

Section 5.8

Placement of Natural Gas Pipelines in Roadways

1.0 INTRODUCTION

Service Nova Scotia and Municipal Relations commissioned a study entitled **A Study to Provide Nova Scotia Municipalities with Information/Issues/Standards (Best Practices)** in reference to placement of natural gas pipelines in municipal roadways. The study was undertaken in two distinct parts:

Part 1 information, collection and assembly of data on practices within other jurisdictions;

Part 2 formulation of a model policy and/or specifications on gas pipeline placement which can be used as a guide to the Municipal Units in Nova Scotia.

This document outlines background data and puts forth recommendations of a model bylaw on gas pipeline placement. The recommendations are based on the survey and discussions with personnel in the gas distribution business.

The information contained herein represents the best practices from municipalities across Canada with respect to the placement of low pressure gas distribution pipe within municipal street rights-of-way. Any Nova Scotia municipality contemplating developing such a bylaw will find this information useful. Some modification of the standards may be necessary to accommodate local circumstances.

2.0 BACKGROUND

2.1 Jurisdictional Responsibility

The transmission and/or distribution of natural gas in Nova Scotia is under the jurisdiction of the Nova Scotia Utility and Review Board. The following acts and regulations outlines the requirements relative to the transmission and distribution of natural gas.

- \$ Public Utilities Act
- \$ Pipeline Act
- \$ Pipeline Regulations (Nova Scotia)
- \$ Gas Distribution Act
- \$ Gas Distribution Regulations (Nova Scotia)

and other associated amendments to the acts and regulations. These documents are available on the web site at www.gov.ns.ca.



2.2 Survey Questionnaire

A survey questionnaire was undertaken throughout Canada, concentrating on input from Municipal Units and Gas Distributors. In addition, telephone conversations were held with various personnel involved in the gas distribution business. The questionnaire is included in Appendix A. The general conclusion is that the location of the pipeline must be a joint effort by the Gas Distributor and the Municipal Unit.

The following summarizes the comments received from the various interviews:

- \$ the distribution of natural gas falls under provincial utility review boards or similar structures. The minimum standards for design, installation etc. for oil and gas pipeline systems are in accordance with the Canadian Standards Associations CSA Z-662. Franchise and/or right-away agreements form the legal document for installations within municipal units between the Municipal Unit and the Gas Distributor. In addition to the franchise agreements guidelines are established by some municipal units addressing the technical issues of installations within street systems. Gas distributors have standards and specifications that are used as in-house documents by the gas distributor. A draft model franchise agreement from the Ontario Energy Board is included in Appendix B. Included in Appendix B also are:
 - \$ Municipal Service Systems Part A: Design Guideline of the Halifax Regional Municipality; and
 - \$ Guidelines for Construction of Natural Gas Mains Within The Municipality of the City of Fredericton.
- \$ the practice of placement of gas distribution lines in street systems is not consistent across the country. Generally there are differences in accepted locations relative to the pressure B that is: for high pressures versus low/medium pressure lines. The practice also varies in some jurisdictions by road classification; that is, gas distribution is not allowed in arterial streets in some Municipal Units. Streets/roads that are under the provincial government jurisdictions also have restrictions, with no distribution lines within TCH 100 series. The Guidelines for Installation of Pipelines on TPW Right-of-Ways from the Nova Scotia Transportation and Public Works are included in Appendix C.
- \$ the accepted position of gas distribution lines on roadways/streets are very variable across the country. Generally the location of pipes are preferred to be installed within the right-of-way but outside the asphaltic surface. However, due to the congestion in many urban streets the locations have to be adjusted to accommodate existing conditions resulting in installations both within and outside the asphaltic surface. In some jurisdictions, the planning incorporates lanes, at the rear of lots where services are installed. The preferred locations are 1 metre outside the asphaltic concrete; within the area of 0 to 3 metres inside the edge of the right-of-way; under boulevards; between the edge of the asphalt surface and the sidewalk. Under sidewalks is not



preferred due to the initial and on-going costs. Examples of the location of the gas pipes relative to the property line (PL) and relative to other services are shown on the sheets in Appendix D. These sketches are from Municipal Units in other jurisdictions. The following sheets are included:

Source: The City of Calgary:

- \$ Sheet 5 - Residential B Parking Both Sides (showing gas pipe in easement with alternative in the asphaltic surface).
- \$ Sheet 6 - Collection (showing gas pipe in easement with alternative under the asphaltic surface).
- \$ Sheet 13 - Undivided Major (showing gas pipe adjacent property line or under the asphaltic surface).
- \$ Sheet 15 - Standard Industrial Street (showing gas pipe adjacent property line or under the asphaltic surface).
- \$ the approval process for the location of services is through the Municipal Unit, with approvals through the municipal engineer. The location is generally a joint effort between the municipal engineer and the gas distributor. In these areas where the highways are under the jurisdiction of the provincial highways, the approval is through the Provincial Highway Department.
- \$ the drawings to be submitted for approval vary from province to province. In all cases plans are required, showing the right-of-way, curbs etc., the existing utilities and the proposed alignment. For local distribution the plans are generally on a scale of 1:500 to 1:1000. For steel pipe (higher pressure) plan and profile are sometimes required. Some municipal units, where GIS is utilized, have the gas distribution information placed on the GIS municipal system and submitted for approval.
- \$ services are installed using both conventional and trenchless technology depending on the geological conditions.
- \$ the depth of bury of services is in accordance with the CSA Standards and the requirements of the municipal unit, whichever is the more stringent; the depth of bury from the survey implied depths varying from 600 mm to 1200 mm, with the deeper depths for steel pipe within the shoulder of the road. Gas pipes placed in the ditch system require deeper depths of cover due to the on-going maintenance in ditch systems.
- \$ technical specifications are developed by the gas distributors for installation procedures. The backfill and compaction criteria is in accordance with the municipal requirements for utility services and/or the specifications for asphaltic services where installed within the asphaltic surfaced area. Standard specifications for municipal services are used where the municipal units do not have their own specifications such as the Standard Specification for Municipal



Services, Nova Scotia Road Builders and Consulting Engineers of Nova Scotia. The timing for upgrades or placement of gas lines are coordinated with the capital investment/reinvestment of municipal units on the street systems. The Municipal Unit in some jurisdictions submit planned upgrades to the street system for the coming year(s) to the Gas Distributor. The Gas Distributor can then coordinate their activities with the proposed capital works and reduce the impact on the pavement structure.

2.3 Design Considerations

The design of the gas distribution system is governed by minimum standards as detailed in the CSA Standards B Z662 B Oil and Gas Pipeline Systems. These standards establish the design criteria relative to class of pipe, design standards for components, joints, sleeves, flexibility/stress analysis, crossings; installation procedures; pressure testing; corrosion control; operating, maintenance and upgrading; gas distribution systems; material specifications etc. Specialty Section 12 B Gas Distribution Systems address the distribution aspects of the system. The design must meet the minimum requirements of CSA Z662 as outlined in the Gas Distribution Act. Clause 12.4.5 Cover and Underground Clearances is of significance to the municipalities relative to acceptance of layout and interference relative to existing infrastructure. The applicable sections of the standard are quoted below relative to cover requirements:

12.4.5 Cover and Underground Clearance

12.4.5.1 Cover Requirements

12.4.5.1.1

Cover requirements for underground piping and casings shall be 60 cm unless otherwise required or allowed by clauses 12.4.5.1.2 to 12.4.5.1.4 inclusive. Where underground structures or adverse subsurface conditions prevent installation with the minimum cover, it shall be permissible to install such pipelines with less cover, if they are provided with appropriate protection.

Note: Where erosion or other factors are likely to reduce the cover over a distribution line, consideration should be given to additional depth of cover or other means of protection.



12.4.5.1.3

For polyethylene pipelines with standard dimension ratios greater than SDR 11, cover requirements shall be determined by calculations in order to ensure that stresses due to external loading are within acceptable levels.

12.4.5.1.4

Service lines shall be installed at depths that will protect them from excessive external loadings and local activities, such as gardening. A minimum of 30 cm of cover shall be provided in private properties and a minimum of 45 cm of cover shall be provided in roads, except that where such cover requirements cannot be met due to existing substructures, less cover shall be permitted, provided that:

- \$ such portions of such service lines subject to excessive superimposed loads are either cased or
- \$ adequate protection from physical damage is provided.

12.4.5.2 Underground Clearance

The following underground clearance requirements shall apply:

- \$ Where practicable, there shall be at least 30 cm of clearance between any pipeline and any other known underground structure that it parallels, but in no case shall the clearance be less than 5 cm.
- \$ Where practicable, there shall be at least 5 cm of clearance between any pipeline and any other known underground structure that it crosses; where a clearance of at least 5 cm is not practicable, the pipeline shall be protected from damage that might result from the proximity of the other structure.
- \$ Precautions shall be taken to prevent electrical contact with, or the imposition of external stresses from or on, any other underground structure.
- \$ Sufficient clearance shall be maintained, or mitigative measures installed, between polyethylene pipelines and steam lines, hot water lines, power lines, and other sources of heat, in order to prevent the temperature of such pipelines from exceeding the limits specified in Clause 12.4.2.2.1.

3.0 RECOMMENDED PRACTICES AND GUIDELINES

3.1 General

Practices and guidelines are noted below relative to the issues that are addressed at the Municipal Unit, rather than at the Nova Scotia Utility and Review Board. The practices and guidelines are a compilation of best practices that have been taken from the interview process, guidelines by other jurisdictions, accepted practices in the industry and standards including CSA Z662-99 Oil and Gas Pipeline systems; Technical Standards and Specification Manual for Gas Distribution Systems, Alberta Energy Utilities Branch; City of Calgary Street Details, City of Fredericton Guidelines for Construction of Natural Gas Mains Within the Municipality; Halifax Regional Municipality, and



Municipal Service Systems Guidelines.

3.2 Approvals

- (1) The Municipality shall be the authority for the approval of the location of all portions of the gas distribution system within municipal streets. In accordance with clause 78 of the Public Utilities Act:
No public utility shall, in any city or town, erect or place in, upon, along, under or across any street, road or highway, any pole, wire, conduit or pipe, without first obtaining the consent of the council of such city or town. . .@

However, in accordance with the Gas Distribution Regulation of the Gas Distribution Act the Gas Distributor can refer the decision to the Nova Scotia Utility and Review Board:

Clause 4 A If pursuant to Section 78 of the Public Utilities Act, a municipality does not consent to the construction requested or gives consent that is unacceptable to the Franchise Holder, the matter shall be referred by the Franchise Holder to the Board.@

- (2) Where the distribution systems falls within highways or roads under the jurisdiction of the Department of Transportation and Public Works, approval from the Department of Transportation and Public Works is required.
- (3) The Gas Distributor shall obtain the necessary municipal or provincial permits for construction of the gas distribution system. These may include: opening permits, Tourism and Cultural Affairs, Nova Scotia Department of Environment and Labour; Nova Scotia Department of Highways and Public Works etc.

3.3 Design

- (1) The gas distribution system shall be designed, installed and maintained to meet or exceed the standards set out in all applicable Federal, Provincial and Municipal enactments, codes and specifications and the Canadian Standard Association (CSA) Oil and Gas Pipeline Systems CSA Z662, latest edition.
- (2) The location of the gas distribution system within the street is site specific and strict guidelines cannot be used to establish the location that will apply for all conditions. However, general guidelines for location can be established and modified as required to meet specific site conditions.
- (3) The location of the gas distribution system should be jointly evaluated between the Municipal Unit and the Gas Distributor, giving consideration to the following:
 - \$ the existing right-of-way;
 - \$ the location of existing infrastructure;
 - \$ the profile of the street B paved area, curb, sidewalk, median, ditch, backslopes, terrain, etc.;
 - \$ the location of trees; and
 - \$ future considerations relative to other infrastructure and planned modifications to the street system.
- (4) In selecting the location of the gas distribution lines, the location selected will require flexibility on the part of both the Municipal Unit and the Gas Distributor. In Nova Scotia, the installations for the initial years will be associated primarily with existing street/road systems, in both the urban and rural environment. Guidelines for construction in a rural environment where shoulders/ditches are more prevalent will vary from those in a more urban environment where the streetscape is more congested and in some cases concrete/asphaltic surface cover the total right-of-way.
 - (a) Urban (Curb and Gutter)



For urban streetscapes the following locations for pipe systems should be considered:

- \$ between the sidewalk and the right-of-way limit, or within easements established parallel to the property line. Locations adjacent the property line are generally within 1.5 to 2 metres inside the property line. Typical details as obtained from the City of Calgary are appended for residential, industrial and major streets.;
 - \$ outside the paved area of the street system **B** in some jurisdictions for urban streets the location is 1 m outside the paved area (back of the curb);
 - \$ within the boulevard;
 - \$ between the sidewalk and the paved street, where a grass median exists; and
 - \$ under the asphalt surface with clearances from other utilities, where no opportunity in other parts of the right-of-way exists; typical sketches within the asphaltic surface are appended.
- (b) Rural (no curb)
- \$ outside the paved area and a minimum of 1.5 metre inside the property line or right-of-way;
 - \$ outside the paved area - 1 m outside the edge of pavement, within the shoulder area; and
 - \$ within the ditch or within the back slope of the ditch. The pipe, if located in the ditch, must have sufficient cover for erosion concerns and maintenance requirements; the depth of bury must be increased due to risks associated with maintenance of the ditch system; the depth of bury is generally 1.2 to 1.5 m. A sketch showing the pipe within a ditch system and a table on recommended depth of bury from the Alberta Energy Utilities Board are included in Appendix D.
- (5) The depth of bury must conform to the minimum requirements of CSA. Generally the following is recommended for the depth of bury where the depth is measured from the surface to the top of casing pipe or carrier for distribution systems:
- \$ minimum of 60 cm for polyethylene pipe;
 - \$ minimum of 100 cm for steel pipe in an urban environment;
 - \$ minimum of 120 cm for steel pipe in the shoulder of the road, within rural areas; and
 - \$ at railway crossings in accordance with requirements of railway company.
- (6) Gas pipelines shall be installed so that the horizontal separation between the gas pipeline and other utilities (water, sewer, storm, cable) is at least 300 mm; some jurisdictions prefer larger clearances where practical.
- (7) Gas pipelines shall be installed so that primary root systems of trees are not damaged. Gas line installation in treed boulevards should be by directional drilling or boring, or an alternative method approved by the Municipal Unit.

3.4 Plans

- (1) Plans showing the location of the gas services are to be submitted to the Municipality for approval. These plans and/or profiles should contain the following:
- \$ for all polyethylene (PE) pipe systems, plans only are required. Plans to be on a scale of 1:1000. Plans to include the right-of-way limits, curb lines, existing municipal infrastructure, north arrow, grid



applicable to the municipal drawings, and associated details for installation;

- \$ for steel pipes in an urban environment plan and profiles are recommended. Plans to be submitted on a scale not larger than 1:1000 and profiles on a scale not larger than 1:1000. Plans to include the data as noted under PE pipe systems; the profiles could be requested only for those areas of intersections, water crossings, pipe crossing etc. Plans should incorporate details as noted above.
- \$ for pipes in a rural environment plans to be submitted on a scale not larger than 1:2000; profiles on a scale of 1:2000 horizontal and 1:1000 vertical;
- \$ all plans shall reflect standard symbology used by the Municipal Unit;
- \$ approved gas line locations shall not deviate by more than 30 cms from the approved alignment; and
- \$ all plans shall bear the professional seal and signature of a professional engineer registered by the Association of Professional Engineers to practice in the Province of Nova Scotia.

3.5 Specifications

- (1) Specifications shall be submitted by the Gas Distributor with the plans to the Municipal Unit.
- (2) The specifications shall incorporate the municipal standard specifications for the earthworks, reinstatement, asphalt paving, sidewalks, curb and gutter, topsoiling, seeding and sodding, concrete, grading, excavation methods including trenchless construction methods;
- (3) Standard specifications for municipal services as developed by the Nova Scotia Road Builders Association and the Consulting Engineers of Nova Scotia, Joint Committee on Contract Documents shall be the standard, supplemented by the Municipal Units specifications as appropriate.

3.6 As-Builts

- (1) As-built plans shall be provided to the Municipal Unit within 60 days of completing the installation of the works. The as-built plans should be provided in hard copy and electronic format, which accurately depicts the location and depth of the gas mains relative to the street/road right-of-way and relative to other infrastructure. The format shall be compatible with GIS systems or other systems used by the Municipal Unit.

3.7 Co-ordination During Construction

- (1) The installation of services by the Gas Distributor shall be co-ordinated with the municipality to minimize disturbance to the street system. The construction procedure should include:
 - \$ notification to the municipality on the commencement of construction;
 - \$ adherence to the by-laws in the Municipal Unit relative to hours of work;
 - \$ written notice to area residents and businesses one (1) week in advance. Notice to include details on location and duration of construction, reinstatement, driveway restrictions, the Contractor's designated contact person and phone number; and
 - \$ for any street closure or blockage near an intersection, a detour plan and a minimum of 5 days notice



to residents/community.

- (2) The Gas Distributor shall maintain suitable access to all commercial facilities at all times during the construction program.. Scheduling shall be co-ordinated to minimize any negative impact on businesses during construction.
- (3) The Gas Distributor shall be responsible for the installation, maintenance and removal of all signage on construction sites. The signage including all traffic signage shall be in accordance with the municipality standards, or other jurisdictions such as Nova Scotia Department of Transportation and Public Works.
- (4) Municipal traffic control devices or signs which conflict with construction must not be removed/disturbed without the approval of the Municipal Unit.
- (5) The Gas Distributor shall be responsible for and implement traffic control during construction, employing competent, certified flag persons to ensure the safe and efficient flow of pedestrian and vehicular traffic.

3.8 Locate Requirements

- (1) The Municipal Unit shall incorporate a locate requirement with the Gas Distributor. The locate requirement should include time frames for response from the Gas Distributor as follows:
 - \$ within two (2) hours in the event of an emergency;
 - \$ within twenty-four (24) hours in the event of a priority request; and
 - \$ within forty-eight (48) hours for all other cases.

3.9 Damage to Municipal Property

- (1) If any portion of any street or municipal infrastructure is damaged by reason of defects in any portion of the gas distribution system, or by reason of any other cause arising directly from the presence of the gas distribution system, the gas distributor shall, at its own cost and expense, immediately repair any such damage and restore such portion of such damaged street to as good or better condition as existed before such defect or other cause of damage occurred, such work to be done under the direction of the Engineer, and to his satisfaction.
- (2) Trees on municipal property are to be protected at all times. The distribution system is to be designed on the premise that, unless approved by the municipal engineer, municipal trees are not to be adversely affected by the installation or operation of the gas distribution system.

3.10 Reinstatement

- (1) The Gas Distributor shall well and sufficiently restore, to the reasonable satisfaction of the Engineer/Road Superintendent, all highways, municipal works or improvements which it may excavate or interfere with in the course of laying, constructing, repairing or removing its gas system, and shall make good any settling or subsidence thereafter caused by such excavation or interference. If the Gas Distributor fails at any time to do any work required within a reasonable period of time, the Municipal Unit may do or cause such work to be done and the Gas Distributor shall, on demand, pay the Municipal Unit's reasonably incurred costs, as certified by the Engineer/Road Superintendent.



- (2) All surfaces shall be restored to at least the same condition as previous to the pipeline installation;
- (3) Topsoil reinstatement shall occur within 2 weeks of excavation and backfilling;
- (4) Where it is necessary for approval to install pipelines within the vehicular travelled way in asphaltic concrete areas, the following shall be undertaken:
 - \$ the asphalt to be removed shall be cut with a wheel cutter or saw; the cut should be 300 mm minimum from the edge of the excavation to minimize tension cracks;
 - \$ backfill shall be with approved granular base materials and compacted in lifts, all in accordance with the Standard Specification for Municipal Services or the specifications of the Municipality;
 - \$ reinstatement of the base courses and asphaltic concrete shall be in accordance with Section 02660 Reinstatement of the Standard Specification for Municipal Services. Asphalt reinstatement shall be of a depth equal to existing surrounding asphalt or a minimum thickness of 130 mm;
 - \$ walks, curbs and gutters shall be reinstated in accordance with Section 02630 and Section 02660 of the Standard Specification for Municipal Services;
 - \$ topsoil reinstatement including hydroseeding and/or sodding shall be in accordance with Section 02650 of the Standard Specification for Municipal Services; and
 - \$ the latest date for reinstatement without prior approval of the Municipal Unit shall be as follows:

Hydroseeding -	September 15
Asphalt -	November 1
Concrete -	November 15

3.11 Pipeline Relocation

- (1) If in the course of constructing, reconstructing, changing, altering or improving any highway or any municipal works, the Municipal Unit deems that it is necessary to take up, remove or change the location of any part of the gas system, the gas distributor shall, upon notice to do so, remove and/or relocate within a reasonable period of time such part of the gas system to a location approved by the Municipal Engineer at the sole expense of the Gas Distributor.
- (2) The Gas Distributor shall not be required to bear the expense of any removal or relocation



made at the request of the Municipality on behalf or for the benefit of any private developer or other third party.

- (3) At the request of the Engineer, the Gas Distributor shall structurally support any portion of its gas distribution system at its own cost where necessary as part of the process of implementing any municipal improvements.

3.12 Indemnification

- (1) The Gas Distributor shall, at all times, indemnify and save harmless the Municipal Unit from and against all claims, including costs related thereto, for all damages or injuries including death to any person or persons and for damage to any property, arising out of the Gas Distributor's operating, constructing, and maintaining its gas system in the Municipality, or utilizing its gas system for the carriage of gas owned by others. Provided that the Gas Distributor shall not be required to indemnify or save harmless the Municipal Unit from and against claims, including costs related thereto, which it may incur by reason of damages or injuries including death to any person or persons and for damage to any property, resulting from the negligence or wrongful act on the Municipal Unit, its servants, agents or employees.

3.13 Insurance

- (1) The Gas Distributor shall maintain Comprehensive General Liability insurance in sufficient amount and description as shall protect the Gas Distributor and the Municipal Unit from claims for which the Gas Distributor is obliged to indemnify the Municipal Unit under Clause 3.12. The insurance policy shall identify the Municipal Unit as an additional named insured, but only with respect to the operation of the named insured (the Gas Distributor). The insurance policy shall not lapse or be cancelled without sixty (60) days prior written notice to the Municipal Unit by the Gas Distributor.
- (2) The issuance of an insurance policy as provided shall not be construed as relieving the Gas Distributor of liability not covered by such insurance or in excess of the policy limits of such insurance.
- (3) Upon request by the Municipal Unit, the Gas Distributor shall confirm that premiums for such insurance have been paid and that such insurance is in full force and effect.
- (4) The Gas Distributor shall confirm that the insurance in place meets the requirements of the terms and conditions of its franchise grant pursuant to Section 13 of the Gas Distribution Act.



3.14 Removal of Gas Distribution System

Any removal of the gas distribution system either upon the termination of this Agreement or otherwise will be as directed by the UARB.





APPENDIX A

Survey Questionnaire

- Note: This section is only available in the printed version of the *Local Government Resource Handbook*.
- This is available at Government Publications:

Mailing Address: P.O. Box 637, Halifax, Nova Scotia, B3J 2T3
Phone: 902-424-7580 and, toll free within Nova Scotia: 1-800-526-6575
Phone Hours of Operation: Monday to Friday, 8:30 to 4:30
Fax: 902-424-5599
e-Mail: publications@gov.ns.ca





APPENDIX B

Model Franchise Agreement
Source: Ontario Energy Board

Guideline for Construction of Natural Gas Mains Within the Municipality
Source: City of Fredericton

Municipal Service Systems Part A B Design Guideline 11.0 Natural Gas Pipelines
Guidelines
Source: Halifax Regional Municipality

- Note: This section is only available in the printed version of the *Local Government Resource Handbook*.
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APPENDIX C

Guidelines for Installation of Pipelines on TPW Right-of-Ways Source: Nova Scotia Transportation and Public Works

- Note: This section is only available in the printed version of the *Local Government Resource Handbook*.
- This is available at Government Publications:

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APPENDIX D

Source: The City of Calgary

Sheet 5 B Residential B Parking Both Sides

(showing gas pipe in easement with alternative in the asphaltic surface)

Sheet 6 B Collection

(showing gas pipe in easement with alternative under the asphaltic surface)

Sheet 13 B Undivided Major

(showing gas pipe adjacent property line or under the asphaltic surface)

Sheet 15 B Standard Industrial Street

(showing gas pipe adjacent property line or under the asphaltic surface)

Source: Alberta Energy Utilities Board

Figure 4.5 Typical Water/Canal Crossing

Figure 4.9 Pipe Installation in Rural Road/Highway Rights-of-Way, with reference Figure 4.3

- Note: This section is only available in the printed version of the *Local Government Resource Handbook*.
- This is available at Government Publications:

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