

Guidelines for Assessing Water Well Development Projects

From the 2004
Guidebook for the
Hawaii State
Environmental
Review Process

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I. INTRODUCTION

Water is recognized as one of Hawaii's most important resources. Its quality and availability for a wide variety of purposes is essential to both humans and the natural environment. Hawaii's water supply, development and distribution is a critical environmental issue today and is likely to become even more sensitive in the future. The establishment of guidance protocols such as this will encourage understanding and careful planning of this important resource.

These guidelines are not new rules or law. The purpose of the guidelines is to provide preparers and reviewers a general standard of completeness to apply for any EA or EIS relating to well development. The objectives of this guidance document are to integrate the review of environmental concerns with existing planning and regulatory processes and to alert decision makers of the environmental effects of the well project. The approving agency or accepting authority remains responsible for the contents of the EA or EIS.

Pursuant to HAR §11-200-8(a)(5), basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource may be exempt from preparing an environmental assessment. Accordingly, drilling of monitor wells as defined by the CWRM (provided the well shall not be capable of being used or intended to be used to withdraw groundwater for the purposes of exploring or developing ground water) may be exempt.

Environmental assessments for exploratory wells should not need to comply with all the information requirements below because some of the information will not be available until the well is tested. Should the exploratory well yield positive results and demonstrate production capability, a second environmental assessment for the production well should be prepared to comply with all the information requirements.

II. IMPACT ASSESSMENT CONTENT

In addition to the content requirements for environmental assessments and impact statements, which are set out in the EIS rules, any well development project should include the following information.

1. Orientation Maps

Maps with the appropriate scale and coverage to analyze the aquifer or hydrologic unit that show the following:

- a) General information: location of proposed well, TMK or land ownership maps, location of existing and future wells in the affected aquifer or hydrologic unit, and general references such as roads, schools, etc.
- b) Hydrologic information: aquifer or hydrologic unit boundary, nearby streams and wetlands, known or assumed groundwater flowpaths, known or assumed water level contours.
- c) Contamination information: Points or regions of known contamination, points of potential contamination (landfills, individual wastewater disposal systems (cesspools, septic tanks, aeration units), hazardous waste sites, dry wells and injection wells), known or assumed chloride levels at specified depths in relation to nearest or adjacent wells, likely wellhead protection area for the proposed well.

NOTE: New injection wells and dry wells are typically prohibited from within 1/4 mile of a drinking water well. Other restrictions could apply. New water wells should not be situated in areas that have a significant need for injection wells, drywells or on-site individual wastewater disposal systems.

2. Aquifer or Hydrologic Unit Status

A description of the aquifer or hydrologic unit status including the following:

- * Sustainable yields or other measures of water availability

- * Authorized water use by the Commission on Water Resource Management (for Water Management Areas only)
- * Data table presenting the following information as appropriate
 - Current water use totals, including subtotals for individual users
 - Current installed capacity including subtotals for individual wells and/or groups of wells.
 - Pending installed capacity and/or use for the proposed well and subtotals for individual wells and/or groups of wells within the aquifer

NOTE: Format suggestions and sample data tables for aquifer status data are contained in appendix #1.

3. Contamination Analysis and Vulnerability Assessment

A record of contamination problems in the aquifer or hydrologic unit including but not limited to saltwater intrusion, turbidity, heavy metals, inorganic and organic chemicals, microbiological agents, water quality parameters (such as pH, alkalinity, calcium, conductivity and temperature), and radioactivity. If contamination exists, the sources and duration of the contamination should be listed. Water quality data from nearby wells should be presented as well as any anticipated need for treatment or filtering systems. Discuss past and existing land uses within the likely wellhead protection area and the potential for future contamination from those uses.

The potential for contamination should be assessed based on geologic and hydrologic considerations. Although sources of contamination might be presently absent, vulnerability to contamination might be great, if contamination sources occur in the future, due to factors such as high rates of infiltration or thin, protective soil horizons.

Any hazardous materials used and/or produced during drilling and treatment should be described. The method of handling these hazardous materials should also be disclosed.

4. Hydrologic Impact Analysis

A description of the associated watershed and recharge area and a discussion of the potential effects the well development may have on affiliated groundwater and surface water (e.g., streams and wetlands). Relevant hydrologic, physical, chemical, and biological data for potentially affected waters should be included. If potential impacts exist, a monitoring program for the surface waters should be included.

NOTE: See appendix #2 for sample description.

The EA should include pump test data on water level, extraction rates, and water quality. Similar data from nearby wells should also be included. The precise criteria used to determine if the well should be converted to production should be described. Any provisions for future use and monitoring of wells not placed into production should also be described.

5. Biological Assessment

A floral and faunal survey for sites in biologically sensitive areas.

6. Archaeological and Cultural Impact Assessment

A description of the archaeological and cultural significance of the region, including an on-site survey as well as consultations with Native Hawaiian groups such as DHHL, OHA and local community associations. (If applicable, the Environmental Council's Guidelines for Assessing Cultural Impacts could be used for this purpose.)

7. Financial and Institutional Arrangements

In some instances, a well is developed by private financing, the transfer of public lands to government or private developers, or in return for a water allocation credit to supply an urban development. The EA should include a full discussion of any institutional, financial or land use arrangements or commitments related to developing the well and delivering water to end users.

These arrangements may include the formation of public utility companies and subsequent rate-setting, the establishment of county water commitments, the co-funding of state or county water system development, an executive order or other set-aside of state lands, and purchase of land or easements by public entities.

Any or all of these arrangements and all permits or governmental approvals required to fulfill these commitments should be listed.

8. Watershed and Land Use Analysis

A discussion of how waters from the well will be used, and an analysis of how the proposed well development may affect land and water uses on the island and in the region. The analysis should include a discussion of the following (published materials may be referenced):

- * Hawaii State Water Plan and its component parts
- * County General, Development, and/or Community Plans
- * Plans for future water development within the aquifer
- * Any related water, wastewater, drainage or erosion control plans
- * Historical water supply and demand figures for the region
- * How the well may affect existing water sources
- * Any secondary or cumulative impacts caused by promoting land uses that alter the hydrology of the source and/or end-use area
- * An assessment of the well's impact on the land owners, water users including farmers and kuleana residents in the region and a declaration if ceded lands are involved.

9. Alternative Analysis

A list of alternatives to new groundwater development and discussion of their related costs and benefits. The list should include but not be limited to alternative locations, wastewater reuse, rainfall catchment, existing potable and non-potable water supplies, water conservation and Demand Side Management or Integrated Resources Planning. Show why developing a new source is more cost efficient than water conservation programs (slow-flow and low-flush retrofits, leak detection, etc.). In the case of back-up wells, there should be a discussion of the feasibility of providing a back-up pump only, rather than drilling a second well.

10. Impacts of Accessory Facilities

A description of impacts associated with the well's permanent production facilities including pumps, distribution pipelines, control devices, storage facilities, access roads and accessory structures.

The inclusion of this information will help make environmental assessments and environmental impact statements complete. If you have any questions, please call OEQC at 586-4185.

Appendix #1

FORMAT SUGGESTIONS AND SAMPLE TABLES AND CHARTS TO DISPLAY SUSTAINABLE YIELD DATA.

Sustainable Yield

Sustainable yield policies for basal aquifers involve trade-offs between groundwater extraction rates and aquifer water levels. The selected extraction rate implies acceptance of the affiliated equilibrium head (h_e), the water level at which the aquifer stabilizes under pumping at sustainable yield levels.

Equilibrium head is usually less than pre-development water levels or initial head (h_i). For comparative purposes, it is helpful to attach values of h_e and h_i to sustainable yield figures. Groundwater extraction can then be discussed in terms of its relationships with sustainable yields and water levels.

Data Subtotals and Grouping

To assure the clarity of information presented in the EA, tables for the following categories of data should be grouped by user/operator and landowner.

Categories for Data Tables in the EA

- * Current water use totals
- * Current installed capacity
- * Pending installed capacity
- * Authorized water use

To assist in spatial analysis, subtotals should also be grouped for aquifer sub areas and/or water quality regimes (such as zones of varying recharge of extraction intensity or chloride concentration).

A sample table for the display of this data is presented in the next page.

Aquifer or Hydrologic Unit Status Data

Sustainable Yield = 40 mgd

Initial head = 20 feet

Equilibrium head = 18 feet

Authorized Water Use (for water management areas only) = 36 mgd

Table 1: Overall Aquifer or Hydrologic Unit Status Data in million gallons per day

Land Owner	Authorized Water Use (Permitted by CWRM)	Existing (E)		Planned/Pending (P)		Potential Future (E + P)	
		Pump Capacity*	Average Use **	Pump Capacity	Proposed Use	Pump Capacity	Proposed Use
A	4	5	4	+5	+4	10	8
B	7	10	7	+3	+2	13	9
C	25	25	15	-10	-5	15	10
Total	36	40	26	-2	+1	38	27

Table 2: Aquifer or Hydrologic Unit Status Data for Landowner C in million gallons per day

Well Site	Authorized Water Use (Permitted by CWRM)	Existing (E)		Planned/Pending (P)		Potential Future (E + P)	
		Pump Capacity	Average Use	Pump Capacity	Proposed Use	Pump Capacity	Proposed Use
Mauka	10	10	8	0	0	10	8
Makai	5	5	0	-5	0	0	0
Central	10	10	7	-5	-5	5	2
Total	25	25	15	-10	-5	15	10

Notes:

* Total amount of water a well pump is capable of removing from the ground under ideal conditions in a 24-hour period. This number should be the same as the “rated pump capacity or installed pump capacity” as reported by the well owner to the CWRM.

** Average water use based upon water meter readings as reported by the well owner to the CWRM. The average should be based on the appropriate number of years of data.

Appendix #2

SAMPLE DESCRIPTION LIST FOR THE AFFECTED SECTOR WITHIN A WATERSHED AND GROUNDWATER RECHARGE AREA

Below you will find a list of characteristics that should be discussed in the description of affected sector within a watershed and groundwater recharge area.

Watershed:

1. Drainage area boundaries
2. Drainage networks and patterns
3. Groundwater discharges as sources of surface water flows
4. Surface water flow and habitat characteristics
 - a. timing, magnitude, duration, frequency of groundwater-source baseflows
 - b. relationships between baseflows and aquatic and riparian habitats and communities,
- c. water quality
- d. water uses (e.g., ditch or ‘auwai systems)

Recharge Area:

1. Boundaries
2. Geologic structure
3. Groundwater flow patterns
4. Overlying land and water uses, and runoff patterns.
5. Relationships between recharge rates and patterns, and climatic variations
6. Relationships between proposed groundwater extraction and associated activities, and aquifer water levels
7. Storage volumes, other wells, discharges to surface and coastal waters, and water quality parameters

Appendix #3

SOURCES OF INFORMATION

1) Hydrologic information may be obtained from the Commission on Water Resources Management. These include:

- a) location of existing wells;
- b) CWRM aquifer boundary;
- c) information on nearby streams;
- d) sustainable yield for aquifer;
- e) authorized water use by CWRM (for water management areas only);
- f) current water use within aquifer;
- g) current installed capacity within aquifer;
- h) pending installed capacity and water use within aquifer;
- i) Hawaii State Water Plan and its component parts;
- j) water levels of nearby wells; and
- k) salinity levels of nearby wells.

2) Contamination information may be obtained from the Department of Health. These include:

Safe Drinking Water Branch

- a) results of water quality tests of nearby wells;
- b) records of contamination problems in the aquifer; and
- c) locations of drywells and injection wells.

Wastewater Branch

- a) locations of individual wastewater systems.

Solid and Hazardous Waste Branch

- a) location of hazardous waste sites; and
- b) location of landfills.

3) Preliminary information about the well head protection area may be obtained from the Safe Drinking Water Branch, Department of Health.

4) Information about wetlands may be obtained from the U.S. Army Corps of Engineers.

5) County general, development and community plans may be obtained from the respective planning departments.