occurred in rural areas (where tree cover can be as high as 88 percent) but most of the health impacts were within urban areas (where air pollution tends to be worse and population levels are higher).

Another study found that a 10-by-10 kilometer space (approximately six by six miles) with 25 percent tree cover in London could remove more than 90 tons of particulate matter annually, which would lead to the avoidance of two deaths and two hospital admissions per year.¹³

Trees Might Encourage You to Get Outdoors

Trees are known to promote physical activity among residents, yet another one of their charms. Better still, exercising outdoors among the trees has unique benefits above and beyond indoor exercise. One meta-analysis of 10 studies found that physical activity outdoors for as little as five minutes leads to measurable improvements in mood and self-esteem.¹⁴

There's even research showing levels of the stress hormone cortisol are lower when people exercise outdoors as opposed to indoors.¹⁵

This can be invaluable among children too. Richard Louv, in his book *Last Child in the Woods*, even used the term "nature-deficit disorder" to describe behavioral problems he believes stem from spending less time outdoors.¹⁶

Plus, children who spent five to 10 hours a week outside developed a strong attachment to nature, a value that is important to both human development and well-being.¹⁷

Those who spent a lot of time outdoors also experienced a wealth of positive emotions, including peacefulness, happiness, and a sense of belonging to the world – pretty impressive benefits for simply spending time out amongst the trees!

How to Add More Trees to Your Backyard Environment

The authors of the featured study made a point of saying that “street” trees (or those in public spaces) had a more pronounced effect than private or backyard trees, but this is likely only because they’re accessible to more people. It certainly doesn’t downplay the importance of adding trees to your own backyard.

Every tree planted helps the environment, and **trees around your home can increase your property value** by more than 15 percent while improving your odds of a sale. Trees also do the following wonderful things for you and the environment:

- Decrease carbon dioxide and increase oxygen levels in the atmosphere
- Improve water quality and reduce erosion
- Give songbirds a home, and provide food for all kinds of wildlife
- Provide shade in summer and a windbreak in winter, thereby reducing your cooling and heating costs
- Beautifying your home and neighborhood, and adding curb appeal

6 Steps to Planting a Tree Properly

If you want to plant some trees but are not sure how to go about it, organic arborist and author Howard Garrett (aka, the Dirt Doctor) can end your confusion with his simple, straightforward steps to tree planting.¹⁸ Planting a tree the right way involves six basic steps:

1. Dig a wide rough-sided hole
2. Run a "perk test" for drainage: Fill the hole with water and wait until the next day. If the water level does not drain away overnight, you have a drainage problem. In this case, you might want to either choose another site or add some additional drainage.
3. Prepare the root ball: Loosen the burlap at the trunk and remove it from the top of the ball. Remove any nylon twine or plastic covering, string, or wire mesh, since these materials do not decompose and can girdle the tree's trunk and roots as it grows.

4. Set the root ball in the hole with backfilled soil
5. Settle the soil with water (don't stomp it down with your foot)
6. Mulch the surface

According to Garrett, almost all trees planted today are being planted incorrectly. The most serious problem is when they are planted too deep. When the top of the root ball and the root flare are buried under the ground, hidden roots can circle and "girdle" the trunk, choking off nutrients and weakening the tree, which makes it susceptible to blowing over. Another problem is when soil comes up too high on a trunk, the covered bark tissue stays moist all the time and plant growth is dramatically slowed or even stopped. Garrett writes:

"Trees that are too deep can be uncovered with an Air Spade [a professional tool] or by hand, but the best solution is to plant trees correctly in the first place."

He also does not recommend staking, wrapping trunks or using other unnecessary and damaging techniques. As for *when* to plant your new tree, fall is a great time due to moderate temperatures and rainfall allowing them to acclimatize and grow strong roots before the heat and dryness of summer. Springtime planting works well too, depending on your region. So do follow the tips above, but don't get too overwhelmed with the details. As Garrett said:

"People don't grow trees. Trees grow in spite of people. For the most part, trees are tough, durable and easy to plant and transplant if treated in a sensible and natural way."

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The 20 % Cap

What does it really mean?



“Whichever is Greater”

Why is that important?

Consultant recommendation #4

*It is suggested that the Parkland Dedication bylaw/Interpretation Guideline identify, for primarily residential greenfield development applications (Secondary Plans and/or Draft Plans of Subdivision), that the City shall implement EITHER up to a maximum of 5 per cent of the land area, OR, up to a maximum of 1 hectare per 300 dwelling units, **WHICHEVER IS GREATER**. Payment-in-lieu is to be calculated based on the Land Value equivalent, up to a maximum of 1 hectare per 500 dwelling units.*

Planning Partnership Recommendations

Page 4

*The application of these maximum parkland dedication/payment-in-lieu requirements have **dramatically different outcomes depending upon the context of where they are applied**, and the residential density applied for.....**The key question** for the municipality when considering parkland dedication for a greenfield development application is **when to use the 5 per cent calculation, or the alternate rate of up to 1 hectare per 300 dwelling units.***

1888 Gordon - a Case Study

Dedication regime	Formula	Land area	\$ Value
Current By-law	10% of site area	0.32 hectares	\$ 913,800.00
Planning Act land & cash-in-lieu	5% of land/site area	0.16 hectares	\$ 456,900.00
Planning Act land Alternative Rate	1 hectare/300 units	1.8 hectares	\$5,140,125.00
Planning Act cash-in-lieu Alternative Rate	1 hectare/500 units	1.08 hectares	\$3,084,075.00
Draft By-law 10. (d) i	Capped at 20% of site area	0.64 hectares	\$1,827,600.00

Consultant recommendation #27

*It is suggested that the Parkland Dedication Bylaw/Interpretation Guideline **clearly empower the City to determine when payment-in-lieu is an acceptable approach, and when a land contribution will be required. In this regard, the Bylaw/Interpretation Guideline should state that land dedication always be the first priority, and that payment-in-lieu only be acceptable where no reasonable alternative exists, including a land dedication elsewhere within the city.***

Consultant recommendation #28

*It is suggested that the Parkland Dedication Bylaw/Interpretation Guideline include a statement that **clearly articulates the City's intent to acquire parkland assets as a first priority, and to only accept payment-in-lieu of parkland in the following circumstances:** (see recommendation #28 for details)*

Consultant recommendation #36

*It is suggested that the Parkland Dedication Bylaw/Interpretation Guideline require that the City establish a special bank account for the receipt of all cash as payment-in-lieu of land contributions accrued through the application of the Bylaw/Interpretation Guideline, and that the accumulated monies may be used for the following priorities: **The first priority shall be to fund the acquisition of parkland and/or the improvement of existing City Parks in areas that have parkland deficiencies;***

Why Parkland/Greenspace is Important for Health and Well-being

EMILY GRANT

PHD CANDIDATE

COGNITIVE NEUROSCIENCE



UNIVERSITY OF
WATERLOO

Greenspace Reduces Stress



- Exercise in greenspace reduces blood pressure
- Stress levels reduce significantly faster after exposure to nature
- Shinrin-yoku (bathing in the atmosphere of the forest) has consistently shown reductions in stress levels and improvements in mood
- People who are less stressed are more productive, take less sick days, and make better quality decisions incurring huge economic benefits to businesses and cities
- Furthermore, reductions in stress help reduce the likelihood of stress related illnesses reducing healthcare costs

Greenspace Improves Health



- Nisbet, Zelenski and Murphy (2011) “nature’s influence extends beyond physical health to psychological health, not just the absence of, or recovery from, ill health, but differences in well-being” (p.305)
- Nisbet and colleagues found a connection between nature connectedness and happiness and well-being
- Hartig et al. (1991) also found those that went on a wilderness vacation as oppose to an urban vacation were significantly happier long after the trip ended
- Suggesting greenspace and parkland can inoculate people against decreases in well-being

Greenspace Restores Attention



- Urban environments draws our attention in all different directions depleting our resources and ability to focus
- Greenspaces have consistently been shown to restore attention after it has been depleted
- One study found students in a class with a view of a window as oppose to a brick wall had significantly higher grades
- Another study found that after controlling for activity, children with ADHD showed significant reductions in symptoms after playing in nature as oppose to urban environments

Social Advantages to Greenspace

- Crime rates reduce
- People are more prosocial around nature
- Bogota Columbia beautified their parks with plants creating an inviting atmosphere drawing in more members of the community



Final Thoughts



Taken together this evidence shows the need to provide accessible greenspace via parkland to

- Reduce stress and stress related illness reducing healthcare costs and providing more productive citizens
- Improve well-being
- Provide attention restoration areas
- Improve prosocial behaviour and reduce the likelihood of crime

Establishing an efficient healthy and cohesive community for the city of Guelph

Emily Grant
PhD Candidate
Cognitive Neuroscience
University of Waterloo

Why parkland is important for health and well-being

Creating urban environments that contribute to the health well-being of residents is a goal of many cities. Research in the discipline of environmental psychology has shown how individuals are affected by the physical and social context of their environments and how this impacts their experiences and behaviours (Winkel, Saegert, & Evans, 2009). Research has shown that greenspaces have positive psychological and physiological effects on people (Velarde, Fry, & Teveit, 2007) especially in terms of restoration from stress, increasing positive moods, restoration of attention, and social cohesion. However, urban environments reduce the likelihood that stress reduction, mood recovery, and attention restoration can be achieved for overworked individuals (Park et al., 2007; Degenhardt, Frick, Buchecker & Gutscher, 2011; Ulrich et al., 1991). Given a strong interest in improving the lives of urban residents, it is very important to enforce the by-law, regarding parkland allocation for developers.

The benefits of greenspace

- Exercising in nature reduced blood pressure more than exercising in urban environments.
- Significantly faster reductions in stress levels have been found after exposure to nature versus urban environments.
- People who are less stressed are more productive, take less sick days, and make better quality decisions.
- Reductions in stress helps reduce the likelihood of stress related illnesses such as cardiovascular disease, strokes, depression, obesity, back problems, and general fatigue (Degenhardt et al., 2011).
- Shinrin-yoku (bathing in the atmosphere of the forest) has consistently shown to reduce stress and improve mood.
- Nisbet and colleagues found a connection between nature connectedness and happiness and well-being, indicating that a connection to nature such as through parklands could help sustain happiness and feelings of well-being.
- This is important because health is not simply the absence of disease or infirmity, but a complete sense of well-being must be felt for an individual to be considered healthy (WHO, 2004).
- Thus increasing greenspace or parkland can help cities depart from the disease model of healing and maximally improve people's health and well-being through greenspace.
- Greenspace has also been shown to improve attention in many studies.

- Finally, there are social advantages to greenspace as it has been found that after controlling for socioeconomic levels, crime rates reduce in areas that have more trees and greenspace. Further, people are found to be more prosocial around nature (i.e. more likely to help a stranger). In
- Taken together this evidence shows the need to provide accessible parkland where available and demand those that are required to provide it provide this relatively inexpensive proven beneficial resource to the communities of Guelph.

Presentation to COW
on
Parkland Dedication BY-LAW
By
Hugh Whiteley
January 14 2019

Recommended Actions by City Council

I recommend that City Council follow the lead of the ten comparator municipalities which have dealt with parkland deficiencies by adopting the maximum dedication rate allowed by the Planning Act:

This would be done by removing the 20% CAP from sections 10 (b) and 10 (d) of the by-law.

IS THERE A PARKLAND DEFICIT ?

City of Guelph Level of Service Targets and Existing Parkland

	Neighbourhood	Community	Regional	Total	2018	2041
POULATION					142,000	191,000
/1000 Target ha	0.7	1.3	1.3	3.3		
Existing 2018 ha	79	150	145	374	(80%)	(60%)
Target 2018 ha	89	185	185	469		
Target 2041 ha	134	248	248	630		
Deficit 2018 ha	-20	-35	-40	-95	-95	
Deficit 2041 ha	-35	-98	-104	-256		-256

To cap or not to cap.... that is the question

MUNICIPALITY	MAXIMUM	CAP
Barrie	YES	
Cambridge	YES	
Hamilton	YES (High Density)	
Kitchener	YES	
London	YES	
Markham	YES	
Mississauga	YES	
Oakville	YES	
Richmond Hill	YES	
Vaughan	YES	
Waterloo		15% (High density)

CAMBRIDGE 2018 OFFICIAL PLAN

7.8 Parkland Dedication

1. The *City* will require parkland dedication from *development* applications in accordance with the Planning Act and the following formulae:
 - a) 5% of the residential *development* application lands are to be dedicated for park or other recreational purposes, or at the rate of one hectare for each 300 dwelling units, whichever is greater;
 - b) 2% of land proposed for *development* for commercial or industrial purposes; and
 - c) cash-in-lieu of parkland dedication may be required to the value of the land otherwise required to be conveyed.
 - d) When cash-in-lieu of parkland dedication is required for residential *development*, the value is based on a maximum rate of 5% or one hectare per 500 dwelling units, whichever is greater.

Affordable and Social Housing Issues

- The provision of adequate supplies of both affordable and government-subsidized social housing is an essential role for governments of all levels.
- The standards set for parkland acquisition for development projects for luxury-level housing should not be lowered to encourage affordability as no benefit will result.
- Projects that involve genuinely affordable housing should be given special status on a case-by-case basis.

OTHER ACTION REQUIRED

“In Guelph, the City determines whether land or payment-in-lieu of land, or some combination thereof is appropriate based on the policies of the Official Plan, **the City’s Parks and Recreation Strategic Plan**, applicable Secondary Plan policies and residents/outdoor user group needs.” *Consultants Recommendations p 18/38*

The underlined portion of the statement is not correct. The Plan named was adopted by City Council in 1997. Since 2010 staff, with the approval of City Council, have not used this Master Plan and no update of the Parks and Recreation Plan has been adopted by City Council.

URGENT ACTION TO ADOPT A PARKS MASTER PLAN IS REQUIRED

- A Master Plan for Parks is essential for the effective acquisition, allocation and use of parkland.
- The best framework for a Parks Master Plan is within a holistic Plan for all Green Space, a framework that Guelph pioneered in Ontario in 1971 and used until 2014 when OP 48 was approved without a Parks Master Plan in place and without reference to the framework of holistic Open Space planning.
- City Council should give high priority to the development of a Parks Master Plan using the framework of Green Space Planning similar the the framework used by the City of Ottawa.

Time for Guelph to access maximum parkland dedication rates under the Planning Act

Susan Watson
January, 2019, Guelph

It is time for Guelph to follow the examples of the Towns of Oakville, Richmond Hill and Markham and the Cities of Burlington and Mississauga and access the maximum Parkland Dedication and Cash-in-lieu allowed under the Planning Act.

City of Burlington Park Land By-Law:

[https://www.burlington.ca/en/Modules/Bylaws//Bylaw/Details/d1054373-2293-48ea-81bf-
ea436abc98cc](https://www.burlington.ca/en/Modules/Bylaws//Bylaw/Details/d1054373-2293-48ea-81bf-
ea436abc98cc)

City of Mississauga Cost Guideline Booklet: Cash-in-lieu for Parks Purposes – page 24:

<http://www.mississauga.ca/file/COM/DevCostGuidelines2011.pdf>

Town of Markham Conveyance of Parkland By-law:

[https://www.markham.ca/wps/wcm/connect/markham/13e9c727-6c5e-410e-80c7-
f6e151150f3d/Bylaw-195-
90.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_2QD4H901OGV1
60QC8BLCRJ1001-13e9c727-6c5e-410e-80c7-f6e151150f3d-mrL-2ZG](https://www.markham.ca/wps/wcm/connect/markham/13e9c727-6c5e-410e-80c7-
f6e151150f3d/Bylaw-195-
90.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_2QD4H901OGV1
60QC8BLCRJ1001-13e9c727-6c5e-410e-80c7-f6e151150f3d-mrL-2ZG)

Town of Oakville Parkland Dedication By-law:

[https://assets.oakville.ca/blis/BylawIndexLibrary/2008-
105.pdf#search=Parkland%20dedication&toolbar=1&navpanes=0](https://assets.oakville.ca/blis/BylawIndexLibrary/2008-
105.pdf#search=Parkland%20dedication&toolbar=1&navpanes=0)

Town of Richmond Hill Parkland Dedication By-law:

[https://www.richmondhill.ca/en/find-or-learn-
about/resources/Parkland_Dedication_By_law_58_13.pdf](https://www.richmondhill.ca/en/find-or-learn-
about/resources/Parkland_Dedication_By_law_58_13.pdf)

As part of the consultation process on the Parkland Dedication By-law update, the Consultant and the City conducted an on-line survey. Responses to the following question are below:

(Planning Partnership Background Report p. 55)

<https://guelph.ca/wp-content/uploads/Guelph-Parkland-Background-Report.pdf>

Under legislation the City could require more parkland from developers than it currently does. Do you think the City should increase the parkland dedication requirement?

84% Yes

4% No

11% Other options.

Consultant comment: *Of note, a number of respondents who answered 'No' or 'Other Options' noted that this question was difficult to answer without greater context and that other City initiatives should be considered alongside parkland dedication. **The sizeable majority of respondents that responded 'Yes' are in accordance that Guelph should be greener and continue to add as much greenspace as possible through the development process.***

As I will illustrate later, even accessing Planning Act maximums will not enable us to meet the minimum requirements set out in our Official Plan.

The Town of Oakville's Parkland Dedication By-law provides the perfect wording for our own By-law:

(a) For residential purposes: 5% of the land proposed for development or redevelopment, or at one hectare for each 300 units proposed if the application of this alternative standard would result in a greater area of land.

The only modification needed is in regard to Cash-in-lieu rates which have changed as a result of Provincial legislation. For Cash-in-lieu, our By-law will need to read something like:

Cash-in-lieu:

(a) For residential purposes: the value of 5% of the land proposed for development or redevelopment, or at a value of one hectare for each 500 units proposed if the application of this alternative standard would result in a greater amount of cash-in-lieu.

Discussion around parkland dedication rates in the supporting documents invokes the concept of "fairness." The unwritten subtext seems to be "fairness to developers".

Fairness is a subjective concept to use in developing standards for a By-law. Council would never consider reducing the required water, wastewater or transportation capacity required for new development because it's "not fair." Why is parkland somehow viewed as discretionary infrastructure?

Moreover, there are issues of fairness which concern current and future residents of Guelph which I believe have not been adequately addressed. I will speak to these matters farther down in this submission.

The foundational premise of the Parkland Dedication By-law as stated on the City website is to ensure *“that, as Guelph grows, our parks and open spaces grow too.”*

In her Master’s thesis, *Overcoming Obstacles to Parkland Acquisition*, Professional Planner Sophie Knowles makes the following statements:

Like all infrastructure, parks have carrying capacities. After a point, the addition of more users puts stress on existing parkland and can detract from the experiences of users or it may simply not be available in sufficient quantity to meet the demand. Ensuring that adequate quantity of parkland is provided to meet the demands of new growth resulting from development is an important policing power to protect existing residents from the deterioration of existing service levels and also to ensure that there are necessary services available to new residents.

<https://digital.library.ryerson.ca/islandora/object/RULA:3027>

Official Plan requirements for Parkland:

If we are to ensure that *“as Guelph grows, our parks and open spaces grow too”*, the starting point for decisions around Parkland Dedication rates needs to be our own Official Plan. Required minimum ratios of parkland to residents are clearly set out in Section 7.3.2. For neighbourhood and community parks the rates are prescriptive and require that city-wide minimums “will” be maintained. For neighbourhood parks, the minimum rate is 0.7 ha/1000 residents and for community parks, 1.3 ha/1000 residents.

For Regional Parks the target is more aspirational: *the City “will encourage the provision of Regional Park facilities at the rate of 1.3 ha/1000 residents.”*

What this leaves us with is an overall parkland requirement of 3.3 ha/1000 residents, with the 2.0 ha/1000 residents for neighbourhood and community parks as a non-negotiable minimum.

How do our Official Plan requirements line up with the maximums allowed under the Planning Act?

The 2016 census tells us that the average household size in Guelph is 2.5 people:

<https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=3523008&Geo2=CD&Code2=3523&Data=Count&SearchText=Guelph&SearchType=Begin&SearchPR=01&B1=All&TABID=1>

When we apply census household size to the Planning Act maximums, 300 units will actually mean 750 new residents in Guelph and 500 units will translate to 1,250 new residents.

What the Planning Act maximums are actually offering us is 1 ha/750 residents in land conveyance or 1ha/1,250 residents for cash-in-lieu.

If we express that as hectares/1000 residents to be consistent with our Official Plan ratios, we see the following:

Planning Act maximum land conveyance: 1.3 ha/1000 residents.

Planning Act maximum cash-in-lieu: 0.8 ha/1000 residents.

So we can see that even accessing the Planning Act Parkland Dedication maximums will not provide us with the minimum parkland of 3.3 ha/1000 residents that we need for current and future residents.

Given this situation, why would Council approve anything lower than the Planning Act maximums?

Let's trial it for 4 years:

In Recommendation #39, the City's consultant recommends the following:

<https://guelph.ca/wp-content/uploads/Consultant-Recommendations-for-Parkland-Dedication-Bylaw.pdf>

It is suggested that the Parkland Dedication bylaw/Interpretation Guideline be reviewed, at a minimum, in response to changes in Provincial planning policies and whenever the City reviews its applicable Official Plan policies. The bylaw/Interpretation Guideline should also indicate that it should be reviewed at a minimum of every 3 years, or at an earlier time as prescribed by Council.

The By-law draft articulates that the Parkland Dedication By-law should be formally reviewed no less than once during a Council term. Given this short framework, there is no reason we shouldn't trial the use of the Planning Act maximums and some of the innovative recommendations of the consultant which have been left on the table for a 4-year period.

Council can review data on cash-in-lieu collected and spent, as well as any impacts on development in the City. The next Council will also have information from the Parks Master Plan update to inform their review of the By-law.

No right of appeal?

Council can confirm with legal staff, however it is my understanding that a Parkland Dedication By-law cannot be appealed. If this is indeed the case, Council can trial innovative and progressive parkland policies for the next 4 years without getting bogged down in an LPAT process.

Inclusion of the 1 ha/300 unit alternative rate in a municipality's Official Plan CAN be appealed. This is currently the case in the Town of Richmond Hill where developers appealed the inclusion of the alternative rate in the Official Plan to the OMB. That case is currently working its way through the court system after a ruling in favour of the Town at the Divisional Court level:

<http://canliiconnects.org/en/commentaries/43245>

Guelph's option to use the alternative rate of 1 ha/300 units has already been enshrined in our Official Plan.

What's Fair?

Accessing the maximums allowed under the Planning Act makes a partial step towards adhering to the principle that ***growth should pay for itself***.

Developers will be raising the spectre of “affordability” in requiring new development to contribute land or pay its share towards new parkland.

But if growth doesn't pay for growth of parkland what are the alternatives? There are only two other scenarios:

- 1) ***We go without the parkland***. This is a moral issue, both for current and future generations. As Ms. Knowles identifies in her thesis, parkland is infrastructure that has a maximum carrying capacity. If we intensify and add population to our City without adding corresponding parkland and open space, the quality of life for everyone will begin to deteriorate as existing amenities become overcrowded or unavailable. The addition of parkland along with density can serve to mitigate some of the negative impacts of intensification.

Ms. Knowles quotes park expert John Crompton on the ethics of failing to create parks:

“If a current council decides not to construct new parks, then it has pre-empted the right of future residents to have them because there will be no land available retrospectively to construct them.”

- 2) ***Current residents pay for needed parkland through property taxes***. This is a situation we are currently facing with the Downtown Parkland Reserve. The 5% land area cap on Downtown developments in our current By-law has meant that we have only \$613,000 in cash-in-lieu in the Downtown Park fund. Data I shared with Council in October illustrated that we would have collected more than \$9 million in cash-in-lieu in the downtown if we had been using the Planning Act maximums.

I am attaching the calculations I shared in October to this email so that my figures can be verified by staff if Council so directs.

The failure to collect the \$9 million to which we were entitled means we have a critical funding shortfall. City Treasurer, Tara Baker, presented this information to the Committee of the Whole on May 7th of last year. \$4.3 million is required for the projected purchase of the Wellington St. Plaza in 2022 and we only have \$613,000 in the Downtown Parkland fund. We are \$3.7 million short. Not only that, the cupboard is bare when it comes to funds to invest in the revitalization of St. George's Square, the new urban square for the Baker St. District and any other downtown opportunities that may present themselves.

Adding park acquisition costs to the tax rate will impact “affordability” for current residents of Guelph, especially seniors and others on fixed incomes.

“Fairness” has not been a concern for the past 30 years. No developers and no City staff have raised the concern over the past 30 years that it wasn’t fair for Guelph citizens to receive only a fraction of the parkland or cash-in-lieu to which we were entitled. In the downtown core, recent intensification has only remitted 3 – 5% of what we could have claimed under the Planning Act. I would suggest that the shortfalls reported by the City Treasurer suggest we have some catching up to do. That would be fair.

The astounding impact of a decades-long failure to access the alternative rates in the Planning Act is most starkly illustrated in the contrast between Guelph’s Parkland fund and that of the Town of Oakville. At the end of 2017, we had \$4.25 million in our fund. Oakville had \$39.5 million.

<https://www.oakville.ca/assets/general%20-%20town%20hall/2017cashinlieuofparklandandbonuszoningres-appendixa.pdf>

It is fair to observe that real-estate is almost twice the price in Oakville and therefore Parkland Cash-in-lieu will also be generated at twice the rate. It is also an objective fact that Oakville has 50% more population than Guelph. But doubling the amount in Guelph’s Parkland Reserve to \$8.5 million and then adding 50% to account for extra population would yield \$12.75 million, still barely a third of what Oakville currently has in the bank.

Guelph citizens have a right to be outraged at this massive financial loss and the failure of City Staff to bring this By-law forward for updating throughout a 30-year period. I would say that the staggering figures involved merit a formal inquiry.

Let’s contrast the losses incurred by Guelph citizens and the Corporation of the City of Guelph with what has been happening in the real-estate industry.

Current real-estate trends:

Data from the Canadian Real Estate Association (CREA) shows that the benchmark housing price in Guelph went up 52.04% over the past 5 years. Moreover, in 2018, Guelph was THE fastest moving real estate market in the country with a benchmark increase of 9.33%.

<https://betterdwelling.com/canadian-real-estate-prices-are-up-over-44-over-the-past-5-years/>

We all know that labour and material costs have not risen 52.04% in the past 5 years, but record profits for developers have. Local developers have all charged what the market will bear. Increases in housing sale prices have not been limited to the rate of inflation out of concern for affordability for home buyers. The issue of affordability only seems to come up when developers are asked to cover the actual costs of infrastructure related to growth (DCs) or parkland dedication requirements.

Context, history and objections to the Alternative Rate

The Province of Ontario has some of the lowest parkland conveyance rates in the country.

In terms of Planning Act history, Sophie Knowles provides interesting context for the debate around Parkland Dedication. She notes

In 1973, the Province amended the Planning Act to allow municipalities to collect cash-in-lieu (CIL) of land and also provided municipalities with the option of establishing an alternative requirement of up to one hectare per 300 units in order to ensure adequate parkland provision in dense communities (Ontario, 1981). (Sophie Knowles, p. 14).

The Building Industry and Land Development Association (BILD) has waged a sustained campaign against the 1 ha/300 unit alternative rate. In 2016, they secured a significant discount from the Province when the maximum cash-in-lieu was cut from 1 ha/300 units to 1 ha/500 units. Given the bottom line financial benefits of contributing cash instead of land, Municipalities across Ontario are now experiencing even greater pressure from developers to accept cash-in-lieu instead of conveyance of land.

Cash-in-lieu is almost always a losing proposition for municipalities because they end up “chasing land values”. Land values rise and the cash banked in their accounts is no longer enough to buy the needed parkland.

Why Parks and Recreation are Essential Public Services

I am concluding this particular submission by reproducing this summary from the American National Recreation and Parks Association.

<https://www.nrpa.org/uploadedFiles/nrpa.org/Advocacy/Resources/Parks-Recreation-Essential-Public-Services-January-2010.pdf>

Parks and recreation have three values that make them essential services to communities:

- 1. Economic value*
- 2. Health and Environmental benefits*
- 3. Social importance*

Just as water, sewer, and public safety are considered essential public services, parks are vitally important to establishing and maintaining the quality of life in a community, ensuring the health of families and youth, and contributing to the economic and environmental well-being of a community and a region.

There are no communities that pride themselves on their quality of life, promote themselves as a desirable location for businesses to relocate, or maintain that they are environmental stewards of their natural resources, without such communities having a robust, active system of parks and recreation programs for public use and enjoyment.

Economic Value

- *Parks improve the local tax base and increase property values. It is proven that private property values increase the value of privately owned land the closer such land is to parks. This increase in private property value due to the proximity to parks increases property tax revenues and improves local economies.*
- *A Texas A&M review of 25 studies investigating whether parks and open space contributed positively to the property values of surrounding properties found that 20 of the 25 studies found that property values were higher. "The real estate market consistently demonstrates that many people are willing to pay a larger amount for property located close to parks and open space areas than for a home that does not offer this amenity,"*
- *American Forests, a national conservation organization that promotes forestry, estimates that trees in cities save \$400 billion in storm water retention facility costs.*
- *Quality parks and recreation are cited as one of the top three reasons that business cite in relocation decisions in a number of studies.*
- *Parks and recreation programs produce a significant portion of operating costs from revenue generated from fees and charges*
- *Parks and recreation programs generate revenue directly from fees and charges, but more importantly, provide significant indirect revenues to local and regional economies from sports tournaments and special events such as arts, music, and holiday festivals. Economic activity from hospitality expenditures, tourism, fuel, recreational equipment sales, and many other private sector businesses is of true and sustained value to local and regional economies.*

Health and Environmental Benefits

- *Parks are the places that people go to get healthy and stay fit.*
- *Parks and recreation programs and services contribute to the health of children, youth, adults, and seniors.*
- *According to studies by the Centers for Disease Control and Prevention, creating, improving and promoting places to be physically active can improve individual and community health and result in a 25 percent increase of residents who exercise at least three times per week.*
- *A study by Penn State University showed significant correlations to reductions in stress, lowered blood pressure, and perceived physical health to the length of stay in visits to parks.*

• Parks and protected public lands are proven to improve water quality, protect groundwater, prevent flooding, improve the quality of the air we breathe, provide vegetative buffers to development, produce habitat for wildlife, and provide a place for children and families to connect with nature and recreate outdoors together.

Social Importance

• Parks are a tangible reflection of the quality of life in a community. They provide identity for citizens and are a major factor in the perception of quality of life in a given community. Parks and recreation services are often cited as one of the most important factors in surveys of how livable communities are.

• Parks provide gathering places for families and social groups, as well as for individuals of all ages and economic status, regardless of their ability to pay for access.

• An ongoing study by the Trust for Public Land shows that over the past decade, voter approval rates for bond measures to acquire parks and conserve open space exceeds 75%. Clearly, the majority of the public views parks as an essential priority for government spending.

• Parks and recreation programs provide places for health and well-being that are accessible by persons of all ages and abilities, especially to those with disabilities.

• In a 2007 survey of Fairfax County, VA, residents of 8 of 10 households rated a quality park system either very important or extremely important to their quality of life.

• Research by the Project on Human Development in Chicago Neighborhoods indicates that community involvement in neighborhood parks is associated with lower levels of crime and vandalism

• Access to parks and recreation opportunities has been strongly linked to reductions in crime and to reduced juvenile delinquency.

• Parks have a value to communities that transcend the amount of dollars invested or the revenues gained from fees. Parks provide a sense of public pride and cohesion to every community.

Susan Watson

Mayor Guthrie and Members of Council:

While the Staff Report and various summaries highlight changes between our existing By-law and the final draft being presented to COW, there is not specifically a document which tracks the changes between the first draft released to the public on April 20th, 2018 and the final draft released on November 30th, 2018.

I thought the attached table would be helpful in illustrating the work that was accomplished as a result of the 6-month delay in bringing the By-law forward.

The table also provides a clear picture of the range of stakeholder and public input from the final April 20 - May 3 consultation that was integrated into the final draft of the By-law.

Standard Market Values for Industrial and Commercial uses have been removed from Schedule A in the final draft version of the By-law. I am not sure why? The possible shortfall in cash-in-lieu remitted for 1888 Gordon underlines the need for an accurate benchmark against which staff can evaluate any appraisals received from the development community.

Lastly, I'm not sure if Ms. Flaherty was misquoted by the Guelph Mercury-Tribune? (See below). As far as I can see, there were no changes made to parkland or cash-in-lieu conveyance rates between those in the April 20th draft released to the public and those in the November 30th final draft coming to COW.

Sincerely,
Susan Watson

Asked why the additional six months was needed to revise the bylaw, Flaherty said the time was used to balance out what residents wanted and what developers wanted.

"Developers generally felt that the proposed rates were too high and the general public generally felt that the rates were too low," she said.

"We looked at what feedback and adjusted the bylaw accordingly. The final bylaw balances the needs of the entire community."

<https://www.guelphmercury.com/news-story/9115073-guelph-s-new-parkland-bylaw-doesn-t-go-far-enough-critic-says/>

Changes made to Parkland Dedication By-law drafts

April 20th, 2018 draft of By-law	Final draft of By-law, November 30 th , 2018
This version contains 10 definitions	Five definitions added: Board of Education, College, Gross Floor Area, University, Zoning By-law
<p>“Market Value” means the amount that the Land might be expected to realize if sold on the open market by a willing seller to a willing buyer, as of the day before the day of the issuance of the first building permit for the Development;</p>	<p>“Market Value” means the the value of the Land determined in accordance as nearly as may be with section 14 of the Expropriations Act, RSO 1990 c E.26, as amended or any successor thereto, as of the day before the day of the issuance of the first building permit for the Development;</p>
Contains a list of 6 types of Land not accepted for Parkland	<p>Added: (c) Areas of Land that are required to accommodate stormwater management facilities;</p> <p><i>Note: This wording is from p. 15 of the Consultant’s report. A draft version was circulated internally in January, 2018. The date on the final report is April 2, 2018.</i></p> <p><i>The following text from the consultant was not included:</i></p> <p>And, where lands for parks purposes include storm water management facilities, that portion of the land that includes a storm water management facility shall not be included in the area calculation for parkland conveyance;</p>

Changes made to Parkland Dedication By-law drafts

April 20th, 2018 draft of By-law	Final draft of By-law, November 30 th , 2018
<p>No requirement for payment before building.</p>	<p>Added:</p> <p>No building without payment: 23.If a payment is required pursuant to section 17 or 18 above, no person shall construct a building on the Land proposed for Development or Redevelopment unless the payment has been made or arrangements for the payment satisfactory to the City have been made.</p> <p><i>Note: This item was flagged by a member of the public, however, this is a requirement of the Planning Act and the text is lifted directly from Section 42.6.1 of the Act.</i></p> <p><i>Our existing By-law requires conveyance of title of land before a building permit is issued, but this hasn't been included in the draft update.</i></p>
<p>(b)Development or Redevelopment of Land owned by and used by a Board of Education and/or a College or University as defined in the Education Act, RSO 1990 c E.2, for non-commercial institutional and/or educational purposes;</p>	<p><i>Note: Separated into two sections:</i></p> <p>(b)Development or Redevelopment of Land owned by and used by a Board of Education; (c) Development or Redevelopment of Land owned by a College or University for non-commercial institutional and/or educational purposes;</p>

Changes made to Parkland Dedication By-law drafts

April 20th, 2018 draft of By-law	Final draft of By-law, November 30 th , 2018
<p>In Force: 35.This By-law shall come into force and take effect on January 1, 2019.</p> <p><i>Note: The original timeline was as follows: Committee of the Whole: July 3, 2018 Council approval: July 23, 2018 Lag time between vote and By-law in force: 5 months, 6 days.</i></p>	<p>In Force: 36.This By-law shall come into force and take effect on January 31, 2019.</p> <p><i>Note: New timeline: Committee of the Whole: January 14th, 2019 Council approval: January 28th, 2019 Lag time between vote and By-law in force: 3 days</i></p>
<p>Range of rates proposed for conveyance of land and cash-in-lieu.</p>	<p>No change to proposed rates from previous draft.</p>
<p>Schedule A attached to this draft contains Standard Market Values for commercial, industrial and residential uses.</p>	<p>In the update, commercial and industrial Standard Market Values have been removed from Schedule A.</p>

Mayor Guthrie and Members of Council:

The Planning Partnership was retained by the City of Guelph as a consulting team for the Parkland Dedication By-law update.

The list of recommendations from the consultant and staff responses are not currently included in the agenda for the Committee of the Whole meeting this coming Monday.

I believe there are a number of recommendations which have not been adopted which will be of interest to members of Council and the general public. They can be found at this link on the City website:

<https://guelph.ca/wp-content/uploads/Consultant-Recommendations-for-Parkland-Dedication-Bylaw.pdf>

Sincerely,

Susan Watson

To Members of City Council and the City Clerk,

With respect to the issue of updates to the City of Guelph's Parkland Dedication By-law, I have two simple questions:

- 1) Can you clearly explain to the residents and rate-payers of this city why we shouldn't seek the maximal parkland directed development fees as allowed by the Province in the soon to be updated by-law?
- 2) Given the fact that Guelph's pool of resources for parkland acquisition and development is significantly underfunded due to years of insufficient fees collected from developers (and delays to updates of the bylaw), why should the City seek anything less than maximal fees calculated at genuine market levels from developers?

If there is a reason to seek anything less than the maximum amounts from developers, City Council and the Mayor have a duty of care to publicly and transparently report their reasoning to the residents of Guelph.

Mary Peirson

To the City Clerk, the Mayor and City Councillors

RE: UPDATE TO PARKLAND DEDICATION BY-LAW

As a family physician, I have an interest in comprehensive health care; having worked in public health for several decades I also have an interest in the determinants of health. A very significant determinant of health is environment - clean air and water and access to green spaces in cities (for mental and physical health and to reduce social isolation).

Guelph recently elected the first Green Party federal MP in Canada's history. It is a reflection of our residents' very significant concern about the environment. The Mayor and Guelph City Councillors should keenly take note of voter's concern with respect to all things 'green'.

The Parkland dedication by-law is coming up for review. The City's resources for acquisition and development of parkland in Guelph are woefully underfunded compared to other communities and fees collected are a fraction of what is allowed by the province. Sometimes fees collected don't appear to reflect accurate land valuations. This update is long overdue.

In this era of global-warming it is imperative to understand that Canada's cities are particularly poorly equipped to cope with the increasing number and severity of heat waves (recall there was dozens of deaths in Montreal this past summer attributed to the vicious heat wave that punished that city). Our infrastructure is not designed to endure prolonged periods of high heat and humidity.

In an article published in the Globe and Mail on July 7th, 2018 The Canada Research Chair in urban governance, David Wachsmuth, at McGill University related some salient points with respect to urban planning and increasing heat related to global warming. In the Globe article Mr. Wachsmuth was reported to say "urban centres face unique challenges during heat waves because they become 'heat islands' - meaning they get hotter than rural areas. A number of factors, including reduced green space and the fact that concrete absorbs the sun's energy, can make cities a few degrees hotter than outlying areas."

All the more reason that cities must maximize urban green space (protect it, plan for it, acquire it) especially in areas of high density such as city centres, commercial hubs and high density residential developments. City Councils have an urgent responsibility to adequately and aggressively collect development fees that are meant to pay for it.

The City of Guelph is 25% short of its own minimum community green space requirements and Guelph's current minimum is among the lowest of any City in Ontario.

Hard to believe coming from the only riding represented by the Green Party of Canada.

Urban green space isn't a luxury, it's a public health necessity. Inadequate planning for green space in our city could potentially become a deadly liability in years to come and significantly impact the determinants of health for our citizens. I hope that our Mayor, planning staff and city councillors are taking note and taking action to improve this dire situation. Acknowledgement of past failings and taking steps to make necessary corrections is the hallmark of an enlightened political body.

Update the Parkland dedication by-law to instate the maximum parkland dedication development fees allowed by the Province. Collect fees based on accurate and current land values (with absolute consistency and transparency). Given the present parkland situation in Guelph, I believe anything less would be irresponsible.

Mary Peirson M.D., C.C.F.P.

Dear Mayor Guthrie, City Councilors and Staff –

I am writing today regarding the Staff Report – (PS-2019-01)- Parkland Dedication Bylaw. I applaud Council's follow-through to (finally) update this sorely outdated bylaw and apply it to maintain a city-wide park service level. We definitely need to update this bylaw.

I'm a downtown mom with an active son and no backyard. We use our local parks, almost daily. It would be amazing if the city could add to the park supply, and not just add more users to our existing parks as our population grows. I strongly support any changes to the bylaw that will result in Guelph kids having more parkland.

To that end, please take the time to debate the staff recommendation of a cap on the payment-in-lieu rate (of 20% of the value for high density residential development). How can it serve Guelph residents to cap a funding source for parkland acquisition? This cap only serves the needs of developers. The rationale that this is '*intended to provide a balance between the proposed increased rate and current practices*' is ridiculous.

For far too long, developers have gotten away with paying pennies on the dollar for development in Guelph. As a result, we don't have the funds we need to acquire or create parkland in a city with dramatically escalating land values. How many new residents have moved downtown? A lot! The wear and tear on our meager downtown park inventory shows this. How much money do we have to acquire this pricey land? Not much. So why would we

ever consider limiting a funding source for this? Just because developers ask us to? Because they're used to paying an unreasonably low rate?

Further, to put this cap in place for high density residential developments makes no sense. Families living in high density developments need more parkland (not less) as they have little to no personal outdoor space. Why would we restrict our ability to provide these residents with the greenspace they need by lowering fees developers pay?

We do not need a cap on fees as an incentive for high density residential intensification. Our low vacancy rates, high average rents, and high property values downtown are incentive enough for downtown intensification. We do, however, need a source of funds for downtown parkland. If it isn't coming from development fees, from where will you source these funds?

I'd like to see retro-active payment required at new cash-in-lieu rates for recently approved development projects to offset lost parkland revenue. Perhaps this would prevent further debate and delays on this bylaw?

Please (quickly) pass a bylaw that will give Guelph the funds it needs to build more parks. Our kids need someplace to play outside.

Kathryn Folkl

Dear council members,

I write to express my deep concern with the lack of space that is currently being devoted to parkland or to undeveloped forest space in new developments.

Many people, both laymen and university professors have extolled the benefits for children and adults alike of spending time in nature.

Readily accessible green space must be available to everyone. People shouldn't have to have access to a vehicle in order to access green space from where they live. At a time in history when many children suffer from what some call Nature Deficit Disorder, it is in the public's best interest to fund green space. It is vital that the government not accept cash in lieu for this green space. The green space will keep on giving; the generosity of the trees, the grasses, the birds, the fresh air, the rain puddles, and the sledding hills will still be around for generations after the cash-in-lieu has been spent and forgotten.

If we accept cash-in-lieu for the green spaces, we should be prepared to pour that money into Mental Health and occupational therapy budgets to support

children who are not prepared for life and school because they have not reaped the benefits of having a life-giving relationship with the earth. It's that simple.

Thank you for your consideration,

Laura Hacker

Class Teacher, Trillium Waldorf School

Dear Mayor Guthrie and Councillors:

I am writing to ask you to vote against the proposed Parkland Dedication Bylaw.

I predict a rise in the per person utilization of parks as jarring technological and economic change - read automation - sweeps across our community in the not to distant future. The number of people employed will be decreasing. As a result, parks will become an increasingly important contributor to the population's well-being and quality of life. Consequently we will need more parks, not fewer.

The proposed bylaw defines acquisition rates below what is permissible under the Planning Act. Since parkland is practically impossible to come by after lands have been developed for other uses, the maximum amount of parkland should be acquired while it is there to be had. The proposed bylaw does not do this.

Please oppose the proposed bylaw and direct Staff to return with a proposed bylaw that maximizes the rate of parkland acquisition within the limit of the Planning Act.

Thank you.

Ted Bangay

As I am temporarily unable to attend Council meetings to speak on this important matter I wish to inform you of my point of view as follows: The idea of Parkland Dedication is not some extreme notion, it is simply trying to catch up with an already legislated norm! Many other municipalities have enforced this practice over the years to their advantage, and now Guelph should benefit as well.

I hope you will encourage and support the implementation and support of Parkland Dedication

Yours truly,
Elizabeth Macrae

* * *

Dear Council,

I am writing as a parent of four Central Public School students and a resident of downtown Guelph to express my concern about inadequate parkland for our children and residents. I think we all must agree that accessible green space is critical to our well being. So how can we even consider taking cash in lieu of parks from developers?

We are counting on your leadership to defend the true intent of our city's official plan. There is presently no accessible green space for Central Public School students or residents of the downtown Guelph core community. My daughter has spoken to you of her fond childhood memories in Germany walking with her kindergarten class to the playground downtown. If only my son now in kindergarten had that same opportunity!

Please don't sell out Guelph's green future. I don't think you need to be an optometrist to realize that this is a nearsighted decision indeed.

With gratitude,

Dr. Christine Main

* * *

Dear Mayor Guthrie and Councillors,

I am urging you to consider Consultant Recommendation #36 (see below) in the Parkland Dedication Bylaw Review. I will give a recent example of why we should adopt this recommendation.

At the Dec 17th council meeting on the Speedvale underpass, a motion was presented by Councillor Goller to include a pathway from the North side of the Speedvale Ave bridge to the underpass. Staff objected with the argument that if it was to be considered then it would need to be funded through the Capital budget and this would mean something else would have to be taken out of the budget.

Simply put if we had a dedicated fund as per Recommendation 36 ,funds may be available for important missing link projects such as this one.

Thanks ,

Mike Darmon

<https://guelph.ca/wp-content/uploads/Consultant-Recommendations-for-Parkland-Dedication-Bylaw.pdf>

Recommendation 36: *It is suggested that the Parkland Dedication bylaw/Interpretation Guideline require that the City establish a special bank account for the receipt of all cash as payment-in-lieu of land contributions accrued through the application of the bylaw/Interpretation Guideline, and that the accumulated monies may be used for the following priorities:*

i. The first priority shall be to fund the acquisition of parkland and/or the improvement of existing City Parks in areas that have parkland deficiencies;

ii- The second priority shall be the development of parks and other public recreational facilities not funded through Development Charges including:

+ The acquisition of lands for pathways, trails and associated infrastructure and furniture throughout the city, with a focus on missing links;

* * *

Mayor Guthrie and Members of Council,

The consultant hired by the City of Guelph to review the proposed new Parkland Dedication Bylaw recommends you seek the maximum amount of parklands as allowed under the Ontario Planning Act. It is important to enact this maximum for the health, wellbeing and value of our City.

City staff did not include some recommendations that will likely leave the public shortchanged in parkland cash in lieu, land value disputes.

Please put parkland in the forefront of development, just as you would for other important infrastructure when you allow any new development.

Developers owe this to our community.

Sincerely,

Clover Woods

January 9th, 2019

RE: Parkland Dedication

Your Worship, Councillors, Staff, and Guelphites,

The recent flourish of residential development in downtown Guelph is mostly positive and welcome. Now we need to work together to ensure that we use the potential unleashed by a period of development to the future benefit of the people of Guelph.

Guelph's downtown is shockingly devoid of parkland. The existing parkland dedication bylaw has caused us to miss out on massive amounts of revenue that should be used to create parkland in the downtown, and this is to say nothing of the potential parkland that has been lost. The proposed Parkland Dedication By-law motions in the right direction, but fails to step forward in a way that will guarantee the best free and accessible public parks for everyone in the city.

As both staff and the TPP report demonstrate, in its current form, the proposed by-law will generate relatively paltry revenue. Let's not let the legacy of this period of development be a multi-storey car park and a weak by-law that quite clearly favours developers' interests over those who live, work, and play in the city. All is not lost. There are still some sites in the downtown that will make for suitable parkland, 75 Dublin being amongst the most obvious.

Now is the time for us to use both the land that development makes available to the city and the revenue that they generate to create useable parkland that is free and accessible to everyone who lives, works, and plays in this great city.

More revenue is good. More land is better.

Yours sincerely,

Dr. Mervyn Horgan

January 2, 2019

Submitted for consideration to the Staff, Councillors, and Mayor of the City of Guelph:

I have enclosed a copy of a report which details the discrepancy between our city's parkland census and the actual parkland inventory within Guelph's boundaries. As you are aware, our city's Official Plan has a minimum requirement of 2.0 hectares of parkland per 1000 residents, and a goal of 3.3 hectares of parkland per 1000 residents – equivalent to 436 hectares at our current population.

The city has reported a total of 442 hectares of parkland, however, upon closer investigation, it was determined that much of that land – over 130 hectares – does not fit our definition of parkland. Some of the larger discrepancies include approximately 40 hectares of provincially significant wetland at Guelph Lake, and approximately 17 hectares of unbuilt future park at Eastview.

Furthermore, an analysis of Guelph neighbourhoods shows many houses, including those within the Chillico and Tovell neighbourhood and the Clairfields West neighbourhood, are not within walking distance of any park. Our parks are not just too small; in some cases, they do not even exist.

To my knowledge, nobody has done a full and accurate analysis of Guelph parks. We do not know how many homes or how many residents do not have a nearby park. We do not know if the parks we are building are big enough for their neighbourhoods.

The data is clear: Guelph is not meeting its target. We need more land area to devote to parks; we also need money to build on the land we have already acquired. The renewal of the parkland dedication bylaw is our opportunity to start fixing the mistakes of the past. When drafting this bylaw, please choose to use the maximum amounts of parkland dedication and cash-in-lieu permitted in the Planning Act, so we can become the city we aspire to be.

Sincerely,

Matt Saunders

City of Guelph Parkland Analysis Report 2018

— prepared by —
Matt Saunders

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1 Introduction

Guelph, a city of 132,000 in the heart of Southern Ontario, is a city known for its commitment to protecting green space. Built among a drumlin field left as a remnant of the most recent period of glaciation, the city's rolling hills and deep-cut river valleys help to make the city one of the greenest in Canada.

In 2009, to protect and enhance this green space, the City of Guelph adopted a new framework: the Recreation Parks, and Culture Strategic Master Plan [1]. In this framework, two types of green space have been defined for the city: parkland, and conservation land. Parkland consists of land suitable for playing fields, play apparatuses, and community recreational and leisure facilities — typically, sports fields and playgrounds. Conservation land, also called natural heritage areas, was defined as woodlands, significant valleylands, and environmentally significant areas. This definition was further refined within Guelph's Official Plan [2], in which the city's open space system was defined as a hierarchy of parkland, specifically excluding the city's Natural Heritage System.

In recognizing the two types of green space, the city can ensure enough land is set aside for all types of outdoor uses: for programmed recreation and for conservation uses. Within the Official Plan, requirements have been set for each type of parkland. The city's policy is to maintain 0.7 hectares of neighbourhood parks, 1.3 hectares of community parks, and also to recommend (but not require) 1.3 hectares of regional parks for every 1000 residents. With a population of 132,000, and a total recommended amount of 3.3 hectares per thousand people, the city should have 435.6 hectares of parkland.

On October 3, 2018, the City of Guelph publicly released a full list of all of its parkland, supporting the claim that the city has enough parkland to serve the current population. In their report, the city claims to own almost 450 hectares of parkland, and leases another 40 hectares from private owners.

However, a detailed analysis of the data shows a number of inconsistencies: large amounts of conservation land, provincially significant wetlands, other significant natural areas, and unbuilt future parks are being counted as parkland. Once these areas are removed from the total, a different picture emerges: the city only owns 270 hectares of developed parkland, and owns an additional 30 hectares of naturalized areas within that parkland. In addition to the city-owned parkland, the city leases another 30 hectares of developed parkland from private owners — a total of just 330 hectares, and over 100 hectares short of the requirement.

The remainder of this report provides the details of this disparity: definitions of parkland, examples of miscategorized parks, and a list of actual parkland by ward.

This report is meant to be read alongside the accompanying open data set, which consists of an Excel spreadsheet containing the raw data, and several ESRI shape files which allow any person with access to GIS software to reproduce the calculations.

2 Definitions

In the Recreation, Parks and Culture Strategic Master Plan [1], page 64, parkland is defined as follows:

- lands within the City's inventory of parks (including those that are leased or under municipal influence) that are suitable for playing fields, play apparatuses, and community recreational and leisure facilities;
- encompassing those lands currently identified in the City's inventory database and Zoning Bylaw as Neighbourhood (P2), Community (P3) and Regional (P4) parks;
- containing mostly tableland, although it may also contain vegetative patches such as woodlots, ravines or other natural heritage features outside of environmentally significant areas; and
- may also be thought of as lands for active and programmed recreation, with the recognition that many active parks in Guelph also offer some naturalized open space elements.

By contrast, open space/conservation lands are defined as:

- lands for the preservation and conservation of the City's natural heritage system (e.g., woodlands, significant valleylands, ESAs, ANSIs, etc.), which tend to be under the ownership of the City or GRCA (although may also contain private lands);
- unprogrammed green spaces within the City's residential, commercial and industrial land base, which serve to reduce the impact of urban densities;
- aesthetically pleasing or beautified areas that enhance the City's beautification efforts;
- lands that preserve historic and cultural areas and structures; and
- linkages or corridors for the movement of animals, birds, pedestrians, cyclists, etc.

From these definitions, it is clear that a distinction is intended: recreational parkland is meant to be separate from conservation land. The distinction is reinforced within the Official Plan [2], which states in section 7.3 that parks are not part of the Natural Heritage System:

The City's open space system accommodates a variety of recreational pursuits while having regard for and complementing the City's natural areas. The open space system consists of parks, trails and open space areas that are not part of but may be interconnected with or supportive of the Natural Heritage System and conservation lands as illustrated on Schedule 6. The open space system plays an important role in defining the character of the City and promoting community health and wellness.

The Official Plan, section 7.3.2, also defines a park hierarchy, consisting of urban squares, neighbourhood parks, community parks and regional parks, and goes on to define the features of each. In addition, the Official Plan requires a minimum provision of 0.7 hectares of neighbourhood parks, and 1.3 hectares of community parks, with a recommendation of 1.3 hectares of regional parks, for each 1000 people in the city.

Additionally, the Official Plan defines size requirements that should be met for new parks: neighbourhood parks should be at minimum 1.0 hectares in size, community parks 10-20 hectares, and regional parks at least 25 hectares.

The Zoning Bylaw [3], section 9, also defines park zones. For the purposes of zoning, conservation land is defined as P.1, neighbourhood park is P.2, community park is P.3, and both regional park and urban squares are P.4. A fifth category, Commercial Recreation Park, is P.5, though for the purposes of parkland inventory, all parks in P.5 land are counted as regional parks.

3 Methodology

Determining actual parkland area is not a simple task. To map all of Guelph's parks, GIS software was used, using data from the Guelph Open Data Portal and from the Grand River Information Network [4], part of the Grand River Conservation Authority. ESRI shape files were obtained for Guelph parks [5], Guelph property parcels [6], and all wetlands and watercourses within the Grand River watershed.

As the parks shape file does not contain the parkland leased from the Wellington Catholic District School Board, consisting of parkland from eight schools across Guelph, the land parcels for these schools was added to the parkland shape file from the parcel data.

Next, ESRI shape files were created for all significant natural areas within Guelph's natural heritage system, by combining aerial imagery with the map in the City of Guelph's Official Plan, Schedule 10 [7]. Since this data has not been made public by the city, the map was created by drawing polygons over forested areas within Guelph that correspond to the areas marked in Schedule 10. Conservative estimates were taken due to the inherent uncertainty; as a result it is likely that the city has even less parkland than stated in this report.

Other ESRI shapefiles were created to map areas of parks with no public access, with unbuilt future parkland, and with naturalized areas which are not part of the natural heritage system.

To determine the actual amount of parkland, the private areas, wetlands, watercourses, significant natural areas, and unbuilt future parkland areas were removed from each park. Finally, to calculate the areas of each polygon in hectares, the map was projected using the NAD 1983 CSRS Ontario MNR Lambert projection, a projection designed to work most accurately with environmental data within Ontario.

4 Parkland within Guelph

4.1 Totals

Table 1 shows the breakdown of parkland within the City of Guelph. A full data dump, in Excel format, has been made available to accompany this report.

Table 1: Areas designated as parkland in Guelph. Data according to (1) the City of Guelph claim, (2) the OpenData set, (3) the amount of land which meets the definition of parkland, and (4) the actual amount of maintained tableland within the city.

Type of Parkland	Parkland Req. (Ha)	City (Ha)	OpenData (Ha)	Actual Parkland	Actual Maintained Tableland
Programmed Natural Space	0.00	18.01	12.26	2.93	0.00
Neighbourhood Parks	92.40	79.14	65.98	59.00	55.65
Community Parks	171.60	150.08	144.87	125.12	110.74
Regional Parks	171.60	190.15	154.90	114.07	104.69
Future Parks	0.00	2.68	2.68	0.00	0.00
Total City-Owned		442.36	378.01	301.11	271.08
Shared Use / Leased	0.00	39.25	42.94	30.53	28.95
TOTALS	435.60	481.61	420.95	331.64	300.03
Shortfall			14.65	103.96	135.57
Missing Parkland %			3.48%	31.35%	45.19%

Next are some examples of larger discrepancies between reported and actual parkland area values.

4.2 Neighbourhood Parks

The City of Guelph reports owning or leasing 58 neighbourhood parks, totaling 79.14 hectares. However, the Guelph Open Data set lists only 65.98 hectares; once water features and significant natural areas are removed, the number drops to 59 hectares.

4.2.1 Kortright Hills Park

There is a significant error in the given area of Kortright Hills Park, located at 165 Milson Crescent. The city reports 12.80 hectares, however, almost all of this land is zoned as P.1 conservation land and provincially significant wetland, as shown in Figure 1. Only 0.36 hectares are P.2 parkland.

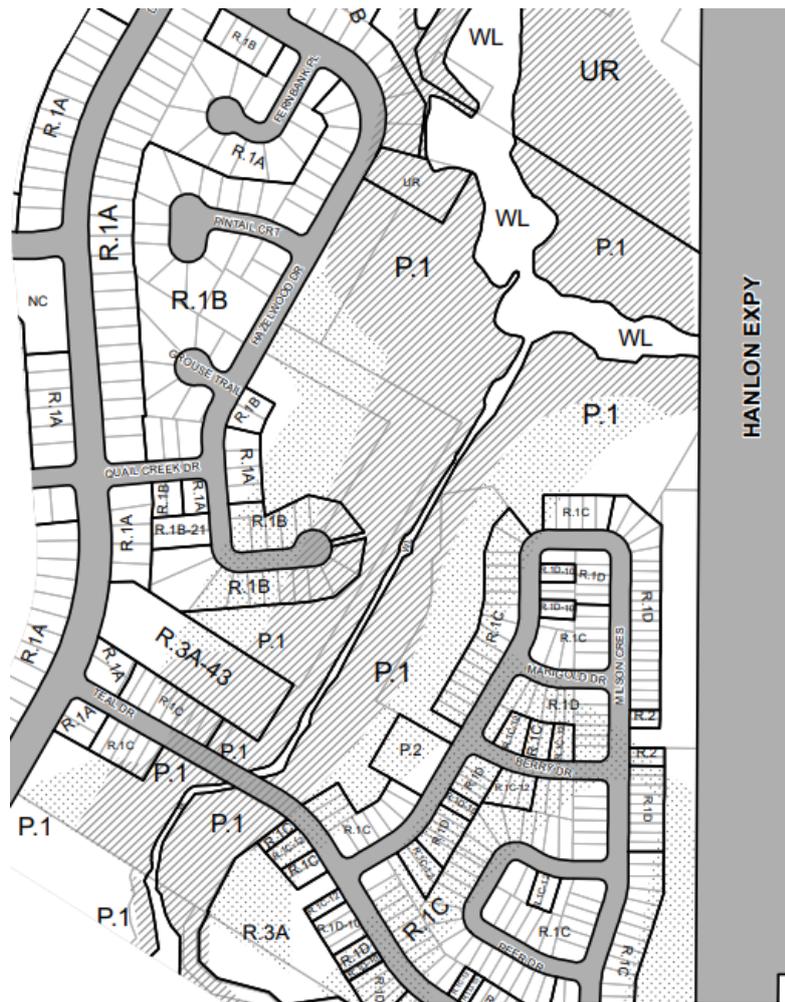


Figure 1: Zoning of Kortright Hills Park, from Schedule A of the Zoning Bylaw, defined area map number 12. Kortright Hills Park is the small P.2 zone square at lower middle of map.

4.2.2 Grange Road Park

A smaller but still significant error can be found in the count for Grange Road park (with the city reporting 4.01 hectares and Open Data reporting 2.72 hectares), which contains 1.95 hectares of wetland and an additional 0.35 hectares of significant natural area; the actual area of parkland is 1.71 hectares. The parcel is illustrated in Figure 2.



Figure 2: Aerial photo of Grange Road Park. The 4.01-hectare land parcel extends east to Watson Road, but the Open Data polygon has some (but not all) wetland removed.

4.3 Community Parks

The City of Guelph reports owning or leasing 32 community parks, totaling 158.8 hectares. However, the Guelph Open Data set lists only 144.87 hectares, and once water features and Significant Natural Areas are removed, only 125.12 hectares remain.

4.3.1 Hanlon Creek Park

The largest error is in the Hanlon Creek Park count. The City has reported large portions of P.1 conservation land, including land owned by the GRCA, as parkland, to give a total size of 23.9 hectares. Only the southwestern quadrant of the park is zoned P.3, as shown in Figure 3; the rest consists of wetland and other conservation land. Of the remaining 6 hectares, only 4.9 hectares are actual parkland (including the forested area); the rest is a Significant Natural Area.

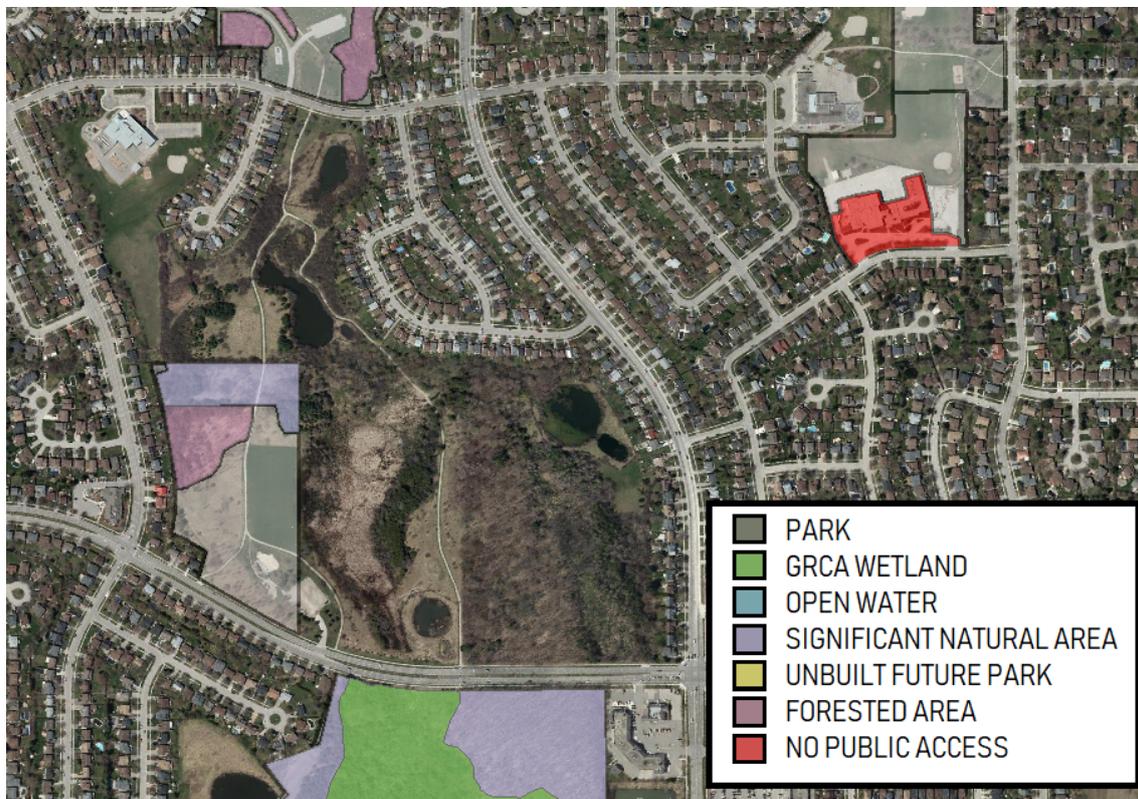


Figure 3: Aerial photo of area surrounding Hanlon Creek Park. The city is counting the large areas of wetland, visible at center, as parkland. Of the actual P.3-zoned section highlighted, the northern quarter consists of a significant natural area; the area also contains a portion of forested area which, for the purposes of this report, is being considered parkland despite not consisting of cleared tableland. Other parks can be seen: Preservation Park to the south is not counted as parkland by the city; St. Michael CS to the northeast is leased parkland with the school building and bus driveway removed, and University Village Park at the very north contains some forested area but no significant natural area.

4.3.2 Eramosa River and York Road Parks

The Eramosa River and York Road park complex, along the Eramosa River between Victoria and Gordon, contains significant natural areas which consist of forested slopes and marshy ground at the riverbank,

as shown in Figure 4. Only 10.62 hectares of the reported 15.02 in Eramosa River Park are parkland. York Road Park, on the other hand, was left out of the city data entirely. The parcel area is 6.16 hectares; 4.69 hectares of this land is usable park.

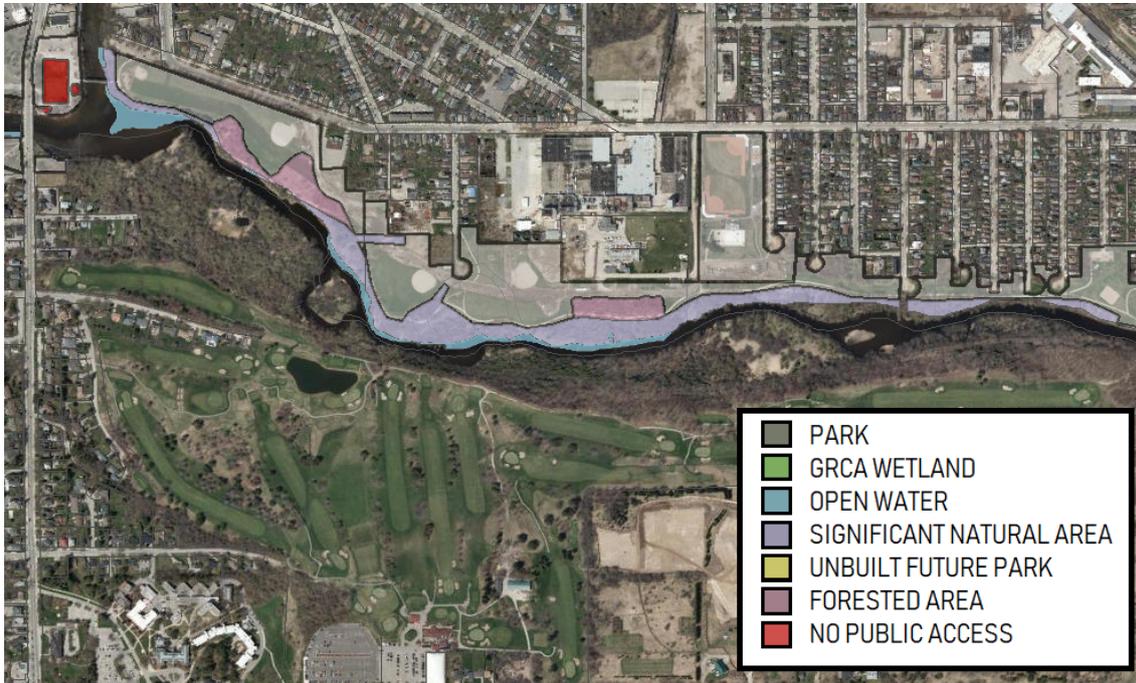


Figure 4: Aerial photo of Eramosa River Park and York Road Park. Much of the riverbank along the north side of the Eramosa River is marshy and forested, and listed as a Significant Natural Area. Additionally, a large portion of the mapped boundaries of York Road Park is currently underwater, visible left. The map also shows the private areas of the Boathouse, including the building itself and the Guelph Lawn Bowling Club.

4.3.3 Woodland Glen Park

Additionally, Woodland Glen Park (2.54 ha) was left out of the city data. 2.09 hectares of this park are usable.

4.4 Regional Parks

The City of Guelph reports owning or leasing 192.45 hectares of regional park. Of this 192.45 hectares, only 154.9 hectares exist in the Guelph Open Data dataset.

4.4.1 Guelph Lake Sports Fields

The largest error is the reported 57.39 hectares for the Guelph Lake Sports Fields. The Guelph Open Data set shows just 13.3 hectares, as shown in Figure 5; only 13.08 hectares are outside of the GRCA wetland, and just 12.54 hectares are usable.

Guelph Lake has no zoning status within the City of Guelph as it is outside of city limits, within Guelph/Eramosa Township.



Figure 5: Aerial photo of the Guelph Lake Sports Fields. The sports fields consist of just 13.08 hectares; the remainder is impassable wetland.

4.4.2 Eastview Community Park

Another concern is the reported 25 hectares for Eastview Community Park. This is a new park with just 7.34 hectares of actual built and maintained park; a large portion of the remainder is uncleared and unbuilt scrub land, filled with waist-high weeds. The park also contains a wetland, several stormwater retention ponds, and a large buffer woodlot, as shown in Figure 6.

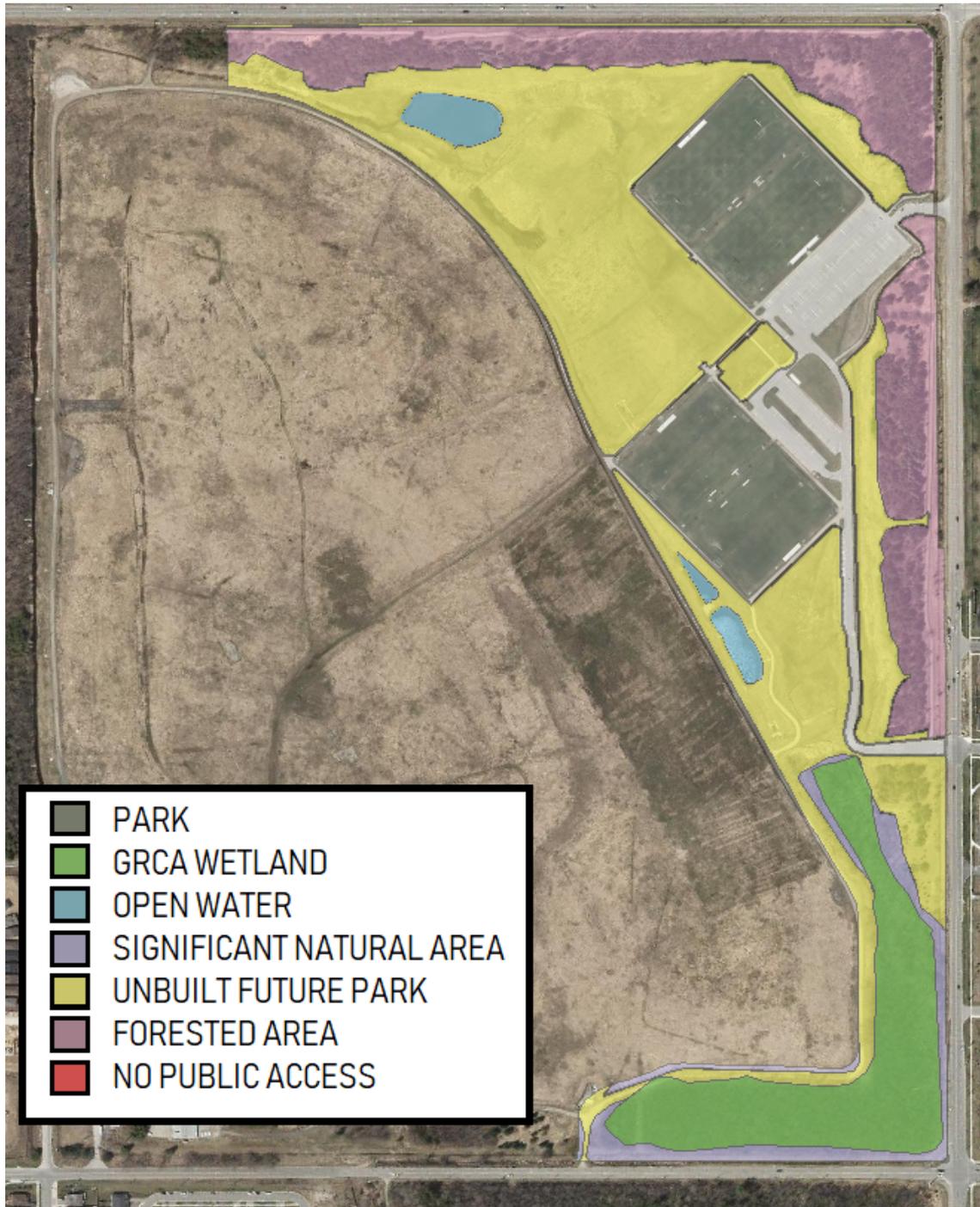


Figure 6: Aerial photo of the Eastview Community Park. Large portions of the park are yet to be built, awaiting funding.

4.4.3 Riverside Park

Riverside Park is also over-represented. The park contains two private areas with no public access: a fire hall and an equipment yard. Additionally, the north end of the park contains both a provincially significant wetland and a significant natural area, shown in Figure 7. Including the non-highlighted outdoor area of the Evergreen Seniors Center, which is functionally but not legally a part of the park, the actual area is 22.74 hectares, nearly 10 hectares short of the initial reported 31.3.



Figure 7: Aerial photo of Riverside Park, containing a provincially significant wetland, open water, multiple significant natural areas, and two private areas. Note that the official definition of Riverside Park extends south of Speedvale Avenue, on both sides of the Speed River. Note also the outdoor portion of the Evergreen Seniors Center land parcel, middle left, which if added to Riverside Park would add 0.96 hectares to its total area for a total of 22.74 hectares.

4.4.4 South End Community Park

The South End Community Park is unique on this list as it is not built in a P.4 zone but rather as specialty zone P.5-6. This specialty zone was required as the attached land parcel was not big enough to build a high school. As a workaround, part of the South End Community Park was leased to the school board as a parking lot. However, the City of Guelph is still counting this area as a park.

Additionally, the southern reaches of the park contain large portions of Significant Natural Area, and a small amount of unbuilt future park, all shown in Figure 8. Of a reported of 16.2 hectares, only 9.46 hectares is usable.

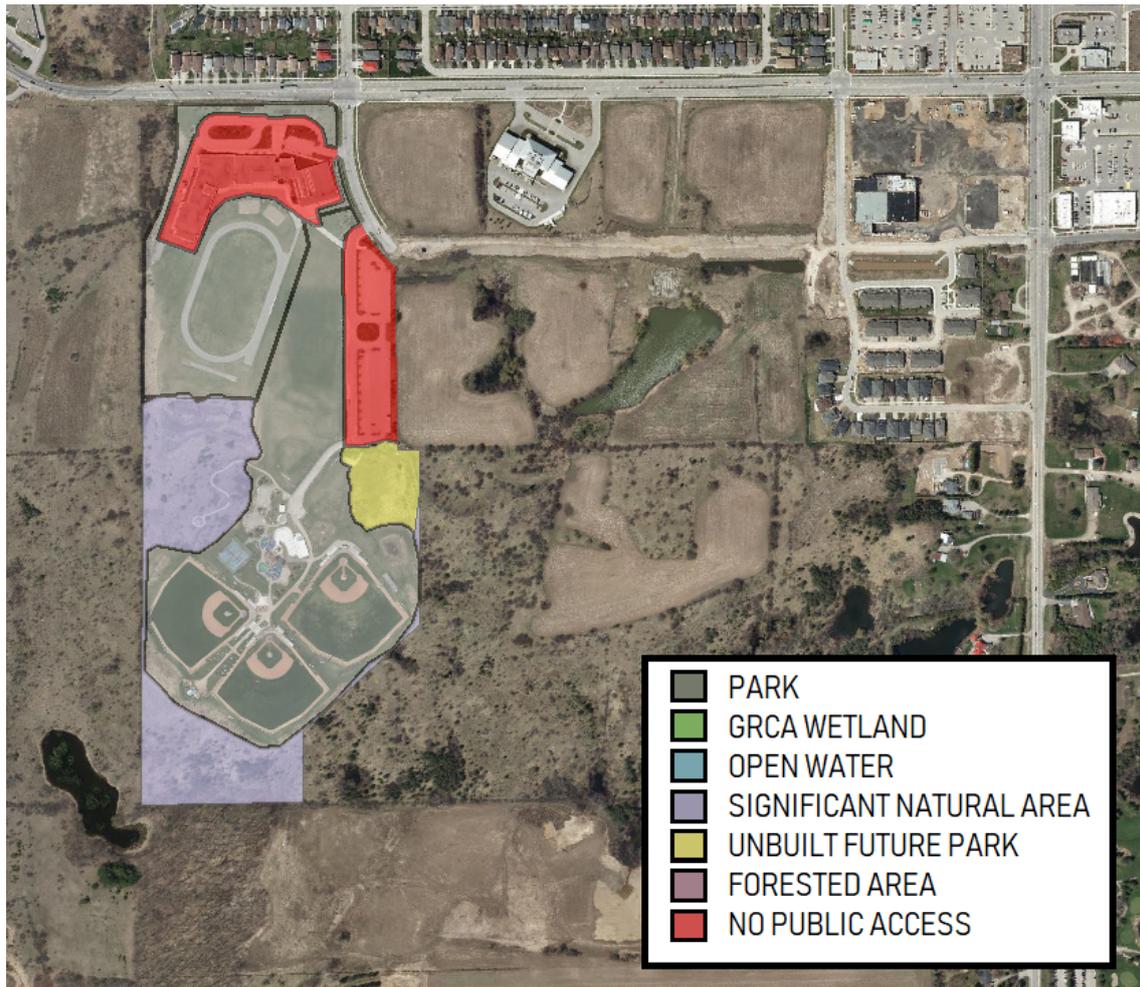


Figure 8: Aerial photo of the South End Community Park and Bishop Macdonell CHS. A portion of the City parkland has been specially zoned as the parking lot for the high school. Other parts are either Significant Natural Areas, or are still unbuilt.

4.4.5 Margaret Greene Park

Margaret Greene Park is listed as 17.7 hectares, but contains a Significant Natural Area 4.20 hectares in size, shown in Figure 9. Additionally, other forested lands outside of the Significant Natural Area amount to 2.36 hectares. In total, the park contains 13.54 hectares of parkland, of which 11.18 hectares is actual cleared tableland.



Figure 9: Aerial photo of Margaret Greene Park. Most of the west end is a Significant Natural Area. Other forested areas separate the park from St. Peter CS to the north.

4.5 Leased / Shared-Use Parkland

The City of Guelph leases and maintains parkland at ten sites: nine schools and the Guelph Curling Club. These schools, all part of the Wellington Catholic District School Board (WCDSB), are under contract with the city, in which the city provides maintenance and booking services. The city reports 39.25 hectares of leased parkland; however, further analysis shows this number includes the areas of the school buildings, and other non-parkland areas such as bus loops.

4.5.1 Wellington Catholic District School Board

Three high schools and six elementary schools consist of leased parkland. Bishop Macdonell CHS, Our Lady of Lourdes CHS, and St. James CHS are all leased to the city, as are Holy Trinity CS, St. Francis of Assisi CS, St. John CS, St. Peter CS, Ecole St. Rene-Goupil, and St. Michael CS.

For those investigating the ESRI shape file data accompanying this report, note that St. James CHS and St. John CS share the same land parcel, with a second land parcel containing St. James sports fields. Due to the nature of the parcel data set, some land that the city considers part of St. James is counted as part of St. John, however, the overall amounts are accurate.

4.5.2 Guelph Curling Club

The Guelph Curling Club sits on a 3.92 hectare parcel of land at the north edge of the city. Of this land, only 2.89 hectares has been built into parks: the remainder is the Curling Club building (a private establishment) and an unmaintained field to the rear of the property.

Removing these private and non-park areas of the schools and the private club reduces the actual parkland area to 28.95 hectares.

4.6 Future Parks

The city data lists six future parks, yet to be built: five neighbourhood (P.2) parks and one community (P.3) park. As they are unbuilt, these parks are not being counted towards the total.

However, as a tangential note, only one of these parks (Kortright East Neighbourhood Park, at 1.02 hectares) is sized adequately per the requirements in the Official Plan. Every other park is under a hectare in size. Neighbourhood Parks are intended to be at least one hectare in size per the Official Plan. Though Community Parks are meant to be ten hectares in size, the future community park listed here is the Woods Development river walk (0.33 hectares), which is constrained by its location and should be expected to be small.

The Open Data set contains six other future parks, for a total of twelve. With the exception of the parks within the future Innovation District, none of these new parks meet the size constraints.

4.7 Programmed Natural Space

The city is also claiming Crane Park as parkland, despite its P.1 zone. The park is a designated off-leash area, which may be the reason behind the declaration. However, as the park is entirely forested and mostly GRCA wetland, it should not be considered parkland.

5 Breakdown by Ward

5.1 Ward 1

Ward 1, with a population of 25,008 [8], has a total parkland requirement of 82.53 hectares. There are currently 56.86 hectares of actual parkland built in Ward 1, amounting to **2.27 hectares per 1000 people**. Full details are shown in Table 2.

Table 2: Amount of each type of parkland in Ward 1.

Zone	City (Ha)	OpenData (Ha)	Actual Parkland	Actual Maintained Tableland
P.2	9.99	8.99	7.84	7.84
P.3	41.64	43.39	37.52	35.76
P.4	4.93	4.57	3.38	3.38
Lease	12.56	12.42	8.12	8.12
Total	69.12	69.37	56.86	55.10

5.2 Ward 2

Ward 2, with a population of 18,501 [8], has a total parkland requirement of 61.05 hectares. There are currently 70.67 hectares of actual parkland built in Ward 2, amounting to **3.82 hectares per 1000 people** — making Ward 2 the only ward to exceed the overall parkland targets, due to the presence of three regional parks. Full details are shown in Table 3.

Table 3: Amount of each type of parkland in Ward 2.

Zone	City (Ha)	OpenData (Ha)	Actual Parkland	Actual Maintained Tableland
P.2	17.88	18.76	16.99	16.99
P.3	4.64	4.91	4.91	4.91
P.4	115.19	75.32	48.77	43.02
Lease	0.00	0.00	0.00	0.00
Total	137.71	98.99	70.67	64.91

5.3 Ward 3

Ward 3, with a population of 21,551 [8], has a total parkland requirement of 71.12 hectares. There are currently 41.51 hectares of actual parkland built in Ward 3, amounting to **1.93 hectares per 1000 people** — well below the minimum amount, though proximity to Silvercreek Park in Ward 5 and Riverside Park in Ward 2 may alleviate this need somewhat. Full details are shown in Table 4.

Table 4: Amount of each type of parkland in Ward 3.

Zone	City (Ha)	OpenData (Ha)	Actual Parkland	Actual Maintained Tableland
P.2	4.24	4.13	4.13	4.13
P.3	20.05	20.65	16.60	15.32
P.4	12.64	13.91	13.67	13.67
Lease	8.52	9.79	7.14	6.37
Total	45.45	48.48	41.51	39.49

5.4 Ward 4

Ward 4, with a population of 20,175 [8], has a total parkland requirement of 66.58 hectares. There are currently 41.07 hectares of actual parkland built in Ward 4, amounting to **2.04 hectares per 1000 people** — the absolute minimum acceptable amount. Full details are shown in Table 5.

Table 5: Amount of each type of parkland in Ward 4.

Zone	City (Ha)	OpenData (Ha)	Actual Parkland	Actual Maintained Tableland
P.2	14.12	14.05	10.91	7.56
P.3	9.47	11.58	11.20	8.46
P.4	17.74	17.82	13.54	11.18
Lease	5.8	7.37	5.42	4.62
Total	47.06	50.87	41.07	31.82

5.5 Ward 5

Ward 5, with a population of 19,173 [8], has a total parkland requirement of 63.27 hectares. There are currently 81.82 hectares of actual parkland built in Ward 5, amounting to **4.27 hectares per 1000 people** — one of two wards with more parkland than required. Full details are shown in Table 6.

Table 6: Amount of each type of parkland in Ward 5.

Zone	City (Ha)	OpenData (Ha)	Actual Parkland	Actual Maintained Tableland
P.1	18.01	19.49	2.93	0.00
P.2	13.42	9.94	9.36	9.36
P.3	66.11	47.27	38.49	29.89
P.4	25.76	27.61	25.25	23.98
Lease	6.30	7.31	5.79	5.79
Total	126.12	111.04	81.82	69.02

5.6 Ward 6

Ward 6, with a population of 27,402 [8], has a total parkland requirement of 90.43 hectares. There are currently 39.69 hectares of actual parkland built in Ward 5, amounting to **1.45 hectares per 1000 people** — by far the ward with the least amount of parkland. Full details are shown in Table 6.

Table 7: Amount of each type of parkland in Ward 6.

Zone	City (Ha)	OpenData (Ha)	Actual Parkland	Actual Maintained Tableland
P.2	23.04	10.64	9.77	9.77
P.3	16.87	17.07	16.40	16.40
P.4	16.19	15.67	9.46	9.46
Lease	6.07	6.05	4.06	4.06
Total	62.17	49.42	39.69	39.69

6 Conclusions

After applying the Official Plan definition of parkland to the OpenData Guelph parkland data set, and comparing it to the parkland amounts provided by the city, it has been shown that Guelph is below its parkland targets by 103.96 hectares. If we consider only parkland Guelph has full control over (i.e. not leased from a third party) there is only 301.11 hectares of parkland, a shortfall of 134.49 hectares. Of this parkland, 90% is developed tableland suitable for programmed recreational activities, with the remaining 10% undeveloped, unbuilt, or forested.

To calculate these numbers, we compared the OpenData dataset to the City-provided dataset, and noted major discrepancies. Importantly, the city is counting P.1 unprogrammed conservation land (at Kortright Hills and Hanlon Creek) as parkland, and GRCA-regulated provincially significant wetland at Guelph Lake Sports Fields as parkland.

We also noted the City's inclusion of lands designated as Significant Natural Areas, GRCA wetlands, and open water features, which are explicitly excluded from parkland in the Official Plan. Finally, the city's data was also noted to include many buildings and areas with no public access, such as the building footprints of elementary schools, and other private organizations such as the Guelph Curling Club and the Guelph Lawn Bowling club.

The City of Guelph needs to have a serious discussion, involving all stakeholders and with real citizen engagement, to determine how to move forward, and how to ensure we are building and maintaining enough parkland as we continue to grow through the next decade.

References

- [1] City of Guelph. Recreation, Parks and Culture Strategic Master Plan. <https://guelph.ca/wp-content/uploads/RecreationParksCultureStrategiMastePlan.pdf>, 2009.
- [2] City of Guelph. The City of Guelph Official Plan, March 2018 Consolidation. <https://guelph.ca/wp-content/uploads/Official-Plan-Consolidation-March-2018.pdf>, 2018.
- [3] City of Guelph. Zoning Bylaw. <https://guelph.ca/city-hall/by-laws-and-policies-2/zoning-by-law/>, 1997.
- [4] Grand River Conservation Authority. Grand River Information Network: Geospatial Data. <https://data.grandriver.ca/downloads-geospatial.html>.
- [5] City of Guelph Open Data. Guelph Parks. <http://data.open.guelph.ca/dataset/guelph-parks>.
- [6] City of Guelph Open Data. Guelph Property. <http://data.open.guelph.ca/dataset/guelph-property>.
- [7] City of Guelph. City of Guelph Official Plan Schedule 10: Natural Heritage System. <http://guelph.ca/wp-content/uploads/OPA420MBAApprovedSchedules.pdf>, 2018.
- [8] City of Guelph. Response to Candidate Question re: Population counts by ward. Available on the City of Guelph election candidates portal., 2018.



City of Guelph
1 Carden Street
Guelph, Ontario
N1H 3A1

January 2, 2019

Attention: Mayor Guthrie and Members of Council

Re: **Proposed Parkland Dedication By-law Review and Update**

The proposed parkland dedication by-law being presented to Council has significant and serious implications on the development and building industries in our community. Our Associations have reviewed the proposed by-law and provide the following comments and requests (**bolded**) for the consideration of Council for inclusion in the subject by-law.

1. The proposed by-law provides the authority for the City to take up to 20% of a private landowner's property or up to 20% of the value of a private landowner's property for parkland purposes. This is an excessive amount that will make development applications financially unfeasible.

We request that this maximum should be capped in the By-law at 10%.

2. The Planning Act permits municipalities to receive land and cash for "park or other public recreational purposes", however, the proposed by-law does not permit land for trails to count toward the parkland requirement.

We request that Section 14. (g) of the By-law be revised to permit a maximum of 1% of the required parkland dedication include land for trails.

3. The proposed by-law does not provide any specific direction regarding how parkland and cash-in-lieu of parkland will be collected for draft plan of subdivision and severance applications.

We request that Section 29 of the proposed by-law be amended to provide certainty therein regarding how parkland and cash-in-lieu of parkland will be collected by the City in accordance with Section 51.1 of the Planning Act for subdivision and severance applications.

Further, we request that City staff meet with representatives of the development community to review, ahead of the new by-law being passed, on how staff intend to calculate the parkland requirement for new subdivisions so the methodology is clear and double counting situations are avoided (e.g. for medium and higher density sites within plans of subdivision where Site Plan approval will be required).

4. Section 33 of the proposed bylaw should include existing detached and semi-detached dwellings as being exempt from requiring cash-in-lieu of parkland regardless of whether evidence is provided that cash-in-lieu of parkland has already been paid. This was one of the recommendations from the consultant hired by the City.

Further, the current definition of "develop" in the proposed by-law (Section 3. (e)) includes increasing the size of a building by more than 40% or greater. This definition is inconsistent with the definition in the City's Official Plan and also contrary to the intent of the parkland dedication provisions of the Planning Act whereby parkland dedication or cash-in-lieu should only be taken where there is an increase in density (i.e. an increase in the number of units). The current by-law sets out a scenario that an owner with a small post war bungalow for example (e.g. +/- 1000 square feet) wanting to put on a large addition or a demolition/rebuild (e.g. total 1800 square feet) will have to pay a +/- \$10,000 parkland payment to the City even though increase in density (i.e. number of units) has not occurred and the property has been paying taxes and indirectly contributing to the parks budget for more approximately 70 years.

We request that Section 33 of the proposed by-law exempt all existing detached and semi-detached dwellings and the definition of "develop" be modified to make it clear that an increase in residential density (number of units) is the trigger for parkland dedication or cash-in-lieu.

5. A recommendation of the consultant hired by the City recommended that the proposed by-law include incentives for higher density developments where cash-in-lieu was required. The rate recommended by the consultant was 1 hectare per 500 dwelling units, or a maximum of 20 % of the land area of the development, **WHICHEVER IS LESS**. The wording in the by-law specifies "the greater of" so there is no incentive and the feasibility of such projects will be jeopardized (also refer to comment 1 above).

We request that the proposed by-law provide incentives for higher density developments in the growth centre (downtown area) and intensification areas.

6. There is already a requirement under Section 20 (a) of the proposed by-law that the developer furnish the City with an appraisal completed by an Accredited Appraiser. This should be sufficient. The development community should not have to pay for two appraisals.

We request that the By-law clarify that Section 15 (costs associated with the conveyance) not apply to the Section 20 (c) "Determination of Market Value" whereby the City retains its own appraisal.

7. We note that the By-law (Schedule A) has attempted to provide a cash-in-lieu of parkland rate for unit type (e.g. detached or semi-detached dwellings) in keeping with an earlier recommendation from the GWDA. Unfortunately, the Schedule includes a per acre land value which will be very cumbersome and will require a detailed calculation each time a new detached dwelling is proposed on a new lot (e.g. in the case of a land severance). Further, we note that the land values are reasonably consistent across the City and therefore

We request that a per unit rate be applied either City wide or by valuation area (e.g. \$9000 for a new detached dwelling) for ease of implementation. (NB: the \$9000 was suggested as the calculation for a new 40x120 foot lot in Valuation Area 1 (one of the higher valued areas) worked out to \$9366).

Also we request that a per unit valuation be established for smaller townhouse (i.e. on-street and cluster) and apartment projects (e.g. less than 30 new units) to avoid the time consuming and costly process of obtaining appraisals and the review of same. We certainly support the review of these valuations every 2 years as noted by Section 22.

8. There are a number of relevant and important sections contained in the Planning Act which should be referenced in the proposed by-law.

We request that Section 24 of the proposed by-law reference Section 42(10) of the Planning Act "Right of Appeal" in addition to Section 42 (12) "Payment Under Protest".

9. The proposed by-law does not reference Site Plan applications for properties not located within a registered plan.

We request that the proposed by-law be amended to specify that for a phased development in properties not located in a plan of subdivision building construction may occur if an agreement requiring the satisfaction of the parkland dedication (in land or payment) has been secured to the satisfaction of the City.

10. The proposed by-law is not clear regarding privately owned land to be used by the public.

We request that the proposed by-law be clear that privately owned lands used for public purposes, particularly in the downtown ie. an urban square, count toward the parkland dedication requirement.

Also, there is a need for monies collected as cash in lieu of parkland to be allocated to specific initiatives so that there is a clear understanding regarding the manner in which the funds will be spent.

We feel that the matters raised above are significant and need to be considered by Council in its deliberations of the proposed parkland dedication by-law on January 14th.

Respectfully submitted,



Carson Reid, President
GWDA



Kevin Brousseau, President
GDHBA

cc:

Stephen O'Brien, City Clerk
Luke Jefferson, Parks and Recreation, Public Services
Jyoti Pathak, Parks and Recreation, Public Services



Date: January 10, 2019

To: City of Guelph Mayor and Councillors

Re: Parkland Designation Bylaw

Guelph Urban Forest Friends supports the **maximum** parkland designation per development unit under the Planning Act for the city of Guelph. As the city becomes denser, there are far fewer areas for trees and other flora and fauna. Biodiversity declines markedly without having an area to thrive. Habitat is desperately needed for a variety of creatures, including wildlife and pollinators. This habitat needs to be incorporated into development areas in the form of naturalized and parkland areas. Parklands provide so many benefits both for residents of Guelph, the wildlife they sustain and the plants that thrive in them. We need the most parkland possible to accommodate both the recreational and health needs of residents and the area needed for larger trees to thrive and their understory plantings to flourish.

In many developed areas of the city there is very little plantable space provided for trees and such space, where available, is restricted to smaller species of trees and shrubs. The city needs the parkland areas where larger trees with their bigger canopies can grow and contribute their ecoservices for residents. If developers do not give land within their developments as opposed to cash in lieu, parks will not be in close enough to citizens for them to reap the benefits both environmentally and recreationally.

If the needs of both residents and trees are not considered in the amount of parkland designated, priority may be given to recreation in the smaller parks and the Guelph goal of a 40% canopy with its benefits for the whole city will never be achieved.

Sue Rietschin, John Ambrose, Christopher Campbell, Sean Fox, Clare Irwin
GUFF Steering Committee
guffguelph@gmail.com

COLDPOINT HOLDINGS LIMITED

5068 Whitelaw Road, Unit # 1
Guelph, ON N1H 6J3

Tel: (519) 827-1900

Fax (519) 827-1916

TO: **Guelph City Council**
1 Carden Street, Guelph, ON, N1H 3A1

RE: **PS-2019-01 Parkland Dedication By-law Review**

DATE: January 14, 2018

Mr. Mayor, Members of Council

Coldpoint Holdings Ltd. represents lands within the Downtown Secondary Plan bounded by Duke, Elizabeth and Huron Streets, identified to undertake an Urban Design Master Plan as part of redevelopment of the properties. This master plan is to include long-identified parkland dedication, the extension of the Trans-Canada Trail through the site as well as the potential for new local streets given the scale of the project – all elements we're excited to incorporate. It is also likely to result in a Plan of Subdivision application under Section 51 of the Planning Act.

We are writing and delegating to the Committee to urge Council to defer the adoption of the proposed Parkland Dedication By-law until further policy on Plans of Subdivision can be included. The proposed by-law excludes providing alternative policy for subdivisions assuming that large, greenfield plans can be appropriately planned through the Official Plan and Planning Act parkland targets as-is. That may indeed be the case for large acreage plans with conventional greenfield densities.

However, just as staff have recommended alternative rates for Downtown and Infill projects under Section 42 of the Planning Act, mainly due to their density targets, it is important that Infill or Redevelopment Plans of Subdivision are also addressed through the by-law.

We are attaching a chart that illustrates the impact of higher-density sites being evaluated at the 1ha/300unit ratio for conventional Plans of Subdivision. It is untenable for higher-density infill subdivision plans to sustain that level of parkland dedication. This is not short-changing the community, but rather getting the policies right for a very different land development situation.

We would point out that ours is not a special case. There are other sites, some held by the City itself, such as IMICO or potentially Baker Street, that may be caught by this policy omission.

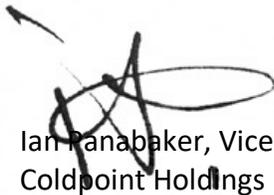
While the issue of alternative Section 51 policy is for us the most important, there are also a series of other detailed issues in the proposed by-law. We are attaching a letter we provided to staff in May 2018 seeking further dialogue ahead of the formulation of the recommendations. This dialogue was never convened, and so nine months later, time that could have been used to develop additional community dialogue and understanding on this complex topic, we are in the predictable position of Council receiving a staff recommendation to adopt a significant by-law without proper public or industry input on the policy.

In addition to the financial impacts, infill projects require a level of flexibility and creative collaborations with staff that this policy, in its current form, would shut down (in considering trails or ownership models or legacy infrastructure as examples). The practical implementation of achieving more open space within intensification is hampered by the by-law as written.

We believe everyone supports the outcome of improving the amount of space for parks as the Guelph grows and neighbourhoods intensify, the bottom line however is that this policy can dramatically impact affordability, and if pushed to the extreme, the viability of developments themselves.

For these reasons we strongly urge Council to defer the recommendations and take the time required to get this policy right before implementation. We look forward to further constructive discussions.

Yours truly,

A handwritten signature in black ink, appearing to be 'Ian Panabaker', with a large, stylized flourish at the end.

Ian Panabaker, Vice President, Development
Coldpoint Holdings Ltd.

cc. Luke Jefferson, Manager, Open Space Planning
Heather Flaherty, General Manager, Parks and Recreation
Colleen Clack, DCAO Public Services

Attachments:

1. Example of a 3 Hectare Infill Development Model with Parkland Ratios
2. Coldpoint Letter, May 4, 2018

ATTACHMENT 1

SAMPLE "INFILL / REDEVELOPMENT" SITE:		
Site Area:	3 hectares (7.5 acres)	
Coverage:	GFA = 2 times Site Area = 60,000m ²	
Units:	600	
Density:	200units/hectare	
Land Value:	\$6,000,000/ha (\$2,000,000/acre) at time of Building Permit	
TOTAL VALUE:	\$18,000,000 (\$30,000/unit)	
Dedication Rate	As Conveyance	As Cash-in-lieu
1ha/300 units	2 hectares (67% of the site)	\$12,000,000 (\$20,000/unit) OP Subdivision Rate
1ha/500 units	1.2 hectares (40% of the site)	\$7,200,000 (\$12,000/unit)
20% Cap	0.6 hectares	\$3,600,000 (\$6,000/unit) Staff's Recommended Downtown Rate
10% Current Infill Cap	0.3 hectares	\$1,800,000 (\$3,000/unit)
5% Current Central Business District Cap	0.15 hectares	\$900,000 (\$1,500/unit)

NOTES

- Under the proposed Parkland Dedication By-law, redevelopment sites would be subject to the 20% Cap while redevelopment subdivision plans would be subject to 1ha/300units.
- In this example, the OP Subdivision rate of 1ha/300u is 3.3X larger than the proposed Downtown 20% capped rate, resulting in 67% of the site being required for conveyance.

COLDPOINT HOLDINGS LIMITED

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TO: **Jyoti Pathak**, Parks Planner
Parks and Recreation
City of Guelph
jyoti.pathak@guelph.ca

RE: **Proposed Update to the Parkland Dedication By-law (2018) - XXXX**

DATE: May 3, 2018

Dear Ms. Pathak;

Having only six days to review both the Background Report, dated March 2018 by The Planning Partnership, and the proposed updated by-law, we have the following comments:

- The implications of this policy update are significant and six days is not enough time to provide meaningful feedback or create the forums for thoughtfully discussing the issues.
- The Background Report raises a series of questions that should be addressed ahead of drafting a by-law. Specifically, it concludes:

Page 61: **"It will be up to the City of Guelph to define their top priorities."** *This has not been undertaken to inform or justify the proposed by-law rates or ratios.*

Page 62: **"An area-specific parkland dedication rate is required within the downtown area as well as other Intensification Areas and Corridors."** *This is not proposed in the by-law, instead there is a single ratio for the entire city that has serious implications for high-density intensifying areas.*

Page 63: **"...considering POPs and strata parks as key tools will be important moving forward [to] offer the City flexibility where it is needed."** *The proposed by-law prohibits this which, by example, contradicts how many of the open-space features of the Downtown Secondary Plan have been and would be achieved in future.*

Page 63: **“The next step in the process will be the development of draft recommendations ... to test the recommended rates and scenarios.”**

We seem to have skipped this step and are heading straight to a by-law being presented to Council.

- The proposed by-law does not reflect the important nuances and considerations identified in the Background Report.
- The draft by-law **doubles** the land or payments that would be taken for higher-density development across the city, and in the case of the older Downtown core, it **quadruples** the taking. With the higher land values within the Urban Growth Centre, this policy change would create significant additional stress on a project’s viability and even greater affordability challenges within the core of the city and infill generally.
- While we are happy to continue to discuss the policy issues, bringing forward the by-law now is premature.

In summary, we believe everyone has an interest in having this parkland policy work effectively for Guelph. Parks are essential elements in building complete and healthy communities and its understood that the current by-law is out of date and needs to be modernised.

We have fundamental concerns however with the by-law as proposed and the process for developing it outside of additional consultation on the underlying direction and recommendations.

We urge staff and Council to take the appropriate time to consult and discuss scenarios in the development of the policy ahead of bringing forward the actual by-law.

Yours truly,



Susan Frasson, President
Coldpoint Holdings Ltd.

cc. Luke Jefferson, Manager, Open Space Planning
Heather Flaherty, General Manager, Parks and Recreation
Colleen Clack, DCAO Public Services



57-295 Water Street,
Guelph, Ontario N1G 2X5

RE: Parkland Dedication Bylaw

Dear Mayor Guthrie and City Councillors

In 1793, Governor John Graves Simcoe was described as having “fallen so much in love with the land that he intends to reserve from population the whole front from the Town to the Fort - a space of nearly three miles.” His vision was to ensure that the newly-founded Town of York would have an adequate supply of parkland: “Pleasure drives, Walks and Shrubbery for the Recreation of the Citizens.”

In line with his intentions, in 1818, 30 acres along what was then Toronto's waterfront were granted by Crown Patent to a group of public trustees for use as a "public walk or mall" for the use and benefit of the inhabitants of the Town of York. The Crown Patent also contained conditions restricting building on the land. In 1853 this land was conveyed to the Mayor, Councillors and the Corporation of the City of Toronto by provincial legislation to be used for the same purpose. In 1857, with the advent of the railway lines crossing the waterfront and the area along Front Street becoming the commercial core of the City, the legislation was amended to allow the sale or lease of the lands by the City, provided the revenues were put into a special account to be used for the same purpose identified in the original Crown Patent. This special account, known as the Walks and Gardens Account, appears in City records from 1857 to 1916 and was used to acquire, expand or improve park spaces in other parts of the rapidly expanding City of Toronto.

Thus, we can see that Parkland dedication has a long and honourable history in Ontario – to grant a portion of lands, either free from development or making use of the sale of land to raise revenues for Walks and Gardens (now called Parks).

Why cannot Guelph City Council assume the spirit of Governor Simcoe and allocate a fair amount of parkland for the pleasure of its citizens? It seems that for the past thirty years, Guelph City Councils/city staff have allowed developers to neglect the parkland requirements of our Official Plan in order to increase their profits. It is time for that practice to stop.

It is time for City Council to update the bylaw to make it serve the citizens of Guelph rather than the developers. As the Consultant report says:

Guelph's current Parkland Dedication Bylaw was first drafted in 1989 with amendments in 1990 and 2007. Guelph has changed substantially over the last three decades, as has planning and development in Ontario generally. Changes to the Planning Act in 2016 combined with Guelph's population growth projections mean that new approaches to parkland planning are needed.

If Guelph adopted the Walks and Gardens approach to parkland, we would be equal to the plan established in Toronto 201 years ago.

The theme of the Consultant report is

the amazing benefits of citizen access to parkland: Parks are an important anchor for community development and engagement. They are community-gathering places and serve an important recreation function, that in turn contributes to stronger and healthier communities and local environmental health.

Every study supports the value of natural heritage in the lives and health of citizens.

Council must support this belief with a Parkland Dedication Bylaw that puts citizen needs first by requiring all developers to adhere to Guelph's Official Plan policies for both cash in lieu of parkland and for land allocation.

Governor Simcoe would do no less.

Susan Ratcliffe
President,
Architectural Conservancy of Ontario,
Guelph and Wellington Branch
57-295 Water Street.
Guelph, N1G 2X5
519 831-0995

REPORT ON THE WALKS AND GARDENS TRUST



View along the shoreline east from Jarvis Street to the first Parliament Buildings and Town Blockhouse at Berkeley and Front. The strip of land along the shoreline from Peter Street to Berkeley, set aside for public use, became known as the Walks and Gardens. From "Part of York the capital of Upper Canada on the Bay of Toronto in Lake Ontario" by Elizabeth Francis Hale, 1804



SHAPING GREAT COMMUNITIES

July 5, 2018

File No.: 11119

City of Guelph
Parks and Recreation
1 Carden Street, 3rd Floor
Guelph, ON
N1H 3A1

Attention: Ms. Jyoti Pathak, Parks Planner

**Re: Draft City of Guelph Parkland Dedication By-law (April 20, 2018)
Schlegel Health Care Inc.
49 Emma Street, 112, 148 and 150 Delhi Street, Guelph**

Dear Ms. Pathak:

On behalf of Schlegel Health Care Inc., the purpose of this letter is to provide a formal response to the Draft Parkland Dedication By-law, released by the City of Guelph for comment on April 20, 2018.

Schlegel Health Care Inc., is the owner of Homewood Health Centre, located at 49 Emma Street, 112, 148 and 150 Delhi Street, Guelph (herein referred to as the "Site"). The Site is approximately 19.1 hectares in size and has frontage on Delhi Street, Arthur Street and Emma Street. The Homewood Health Care Centre includes 27,172 square metres (292,466 square feet) of treatment space. For more than 130 years, Homewood has been recognized for being a clinical, programmatic and innovation leader in the area of mental health and addiction treatment. Homewood is one of the largest mental health and addiction hospitals in Canada and is unique in Canadian healthcare, serving as a specialized provincial and national resource as well as providing essential regional services for residents of Guelph and Wellington County. Currently, Homewood provides 312 beds as well as many treatment programs for a wide range of mental health and addiction illnesses.

By way of this letter, Schlegel Health Care Inc. is requesting that the City consider exempting the Site from parkland dedication requirements. Under the current Parkland Dedication By-law (December 1989, amended 2007), all institutional land in the City of Guelph is exempt from parkland dedication, including the existing and proposed institutional development on the Site. The Draft Parkland Dedication By-law (Section 32) is proposing to continue this exemption for only those institutional uses that are owned by a public body (e.g. Guelph General Hospital,

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gspgroup.ca

public schools, University of Guelph). Those privately owned institutional uses, such as Homewood, would be subject to parkland dedication under the new By-law.

It is our submission that Homewood plays a vital role in meeting the social and mental health treatment needs of the City of Guelph and Wellington County and in fact provides a number of government funded programs and projects.

Homewood is a Schedule One Provider under the Provincial Mental Health Act and reports to the Ministry of Health and Long Term Care. Homewood has a Hospital Service Accountability Agreement and an Amending Agreement with the Waterloo Wellington Local Health Integration Network (LHIN) to provide for 89,000 patient days per year for City of Guelph, Wellington County and Province of Ontario residents and receives a significant amount of its overall funding from the LHIN.

The LHIN funds a wide range of regional public in-patient services including the Emergency Mental Health Unit at Guelph General Hospital, Trillium Crisis and Acute Care programs, Program for Older Adults and the Comprehensive Psychiatric Care program. The LHIN also funds a wide range of out-patient regional public services including the Transitional Care Program, Case Coordination, Community Addiction Services and Assertive Community Treatment. The foregoing in-patient and out-patient services are similar to services provided at public general hospitals.

In addition, Homewood offers specialized psychiatric services that are available to the public of Guelph and Wellington County through the LHIN funding. These in-patient programs include Addictions Medicine Services, Eating Disorders program, Post Traumatic Stress Disorder program and Integrated Mood and Anxiety Program. These services are very similar to programs offered at public mental health and addiction hospitals such as The Centre for Addiction and Mental Health (CAMH), Ontario Shores Centre for Mental Health Sciences and The Royal Ottawa Mental Health Centre.

Homewood also offers programs specifically designed to treat people who provide public services including the Uniformed Professionals Addiction Program and the Healthcare Professionals Addiction Program.

In addition to the important health care role of Homewood within the City of Guelph and Wellington County, the Site itself provides for a significant amount of open space and parkland for its patients. It has been proven that the connection with the natural physical environment is an important factor in the recovery from mental illnesses. Homewood's beautiful property which abuts the Speed River has offered a therapeutic landscape for patients since the hospital was

founded in 1883. The grounds are an important component of the treatment and recovery process for the patients.

Homewood, in recognizing the recreational value of the property, initiated a “Friends of Homewood” program that allows public access to the existing trails on the property. Members of the public can join the program for a nominal fee.

Based on the foregoing, we would respectfully request that the City consider exempting the Site from the Draft Parkland Dedication By-law, through the Section 32 of the By-law.

Should you have any questions or require additional information, please do not hesitate to contact Sarah Code or myself.

Kind regards,

GSP Group Inc.

A handwritten signature in blue ink that reads "Hugh Handy". The signature is written in a cursive style with a period at the end.

Hugh Handy, MCIP, RPP
Senior Associate

cc: Brad Schlegel, Schlegel Health Care Inc.

GUELPH

PARKS AND RECREATION

1830 – 1960

Ross W. Irwin
Guelph Historical Society
2002

PARKS AND RECREATION IN GUELPH, 1830 - 1960

by Ross W. Irwin

Talk given at Evergreen Centre, March 11, 2002.

MUNICIPAL ADMINISTRATION OF RECREATION AND PARKS

John Galt chopped down the first maple tree on St. George's Day, April 23, 1827, and then proceeded to clear cut the town site. The market square was the earliest victim. Based on his experience in the great cities of the old world parks were not wooded but were small, diverse "breathing spots" with major central park such as Central Park in New York, High Park in London. This was Galt's original concept for Guelph.

John Galt provided a number of parks in his original plan. The earliest map show all the land fronting on the river from Huskisson St. to Neeve St. (later the mill lands) was reserved for a park named Clarence Place. Essex St, originally intended as one of the principal streets, ends in a circus in line with the site originally occupied by Holliday Brewery. The land on London Road opposite St. Joseph's hospital farm was also set apart as a park. Market Square, and Nelson Crescent. Of all of these only Nelson Crescent was used as the founder intended. The Canada Company changed his plan of the town and sold many of the parks. Subsequent City Councils gave away or sold the balance. When Nelson Crescent was given to the Guelph Public Library Board in 1903 the question was raised "Why, to save a few hundred dollars would you want to destroy a heritage park". The question was not answered.

So, by 1857, a mere 30 years, the Guelph town site was denuded. Wood was scarce. Sheriff Grange threatened to prosecute persons who stole wood from the lot he was trying to sell. Fire wood was sold at the wood yard on market days and delivered by farmers to their home.

By 1860 some citizens encouraged the town council to plant poplar trees at the old cemetery and to hide the outdoor privies behind town hall and the railway. Town Council, acting on a recommendation of its Roads and Bridges Committee established a Tree Planting Committee. Citizens began to beautify their own property. Council declared May 15 as Arbor Day and each citizen was asked to plant at least one tree on the public thoroughfare.

Town Council implemented improvements through recommendations of its Public Works Committee, which also regulated the drill hall and fees at the market. In 1876 the town passed a bylaw to encourage the owners to plant and take care of trees in front of their property. Hard maple, elm, basswood and horse chestnut were to be planted 21 feet apart. If the tree survived 3 years the owner could apply for a grant of \$1.00.

The width of boulevards was established in 1881 and the same year Council regulated the bathing and washing of persons in a public water. There had been numerous complaints to the Chief Constable about the nuisance of persons bathing in the river. A screen was to be built on some of river so people wanting to enjoy the privilege could do so.

In 1882 the Tree Planting Committee became the Parks and Shade Tree Committee of Council. It was given an appropriation of \$200/yr. They used \$8 to clean the water closets in Central Park that year. The Committee also collected private funds for projects such as \$20 for a fountain in Exhibition Park. This committee continued to October 1908.

In 1889 trees were planted on Paisley St., Elora Road and Waterloo St. Many of these remain today. However, by 1907 some owners now wanted to cut these large shade trees as they were getting large and poorly placed.

Private parks, such as George Sleeman's on Waterloo Avenue as well as McAllister's Victoria Park, off Victoria Road, were both open to "all well-behaved persons". Private persons willing to open their grounds to the public were publically thanked.

Based on a petition of 523 electors, city council passed a by-law to provide for the adoption of the Public Parks Act in Guelph. Mayor George Hastings appointed a Board of Parks Management in February 1909 under Chairman George Sleeman. This Board continued until 1918. One of their important projects that failed was the preservation of the old Priory.

It is my view two people made a major difference to the early beautification of Guelph which remains today. They, along with John Galt, have received little recognition for their foresight. The first is William Stevenson, a nurseryman, who lived in the fine stone house at the corner of Stevenson and Grange. He served on Town Council in 1879 and was Mayor in 1885 and 1886. He promoted a major treeplanting program on the streets and instilled beautification and pride in the city from an individuals initiative. Many of these trees are still with us 125 years later.

The other person is George Sleeman, a man of vision, Councillor in 1876 and Mayor in 1880 to 1882, 1905, 1906 and 1910. He was chair of the new Board of Parks Management which recommended the acquisition of Royal City, Lyon and St. George Park. He was Mayor when John Walter Lyon bought Riverside Park on his behalf for the city. Except for Central Exhibition Park, prior to 1950 the entire park system was created by Sleeman.

A study of Guelph history shows important long term development has been through independent boards. Committees of Council do not look forward in any long term planning sense. In January 1919 the commission form of government was abolished and the Board of Parks Management ceased to exist. Council then appointed annually a Parks and Buildings Committee. Park acquisition stagnated.

PARK MANAGEMENT

Maintenance of parks prior to 1948 were by volunteer groups, with some assistance from the city parks foreman and his small staff. The city employed a caretaker for Exhibition Park and for Royal City and Riverside Parks. County Council had purchased the glebe area in 1871 for the central exhibition and a joint committee was established to operate the grounds and buildings.

The first foremen for Central Exhibition Park and sole employee was John Mariott who served until 1901. Mariott lived in a house at the park gate. He built a greenhouse in 1886 and made other park improvements. In 1897 City Council tried to reclaim his salary; however, since he was only paid \$1.00/day, without a house, there was "little damage". John Mariott resigned as caretaker in May 1901.

Christopher E. Dawson was employed in 1901 as caretaker at the same wage of \$365/yr which was raised to \$450 in 1903. When he resigned in 1905 he had 2 employees. The park horse was sold for \$45. Thos Collier became foreman in 1908. Two years later, in 1910, their wages were increased from 17.5¢ to 20¢/hour.

After a devastating depression and six years of war the pent up recreational and other needs of the people were

slowly fulfilled. Prosperity showed its head. War taxes remained.

A referendum under the Public Parks Act of 1947 was placed before the voters - "Are you in favor of a Parks Commission to manage, regulate, and control all Public Parks, Avenues, Boulevards and Drives within the City of Guelph". The vote was - Yes 3718 No 582.

So, in 1947 a Board of Parks Management was formed of citizens appointed by Council. The Schedule of Parks to manage included:- Exhibition; Lyon; Riverside; Royal City; St George; Priory; and Trafalgar. Additional parks were added to the Schedule in 1951, Col John McCrae Memorial Garden; Athletic Park, incl. gore at Division and Kathleen; Nelson; Gore at Essex/Waterloo; Wartime Housing; Wartime housing children's playground

In 1948 the Board immediately regulated vehicle traffic and forbid golf in city parks. They also stated the 1 mill Council voted for parks was insufficient. In 1957 the Guelph Horticultural Society planted 500 trees on streets.

In 1946 the Department of Education provided grants for recreation. The Guelph Recreation Commission was established in 1948. Its first Director of Recreation appointed in 1949 was Claude Elliott. Elliott was followed by Frank Vigor. Their offices were in the basement of City Hall.

In 1960 the old Board of Light and Heat building on Huskisson St. was made available for the Recreation Department. It burned in February 1962. In 1963 the old Isolation hospital on Delhi St, was then made available and was converted for recreation from fire insurance money. It was to provide leadership and coordinate all aspects of recreation programming. Sunday sports became legal in Guelph in November 1960.

In 1976 a recreation Advisory Committee was formed to carry out Recreation and Parks development. Their mandate was leisure - recreation - open space - culture. G.W. Stahlmann Director of Parks and Recreation - Jay Kivell, Parks; Frank Vigor, Recreation.

CANADA COMPANY BURYING GROUND (CEMETERY PARK, CENTRAL PARK, BAKER STREET PARKING LOT)

John Galt, for the Canada Company, identified an area on the original Canada Company town plan as the public "Burying Ground." The burying ground was dedicated to public use similar to the public streets, but was not the property of the town. It was not an official cemetery although it was used to 1854. This area is now the Baker Street parking lot. The defined area was between the rear of the lots on Quebec Street and Woolwich Street and from the rear of lots on Wyndham Street and Yarmouth Street. The administration of the cemetery was shared with the Township of Guelph.

The first burial was a Mr. Reid, a Scotch Block settler, who was killed by a falling tree in August 1828. Two others were buried the following day. By 1851, Guelph was a separated village. Its growth now encompassed the burial ground which was becoming filled. There was also a trend to move cemeteries outside built up areas because of the fear of pollution of shallow ground water wells. Bylaw 33 to regulate the interment of the dead was passed December 5, 1853. It stated that after December 27, 1853, it is not lawful to bury a body in any spot within the town except within a cemetery. The penalty was a £5 or imprison for 20 days. The Canada Company cemetery was closed to further burials in June 1854.

The adherents to the Church of England (559 in 1851) had built St. George's Church in St. George's Square in 1833. A small cemetery, administered by the sexton, was at the rear of the church. Some of these graves were moved to the new St. George's Anglican cemetery in 1855 and the balance of the graves in 1873 when the church was removed from the Square.

The Roman Catholic population (193 in 1851) had built a frame St. Peter's Church in 1835 and a burying ground was located on the north side (today's parking lot). This church burned during a celebration in 1844 and was replaced by the stone St. Bartholomew Church in 1846. In preparation for a much larger church the foundation stone was laid in 1863. Whilst construction of this church was delayed, the existing graves were removed to the new St. Joseph's (Pioneer) Cemetery at the rear of St. Joseph's Hospital and Home on Hospital Street (Westmount Rd). The Sisters of St. Joseph had established the hospital in 1861.

In 1853 a search committee was established to find a new burial site for the town population of 559 Anglicans, 458 Presbyterians, and 588 Methodists and Congregationalists. Advertisements were placed in the local newspapers and Dr. William Clark, an Anglican and member of the search committee, and not recognizing any conflict of interest, offered 40 acres of land he owned at what is now the corner of Woolwich St. and Woodlawn Ave. for a new cemetery. It was purchased by the township and town and was shared 30 acres for the Guelph Union Cemetery and 10 acres for the St. George's Cemetery. The first burial in the new cemetery was that of John Scroggie, January 13, 1854. Some families removed a few bodies from the old to the new cemetery at this time.

The old burying ground remained unused after 1854 and was seeded to wheat and grass. The rail fence was sold at \$2.00 per hundred for 8 and 12-foot rails. The cemetery fell into disrepair with persons living in the neighborhood pastured cows and made improper use of it for private purposes. For example a Mr Hubbard used it as a nursery and Robert Stewart used it for lumber storage. A stone fence had replaced the old rail fence around the old cemetery.

In 1879 city council petitioned the legislature for "An Act respecting Public Burying Ground in the Town of Guelph" (c.72) to legally close the old cemetery. The preamble to the bill states that the Canada Company no longer had an interest in the property and that practically all the dead bodies had been removed. The bill asked that the property be abandoned as a cemetery and it be vested in the town to be used as a public park. Any remaining bodies were to be removed and re-interred at public expense. It was named Cemetery Park but residents called it Central Park. It became vested in the city as a public park.

In February 1883 the stone wall around the cemetery was sold at auction and brought \$32.20 which paid for grading and leveling the grounds. The poplar and willow trees surrounding the cemetery were also removed and replaced with hard maple.

From February to May 1885 the mass removal of marked and identified graves was conducted: however, the transfers made between 1854 and 1885 were paid for by subscribers, where they could be found. By August the Committee on Parks and Shade Trees reported "They have had removed all the corpses (that could be found) from the old cemetery park and had the same re-interred in Union and St. George's Cemetery, numbering 402 bodies at an average of 46 cents each. Total cost \$185.57. *Unclaimed bodies still remain in the old cemetery today.*

In November 1885 a low wall was built around the old cemetery and the name that had previously been officially Cemetery Park was changed to Central Park. The land was plowed, harrowed and the lumber

removed.

In 1889 Council received a petition for a skating and curling rink on the park site. A lease was provided and a rink built on the southern portion of the lot. The park property was still under joint ownership until May 23, 1891 when the city paid a penalty of \$500 to the Township of Guelph for their illegal lease of the property to the Guelph Curling and Skating Rink Co.

On September 21, 1891, (BL 264/91, 16/11/91) Council had leased the burying ground for 30 years at \$50/year rent and set aside a 50-foot wide street on each side of the property for streets and lanes. The boundary street from Woolwich Street to Quebec Street on the west side had been called Elizabeth St from 1856. It was changed to Baker St. (BL286/92, 15/8/92) after Alfred Baker who lived on the street. The street behind Knox Church was named Chapel Lane in 1956.

To clarify the situation, on April 14, 1892, the city petitioned the legislature for another public act - a private bill "An Act Respecting Burying Ground, c.72" - to obtain an exclusive deed to the property. They paid the township a further \$50 in June 1891 to obtain a quit-claim deed. The city now had exclusive ownership of the property and sold it to the Guelph Curling and Skating Co.

Also in 1892, the City granted part of the cemetery to the lacrosse team, an area 150 feet along Baker Street from the Victoria Rink. This area was also used for lawn bowling in the summer.

In 1899 some councillors recommended the old cemetery be laid out in building lots and be sold. On April 2, 1900, the city sold part of the cemetery park to the National Cream Separator Co. for \$2,500. They built a large 3-storey brick building at the north-west corner. This building was taken over by the Raymond Sewing Machine Co. which on April 24, 1916, became the White Sewing Machine Co. This company discontinued production in 1922 and Steele Bros made steel springs here until the city bought the area for a parking lot in 1968. In 1949 Loblaw's asked that the lane behind their store be stopped up.

The rink burned twice and was renamed the Victoria Roller and Skating Rink in 1914. The lease was renewed in 1921 but the curling club defaulted on its rent and surrendered its lease to the city May 28, 1936. The following month (16/6/36) (BL 2335) the City sold the building to the club for \$1.00. The city bought the land back from the Guelph Curling Club October 16, 1968 for \$1.00 and closed the area December 17, 1968, to be used as an enlarged the Baker Street Parking lot. Central Park had a short life!

CENTRAL EXHIBITION PARK

The Attorneys of the Canada Company deeded 116 acres as a Glebe in support of the Roman Catholic Church. In 1871, Range II, Lots 1 to 11 totaling 33 acres were sold to the County to be used for a Central Exhibition to replace the fairground where the Armoury now stands.

Acton Burrows wrote "For some years from 1863 attempts had been made to induce directors of the Provincial Exhibition to hold it in Guelph. It was proposed to establish a Central Exhibition for which it would be necessary to purchase land and a committee of County Council was appointed to consider the matter. Nov. 10, 1870, it recommended purchase of the Catholic Glebe". The city purchased the Catholic Glebe for \$5,000, and repaid the County paid \$1,000 a year over 4 years. County gave a grant of \$3,000 toward the first

exhibition. William Allen was President.

The Guelph Central Exhibition, hosted by the South Wellington Agricultural Society which had been formed from the Guelph Township Society, organized a show in the new park October 10-12, 1871. Prizes offered were \$8,000. There were almost 7,000 entries and new buildings had been erected to house them. Attendance exceeded 15,000 daily. A high board fence surrounded grounds. There was a band competition and entrance was 25¢.

By 1872 an octagonal "Palace" had been built and exhibits included Bell pianos, Raymonds sewing machines and harness. Livestock was a large part of the fair. Sideshow performances in a midway. Horse racing.

The town provided for management of Central Exhibition Park and appointed John Marriott as caretaker of Central Exhibition Park and all other parks at \$250/yr. They also appointed him Constable for Exhibition grounds in 1880. His house was at the gate.

Additional buildings were erected in 1883, and in 1886 seven greenhouses were built. The cricket club played here in 1886 and Robinson's Circus visited here in 1891. They unloaded from the GWR railway in the park.

The old buildings were sold in 1890 to be replaced with new ones. In 1891 a new grandstand for 1,000 people was built as well as a new horse ring. There was a ½-mile track and a main driving track. School kids got a half holiday.

On April 13, 1893, a storm demolished the "so called grandstand". It was rebuilt. The Royal City Cycle Club used the track

By 1894 Exhibition Park had half-mile speeding track in back, a 1/3 mile bicycle track projected, a cricket crease and 1st class baseball diamond. The palace and grandstand afforded every facility for demonstrations and excursionists. The front part of park is to be laid out with trees according to a plan developed by a Buffalo architect. The budget for this was \$400. The Buffalo Bill show was attracted to come for \$50.

The old buildings at the entrance to the park and the caretakers house was sold in 1898. Fire destroyed some stables and buildings in 1902 and again in 1907 but were replaced. Water in the fountain was turned on at 9:00 am and turned off at 11:00 pm. Lights were added to the park in 1909 to "discourage its use as a loitering place for undesirable persons on summer evenings." One hundred trees were culled from the park.

In 1902 the special attractions were "Speeding in the Ring", a dog circus, jugglers, pantomines, aerialist, contortionist, balloon ascension which landed at Marden and missed the evening performance. Bicycle and unicycle with fireworks at night. Attendance was still 5,000.

In 1909 the grounds was still enclosed with 8-foot high board fence. There were four buildings (Palace or main building with 4 wings, 200 ft by 200 ft) with a dome roof- main hall for "ladies work", dairy products, fruits, flowers, etc. One for implements, one for grain and roots and one for poultry. There was a row of horse stalls 600 ft long, a row of cattle pens 900 ft long, and a row of sheep and pig pens 500 feet long. In front of the horse stalls was a fenced ring about 400 ft in diameter with a judges stand in the centre to exhibit the animals. A new grandstand, 128 feet long, had been erected in 1908 at the south end as well as a new fence.

That year, 1909, the fence was removed from front section which was now the wooded picnic area. Cinder walks replaced the muddy cow paths at the entrance and the two old cannons from Jubilee Park were placed at the front gate. A new bandstand was erected in 1911. It was taken down in Sep. 9, 1964. The central part remained fenced and became the ball park with the grandstand along Kathleen St. The Central Exhibition continued in a smaller way to 1915. It closed for WW I and never reopened. The buildings were razed after 1917. A large German artillery piece was placed on a concrete pad in 1921. It was melted down in 1941.

The Inter-County Baseball League was formed in 1919 and got large crowds. In 1922 the ratepayers approved a by-law to spend \$25,000 on an Athletic Field and grandstand. The 3-bay stand seated 1,200 people and replaced an "old wooden eyesore". It cost was \$27,000 and was officially opened at the north end by Mayor George Drew, May 16, 1925, on occasion of opening of the Inter County League season in Guelph. All fences were taken down.

In 1926 the Park Supt finished levelling the old garbage dump on Division St (present arena & stadium), covered it with top soil and planted with shrubs and trees.

The softball diamond was established in 1946 and floodlights were added. Tennis and children area are now part of Exhibition Park. Exhibition Arena was opened in 1965. The baseball grandstand was replaced in 1988.

TRAFALGAR PARK

There was an open area on the west side of the junction of Wyndham Street, Eramosa Road, Woolwich Street and Cardigan Street. A Committee of Citizens chaired by John A. Wood, merchant, thought the area should be improved into a small park and took it upon themselves to make the improvements. There was a problem in having City Council take any responsibility for it, but 2 Aug 1880, based on a recommendation of the Parks and Shade Trees Committee they eventually accepted it with thanks and officially named it Trafalgar Place. (BL 28, 1880) but became known as Trafalgar Park.

Shrubs were planted and rustic benches provided. Piped water had just become available in the city and a fountain was proposed for the park. The IODE provided funds for an ornate drinking fountain which occupied the centre of the plot. It was opened in 1914. A sundial was installed 3 May 1880.

Wood also had plans for a roofed bandstand on the Wyndham Street side. It was opened 19 Apr 1884. The City Band played concerts twice a week in summer months. The stand required a lot of paint and maintenance. Because of traffic noise and the danger of people standing on the pavement during concerts, they were discontinued when Woolwich Street was widened in 1911 the bandstand was moved to St. George's Park.

The CPR station was opened at the bottom of the hill in 1913 but did not take park land. In 1925 Trafalgar Park was selected as the site for the new war memorial. This was unveiled in 1927. To make room for it, the IODE fountain was moved in 1926 from the park to the gore lot at Yarmouth and Norfolk opposite the public library at a cost of \$3,617. (Secord Bros. 1/1914)

In 1927 it was described thus "Trafalgar Place, or rather Trafalgar Square, can scarcely be termed a park". It is an ornamental spot with some beautiful trees, a small plot at the top of Wyndham. and the war memorial occupies this site. Seats under the trees. Planted trees, shrubs and flowers in 1912. Beautiful war memorial unveiled in July 1927 now occupies this prominent site. Seats placed under trees for people to reflect on the memorial.

In June 1978, for the re-alignment of Woolwich and Cardigan streets the war memorial was moved back and the park made much smaller.

THE PRIORY

The first building in Guelph was The Priory, named for Charles Prior a Canada Company employee. It was built in 1827 and used as a dwelling until 1887 when the Guelph Junction Railway took it over as its station. It was used as the station until the new CPR station was opened at the Eramosa bridge in 1911.

The Parks Board took responsibility for the old Priory in Sept. 1911. It was to be demolished however George Sleeman bought the building and moved the two wings to his home on Waterloo Ave. The main part was to be moved to a vacant lot in Woolwich Crescent behind the structure. Council voted approval if there was no cost, but the Board of Works refused to permit the removal as the space was needed for tracks and siding. It remained there until 1926. The president of OAC suggested the building be moved there. The Guelph Horticultural Society offered to fix it up. The rail fence was replaced in 1914.

The logs were stored but on a motion of City Council in 1930 the timbers of the Priory to be cut up into cordwood lengths and placed at the disposal of the Relief Department. The logs Sleeman possessed were given to Doon Pioneer Village. The model of the building in the park is the work of a park superintendent.

PRIORY PARK

St. George's Square was purchased March 18, 1873, by the town "as a public park". J.B. Armstrong, local merchant, purchased a fountain for it which arrived May 13, 1884. Funds were not fully subscribed, so with \$400 donated by private parties, Armstrong also donated the base the blacksmith fountain which was set up and remained on the site until 1922. City spent \$200 on an iron railing and \$100 for grading and filling. It was said to be an Object of beauty as well as serving a useful purpose.

Hydro wanted the fountain moved so the street cars could go directly through the square. In 1922 a new base was built for the blacksmith in Priory Park.

ST. GEORGE'S PARK

The site for St. George's Park, about four acres, was purchased by the Parks Board in 1909 for \$4,000. It consisted of McDonald's Grove on Palmer's Hill, a natural woodland, well treed, with a playground, both somewhat rough. The ground in the grove was leveled, stones and roots were removed, swings and a sand bed built for kiddies, rustic seats built, the band stand formerly near the City Hall was set up. It was then followed by the bandstand from Trafalgar Park (1911), the park was lighted, and a few more shrubs and trees planted, the playground was plowed and seeded, a drinking fountain installed. This park is now in very satisfactory condition and is greatly enjoyed by the residents of Mountaintown.

The park was named St. George's Park March 24, 1910. St. Catherine St. went through park, on paper but not in fact, until it was closed by Council in 1949.

A billboard was erected in the park in June 1910 "horses and cattle found trespassing in the park will be impounded". A tennis court was built in 1947 and a baseball backstop in 1954.

JUBILEE PARK

Queen Victoria celebrated her diamond jubilee, 60 years on the throne, in 1897. Many cities celebrated this event. In Guelph, the plan developed February 15, 1897 was for a park, named Queen Victoria Jubilee Park,

to be developed on the site of the old market building, which was moved behind city hall. A budget of \$200 was allocated to grading the ground.

Council named the park June 21, 1897, and asked the Dept of Militia for two cannon. In July two 32-pounder cannon arrived from Quebec, without a carriage. These were built. The old bandstand was moved from the Wood Market in May 1901. There were pathways and benches - a pleasant downtown park.

Jubilee Park had a short life. By 1905 the city was negotiating with the GTR for a site for a proposed new station and discussed the sale of the park. In 1909 the city was awarded \$9,000 for Jubilee Park. The Parks Board asked for the money to buy a replacement park, but was refused.

I.O.D.E. WAR MEMORIAL C.N.R. STATION

"This memorial was erected by the I.O.D.E. at a cost of \$2,300. It is of the standard design used by the Imperial Great War Commission representing the "Cross of Sacrifice". It was built by the McIntosh Granite Co. Ltd. Of Toronto, of Stanstead granite and supervised by Architects of Guelph." From:- The Municipal Review of Canada, War Memorials Souvenir Book. Unveiled May 26, 1925.

PRIVATE PARKS

There were two private parks in Guelph. Private persons willing to open their grounds to the public.

VICTORIA PARK

Victoria Park "that newly discovered paradise on the banks of the Speed River" opened by the Boating Club, 23 Jun 1886. Often called McAllister's Park. Summer boating extended for a four-mile stretch past Victoria Park to The Rockeries.

SLEEMAN'S PARK

George Sleeman's private Park by 1907 at his home on Waterloo Avenue. Both of the above were open to all "well-behaved persons".

NELSON CRESCENT

Nelson Crescent, named by John Galt, for his great naval hero and friend, was laid out on the original town plan at the intersection of Norfolk and Paisley. The chain fence and posts were removed in 1891 but benches remained in the park. There was much bitterness 16 June 1902 when City Council stopped up and sold a portion of Nelson Crescent to the Guelph Public Library board for a new Carnegie library. The problem was the board could not get a subscription for another site, so another park was given away.

WATERWORKS PARK

The Guelph waterworks was built at the side of the Eramosa River in 1879. It was public property and people used it as a park for entry to the river. It was used as such until Lyon Park was built next door and when the city deeded some of the land to Fibreglas in the 1960's.

GORE PARKS

Gores occur when two streets join and areas too small to build upon are left. The city has adopted many of these areas for use as small parks. For example. Gore park between Waterloo and Essex Streets in 1899. The city sodded the junction of Norfolk/Waterloo + fencing 1882 - fence still here 1949 when Kenton-McIntyre Motors wanted the space. However, the city gave away a beautiful park in 1910 on Gordon St between the GTR tracks and Freshfield st to the Winter Fair for construction of an extension for the horse stables. There

is also the Gore park at Norfolk/Yarmouth used for the IODE fountain.

RIVERSIDE PARK

PREVIOUS USE

On Nov 14, 1859 James Goldie bought the Speedvale Mill property from William Hood and proceeded to build a mill and house on the North-East side of the river, which was working by 1861. The mill dam was 200 yards from the mill and used a long raceway. The mill site had previously been occupied by Samuel Smith who operated a sawmill to make barrel staves on the East side of the river.

John Pipe bought the property from Goldie in 1866 and operated the flour mill until 1883. He sold to G.E. Tolton who in turn sold it to Alex Nicklin. In 1887, Nicklin sold to D. Zimmerman. James Simpson bought the Speedvale Mill in August 1900. He started to make flour but changed to feed and chop. The mill burned in 1922.

ACQUISITION OF PROPERTY

George Sleeman built the Guelph Street Railway in 1895. The city took over its operation in 1903. The electorate approved a money by-law to purchase a park at \$3,700. A letter to the Guelph Mercury (14 Oct 1904) from chairman, J. W. Lyons reads:

I and the Directors are extremely anxious to make the Guelph Radial Railway a success financially as well as a means of recreation. While our earnings are going up, the trouble with the line is that it starts nowhere and goes nowhere, or, as it is said with a smile from a brewery to a cemetery. The College end is satisfactory and we desire to make the opposite end, up the Elora Road equally satisfactory and profitable. With this in view we have obtained an option on two properties belonging to Alfred Lace, one 5 acres and the other 9½ acres fronting about 1/4 mile on the Speed River and with the dam for Pipes Mill furnishing boating and bathing, an ideal spot for sports, bandstand, games and amusements.

Unfortunately we find that there is no legal way for the Railway to obtain cash to carry out the purchase. We understand that the City has in hand over \$1,000 left from the sale of the Armoury site. As this came from the sale of Peoples land, not raised by taxation, I feel it should be used to secure another park. Our parks are vanishing one by one. With this the land can be purchased and we can arrange to pay off the balance. Years ago, Mr Guthrie, Col. Higinbotham and a few other public spirited citizens secured our splendid Exhibition Park for \$3,000 for 30 acres and it must be worth \$50,000 today.

The city has the right to use this money for the purposes of obtaining this property for a park. In my opinion it will make a great recreation area and will help greatly the Guelph Radial Railway.

I would therefore recommend that the money from the Armoury site be used to purchase this area for a park. J.W. Lyons

On November 9, 1904, James W. Lyon bought from Alfred Lace, 14.5 ac for park purposes and the use of the water in the Speed River. The same day James L. Simpson sold Lyon the privilege of bathing and boating on his mill pond for 10 years. Sep 13, 1905, J.W. Lyon sold the Guelph Radial Railway Co the property he bought for park purposes. To increase ridership the Elora Road line was extended from Speedvale Av on left hand side of road as far as Union Cemetery. A bench was built for travellers to rest. Open cars with no walls on either side were often used. The fare was 5c fare from any part of railway to the park.

To draw pic-nic groups and school children a zoo and merry-go-round was built. The land was levelled and tables and trestles added as well as a cook house. A spring supplied water. By July 8, 1905, the Mercury was advertising a bandstand with concerts and rustic seats.

A contest to choose a name for the Railway Park was conducted and on July 11, 1905, a Mr. Carroll won with the name Riverside Park. The first park superintendent was Charles Eastern, a motorman on the GSR. He lived on the property in the farm house vacated by Alfred Lace.

The original 14.5 acres was enlarged as city finances permitted and as land became available. On May 1, 1937, part of lot 33 was bought from Robert McLeod and took an option on his property adjacent to Riverside, including a water right; however, there was no budget to extend the park. It wasn't until 1950 that the McLeod lots 33, 35 17ac were bought for \$3,800.

On June 12, 1953 a larger section of lots 33 to 35 were sold by W.J. Coons and F.J. Briestensky. when that area was annexed into city. On August 28, 1956, the city bought from Wilbert Nesbitt the Speedvale Mill property which included 17 acres north east of river from Speedvale to Riverview to just beyond the dam. The park then extended from Woodlawn Rd. to Speedvale Av. and from Woolwich St. to Riverview Dr.

In 1961 smaller areas in the Hubbard survey lot 4, behind apartment buildings were added and land to woodlawn. The park was now 64 acres. In 1962 work was started to improve the area from Speedvale to the dam.

Additional land was added in 1955 and 1966 for a total of 66.7 acres. The 45-foot floral clock was dedicated in 1955. In 1957 the west area was used for a sanitary land fill and in 1962 a sports and recreation area was built on the land fill above the flood line

ZOO

In 1914, the caretaker, W. Pearson, started a zoo and gets pair of spotted Canadian lynx. The next year it was reported (1915/09/02) "The zoo at Riverside has not been the success this year that it should have been. It has been almost impossible to secure animals as the majority of trappers and hunters who engaged in trapping wild animals have enlisted. At the zoo at present are - a pair of coyote, 3 racoons, some pheasants, 5 red deer, 3 goats."

DANCE PAVILION

In 1944, William "Wib" Nesbitt sold the old mill swimming pool. A public dance pavilion at 74 Speedvale Av. was added to mill owners house and the old mill race was filled in. The old pavilion was removed in October 1949. Dances were popular but attendance declined after Paradise Gardens was built. The building was rented to Guelph Little Theatre in 1957.

The house was taken down in 1963 and a new fire hall was built on the site.

PARK AMENITIES

1948 - lights in park

1952 - build greenhouse

1963 - put topsoil on landfill and plant grass

1963 - miniature RR at park

1962 - Band stand, 1965 - Ald. Chris Robinson proposed a bandshell as centennial project

1969 - Edward Johnson plaque 7/9/69

1972 - Kiwanis concert shell

FOOT BRIDGE

There were two foot bridges to gain access from Riverview Dr. The portable foot bridge below the last weir was washed away and never replaced. The present swing bridge was built in the early days of the park and was most recently renewed in 1979.

In 1927 it was described as a natural park, level for picnics, shade trees, proposed to build a swimming pool and dancing pavilion. It was described as a mecca for the bather. The dam and spillway offer a place for children to play.

The City improved the channel by widening it from Speedvale Av. to the mill dam. Retaining walls were built, and 5 weirs to control water height and direction. In 1964 Royal City Kiwanis Club paved the river bed for bathing from below dam to first weir. A change house was built at the bridge. Paddle boats for children were added. The river has increased use by boating and canoes.

The Guelph Historical Society sponsored the John Galt Garden which was opened in 1967. There is an annual tree planting ceremony in the park to honour organizations and citizens.

The model of The Priory, Guelph's original first building, was built in 1972 by David Cowan from measurements of the original building taken by his father William in 1926. When City Hall was remodelled in 1961 the bell which had hung in the tower since 1857 was dismantled and moved to the park.

A Carousel replaced an old merry-go-round. Ball diamonds were added on the sanitary land fill area Dutch Watermill. Local school sections hold picnics for children 2 large picnic areas, covered shelters

Each superintendant left their own contribution to the park.. On July 11, 1955 - golden jubilee of Riverside. John Clark built a greenhouse in 1949 and in 1961 grew 60,000 bedding plants. Helen Galt Mitchell, gggd of John Galt cuts ribbon. Floral Clock by Clark.

Park Superintendents/Caretakers at Riverside Park were;

1905 - 1913 Charles Eastern
1913 - 1935 William Pearson
1935 - 1946 Roy Fleming
1946 - 1946 "Mack" Shaw
1946 - 1948 James Devereaux (t)
1948 - 1973 John Clark
1973 - Gus Stahlman

ROYAL CITY PARK

On February 10, 1899, Peter Gow offered to sell his mill lands to the City. The City stated there was no money in the budget. A committee, with Lyon and Hutt, examined the river in 1907 as far as the waterworks park.

Based on a recommendation of the new Parks Board on March 8, 1910, the City purchased for \$6,000 30 acres of flats along the Speed River, including the mill site and water right, from the Gow Estate. At the same time they bought 3.75 acres of the Petrie recreation area for \$4,000.

The land was very low and swampy and required much filling. The old mill was in poor shape. However, in March 1910 the City built a "cabinet" for boys to undress behind the mill - "The Willows" bath house. Citizens were admonished that only bathers wearing proper suits would be permitted to use the river for bathing and swimming.

The park was then used as a dump for refuse and ashes in order to build up the elevation and fill low spots south of the river and straighten it. The city built a \$5.00 shanty to house a man to control the dumping operations. Top soil was removed and then replaced over the fill. William Johnson, who rented the adjacent boathouse, objected to paying \$75 a year when the dump was adjacent. Council reduced his rent to \$50, which included pasture rights.

In 1912 the land was damaged by flood waters and in 1914 the Gow dam was repaired so the river could again be used by boaters. The land at the boathouse was filled and raised.

Professor Howard L. Hutt, Dept. of Horticulture, OAC (1893-1913) landscape designer, addressed the Guelph Horticultural Society the Spring of 1909 suggesting a park from Gow's bridge to Lyon Park on the Eramosa branch of the Speed River. Prof. Hutt was asked to assist with the design and development of the Gow property as he was already in charge of park design at Lyon Park and St. George Park, but paid by W. Lyon.

The city wanted to have this new park as well as the recently acquired St. George's Park properly designed. The I.O.D.E. came to the rescue and paid Fred G. Todd, a Montreal landscape architect to examine the city parks. He recommended a boulevard drive from Dundas Rd to Victoria Rd. Todd asked Council for the name of the park which he could put on his plan. For this the I.O.D.E. were given an opportunity to name this new park. It was named Royal City park (the Coronation of King George V had just been in June) and confirmed by City Council, September 28, 1911. The island in the river was removed and 50 elm and 99 maples were planted in 1910.

Even in 1932 Council decreed that all garbage was to be dumped in Royal City Park. Royal City Park was the principal city dump from 1910 to about 1945.

Parkland appears to be unused and should be available to the public. Thus, in 1965 the neighbouring industry insisted some of Royal City park should be available for employee parking. It was discouraged however the Mayor yielded and a high fence was built to separate the parking and park area.

Sculpture created of material removed from the river. Playground on each side of river and park benches. Floral display modelled on the Riverside clock. Gazebo type Bandstand erected by Guelph Concert Band in 2001.

BUILDING THE WALL

Black Wednesday, the day the New York financial market crashed, in October 1929 was the event said to have set off almost a decade of depressed economy. It created havoc to a labour market already with 10 percent unemployed even in these good times. Unemployment skyrocketed. The Federal government passed "An Act respecting Unemployment Relief" (21 Geo V, c.4) on April 2, 1931, but dated back to an agreement with the provinces of Oct. 2, 1930. The funding program was 25 percent Federal, 25 percent Provincial and 50 percent Municipal on approved public works. This economic disaster has left a priceless heritage in Guelph the stone wall along the Speed River from Gow's bridge to Allan's bridge.

City Council originally (29/10/1930) authorized the City Engineer and the Parks Superintendent to proceed with a plan to use relief labour to build a wall along the north and south bank of the Speed River from the Gow bridge to the Dundas bridge as well as cleaning up the bed of the river and filling up the Royal City Park on the south side of the river with debris and garbage. A special appropriation of \$35,000 was granted for this purpose.

The relief work was later extended to include a wall on the north side of the river and the cleaning of the river to the Goldie Mill. The dam at the Guelph Carpet Mill was also removed in February 1930.

At the end of 1930 there were 850 men on the City Hall list looking for work. This was broken down into 499 married men and 351 single men. It was further broken down for some reason into 618 British subjects and 232 men of foreign extraction. There were 245 men in the river gang working on the wall.

The relief workers were not paid in cash. They worked three days a week and were issued a work ticket which was taken to Harry Mahoney, Relief Officer at City Hall, who issued a voucher worth \$2.50 for bread and groceries for the week. However, bread and milk was only 10¢ at the time. It cost \$2.50 to wallpaper a room.

It was also an unhappy time. The Public Works Committee instructed the city engineer to lay off all hired trucks and to issue no more work tickets. Only the minimum Public Works staff of 16 was to be maintained - no money nor work.

When funds became available the following year, 1931, the city changed the system of handling aid. Single men got two days work in one week and no work the next week. There were 277 married men and 100 single men employed of which 225 were on the river gang.

Another problem dealt with at a special meeting in 1930 was the eight skilled stone masons working on the wall complained about the unskilled labour doing work usually done by the stone masons. The relief workers usually carried the stone to the stonemasons. Ald. Frank wanted to lay them all off.

The wall got built, a reminder of what can be achieved in time of adversity where the city could only collect a fraction of the taxes owing. We thank them for their sacrifice.

SUNNY ACRES PARK

The community Neighbourhood Association built a playground 13 July 1921 on Edinburgh Road. In April 1923 Frederic Watt offered a strip of land for Sunny Acres on Edinburgh Rd and asked no payment for 3 years. Council decided "no action to be taken towards providing such amusement place for the children this year". It was not until 1948 when Sunnyacres Park was dedicated as a public park - a 40 foot wading pool had been built in 1947 for \$1,500. In 1950 a brick dressing room was built for the Neighborhood Assn

GREEN MEADOWS PARK

Green Meadows was adjacent to the Lincoln Heights subdivision. A wading pool was opened by the Kinsmen Club 14 Oct 1964.

BEDFORD PARK

Bedford Park was established 29 Aug 1945.

GLENAIRN ACRES PARK

Glenairn Acres Park was established on Lot 57 of the Glenairn III subdivision, 2 Jul 1956.

WAVERLEY DRIVE PARK

In 1963 the Waverley Drive School Association requested a park. This was established on Lot 124, Plan 492, 12 Feb 1964..

BROOKLYN PARK

A children's playground was established 13 Jul 1921 in connection with the Brooklyn Sunday School lot. There were 500 children present at the opening. Mrs C.R. Crowe organized idea which was promoted by Harcourt Forbes.

Miscellaneous items

Kiwanis Swimming pool established in 1943, where ?????.

James Barclay authorized to erect a drinking fountain in the park near city hall if no cost to city.

Improvement to the small park at the water stand pipe 1909.

Mayor Caleb Chase presented a drinking fountain to the city to be placed in Market Square, 15 Aug 1884.

Memorial Gardens - public subscription - arena committee to manage, 1948.

Community Centre legislation provided funds, 1948.

Memorial Gardens, Bylaw 3231, 3 Nov 1947.

Section 28 of the Planning Act was used to acquire dedicated parkland from developers, 2% for industrial and 5% residential.

FACILITIES

ICE RINKS AND ARENAS

In early days the Speed River between Allan's Mill and the Eramosa bridge provided natural ice skating, for those who could afford to own skates. It was more popular than the closed rinks. There were large crowds on the ice as well as spectators along the bank. Open air skating was also provided on the flats below the Holloday brewery and in 1888 on the race track at Exhibition Park. Parks superintendent Nichol flooded two rinks on the Speed River in the 1920's. Open air rinks continue to be popular in local neighbourhoods.

Curling was also an early sport played on the river. However, scheduled events are highly dependent on the weather so indoor rinks were planned. A subscription was taken Sep 9, 1868 to build a new curling and skating rink. The **Guelph Skating Rink Company** built the first covered rink in the town. It was built in 1869. A wooden rink at Huskisson and Wellington Streets opposite Presant's Mill. The door and dressing rooms faced Huskisson St. An 18-foot addition was made on the north side in 1870. This rink was used for skating and curling. About four carnivals were held each year, the last usually in March, depending on the weather.

The **Speed Skating Rink Co.** was incorporated in 1881 and opened their new stone rink in December 1882. It had a short life. The Guelph Junction Railway took about 30 ft off the end of the building in 1888 and it was then converted to a freight office. Shareholders were paid 70¢ on the dollar when it was wound up in 1890. In its short life there were many carnivals, skating to the City Band and school exercises held in the building. The building burned May 19, 1991.

In 1889 the Guelph Curling and Skating Club leased for 99 years a portion of Central Park (the Old Burying Ground) for \$50 a year from the city and built a wooden rink behind Knox church which they named the **Victoria Rink**. This burned in 1892. The rink was rebuilt only to have it burn again in 1914. It was again rebuilt, but smaller for curling, and the remainder of the space used as a lawn bowling green. Opened December 19, 1914. The rink was used for ice skating and curling in winter and as a roller rink in summer (500 skaters and 1,000 spectators). The maple floor was sanded weekly. The rink was used for the Guelph Fat Stock Show until the Winter Fair Building was erected in 1900.

The club could not pay rent to the city and gave up their lease in 1936. The city sold the rink to the Guelph Curling and Skating Club for \$1. It was used until 1965 when the city bought it back for a parking lot.

A.B. Petrie, a sportsman and druggist built a large white brick building on Wellington Street near Gordon, called the **Petrie Rink**. It also had athletic space at rear south to the boathouse. This rink opened a large white brick in 1898 and included a gymnasium indoor swimming pool and bath. Unfortunately it was not popular since the roof support timbers were embedded in the ice surface. A 5-piece band entertained the skaters. The rink was gutted by fire in 1954 and was removed in 1965 for the new Canadian tire Store.

The **Cambridge Street Arena**, was a corrugated metal clad steel structure built by the Guelph Arena Co on Cambridge Street, Now Commercial Street and was used for skating, hockey, dances. It 1925 it became the Cambridge Ice Palace. Maintenance was high and the arena was sold to Roy "Swat" Mason in 1936. He sold the building to the Royal Dairy in 1941 but it continued to be used as an arena until 1947. It then became a storage garage for the dairy. It was removed about 1968 for a Red Barn.

Guelph Memorial Gardens

In 1884 the Ontario Provincial Fat Stock Show came to Guelph and was held in hotel stables. It met several more times and decided to move to Brantford where permanent accommodation was available. Guelph decided to build them a site west of City Hall on Market Square. A stone faced, two storey building was opened in December 1900. The show was now called the Provincial Winter Fair and in December 1909 an annex was made to the building. The large show ring was used for a hockey arena. The Winter Fair building housed troops in WW I and the Provincial Winter Fair moved to Toronto in 1922. The military also controlled the building from February 1940 to June 1946.

The original plan of the city was to build a recreation centre. Jenkins and Wright, architects, planned a renovation of the 1900 Winter Fair building. Dario Pagani was the prime contractor at cost plus 15% as material was still rationed. In June 1947 a motion of city council moved a new hockey arena be dedicated as a War Memorial and be named "Guelph Memorial Arena", and that a suitable bronze plaque be prepared and erected at the end of the arena surmounted by an illuminated picture of the king and bordered by flags. The names for the plaque were researched by the Ladies Auxiliary of the 16/43 Battery. The name was changed to "Guelph Memorial Gardens" in June 1948. It was officially opened 11 Nov 1948. The Winter Fair Annex was taken down in 1968 and a new entrance to the Gardens was made.

1965 - Exhibition Arena, Division St.

1967 - Centennial Arena, College Av

1975 - Victoria Road Recreation Centre, Victoria Rd

2001 - West End arena, Paisley Rd

CRICKET

The first team sport organized in Guelph was the Guelph Cricket Club in 1833. It was organized by J.C.W. Daly, the Canada Company agent, who obtained \$20 from the company to level a piece of Market Square. Daly also presented the club with a set of balls and bats. This club beat many in the province. They practiced three afternoons a week.

Later, a cricket ground was made near Goldie's Mill. There were about 13-14 men on a team. It took 2 days to go to Toronto by open wagon to play. Two days of playing and return home. It took a week to compete in 1840. Certainly not a working man's sport.

Another cricket crease was at Exhibition Park from 1886, across from the present Victory School. It was a sodded cricket field. In 1907, the Western Ontario Cricket League was formed to revive the game. The local club was the O.A.C. Cricket Club; however, in 1924 it was renamed the Guelph Cricket Club. They won the championship three times. Cricket was also played behind Horseman's house on Grange St and at the Homewood property.

CURLING

Dr Dunlop and others curled the first few years in Guelph but the sport was dropped until 1838 when the Guelph Union Curling Club was organized..

About 1855. Wm Congalton renewed th game. Stones were made from granite boulders and Adam Robinson made the handles for the stones. The game was held on the river behind Allan's mill dam. . The club played matches with Fergus, Elora and Galt.

The first indoor curling rink was built on Huskisson St., opposite Presant's Mill, in 1869. The Club had 50 members.

On Oct 4, 1888, the Royal City Curling Club was formed with George Sleeman the first President. It had 120 members. They used the Speed skating rink.

The Victoria Rink was built in 1892 on Baker St. It was an all purpose arena for curling, ice hockey, ice skating, and roller skating. It was sold and taken down in 1968 and was replaced by a new building on Highway 6 north of Woodlawn road.

In 1926 the Union Curling Club joined with the Royal City Curling Club to found the Guelph Curling Club.

SKATING

Skaters wore silk hats and hoop skirt crinolines on Speed river in 1860's. They also skated on the flats below Halliday brewery. Skates were strapped on their shoes. Broad iron runners curled at front. It was a large spectator sport as well, people lined the river banks. Natural ice open air rinks were common. For example in 1922 Parks Supt. Nichol scraped off the snow and flooded the river between the Eramosa bridge and Allen's Mill.

ROLLER SKATING

The Victoria rink, at the rear of Knox Presbyterian church, was used for roller skating in summer, ice skating and curling in winter and for the Guelph Fat Stock show.

In 1906 it was noted "all last week roller skating rink was well patronized, four of the 6 nights every available pair of skates were taken by 8 pm. The rink has largest floor space in Canada - 180 ft x 84 ft wide. Floor made of maple, sanded about once a week. On Sep 25, 1906, 500 people skated and 1,000 watched and listened to band (2 sections of city band alternated). In 1909 they held 26-mile races. The ice was taken out in mid March, the floor was let dry then skating started.

When the building burned in 1914 the curling club built a smaller rink for curling and used the spare ground for a bowling green.

LACROSSE

The Guelph Lacrosse Club was formed in 1878 - Canada's national game of broken heads and skinned joints. It was played at the old cemetery in 1892 but by 1901 were at Exhibition Park. The Shamrock's were organized in 1897 - usually a battle between Elora and Guelph. The last Guelph team of the period was 1912.

TENNIS

The 1st club was formed in 1893. It was social in nature, courts were on the Maple Leaf grounds and later on the Goldie property on Cardigan St. They moved along street and laid out 3 more grounds. St. John's Club was formed with 2 courts in rear of Church of our Lady in 1912. In 1919 it became the Church of our Lady Tennis Club, still going. St. George's also had a club. Chalmer's club and St James were 2 new clubs in 1925. The City Tennis Club was reorganized as the Garrison Club in 1926 with older devotees. In 1923 they won the Western Ontario championship. In 1927 there were 6 tennis clubs in the city. Tennis courts are now in St. George's Park and in many private areas.

BASEBALL

Guelph was the foremost baseball town in Canada. The game was introduced to Guelph by A.S. Feast of Berlin in 1860. It was played at the GWR Stn off Edinburgh Rd. The Maple Leafs were organized in 1861. The membership fee was 6d. and J.W. Colson was the first President. In 1863 Guelph lost a game to Elora - 129-8. A red maple leaf was sewn to their work clothes.

In 1866 the Maple Leaf Club starts from old Union Club and in 1868 1,500 Guelph people with their brass band travel to Woodstock for Civic Holiday. They lose 38-28. One citizen wrote the town was going to moral shipwreck over ball. Again, in 1869 Guelph won the amateur championship of Canada. Guelph was a Canadian team made up of local artisans.

By 1872 Guelph was good for Ontario clubs and began to play US. In 1873, the Boston Red Socks, the best team in America, visited Guelph - Guelph lost 27-8. However, in 1874 they won the amateur championship of the world at Waterdown, NY. In 1874, Geo Sleeman became President and Guelph became a professional team in 1876.

There were changes in pitching from lob and twist to the swift ball and then the curve.

In 1876 a baseball scandal happened when the London umpire was caught wagering on Guelph-London game. Guelph lost 5-0 but game tossed out. He bet a box of cigars Guelph would lose.

In 1897 Guelph, 4000 of the towns 10,000 population celebrate the towns 50th anniversary by watching the Maple Leafs defeat the local amateurs 29-0 - at 25c/head

Other minor teams were the Silver Creeks, The Beavers, the Unions, the Mountain Rangers

Guelph Turf Club

Queen's Plate run in Guelph on 1-1/8 mile track at Gray's Inn on John Newstead farm Eramosa Rd in 1864.
11 horses run. for 50 sovereigns "Fast young men in white turbans, and the latest "peg-tops" and the latest slang were in abundance" Union Brass Band in attendance
1870 subscription list in hotels for donations for prizes - fall races - \$2,400 in prizes

Guelph Race Course – grandstand for ladies

1881 - Eramosa races at the Centre Inn

1891 races by Guelph Turf Club

1903 - Geo Sleeman President of GTC - races at Exh Park

1919 - 6,000 people attended at Exh Park - "not since Old Home Week in 1908 has such a crowd gathered in the park"

1896 - Guelph Trotting Association formed

ROAD RACES

Guelph Cross Country & Road Race Assn - 1906, 12th annual event - 15, 10, 5 miles races
Thanksgiving Day races sponsored by above in 1902 for 1st by above

GOLF

GUELPH COUNTRY CLUB

Located on the hill near Wellington Place. Meeting held 10 Dec 1910 to found the club.

Apr 2, 1912 meeting to select site - Hood farm, old race track at rear of Riverside Park, also look at Grange property on Waterloo Av - decide to buy 75 ac Hood farm. Lisle, Toronto architect drew up plans for club house and Mahoney supervise the work. 6 holes open in 1913 expanded to 9 holes.

Apology for another golf course laid down near rifle ranges (Probably Sleeman's), better course at the Junction where McArthur located. Too small. Club house was an elm tree upon which players hung their coats.
Founded February 4, 1912.

CUTTEN CLUB

Established in 1930.

ERAMOSA RIVER

BOATING & THE BOATHOUSE

A Boating Club was organized in April 1870. Each member had their own boat and the boathouse was at the side of the spillway at the rear of J.C. Presant's Victoria Mill. The club members cleaned obstructions from the river and in 1873 held a regatta at Allan's Dam. In 1875 there was skating on the bay at Dundas bridge.

In 1879 the Royal City Canoe Club was formed and met in a hall above William Johnson's boathouse and boat livery at the Dundas bridge. Johnson had 28 row boats and canoes for rent. After 1886 it was called the Guelph Boat and Canoe Club.

The Club leased (23/6/1886) what they called Victoria Park, an area across the river from Hooper Street at

the waterworks, and owned by McCaskill, now part of the Cutten Club. They would meet in the Victoria Rink and with 60 canoes gather at the Johnson boat house and paddle 1.5 miles up the river.

There was a four mile stretch up the Eramosa River past Victoria Park to The Rocks. They went up the river in groups. Club had over 40 members. They passed Rice Island and then Paradise then 1.5 miles to Victoria bridge. Rocks were used for duck shooting - the water was too shallow to go further. Between 1895 and 1901 the Speed Canoe Club, with music., made weekly trips up the river, 250 members held concerts in summer at Victoria Park.

When the City acquired Royal City Park they rented the boathouse to Johnson at \$75 a year, including pasture rights. When the park was used for a dump the rent was reduced to \$50. The land at the boathouse was filled and raised in 1914.

In 1938 the Dundas Street bridge was rebuilt. The boathouse was demolished November 24, 1937 in preparation for the new bridge. It was rebuilt.

In May 1941 the city leased the boathouse to the Navy League of Canada for \$1.00. It was used for a training quarters for sea cadets and navy league cadets for the duration of the war. The league built an addition to the building in 1943. The Navy League moved out and the boathouse was rebuilt in 1999.

LAWN BOWLING

Old game held Francis Drake from the Spanish Armada - professional men of the city. In 1904 George Chapman with George Creelman won the championship of Canada. Guelph Bowling Club at the new 1914 Victoria Rink

Harry Mahoney was a good bowler and singles championship.

It was noted in 1927 the ladies of Guelph have not included bowling in their sporting activities.

Other clubs and greens in 1927 were at the Homewood, Court House, Hillcrest and Reformatory.

Other Notes:-

¶1923 citizens vote \$25,000 for steel grandstand at Ex Pk, seat 1,200, and bleachers for another 700 and new athletic ground. Actual cost was \$40,000 – baseball became the primary sport in Guelph

¶Enclosed soccer field - \$3,000 for Lyon Park in 1926 - fencing so charge admission instead of passing the hat.

¶softball played at Lyon Park, the armouries, Ex pk and many others.

¶tennis court now at Ex Pk – cricket coming back, played at Ont Ref pitch

¶Hockey cushions at Lyon Park — Rotary and GCVI

¶6 tennis clubs, mostly at churches

Local men clean up park in 1920 under Supt Nichol

1889 - 100 trees planted on property of waterworks

Guelph Bicycle Club, org 1882 , Geo Sleeman Pres. - 18 wheels

Guelph Cricket Club, org 1846, Geo Sleeman, patron, 150 members

Guelph Rifle Assoc., Geo Sleeman, Pres., org 1854 - 120 members - weekly practice range Waterloo Av May-Oct

Guelph Turf Club, org 1871, Geo Sleeman, Pres, 13 members

Guelph Union Curling Club, org 1838, 50 members

Maple Leaf Baseball Club, org. 1860, Geo Sleeman, Pres. Practice ground west of Edinburgh Rd near G. W.R. station. 2 stands for spectators. Championship of Canada in 1869

Speed Skating Rink Co. inc. Dec 1881, stone rink cost \$15,000

Wolesley Lacrosse Club org Apr 1884, 40 members, Exhibition grounds

Boating Club org 1870, 35 members, cleared Speed of obstructions