



**CITY OF HAMILTON**  
**PUBLIC WORKS DEPARTMENT**  
*Corporate Assets and Strategic Planning Division*

<b>TO:</b>	Chair and Members Public Works Committee
<b>COMMITTEE DATE:</b>	March 21, 2016
<b>SUBJECT/REPORT NO:</b>	Installation of Ground Mounted Solar Panels on Active and Dormant Landfill Sites (PW16020) (City Wide) (Outstanding Business List Item)
<b>WARD(S) AFFECTED:</b>	City Wide
<b>PREPARED BY:</b>	Debbie Achatz Senior Project Manager Energy Engineering 905-546-2424, Extension 6240  Frank Gazzola Superintendent Energy Engineering 905-546-2424, Extension 7518  Tom Chessman Manager Office of Energy Initiatives 905-546-2424, Extension 2494
<b>SUBMITTED BY:</b>	Gerry Davis, CPA, CMA General Manager Public Works Department
<b>SIGNATURE:</b>	

**RECOMMENDATION**

- (a) That the General Manager of Public Works or their delegate be directed to proceed with a detailed feasibility study for the installation of a ground mounted solar photo-voltaic (PV) project, located on the Glanbrook Landfill Site, North Buffer Land Parcel, at an estimated cost of \$150,000;
- (b) That the General Manager of Public Works or their delegate be authorized to enter into all necessary applications or agreements (estimated at \$10,000), required as part of the Independent Electricity System Operator (IESO), Large Renewable Procurement (LRP) program for the City to become a 'Registered Proponent' for the project, in a form satisfactory to the City Solicitor;
- (c) That funds for the installation of a ground mounted solar photo-voltaic (PV) project, located on the Glanbrook Landfill Site, North Buffer Land Parcel, be borrowed from the Energy Reserve (No. 112272);
- (d) That staff report back to the Public Works Committee with the results of the detailed feasibility study, along with the rationale and staff recommendations, as to

whether there is a viable business case for proceeding with the ground mounted solar photo-voltaic (PV) project, located on the Glanbrook Landfill Site, North Buffer Land Parcel;

- (e) That the Outstanding Business List item related to the Installation of Ground Mounted Solar Panels on Active and Dormant Landfill Sites be identified as complete and removed from the list.

### **EXECUTIVE SUMMARY**

At the September 9, 2015 Council meeting, staff was directed to investigate the feasibility of installing ground mounted solar panels on active and dormant landfill facilities (PW Report 15-011). In cases where the installation of solar panels on active and dormant landfill facilities is being considered, staff was directed to consult with the appropriate Ward Councillor.

The City of Hamilton maintains thirteen closed landfill sites and one active landfill site. A landfill site may have more than one identified land parcel which may be considered for development. Staff conducted a high level review of 20 potential land parcels within the City's fourteen landfills sites. Landfill sites with existing land use applications such as soccer fields, baseball diamonds, reforested sites or other site logistics were removed as potential project locations and were not recommended as part of this report.

To begin the investigation into the feasibility of solar installations on City landfills a consultant was retained to conduct a high level review of the technical, financial and environmental potential of each of the City's 20 land parcels. The intent of this review was to identify high potential locations that may warrant further detailed investigation. The selection criteria used as part of this review identified high, medium and low potential sites for solar installations. These criteria are outlined in Appendices A, B & C.

The results of this review identified the Glanbrook Landfill's north buffer land parcel shown in Appendix D, as the location with the highest potential for a ground mounted solar PV installation. In order to confirm the viability of the potential identified at this location, staff recommends that a detailed feasibility study be completed. The purpose of this study would be to conduct a detailed business case review and report back to the Public Works Committee on the overall viability of the project specifics. The cost to complete the detailed feasibility study is estimated at \$150,000. This level of detail is also required for the application process of the IESO Large Renewable Procurement (LRP) Program.

The IESO LRP program is the competitive bid process established for procuring large renewable energy projects greater than 500 kilowatts (kW). The project identified for Glanbrook could be as large as 5.0 megawatts (5,000 kW). The application process for the IESO's LRP program is a two staged process. The first is the initial Request for Qualifications (RFQ) phase to become a "Registered Proponent". In the RFQ phase, applicant qualifications are assessed based on their ability to meet a set of mandatory requirements including past project development experience (planning, developing, financing and constructing projects) and financial capability. The estimated cost for the first or RFQ stage of the application is \$10,000.

While the timing for the next round of LRP offering has not yet been announced by the IESO, it is important for any proponent to be ready when the next round is open for applications. When the program does open, there is only a short window to apply (typically four to six weeks). This is why staff is requesting advanced approval to submit the initial RFQ application to the IESO for the City to become a registered proponent. Funding for both the feasibility study and for the RFQ application to the IESO is being proposed from the City's Energy Reserve (No. 112272).

The second phase of the IESO LRP program is the Request for Proposals (RFP) phase. If accepted as a Registered Proponent, the applicant moves from the RFQ phase to the RFP phase which requires submission of project-specific details such as: bid price, site details, grid connection point, project capacity and community consultation. Prior to submission of the second phase RFP, staff would report back to the Public Works Committee with the results of the detailed feasibility study and recommendations as to whether there is a viable business case for proceeding with the project. At this point the Public Works Committee can determine if it wishes to approve proceeding with the second phase RFP submission and the overall project. Phase 2 -RFP registration and security fees are estimated at \$100,000.

***Alternatives for Consideration – See Page 9***

**FINANCIAL – STAFFING – LEGAL IMPLICATIONS**

Financial: Funding for the recommendations (a) and (b) are to be borrowed from the Energy Reserve (No. 112272) and could be paid back through future project revenue, should the project proceed.

Staffing: There is no impact on staffing.

Legal: At the required time, the City's legal department will be engaged to review and advise staff on contracts as necessary, in order to participate in the IESO programs.

**HISTORICAL BACKGROUND**

The City of Hamilton maintains thirteen closed landfill sites and one active landfill site. Ground Mounted Solar PV projects are becoming increasingly common in North America and provide an opportunity to convert dormant lands to some economic use.

In 2011, the City conducted an initial review regarding the viability and implications of Ground Mounted Solar Photovoltaic (PV) Systems installation on City owned land and landfills, specifically in terms of Community Energy Project Partnerships. On June 6, 2011 Public Works presented an Information Report 'Community Energy Project Partnerships (Ground Mounted Solar Photo-Voltaic) (PW11035) which reviewed the risks including legal, financial, technical and environmental impacts. It was concluded that the magnitude of the financial investment, limitations in available resources and the unknown legal complexities and potential liabilities, that the City not proceed at that time to enter into a Community Energy Partnership Project.

On September 9, 2015 City Council passed a motion (presented to Public Works Committee on August 31, 2015 (PW15-011)) directing staff to assess the viability of

installing ground mounted solar panels at the City's 13 closed landfill sites and 1 active landfill site. Pursuing this direction from City Council, the City retained a consultant to conduct a preliminary feasibility study. The report focused on the technical, financial and environmental feasibility including an economic and life cycle analysis.

At this time, 5 years after the 2011 review, solar technology has greatly evolved and material costs have decreased significantly providing an improved business case. Along with available funding programs, smaller project sizes are now viable to take advantage of smaller parcels of land available. There are business models and ownership structures that can be examined in terms of benefits and risks to the City i.e. City owned and operated, land lease to project developer, joint venture or Hamilton Renewable Power Inc. (HRPI) models.

The City also reviewed available funding programs to support the project economics. Each program has specific timelines and eligibility criteria including monetary requirements for application submissions that must be considered and prepared in order to utilize potential program offerings.

The Large Renewable Procurement (LRP) program is a competitive process for procuring large renewable energy projects greater than 500 kilowatts. The program consists of two phases: an initial Request for Qualifications (RFQ) phase to become a Registered Proponent and a Request for Proposals (RFP) phase. In the RFQ phase, applicant qualifications are assessed based on their ability to meet a set of mandatory requirements including past project development experience (planning, developing, financing and constructing projects) and financial capability. If qualified, the applicant then moves on to the RFP phase which requires submission of project-specific proposals that detail location, connection point and capacity, as well as evidence of conducting community engagement. There are submission and deposit fees dependent on project size. Timing for the next round of LRP offering has not yet been announced by the IESO.

Should Council decide to move forward with a project that is 500 kW or less, the Feed-in Tariff (FIT) Program would be used. The FIT program was developed to encourage and promote greater use of renewable energy sources including solar photovoltaic (PV) for electricity generation projects in Ontario. The IESO's fundamental objective of the FIT Program, along with the *Green Energy and Green Economy Act, 2009* (Ontario) and Ontario's Long-Term Energy Plan, 2013, is to promote increased development of renewable generating facilities of different technologies using an open, fair and standardized process. The FIT Program is open to projects with a rated electricity generating capacity greater than 10 kilowatts (kW) up to 500 kW. The program is referred to as a standard offer program with standardized pricing, contract terms and program rules (guaranteed price over a 20-year term). Applications must be approved through various steps and are prioritized using a point scheme. The prices paid for electricity produced vary according to the renewable energy source used and size of the project. A FIT (version 4) price schedule effective January 1, 2016 has been established with prices based on project size. A program for new FIT (version 5) projects has not yet been established.

## **POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS**

This initiative aligns with the focus of the Corporate Energy Policy to facilitate the achievement of City-wide emission reduction targets set forthwith in the policy (Report PW14050). Namely, the stated target for Greenhouse Gas emissions reduction targets is an 80% reduction by 2050. The Corporate Energy Policy also supports the development of renewable energy projects.

## **RELEVANT CONSULTATION**

Planning and Economic Development Department – Director Planning

Public Works Department – Senior Project Manager Landfills; Manager of Recycling and Waste Disposal, Operations Division

Horizon Utilities and Hydro One – Utility Customer Service

Community and Emergency Services Department – Division Director Recreation

Corporate Finance - Director, Financial Planning and Policy

Mayor Eisenberger

Councillors Collins, B. Johnson, Jackson, Whitehead, Vanderbeek, Ferguson, Merulla, Green

## **ANALYSIS AND RATIONAL FOR RECOMMENDATION**

### Technical Review

For the technical review, fifteen criteria (see Appendix A ) were used to determine the feasibility of installing solar PV systems on City landfills e.g. electrical connection, capacity availability, connection type, current or planned land use, species at risk, landfill topography, sun orientation, shading etc. Full site list and wards are indicated in Appendix E.

A technical risk rating system was used to assess each criterion and the landfill sites were categorized as sites with high, medium or low potential for installation of solar PV systems. Table 1 below is a summary chart of the technical risk rating system:

Table 1 – Technical Risk Rating system

LOW RISK	Few or no alterations / obstacles to implementation identified.
MEDIUM RISK	Moderate alterations / obstacles to implementing. Some technical risk to proceeding.
HIGH RISK	Major alterations / obstacles to implementation. Not recommended.
NA	Insufficient information available to complete an assessment.

Financial Review

A financial review was conducted which provided high level estimates of capital costs, revenue from electricity production, project payback and Internal Rate of Return (IRR) estimates for each potential site.

Potential capital funding sources include:

- Green Municipal Fund;
- Infrastructure Ontario Funding;
- Other program funding options will be monitored and evaluated as they become available.

IESO Renewable Energy Programs that offer potential long-term electricity supply contracts for Solar PV are:

- Large Renewable Procurement (LRP) Program;
- Feed-In Tariff (FIT) Program.

Funding programs to strengthen the business case were reviewed and this process included a determination of specific fee and application deposits required for program eligibility, as outlined in Table 2 below. The table outlines the anticipated fees and deposits required to participate in the IESO’s LRP or FIT programs. These fees and deposits are subject to change with future program offerings from the IESO. The LRP program is a competitive process for procuring large renewable energy projects greater than 500 kilowatts. The FIT program supports renewable energy projects greater than 10 kilowatts (kW) and up to 500 kW.

Table 2 – IESO Program Fees

LRP - Large Renewable Procurement Program (> 500kW)	FIT - Feed In Tariff Program (< 500kW)
Qualification Submission Fees/ Deposits	Application Fees
\$10,000 (Est. based on system size, prescribed forms & contract capacity)	\$500
Registration & Proposal Security Fees	Application Security Fees
\$100,000 (Based on \$20,000 per MW)	\$15,000 (based on priority points used and price reduction scheme submitted)

Note: A Megawatt (MW) is the equivalent to 1,000 kilowatts (KW).

Environmental Review

Discussions were held with Environmental Services Operations and Waste Management staff about environmental considerations. Various environmental criteria were evaluated such as impacts to environmentally significant or protected natural areas, wildlife habitat, water bodies and wetlands, and Species at Risk (SAR). Approval requirements were identified such as Environmental Compliance Approvals (ECA's) including new approvals and approval amendments, and a Renewable Energy Approval (REA). Impacts or changes to the sites Certificate of Approval must also be reviewed. Detailed environmental reviews are typically required for selected sites due to the significant time and financial investment required. Study results were then used to categorize each potential site into three groups as follows:

**High Potential:** most favourable criteria, unobstructed and suitable land area, minimal community and environmental considerations, potential capacity.

**Medium Potential:** several criteria that make the site less ideal, requiring potential evaluation, permitting and/or alterations at the site.

**Low Potential:** many unfavourable criteria that greatly limit the feasibility of constructing a ground mounted solar PV system (not recommended).

The report concluded that the buffer land for Glanbrook Landfill north buffer land parcel, located in Ward 11 was ranked as high potential. A review by staff has determined that this would be a desirable location as there are minor encumbrances to address. The report also listed Brampton Yard on Rennie Street as high potential. However staff removed this site for consideration due to known ceremonial burial grounds in the area, existing landfill monitoring activities, existing use of the yard (fuel pumps and salt dome), close proximity to residential area and the future land use plans (potential for park in 2020). Table 3 below is a summary of staff recommended High and Medium potential sites for ground mounted Solar PV.

Table 3 – Selected High and Medium Ranked Sites

Sites	Capacity (MW)	Est. Annual Generation (kWh/year)	Cost (\$)	Est. Annual Income (\$)	Payback (yrs.)	Current Land Use	Ward
<b>HIGH POTENTIAL</b>							
Glanbrook North	5	6,570,000	\$12,500,000	\$1,116,900	11.2	Active Landfill – Buffer Land	11
<b>MEDIUM POTENTIAL</b>							
Glanbrook – South	2.3	3,022,200	\$5,750,000	\$513,800	11.2	Active Landfill – Buffer Land	11

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Sites	Capacity (MW)	Est. Annual Generation (kWh/year)	Cost (\$)	Est. Annual Income (\$)	Payback (yrs.)	Current Land Use	Ward
Glanbrook – Centre	1.6	2,102,400	\$4,000,000	\$357,400	11.2	Active Landfill – Buffer Land	11
87 Acre Park Landfill Area	1.5	1,971,000	\$3,750,000	\$335,100	11.2	Dormant Land	11
87 Acre Park North Area	7.9	10,380,600	\$19,750,000	\$1,764,700	11.2	Dormant Land (local model plane club)	11

Table 3 Note: Capacity quoted in Megawatts (MW) is the equivalent to 1,000 kilowatts (KW). KWh refers to kilowatt-hours.

As part of the review, City staff was directed by Council to consult with the appropriate ward Councillors. Public consultation was not included in this review and will be conducted in the subsequent phase as appropriate. Public consultation is required as part of the IESO program application process.

Without electricity revenue through a long-term energy supply contract from the LRP program the economics of the project are not viable. A similar approach was used through Hamilton Renewable Power Inc. (HRPI) for its cogeneration projects at Woodward and Glanbrook.

Staff is requesting approval to proceed with a detailed feasibility study at an estimated \$150,000 in order to confirm technical, environmental, and financial costs and identify any other project risks. Overall, a project design is needed to position the City to make a qualifying bid and further refine the business case, should the next IESO LRP program become available for the Glanbrook North buffer land parcel.

It is important for any proponent to be “shovel” ready when the next round is open for applications. When the program does open, there is only a short window to apply (typically four to six weeks). The LRP program is a competitive bidding process and there are no guarantees of a proponent having a successful bid. The overall continuation of the LRP and FIT programs remains at risk as past programs have been oversubscribed and there is currently a surplus market condition for electricity, in Ontario. The IESO is also reviewing the province’s Long Term Energy Plan in 2016.

The City has taken a systematic, risk based, analytical approach to identifying the potential landfill sites for ground mounted solar PV. Tools for evaluation and risk assessment include:



- Landfill site matrix evaluation of criteria that influence the feasibility of installing solar PV systems;
- Risk rating system;
- Landfill site matrix financials development;
- RETScreen analysis (This is a federally developed industry standard for evaluating the financial viability of clean energy projects).

If the City was to proceed with the overall project, the benefits could include:

- Promotion of the City of Hamilton as a Green and Healthy Community;
- Leadership in renewable energy;
- Environmental stewardship;
- Alignment with the City's targets for environmental emissions and reductions including the City energy policy;
- Solar technology is maturing and continues to see technological and financial advances;
- Familiarity with renewable energy through leveraging of existing operations such as HRPI (Hamilton Renewable Power Inc.), the Woodward cogeneration plant, Glanbrook landfill generators, the biogas unit at 900 Woodward and the roof top solar PV project at Wentworth Operations Centre;
- A new revenue stream should the project prove to have an overall positive return on investment.

### **ALTERNATIVES FOR CONSIDERATION**

Recommendation (a) and (b) puts the City in a better position to determine the viability of proceeding with the overall project and to be prepared to submit an application into the IESO's RFQ stage, once the next round of funding is announced. By not proceeding with recommendation (a) the overall viability of a solar PV project at Glanbrook, cannot be fully evaluated. By not approving recommendation (b) the risk would be missing the next window of opportunity to apply to the IESO's LRP program.

The possibility also exists for the City to consider a smaller sized project, which would have a lower total capital requirement; however, this would also reduce the potential revenue generated. The detailed feasibility study would still need to be conducted to determine the viability of various project size options.

Further review of medium potential sites or other City owned properties and other technologies could be developed as Council desires.

### **ALIGNMENT TO THE 2012 – 2015 STRATEGIC PLAN**

#### **Strategic Priority #1**

A Prosperous & Healthy Community

*WE enhance our image, economy and well-being by demonstrating that Hamilton is a great place to live, work, play and learn.*

**Strategic Objective**

- 1.1 Continue to grow the non-residential tax base.
- 1.2 Continue to prioritize capital infrastructure projects to support managed growth and optimize community benefit.
- 1.5 Support the development and implementation of neighbourhood and City wide strategies that will improve the health and well-being of residents.
- 1.6 Enhance Overall Sustainability (financial, economic, social and environmental).

**Strategic Priority #2**

Valued & Sustainable Services

*WE deliver high quality services that meet citizen needs and expectations, in a cost effective and responsible manner.*

**Strategic Objective**

- 2.1 Implement processes to improve services, leverage technology and validate cost effectiveness and efficiencies across the Corporation.

**Strategic Priority #3**

Leadership & Governance

*WE work together to ensure we are a government that is respectful towards each other and that the community has confidence and trust in.*

**Strategic Objective**

- 3.1 Engage in a range of inter-governmental relations (IGR) work that will advance partnerships and projects that benefit the City of Hamilton.

**APPENDICES AND SCHEDULES ATTACHED**

Appendix A – Site Criteria Descriptions

Appendix B – Criteria Risk Summary

Appendix C – Landfill Ranking

Appendix D – Glanbrook Site Map

Appendix E – Site List and Ward