1.8
14.7

Town of Hampton

WATER SUPPLY ASSESSMENT GUIDELINES

For Subdivisions Serviced by Individual Private Wells

March 2008

WHY?

To ensure that homeowners in the Town of Hampton have a high probability of obtaining a good quality and quantity of drinking water, as defined by the Canadian Drinking Water Quality Guidelines. To be suitable the water resource must be of acceptable quality and in adequate quantities in both the short and long term.

These water supply assessment guidelines provide administrative and technical guidance to developers applying for subdivision approval and ensure that development proposals are submitted with the required technical support. These also ensure consistency in the review of development proposals with regard to water supply assessments.

WHAT SUBDIVISION PLANS REQUIRE WATER SUPPLY ASSESSMENTS?

Abbreviated water supply assessment reports are required for subdivisions that:

- Create 10 or more lots (including the remnant)
- Are in an area with documented drinking water quality or quantity problems
- Would create a cumulative total of 10 or more lots from the original lot, as of September 1, 1998.

Comprehensive water supply assessment reports are required for subdivisions that:

- Had an abbreviated report completed that recommends that the subdivision plan be subject to a comprehensive investigation
- Would create 25 or more lots (including the remnant)
- Would create a cumulative total of 25 or more lots from an original lot, as of September 1, 1998.

WHAT'S REQUIRED?

Abbreviated water supply assessment reports involve the collection and interpretation of available information, site visits and discussions with local well drillers, assessment of local geology and surrounding land uses and professional recommendations.

Comprehensive water supply assessment reports involve requirements of abbreviated assessments, test wells for quality and quantity testing, and professional recommendations.

Both abbreviated and comprehensive reports must be completed by a qualified hydrogeologist or qualified professional engineer with training in groundwater science.

LEGISLATIVE AUTHORITY

The legislative authority for policies regarding water supply is found in the *Community Planning Act (CPA)* and the provincial *Subdivision Regulation*. Section 49(2) (g) of the CPA states:

> **49(2)** *Subject to paragraph 44(1) (c), a tentative plan shall be marked "Tentative Plan" and shall show...*
>
> *(g) the availability and nature of domestic water supplies;*

Section 7 of the provincial Subdivision Regulation, which deals with the approval of a subdivision plan, lists matters for consideration in review of a subdivision plan.

> *7(2) The development officer shall not approve a subdivision plan if, in his opinion and in the opinion of the Planning Committee.*
>
> *(g) the land is not reasonably suited or cannot be economically suited to the purpose for which it is intended or may not reasonably be expected to be used for that purpose within a reasonable time after the plan is approved.*

POLICIES

It is a policy of the Town of Hampton that:

1. A water supply assessment report shall be submitted with a subdivision plan, in accordance with policy 3 and 4 below.

2. Subdivision plans that are serviced by municipal or communal water supply system shall be exempt from the policies in this document. It is noted that terrace dwellings and semi-detached dwellings sharing a well are not considered as communal water system in accordance with these guidelines.

3. Town types of water supply assessments shall be required, according to the scale and location of the development proposed. Accordingly:

    a) An abbreviated water supply assessment report shall be completed for a subdivision plan which:

        i) would create 10 or more lots, including the remnant; or
        ii) is in an area with documented drinking water quality or quantity problems; or
        iii) would create a cumulative total of 10 or more lots from the original lot, as defined in Regulation 80-159, in existence as of September 1, 1998.

b) A comprehensive water supply assessment report shall be completed for a subdivision plan which:

i) had an abbreviated water supply assessment report completed that recommends that the subdivision plan be subject to a comprehensive water supply assessment; or
ii) would create 25 or more lots, including the remnant; or
iii) would create a cumulative total of 25 or more lots from an original lot, as defined in Regulation 80-159, in existence as of September 1, 1998.

4. Abbreviated and comprehensive water supply assessment reports shall be completed by a qualified hydrogeologist or a qualified professional engineer with training in ground water science, in accordance with the guidelines established in Appendix 1.

IMPLEMENTATION

A completed water assessment report shall be submitted with the tentative subdivision plan. The Town of Hampton requires that the water assessment report be reviewed by a qualified third party to ensure that the report conforms to the requirements set out in this document and other with other applicable legislation and regulations. The developer may elect to have the water assessment report reviewed by an independent third party selected by the Town of Hampton or by the Department of Environment. There is no charge for the Department of the Environment to review the report. The developer is responsible for the cost of having the report reviewed by an independent third party. The independent third party is generally able to review the report in a shorter amount of time.

When the report indicates that the water supply is unsuitable for normal domestic uses, the Department of Environment may be asked to assess and review the consultant's report regarding such matters as modifications to the subdivision plan, restrictions placed on the water uses (e.g., groundwater heat pumps), and/or measures for satisfying health and aesthetic criteria. Is such recommendations are not included, the Department of Environment may outline to the Town of Hampton deficiencies in the report and recommend that the approval be denied or deferred, pending further investigation.

APPENDIX 1 – GUIDELINES FOR COMPLETING WATER SUPPLY

Abbreviated Water Supply Assessment Reports

Abbreviated investigations will generally involve the collection and interpretation of available information. Recommendations in the consultant's report should be based on the following:

(i) a site visit;
(ii) discussions of the proposal with local well contractors;
(iii) review of the Department of Environment publications on groundwater potential (e.g., existing yield test studies produced by the Province.)
(iv) assess local geology and soils information;
(v) develop property maps for lands considered to be within the influence area or supplied with water from the same groundwater resource;
(vi) determine if there are, or have been, uses in the assumed groundwater influence area that may contaminate groundwater resources;
(vii) determine if there are uses in the assumed groundwater influence area that draw large quantities of water;
(viii) examine nearby water wells and the Department of Environment water well records for water quality or quantity concerns; and for well design or construction abnormalities (well depth, casing length; low static water level, etc.)
(ix) examine available groundwater studies and/or literature on the area; and
(x) consultant's own familiarity with the area.

The consultant's report will typically result in one of three conclusions:

1. water supply is not a concern;
2. water supply may be a concern, therefore a comprehensive investigation is recommended; or
3. the development should not proceed, as submitted. It is anticipated that this third conclusion will result only in extreme circumstances.

The rationale for each conclusion must be provided.

Comprehensive Water Supply Assessment Reports

General

The comprehensive water supply assessment report must address concerns relative to the following:

- There must be a high probability that future residents will be provided with water for domestic consumption that is of acceptable quality and in adequate quantities over the long term.

- Appropriate well construction techniques must be employed in order to minimize the possibility of well water quality degradation.

- There must be minimal probability that well water in the subdivisions will be affected by sources of contamination on site or on adjoining lands, or that there will be water use conflicts between users in the subdivision and the users of adjoining lands.

With respect to quantity, each future domestic well must provide sufficient water for normal domestic purposes. If groundwater heat pumps (i.e., heat pumps with extract groundwater from the subsurface) are to be used in the subdivision now or at any future time, the study must show that there will be sufficient water for normal domestic supply as well as for the heat pumps for all the residences in the subdivision. Where treatment systems which require significant additional amounts of water are employed, these amounts must be added to the yield required of the wells.

With respect to quality, each future domestic well must provide water that is safe and aesthetically suitable for human consumption. Water samples must be obtained from test wells and analyzed against the Canadian Drinking Water Quality Guidelines. The suitability of the water for domestic use is determined by comparing the analytical results with relevant drinking water quality objectives.

After the initial review of a comprehensive water supply assessment report, the Town of Hampton, in consultation with the Department of the Environment, may request additional information or recommendations from the consultant or proponent. Delivery of the requested information does not necessarily guarantee approval to the project. Ultimately, it is the hydrogeology of the site itself which will determine whether or not a proposal is acceptable.

(Note: The Town of Hampton will return to the proponent or consultant incomplete reports)

Test Well Requirements

Test well requirements must be determined on a site-specific basis. The following are recommended:

(i) a minimum of three test wells or of one test well located on each 5 hectare portion of the site, whichever is greater (except where existing wells on adjacent property are used as test well – see below); in areas where ground water quantity or quality are considered marginal with respect to domestic requirements, as many as one test well per lot may be required;

(ii) the areal distribution of test wells must be such that hydrogeological conditions across the site are adequately represented; depending on the areal configuration and hyrdogeological complexity of the site. More than the minimum number referred to in section (i) may be required where past or present land uses on or adjacent to the site may affect water quantity or quality, test wells must be strategically located in order to address their impact, and the impact of these land uses must be addressed in the assessment;

(iii) the test wells must be located and constructed in such a way as to permit the prediction of the quantity and quality of groundwater supplies which domestic wells will supply in the future; accordingly, the construction of these wells must be typical of wells which will be used in the subdivision in the future and must comply with the Water Well Regulation under the Clean Water Act, with other jurisdictions' requirements and with any additional specifications recommended by the consultant and the Town of Hampton.

Existing water wells located on the site or on property immediately adjacent to the site may be used as test wells. However, these wells must fulfill requirements (ii) and (iii) above and must be fully incorporated into the well water quantity or quality testing programs described in the sections bellows. The use of existing wells and of data obtained from them must be justified in the report as being technically appropriate. However, there must be at least one test well, new or existing, located on the site.

If the consultant properly located and constructs the test wells, or if there are acceptable existing wells on the property, the developer may use them later as domestic water wells. They must, however, yield potable water and meet the construction requirements indicated under the Water Well Regulation, including being tagged for identification purposes. If any such wells are not to be maintained for future use, they must be properly abandoned as required by the Water Well Regulation; abandonment must be recommended in the comprehensive water supply assessments report and must be implemented by the developer.

Well Water Quantity Testing

At least one of the test wells must be subjected to a pumping test with the other wells used as observation wells. If static water level in an observation well is not affected by the testing of the pumped well, then pumped tests must also be carried out on that well. In cases where the number of tests wells is greater than three, pump tests must be conducted on at least one in three wells, with the other wells used as observation wells. Test wells and observation wells must be appropriately grouped.

The report must contain all well logs, water well records, pumping test data and graphs and must discuss the sustainability of domestic well yields, the potential for supply interference and site aquifer characteristics such as hydraulic gradient, transmissivity and boundary conditions. (Note that, in most cases where septic systems are proposed, the impact assessment requires a determination of hydraulic gradient.)

The following pumping test procedure is recommended:

- the test wells must be adequately developed prior to the pumping test;
- the pumping test must begin with a static water level and must be performed at the calculated rate (±5%) for a minimum period of six hours (longer where supplementary storage systems are necessary); water levels must be monitored in the test wells and observation wells; water must be discharged at an appropriate distance from the test wells to ensure that artificial recharge does not occur;
- Immediately following the pumping test, water level recovery must be monitored in the test wells until 90% recovery occurs or for 24 hours, whichever is less; where sufficient recovery does not occur, the issue of the long-term safe yield of the aquifer is especially significant.

The particular rate and yield required for a particular subdivision must be calculated as follows:

> The per-person requirement shall be 450 litres per day. Peak demand occurs for a period of 120 minutes each day. This is equivalent to a peak demand rate of 3.75 litres/minute for each person. The basic minimum pumping test rate is this rate multiplied by the "likely number of persons per well" which, for a single family residence, shall be the number of bedrooms plus one.

If groundwater heat pumps are to be allowed in the subdivision, the higher of their maximum cold or hot weather rates must be added to the rate determined above. Similarly, if treatment systems or other water uses which require additional amounts of water for their operation are to be used, those rates must be added.

Consultants must address the issue of whether the groundwater withdrawals in the proposed development and other existing or planned developments in the area will exceed the long-term safe yield of the aquifer or significantly decrease base flow to sensitive watercourses (trout streams, etc.).

Where there are established subdivisions in the vicinity, information from residents and other sources regarding well yield problems (water shortages, replacement well, etc.) and any sensitive watercourses should be obtained.

Consultants must provide a statement indicating that, in their professional opinion, the probable well yields determined on the basis of their investigations are representative of the yields which residents of the subdivision are likely to obtain from their wells in the long-term.

Well Water Quality Testing

Raw Water Quality

At least one set of samples must be obtained from the pumped well and each observation well near the end of each pumping test and analyzed in order to determine the chemical and bacteriological quality of the water. The results of chlorine residual tests performed at the well head at the same time that bacteriological samples are obtained must be reported. The consultant should obtain earlier samples and have them analyzed in the event that information on trends in water quality is required.

Where there are established subdivisions, other major water users, or potential contaminant sources in the vicinity, information from residents and other sources regarding water quality problems should be obtained. If individual septic systems are proposed and there are existing down-gradient wells near the property boundary, sampling and analysis for the nitrogen cycle may be required for the purposes of the impact assessment.

Consultants must provide a statement indicating that, in their professional opinion, the water quality determined on the basis of their investigations is representative of the quality of the water which residents of the subdivision are likely to obtain from their wells in the long-term.

The minimum suite of parameters for which analyses must be performed, along with their drinking water quality limits, are listed in the Canadian Drinking Water Quality Guidelines. If conditions specific to the site or its surrounding area suggest that other parameters may be relevant (heavy metals, pesticides, etc.), these other parameters must be added to the list. The report must evaluate whether the list of parameters examined in the study is sufficiently comprehensive to fully characterize groundwater quality for the particular site or area. Complete documentation of sampling times, of any on-site analytical methods and of all analytical results must also be included in the report.

Treatment Systems

For some aesthetic and health related parameters, the drinking water quality limit may be exceeded provided that domestic treatment systems are available which can adequately remove these parameters from the entire water supply entering the residences to a level below the relevant drinking water quality limits.

If the raw water from the wells exhibits values for aesthetic and health related parameters that are above the drinking water quality limits but below the treatment limits, or if supplemental storage systems are proposed which require special treatment systems, the Department of Environment shall be consulted regarding the appropriateness of development based on treatment systems.

Some criteria which should be considered in determining whether a water treatment system represents a reasonable alternative include the following:

- capital and maintenance costs should be reasonable;
- there should be no excessive space requirement for the equipment;
- there should be no excessive demand for water to operate the system, such as for back-washing;
- there should be no excessive requirement for the monitoring of water quality or for system maintenance; and
- the systems should be in relatively common and widespread use.

Where treatment for more than one parameter is required, the systems suggested may not be appropriate due to treatment process interferences. In this case, the consultant should obtain and document a professional opinion regarding the type of system required.

In all cases, the water supply entering the residence must be treated to satisfy all drinking water quality objectives.

(Note: Where health-related water quality limits or treatment limits have been exceeded, the areas which the relevant test wells represent may have to be excluded from the proposed development site; in this case a justification for the selection of the boundary of the site is required.)

Well Construction

Construction specifications for future domestic wells in the subdivision must be addressed by the consultant in the comprehensive water supply assessment report. Minimally, the construction of both the test wells and future domestic wells must comply strictly with Water Well Regulation under the Clean Water Act. Where septic systems are proposed, or where they already exist on an adjacent property, protection of the wells from contamination by effluent must be addressed.

The consultant may wish to recommend additional site-specific construction criteria. In studies where consultants' initial findings show that water quality or quantity standards

cannot be met without special well construction specifications, the initial data which led to these conclusions must be included in the report. The structure of the test wells on which the final quantity and quality data are based must meet these specifications and the wells must be tested according to the procedures stipulated in this Guideline in order for the data to be deemed representative.

Land and Water Use Conflicts

Land uses on or within 500 metres of the site must be described and illustrated on a map at 1:10,000 scale or larger. Where there have been, are, or may in the foreseeable future be significant potential sources of groundwater contamination (old, operating or proposed waste disposal sites, road salt storage facilities, farming activities, locations of contaminant spills, etc.) or potential causes of quantity interference with groundwater resources or well water supplies (municipal wells, dewatering activities, etc.) on or within 500 metres of the site, the potential for an impact on the subdivision must be addressed. The issue of whether additional water quality parameters should be included in the testing must be addressed.

Phased Developments

Where a subdivision application relates to an additional phase of a phased development, even though previous phases may already have been approved on the basis of a previous abbreviated or comprehensive water supply assessment report which encompassed those phases or the entire site, a supplementary study and report is required. Water samples from wells that are located on nearby developed lots in previous phases and that are in use must be analyzed for the required parameters and the well owners must be interviewed regarding their experience of their well water quantity and quality. This information, as well as the water well records and a map showing the locations of all wells in previous phases, must be provided. The original report must be re-assessed in light of the new information obtained and according to any new criteria or guidelines which may not have been in effect at the time of the original study.

Where well water quality or well yield in the previous phases are not comparable to that found in the original test wells or predicted by the original water supply assessment, the new study should investigate and explain the causes and provide new recommendations based on a re-assessment of the original report. Where new guidelines require information which is not included in the original report, the new report must provide it.

If the new phase does not contain test wells from the original study, new ones must be installed. Where additional study involving new test wells is necessary, most or all of the criteria set forth in this Guideline will apply. Consultants should discuss these issues with Department of Environment staff before proceeding.

Conclusions

A comprehensive assessment may 1) conclude that the development will not aggravate existing, or create new water supply problems, 2) recommend modifications to the plan of subdivision to address identified water supply concerns and/or restrict water dependent uses, or, 3) state that the development should not proceed due to extreme water supply constraints.

Appendix 2 - Water Quality Parameters[3]

Microbiology Section

Codes

Results:
P Presence of bacteria in sample
A Absence of bacteria in sample

Units
Number of colonies detected.
NA Not applicable

Sample Containers:
B 100 or 250 ml sterile plastic bottle containing a pill or powder respectively
C Sterile Whirlpak bag capable of holding 10 grams of sample

General Sampling Instructions - Microbiology

Do not rinse sample containers prior to filling.
Fill sample container to the mark indicated on the bottle
Keep the samples cool during transport.
Samples must be analyzed within 30 hours of sampling

For more detailed sampling instructions please contact the laboratory.

[3] Reference: Laboratory Reference Guide
Analytical Services, New Brunswick Department of Environment, 2/12/96 no. 1, 28p

PARAMETER	UNITS REPORTED	LIMIT OF QUANTITATION	HEALTH ADVISORY LEVEL	CONTAINER /HANDLING
Coliform bacteria, water • qualitative analysis, treated and untreated potable water • quantitative analysis, treated and untreated potable water	P or A #/100 mL	1/100 ml 1/100 mL	na contact Dept. of Health	B B
Faecal coliform bacteria, water • qualitative analysis, treated and untreated potable water • quantitative analysis, treated and untreated potable water	P or A #/100 mL	1/100 mL 1/100 mL	na zero/100 mL	B B
Total coliform bacteria *(see Coliform bacteria water)*				
Total faecal coliform bacteria *(see Faecal coliform bacteria water)*				
Heterotrophic Plate Counts (HPC)				

Inorganic Section

Codes

Units:

mg	Milligram	10^{3} gram
ug	Microgram	10^{6} gram
mL	Millilitre	10^{3} litre
L	Litre	
Kg	Kilogram	10^{3} gram
uSie/cm	Micro Siemen/centimetre	

HAL:
Health Advisory Levels are listed where available.

Aq applicable to aquatic lifeforms only

Sample Container:

A	1L Plastic
B	500 mL plastic
C	125 (or 250 mL plastic)
F	500 mL mason jar
J	125 mL precleaned glass
K	125 mL glass

Sample Handling:

a	Room temperature - no preservative
b	Room temperature - 0.5 mL concentrated HNO3/250mL sample
c	Cool - no preservative
d	Cool - 1 ml 25% H2SO4 /500 mL sample
e	5 mL 7:1 HNO3:H2SO4 + 0.1 mL 5% potassium permanganate/125 mL sample
f	Freeze - no preservative
h	Cool - avoid rocks
g	Cool - no headspace - deliver ASAP to laboratory
I	Cool - Protect from light - deliver ASAP to laboratory

- Highly coloured or turbid samples not suitable for this parameter

Report:

A	Approximate value
F	Result to follow
I	Interferences present
M	Missing

N	No sample bottle received in the laboratory
Q	Result not quality assured
T	Detected at a level below our Limit of Quantitation
U	Undefined
V	Insufficient volume to perform analysis
E	Sample expired
L	Result less than

Parameter Extensions:

Method Related:

AIC	Air Ion Chromatography
D	Dissolved
G	Grans
GAL	Grans Alkalinity
P	Phenol
T	Total
PP	Pulp and Paper

Method and Detection Limit Related

-H	High Level
-L	Low Level
-V	Vegetation
-X	Extractable, Atomic Absorption or Inductively Coupled Plasma
-XGF	Extractable, Graphite Furnace

Total and Dissolved Parameters:

A number of the procedures listed herein are also available in the total acid extractable or dissolved phase. For information on these parameters contact the laboratory.

General Sampling Instructions - Inorganic

Let cold water run for 5 minutes
Rinse container twice with cold water.
Fill the container to shoulder and close tightly
Keep the samples cool during transport

For more detailed instructions please contact the laboratory.

PARAMETER	UNITS REPORTED	LIMIT OF QUANTITATION	HEALTH ADVISORY LEVEL	CONTAINER/ HANDLING
Acidity -G -P -T	mg/L as CaCO3			 Aa Aa Aa
Alkalinity -G -P -T	mg/L as CaCO3			 Aa Aa Aa
Aluminum -X -XGF	mg/L	 0.100 0.002	under review aq-varies based on other parameters	 Cb Cb
Ammonia -T	mg/L as N	 clean: 0.1 industrial: 1.0 rain: 0.01	aq-1.37-2.20 mg/L pH 7 temperature dependent	* Bd Bd Bc
Antimony -XGF	mg/L	 0.001	0.006 mg/L	 Cb
Arsenic -XGF	mg/L	 0.001	0.025 mg/L aq-0.050 mg/L	 Cb
Barium -X	mg/L	 0.050	1.0 mg/L	 Cb
Boron	mg/L	0.20	5.0 mg/L	Cb

PARAMETER	UNITS REPORTED	LIMIT OF QUANTITATION	HEALTH ADVISORY LEVEL	CONTAINER/ HANDLING
Bromide	mg/L	0.100		Aa
Cadmium -X -XGF	mg/L	 0.010 0.0001	0.005 mg/L aq- 0.0002-0-0018 mg/L based on hardness	 Cb Cb
Calcium -X	mg/L	0.05	200 mg/L	Cb
Chloride **Water,** - colorimetric - IC	mg/L	 5.00 0.05	250 mg/L	 Aa Aa
Chromium -X -XGF	mg/L	 0.020 0.0005	0.050 mg/L aq.0.002 mg/L	 Cb Cb
Conductivity	uSIE/cm			Aa
Copper -X -XGF	mg/L	 0.010 0.0005	1.0 mg/L aq-0.002-0.004 mg/L based on hardness	 Cb Cb
Fluoride	mg/L	0.10	1.5 mg/L	Aa Note: type C bottle sufficient for Fluoride only
Hardness			200 mg/L	Cb

PARAMETER	UNITS REPORTED	LIMIT OF QUANTITATION	HEALTH ADVISORY LEVEL	CONTAINER/ HANDLING
Iron -X	mg/L		0.3 mg/L aq- 0.3 mg/L	Cb
Lead -X -XGF	mg/L	 0.060 0.001	0.010 mg/L aq.0.001-0.007 mg/L based on hardness	 Cb Cb
Magnesium -X	mg/L	 0.05	150 mg/L	 Cb
Manganese -X	mg/L	 0.010		 Cb
Nitrate/Nitrite	mg/L as N	0.05	10.0 mg/L	Aa*
Nitrite	mg/L as N	0.05	aq - 0.06 mg/L	Aa
pH	pH		6.5-8.5 aq-6.5-9.0	Aa
Potassium	mg/L	0.05		Cb
Selenium	mg/L	0.001	0.01	Cb
Sodium	mg/L	0.05	270 mg/L (20 mg/L for Na reduced diets)	Cb
Sulfate **Water,** - colorimetric - IC	mg/L	 5.00 0.05		 Aa Aa
Thallium - XGF	mg/L	 0.0001	under review	 Cb

PARAMETER	UNITS REPORTED	LIMIT OF QUANTITATION	HEALTH ADVISORY LEVEL	CONTAINER/ HANDLING
Turbidity	NTU	0.	less than 5 NTU (1.0 chlorinated sources)	Aa
Zinc -X	mg/L	0.010	5.0mg/l aq - 0.030 mg/l	Cb