County of Santa Cruz

Health Services Agency - Environmental Health

701 Ocean Street, Room 312, Santa Cruz, CA 95060
(831) 454-2022 TDD/TTY - Call 711 http://www.scceh.org
EnvironmentalHealth@santacruzcounty.us

Santa Cruz County Water Advisory Commission Public Workshop

Proposed Updates of Well and Individual Water System Ordinances

August 7, 2024, 4:30 pm-6 pm

In-Person Location: 701 Ocean Street Room 520

Remote Location: Teams, Join the meeting now

Meeting ID: 270 495 730 188 Passcode: V4mnHU
Dial in by phone +1 831-454-2222 Phone conference ID: 719 598 662#

1) Welcome
2) Introduction to the ordinances and the need to update.
3) Update Process
4) Summary of Significant Changes
    a. Resource Protection Policy
    b. Tiers for Application Review
    c. Background Technical Information
5) Discussion
6) Next Steps
7) WAC Recommendation to Board of Supervisors

County of Santa Cruz

Water Advisory Commission

701 Ocean Street, Room 312, Santa Cruz, CA 95060
(831) 454-2022 TDD/TTY -Call 711 www.scceh.com
EnvironmentalHealth@santacruzcounty.us

Subject: August 7, 2024 Water Advisory Commission Item G2

Title: Well Ordinance Update Public Workshop

Recommended Action:

1. Provide feedback and recommend that the updated ordinances advance to the Planning Commission for review and approval.

Background

At the August 2, 2023 Water Advisory Commission meeting, the Commission directed staff to form a Technical Advisory Committee (TAC) and begin the process to update the ordinances. The TAC met four times in six months, with smaller subsets of interest groups meeting with staff in between and after the full TAC meetings. All of the meeting materials and more information about the TAC can be found at the website: https://scceh.com/NewHome/Programs/WaterResources/WellOrdinanceUpdate.aspx. The first public drafts of the updated Santa Cruz County Code sections 7.70 and 7.73 have been completed along with a supporting Resource Protection Policy and substantial documentation regarding the analyses completed by staff as part of this process.

During this workshop, staff will provide a presentation on the updated ordinance, discussing the process and major changes.

Included Documents:

There are several documents included in the packet, not every individual may be interested in reviewing all of the documents. Below is a description of what is included:

1) Well Ordinance Update Significant Changes Summary
   This document outlines the key changes between the current well construction and Individual Water System (IWS) permitting, and the new requirements under the proposed ordinances.
2) Well Ordinance Update Context

This document provides valuable context and support for the decisions made by the TAC and staff as part of the update process.

3) Proposed Updated Santa Cruz County Code Chapter 7.70 Clean

   This is a clean copy of the updated proposed ordinance as drafted by staff with input from the Technical Advisory Committee and key stakeholders.

4) Redlined Copy of Santa Cruz County Code Chapter 7.70

   This compares all the changes proposed by staff between the current language last updated in 2009, and the new proposed language.

5) Proposed Updated Santa Cruz County Code Chapter 7.73 Clean

   This is a clean copy of the updated proposed ordinance as drafted by staff with input from the Technical Advisory Committee and key stakeholders.

6) Redlined Copy of Santa Cruz County Code Chapter 7.73

   This compares all the changes proposed by staff between the current language, and the new proposed language.

7) Resource Protection Policy and Critical Streams Table

   In several places in 7.70 and 7.73, the language points to the development of a policy to outline how some of the requirements would be implemented. This document includes some notes highlighted in green, which provide a little background as to how some decisions in the policy were made. These will not be in the final adopted policy, but they will assist Commissioners and other interested parties in their review. The Critical Streams table has now been incorporated into the Resource Protection Policy. As an appendix to this document, staff has included notes explaining the logic behind the information included and the decisions made in the Critical Streams Table, which is used for Tier 3 wells.

8) Notes on Critical Streams Table

   This document provides the background and factors that were considered during the development of the Critical Streams Table.

9) Groundwater Maps

   This is a series of maps outlining areas of elevated groundwater concern due to yield, environmental resource protection, and water quality impairment.

10) Analysis of Streamflow Depletion and Well Interference under Various Conditions.

This document describes in detail, the technical analyses done during the development of the Ordinances and Resource Protection Policy. The document summarizes the approaches to evaluating depletion using best available data and analytical models, and using that to establish meaningful standards. The document includes attachments detailing the model runs.

Presented by: Sierra Ryan

Water Resources Program Manager

County of Santa Cruz

HEALTH SERVICES AGENCY

ENVIRONMENTAL HEALTH DIVISION

Water Resources Program

701 Ocean Street room 312, Santa Cruz, CA, 95060

Phone:(831) 454-7519 Fax:(831) 454-4770

Summary of Changes in Amendment of Chapter 7.70 and 7.73

Project Description:

Amend County Code Chapter 7.70 (Water Wells) and Chapter 7.73 (Individual Water Systems) to bring County provisions into conformance with State Policy and recent court decisions. Amendments include various measures for improved protection of groundwater and other resources and improved water supply reliability, including requirements for: various measures to reduce impact of wells on groundwater resources, streams and associated public trust resources, karst areas, nearby wells, and designated groundwater extraction concern areas; different levels of review and protective measures for different types of wells, including discretionary review and potential for denial of Tier 4 wells; provisions for review and comment on well applications by affected water agencies and groundwater sustainability agencies; provisions for regulation of soil borings and stormwater infiltration devices; metering of all newly installed non domestic wells; penalties for code violations; promulgation of specific policies for implementation of code requirements; more extensive water quality testing for individual water systems and more stringent yield testing in known limited yield areas; recordation of a notice on the deed for wells with limited yield or quality; water quality testing and yield testing at the time of property transfer; and, various other wording changes and clarifications. Amendments to County Code Chapter 7.70 and 7.73 are Coastal Implementing and will require Coastal Commission certification after County Adoption.

Chapter 7.70, Significant changes

Change Chapter title from “Water Wells” to “Wells and Borings”

7.70.010: Expand Chapter purpose to include regulation of soil borings; protection of groundwater, surface water, public trust resources; and support implementation of the Sustainable Groundwater Management Act and local Groundwater Sustainability Plans.

7.70.015: Add section to clarify applicability.

7.70.020: Add various definitions: Control zones, groundwater, groundwater extraction concern areas, karst, public trust resources, seepage pit, soil boring, stormwater infiltration device, sustainable yield, tier, water well (including de minimis well, and replacement/supplemental well).

7.70.030(A): permits will be required for soil borings.

(C) Tier 1-3 wells, including qualifying water system wells, will be ministerial; Tier 4 wells and wells requiring discretionary approval under other County Code Chapters will be discretionary, subject to CEQA review.

(D) Tier 4 wells will require an evaluation of potential impacts and may be denied if significant impacts cannot be mitigated.

(F) Applications will be transmitted to affected water agencies and groundwater sustainability agencies for review and comment

(I): Double fee for work commenced without permit

7.70.090(A) Add additional provisions for horizontal well separation from seepage pits (150 ft), community wells and shallow sewage dispersal system (150 ft) community well and deep dispersal system (200-600 ft)

7.70.105: Policies shall be established for installation and destruction of soil borings.

7.70.107: Policies shall be established for installation and destruction of stormwater infiltration devices.

7.70.110(D): Water efficiency measures, metering and reporting required for all newly installed non-de minimis wells, with authority for Health Officer to verify ongoing efficiency.

7.70.110(E, H,J) Tier 1-4 are defined: Tier 1 is all de minimis wells that do not require other discretionary approval, Tier 2 are non-de minimis replacement wells that meet

protective requirements, Tier 3 are new non-de minimis wells that produce less than 50 af/y; Tier 4 are all other wells that do not meet requirements for Tier 1-3, including wells control zones and seawater intrusion concern areas. Wells will be prohibited in control zones. Specific criteria for Tiers and other resource protection measures will be included in a Resource Protection Policy to be adopted by Board resolution, and subject to adaptive management.

(F) A well will not be approved that conflicts with implementing a groundwater sustainability plan.

(G) Non-de minimis wells in karst will require further evaluation.

(I) The Health Officer may require compliance with GSA requirements for metering or other actions.

7.70.180, 190 Ability to levy violation reinspection fee and record notice of violations

7.70.200: Provides for promulgation of policies for detailed implementation. It is much quicker to update policy than code sections, allowing for more adaptive management.

Chapter 7.73: Significant changes

7.73.030, 050(C): Language added to require IWS permit and yield testing for non-de minimis uses that provide water to the public but are smaller than public water systems.

7.73.050(D): More extensive yield testing required in limited yield areas.

7.73.050(F): Streams will no longer be permitted as an IWS water source.

7.73.070(B): Water quality testing expanded to include all Title 22 parameters, with the addition of testing for hexavalent chrome in the Aromas formation.

7.73.070(D): Allowances for deviation from water secondary quality standards and provision for treatment to meet standards, including point of entry and point of use treatment.

7.73.070(E): A Notice of Nonstandard water quality will be recorded on the deed where water quality does not meet drinking water standards and/or treatment is required.

7.73.075: Requirement for water quality and yield testing prior to property transfer.

Resource Protection Policy

Proposed Level of Review and Mitigation Required for Various Types of Well permit Applications					
Tier	**Criteria**	**Average Number of Permits/year**	**CEQA Review Required?***	**Connected Stream Setback**	**Nearby Well Setback**
Tier 1	De Minimis, domestic < 5 connections; Non-de minimis <2 AFY	44	Ministerial	>50 ft and 100 ft deep seal within 1000 ft of stream**	>50 ft
Tier 2	Non-De minimis Replace/Supplemental	11	Ministerial	>100 ft or not less than existing, and 200 ft deep seal within 2000 ft of stream**	>50 ft, or not less than existing
	Public Water system replace/supplemental	1			
Tier 3	New Non-De minimis wells that are consistent with GSPs, meet Tier 3 calculated setbacks, and will pump less than 50 afy/100gpm	1	Ministerial	If within 2000 ft of stream, Using depletion model, 10th percentile dry season flow shall not be reduced by more than allowed % after 10 years of pumping ***	Calculated minimum setback so that drawdown at nearby well is less than 5 feet****
	Wells that do not meet Tier 1 or 2 minimum setbacks, but do meet Tier 3 calculated setbacks	?			
Tier 4	Wells that do not meet Tier 1,2,or 3 requirements; or located in a control zone or Tier 4 gw concern area	?	Yes	Analysis, including cumulative effect on streamflow in overall basin	Analysis and mitigation
	New Public Water System Serves > 199 connections	<1			
Notes:					
*	Well permit is discretionary if other discretionary permits are requried by other sections of County Code.				
**	Deep Seal is specified depth or first impermeable layer, whichever is less.				
***	Allowed depletion is function of stream value and current impairment, as shown in Critical Stream Table				
****	Use modified Theis Non-Equilibium Equation (Cooper-Jacob), with proposed well parameters and regional aquifer properties. Calculated drawdown at proposed distance of nearby well should not exceed 5 foot after 60 days of pumping.				
Water use efficiency measures are required for all wells; metering and reporting is required for all non-de minimis wells; other mitigation measures may be required.					

County of Santa Cruz

HEALTH SERVICES AGENCY

ENVIRONMENTAL HEALTH DIVISION

Water Resources Program

701 Ocean Street room 312, Santa Cruz, CA, 95060

Phone:(831) 454-7519 Fax:(831) 454-4770

Well Ordinance Update Context

Purpose:

The purpose of this document is to outline the factors that should be understood when evaluating the necessity for and impacts of the proposed amendments to Santa Cruz County Code Chapters 7.70 and 7.73.

Growth:

- There is limited allowable growth in rural areas due to the 1978 Growth Management Initiative Measure J, as well as other factors that limit development such as roads, septic constraints, slope, and fire risk. These restrictions are incorporated into the General Plan, which was recently updated, and can't be changed without a vote of the people.
- None of the zoning to meet the RHNA allotments are proposed for areas outside of municipal water supplies.
- None of the Groundwater Sustainability Plans in the County anticipate significant increases in pumping for rural or agricultural water users.

Limited new water use, mitigated by septic systems, recharge, and conservation:

- The County and Groundwater Sustainability Agencies estimates that a domestic user pumps between 0.3-0.5 AFY of water based on measured data from small water systems and the infrequency of large, irrigated landscapes throughout most of the rural parts of the county.
- Most homes served by wells are also on septic systems which are estimated to recharge 90% of indoor water use, which is up to 70% of total water used. For a home that pumps 0.5 AFY, that means 0.315 AFY is recharged.
- New development and some redevelopment are already required to retain pre-development stormwater recharge onsite.
- The County's geology is heterogeneous and many areas have a prevalence of fine grained materials that limit recharge – making a blanket recharge mitigation program infeasible.

- A property already recharging pre-development stormwater, with a septic adding additional water, will see little marginal benefits of additional small recharge projects, which must be properly maintained, and may compromise water quality.
- Permits for new water use in the County recently have been largely limited to domestic wells (approximately 10 well applications per year).
- New development and some redevelopment already requires the installation of water saving devices and water efficient landscapes. Non-de minimis wells must already fill out a water conservation form and new de minimis wells will be required to under the new permit as well.
- While there have been historical declines in groundwater levels, there are no parts of the County that are currently experiencing downward water level trends.
- New wells are not drawing from alluvium - in the last five years, only 7% of wells drilled are less than 200 feet deep and 73% are deeper than 300 feet.
- New large capacity wells are less common (0-2 per year) and still relatively small water users compared to other parts of the state (typically under 100 AFY).

Ample monitoring:

- There are 482 groundwater monitoring locations, and 53 surface monitoring locations tracked on the regional data management system. Note that not all of the sites are currently being actively monitored. Santa Cruz is the smallest County in California with the exception of San Francisco.
- The County has maintained a geodatabase for wells for over 20 years. Wells installed since that time have accurate spatial data and links to the well logs. Older wells are a mix of actual location, centroid of parcel, and centroid of grid location. The County has a grant to improve the legacy data quality and will be using innovative AI approaches to be more efficient with staff time.
- New and replacement wells pumping over 2AFY or supporting over ½ acre of irrigated landscape will be required to meter and report water use.

Limits to additional monitoring and modeling:

- Outside of the limited alluvial groundwater basins in the County, using representative monitoring points to inform groundwater management and the impacts of wells is of limited utility, as demonstrated by the Mid-County Groundwater Agency.
- Detecting depletion from pumping lower aquifers in the field is not possible, as demonstrated by the significant monitoring for depletion caused by the Soquel Creek Water District Main Street Well.
- There are three numerical models in the County. To estimate the impact of a single well costs around $6,000 per model run. If the well is within 100 feet of a stream it will likely over-estimate the impact of that well. The parts of the County without alluvial basins or marine sedimentary rock are mostly fractured crystalline rock, which is not suitable for the development of a numeric model.

Adaptability of Proposed Approach

- The approach taken by the County is to have the County Code point to Policy for a few different concerns such as water conservation and resource protection, rather than to have those guidelines adopted within the Code itself.
- While the Code takes approximately two years and upwards of $200,000 to update, policy updates can be brought to the Board of Supervisors for adoption in a matter of months.
- This allows for adaptive management over time as new information becomes available.

Allowable Depletion Limits:

- The work from Sonoma County, cognizant that there will be some impact to streamflow, determined that 10% depletion is acceptable in coho salmon bearing streams, and 20% depletion is acceptable in steelhead bearing streams.
- Santa Cruz County estimated current depletion from every major salmonid bearing stream that is or may be interconnected with groundwater more than 5% of the time using methodology recommended by the Nature Conservancy with the Natural Flows Database, stream gages, and known surface water diversions.
- Using thresholds protective of species lifecycles, the County calculated the additional allowable depletion for Tier 1-3 wells. Tier 4 wells would require additional analysis.
- Setback and seal depth requirements were determined for Tiers 1-3 that will limit the direct depletion from streams by new or replacement wells.
- Tier 4 are Discretionary review and thus trigger CEQA. Sometimes wells are exempt but likely they would result in an IS/MND that the County would likely lead. The applicant would have to provide the analysis of surrounding impacts as part of informing the IS (as outlined in Tier 4). I have to dig into this a little, but I know that when the Planning department does an IS/MND for development projects they also require a CDFW review, so I think that may be required for at least some of these cases as well.
- Tiers 1-4 are designed to limit the cumulative impacts of pumping to keep cumulative depletion below the allowable depletion thresholds.

Karst Protection

- Non-de minimis wells proposed in an area likely to experience solution caverns are automatically included in Tier 4. De minimis wells are exempt from this requirement.

Legal Landscape

- Barstow V. Mojave Water Agency: The California Supreme Court emphasized that water right priority is a fundamental principle in California water law. It affirmed that overlying property owners have the right to use water reasonably and beneficially.
- Environmental Law Foundation v. State Water Resources Control Board: The court found that the state has a duty to consider the public trust values of groundwater in

its management and regulation of the resource. It does not prohibit impacts on Public Trust Resources.
- Protecting Our Water and Environmental Resources v. County of Stanislaus: The court held that county well permitting decisions are discretionary and subject to CEQA review to determine if issuance of the well permit could potentially cause significant impacts to the environment or public health.

Fiscal Responsibility

- Every dollar and every minute of staff time spent on increasingly complicated analysis comes at the direct cost of other water management activities.

Water Quality:

- Currently, Public Community Water Systems are required to test for around 100 contaminants at the time of development and must test for over 70 contaminants on a regular basis. Based on the system location, other contaminants may be added.
- Water Quality testing of any kind for the development of an Individual Water System (IWS, also known as a domestic well) has only been required since the 1980s.
- In Santa Cruz County, domestic wells are currently only required to test for the following contaminants with primary drinking water Maximum Contaminant Levels (MCLs)- bacteria, nitrate, total dissolved solids, chlorides, as well as iron and manganese which have secondary MCLs which affect color, odor, and taste.
- There are many contaminants, naturally occurring and/or resulting from human activities, that can impact the water quality in an IWS. For example, the County is known to have elevated levels of contaminants such as arsenic and hexavalent chromium (typically associated with the movie Erin Brockovich).
- Residences on an IWS are not typically required to do any testing after the completion of the well.
- This means that most of the over 8,000 households with an IWS are drinking water that has never had comprehensive testing, which may present a health risk.
- The update to SCCC 7.73 is addressing this through the requirement that all new and replacement wells intended to be used as an IWS get tested for the full common range of contaminants (known as Title-22) as well as any additional tests recommended by the County based on the location of the well. Treatment may be required for some exceedances, and in that case, the requirement for treatment would be recorded on the Deed.
- Additionally, there will be a time-of-sale requirement that any household receiving its water from an IWS must test for Title-22 contaminants, and that the results are provided to the buyer through the Disclosures, as well as to the County. No requirement for treatment is included, that is something the buyer can negotiate with the seller. The requirement is waived for properties that have had comprehensive testing within three years of the sale date.

Drought resilience/supply protection:

- Climate change has altered the way water recharges local aquifers, a pattern that is expected to continue into the future.
- The geology of the County is extremely complex and some areas have a naturally limited supply of groundwater. Property owners and buyers may not be aware that their well is vulnerable to water shortages based on location.
- Senate Bill 552 includes requirements for drought response and planning on the part of Counties when it comes to domestic wells.
- Given the importance of a secure water supply for rural households, the update to SCCC 7.73 will require more extensive yield testing during well development in areas mapped as "Groundwater Concern Areas."
- Additionally, yield testing will now be a requirement for homes relying on an IWS for water supply at time-of-sale. The results of this testing must be included in the Disclosures. No restrictions on sale will be placed on properties based on the results, but it may impact negotiations between buyer and seller.

Chapter 7.70
WELLS AND BORINGS

Sections:

7.70.010 Purpose of provisions.

The purposes of this chapter are to:

(A)Provide for the location, construction, repair, and reconstruction of all wells, including geothermal heat exchange wells, cathodic protection wells, test wells, monitoring wells, and soil borings, to the end that the groundwater of this County will not be polluted or contaminated and that water obtained from such wells will be suitable for the purpose for which used and will not jeopardize the health, safety or welfare of the people of this County;

(B) Provide for the destruction of any abandoned wells, monitoring wells, test wells, geothermal heat exchange wells, cathodic protection wells or soil borings, which may serve as a conduit for movement of contaminants, or which are found to be a public nuisance, to the end that such a well or boring will not cause pollution or contamination of groundwater or otherwise jeopardize the health, safety or welfare of the people of this County;

(C) Protect surface and ground water resources, and related public trust resources; and,

(D) Implement policies of the County General Plan and the Local Coastal Program Land Use Plan, the California Sustainable Groundwater Management Act, and local groundwater sustainability plans.

7.70.015 Applicability.

Except as otherwise provided in this chapter, this chapter shall apply to all wells and soil borings within the unincorporated area of the County, except the following:

(A) Oil and gas wells, or geothermal wells constructed under the jurisdiction of the Department of Conservation, except those wells converted to use as water wells;

(B) Wells or bores used for the purpose of dewatering excavation during construction, or stabilizing hillsides or earth embankments; or
(C) Seepage Pits.

7.70.020 Definitions.
As used in this chapter, the following words shall have the meanings provided in this section:

(A) "Abandoned well" means any well whose original purpose and use have been permanently discontinued or which is in such a state of disrepair that it cannot be used for its original purpose. A well is considered abandoned when it has not been used for a period of one year, unless the owner demonstrates their intent to use the well again for supplying water or other associated purposes and the well is maintained as an inactive well.

(B) "Abatement" means the construction, reconstruction, repair or destruction of a well so as to eliminate the possibility that such well could pollute or contaminate groundwater.

(C) "Cathodic protection well" means any artificial excavation in excess of 50 feet in depth constructed by any method for the purpose of installing equipment or facilities for the protection electronically of metallic equipment in contact with the ground, commonly referred to as "cathodic protection."

(D) "Contamination" or "contaminated" means an impairment of the quality of water to a degree that water contains contaminants in excess of the applicable standards currently promulgated by the State Water Resources Control Board.

(E) "Contamination hazard" is the hazard to a well when the water entering a well contains, or that within a reasonable period of time it will likely contain, contaminants in excess of the applicable standards currently promulgated by the State Water Resources Control Board.

(F) "Control Zone" means an area around a groundwater management project where well drilling is prohibited. Control Zones are defined by a water district and/or groundwater sustainability agency in order to comply with state health and safety requirements as required by the Section 60320.200(e) of Title 22 of the California Code of Regulations.

(G) "Geothermal heat exchange well" means any uncased artificial excavation, by any method, that uses the heat exchange capacity of the earth for heating and cooling, and in which excavation the ambient ground temperature is 30 degrees Celsius (86 degrees Fahrenheit) or less, and which excavation uses a closed-loop fluid system to prevent the discharge or escape of its fluid into surrounding aquifers or other geologic formations. Geothermal heat exchange wells include ground source heat pump wells. Such wells or boreholes are not intended to produce water or steam.

(H) "Groundwater" means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water.

(I) "Groundwater Extraction Concern Area" means an area designated by the Health Officer where groundwater availability is limited due to inadequate supply or poor quality, or where construction of additional wells may cause significant adverse impacts on groundwater levels, surface water flow, or seawater intrusion.

(J) “Health Officer” means the County Health Officer or their authorized representative.

(K) “Inactive well” means a well not routinely operated but capable of being made an operating well with a minimum of effort.

(L) “Karst” means a type of underlying geology that may have the presence of subsurface fissures, caverns, sinkholes or other features resulting from dissolution of limestone or marble that could lead to the rapid subsurface movement of water. Known areas of karst are shown on maps maintained by the Health Officer and other underground karst areas may be discovered in the process of drilling.

(M) “Monitoring or observation well” means any artificial excavation by any method for the purpose of obtaining groundwater, vadose zone, or other subsurface data, including groundwater levels, groundwater quality, and soil vapor quality.

(N) “Order of abatement” means both mandatory and prohibitory orders requiring or prohibiting one or more acts; the term also includes those orders effective for a limited as well as an indefinite period of time, and includes modifications or restatements of any order.

(O) “Pajaro groundwater protection zone” means the area in the Pajaro Valley Groundwater Basin within the boundaries of the Pajaro Valley Water Management Agency.

(P) “Person” means any person, firm, corporation or governmental agency.

(Q) “Pollution” means an alteration of the quality of water to a degree that unreasonably affects:
    (1) Such waters for beneficial uses; or
    (2) Facilities which serve such beneficial uses.
    (3) Pollution may include contamination or the presence of contaminants in amounts less than the applicable standards currently promulgated by the State Water Resources Control Board.

(R) “Public Trust Resources” mean resources, such as fisheries, wildlife, aesthetics, and navigation, which are held in trust for the public.

(S) “Seepage pit” means a large diameter borehole for the disposal of sewage.

(T) “Soil Boring or Boring” means an excavation or boring constructed to obtain information on subsurface conditions.

(U) “Stormwater infiltration device or dry well” means a trench or large diameter borehole for the infiltration of stormwater.

(V) “Sustainable yield” means the annual draft of water that can be withdrawn from an aquifer without producing some significant unreasonable, undesirable result such as chronic lowering of groundwater levels, reduction of storage, seawater intrusion, degraded water quality, depletion of interconnected surface water. Where applicable, sustainable yield would be as defined by the Groundwater Sustainability Agency in their Groundwater Sustainability Plan or Alternative.

(W) "Test well" means a well constructed for the purpose of obtaining information needed to design a well prior to its construction. Test wells are cased and can be converted to observation or monitoring wells and under certain circumstances to production wells.

(X) "Tier" means the type of well application and the level of review and conditions that will be needed for approval based on the proposed volume of pumping, type of water use, proposed increase in water use, the aquifer characteristics and the potential for impact on streams, public trust resources, nearby wells, groundwater sustainability, control zones, and/or the environment.

(Y) "Water Well" means a well constructed to extract groundwater. Types of water wells include:

(1) "Agricultural well" means a water well used to supply water for commercial agricultural purposes, including so-called "livestock wells."

(2) "Community well" means a water well used to supply water for domestic purposes in public water systems or state small water systems as defined in Section 116275 of the Health and Safety Code.

(3) "De Minimis Well" means a water well used to supply water for domestic needs of up to four individual primary residences using a total of less than 2 acre-feet per year. An approved accessory dwelling unit is not considered a separate primary residence for this purpose. De minimis domestic use may include up to one half acre of non-commercial residential irrigated landscaping and gardening per primary unit.

(4) "Industrial well" means a water well used to supply industry or a commercial use on an individual basis.

(5) "New Well" means a water well that will serve a new or significantly expanded use, which represents an increased extraction of groundwater.

(6) "Replacement Well" means a water well that will serve an existing use with no significant increase in water use and will replace an existing water source such as a spring or well that is to be destroyed.

(7) "Supplemental Well" means a water well that that will support an existing use with no overall increase in water use. The existing source could be a shared well or other well that will be maintained as a backup source.

(Z) "Well" means any artificial excavation, constructed by any method for the purpose of extracting water or injecting water into the underground, evaluating subsurface conditions, providing for geothermal heat exchange or cathodic protection, or any other subsurface installation that may create a potential conduit or preferential pathway for movement of water or contaminants to groundwater.

(AA) "Well reconstruction" or "well repair" means certain work done to an existing well in order to restore its production, replace defective casing, seal off certain strata or surface water, or similar work, not to include the cleaning out of sediments or surging, or maintenance to the pump or appurtenances where the integrity of the annular seal or water-bearing strata is not violated.

7.70.030 Permit—Required—Issuance.

(A) No person shall, within the unincorporated area of the County, construct, repair, reconstruct or destroy any well, abandoned well, cathodic protection well, geothermal heat exchange well, monitoring well, test well, or soil boring unless a written permit has first been obtained from the Health Officer as provided in this chapter, and the work conforms to the conditions of such permit and this chapter.

Applications for such permits shall be made on the forms provided for that purpose and in accordance with procedures established by the Health Officer.

(B) A coastal development permit shall be required for any well proposed to be drilled in the Coastal Zone unless exempt or excluded as provided in Chapter 13.20 SCCC.

(C) Well permits for wells that meet the Tier 1, Tier 2 or Tier 3 requirements of SCCC 7.70.110(E) of this chapter are ministerial unless the issuance of the well permit requires one or more discretionary approvals pursuant to Chapter 13.20, 16.20, 16.30, 16.32, 16.40, or 16.42 SCCC.

(D) For proposed wells that do not meet the Tier 1, Tier 2, or Tier 3 requirements of SCCC 7.70.110(E), the Health Officer may require a report evaluating the potential impact of the proposed well to nearby wells, surface waters, public trust resources, or groundwater sustainability that is to be prepared and submitted to the Health Officer prior to issuance of a well permit. The report shall be prepared by a professional geologist, engineering geologist, or professional engineer and shall at a minimum include conclusions and data supporting the conclusions including a description of site and regional geology, subsurface conditions, strata, direction and rate of groundwater flow, locations of nearby water wells, and construction details for those wells as can be determined based on existing data. The report shall describe proposed well construction methods and other measures to be taken to prevent adverse impacts of the well. The Health Officer shall deny a well permit or require specific construction requirements in order to prevent significant adverse impacts on nearby wells, surface water, public trust resources, or groundwater sustainability as defined by the applicable groundwater sustainability agency.

(E) Each application shall be accompanied by a filing fee set by resolution of the Board of Supervisors. No part of the fee shall be refundable.

(F) Water well permit applications shall be transmitted to the water system, water district, and/or groundwater sustainability agency that has jurisdiction over the parcel where the proposed well will be located or that could be impacted by the proposed well. Those entities shall have ten business days to provide any comment, request additional information, or identify any other requirements that must be met for the construction of the proposed well within their jurisdiction.

(G) Within 20 business days after receipt of a complete application including all studies or additional information requested by the Health Officer, the County Health Officer shall either grant or deny the permit. Well permits shall be issued only if the proposed well is in compliance with all applicable County codes and will be located on a legal lot of record. Well permits may be approved with specific requirements to comply with this chapter.

(H) At the discretion of the Health Officer and prior to the commencement of any work, an emergency approval may be granted for any work for which a permit is required by this chapter if the Health Officer determines that a sudden, unexpected occurrence demands immediate action to prevent loss of or damage to life, health, property, or essential public services, and it is not practical to obtain a permit before the commencement of the work. The Health Officer may request, at the applicant's expense, verification by a professional geologist, engineering geologist, or professional engineer of the nature of and solutions to the emergency situation. In all cases in which emergency work is necessary, a permit shall be applied for within three (3) business days after commencement of the work. If emergency approval by the Health Officer is not requested or an application is not submitted within the specified time, the work shall be considered a violation of this chapter. The applicant for a permit for any such

emergency work shall demonstrate that all work performed is in compliance with the technical standards of SCCC 7.70.090.

(I) Any person who commences or completes any work for which a permit is required without first having obtained a permit therefor shall, if subsequently permitted to obtain a permit, pay double the permit fee established by resolution of the Board of Supervisors for such work. If such well does not meet the requirements of this Chapter, the Health Officer shall require the well to be destroyed under permit.

7.70.040 Permit—Expiration

(A) Each permit issued pursuant to this chapter shall expire and become null and void if the work authorized thereby has not been completed within two (2) years following the issuance of the permit.

(B) Upon expiration of any permit issued pursuant thereto, no further work may be done in connection with construction, repair, reconstruction or destruction of a well, monitoring well, test well, geothermal heat exchange well, cathodic protection, or soil boring well unless and until a new permit for such purpose is secured in accordance with the provisions of this chapter.

(C) The Health Officer may authorize renewal of a permit for an additional year upon payment of 20 percent of the application fee within 180 calendar days after the date of permit expiration.

7.70.050 Permit—Suspension or revocation(A) A permit issued under this chapter may be revoked or suspended by the Health Officer as provided in this section if they determine that a violation of this chapter exists, that written notice has been directed to the permittee specifying the violation, and that the permittee has failed or neglected to make necessary adjustments within thirty (30) calendar days after receiving such notice.

(B) A permit may be revoked or suspended by the Health Officer if they determine at a hearing held by the Health Officer for such purpose that the person to whom any permit was issued pursuant to this chapter has obtained the same by fraud or misrepresentation; provided, that notice of the time, place, and purpose of such hearing is given to the permittee at least five (5) calendar days prior thereto.

(C) The suspension or revocation of any permit shall not be effective until notice thereof in writing is provided to the permittee.

7.70.060 Licensed contractor required.
Construction, reconstruction, repair, and destruction of all wells covered by this Chapter, shall be performed by a contractor with a C-57 contracting license or an equivalent license issued by the Department of Professional and Vocational Standards.

7.70.070 State and Federal reporting regulations.
Nothing contained in this chapter shall be deemed to release any person from compliance with the provisions of Article 3, Chapter 10, Division 7 of the California Water Code or any other State or Federal reporting regulations.

7.70.080 Inspections.

(A) Upon receipt of an application, an inspection of the location of the well, test well, geothermal heat exchange well, or cathodic protection well shall be made by the Health Officer prior to issuance of a well permit. Inspection of monitoring well and soil boring locations prior to permit issuance may be made by the Health Officer.

(B) The person responsible for construction, reconstruction, or destruction of any well shall notify the Health Officer at least 48 hours prior to commencement of work. All work shall be subject to inspection by the Health Officer to ensure compliance with all the requirements of this chapter.

(C) The Health Officer shall make inspection of the well seal and completed work to determine compliance with the well standards. After work has been completed, the person performing the work shall file with the Health Officer a notice of completed work or a copy of the California Department of Water Resources well report.

7.70.090 Technical standards.

Standards for the construction, repair, reconstruction of, or destruction of wells, abandoned wells, monitoring wells, test wells, geothermal heat exchange wells, and cathodic protection wells shall be as set forth in Chapter II of the Department of Water Resources Bulletin No. 74-81, "Water Well Standards" (December 1981), the Department of Water Resources Bulletin No. 74-90, "Water Well Standards" (June 1991), and Chapter II of the Department of Water Resources Bulletin No. 74-1, "Cathodic Protection Well Standards" (March 1973), or as subsequently revised or supplemented, which are incorporated by reference in this chapter, with the following modifications:

(A) The minimum horizontal distance between wells and potential sources of contamination shall be:

(1) 100 feet between subsurface sewage leaching fields, septic tanks, or animal enclosures If the property is already developed and served by a well that is less than 100 feet from the septic system, and if no other alternative water source is available, a replacement well may be drilled less than 100 feet from the septic system if a sanitary seal at least 100 feet deep is installed and the existing well is destroyed under permit.

(2) 150 feet to seepage pit

(3) 150 feet between a community well and subsurface sewage dispersal system less than 10 feet deep

(4) 200 feet between a community well and a subsurface sewage dispersal system greater than 10 feet deep. A greater separation up to 600 feet may be required in order to maintain a 2 year time of travel.

(B) No well shall be constructed within 50 feet horizontal from the property line of the property owner authorizing construction of the well. This setback may be reduced to not less than five feet horizontal if the owner of the adjacent property authorizes a reduction in setback or if the Health Officer determines area on the adjacent property within 100 feet of the proposed well is unsuitable for installation of an onsite sewage disposal system.

(C) All wells shall be constructed so that the well seal shall be a minimum of 50 feet below the surface of the ground. If usable water is only available less than 50 feet from the surface, the Health Officer may allow the seal depth to be reduced to not less than 20 feet if the well construction, site conditions, and the characteristics of the underlying geology will preclude the downward movement of contaminants into the aquifer.

(D) Drilling fluids and other drilling materials used in connection with well construction shall not be allowed to discharge onto streets or into waterways; and shall not be allowed to discharge off the parcel on which the well is constructed onto adjacent properties; provided, that adjacent property may be used temporarily for the discharge of such fluids and materials pursuant to written agreement with the owner(s) of the adjacent property; and provided, that such fluids and materials are removed and cleaned up within thirty (30) days of completion of the well drilling.

(E) Water generated during test pumping of wells shall be dispersed or disposed of in a manner which will not cause excessive erosion or turbidity, in violation of Chapter 16.22 or 16.24 SCCC.

(F) Subsections (A), (B) and (C) of this section do not apply to monitoring wells.

(G) New wells that supply water to a public water system must use the methodology, as required by the State of California State Water Resources Control Board Drinking Water Source Assessment and Protection Program, to determine the 10-year time-of-travel groundwater protection zone. For other wells, e.g., de minimis wells, the default groundwater protection zone minimum radius of 1,000 feet for a five-year time-of-travel shall be used to protect the drinking water source from chemical contamination. If sites with existing soil and/or groundwater contamination are present within the 10-year zone for public water systems, or five-year zones for other wells such as domestic wells, and the Health Officer determines that there is a potential for a contamination hazard to be created, the Health Officer may require that a report evaluating the potential for contamination or pollution of the well from existing nearby activities be prepared prior to issuance of a well permit. The report shall be prepared by a professional geologist, engineering geologist, or professional engineer and shall at a minimum include conclusions and data supporting the conclusions including without limitations a description of site and regional geology, subsurface conditions, strata, direction and rate of groundwater flow, locations of vicinity water wells, and construction details for those wells as can be determined based on existing data. The report shall describe proposed well construction methods and other measures to be taken to prevent contamination or pollution of the well and surrounding aquifers. The Health Officer shall deny a well permit or require specific construction requirements in order to prevent contamination or pollution of the well or surrounding aquifers.

(H) The Health Officer shall have the power to allow minor variances from the standards set forth in this section so as to prevent unnecessary hardship or injustice and at the same time accomplish the general purpose and intent of the standards and the resource protection policies of the County's General Plan and Local Coastal Program Land Use Plan. In no case may a variance be granted that constitutes a special privilege.

(I) The Health Officer may establish standards and procedures for the construction and destruction of wells or soil borings to be used for evaluation, monitoring or remediation of sites with known or threatened contamination.

7.70.100 Well abandonment and destruction—Inactive well.

(A) A well is considered abandoned when it has not been used for a period of one (1) year and it is not being maintained as a monitoring well or an inactive well.

(B) The owner of an inactive well shall properly maintain the well in such a way that:

(1) The well is covered such that the cover is watertight and cannot be removed, except with the aid of equipment or the use of a tool.
(2) The well is marked so it can clearly be seen.
(3) The area surrounding the well is kept clear of brush or debris.
(4) The pump shall be maintained in the well with an approved power supply, except for temporary removal for repair or replacement.

(C) On abandonment of a well, or on the order of the Health Officer, a well shall be destroyed under permit by methods described in Bulletin Nos. 74-81 and 74-90, or as subsequently revised or supplemented, which are incorporated by reference in this chapter with the following modifications.
(1) All open wells shall be immediately capped with a fixed cover until the well is properly destroyed.
(2) The well shall be completely sealed with acceptable sealing material from the true bottom of the well up to five (5) feet of the surface. The casing should be cut off five (5) feet below the surface, with the excavation backfilled by compacted native material.
(3) Acceptable sealing materials are 23 sack neat cement, 10 sack cement grout, , or any other compound approved by the Health Officer.
(4) A tremie pipe or other method approved by the Health Officer shall be used to pump the sealing material into the well under pressure if the well is over 30 feet deep or more than three (3) feet of standing water is present in the well.
(5) Where there is potential for movement of contaminants between the outside of the well casing and the borehole, the Health Officer shall require perforation of the casing at certain depths, overdrilling, and/or other techniques which will seal the annular space outside the well casing as needed to prevent the migration of contaminants.
(6) For destruction of wells where groundwater quality problems are known to exist, the Health Officer may require that destruction be designed and supervised by a professional geologist, professional engineer, or other qualified person. The proposed method of destruction shall be subject to approval by the Health Officer prior to performance of the work.

(D) A well which has any defects which will allow the impairment of quality of water in the well or in the water-bearing formations penetrated shall be destroyed and may not be designated inactive. In areas where groundwater problems are known to exist, abandoned wells that penetrate and/or are perforated in two or more aquifers shall be destroyed and may not be designated inactive.

(E) To prevent the contamination of underground water supplies through open wells, no person shall knowingly permit the existence on premises in their ownership or possession or control of any well opening or entrance which is not sealed or secured in such a way as to prevent the introduction of contaminants.

(F) No person shall knowingly permit on premises in their ownership or possession or control the existence of any abandoned well that constitutes a known or probable pathway for the vertical movement of contaminants.

7.70.105 Soil Borings.

The Health Officer shall establish policies and procedures for installation and destruction of soil borings so that such soil borings do not create a conduit or preferential path for movement of contaminants into groundwater.

7.70.107 Stormwater Infiltration Devices.
The Health Officer shall establish policies and procedures for installation and destruction of stormwater infiltration devices so that such installations do not create a conduit or preferential path for movement of contaminants into groundwater.

7.70.110 Resource protection.

(A) Within the Pajaro groundwater protection zone, and in other areas where water contains constituents in excess of the applicable standards currently promulgated by the California Department of Health or where a monitoring agency or groundwater sustainability agency has determined that seawater intrusion is threatened, all wells shall be constructed in such a manner that the well does not provide a conduit for contamination or pollution between aquifers.

(1) In such areas, the Health Officer shall impose a requirement for new wells which penetrate more than one aquifer that an electric log device measuring spontaneous potential and resistivity be run in the uncased well borehole by a certified hydrologist, geohydrologist or other qualified person approved by the Health Officer. Based on the data obtained from the electric log and the geologic log of the well, the certified hydrologist, geohydrologist or other qualified person approved by the Health Officer shall identify strata containing poor water quality and recommend to the well driller the location and specifications of the seal or seals needed to prevent the entrance of poor-quality water or its migration into other aquifers.

(2) The well shall be completed with the seal or seals specified by the certified hydrologist, geohydrologist or other such qualified person approved by the Health Officer. The person performing and evaluating the electric log shall submit a written report to the Health Officer.

(B) Prior to completion of a well, a water sample shall be collected and tested for total dissolved solids, chloride, nitrate, and any other constituent which the Health Officer has reason to believe could be present in the well. The sample results shall be submitted to the Health Officer. If any constituent exceeds drinking water standards, the Health Officer shall require testing and sealing of the well pursuant to subsection (A) of this section. If standards for the proposed use cannot be met or the aquifer cannot be adequately protected from contamination or pollution, the Health Officer shall require that the well be destroyed. The Health Officer may require additional water quality testing upon completion of the well.

(C) Each application for a new, supplemental, or replacement well shall accurately specify the parcels proposed to be served, the type of land uses to be served, the estimated annual water use for non-de minimis wells, and the presence of any existing wells which also serve those uses. The Health Officer may require documentation to support the water use estimates provided.

(D) For new, supplemental, or replacement wells, the following measures will be taken to ensure that groundwater is put to beneficial use and is not wasted:

(1) A water use efficiency evaluation shall be completed, with recommendations for increased efficiency of use identified. The Health Officer shall require that all reasonable measures be implemented.

(2) In lieu of performing an efficiency evaluation as required by subsection (D)(1) of this section, the property owner may provide verification that conservation measures to achieve efficient interior and exterior water use have been taken.

(3) For new uses that will be developed after the well is completed, the property owner shall provide certification that conservation measures will be implemented as a part of the new use.
(4) Requirements for water efficiency evaluations and acceptable conservation measures shall be established by policy by the Health Officer. The Health Officer may specify maximum annual water use based on Tier and mitigation of potential impacts.
(5) A meter shall be installed and maintained to accurately measure water use and usage shall be reported annually to the Health Officer, according to procedures established by the Health Officer. The cost of meter installation, maintenance and reporting shall be borne by the well owner(s).
(6) The Health Officer may require the property owner to provide information to confirm that the required conservation measures are being maintained. If such information is not provided or water usage is not being reported, the Health Officer may conduct an inspection to observe the meter and/or verify that water conservation measures are being maintained. Inspections shall be conducted at reasonable times and the inspector shall first make a reasonable effort to contact the property owner(s) or occupant(s) of the premises. If the inspection requires the entry into a building or an area that is designed for privacy, then prior permission shall be obtained from any of the property owner(s) or occupant(s). If permission is denied, then a site inspection warrant shall be obtained.
(7) If the usage information or the results of a site inspection show that the well owner is not in compliance with this Chapter or with the requirements of the permit, the Health Officer shall require that corrective measures be taken.

(E) Each application for a new, supplemental, or replacement well shall be evaluated and specific measures may be required to ensure that the well will not have significant adverse impacts on groundwater sustainability, nearby wells, surface water, or the environment. The level of evaluation and required measures will depend on the Tier in which the well falls, based on the type of well, the location, and the aquifer characteristics. The Health Officer shall establish specific criteria and procedures for assigning the Tier and the extent of required evaluation and protective measures. Such criteria shall be adopted by resolution of the Board of Supervisors. The Health Officer may deny applications for Tier 4 wells that will have a significant adverse impact on groundwater sustainability, nearby wells, surface water, or the environment.

(1) Tier 1 will include de minimis wells and non-domestic wells using less than 2 acre-feet per year that do not require any discretionary review under other chapters of the SCCC and meet the minimum standards for preventing impacts on streams and nearby wells based on aquifer characteristics, well characteristics, depth of well seal, and location.
(2) Tier 2 will include supplemental and replacement non-de minimis wells with no significant increase in water use and meet the minimum standards for preventing impacts on streams and nearby wells based on aquifer characteristics, well characteristics, depth of well seal, and location.
(3) Tier 3 will include new non-de minimis wells serving new uses that will pump less than 50 acre-feet per year and Tier 1 or Tier 2 wells that do not meet the Tier 1 or Tier 2 requirements. Tier 3 wells must also meet the minimum Tier 3 requirements for stream depletion and nearby well drawdowns.
(4) Tier 4 will include wells that do not meet the Tier 1, 2, or 3 requirements, are in a control zone, are in specified Tier 4 Groundwater Extraction Concern Areas, or are wells that could adversely affect the sustainability of a groundwater basin.

(F) A well permit shall not be approved for a well that poses a significant conflict with the implementation of a groundwater replenishment project or other project specified in an adopted groundwater sustainability plan as determined by the affected water district or groundwater sustainability agency.

(G) For non de minimis wells, if a well is proposed in a known karst area or if karst is encountered during the drilling process, further drilling shall be suspended, and the Health Officer shall evaluate whether a well can be completed without causing adverse impacts on groundwater resources, surface waters, or other water users. The Health Officer shall establish procedures for such evaluation and may require analysis at the expense of the applicant by a professional geologist familiar with occurrence and movement of water in karst landscapes. Recommendations may include procedures for destroying the borehole without adversely affecting subsurface conditions.

(H) Wells located in designated groundwater extraction concern areas will be subject to additional requirements to ensure reliability, adequate quality, and limited resource impact, as established by the Health Officer's policy. Approval of wells located in Tier 4 groundwater extraction concern areas shall be discretionary and may not be granted if resource impacts cannot be mitigated.

(I) If a groundwater sustainability agency has required metering or other conditions for an existing, new, replacement, or supplemental well, the property owner shall abide by those requirements. If the usage information or the results of a site inspection show that the well owner is not in compliance with those requirements, the Health Officer shall require that corrective measures be taken.

(J) New, supplementary, or replacement wells shall not be constructed within a designated control zone for a groundwater management project.

7.70.120 Soquel Creek service area restrictions.

(A) Findings. The Board of Supervisors finds and determines that:

(1) Several reports have been prepared which indicate the potential for seawater intrusion into the Santa Cruz Mid-County Groundwater Basin; and

(2) There is need for careful monitoring and management of the groundwater basin; and

(3) Careful management is greatly facilitated by restricting the number of new wells and requiring that new development be supplied by Soquel Creek Water District, a public agency empowered to carry out monitoring and management efforts; and

(4) Construction of new wells within the water district service area increases the potential public health hazard of cross-connection between public and private water systems; and

(5) Current County General Plan policies require that new development within the urban services line be served by a public water system.

(B) Well Construction within the Soquel Creek Water District Service Area. The construction of new wells shall be prohibited on parcels that are within 200 feet horizontal of a water distribution line of the Soquel Creek Water District.

(C) New Well Construction—Exceptions. The following new well construction shall not be subject to the prohibition of this section:

(1) Replacement of existing wells;

(2) Construction of a well for commercial agricultural use, monitoring and observation purposes, geothermal heat exchange or cathodic protection; and

(3) Well construction on parcels which cannot be served by the Soquel Creek Water District, as determined by the Environmental Health Director based on a written statement from the District clearly demonstrating their inability to provide service.

(4) Construction of a well by any public water purveyor or state small water system.

7.70.130 Groundwater emergencies.

A groundwater emergency shall be declared in areas demonstrated to be experiencing a groundwater overdraft exceeding the sustainable yield in order to prevent further depletion and degradation of water resources where such degradation threatens the public health, safety and welfare of the community, or the ability of a groundwater sustainability agency to meet its minimum thresholds, and where the Board of Supervisors finds that adequate measures are not already being taken to alleviate the overdraft situation. The emergency shall have no effect on drilling of monitoring, soil borings, geothermal heat exchange, or cathodic protection wells.

(A) Declaration. A declaration of a groundwater emergency shall be made by the Board of Supervisors only after a public hearing. Such an emergency shall be declared by resolution of the Board of Supervisors after the public hearing to consider all relevant information such as, but not limited to, the most current groundwater study, recommendations of groundwater sustainability agencies, water purveyors, and the Water Advisory Commission and only after the following findings can be made:

(1) The designated area is experiencing a groundwater overdraft exceeding the long-term sustainable yield;

(2) The creation of new wells or the expansion of existing wells will significantly increase the demand on the affected aquifer and thereby increase the overdraft;

(3) The continuation of the overdraft will result in further depletion and degradation of the water resource that can lead to, but is not limited to, impairment of the aquifer, allowing the ingress of low-quality or saline water, or other undesirable results; and

(4) Adequate measures are not being taken by water users and other responsible agencies to alleviate the overdraft situation.

(B) Immediate Measure to Alleviate. In areas where a groundwater emergency is declared, the Board of Supervisors shall take action to establish water conservation measures, to limit construction of new wells, to regulate pumping from or expansion of existing wells, in order to prevent further depletion and degradation of the affected aquifer. In taking these actions, the Board of Supervisors shall give consideration to the seasonal needs of agriculture including, but not limited to, the following factors.

(1) Agriculture's need to repair, maintain, and replace existing wells serving existing agricultural use acreage;

(2) Well construction for agricultural use to serve existing agricultural acreage when new parcels are created due to change in legal ownership, split parcels or parcels created by change in zoning laws, or other governmental regulations; and

(3) The different water requirements of agricultural crops.

(C) Long-Term Measures to Alleviate. The Board of Supervisors shall initiate actions such as, but not limited to, joint power agreements with other agencies with the goal of finding permanent solutions to the groundwater problem.

(D) Duration. A groundwater emergency and the measures enacted to alleviate the emergency shall remain in effect until rescinded as established in subsection (F) of this section.

(E) Annual Review. The establishment of a groundwater emergency and all actions to alleviate the emergency shall be reviewed by the Board of Supervisors within one (1) year of the date of enactment of the measures at a public hearing to decide whether the declaration of emergency shall remain in effect.

(F) Rescinding. A groundwater emergency shall be rescinded by resolution of the Board of Supervisors after a public hearing when one of the following findings is made:

(1) Alternative water sources which compensate for the existing overdraft and supply the affected area are developed;

(2) A groundwater management program is implemented which will allow for additional development without contribution to groundwater overdraft; or

(3) The Board of Supervisors determines that new information is available which indicates that the technical data upon which the original findings were based is no longer valid.

7.70.140 Abatement—Investigation.

The Health Officer may, upon reasonable cause to believe that an abandoned well, a cathodic protection well, or any other well or soil boring that may potentially either contaminate or pollute groundwater, investigate the situation to determine whether such potential threat to groundwater quality or present nuisance does, in fact, exist. The Health Officer shall have the power upon presenting identification to any person apparently in control of the premises to enter upon any such premises between the hours of 8:00 a.m. and 6:00 p.m. to discover or inspect any thing or condition which may indicate such a nuisance or threat to groundwater quality. The Health Officer may examine such premises, things or conditions, take such samples and make such tests as needed, and take other steps reasonably necessary for the proper investigation and determination of whether a nuisance or threat to groundwater quality exists.

7.70.150 Abatement generally.

Whenever the Health Officer determines that an abandoned well, a cathodic protection well, or any other well or soil boring is presently polluting or contaminating groundwater, or poses a substantial threat to groundwater quality, or is otherwise not in compliance with the provisions of this chapter, the Health Officer shall abate the well as a nuisance in accordance with the provisions of Chapter 1.14 SCCC.

7.70.160 Nuisance—Abatement of safety hazard.

This chapter shall not affect the right of the County to abate as a public nuisance pursuant to Article 9, Chapter 1, Division 1, Title 5, of the Government Code (commencing with Section 50230) any abandoned well, cathodic protection well, or other well or soil boring which presents a safety hazard.

7.70.170 Amendments.

Any revision to this chapter which applies to the Coastal Zone shall be reviewed by the Executive Director of the California Coastal Commission to determine whether it constitutes an amendment to the Local Coastal Program. When an ordinance revision constitutes an amendment to the Local Coastal

Program, such revision shall be processed pursuant to the hearing and notification provisions of Chapter 13.03 SCCC, and shall be subject to approval by the California Coastal Commission.

7.70.180 Violations.

(A) In the event of a violation of the provisions of this chapter or the conditions of any permit issued under this chapter, the property owner/permittee shall be given notice of such violation and a reasonable time to correct the violation.

(B) Whenever the Health Officer visits a property to ensure compliance with a permit condition or a notice to correct violation, and the condition or requirement is not satisfied or the violation has not been corrected, the property owner shall be subject to a violation reinspection fee, the amount to be established by resolution of the Board of Supervisors.

7.70.190 Recording notices of violations.

Whenever the Health Officer has knowledge of a violation of any of the provisions of this chapter or any condition of a permit issued under this chapter, the Health Officer may provide a notice of intent to record a notice of violation to the owner of the property on which the violation is located. Notice shall be provided by posting on the property and by mail at the address shown on the latest assessment roll or at any other address of the owner known to the Health Officer. The notice shall state that within twenty (20) calendar days of the date of the notice, the owner may request a meeting with the Health Officer to present evidence that a violation does not exist. In the event that a meeting is not requested and the violation has not been corrected, or, in the event that after consideration of the evidence the Health Officer determines that a code violation in fact exists, the Health Officer may record a notice of code violation in the office of the County Recorder. At the request of any affected property owner, the Health Officer shall issue a notice of expungement of code violation upon correction of any violation noticed hereunder. The notice of expungement may be recorded by the affected property owner at their expense. The decision of the Health Officer shall be final.

7.70.200 Promulgation of policies.

Any policy, specification, or procedure which the Health Officer is authorized by this chapter to adopt shall be in writing with copies made available to the public. Such policies, specifications or procedures shall be made available to the public thirty (30) days before their implementation by the Health Officer.

Chapter 7.70
~~WATER~~ WELLS AND BORINGS

Sections:

7.70.010 Purpose of provisions.

~~It is the purpose~~The purposes of this chapter are to ~~provide~~:

(A)Provide for the location, construction, repair, and reconstruction of all wells, including geothermal heat exchange wells, cathodic protection wells, test wells ~~and~~, monitoring wells, and soil borings, to the end that the groundwater of this County will not be polluted or contaminated and that water obtained from such wells will be suitable for the purpose for which used and will not jeopardize the health, safety or welfare of the people of this County~~. It is also the purpose of this chapter to provide~~;

(B) Provide for the destruction of any abandoned wells, monitoring wells, test wells, geothermal heat exchange wells, ~~or~~ cathodic protection wells or soil borings, which may serve as a conduit for movement of contaminants, or which are found to be a public nuisance, to the end that such a well or boring will not cause pollution or contamination of groundwater or otherwise jeopardize the health, safety or welfare of the people of this County~~. It is also the purpose of this chapter to implement policies of the County General Plan and the Local Coastal Program Land Use Plan.~~ ;

(C) Protect surface and ground water resources, and related public trust resources; and,

(D) Implement policies of the County General Plan and the Local Coastal Program Land Use Plan, the California Sustainable Groundwater Management Act, and local groundwater sustainability plans.

7.70.015 Applicability.

Except as otherwise provided in this chapter, this chapter shall apply to all wells and soil borings within the unincorporated area of the County, except the following:

(A) Oil and gas wells, or geothermal wells constructed under the jurisdiction of the Department of Conservation, except those wells converted to use as water wells;
(B) Wells or bores used for the purpose of dewatering excavation during construction, or stabilizing hillsides or earth embankments; or
(C) Seepage Pits.

7.70.020 Definitions.
As used in this chapter, the following words shall have the meanings provided in this section:

(A) ~~(A)~~ "Abandoned well" means any well whose original purpose and use have been permanently discontinued or which is in such a state of disrepair that it cannot be used for its original purpose. A well is considered abandoned when it has not been used for a period of one year, unless the owner demonstrates ~~his~~their intent to use the well again for supplying water or other associated purposes and the well is maintained as an inactive well.

(B) ~~(B)~~ "Abatement" means the construction, reconstruction, repair or destruction of a well so as to eliminate the possibility that such well could pollute or contaminate groundwater.

~~(C)~~

~~(1) "Agricultural well" means a water well used to supply water for commercial agricultural purposes, including so-called "livestock wells."~~

(C) ~~(D)~~ "Cathodic protection well" means any artificial excavation in excess of 50 feet in depth constructed by any method for the purpose of installing equipment or facilities for the protection electronically of metallic equipment in contact with the ground, commonly referred to as "cathodic protection."

~~(E) "Community water supply well" means a water well used to supply water for domestic purposes in systems subject to Chapter 7 of Part 1 of Division 5 of the California Health and Safety Code (commencing with Section 4010).~~

(D) ~~(F)~~ "Contamination" or "contaminated" means an impairment of the quality of water to a degree that water contains contaminants in excess of the applicable standards currently promulgated by the ~~California Department of Health Services~~State Water Resources Control Board.

(E) ~~(G)~~ "Contamination hazard" is the hazard to a well when the water entering a well contains, or that within a reasonable period of time it will likely contain, contaminants in excess of the applicable standards currently promulgated by the ~~California Department of Health Services~~State Water Resources Control Board.

(F) ~~(H)~~ "Control Zone" means an area around a groundwater management project where well drilling is prohibited. Control Zones are defined by a water district and/or groundwater sustainability agency in order to comply with state health and safety requirements as required by the Section 60320.200(e) of Title 22 of the California Code of Regulations.

(G) "Geothermal heat exchange well" means any uncased artificial excavation, by any method, that uses the heat exchange capacity of the earth for heating and cooling, and in which excavation the ambient ground temperature is 30 degrees Celsius (86 degrees Fahrenheit) or less, and which excavation uses a closed-loop fluid system to prevent the discharge or escape of its fluid into

surrounding aquifers or other geologic formations. Geothermal heat exchange wells include ground source heat pump wells. Such wells or boreholes are not intended to produce water or steam.

(H) ~~(I)~~ "Groundwater" means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water.

(I) "Groundwater Extraction Concern Area" means an area designated by the Health Officer where groundwater availability is limited due to inadequate supply or poor quality, or where construction of additional wells may cause significant adverse impacts on groundwater levels, surface water flow, or seawater intrusion.

(J) "Health Officer" means the County Health Officer or ~~his/her~~their authorized representative.

~~(J) "Individual domestic well" means a water well used to supply water for domestic needs of an individual residence or commercial establishment.~~

~~(K) "Industrial well" means a water well used to supply industry on an individual basis.~~

(K) ~~(L)~~ "Inactive well" means a well not routinely operated but capable of being made an operating well with a minimum of effort.

~~(M) "Observation or monitoring well" means a well constructed or modified for the purpose of observing or monitoring groundwater conditions.~~

(L) ~~(N)~~ "Karst" means a type of underlying geology that may have the presence of subsurface fissures, caverns, sinkholes or other features resulting from dissolution of limestone or marble that could lead to the rapid subsurface movement of water. Known areas of karst are shown on maps maintained by the Health Officer and other underground karst areas may be discovered in the process of drilling.

(M) "Monitoring or observation well" means any artificial excavation by any method for the purpose of obtaining groundwater, vadose zone, or other subsurface data, including groundwater levels, groundwater quality, and soil vapor quality.

(N) "Order of abatement" means both mandatory and prohibitory orders requiring or prohibiting one or more acts; the term also includes those orders effective for a limited as well as an indefinite period of time, and includes modifications or restatements of any order.

(O) ~~(O)~~ "Pajaro groundwater protection zone" means the area in the Pajaro Valley Groundwater Basin within the boundaries of the Pajaro Valley Water Management Agency.

(P) ~~(P)~~ "Person" means any person, firm, corporation or governmental agency.

(Q) ~~(Q)~~ "Pollution" means an alteration of the quality of water to a degree that unreasonably affects:

(1) ~~(1)~~ Such waters for beneficial uses; or

(2) ~~(2)~~ Facilities which serve such beneficial uses.

(3) Pollution may include contamination or the presence of contaminants in amounts less than the applicable standards currently promulgated by the ~~California Department of Health Services~~State Water Resources Control Board.

(R) ~~(R) "Safe~~"Public Trust Resources" mean resources, such as fisheries, wildlife, aesthetics, and navigation, which are held in trust for the public.

(S) "Seepage pit" means a large diameter borehole for the disposal of sewage.

(T) "Soil Boring or Boring" means an excavation or boring constructed to obtain information on subsurface conditions.

(U) "Stormwater infiltration device or dry well" means a trench or large diameter borehole for the infiltration of stormwater.

(V) "Sustainable yield" means the annual draft of water that can be withdrawn from an aquifer without producing some ~~undesirable result such as reducing the total amount of water available or allowing the ingress of low-quality water~~significant unreasonable, undesirable result such as chronic lowering of groundwater levels, reduction of storage, seawater intrusion, degraded water quality, depletion of interconnected surface water. Where applicable, sustainable yield would be as defined by the Groundwater Sustainability Agency in their Groundwater Sustainability Plan or Alternative.

(W) ~~(S)~~ "Test well" means a well constructed for the purpose of obtaining information needed to design a well prior to its construction. Test wells are cased and can be converted to observation or monitoring wells and under certain circumstances to production wells.

(X) ~~(T) "Well" or "~~"Tier" means the type of well application and the level of review and conditions that will be needed for approval based on the proposed volume of pumping, type of water use, proposed increase in water use, the aquifer characteristics and the potential for impact on streams, public trust resources, nearby wells, groundwater sustainability, control zones, and/or the environment.

(Y) "Water Well" means a well constructed to extract groundwater. Types of water wells include:

(1) "Agricultural well" means a water well used to supply water for commercial agricultural purposes, including so-called "livestock wells."

(2) ~~well~~"Community well" means a water well used to supply water for domestic purposes in public water systems or state small water systems as defined in Section 116275 of the Health and Safety Code.

(3) "De Minimis Well" means a water well used to supply water for domestic needs of up to four individual primary residences using a total of less than 2 acre-feet per year. An approved accessory dwelling unit is not considered a separate primary residence for this purpose. De minimis domestic use may include up to one half acre of non-commercial residential irrigated landscaping and gardening per primary unit.

(4) "Industrial well" means a water well used to supply industry or a commercial use on an individual basis.

(5) "New Well" means a water well that will serve a new or significantly expanded use, which represents an increased extraction of groundwater.

(6) "Replacement Well" means a water well that will serve an existing use with no significant increase in water use and will replace an existing water source such as a spring or well that is to be destroyed.

(7) "Supplemental Well" means a water well that that will support an existing use with no overall increase in water use. The existing source could be a shared well or other well that will be maintained as a backup source.

(Z) "Well" means any artificial excavation, constructed by any method for the purpose of extracting water ~~from~~ or injecting water into the underground~~. "Well" or "water well" does not include:~~, evaluating subsurface conditions, providing for geothermal heat exchange or cathodic protection, or any other subsurface installation that may create a potential conduit or preferential pathway for movement of water or contaminants to groundwater.

~~(1) Oil and gas wells, or geothermal wells constructed under the jurisdiction of the Department of Conservation, except those wells converted to use as water wells; or~~

~~(2) Wells or bores used for the purpose of dewatering excavation during construction, or stabilizing hillsides or earth embankments.~~

~~(U)~~

(AA) "Well reconstruction" or "well repair" means certain work done to an existing well in order to restore its production, replace defective casing, seal off certain strata or surface water, or similar work, not to include the cleaning out of sediments or surging, or maintenance to the pump or appurtenances where the integrity of the annular seal or water-bearing strata is not violated.

7.70.030 Permit—Required—Issuance.

(A) No person shall, within the unincorporated area of the County, construct, repair, reconstruct or destroy any well, abandoned well, cathodic protection well, geothermal heat exchange well, monitoring well, ~~or~~ test well, or soil boring unless a written permit has first been obtained from the Health Officer as provided in this chapter, and the work conforms to the conditions of such permit and this chapter. Applications for such permits shall be made on the forms provided for that purpose and in accordance with procedures established by the Health Officer.

(B) A coastal development permit shall be required for any well proposed to be drilled in the Coastal Zone unless exempt or excluded as provided in Chapter 13.20 SCCC.

(C) Well permits for wells that meet the Tier 1, Tier 2 or Tier 3 requirements of SCCC 7.70.110(E) of this chapter are ministerial unless the ~~proposed well will serve a water system that is regulated by the State Department of Health Services or~~ issuance of the well permit requires one or more discretionary approvals pursuant to Chapter 13.20, 16.20, 16.30, 16.32, 16.40, or 16.42 SCCC.

~~(D) Each such~~(D) For proposed wells that do not meet the Tier 1, Tier 2, or Tier 3 requirements of SCCC 7.70.110(E), the Health Officer may require a report evaluating the potential impact of the proposed well to nearby wells, surface waters, public trust resources, or groundwater sustainability that is to be prepared and submitted to the Health Officer prior to issuance of a well permit. The report shall be prepared by a professional geologist, engineering geologist, or professional engineer and shall at a minimum include conclusions and data supporting the conclusions including a description of site and regional geology, subsurface conditions, strata, direction and rate of groundwater flow, locations of nearby water wells, and construction details for those wells as can be determined based on existing data. The report shall describe proposed well construction methods and other measures to be taken to

prevent adverse impacts of the well. The Health Officer shall deny a well permit or require specific construction requirements in order to prevent significant adverse impacts on nearby wells, surface water, public trust resources, or groundwater sustainability as defined by the applicable groundwater sustainability agency.

(E) Each application shall be accompanied by a filing fee set by resolution of the Board of Supervisors. No part of the fee shall be refundable.

~~(E) Within 10~~(F) Water well permit applications shall be transmitted to the water system, water district, and/or groundwater sustainability agency that has jurisdiction over the parcel where the proposed well will be located or that could be impacted by the proposed well. Those entities shall have ten business days to provide any comment, request additional information, or identify any other requirements that must be met for the construction of the proposed well within their jurisdiction.

(G) Within 20 business days after receipt of a complete application including all studies or additional information requested by the Health Officer, the County Health Officer shall either grant or deny the permit. Well permits shall be issued only if the proposed well is in compliance with all applicable County codes and will be located on a legal lot of record. Well permits may be approved with specific requirements to comply with this chapter.

(~~F~~H) At the discretion of the Health Officer and prior to the commencement of any work, an emergency approval may be granted for any work for which a permit is required by this chapter if the Health Officer determines that a sudden, unexpected occurrence demands immediate action to prevent loss of or damage to life, health, property, or essential public services, and it is not practical to obtain a permit before the commencement of the work. The Health Officer may request, at the applicant's expense, verification by a ~~qualified~~ professional geologist, engineering geologist, or professional engineer of the nature of and solutions to the emergency situation. In all cases in which emergency work is necessary, a permit shall be applied for within three ~~working~~(3) business days after commencement of the work. If emergency approval by the Health Officer is not requested or an application is not submitted within the specified time, the work shall be considered a violation of this chapter. The applicant for a permit for any such emergency work shall demonstrate that all work performed is in compliance with the technical standards of SCCC 7.70.090.

(I) Any person who commences or completes any work for which a permit is required without first having obtained a permit therefor shall, if subsequently permitted to obtain a permit, pay double the permit fee established by resolution of the Board of Supervisors for such work. If such well does not meet the requirements of this Chapter, the Health Officer shall require the well to be destroyed under permit.

7.70.040 Permit—Expiration.

(A) Each permit issued pursuant to this chapter shall expire and become null and void if the work authorized thereby has not been completed within ~~one year~~two (2) years following the issuance of the permit.

(B) Upon expiration of any permit issued pursuant thereto, no further work may be done in connection with construction, repair, reconstruction or destruction of a well, monitoring well, test well, geothermal

heat exchange well, ~~or~~ cathodic protection, or soil boring well unless and until a new permit for such purpose is secured in accordance with the provisions of this chapter.

(C) The Health Officer may authorize renewal of a permit for an additional year upon payment of 20 percent of the application fee within 180 calendar days after the date of permit expiration.

7.70.050 Permit—Suspension or revocation~~.~~

(A) A permit issued under this chapter may be revoked or suspended by the Health Officer as provided in this section if ~~he/she determines~~they determine that a violation of this chapter exists, that written notice has been directed to the permittee specifying the violation, and that the permittee has failed or neglected to make necessary adjustments within thirty (30) calendar days after receiving such notice.

(B) A permit may be revoked or suspended by the Health Officer if ~~he/she determines~~they determine at a hearing held by the Health Officer for such purpose that the person to whom any permit was issued pursuant to this chapter has obtained the same by fraud or misrepresentation; provided, that notice of the time, place, and purpose of such hearing is given to the permittee at least five (5) calendar days prior thereto.

(C)~~-~~ The suspension or revocation of any permit shall not be effective until notice thereof in writing is ~~mailed~~provided to the permittee.

7.70.060 Licensed contractor required.
Construction, reconstruction, repair, and destruction of all wells~~, including cathodic protection wells, geothermal heat exchange wells, test wells and monitoring wells~~ covered by this Chapter, shall be performed by a contractor with a C-57 contracting license~~,~~ or an equivalent license issued by the Department of Professional and Vocational Standards.

7.70.070 State and Federal reporting regulations.
Nothing contained in this chapter shall be deemed to release any person from compliance with the provisions of Article 3, Chapter 10, Division 7 of the California Water Code ~~of the State~~ or any other State or Federal reporting regulations.

7.70.080 Inspections.
(A) Upon receipt of an application, an inspection of the location of the well, test well, geothermal heat exchange well, or cathodic protection well shall be made by the Health Officer prior to issuance of a well permit. Inspection of monitoring well and soil boring locations prior to permit issuance may be made by the Health Officer.

(B) The person responsible for construction, reconstruction, or destruction of any well shall notify the Health Officer at least 48 hours prior to commencement of work. All work shall be subject to inspection by the Health Officer to ensure compliance with all the requirements of this chapter.

~~(C)~~ (C) The Health Officer shall make inspection of the well seal and completed work to determine compliance with the well standards. After work has been completed, the person performing the work shall file with the Health Officer a notice of completed work or a copy of the California Department of Water Resources well report. ~~The Health Officer shall make final inspection of the completed work to determine compliance with the well standards.~~

7.70.090 Technical standards.

Standards for the construction, repair, reconstruction of, or destruction of wells, abandoned wells, monitoring wells, test wells, geothermal heat exchange wells, and cathodic protection wells shall be as set forth in Chapter II of the Department of Water Resources Bulletin No. 74-81, "Water Well Standards" (December 1981), the Department of Water Resources Bulletin No. 74-90, "Water Well Standards" (June 1991), and Chapter II of the Department of Water Resources Bulletin No. 74-1, "Cathodic Protection Well Standards" (March 1973), or as subsequently revised or supplemented, which are incorporated by reference in this chapter, with the following modifications:

(A) The minimum horizontal distance between ~~all~~ wells and potential sources of contamination shall be:

(1) 100 feet between subsurface sewage leaching fields, septic tanks, or animal enclosures ~~shall be 100 feet.~~ If the property is already developed and served by a well that is less than 100 feet from the septic system, and if no other alternative water source is available, a replacement well may be drilled less than 100 feet from the septic system if a sanitary seal at least 100 feet deep is installed and the existing well is destroyed under permit.

(2) 150 feet to seepage pit

(3) 150 feet between a community well and subsurface sewage dispersal system less than 10 feet deep

(4) 200 feet between a community well and a subsurface sewage dispersal system greater than 10 feet deep. A greater separation up to 600 feet may be required in order to maintain a 2 year time of travel.

(B) No well shall be constructed within 50 feet horizontal from the property line of the property owner authorizing construction of the well. This setback may be reduced to not less than five feet horizontal if the owner of the adjacent property authorizes a reduction in setback~~,~~ or if the Health Officer determines area on the adjacent property within 100 feet of the proposed well is unsuitable for installation of an onsite sewage disposal system.

(C) All wells shall be constructed so that the well seal shall be a minimum of 50 feet below the surface of the ground. If usable water is only available less than 50 feet from the surface, the Health Officer may allow the seal depth to be reduced to not less than 20 feet if the well construction, site conditions, and the characteristics of the underlying geology will preclude the downward movement of contaminants into the aquifer.

(D) Drilling fluids and other drilling materials used in connection with well construction shall not be allowed to discharge onto streets or into waterways; and shall not be allowed to discharge off the parcel on which the well is constructed onto adjacent properties; provided, that adjacent property may be used temporarily for the discharge of such fluids and materials pursuant to written agreement with the owner(s) of the adjacent property; and provided, that such fluids and materials are removed and cleaned up within thirty (30) days of completion of the well drilling.

(E) Water generated during test pumping of wells shall be dispersed or disposed of in a manner which will not cause excessive erosion or turbidity, in violation of Chapter 16.22 or 16.24 SCCC.

(F) Subsections (A), (B) and (C) of this section do not apply to monitoring wells.

(G) New wells that supply water to a public water system must use the methodology, as required by the State of California ~~Department of Health Services~~State Water Resources Control Board Drinking Water Source Assessment and Protection Program, to determine the 10-year time-of-travel groundwater protection zone. For other wells, e.g., ~~individual domestic~~de minimis wells, the default groundwater protection zone minimum radius of 1,000 feet for a five-year time-of-travel shall be used to protect the drinking water source from chemical contamination. If sites with existing soil and/or groundwater contamination are present within the 10-year zone for public water systems, or five-year zones for other wells such as domestic wells, and the Health Officer determines that there is a potential for a contamination hazard to be created, the Health Officer may require that a report evaluating the potential for contamination or pollution of the well from existing nearby activities be prepared prior to issuance of a well permit. The report shall be prepared by a professional geologist, engineering geologist, or professional engineer and shall at a minimum include conclusions and data supporting the conclusions~~,~~ including without limitations a description of site and regional geology, subsurface conditions, strata, direction and rate of groundwater flow, locations of vicinity water wells, and construction details for those wells as can be determined based on existing data. The report shall describe proposed well construction methods and other measures to be taken to prevent contamination or pollution of the well and surrounding aquifers. The Health Officer shall deny a well permit or require specific construction requirements in order to prevent contamination or pollution of the well or surrounding aquifers.

(H) The Health Officer shall have the power to allow minor variances from the standards set forth in this section so as to prevent unnecessary hardship or injustice and at the same time accomplish the general purpose and intent of the standards and the resource protection policies of the County's General Plan and Local Coastal Program Land Use Plan. In no case may a variance be granted that constitutes a special privilege.

(I) The Health Officer may establish standards and procedures for the construction and destruction of wells or soil borings to be used for evaluation, monitoring or remediation of sites with known or threatened contamination.

7.70.100 Well abandonment and destruction—Inactive well.

(A) A well is considered abandoned when it has not been used for a period of one (1) year and it is not being maintained as a monitoring well or an inactive well.

(B) The owner of an inactive well shall properly maintain the well in such a way that:

(1) The well is covered such that the cover is watertight and cannot be removed, except with the aid of equipment or the use of a tool.

(2) The well is marked so it can clearly be seen.

(3) The area surrounding the well is kept clear of brush or debris.

(4) The pump shall be maintained in the well~~,~~ with an approved power supply, except for temporary removal for repair or replacement.

(C) On abandonment of a well, or on the order of the Health Officer, a well shall be destroyed under permit by methods described in Bulletin Nos. 74-81 and 74-90, or as subsequently revised or supplemented, which are incorporated by reference in this chapter with the following modifications.

(1) All open wells shall be immediately capped with a fixed cover until the well is properly destroyed.

(2) The well shall be completely sealed with acceptable sealing material from the true bottom of the well up to five (5) feet of the surface. The casing should be cut off five (5) feet below the surface, with the excavation backfilled by compacted native material.

(3) Acceptable sealing materials are 23 sack neat cement, 10 sack cement grout, ~~hydrated high solids 20 percent bentonite slurry~~, or any other compound approved by the Health Officer.

(4) A tremie pipe or other method approved by the Health Officer shall be used to pump the sealing material into the well under pressure if the well is over 30 feet deep or more than three (3) feet of standing water is present in the well.

(5) Where there is potential for movement of contaminants between the outside of the well casing and the borehole, the Health Officer shall require perforation of the casing at certain depths, overdrilling, and/or other techniques which will seal the annular space outside the well casing as needed to prevent the migration of contaminants.

(6) For destruction of wells where groundwater quality problems are known to exist, the Health Officer may require that destruction be designed and supervised by a professional geologist, professional engineer, or other qualified person. The proposed method of destruction shall be subject to approval by the Health Officer prior to performance of the work.

(D) A well which has any defects which will allow the impairment of quality of water in the well or in the water-bearing formations penetrated shall be destroyed and may not be designated inactive. In areas where groundwater problems are known to exist, abandoned wells that penetrate and/or are perforated in two or more aquifers shall be destroyed and may not be designated inactive.

(E) To prevent the contamination of underground water supplies through open wells, no person shall knowingly permit the existence on premises in ~~his or her~~their ownership or possession or control of any well opening or entrance which is not sealed or secured in such a way as to prevent the introduction of contaminants.

(F) No person shall knowingly permit on premises in ~~his or her~~their ownership or possession or control the existence of any abandoned well that constitutes a known or probable pathway for the vertical movement of contaminants.

7.70.105 Soil Borings.

The Health Officer shall establish policies and procedures for installation and destruction of soil borings so that such soil borings do not create a conduit or preferential path for movement of contaminants into groundwater.

7.70.107 Stormwater Infiltration Devices.

The Health Officer shall establish policies and procedures for installation and destruction of stormwater infiltration devices so that such installations do not create a conduit or preferential path for movement of contaminants into groundwater.

7.70.110 ~~Groundwater~~Resource protection.

(A) Within the Pajaro groundwater protection zone, and in other areas where water contains constituents in excess of the applicable standards currently promulgated by the California Department of Health or where a monitoring agency or groundwater sustainability agency has determined that

seawater intrusion is threatened, all ~~new~~ wells shall be constructed in such a manner that the well does not provide a conduit for contamination or pollution between aquifers.

(1) In such areas, the Health Officer shall impose a requirement for new wells which penetrate more than one aquifer that an electric log device measuring spontaneous potential and resistivity be run in the uncased well borehole by a certified hydrologist, geohydrologist or other qualified person~~.~~ approved by the Health Officer. Based on the data obtained from the electric log and the geologic log of the well, the certified hydrologist, geohydrologist or other qualified person approved by the Health Officer shall identify strata containing poor water quality and recommend to the well driller the location and specifications of the seal or seals needed to prevent the entrance of poor-quality water or its migration into other aquifers.

(2) The well shall be completed with the seal or seals specified by the certified hydrologist, geohydrologist or other such qualified person approved by the Health Officer. The person performing and evaluating the electric log shall submit a written report to the Health Officer.

(B) Prior to completion of a well, a water sample shall be collected and tested for total dissolved solids, chloride, nitrate, and any other constituent which the Health Officer has reason to believe could be present in the well. The sample results shall be submitted to the Health Officer. If any constituent exceeds drinking water standards, the Health Officer shall require testing and sealing of the well pursuant to subsection (A) of this section. If ~~drinking water~~ standards for the proposed use cannot be met or the aquifer cannot be adequately protected from contamination or pollution, the Health Officer shall require that the well be destroyed. The Health Officer may require additional water quality testing upon completion of the well.

(C) Each application for a new, supplemental, or replacement well shall accurately specify the parcels proposed to be served, the type of land uses to be served, the estimated annual water use for non-de minimis wells, and the presence of any existing wells which also serve those uses. The Health Officer may require documentation to support the water use estimates provided.

(D) For ~~wells which will serve more than four residential connections or which will serve nonresidential uses which can be expected to utilize more than two acre-feet of water per year~~new, supplemental, or replacement wells, the following measures will be taken to ensure that groundwater is put to beneficial use and is not wasted:

(1) A water use efficiency ~~audit~~evaluation shall be completed, with recommendations for increased efficiency of use identified. The Health Officer shall require that all reasonable measures be implemented.

(2) In lieu of performing an efficiency ~~audit~~evaluation as required by subsection (D)(1) of this section, the property owner may provide verification that conservation measures to achieve efficient interior and exterior water use have been taken.

(3) For new uses that will be developed after the well is completed, the property owner shall provide certification that conservation measures will be implemented as a part of the new use.

(4) Requirements for water efficiency ~~audits~~evaluations and acceptable conservation measures shall be established by policy by the Health Officer. The Health Officer may specify maximum annual water use based on Tier and mitigation of potential impacts.

(5) A meter shall be installed and maintained to accurately measure water use and usage shall be reported annually to the Health Officer, according to procedures established by the Health Officer. The cost of meter installation, maintenance and reporting shall be borne by the well owner(s).

(6) The Health Officer may require the property owner to provide information to confirm that the required conservation measures are being maintained. If such information is not provided or water usage is not being reported, the Health Officer may conduct an inspection to observe the meter and/or verify that water conservation measures are being maintained. Inspections shall be conducted at reasonable times and the inspector shall first make a reasonable effort to contact the property owner(s) or occupant(s) of the premises. If the inspection requires the entry into a building or an area that is designed for privacy, then prior permission shall be obtained from any of the property owner(s) or occupant(s). If permission is denied, then a site inspection warrant shall be obtained.

(7) If the usage information or the results of a site inspection show that the well owner is not in compliance with this Chapter or with the requirements of the permit, the Health Officer shall require that corrective measures be taken.

(E) Each application for a new, supplemental, or replacement well shall be evaluated and specific measures may be required to ensure that the well will not have significant adverse impacts on groundwater sustainability, nearby wells, surface water, or the environment. The level of evaluation and required measures will depend on the Tier in which the well falls, based on the type of well, the location, and the aquifer characteristics. The Health Officer shall establish specific criteria and procedures for assigning the Tier and the extent of required evaluation and protective measures. Such criteria shall be adopted by resolution of the Board of Supervisors ~~and updated~~. The Health Officer may deny applications for Tier 4 wells that will have a significant adverse impact on groundwater sustainability, nearby wells, surface water, or the environment.

(1) Tier 1 will include de minimis wells and non-domestic wells using less than 2 acre-feet per year that do not require any discretionary review under other chapters of the SCCC and meet the minimum standards for preventing impacts on streams and nearby wells based on aquifer characteristics, well characteristics, depth of well seal, and location.

(2) Tier 2 will include supplemental and replacement non-de minimis wells with no significant increase in water use and meet the minimum standards for preventing impacts on streams and nearby wells based on aquifer characteristics, well characteristics, depth of well seal, and location.

(3) Tier 3 will include new non-de minimis wells serving new uses that will pump less than 50 acre-feet per year and Tier 1 or Tier 2 wells that do not meet the Tier 1 or Tier 2 requirements. Tier 3 wells must also meet the minimum Tier 3 requirements for stream depletion and nearby well drawdowns.

(4) Tier 4 will include wells that do not meet the Tier 1, 2, or 3 requirements, are in a control zone, are in specified Tier 4 Groundwater Extraction Concern Areas, or are wells that could adversely affect the sustainability of a groundwater basin.

(F) A well permit shall not be approved for a well that poses a significant conflict with the implementation of a groundwater replenishment project or other project specified in an adopted groundwater sustainability plan as ~~appropriate at least every three years to reflect advanced technology that is readily available locally.~~ determined by the affected water district or groundwater sustainability agency.

(G) For non de minimis wells, if a well is proposed in a known karst area or if karst is encountered during the drilling process, further drilling shall be suspended, and the Health Officer shall evaluate whether a well can be completed without causing adverse impacts on groundwater resources, surface waters, or other water users. The Health Officer shall establish procedures for such evaluation and may require

analysis at the expense of the applicant by a professional geologist familiar with occurrence and movement of water in karst landscapes. Recommendations may include procedures for destroying the borehole without adversely affecting subsurface conditions.

(H) Wells located in designated groundwater extraction concern areas will be subject to additional requirements to ensure reliability, adequate quality, and limited resource impact, as established by the Health Officer's policy. Approval of wells located in Tier 4 groundwater extraction concern areas shall be discretionary and may not be granted if resource impacts cannot be mitigated.

(I) If a groundwater sustainability agency has required metering or other conditions for an existing, new, replacement, or supplemental well, the property owner shall abide by those requirements. If the usage information or the results of a site inspection show that the well owner is not in compliance with those requirements, the Health Officer shall require that corrective measures be taken.

(J) New, supplementary, or replacement wells shall not be constructed within a designated control zone for a groundwater management project.

7.70.120 Soquel Creek service area restrictions.

(A) Findings. The Board of Supervisors finds and determines that:

(1) Several reports have been prepared which indicate the potential for seawater intrusion into the ~~Soquel-Aptos~~Santa Cruz Mid-County Groundwater Basin; and

(2) There is need for careful monitoring and management of the groundwater basin; and

(3) Careful management is greatly facilitated by restricting the number of new wells and requiring that new development be supplied by Soquel Creek Water District, a public agency empowered to carry out monitoring and management efforts; and

(4) Construction of new wells within the water district service area increases the potential public health hazard of cross-connection between public and private water systems; and

(5) Current County General Plan policies require that new development within the urban services line be served by a public water system.

(B) Well Construction within the Soquel Creek Water District Service Area. The construction of new wells shall be prohibited on parcels that are ~~both within the area designated as the "Soquel-Aptos Groundwater Basin" (as adopted by separate Board Resolution 233-81) and within 200 feet~~within 200 feet horizontal of a water distribution line of the Soquel Creek Water District.

(C) New Well Construction—Exceptions. The following new well construction shall not be subject to the prohibition of this section:

(1) Replacement of existing wells;

(2) Construction of a well for commercial agricultural use, monitoring and observation purposes, geothermal heat exchange or cathodic protection; and

(3) Well construction on parcels which cannot be served by the Soquel Creek Water District, as determined by the Environmental Health Director based on a written statement from the District clearly demonstrating their inability to provide service.

(4) Construction of a well by any public water purveyor or state small water system.

7.70.130 Groundwater emergencies.

A groundwater emergency shall be declared in areas demonstrated to be experiencing a groundwater overdraft exceeding the ~~safe~~sustainable yield in order to prevent further depletion and degradation of water resources where such degradation threatens the public health, safety and welfare of the community, or the ability of a groundwater sustainability agency to meet its minimum thresholds, and where the Board of Supervisors finds that adequate measures are not already being taken to alleviate the overdraft situation. The emergency shall have no effect on drilling of monitoring, soil borings, geothermal heat exchange, or cathodic protection wells.

(A) Declaration. A declaration of a groundwater emergency shall be made by the Board of Supervisors only after a public hearing. Such an emergency shall be declared by resolution of the Board of Supervisors after the public hearing to consider all relevant information such as, but not limited to, the most current groundwater study, recommendations of groundwater sustainability agencies, water purveyors, and the Water Advisory Commission and only after the following findings can be made:

(1) The designated area is experiencing a groundwater overdraft exceeding the long-term ~~average annual recharge of groundwater resource~~sustainable yield;

(2) The creation of new wells or the expansion of existing wells will significantly increase the demand on the affected aquifer and thereby increase the overdraft;

(3) The continuation of the overdraft will result in further depletion and degradation of the water resource that can lead to, but is not limited to, impairment of the aquifer ~~or~~, allowing the ingress of low-quality or saline ~~waters~~water, or other undesirable results; and

(4) Adequate measures are not being taken by water users and other responsible agencies to alleviate the overdraft situation.

(B) Immediate Measure to Alleviate. In areas where a groundwater emergency is declared, the Board of Supervisors shall take action to establish water conservation measures, to limit construction of new wells, to regulate pumping from or expansion of existing wells, ~~and~~ in order to prevent further depletion and degradation of the affected aquifer. In taking these actions, the Board of Supervisors shall give consideration to the seasonal needs of agriculture including, but not limited to, the following factors.

(1) Agriculture's need to repair, maintain, and replace existing wells serving existing agricultural use acreage;

(2) Well construction for agricultural use to serve existing agricultural acreage when new parcels are created due to change in legal ownership, split parcels or parcels created by change in zoning laws, or other governmental regulations; and

(3) The different water requirements of agricultural crops.

(C) Long-Term Measures to Alleviate. The Board of Supervisors shall initiate actions such as, but not limited to, joint power agreements with other agencies with the goal of finding permanent solutions to the groundwater problem.

(D) Duration. A groundwater emergency and the measures enacted to alleviate the emergency shall remain in effect until rescinded as established in subsection (F) of this section.

(E) Annual Review. The establishment of a groundwater emergency and all actions to alleviate the emergency shall be reviewed by the Board of Supervisors within one (1) year of the date of enactment

of the measures at a public hearing to decide whether the declaration of emergency shall remain in effect.

(F) Rescinding. A groundwater emergency shall be rescinded by resolution of the Board of Supervisors after a public hearing when one of the following findings is made:

(1) Alternative water sources which compensate for the existing overdraft and supply the affected area are developed;

(2) A groundwater management program is implemented which will allow for additional development without contribution to groundwater overdraft; or

(3) The Board of Supervisors determines that new information is available which indicates that the technical data upon which the original findings were based is no longer valid. ~~[~~

7.70.140 Abatement—Investigation.

The Health Officer may, upon reasonable cause to believe that an abandoned well, a cathodic protection well, or any other well or soil boring that may potentially either contaminate or pollute groundwater, investigate the situation to determine whether such potential threat to groundwater quality or present nuisance does, in fact, exist. The Health Officer shall have the power upon presenting identification to any person apparently in control of the premises to enter upon any such premises between the hours of 8:00 a.m. and 6:00 p.m. to discover or inspect any thing or condition which may indicate such a nuisance or threat to groundwater quality. The Health Officer may examine such premises, things or conditions, take such samples and make such tests as needed, and take other steps reasonably necessary for the proper investigation and determination of whether a nuisance or threat to groundwater quality exists.

7.70.150 Abatement generally.

Whenever the Health Officer determines that an abandoned well, a cathodic protection well, or any other well or soil boring is presently polluting or contaminating groundwater, or poses a substantial threat to groundwater quality, or is otherwise not in compliance with the provisions of this chapter, the Health Officer ~~may~~shall abate the well as a nuisance in accordance with the provisions of Chapter 1.14 SCCC.

7.70.160 Nuisance—Abatement of safety hazard.

This chapter shall not affect the right of the County to abate as a public nuisance pursuant to Article 9, Chapter 1, Division 1, Title 5, of the Government Code (commencing with Section 50230) any abandoned well, ~~or~~ cathodic protection well, or other well or soil boring which presents a safety hazard.

7.70.170 Amendments.

Any revision to this chapter which applies to the Coastal Zone shall be reviewed by the Executive Director of the California Coastal Commission to determine whether it constitutes an amendment to the Local Coastal Program. When an ordinance revision constitutes an amendment to the Local Coastal Program, such revision shall be processed pursuant to the hearing and notification provisions of Chapter 13.03 SCCC, and shall be subject to approval by the California Coastal Commission.

7.70.180 Violations.

(A) In the event of a violation of the provisions of this chapter or the conditions of any permit issued under this chapter, the property owner/permittee shall be given notice of such violation and a reasonable time to correct the violation.

(B) Whenever the Health Officer visits a property to ensure compliance with a permit condition or a notice to correct violation, and the condition or requirement is not satisfied or the violation has not

been corrected, the property owner shall be subject to a violation reinspection fee, the amount to be established by resolution of the Board of Supervisors.

7.70.190 Recording notices of violations.

Whenever the Health Officer has knowledge of a violation of any of the provisions of this chapter or any condition of a permit issued under this chapter, the Health Officer may provide a notice of intent to record a notice of violation to the owner of the property on which the violation is located. Notice shall be provided by posting on the property and by mail at the address shown on the latest assessment roll or at any other address of the owner known to the Health Officer. The notice shall state that within twenty (20) calendar days of the date of the notice, the owner may request a meeting with the Health Officer to present evidence that a violation does not exist. In the event that a meeting is not requested and the violation has not been corrected, or, in the event that after consideration of the evidence the Health Officer determines that a code violation in fact exists, the Health Officer may record a notice of code violation in the office of the County Recorder. At the request of any affected property owner, the Health Officer shall issue a notice of expungement of code violation upon correction of any violation noticed hereunder. The notice of expungement may be recorded by the affected property owner at their expense. The decision of the Health Officer shall be final.

7.70.200 Promulgation of policies.

Any policy, specification, or procedure which the Health Officer is authorized by this chapter to adopt shall be in writing with copies made available to the public. Such policies, specifications or procedures shall be made available to the public thirty (30) days before their implementation by the Health Officer.

Chapter 7.73
INDIVIDUAL WATER SYSTEMS

DRAFT UPDATE FOR DISCUSSION

Sections:

7.73.010 Purpose of provisions.

It is the purpose of this chapter to establish standards for safe and adequate water supplies for individual water systems and to ensure that such systems do not induce contamination of aquifers and therefore jeopardize the health, safety, and welfare of the people of Santa Cruz County. It is also the purpose of this chapter to implement policies of the County General Plan and Local Coastal Program Land Use Plan. [Ord. 4023 § 2, 1989].

7.73.020 Definitions.

As used in this chapter:

(A) "Destroy" means the complete filling of the well, with impervious sealing materials to an appropriate level in accordance with procedures established by Department of Water Resources Bulletin No. 74-81, "Water Well Standards" (December 1981), the Department of Water Resources Bulletin No. 74-90, "Water Well Standards" (June 1991), and Chapter II of the Department of Water Resources Bulletin No. 74-1, "Cathodic Protection Well Standards" (March 1973), or as subsequently revised or supplemented, and Chapter 7.70 SCCC, in order to restore, as nearly as possible, those subsurface conditions which existed before the well was constructed.

(B) "Dwelling unit" means a structure for human habitation providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation, with the restrictions that only one kitchen or set of food preparation facilities is allowed in each dwelling unit and an interior stairway shall be provided between all stories. These restrictions shall not

apply where an Accessory Dwelling Unit (ADU) or Junior Accessory Dwelling Unit (JADU) is permitted pursuant to Chapter 13.10 SCCC. ADUs and JADUs shall be considered as extensions of the primary dwelling unit.

(C) "Health officer" means the County Health Officer or authorized representative.

(D) "Horizontal well" means a well drilled approximately horizontally into a water-bearing stratum as contrasted with a common vertical well, and from which water issues without the aid of a pump.

(E) "Individual water system" means any combination of water sources, storage facilities and related appurtenances which provides domestic water service to either:

(1) A single parcel under one ownership with not more than four dwelling units or other permitted land uses on the parcel;

(2) Up to four parcels, if:

(a) All parcels served are either contiguous with one another or are contiguous with the parcel on which the water source is located; provided, that public or private rights-of-way shall not be taken into consideration in determining contiguity; and

(b) The water source(s) is located on one of the parcels served; and

(c) Each parcel owner has not less than a one-quarter interest in the water system (source, facilities and appurtenances) and a sufficient legal interest in the land upon which it is located to guarantee access thereto and a right to the use thereof; and

(d) All of the parcels taken together have a total of no more than four primary dwelling units or other permitted land uses existing on them.

(3) A permitted land use that includes the provision of water to members of the public and/or employees but does not regularly serve more than an average of 25 individuals daily for more than 60 days out of the year,

(F) "Permit" means the written permission of the Health Officer or authorized representative to utilize water from, or otherwise participate in, an individual water system.

(G) "Spring" means a place where water issues from a rock or soil strata onto the land.

(H) “Well” means any artificial excavation constructed by any method for the purpose of extracting water from underground. [Ord. 5326 § 1, 2020; Ord. 5325 § 1, 2020; Ord. 4283 § 13, 1993; Ord. 4023 § 2, 1989].

7.73.030 Requirement for permit.

No parcel which is or shall be dependent in whole or in part upon an individual water system for its water supply shall be developed for human habitation until an individual water system permit is granted by the Health Officer. [Ord. 4023 § 2, 1989].No land use which is or shall be dependent in whole or in part upon an individual water system for its water supply shall be approved until an individual water system permit is granted by the Health Officer.

7.73.040 Application for permit.

(A) An application for an individual water system permit shall be made to the Health Officer on forms provided for that purpose and each such application shall be accompanied by a filing fee set by resolution of the Board of Supervisors. No part of the fee shall be refundable.

(B) Whenever an applicant seeks a permit for an individual water system which is to supply water to other properties in addition to the applicant’s, the applicant must submit a copy of a recorded deed showing not less than one-quarter individual interest in the water source, storage and transmission facilities, and the land upon which the system is situated. The applicant must also identify the holders of the remaining interests in the water system, and comply with the requirements of SCCC 7.73.050, 7.73.060 and 7.73.070.

(C) Within ten (10) business days after receipt of a completed application, the Health Officer shall either grant, conditionally grant, or deny the permit. A permit shall be granted if the applicant has complied with all the provisions of this section and if those conditions specified in SCCC 7.73.050, 7.73.060 and 7.73.070 are satisfied. [Ord. 4023 § 2, 1989].

7.73.050 Yield requirements.

No permit shall be issued unless and until the following water source requirements are established as prescribed in SCCC 7.73.060:

(A) November Through July. For each connection to a well water source, a minimum of three gallons per minute of yield must be sustained during a 24-hour period of continuous pumping, or until 4,320 gallons have been achieved during a time period of 24 hours or less of continuous pumping.

(B) August Through October. For each connection to a well water source, a minimum of two gallons per minute of yield must be sustained during a 24-hour period of continuous pumping, or until 2,880 gallons have been achieved during a time period of 24 hours or less of continuous pumping.

(C) For water systems serving new or expanded uses other than residential dwelling unit, the applicant shall estimate the proposed water use and shall demonstrate that the water source can reliably and sustainably supply that amount of water and meet the requirements to protect resources as specified in County Code Section 7.70.110. Such estimates and demonstration of water availability and compliance with Section 7.70.110 must be approved by the Health Officer. The Health Officer may develop policies for the demonstration of adequate non-residential supply.

(D) Limited Yield Areas. In areas where groundwater yield is known or expected to be limited, as determined by the Health Officer, more extensive yield testing will be required, which may include longer duration testing and monitoring of groundwater levels in the source well and nearby wells. Yield testing will also be required to demonstrate that yield requirements are met prior to approval of accessory dwelling units in Limited Yield areas. Limited Yield areas are those areas where underlying geologic conditions are limiting for the storage and transmittal of groundwater, particularly where rock is impermeable, and water only occurs in fractures.

(E) Spring or Horizontal Well.

(1) For each connection to a spring or horizontal well, a continuous yield of at least one gallon per minute during the dry season (August through October). The yield requirements of this subsection may not be satisfied by tests conducted during the months of November through July.

(2) Notwithstanding the provisions of subsection (1) of this section, the Board of Supervisors may, upon finding of drought or other unusual weather conditions of limited duration, extend or redefine by resolution the period of time defined in subsection (1) of this section as the “dry season” for purposes of undertaking the required testing to establish compliance with the yield requirements of this subsection. Any resolution adopted pursuant to this subsection shall be resubmitted to the Board of Supervisors for consideration of whether or not it should continue to be in effect on or before the first meeting of the calendar year which follows the calendar year in which the resolution was first adopted.

(F) Streams. Due to water quality concerns and limited availability of available flow during dry periods, streams shall not be permitted as a new source of domestic water supply.

(G) Existing Permit—Yield Retesting. The applicant for a building permit for a dwelling unit or other expanded use proposed for connection to a previously permitted individual water system shall submit a new certified yield test for any water source which is a component of that system in the event that two (2) years or more have elapsed since the last certified test of that water source or sources. The yield test must demonstrate that the source or combination of sources meet the present yield requirements for the existing and proposed connection to the individual water system. A bacteriological analysis shall be performed in accordance with the requirements of SCCC 7.73.070(A). A chemical analysis may be required by the Health Officer under the requirements of SCCC 7.73.070(B). [Ord. 4283 § 14, 1993; Ord. 4023 § 2, 1989].

7.73.060 Yield testing.

Compliance with the standards set forth in SCCC 7.73.050 shall be established by well pumping tests to be performed by a California-licensed well driller, pumping contractor maintaining a C-61 license with a D-21 classification, registered engineer, registered geologist, or registered environmental health specialist, according to the standards and procedures established by the Health Officer. Water yield reports shall be reported and certified on forms provided by the Environmental Health Service. [Ord. 4283 § 15, 1993; Ord. 4023 § 2, 1989].

7.73.070 Quality requirements.

No permit shall be issued until required reports of bacteriological analysis and chemical analysis performed by a laboratory certified by the Environmental Laboratories Accreditation Program are submitted to the Health Officer, and the Health Officer determines that water produced by the system is fit for human consumption, according to standards established by the State Water Resources Control Board . The Health Officer shall require that the water sample(s) be obtained by the certified laboratory or an independent third party acceptable to the Health Officer.

(A) Bacteriological Analysis. Bacteriological analysis shall be performed by a laboratory certified by the Environmental Laboratories Accreditation Program. The analysis shall be for total coliform organisms by the methods as prescribed by the latest edition of the Standard Methods for the Examination of Water and Wastewater, American Public Health Association.

(B) Chemical Analysis. Chemical analysis must conform to the specifications of the California Drinking Water Standards Test (Title 22 of the California Code of Regulations) for inorganic (chemical) analyses and shall be performed by a laboratory certified by the Environmental Laboratories Accreditation Program. Such analysis shall be as prescribed by the latest edition of the Standard Methods for the Examination of Water and Wastewater, American Public Health Association. Wells drawing water from the Aromas formation shall also be tested for hexavalent chromium. More extensive analysis may be

required on a case-by-case basis if the Health Officer determines that the quality of the water may not be safe for domestic use because of evidence of contamination of groundwater in the area or because of past or present land use related or potentially related to the use or disposal of hazardous materials.

(C) Sealing or Destruction of Substandard Wells. All new wells found to be of unsuitable quality according to standards established by the State Water Resources Control Board shall be sealed or destroyed as prescribed in the Department of Water Resources Bulletin No. 74-81, or as subsequently revised or supplemented, unless mitigating measures can be found to make the water potable and to assure that the groundwater supply is protected, as determined by the County Health Officer.

(D) Deviation or Treatment. Deviations exceeding any of the maximum contaminant levels for secondary (aesthetics) chemicals may be allowed, in the discretion of the Health Officer, if adequate chemical treatment is provided, or if the quality of water from the water system is not objectionable to an appreciable number of users. Individual water systems which fail primary or secondary drinking water standards as set forth in Chapter 15, Division 4 of Title 22 of the California Code of Regulations, as may be amended from time to time, and incorporated herein by this reference, may choose to treat the supply at the source. In lieu of a source treatment facility, an individual water system may choose to install a Point of Use (POU) or Point of Entry (POE) treatment device at each connection, subject to approval by the Health Officer.

(E) Notification Requirement. A notice of nonstandard water quality shall be recorded by the Health Officer with the County Recorder's office on the deed of any property served by a water source that does not meet water quality standards for drinking water according to standards established by the State Water Resources Control Board. The Notice shall include:

(1) The date(s) the well was tested and the identity and amount of the constituent(s) found that did not meet standards,

(2) The type of treatment device (s) installed to reduce the constituent to a level that meets standards.

(3) Statement of the operating requirements to ensure proper performance of the treatment system, such as: use of water conservation measures, disposal of byproducts, maintenance of a contract for servicing of the treatment system, other maintenance requirements.

(4) Specification of any restriction on system use or property use, such as limitations on amount of water used, wastewater generated, restrictions on building additions, etc.

(5) Notification that County staff may conduct routine inspections of the system, as necessitated by the increased likelihood that the treatment system might fail.

7.73.075 Water source evaluation upon transfer of property.

(A) Evaluation Prior to Sale of Property. Prior to selling a property that is served by an individual water system, a property owner shall cause the water quality of the water source to be tested pursuant to the requirements of Section 7.73.070 and the yield of the source to be tested pursuant to the requirements of Section 7.73.060. The results of water quality testing and yield testing shall be provided to prospective buyers and the Environmental Health Division. Tests must have been completed within three (3) years prior to the date of transfer.

(B) Water Treatment Systems. If the property is served by a water treatment system or if a notice of nonstandard water quality has been recorded for the property, the seller is required to disclose any active annual service agreements, contact information of the current service provider, and the associated annual county and service provider fees.

(C) Enforcement. Failure to comply with any of the provisions of this section will be considered a violation of this chapter and subject the violator to any and all enforcement remedies provided by SCCC.

7.73.080 Amendments.

Any revision of this chapter which applies to the Coastal Zone shall be reviewed by the Executive Director of the California Coastal Commission to determine whether it constitutes an amendment to the Local Coastal Program. When a revision constitutes an amendment to the Local Coastal Program such revision shall be processed pursuant to the hearing and notification provisions of Chapter 13.03 SCCC and shall be subject to approval by the California Coastal Commission. [Ord. 4023 § 2, 1989].

Chapter 7.73
INDIVIDUAL WATER SYSTEMS

DRAFT UPDATE FOR DISCUSSION

Sections:

7.73.010 Purpose of provisions.

It is the purpose of this chapter to establish standards for safe and adequate water supplies for individual water systems and to ensure that such systems do not induce contamination of aquifers and therefore jeopardize the health, safety, and welfare of the people of Santa Cruz County. It is also the purpose of this chapter to implement policies of the County General Plan and Local Coastal Program Land Use Plan. [Ord. 4023 § 2, 1989].

7.73.020 Definitions.

As used in this chapter:

(A) "Destroy" means the complete filling of the well, with impervious sealing materials to an appropriate level in accordance with procedures established by Department of Water Resources Bulletin ~~74-81~~No. 74-81, "Water Well Standards" (December 1981), the Department of Water Resources Bulletin No. 74-90, "Water Well Standards" (June 1991), and Chapter II of the Department of Water Resources Bulletin No. 74-1, "Cathodic Protection Well Standards" (March 1973), or as subsequently revised or supplemented, and Chapter 7.70 SCCC, in order to restore, as nearly as possible, those subsurface conditions which existed before the well was constructed.

(B) "Dwelling unit" means a structure for human habitation providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation, with the restrictions that only one kitchen or set of food preparation facilities is allowed in each dwelling unit and an interior stairway shall be provided between all stories. These restrictions shall not

apply where an Accessory Dwelling Unit (ADU) or Junior Accessory Dwelling Unit (JADU) is permitted pursuant to Chapter 13.10 SCCC. ADUs and JADUs shall be considered as extensions of the primary dwelling unit.

(C) "Health officer" means the County Health Officer or authorized representative.

(D) "Horizontal well" means a well drilled approximately horizontally into a water-bearing stratum as contrasted with a common vertical well, and from which water issues without the aid of a pump.

(E) "Individual water system" means any combination of water sources, storage facilities and related appurtenances which provides domestic water service to either:

(1) A single parcel under one ownership with not more than four dwelling units or other permitted land uses on the parcel;

(2) Up to four parcels, if:

(a) All parcels served are either contiguous with one another or are contiguous with the parcel on which the water source is located; provided, that public or private rights-of-way shall not be taken into consideration in determining contiguity; and

(b) The water source(s) is located on one of the parcels served; and

(c) Each parcel owner has not less than a one-quarter interest in the water system (source, facilities and appurtenances) and a sufficient legal interest in the land upon which it is located to guarantee access thereto and a right to the use thereof; and

(d) All of the parcels taken together have a total of no more than four primary dwelling units or other permitted land uses existing on them.

(3) A permitted land use that includes the provision of water to members of the public and/or employees but does not regularly serve more than an average of 25 individuals daily for more than 60 days out of the year,

(F) "Permit" means the written permission of the Health Officer or authorized representative to utilize water from, or otherwise participate in, an individual water system.

(G) "Spring" means a place where water issues from a rock or soil strata onto the land.

(H) “Well” means any artificial excavation constructed by any method for the purpose of extracting water from underground. [Ord. 5326 § 1, 2020; Ord. 5325 § 1, 2020; Ord. 4283 § 13, 1993; Ord. 4023 § 2, 1989].

7.73.030 Requirement for permit.

No parcel which is or shall be dependent in whole or in part upon an individual water system for its water supply shall be developed for human habitation until an individual water system permit is granted by the Health Officer. [Ord. ~~4023 § 2, 1989].~~4023 § 2, 1989].No land use which is or shall be dependent in whole or in part upon an individual water system for its water supply shall be approved until an individual water system permit is granted by the Health Officer.

7.73.040 Application for permit.

(A) An application for an individual water system permit shall be made to the Health Officer on forms provided for that purpose and each such application shall be accompanied by a filing fee set by resolution of the Board of Supervisors. No part of the fee shall be refundable.

(B) Whenever an applicant seeks a permit for an individual water system which is to supply water to other properties in addition to the applicant’s, the applicant must submit a copy of a recorded deed showing not less than one-quarter individual interest in the water source, storage and transmission facilities, and the land upon which the system is situated. The applicant must also identify the holders of the remaining interests in the water system, and comply with the requirements of SCCC 7.73.050, 7.73.060 and 7.73.070.

(C) Within ten (10) business days after receipt of a completed application, the Health Officer shall either grant, conditionally grant, or deny the permit. A permit shall be granted if the applicant has complied with all the provisions of this section and if those conditions specified in SCCC 7.73.050, 7.73.060 and 7.73.070 are satisfied. [Ord. 4023 § 2, 1989].

7.73.050 Yield requirements.

No permit shall be issued unless and until the following water source requirements are established as prescribed in SCCC 7.73.060:

(A) November Through July. For each connection to a well water source, a minimum of three gallons per minute of yield must be sustained during a 24-hour period of continuous pumping, or until 4,320 gallons have been achieved during a time period of 24 hours or less of continuous pumping.

(B) August Through October. For each connection to a well water source, a minimum of two gallons per minute of yield must be sustained during a 24-hour period of continuous pumping, or until 2,880 gallons have been achieved during a time period of 24 hours or less of continuous pumping.

~~(C~~(C) For water systems serving new or expanded uses other than residential dwelling unit, the applicant shall estimate the proposed water use and shall demonstrate that the water source can reliably and sustainably supply that amount of water and meet the requirements to protect resources as specified in County Code Section 7.70.110. Such estimates and demonstration of water availability and compliance with Section 7.70.110 must be approved by the Health Officer. The Health Officer may develop policies for the demonstration of adequate non-residential supply.

(D) Limited Yield Areas. In areas where groundwater yield is known or expected to be limited, as determined by the Health Officer, more extensive yield testing will be required, which may include longer duration testing and monitoring of groundwater levels in the source well and nearby wells. Yield testing will also be required to demonstrate that yield requirements are met prior to approval of accessory dwelling units in Limited Yield areas. Limited Yield areas are those areas where underlying geologic conditions are limiting for the storage and transmittal of groundwater, particularly where rock is impermeable, and water only occurs in fractures.

(E) Spring or Horizontal Well.

(1) For each connection to a spring or horizontal well, a continuous yield of at least one gallon per minute during the dry season (August through October). The yield requirements of this subsection may not be satisfied by tests conducted during the months of November through July.

(2) Notwithstanding the provisions of subsection (~~C)(~~1) of this section, the Board of Supervisors may, upon finding of drought or other unusual weather conditions of limited duration, extend or redefine by resolution the period of time defined in subsection (~~C)(~~1) of this section as the “dry season” for purposes of undertaking the required testing to establish compliance with the yield requirements of this subsection. Any resolution adopted pursuant to this subsection shall be resubmitted to the Board of Supervisors for consideration of whether or not it should continue to be in effect on or before the first meeting of the calendar year which follows the calendar year in which the resolution was first adopted.

~~(D) Streams. A stream source must have an adequate year-round flow during drought periods and must have a minimum flow of at least five gallons per minute for each connection, measured during the months of August through October. The users must have a legal right to use water from the stream source on each property where the water will be used.~~

~~(E~~(F) Streams. Due to water quality concerns and limited availability of available flow during dry periods, streams shall not be permitted as a new source of domestic water supply.

(G) Existing Permit—Yield Retesting. The applicant for a building permit for a dwelling unit or other expanded use proposed for connection to a previously permitted individual water system shall submit a new certified yield test for any water source which is a component of that system in the event that two (2) years or more have elapsed since the last certified test of that water source or sources. The yield test must demonstrate that the source or combination of sources meet the present yield requirements for the existing and proposed connection to the individual water system. A bacteriological analysis shall be performed in accordance with the requirements of SCCC 7.73.070(A). A chemical analysis may be required by the Health Officer under the requirements of SCCC 7.73.070(B). [Ord. 4283 § 14, 1993; Ord. 4023 § 2, 1989].

7.73.060 Yield testing.

Compliance with the standards set forth in SCCC 7.73.050 shall be established by well pumping tests to be performed by a California-licensed well driller, pumping contractor maintaining a C-61 license with a D-21 classification, registered engineer, registered geologist, or registered environmental health specialist, according to the standards and procedures established by the Health Officer. Water yield reports shall be reported and certified on forms provided by the Environmental Health Service. [Ord. 4283 § 15, 1993; Ord. 4023 § 2, 1989].

7.73.070 Quality requirements.

No permit shall be issued until required reports of bacteriological analysis and chemical analysis performed by a laboratory certified by the ~~State Department of Health Services~~Environmental Laboratories Accreditation Program are submitted to the Health Officer, and the Health Officer determines that water produced by the system is fit for human consumption, according to standards established by the ~~California Department of Health Services.~~State Water Resources Control Board . The Health Officer shall require that the water sample(s) be obtained by the certified laboratory or an independent third party acceptable to the Health Officer.

(A) Bacteriological Analysis. Bacteriological analysis shall be performed by a laboratory certified by the ~~California Department of Health Services.~~Environmental Laboratories Accreditation Program. The analysis shall be for total coliform organisms by the methods as prescribed by the latest edition of the Standard Methods for the Examination of Water and Wastewater, American Public Health Association.

(B) Chemical Analysis. Chemical analysis must conform to the specifications of the California Drinking Water Standards Test (Title 22 of the California Code of Regulations) for ~~chlorides, nitrates, total~~

~~dissolved solids, iron and manganese~~inorganic (chemical) analyses and shall be performed by a laboratory certified by the ~~California Department of Health Services~~Environmental Laboratories Accreditation Program. Such analysis shall be as prescribed by the latest edition of the Standard Methods for the Examination of Water and Wastewater, American Public Health Association. Wells drawing water from the Aromas formation shall also be tested for hexavalent chromium. More extensive analysis may be required on a case-by-case basis if the Health Officer determines that the quality of the water may not be safe for domestic use because of evidence of contamination of groundwater in the area or because of past or present land use related or potentially related to the use or disposal of hazardous materials.

(C) Sealing or Destruction of Substandard Wells. All new wells found to be of unsuitable quality according to standards established by the ~~California Department of Health Services~~State Water Resources Control Board shall be sealed or destroyed as prescribed in the Department of Water Resources Bulletin No. 74-81, or as subsequently revised or supplemented, unless mitigating measures can be found to make the water potable and to assure that the groundwater supply is protected, as determined by the County Health Officer.

~~(D) Treatment of Stream Sources. An automatic chlorination device, or other approved treatment system to assure that established bacteriologic standards for drinking water will be met at all times shall be required for all stream sources. The Health Officer may also require installation of water filtration equipment for streams subject to turbidity levels that could interfere with the treatment process or otherwise make the water unsuitable for consumption. [Ord. 4283 § 16, 1993; Ord. 4023 § 2, 1989].~~

(D) Deviation or Treatment. Deviations exceeding any of the maximum contaminant levels for secondary (aesthetics) chemicals may be allowed, in the discretion of the Health Officer, if adequate chemical treatment is provided, or if the quality of water from the water system is not objectionable to an appreciable number of users. Individual water systems which fail primary or secondary drinking water standards as set forth in Chapter 15, Division 4 of Title 22 of the California Code of Regulations, as may be amended from time to time, and incorporated herein by this reference, may choose to treat the supply at the source. In lieu of a source treatment facility, an individual water system may choose to install a Point of Use (POU) or Point of Entry (POE) treatment device at each connection, subject to approval by the Health Officer.

(E) Notification Requirement. A notice of nonstandard water quality shall be recorded by the Health Officer with the County Recorder's office on the deed of any property served by a water source that does not meet water quality standards for drinking water according to standards established by the State Water Resources Control Board. The Notice shall include:

(1) The date(s) the well was tested and the identity and amount of the constituent(s) found that did not meet standards,

(2) The type of treatment device (s) installed to reduce the constituent to a level that meets standards.

(3) Statement of the operating requirements to ensure proper performance of the treatment system, such as: use of water conservation measures, disposal of byproducts, maintenance of a contract for servicing of the treatment system, other maintenance requirements.

(4) Specification of any restriction on system use or property use, such as limitations on amount of water used, wastewater generated, restrictions on building additions, etc.

(5) Notification that County staff may conduct routine inspections of the system, as necessitated by the increased likelihood that the treatment system might fail.

7.73.075 Water source evaluation upon transfer of property.

(A) Evaluation Prior to Sale of Property. Prior to selling a property that is served by an individual water system, a property owner shall cause the water quality of the water source to be tested pursuant to the requirements of Section 7.73.070 and the yield of the source to be tested pursuant to the requirements of Section 7.73.060. The results of water quality testing and yield testing shall be provided to prospective buyers and the Environmental Health Division. Tests must have been completed within three (3) years prior to the date of transfer.

(B) Water Treatment Systems. If the property is served by a water treatment system or if a notice of nonstandard water quality has been recorded for the property, the seller is required to disclose any active annual service agreements, contact information of the current service provider, and the associated annual county and service provider fees.

(C) Enforcement. Failure to comply with any of the provisions of this section will be considered a violation of this chapter and subject the violator to any and all enforcement remedies provided by SCCC.

7.73.080 Amendments.

Any revision of this chapter which applies to the Coastal Zone shall be reviewed by the Executive Director of the California Coastal Commission to determine whether it constitutes an amendment to the Local Coastal Program. When a revision constitutes an amendment to the Local Coastal Program such revision shall be processed pursuant to the hearing and notification provisions of Chapter 13.03 SCCC and shall be subject to approval by the California Coastal Commission. [Ord. 4023 § 2, 1989].

County of Santa Cruz

HEALTH SERVICES AGENCY

ENVIRONMENTAL HEALTH DIVISION

Water Resources Program
701 Ocean Street room 312, Santa Cruz, CA, 95060
Phone:(831) 454-7519 Fax:(831) 454-4770

This version is a draft, the notes written in green are informational and will be deleted in the final version.

Policy for Evaluation of Well Applications to Minimize Resource Impacts

This policy specifies the level of review of proposed well applications and requirements to minimize potential impacts on water resources, public trust resources, and other wells; (7.70.110 (C-G)), and coastal, biotic and cultural resources (7.70.030(C)). This policy addresses the following issues:

- Water use efficiency measures to prevent waste and minimize overdraft;
- Influence on groundwater levels and production of nearby wells;
- Influence on surface water and public trust resources;
- Evaluation of wells that encounter karst;
- Consistency with groundwater sustainability plans;
- Applicability of environmental and coastal review and assessment of biotic and cultural resources.
- Metering and reporting for non-de minimis wells;
- Additional requirements in groundwater extraction concern areas.

Definitions:

(1) "Community well" means a water well used to supply water for domestic purposes in public water systems or state small water systems as defined in Section 116275 of the State Health and Safety Code.

(2) "De Minimis Well" means a well that is used to extract less than 2 acre-feet per year for domestic purposes. De minimis wells include a water well used to supply water for domestic needs of up to four individual primary residences using a total of less than 2 acre-feet per year. An approved accessory dwelling unit is not considered a separate primary residence for this purpose. De minimis domestic use may include up to one half acre of non-commercial residential irrigated landscaping and gardening per primary unit. {*Santa Cruz County Board of Supervisors has adopted General Plan Policy that ADUs are not to be considered as separate connections. A modest amount of irrigation for landscaping and gardening can be considered to be part of domestic use. Actual average de minimis use in Santa Cruz County is 0.3-.05 af/y based on metered records for small rural water systems.*}

(3) "Non-De Minimis Well" means a well that is not a de minimis well: it serves a non-domestic use, or serves more than 4 separate primary dwelling units.

(4) “New Well” means a well that will serve a new or significantly expanded use, which represents an increased extraction of groundwater. A significant increase would result from a new use or change of use in the area served by the well that will result in an increase in the maximum annual amount of water extracted in the past 5 years. {*New wells are rare in the County. We receive around 10 applications per year for new wells, usually de minimis. There are very strict limits to growth outside of the urban services line that prevents subdivisions, the only new development is the occasional single-family house. Given the slope, roads, and septic constraints, most areas that could support a house have already been developed.}*

(5) “Replacement Well” means a well that will serve an existing use or change of use with no significant increase in water use as defined above and will replace an existing water source such as a spring or a well that is to be destroyed. *{The definition of a replacement/supplemental well is tied to no significant increase in the amount of water used in the last 5 years. A change in well depth, or pump size would be generally acceptable as those changes can make the well more efficient and reliable and can reduce impacts to surface water and/or improve water quality, provided other conditions ae also met. Adverse impacts of well deepening have not been observed in Santa Cruz County, though may be of concern to groundwater agencies in specific locations.}*

(6) “Supplemental Well” means a well that that will support an existing use, including a change of use, with no significant overall increase in total water use as described above. The existing source could be a shared well or other well that will be maintained as a backup source.

(7) “Tier” means the type of well application and the level of review and conditions that will be needed for approval based on the proposed volume of pumping, type of water use, proposed increase in water use, the aquifer characteristics and the potential for impact on streams, nearby wells, groundwater sustainability, and/or the environment. Each application for a new, supplemental, or replacement well shall be evaluated and specific measures may be required to ensure that the well will not have significant adverse impacts on groundwater sustainability, nearby wells, surface water, or the environment. The level of evaluation and required measures will depend on the Tier in which the well falls, based on the type of well, the location, and the aquifer characteristics. The Health Officer shall establish specific criteria and procedures for assigning the Tier and the extent of required evaluation and protective measures. Such criteria shall be adopted by the Board of Supervisors by resolution. The Health Officer may deny applications for Tier 4 wells that will have a significant adverse impact on groundwater sustainability, nearby wells, surface water, or the environment.

(a) Tier 1 will include de minimis wells and non-domestic wells using less than 2 acre-feet per year that do not require any discretionary review under other chapters of the SCCC and meet the minimum standards for preventing impacts on streams and nearby wells based on aquifer characteristics, well characteristics, depth of well seal, and location.

(b) Tier 2 will include supplemental and replacement non-de minimis wells with no significant increase in water use and meet the minimum standards for preventing

impacts on streams and nearby wells based on aquifer characteristics, well characteristics, depth of well seal, and location.

(c) Tier 3 will include new non-de minimis wells serving new uses that will pump less than 50 acre-feet per year and Tier 1 or Tier 2 wells that do not meet the Tier 1 or Tier 2 requirements. Tier 3 wells must also meet the minimum Tier 3 requirements for stream depletion and nearby well drawdowns.

(d) Tier 4 will include wells that do not meet the Tier 1, 2, or 3 requirements, are in a control zone, are in specified Tier 4 Groundwater Extraction Concern Areas, or are wells that could adversely affect the sustainability of a groundwater basin.

(8) "Groundwater Extraction Concern Area" means an area designated by the Health Officer where groundwater availability is limited due to inadequate supply or poor quality, or where construction of additional wells may cause significant adverse impacts on groundwater levels, surface water flow, or seawater intrusion. These areas are shown in the County's Geographic Information System. *{Designations and requirements for groundwater extraction concern areas are still being developed, and may evolve with time.}*

Requirements for Minimizing Impacts on Stream, Public Trust Resources and Groundwater Dependent Ecosystems

Applicable Streams:

- These standards shall apply to wells near wetlands, streams or reaches that are hydraulically connected to groundwater more than 5% of the time. (This does not include lower Valencia Creek, lower Corralitos Creek. Specific reach designations and other exempt streams may be added.) *{In these locations, well pumping cannot further deplete streamflow. These reaches are impacted by the long-term overdraft of the Pajaro Groundwater Basin. The GSP for that basin does not project restoring connectivity at any specific time in the new future. Connectivity can only be achieved through basin-wide management and will not be affected by the county well ordinance}*

Tier 1: (New and replacement de minimis wells)

- All wells located within 1000 ft of perennial or intermittent stream as mapped on a USGS map or as identified in the field shall meet standards for minimizing impact on streamflow unless that stream is designated as exempt by the Health Officer.
- Wells shall be located a minimum of 50 ft from the streambank, outside riparian woodland and outside the 100 year floodplain, whichever distance is greater. If a 50 ft setback cannot be attained due to the size of the property, steep slopes, setbacks from onsite wastewater treatment systems, or other factors, the setback shall be the maximum attainable and shall not be less than the existing well if the proposed well is a replacement or supplemental well. *{These setbacks are already required by other provisions in County Code. The analysis of stream setback indicates that the amount of setback has very little influence on direct stream depletion by low volume wells. The use of a deep seal is much more effective. See separate Analysis of Streamflow Depletion.}*

- The minimum depth of the well seal shall be 100 ft or into first impermeable material, whichever is less. An impermeable layer is defined as a layer that limits the downward movement of groundwater and will be identified based on information on local geology or nearby well logs, and will be confirmed by the well log of the newly installed well.
- No well shall be completed in alluvium deposited into a known and definite channel with a direct hydraulic connection to surface water. *{This condition refers to State Water rights law, which requires a surface water right if water is drawn from a known and definite subterranean channel.}*
- Additional measures, as outlined in the *'Groundwater Extraction Concern Table',* may be required for proposed Tier 1 wells located within a designated groundwater concern area.

Tier 2 (Replacement/supplemental non-de minimis wells, with no increase in water use)

- All wells located within 2000 ft of perennial or intermittent stream as mapped on a USGS map or as identified in the field shall meet standards for minimizing impact on streamflow unless that stream is designated as exempt by the Health Officer.
- Wells shall be located a minimum of 100 ft from the streambank, outside riparian woodland, and outside the 100 year floodplain, whichever is greater. If a 100ft setback cannot be attained due to the size of the property, steep slopes, setbacks from onsite wastewater treatment systems, or other factors, the setback shall be the maximum attainable and shall not be less than the existing well. *{Increasing the setback from 50 to 100 feet provides some additional margin of protection. The requirement for a deep seal provides more significant reduction of depletion. This tier addresses replacement/supplemental wells which may already be having an impact on stream depletion, and these requirements will reduce that impact.}*
- The minimum depth of the well seal shall be 200 ft or into first impermeable material, whichever is less. An impermeable layer is defined as a layer that limits the downward movement of groundwater and will be identified based on information on local geology or nearby well logs, and will be confirmed by the well log of the newly installed well.
- No well shall be completed in alluvium in a known and definite channel.
- Additional measures, as outlined in the *'Groundwater Extraction Concern Table',* may be required for proposed Tier 2 wells located within a designated groundwater extraction concern area.

Tier 3 (Wells that do not meet Tier 1 or 2 requirements and new non-de minimis wells that will not pump more than 50 afy or more than a daily average of 100 gpm and are consistent with local GSPs.) *{Stream depletion calculations show that unmitigated pumping of 50 af/y can result in a stream depletion of 0.05-0.1cfs, which can be significant on most streams during the dry season. Larger new wells will require a more thorough analysis through Tier 4.}:*

- All wells located within 2000 ft of perennial or intermittent stream as mapped on a USGS map or as identified in the field shall meet standards for minimizing impact on streamflow unless that stream is designated as exempt by the Health Officer.
- The minimum depth of the well seal shall be 200 ft or into first impermeable material, whichever is less.
- The well shall be located and designed so that a calculation of projected streamflow depletion shall not cause exceeding the allowable additional cumulative depletion percentage of the 10th percentile dry season flow in an affected fish-bearing stream after 10 years of pumping, as calculated by Environmental Health staff based on well characteristics, water usage, aquifer characteristics using the most appropriate streamflow depletion model (e.g. Reeves, 2008; Hunt, 1999 ; Hunt, 2003, Li et. al. 2022, Bakker 2013). 10th percentile dry season flow shall be the observed flow, if available, or the calculated natural flow as indicated in the most recent version of the California Unimpaired Flow Database (Zimmerman, et.al, 2023). Environmental Health staff will utilize the Critical Stream Table and will develop additional resource and streamflow information for the specific location of the proposed well as needed. *{Studies have identified a 10-20% depletion of dry season flows as a significant impact in coho and steelhead stream, respectively. No individual well should be allowed to reduce flow by more than 1-15%, depending on the public trust values present and the degree of flow depletion already occurring (see critical stream tables, below).*
- Consideration will be given for mitigating flow depletion impacts through increased groundwater recharge, use of summer storage, limitations on water use, or other methods of reducing impact on flow or associated public trust resources.
- Additional measures, as outlined in the *'Groundwater Extraction Concern Table',* may be required for proposed Tier 3 wells located within a designated groundwater concern area.

Tier 4 (Wells that do not meet Tier 1, 2, or 3 requirements, are in a control zone, are in specified Tier 4 Groundwater Extraction Concern Areas, are in a seawater intrusion area, are wells that could adversely affect the sustainability of a groundwater basin, or are new Public Water System wells serving 200 or more connections) *{Tier 4 requires a very thorough evaluation, CEQA review and possible denial}*.

- An analysis of the projected impacts on groundwater levels, streamflow, and groundwater dependent ecosystems in the groundwater basin and watershed where the well will be located shall be conducted by a hydrogeologist, taking into account specific aquifer characteristics, well characteristics, cumulative impacts of existing groundwater and surface water withdrawals, the presence and lifecycle needs of protected species in affected surface waters, and the potential impact on public trust resources.
- Consideration will be given for mitigating flow depletion impacts through increased groundwater recharge, use of summer storage, limitations on water use, or other methods of reducing impact on flow or associated public trust resources.

- This analysis will be required for any proposed Tier 4 well located within a half mile of a stream that is not exempt, in a designated Tier 4 groundwater extraction concern area, or anywhere within the watershed of a critical Level 1 stream (Scott Creek, San Vicente Creek, Laguna Creek, Bean Creek, Zayante Creek, East Branch Soquel Creek). Critical Streams are indicated in the critical stream table and additional streams may be added as additional information on habitat value and/or extent impairment becomes available.
- This analysis will also be required for any Tier 4 well located within or near a groundwater basin where the GSA has determined that the well may threaten achieving groundwater sustainability pursuant to the GSP. Wells will not be approved in the Pure Water Soquel Control Zones, unless it can be shown that well will not impact or be impacted by the injection program.
- Tier 4 wells are subject to discretionary review and evaluation under the California Environmental Quality Act (CEQA).
- Specific construction and/or operating measures may be required as a condition of approval and the application may be denied if the project would result in significant adverse impacts on groundwater resources, control zones, surface water or public trust resources.

Critical Streams: Updated

Allowable Additional Cumulative Flow Depletion				
Current Depletion	**>20%**	**10-20%**	**5-10%**	**<=5%**
Resource Value				
Coho Core-1	1%	1%	5%	10%
Coho Recovery-2	1%	5%	5%	10%
Steelhead high intrinsic=3	1%	5%	5%	10%
Steelhead/Other Fish-4	1%	5%	10%	15%

Stream	Resource Value	All years 10th Percentile Dry Season Unimpaired Flow (A)	All Years 10th Percentile Dry Seas. Observed Flow	Data Sources Observed Flow	Current Estimated Depletion	Data Sources Estimated Depletion	Allowed Additional Depletion*	Allowed Depletion cfs*
Lower Soquel @USGS	2	2.44	0.84	A	65%	B,G,H,G	1%	0.008
E. Branch Soquel @ W. Branch	1	1.23	0.1	B,D,E,G	60%	B,D,E,G	1%	0.001
W. Branch Soquel @ E. Branch	2	0.63	0.81	B,D,E,F	15%	B,D,E,F	5%	0.041
Moore Gulch	4	0.05	0.15	E,F	17%	E,I	5%	0.008
Other Soquel Tribs	4				10-20%	E	5%	
Aptos ab Valencia	2	0.46	0.66	D,E,G	<=5%	D,E	10%	0.046
Valencia	4	0.11	0.02	D,E,G	82%	D,E	1%	0.001
Upper Corraltios	4	0.63	0.3	D, E	50%	D,E	1%	0.006
Browns Valley Cr.	4	0.22	0.2	D, E	>20%	D,E	1%	0.002
SLR @ Big Trees (Felton, mainstem)	2	15.2	12	A,C,G,H	30%	C,D,E,G,H	1%	0.120
Branciforte	2	0.34	0.46	C,D,E,F	5-10%	C,D,E	5%	0.017
Bean	1	0.5	2.3	C,D,F,G	21%	F,G,H	1%	0.023
Zayente ab Bean	1	1.19	1.53	A,D,E,G,H	5-10%	C,D,E,G	5%	0.077
Bear	2	1.12	0.63	C,D,E,F	<=5%	C,D,E	10%	0.063
Kings	2	0.58	0.2	A,C,E,F	<=5%	C,E	10%	0.058
Boulder Creek	3	0.89	1.1	A,C,D,E,F	25%	C,D,E	1%	0.011
SLR Other Tribs	4			C,E	5-10%	C,E	10%	
Laguna	1	0.5		A,G	>10%	E,G	1%	0.005
Majors	2	0.22		A,G	>10%	E,G	5%	0.011
San Vicente	1	0.85		A	>10%	E	1%	0.009
Scott	1	1.99		A	>10%	E	1%	0.020
Other County Streams	4			E	5-10%	E	10%	
* Allowed depletion for Tiers 1-3. Additional Analysis would be required for Tier 4.								
Data Sources (See Notes for more information)								
A-California Natural Flows Database								
B-RCDSCC-TU surface diversion info								
C- San lorenzo River Watershed Plan								
D-JSSH September Flow Summary-cbec								
E - Judgement and observations								
F-Flow Measurements								
G-Gage data, current								
H-Numerical Basin Model								
I - Calculated Water Budget								

Minimizing Impact on Nearby Wells

- Tier 1 and 2: The minimum setback from existing wells shall be 50 ft. If this cannot be met, the setback shall not be less than the setback of the existing well to be replaced. Minimum setbacks will not be required for wells located on the same parcel or owned by the same owner. *{Application of the modified Theis Non-Equilibrium Equation to low volume wells, shows that there is minimal drawdown for wells that pump up to 50 gpm in most formations. Santa Cruz County requires a 50 ft setback from a property line and San Mateo County requires a 50 ft separation for all wells.}*
- Tier 3: The minimum setback to a nearby well shall be calculated using the modified Theis Non-Equilibrium Equation (Cooper-Jacob), with proposed well parameters and regional aquifer properties. Calculated drawdown at the proposed distance of nearby well shall not exceed 5 feet after 180 days of pumping. *{The standard of 5 ft drawdown after 180 days of pumping is proposed as it is expected that this would have minimum impact on the yield of a nearby well. The modified Theis Non-Equilibrium Equation is also used by Monterey County.}*
- Tier 4: A geohydrologic analysis shall be required for Tier 4 wells that will evaluate the projected effect on nearby wells and shall demonstrate that the new well will not cause significant and unreasonable impacts on nearby wells. If projected impacts are found to be significant and unreasonable, the well applicant must implement a monitoring plan with possible mitigation measures to address observed impacts.

Proposed Level of Review and Mitigation Required for Various Types of Well permit Applications					
Tier	**Criteria**	**Average Number of Permits/year**	**CEQA Review Required?***	**Connected Stream Setback**	**Nearby Well Setback**
Tier 1	De Minimis, domestic < 5 connections; Non-de minimis <2 AFY	44	Ministerial	>50 ft and 100 ft deep seal within 1000 ft of stream**	>50 ft
Tier 2	Non-De minimis Replace/Supplemental	11	Ministerial	>100 ft or not less than existing, and 200 ft deep seal within 2000 ft of stream**	>50 ft, or not less than existing
	Public Water system replace/supplemental	1			
Tier 3	New Non-De minimis wells that are consistent with GSPs, meet Tier 3 calculated setbacks, and will pump less than 50 afy/100gpm	1	Ministerial	If within 2000 ft of stream, Using depletion model, 10th percentile dry season flow shall not be reduced by more than allowed % after 10 years of pumping ***	Calculated minimum setback so that drawdown at nearby well is less than 5 feet****
	Wells that do not meet Tier 1 or 2 minimum setbacks, but do meet Tier 3 calculated setbacks	?			
Tier 4	Wells that do not meet Tier 1,2,or 3 requirements; or located in a control zone or Tier 4 gw concern area	?	Yes	Analysis, including cumulative effect on streamflow in overall basin	Analysis and mitigation
	New Public Water System Serves > 199 connections	<1			

Notes:	
*	Well permit is discretionary if other discretionary permits are requried by other sections of County Code.
**	Deep Seal is specified depth or first impermeable layer, whichever is less.
***	Allowed depletion is function of stream value and current impairment, as shown in Critical Stream Table
****	Use modified Theis Non-Equilibium Equation (Cooper-Jacob), with proposed well parameters and regional aquifer properties. Calculated drawdown at proposed distance of nearby well should not exceed 5 foot after 60 days of pumping.

Water use efficiency measures are required for all wells; metering and reporting is required for all non-de minimis wells; other mitigation measures may be required.

Karst Areas

For non de minimis wells, if a well is proposed in a known karst area or if karst is encountered during the drilling process, further drilling shall be suspended, and the Health Officer shall evaluate whether a well can be completed without causing adverse impacts on groundwater resources, surface waters or other water users. The Health Officer may require analysis at the expense of the applicant by a professional geologist familiar with the occurrence and movement of water in karst landscapes. The analysis shall take into account the potential effect of the proposed well on nearby wells, springs and streams in terms of flow, water temperature and water quality. Recommendations may include procedures for destroying the borehole without adversely affecting subsurface conditions. Known karst areas and outcrops of marble or limestone are shown on the map of Groundwater Extraction Concern Areas, but other unmapped areas of karst may be encountered during drilling, particularly within mapped metasedimentary formations. *{There is a limited extent of karst on private lands in the Bonny Doon area and near UCSC. There are a number of concerns that larger non de minimis wells in karst could impact the flow to springs that provide cool, high quality water to streams that support fish and local water supply. In addition, there is a risk of groundwater contamination from surface pollutants or leaking septic systems. Encountering caverns and other karst features can also present challenges to the well drilling operation.}*

Compliance with California Environmental Quality Act and Protection of Coastal, Biotic and Cultural Resources

Tier 1, 2, and 3 wells that meet the requirements for those tiers may be approved ministerially. Tier 4 wells are subject to discretionary review and evaluation under the California Environmental Quality Act (CEQA), pursuant to state and local environmental review guidelines.

Wells within the Coastal Zone require a coastal development permit and are subject to evaluation under CEQA unless they qualify for an exemption or exclusion under County Code Chapter 13.20:

1. The following wells are exempt from coastal permit requirements: Replacement well on Park land (13.20.064) or serving an existing single-family dwelling (including ADU) or other existing legal structure where there will be no increase or expansion of the use and where the well or access road will not encroach into a sensitive biotic habitat.
2. A well can qualify for a coastal exclusion under the following circumstances:
    a. The well is for agriculture on lands designated for agriculture on a parcel greater than 10 acres, the well is greater than 100 feet from a stream or waterbody, and is not between the coast and the first public through road paralleling the coast (typically Hwy 1, or San Andreas Rd)
    b. The well will serve a proposed single-family dwelling (including ADU) and is not in a sensitive habitat, urban services line, rural services line, appealable area, or in an area subject to saltwater intrusion or groundwater emergency.

c. If a well meets the above requirements, a notice of coastal exclusion must be completed and sent to the Coastal Commission. These forms must be completed by staff in the Community Development and Infrastructure Department (CDI).

3. In all other cases the well is subject to Coastal Development Permit Requirements, and the applicant must apply to CDI. In some cases an emergency coastal permit may be obtained, but the applicant will still need to go through the process to obtain a coastal development permit.

When a well application is submitted, County staff will assess the potential impact on mapped resources, including, sensitive habitat (Chapter 16.32), riparian corridors (Chapter 16.30), native American cultural sites (Chapter 16.40), and historic resources (Chapter 16.42). Where the proposed well location may impact any of those resources, further analysis and discretionary review may be required prior to well permit approval. Any site disturbance required for the well construction must be in compliance with the County Grading ordinance (Chapter 16.20), and as such may require further discretionary review and permitting.

Metering and Reporting

- For all non de minimis wells, a meter shall be installed to measure water use and usage shall be reported annually to the Health Officer, according to procedures established by the Health Officer. The cost of meter installation and reporting shall be borne by the well owner(s). *{The County and the GSA's have good information on average water use of de minimis users. SGMA does not authorize metering of de minimis users and there would be considerable resistance to requiring that without adequate justification. However, SGMA does authorize metering of non-de minimis users and given the large variability and much greater usage of those users, it is justified to require meters on all new and replacement non-de minimis wells.}*
- The Health Officer may require the property owner to provide information to confirm that any required conservation measures are being maintained. If such information is not provided or water usage is not being reported, the Health Officer may conduct an inspection to observe the meter and/or verify that water conservation measures are being maintained. Inspections shall be conducted at reasonable times and the inspector shall first make a reasonable effort to contact the owner or occupant of the premises. If the inspection requires the entry into a building or an area that is designed for privacy, then prior permission shall be obtained from the owner or occupant. If permission is denied, then an inspection warrant shall be obtained.
- If the usage information or the results of a site inspection show that the well owner is not in compliance with Chapter 7.70 or with the requirements of the permit, the Health Officer shall require that corrective measures be taken.

Water Use Efficiency

Section 7.70.110.D of the County Well Ordinance requires that as a condition of approval of a well permit, it is demonstrated that groundwater will be put to beneficial use and will not be wasted. To that end, each non de minimis well permit application shall be accompanied by the attached supplemental sheet (Attachment A) which describes the proposed use of the well and measures that are taken to maximize water use efficiency. De minimis users are required to complete a water efficiency checklist and ensure that irrigated areas do not exceed 0.5 acre. The section requires that a water efficiency evaluation be performed, with reasonable recommendations for improved efficiency implemented. Following are the elements to be addressed in the water use efficiency audit. *{Water efficiency measures are currently required for all non de minimis uses. The requirement for a checklist/evaluation would be extended to de minimis wells.}*

Water Use Efficiency Audit for Non-Agricultural Uses

- Measure showerhead flow rates and install low flow showerheads, if needed.
- Measure faucet flow rates and install faucet aerators for kitchens and bathrooms, if needed.
- Check toilet for leaks and install tank displacement devices or retrofit, if needed.
- Evaluate the efficiency of the irrigation system.
- Identify and correct irrigation leaks, broken or mismatched sprinkler heads, high pressure and other common problems.
- Provide water conservation materials and water-wise landscaping tips.
- Evaluate any other water uses in the home or business for efficiency.
- Institute measures for dispersal and infiltration of stormwater where feasible, ensuring slope stability is not compromised.

Section 7.70.110.D.2 allows the installation of standard conservation measures in lieu of performing an audit. In this case, the following measures would be required. Some optional measures could be substituted to offset high water use landscaping.

Conservation Measures (** - Mandatory Measures)

1. Install ultra-low flow toilets (<1.2 gal/flush)** (retrofit waived if 1.6 gal/flush toilet is already in use)
2. Install low-flow showerheads (<2.0 gpm)**
3. Retrofit Clothes Washer
4. Audit for leaks**
5. Audit for irrigation efficiency**

6. Use xeriscape landscaping.
7. Utilize drip irrigation if feasible. (Required for agricultural use if feasible)
8. Evaluate water use and water savings by installation and use of a water meter.

Conservation Measures for Agricultural Uses

A more detailed and specific analysis of water use efficiency for agricultural uses shall be required to be completed on forms developed by the Health Officer. Additional measures may be required to prevent unnecessary water waste.

Groundwater Extraction Concern Areas

Additional measures will be required in designated groundwater extraction concern areas:

Type of Concern:	Karst	Limited Yield	Elevated Nitrate/ TDS/Cl	Tier 4 Seawater Intrusion
Protective Measure:				
Geohydrologic Evaluation	x			x
Modified Yield test observed by County		x		
Discretionary CEQA Review	x			x
Water Quality Testing			x	x
Seal Design	x		x	x
Treatment/Deed Recordation			x	
Well Interference Evaluation?		x		
Water Conservation/ Recordation		x		

Limited Yield Areas:

These are areas of the county known to provide limited amounts of groundwater due to the presence of non-water-bearing formations, with limited fractures. These areas have a history of dry holes and/or wells going dry during the summer or dry years. Wells proposed to serve a new or expanded use, including an accessory dwelling unit, in these areas will require a yield test that includes observation of a sustained pumping rate over a four-hour period that meets the requirements of Chapter 7.73 and concurrent observation of groundwater level in the well to show the level is stable and that it recovers at least 90% within 24 hours after the pump test is completed. Tier 2, 3 and 4 wells will also require concurrent observation of groundwater levels in existing wells within 2000 ft of the new well, subject to authorization by the affected well owners, who will also be required to rest their wells during the test period. If the yield test does not meet standards, additional water efficiency measures may be required and a notice may be recorded on the deed to note the limitations of the well.

Elevated Water Quality Concern

Areas of the county are known to have elevated levels of nitrate, total dissolved solids, chloride, chromium, or other constituents. Water quality testing is required for all newly constructed wells. In water quality concern areas this testing must be completed and submitted to the Health Officer for review and approval prior to well completion. If constituents are found to exceed drinking water standards, or may degrade nearby groundwater quality, the Health Officer may require additional testing, electronic logging, evaluation by a qualified professional, specific completion and sealing measures, treatment, complete destruction and sealing of the borehole, and/or other measures necessary to protect groundwater quality and ensure the water quality is suitable for the proposed use. If treatment is required to meet drinking water standards, a notice will be recorded on the deed, pursuant to Chapter 7.73.

Tier 4 Seawater Intrusion Areas

Some areas of the county are experiencing seawater intrusion that is not currently being controlled by implementation of groundwater sustainability plans. In these areas, continued or expanded pumping may further threaten groundwater quality. Any new or replacement non-de minimis well in these areas shall be considered Tier 4 and will require an evaluation by a qualified professional to evaluate the likely impact of that well on seawater intrusion and groundwater quality, also taking into account the potential effects of sea level rise and climate change. The Health Officer may deny drilling of a non-de minimis well in these areas if such well is expected to worsen seawater intrusion.

Attachment A: Well Application Supplemental Information Sheet
Water Use and Water Conservation Measures

For well permit application #_____, on APN _____

The Santa Cruz County Well Ordinance (Section 7.70.110) specifies that all well permit applications must specify the parcels proposed to be served, the type of land uses to be served, the estimated annual water use, and the presence of any existing wells which also serve those uses. The Health Officer may require documentation to support the water use estimates provided. For wells which will serve more than four residential connections or which will serve nonresidential uses which can be expected to utilize more than 2 acre-feet of water per year, measures must be taken to ensure that groundwater is put to beneficial use and is not wasted. These may include completion and implementation of a water use efficiency audit, and/or installation of water conservation measures (see attached).

The applicant must provide in writing the following information:

The proposed well is a (circle one): replacement supplemental new

Water will be used for: Residential: Number of Units____
Area of irrigated landscape or garden: _____
(Indicate all that apply) Commercial or Industrial (Describe)_____
Agricultural Irrigation: acreage and crop type:_____
Other:_____

Water will be used on the following parcels:_____ _____ _____

Reasons for Needing Proposed Well (circle all that apply):
New Use Declining Production Declining Water Quality Sanding Casing Collapse Other

Number of other wells on property or serving the property: ____
For each well provide the following information:

Location/Description/APN:	Depth:	Diameter:	Pump Size:	Metered Water Usage:	Status:
1.					
2.					
3.					

Estimated annual water use from new well will be: ____
Briefly describe how use was estimated (attach back up information as necessary)

List water conservation measures: _____

	in place:	to be installed:
1.		
2.		
3.		
4.		
5.		

Provide a plot plan showing all existing wells on the properties to be served by existing and proposed wells. Provide well logs for existing wells or other information on depth and perforations of existing wells. If the existing well(s) are metered, submit water meter readings from the past two years. Provide estimates for water use, back up calculations and detailed description and documentation of water conservation measures.

_____ _____ _____
Name of Person Preparing Checklist Signature Date

Return this form to: Environmental Health, 701 Ocean St., Room 312, Santa Cruz, CA 95060; or, Fax (831)454-3128

County of Santa Cruz

HEALTH SERVICES AGENCY

ENVIRONMENTAL HEALTH DIVISION

Water Resources Program

701 Ocean Street room 312, Santa Cruz, CA, 95060

Phone:(831) 454-7519 Fax:(831) 454-4770

Notes for Critical Streams Table

The Critical Streams Table was developed to estimate the allowable depletion of dry season streamflow without causing significant adverse impacts on stream-related public trust resources. It considers the value of existing resources and the extent of natural flow depletion due to surface diversions and groundwater extraction. The table is based on best available information and professional judgement, but can be refined as more information becomes available or information is developed for stream locations not listed in the table.

Resource Value Data Source

Mapped information from the Coho Salmon Recovery Plan (2012), the South Central California Steelhead Recovery Plan (2013) and the Coastal Multispecies Plan for Central Coast Steelhead (2016) were consulted to identify the resource value of specific streams, with some adjustments made based on more current information regarding occurrence of coho or lack thereof.

Streamflow Data Sources

- NFD (2024): The California Natural Flows Database was established to model estimated unimpaired flow characteristics on individual stream reaches throughout the state. It uses the record from nearby unaltered reference gages to estimate flows on ungaged streams and to calculate statistics for the gaged streams. While many statistics are available, the analysis for Santa Cruz County has primarily made use of the 10th percentile dry season baseflow for all years as that can also be readily compared to the statistic for observed flows. In many cases the NFD overestimates or underestimates flows for many streams, likely due to the fact that it may not take into account underlying geology which can have an effect on dry season baseflow. *California Environmental Flows Working Group (CEFWG). California Natural Flows Database: Functional flow metrics v1.2.1, May 2021.* https://rivers.codefornature.org/ *(1/14/24)*

- RCDSCC/TU (2019): The Resource Conservation District of Santa Cruz County contracted with Trout Unlimited to conduct the Soquel Creek Streamflow Assessment Study, which included dry season gaging at 4 locations for 2017-2022 and assessment

of basin water use and likely impacts of surface diversions. *Resource Conservation District of Santa Cruz County. December 2019. Soquel Creek Streamflow Assessment Study, with Trout Unlimited*.

- SLRWMP (1979): The San Lorenzo River Watershed Management Plan Hydrology Technical Section includes estimates of monthly flow frequency statistics for major tributaries based on USGS monthly flow measurements in 1973-76 as related to gaged stations, including flow statistics for the 10th percentile flow for each month at each location. The September 80% exceedance flow at Big Trees is comparable to the observed 10th percentile observed dry season flow for all years in the NFD. The September 80% exceedance flow is utilized as the observed flow for the ungauged tributaries unless more recent information is available. The document also includes estimates of the impact of stream diversions based on observed diversions, water rights records and actual diversion records. This provides an upper estimate of the impact of diversions since the actual number of stream diversions has been significantly reduced since that time. *County of Santa Cruz, San Lorenzo River Watershed Management Plan Hydrology Technical Section, 1979*.

- JSSH September Flow Summary, 2024: The County and partner agencies have conducted the Juvenile Steelhead and Stream Habitat (JSSH) Monitoring program in 1981, 1988, 1997 and annually from 2002- present. It includes monitoring of juvenile steelhead populations and various parameters in stream reaches throughout much of the county. This program has included flow measurements, but in order to more consistently characterize flow in relation to observed populations, it was determined that flow should be characterized for June and September of each year. A local consultant, cbec, was commissioned to utilize historical flow measurements to develop a linear relationship to one of two gaged streams, either San Lorenzo at Big Tress or Soquel at Soquel, separately for each of those months. These relationships are typically based on 8-20 instantaneous flow measurements at the specific location during each period of high baseflow (June) and low baseflow (September). For many ungaged streams, flow estimates were based on the JSSH September flow estimates for the years that the reference stations had mean September flows comparable to the 10th percentile dry season observed flow for those stations in the NFD. It is believed that in many cases the JSSH estimates are more accurate than the estimates in the NFD.

- Flow Measurements and Gage Data: Since 1975, Santa Cruz County staff have made over 3000 individual flow measurements during the dry season (June-October) at 170 locations in the county. Most of these are at regular water quality sampling stations,

with 6-60 dry season measurements at each location. This data is used to check and adjust values estimated by the Natural Flows Database, also utilizing local knowledge of the conditions in the watershed and best professional judgement. In addition to ongoing periodic discharge measurements, there are numerous continuous stream gages measuring low flows that are maintained by the USGS and local agencies, including 3 on North Coast streams, 8 in the San Lorenzo Watershed, 7 on mid-county streams, and 5 in the Pajaro watershed in Santa Cruz County.

- Numeric Groundwater Models: Groundwater models have been developed and utilized for each of the three groundwater basins subject to management under SGMA. These models simulate both groundwater conditions and interactions with surface water and have been used to estimate impacts on streamflow of basin-wide groundwater extraction. The geology of the areas of the County outside of the SGMA basins are not suitable for developing numeric models.

Notes on Specific Streams

Soquel Creek:

Soquel Creek and all its tributaries have been determined by the State Water Resources Control Board to be fully appropriated in the dry season. The State Board completed an adjudication of surface water rights in 1977, which did not recognize any new riparian rights beyond those specified in the adjudication. Stream surveys by County staff in 2013 indicated that only about 25% of the permitted diversions from lower Soquel Creek were active. A number of studies have been conducted over the years to assess the impact of groundwater pumping on streamflow but have not conclusively established a measurable impact. There are many factors affecting flow, including upstream watershed contribution, surface diversions, riparian evapotranspiration and streambed aggradation. Soquel Creek had 0 flow at the USGS gage in 1977, 1988, 1992 and 1994, but has not experienced 0 flow since. Numeric groundwater modelling for the Mid-County basin GSP suggested that the potential surface water depletion in Soquel Creek from groundwater pumping could be as much as 1.4 cfs, or 57% of the estimated 10 percentile unimpaired dry season flow (2.44 cfs). This depletion is primarily a result of cumulative impacts of municipal pumping, with the groundwater level observed to be drawn down below the stream level at times in the lower reaches of Soquel Creek and measured losses in flow from upstream to downstream during dry periods. Modelling indicated that eliminating all the inland non-municipal pumping would only increase flow by 0.1 cfs. Moving pumping up from the deeper zone into the shallow alluvial zone would reduce flow by 0.1 cfs. Eliminating all non-municipal pumping in Soquel Valley and Bates Creek valley would increase Soquel flow by 0.15 cfs. Rural non-municipal pumping is thus only reducing 10 percentile dry season flow by 6%. Surface diversions are estimated to account for another reduction of 0.2 cfs, or 8%.

East Branch of Soquel Creek

The NFD estimate of unimpaired flow seems to be a significant overestimate as compared to observed flow on the East Branch and the estimated flow on the West Branch. The East Branch is subject to some direct surface diversions upstream as well as groundwater extraction in the lower reach from a quarry and de minimis uses. The dry season flow is reduced in the lower reach and has been observed to go dry in some years. Cbec (a local hydrology firm) estimated the flow to be 0 at the lower reach of the east branch during the 10th percentile dry years at the USGS gage on Soquel Creek (2014 and 2021). The East Branch was gaged upstream near the quarry and at the confluence with the west branch 2017-2022. It did not go dry, but the low flow in 2021 was 0.1 cfs. The upper gage location has an estimated 10 percentile dry season flow of 0.35 cfs, while the lower station estimated flow is 0.1 cfs. There may be a geologic reason for the decline in flow at the lower gage. The East Branch has been designated as a core area for coho recovery and juvenile coho were found there several years ago.

West Branch Soquel Creek

The West Branch flows through a deep bedrock gorge in much of its lower reach, with limited nearby groundwater pumping. The upper watershed has low density rural wells and surface diversions. Although the observed flow is greater than the estimated unimpaired flow, it is estimated that actual depletion is likely approximately 15%, similar to the maximum depletion calculated for Moore's Gulch.

Moore's Gulch

An example of a typical rural basin with significant de minimis groundwater use. It is a 1.5 square mile basin that drains to Soquel Creek, with a measured late dry season flow of 0.15-0.3 cfs, for dry and wet years, respectively, based on periodic County flow measurements. (The Natural Flows database estimates a natural dry season flow range of 0.05 cfs (10th percentile) to 0.45 cfs (90th percentile).) The basin is mostly underlain by the Purisima AA unit, with groundwater depth increasing from 10 ft near the stream to 40 ft on the mid-slopes to 100 ft near the ridgetops. The basin includes 105 rural dwelling units, with landscaping, vegetable gardens, and some livestock. It also has a small public water system serving an institutional facility that extracts 2 af/yr. Well density in Moore's Gulch watershed is 70 units/sq.mi., compared to a maximum density of 52/sq.mi. in parts of Santa Margarita and 144/sq.mi. in parts of Mid-County. Well density would not be expected to change significantly in the future, as the area is at least 90% built out. Applying the water use factors and return flow estimates used in the MGA GSP, total consumptive indoor water use would be 0.225 af/month and total outdoor water use would be 1.75 af/month during the 6-month summer period. That would amount to 2 af/month in the driest month of September, or 0.03 cfs., 9-14% of the measured dry season streamflow. Applying the Sonoma County method of estimating streamflow depletion, groundwater use divided by recharge equals 8%, which is comparable to a July-September streamflow depletion rate of 14%. This water budget estimate does not take into account any mitigating factors such as distance from the stream, pumping from deeper layers, or the effect of riparian transpiration on unimpacted groundwater discharge.

Other Soquel Tributaries

Other Soquel Creek tributaries are judged to have similar conditions to Moore's Gulch with approximately 15% depletion attributed to de minimis pumping.

Aptos and Valencia Creeks

Most of the Aptos Creek watershed upstream of Valencia Creek is in State Parks, with limited influence from surface or groundwater extraction. The observed flows based on the JSSH data and the gaging history is greater than the NFD unimpaired flow. A gage has been reestablished on Aptos Creek. Valencia Creek is impacted by surface diversions and groundwater extractions and is hydraulically disconnected from underlying groundwater for much of its distance. Consequently, additional groundwater pumping will not increase depletion in these areas where it is hydraulically disconnected. Valencia does go dry in the lower reach in drier years.

Corralitos and Browns Valley Creeks

Corralitos Creek is designated as fully appropriated during the dry season upstream of Rider Creek. Both upper Corralitos and Browns Valley Creeks have nearby wells, individual surface diversions and municipal diversions for the City of Watsonville. Downstream of the confluence, Corralitos Creek is hydraulically disconnected from groundwater and goes dry most summers. The GSP concludes there is no potential for further depletion of interconnected surface water, but it does include a measurable objective to increase the extent and frequency of connectedness "where reasonably achievable."

San Lorenzo River

The San Lorenzo River and its tributaries are designated as fully appropriated during the dry season. Practically all streams in the San Lorenzo Watershed and the Santa Margarita Basin are considered to be interconnected to groundwater. Groundwater modelling suggests that if there was no groundwater pumping, an additional 1000 af/yr (1.4 cfs) would be released to surface water most of it eventually reaching the mainstem of the River at the Big Trees gage in Felton. This represents a depletion of about 10%. Upstream surface diversions on west side tributaries, primarily for municipal use, account for 20% depletion of about 3-4 cfs. Flows in the San Lorenzo River from Felton downstream are managed by established flow targets in the City of Santa Cruz Habitat Conservation Plan (HCP).

Bean Creek

Lower Bean Creek receives considerable groundwater discharge from the Santa Margarita groundwater basin, whereas the middle reach of Bean loses water and goes dry many years. This is a geologic condition that has been documented by old Fish and Game Surveys to have occurred at least back as far as the 1940's. The NFD greatly underestimates the dry season 10 percentile unimpaired flow in Bean Creek as 0.5 cfs, whereas the observed flow is 2.3 cfs. Numerical groundwater modelling for the Santa Margarita GSP provides an estimate of the extent to which Bean Creek flow is influenced by groundwater pumping. If there was no pumping, flow in Bean Creek would increase by 0.5 cfs, which is about 18% of the modelled unimpaired dry season flow. The majority of the

pumping impact is from municipal pumping (only 8% of the pumping in the Santa Margarita Basin is attributable to de minimis wells). More shallow monitoring wells are being installed to better characterize groundwater/surface water interactions. Bean Creek is a designated Coho restoration core area and coho were last found in Bean Creek in 2005.

Zayante Creek

Lower Zayante Creek receives significant groundwater contribution from the Santa Margarita Basin and its observed 10 percentile dry season flow (1.53 cfs) is greater than the NFD estimated unimpaired flow of 1.19 cfs. Most of the properties in the watershed are served by municipal water and the one large upstream surface diversion has been discontinued. Current depletion is estimated at 5-10%. Zayante is also designated as a core coho recovery stream.

Branciforte Creek

The Branciforte Creek watershed is split between the Santa Margarita groundwater Basin and the Santa Margarita Groundwater Basin. While some homes have municipal supply, the majority rely on individual wells and some stream diversions, amounting to an estimated 0.16 cfs of depletion. Overall depletion is estimated to be 5-10%. Branciforte is a designated coho recovery stream.

Bear Creek and Kings Creek

Bear Creek and Kings Creek have low density rural de minimis use and are located within geologic formations that produce relatively low baseflows, unlike Bean, Zayante or Boulder Creeks. Areas of denser development in the lower watersheds are served by municipal sources and a limited number of private diversions have been observed. A historical municipal stream diversion on Bear Creek has been long discontinued. The NFD greatly overestimates unimpaired flow for Bear Creek and likely for Kings Creek. Kings Creek has gone dry in very dry years.

Boulder Creek

Most of Boulder Creek is served by municipal sources, with some significant surface municipal diversions and one municipal well. There is limited de minimis groundwater use in the upper watershed, which also has poor water-bearing capacity. Upper Boulder Creek has gone dry in very dry years, but the lower reaches have good flow from the southwest tributaries.

Other San Lorenzo Tributaries

Other tributaries have likely experienced depletion ranging from 10% to less than 5%. Denser areas are served by municipal sources and a low number of private diversions have been observed. If a Tier 3 or 4 well is proposed on one of the other tributaries a more in-depth analysis of current flow depletion will be performed.

North Coast Streams:

Laguna, Majors and Liddell Creeks

These creeks are sources of water supply for the City of Santa Cruz and are managed under established flow targets in the City of Santa Cruz HCP. The City has maintained stream gages in the anadromous reaches of these creeks and will continue to monitor flow. They are subject to influences from some agricultural wells and stream diversions in their lower reaches, as well as low density rural wells serving homes and some vineyards in their upper reaches. Laguna Creek supports an increasing population of coho salmon.

San Vicente Creek

San Vicente Creek supports two municipal diversions for town of Davenport, along with at least one large agricultural well in the lower watershed and some rural groundwater use in the upper watershed of Mill Creek. The majority of the San Vicente watershed is timberland and parkland. San Vicente supports coho.

Scott Creek

Scott Creek has wells for low density rural use, agricultural use and some surface diversions. Scott also supports coho. Much of the land in this watershed is affiliated with Cal Poly State University and may not be subject to the County's ordinance.

Other County Streams

Other county streams are judged to support steelhead, but not coho, and likely have a current level of depletion of 5-10%. More site-specific analysis would be done if a Tier 3 or 4 well is proposed near one of the other county streams.

PRELIMINARY

N

0 0.5 1 2 3 4 Miles

EXPLANATION

- Streets: Highways
- Streets: Major
- Wells
- Potentially Limited Supply Areas
- SPCR Tunnels
- Tier 1 Stream Depletion Standards Required
- Tier 2-3 Stream Depletion Standards Required

Streams Fish Bearing
- Resident Rainbow
- Steelhead
- Steelhead High Flow
- Steelhead and Coho
- Steelhead and Limited Coho

Streams
- INTERMITTENT
- PERENNIAL

Coastal Zone

- Pure Water Soquel Control Zones
- Pure Water Soquel Control Zones
- Karst - Marble Outcrops

Geologic Units
- m (Marble)
- sch (Metasedimentary rocks)

Seawater Intrusion Zone

Karst Springs

PRELIMINARY

N

0 0.5 1 2 3 4 Miles

EXPLANATION

- Streets: Highways
- Streets: Major
- Wells
- Streams
  - INTERMITTENT
  - PERENNIAL
- Chloride Concern Areas
- Nitrate Concern Areas
- Chromium-6 Concern Areas
- 1,2,3 TCP Concern Areas

Analysis of Streamflow Depletion and Well Interference under Various Conditions

In the process of revising the County well ordinance and developing policies to minimize impact on streamflow and public trust values, County staff have analyzed the potential effects of individual wells under various conditions using several different analytical models. These models are used to provide a sensitivity analysis and evaluate the extent to which different factors may influence streamflow depletion in Santa Cruz County. However, it's important to note that analytical models rely on various assumptions, commonly including the presumption of steady-state conditions for the stream and aquifer. In reality, the degree of stream depletion is likely to fluctuate in response to changing climate conditions over time. Modeled estimates of depletion are likely somewhat inaccurate as the environment of the Santa Cruz Mountains is inconsistent with many of the underlying assumptions upon which the models are based.

The variability of Santa Cruz County's climate, geology, topography, ecological, and stream conditions makes the establishment the thresholds for each tier, and allowed additional stream depletion for specific streams is challenging. The thresholds and limits are formed on empirical data, current and expected water use conditions, model simulations, and expert judgment, and are subject to refinement as new data and models emerge. It's important to recognize that model-derived values are especially influenced by specific hydrogeologic conditions unique to our community. Therefore, while our approach provides a valuable framework for assessing local impacts, its application to other regions should consider local conditions and professional discretion.

In addition, the amount of total depletion that is estimated to be presently occurring based on numeric groundwater models and flow measurements (Table 4) is considerably less than the amount that would be calculated by multiplying the number of current wells by the worst-case calculations of the direct effect of individual wells provided by the analytical models.

Estimates of streamflow depletion were calculated and analyzed using a combination of models including the USGS web based calculation, STRMDEPL08 (available at https://mi.water.usgs.gov/software/groundwater/CalculateWell/index.html), the analytical depletion function (ADF) model developed by Li et al. 2022 (found at: https://github.com/FoundrySpatial/streamDepletr), and ADF model developed by Bakker in 2013 (found at: https://github.com/mbakker7/ttim). Below is a summary of the key results, along with their policy implications, detailed observations, a more in-depth discussion of our sensitivity analysis and modeling tools, and appendices providing supporting documents of our analysis.

DRAFT

Summary and Policy Implications:

In our sensitivity analysis, we examined various aquifer conditions and potential well mitigation strategies to account for a wide range of effects. This included assessing both unconfined and confined aquifers, incorporating detailed regional data on the variability in aquifer properties and confining layers. Specifically, we analyzed the Santa Margarita Formation (Tsm) under unconfined conditions due to its wide range of aquifer properties (e.g., hydraulic conductivity values from 2 to 130 ft/day), aiming to establish upper and lower bounds for streamflow depletion estimates. Similarly, the Monterey Formation (Tm) was studied to understand streamflow impacts under confined conditions.

In general, stream depletion impacts are more significant in interconnected wells within aquifers of high hydraulic conductivity and low storage coefficients, and less pronounced in aquifers with low conductivity and high storage coefficients. Our analysis shows that in unconfined aquifers without well seals, stream depletion correlates closely with extraction rates over relatively short distances and time periods (about 700 days). For example, pumping from the Santa Margarita Formation in an unconfined state can deplete streams by up to 98% of the pumped volume.

For confined settings, over shorter time periods (approximately 2 years), wells extracting from a confined aquifer with median Tsm hydraulic conductivity values, and a confining layer consisting of median Tm hydraulic conductivity values, the estimated stream depletion is approximately 25% of the pumped volume. However, over 10 years under the same conditions, total stream depletion can rise to about 55% of the pumping volume, indicating delayed impacts, especially pronounced in confined settings. Therefore, Tier 3 permit applications must evaluate stream depletion impacts over a 10-year timeframe. For detailed hydraulic properties used and modeled results, refer to the plots in Appendix A.

We also analyzed potential well mitigation strategies, including the use of deeper well seals. Analytical models indicate that well seals are effective in reducing stream depletion, especially over short distances and periods (~200 days) when wells are within 800 feet of streams (Appendix D). For example, in an unconfined aquifer with median Tsm properties, a well with a 100-foot seal located 100 feet from the stream can reduce depletion by 60% compared to a well without a seal over 200 days. Extending the time period to 10 years reduces the effects of diminished stream depletion, yet it still can be 20 to 70% more effective than wells without a seal (Appendix B). When evaluating the impacts of wells situated at farther distances, such as 1000 feet from the stream, the effectiveness of the seal diminishes significantly (Appendix E).

DRAFT

Based on this analysis, we are requiring a minimum 100-foot well seal for Tier 1 applicants within 1000 feet of a stream, and a minimum 200-foot seal for Tier 2 and 3 wells within 2000 feet of a stream.

Other well mitigation strategies and their impact on stream depletion were also analyzed, including the effects of setbacks. Analytical models suggest that increasing the distance from the well to the stream can lead to minor to substantial reductions in stream depletion. For example, at 50 feet from the stream, depletion reductions range from 2 to 10%, and at 100 feet, reductions add some additional margin of protection at a range from 3 to 20%. A 1000-foot setback can reduce depletion by approximately 15 to 75%, and at 2000 feet, up to 95%. Actual impacts in Santa Cruz County can vary widely due to abrupt changes in topography, hydrogeology, faulting, folding, and fracturing.

Based on the modeled benefits of setbacks for wells near streams and considering existing provisions in the County Code, we are establishing specific setbacks for different tiers of applicants. Tier 1 wells must maintain a minimum 50-foot setback from the stream, and Tier 2 wells are required to maintain a 100-foot setback. Setbacks for Tier 3 wells will be determined based on the criteria necessary to meet stream depletion standards, potentially advancing to Tier 4 standards if compliance is not feasible. Given the modeled potentially significant adverse impacts of stream depletion within 1000 feet (Tier 1) and 2000 feet (Tiers 2 and 3), these wells must adhere to standards aimed at minimizing impacts on streamflow (see Resource Protection Policy), except in cases where a Health Officer designates a stream as exempt.

Detailed Observations Relative to Direct Streamflow Depletion:

1. The amount of depletion is moderately reduced by a greater setback from the creek in aquifers characterized by high transmissivity and low storativity. Increasing the setback from 50 ft to 1000 ft reduces the amount of depletion by 25-30% for formations with moderately favorable aquifer properties concerning stream depletion impacts. Conversely, in aquifers with low transmissivity and high storativity, increasing the setback from 50 feet to 1000 feet reduces depletion by approximately 55% for formations with highly favorable aquifer properties.

2. Wells pumping 10 af/y or less have very minimal impact on direct flow depletion: less than 0.01-0.02 cfs at a setback of 50 ft from a creek. Incorporating a seal depth of 100 feet further diminishes depletion, with the depletion reduced by

approximately 82% for aquifers characterized by low transmissivity and high storativity values, and depletion reduced by up to 31% for aquifers with high transmissivity and low storativity values. Previous analysis showed that total non-municipal pumping has reduced the 10th percentile dry season flow by 2-4% in the Santa Margarita Groundwater Basin and 15-17% in the Mid-County Groundwater Basin. Cumulative impacts are not expected to increase in the future, given the low rate of new rural development and the active management of both basins to reduce the impacts of municipal pumping and raise groundwater levels.

3. Pumping from a deeper zone below an aquitard significantly reduces the impact of streamflow depletion, particularly over short time periods (Hunt, 2003). Over modeled 700-day periods, depletion when pumping from below an aquitard with a 50-foot separation is 95-97% less than the depletion at the same distance when pumping from an unconfined aquifer more hydraulically connected to the stream. Over longer periods, such as 10 years, the benefits can remain substantial. With median confining layer hydraulic conductivities, depletion when pumping from below an aquitard with a 100-foot separation is approximately 50% less than the extraction rate. However, under high hydraulic conductivities and low storativity values for both the confining unit and primary aquifer, depletion at a 100-foot separation can still be significant and amount to approximately 80% of the pumped volume. Encouraging new and replacement wells to have a deep seal below an aquitard is expected to be a highly effective strategy for reducing streamflow depletion. These conditions are expected to occur within the Monterey Formation and certain parts of the Purisima Formation.

4. Some of the calculations were done assuming the annual volume of pumping all took place in 180 days during the dry season. However, if a 2-year drought was assumed, with the same rate of pumping assumed for the dry season for 700 days, the amount of depletion increased by 17% in the Purisima AA and 56% in the Santa Margarita. If the pumping was from below an aquitard, depletion increased by about 90% in both aquifers when compared with the 180-day scenario, although the amount of depletion was still only 1.6% of the pumping volume.

5. Incorporating a deep seal within 1000 feet of a stream is an effective method to mitigate streamflow depletions and reducing drawdown in the upper portion of the aquifer, where the stream is most likely closely interconnected to (Figure 1). This mitigation strategy is particularly impactful for streams connected through aquifers with low permeabilities. However, the degree of reduction in depletion is notably

more pronounced when the well is closer to the stream, likely due to the attenuation of the cone of depression.

For wells with extraction rates of less than 100 AFY located beyond 1000 feet from the stream, the impact of the well seal diminishes (Appendix E) as the curvature of the cone of depression flattens out at farther distances. At these longer distances, the overall drawdown resulting from the pumping volume of the aquifer becomes the primary factor contributing to streamflow depletion.

For instance, when assessing the effects of wells situated 50 feet from a stream, tapping into an aquifer with median values of transmissivity and storativity in the Santa Margarita Formation, a seal depth of 100 feet is projected to decrease stream depletion by approximately 54%, while a 200-foot seal depth could reduce it by around 72%.

For wells positioned 200 feet from the stream under similar geological conditions, a 100-foot seal depth is estimated to mitigate stream depletion by approximately 43%, and a 200-foot seal could reduce it by approximately 62%.

However, when evaluating the impacts of wells situated at farther distances, such as 1000 feet from the stream, the effectiveness of the seal diminishes significantly. In this scenario, with aquifers of similar properties as above, a 100-foot seal depth is anticipated to reduce stream depletion by only 3%, while a 200-foot seal might reduce it by just 5%.

DRAFT

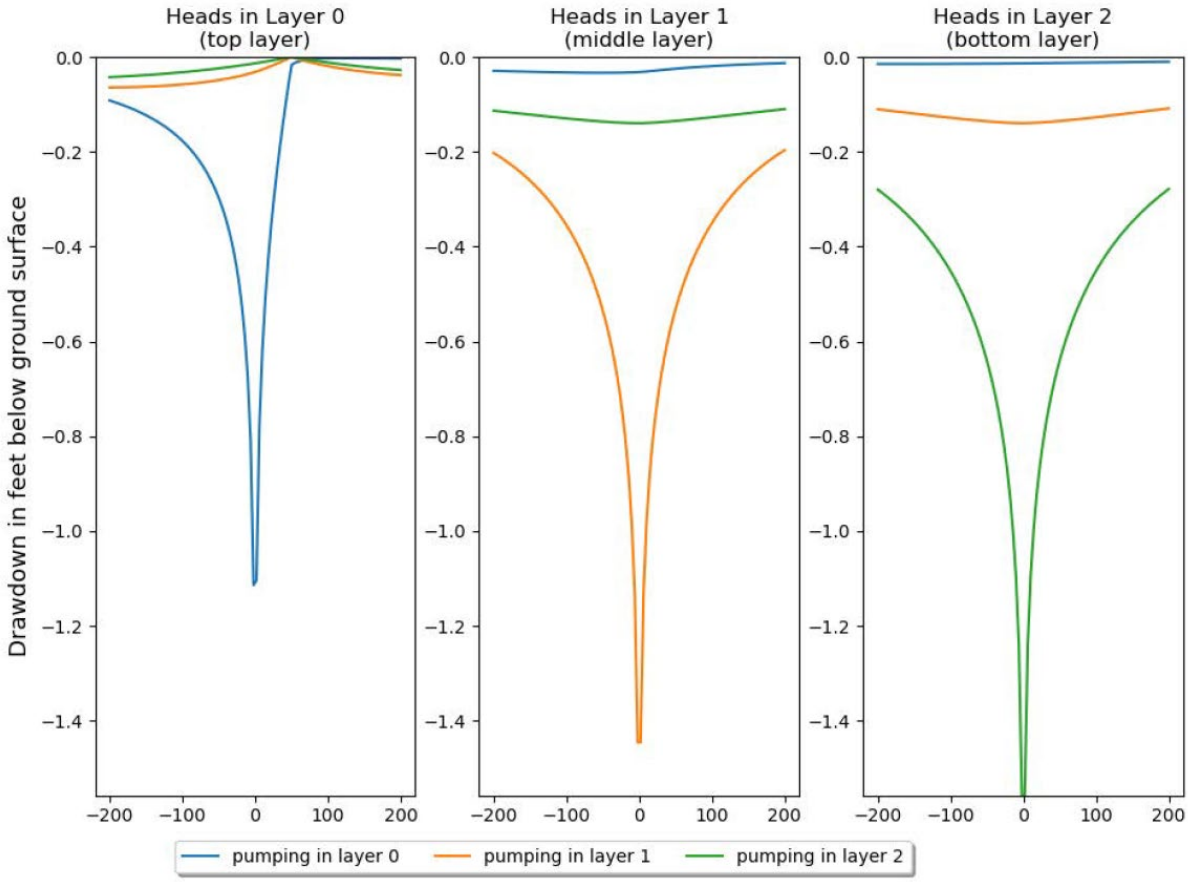


Figure 1- Drawdowns at Different Seal Depths (TTim, Bakker 2013)

6. Beyond 1000 feet, well seal depths are not expected to have a significant impact for wells using less than 100 AFY (see observation #7), and the primary driver to further reduce stream depletion depends on increasing the distance between the stream and the well. For example, considering depletion modeled for wells without seals located in aquifers with high transmissivity and low storativity values, where the zone of influence is expected to be most extensive, stream depletion impacts are reduced by approximately 50% when the well location is increased from 800 feet to 2000 feet (Figure 2). The reduction is projected to be even more significant with distance for aquifers with lower permeabilities.

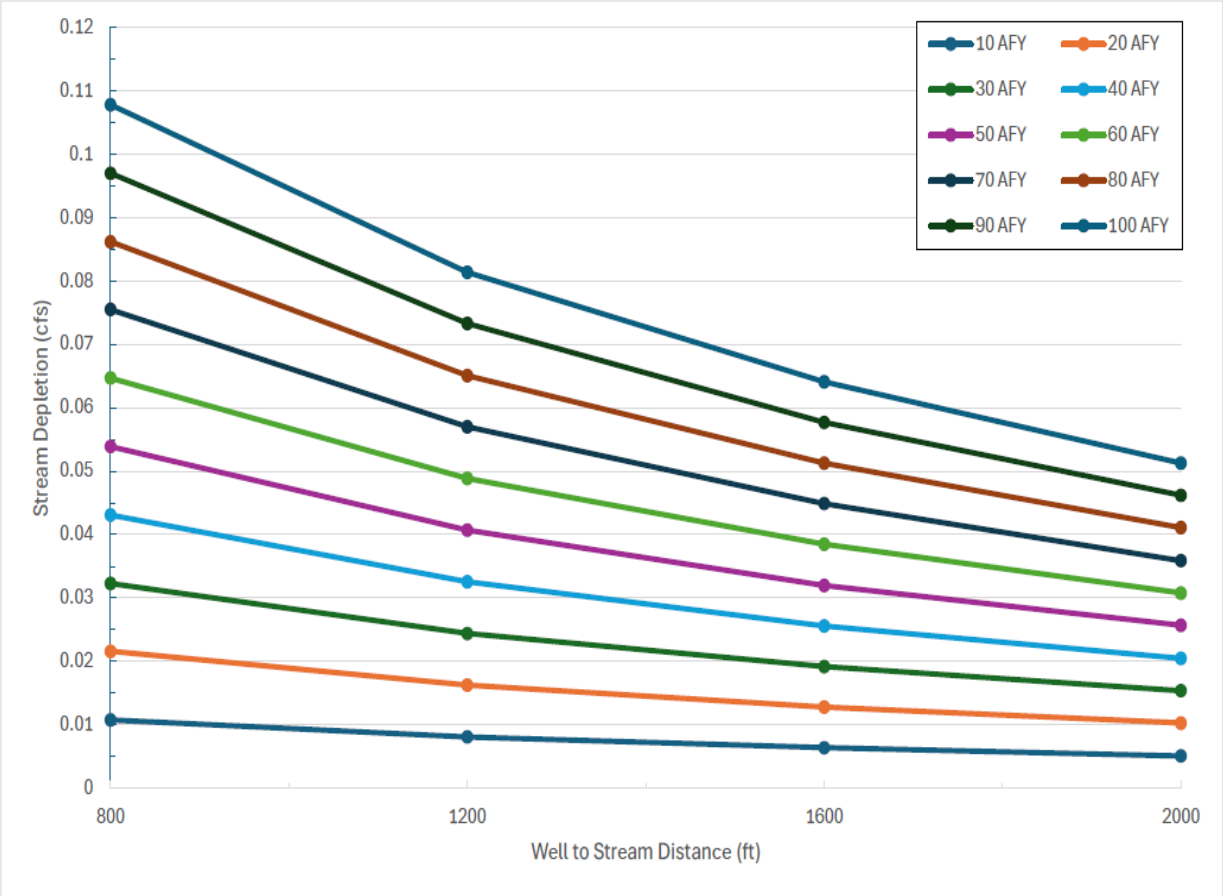
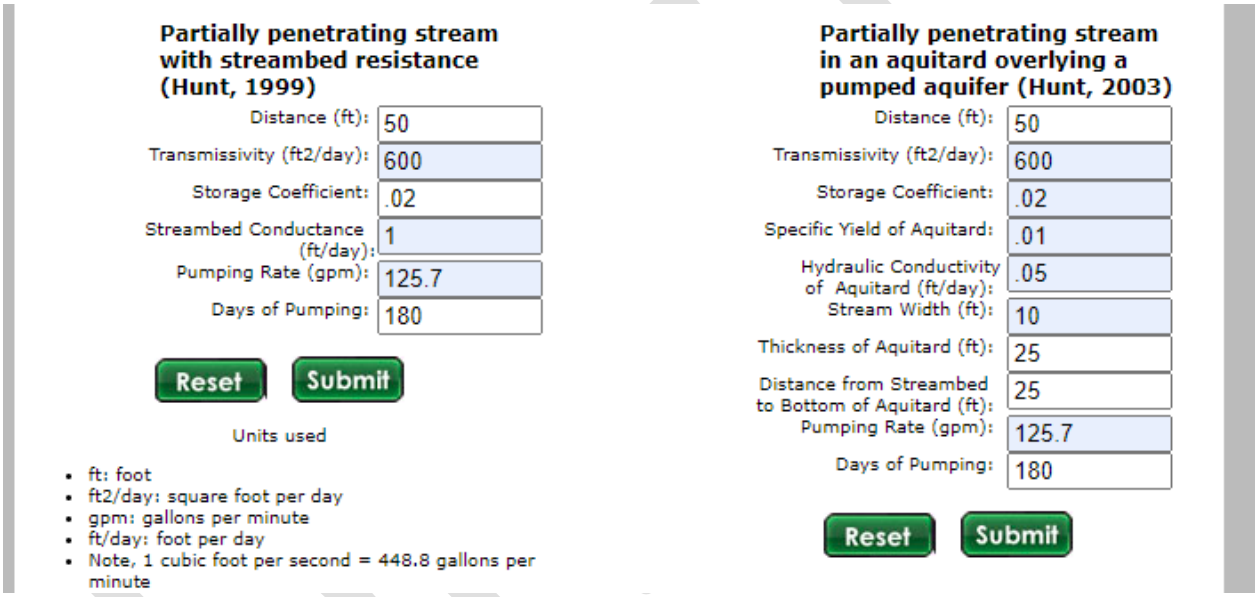


Figure 2- Stream Depletion Beyond 800 Feet without Seals (TTim, Bakker 2013)

7. Tier 1 wells are expected to have a minimal impact on stream depletion, given their expected requirements, which include a minimum 50-foot stream setback and a 100-foot seal depth when situated in close proximity to the stream. At 50 feet, the maximum estimated depletion ranges from nearly negligible (0.00002 cfs) to 0.0032 cfs (Appendix F with the former corresponding to very low permeable conditions, and the latter corresponding to very permeable conditions. These ranges are projected to be even lower for streams with streambed resistance or scenarios where an aquitard is situated between the stream and the well screen.

Streamflow Depletion Analysis Using USGS Analytical Models:

For the USGS application, three models were primarily used: a partially penetrating stream with nearby pumping from an unconfined aquifer (Hunt, 1999) a partially penetrating stream in an aquitard overlying a pumped aquifer (Hunt, 2003), and a fully penetrating stream with no streambed resistance (Jenkins, 1968). Hunt, 2003 was used to evaluate the effects of requiring a deep seal to the first impermeable layer. Below is a figure showing the set-up for running STRMDEPL08 for pumping from an aquifer associated with the Purisima AA formation with a stream that partially penetrates the aquifer and has streambed resistance (left), and with a stream partially penetrating an impermeable layer with properties similar to the Monterey Formation overlying a pumped aquifer (right). Aquifer parameters are taken from the Groundwater Sustainability Plans, with generally the median figures used (see Table 3).



The USGS analytical models were run for two different aquifer types, the Purisima AA, which has the potential for low to moderate permeability, and the Santa Margarita formation, which has the potential for high permeability. The models were run for various pumping rates and stream setbacks (Table 1). The pumping rates were derived from the annual production (af/y), with a worst-case assumption that the total annual amount is drawn during the typical 6-month dry period (180 days) and maintained at a consistent average amount of continuous pumping to achieve that volume. The volume of pumping for 100 af/y at a 50 ft setback was also considered for situations where pumping occurred below an aquitard, over a 700 day period (2-year drought) and a 10-year period, to understand potential long term effects. However, very long-term effects would normally be mitigated by recharge during normal wet winters.

Purisima AA (T=600, S=.02)180 days	Depletion (cfs) with indicated setback from creek (ft) 180 days of pumping, unless noted otherwise

Af/y	summer gpm	pumping cfs	50 ft	100 ft	200 ft	1000 ft
0.5	0.6	0.0014	0.001*	0.001	0.0009	0.0007
2	2.5	0.0056	0.004*	0.004	0.0039	0.003
10	12.6	0.0280	0.0204*	0.0201		0.0149
100	125.7	0.2801	0.2035*			0.1486
100	125.7	0.2801	0.2383*	No aquitard, 700 days		
100	125.7	0.2801	0.2613*	No aquitard, 3650 days		
100	125.7	0.2801	0.0095**	Pumping from below aquitard		
100	125.7	0.2801	0.0181**	Below aquitard, 700 days		
100	125.7	0.2801	0.0388**	Below aquitard, 3650 days		
250	314.3	0.7002	0.5765*			0.4288
	1000	2.2282	1.619*		1.547	1.1845

Santa Margarita (T=3000, S=.1)			Depletion (cfs) with indicated setback from creek (ft), 180 days of pumping, unless noted otherwise			
Af/y	summer gpm	pumping cfs	50 ft	100 ft	200 ft	1000 ft
0.5	0.6	0.0014	0.0004*			
2	2.5	0.0056	0.0018*	0.0017		0.0012
10	12.6	0.0280	0.0089*			
20	25.1	0.0560	0.0177*			
50	62.9	0.1400	0.0443*			
100	125.7	0.2801	0.0885*	0.0869	0.0839	0.0616
100	125.7	0.2801	0.1383*	No aquitard, 700 days		
100	125.7	0.2801	0.1994*	No aquitard, 3650 days		
100	125.7	0.2801	0.0023**	Pumping from below aquitard		
100	125.7	0.2801	0.0044**	Below aquitard, 700 days		
100	125.7	0.2801	0.0100**	Below aquitard, 3650 days		
	1000	2.2282	1.1000*		1.0456	0.7798

*Uses Hunt, 1999 model with a streambed conductance of 1 (ft/day)

**Uses Hunt, 2003 model using aquitard properties similar to the Monterey Formation

Table 1- Key Results Using USGS Models (STRMDEPL08, Reeves 2008)

Analyzing Ranges of Streamflow Depletion and Seal Depth Impacts:

In our analysis of streamflow depletion, we focused on evaluating the upper and lower range of impacts by analyzing various models. Specifically, we examined models that assume a fully penetrating stream without streambed resistance, such as those by Glover, Jenkins, and Bakker (with streamed resistance as an optional parameter). These models predict more significant streamflow depletion compared to models that incorporate streambed resistance or consider partially penetrating streams, such as Hunt's models.

DRAFT

Our simulations utilized the aquifer properties of the Santa Margarita Formation under unconfined conditions. This formation was selected because it represents one of the primary water-bearing units in the county, which is also commonly interconnected with surface water. With its potential for high transmissivity/high hydraulic conductivity values and low specific yield values, streams and aquifers associated with the Santa Margarita Formation are particularly susceptible to significant stream depletion (refer to Table 2 for aquifer properties).

We conducted the models for various pumping rates and stream setbacks over a 700-day and 3,650 day periods (Appendix B), corresponding to a 2-year and 10-year drought cycle. During the 2-year timeframe, stream discharge reaches near-equilibrium with unconfined aquifers under steady-state conditions (see Figure 3). To simulate drought conditions and the worst-case effects of intermittent pumping (all water extraction occurring during dry period), we derived pumping rates from annual production, assuming that the total amount is drawn during the typical 6-month dry period and maintained over the drought period. This effectively doubles the amount of typical usage during normal years over the modelled period and serves as a very conservative approach (e.g., 2 AFY wells are modeled as 4 AFY wells).

To analyze the influence of seal depths on stream depletion, we employed the TTim model developed by Bakker in 2013, known for its effectiveness in simulating transient flow in multi-layer systems. The TTim model also served as our primary tool for assessing the worst-case and most extreme impacts on streamflow depletion.

Our simulation environment emulates a homogeneous aquifer divided into three layers, each 100 feet thick. Despite this division, all layers share identical aquifer properties, effectively representing one homogenous aquifer. The top layer is designated as phreatic to mimic unconfined conditions. The simulation includes a well screen positioned sequentially in each layer to assess the impacts of different seal depths for each respective layer. For example, during the third iteration, the well screen is placed in layer 2, effectively simulating sealing of layers 0 and 1. When the iteration has the well screen in Layer 0, the simulation effectively represents no seal for the well. Layer 0 represents the topmost layer (0 - 100 feet below ground surface), while Layer 2 represents the bottommost layer (200 - 300 feet below ground surface). The extraction of the well is averaged over the entire screen interval. An example of this simulation is provided in Figure 4, used to assess the worst-

DRAFT

case impacts of a 50 AFY well located 200 feet away from the stream.

Table 2-14. Principal Hydrogeologic Units Hydraulic Properties

Principal Hydrogeologic Unit	Hydraulic Conductivity (feet/day)	Transmissivity (feet²/day)	Storativity[1]	Specific Yield[2]
Santa Margarita Aquifer Entire Basin	2 – 130	430-7,700	0.008 – 0.02	0.02 – 0.25
Santa Margarita Aquifer Quail Hollow/ Olympia	2 – 50	430 – 6,200	0.008 – 0.02	0.12 – 0.25
Santa Margarita Aquifer Central Portion of Basin	3 – 130	2,000 – 7,700	NA	0.02 – 0.13
Santa Margarita Aquifer Scotts Valley Area	12 – 35	1,000 – 1,700	NA	0.02 – 0.13
Monterey Aquifer [3]	0.05 – 6	170 – 1,000	0.00001 – 0.001	0.01 – 0.03
Lompico Aquifer	0.5 – 7	500 – 3,200	0.000001 – 0.001	0.02 – 0.07
Butano Aquifer	0.1 – 6	100 – 1,070	0.000001 – 0.0007	

Adapted from Kennedy/Jenks Consultants (2015); NA = non-applicable given unconfined conditions
[1] Storativity is the volume of water released from confined aquifer storage per unit decline in hydraulic head in the aquifer per unit area of the aquifer.
[2] Specific yield is the amount of water released from an unconfined aquifer if allowed to drain completely under force of gravity.
[3] The Monterey Formation is not a principal aquifer but is included here as there are aquifer test data available for it, and because its occurrence between 2 principal aquifers plays an important role in the hydrogeology of the Basin.

Table 2 “Principal Hydrogeologic Units Hydraulic Properties”, (Kennedy/Jenks Consultants, 2015)

DRAFT

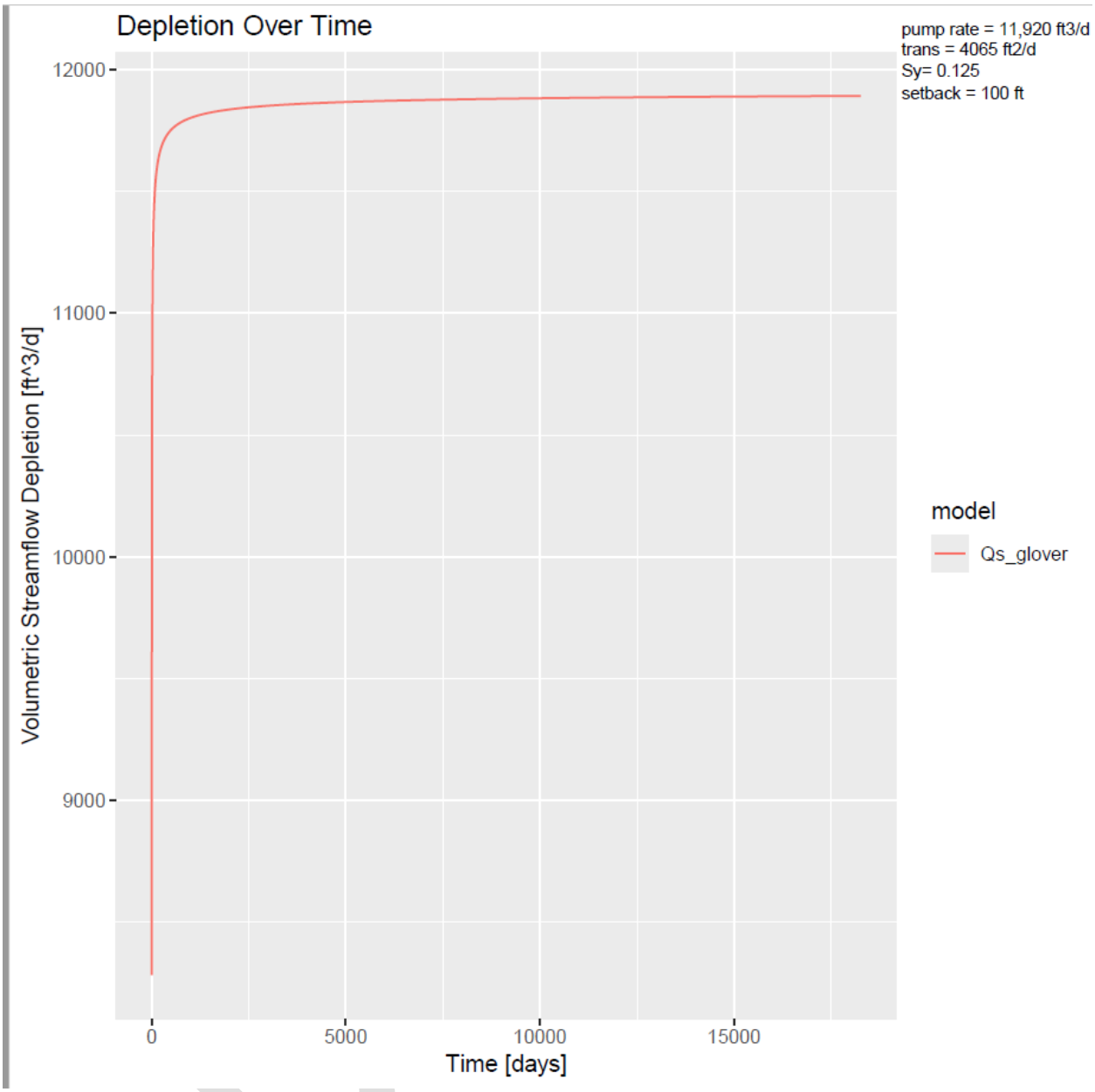


Figure 3- Stream Depletion Over 50 Years (streamDepletr, Li et. al)

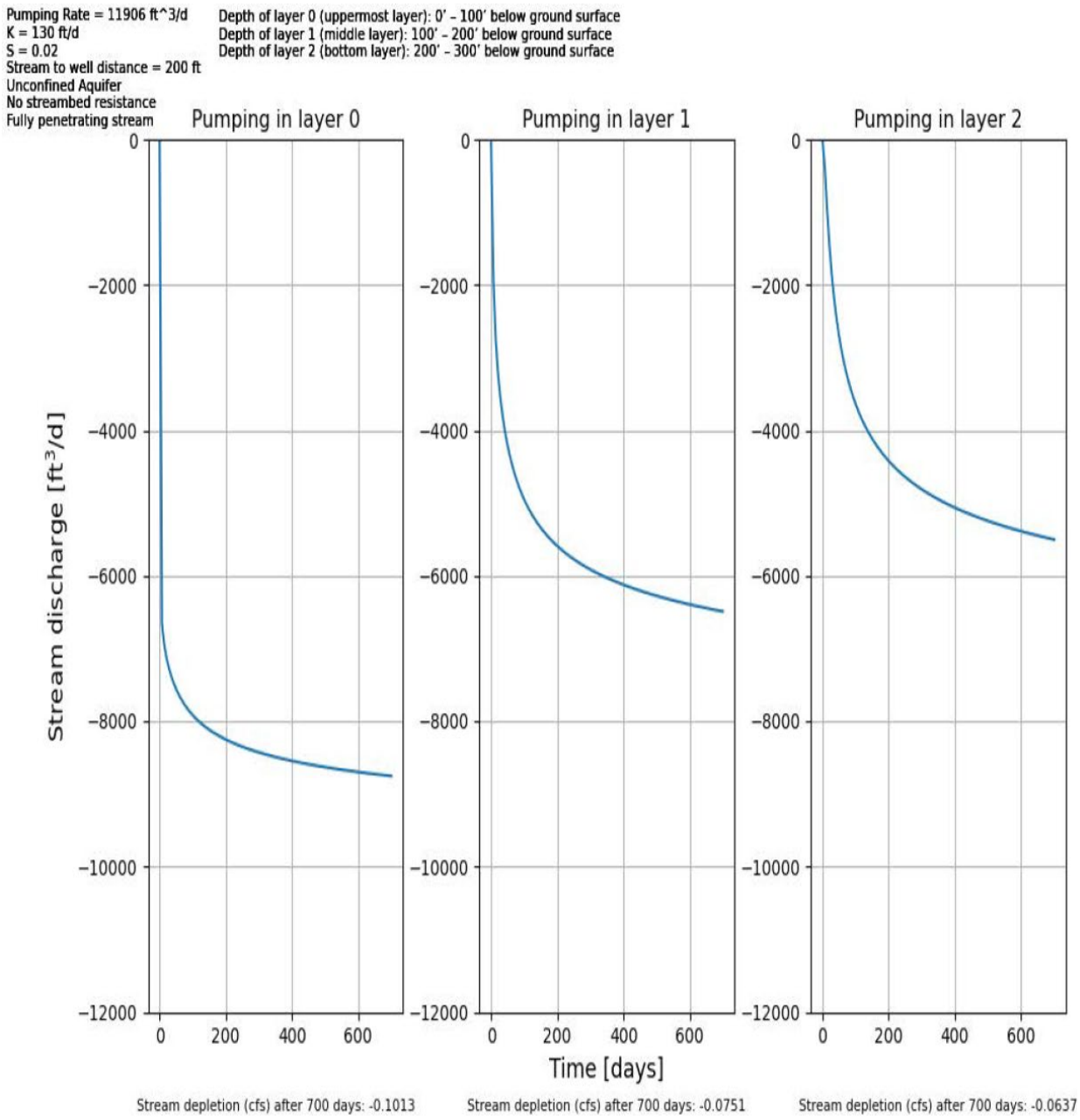


Figure 4-Simulation of Well Seal Depth Impacts on Groundwater Extraction at Different Depths (TTim, Bakker 2013)

Tool Selection for Applicants:

In evaluating streamflow depletion due to groundwater pumping, county staff have used numeric groundwater models where they have been developed for the Mid County and Santa Margarita groundwater basins. Staff have also applied the analytical models developed by Hunt, Jenkins, Li, and Bakker. Staff have assessed

more complex models cited by Li, et.al. and Bakker, recognizing their significance and usefulness in establishing thresholds for policy development and testing. These models are particularly valuable for evaluating impacts over extended timeframes, intermittent pumping, seal depths, setbacks, and areas requiring more thorough analysis.

While the County staff found these programming models (Li. et al, Bakker)useful, they did not observe significant differences in the fundamental calculation for stream depletion (without incorporating well seals) when assuming fully penetrating streams with no streambed resistance compared to the simpler USGS web-based application, especially when analyzing single-point scenarios that focus on streams closest to the well. While the USGS web-based application may be suitable for Tier 3 applications, Tier 4 applicants must prepare a report by a professional geologist, engineering geologist, or professional engineer to evaluate more detailed projected impacts, including the cumulative effects on streamflow in the overall basin. Because of this requirement, we encourage these consultants to consider using more advanced tools, particularly Li et al. for evaluating cumulative impacts on a network of streams and Bakker for evaluating the influence of deeper seals in minimizing stream depletion impacts.

Local Aquifer Properties: Range (typical value used)	**Transmissivity (ft^2/day) {gpd/ft}**	**Storage/ Storativity**	**Specific Yield**	**Hydraulic Conductivity**
TP-a - Purissima A	(2000) {15,000}	0.00055	0.02-0.07 (0.05)	5.2
TP-aa- Purissima AA	(600) {4500}	0.03100	(0.02)	1.7
TSM - Santa Margarita	430-7700 (3000) {22,500}	0.01	0.02-0.25 (0.2)	2-130
TLO - Lompico	500-3200 (2000) {15,000}	0.0000020	.02-.07 (.05)	0.5-7
Aromas/Purisima F	(4000) {30,000}	0.004		
Tm-Monterey	170-1000	0.00001-0.001	.01-.03	.05-.6

Table 3- Aquifer parameters from Groundwater Sustainability Plans

DRAFT

Estimated Surface Water Depletion from Groundwater Pumping in Selected Santa Cruz County Streams					
		Dry Season Flows, cfs (All Years)			
Creek		10th Percentile	Median	90th Percentile	Source
Bean Cr. @ Mt Hermon Rd (USGS)	Estimated Natural Flow*	0.509	1.08	1.89	FF model*
	Observed *	1.9	2.25	2.82	FF Database*
	Est.depletion by total gw pumping	0.5	0.5	0.5	GSP model
	% depletion**	21%	18%	15%	
	Est depletion by Non-Mun pumping	0.08	0.08	0.08	Apply Basin-wide proportion from GSP Model
	% Non-muni depletion	4%	3%	3%	
San Lorenzo River @ Big Trees (USGS)	Estimated Natural Flow*	15.2	20.2	23.7	FF model*
	Observed*	12	19	32	FF Database*
	Est.depletion by total gw pumping	1.5	1.5	1.5	GSP model
	% depletion**	10%	7%	4%	
	Est depletion by Non-Mun gw pumping	0.23	0.23	0.23	Apply Basin-wide proportion from GSP Model
	% Non-muni depletion	2%	1%	1%	
Moore Cr	Estimated Natural Flow*	0.0542	0.153	0.452	FF model*
	Observed	0.15	0.3	0.5	Estimated based on Occasional Measurements
	Est.depletion by Non-Mun gw pumping	0.03	0.03	0.03	Water Budget
	% depletion	17%	9%	6%	
Soquel Cr. @ Soquel (USGS) ***	Estimated Natural Flow*	2.44	3.05	5.28	FF model*
	Observed *	0.84	2.86	8.05	FF Database*
	Est.depletion by total gw pumping***	1.4	1.4	1.4	GSP model
	% depletion	57%	33%	15%	
	Est depletion by Non-Mun pumping	0.15	0.15	0.15	GSP Model
	% Non-muni depletion	15%	5%	2%	
Notes					
* Estimated Natural Flow and Observed Flow is provided by the California Unimpaired Flow Database, v2.1.2 (Zimmerman, et.al., 2023)					
** % depletion is the estimated depletion divided by the greater of the estimated natural flow, or the observed flow plus the estimated depletion					
*** Soquel Creek experiences signficant riparian surface diversions, potentially 0.5-0.7 cfs (RCDSCC,2019).					
The potential effect of surface diversions has not been factored into this table, other than where the estimated natural flow is used.					

Table 4- Estimated Natural Flows and Depletion Based on Natural Flows Database, Streamflow Measurements, Local Groundwater Modelling, and Water Budgets

Well Interference

Staff have used the Modified Theis Non-Equilibrium Equation to estimate the amount of drawdown at various distances from a proposed pumping well in order to evaluate the potential for well interference and potential impacts on nearby wells. Values for local aquifer properties, pumping rates and potential setbacks were entered in the formula to produce an estimated drawdown. The following table shows the setbacks required for

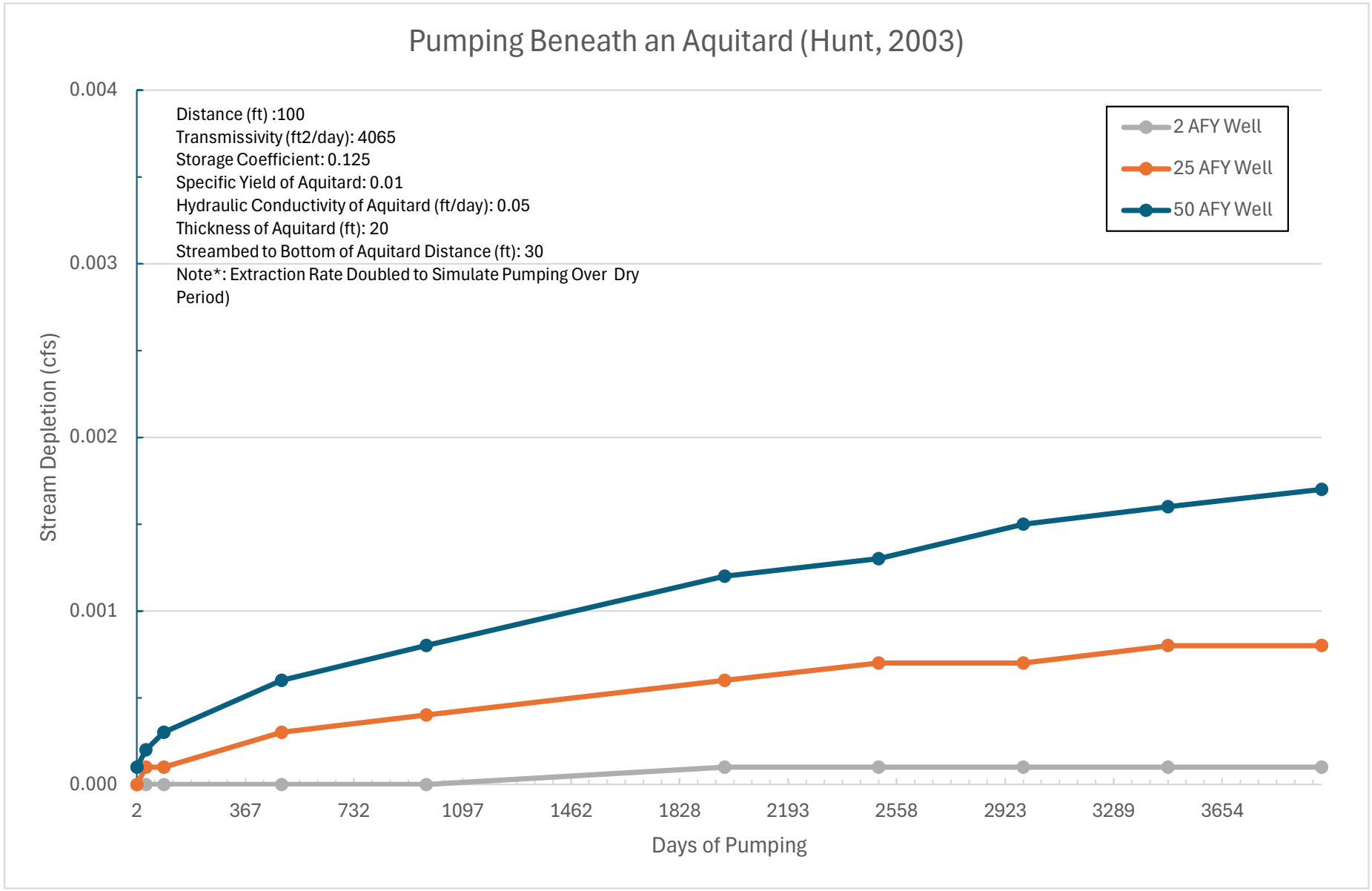
particular pumping rates in order to keep the drawdown less than 5 ft after 180 days of pumping.

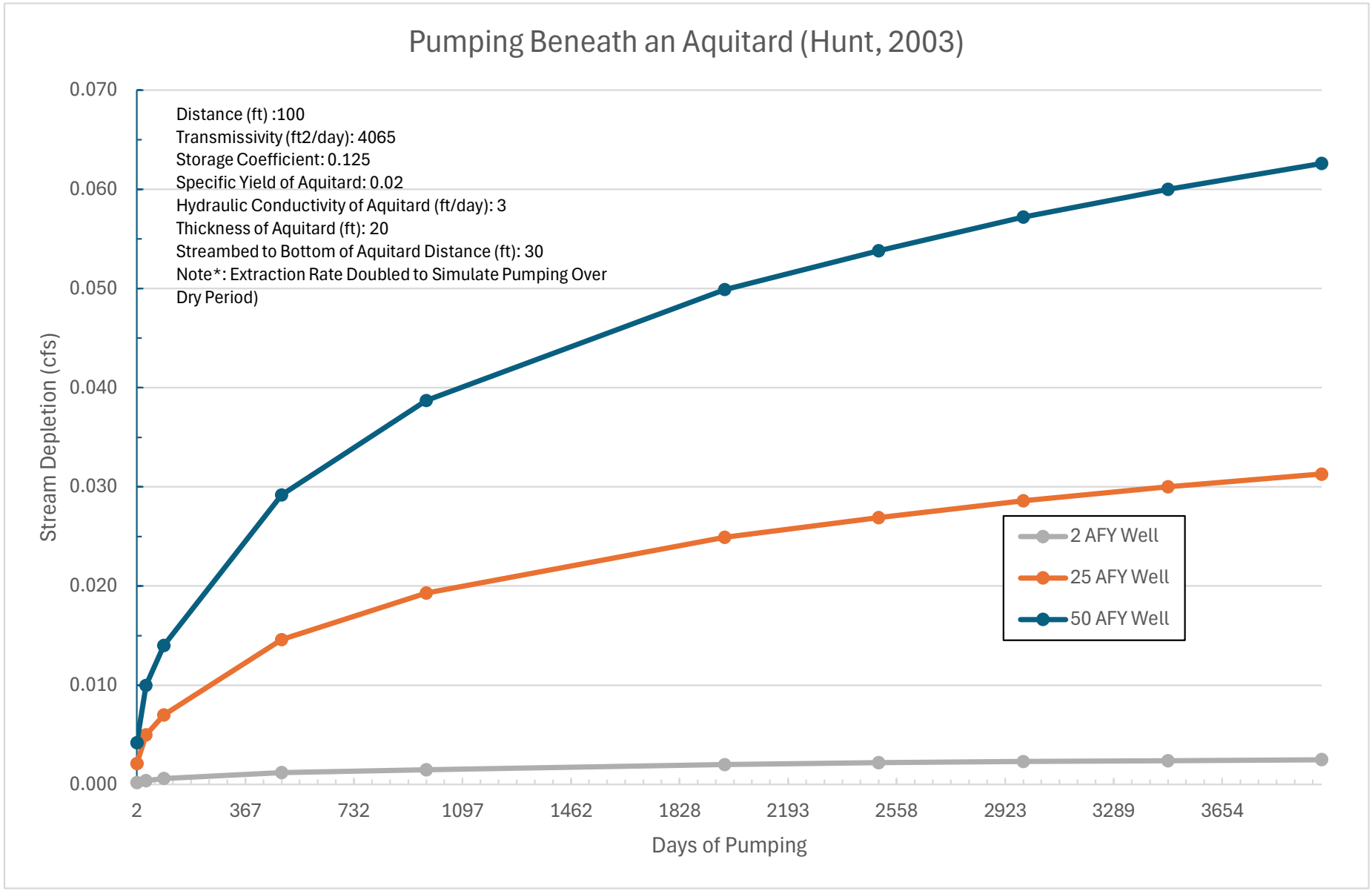
Pumping Rate (GPM)	2	8	20	50	100
Aquifer					
TP-a/TLO	10	10	10	10	150
TP-aa	10	10	25	500	1400
TSM	10	10	10	10	25

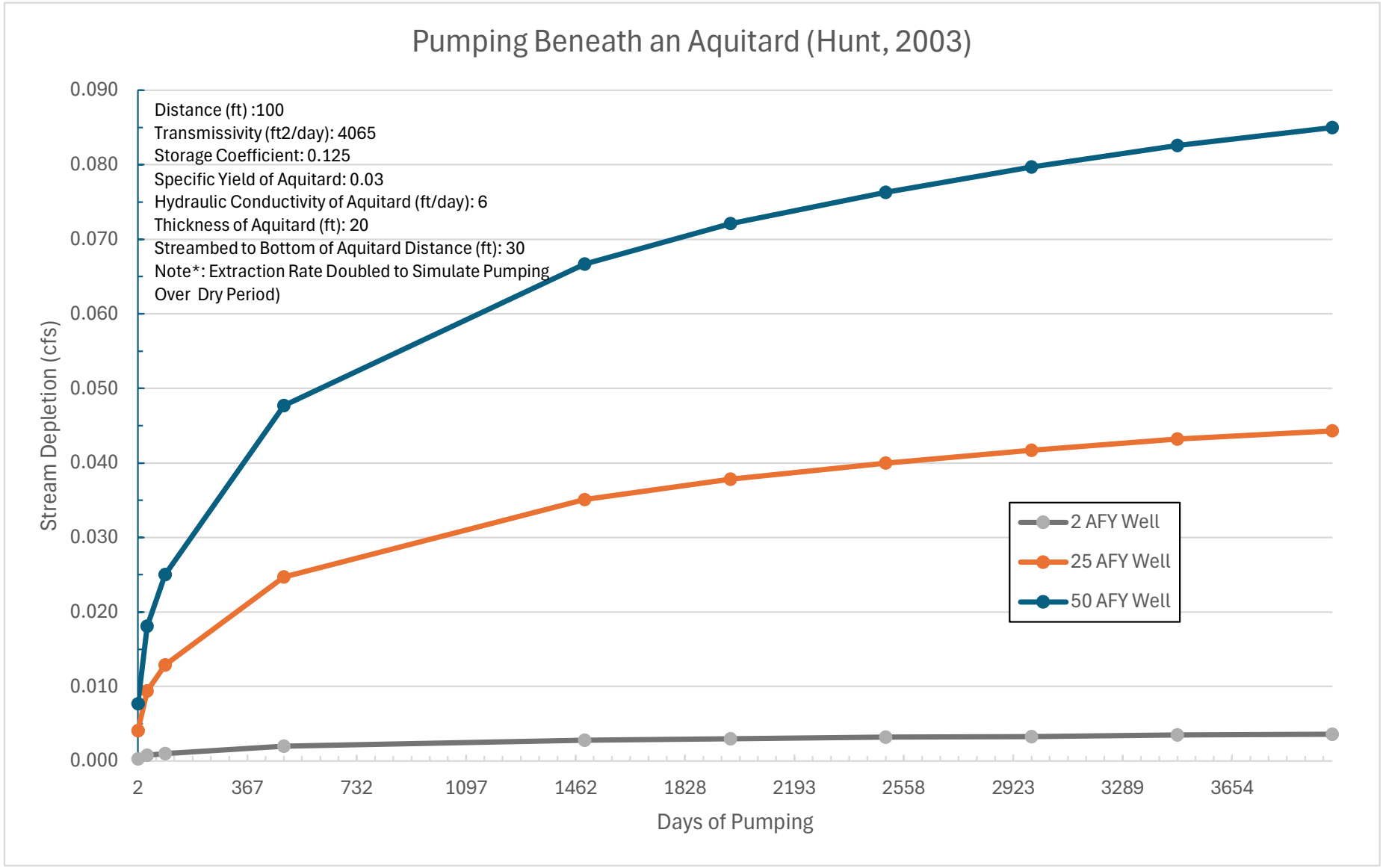
Equation	**s=(264Q/T)*log(.3Tt/((r^2)S)**		**Input Values**	**Result**
Q	Discharge	gpm	50	
T	Transmissivity	gpd/ft;(7.48*ft^2/d)	4500	
S	Storage Coefficient	dimensionless	0.020	
t	Pumping time	days	180	
r	Distance	ft	100	
s=	drawdown-calculated	ft		**9.0**

Staff is proposing to use a standard of 50 ft separation for de minimis wells and replacement non-de minimis wells, although a greater setback could be required for new non-de minimis wells after applying the Modified Theis Non Equilibrium Equation to the specific well and aquifer properties.

DRAFT

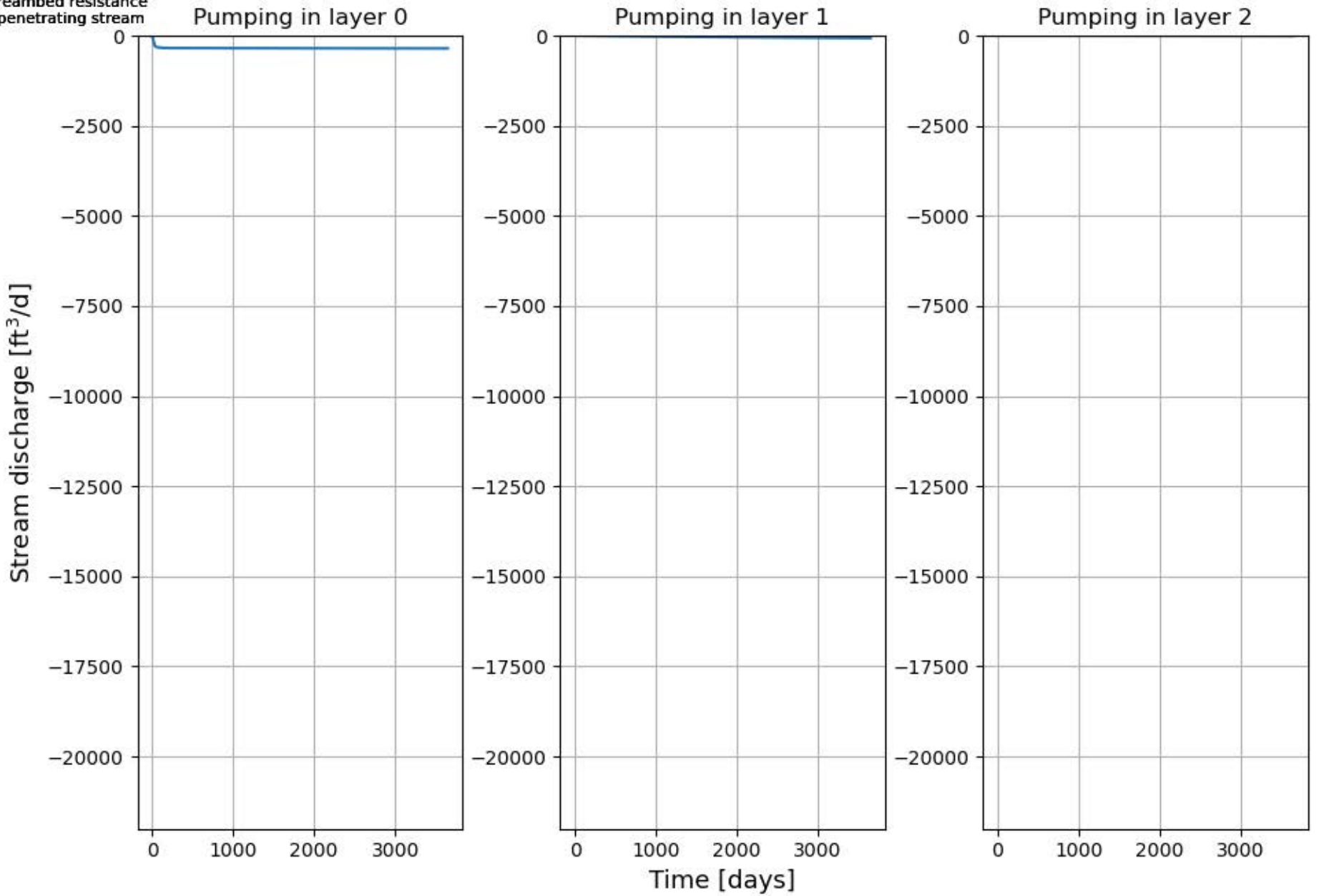

Pumping Beneath an Aquitard (Hunt, 2003)
Distance (ft) :100
Transmissivity (ft2/day): 4065
Storage Coefficient: 0.125
Specific Yield of Aquitard: 0.01
Hydraulic Conductivity of Aquitard (ft/day): 0.05
Thickness of Aquitard (ft): 20
Streambed to Bottom of Aquitard Distance (ft): 30
Note*: Extraction Rate Doubled to Simulate Pumping Over Dry Period)
2 AFY Well
25 AFY Well
50 AFY Well
Stream Depletion (cfs)
0.004
0.003
0.002
0.001
0.000
2
367
732
1097
1462
1828
2193
2558
2923
3289
3654
Days of Pumping


Pumping Beneath an Aquitard (Hunt, 2003)
Distance (ft) :100
Transmissivity (ft2/day): 4065
Storage Coefficient: 0.125
Specific Yield of Aquitard: 0.02
Hydraulic Conductivity of Aquitard (ft/day): 3
Thickness of Aquitard (ft): 20
Streambed to Bottom of Aquitard Distance (ft): 30
Note*: Extraction Rate Doubled to Simulate Pumping Over Dry Period)
Stream Depletion (cfs)
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2
367
732
1097
1462
1828
2193
2558
2923
3289
3654
Days of Pumping
2 AFY Well
25 AFY Well
50 AFY Well


Pumping Beneath an Aquitard (Hunt, 2003)
Distance (ft) :100
Transmissivity (ft2/day): 4065
Storage Coefficient: 0.125
Specific Yield of Aquitard: 0.03
Hydraulic Conductivity of Aquitard (ft/day): 6
Thickness of Aquitard (ft): 20
Streambed to Bottom of Aquitard Distance (ft): 30
Note*: Extraction Rate Doubled to Simulate Pumping Over Dry Period)
Stream Depletion (cfs)
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2
367
732
1097
1462
1828
2193
2558
2923
3289
3654
Days of Pumping
2 AFY Well
25 AFY Well
50 AFY Well

Pumping Rate = 480 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



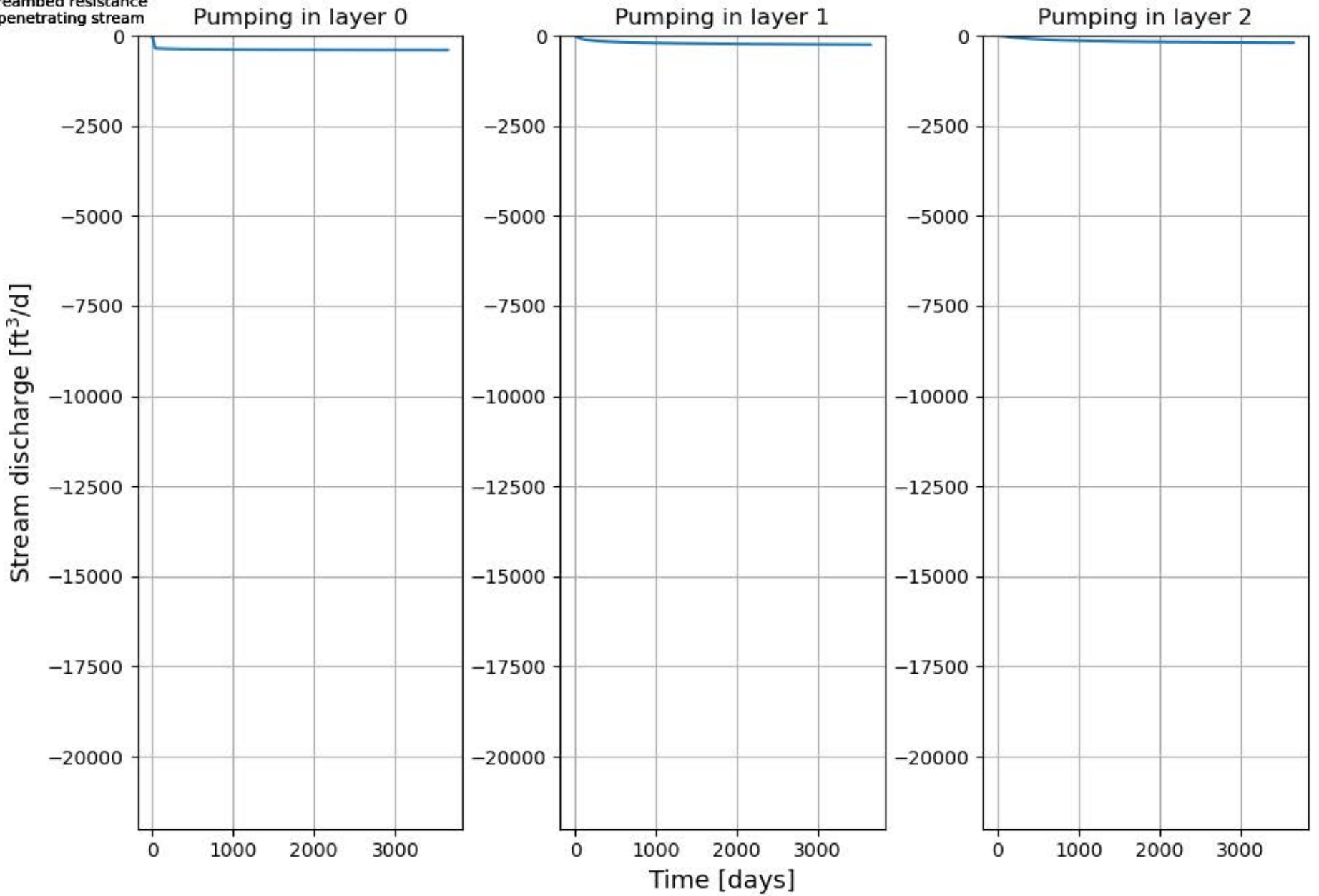
Stream depletion (cfs) after 10 years: -0.0041

Stream depletion (cfs) after 10 years: -0.0008

Stream depletion (cfs) after 10 years: -0.0001

Pumping Rate = 480 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



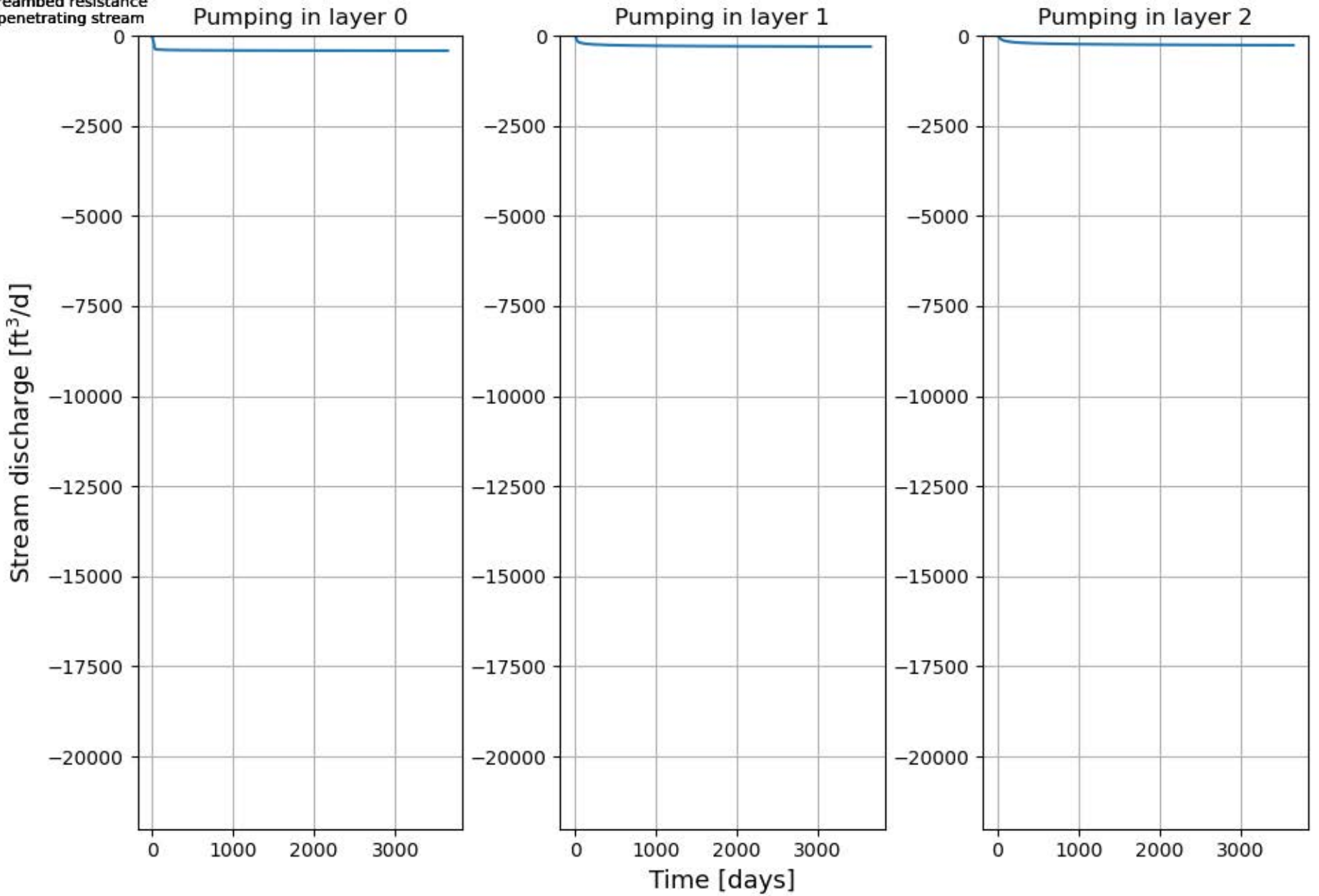
Stream depletion (cfs) after 10 years: -0.0046

Stream depletion (cfs) after 10 years: -0.0029

Stream depletion (cfs) after 10 years: -0.0023

Pumping Rate = 480 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



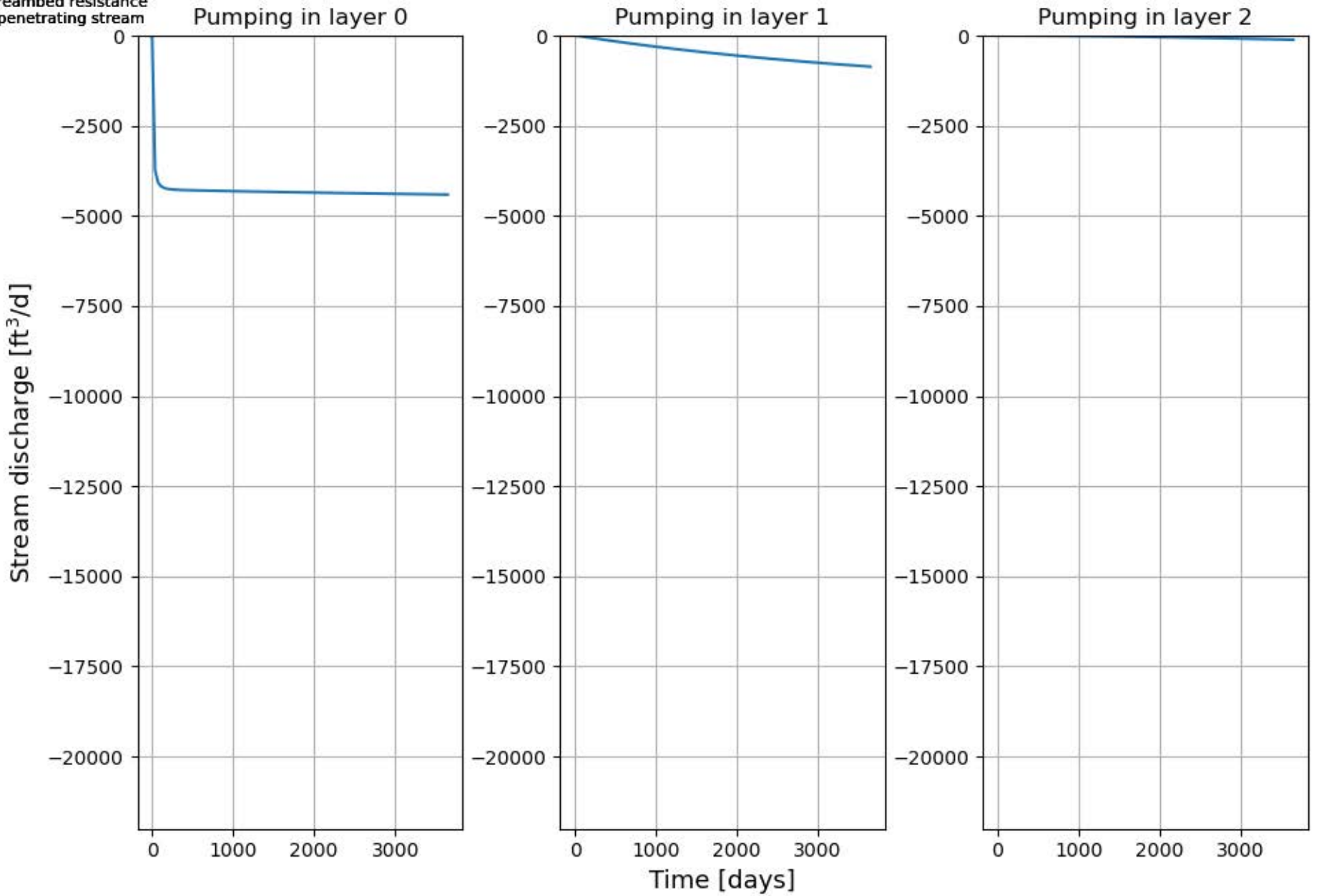
Stream depletion (cfs) after 10 years: -0.0049

Stream depletion (cfs) after 10 years: -0.0035

Stream depletion (cfs) after 10 years: -0.0031

Pumping Rate = 5953 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



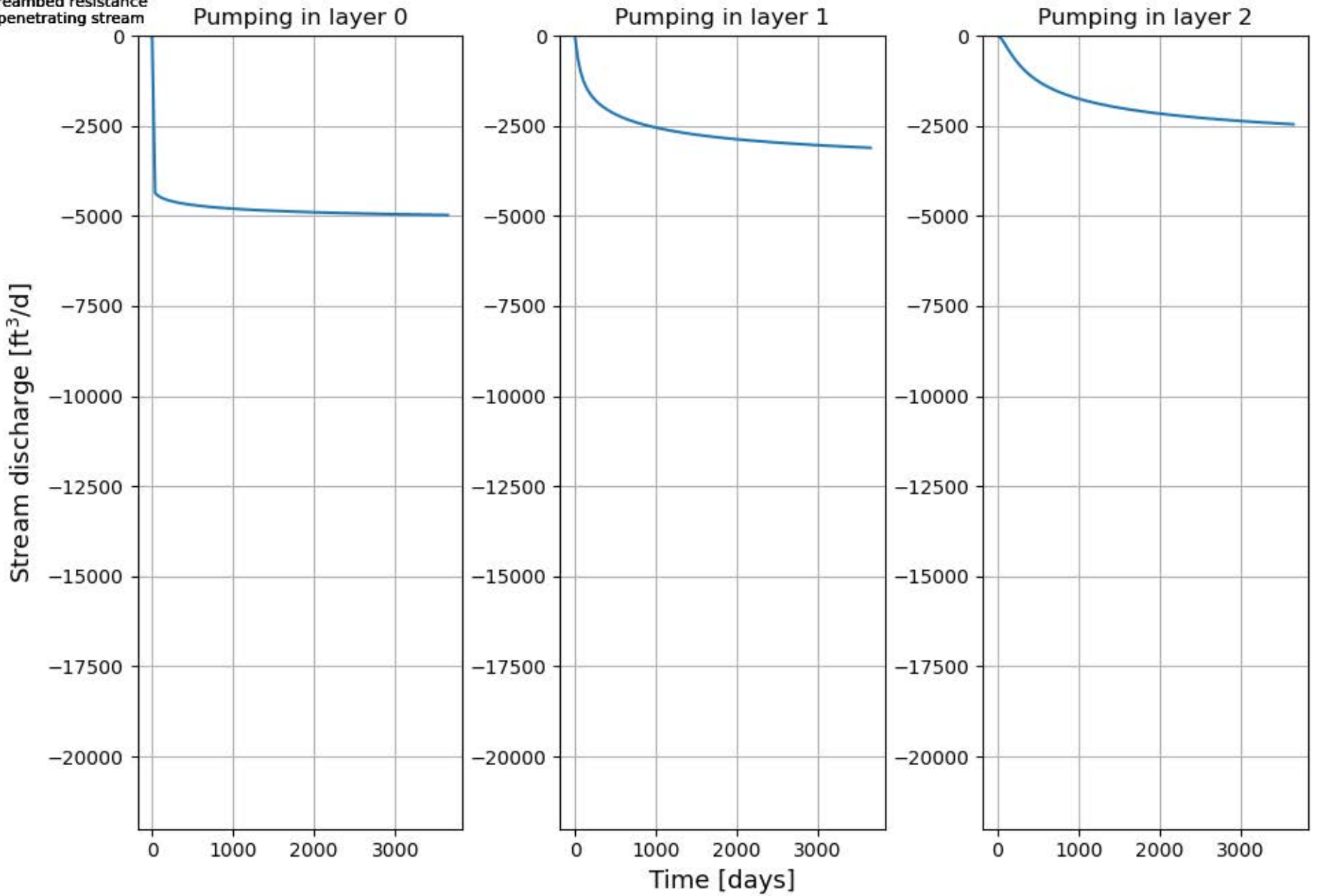
Stream depletion (cfs) after 10 years: -0.0510

Stream depletion (cfs) after 10 years: -0.0100

Stream depletion (cfs) after 10 years: -0.0013

Pumping Rate = 5953 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



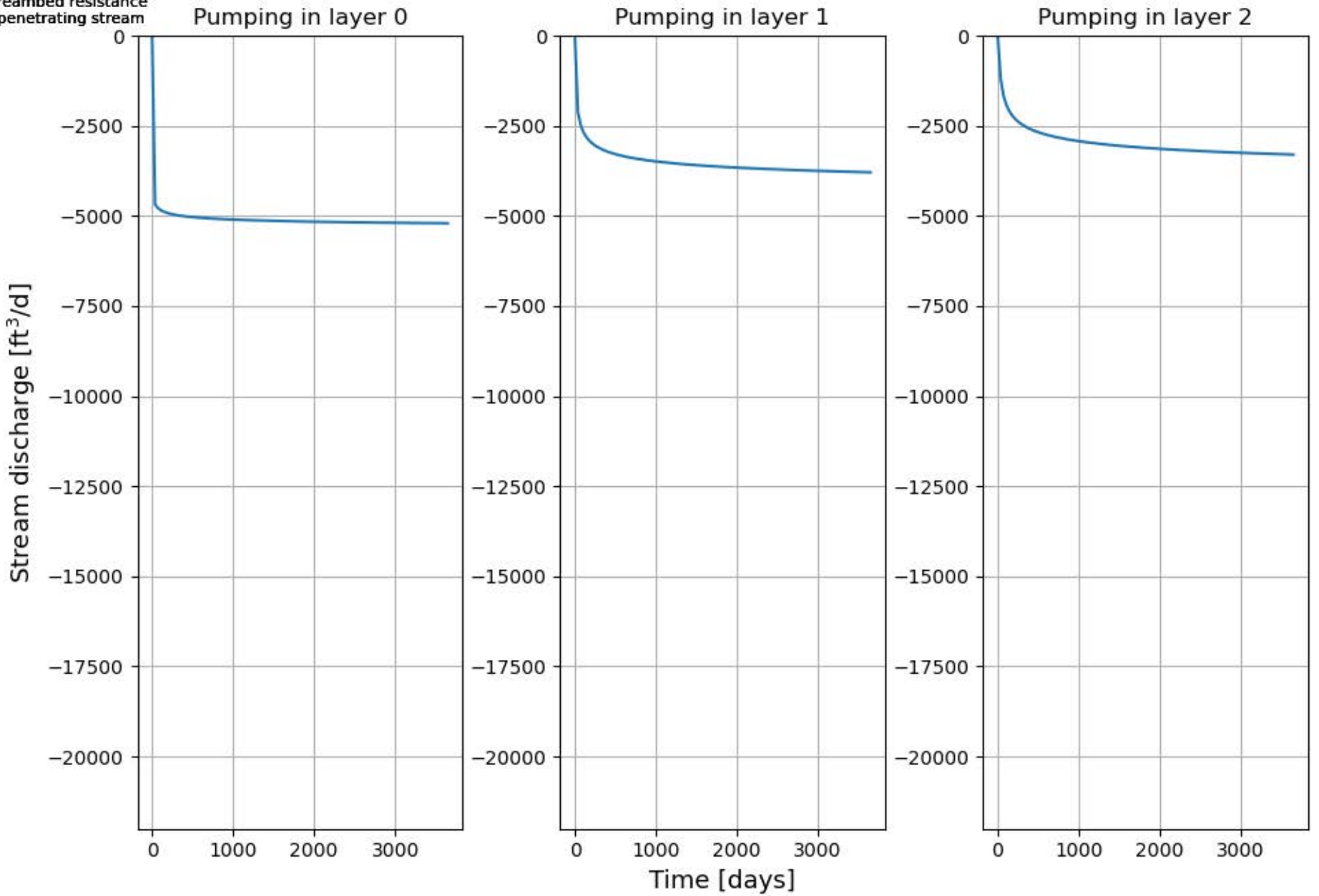
Stream depletion (cfs) after 10 years: -0.0576

Stream depletion (cfs) after 10 years: -0.0360

Stream depletion (cfs) after 10 years: -0.0285

Pumping Rate = 5953 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



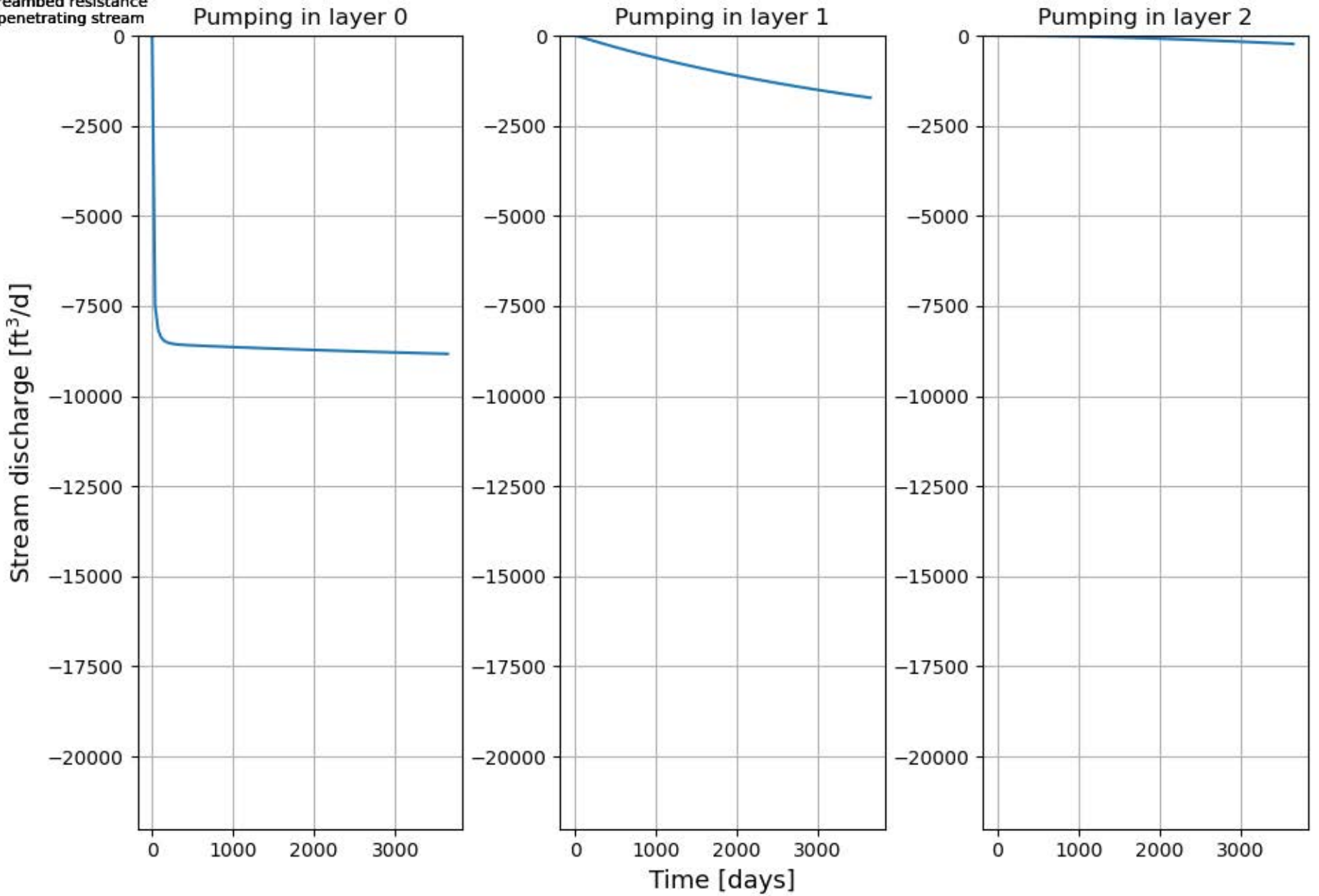
Stream depletion (cfs) after 10 years: -0.0603

Stream depletion (cfs) after 10 years: -0.0439

Stream depletion (cfs) after 10 years: -0.0382

Pumping Rate = 11920 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



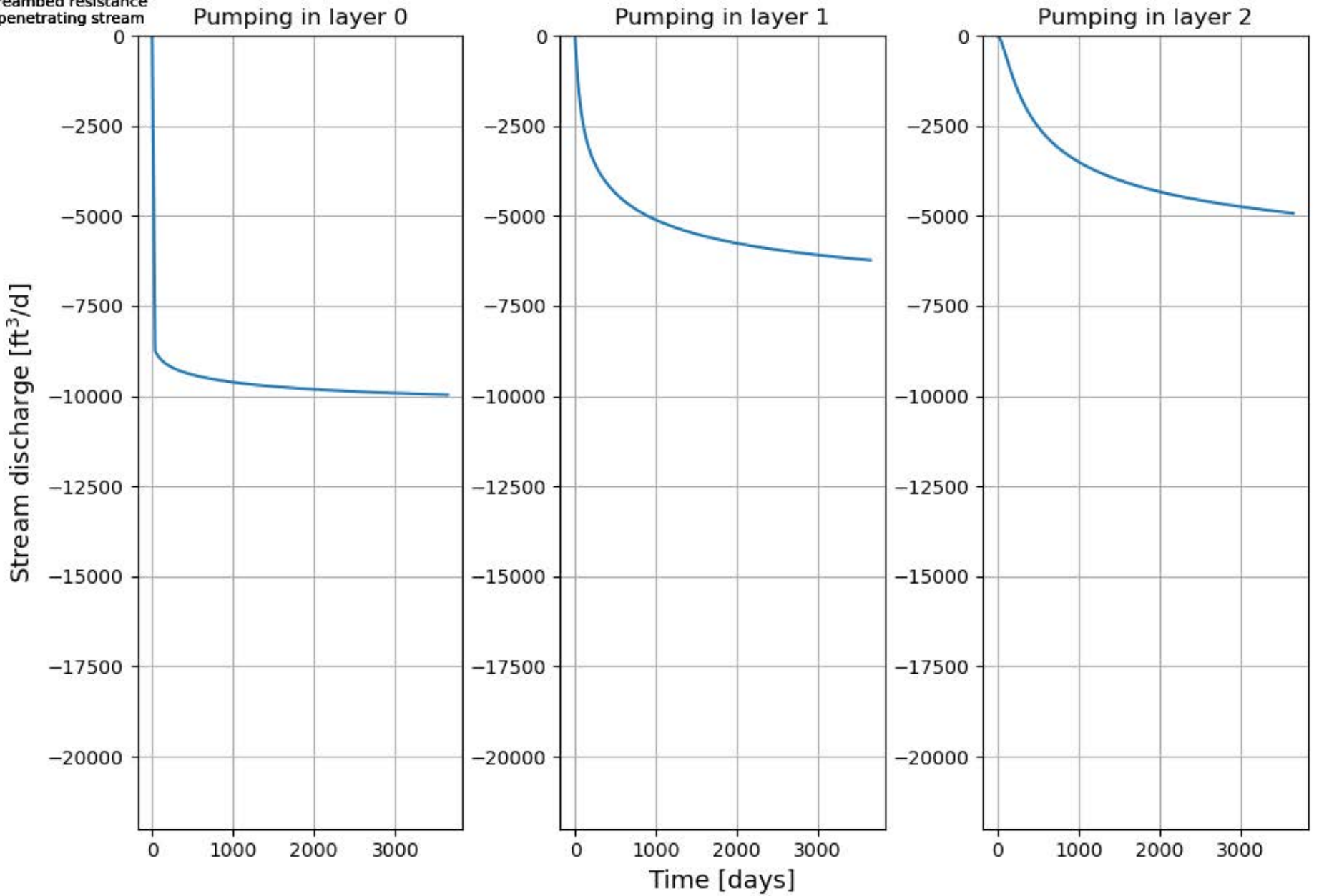
Stream depletion (cfs) after 10 years: -0.1022

Stream depletion (cfs) after 10 years: -0.0200

Stream depletion (cfs) after 10 years: -0.0027

Pumping Rate = 11920 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



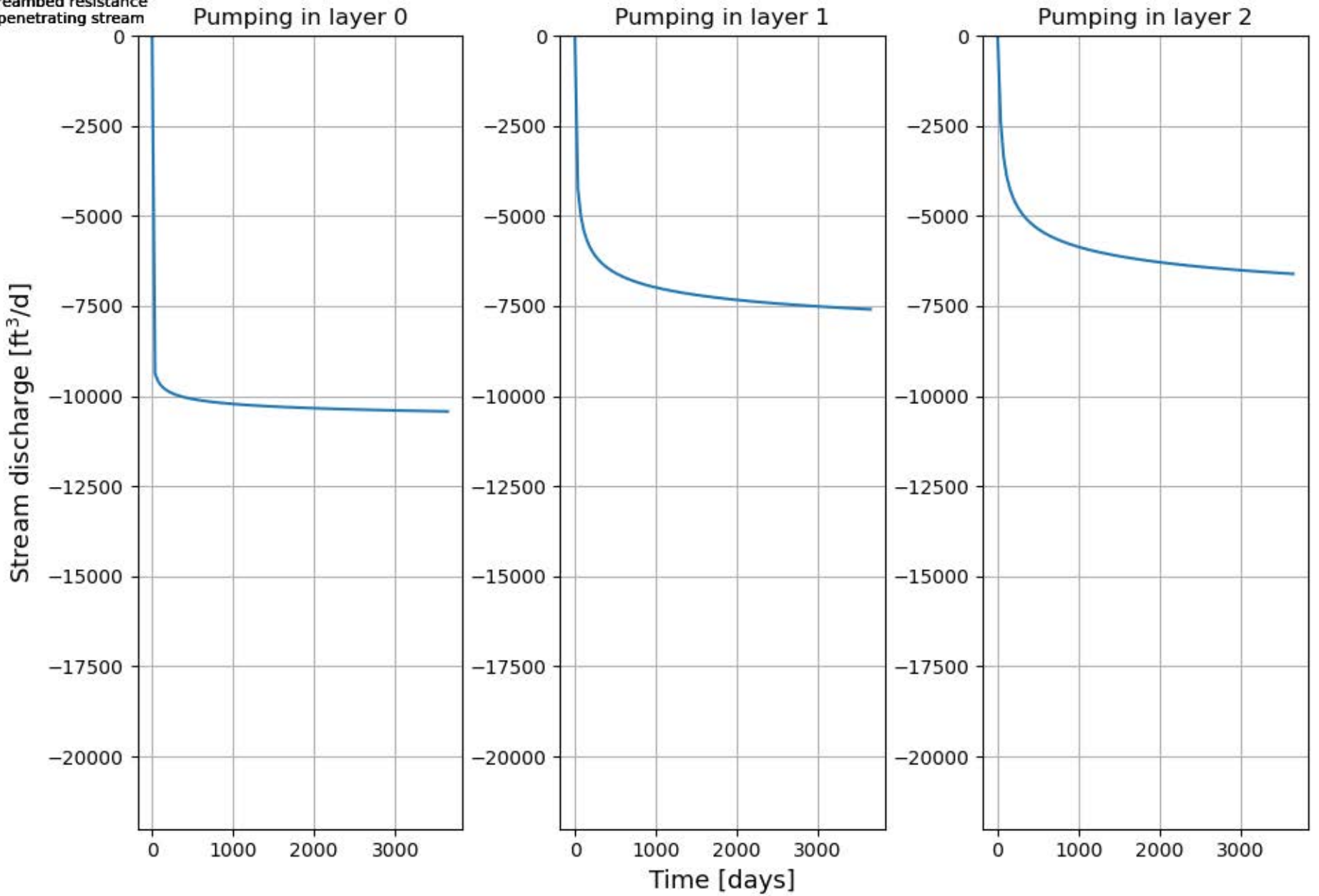
Stream depletion (cfs) after 10 years: -0.1154

Stream depletion (cfs) after 10 years: -0.0721

Stream depletion (cfs) after 10 years: -0.0570

Pumping Rate = 11920 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



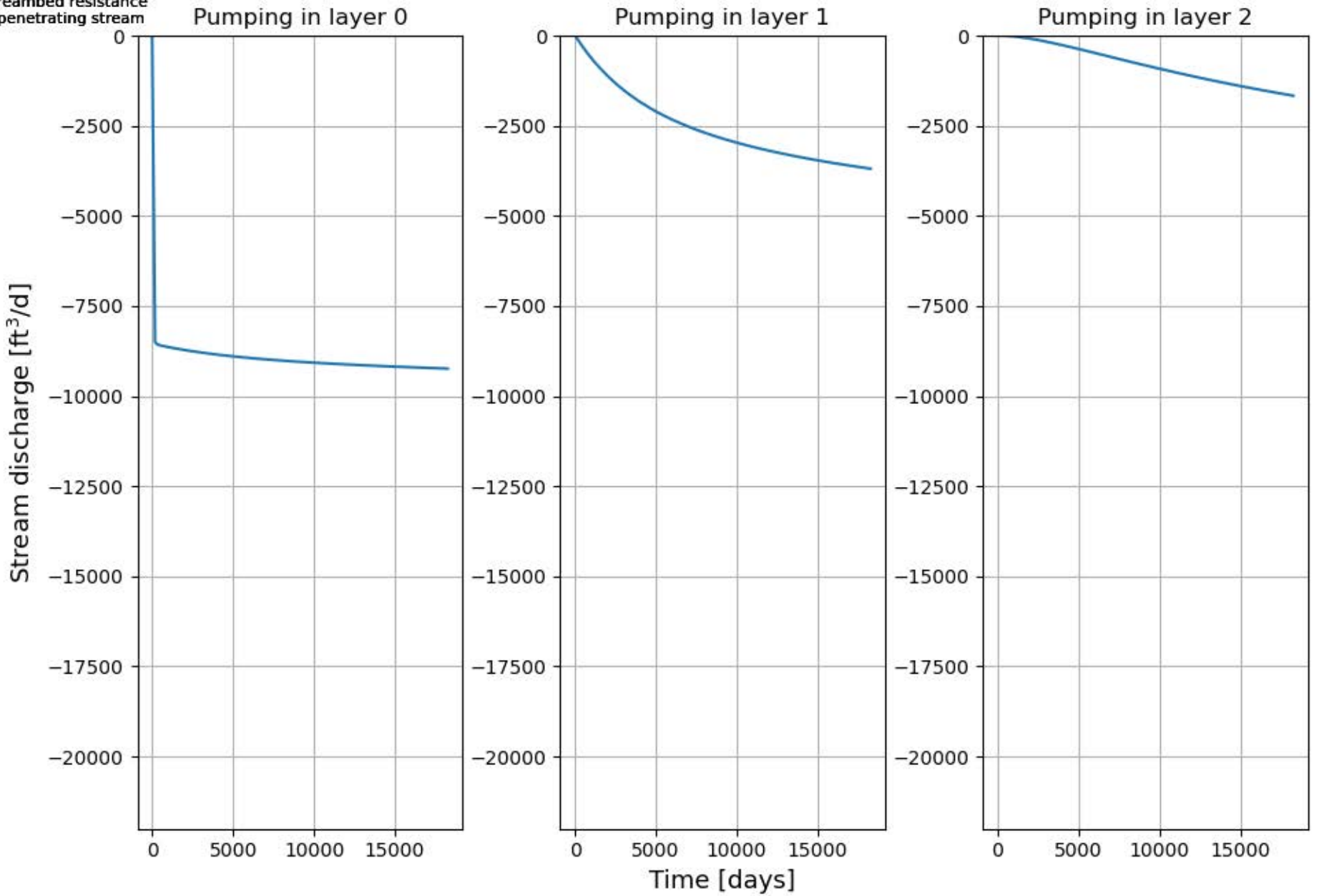
Stream depletion (cfs) after 10 years: -0.1207

Stream depletion (cfs) after 10 years: -0.0879

Stream depletion (cfs) after 10 years: -0.0765

Pumping Rate = 11920 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



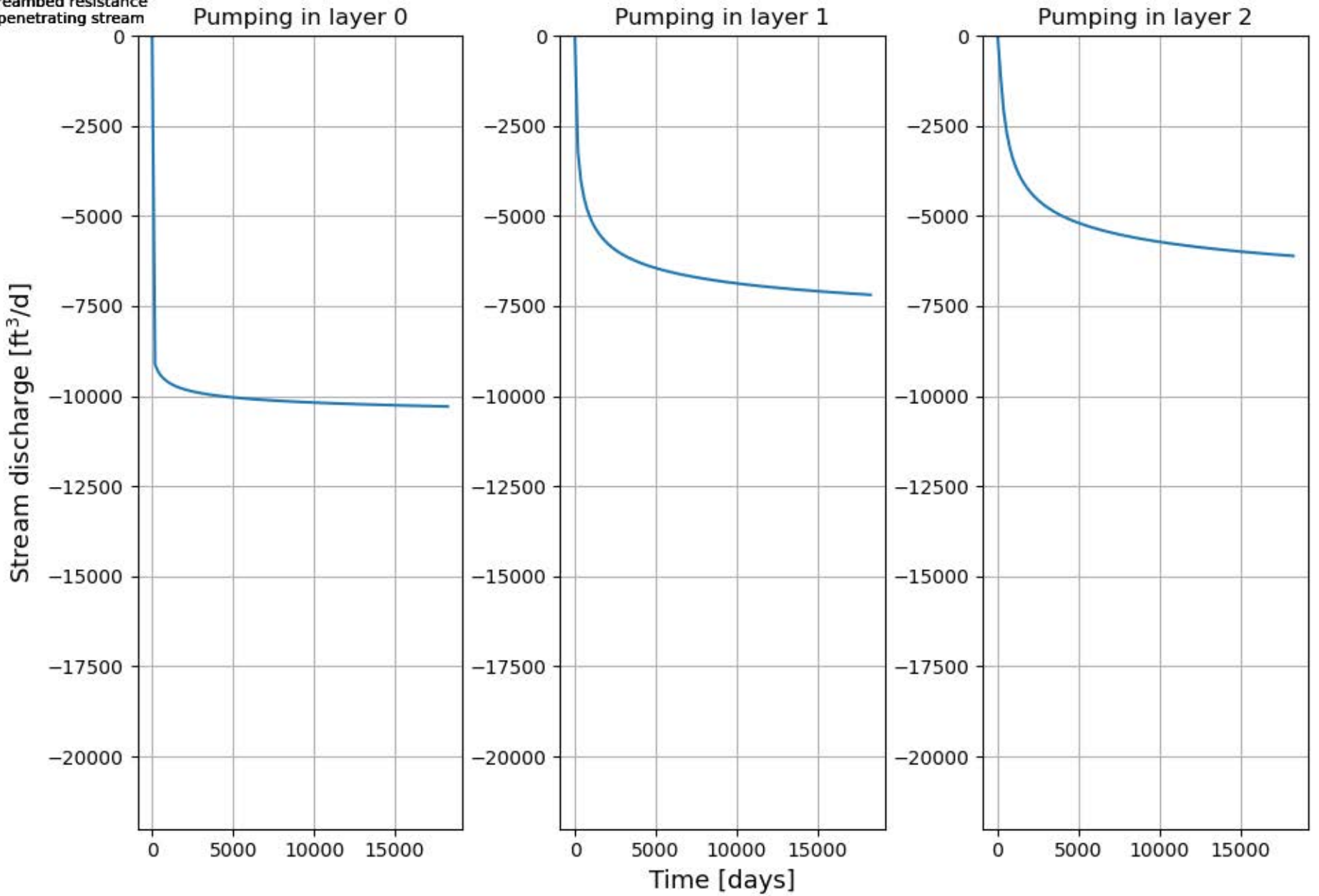
Stream depletion (cfs) after 50 years: -0.1069

Stream depletion (cfs) after 50 years: -0.0427

Stream depletion (cfs) after 50 years: -0.0193

Pumping Rate = 11920 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



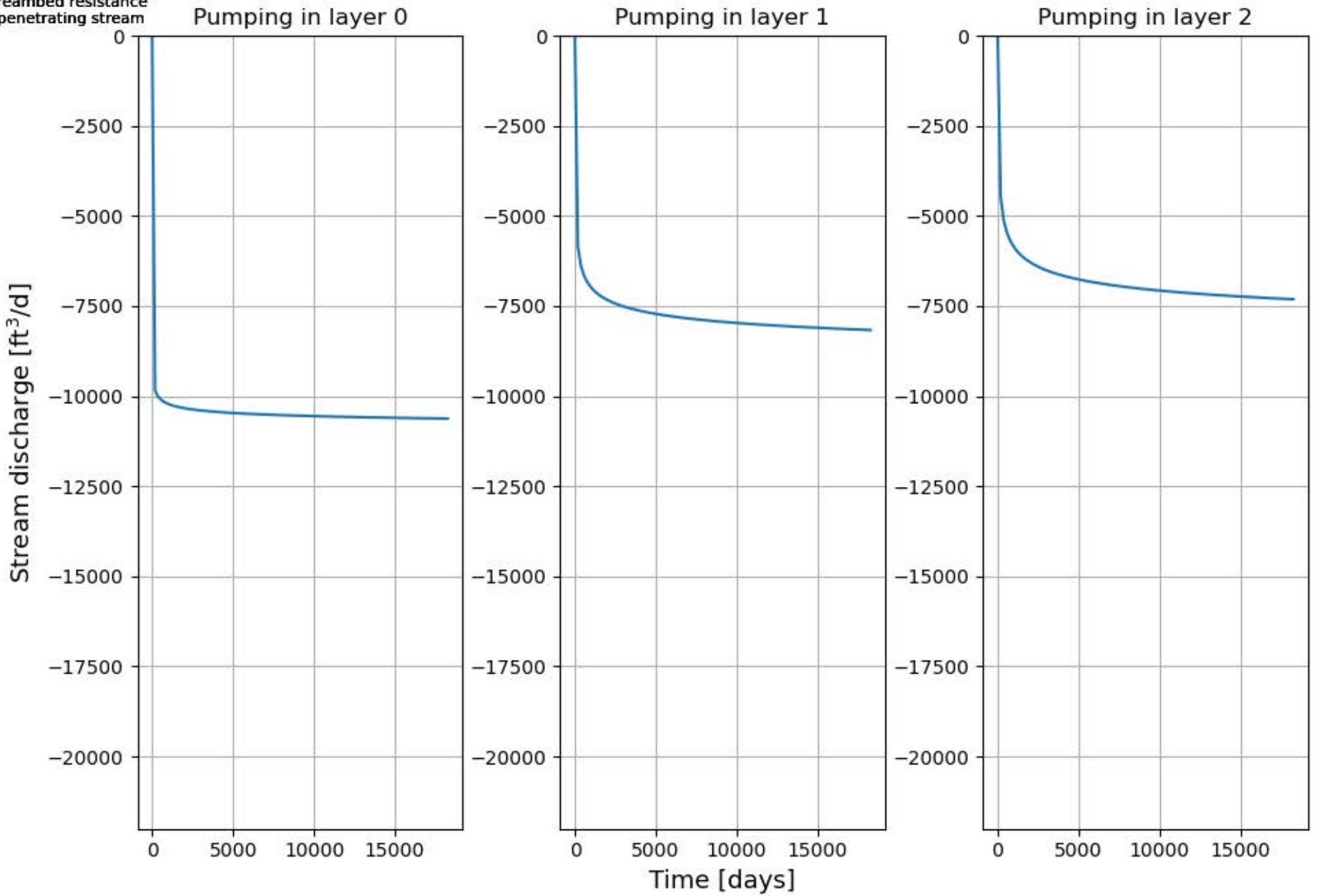
Stream depletion (cfs) after 50 years: -0.1191

Stream depletion (cfs) after 50 years: -0.0832

Stream depletion (cfs) after 50 years: -0.0708

Pumping Rate = 11920 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

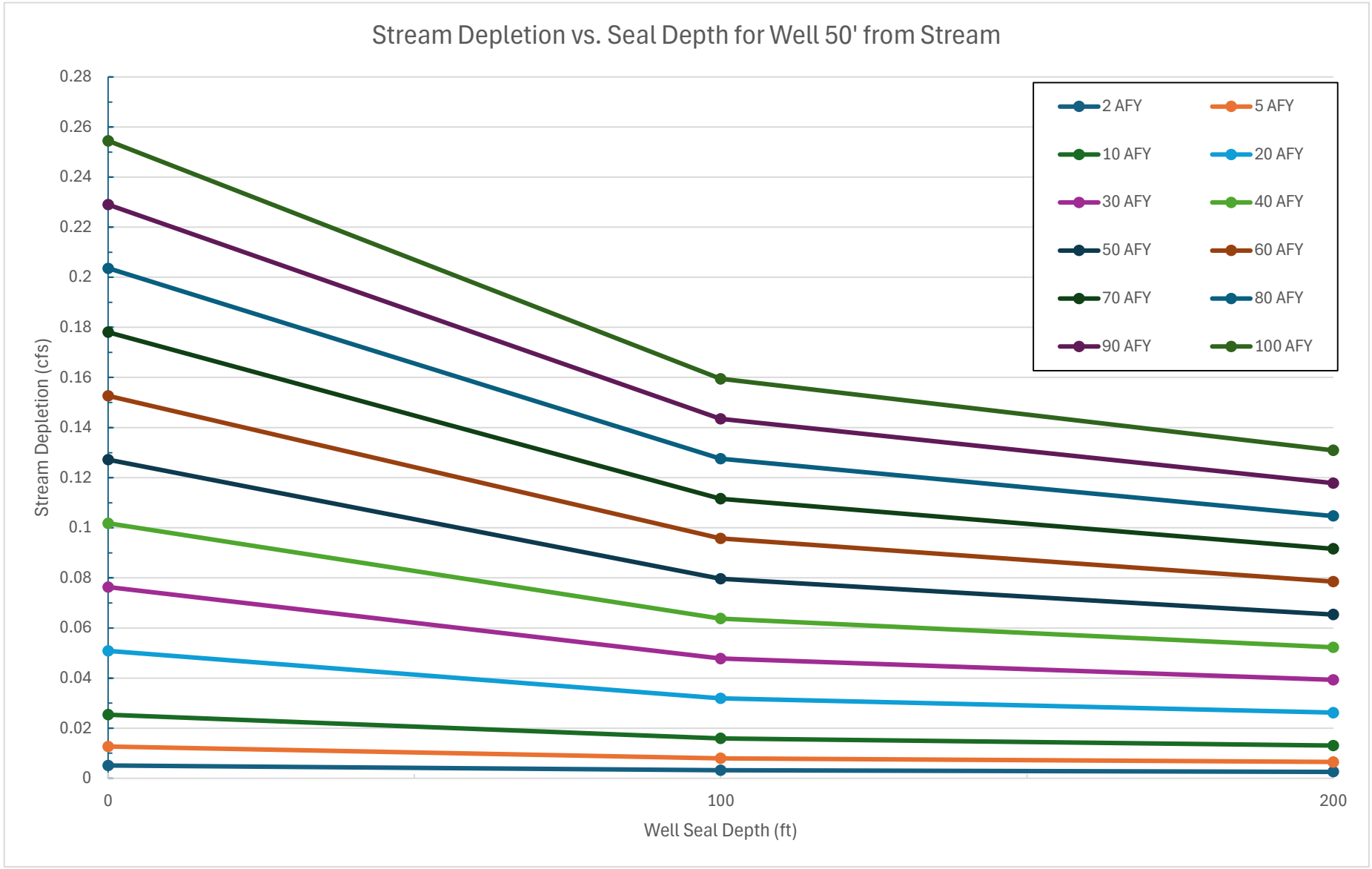
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface

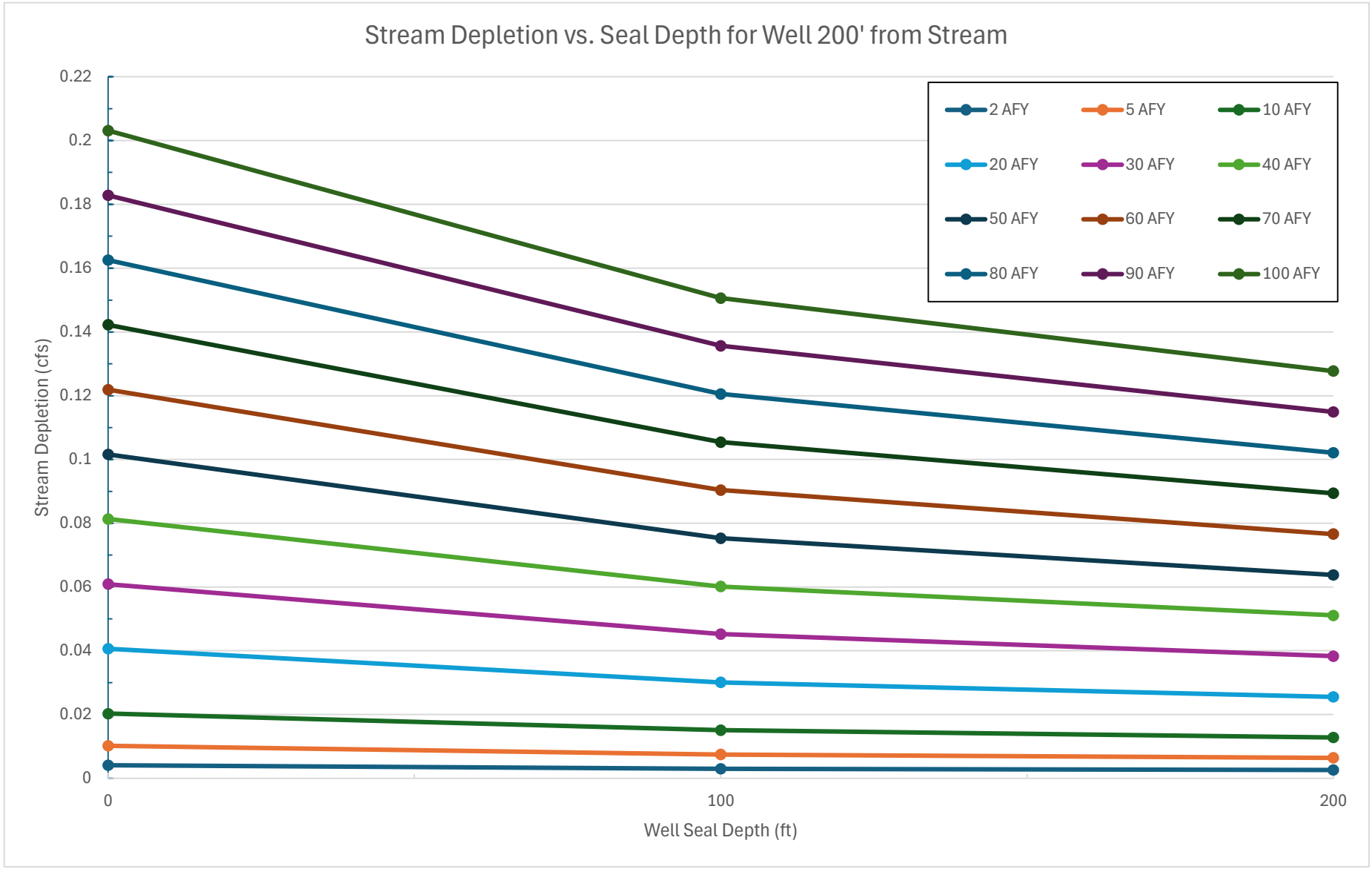


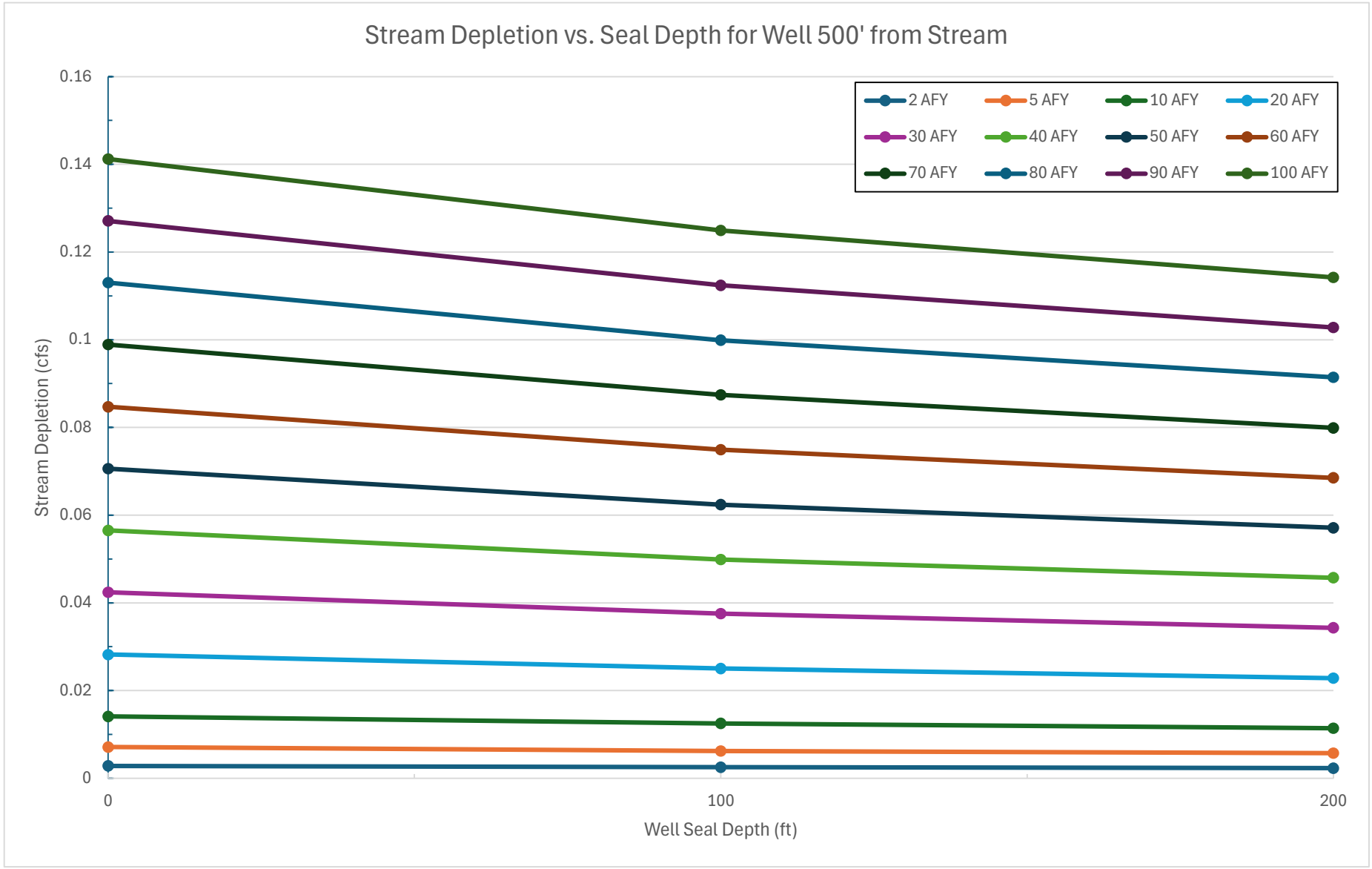
Stream depletion (cfs) after 50 years: -0.1230

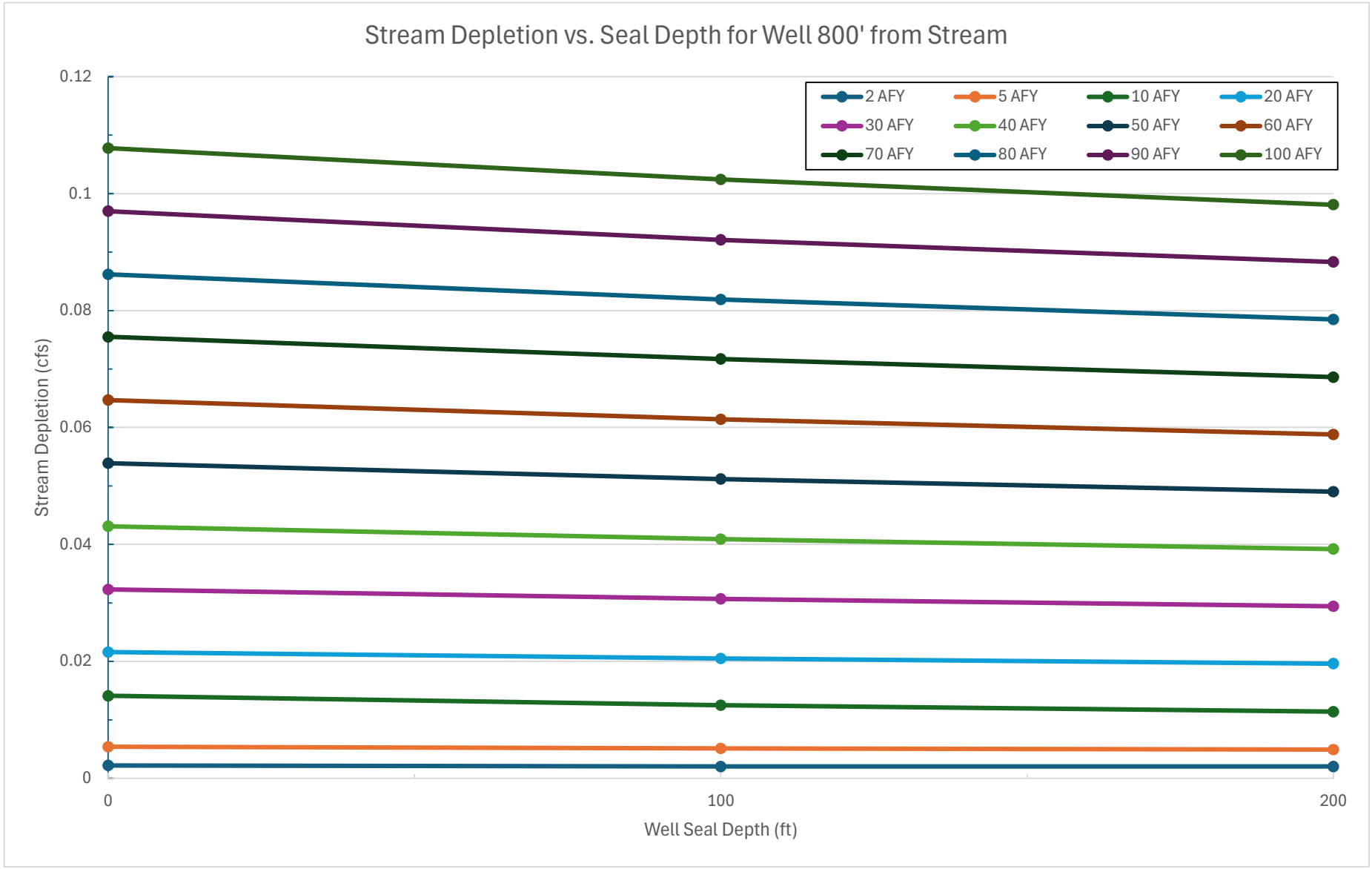
Stream depletion (cfs) after 50 years: -0.0945

Stream depletion (cfs) after 50 years: -0.0847


Stream Depletion vs. Seal Depth for Well 50' from Stream
Stream Depletion (cfs)
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
100
200
Well Seal Depth (ft)
2 AFY
5 AFY
10 AFY
20 AFY
30 AFY
40 AFY
50 AFY
60 AFY
70 AFY
80 AFY
90 AFY
100 AFY

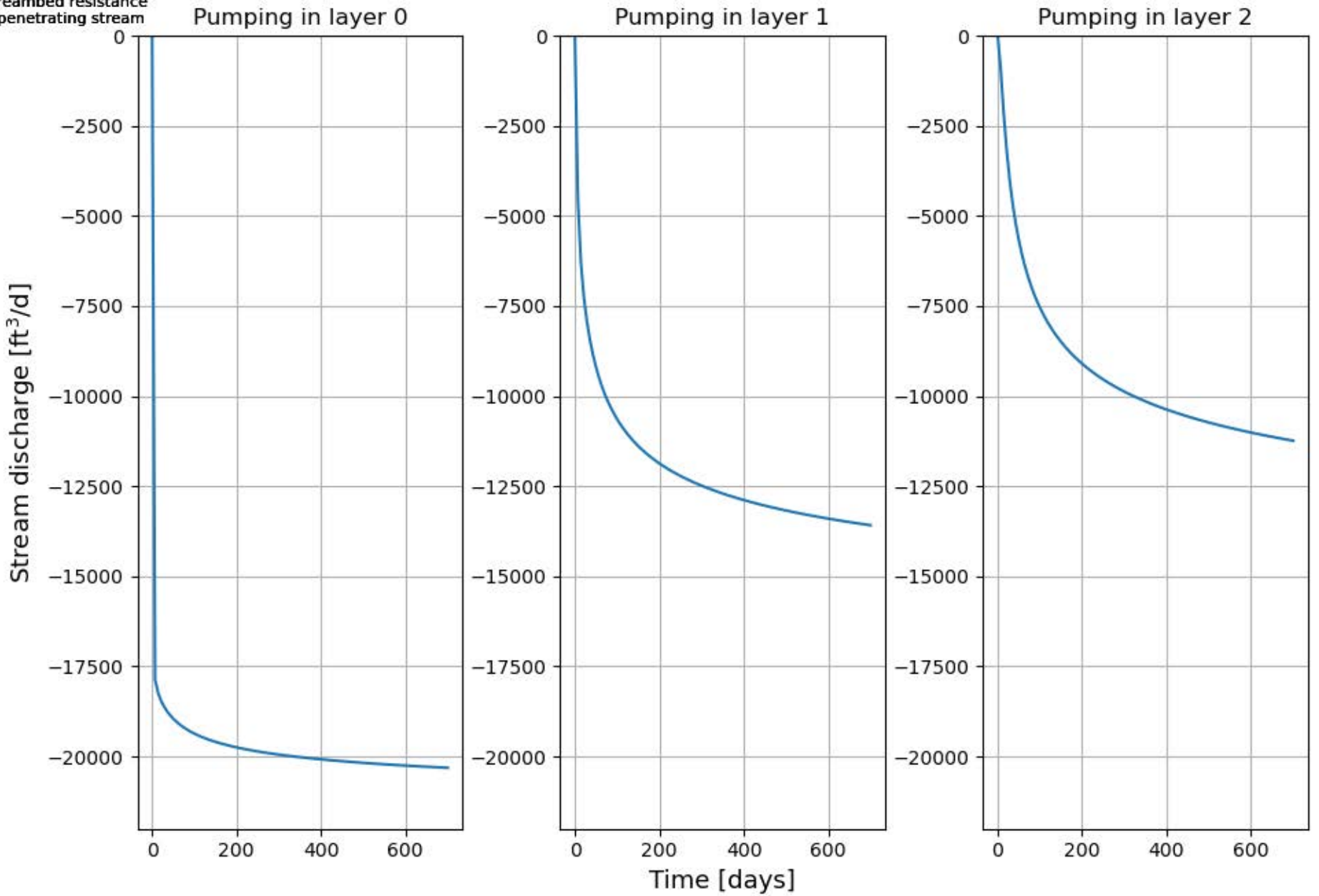

Stream Depletion vs. Seal Depth for Well 200' from Stream
Stream Depletion (cfs)
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
100
200
Well Seal Depth (ft)
2 AFY
5 AFY
10 AFY
20 AFY
30 AFY
40 AFY
50 AFY
60 AFY
70 AFY
80 AFY
90 AFY
100 AFY


Stream Depletion vs. Seal Depth for Well 500' from Stream
Stream Depletion (cfs)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
100
200
Well Seal Depth (ft)
2 AFY
5 AFY
10 AFY
20 AFY
30 AFY
40 AFY
50 AFY
60 AFY
70 AFY
80 AFY
90 AFY
100 AFY


Stream Depletion vs. Seal Depth for Well 800' from Stream
0.12
0.1
0.08
0.06
0.04
0.02
0
Stream Depletion (cfs)
0
100
200
Well Seal Depth (ft)
2 AFY
5 AFY
10 AFY
20 AFY
30 AFY
40 AFY
50 AFY
60 AFY
70 AFY
80 AFY
90 AFY
100 AFY

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



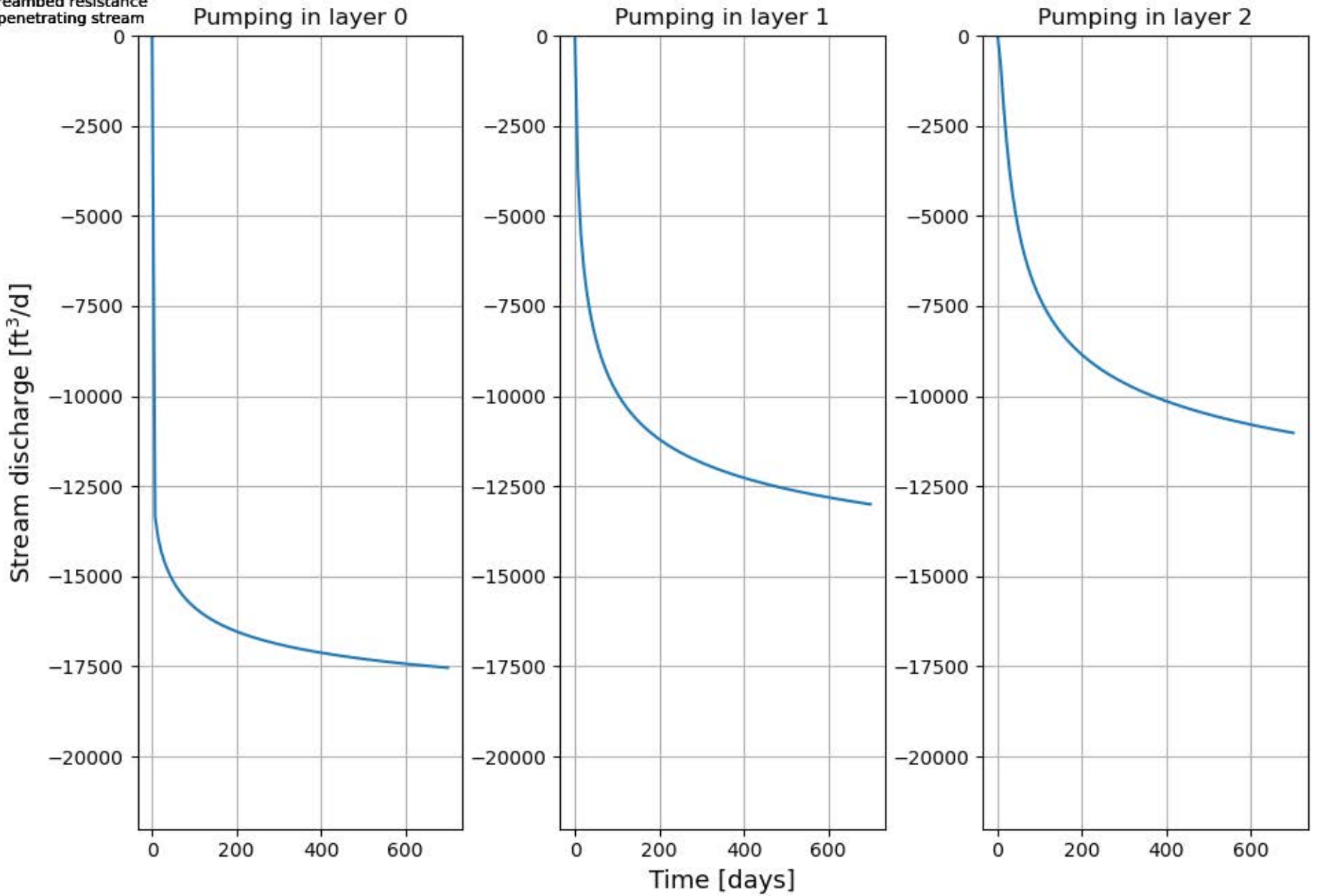
Stream depletion (cfs) after 700 days: -0.2351

Stream depletion (cfs) after 700 days: -0.1572

Stream depletion (cfs) after 700 days: -0.1301

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



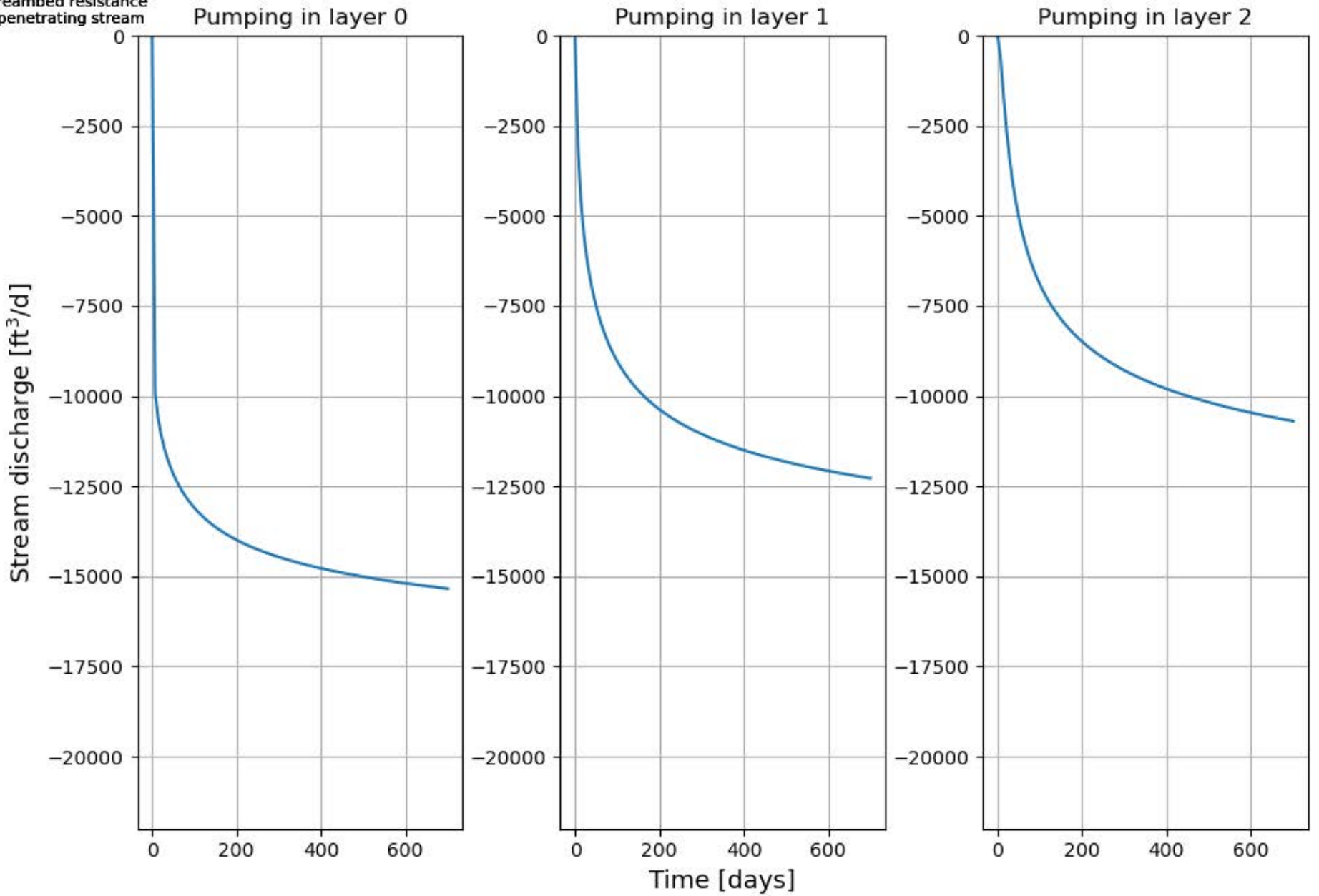
Stream depletion (cfs) after 700 days: -0.2030

Stream depletion (cfs) after 700 days: -0.1505

Stream depletion (cfs) after 700 days: -0.1276

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 300 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



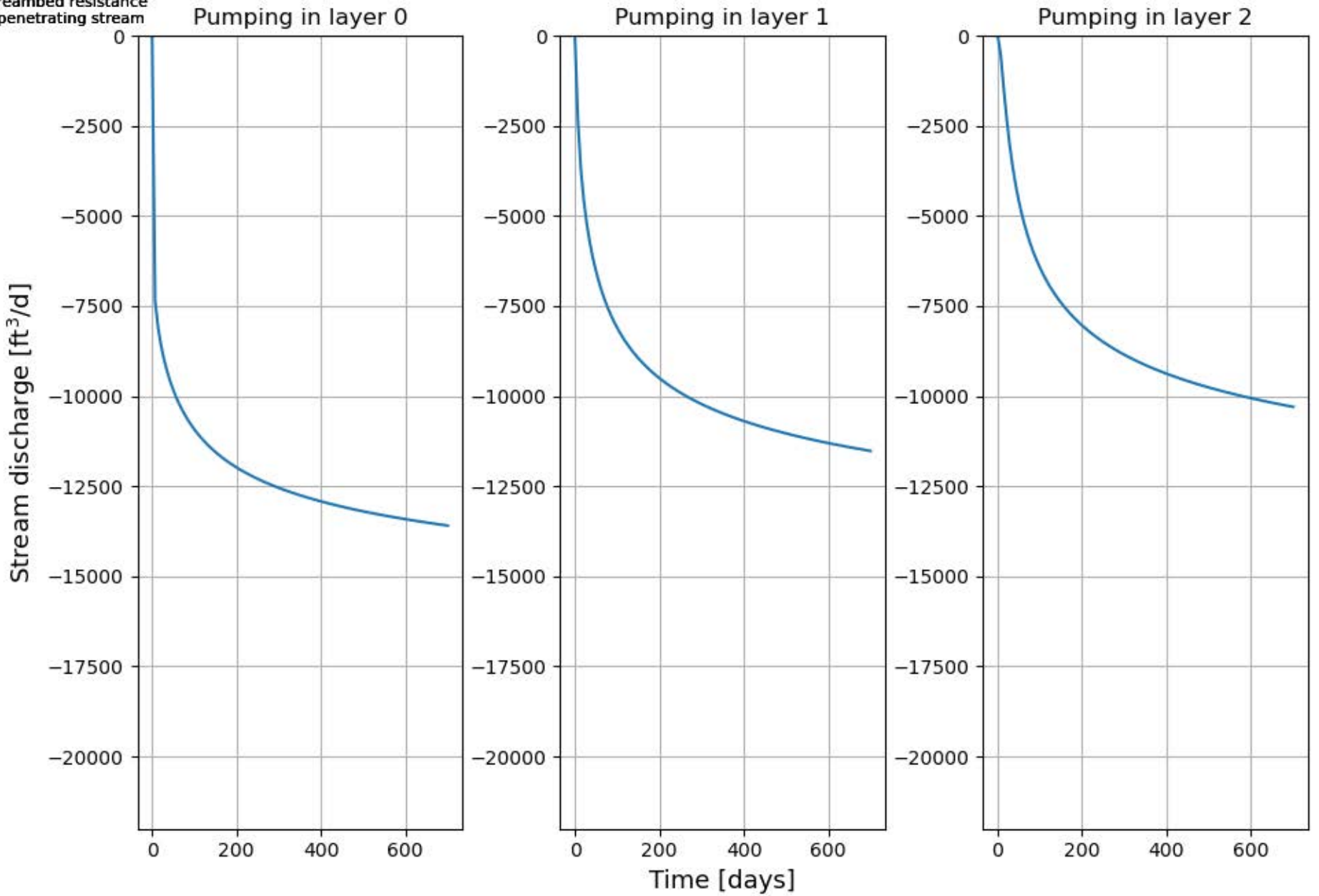
Stream depletion (cfs) after 700 days: -0.1776

Stream depletion (cfs) after 700 days: -0.1422

Stream depletion (cfs) after 700 days: -0.1238

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 400 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



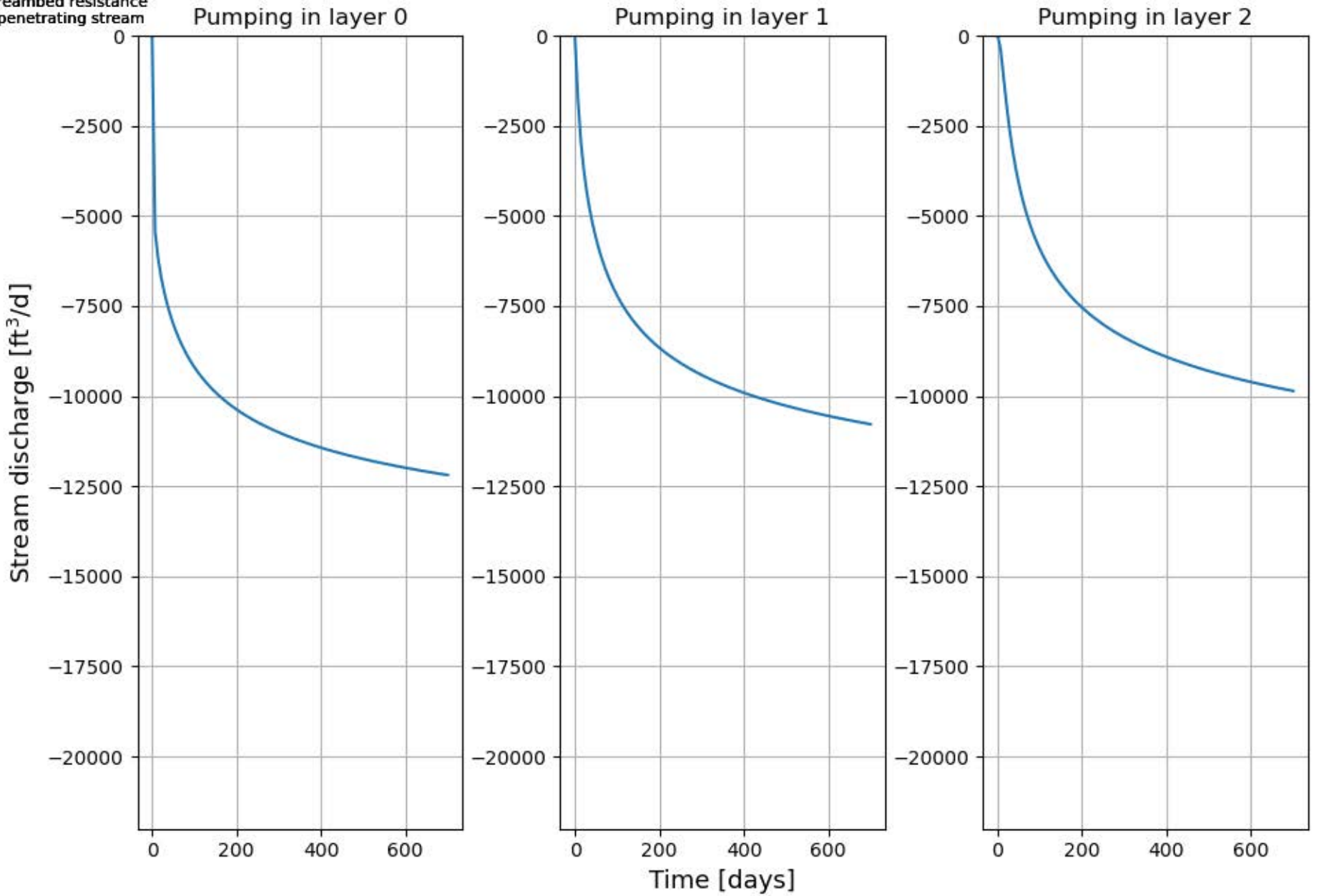
Stream depletion (cfs) after 700 days: -0.1574

Stream depletion (cfs) after 700 days: -0.1334

Stream depletion (cfs) after 700 days: -0.1192

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 500 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



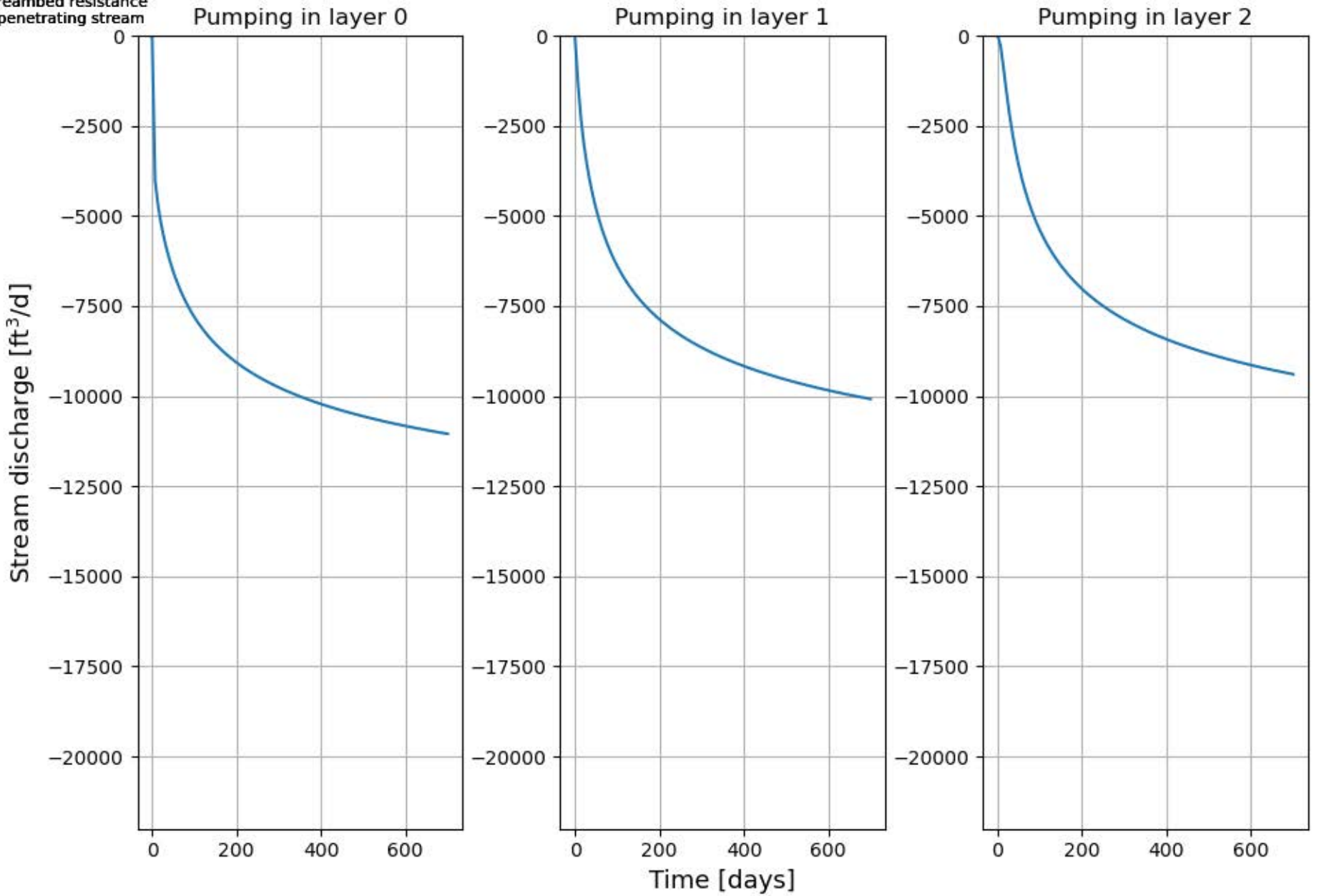
Stream depletion (cfs) after 700 days: -0.1411

Stream depletion (cfs) after 700 days: -0.1248

Stream depletion (cfs) after 700 days: -0.1141

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 600 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



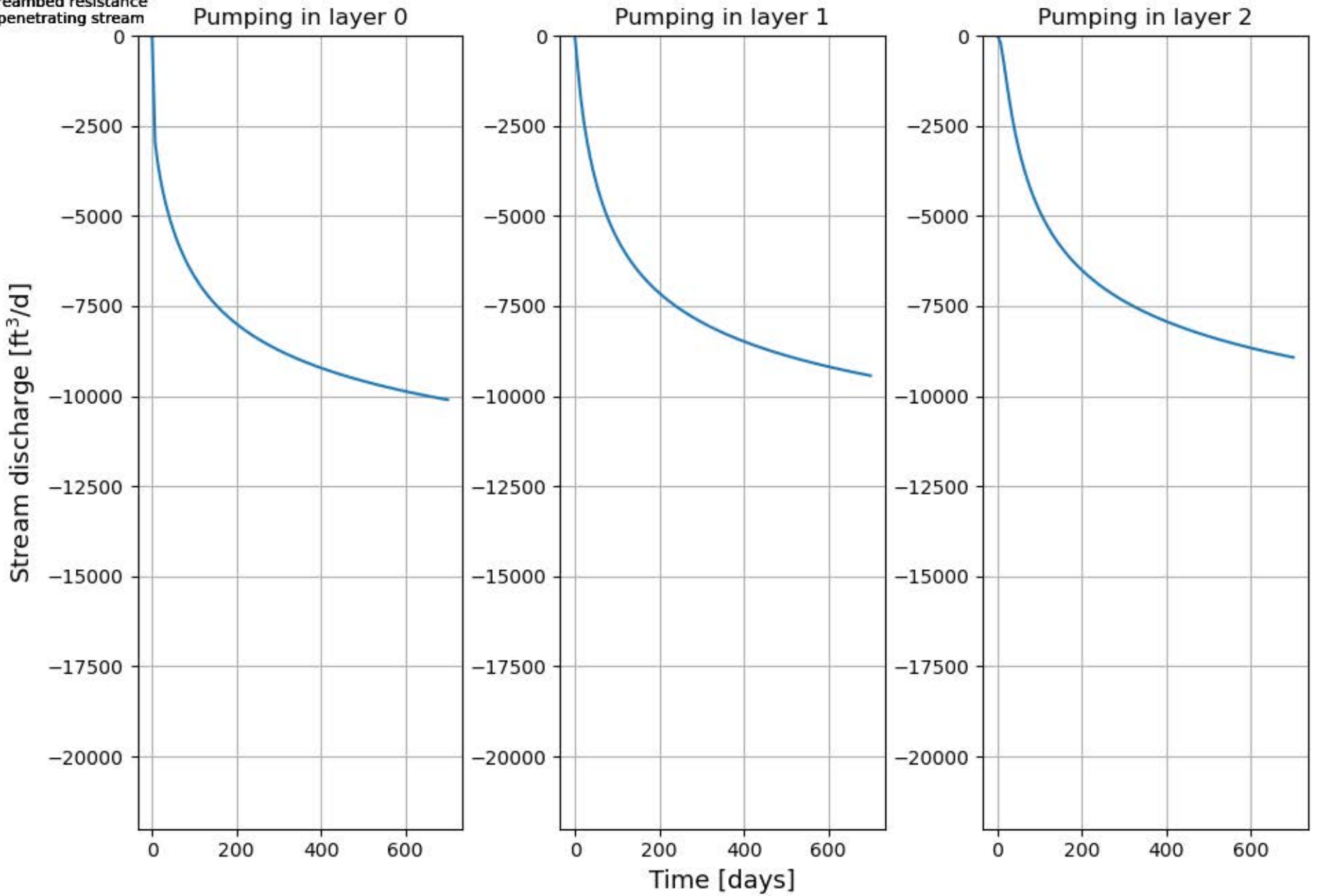
Stream depletion (cfs) after 700 days: -0.1279

Stream depletion (cfs) after 700 days: -0.1167

Stream depletion (cfs) after 700 days: -0.1088

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 700 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



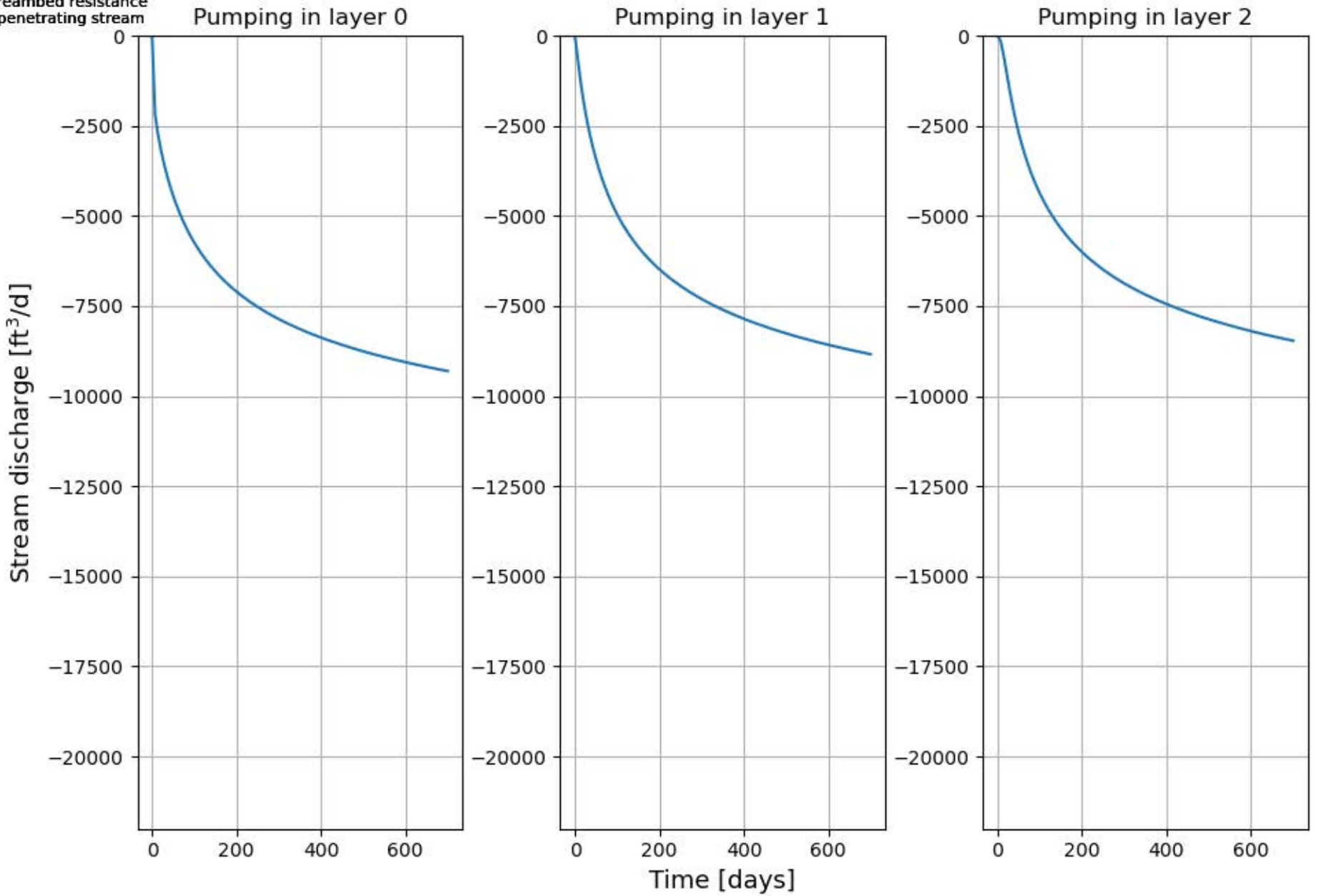
Stream depletion (cfs) after 700 days: -0.1170

Stream depletion (cfs) after 700 days: -0.1092

Stream depletion (cfs) after 700 days: -0.1033

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 800 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



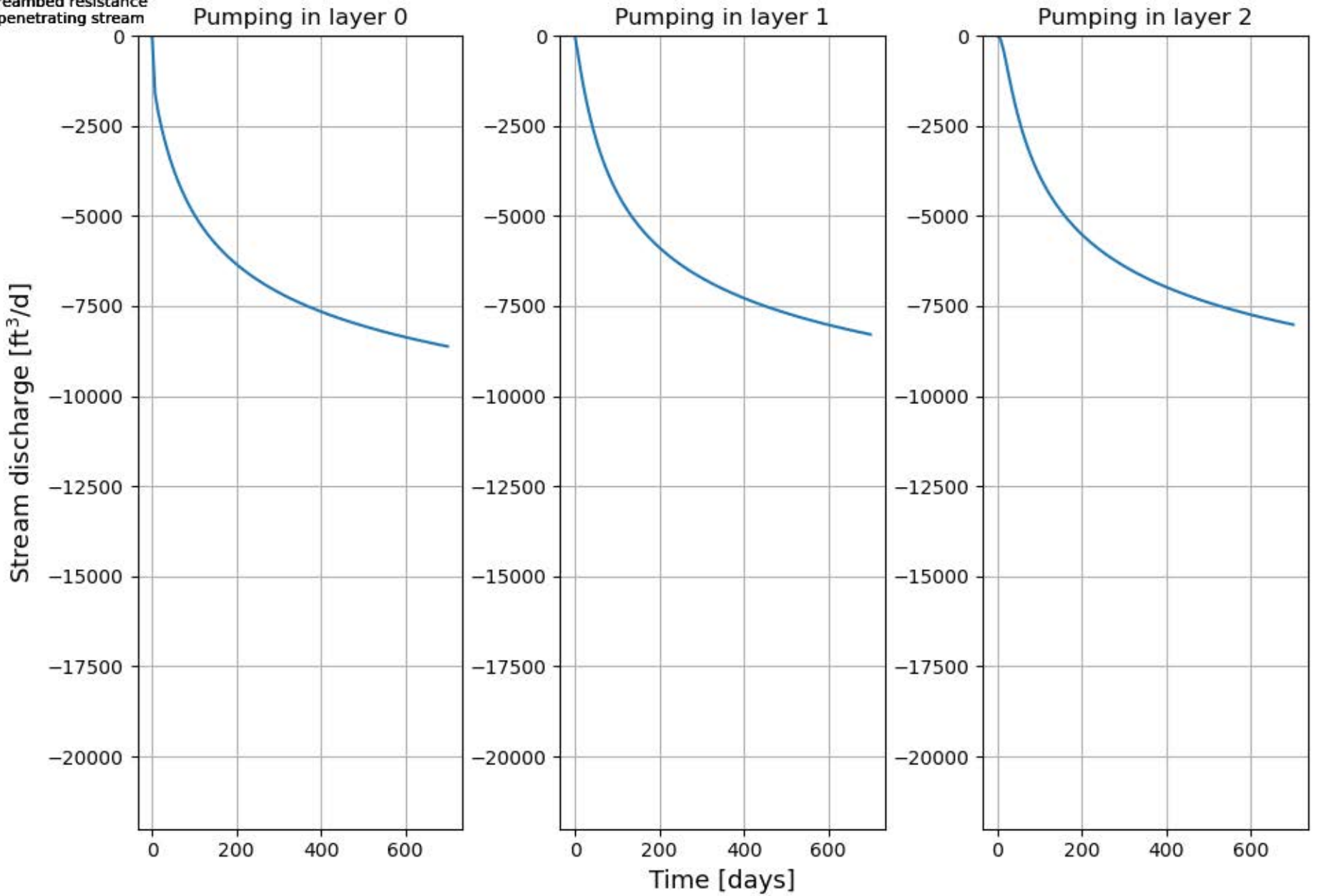
Stream depletion (cfs) after 700 days: -0.1077

Stream depletion (cfs) after 700 days: -0.1023

Stream depletion (cfs) after 700 days: -0.0980

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 900 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



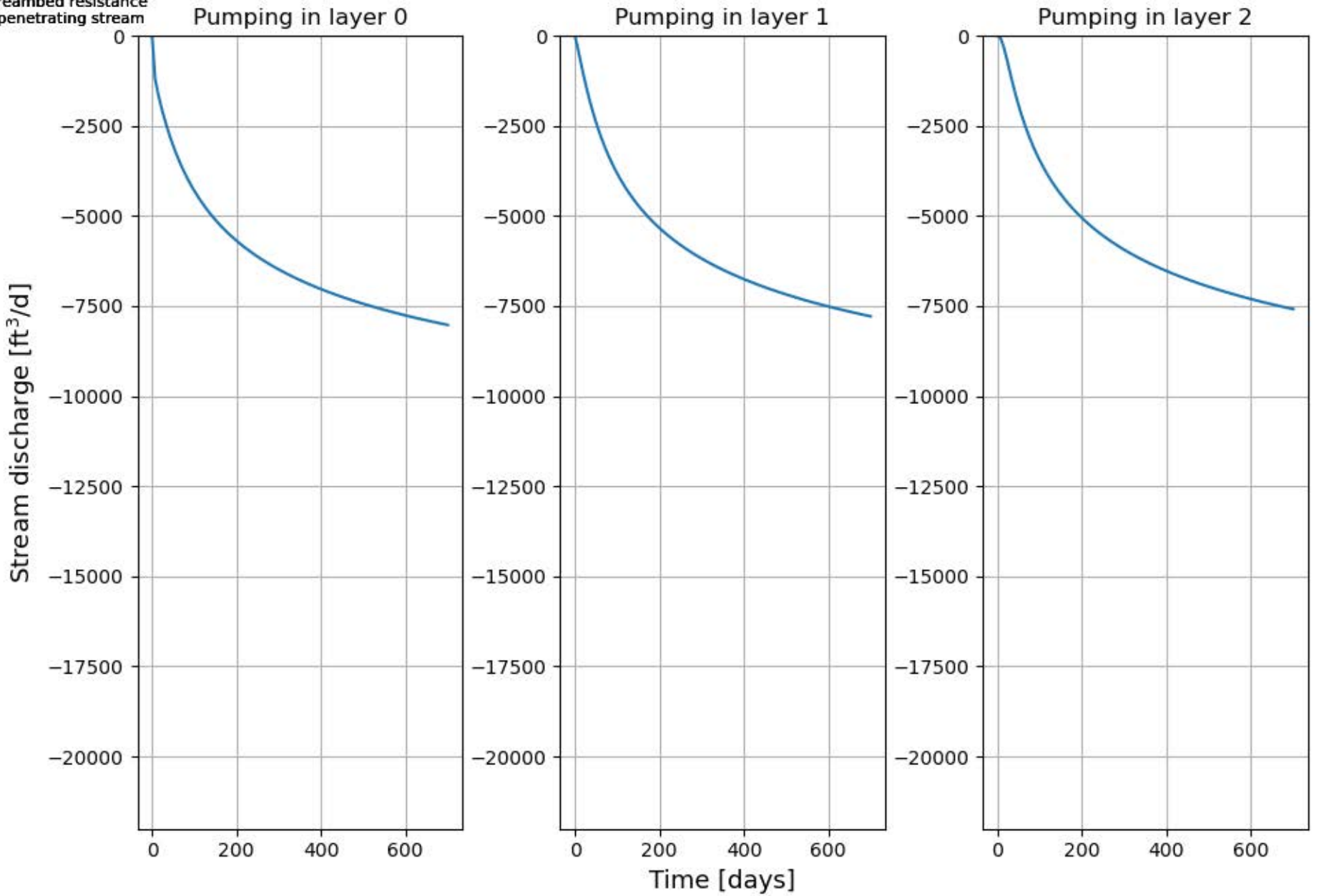
Stream depletion (cfs) after 700 days: -0.0998

Stream depletion (cfs) after 700 days: -0.0960

Stream depletion (cfs) after 700 days: -0.0928

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



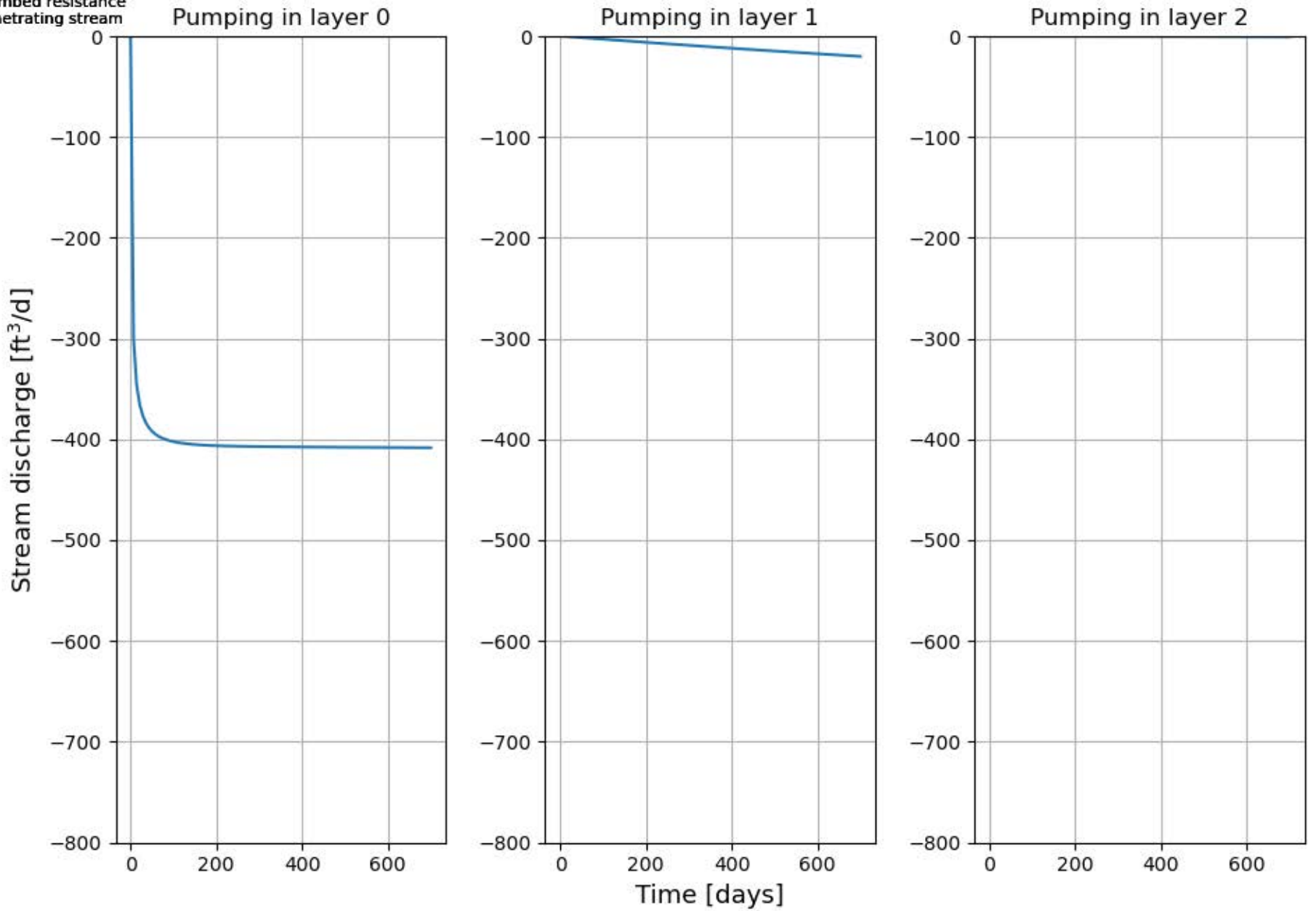
Stream depletion (cfs) after 700 days: -0.0929

Stream depletion (cfs) after 700 days: -0.0901

Stream depletion (cfs) after 700 days: -0.0878

Pumping Rate = 480 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



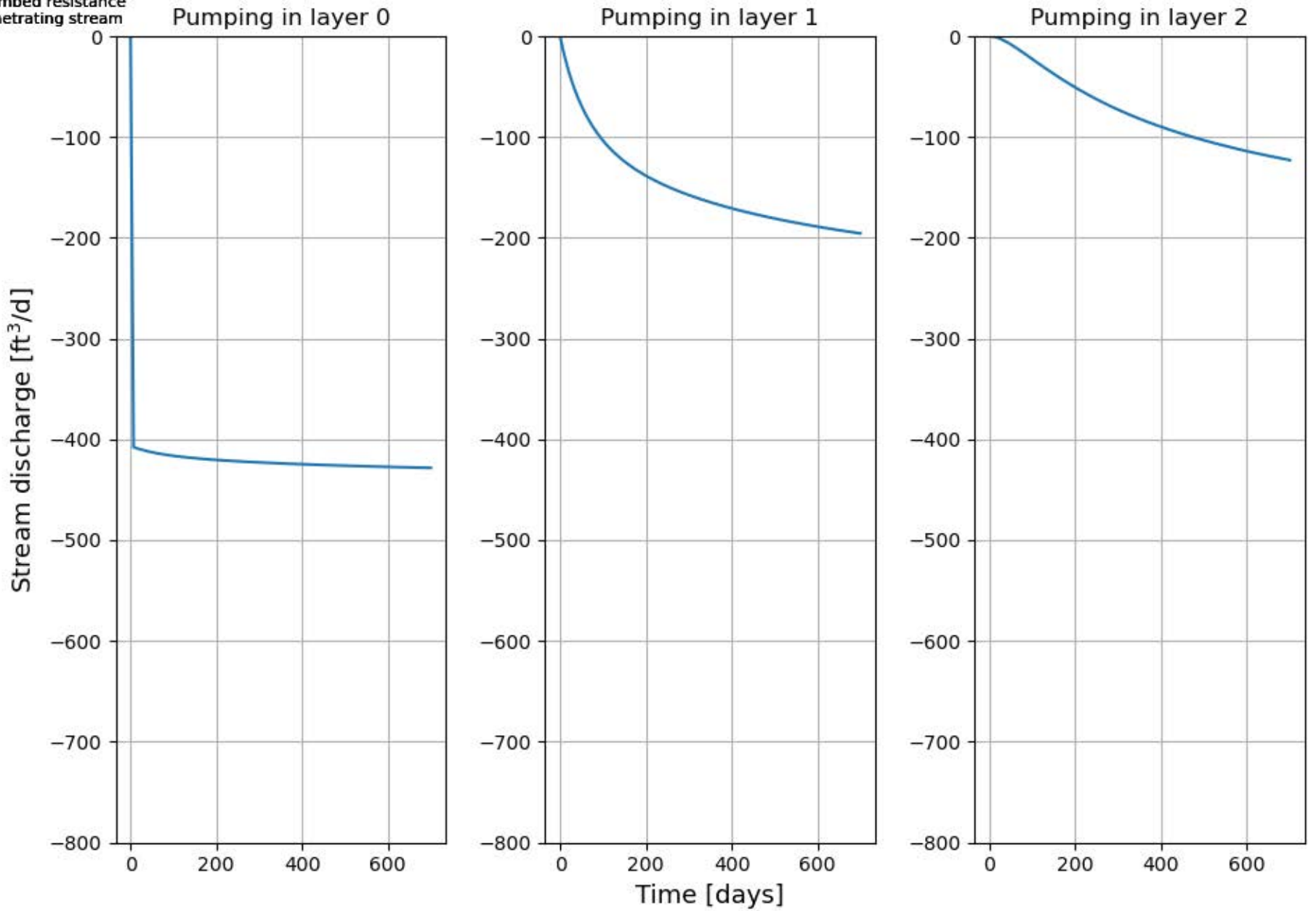
Stream depletion (cfs) after 700 days: -0.0047

Stream depletion (cfs) after 700 days: -0.0002

Stream depletion (cfs) after 700 days: -0.0000

Pumping Rate = 480 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



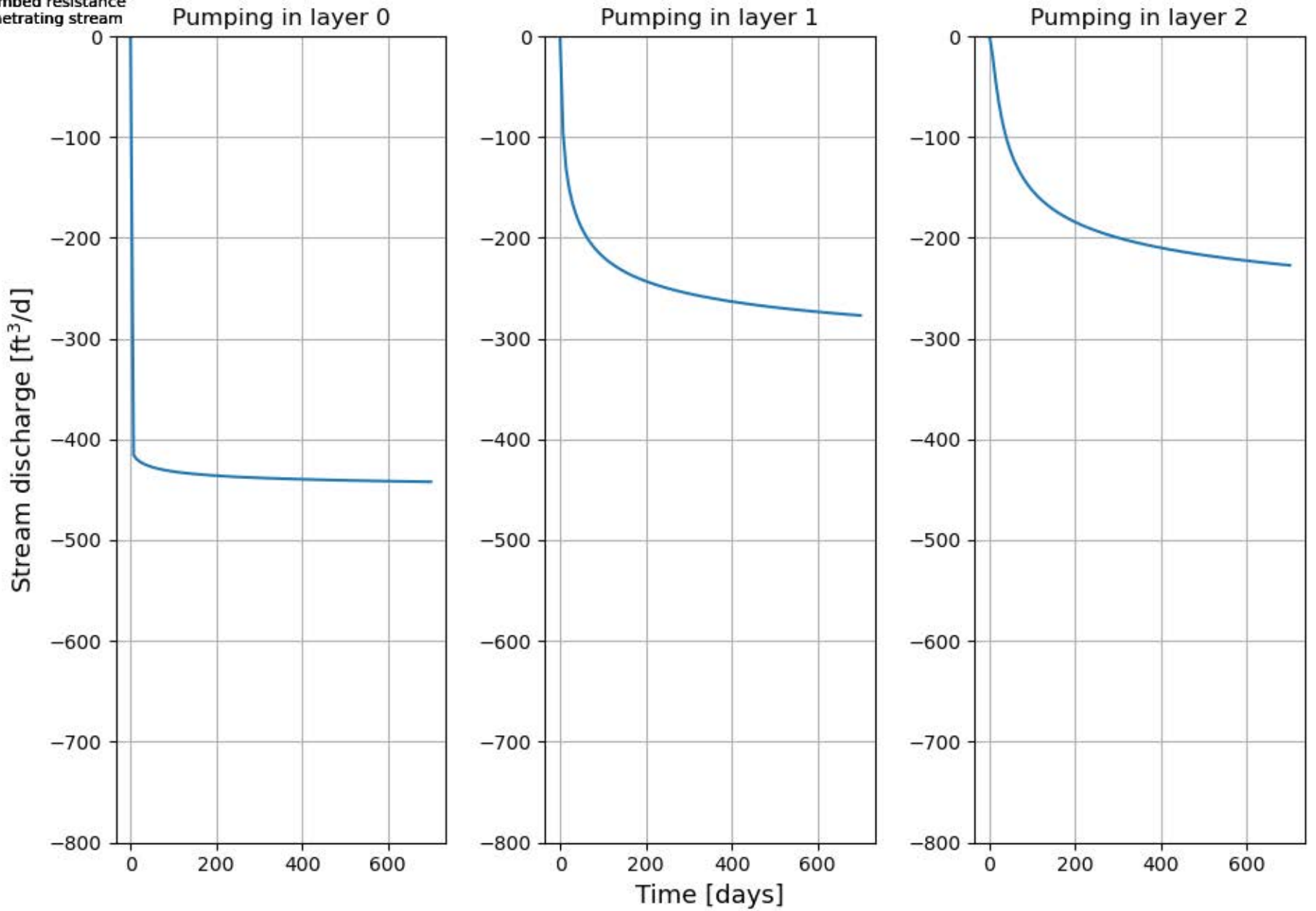
Stream depletion (cfs) after 700 days: -0.0050

Stream depletion (cfs) after 700 days: -0.0023

Stream depletion (cfs) after 700 days: -0.0014

Pumping Rate = 480 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



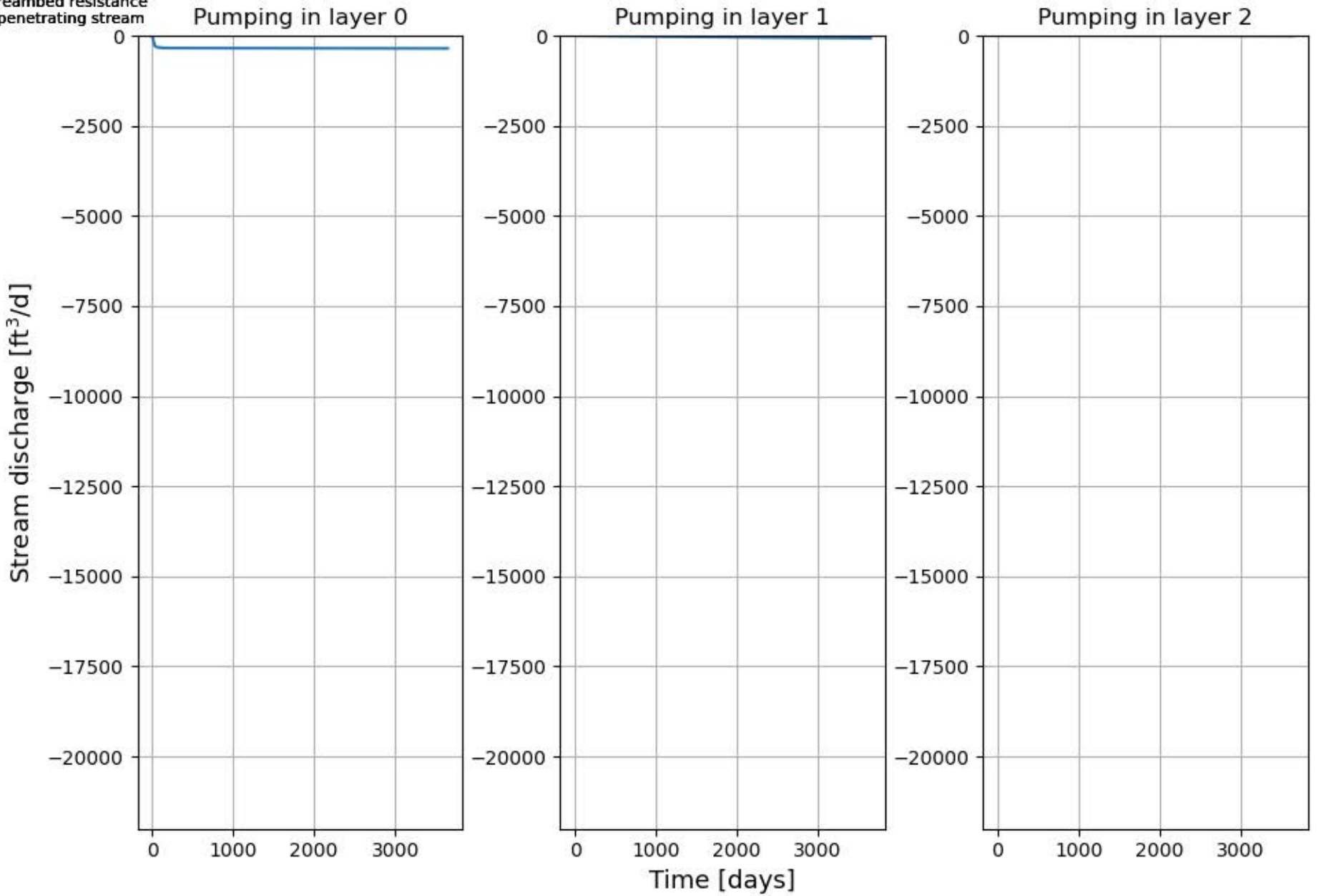
Stream depletion (cfs) after 700 days: -0.0051

Stream depletion (cfs) after 700 days: -0.0032

Stream depletion (cfs) after 700 days: -0.0026

Pumping Rate = 480 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



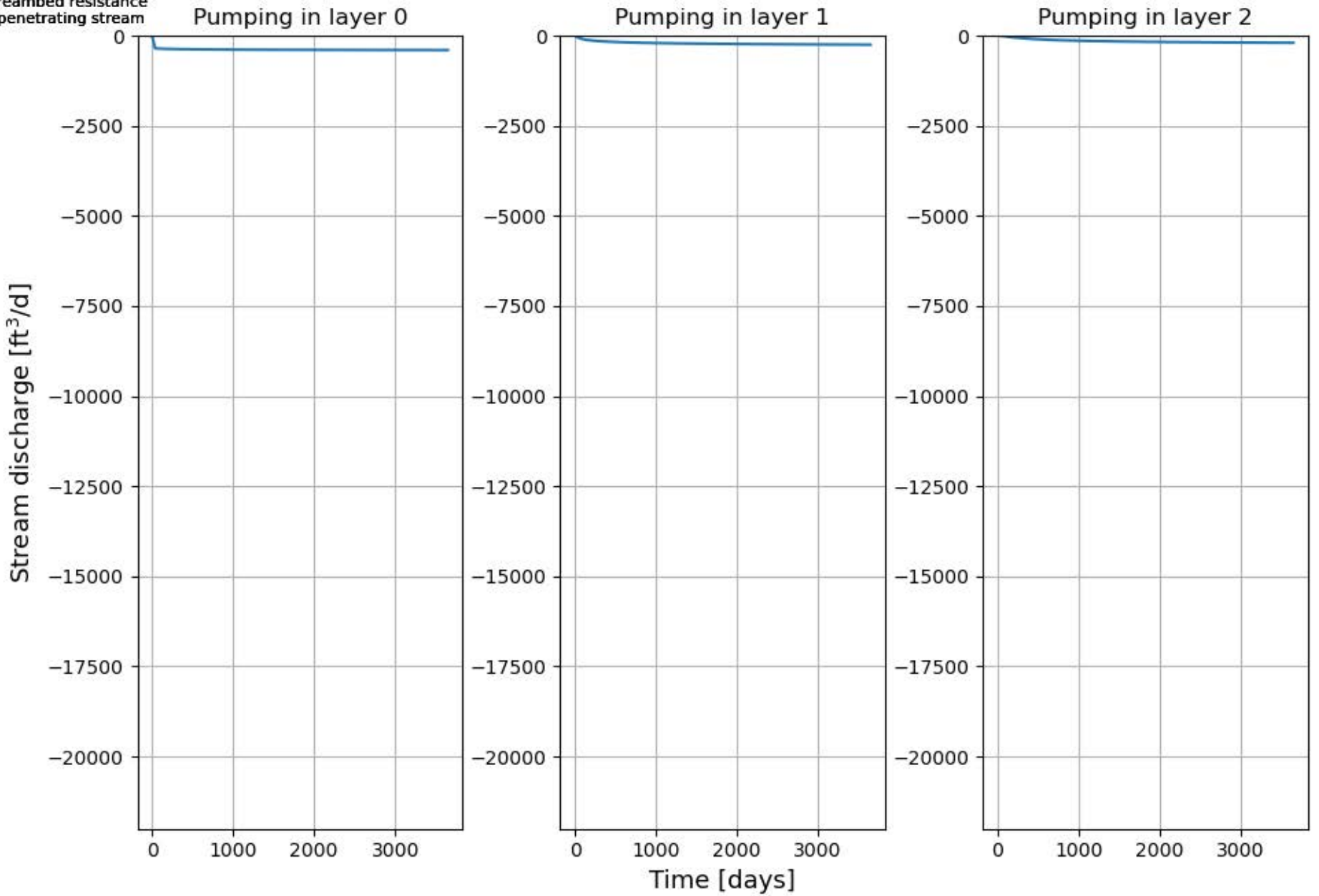
Stream depletion (cfs) after 10 years: -0.0041

Stream depletion (cfs) after 10 years: -0.0008

Stream depletion (cfs) after 10 years: -0.0001

Pumping Rate = 480 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



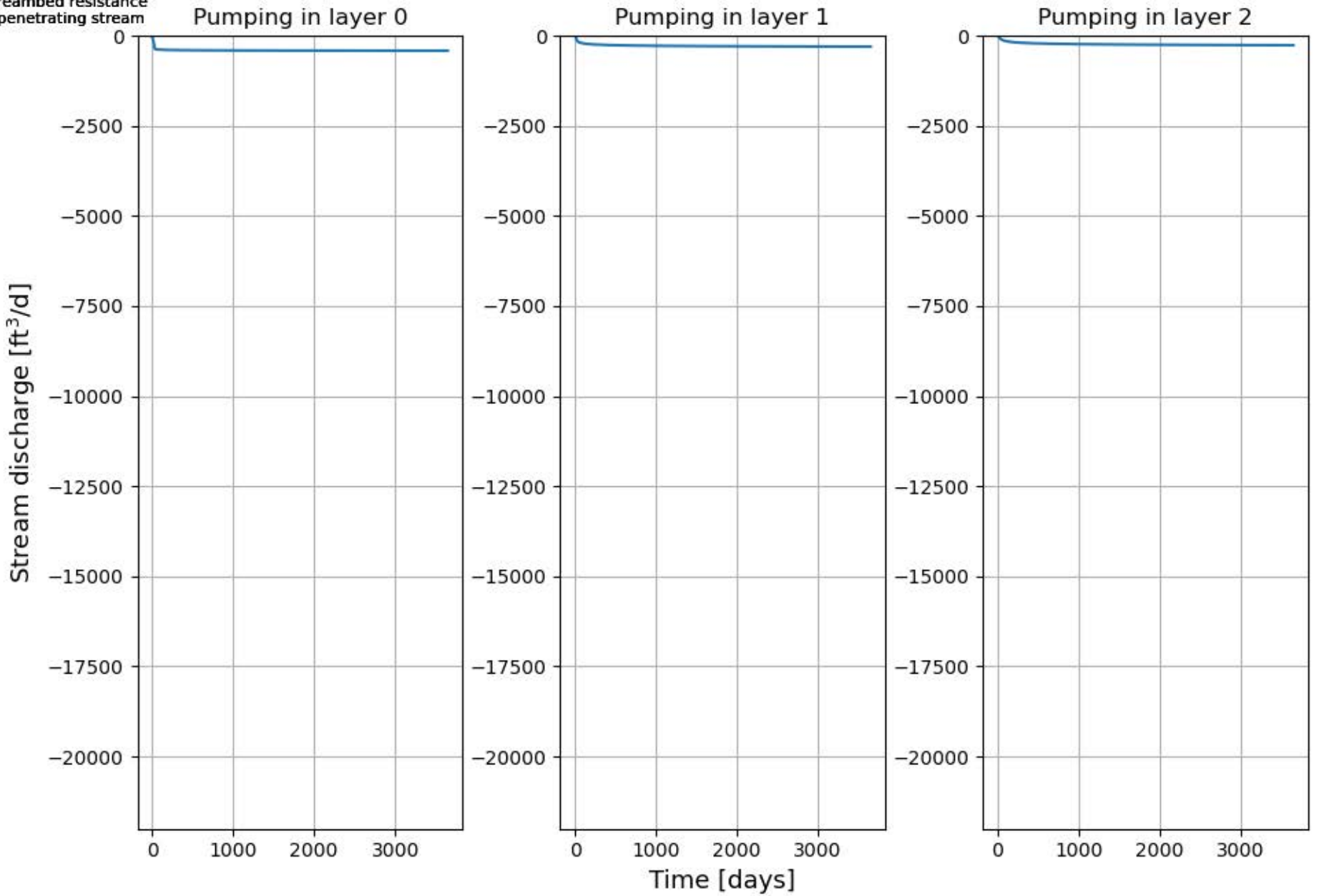
Stream depletion (cfs) after 10 years: -0.0046

Stream depletion (cfs) after 10 years: -0.0029

Stream depletion (cfs) after 10 years: -0.0023

Pumping Rate = 480 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 100 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



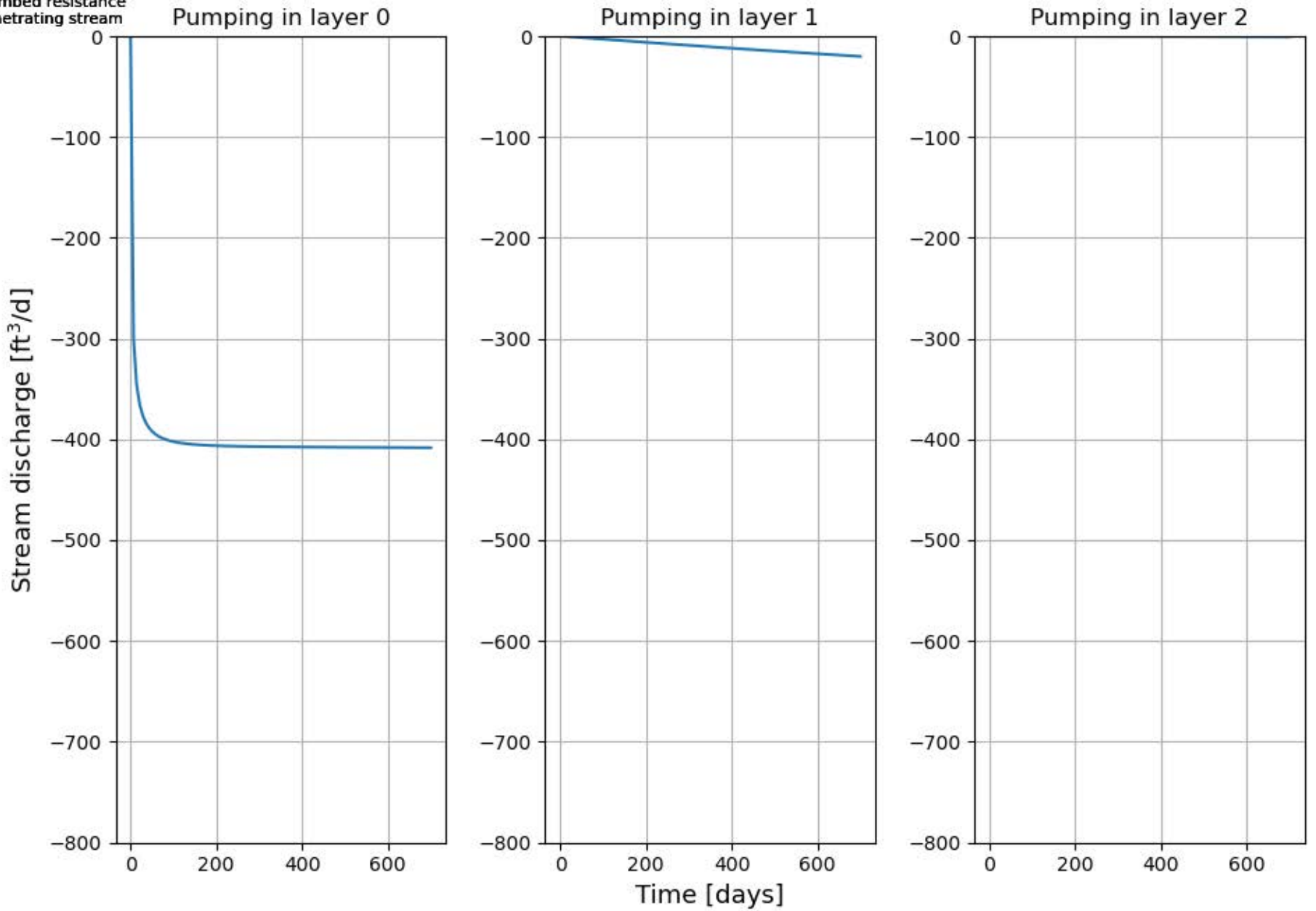
Stream depletion (cfs) after 10 years: -0.0049

Stream depletion (cfs) after 10 years: -0.0035

Stream depletion (cfs) after 10 years: -0.0031

Pumping Rate = 480 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

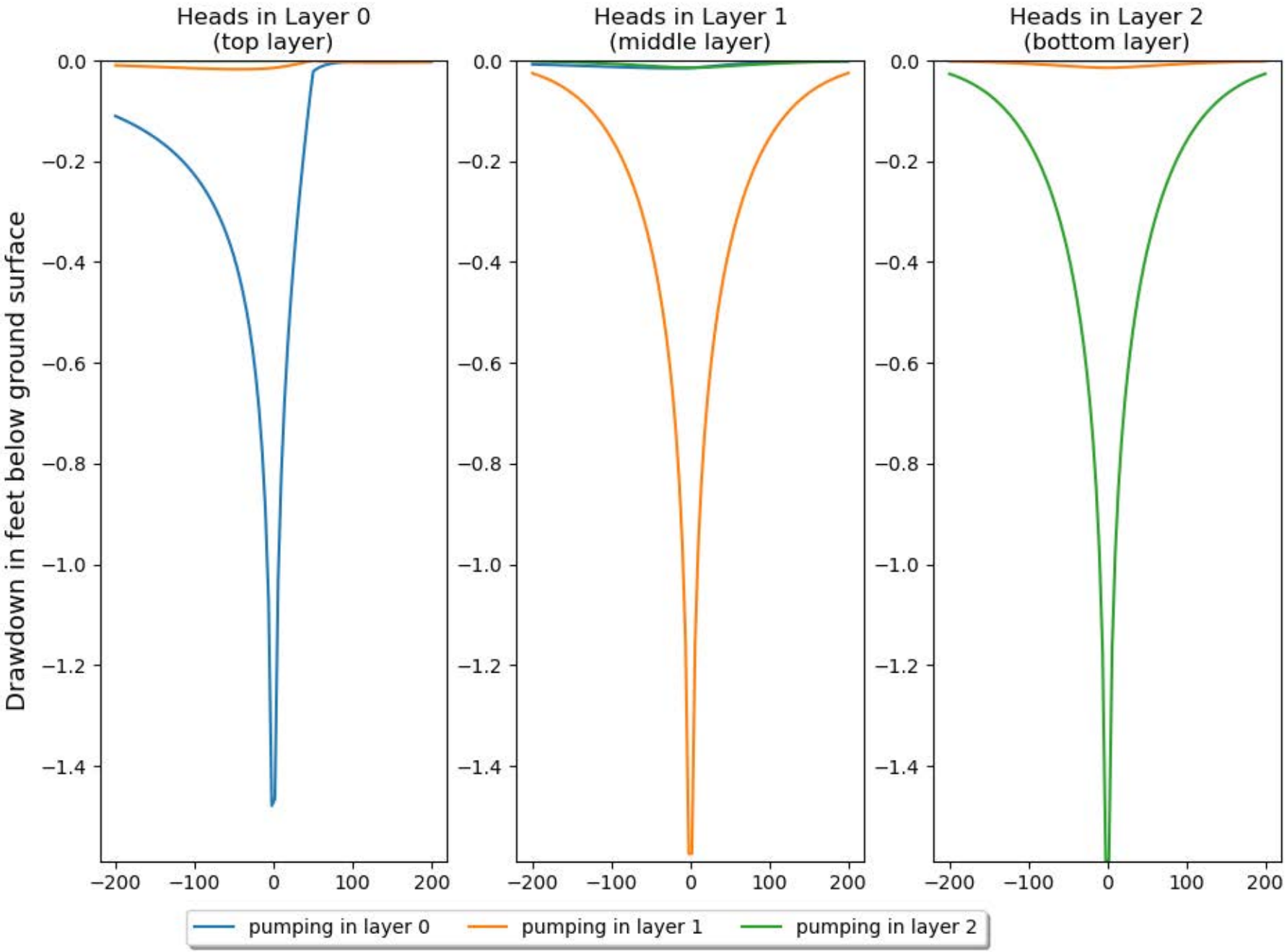
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0047

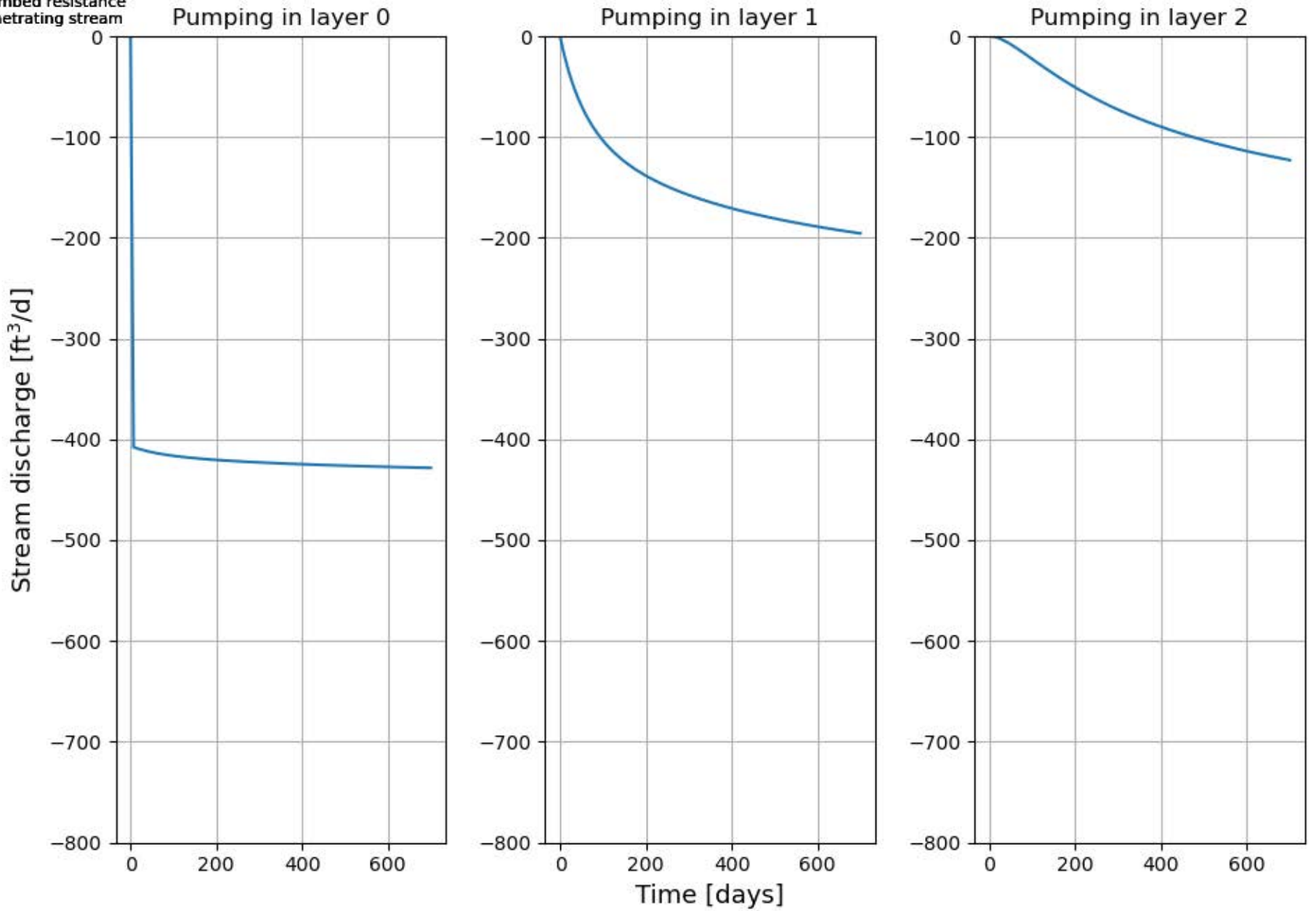
Stream depletion (cfs) after 700 days: -0.0002

Stream depletion (cfs) after 700 days: -0.0000


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 480 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

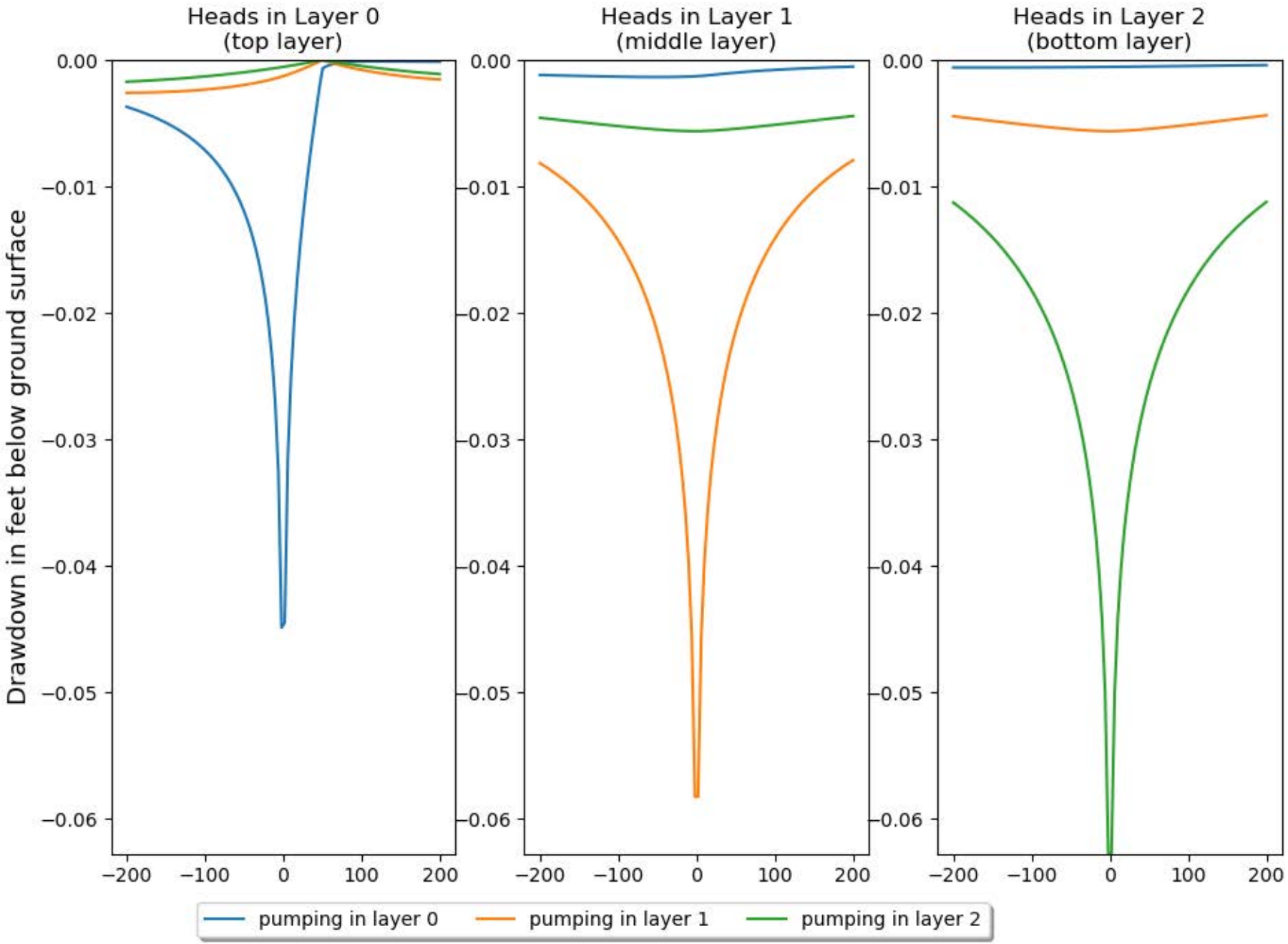
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0050

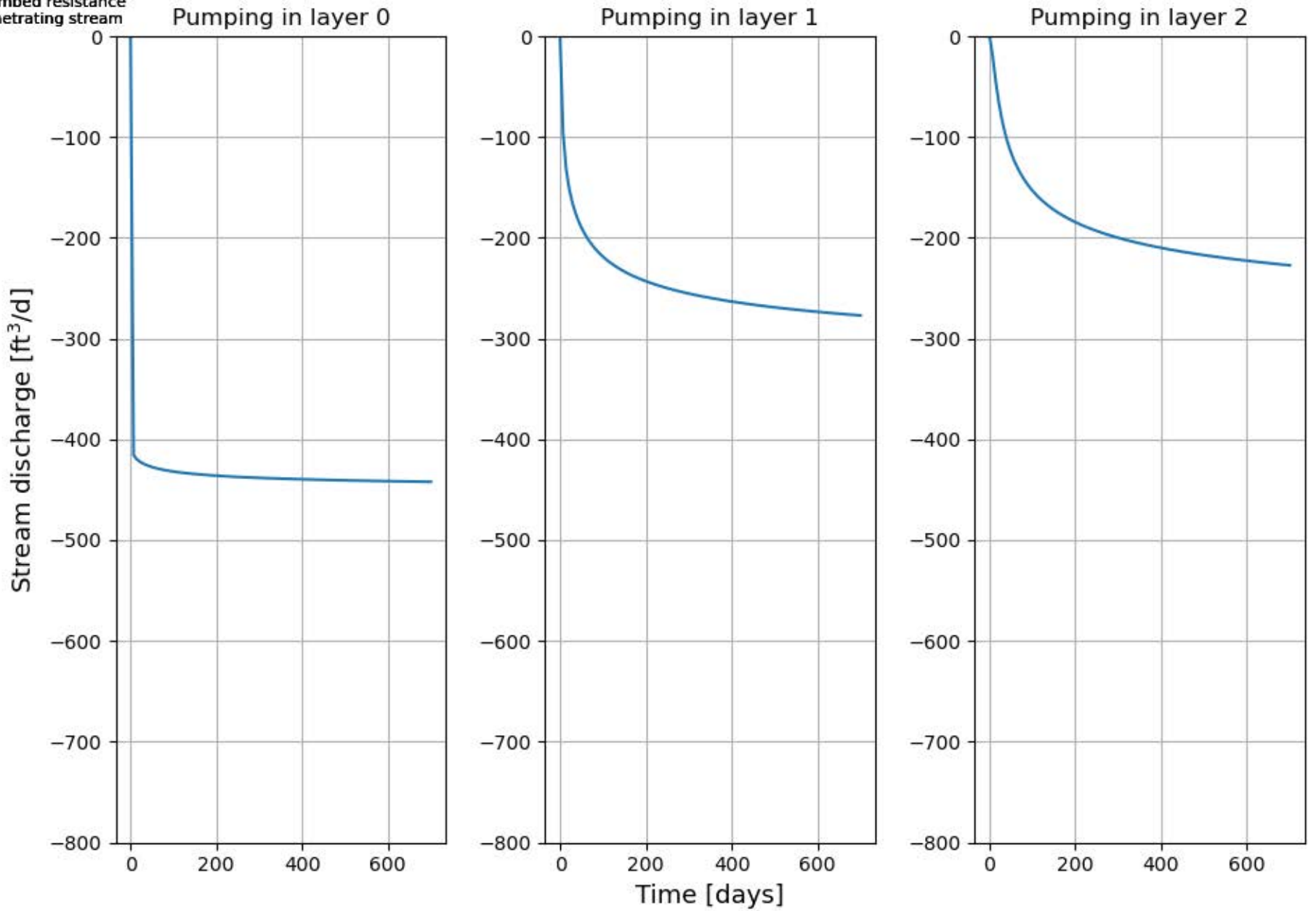
Stream depletion (cfs) after 700 days: -0.0023

Stream depletion (cfs) after 700 days: -0.0014


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.00
−0.01
−0.02
−0.03
−0.04
−0.05
−0.06
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 480 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

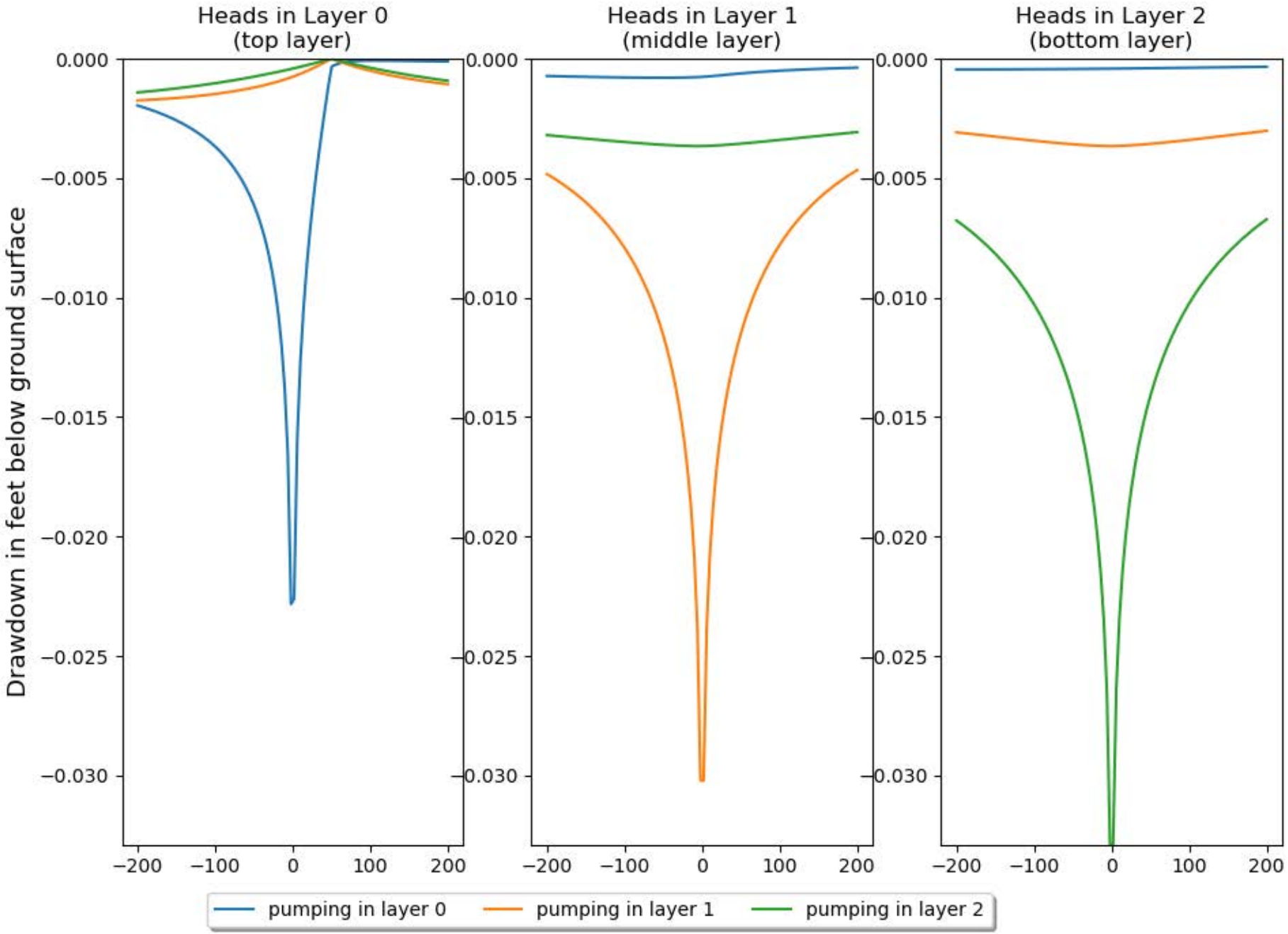
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0051

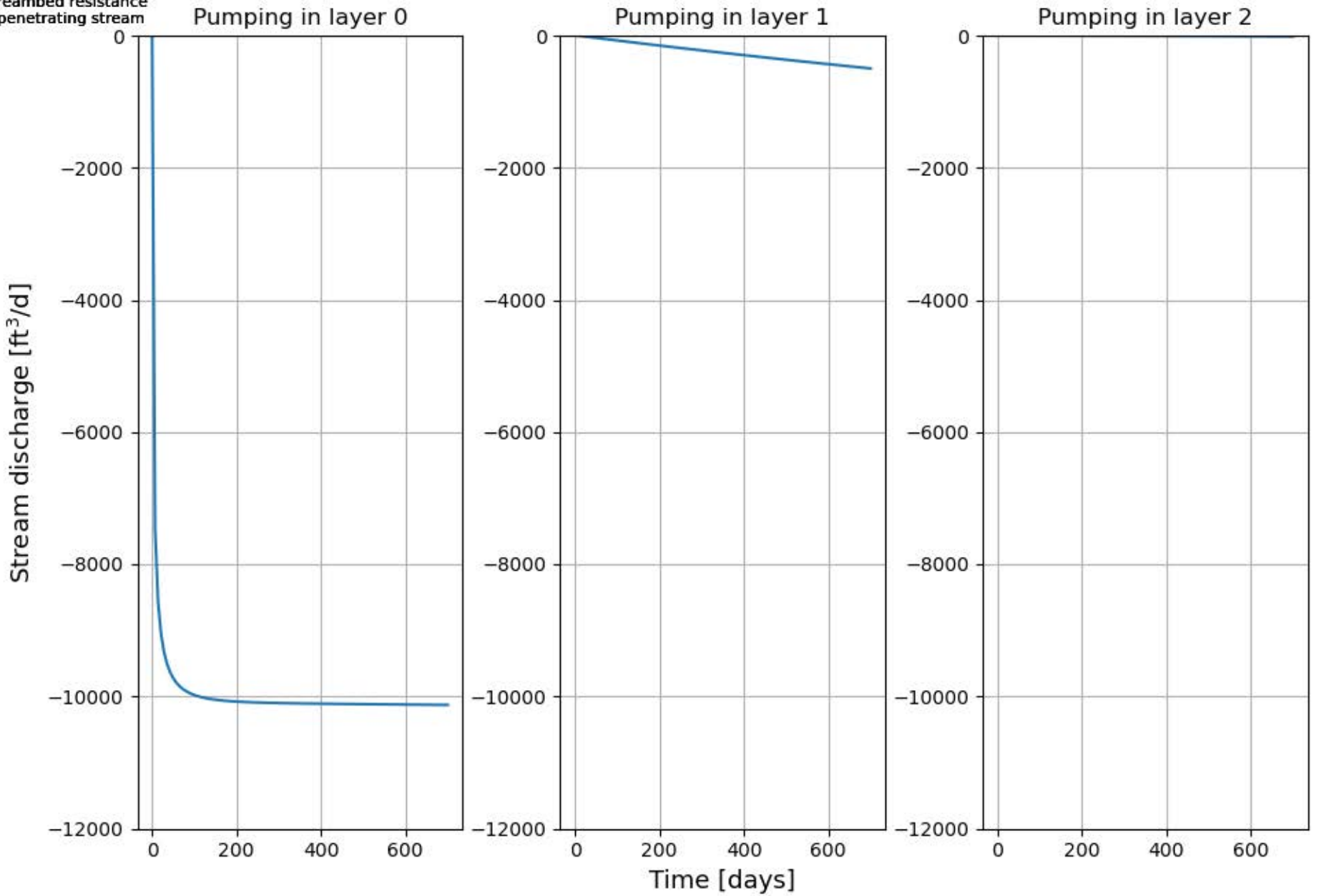
Stream depletion (cfs) after 700 days: -0.0032

Stream depletion (cfs) after 700 days: -0.0026


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.000
−0.005
−0.010
−0.015
−0.020
−0.025
−0.030
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 11906 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

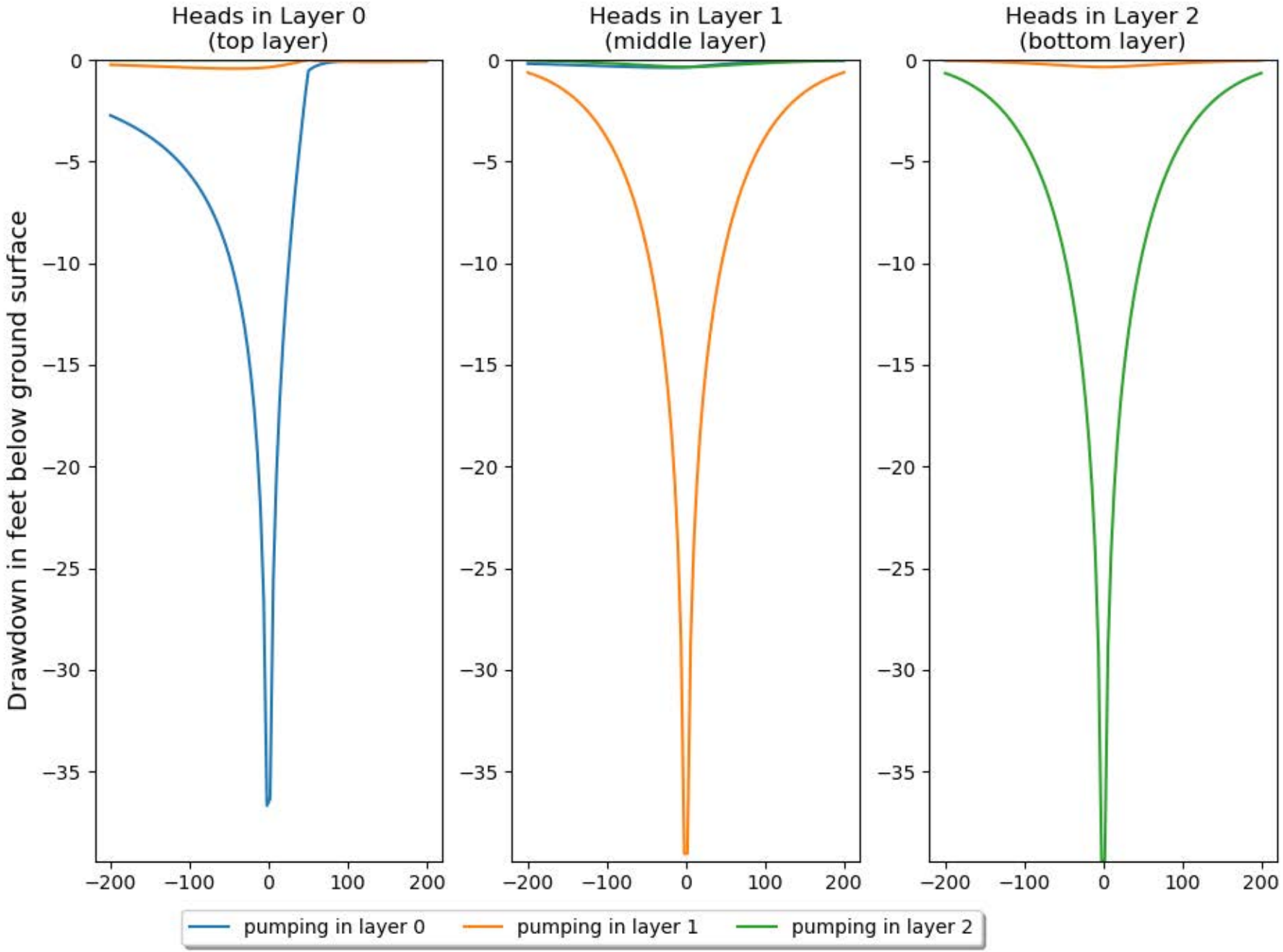
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.1172

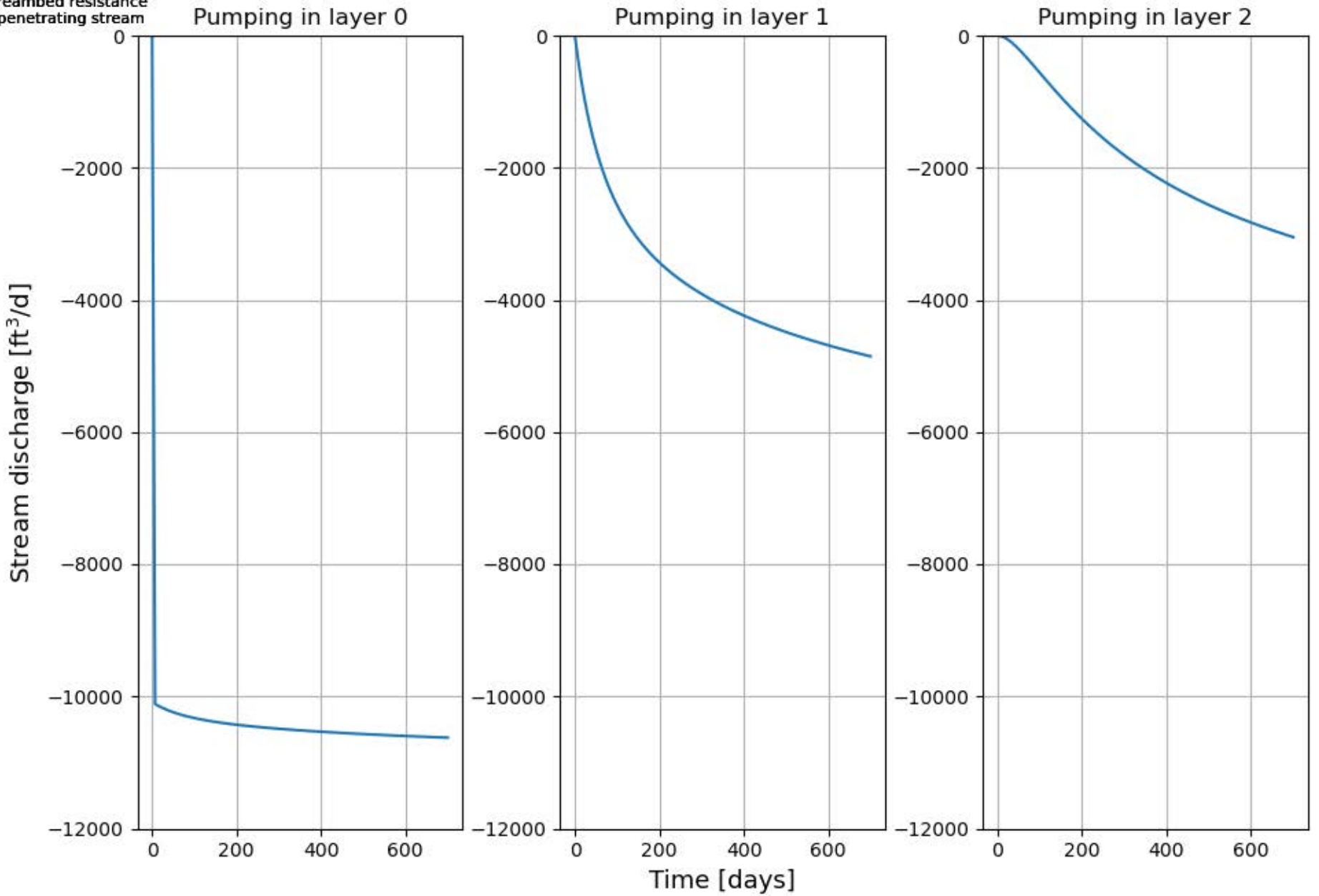
Stream depletion (cfs) after 700 days: -0.0058

Stream depletion (cfs) after 700 days: -0.0002


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0
−5
−10
−15
−20
−25
−30
−35
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 11906 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

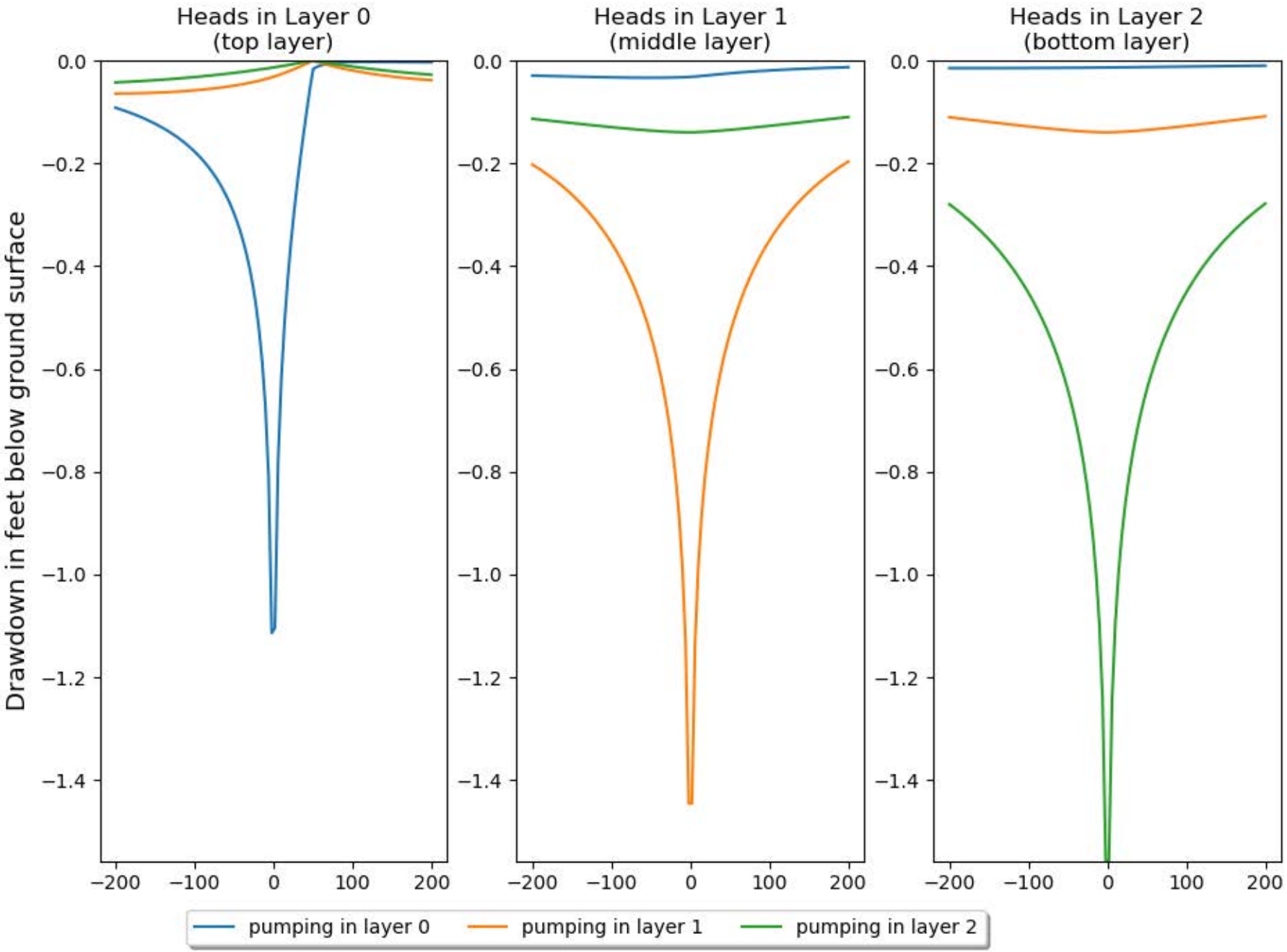
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.1230

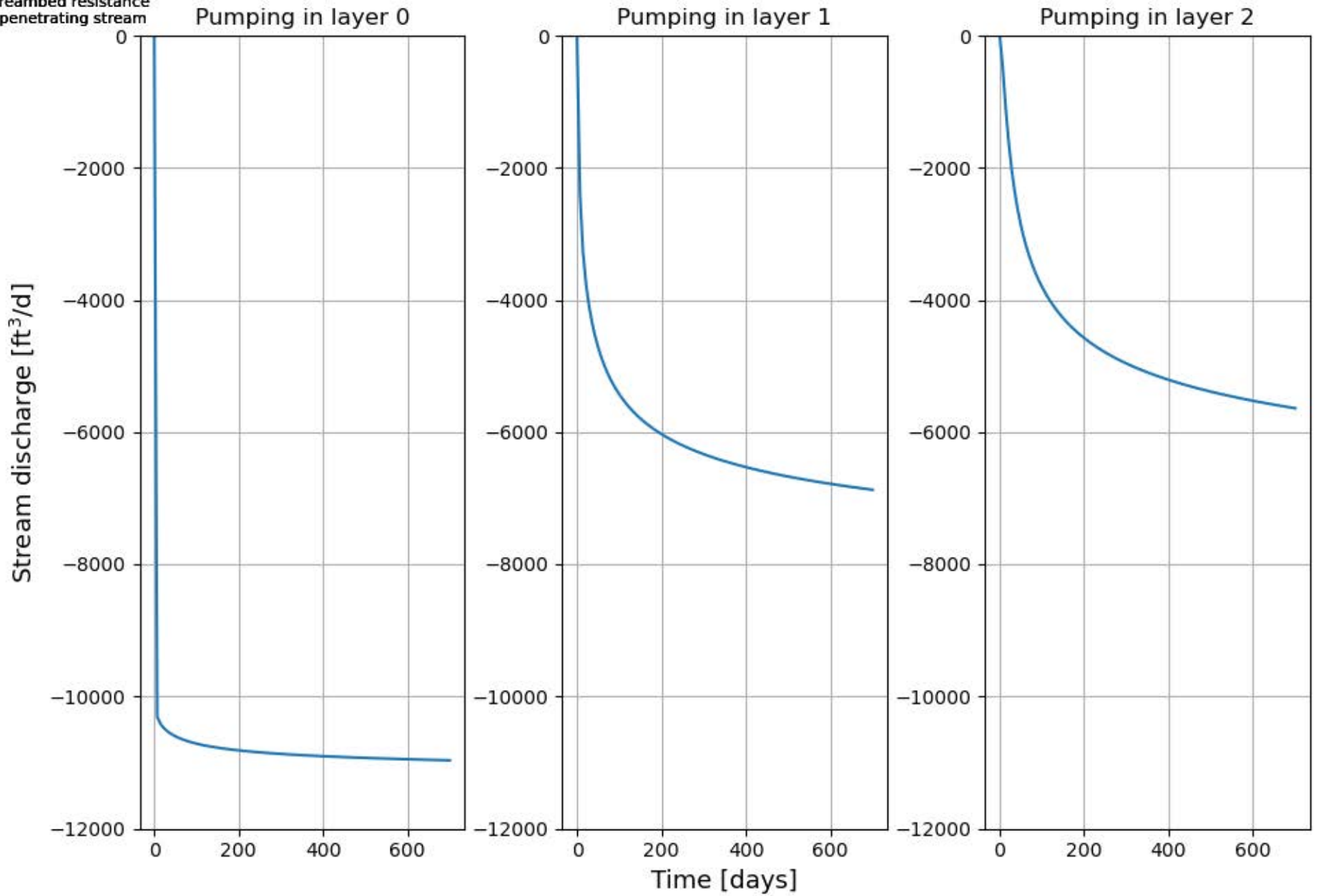
Stream depletion (cfs) after 700 days: -0.0562

Stream depletion (cfs) after 700 days: -0.0353


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 11906 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

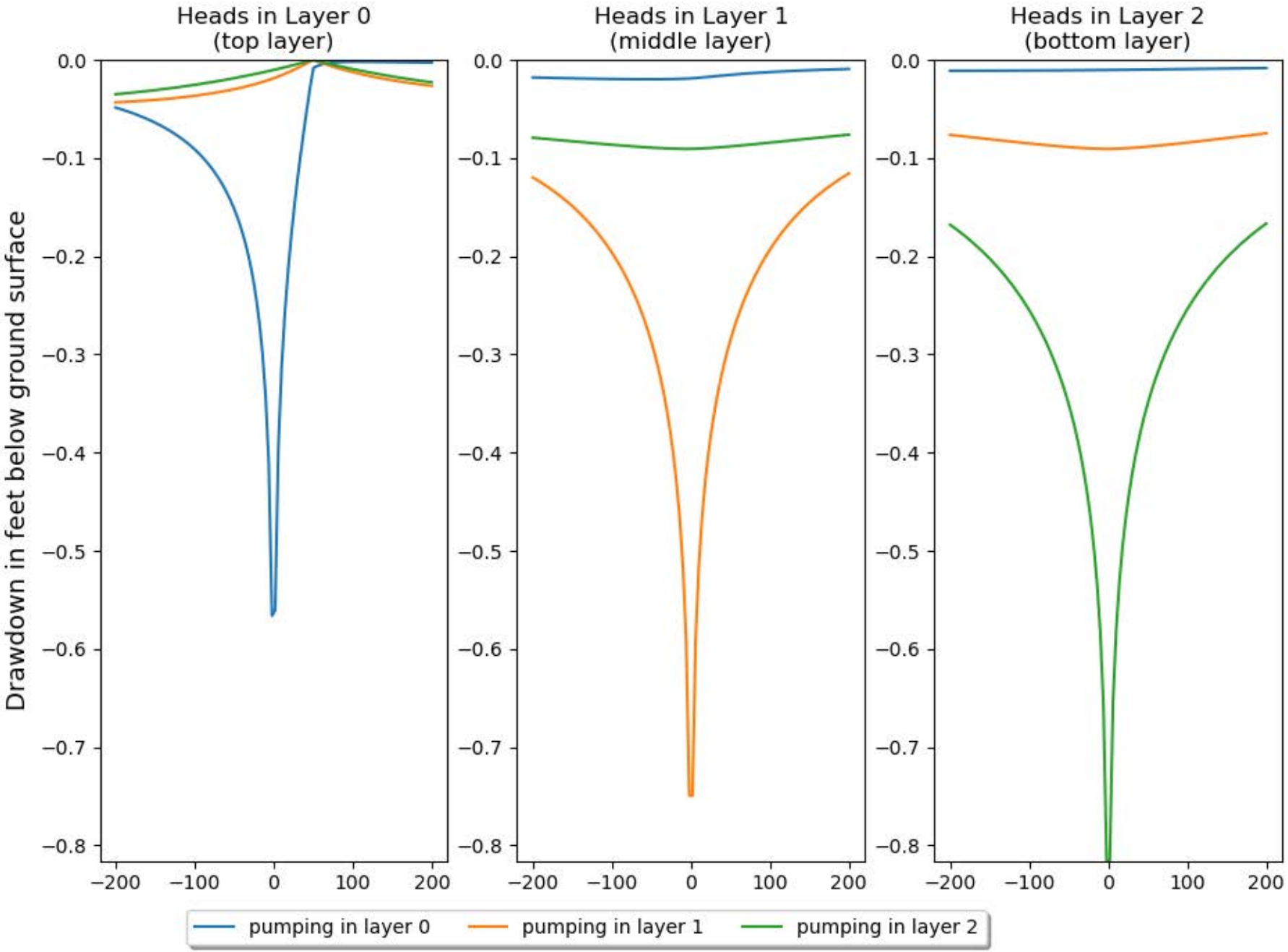
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.1269

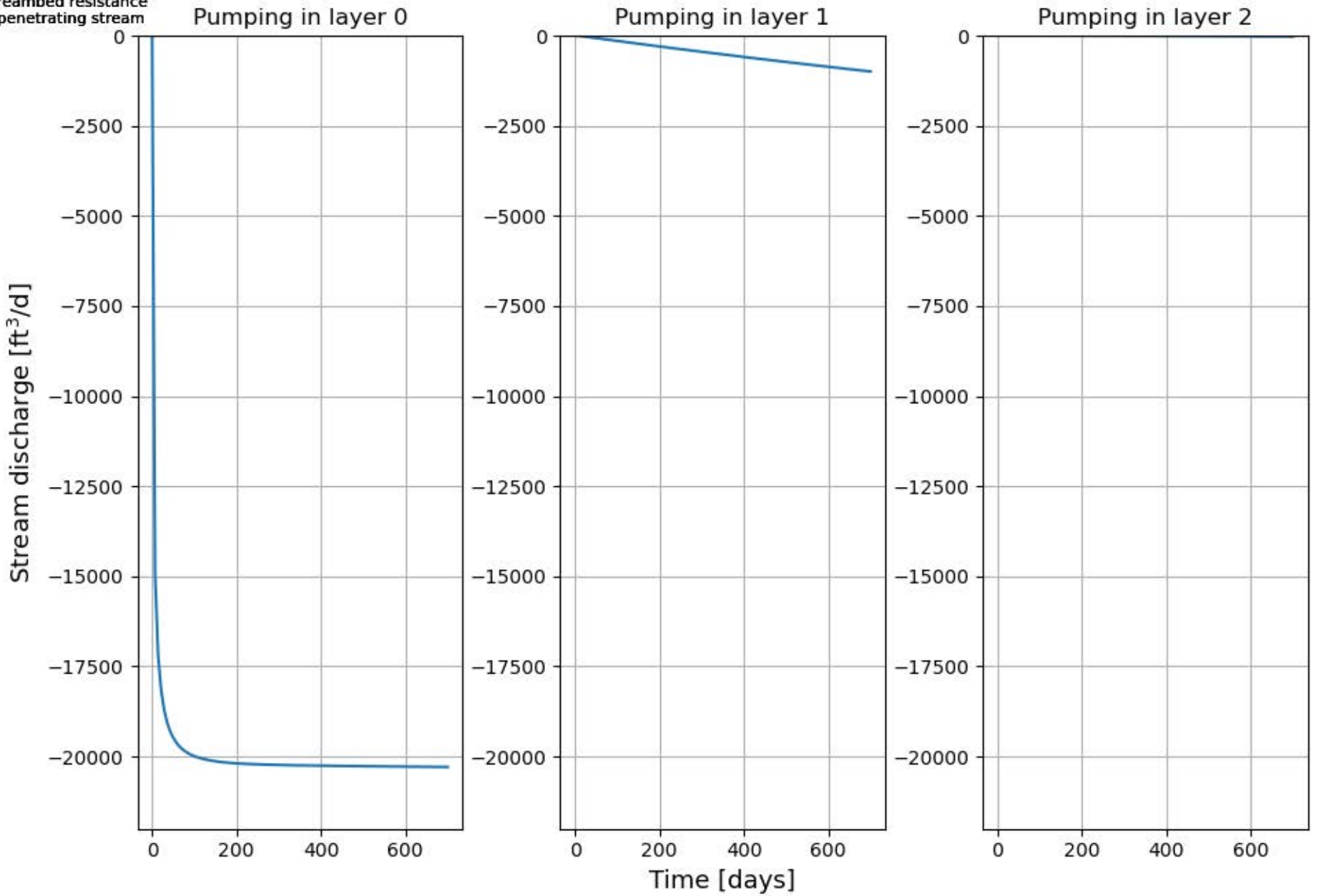
Stream depletion (cfs) after 700 days: -0.0796

Stream depletion (cfs) after 700 days: -0.0653


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.1
−0.2
−0.3
−0.4
−0.5
−0.6
−0.7
−0.8
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 23852 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

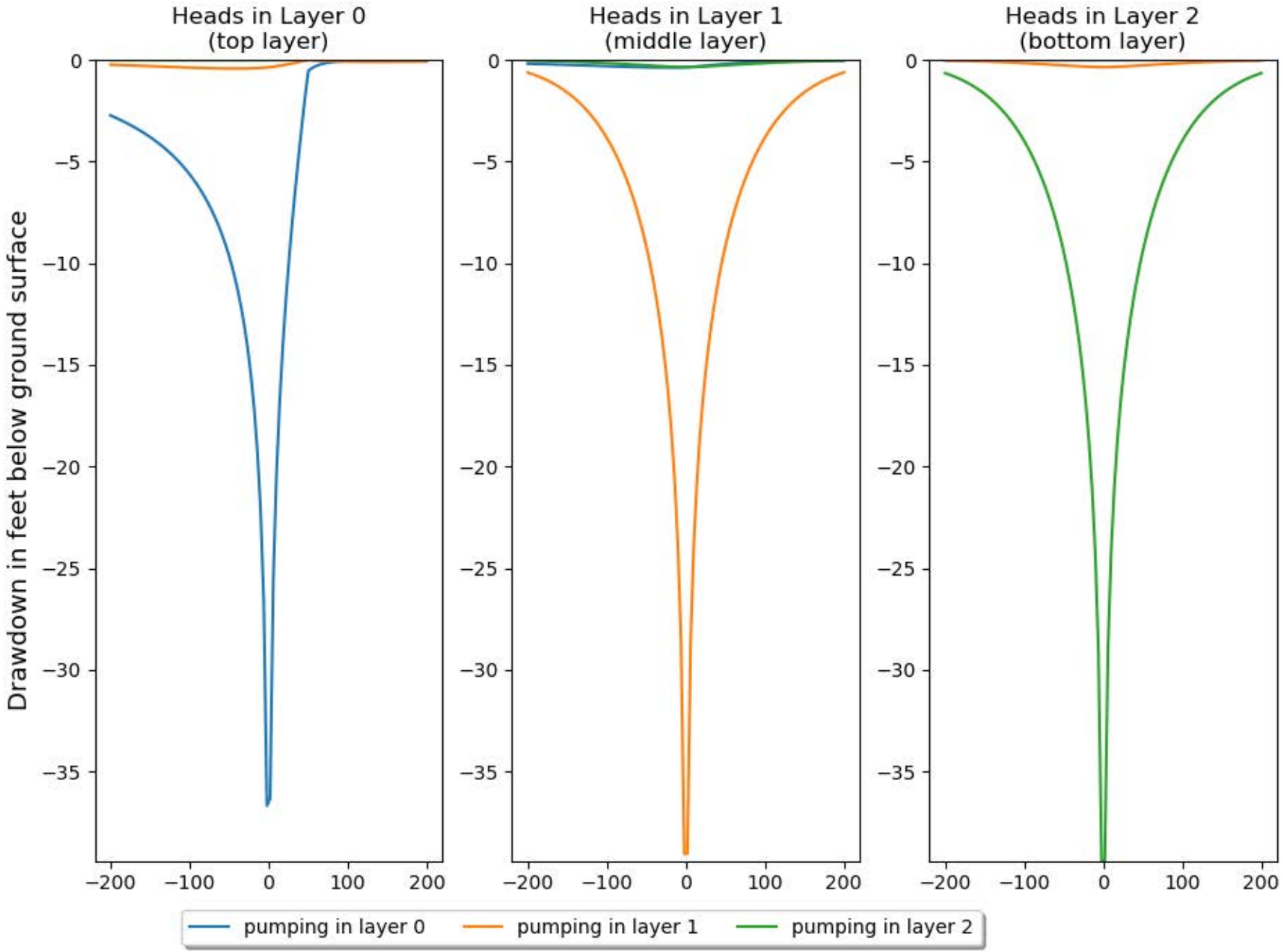
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.2349

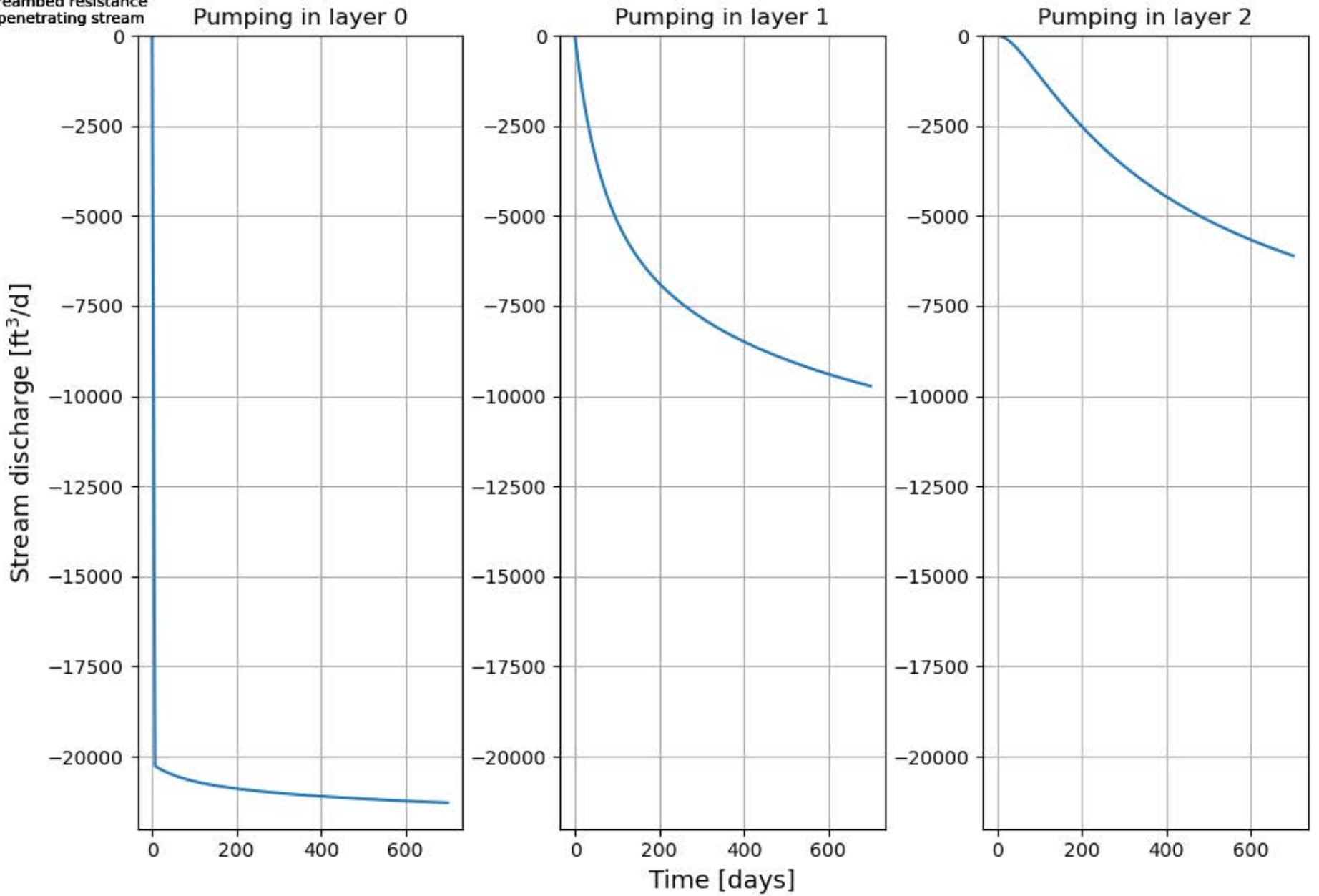
Stream depletion (cfs) after 700 days: -0.0115

Stream depletion (cfs) after 700 days: -0.0003


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0
−5
−10
−15
−20
−25
−30
−35
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 23852 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

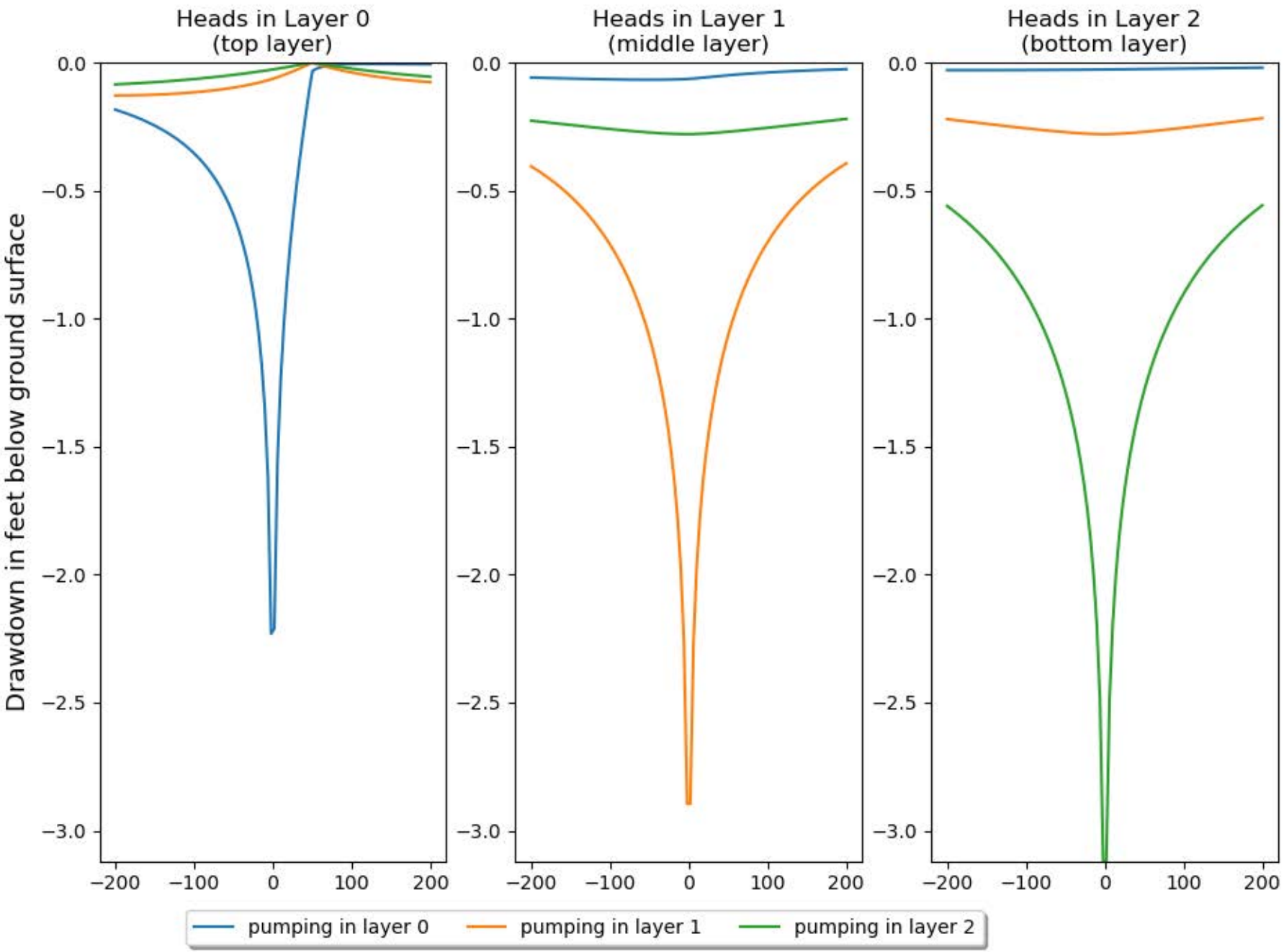
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.2464

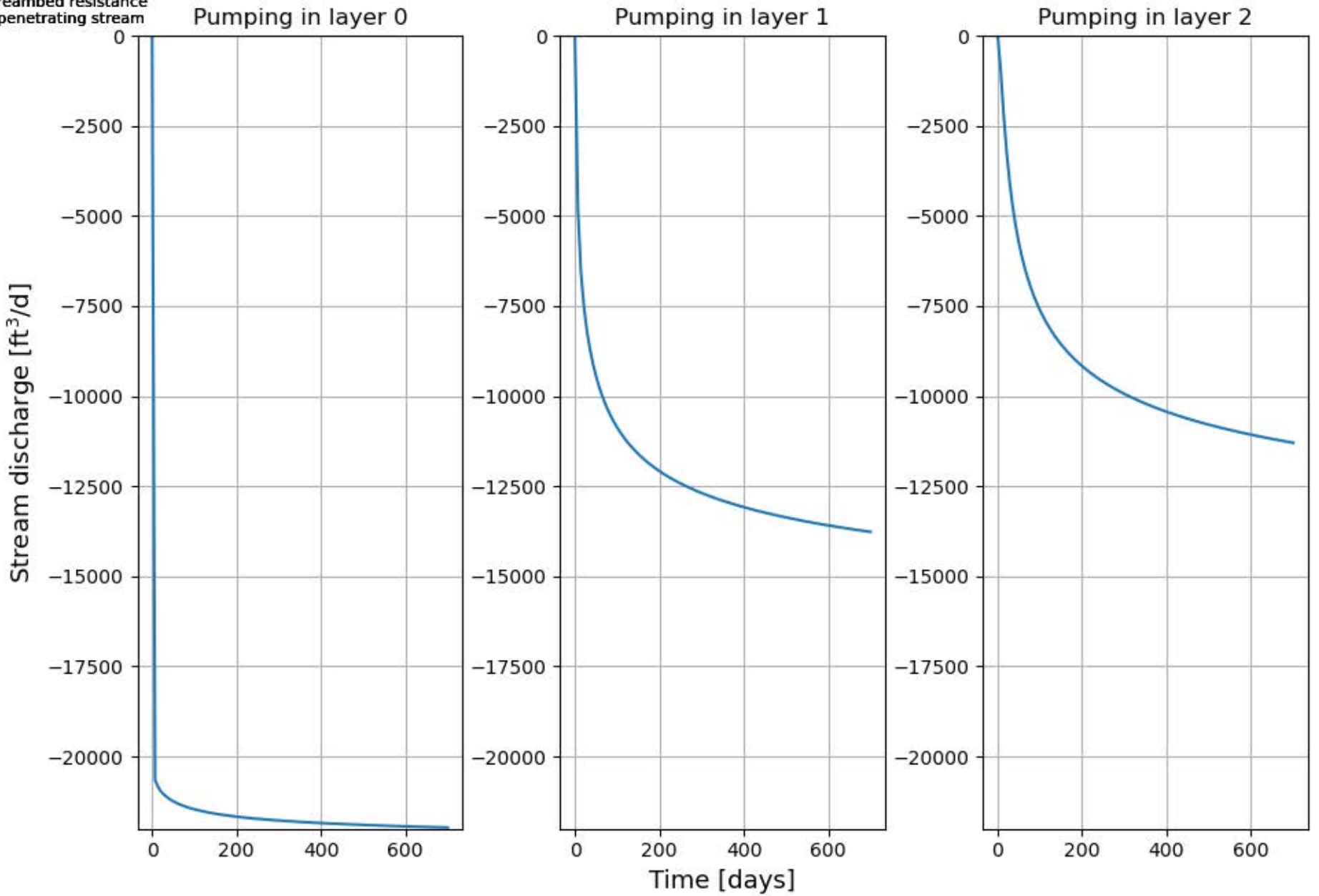
Stream depletion (cfs) after 700 days: -0.1125

Stream depletion (cfs) after 700 days: -0.0707


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
−3.0
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 50 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

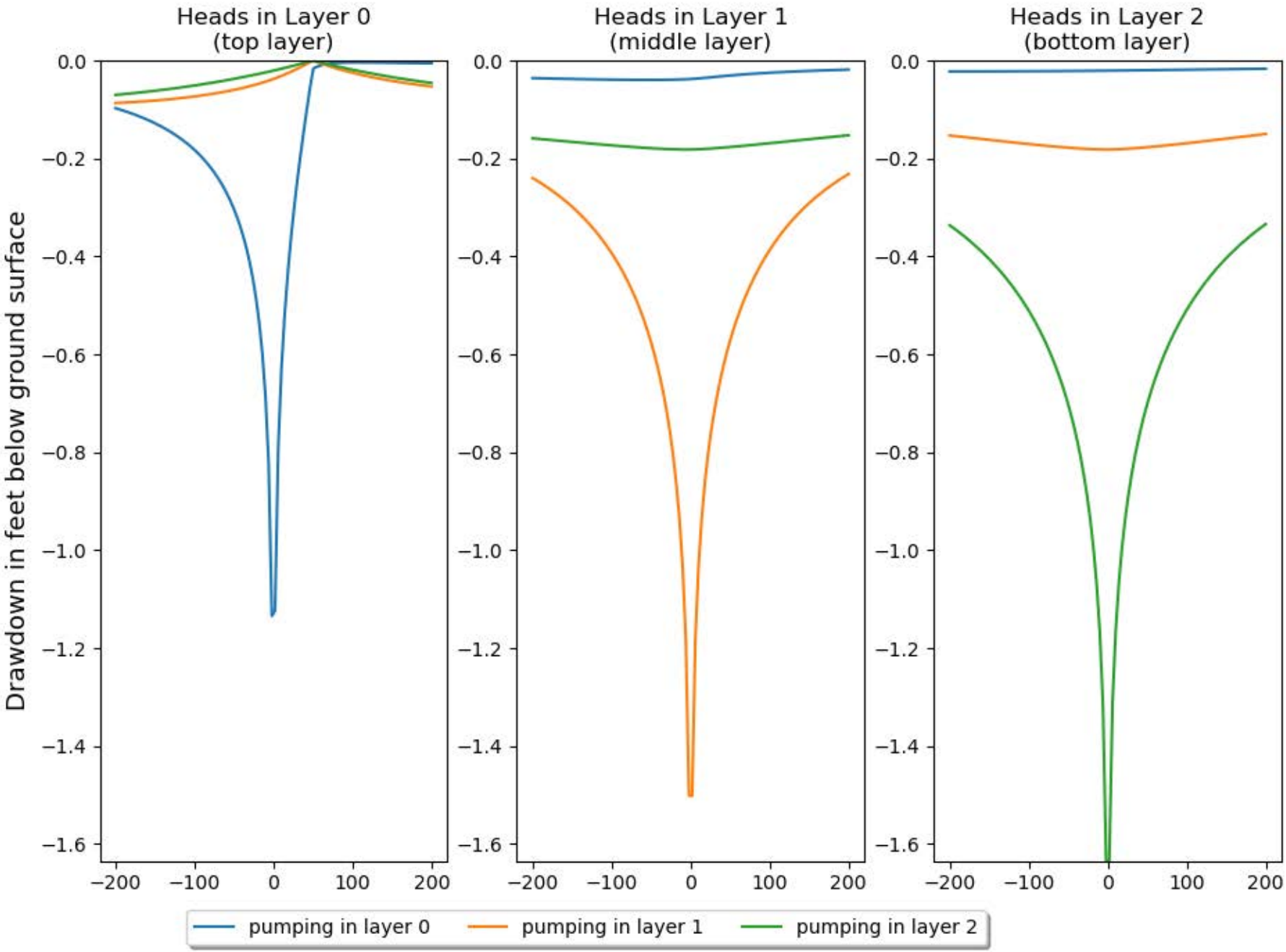
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.2543

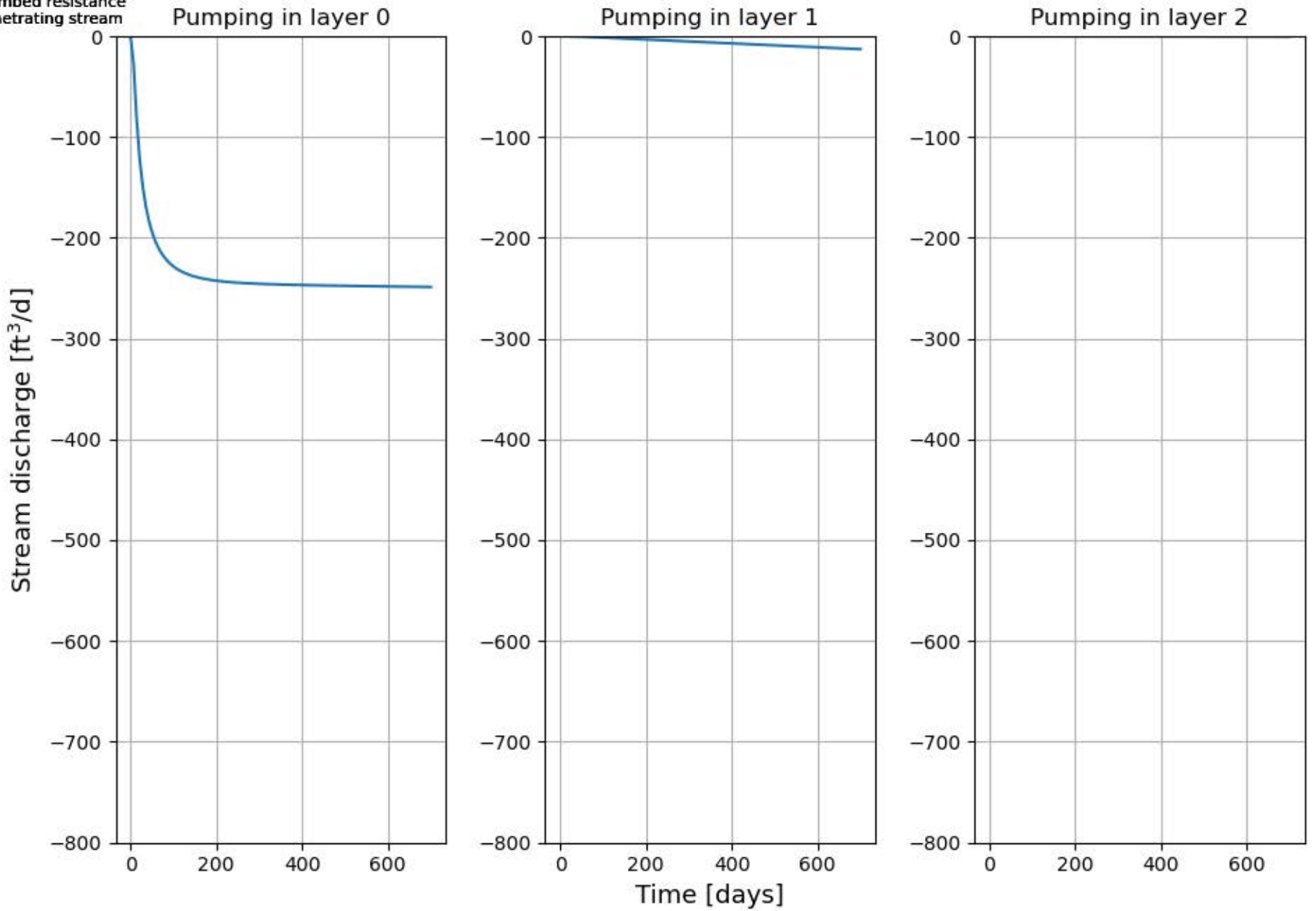
Stream depletion (cfs) after 700 days: -0.1594

Stream depletion (cfs) after 700 days: -0.1308


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
−1.6
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 480 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

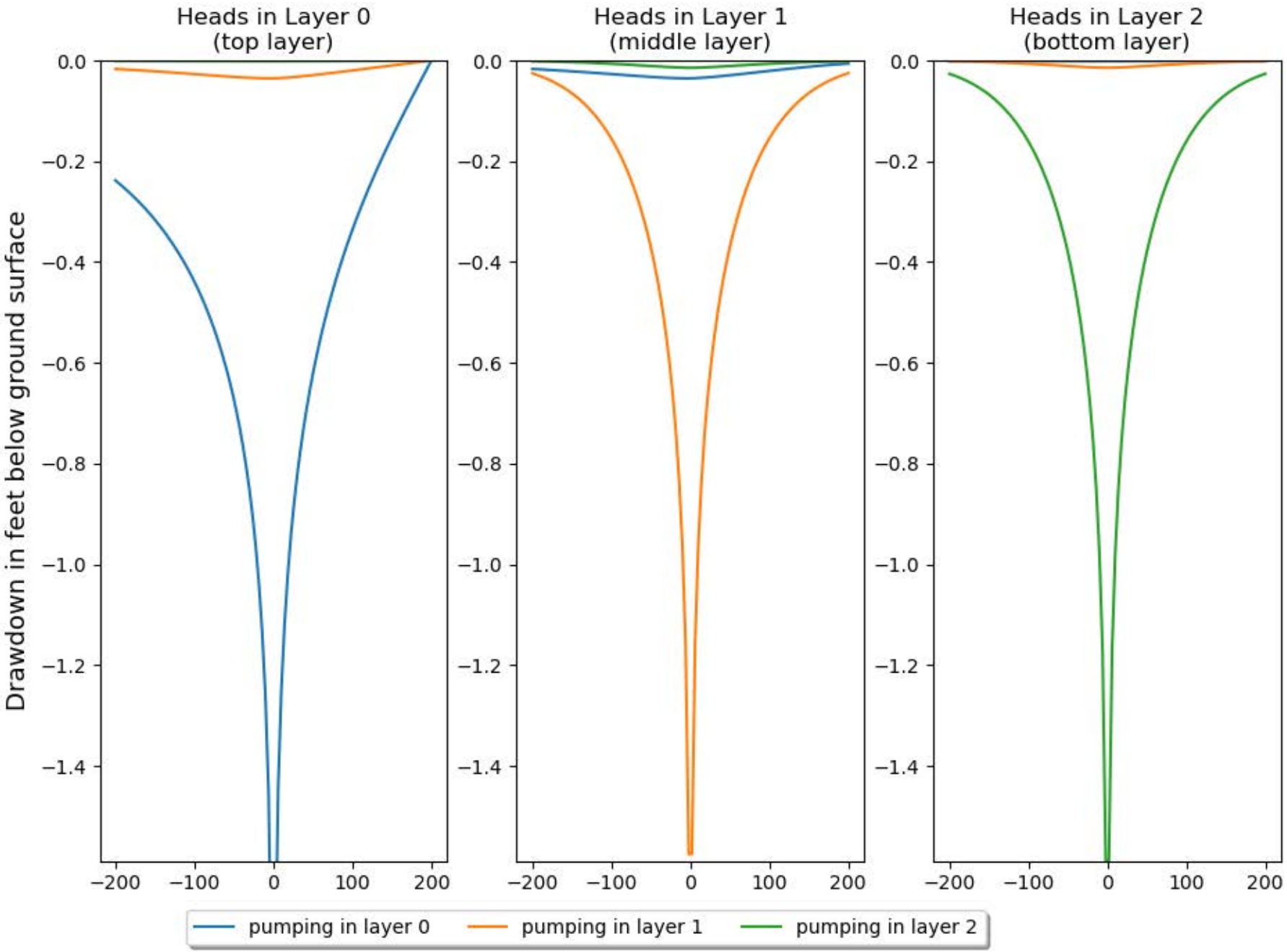
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0029

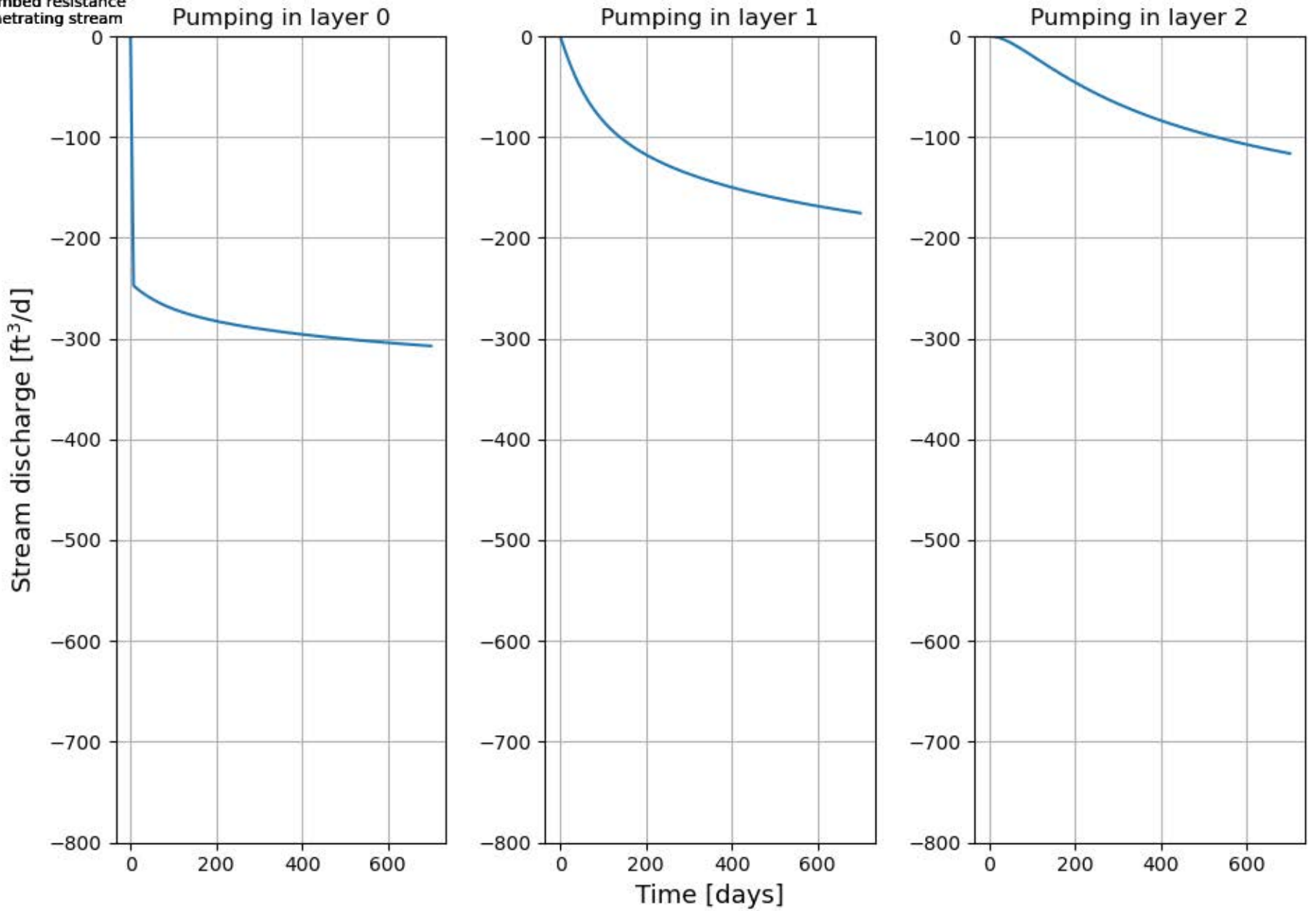
Stream depletion (cfs) after 700 days: -0.0001

Stream depletion (cfs) after 700 days: -0.0000


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 480 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

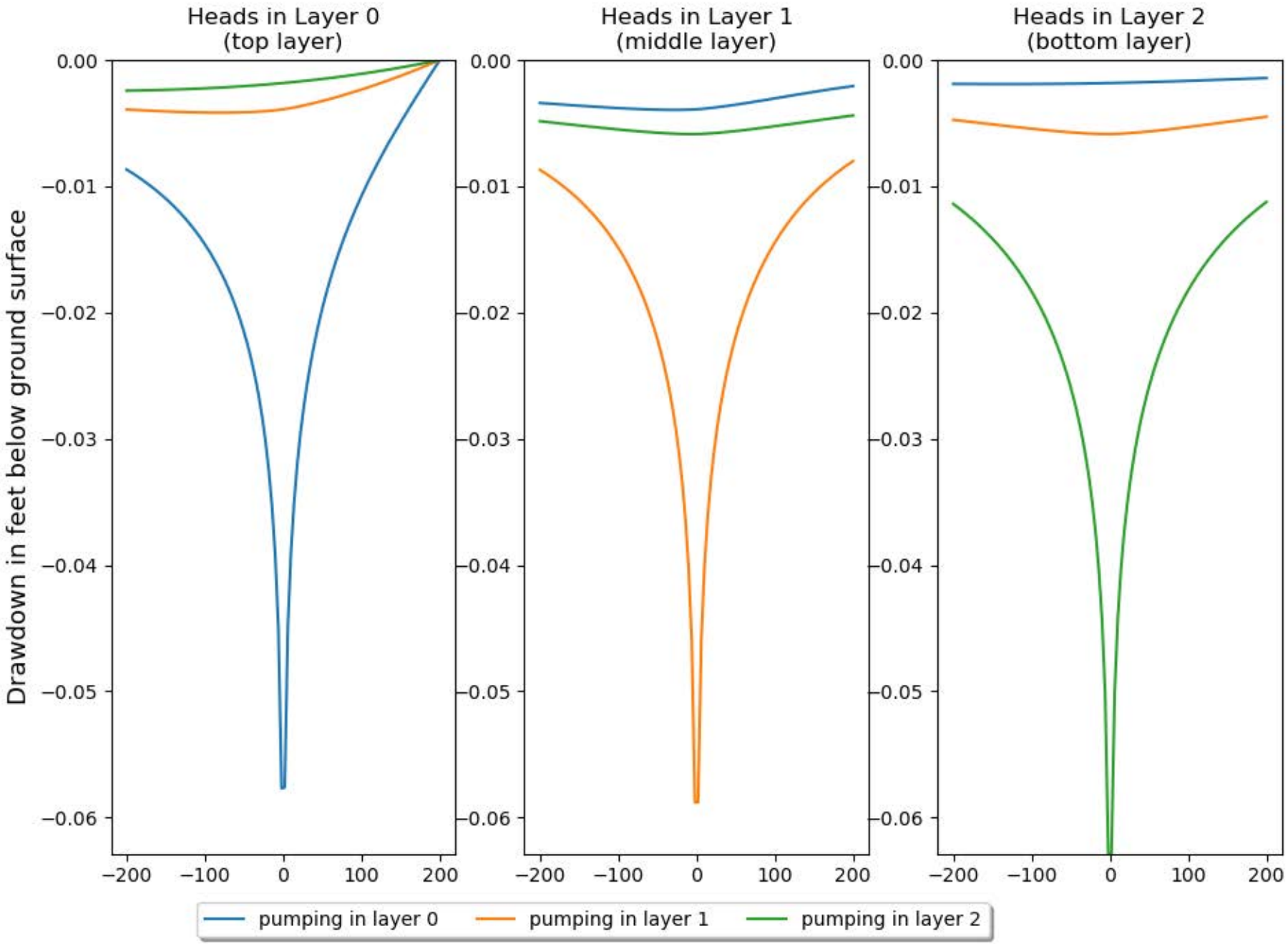
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0036

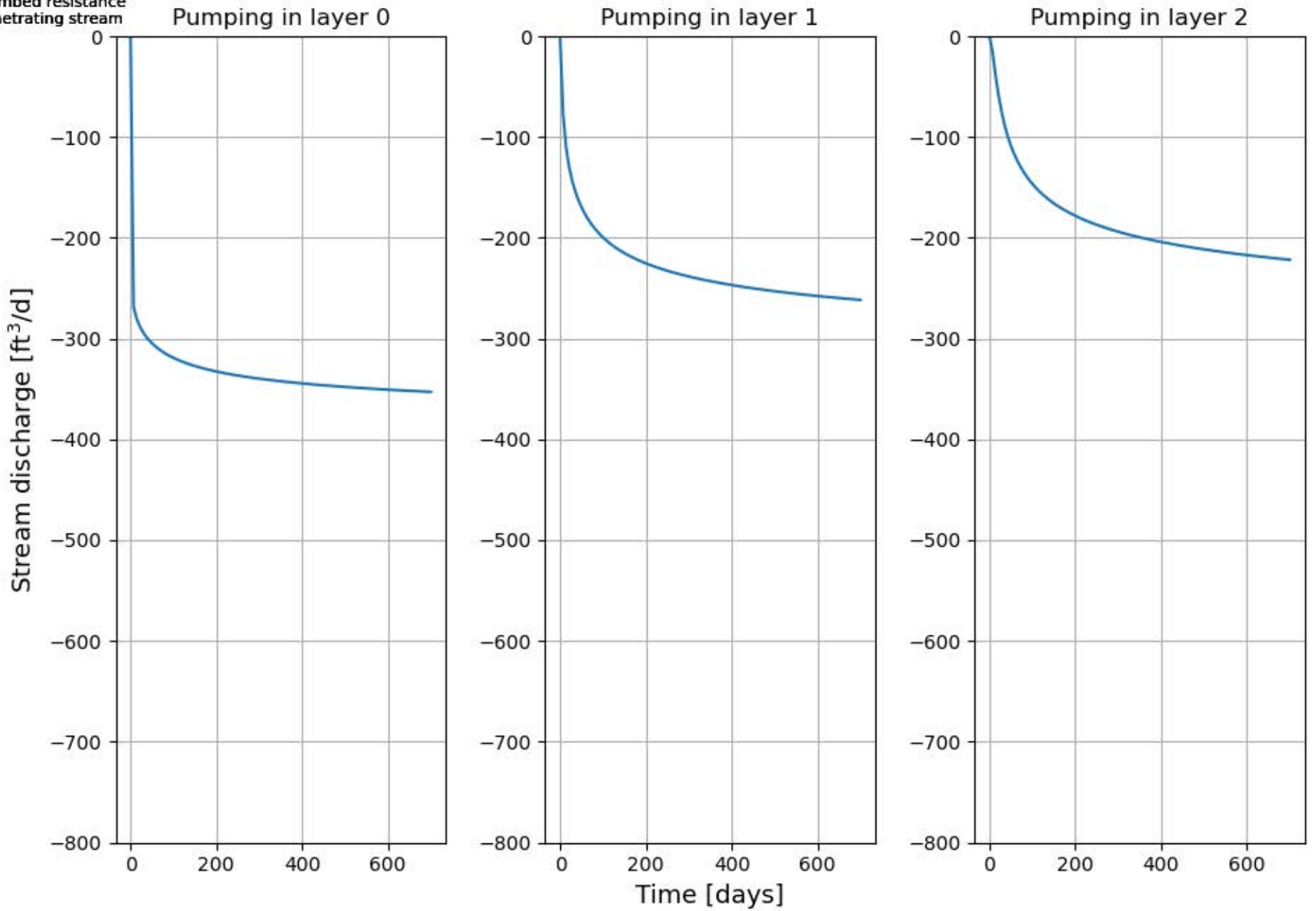
Stream depletion (cfs) after 700 days: -0.0020

Stream depletion (cfs) after 700 days: -0.0013


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.00
−0.01
−0.02
−0.03
−0.04
−0.05
−0.06
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 480 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

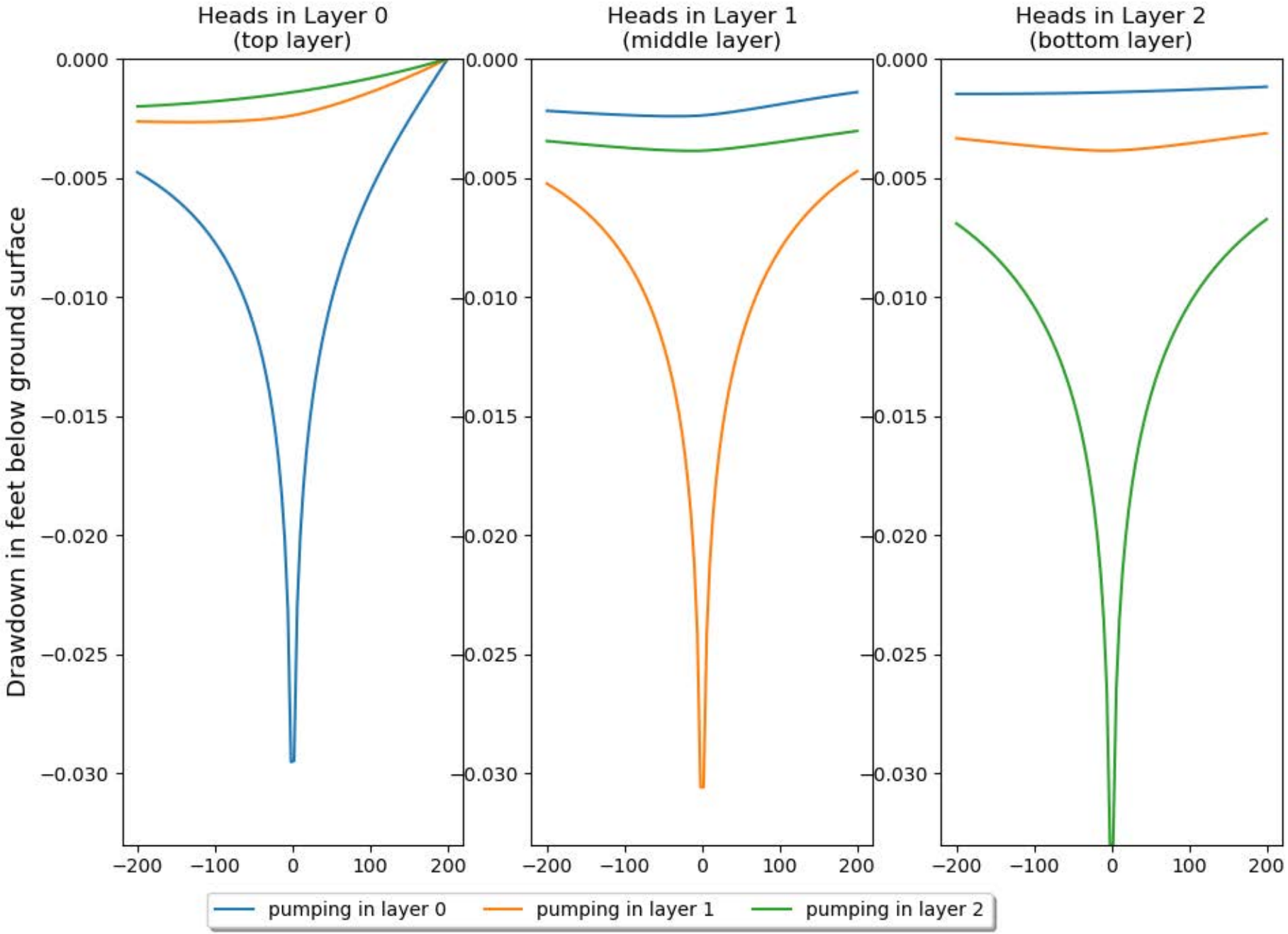
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0041

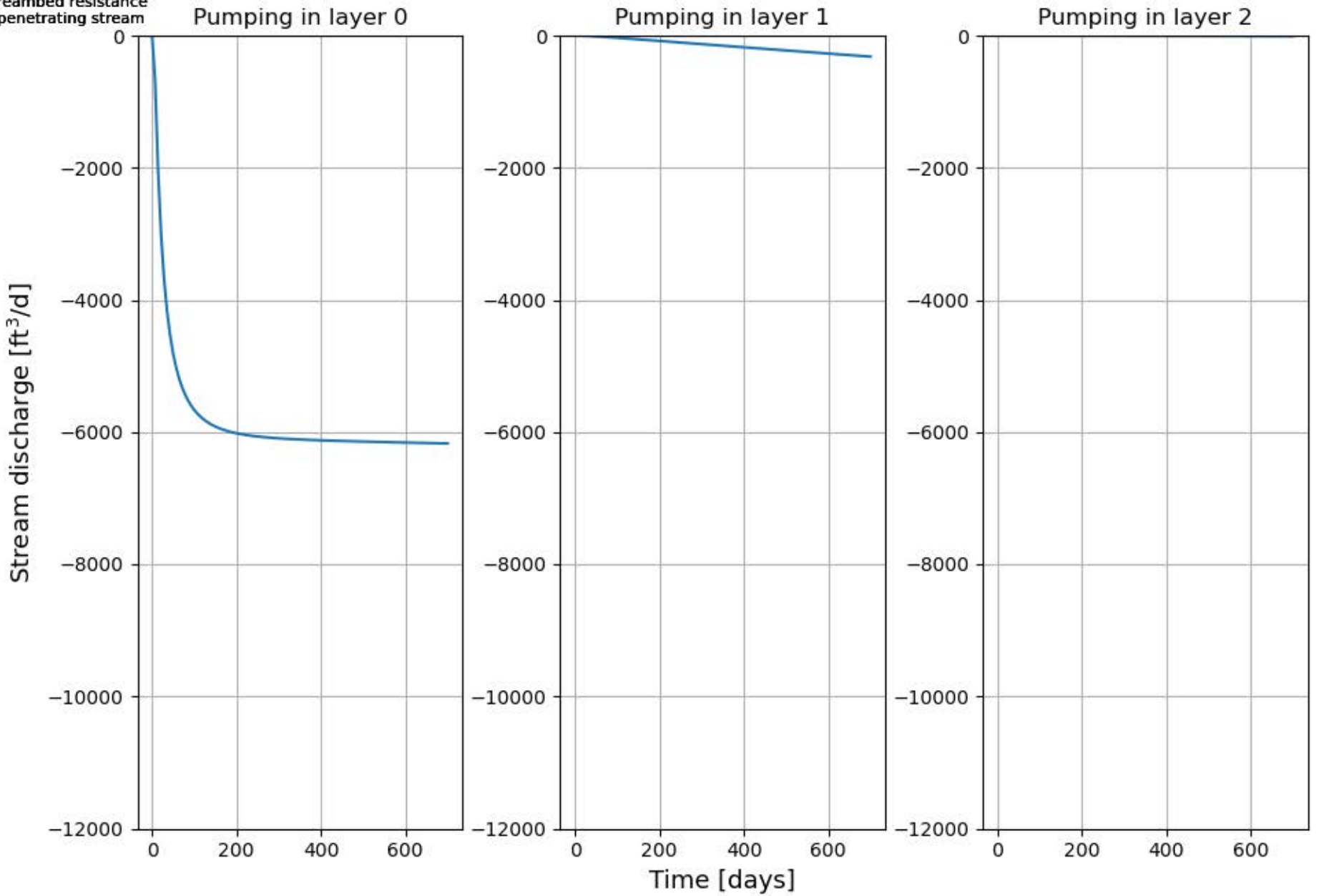
Stream depletion (cfs) after 700 days: -0.0030

Stream depletion (cfs) after 700 days: -0.0026


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.000
−0.005
−0.010
−0.015
−0.020
−0.025
−0.030
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 11906 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

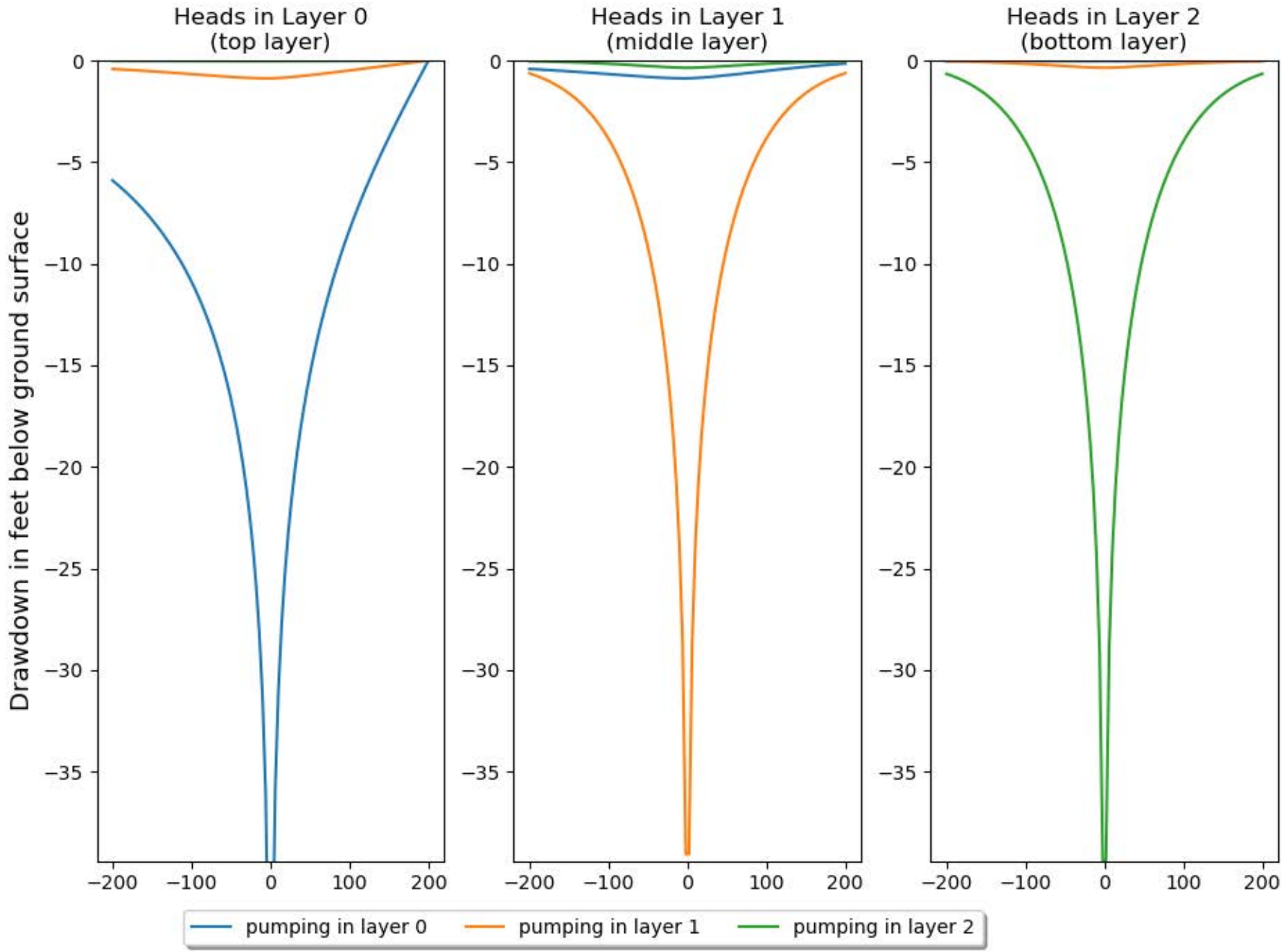
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0714

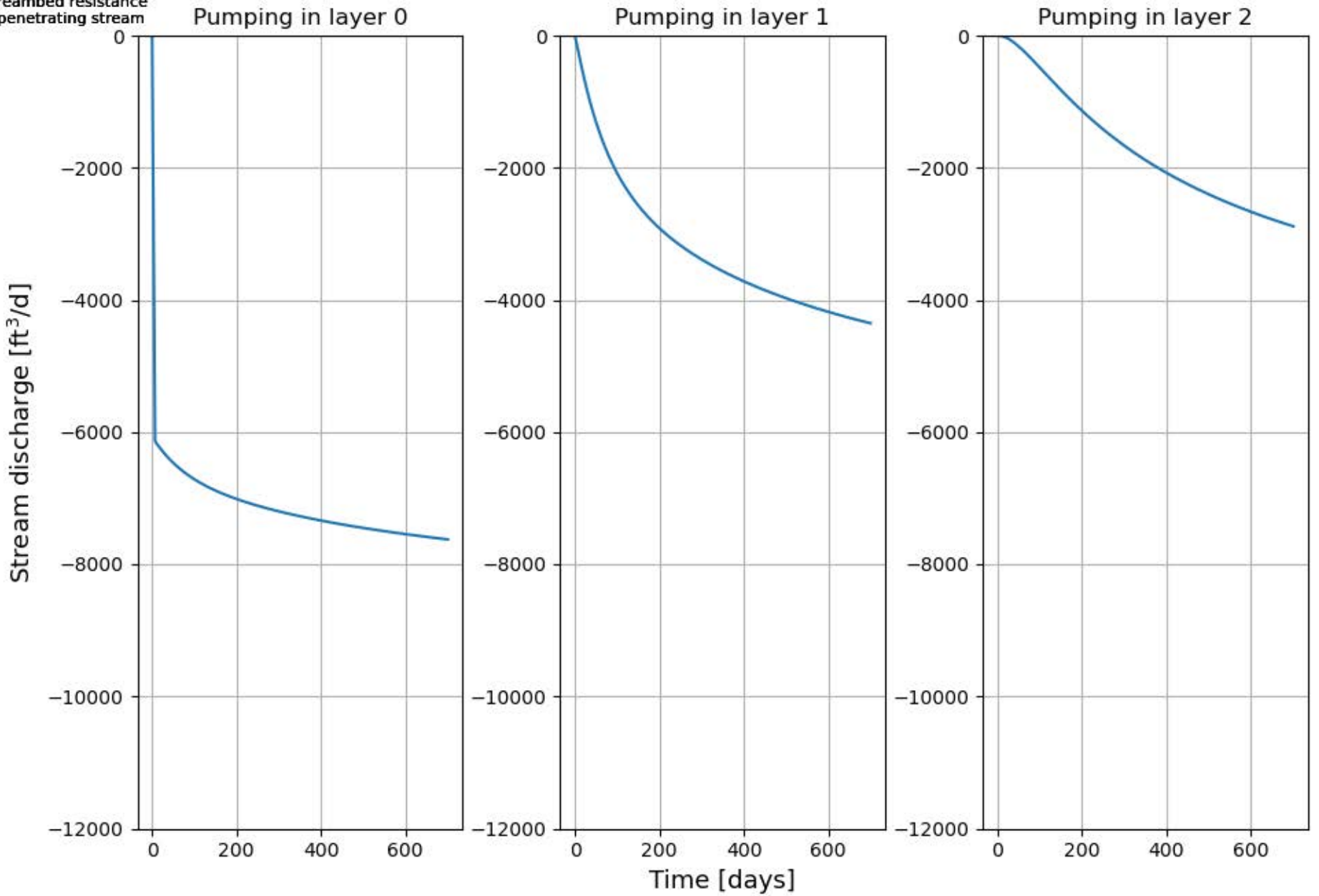
Stream depletion (cfs) after 700 days: -0.0037

Stream depletion (cfs) after 700 days: -0.0001


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0
−5
−10
−15
−20
−25
−30
−35
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 11906 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

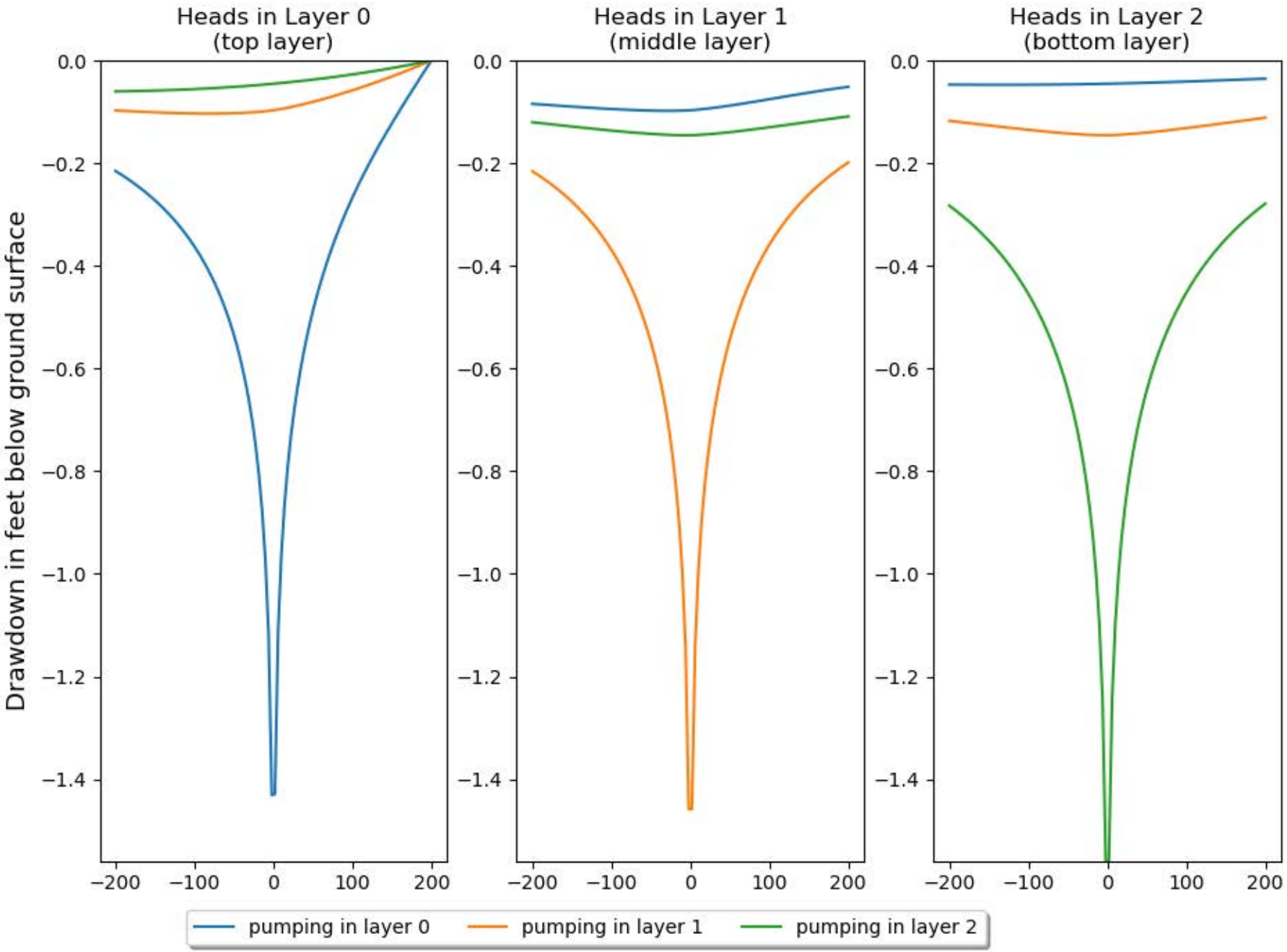
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0882

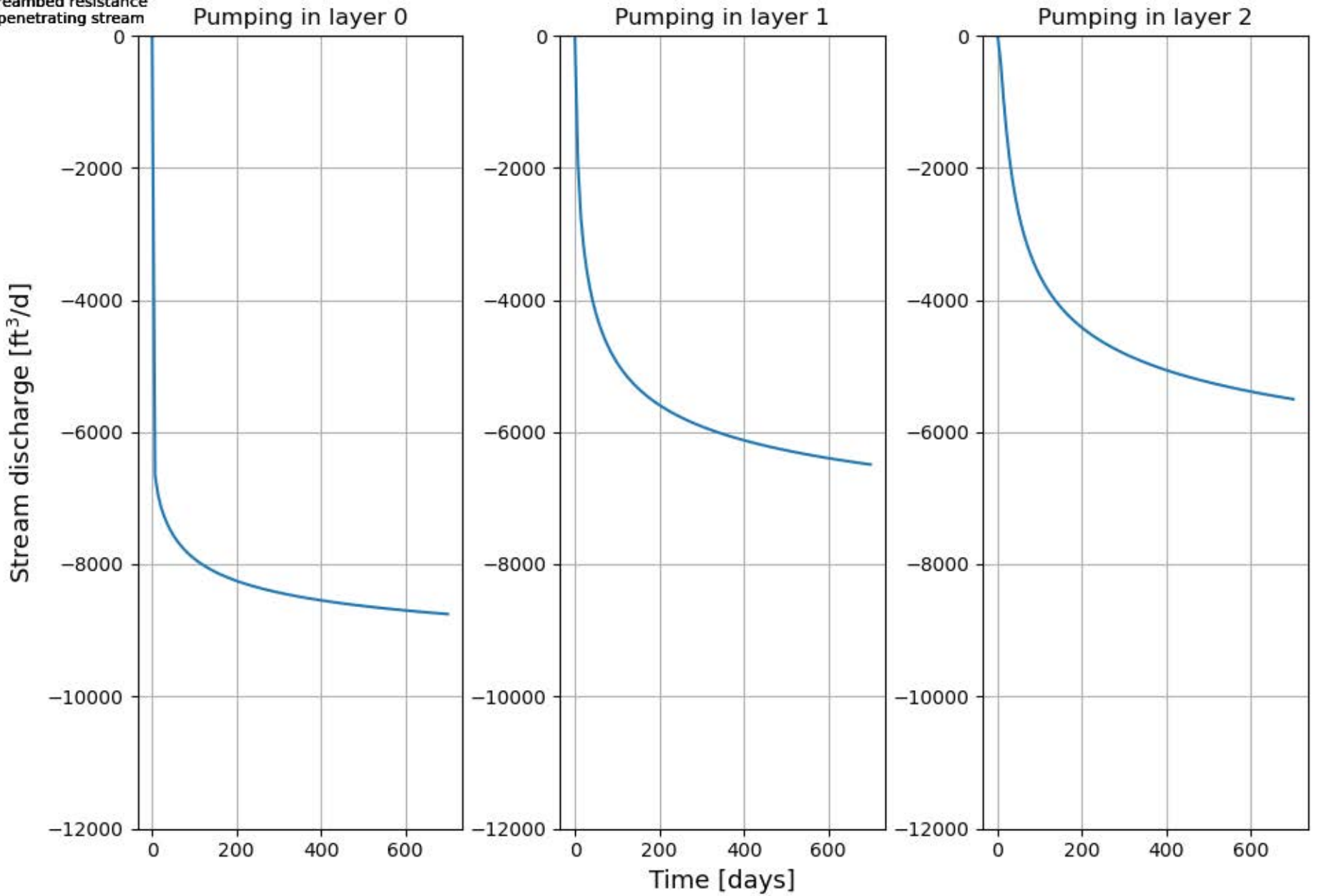
Stream depletion (cfs) after 700 days: -0.0504

Stream depletion (cfs) after 700 days: -0.0334


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 11906 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

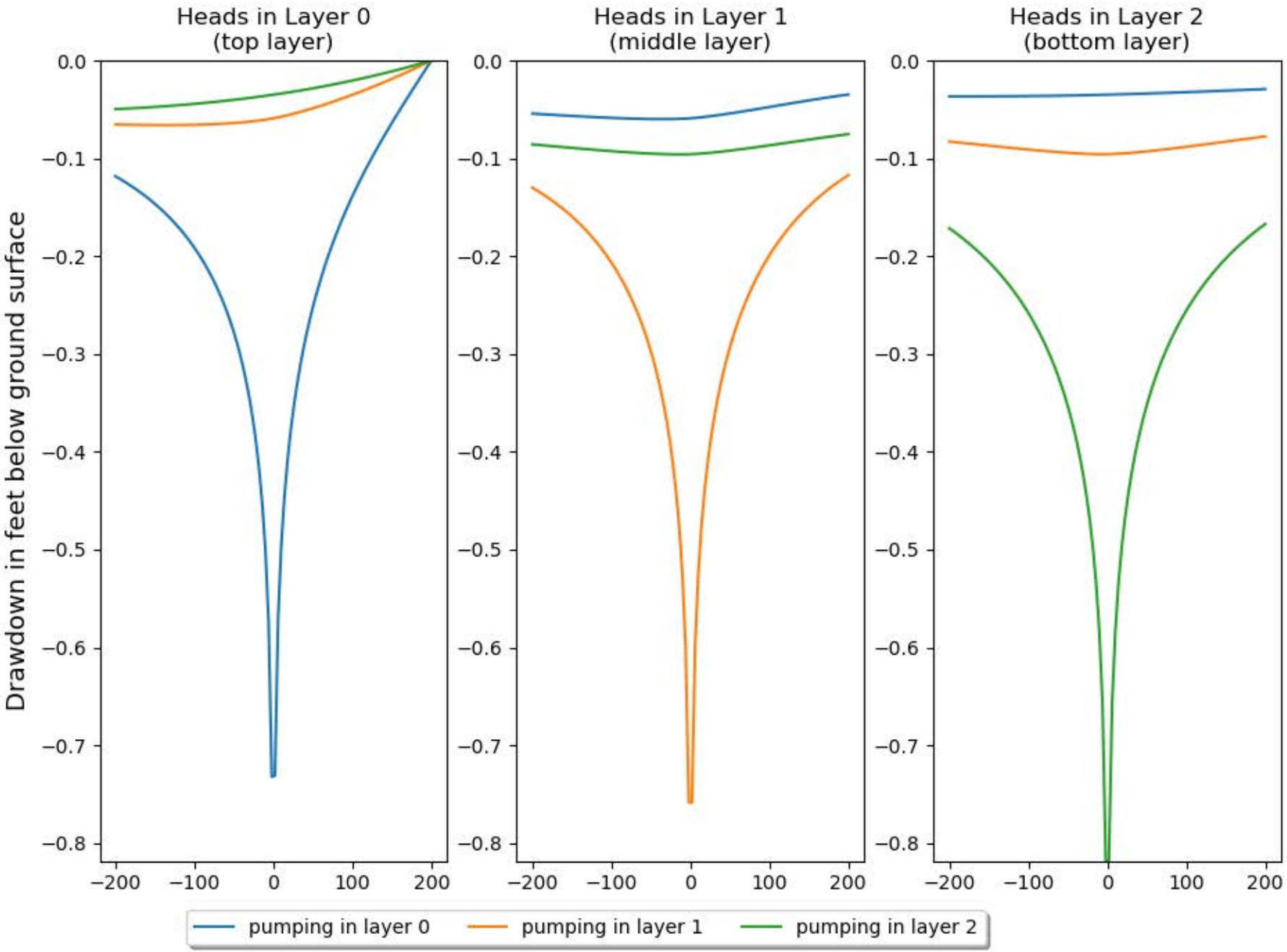
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.1013

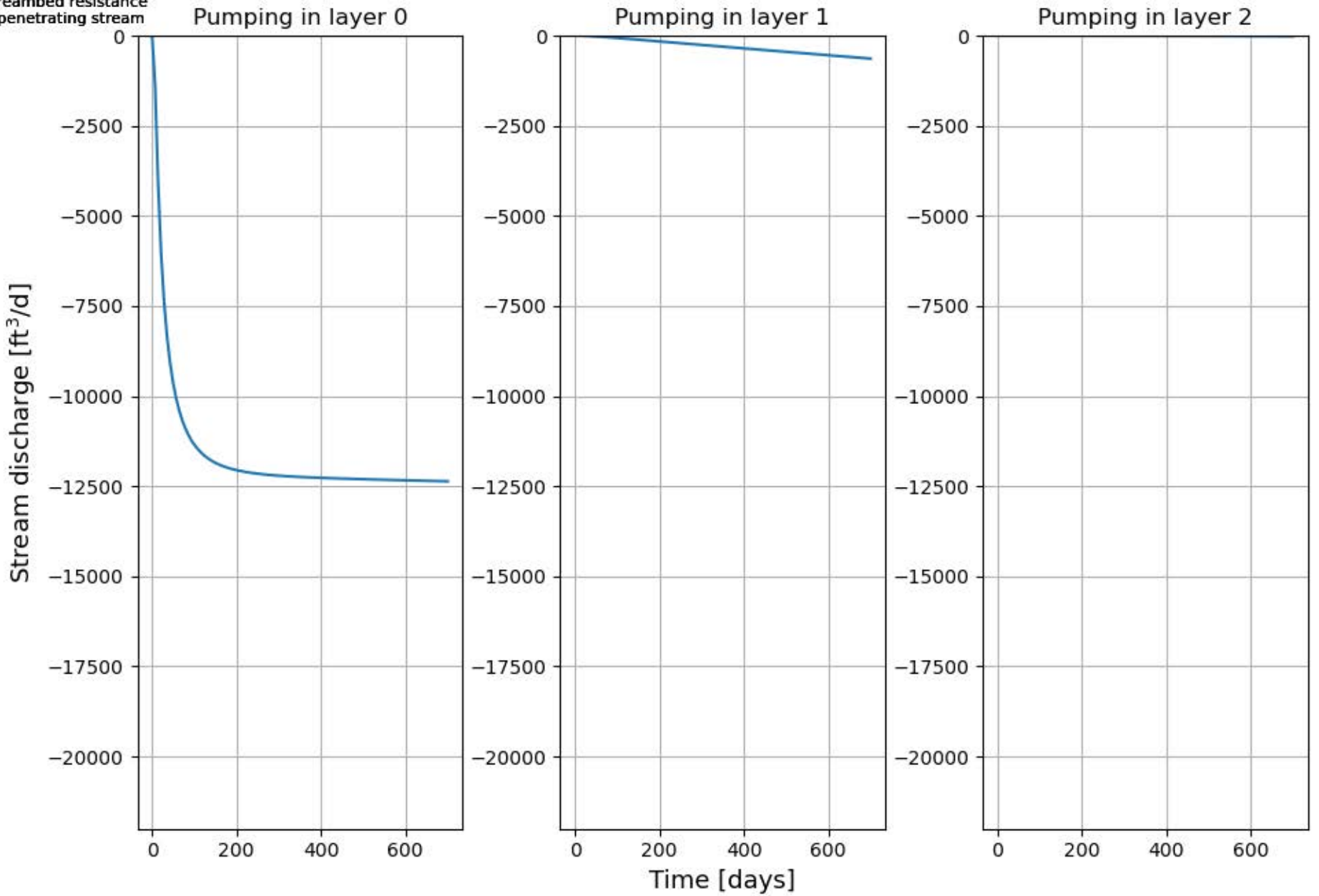
Stream depletion (cfs) after 700 days: -0.0751

Stream depletion (cfs) after 700 days: -0.0637


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.1
−0.2
−0.3
−0.4
−0.5
−0.6
−0.7
−0.8
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 23852 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

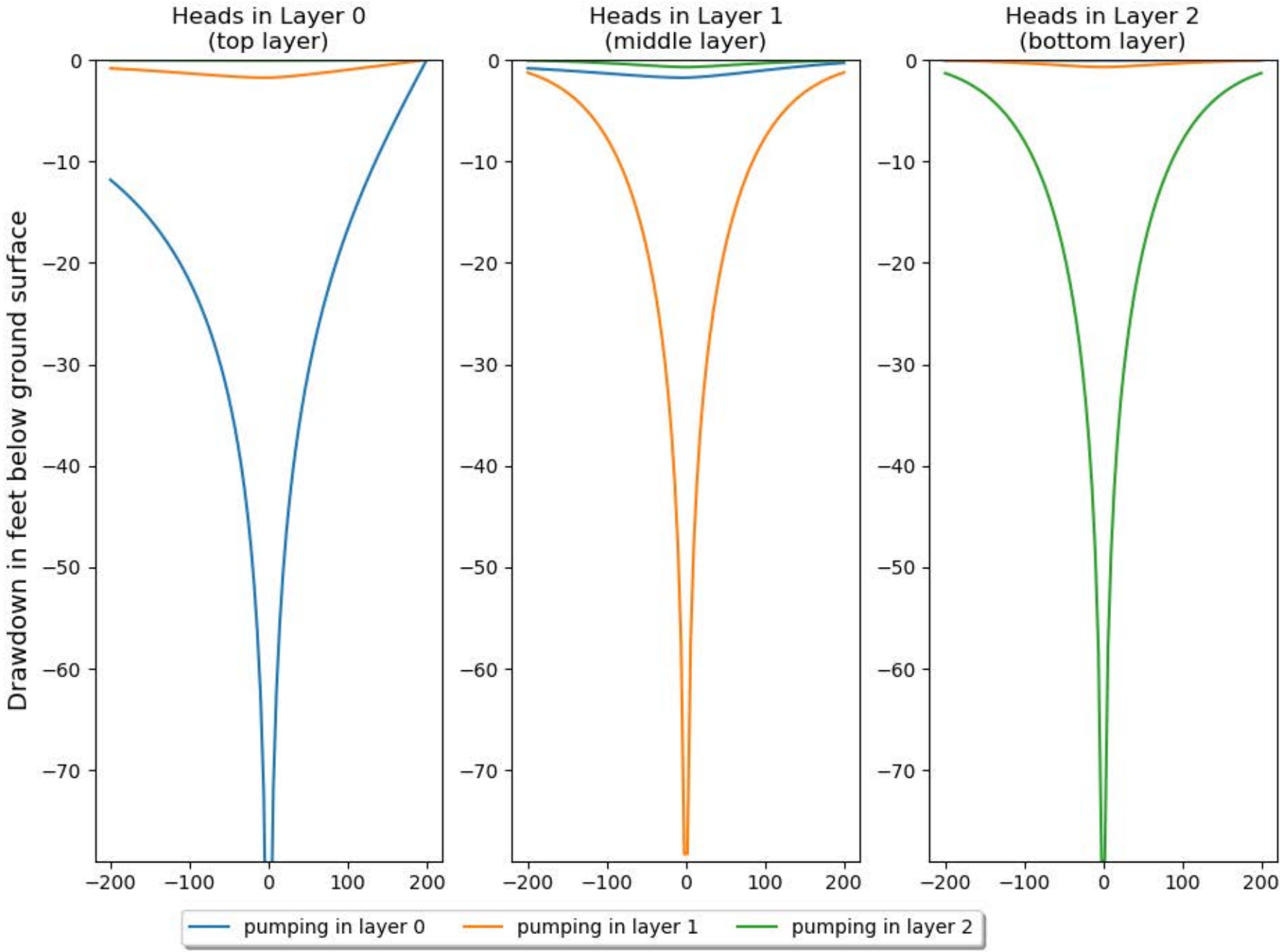
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.1431

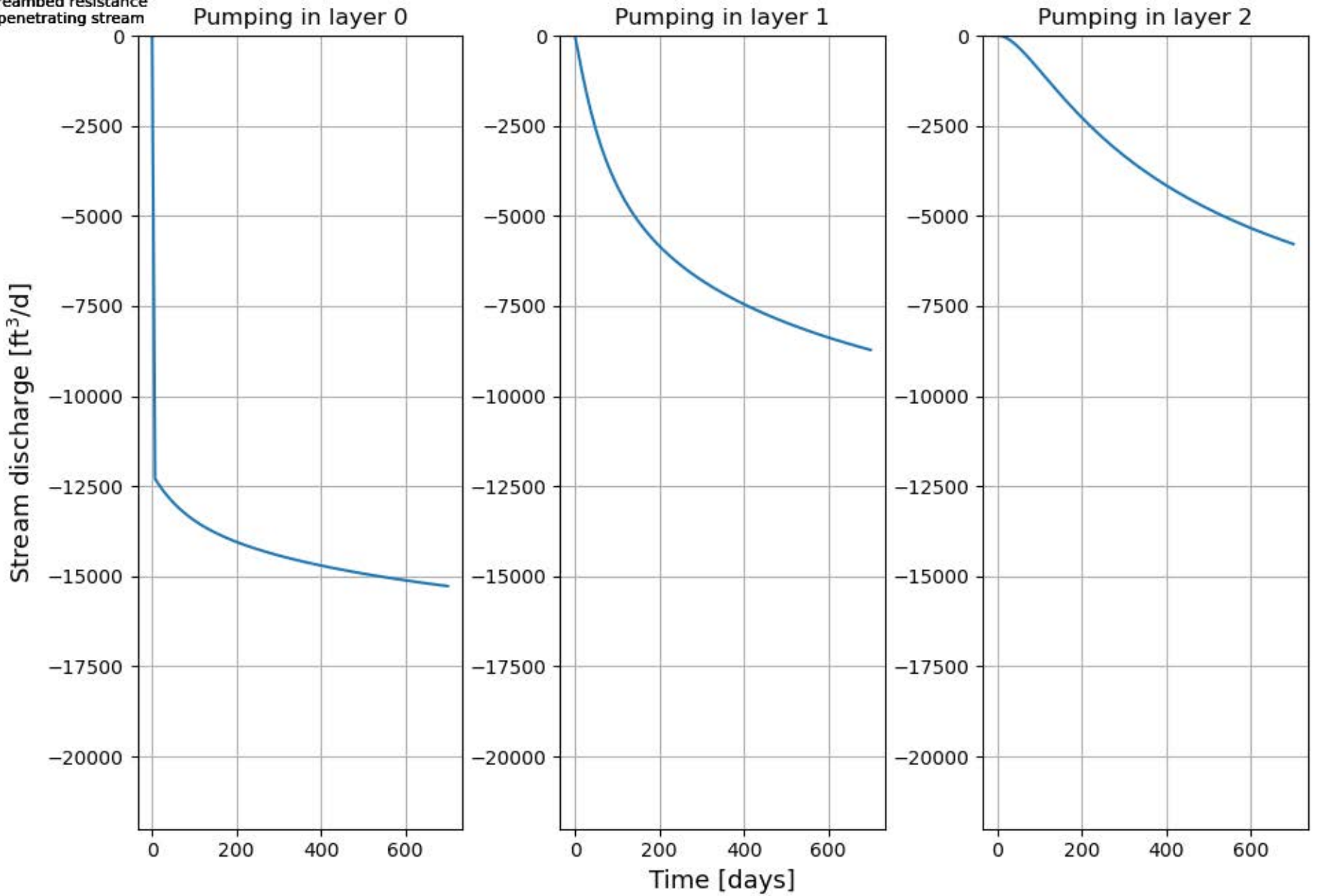
Stream depletion (cfs) after 700 days: -0.0074

Stream depletion (cfs) after 700 days: -0.0002


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0
−10
−20
−30
−40
−50
−60
−70
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 23852 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

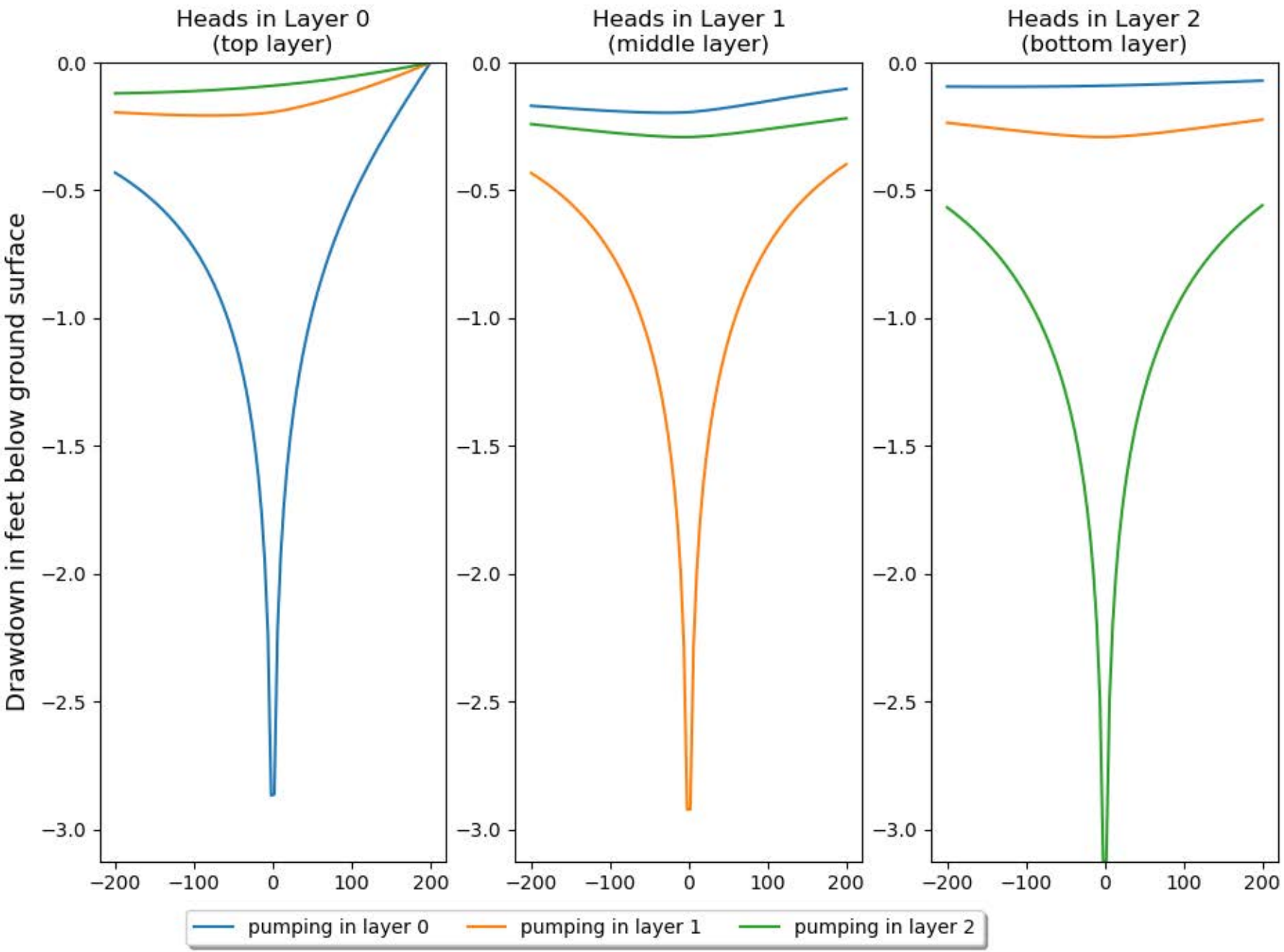
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.1768

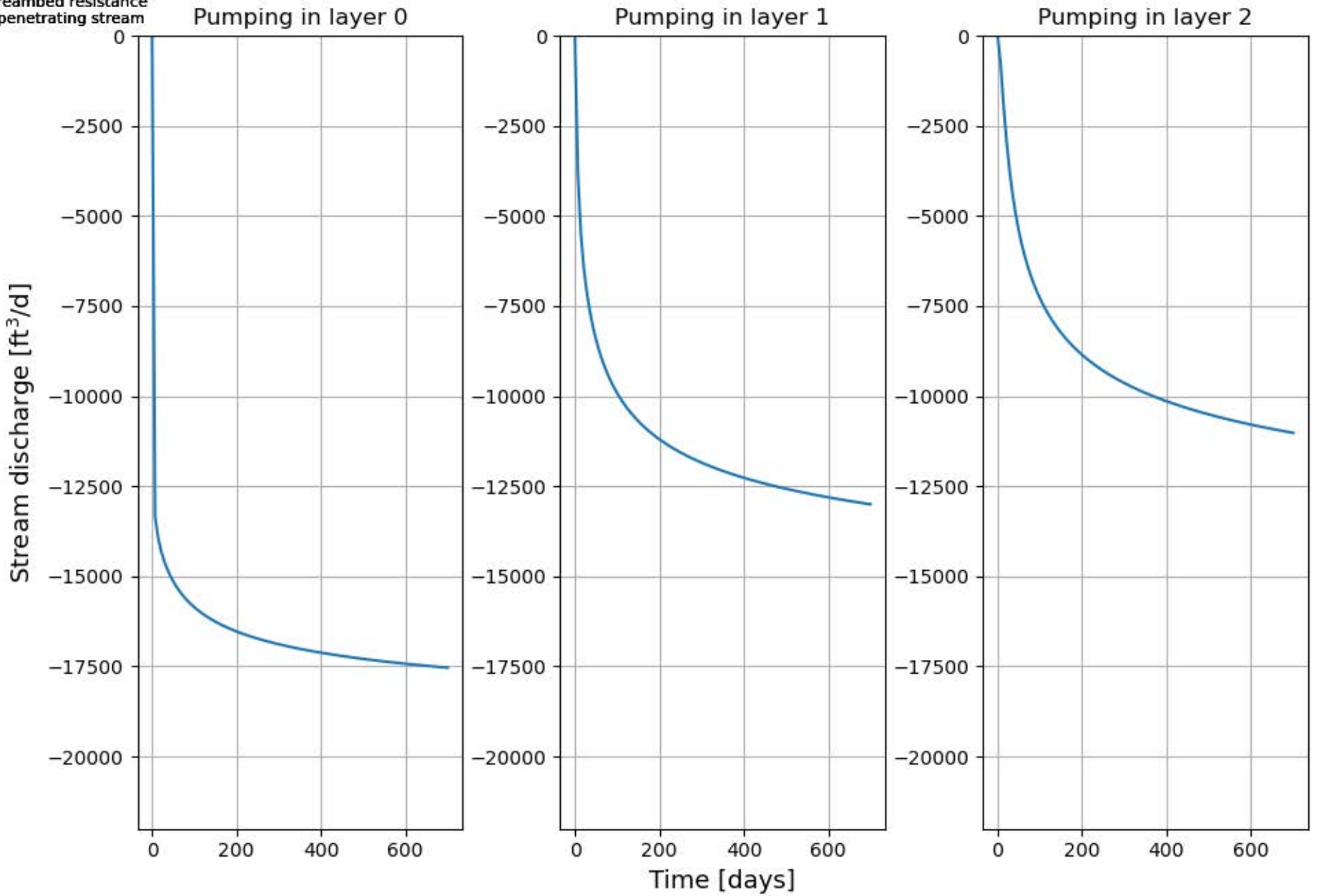
Stream depletion (cfs) after 700 days: -0.1009

Stream depletion (cfs) after 700 days: -0.0669


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
−3.0
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 200 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

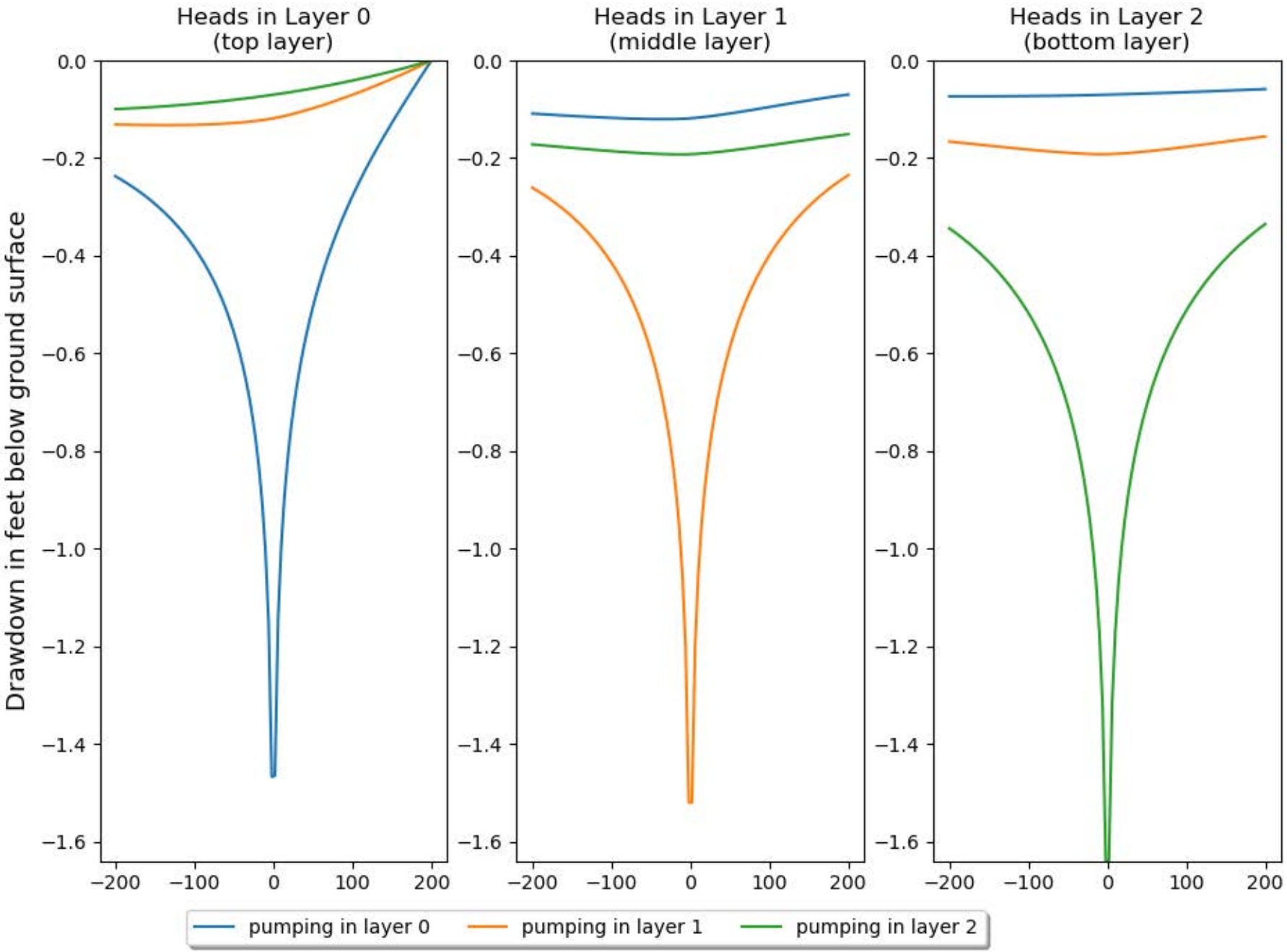
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.2030

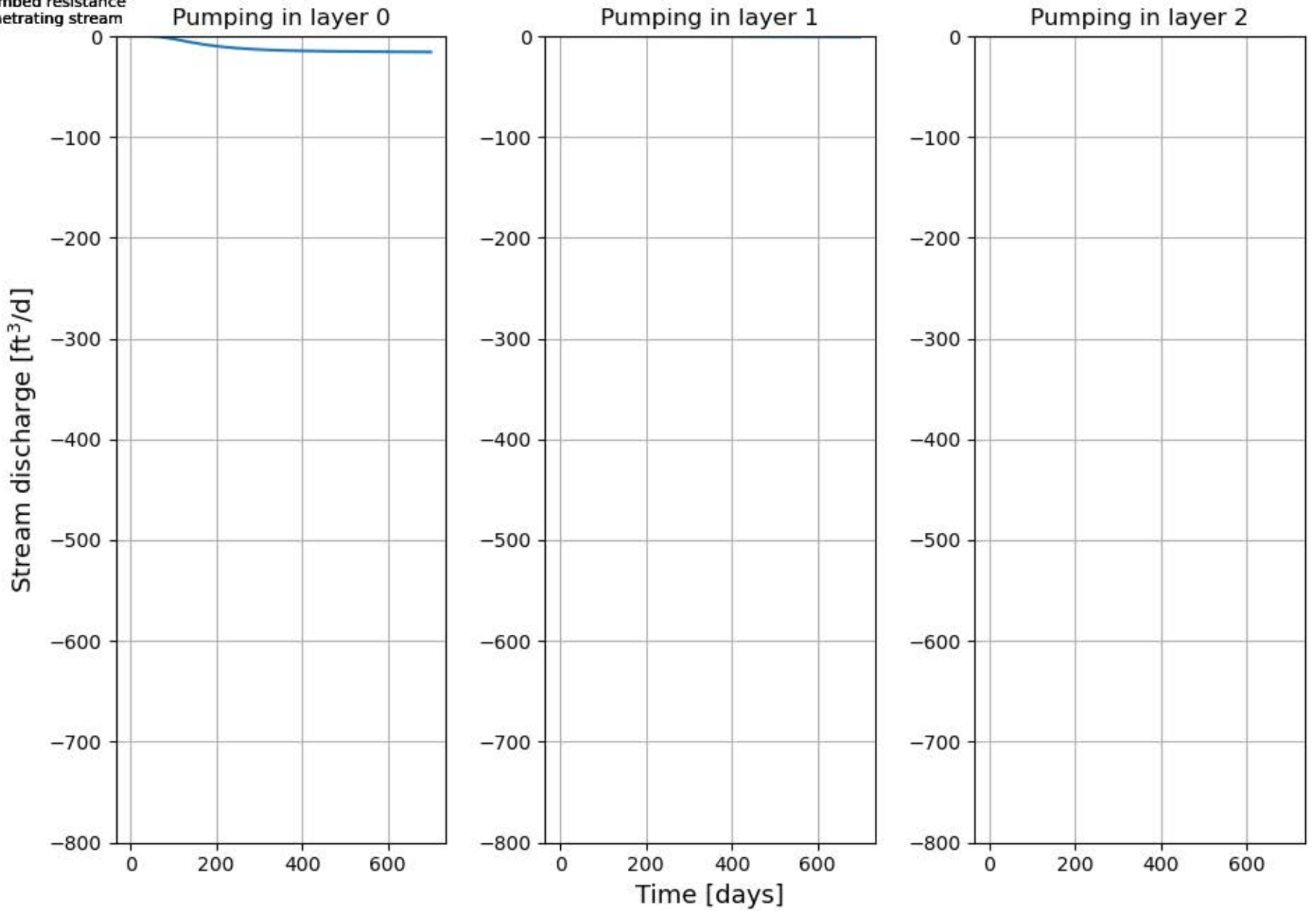
Stream depletion (cfs) after 700 days: -0.1505

Stream depletion (cfs) after 700 days: -0.1276


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
−1.6
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 480 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

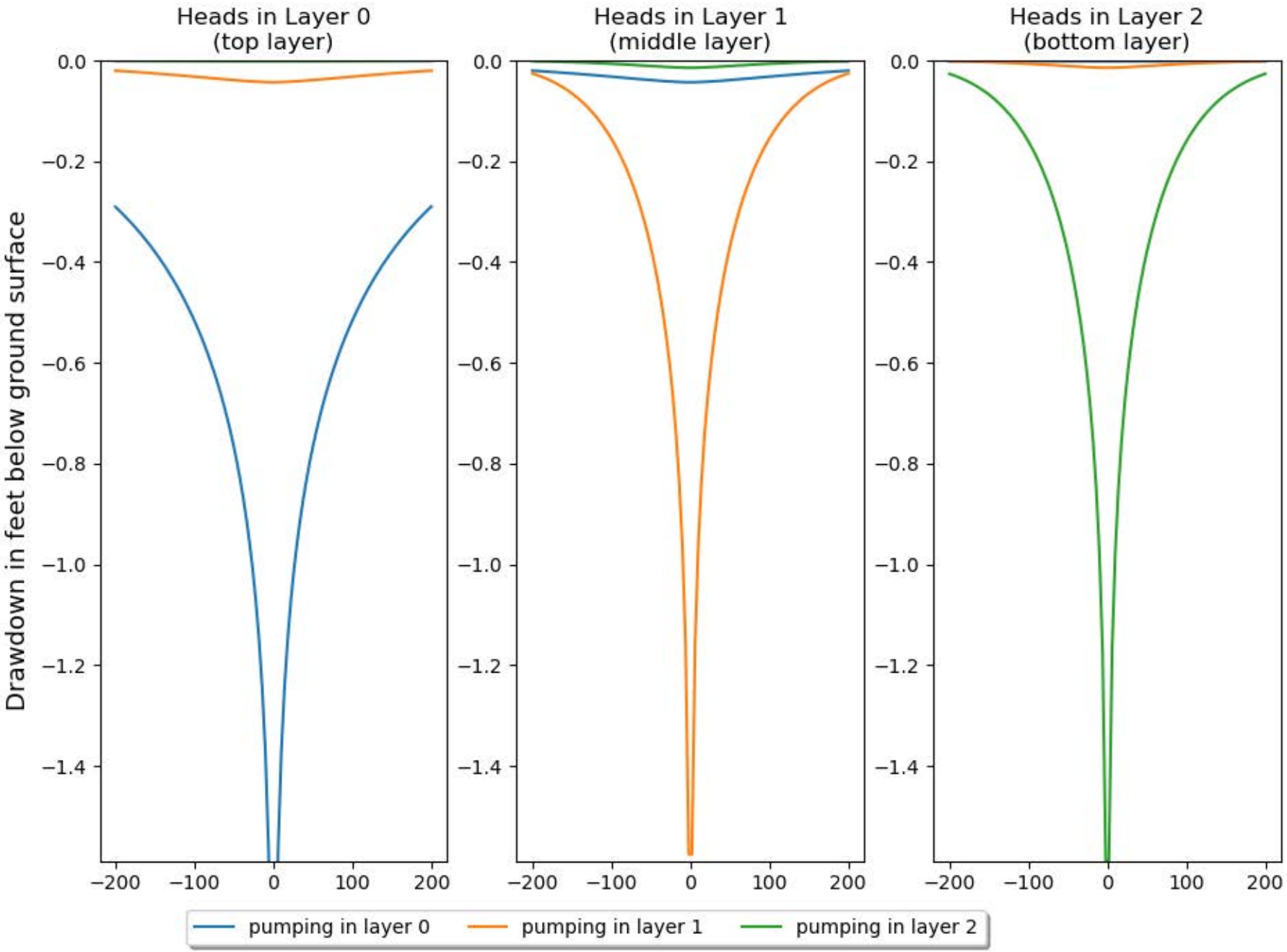
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0002

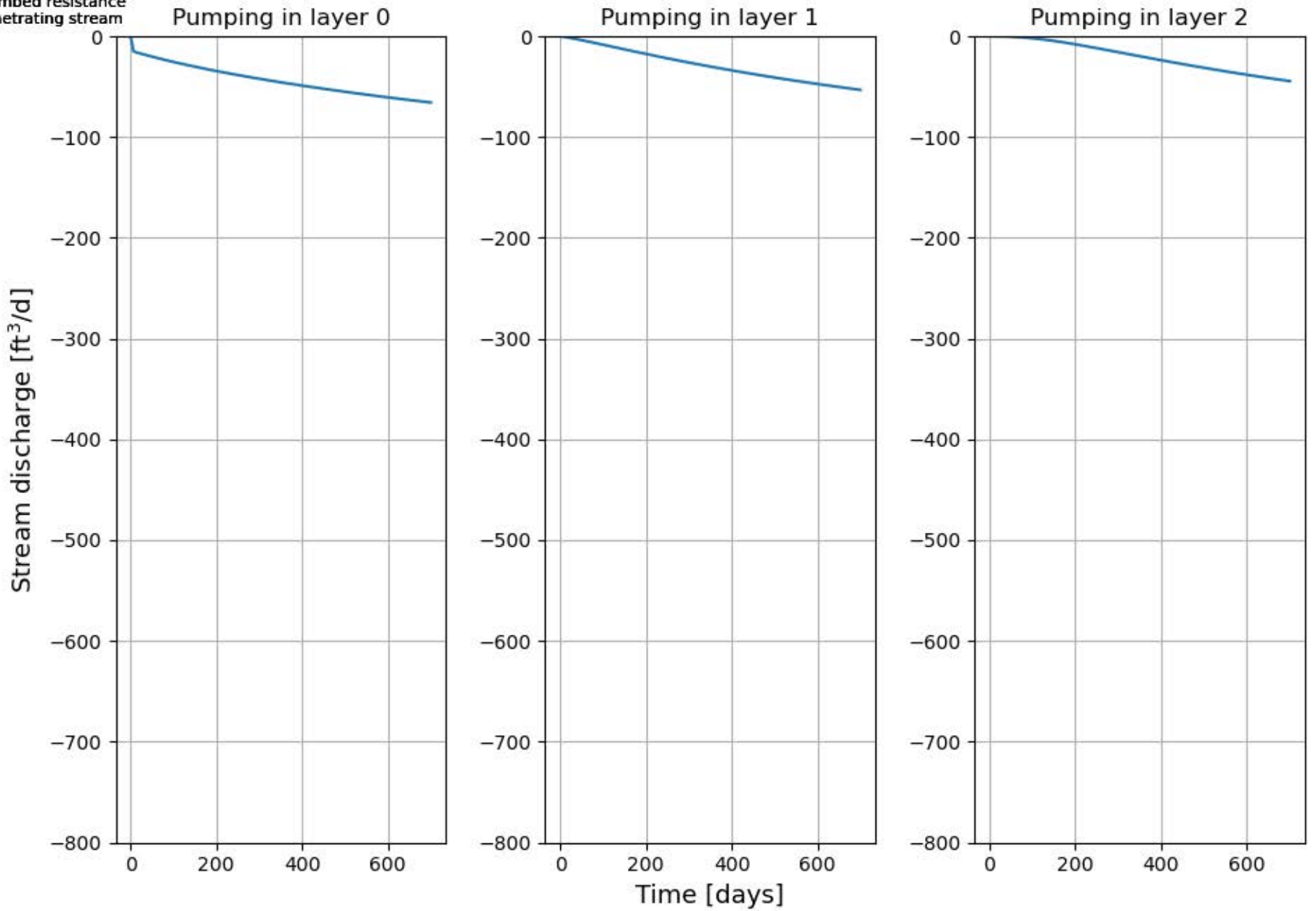
Stream depletion (cfs) after 700 days: -0.0000

Stream depletion (cfs) after 700 days: -0.0000


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 480 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

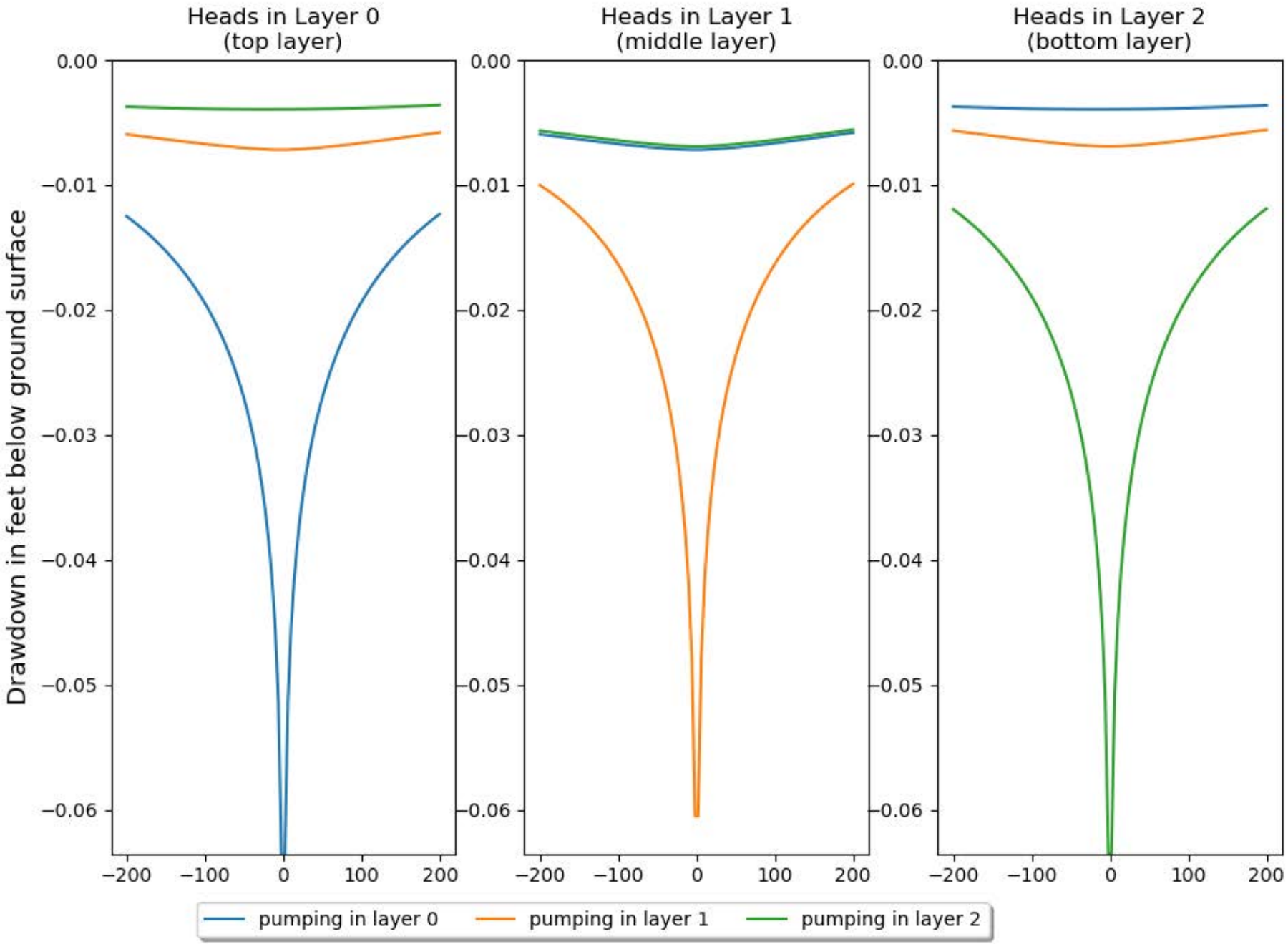
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0008

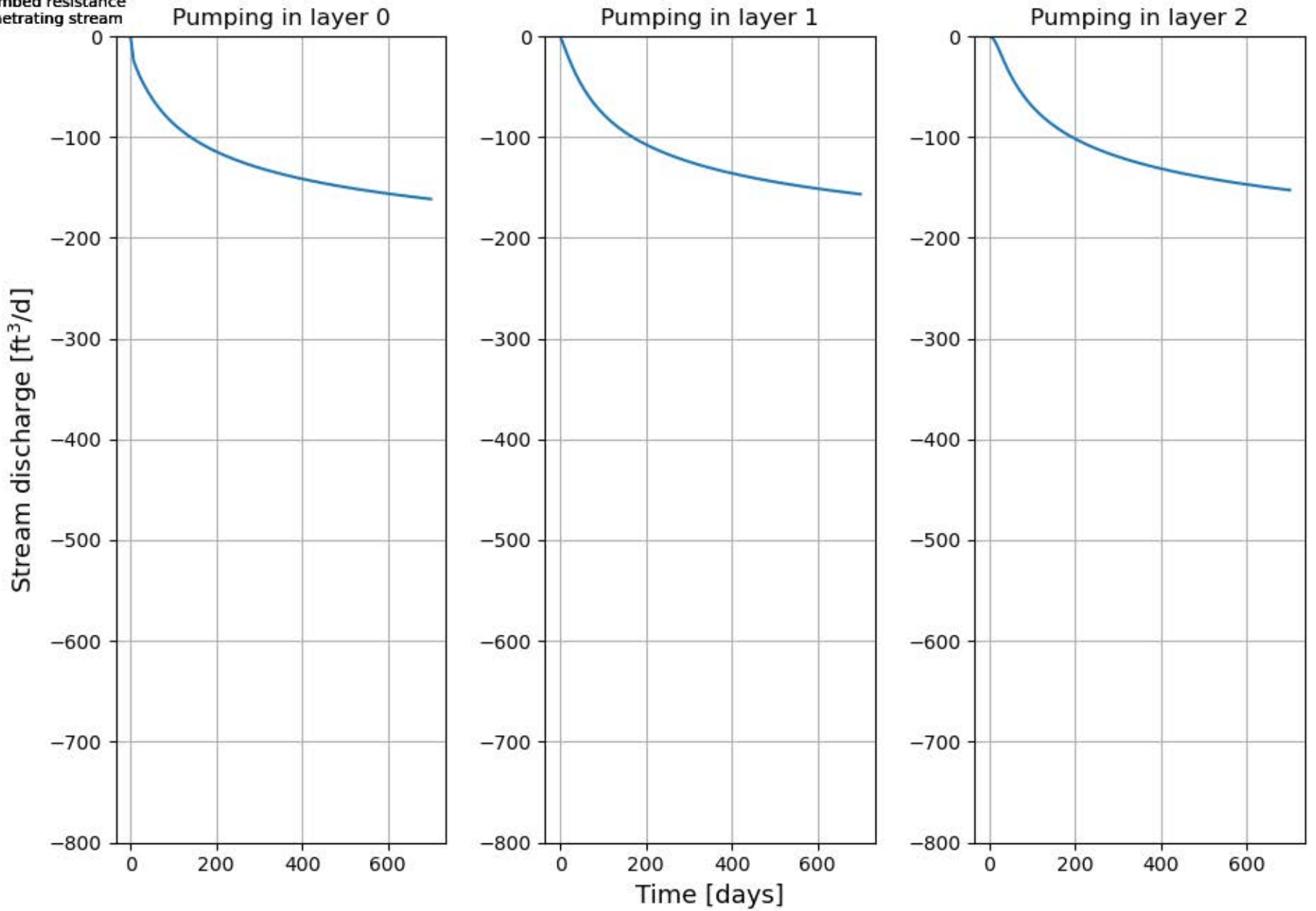
Stream depletion (cfs) after 700 days: -0.0006

Stream depletion (cfs) after 700 days: -0.0005


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.00
−0.01
−0.02
−0.03
−0.04
−0.05
−0.06
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 480 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

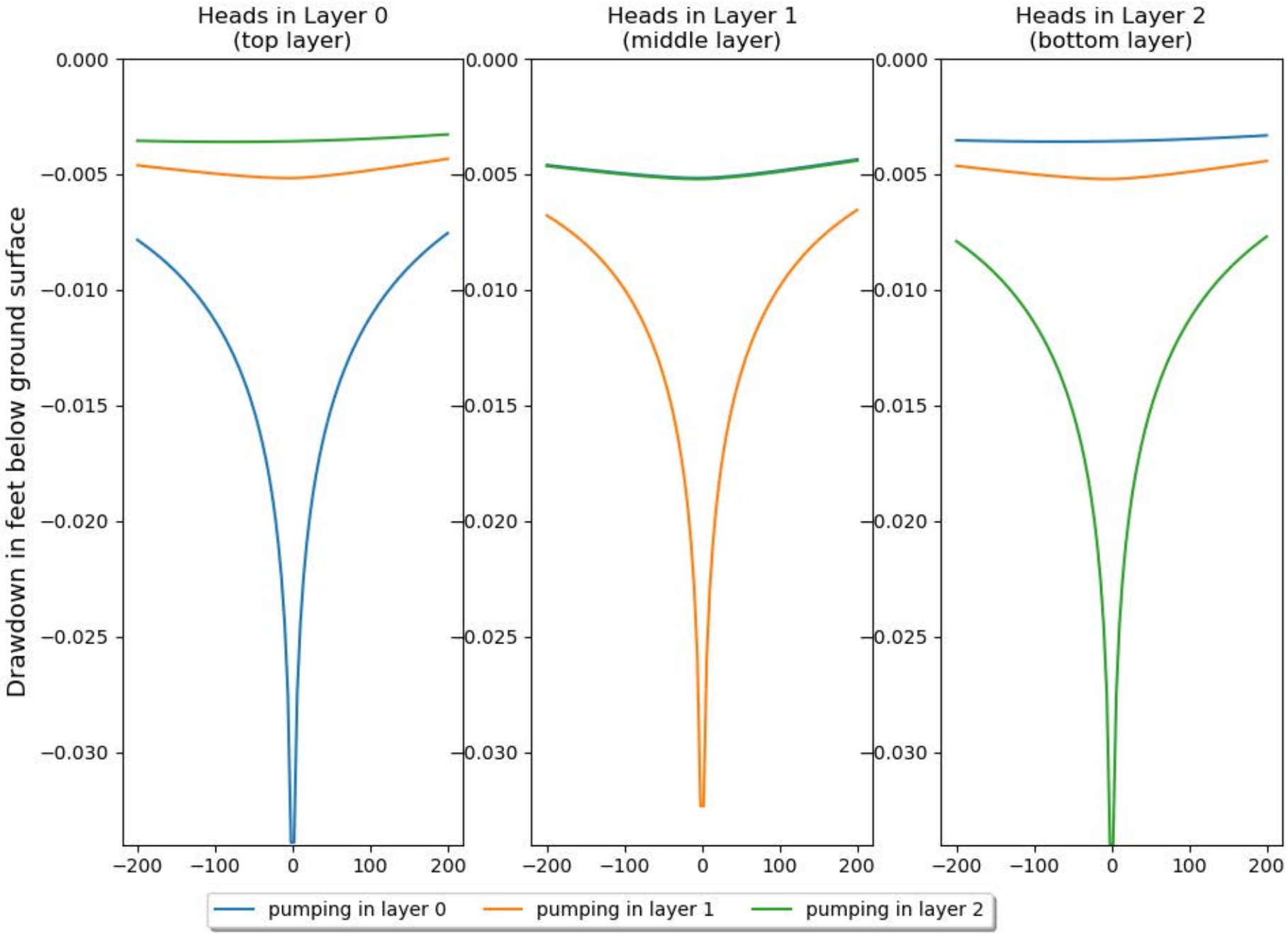
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0019

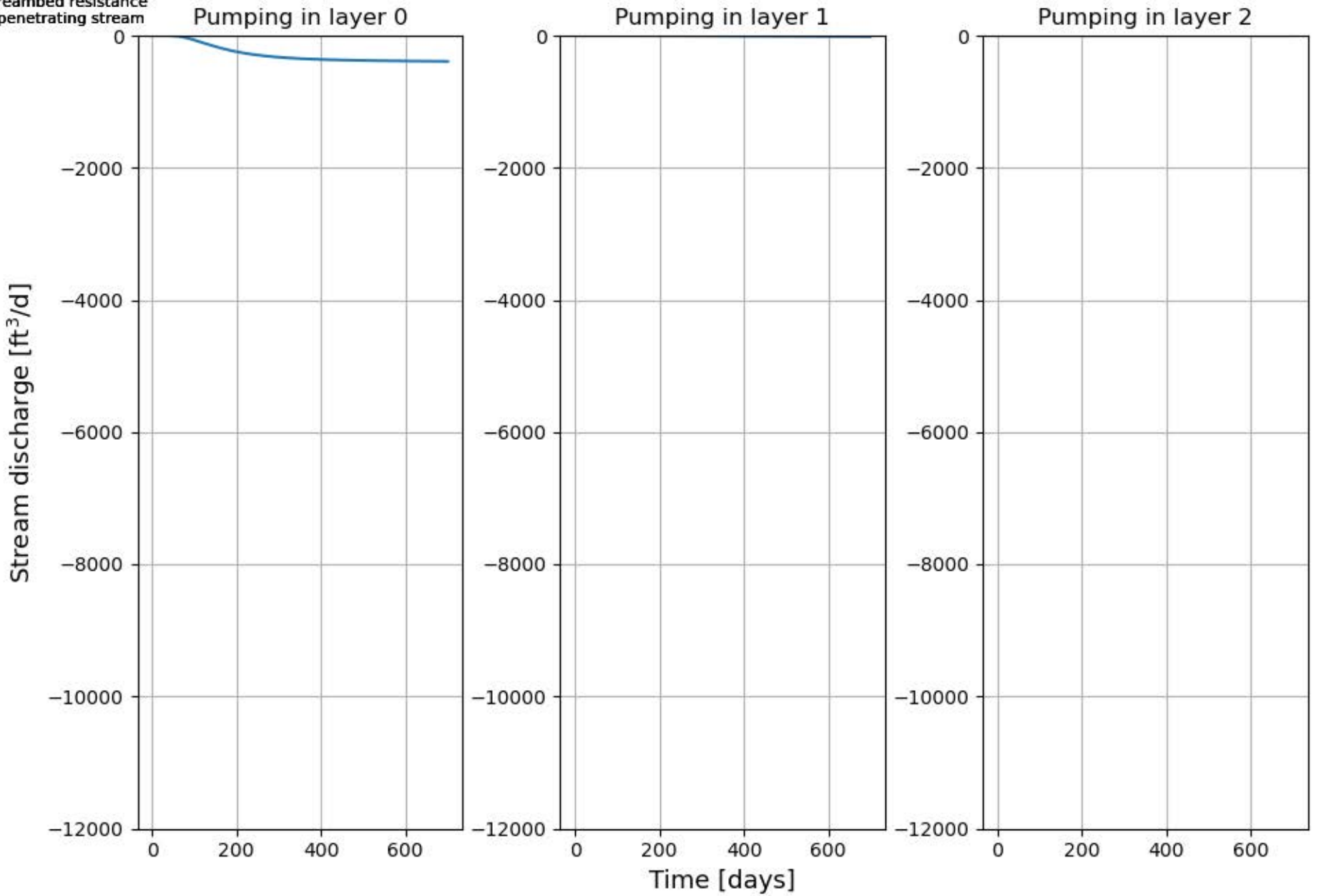
Stream depletion (cfs) after 700 days: -0.0018

Stream depletion (cfs) after 700 days: -0.0018


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.000
−0.005
−0.010
−0.015
−0.020
−0.025
−0.030
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 11906 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

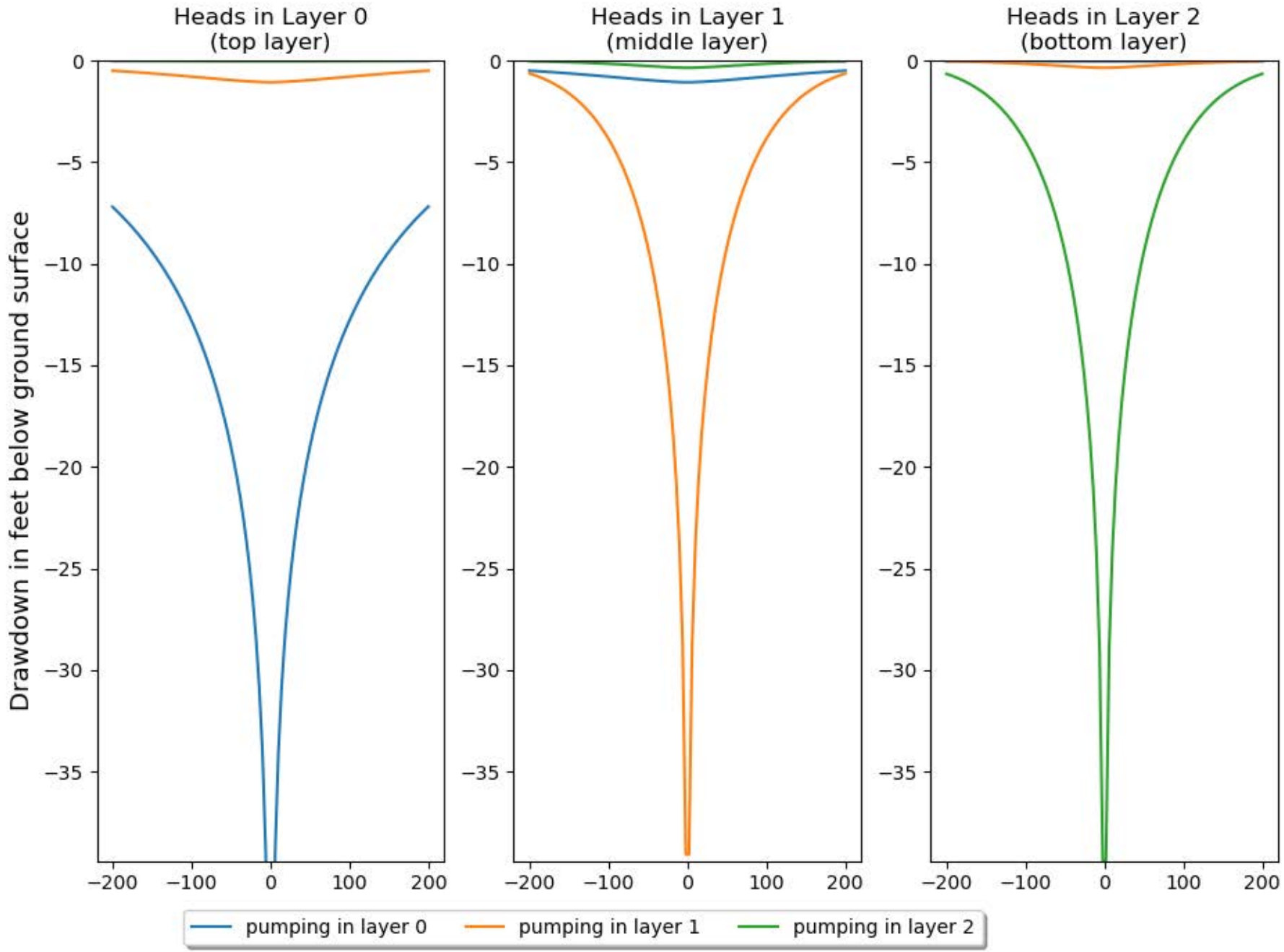
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0045

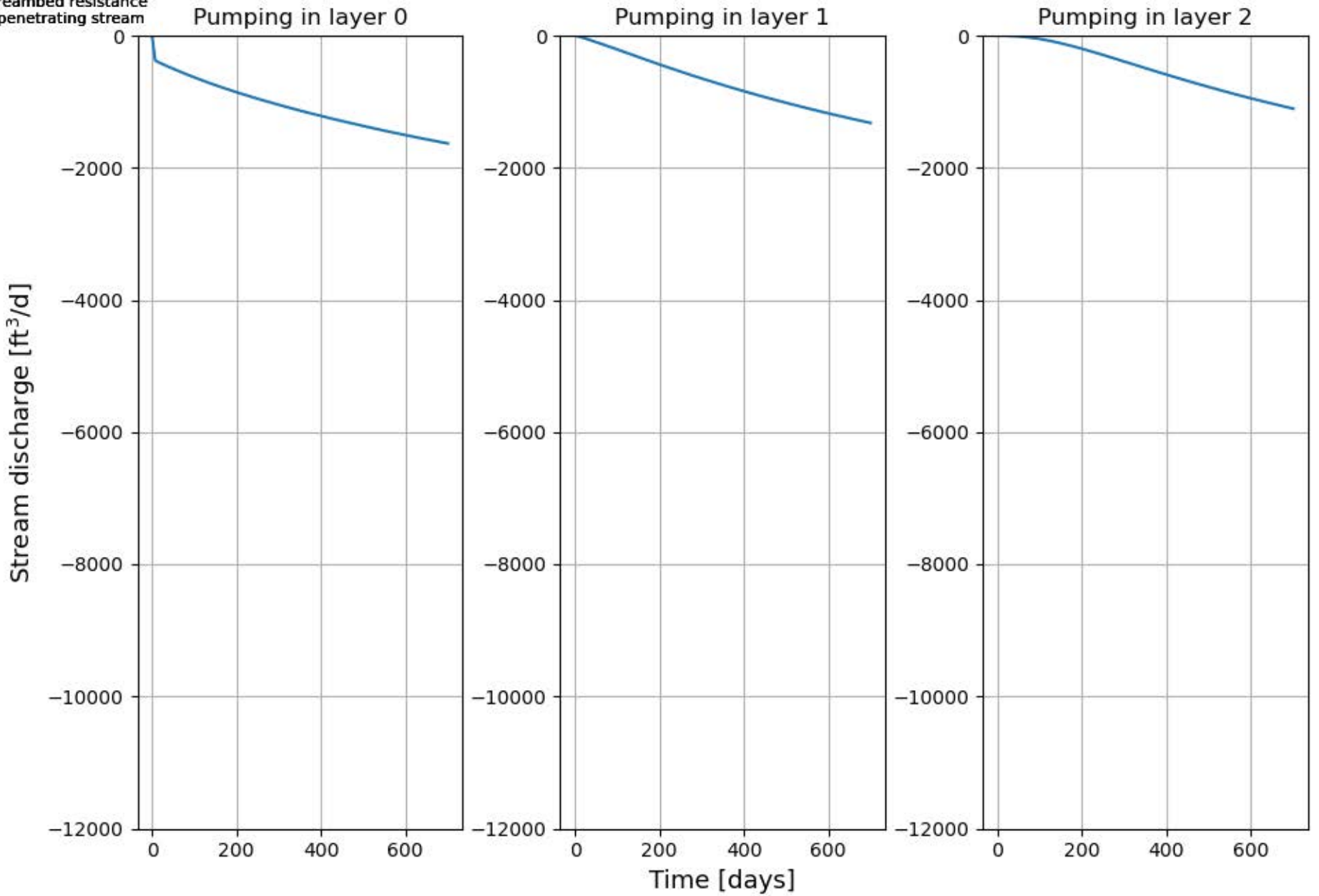
Stream depletion (cfs) after 700 days: -0.0002

Stream depletion (cfs) after 700 days: -0.0000


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0
−5
−10
−15
−20
−25
−30
−35
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 11906 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

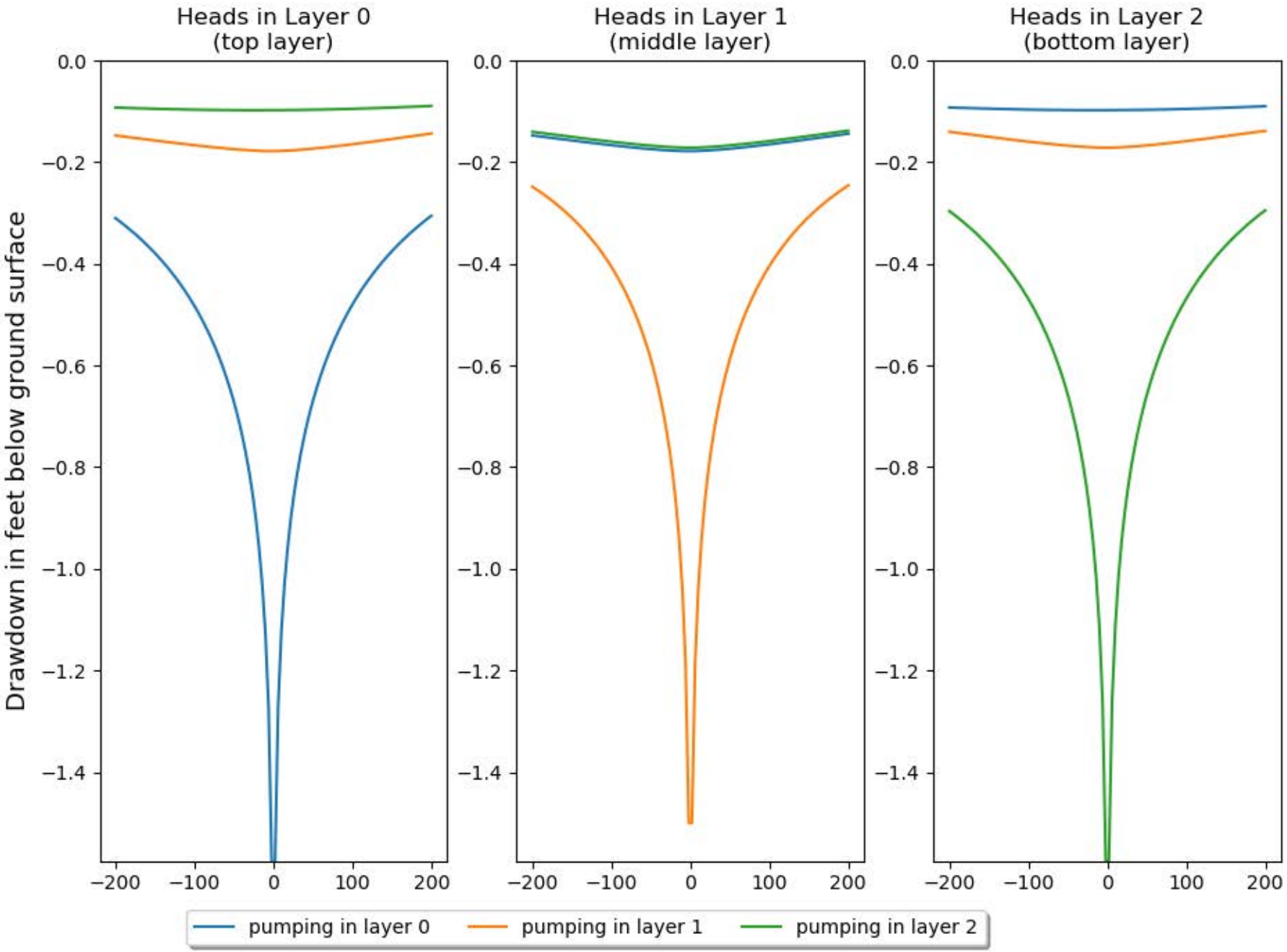
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0189

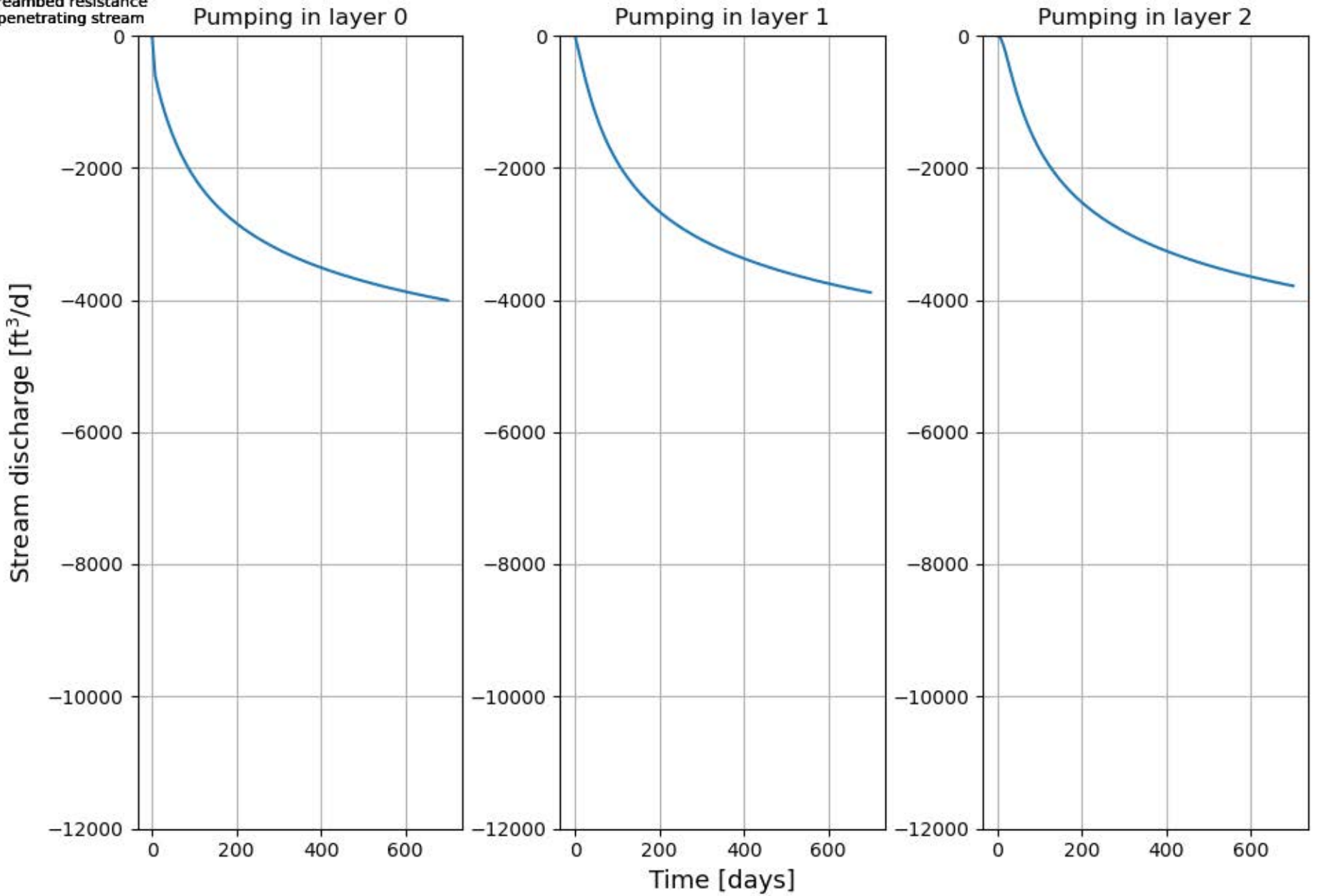
Stream depletion (cfs) after 700 days: -0.0153

Stream depletion (cfs) after 700 days: -0.0128


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 11906 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

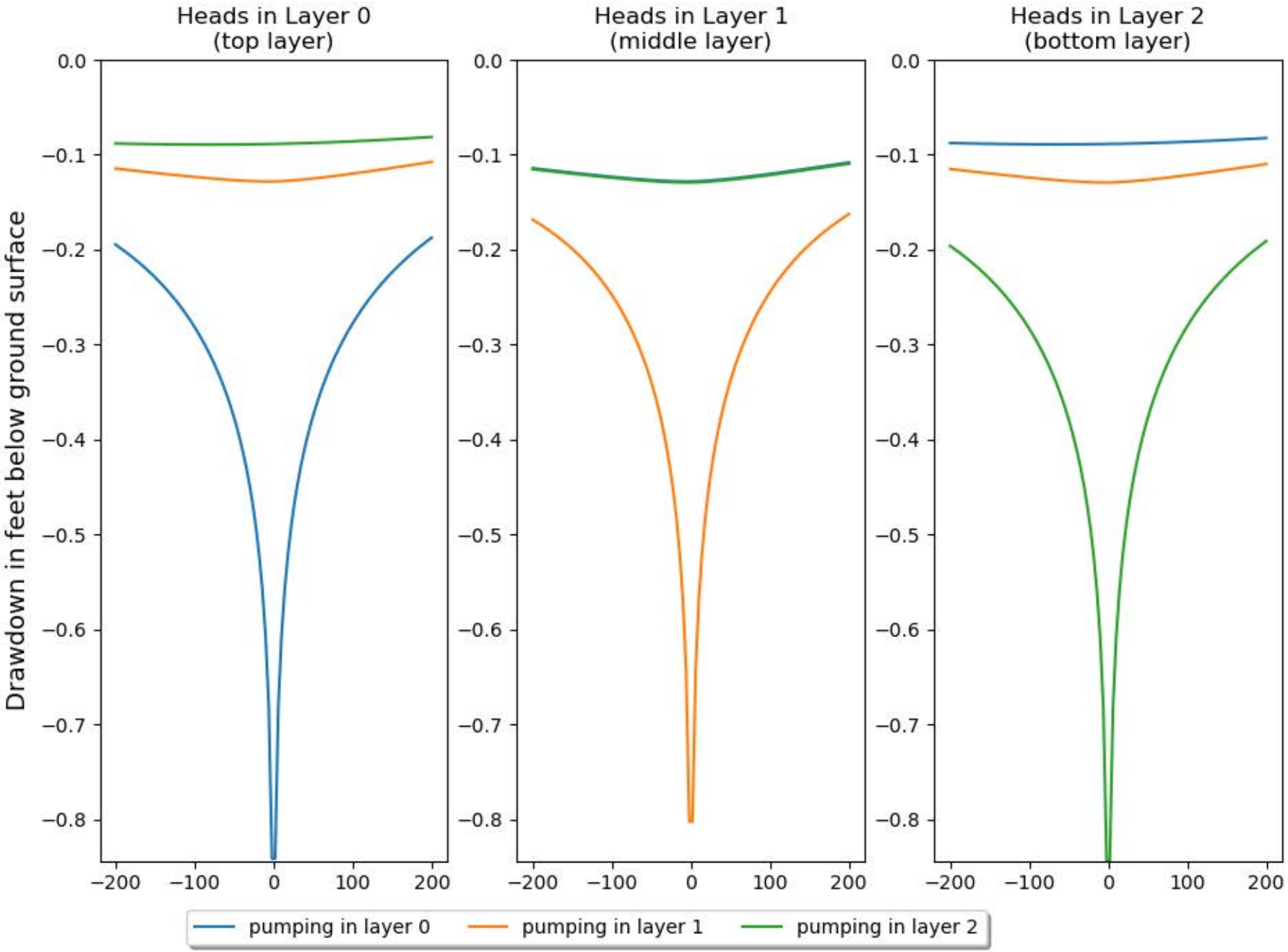
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0464

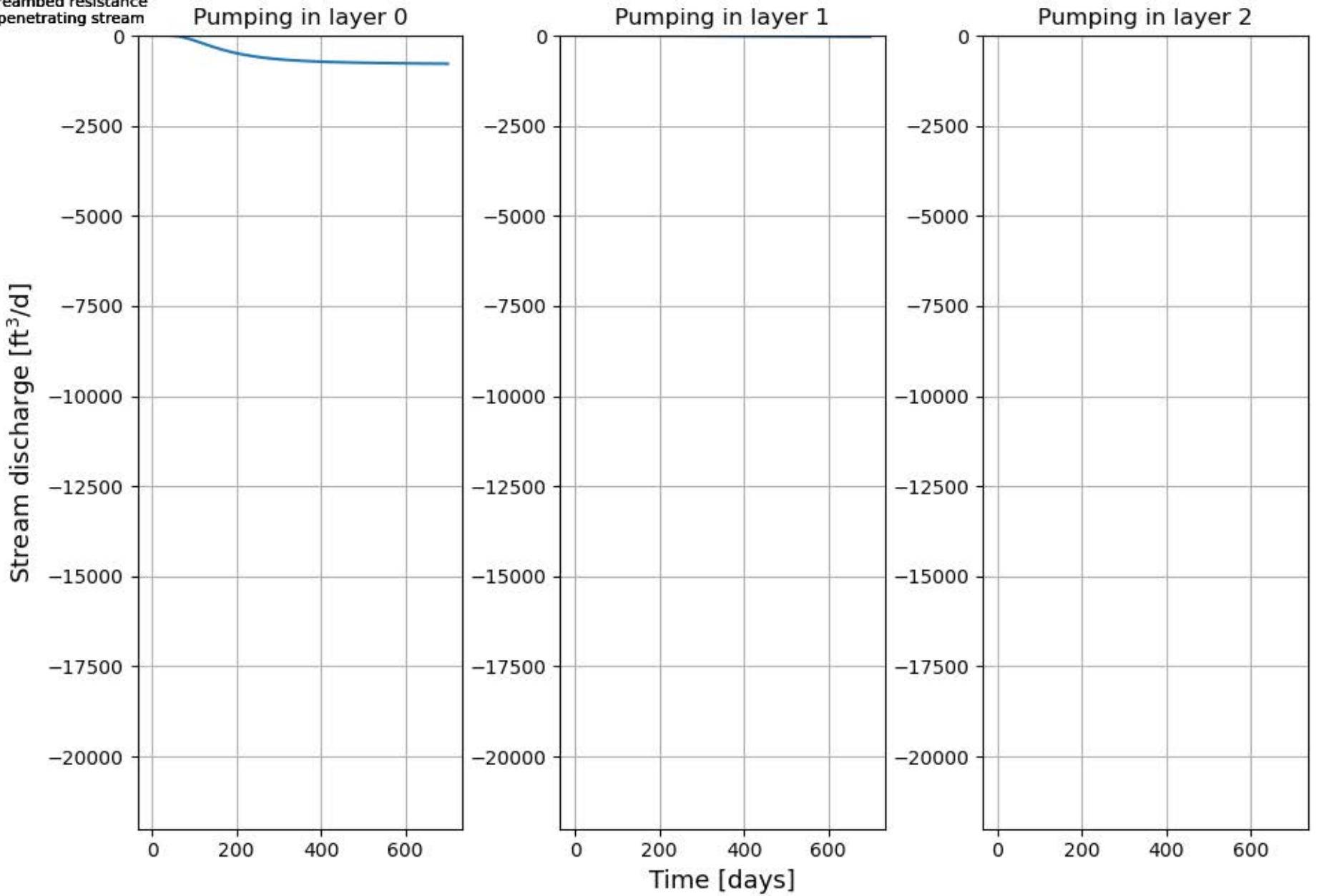
Stream depletion (cfs) after 700 days: -0.0450

Stream depletion (cfs) after 700 days: -0.0438


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.1
−0.2
−0.3
−0.4
−0.5
−0.6
−0.7
−0.8
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 23852 ft^3/d
K = 2 ft/d
S = 0.25
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

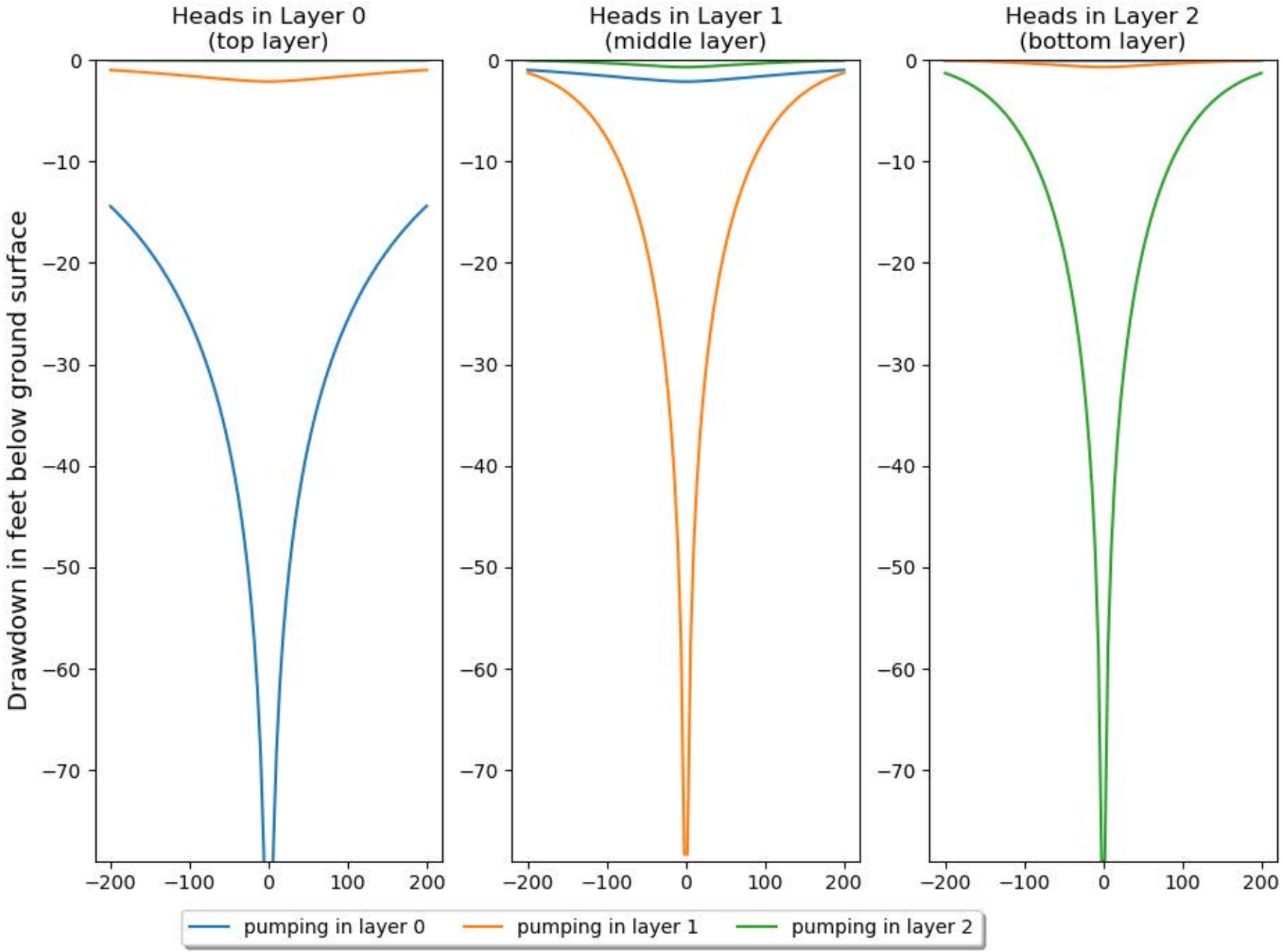
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0090

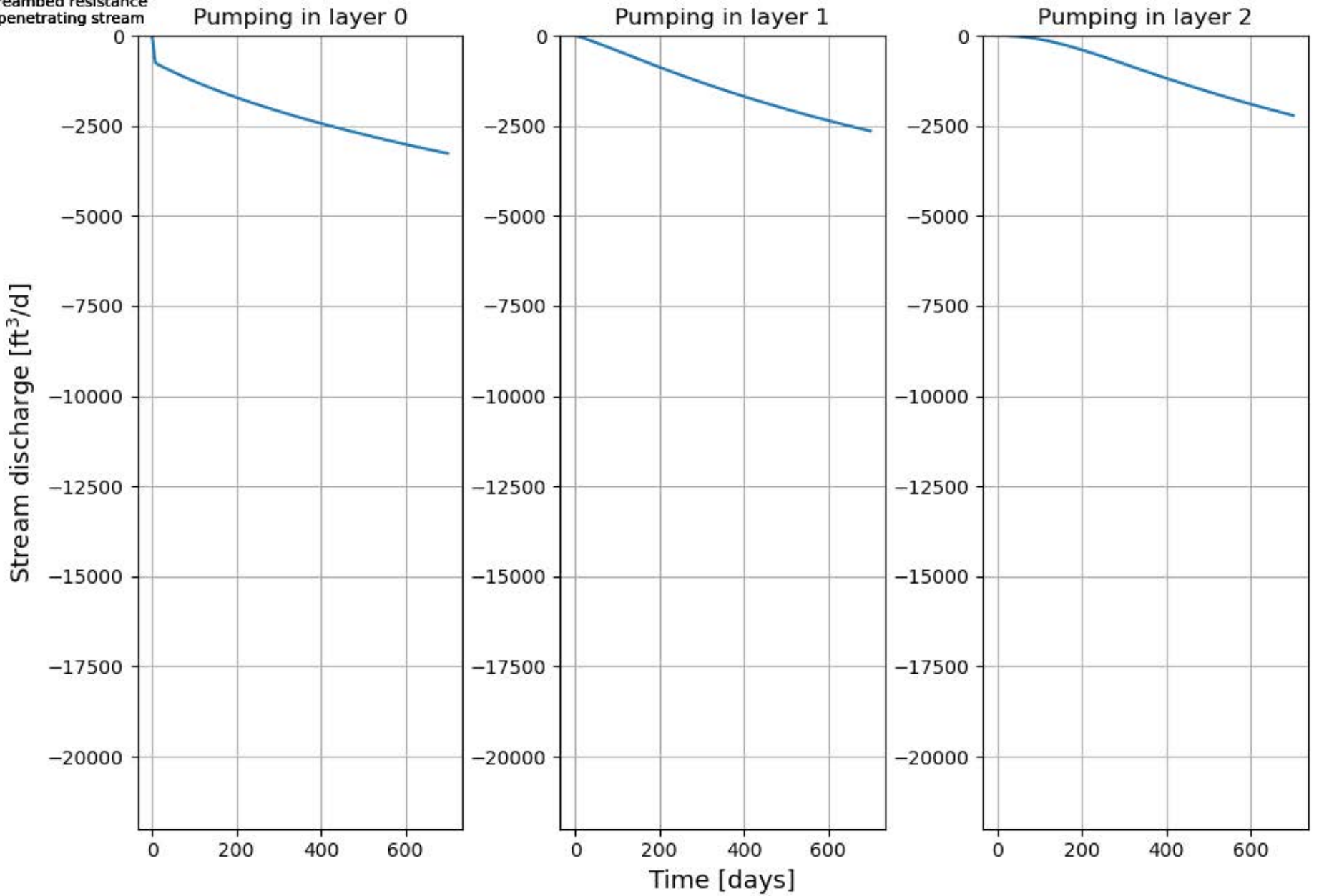
Stream depletion (cfs) after 700 days: -0.0004

Stream depletion (cfs) after 700 days: -0.0000


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0
−10
−20
−30
−40
−50
−60
−70
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 23852 ft^3/d
K = 66 ft/d
S = 0.125
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

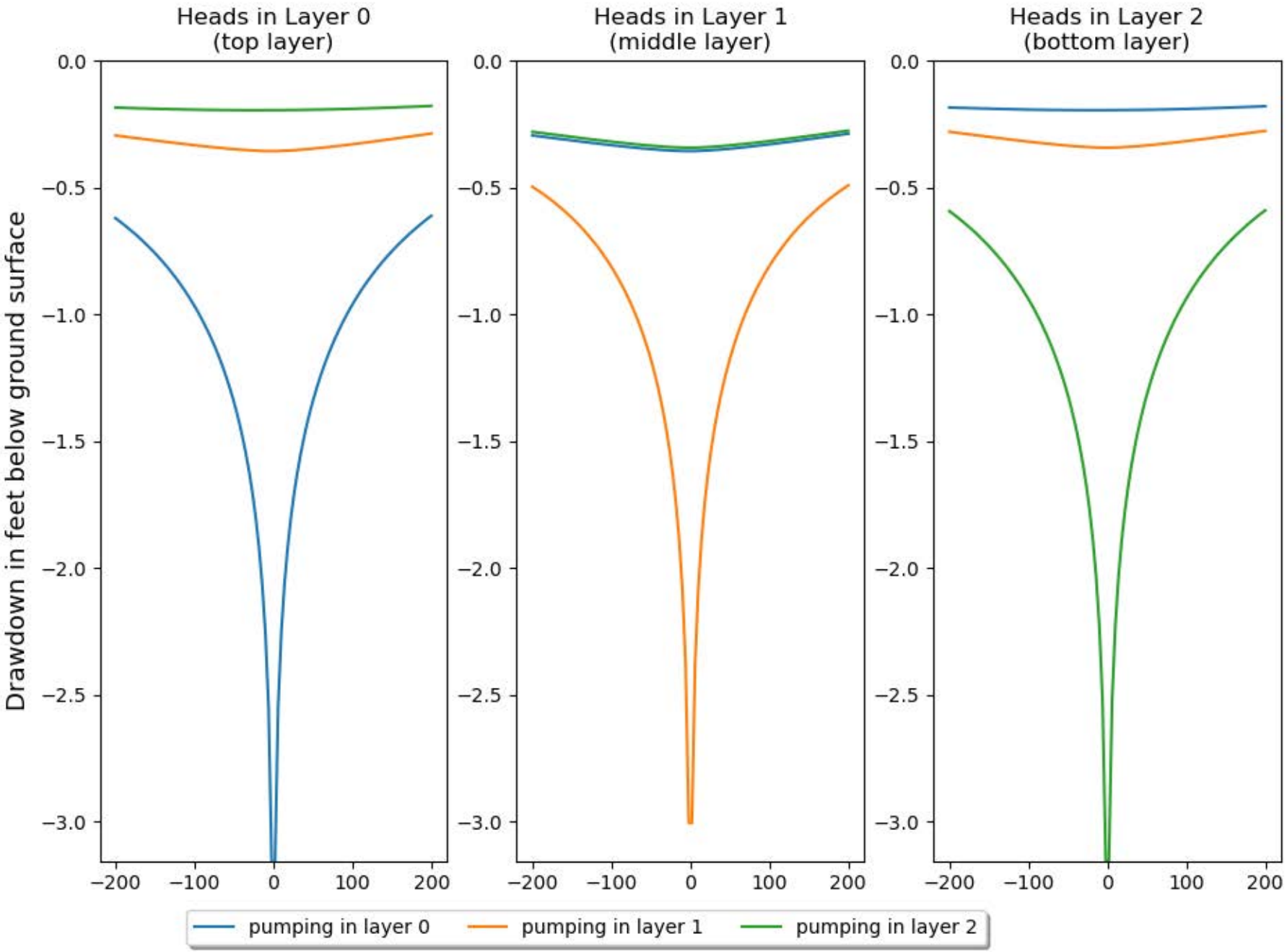
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0378

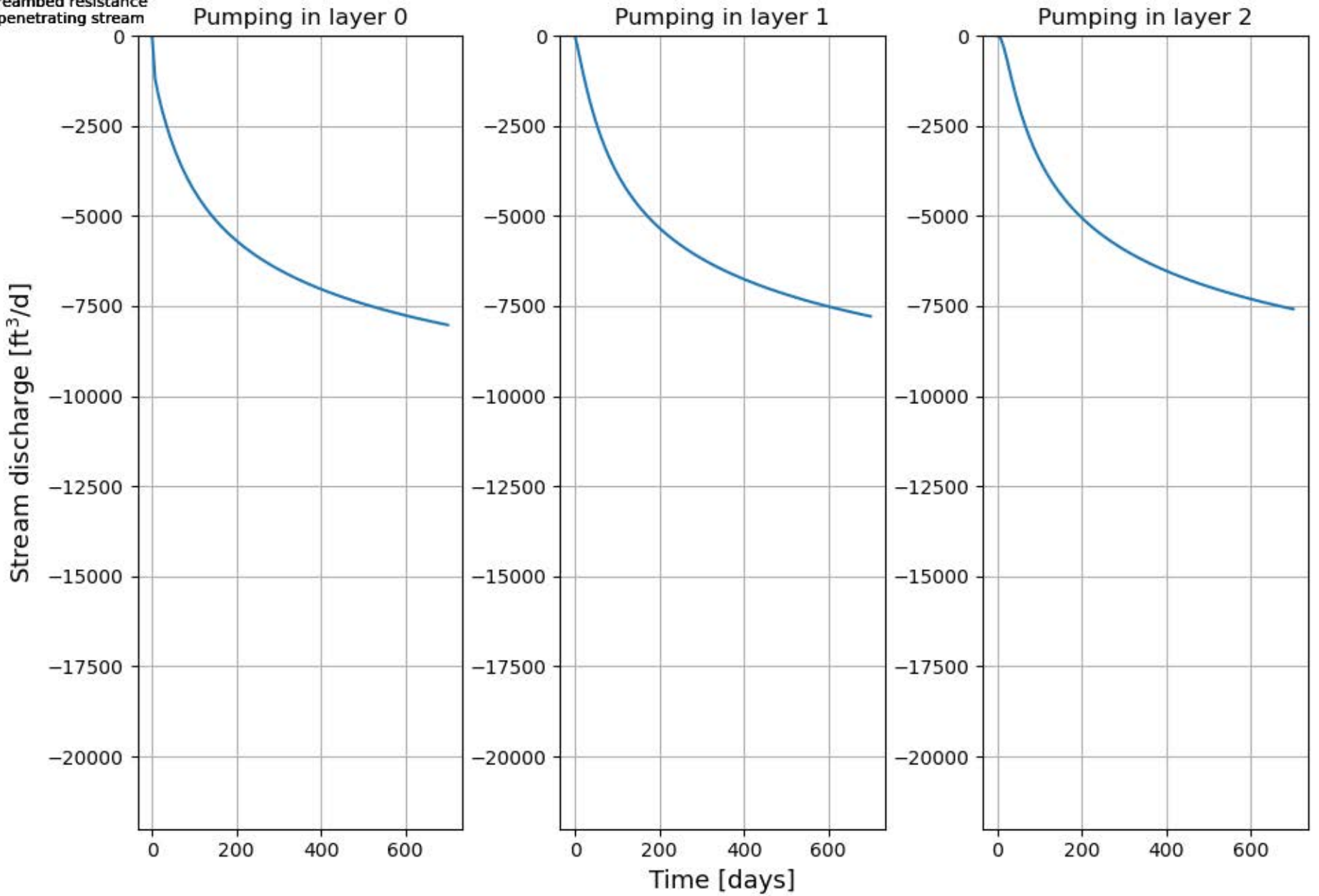
Stream depletion (cfs) after 700 days: -0.0306

Stream depletion (cfs) after 700 days: -0.0256


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
−3.0
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2

Pumping Rate = 23852 ft^3/d
K = 130 ft/d
S = 0.02
Stream to well distance = 1000 ft
Unconfined Aquifer
No streambed resistance
Fully penetrating stream

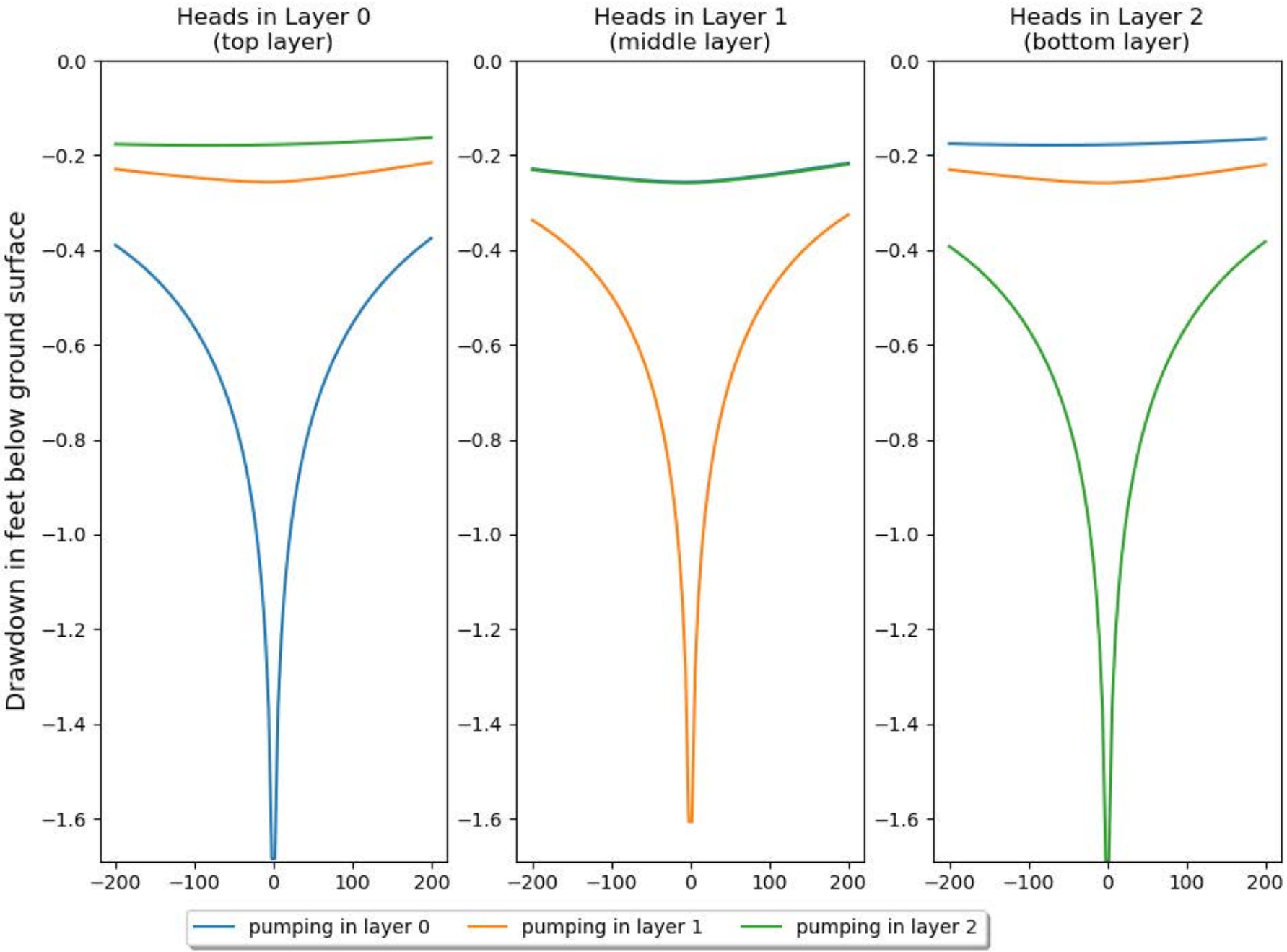
Depth of layer 0 (uppermost layer): 0' – 100' below ground surface
Depth of layer 1 (middle layer): 100' – 200' below ground surface
Depth of layer 2 (bottom layer): 200' – 300' below ground surface



Stream depletion (cfs) after 700 days: -0.0929

Stream depletion (cfs) after 700 days: -0.0901

Stream depletion (cfs) after 700 days: -0.0878


Heads in Layer 0
(top layer)
Heads in Layer 1
(middle layer)
Heads in Layer 2
(bottom layer)
Drawdown in feet below ground surface
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
−1.2
−1.4
−1.6
−200
−100
0
100
200
pumping in layer 0
pumping in layer 1
pumping in layer 2