IMPROVE STATE AND PUBLIC GROUNDWATER QUALITY INFORMATION

Surface water is the property of the state, but groundwater is considered private property and belongs to the landowner above it. Owners residing above the same aquifer can influence the quantity and quality of each other's supply. Private or domestic wells can be used for various purposes, such as irrigation, drinking water and industrial uses. Groundwater information regarding quality is less robust than it is for surface water or public drinking water systems. For example, of the approximately 140,000 wells in the Texas Water Development Board groundwater database, the agency has information related to whether the well meets drinking water standards for approximately 8.0 percent of those wells. The Texas Water Development Board estimates that approximately 1.5 million water wells have been drilled in Texas since 1900.

Information that the state collects shows that harmful contaminants such as arsenic, radionuclides, and nitrates have been detected throughout the state. In its report to the Eighty-fifth Legislature, Regular Session, 2017, the interagency Texas Groundwater Protection Committee identified 3,426 groundwater contamination cases during calendar year 2017. According to academic studies and evaluations conducted by the Texas A&M AgriLife Extension Service, the majority of landowners with private wells do not test the quality of their water. Private well owners are not required to test for water quality; therefore, they run the highest risk of being exposed to contaminants. Owners also may expose others that consume water from the same aquifer segment to contaminants, such as through an abandoned well. Readily accessible information to the public regarding an area's contaminant risks is not available.

FACTS AND FINDINGS

- Although the number of water disease outbreaks has decreased nationwide since the 1980s, the proportion of outbreaks originating from groundwater sources has increased.
- Private water wells are not required to be tested for water quality. However, during the sale of the property, the source of the water supply and condition of the well are required to be disclosed.
- Statute requires the Texas Commission on Environmental Quality to mail copies of certificates of Municipal Setting Designations, which informs those within a municipal territory that groundwater is not potable, to nearby well owners as part of notification requirements of nonpotable groundwater sources.

CONCERNS

- Statute requires landowners to be notified by mail in case of groundwater contamination within 30 days. However, according to Texas Commission on Environmental Quality staff, no comprehensive list of well owners in the state has been compiled, which complicates timely notification.
- According to Texas Commission on Environmental Quality staff, the requirement to mail notices of Municipal Setting Designation certificates is a redundant and unnecessary activity.
- According to survey information, from 65.0 percent to 80.0 percent of well owners have never had their groundwater tested for contaminants. Guidance regarding potential contaminants and testing facilities is not readily available.
- The state collects water quality data related to approximately 8.0 percent of all water wells reported into the Texas Water Development Board groundwater database. Additional opportunities to collect information voluntarily from those well owners that perform drinking water tests is available but is not pursued because no system is in place to receive and integrate these results with other state water data sets.
- Texas Department of Licensing and Regulation staff estimates approximately 150,000 water wells in the state are abandoned or unplugged. According to the Texas Groundwater Protection Committee, these wells represent a significant threat to groundwater quality because contaminated runoff can enter an aquifer directly via the well.

OPTIONS

- **Option 1:** Amend statute to authorize the Texas Commission on Environmental Quality to notify private well owners of potential contamination through email, doorknob hanger or other delivery methods.
- **Option 2:** Amend statute to authorize the Texas Commission on Environmental Quality to notify applicable entities of a Municipal Setting Designation certificate via a website, in lieu of mailing copies of the certificate.
- **Option 3:** Include a rider in the 2020–21 General Appropriations Bill requiring the Texas Water Development Board, with the assistance of members of the Texas Groundwater Protection Committee, to modify existing databases and provide additional, consolidated, location-specific information to the public, including groundwater quality, contamination events, and nearby certified testing facilities.
- **Option 4:** Amend statute to require the Texas Commission on Environmental Quality to establish a process with accredited laboratories to receive water quality testing data. An opt-out provision would be provided to those not wishing to share that information with the state.
- **Option 5:** Amend statute to increase information reported to buyers and to the state about abandoned wells during the real estate disclosure process and require that the Texas Department of Licensing and Regulation is notified if an abandoned well is identified.
- **Option 6:** Amend statute to establish a statewide abandoned water well-plugging program administered by Groundwater Conservation Districts and the Texas Department of Licensing and Regulation, funded through one of the following mechanisms:
  - establish a fee on new water well construction; or
  - appropriate an existing state revenue source, such as General Revenue Funds, or by expanding the allowable use of the General Revenue–Dedicated Account No. 655, Petroleum Storage Tank Remediation.

DISCUSSION

Two primary sources of water provide consumable use: groundwater and surface water. Surface water is found in ponds, lakes, rivers, streams, and bays. Groundwater filters down from the earth's surface and accumulates underground in aquifers. More than half of the water used in Texas, including domestic, agricultural, and industrial uses, is supplied by aquifers for various purposes.

In Texas, surface water is owned publicly and governed by the state. Before using surface water, a permit must be obtained from the Texas Commission on Environmental Quality (TCEQ). A permit may be granted only if the applicant makes beneficial use of water; if water is available and its use does not impair vested water rights; if the applicant practices water conservation; and if the use of water is not detrimental to public welfare.

In Texas, groundwater is considered property of the landowner. A landowner has the right to capture the water beneath the property and to sell, lease, and move the water pumped from that property to another location. This rule, referred to as the rule of capture, was adopted by the Supreme Court of Texas in 1904. Groundwater use or actions that affect the quality of that water can affect that supply and the quality of water available to neighboring property owners that use that same portion of an aquifer.

Groundwater conservation districts (GCD) are local governmental organizations in Texas that are responsible for groundwater management. GCDs manage groundwater by adopting rules in accordance with the provisions of the Texas Water Code and their enabling legislation. Texas Water Code, Chapter 36, authorizes GCDs to regulate groundwater production through permitting of applicable water wells, well-spacing requirements, and other rules deemed necessary to conserve, preserve, protect, recharge, and prevent waste of groundwater, and to control subsidence, which is the gradual caving in or sinking of land. As of August 2018, Texas had 100 GCDs with two more pending confirmation, serving more than two-thirds of the state's land area.

The federal Safe Drinking Water Act (SDWA) protects public drinking water supplies throughout the U.S. Pursuant to the SDWA, the U.S. Environmental Protection Agency (EPA) sets standards for drinking water quality. The EPA, state governments, tribes, water systems, and water system operators collaborate to provide safe drinking water. EPA, delegated states, and tribes regulate public drinking water systems that provide drinking water to 90.0 percent of the

U.S. population. A public water system provides water for human consumption through pipes or other constructed conveyances. According to TCEQ data from June 2017, 79.2 percent of water used by public water systems was derived from groundwater sources. Additionally, 78.0 percent of the water for agricultural use comes from groundwater. EPA does not regulate private wells nor does it provide recommended criteria or standards for individual wells.

The Seventy-first Legislature, Regular Session, 1989, established the policy of nondegradation of the state's groundwater resources as the goal for all state programs. The state's groundwater protection policy recognizes the following factors:

- variability of the state's aquifers in their potential for beneficial use and susceptibility to contamination;
- value of protecting and maintaining present and potentially usable groundwater supplies;
- need to keep present and potential groundwater supplies reasonably free of contaminants for the protection of the environment and public health and welfare; and
- importance of existing and potential uses of groundwater supplies to the economic health of the state.

The state's groundwater protection policy requires that the discharge of pollutants, disposal of waste, and other regulated activities are conducted in a manner that will maintain current uses and not impair potential uses of groundwater or pose a public health hazard. The Seventy-first Legislature, Regular Session, 1989, established the Texas Groundwater Protection Committee as an interagency committee to coordinate state actions for the protection of groundwater quality. The committee is administered through TCEQ and is composed of the following state agencies and the nonprofit Texas Alliance of Groundwater Districts:

- TCEQ;
- Texas Water Development Board (TWDB);
- Railroad Commission of Texas;
- Department of State Health Services (DSHS);
- Texas Department of Agriculture (TDA);
- Texas State Soil and Water Conservation Board (TSSWCB);
- Texas A&M AgriLife Research;
- University of Texas Bureau of Economic Geology; and
- Texas Department of Licensing and Regulation (TDLR).

GROUNDWATER CONTAMINANTS

According to Texas A&M AgriLife Research staff, the lack of requirements for owners of private water wells to perform routine water quality testing increases the risk of exposure to compromised water quality. Public drinking water systems are required by federal and state law to perform extensive testing for many potential contaminants. The public water systems often have systems in place to address contamination issues if they arise. According to a 2010 study published by the American Society for Microbiology, cases of drinking water disease outbreaks have decreased for public water supply systems nationwide since the 1980s. However, the proportion of remaining outbreaks coming from groundwater, particularly those affecting private wells, has increased. The federal Centers for Disease Control and Prevention (CDC) cites a variety of potential sources of contamination of groundwater, including the following most common sources:

- naturally occurring chemicals and minerals, such as arsenic, radon, and uranium;
- local land use practices, such as fertilizers, pesticides, livestock, animal feeding operations, and biosolids application;
- manufacturing processes;
- sewer overflows; and
- malfunctioning wastewater treatment systems (e.g., nearby septic systems).

Unlike surface water, groundwater typically is not classified as contaminated or impaired. Total dissolved solids (TDS) are a measure, typically expressed in milligrams per liter (mg/l), of the salinity and minerals dissolved in water. Groundwater can be classified according to its potential use, by salinity levels, in the following measurements:

- 1–1,000 mg/l TDS content is considered fresh water, suitable for human consumption and all other uses;

- greater than 1,000–3,000 mg/l TDS is considered slightly saline, suitable for livestock, irrigation, industrial use, mineral extraction, oil and gas production, and human consumption if fresh water is unavailable;
- greater than 3,000–10,000 mg/l TDS is considered moderately saline, suitable for industrial use, mineral extraction, and oil and gas production. If fresh and slightly saline water are unavailable, moderately saline water may be used for livestock and for human consumption after relatively economical treatment; and
- greater than 10,000 mg/l TDS is considered very saline to brine, suitable only for mineral extraction and for oil and gas production without extensive treatment.

According to TWDB's 2011 *Aquifers of Texas* study, the majority of groundwater used for drinking in Texas meets TDS and EPA maximum acceptable levels for specific contaminants. However, in some parts of the state, naturally occurring levels of certain substances and human-caused contamination prevent the water from meeting those standards. At certain levels, some minerals, such as nitrate, fluoride, arsenic, and other heavy metals, may render fresh and slightly saline water unsuitable for human consumption. High levels of arsenic in drinking water can cause cancer and other health problems. TWDB's 2011 report indicates that wells with arsenic levels that exceed federal standards can be found throughout the state, but they are most concentrated in western and southeastern Texas. Radionuclide also can cause cancer and has been identified in concentrations exceeding federal levels in wells throughout the state, particularly in central and western Texas. Nitrates in drinking water can cause blue baby syndrome in infants and are found in high concentrations in wells in central and western Texas and the Panhandle region. Bacteria also may render fresh and slightly saline water unsuitable for human consumption without disinfection.

According to the Water Quality Association, a national water treatment industry group, during and after heavy rains, water can become contaminated with microorganisms such as bacteria, sewage, heating oil, agricultural or industrial waste, chemicals, and other substances that can cause serious illness. Hurricane Harvey inflicted heavy rainfall and damage, predominately on the Texas Gulf Coast, in August 2017. Hurricane Harvey is tied with 2005's Hurricane Katrina as the costliest tropical cyclone on record, causing $125.0 billion in related damages, primarily from flooding in the Houston metropolitan area. After Hurricane Harvey, nearly 60.0 percent of water samples from 50 private wells in Harris County tested positive for bacteria found in feces, including total coliform and escherichia coli. Federal and state law do not require the monitoring or regulation of the water quality of private wells, even after flooding events. According to staff at the Texas Water Resources Institute (TWRI), a unit of Texas A&M AgriLife Research, the lack of state oversight and monitoring of groundwater quality is a concern for planning and management of this resource, particularly as it relates to flooding events and their potential effects on groundwater resources via inundated water wells. TCEQ, through the Texas Groundwater Protection Committee (TGPC), coordinated with TWRI and the Texas Well Owners Network program, offered by the Texas A&M AgriLife Extension Service, to assist private water well owners who requested assistance after Hurricane Harvey. The agencies posted guidance and resources on their websites regarding how to determine whether water was safe to drink, including how to sample and disinfect a private well.

EMERGING CONTAMINANTS

In addition to contaminants for which state agencies test, other substances may also affect groundwater quality. Any biological or chemical substance (e.g., pharmaceuticals, personal care products, and new chemical formulations) that is not currently monitored or regulated but could enter the environment and is known or suspected to cause adverse ecological or human health effects is considered an emerging contaminant. According to TCEQ staff, the agency has not established standards for emerging contaminants such as perfluoroalkyl and polyfluoroalkyl substances. These substances are referred to more commonly as PFAS but can include other chemicals. PFAS can be found in common consumer products, such as cookware and stain repellents, and they have been found in contaminated water. Studies on the effects of these chemicals on animals and humans has shown that increased or prolonged exposure can affect the immune system and cause increased cholesterol levels and cancer. TCEQ staff stated that if new federal regulations address this topic, the agency would review and determine whether to adopt equally stringent state standards. In the context of site-specific environmental remediation projects, however, TCEQ has established soil and groundwater cleanup standards for 16 PFAS in its Texas Risk Reduction Program (TRRP). These types of projects are isolated to

releases made from specific sources, including petroleum storage tanks, industrial solid waste facilities, and municipal hazardous waste facilities. As such, entities that produced or used PFAS and contaminated soil or groundwater may be required to mitigate those sources if they are subject to TRRP.

According to TWRI staff, emerging contaminants, particularly PFAS, are a significant concern for water quality in the state. Studies indicate that exposure to PFAS of greater than the advised EPA levels may result in adverse health effects. These include developmental effects to fetuses during pregnancy or to breastfed infants; cancer; and effects to the liver, immune system, or thyroid. Limited information is available nationwide, including in Texas, and federal guidance on how to address PFAS if detected also is limited. PFAS could be addressed in accordance with the federal Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as the Superfund. According to EPA, site-specific conditions inform how to determine cleanup levels, and, as of September 2018, the federal agency is developing groundwater cleanup recommendations for PFAS at Superfund sites. Several states, including Michigan, New Jersey, and Vermont, have taken steps to categorize and provide maximum contaminant level thresholds for PFAS. TGPC recommends that the state improves the detection, quantification, and research on the environmental and human health effects of emerging contaminants in groundwater.

TRACKING WATERBORNE ILLNESS

No comprehensive studies exist regarding the percentage of private wells in Texas that have water quality contaminants. Survey studies performed in Pennsylvania, Wisconsin, and Virginia, indicate that 40.0 percent to 58.0 percent of private wells in those states exceed at least one federal Safe Drinking Water Act health-based standard, most commonly for bacterial contamination. TWDB considers bacteria, nitrates, and nitrites as significant health threats from untreated groundwater. These contaminants can cause gastro-enteric illness and represent immediate risks to young children and pregnant mothers. In North Carolina, 99.0 percent of statewide emergency-department hospital visits for acute gastrointestinal illness associated with exposure to waterborne microbial contaminants were attributable to private-well contamination.

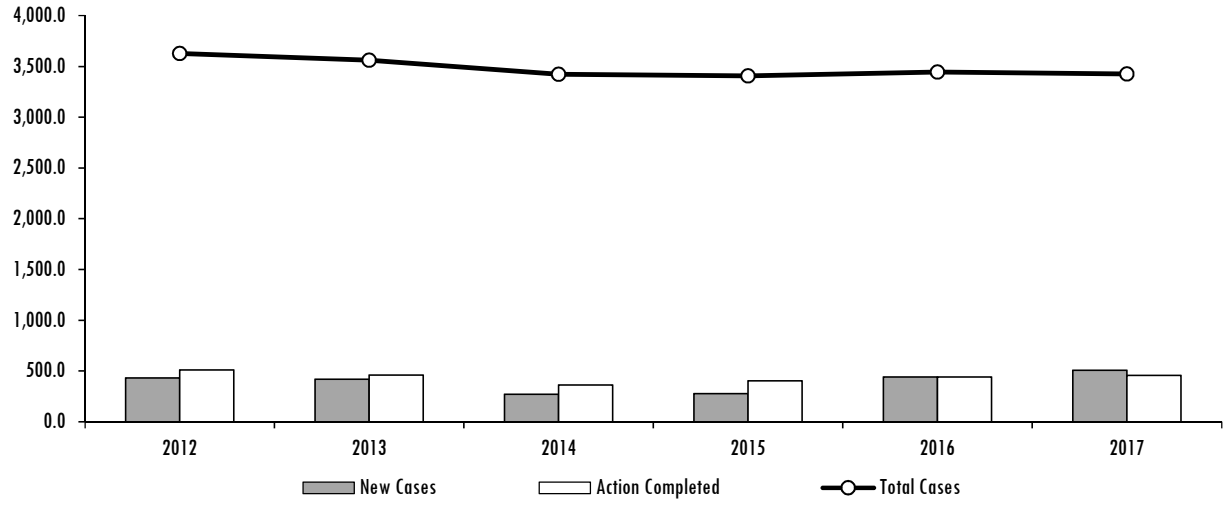
Texas has no systematic way to track whether illnesses are caused by private-well contamination and notify others at risk from the same source. According to staff at DSHS and TCEQ, neither agency actively tracks the number or source of waterborne illness in the state, or links illnesses with possibly contaminated water supplies. DSHS staff, referencing the federal National Outbreak Reporting System, traced the primary mode of transmission in 18 outbreaks to water from calendar years 2013 to 2017. One-third of these outbreaks were due to legionellosis, which can cause pneumonia and resulted in 250 deaths nationwide in 2017. According to Texas A&M AgriLife Research staff, waterborne illnesses are difficult to track and often are attributed to other causes, such as food poisoning. The DSHS Infectious Disease Control Unit has reporting requirements for infectious diseases, which include waterborne illnesses, and promotes awareness of waterborne illnesses as they arise. According to the CDC, a waterborne disease outbreak is defined as two or more cases that can be linked by time, illnesses, or condition, and to which water could have been a contributing factor. According to TCEQ staff, the agency notifies DSHS in the event that a potential waterborne illness is reported to TCEQ. Additional data would improve the state's ability to determine potential links between illnesses and water sources.

GROUNDWATER CONTAMINATION DATA

According to TGPC's Joint Groundwater Monitoring and Contamination Report, 3,426 groundwater contamination cases were reported during calendar year 2017. Approximately 83.5 percent (2,860) of the documented cases were within TCEQ's jurisdiction. The most common contaminants reported included gasoline, diesel, and other petroleum products. More than half (54.3 percent) of TCEQ's documented contamination cases were reported by the Petroleum Storage Tank Remediation (PSTR) Program. PSTR was established in 1989 to receive fees and funds for corrective and enforcement actions concerning underground and aboveground petroleum storage tanks, including the cleanup of leaks from storage tanks. Other contamination sources include dry-cleaning facilities, landfills, industrial sites, and refineries. The remainder of the cases are within the jurisdictions of the Railroad Commission of Texas (RRC) (565 cases, or approximately 16.5 percent) and GCDs (one case, or less than 0.1 percent).

As shown in **Figure 1**, the number of new and existing groundwater cases and actions completed to address contamination have remained relatively constant in recent years. Total cases represents the sum of new cases, actions completed, and ongoing investigations, and other steps in the monitoring and correction of groundwater contamination events. Addressing groundwater contamination can take a

FIGURE 1
TEXAS GROUNDWATER CONTAMINATION EVENT CASE HISTORY, CALENDAR YEARS 2012 TO 2017



SOURCE: Texas Groundwater Protection Committee.

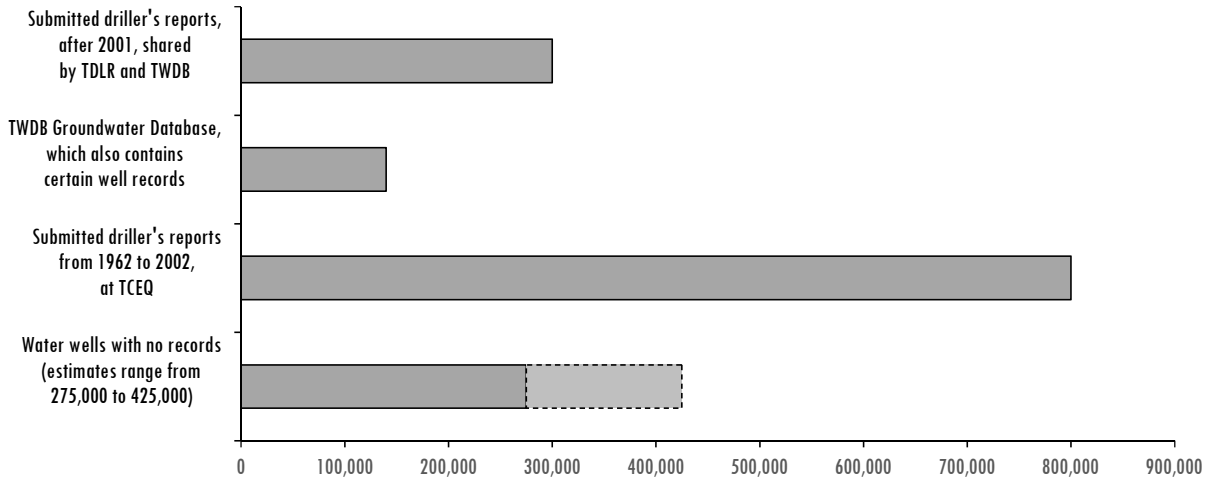
significant amount of time from conducting investigations to cleanup and remediation. According to TGPC staff, the average age of petroleum storage tank cases in the 2017 report is 12.6 years, representing a straightforward cleanup process in relatively shallow groundwater, using proven technology on well-characterized contaminants. The average age of corrective action cases is 17.3 years, representing contaminants that are more difficult to clean up, typically in deeper groundwater zones. The average age of Superfund cases is 21.9 years, representing the most difficult contaminants to clean up, typically in more complex geologic settings and often in deeper groundwater.

GROUNDWATER QUALITY AND WELL DATA COLLECTION PRACTICES

Information about the actual number of wells in Texas and the quality of well water is incomplete. Multiple state agencies collect and track water from the state's wells. According to TWDB staff, approximately 1.5 million water wells have been drilled throughout Texas since 1900, although data describing the quality of those wells is incomplete. TWDB performance measure data shows that, for fiscal year 2018, the agency received approximately 65.2 percent of the information needed to monitor the state's water supplies. This performance measure includes information from seven TWDB program areas. One of these program areas, groundwater Quality Samples, received 44.5 percent of the information necessary to categorize groundwater quality throughout the state. Percentages are derived from information meeting certain quality standards supplied by TWDB and its partners, such as the U.S. Geological Survey. TWDB staff determines the amount of data necessary to monitor various aspects of the state's water supply. The measurement of groundwater quality, as conducted by TWDB, measures naturally occurring constituents and not human-caused contaminants within an aquifer. According to TWDB staff, monitoring for other organic or bacterial constituents or in response to specific, local concerns, may call for more targeted or frequent monitoring.

TDLR performs licensing and testing of water well drillers (WWD) and pump installers. A WWD drills, bores, cores, or constructs a water well. It includes an owner, an operator, a contractor, and a drilling supervisor. A pump installer installs or repairs well pumps and equipment. Since the early 1960s, licensed WWDs have been required to file well reports indicating intended water use, well location, and basic well construction information at the time boreholes are drilled. This information previously was stored in TCEQ's Water Well Report Viewer, which contains older well reports with only construction information related to the well. No additional data is added to this database, and staff state that wells listed are located within an approximately 7.0-square-mile defined grid. Information is stored in the Submitted Drillers Report Database, which began in 2001 and is populated from the online Texas Well Report Submission

FIGURE 2
WATER WELLS IN TEXAS BY DATA SOURCE, FISCAL YEAR 2018



NOTES:
(1) TDLR=Texas Department of Licensing and Regulation; TWDB=Texas Water Development Board; TCEQ=Texas Commission on Environmental Quality.
(2) Well numbers are estimates and may contain overlap in data submitted and recorded by state agencies or other entities, such as U.S. Geological Survey.
SOURCE: Texas Water Development Board.

and Retrieval System, which is a cooperative TDLR and TWDB application.

According to TWDB staff, water quality data can be provided in water well reports; however, if any is provided, it is limited to a broad qualitative description (e.g., salty) rather than measured results. If an individual drills a water well on privately owned property for personal use, that driller is not required to be licensed. However, the well must be constructed in compliance with the construction standards prescribed in law. **Figure 2** shows the estimated number of water wells in the state and the source of information about those wells.

During the last century, TWDB has received access from TDLR and TCEQ to some water-quality data from approximately 57,000 of the 140,000 wells in its groundwater database, and information related to springs and oil and gas tests. Approximately 11,400 of these wells, or 20.0 percent, provide groundwater for public drinking water systems regulated by the TCEQ. These wells are required to conduct water quality testing and report the results to TCEQ to demonstrate compliance with applicable drinking water standards. This data is the most accurate source of groundwater quality analysis, representing 0.8 percent of the estimated 1.5 million wells in Texas. Neither the TWDB nor TCEQ databases contain verified geolocation information, nor do they necessarily contain accurate or complete owner address data. TDLR typically collects samples for water quality analysis by request when a complaint about poor water quality is reported or if the agency has reason to consider that the well has deteriorated.

NOTIFICATION OF GROUNDWATER CONTAMINATION

The Texas Water Code, Section 26.408, requires state agencies that are aware of groundwater contamination that may affect a drinking water well to notify TCEQ, which is required to notify nearby well owners and any related GCD that may be affected. This notification is required to be sent through first class mail within 30 days of TCEQ being informed of the contamination. According to TGPC data for calendar year 2017, TCEQ used 27 days, on average, before notifying well owners that groundwater was contaminated.

According to TGPC staff, in instances in which TCEQ is required to provide a notice of groundwater contamination, the TDLR water well driller database is not sufficient to provide accurate or complete mailing addresses. TCEQ staff must conduct research to find mailing addresses for well owners, which can be time-consuming. Option 1 would amend the Texas Water Code, Chapter 26, to remove the requirement that notification of potential contamination must be sent to well owners via postal mail. Other direct

means such as email, a doorknob hanger, or other delivery methods may be more effective and expeditious ways of notifying private water well owners. TDLR does not capture email addresses on well reports. The executive director of TDLR prescribes the content of the forms and, as part of Option 1, would be required to collecting additional contact information, to ease future communication efforts, such as an email address.

NOTIFICATION OF MUNICIPAL SETTING DESIGNATIONS

The Seventy-eighth Legislature, Regular Session, 2003, established a Municipal Setting Designation (MSD), which provides a less expensive and faster alternative to existing environmental regulations governing the investigation and cleanup of contaminated groundwater. A property owner, including a local government, may submit a request to TCEQ to establish an MSD for a property within the requestor's jurisdiction. This designation certifies that groundwater at the property is prohibited from potable use because it is contaminated in excess of the applicable potable-water standards. The prohibition must be in the form of a city ordinance or a restrictive covenant that is enforceable by the city and filed in the property records. By offering this alternative to address the problem of contaminated groundwater that will not be used as potable water, entities may be more inclined to develop and redevelop properties in municipal areas that have contaminated groundwater.

The Texas Health and Safety Code, Section 361.805, requires MSD applicants to submit notice information to any affected municipality, private water well owner and retail public utility within 5.0 miles of the proposed location. Notification must include information specified in the statute, including that the notified party has up to 60 days after receiving the notice to file comments with TCEQ. The applicant must submit copies of the notice letters, including signed delivery receipts to TCEQ. During calendar year 2017, 32 MSDs were certified for a total of 353 MSDs certified since 2003.

The Texas Health and Safety Code, Chapter 361, requires TCEQ to provide certain private well owners, regardless of whether they submitted comments on the MSD application, with copies of the issued MSD certificate. Information about the MSD is provided to affected parties via mail upon application and again upon issuance, which, according to TCEQ staff, is a redundant and unnecessary activity. Option 2 would amend statute to authorize TCEQ to notify affected landowners that the MSD certificate will be published via the TCEQ website. This notification would be part of the initial notification made by an applicant to well owners. According to TCEQ, this notification method would result in administrative savings of approximately $10,000 annually and more efficient communication with certain private well owners. Landowners would continue to have the opportunity to weigh in on the proposed designation and would be informed about how and approximately when to access a certificate online when it is issued. TCEQ still would be required to notify private well owners when a decision regarding an MSD application has been made if the owners commented on the application and provided TCEQ with email addresses for notification.

PUBLIC AWARENESS OF WATER QUALITY

A 2018 study published in the *Journal of Water and Health* assessed public attitudes and perceptions regarding drinking water in Texas. The study found that more than 65.0 percent of Texans receiving their primary drinking water from private supplies, usually their private wells, have never had their water supplies tested. Similarly, the Texas Well Owner Network, an organization administered within the Texas A&M AgriLife Extension Service, routinely asks participants how often they test their wells. Approximately 80.0 percent of respondents state that they have never tested their wells or tested them only once when the wells first were constructed. Most health-related contaminants cannot be seen, tasted, or smelled. As previously described, a significant information deficit exists regarding the quality of groundwater in the state. Information available from sources such as the TWDB 2011 *Aquifers of Texas* study suggests that areas throughout the state have groundwater that is unsuitable for human consumption, unless additional filtration and treatment are applied. Human activity that affects groundwater quality negatively also can affect the water quality for others that consume from the same portion of that aquifer.

PUBLIC ACCESSIBILITY TO WATER QUALITY INFORMATION

Current methods for the public to query water quality data related to groundwater supplies and any reports of contamination are fragmented. Water well and groundwater data are located in several separate online viewers that TWDB and TCEQ manage. Additionally, agencies have no centralized, reporting and tracking system for groundwater contamination data. Case information regarding groundwater contamination is not available in real time because it is compiled annually for TGPC's annual report.

Wisconsin and Rhode Island are examples of states that provide a high level of access to groundwater quality data,

including private well data. The Rhode Island Private Drinking Water Well Information application offers features such as the ability to search for a specific property and to receive a list of recommended tests that should be performed. These features are customized based on location and are updated as new water quality information is provided to the state. According to Rhode Island Department of Health staff, the program was developed at a cost of roughly $36,000 in calendar year 2013. The well data was geocoded from the collection address on state laboratory reports, and was linked to the water quality results. The wellhead protection and hydrology data were imported from a separate data set. New Hampshire implemented an application, known as Be Well Informed, in 2015 to help private well owners interpret their water quality test results and to identify appropriate water treatment options.

The Texas Natural Resources Information System (TNRIS) is a function within TWDB. Pursuant to the Texas Water Code, Section 16.021, what is now TNRIS was established by the Sixtieth Legislature, Regular Session, 1967, to serve Texas agencies and residents as a centralized clearinghouse for data related to natural resources, census, emergency management, and other socioeconomic information. The division houses data including topics related to air quality, radioactive waste, and surface water quality. However, the division does not report on private water well quality-related data. According to the Eighty-fifth Legislature, General Appropriations Act, 2018–19 Biennium, it is expected that TNRIS will respond to 150,000 requests for information per fiscal year.

Option 3 would include a rider in the 2020–21 General Appropriation Bill to require TNRIS, with the assistance of TGPC member agencies, to provide the public with regularly updated and location-specific information regarding groundwater quality, reports of groundwater contamination, and TCEQ-certified laboratory-testing facilities. This option would require TWDB, TCEQ, TDLR, and other TGPC member entities to examine the databases and public information applications developed for potential consolidation or integration. The publicly accessible electronic interface would enable users to access this information by searching for registered wells or addresses or searching by county or region of the state.

Augmenting existing database functionality also would provide more timely and precise information related to groundwater contamination cases that are brought to the attention of state agencies, which include TCEQ, TDA, TSSWCB and RRC. This functionality would decrease the amount of time needed to locate landowners to notify them of potential contamination. Option 3 is consistent with a similar recommendation that TGPC made in its report to the Eighty-fifth Legislature, Regular Session, 2017. According to TGPC, risks associated with not tracking groundwater contamination properly can result in delayed response to new occurrences of contamination or to new contaminants found at an existing site; duplication of investigation or cleanup measures by independent agencies; and unnecessary public exposure to contamination through lapses in notification efforts.

The TWDB groundwater database was restructured during fiscal year 2015. The database accepts additional types of information that previously were not supported, including water quality analysis information, for sites that have accurate latitude, longitude, and depth. TWDB also is developing a public water system viewer, which will enable the public to search for a public water provider using a home address, view the service area of the water system, and link to related agency data. The application is scheduled for public release in January 2019. However, according to TWDB staff, the agency does not yet have an application that enables GCDs or individuals to upload their water-quality data directly into the agency's database. Option 3 also would enhance state resources by enabling well owners to register or amend information regarding their wells online.

Costs will be incurred to improve the system functionality described in Options 3 and 4. Costs could be absorbed among the nine state agencies that participate in TGPC. If costs are determined to be significant, a potential source of funding to augment existing resources is the federal Drinking Water State Revolving Fund (DWSRF), administered in Texas by TWDB. The DWSRF was established to provide financial assistance to political subdivisions for purposes authorized by the federal Safe Drinking Water Act. The DWSRF consists of monies derived from federal grants, loan principal and interest payments, and investment earnings. For state budgeting purposes, DWSRF is a method of finance called an Other Fund, held outside the state Treasury, and expenditures made from the fund do not factor into state budget certification activities.

TWDB assesses fees on loan recipients for recovering administrative costs associated with the DWSRF. These fees are placed in a separate account held outside of the program funds. The fees are an assessment of 2.25 percent of the portion of the DWSRF financial assistance that is provided

and are calculated and assessed in full at closing. According to TWDB staff, the agency could use administrative funds or fees for activities that benefit the collection, monitoring, and communication of water quality information. The balance of funds in the fee account as of fiscal year 2018 was $33.5 million. The purpose of the fund balance is to ensure that sufficient funds are available to support TWDB staff in the administration of outstanding financial DWSRF activities, if federal funding for this program is eliminated, which has not occurred. DWSRF funds also could be used to fund 1.0 full-time-equivalent (FTE) position to manage the TNRIS augmented well data system, to respond to public inquiries regarding the application, and to oversee the development of potential enhancements to communicate additional beneficial information.

INCREASE WATER QUALITY TEST DATA SHARING

The state receives approximately 44.5 percent of groundwater quality information that TWDB determines necessary to assess the quality of the aquifers in the state. A small portion of this data includes water quality information related to bacterial and organic compounds that can pose significant health hazards. Increasing the amount of information that the state receives would facilitate accurate communication with the public about potential health hazards. Increased water quality testing information could inform regulatory decision making about waterborne illnesses and emerging contaminants to ensure the health and safety of Texans.

Governmental entities assist in the collection of groundwater quality data that typically is not shared with TCEQ, TWDB, or TDLR for inclusion in relevant databases. These entities periodically offer regional water testing opportunities to the public, free of charge. For example, in August 2018, the Texas Well Owner Network (TWON) offered residents in Burleson and Milam counties well water testing at no cost. The TWON program is an educational training offered by the Texas A&M AgriLife Extension Service in cooperation with the TSSWCB and other partner agencies and organizations. This event also was sponsored by the Post Oak Savannah Groundwater Conservation District, Texas A&M AgriLife Extension Service, and TWRI. DSHS and TSSWCB also conduct or contract water quality testing. Other entities such as GCDs also may test for water quality; however, GCDs determine their responsibilities related to collecting, analyzing, and monitoring groundwater quality.

The Rhode Island Private Drinking Water Well application contains the results of water quality tests conducted at state-certified testing facilities. Databases managed by the state of Texas do not contain this information. In Texas, certain testing facilities are accredited by TCEQ through the National Environmental Laboratory Accreditation Program. As of fiscal year 2018, 147 facilities were certified for drinking water, and 184 facilities were certified for nonpotable water sources. Becoming an accredited laboratory is a voluntary activity, but the certification process helps to ensure that analysis and data provided by the laboratory is legitimate and conducted according to established standards. TCEQ requires, as part of its quality assurance process, that testing and compliance samples are analyzed by accredited laboratories.

Aside from work that TCEQ funds directly or for analyses the TCEQ laboratory conducts, laboratories do not provide data directly to TCEQ. To expand the state's ability to receive water quality data from external sources, Option 4 would amend statute to require TCEQ to work with certified laboratories to transmit additional testing results to the state. This collaboration could be structured as an opt-out arrangement when samples are submitted for testing. The collaboration would enable the following actions: (1) enhance TWDB's knowledge related to groundwater quality supplies in the state; (2) provide data that DSHS could use as part of its outbreak surveillance activities to link waterborne illnesses to a specific water source; and (3) inform the public regarding local contamination so that private owners can monitor and test their water supplies. The information also would benefit DSHS to collect information related to birth defects, blood lead levels, and cancer and to link illnesses with possibly contaminated water supplies. Additionally, the increase in data available to the state through Option 3 could assist TCEQ in identifying emerging contaminants that warrant additional regulatory scrutiny.

ABANDONED WATER WELLS

Texas A&M AgriLife Extension defines an abandoned water well as a direct conduit from the surface to the aquifer below. Any contaminants on the surface can flow directly into the groundwater without natural filtration from the soil. If a concentrated chemical enters the aquifer through an abandoned well, the health of anyone who uses water from the aquifer, including other nearby wells, could be at risk. Additionally, abandoned wells represent a potential threat to human and animal life because one could fall down a well. According to TDLR staff, the last analysis the agency conducted in 2001 estimated that Texas has 150,000 abandoned wells. The exact number of abandoned wells

cannot be determined because records were not required before 1965. Considering these factors, TGPC has stated that abandoned wells and unplugged test-holes represent a significant threat to the state's groundwater quality.

State law requires landowners or other entities that possess an abandoned or deteriorated well to have the well remediated in accordance with TDLR's standards and procedures. The following methods address abandoned wells: (1) returning the well to an operable state; (2) capping the well to prevent surface water or contaminants from entering it; or (3) plugging the well from the bottom up to more permanently seal it from the aquifer. Landowners are permitted to do this work themselves or to hire a licensed well contractor, provided the quality of work meets legal requirements. If the well is plugged, a report is required to be sent to TDLR and the local GCD, if applicable. GCDs also share the same responsibility to enforce provisions related to abandoned wells, as established by the Texas Occupations Code, Section 1901.255.

To enforce these requirements, TDLR, TCEQ, and the local GCDs entered into a memorandum of understanding, pursuant to the Texas Occupations Code, Section 1901.256, to locate and address abandoned wells. If TCEQ field staff locate a well while performing field inspections, the staff report the well through the TDLR online reporting system. TDLR works with local GCDs to address the well. If the well is determined to be abandoned or deteriorated, TDLR staff will notify the landowner via mail that they have 180 days from the date of that letter to bring the well into compliance. If these requirements are not met, all information is forwarded to the TDLR Enforcement Division to proceed with action. TDLR has an enforcement plan related to the water well driller and pump installer program that includes penalties for landowners that fail to bring an abandoned well into compliance. For a first violation, a landowner can be assessed penalties from $500 to $3,000. For repeat violations, that penalty can be up to $5,000. The Texas Occupations Code provides the executive director of TDLR the ability to enforce, by injunction, an order against anyone who violates the statute. According to TDLR staff, that remedy has not been utilized within the last five years.

According to TDLR staff, during calendar year 2017, 37 wells were investigated in the enforcement process, of which 25 were reported as new abandoned wells. During this period, 16 wells were plugged, one well was determined not to be abandoned, and two complaints were referred to a local GCD for investigation and possible administrative action. Eighteen other wells were in various stages of notification, review, or investigation.

IMPROVING DISCLOSURE DURING SALE OF PROPERTY

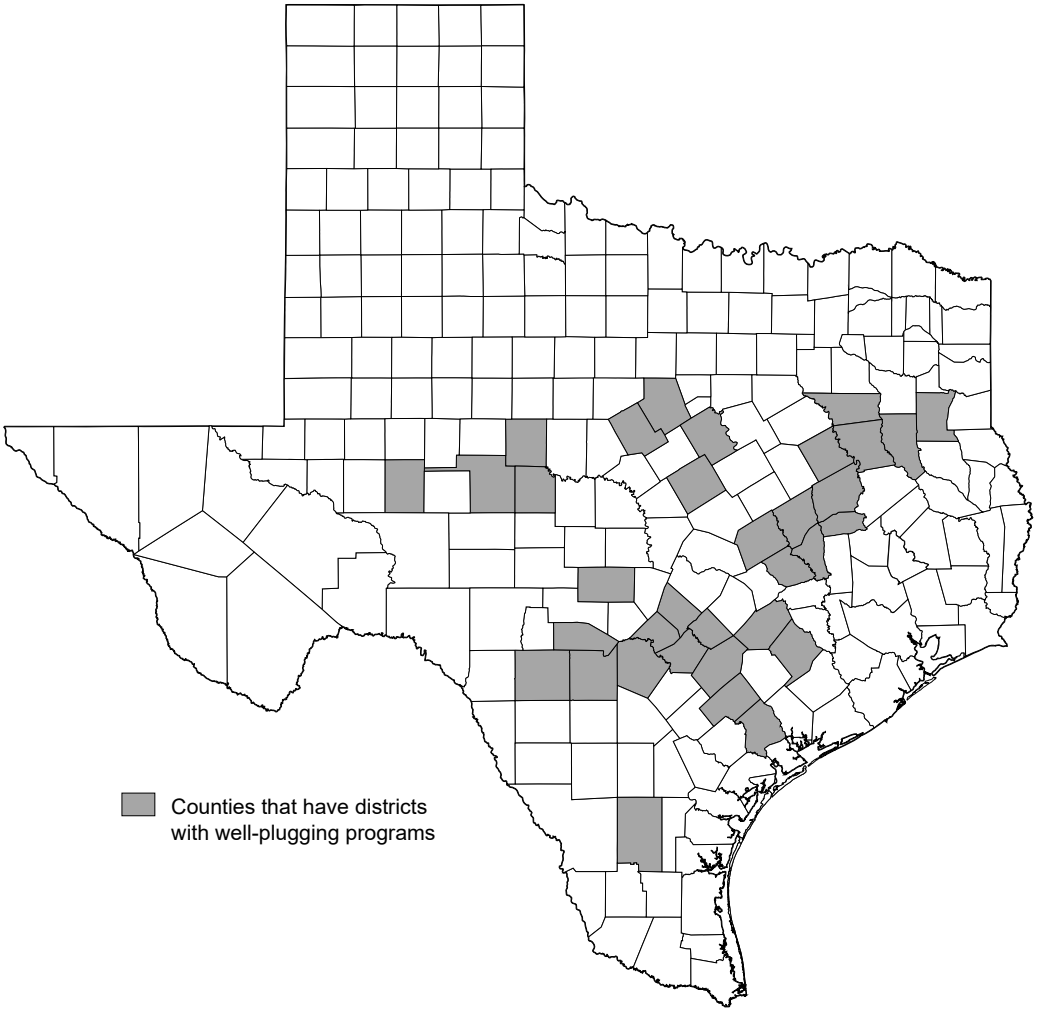
In Texas, real estate sale requirements state that the seller must disclose whether a well is located on the property and what its condition is. However, no water well inspection is required relating to the sale of property. The disclosure of an abandoned well does not compel action to be taken as part of receiving that disclosure. The state also does not receive information that is completed as part of the disclosure process during the sale or transfer of property. The Texas Real Estate Commission prescribes the disclosure forms, but the agency does not receive the completed forms or track the number of sales that include disclosure of a well on the property or its condition. Option 5 would amend the Texas Property Code to require the property transfer disclosure process to include the number of wells that are on the property and their condition. If an abandoned well is found and disclosed, it would be required that the seller convey to the buyer the legal consequences of having an abandoned well before the final sale, and TDLR must be notified immediately of this condition. This notification could be communicated online through TDLR's Abandoned Well Reporting System (AWRS). Any individual that finds an abandoned or deteriorated well can report it through the AWRS.

ESTABLISHING AN ABANDONED WELL PLUGGING FUND

According to an interim report produced by the House Committee on Natural Resources to the Seventy-seventh Legislature, 2001, owners of abandoned wells have little incentive to comply voluntarily with statutory plugging or capping provisions. Some areas of Texas have assistance programs for plugging abandoned wells. According to TGPC information, and as shown in **Figure 3**, at least 17 of 100 GCDs have plugging programs available; however, the scope of these programs varies. For example, eight of the 17 GCDs offer cost sharing or reimbursement, ranging from $300 to $3,000. Others indicate that a program exists, or refer to a third-party contractor to handle the plugging. GCDs that have abandoned well-plugging programs do so of their own volition.

According to TGPC, some GCDs make match-funding available to landowners; however, a state funding source to assist landowners with abandoned well-plugging efforts would result in an increase in the number of wells plugged and, thus, decrease the threats to groundwater quality.

FIGURE 3
TEXAS COUNTIES WITH GROUNDWATER CONSERVATION DISTRICTS THAT HAVE WELL-PLUGGING PROGRAMS
FISCAL YEAR 2014



SOURCE: Texas Groundwater Protection Committee.

Option 6 would amend statute to establish a statewide abandoned water well-plugging program. The option would require TDLR to adopt rules regarding the structure and requirements of the program, including any cost sharing requirements, with authority delegated to GCDs to administer within their territory. Abandoned wells where the landowner cannot be located would be prioritized, followed by those with insufficient funds to address the wells independently. In areas of the state where no GCD exists, TDLR would assume responsibility for that area. TDLR, with the assistance of GCDs, would report to the Legislature regarding the status of abandoned water wells in Texas every five years. One method to fund Option 6 would authorize program costs to be recouped through a new fee that would be added to the cost of new well construction that is performed by a licensed water well driller or pump installer. The Texas Water Code, Chapter 36, provides general authority for GCDs to charge fees and states that revenue from those fees may be used for any lawful purpose. TDLR staff estimate that approximately 15,600 new wells are drilled per year. Assuming additional TDLR administrative costs and that eventually approximately 150 wells would be plugged statewide per year through this program, at a cost of approximately $2,500 per well, this option could result in an estimated fee on new well construction of approximately $32.75. As the number of new wells constructed and number

of abandoned wells that TDLR and GCDs are able to address per year are variable, however, these amounts may be subject to change.

Alternatively, Option 6 could also be funded through existing state revenue sources, such as General Revenue Funds. As another alternative, statute could be amended to expand the allowable uses of an existing revenue source to include these activities. For example, the General Revenue–Dedicated Petroleum Storage Tank Remediation (Account No. 655) is used to pay expenses associated with the state's groundwater petroleum cleanup program. The primary source of revenue for Account No 655 is the petroleum product delivery fee, which is assessed on the delivery of a petroleum product that is removed from a bulk storage facility for distribution or sale within the state. The associated program engages in corrective and enforcement actions concerning petroleum storage tanks, which, according to TGPC, is one of the leading causes of groundwater contamination. As of the beginning of fiscal year 2018, the account had a balance of $134.3 million. According to TCEQ, approximately $82.6 million in ongoing projected cleanup and monitoring costs could be related to releases at 366 petroleum-contaminated sites. A portion of the difference of approximately $51.7 million could be appropriated to incrementally fund the well-plugging program, contingent on amending statute to establish this program funding as an eligible use.

FISCAL IMPACT OF THE OPTIONS

Option 1 would amend statute to modify the method and timeliness of communication by TCEQ with landowners that potentially are affected from groundwater contamination events. No significant fiscal impact is anticipated as a result of the option.

Option 2 would amend statute to authorize TCEQ to notify applicable entities, as part of the Municipal Setting Designation process, regarding the ability to check proposal status and certificates online, in lieu of mailing the certificate. TCEQ staff estimate a savings of $20,540 in associated administrative costs and staff time for the 2020–21 biennium. TCEQ would be authorized to reallocate any realized savings toward other agency priorities.

Option 3 would include a rider in the 2020–21 General Appropriations Bill to require TWDB, with the assistance of TGPC member agencies, to make information technology (IT) and database improvements. These changes would provide agencies and the public with additional information regarding groundwater quality, contamination cases, and nearby testing facilities.

FIGURE 4
FIVE-YEAR FISCAL IMPACT OF OPTIONS 3 AND 4
FISCAL YEARS 2020 TO 2024

YEAR	PROBABLE SAVINGS/(COST) IN DRINKING WATER STATE REVOLVING FUNDS (OTHER FUNDS)	PROBABLE ADDITION/ (REDUCTION) OF FULL-TIME-EQUIVALENT POSITIONS
2020	($500,000)	1.0
2021	($500,000)	1.0
2022	($63,616)	1.0
2023	($63,616)	1.0
2024	($63,616)	1.0

SOURCES: Legislative Budget Board; Texas Water Development Board.

Option 4 would amend statute to require TCEQ to establish a process to receive water-quality-testing information from accredited laboratories, providing an opt-out provision for those not wishing to share this data with the state. IT systems would be augmented to enable easier submission to the state of water quality data from the public and governmental entities. According to TWDB, additional resources would be required to accomplish these provisions. It is estimated that the onetime costs to the TWDB-administered Drinking Water State Revolving Fund for Options 3 and 4 would be less than $1.0 million for the 2020–21 biennium and would require an additional and ongoing 1.0 FTE position to administer and communicate with stakeholders regarding system operations, as shown in **Figure 4**.

Option 5 would enhance real estate disclosure requirements related to abandoned wells and increase TDLR notification of the existence of abandoned wells during the sale of property. It is assumed this can be absorbed within existing resources, and no significant fiscal impact is anticipated.

Option 6 would establish a statewide abandoned water well-plugging program and fund, held outside of the General Revenue Fund but retained within the state Treasury. This program would be administered by GCDs within their territories and by TDLR in areas of the state that are not served by a GCD. It is assumed that TDLR would require an additional 2.0 FTE positions for a Hydrologist II and an Administrative Assistant III for a cost of approximately $135,987.0 per fiscal year. It is assumed that the agency would contract the plugging of abandoned wells to licensed water

FIGURE 5
FIVE-YEAR FISCAL IMPACT OF OPTION 6, ESTABLISHING A FEE ON NEW WATER WELL CONSTRUCTION
FISCAL YEARS 2020 TO 2024

YEAR	PROBABLE SAVINGS/(COST) FROM NEW WATER WELL-PLUGGING FUNDS	PROBABLE REVENUE GAIN/(LOSS) FROM NEW WATER WELL-PLUGGING FUNDS	PROBABLE ADDITION/(REDUCTION) OF FULL-TIME-EQUIVALENT POSITIONS
2020	($280,907)	$280,907	2.0
2021	($260,987)	$260,987	2.0
2022	($385,987)	$385,987	2.0
2023	($385,987)	$385,987	2.0
2024	($510,987)	$510,987	2.0

SOURCES: Legislative Budget Board; Texas Department of Licensing and Regulation.

well drillers or pump installers. An estimated onetime cost to adjust the Texas Well Report Submission and Retrieval System and set up a payment portal through Texas.gov would be $19,920. TDLR's related administrative and contract functions would be paid from revenue deposited to the new fund. According to TDLR staff, it is assumed that the number of abandoned wells addressed for the 2020–21 biennium would be 50 per year, increasing to 150 per year in subsequent years. GCD involvement in administering this program also may affect the number of abandoned wells to be addressed per year, the impact of which cannot be determined. One method to fund Option 6 would require a fee to be collected for construction of new wells, to be remitted to the state and distributed by TDLR to GCDs proportionally. This fee could be based on the number of abandoned wells identified in GCDs' territories. The fee would offset the cost of administering the program; therefore, this would be revenue-neutral to the state, as shown in **Figure 5**.

An additional method to fund Option 6 would use existing state revenue sources, which could be derived from General Revenue Funds or from repurposing an alternate revenue source, such as amending statute to expand the allowable use of the General Revenue–Dedicated Account No. 655. This use of state revenue would result in a cost of approximately $0.5 million for the 2020–21 biennium, as shown in **Figure 6**. The fiscal impact is contingent on fee amounts established by TDLR and the number of wells that feasibly can be addressed per year.

The introduced 2020–21 General Appropriations Bill does not include any adjustments as a result of these options.

FIGURE 6
FIVE-YEAR FISCAL IMPACT OF OPTION 6, USING EXISTING REVENUE SOURCES
FISCAL YEARS 2020 TO 2024

YEAR	PROBABLE SAVINGS/(COST) IN GENERAL REVENUE FUNDS OR GENERAL REVENUE–DEDICATED FUNDS	PROBABLE ADDITION/(REDUCTION) OF FULL-TIME-EQUIVALENT POSITIONS
2020	($280,907)	2.0
2021	($260,987)	2.0
2022	($385,987)	2.0
2023	($385,987)	2.0
2024	($510,987)	2.0

SOURCES: Legislative Budget Board; Texas Department of Licensing and Regulation.