HALIFAX
REGIONAL MUNICIPALITY

PO Box 1749
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Item No. 10.1.3

Halifax Regional Council
February 10, 2009

TO: Mayor Kelly and Members of Halifax Regional Council

SUBMITTED BY:

Dan English, Chief Administrative Officer

Wayne Anstey, Deputy Chief Administrative Officer - Operations

DATE: January 19, 2009

SUBJECT: **Cutoff Light Fixture Application/Streetlight Ownership**

ORIGIN

Item 11.1 from the November 18, 2008 meeting of Halifax Regional Council.

RECOMMENDATION

It is recommended that Halifax Regional Council:

1. **Not** proceed with replacement of existing semi-cutoff streetlight fixtures with full cutoff fixtures until HRM updates its Streetlighting Guideline to reflect a single standard which is based on best practice and most recent design guides, and develops a comprehensive plan which will identify the most economic approach to introducing energy efficient streetlighting technologies. This guideline update and energy efficiency plan shall be completed before the end of 2009.

2. Direct staff to undertake a detailed cost/benefit analysis and implementation plan for taking on the ownership and maintenance responsibilities attached with new residential subdivision streetlights, to coincide with the implementation of associated common trench and undergrounding of overhead utilities regulations for the core area of the Halifax Regional Municipality.

BACKGROUND

Item 11.1 from the November 18, 2008 meeting of Halifax Regional Council, requested a recommendation report on the feasibility of:

1. Replacing existing street lights with cutoff fixtures for all new or replacement installations.

2. Taking ownership of any new lights installed on municipal roads as part of subdivisions.

In addition, the Motion requested the Mayor to forward a letter to Nova Scotia Power expressing HRM's preference for low energy options in terms of replacements of the lights they own.

1. Cutoff Streetlights Obtrusive light, as defined by the Transportation Association of Canada (TAC) in its Guide for the Design of Roadway Lighting, consists of three elements:

1. **Spill Light** which is illuminance falling beyond the area that is being lighted.
2. **Glare**, which is light that bothers the human eye.
3. **Sky Glow** which is light which is caused by a combination of light emitted upwards from a light source and reflected light cast upwards from the surface being illuminated.

TAC categorizes all light fixtures by their ability to limit the amount of light which is directed above the horizontal plane of the fixture. It indicates that light emitted directly from light fixtures into the sky can be reduced with cutoff and full cutoff optics.

Full cutoff fixtures are designed such that no light is emitted at the horizontal plane or above.
Cutoff fixtures are designed such that the intensity at the horizontal plane does not exceed 2.5% of the rated lamp lumens.
Semi-cutoff fixtures are designed such that the intensity at the horizontal plane does not exceed 5% of the rated lamp lumens.
Non-cutoff fixtures have no intensity limits.

Groups like the International Dark Sky Association (IDA) have been strong advocates for reductions to light pollution through establishment of local by-laws as well as promoting national and provincial standards to reduce obtrusive light. Outdoor lighting codes and by-laws have proven to be somewhat effective in reducing sky glow and spill light. However, it is important to note that the IDA exempts streetlighting from their Model Outdoor Lighting Ordinance, because warranted roadway lighting serves a specific purpose related to safety. Roadway lighting, therefore, should not be compromised or regulated by outdoor lighting by-laws.

2. **Ownership** At amalgamation, the former City of Halifax owned and maintained all its streetlights. Power consumption was paid to Nova Scotia Power through their unmetered rate. The

streetlights in all other areas of the municipality were owned and maintained by Nova Scotia Power. Municipalities paid the utility for the use, maintenance of the fixtures, and the energy used by the lights. This is the present arrangement for the streetlighting system in the amalgamated municipality, with a few exceptions. HRM is responsible for the maintenance of approximately 13,000 standard streetlights, including all decorative streetlights regardless of where they are in the municipality. Ownership of streetlights in HRM has been a focus since amalgamation. A report to Regional Council on February 3, 1998 recommended that HRM initiate discussions with NSPI to discuss taking over of the remaining streetlights in the municipality. A report to Council as recently as July 8, 2008 concluded that because the utility was committed to improving the service level for streetlight outage repairs, no ownership decisions should be made until a service level review was presented to Regional Council early in 2009.

DISCUSSION

Concern about ”light pollution” is a relatively recent phenomenon and has received considerable attention as a result of groups such as the IDA. This, in combination with a focus on energy conservation which had been driven by a heightened awareness of environmental impacts of energy consumption as well as the cost of maintaining such services to communities, has brought this issue to the forefront. As an example, the City of Calgary has invested significantly in replacing non-cutoff fixtures with full cutoff fixtures, with lower wattage lamps. They replaced 40,000 light fixtures, over a 5-year period, at a cost of over $7.0 million. They anticipate a six to seven year payback for their investment, resulting in an ongoing $2.0 million reduction to their annual street light budget. As a final note, the Calgary project excluded a number of applications from the switch to full cutoff fixtures. They included:

- in front of playgrounds
- in front of parks
- in locations where spacing between streetlights is too great
- some intersections
- decorative style streetlights

The Halifax Regional Municipality has approximately 35,000 streetlight fixtures, the vast majority of which are non-cutoff style. HRM owns approximately 35% of these fixtures, and NSPI owns the remainder. HRM does not stipulate cutoff fixtures for any streetlight applications. However, where spill light and glare are a problem to residents, a cutoff option is made available. At this time, less than 100 cutoff fixtures have been installed by HRM in the municipality. NSPI has standardized on the semi-cutoff cobra head fixture, as well. Because, for the most part, streetlight installations in HRM are dependant on positioning of power poles associated with the overhead power system, location, spacing, angle of fixture and proximity to the street is not always consistent. As a result, a fixture that provides a more widespread light pattern compensates for an imperfect design. In addition, spill light is used to provide additional lighting to sidewalks or entrances to residences that are not specifically lighted.

HRM is involved in a number of initiatives that will assist the municipality in developing a more comprehensive streetlighting standard, one that recognizes energy efficiency, minimization of light pollution, and proper design. Initiatives include:

1. HRM has committed to a pilot program which will include installation of 300 to 500 LED full cutoff fixtures in the municipality. These fixtures, while eliminating light above the vertical plane, will also provide significant energy reduction. This project is in partnership with a local LED roadway light manufacturer, and Nova Scotia Power, and is funded through the Department of Environment's Eco Trust program. Nova Scotia Power intends to install an additional 500 to 700 fixtures in various locations around the province.

2. HRM has partnered with Nova Scotia Power, Conserve NS, and UNSM to commission a report on street light standards best practices, and identification of energy efficient street light technologies. This study is expected to be released within the next two months. It will provide a better understanding of the stage of development of various energy efficient streetlight technologies, what the benefits and concerns are associated with each, and a typical streetlighting standard that will assist with implementation of system change.

3. HRM is examining the feasibility of requiring undergrounding of overhead utilities in new residential subdivisions. This initiative will enable proper streetlight design to be carried out. Position of poles and angle of fixtures would be driven by design, rather than the location of overhead system power poles. HRM, in partnership with NSPI, has commissioned an engineering study to develop a common trench design to minimize the cost of undergrounding utilities. A second study to focus on financing and ownership models and best practices are expected to be contracted for this month.

It is hoped that over the next number of months, these initiatives will enable HRM to develop an overall streetlight strategy that will incorporate a more comprehensive standard which incorporates an energy efficiency as well as a light pollution policy. Because investment in changes to the existing streetlight infrastructure will be considerable, it is necessary to be cognizant of all potential impacts before focusing on a particular technology/system.

As indicated previously, the City of Calgary invested over $4 million (the remainder was grants from federal and provincial governments) to replace existing fixtures with full cutoff fixtures. HRM has the ability to convert up to as many as 13,000 fixtures. The present cost difference for each fixture is about $250.00. This would result in an anticipated cost for fixture replacement of about $3.0 million. Calgary was only able to recover their investment through reduction in lamp wattage which was due in large part to over lighting. Calgary indicated that its streetlighting levels were "among the highest in North America". It replaced 250 watt and 200 watt lamp fixtures with 150 watt and 100 watt fixtures. In HRM, more than 50% of the light fixtures the municipality owns are 70 watt.

There would be no achievable energy reduction from these fixtures, because that is the smallest lamp size for such roadway applications. In addition, only about 1600 of the approximate 13,000 light fixtures are greater than 150 watts. So, while there are significant benefits associated with cutoff fixtures, implementing a wholesale switch may not be an economic decision, and would require the direction that an updated streetlighting standard would provide, with respect to minimum lighting levels, spacing of fixtures for various applications in the municipality.

With respect to the ownership issue, the referenced Information Report to the July 8, 2008 Regional Council meeting, argued for taking over ownership of streetlights associated with new subdivision development. A stepped approach enables the Municipality to manage the added responsibilities associated with increased maintenance, and to adjust to the incremental costs associated with maintaining a more spread out street light system. However, one of the difficulties associated with HRM maintenance of streetlights is the inability to access the power supply. The interface between the Municipality and NSPI is the power connection to the fixture. Because there is no means for disconnecting fixtures from NSPI's power system, the utility does not allow HRM to connect or disconnect to their system. This would extend to subdivisions, as well, unless and until the Municipality institutes a requirement to underground utilities in all new subdivisions in the HRM core. With undergrounded power systems, a single switched connection to the streetlights can be specified, enabling the municipality to have the capability of maintaining the system independent of the utility.

In accordance with a motion passed by Regional Council on May 24, 2005, HRM is moving toward implementation of regulations prohibiting all overhead utilities in new subdivisions in the municipal core. In April 2008, an engineering study was issued which provides a working design for undergrounding of utilities in new subdivisions. HRM has requested a second study be undertaken which will examine how other jurisdictions manage ownership and cost issues associated with a common trench concept for undergrounding utilities. It is hoped that within a year, the Municipality will be able to modify its subdivision by-law to require new developments to adhere to this requirement. At that time, ownership of streetlights in these instances, will be most reasonable, and justification, through a cost/benefit analysis could be carried out to accommodate this schedule.

BUDGET IMPLICATIONS

Ownership of additional streetlights in the municipality will impact the streetlighting operating budget. The extent of that impact will not be known until a detailed cost/benefit analysis of HRM maintaining subdivision streetlights rather than NSPI is carried out.

FINANCIAL MANAGEMENT POLICIES / BUSINESS PLAN

This report complies with the Municipality's Multi-Year Financial Strategy, the approved Operating, Capital and Reserve budgets, policies and procedures regarding withdrawals from the utilization of Capital and Operating reserves, as well as any relevant legislation.

ALTERNATIVES

Proceed immediately with installing full cutoff fixtures for new applications and for existing streetlights requiring replacement. HRM would incur a capital cost of about $3.0 million to replace all existing cobra head, non cutoff streetlight fixtures with cutoff units. The operating cost impact would be about a $0.3 million saving annually. This option is not recommended until the HRM Streetlighting Guideline is updated.

ATTACHMENTS

1. Letter to Rob Bennet, President, and CEO, NS Power, from Peter Kelly, Mayor, Halifax Regional Municipality
2. "Streetlight Service Level Improvements Options" Halifax Regional Council Information Report, July 8, 2008
3. Illustration - Cutoff Light Fixtures

A copy of this report can be obtained online at http://www.halifax.ca/council/agendasc/cagenda.html then choose the appropriate meeting date, or by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

Report Prepared by: Angus Doyle, Manager, Utilities Coordination, 490-5019

Report Approved by: Ken Reashor, P.Eng., Manager, Traffic & Right of Way Services, 490-6637

Report Approved by: Mike Labrecque, P.Eng., Director, Transportation and Public Works, 490-4855

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PO Box 1749
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Item No. 3

Halifax Regional Council
July 8, 2008

TO: Mayor Kelly and Members of Halifax Regional Council

SUBMITTED BY: Mike Labrecque, P.Eng., Director, Transportation and Public Works

DATE: June 17, 2008

SUBJECT: **Streetlight Service Level Improvements Options**

INFORMATION REPORT

ORIGIN

On April 17, 2008, Council requested a staff report on the challenges and benefits of taking over NSPI owned streetlights in HRM. This report was to examine options available to the Municipality, as well as provide available outage statistics.

BACKGROUND

Prior to amalgamation, the City of Halifax took over ownership of all its streetlights. In doing so, it also agreed to take responsibility for maintaining these lights and paying NSPI for power and energy charges based on a calculated usage for each streetlight type and size. Generally, all other streetlights in HRM are owned by NSPI, or the Nova Scotia Department of Infrastructure Renewal (100 series highways). The NSPI owned lights, which amount to approximately 27,000 fixtures, are maintained by the utility on a breakdown basis. As a result, it relies on the general public to report burned out streetlights, and provides a service level of seven working days to repair, from the time of notification. Otherwise, lights are not repaired. This is of concern to HRM Council for several reasons.

- First, there is a concern that the present reporting process is not user-friendly, and discourages residents from reporting outages.
- Second, the reduced light levels will result in neighborhoods being less secure for residents.
- Third, because street lights are covered by the Unmetered Rate Class, HRM's power bill for this load is based on a flat rate. The Municipality pays for the anticipated energy consumption not the actual consumption.

Because there is a perception that the standard of service is poor in HRM districts being maintained by NSPI, Council has asked whether there would be an advantage for the residents of HRM if the Municipality took over ownership and responsibility for all streetlights including those owned by NSPI. As a result, Council requested a staff report on April 17, 2008, that would examine the feasibility of consolidating all of HRM's streetlights under a single owner. The report should include:

- challenge relating to taking over streetlights;
- cost/benefit analysis of purchasing NSPI streetlights;
- other options that would provide improved service levels;
- the Unmetered rate energy charges for nonoperating fixtures;
- potential for taking over new subdivision streetlights.

DISCUSSION

In the Fall of 2007, NSPI and HRM undertook a process to better understand the extent of streetlight outages in a sample of districts in the Municipality, and have compiled a database of streetlight performance levels in six of the Municipality's 23 polling districts. There was an attempt to collect data from two separate focuses.

- HRM owned/maintained districts and NSPI owned/maintained districts
- Districts that were representative of the urban, suburban and rural make-up

A detailed inventory of each of the districts was undertaken by the Utility, and a survey of streetlight performance was carried out by HRM. The results are summarized in the table below. The streetlight outage levels range from a high of 11.82% to a low of 1.60%.

District	Owner	Location	Classification	Total Streetlights	Total Outages	Percent Outages
3	NSPI	Preston/Lawrencetown	Rural	2475	264	10.7
6	NSPI	Dartmouth East	Urban	1130	99	8.8
11	HRM	Halifax Northend	Urban	1764	31	1.8
15	HRM	Fairview/Clayton Park	Urban	1815	29	1.6
20	NSPI	Lower Sackville	Suburban	1549	99	6.4
22	NSPI	Timberlea/Prospect	Suburban/Rural	1328	157	11.8

Streetlight Service Level Improvements Options

These statistics represent a total number of streetlights not working in the districts surveyed. Based on the randomness of the selected districts, and the extent of the survey, it could be concluded that these districts are representative of the service level for the type of district, whether that be urban, suburban, or rural. HRM urban districts average an unreported outage rate of 1.67%, whereas the urban district maintained by NSPI is 8.76%.

Alternatives

NSPI Modify Maintenance Practices

NSPI agrees that improvements can be made in reducing the number of lights not working within HRM. NSPI is committed to working with HRM staff to reduce the number of burnt out NSPI owned and maintained streetlights. NSPI commits to implementing the following measures to improve service levels:

- completing a detailed inventory of its streetlight fixtures in HRM;
- Initiating a survey (at their cost) of all NSPI owned lights in HRM to identify all burned out streetlights and implement immediate repair.
- commit to a 5% burn out target for all NSPI owned fixtures in HRM by the end of 2008. This will require follow-up outage surveys which will be implemented by the utility. This service level will be reevaluated for 2009 based on industry best practice.
- Initiate a cost/benefit analysis for a relamping program. If determined appropriate, NSPI will commence implementation in 2009 subject to NSUARB approval;
- investigate technology and energy efficiency initiatives as these relate to street lighting in HRM.

Through a joint effort between HRM and NSPI, the extent of the service level problem in the municipality has been clearly articulated. NSPI's response is positive and encouraging. However, the final configuration for long term maintenance of streetlights in HRM still requires continued cooperation, and focus on how to optimize a service level that is manageable within the utility's mandate. There is interest in exploring technology options such as GPS assisted reporting, and continuous monitoring technologies that also offer energy efficiency benefits through dimming capability. It is hoped that the UNSM commissioned Effective Streetlight Efficiency Strategies Study will assist with providing some direction for both utility and municipality.

HRM Purchase NSPI Light Fixtures

Due to concerns about streetlight maintenance service level being provided by NSPI, it would not be unreasonable for the Municipality to examine the costs and benefits of taking ownership of HRM streetlights presently owned by NSPI, as an alternative to the present arrangement. Obviously, this could be easily implemented if both parties were amenable to a purchase option. At this time, however, NSPI has not confirmed that they are interested in selling their streetlighting assets to HRM.

For the purpose of understanding a range of costs that HRM might face if a purchasing option was available for consideration, an examination of the inventory value and its earning power was carried out. NSPI owns approximately 27,000 light fixtures in HRM. These include Mercury Vapour, Fluorescent, Low Pressure Sodium, High Pressure Sodium and Metal Additive. The undepreciated book value for these fixtures is approximately $5,000,000 in 2008. The NSPI 2005 Rate Hearing indicated that the streetlighting account was 44% depreciated. Assuming this is representative of the HRM lighting assets, the book value would be in the $2.8 million range. Since this valuation is based on 2008, the actual book value would be something less than $2.8 million. Over a remaining life of approximately 12 years, an additional NPV of $2 million could be realized from the allowed return on this investment.

It is difficult to factor in the maintenance cost advantage/disadvantage associated with the NSPI owned HRM lights. HRM maintained lights are situated in an urban environment. System maintenance costs reflect high density application of light fixtures. Extrapolating these costs to suburban and rural applications would require a dedicated study. Potential savings associated with economies of scale could be offset by reduced efficiencies associated with maintaining streetlights that are spread out over much larger territories. In addition, if this option is to be considered, it is essential to examine the costs that are included in the maintenance portion of the unmetered tariff, in order to compare that cost with HRM's overall streetlight budget, to ensure that a comparison is on an equal basis. Based on NSPI's present maintenance charge, HRM would need to be able to reduce that amount by 50% to experience a ten year payback on a $5.0 million investment in a streetlight purchase. If the remaining book value of the NSPI streetlight inventory is in the twelve year range, this would not make economic sense.

HRM Take Ownership of New Residential Subdivision Streetlights

An option that is available to HRM would be to take ownership of new light fixtures that are being installed in HRM by developers, or by the utility on behalf of developers. These fixtures would be incorporated into the streetlight inventory, and would be maintained by the Municipality. It would fix NSPI's involvement in streetlight maintenance to its present inventory. It would also allow the HRM Streetlighting Department to adjust to an increased scope of work for its crew, and contractor. A gradual expansion would also help better understand the incremental costs associated with expansion of service territory outside the core. The timing for this initiative could coincide with the implementation of HRM's common trench design which would require decorative streetlights in new subdivisions due to the removal of power poles from the streetscape. It would also provide a single utility connection for a subdivision, rather than individual fixture connections to an overhead system, which would be much more acceptable to the utility.

CONCLUSION

Streetlight service level improvement has been a concern of HRM Council and staff for some time. Over the past nine months the extent of the problem has been documented through a joint effort of NSPI and HRM, and a remediation plan has been recommended and is in process. The utility has

committed to measurable service level improvements on a go forward basis, and a reexamination of that service level from an industry best practice perspective. This initiative, in combination with communication improvements that have occurred over the past six months, and a commitment from NSPI to examine alternate maintenance practices, as well as emerging technologies, is encouraging, and represents real progress. Considering the timeline for measured improvements is six months, the utility should be provided the opportunity to demonstrate its commitment to real and measurable improvement to streetlight service level, and be encouraged to proceed with it's recommended plan. A follow up report in early 2009 can provide Council with a progress update, and, if necessary, focus more closely on other alternatives such as the purchase option.

BUDGET IMPLICATIONS

The service level improvement option will not have any budget implications. The utility has agreed to absorb costs associated with improvement to their existing service standard. In addition, they will implement the changes to their maintenance procedures if it is economic to do so. The purchase options would result in additional costs to HRM.

FINANCIAL MANAGEMENT POLICIES / BUSINESS PLAN

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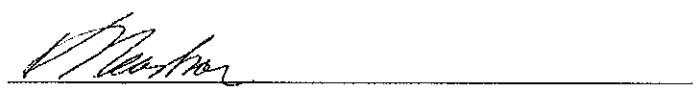
Report Prepared by: Angus Doyle, P.Eng., Manager, Utilities Coordination, 490-5019

Report Approved by: 
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November 25, 2008

COPY

RECEIVED
-11- 27 2008
TRAFFIC & R.O.W.

Mr. Rob Bennett
President and CEO
Nova Scotia Power Incorporated
P. O. Box 910
Halifax, NS B3J 2W5

Dear Mr. Bennett:

Re: Energy Efficient Lighting - Halifax Regional Municipality

In consideration of the fact that Nova Scotia Power Inc provides street lighting service to approximately 70% of the Halifax Regional Municipality, and in recognition of HRM's goal of reducing greenhouse gas emissions, as articulated in the HRM Community Energy Plan, on behalf of Halifax Regional Council, I would like to take this opportunity to encourage you to move to initiating a streetlight replacement program that would focus on low energy options.

The partnering of the Municipality with NSPI and Conserve Nova Scotia, through a UNSM coordinated engineering study, due to be completed in 2008, will assist in providing a more comprenhensive understanding of existing and emerging energy efficient streetlight technologies, and enable us to identify reliable and efficient low energy options.

In addition, both NSPI and HRM plan to participate in an LED streetlight program commencing early in the new year. This initiative will involve locally built fixtures and hopefully will provide a home grown solution to inefficient roadway lighting.

HRM would also encourage NSPI to initiate the regulatory process necessary to modify the Unmetered Rate Class to incorporate the anticipated low energy light fixtures, allowing customers to realize operating cost savings in addition to GHG emissions reductions.

HRM is also encouraged by NSPI's desire to improve street light service levels this year. By committing to acheiving a street light outage level of 5%, averaged over the HRM service territory by the end of 2008, NSPI will realize significant improvement in the street light level in all areas of the Municipality. This translates to improved levels of safety and security for residents throughout the HRM. Halifax Regional Council recognizes that this initiative is significant, and we look forward to an update on NSPI's progress, early in the new year.

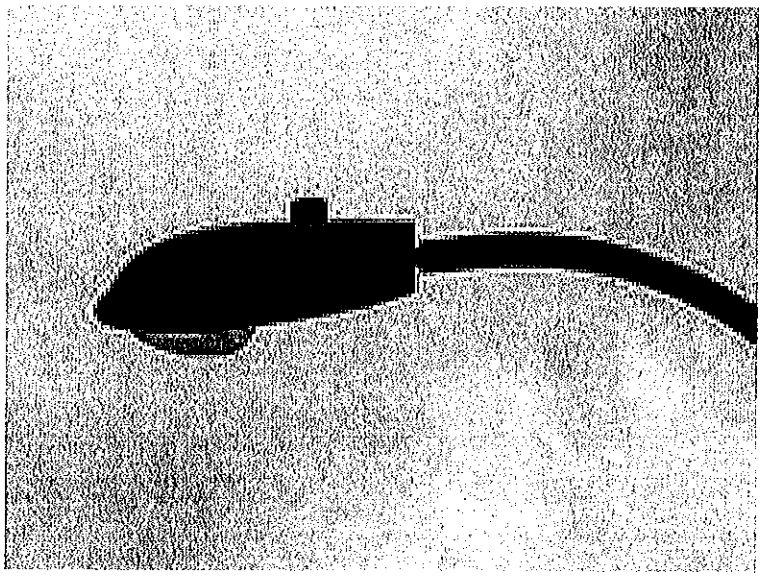
On behalf of my colleagues on Halifax Regional Council, I look forward to a positive response to our request.

Respectfully, I remain

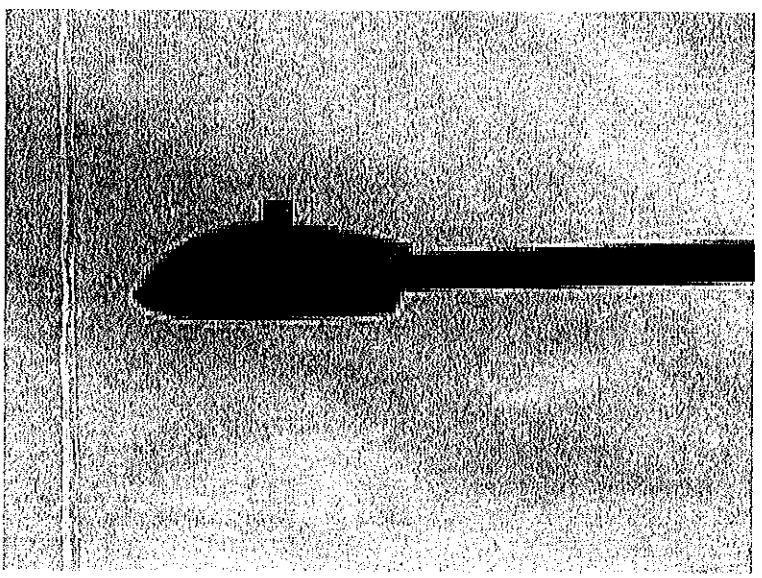
Peter Kelly
Mayor

cc - Halifax Regional Council

CUTOFF LIGHT FIXTURES



This *drop-lens cobra luminaire* allows light to escape sideways and upwards, where it may cause problems.



A *flat-lens cobra luminaire*, which is a full-cutoff fixture, may be effective in reducing light pollution. It ensures that light is only directed below the horizontal, which means less light is wasted through directing it outwards and upwards.