

NATIONAL PARK SERVICE (1982)

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WATER RESOURCE MANAGEMENT PLAN

BRYCE CANYON NATIONAL PARK

Recommended by _____ ~~1980~~ 1982
Superintendent Date

Approved by _____
Regional Director Date

A. Information Base

1. The park water system was originally installed in the late 1920's by the Utah Park Company and since that time various repairs, modifications and additions have been made to the system. The older cast iron pipes with leaded caulked joints required continuing maintenance to fix leaks and the problem was compounded by freezing in the winter since many of the pipes are not adequately buried. Park personnel estimated leakage of 8,000 - 15,000 gallons per day.

In the summer of 1977, water conservation measures had to be initiated due to drought conditions. One of the two East Creek wells had to be taken out of service as a result of the decline in the local groundwater table. The loss of water by leaking pipes intensified the shortage.

Two wells constituted the source of fresh water for the Bryce Canyon headquarters development. Trough and Shaker Springs, 9 km (5 mi) southeast of the headquarters area, once provided water year-round by gravity flow at a capacity of about 14 gallons per minute maximum. Use of these sources was discontinued in 1980. Presently the headquarters fresh water supply is pumped from two East Creek wells, located approximately 4 km (2 1/2 mi) west of the headquarter in the East Creek drainage. Their combined capacity is estimated at 100 - 115 GPM. The wells are located in an alluvian aquifer and are 10 m (30 ft) and 27 m (80 ft) deep. A third well, 10 m (30 ft) deep, is not in use and has no pump.

A Development/Study Package Proposal (10-238) has been submitted for the re-development and improvement of the gravity feed Shaker-Trough Springs system to supplement the existing water system.

A well, dug in Upper East Creek approximately 3/4 mile west of Paria View, has been abandoned because of a high hydrogen sulfide content. Powerlines to the well are to be removed during FY 83.

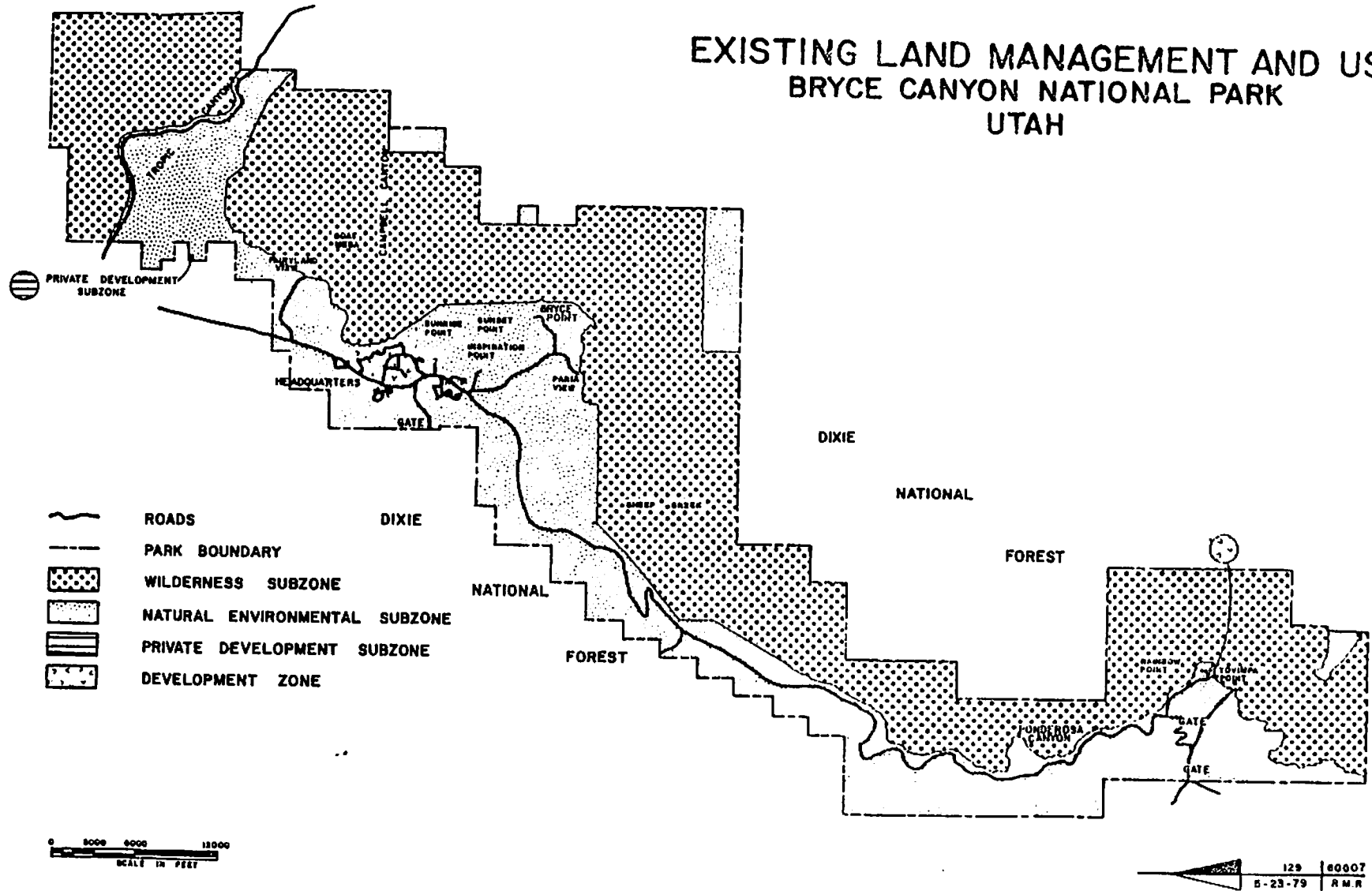
The Peek-A-Boo Spring, located along the Peek-A-Boo Trail, is maintained as a domestic source for hikers and riders. The system is slated for improvement during FY 83.

Water from the Yovimpa Pass pumphouse is piped uphill to a storage tank near Rainbow Point. The water is used for drinking and in the restrooms during the summer months.

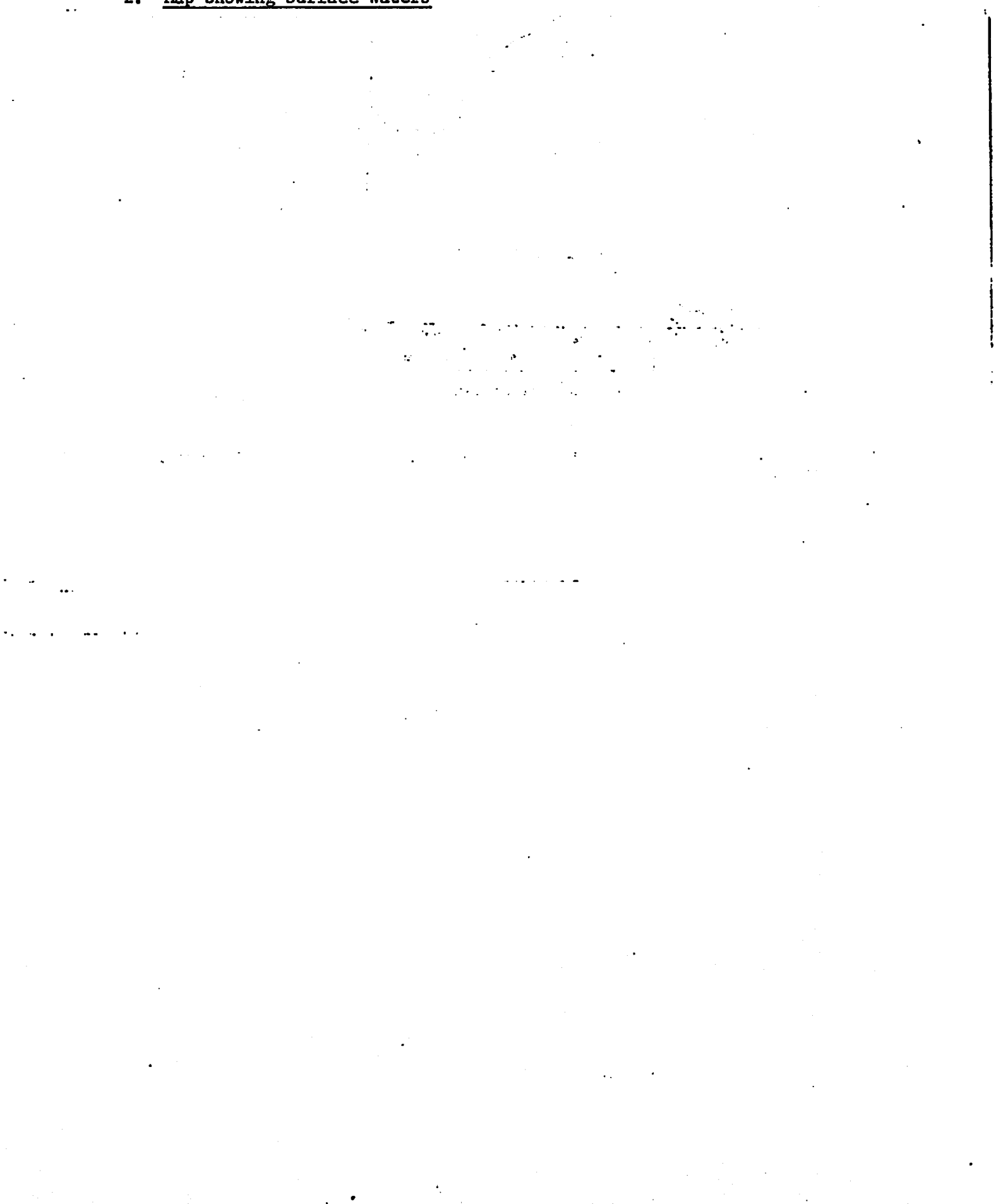
Iodinator purification systems are to be installed into both the Peek-A-Boo and the Yovimpa systems during FY 83.

Other components of the water supply system include two storage tanks total capacity 1,312,000 gal), a chlorination facility, 11 km (6 3/4 mi) of transmission main, and 9 km (5 1/2 mi) of water distribution pipes. The reservoirs and chlorination facility are in good condition and sections of the transmission and distribution pipes are new.

EXISTING LAND MANAGEMENT AND USE BRYCE CANYON NATIONAL PARK UTAH



2. Map Showing Surface Waters



3. Classification of Park Surface Water

Park waters can be classified under the following headings:

- a) Public Water Supply--well water pumped to storage tanks and used as a culinary source within the park;
- b) Aesthetics--creek and spring waters that add to a visitor's enjoyment of the backcountry;
- c) Agricultural--diverted creek water that flows through Tropic Ditch and which is eventually used for irrigation and a live-stock water supply;
- d) Backcountry Water--creek and spring water that is utilized by hikers;
- e) Disposal of Sewage--water that flows through sewage system and eventually evaporates from the impermeable waste-water treatment lagoons.

4. Flood Plain Management

As most of the developed portion of the park is found along the high edge of the plateau there is little chance of it being damaged by flooding. Park trails found below the rim are subjected to erosion on a yearly basis. This is due to the spring snow melt and summer thunderstorms acting on the highly erodible Wasatch soil type. In the past, flooding has caused severe erosion in overgrazed meadows, but this problem has been reduced with the construction of check dams in the gullies and the elimination of grazing.

Areas of the park susceptible to flash flooding include much of the lower backcountry and the Tropic Canyon area. Flash floods in the backcountry destroy trails and threaten backcountry users. Flood-destroyed trails are rebuilt. Hikers and backpackers are advised of the hazard through available literature. A State-maintained highway runs through Tropic Canyon. Flash flooding could damage bridges and portions of the road. Area residents are alerted to the possibility of flash flooding by Weather Service special broadcasts. Damaged portions of the NPS-owned highway are repaired by the State of Utah.

Due to the nature of area and the type of potential flooding, the park has little need for a flood plain management program other than advising people of the problem and ways to avoid injury.

5. Water Quality

Water quality of Trough, Shaker, and Yovimpa Springs and other springs on the top of the plateau is good. Springs below the rim tend to be high in mineral content.

The water pumped from the alluvium deposits is of good quality. Deep wells may yeild water with high mineral content.

In 1980, work was begun to place the main transmission pipeline, several pipelines in the distribution system and upgrade the East Creek wells.

The main transmission pipelines was replaced at a 48" depth. The transmission lines from Trough and Shaker Springs were tied into the new line, but were later shut down.

Distribution pipes and valves were replaced. All the lines were buried 2/3 m (48") deep. Pipe sizes and lengths are as listed in the table below:

<u>Pipe Sizes</u>	<u>Location</u>	<u>Length (feet)</u>
6"	Wells to tank	19,900
6"	Distribution System	5,390
4"	Distribution System	5,390
2"	To comfort station	920
Total		31,800

The existing wells were made 26 m (80 feet) deep to provide more casing storage. Three pumps with automatic controls and one new well house was installed.

6. Water Quality

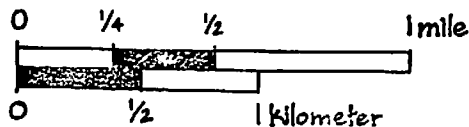
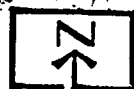
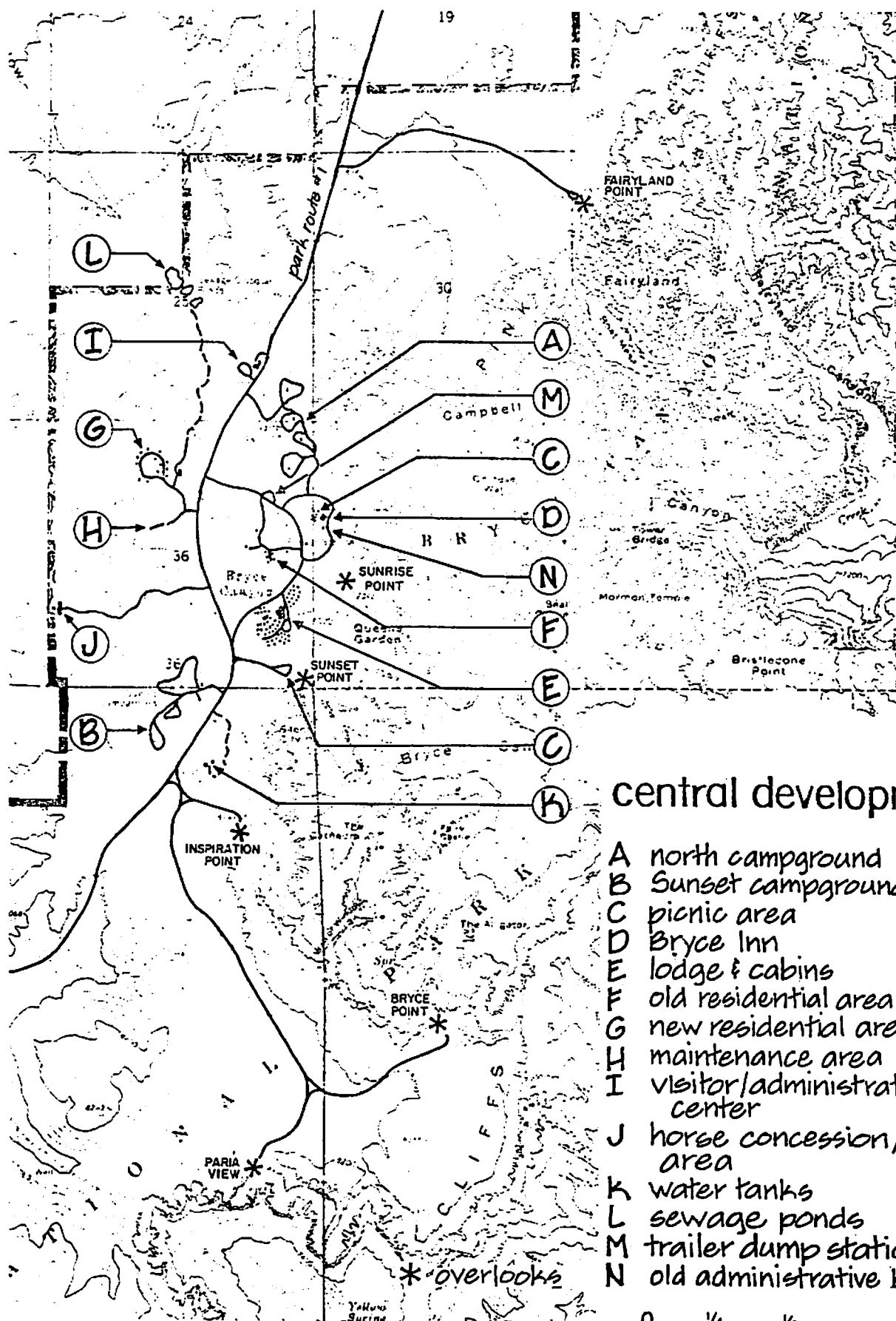
The existing maximum day water demand is estimated at 136,000 gal/day, of which 100 - 1,000 gallons is leakage. For design purposes, the following daily water demand is estimated for the various units on the distribution system:

<u>Location</u>	<u># Units or Users</u>	<u>Unit Consumption (GPD)</u>	<u>Demand (GPD)</u>
Visitor Center	2340 users	5	11,700 -
North Campground	115 sites	100	11,500
Sunset Campground	113 sites	100	11,300
Sunset Point			
Comfort Station	480	5	2,400
Concession Area	metered		81,300
Horse Concession	—	—	1,000
Dump Station	—	—	4,800
Maintenance Yard			
Residential Area	17 houses	300	5,100
	34 apartments	75	2,550
Residential Irrigation			6,000

Maximum Fire Flow = 1000 gpm for 3 hours.

Wastewater from the headquarters developments is collected and stored in three non-discharging impermeable lagoon cells. The present system is operating at less than two-thirds capacity.

The major development cluster in Bryce Canyon National Park is located on the moderately flat surface of the Paunsaugunt Plateau near the northern end of the Park (see Figure 1). The major developments include a visitor center, two campgrounds (total 228 sites), a residential area (13 houses, 4 apartments and 34-unit dormitory), a maintenance yard and a concession lodge with a restaurant. Over 600,000 visitors are served annually by park facilities.



About 3 million gallons/year (12,000 m³/year) of water diverted from the East Creek aquifer ends up in the non-discharging sewage lagoons and is lost through evaporation. A portion used for residential irrigation will return to the same watershed. The total amount of water withdrawn from the East Creek aquifer does not exceed 10 million gallons annually (40,000 m³/year). The continued water diversion is not considered detrimental to the ecosystem of the watershed in this relatively moist area.

The increase in wastewater flow resulting from the improved water supply capacity is adequately handled with the present wastewater treatment system. The three-celled non-discharging, impermeable lagoons are operating at less than two-thirds capacity.

Hydrology

The Paria River below the plateau to the east and the Sevier River on the top of the plateau to the west form the major drainages of Bryce Canyon National Park. East Creek originates in the park, then joins the East Fork of the Sevier River in the Dixie National Forest (see Figure 2). There are no perennial streams in the park except for a few spring-fed stretches of Yellow Creek, a tributary of the Paria River.

Several springs occur in the bedrock on the top of the plateau, including Trough and Shaker. These springs originate where the sandy, white beds of the Wasatch formation lie in contact with dense, pink limestone beds. The springs are recharged by rain and snow and the yields are unstable and fluctuate in response to variations in precipitation. The small springs which originate in the alluvium deposits in the East Creek valley are similarly dependent on precipitation.

The principal subsurface water-bearing formation is the alluvium deposits in the drainages on the surface of the plateau. Test wells which penetrate the Wasatch formation have had moderately low yields (less than 30 GPM).

Spring below the rim of the Plateau have a fairly constant yield. In this area springs issue from lower beds of the Wasatch formation and along the Paunsaugunt fault.

7. Park Ecosystem and Endangered Species

Information on the park ecosystems is available in the park's General Management Plan.

Threatened and Endangered Species

None of the plants found on the 1980 Endangered and Threatened Species in Utah list are found within the park. However, a number of species that may eventually qualify for the list are present.

Several wildlife species named on the 1980 list are found within the park. Utah Prairie Dog, Cynomys parvidens, has been established in a number of meadows in the developed area of the park. Bald Eagles are known to utilize the area during migration periods. An active Peregrine Falcon eyrie was discovered within the park during the summer of 1982.

Park management has little impact on the quantity and quality of water available to vegetation and wildlife. Existing creeks and springs are protected from man-caused damage and left in their natural state. These surface water sources are used by park wildlife and backpackers. The White-tailed Prairie Dogs rely very little on surface water. They are adapted to derive needed water from plants they eat. Peregrine falcons utilize open water sources. Open sources within the range of the nesting birds include Black Birch Springs, Riggs Spring, and Yovimpa Pass. These sources are protected and maintained in their natural state. Continuing the present management posture will assure that available water sources are not disturbed or destroyed.

8. Water Rights

1. The Tropic Irrigation Ditch crosses the Park through Water Canyon. The ditch has been in existence since 1894, prior to establishment of the Park and legislatively recognized. (Act, February 17, 1931-Stat. 1166)
2. Executive Orders 11988 and 11990 control any development or planning on possible 100-year floodplains or designated wetlands.
3. Special Use Permit No. 1330-5-7001, to expire December 31, 1986, to the Town Board of Tropic, Utah, for developing, conveying, maintaining, and repairing the collection and conveying facilities of a culinary water supply system for the town of Tropic, Utah.
4. There is a Letter of Agreement between the National Park Service and the Forest Service for a water line from Riggs Spring to outside the Park boundary, dated December 4, 1930.
5. There is a Memorandum of Agreement executed September 27, 1976 between the National Park Service and U.S. Forest Service to develop, use and maintain a waste-receiving station, holding tank, metering pump, and use of waste water lagoons in Bryce Canyon National Park.

Utah State law provides for the appropriation of rights to surface and ground water. The United States has perfected ownership rights only to Yovimpa Spring, the Headquarters Well, Shaker Spring, Trough Spring, and the East Creek Wells.

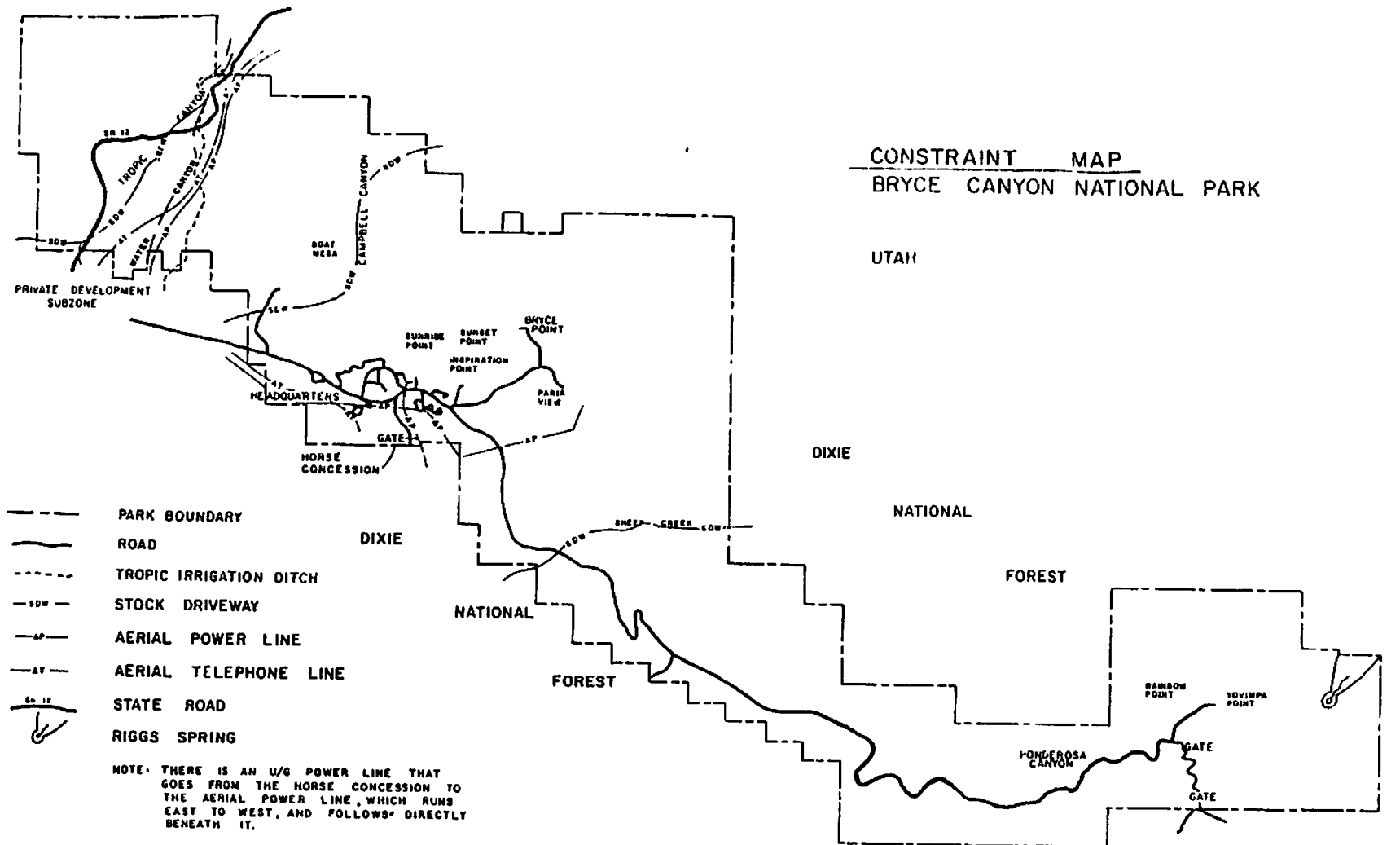
The Tropic and East Fork Irrigation Company maintain the Tropic Ditch through a portion of the Park. There have been relatively few problems associated with maintenance of that section of the ditch passing through the Park.

It also claims diligent rights to all of the water rising in Tropic Canyon, but the validity of this claim needs to be resolved. Pressures have been, and will continue to be, exerted for the development of the Tropic Canyon water.

Presently the town of Tropic utilizes, as their only culinary source, water from a spring located next to Highway 12 near the Water Canyon bridge. The source proved to be inadequate during the summer of 1981. Because of the reduced flow Tropic requested it be allowed to expand the supply by developing another source located about 100 yards upstream from the present source. Water gathered from the proposed development will be piped to the existing supply line near the existing spring box.

As the project will be an expansion of an existing project, and as the environmental damage will be slight and can be mitigated, approval for the project was given in August 1982. Construction should begin during the Fall of 1982. An Environmental Assessment of the project is available in the Superintendent's files at the Park Headquarters.

CONSTRAINT MAP BRYCE CANYON NATIONAL PARK



9. Bibliography

- A. Environmental Assessment - Reconstruct Water System; Package No. 118; Park files.
- B. Project Manual - Water System; IFB 1330-79A; Park files.
- C. Environmental Assessment - Culinary Water Supplyline Construction; Park files.
- D. General Management Plan; Park files.
- E. Backcountry Water Quality Survey Report, Nakashima, 1981; Park files.

B. Objectives For Management of Water Resources

Management Objectives Relating to Water

- 1. To secure, through research or other means, adequate information to increase management efficiency and to ensure conservation of Park resources.
- 2. To cooperate with outside agencies, organizations, and members of the public in (a) assuring, to the greatest extent possible, that nearby lands are developed and managed in ways that are compatible with preserving the Park's water quality; and (b) minimizing the adverse effects of public use on the Park's (water) resources through the provision of recreational lodging, and other visitor service facilities on the Park's vicinity.
- 3. To protect and enhance the natural and scenic values of the Park by maintaining an adequate land base to permit achievement of the Park's purpose, and acquiring outstanding mineral interests on the lands providing culinary water supply for the Park.

Present Management Action

To date, park objectives for management of the water resources have nearly been met. The water system improvement project completed in 1981 has increased the quantity and quality of water available for use by park visitors and residents. Backcountry water sources are protected from damage and management action is being considered to move or close certain backcountry campsites to reduce the potential of pollution of surface waters by hikers. Surface waters collected within the park for culinary and agricultural uses by the Town of Tropic are covered by Special Use Permits. The town's activities are closely monitored to see that stipulations of the permits are adhered to. Re-development and improvement of the Shaker-Trough and the Peek-A-Boo systems are being considered for FY 83.

The park works closely with the state to maintain water quality standards.] ?

There appear to be no problems associated with the water resources within the park. Under current management policies, and with no dramatic increase in visitation or local population, park water resources will continue to supply park needs with no adverse affects on the resource.] Says who

C. Alternative Actions and Their Probable Impacts

1. No Action - This is an unacceptable alternative. Selected water resources must be managed in the park in order to provide for human use and health as mandated in the Act of 1916.
2. Maintain the Current Program - Selected water resources will be managed in the park for human and health. Park water rights will be maintained and sought after. The Tropic Ditch will be permitted. Water use, and water resources will be inventoried and classified.

Management of park water resources will continue to provide for the health and safety of humans using the park water as a culinary source. Natural drainages and springs will be protected and maintained in their natural states.

As the need arises and new technology becomes available, the park water system will be expanded and improved.

D. Finding of No Significant Impact

Since the adoption of the water plan will provide for health and safety of park visitors and residents, will be carried out in compliance of all applicable codes, will protect natural sources and drainages, and will guide any future development, and since the effects of implementation of the plan can be satisfactorily mitigated to the extent possible, alternative 2 is selected as the proposal. The above discussion indicated that this is not a major federal action that would have significant impact on the environment, thus an environmental impact statement will not be prepared.