



Step Four

DEVELOP MANAGEMENT STRATEGIES

Library and Archives Canada Cataloguing in Publication Data

Main entry under title:

Well protection toolkit [electronic resource]. --

Available on the Internet.

A joint project of the Ministry of Environment, Lands and Parks, Ministry of Health and Ministry of Municipal Affairs; with support from Environment Canada and the B.C. Ground Water Association.

Cf. Acknowledgements.

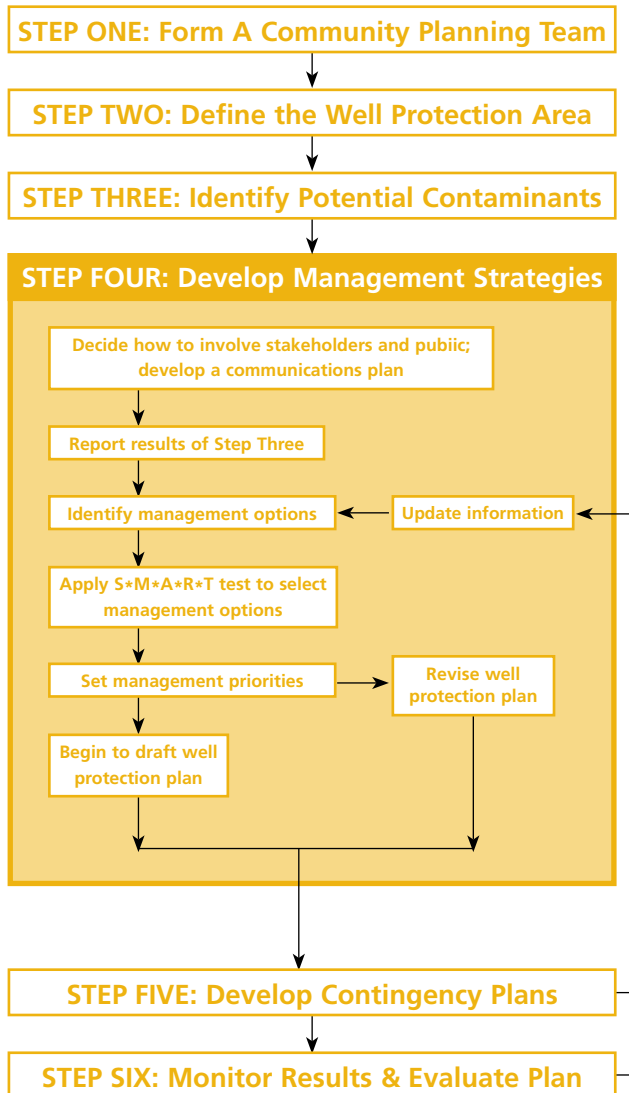
Issued by: Water Stewardship Division.

ISBN 0-7726-5566-9

1. Wellhead protection - British Columbia. 2. Water quality management - British Columbia. 3. Groundwater - Management. 4. Wellhead protection. I. British Columbia. Ministry of Environment, Lands and Parks. II. British Columbia. Ministry of Environment. III. British Columbia. Water Stewardship Division. IV. British Columbia. Ministry of Health. V. British Columbia. Ministry of Municipal Affairs. VI. Canada. Environment Canada. VII. British Columbia Ground Water Association.

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Figure 4.1



More than 1,000,000 British Columbians rely on groundwater as their source of drinking water, and there are thousands of community well systems in British Columbia. A well protection plan allows communities to identify land use activities that may threaten the quality of their well water, and to develop a strategy to avoid or minimize these threats.

There are six steps to follow in developing a well protection plan:

1. Form a community planning team
2. Define the well protection area
3. Identify potential contaminants
4. Develop and implement management strategies
5. Develop contingency plans
6. Monitor results and evaluate the plan

These steps are described in the six booklets that make up the *Well Protection Toolkit*. Each booklet describes activities that lead to the development and implementation of a well protection plan. In each step, a fictional case study of the town of Pumphandle shows how one community took on this challenge.

Step Four: Develop Management Strategies

The fourth step is to identify a range of appropriate management options, and to determine priorities for action. The S*M*A*R*T test is used to assess which management options should be adopted. This is the time to begin writing the well protection plan.

It is important to keep stakeholders and the public informed and involved throughout the well protection planning, but it is essential for this step because public support can help the success of the plan.

Figure 4.1 shows the stages of Step Four.

Develop Management Strategies

OBJECTIVES

- To use a variety of management approaches to prevent contamination
- To identify management options for all potential contaminant sources in the well protection area
- To assess management options and set priorities
- To set schedules for implementation
- To begin to draft the well protection plan

During Step Three, sources of potential contaminants in the well protection area were identified and mapped, and sources for priority action were identified. The next task is to determine the best way to manage these potential contaminant sources, and to decide which actions should be implemented first. The planning team can then begin drafting the action items for the well protection plan.

As you develop the management strategies, think about how you will evaluate them (Step Six).

4.1 Generate Public Support

Managing activities in the well protection area requires support and commitment from stakeholders¹ and residents of the community. A public information process is vital throughout the development of the well protection plan. During Step One, the planning team provided basic information on the well

¹ A “stakeholder” is anyone who has an interest in or may be affected by the well protection plan (e.g. business owners, residents, conservation groups and governments agencies)

² An overview of regulatory and non-regulatory options can be found in: Environment Canada, 1995. *Groundwater Quality Protection Practices*. Prepared by Golder Associates Ltd. for the Fraser Valley Action Plan; and U.S. Environmental Protection Agency, 1993. *Wellhead Protection: A Guide for Small Communities*. EPA/625/R-93/002 report, 144pp.

protection planning process through flyers and public meetings. During Step Three, there were articles in the local media, and some people were made aware of the well protection process through surveys. At this fourth step, it is again a good idea to ensure that the community at large has an opportunity to learn about and comment on the survey results and proposed management options (Sections 4.2 to 4.4).

During the surveys, stakeholders and residents often ask questions such as “Why is this information being collected?” and “How will this information be used?” You need to report the survey findings back to the people surveyed. One way to do this, and to involve the public in developing the well protection strategy for their community, is to present your findings at a public meeting.

“Public involvement” should bring stakeholders, residents and the planning team together to review the results from Step Three, and to identify and evaluate the management options available for each of the various potential contaminant sources. To ensure the widest public support, consider the following during the public consultation process:

- Inform the public from the outset that their input is needed to develop the well protection plan;
- Explore a variety of public views;
- Use the specialized knowledge and expertise available in the community;
- Use brainstorming to gather ideas for the protection strategy;
- Be open and democratic;
- Find ways to resolve conflict and controversy; and
- Develop public support and commitment for the protection strategy.

4.2 Identify Management Options

Management options fall into two broad categories: regulatory and non-regulatory options² (see Appendix 4.1). A regulatory option is based on laws or regulations and can be enforced. An example

would be a land-use by-law that requires proposed developments in the well protection area to identify and address potential impacts on groundwater. Non-regulatory options are voluntary – they cannot be enforced. An example would be educating landowners about the best ways to minimize their impact on groundwater.

Focus on Prevention

Management options should focus on prevention. It is much cheaper to prevent groundwater contamination than it is to restore a contaminated drinking water supply. Most B.C. communities have not yet experienced severe water quality problems, and will be able to focus on prevention when developing management options for the protection of their well.

Apply Differential Management

“Differential management” means using a variety of different approaches throughout the well protection area. The approach used will depend on the type of activity and its location relative to the well. Even two sources of the same type (e.g. two storage yards) may be managed differently. For example, one way to manage a storage yard close to the well (where the threat of pollution is high) might be to purchase the land and directly control future land use activities. Another storage yard, located in the ten-year time of travel area, could be managed through a public education program, and by working with the landowner to minimize impacts on groundwater. Differential management allows the planning team to focus its efforts and resources on the highest priority contaminant sources.

Identify a Full Range of Management Options for Each Source

A range of possible management options should be identified for every single potential contaminant source in the well protection area. Options are based

³ Environment Canada, 1995. *Groundwater Quality Protection Practices*. Prepared by Golder Associates Ltd. for the Fraser River Action Plan; U.S. Environmental Protection Agency, 1994. *Ground Water and Wellhead Protection Handbook*. EPA/625/R-94/001, 269pp.; U.S. Environmental Protection Agency, 1993. *Wellhead Protection: A Guide for Small Communities*. EPA/625/R-93/002 report, 144pp.

⁴ The Ministry of Environment or Ministry of Health in Victoria can provide you with a list of communities that have completed well protection plans.

on the results of the contaminant survey in Step Three, the location of the source in relation to the well protection area, and knowledge of the various options available.

There are several ways to identify management options for each potential contaminant source:

- Refer to generic checklists of management options such as those found in groundwater protection guidance documents;³
- Consult with government staff that have jurisdiction over particular activities, and with consultants and industry associations;
- Consult with the public to get local knowledge and expertise; and
- Seek advice from other communities that have completed a well protection plan.⁴

When identifying possible management options, look at the area as a whole, as well as at specific sources. Decide how policies and practices could be used to minimize future impacts on groundwater. What is the best way to reach your audience? For example, it may be effective to work with a berry growers’ association to address proper fertilizer practices to all farmers in the area, in addition to working with specific farmers. The British Columbia Federation of Agriculture can help you identify the agricultural association(s) in your area.

Identify Agencies with Jurisdiction and Resources

Find out which agencies have regulatory control over potential contaminant sources. The government representative on the planning team may be able to identify government agencies that regulate these activities.

Government agencies and industry associations can also be great sources of advice on possible management options. Operators in the well protection area may have contacts with the particular association for their business. These business and industry associations can often provide background information on the activities and programs to help control their impacts on the environment.

The B.C. Recycling Hotline⁵, which is operated by the Recycling Council of BC (RCBC), provides information on waste reduction and household hazardous products. The Ministry is responsible for product stewardship regulations. For example, the Post-Consumer Paint Stewardship Program Regulation requires every brand owner and seller of consumer paint products to arrange for the collection, transportation and final treatment of paint that is no longer wanted by consumers, and to incorporate the principles of pollution prevention in the stewardship of consumer paint products. There is information on Integrated Pest Management at the Ministry's web site at

www.env.gov.bc.ca/epd/epdpa/ipmp/index.html

There are many sources of written information. Government agencies, associations, and pollution prevention and toxic reduction programs from other jurisdictions have manuals on Best Management Practices, pollution prevention guides, technical programs and expertise which may be relevant to the activities in your well protection area. Unfortunately, there is no current comprehensive listing of the guides and manuals. You may need help from your local librarian, or to conduct your own Internet search for the information.

4.3 Select the Appropriate Management Options

Once you have identified a range of possible management options for each source, you will need to evaluate these options to decide which are the most appropriate and effective.

To help you do this, apply the S*M*A*R*T test to assess and compare management options. S*M*A*R*T stands for Specific, Measurable, Achievable, Realistic and Time-bound.

⁵ Call 1-800-667-4321 (or 732-9253 in the Lower Mainland) for the RCBC Recycling Hotline (604) 732-9253 (Lower Mainland); (800) 667-4321 (outside Lower Mainland).

Think S*M*A*R*T

Specific

Measurable

Achievable

Realistic

Time-bound

- **SPECIFIC**

Is the management option specific, and the responsibility identified? What is to be done? Who is going to do it? For example, "educating the public on septic system maintenance" may be a general component in the protection strategy. A *specific* management option might be: "The environmental group will prepare a newsletter on septic system maintenance and how it benefits groundwater protection, and the water purveyor will distribute it to local residents with their water bill."

- **MEASURABLE**

Can the success or failure of the management option be measured? What indicators will you use to measure this? Using the newsletter example, the design, production and distribution of the newsletter are easily measurable. The impact of the newsletter in changing people's behaviour is harder to measure, but can be done through a follow-up phone or door-to-door survey (especially if an initial survey provides information on "pre-newsletter" behaviours). This kind of follow-up is reasonable, especially if the newsletter is part of a series.

- **ACHIEVABLE**

Can the management option be achieved in practice? Are there sufficient funds and technical resources to complete the task? The newsletter can be developed on a home computer by the planning team member and distributed as part of the water bill. This is achievable.

- **REALISTIC**

Can this management option be successfully implemented? Is it cost-effective? What are the risks? Will it have public support, or generate controversy? The likely effectiveness of the management option is also evaluated here. The newsletter is likely to be at least somewhat effective because it is not controversial, carries little risk and is an inexpensive way to get the message of septic system maintenance and groundwater protection to every household. Additional public education can also occur through direct public contact in follow-up surveys.

- **TME-BOUND**

Can this option be achieved within a reasonable time period, according to the schedule? Scheduling is important because some activities cannot be implemented until other tasks have been completed. The scheduling of the newsletter is governed by the time required to design and produce the newsletter, availability of resources, the date water bills are sent out and the way the newsletter will be coordinated with other public education and groundwater protection management initiatives.

The S*M*A*R*T test helps you to choose management options that will work. It allows the various management options to be evaluated and compared in a systematic and objective way, and so makes the final selection of options fair and accountable.

The management options that pass the S*M*A*R*T test are the ones that should be considered for implementation. Keep the original list of all the possible management options – you can refer to it again in the annual review. It may be that some of the conditions which caused the option to fail the S*M*A*R*T test are no longer a concern, and you may want to reconsider this option.

If all of the management options for a given source fail the S*M*A*R*T test, then it's time to think more creatively. Are there other options you hadn't previously considered? Can you modify some of the proposed options so they become S*M*A*R*T?

4.4 Set Priorities for the Implementation of Management Options

Not all of the S*M*A*R*T options will be implemented at once. For each option that passes the S*M*A*R*T test, decide whether it should be a priority for immediate action or scheduled for later action.

Setting priorities for implementation makes sense because a community usually has a limited amount of resources and energy and cannot do everything at once. Some management activities may have to be implemented sequentially (one task needs to be completed before another one can start). Develop a schedule with items for immediate action, and actions that will take place as second or third priorities. The schedule of implementation will likely span several years as this is usually the time needed to implement many of the options, such as public education programs, revising regulations and persuading landowners to improve land use practices.

Factors to consider in setting priorities include contaminant priority, cost-effectiveness and ease of implementation. In developing priorities for implementation, all these factors need to be considered together. Each is discussed briefly below.

Contaminant Priority

Some contaminant sources will be rated as a high priority. This may be because the potential for contamination is high (for example, a golf course that regularly over-fertilizes), or because the consequences of contamination would be very severe (such as a chemical spill on the highway close to the wellhead).

Priorities for each source were set in Step Three, based on the distance between the source and well, and the aquifer's vulnerability. Management actions should also be implemented first in the most critical areas, usually those areas closest to the well. For example, actions may focus initially in the one- or five-year time of travel areas, and any highly vulnerable areas. Implementation in more distant and less vulnerable areas would take place later, as more resources become available.

STEP FOUR

Cost-effectiveness

Where there is more than one management option for a given source, look at which option is most cost-effective and implement it first. Other options that are only marginally cost-effective may not have to be implemented at all.

Ease of Implementation

Where possible, choose management options that are relatively easy to implement. Implementing the easy options first builds momentum and confidence within the planning team and the community.

Although the community may wish to start by implementing the easiest and most-cost effective solutions, the protection plan may require significant efforts, involving some difficult decisions and associated costs. However, by using the S*M*A*R*T method, the community should be able to always implement what is possible for them to do.

4.5 Draft the Well Protection Plan

You now have all the elements required to begin drafting the well protection plan. A sample table of contents for this plan is shown in Appendix 4.2.

The well protection plan is a written document to which the community can refer. In writing the plan, be specific and concise. What are the concerns? What is to be done, and why? How will it be done? Who will do the work? By what date? Anyone who reads the plan document should be clear about the “what, why, how, who and when.” Include maps and figures to show the well protection area, location of well(s), geographic features of the local area, and the location of potential contamination sources, etc. which give the reader a picture of the area. An example of a draft well protection plan is included with this *Toolkit*.

It is a good idea to have the draft plan reviewed before being finalized so anything that is unclear or missing can be addressed. The planning team should review the plan on a yearly basis.

CHECKLIST FOR STEP FOUR

The following is a basic checklist for action items to be completed during Step Four of the well protection planning process:

ACTION ITEM	COMMENTS	COMPLETED
Decide who is responsible for this action	Enlist consultants, technical and volunteer assistance if required.	<input type="checkbox"/>
Decide how stakeholders will be involved	Hold public meetings to invite input from the community.	<input type="checkbox"/>
Report results of survey to the public	Public meetings, articles in the media are options.	<input type="checkbox"/>
Identify management options	Develop a range of options for each potential contaminant source identified in Step Three.	<input type="checkbox"/>
Apply the S*M*A*R*T test	Select the management options that work, or modify proposed options so that they work.	<input type="checkbox"/>
Set priorities	Determine which management options should be applied first.	<input type="checkbox"/>
Begin to draft the well protection plan	See sample table of contents (Appendix 4.2).	<input type="checkbox"/>
Update information	Determine how often information will be reviewed.	<input type="checkbox"/>

Appendix 4.1 Summary of Regulatory and Non-Regulatory Tools for Well Protection Planning

Regulatory Tools

The Provincial Legislative Framework

British Columbia has a number of provincial laws and regulations that have a degree of control over groundwater protection. Table 4.1 lists the current provincial regulations, the lead government agency and a brief description of the legislation. The Acts are administered independently by various agencies within government.

Local Regulations and By-laws

Local government receives its power from the provincial government, and these powers are explicitly delegated through the *Local Government Act and Community Charter*. Municipalities (cities, towns or villages) and regional districts (which may include one or more municipalities and electoral districts) may exercise these local powers.

Working Together

Coordination between different jurisdictions in implementing protection measures is vital. A well protection plan focuses the coordination of the various Acts within a well protection area and encourages individuals, local governments, and provincial agencies to work together towards a common objective. For example, if the well protection area for a community well straddles two regional districts, protection measures such as land zoning or approvals within the protection area should be coordinated between the two jurisdictions.

Since many of the water purveyors do not own or control all of the land that falls within their protection areas, an effective well protection plan must have the cooperation of those who do have control over the land, such as local government, developers, landowners, and other individuals and agencies.

Common Law

According to the common law, a person cannot contaminate someone else's water if the result of that contamination is to cause damage to the well owner. In such cases, there may be a right of action in nuisance and/or negligence. Also, the contamination of water may be a contravention of provincial environmental and health statutes.

The quality of groundwater in wells has no formal protection. At this time, there is no licensing of groundwater so the extraction and use of groundwater is not generally regulated.

Non-Regulatory Tools

Non-regulatory tools are described in Table 4.2.

TABLE 4.1 EXISTING PROVINCIAL LEGISLATION (CURRENT AS OF 2006)

Legislation (Lead Agency)	Description
<i>Local Government Act</i> Ministry of Community Services	<p>The Local Government Act is the primary legislation for regional districts and improvement districts. Certain municipal provisions remain in effect for matters not covered by the Community Charter (e.g. land use planning, elections, incorporation of municipalities, tax sale process, and the role of the Inspector of Municipalities).</p> <p>The Act allows for the</p> <ul style="list-style-type: none"> • organization of municipalities, improvement districts, regional districts; • provision of local services including water; • regulation of land use; • powers of taxation; • expropriation of land • establishing of a health protection authority; and • other measures necessary to ensure the orderly conduct of business. <p>For example, in some areas local by-laws require that adequate supplies of groundwater are available before subdivisions are allowed to proceed.</p> <p>The Act also stipulates that when community plans are initiated they must include information pertaining to restrictions on the use of land that is environmentally sensitive; that development permits may designate areas for the protection of the environment; and that a development permit may require that no septic tank, drainage and deposit fields be constructed in area that the permit designates as containing water which is subject to degradation.</p>
<i>Community Charter</i> Ministry of Community Services	<p>The Community Charter serves a similar purpose to the Local Government Act and governs municipalities. The Community Charter, provides municipalities with the flexibility to determine the public interest of their communities, address existing and future community needs, provides effective management and delivery of services in a manner that is responsive to community needs.</p> <p>The province must be involved (by way of regulation, agreement, or Minister's approval) before the municipality can adopt a bylaw with respect to:</p> <ul style="list-style-type: none"> • public health; and, • protection of the natural environment.
<i>Local Services Act</i> Ministry of Community Services	<p>The <u>Subdivision Regulation</u> of this Act regulates minimum lot sizes for subdivision in areas not within the boundaries of a Municipality or governed by other regulations or bylaws.</p> <p>The lot size is standard and does not consider geologic and geographic conditions of the site. Minimum lot sizes in highly vulnerable areas may need to be larger in order to effectively address environmental issues such as contamination of wells by a high density of sewage disposal fields in the area.</p>
<i>Regional Growth Strategies, Local Government Act,</i> Ministry of Community Services	<p>This legislation enables regional districts to develop and implement regional scale growth management plans (regional growth strategies). The general purpose of a regional growth strategy is to promote human settlement that is socially, economically and environmentally healthy. More specifically growth strategies can deal with matters to protect the quality and quantity of ground water supply. The legislation creates a framework for dispute resolution for instances where the parties involved (regional districts and municipalities) find it difficult to reach agreement on the content of a growth strategy or on implementation issues. Under special circumstances, the Minister (of Community Services) can require the development of a growth strategy.</p>
<i>Mines Act</i> Ministry of Energy, Mines and Petroleum Resources	<p>As a part of the permit application under the Act, the proponent must outline a program for the protection and reclamation of land, watercourses and groundwater affected by the mine. As a condition of a permit, the proponent may be required to provide protection and mitigation of watercourses affected by the mine.</p>
<i>Mines Act – Health Safety and Reclamation Code for Mines Minerals Exploration Code</i> Ministry of Energy, Mines and Petroleum Resources	<p>There are powers under this Act to make regulations respecting standards for environmental protection and reclamation. One of the aims of the Code for Mines is to protect and reclaim the land and watercourses affected by mining. Plans for coal and hardrock mineral mines must contain particulars with respect to the protection of watercourses, including prediction of effluent quality for activities and drainage control, monitoring and maintenance. During the construction and operation phases of mining, a program must be developed to ensure that water quality is maintained, drainage is restored and use and productivity is returned. Mineral exploration at a designated site must take all the necessary steps to ensure that no drilling fluid, water, or drill cuttings contaminate any drinking or irrigation water supply.</p>
<i>Health Act</i> Ministry of Health	<p>Empowers health officials to review, investigate, monitor, regulate and control public health hazards, including, but not limited to the installation and administration of septic tanks, and sewage disposal systems under the <u>Sewerage System Regulation</u>.</p> <p>The Act also contains provisions that require owners of land, whose land or land-use practices are believed to have caused a health hazard, to cease activities causing the hazard.</p> <p>The <u>Sanitary Regulation</u> specifies minimum distances between wells and potential sources of contamination and requires the proper closure of abandoned wells.</p> <p>The <u>Sewerage System Regulation</u> requires that domestic sewage must either be discharged into a public sewer, holding tank or sewerage system. The latter two methods of disposal require that a permit be obtained prior to construction and that proper maintenance be performed. No method of disposal is permitted to cause a health hazard. The regulation also outlines requirements for persons who will be engaged in constructing, installing, altering or repairing a sewerage disposal system (which includes a holding tank).</p>

TABLE 4.1 EXISTING PROVINCIAL LEGISLATION CONTINUED

Legislation (Lead Agency)	Description
<p><i>Drinking Water Protection Act</i> Ministry of Health</p>	<p>The legislation gives drinking-water officers powers to protect public water sources from contamination by any drinking-water health hazard. The Act ensures that water quality is maintained through operating permits developed specifically for each water system. The permits specify monitoring requirements for all substances of concern in a particular water system. In addition, the regulations require all water-system operators to be certified under the environmental operators certification program.</p> <p>The main requirements/provisions for water supply systems under the Act can be summarized as follows:</p> <ul style="list-style-type: none"> • Required provision of potable water • Obtaining construction and operating permits for water supply systems • Qualification standards for system operators • Establishment of emergency response and contingency plans • Water monitoring requirements • Reporting of threats to water to Drinking Water Officer • Public notification of threats to drinking water • Water systems assessments and plans • Hazard abatement and prevention order • Ability to establish Drinking Water Protection Plans. <p>The Drinking Water Regulation outlines the requirements and specifications concerning the Drinking Water Protection Act and establishes water quality standards for potable water (i.e., number of samples required, frequency of monitoring requirements and criteria that must be sampled for (Fecal Coliform, Total Coliforms and E-Coli). There is no specific reference to other water quality criteria such as standards for inorganic substances. Only water supplied by a purveyor is subject to the regulation.</p>
<p><i>Environmental Management Act</i> Ministry of Environment</p>	<p>The <i>Environmental Management Act</i> encompasses the former Act, along with the former <i>Waste Management Act</i> which no longer exists. The Act prevents the disposal of wastes as a byproduct of a prescribed industry, trade or business unless authorized by a permit or approval.</p> <p>The Act contains provisions for municipal waste management, regulating contaminated sites (e.g., identification and remediation requirements). The Act also provides for spill prevention and reporting of polluting substances onto lands or bodies of water and allows for requiring the development of contingency plans and activation of spill response actions. Pollution prevention and abatement orders can also be issued under this enactment.</p> <p>Enables the Minister of Environment to require Environmental Impact Assessments for any activities that may have an adverse environment impact. The Act also enables the Minister to prepare environmental management plans for specific areas of the province and mandates Environmental Protection Orders that can be used to delay or stop activities which could have negative environmental consequences.</p> <p>The Act also authorizes the Minister to declare environmental emergency measures that can be invoked in the case of an environmental emergency such as a major chemical spill.</p>
<p><i>Environmental Assessment Act</i> Environmental Assessment Office</p>	<p>Requires an environmental assessment to be prepared for major water storage and diversion projects including groundwater extractions which exceed 75 litres per second (approx. 1,000 lgal per minute). Any use of groundwater above this extraction rate requires an environmental study to assess any potential impacts on neighbouring wells or other source of water. Proper closure practices also have to be followed for any existing wells of this capacity that are abandoned.</p>
<p><i>Environment and Land Use Act</i> Ministry of Environment</p>	<p>Empowers the Environment and Land Use Committee to make recommendations to the Lieutenant Governor-in-Council with respect to preservation and maintenance of the natural environment in the administration of land use and resource development. The Lieutenant Governor-in-Council may make such orders respecting the environment or land use as advisable.</p>
<p><i>Water Protection Act</i> Ministry of Environment</p>	<p>This Act reconfirms that groundwater is a public resource and restricts bulk removal of groundwater for export purposes.</p>
<p><i>Water Act</i> Ministry of Environment</p>	<p>This Act enables the Ministry of Environment to issue water licences for use of surface water and spring sources and to regulate work in and around a stream. The Water Act and the Ground Water Protection Regulation protects the groundwater resource by:</p> <ul style="list-style-type: none"> • setting out standards to safeguard and maintain the integrity and efficient use of the ground water resource, and • ensuring activities related to well water and ground water are undertaken in an environmentally safe manner. <p>The requirements under the Regulation will be brought into effect in 3 Phases. The dates that requirements under Phase 1 become effective are noted in brackets—there are no specific effective dates for Phase 2 and 3.</p> <p>Phase 1:</p> <ul style="list-style-type: none"> • qualifications for well drillers and well pump installers (Nov 1, 2004) • a register for qualified well drillers and well pump installers (Nov 1, 2004) • ground water protection through flood proofing, surface sealing, well caps and covers (effective Oct 31, 2007), protection of the well head, and deactivating or closing of wells (well construction standards) (all provisions under this bullet are effective as of Nov 1, 2005 except as noted), and • well identification (Nov 1, 2005). <p>Phase 2:</p> <ul style="list-style-type: none"> • additional standards for well construction, flowing wells, well pumps, flow testing and well operation, • water analysis for new and altered wells, • well reports, and • the establishment of offences for which tickets may be issued. <p>Phase 3:</p> <ul style="list-style-type: none"> • implementing water management plans in designated areas.

TABLE 4.1 EXISTING PROVINCIAL LEGISLATION CONTINUED

Legislation (Lead Agency)	Description
<i>Integrated Pest Management Act</i> Ministry of Environment	Requires every person applying pesticide to a body of water or an area of public land to have a permit or an approved Pesticide Management Plan and to comply with its terms. The Act also prohibits a person from disposing a pesticide other than as permitted by regulation or another enactment; wash or submerge equipment in a body of water; or draw water into a container containing pesticide unless there is a barrier to prevent backsiphonage. The <i>Integrated Pest Management Regulation</i> provides that applicators be trained and certified, that pesticides must be stored, transported and disposed of in a manner specified by regulations and allows for seizure of a pesticide, equipment and records, and other enforcement measures. Some pesticides are exempted for permitting requirements.
<i>Agricultural Waste Control Regulation</i> , Ministry of Environment	Prescribes practices for using, storing and managing agricultural waste in an environmentally sound manner and provides exemptions from permitting requirements under the <i>Environmental Management Act</i> for farmers who adhere to the Code.

TABLE 4.2 SUMMARY OF NON-REGULATORY TOOLS FOR GROUNDWATER PROTECTION

Non-Regulatory Tool	Description
Land acquisition by the community	Purchase, exchange or donate land to control land use over the aquifer. Effective in rural areas where there is little existing development and for local problems. Not practical in more developed areas or where large areas of land are needed to protect the aquifer. On-going management, maintenance, and loss of tax base are also considerations.
Purchase of development rights	Purchasing the right to develop a parcel of land while keeping the property under private ownership. Property owner is paid the difference between the current value and development value of their land; in effect, paying the landowner not to develop. Effectiveness of this option is similar to land acquisition, except that it is likely less costly. Useful where regulatory restrictions on land use are not politically feasible and the purchase of the development rights is.
Conservation easements	A voluntary, legal agreement that the property owner makes with the local government to limit the type and degree of development on their property. Less costly than land acquisition but depends on the goodwill of the property owner.
Covenants	A covenant is a formal and binding written contract between the landowner and another party (such as the municipality). The covenant restricts the use of the land. It is registered against the title of a property and is binding on future landowners. Refer to the <i>Land Titles Act</i> , Section 219.
Market approaches	Use taxes, subsidies, penalties to influence land use and to encourage aquifer protection. For example, tax credits for retaining private land as open space above aquifer recharge areas and for use of land for development in less vulnerable areas. Depends on the voluntary will of individual property owners.
Cluster developments	Promoting concentrated development in less vulnerable areas outside of groundwater protection zones.
Hazardous waste collection	Dispose of household hazardous waste at drop-off centres and/or to mobile collection units. In B.C. dispose of household paints, solvents and fuels at regional drop-off centres; contact the Recycling Hotline (1-800-667-4321) for information on your area. Depends on initiative of individual household. Public information/education is important.
Facility siting, design, and operation controls	Siting high impact activities/facilities away from vulnerable areas, incorporating environmental safeguards and controls. Usually regulated through zoning by-laws. For potential point sources of contamination. Examples of facilities that may require control are airports, auto repair shops, dry cleaners, gasoline stations and fuel storage facilities, laboratories, landfills, manufacturing and processing facilities, waste treatment and storage facilities.
Performance and operating standards	Establish measurable environmental standards that protect human health or the environment. Performance and operating standards alone do not specify how performance should be achieved. This approach provides more flexibility than design standards and Best Management Practices since almost any method can be used as long as the performance standard is achieved. To be effective, performance and operation standards must be implemented far enough from a well head area that non-compliance can be rectified without posing a threat to the well.
Storm water and sewage controls	Collecting and directing storm water and sewage away from vulnerable areas and treating the discharge. This involves regular maintenance, inspections, and up-grades (non-regulatory) as well as registration, permitting, and testing of these systems (regulatory).
Water conservation	Encourage individuals, commercial and industrial users to limit their water use, thereby reducing demand on groundwater supplies. Useful in coastal areas where saltwater encroachment is a possibility.
Technical assistance for Best Management Practices	Provide technical advice for evaluating, developing, implementing and monitoring Best Management Practices (BMPs), agricultural wastes, animal wastes, industry practices, commercial operations, Integrated Pest Management (IPM) etc.
Public Education	Raise public awareness and communicate the well protection message to others by using newsletters, brochures, posters, signage, presentations, talks, and other communication tools.

APPENDIX 4.2 SAMPLE TABLE OF CONTENTS FOR A WELL PROTECTION PLAN

Section	Contents	Comments
Executive Summary	A concise summary of the main points of the plan	Write this last!
Introduction	Brief description and relevant history of the community Description of the community water supply Background on water quality issues Reasons for protecting the well supply	
STEP ONE The Community Planning Team	Terms of reference for planning team Members of the planning team Goals and objectives	Acknowledge those who helped Describe process followed Explain <u>what</u> a well protection plan is and <u>why</u> your community has prepared one
STEP TWO The Well Protection Area	Description of the aquifer and hydrogeology (vulnerable and non-vulnerable areas) Capture zone (location, how it was defined, uncertainties) Time of travel areas Map of well protection area	Note any implications for protection (e.g. protection area is in private ownership) Note any missing information, and how it will be gathered
STEP THREE Sources of Potential Contamination	Describe contaminant inventory and surveys Explain results List priorities Map of sources and priorities Describe how data is stored	Describe <u>what</u> the potential sources are, <u>where</u> they are, and level of <u>priority</u> Note plans for updating the inventory
STEP FOUR Management Options	Describe range of possible management options (and how derived) Show results of S*M*A*R*T test Describe results of public consultation/information Describe final list of management activities selected Implementation schedule (who will implement actions, how and when) Identify indicators that will be used to measure success	List all the results of the S*M*A*R*T test and describe why options passed or failed Describe <u>how</u> sources will be managed
STEP FIVE Contingency Plan	List all possible contamination events Identify resources available to deal with emergencies Describe contingency plans	Describe <u>what</u> to do in case the water supply is impaired and <u>how</u> to deal with this (short-term and long-term)
STEP SIX Evaluating the Plan	Describe how water quality will be monitored Describe how the well protection plan will be monitored and evaluated (who, how often)	Identify success measures
Appendices	Include any detailed information E.g. data for contaminant survey, results of public meetings, calculation of well capture zone delineation	

STEP FOUR: Potential Management Options

List Management Options and Apply S*M*A*R*T Test

A public meeting was held at the fire-hall to present the survey findings. Planning team leader Andrew Aiken chaired the meeting. The meeting was attended by a number of residents, members of the community planning team, and the students and teachers involved in the mapping exercise. About 30 people spent the evening discussing and identifying possible management options for every potential contaminant source (Table CS 4.1), and listing the agencies with the authority to control activities. The participants then applied the S*M*A*R*T test to assess the suitability of each possible option (Table CS 4.2).

The idea of protecting groundwater was new to the community, and although they were supportive, they were somewhat cautious and concerned about cost implications. The planning team agreed it would be best to focus first on non-regulatory options, by educating landowners and stakeholders about ways to change land use practices. For many of the options, the next step for the planning team will be to talk to the owner/operator and get their commitment to implement the option.

The support of the various provincial agencies and the Regional District is vital to the success of both regulatory and non-regulatory measures. Members of the planning team made sure that local staff from both levels of government (provincial and regional) knew about and supported the well protection initiative.

Identify Non-Regulatory Measures

Simon Lee, the farmer of A-4 and A-5, is part of the planning team and is already implementing Best Management Practices (BMP) and Integrated Pest Management (IPM) on his property. His support of groundwater protection activities is a key to Pumphandle's success in developing the plan. He has also indicated a willingness to speak to the other farmers in the area on BMPs and IPMs.

The proximity of the gas station and dry cleaner to Aiken's Well was a real concern to the community because this is the only water supply for 500 residents. There was considerable discussion about the possibility of relocating these activities outside of the well protection area. However, without legislated authority, the planning team agreed to encourage the owners of these facilities to adopt Best Management Practices instead. The concerns were lessened somewhat when the purveyors proposed that the Blackwater Well become the main source of supply in the near future.

Actions for the coming year would include:

- The farmer and purveyors would meet with the other farmers and the golf course operators to encourage them to adopt BMPs and IPMs that would minimize use of pesticides and fertilizers;
- The Drinking Water Officer would ask the owner of A-3 to grout his abandoned well according to the Groundwater Regulation under the *Water Act*, to prevent contaminants from directly entering into the aquifer;
- The Drinking Water Officer would work with the owners of the gas station and dry cleaner to attend a spill response course and adopt improved practices;
- The Pumphandle Valley Conservation Society would distribute information to encourage key landowner/operators to adopt groundwater-friendly practices;⁶
- The Regional District would place signs on the roads, letting people know that they are entering a well protection area; and
- The Regional District would develop a public education program. They would work with the

⁶ E.g. Ministry of Agriculture, Fisheries and Food, 1977. *Environmental Guidelines for Poultry Producers in British Columbia*. Published in cooperation with the Poultry Industry of B.C. and the B.C. Federation of Agriculture. See also, Ministry of Agriculture, Fisheries and Food 1995. *Environmental Guidelines for Berry Producers in British Columbia*. Environment Canada and Province of British Columbia.

Pumphandle Valley Conservation Society and purveyors to prepare a two-page newsletter on wise use of garden fertilizers and pesticides, to be sent with the water bills to all residents in the region.

Identify Regulatory Measures

Under provincial legislation, the Agricultural Waste Control Regulation is the main regulatory control. Staff from the local Ministry of Environment agreed to place a priority on enforcing the Agricultural Waste Control Regulation over the entire aquifer in the Pumphandle Valley, including the handling of manure and other agricultural waste for the poultry barn on A-3 and on the other farms.

The Regional District agreed to create a new by-law to restrict the quantity of dry cleaning chemicals in the protection area. They will also work towards a second by-law, that would require that any new land development in the well protection area to identify and address potential impacts on the groundwater.

No changes to local land use zoning were proposed but impacts on groundwater would be considered when the zoning plan is next reviewed in two years' time. Signs and fencing around the gravel pit (I-1), where illegal dumping may occur, could become a condition of the permit for that operation. The Regional Engineer would contact the Mines Inspector for support of this proposal.

Prepare an Action Plan and Schedule

The planning team reviewed all of the management options that passed the S*M*A*R*T test and decided that all the options are worth implementing. They drew up a two-year schedule for implementing the management options (Table CS 4.3). The focus will be on encouraging landowners to adopt the recommended practices within the first year.

TABLE CS 4.1: POSSIBLE MANAGEMENT OPTIONS FOR EACH POTENTIAL SOURCE

Source Activity	Potential Sources of Contaminants	Jurisdiction	Possible Management Options
*A-1-hay field	Fertilizers	MAL ⁷	Best Management Practices (MAL), educate farmer, review historical nitrate-N values for Blackwater Well, monitor for nitrate-N
+A-2-hay field former corn field	Fertilizers Atrazine	MAL	Best Management Practices (MAL), educate farmer, review historical nitrate-N values for Charlie's Well, monitor for nitrate-N and pesticides
+A-3-hay field + barn	Abandoned well Poultry wastes Fertilizers	MAL HA ⁸	Best Management Practices (MAL), educate farmer, review historical nitrate-N values for Blackwater Well and Aiken's Well, monitor for nitrate-N, inform owner that abandoned well must be decommissioned in accordance with the requirements under the <i>Water Act</i> , Groundwater Regulation.
+A-4 hay field	Fertilizers	MAL	Best Management Practices (MAL), educate farmer, review historical nitrate-N values for Blackwater Well, monitor for nitrate-N
*A-5-corn field	Pesticides, fertilizers	MAL	Best Management Practices (MAL), educate farmer, review historical nitrate-N values for Aiken's Well & Blackwater Well, monitor for nitrate-N
+A-6-corn field	Pesticides, fertilizers	MAL	Best Management Practices (MAL), educate farmer, review historical nitrate-N values for Aiken's Well & Blackwater Well, monitor for nitrate-N
*C-1-gas station	Gasoline, septic system, oils, chemicals	MOE ⁹	Test tanks for leaks, replace tanks & install leak detection system, educate operator, monitor for VOCs ¹⁰ , relocate gas station outside of capture zone
*C-4-dry cleaner	Perchloroethylene (perc)	MOE Regional District	Adopt CCME ¹¹ Code of Practice, encourage owner to take spill response course, educate owner to join industry association, pass by-law to restrict amount of perc in capture zone, relocate dry cleaner outside of capture zone
+C-2-hotel	Septic system	HA	Maintain septic system, build piped sewer system
*C-3-private golf course	Pesticides, fertilizers, septic system	HA (for septic systems only)	Review nitrate-N results and sample for nitrate-N, provide lawn care & integrated pest management educational material to owners, Best Management Practices for golf course, maintain septic systems, build piped sewer system
+I-1-gravel pit	Illegal dumping	MEMPR ¹²	Put signage up, restricted access (fencing), review permit, note any future land use changes, waste disposal education
*R-1-subdivision	Pesticides, fertilizers, septic system, degreasers, household hazardous wastes	HA; MOE	Signage, educate residents on waste disposal, pesticide usage, water conservation, maintain septic system or build piped sewer system, distribute newsletter, review and monitor for nitrate-N in Aiken's Well
*R-2-subdivision and campground	Pesticides, fertilizers, septic system, degreasers, household hazardous wastes	HA; MOE	Signage, educate residents on waste disposal, pesticide usage, water conservation, septic system maintenance, produce and distribute newsletter, review and monitor for nitrate-N in Charlie's Well.
+R-3-subdivision	Pesticides, fertilizers, septic system, degreasers, household hazardous wastes	HA; MOE	Signage, educate residents on waste disposal, pesticide usage, water conservation, septic system maintenance, produce and distribute newsletter, review and monitor for nitrate-N in Charlie's Well.
*T-1-main road	Chemicals, garbage, salt	Regional District	Signage, prepare an emergency spill response plan, initiate a road keepers program ("adopt a road"), ensure main road is not used to transport dangerous goods.

Source activity coding: C= commercial, I= industrial, A = agricultural, R= residential, T= transportation

Priority Coding: * = 1st priority + = 2nd priority

⁷ MAL: Ministry of Agriculture and Lands, ⁸ HA: Health Authority, ⁹ MOE: Ministry of Environment, ¹⁰ VOCs: Volatile Organic Compounds,

¹¹ CCME: Canadian Council of Ministers of the Environment, ¹² MEMPR: Ministry of Energy, Mines and Petroleum Resources

TABLE CS 4.2: SELECTED MANAGEMENT OPTIONS FOR POTENTIAL CONTAMINANT SOURCES

Activity	Management Option	Specific	Measurable	Achievable	Realistic	Time-bound	Pass-Fail S*M*A*R*T test
1 A-1 to 4 hay fields (does not address historic corn field at A2)	Encourage growers to optimize fertilizer use & implement Best Management Practices (BMPs)	Specify BMPs for fertilizer & irrigation	Record fertilizer & water use; measure crop yield	Farmer on CPT ¹³ is already implementing BMP at A-4	Consult MAL ¹⁴ & AC ¹⁵ on BMP	Farmer on CPT and purveyor to talk to growers at A-1, 2, & 3; implement BMPs by next year	Pass
2a. A-5, 6 corn fields	Encourage growers to optimize fertilizer use & implement BMP to reduce nitrate loading	See 1	See 1	Landowner at A-5 on CPT & is already implementing BMP	Consult MAL's environmental guidelines on field corn production	Farmer on CPT and purveyor to talk to grower at A-6; implement BMP within 2 years for A-6	Pass
2b.	Encourage growers to reduce pesticide use with IPM plan	Identify alternative pest control methods, develop IPM & implement	Reduced pesticide use; regular inspections	Technical assistance available from consultants	Consult MAL & hire pest management consultants	Farmer on CPT and purveyor to talk to grower at A-6; implement IPM by next year for A-5 & within 2 years for A-6	Pass
3a. A-7 raspberry field	Encourage growers to optimize fertilizer use & implement BMP	See 1	See 1	Landowner at A-7 was cooperative during inventory survey in Step 3	Consult MAL's environmental guidelines on berry production	Farmer on CPT and purveyor to talk to grower at A-7; implement BMP within 2 years	Pass
3b.	Encourage growers to reduce pesticide use by implementing IPM plan	See 2b	See 2b	See 2b	See 2b	As above	Pass
4a. A-3 poultry barn	Handle & dispose of manure in accordance with MOE's Code of Practice	Landowner implements Code of Practice	Periodic inspections	MOE ¹⁶ to enforce regulation	Code of Practice is regulation	Already being done; MOE to begin inspections by next year	Pass
4b.	Grower to dispose of carcasses to compost facility in accordance with MOE's Code of Practice	Temporarily hold carcasses in freezer container & regularly dispose at compost facility	Records at compost facility; periodic inspection	Nominal cost for disposal	Done elsewhere	Implement next year	Pass
5a. C-3 private golf course	Encourage owner to minimize herbicide & pesticide use through IPM plan	Develop IPM for herbicide & pesticide use & implement	Reduced quantity of herbicide & pesticide use; regular inspections	Greens can be maintained using eco-friendly maintenance techniques, training of grounds keepers required	Consult DFO ¹⁷ & EC ¹⁸ guidelines & industry association for BMP (e.g. Canadian Golf Superintendent Association)	Farmer on CPT and purveyor to talk to the golf course owner at C-3; implement within 2 years	Pass
5b.	Encourage owner to minimize fertilizer use & implement BMP	See 1	Reduced fertilizer & water use; periodic inspections	As above	As above	As above	Pass

TABLE CS 4.2: SELECTED MANAGEMENT OPTIONS FOR POTENTIAL CONTAMINANT SOURCES CONTINUED

Activity	Management Option	Specific	Measurable	Achievable	Realistic	Time-bound	Pass-Fail S*M*A*R*T test
5c.	Encourage owner to maintain septic system as per requirement under the Sewerage System Regulation (<i>Health Act</i>)	Annual maintenance of septic system by owner	Septic system maintenance records	Reasonable cost (<\$500)	Routinely done elsewhere	Implement by next year	Pass
6a. R-1-3 trailer park & subdivision	Include 2-page newsletter in water bill about wise use of garden fertilizers & pesticides, disposal of household hazardous waste, & water conservation	CPT produce one newsletter & mail to clients	One newsletter produced & distributed	Pumphandle Valley Conservation Society and the purveyors designs newsletter & Regional District pays for copying; advice on content from MOE & Regional District	Done in other municipalities	Implement immediately & send out in next water & pad rental bills; repeat on annual basis with up-dates & articles	Pass
6b.	Organize hazardous waste collection annually (paints, solvents/flammable liquid/pesticides)	Collect household paints & solvents; include information in two-page newsletter	Ship household wastes to depots once a year	Paint depot in Chilliwack; solvent depot to be established by 1998; call depot to set-up drop-off	Call B.C. Recycling Hotline or Paint Care Association (604-482-8686) for more information	CPT to organize collection annually	Pass
6c.	Encourage owners to maintain septic system as per requirement under the Sewerage System Regulation (<i>Health Act</i>)	See 5c	See 5c	See 5c	See 5c	Implement by next year	Pass
7a. hotel	Encourage owner to maintain septic system as per requirement under the Sewerage System Regulation (<i>Health Act</i>)	See 5c	See 5c	See 5c	See 5c	Implement by next year	Pass
8a. abandoned well	Grout well in accordance with MOE's <u>Groundwater Regulation</u>	Hire registered driller to grout & cap abandoned well in accordance with the Groundwater Regulation	Well capped & grouted, report by driller sent to MOE	Cost ~\$1K	Common industry practice	DWO to talk to owner of A-3; obtain well construction record; hire registered/qualified driller by Fall	Pass
9a. I-1 gravel pit	Erect signs, "No Dumping in Gravel Pit" along the fence	Produce & erect signs (by owner)	Signs produced & erected by pit staff	\$50/sign	Pit staff to do this on slow days	Regional Engineer to talk to pit owner/operator at I-1 & MEMPRs ¹⁹ District Manager; have sign erected by Fall	Pass
9b.	Educate workers on handling, storing & disposing of petroleum products & spill response	Hang poster in pit office, staff take training & post emergency phone list in office	Poster hung, course taken & phone list posted	Order poster from MOE, have manager develop safety program and deliver to staff, & compile emergency phone list with CPT	Staff well aware of groundwater protection efforts	As above	Pass

