Cricket Valley Energy
Water Budget Evaluations

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Outline

- Swamp River Regional Water Budget Evaluation
- Stream Gauging Data
- Recommendations from 1999 Harlem Valley Aquifer study
- Local Impacts

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Summary of Proposed CVE Water Consumption*

- 20.4 gallons per minute (gpm) annual average.
- 60.3 gpm when summer temps reach 83 degrees F**.
- 53 gpm in summer as above, when stored rainwater is available.

*Assumes continuous operation

**Temperature based on 24-hour average

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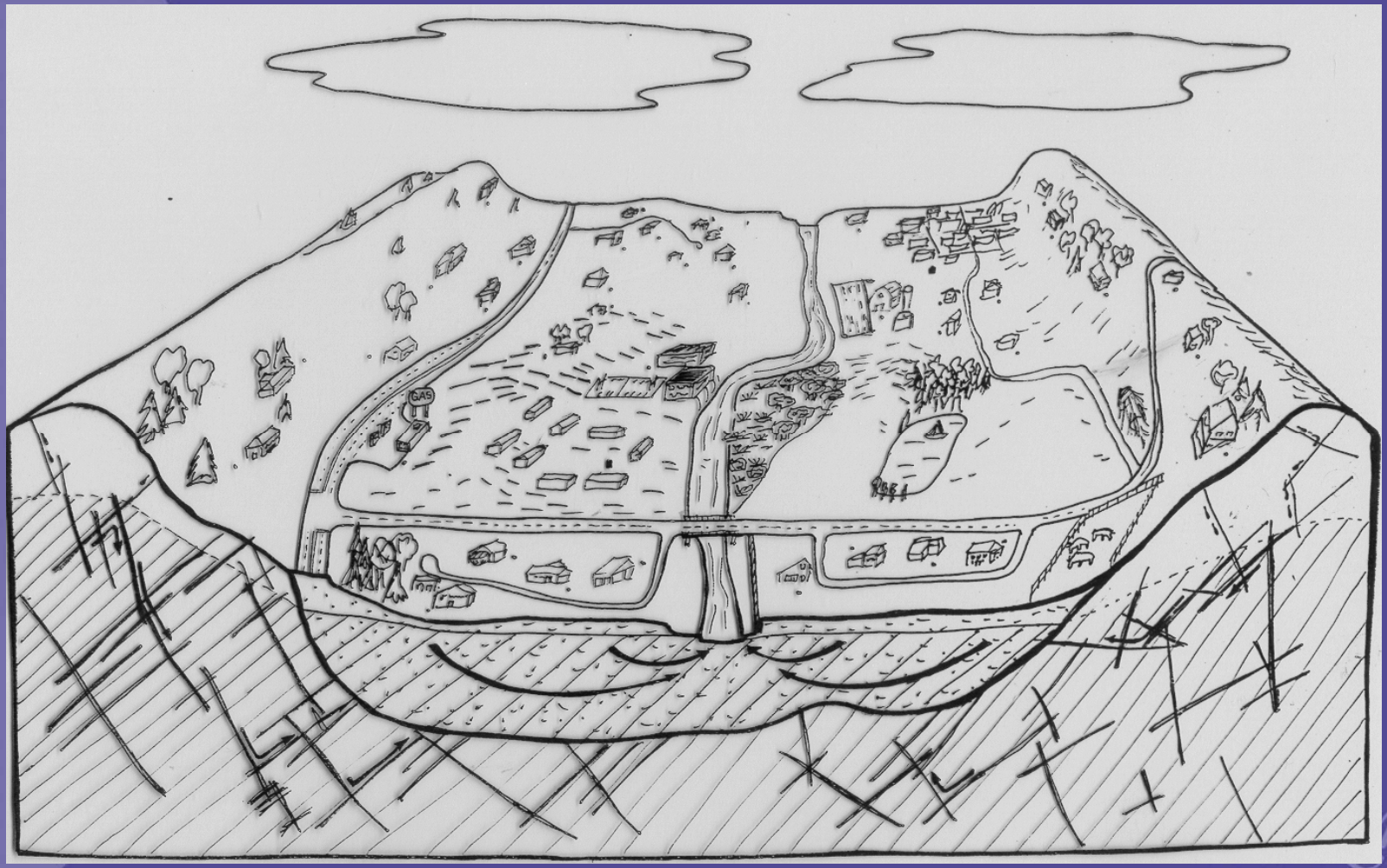
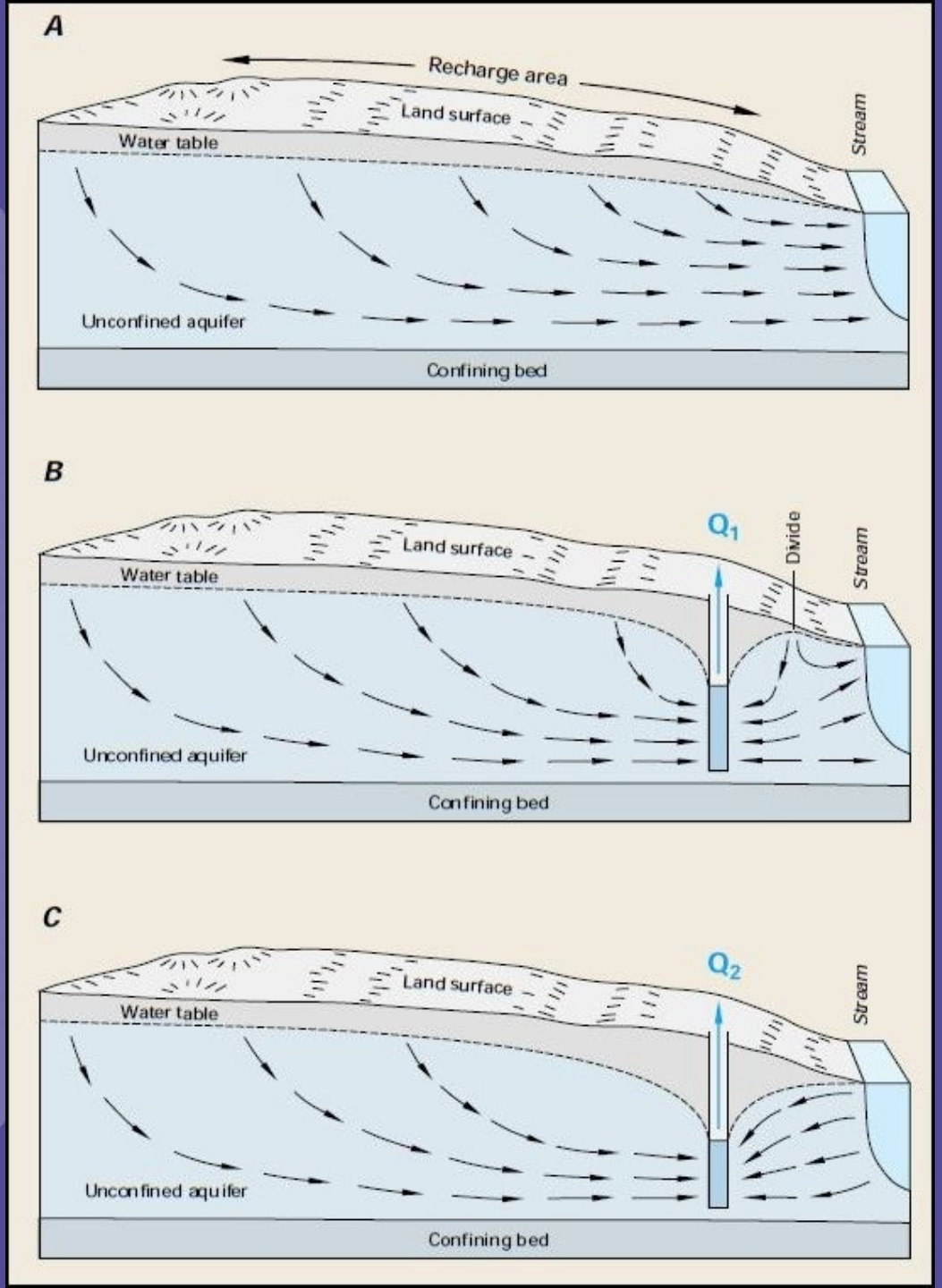
Typical Groundwater Flow Diagram





No Well Impacts

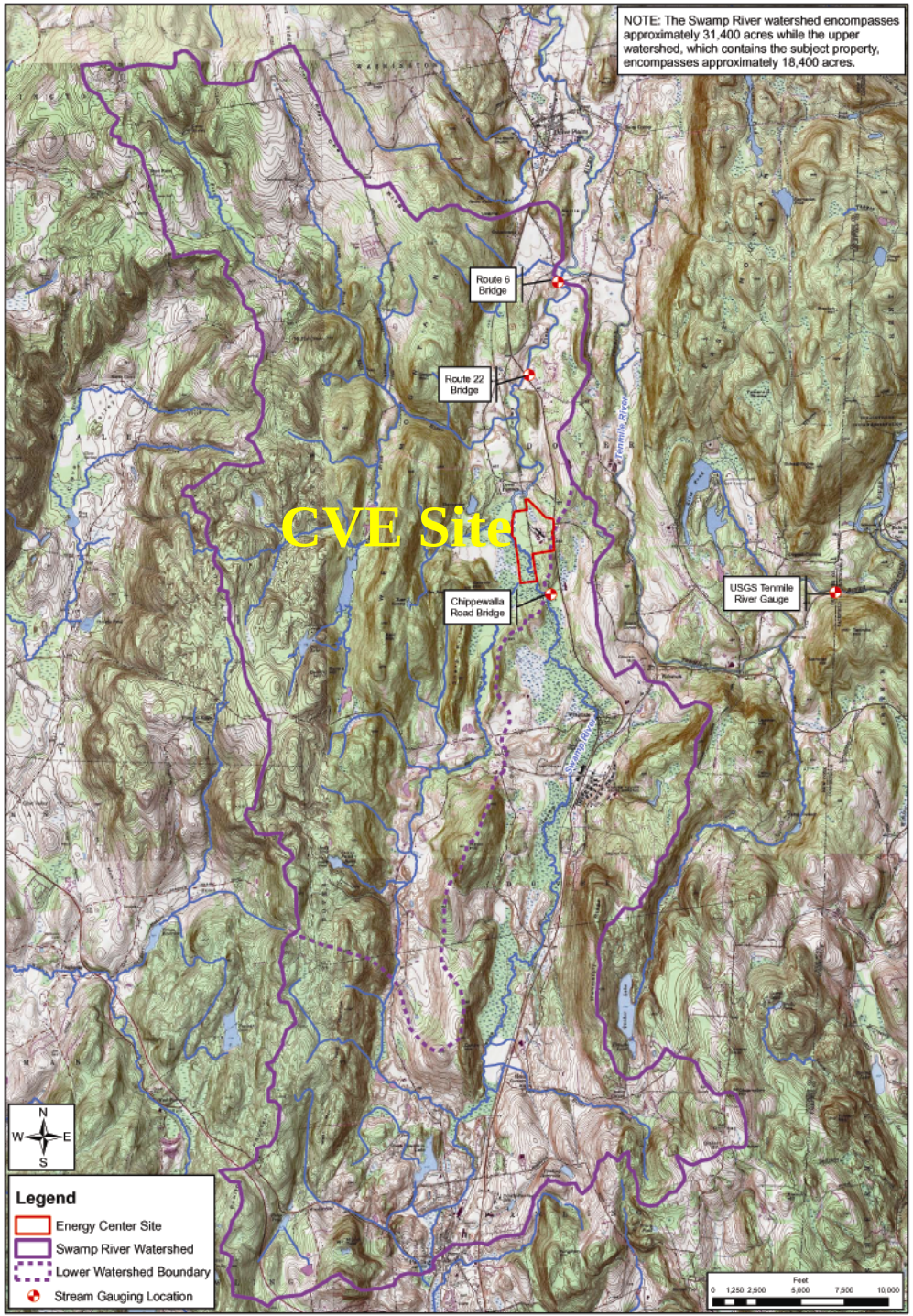
vs.

Some pumping, so less water reaches the stream.

With heavy pumping, stream gives back flow

Swamp River Watershed

* CVE site low (downstream) in watershed
* Flow gauging locations shown
*Valley setting
* Flows into Ten Mile River



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1997 Swamp River Flow

Stream flow was recorded in 1997. Ten Mile River at ~50% average conditions.

- Swamp River at Route 22 (below site) was 24,590 gallons per minute
- Swamp River at Chippewalla Road (above site) was 13,316 gpm
- This means ~50% of Swamp River flow entered in the vicinity of the site.

Conclusion: Good local aquifer and good local recharge by CVE site.

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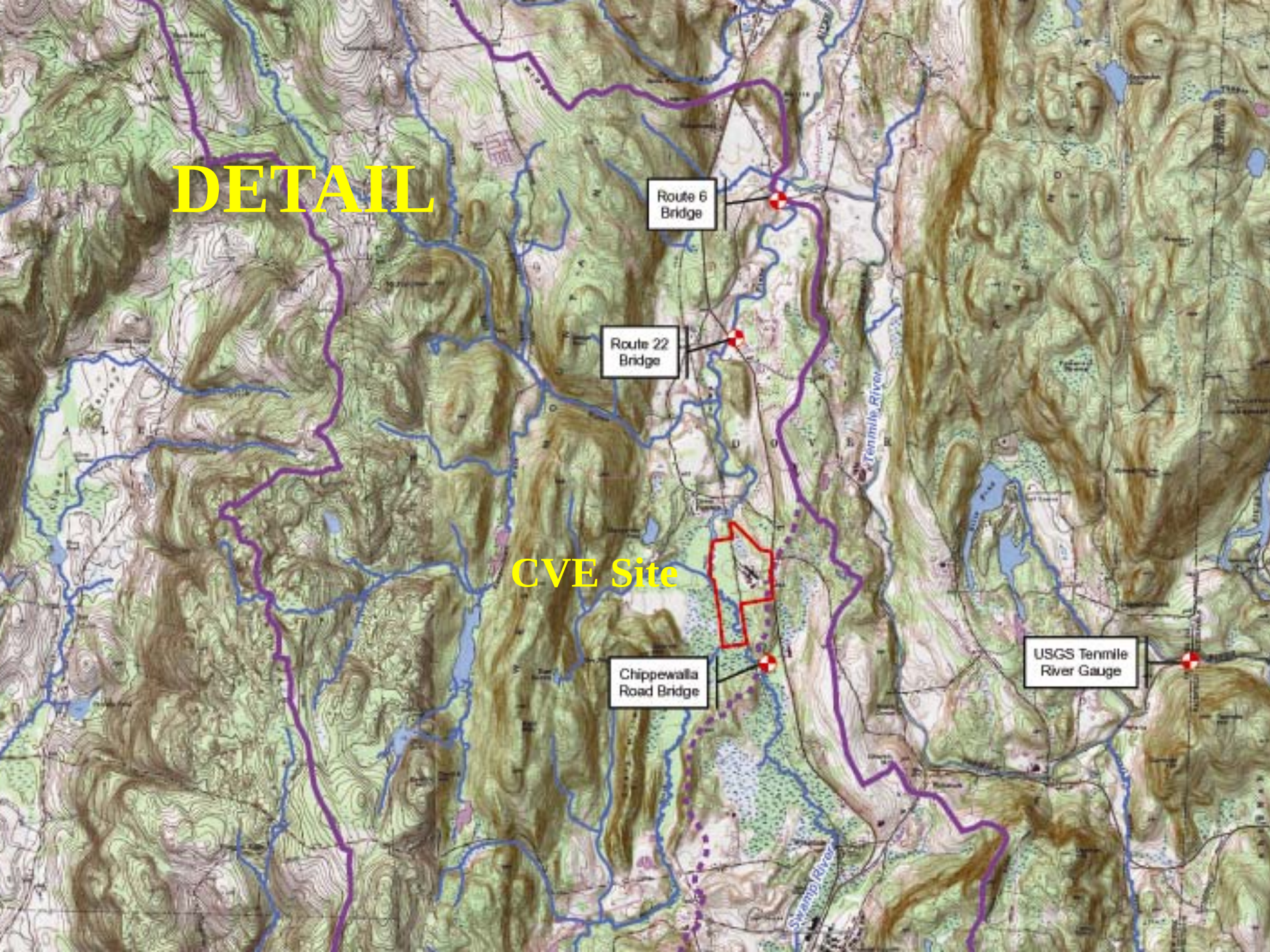
DETAIL
Route 6 Bridge
Route 22 Bridge
CVE Site
Chippewalla Road Bridge
USGS Tenmile River Gauge
Tenmile River
Swamp River

2010 Stream Gauging Data

Stream flow was recorded on July 13, 2010. Ten Mile River at ~10% dry conditions.

- Swamp River at Route 22 (below site) was 3,909 gallons per minute
- Swamp River at Chippewalla Road (above site) was 987 gpm
- This means ~75% of Swamp River flow was entering in the vicinity of the site.

Conclusion: Still good local aquifer and good local recharge by CVE site.

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Swamp River Drought Flow

Published drought flow (10 year drought) of the Swamp River is 718 gpm at Route 22.

Application: Applying the 2010 stream gauging data, we estimate that ~75% of the drought flow, or 538 gpm, enters the Swamp River in the vicinity of the site during a 10-year drought.

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Recommendations from 1999 Valley Aquifer Report

Report recommendation: To protect ecological and economic stream values, human water uses should consume no more than 50% of 10-year drought flow.

(Consumption means the difference between pumped water and returned water, usually associated with evaporative or export loss.)

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Applying the 1999 Recommendations:

- The Ten Mile watershed gains 3,194 gpm in Dover during the 10-yr drought (consuming half would be 1,597 gpm)
- The Swamp River drought flow is 718 gpm (consuming half would be 359 gpm)
- The Swamp River near the CVE site gains ~538 gpm (consuming half would be ~269 gpm)
- *Finding: CVE consumption is less than all these half values.*

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Swamp River Water Budget Conclusions, for 20.4 gpm and 60.3 gpm CVE consumption values

- 60.3 gpm is ~2% of Ten Mile River drought flow.
- 20.4 gpm is ~1% of dry Swamp River flow and ~3% of 10-year drought flow.
- 60.3 gpm is ~2% of dry Swamp River flow and ~8% of 10-year drought flow.
- *Conclusion: CVE consumption leaves capacity in Dover for the future and other projects.*

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Local Water Budget

- Using soil recharge rates, the site receives 35 gpm of recharge during average years (and 25 gpm during drought years).
- The site and uphill areas receive 55 gpm of recharge during average years (and 38 gpm during drought years).

Conclusion: The site "makes its own water." There is ample site recharge to support consumption of 20.4 gpm.

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Local Water Budget

- Summer consumption rates exceed site recharge, so off-site groundwater capture will occur at times, but…

Conclusions: Pumping Tests by SSEC show peak pumping rates up to 120 gpm do not harm operation of off-site wells.

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Conclusions

- The Swamp River can support CVE water consumption and will leave drought water allocations for other projects.
- The CVE site is advantageously situated low in the watershed and along a portion of the river receiving most inflows.
- The CVE site receives enough onsite recharge to meet its average water consumption budget. Pumping tests showed no negative impacts from higher pumping rates.

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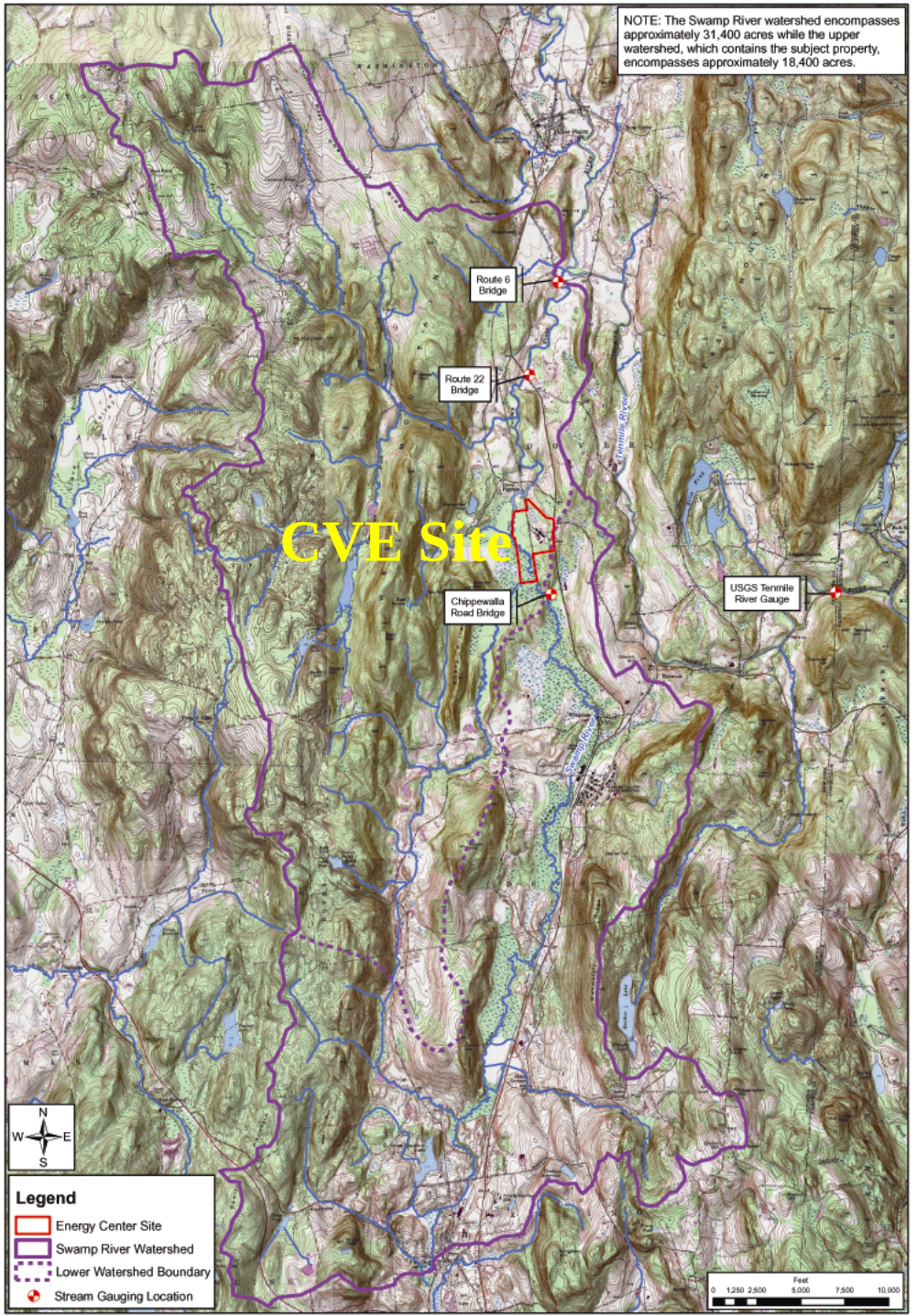
Swamp River Watershed



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