California Underground Facilities Safe Excavation Board

November 13-14, 2023

Agenda Item No. 41 Information Item) – Staff Report

Geographic Information System (GIS) Development Update: Outreach Survey Results

PRESENTER
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SUMMARY
At the July 2023 Board meeting, the Board established a GIS-mapping committee, led by Chair Amparo Muñoz and Carl Voss, to look for opportunities to clarify, perhaps through regulation, what constitutes a "new" subsurface installation pursuant to SB 865. In September, the GIS mapping committee and staff released a survey to learn more about facility operator's adoption and use of GIS for mapping buried facilities. Staff recommends the Board direct staff to develop definitions for the following key terms within statute: "new subsurface installations," "geographic information system," "mapped using GIS," and "permanent records." Staff recommends the Board's GIS Mapping Committee facilitate a workshop to engage stakeholders to identify other opportunities to clarify the implementation of Government Code § 4216.3(c)(5) besides defining "new" subsurface installations.

STRATEGIC PLAN
2020 Strategic Plan Objective: Improve Accessibility of Buried Infrastructure Location Knowledge and Understanding
> 2023 Plan Activity: Determine What New Facilities Need to be Incorporated into Utility Operator Geographic Information Systems (GIS)

BACKGROUND
Effective January 1, 2023, California's Government Code § 4216.3(c)(5)[1] (amended by Senate Bill 865, Chapter 307 of the Statutes of 2020) mandates utility operators use GIS technology for mapping their "new subsurface installations."

In August of 2022, CARCGA raised an issue through the Board's Idea Register: utility operators are not clear on what constitutes a "new" subsurface installation. CARCGA requested the Board

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[1] Government Code § 4216.3(c)(5)

adopt a minimum standard defining "new subsurface installation."[2]

In its *2023 Workplan*[3], the board identified a looking-ahead activity to "look for opportunities to clarify, perhaps through regulation, what constitutes a 'new' subsurface installation pursuant to SB 865."

The Board established a GIS-mapping committee in July 2023, led by Chair Amparo Muñoz and Carl Voss, to look for opportunities to clarify, perhaps through regulation, what constitutes a "new" subsurface installation pursuant to SB 865.

DISCUSSION

To further identify opportunities to clarify what constitutes a "new" subsurface installation pursuant to SB 865, Board GIS mapping committee and staff seek to understand the facility operators' current adoption and use of GIS technology for mapping buried facilities.

Staff created a survey (Attachment A) to understand if facility owners/operators:
- Are mapping their buried facilities using GIS,
- Made a complete transition to digital recordkeeping,
- Integrated GIS fully with asset management and other daily operations, including engineering and operations and maintenance,
- Implemented procedures to maintain their GIS databases thereby ensuring base maps and data layers are complete and accurate.

In addition, the survey gathered insights on the challenges facility operators face when mapping buried facilities within GIS and how their management demonstrates the importance of mapping within their organization.

Staff developed an outreach plan to drive survey participation from facility owners. This plan included outreach to the regional notification centers, selected professional associations, trade associations, and regional councils of government to help publicize the survey. The survey was also distributed to the Board's email service list.

Individuals were given three weeks to participate in the survey.

ANALYSIS OF SURVEY RESULTS

The Board received 103 responses to the survey. Of these, 64 respondents were from government organizations, such as cities and special districts. Thirty-eight respondents were from non-government entities, such as privately owned utilities, oil and natural gas producers or pipeline companies. Four non-government respondents, however, indicated they did not

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[2] CARGA Idea Register Submission, August 2022
(https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=53200&shareable=true)
[3] 2023 Annual Work Plan (https://energysafety.ca.gov/wp-content/uploads/2023-annual-work-plan_ada.pdf)

own or operate any buried facilities. One individual did not specify whether they worked for a government or non-government organization. Some respondents did not answer all the survey questions.

Respondent's Organizational Roles

One hundred and one survey respondents provided information about their role within their organization. The top roles reported – listed in rank order – were:

- *All respondents:* Operations, GIS and Locating,
- *Government*: GIS, Operations and Asset Management, and
- *Non-government*: Operations, Locating and GIS.

Among those involved with GIS, 14 said GIS-related work was their only role within the organization. Asset managers always reported having at least one other role within the organization.

"Other" roles reported by respondents include Board President, Damage Prevention, fulfilling map requests, Information Technology (IT), IT Education, forensics engineering and Office Manager. One individual commented, "I wear many hats at our small district."
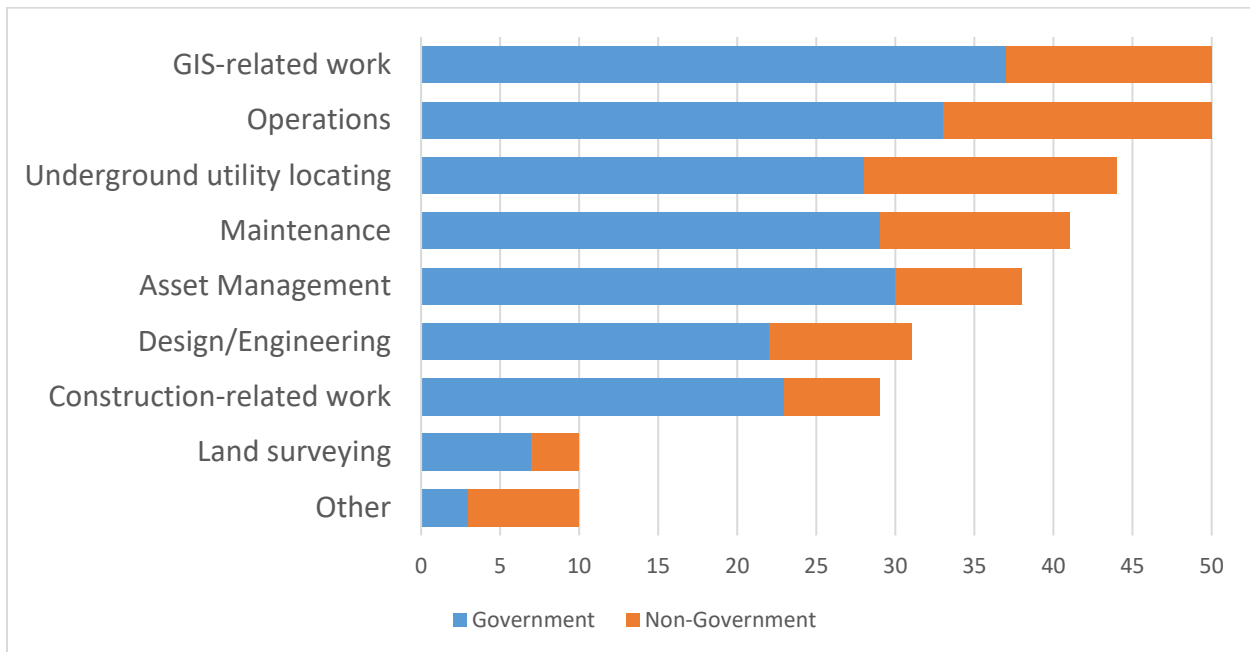

Chart 1: Roles within the Organization Represented by Survey Respondents

Types of Buried Facilities

Ninety-nine operators reported having at least one type of buried facility. Four survey non-government respondents indicated they did not operate any buried facilities. As shown in **Chart 2** below, public works infrastructure was the best represented among survey respondents.
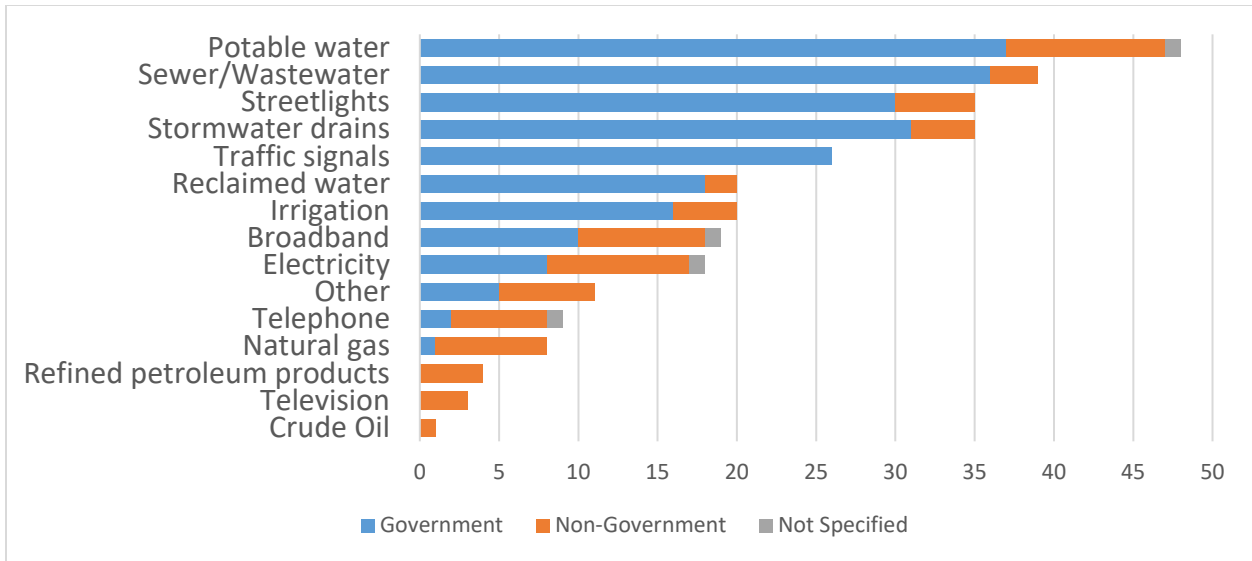
Chart 2: Types of Underground Infrastructure represented by Survey Respondents

Forty percent of respondents to the survey question said they operated just one type of facility. At the other end of the scale, one non-government operator reported responsibility for 11 types of buried facilities.

"Other" types of buried facilities reported by respondents include (non-broadband) fiber optic cable, the State Water Project, 'creeks in pipes' (for a trout farm), a crude coconut oil pipeline and a biogas pipeline.
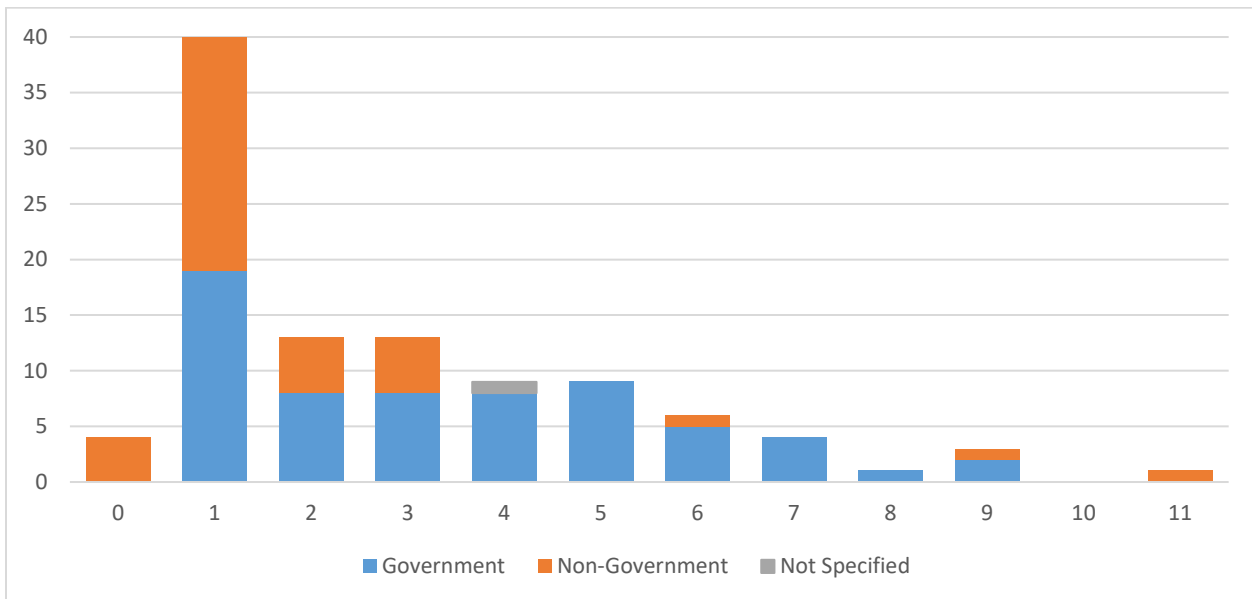

Chart 3: Number of Facility Types Operated per Survey Respondent

Survey responses illustrate the variety and complexity of who owns and operates buried facilities in California:

- Respondents responsible for operating buried power lines are not necessarily electric

utilities,
- Those operating "natural gas" pipelines could be natural gas utilities, oil and gas producers or interstate pipeline companies,
- Broadband companies aren't the only entities responsible for GIS mapping the locations of buried fiber optic cable, and
- Private companies also own and operate stormwater systems.

Underground Facilities Mapped Using GIS

Of the approximately 300 buried facilities represented by respondents, approximately 68 percent of the facility operators have begun mapping their buried facilities.

Sixty-three respondents indicated they have begun mapping all the buried facility types they operate within their organization using GIS. Another ten respondents have begun mapping some of the buried facility types within their organization using GIS, but not all. Twenty-six respondents indicated none of their buried facilities have been mapped using GIS, of which 50% operated multiple facility types.
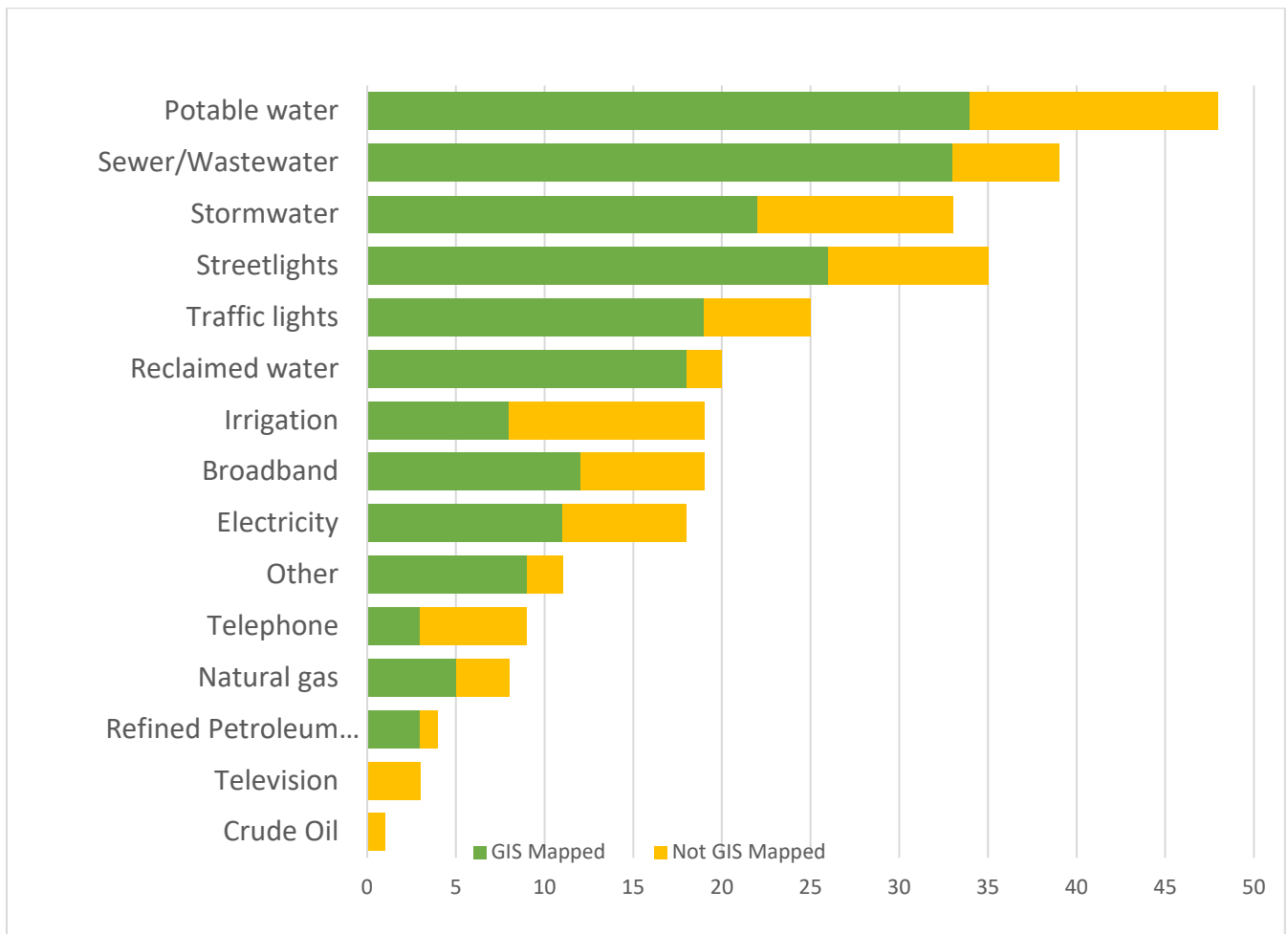

Chart 4: Number of Underground Facilities Mapped using GIS

Chart 4A below provides a breakout of government responses to whether the facility operator is mapping their buried facilities in GIS representing 217 underground infrastructure facilities[4]. Two stormwater and one traffic signal operator, however, skipped the question about whether those systems were mapped using GIS.

Government respondents reported nearly all their reclaimed water, sewer/stormwater and electrical systems are being mapped to some extent in their GIS systems (94 percent, 92 percent, and 88 percent, respectively). Seventy-nine percent of respondents' potable water systems are being mapped in GIS to some extent as well. Only 50 percent of irrigation systems have been mapped.
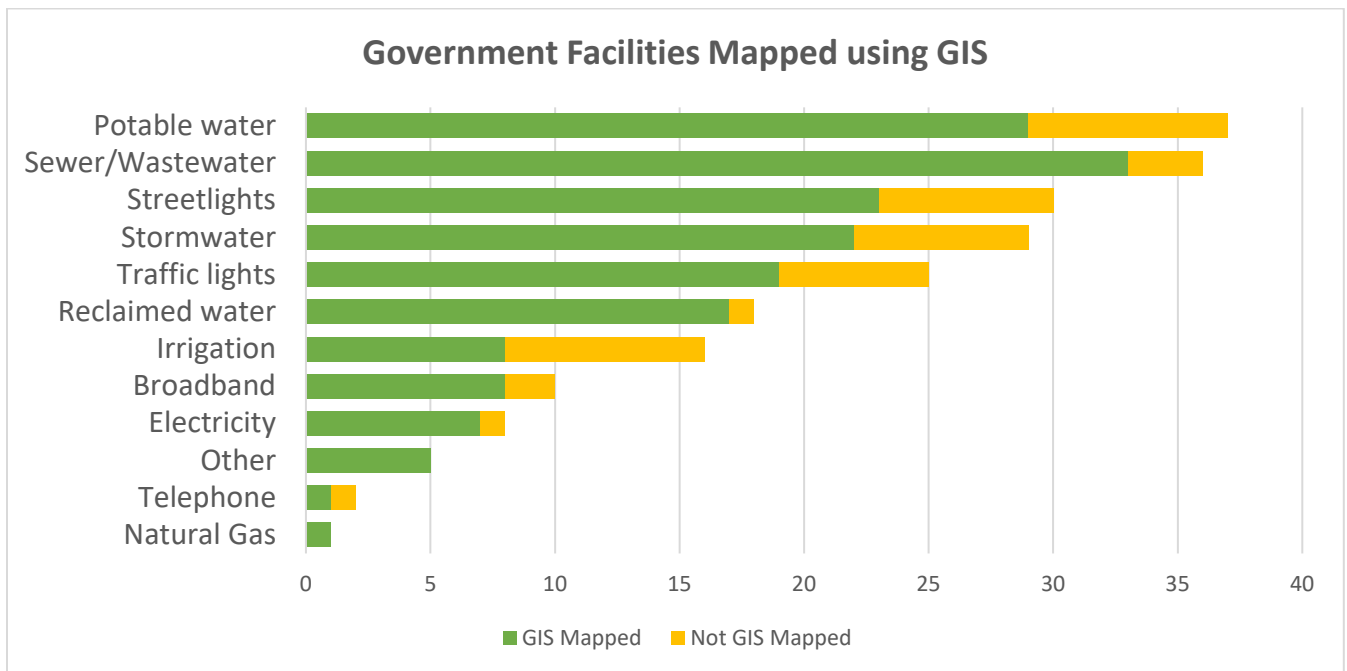

Chart 4A: Underground Facilities Mapped using GIS by Government Survey Respondents

Chart 4B below provides a breakout of non-government responses to whether facility operators are mapping their buried facilities in GIS. It is unclear if the low percentages of mapping buried facilities in GIS is attributable to the small sample size: 38 non-government respondents operating 71 underground systems of various types. For example, only 14 facilities of type stormwater, television, irrigation, sewer/wastewater, and crude oil pipelines were represented in the survey, and none are shown as mapped in GIS.

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[4] **Chart 4A** omits television cable, crude oil pipelines and pipelines for refined petroleum products, because no government respondent claimed operating those types of underground infrastructure.
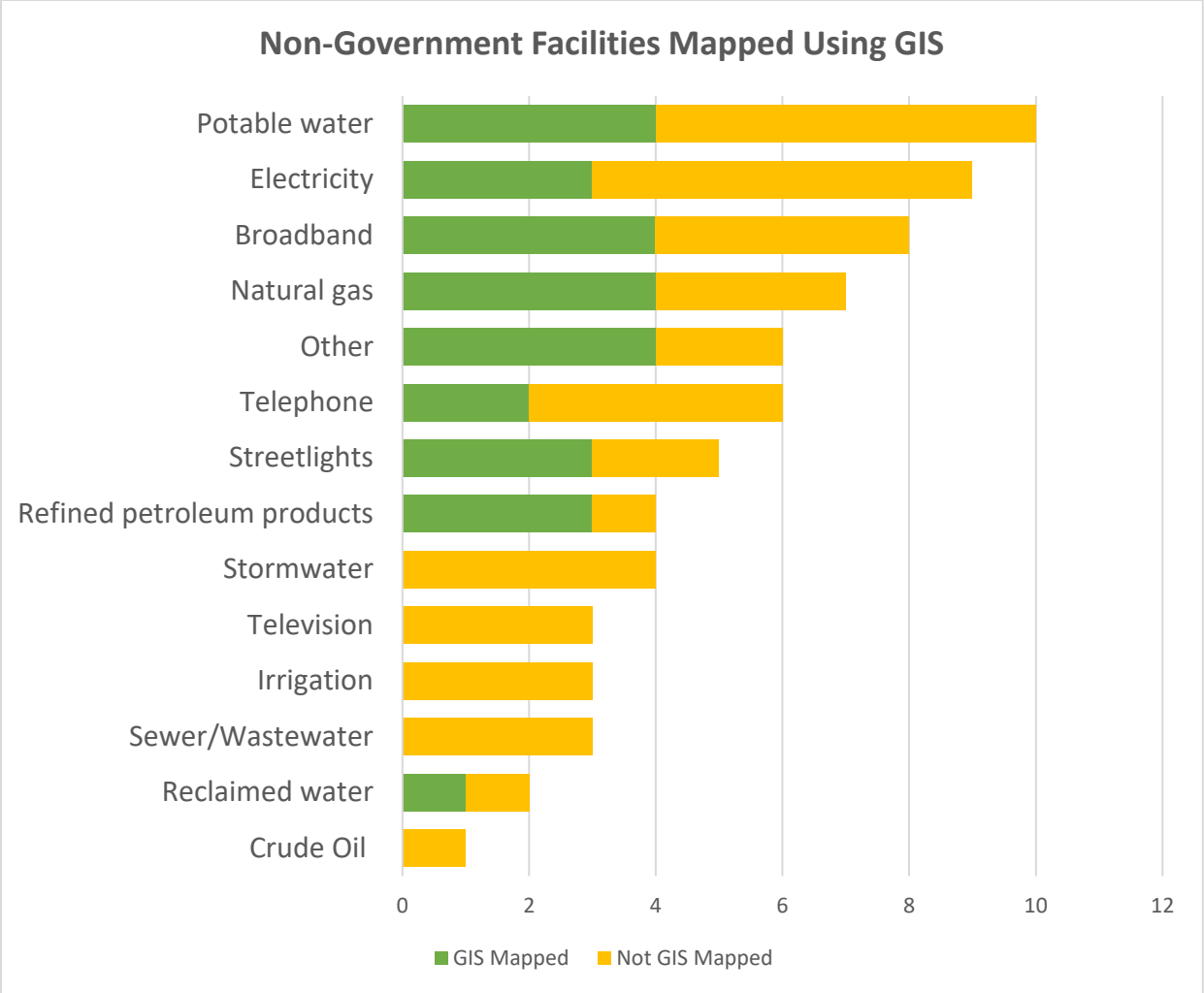
Non-Government Facilities Mapped Using GIS

Facility	
Potable water	
Electricity	
Broadband	
Natural gas	
Other	
Telephone	
Streetlights	
Refined petroleum products	
Stormwater	
Television	
Irrigation	
Sewer/Wastewater	
Reclaimed water	
Crude Oil	

GIS Mapped   Not GIS Mapped

Chart 4B: Underground Facilities Mapped Using GIS by Non-Government Survey Respondents

The respondent who did not specify government or non-government indicated they have started mapping electricity and potable water, but not telephone and broadband.

Percentage of Underground Facilities Mapped Using GIS

Chart 5 below shows the extent to which 200 buried utility systems operated by survey respondents have been mapped in GIS. Both government and non-government respondents estimated more than 80 percent of their facilities have been mapped between 75 and 100 percent. Irrigation facilities showed the lowest percentages mapped (38 percent) for facilities that have been mapped between 75 and 100 percent.
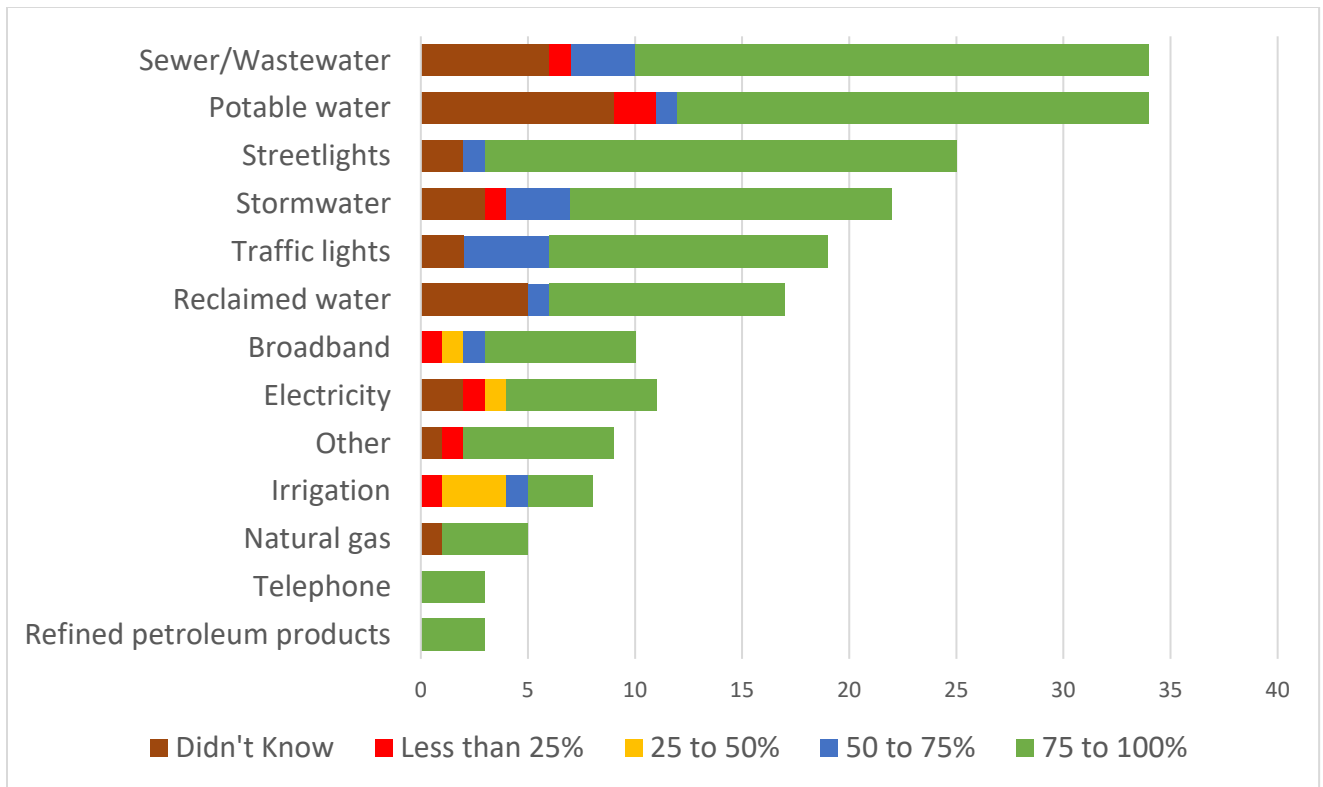
Chart 5: Number of Survey Respondents Reporting GIS Mapping Percentages by Type of Subsurface Installation

Number of Years Spent Mapping Underground Facilities using GIS

Survey respondents representing 199 buried systems provided estimates of the number of years their organizations have been mapping each type of facility. Approximately 64 percent of all facilities have been in GIS for more than five years. Only 25 percent of broadband facilities, however, have been mapped in GIS for more than five years.

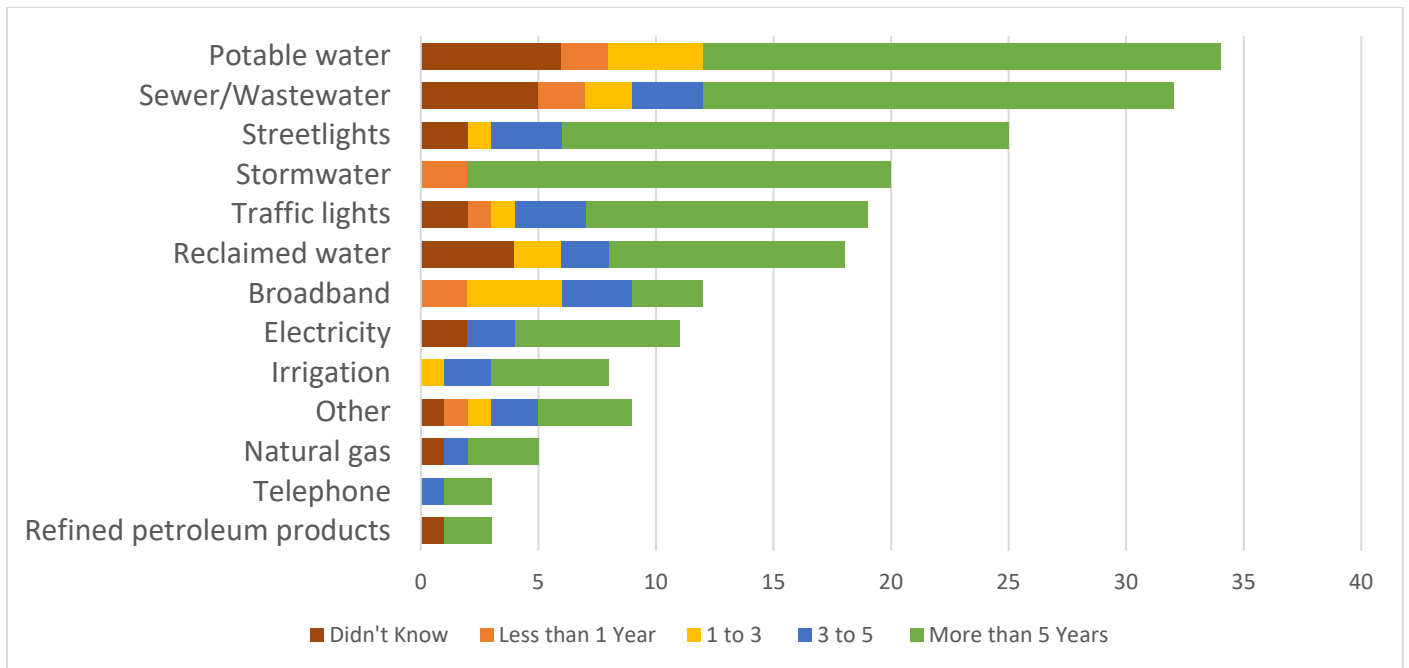One individual commented, "Our utility mapping started some 20 years ago..."

Chart 6: Number of Survey Respondents Reporting Years Spent Mapping their Subsurface Installations

Map Recordkeeping Approaches

Fifty-four respondents revealed that their organization currently store buried infrastructure records via digital and non-digital methods. Eleven respondents reported still using non-digital media, such as mylar overlays, paper maps and other physical documents. Thirty-one respondents reported their organizations now use digital records, such as GIS databases. Six respondents reported that they did not know how the buried infrastructure records were stored.
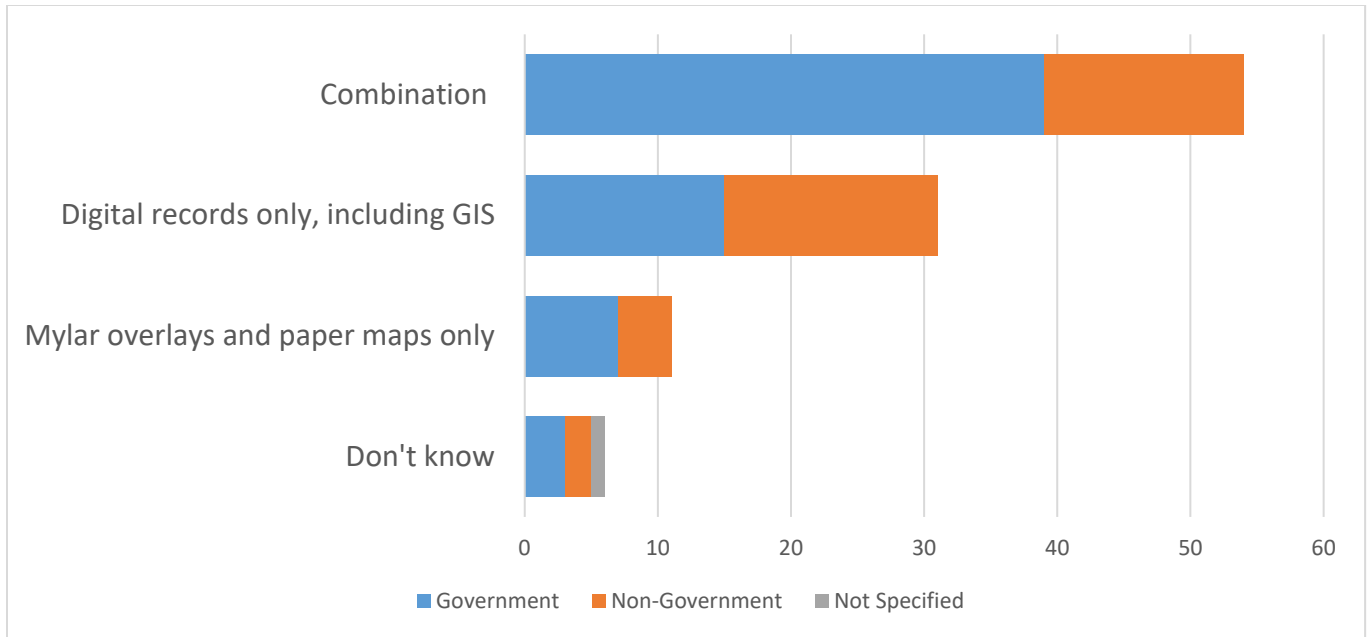
Chart 7: How Survey Respondents Store Records of Buried Infrastructure

Frequency of Basemap Updates

Twenty-one respondents reported they update their basemaps monthly. Three non-government respondents said their basemaps are updated less frequently, either every five years or longer. Twenty-eight respondents did not know the frequency in which the basemap was updated.
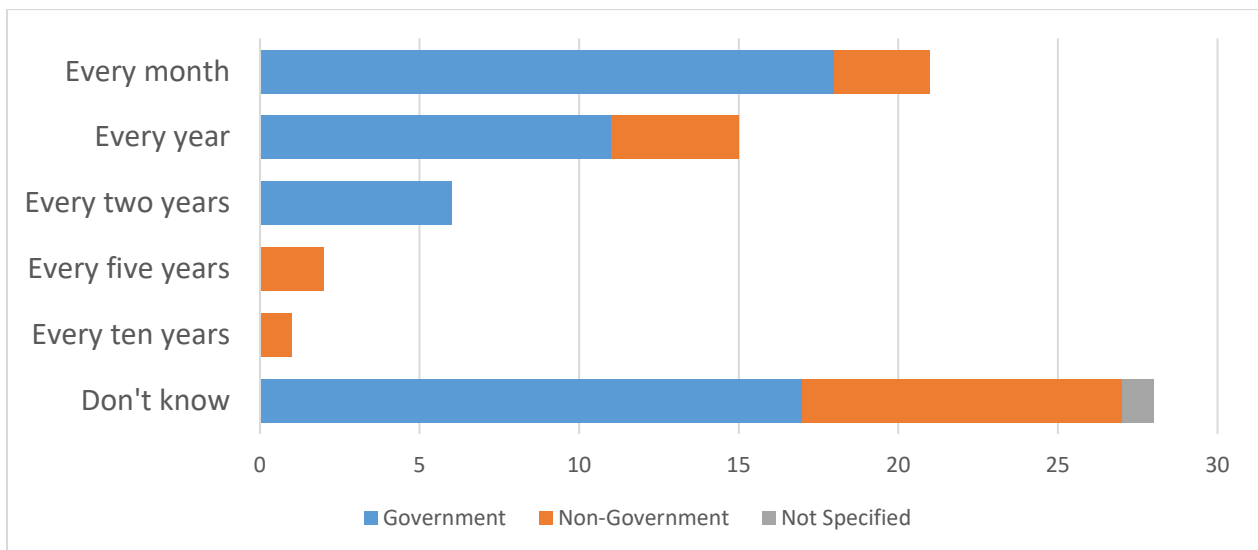

Chart 8: How Frequently GIS Basemaps are Updated by Survey Respondents

Standard Practice for Collecting Updates to GIS Location Data

Fifty-five percent of government respondents reported their organizations use approximate locations from engineering drawings or as-installed construction documents, compared to 17

percent who collect location coordinates in the field. Non-government responses were more evenly distributed: 35 percent used engineering or as-installed drawings versus 27 percent who collected GIS data in the field.
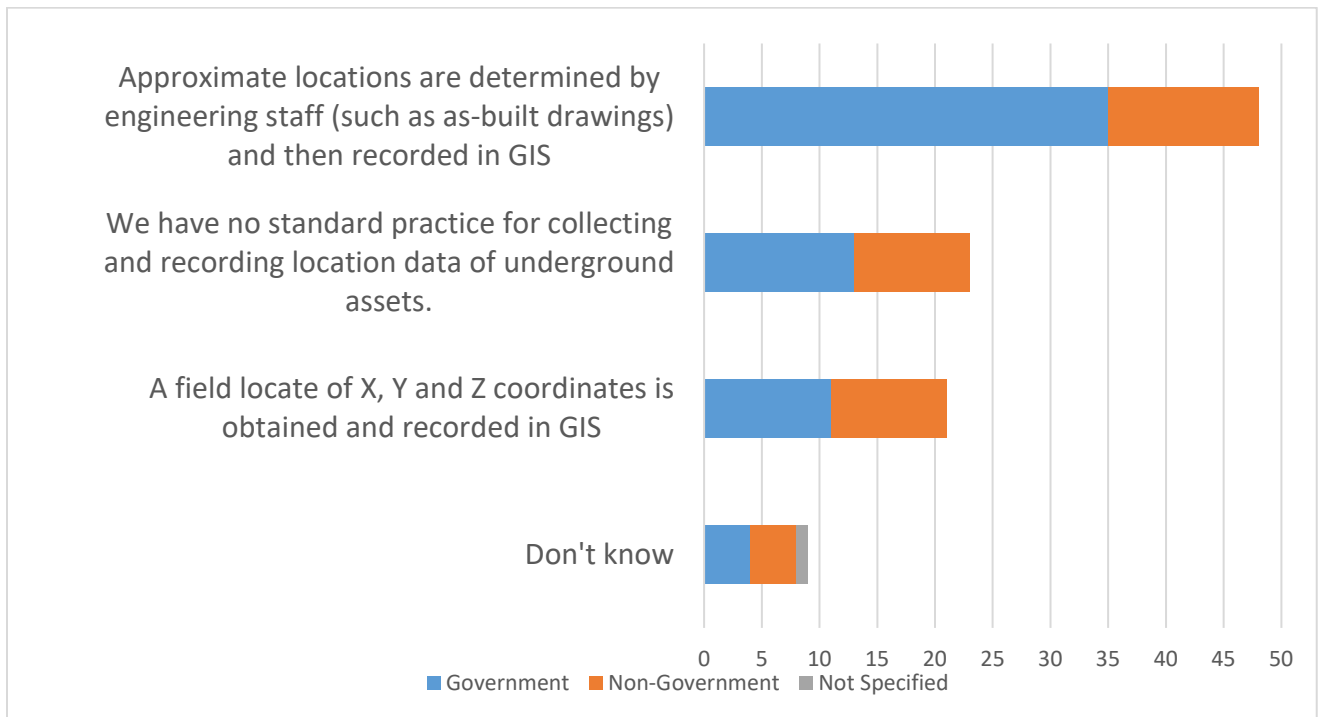

Chart 9: Standard Practice for Collecting Updates to GIS Location Data by Survey Respondents

How Quickly Survey Respondents Update their GIS Records

After installing or replacing buried infrastructure, 17 respondents reported updating their GIS records within three months. Twenty-three respondents reported more frequent updates, within one month (13) or within ten days (10).
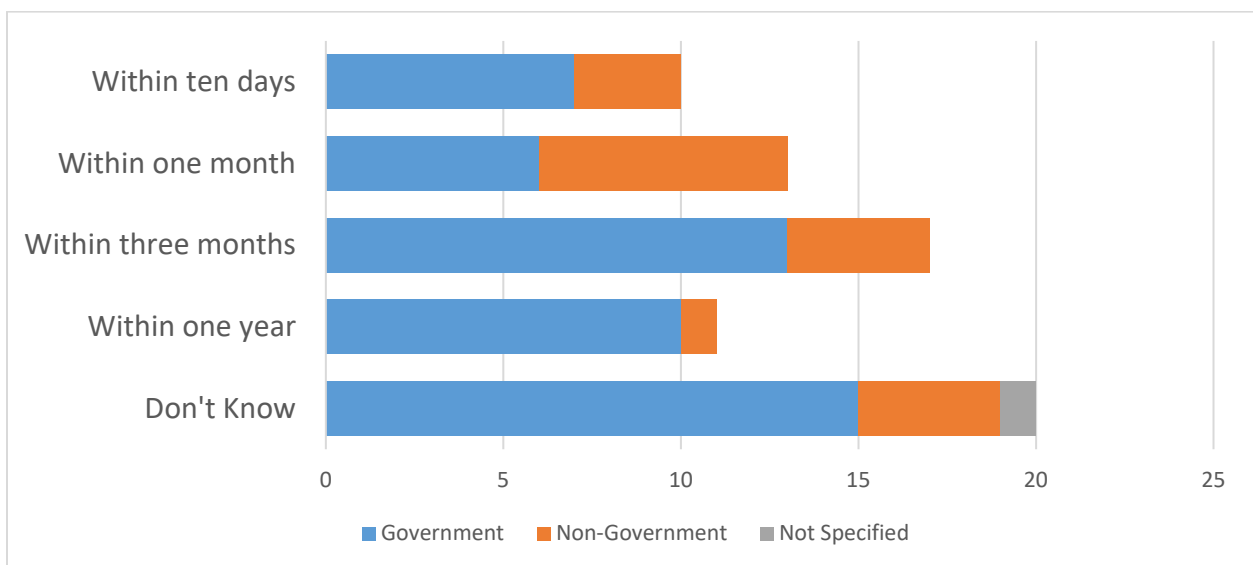

Chart 10: How Quickly Survey Respondents Update their GIS Records

Other Uses of GIS

Ninety-four respondents responded to this survey question. When government and non-government responses are combined, they reported using GIS most frequently for:

- Providing responses to 811 ticket requests (22 percent),
- Asset inventory and management (22 percent), and
- Infrastructure planning and expansion (20 percent).

Six respondents used the "other" option responded they were not using GIS. Two "other" responses from government entities said they also use GIS to manage real property rights records and owner parcel information. Two non-government entities provided "other" responses for as-built information for underground facilities and providing information for 811 tickets.

Government respondents ranked asset inventory and management as the highest GIS mapping use (24 percent), followed by 811 ticket responses and infrastructure planning and expansion were the next highest (22 percent each).

Government respondents identified an average of 3.6 uses of their GIS, but 28 of them (30 percent) claimed five current uses. By contrast, non-government respondents had an average of 2.2 uses for GIS.
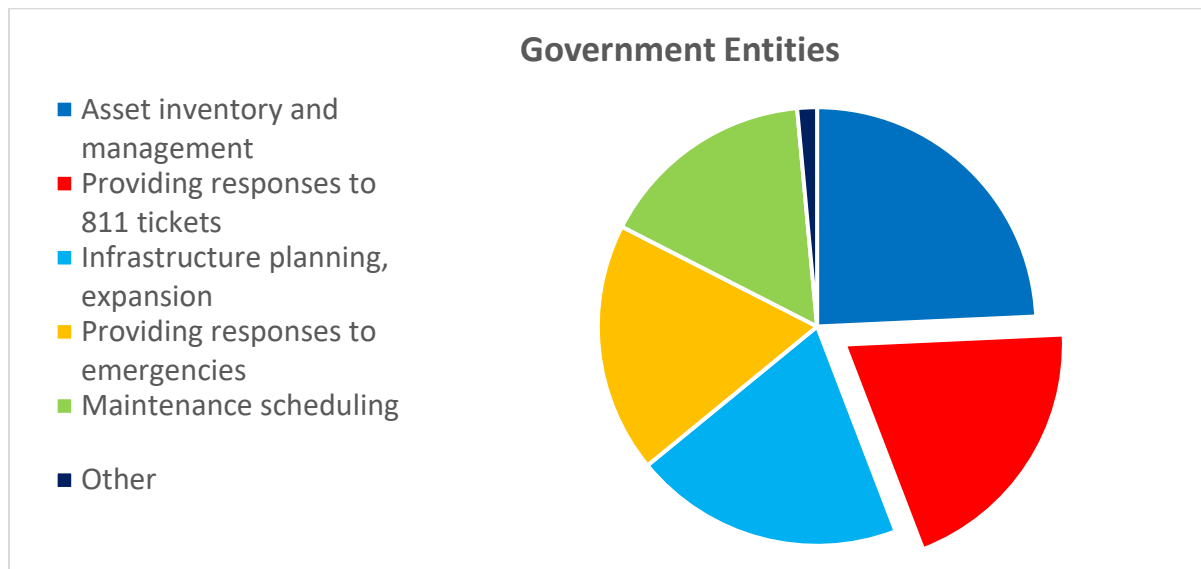

Chart 11A: How Government Survey Respondents Use GIS

Non-government facility operators' responses are shown in **Chart 11B** below. The highest-percentage use (27 percent) was for providing responses to 811 tickets. Use for infrastructure planning and expansion was the next highest at 20 percent.
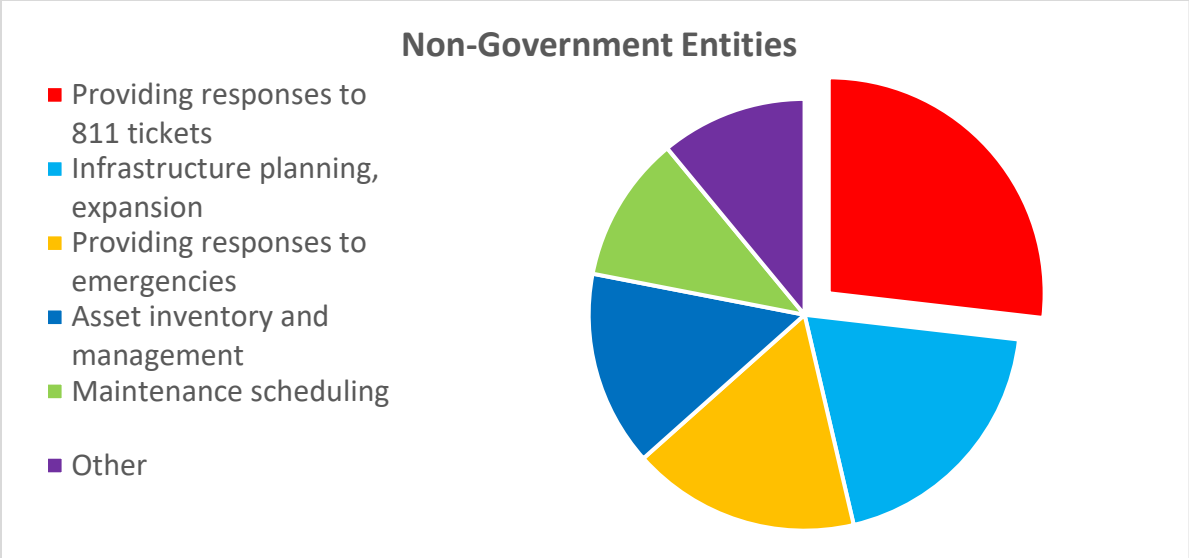
Non-Government Entities

- ■ Providing responses to 811 tickets
- ■ Infrastructure planning, expansion
- ■ Providing responses to emergencies
- ■ Asset inventory and management
- ■ Maintenance scheduling
- ■ Other

Chart 11B: How Non-Government Survey Respondents Use GIS

The respondent, who did not specify government or non-government, indicated GIS mapping was used to provide responses to 811 tickets.

Challenges when Using GIS for Mapping

The top GIS-related "challenge" reported by both government and non-government survey respondents was collecting accurate field coordinates.

Respondents from government organizations ranked updating and maintaining accurate GIS data as their next big challenge. Non-government respondents ranked integrating GIS into their asset management or construction management systems as their second highest challenge.
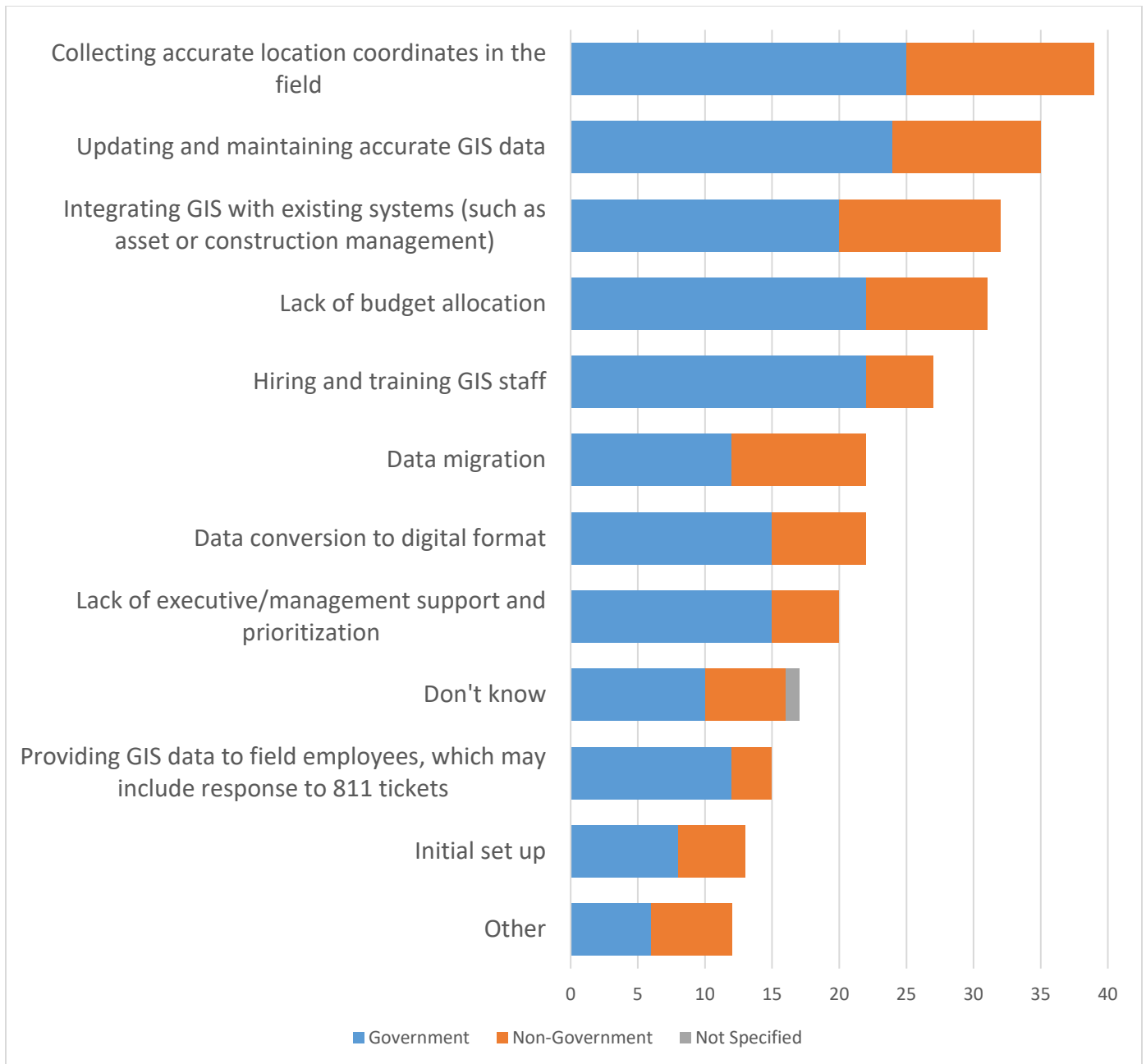
Chart 12: Current GIS-Related Challenges faced by Survey Respondents

Twelve respondents mentioned "other" challenges or provided specific examples of the challenges they are facing, including the following:

- "The owners/operators do not comply with the law [SB865]. They simply say they will not pay to have the work completed."
- "Lack of process to ensure that information makes it into GIS in a timely manner."
- "We were primarily CAD based before my arrival. Converting CAD text to the attributes of GIS assets has been a challenge."
- "Keeping up with technology - software vendor's new tools require significant time and effort to train up on and then to implement via development."

- "Getting staff to utilize GIS data...some are reluctant to embrace technology."
- "We have no paid staff. It's entirely a volunteer organization and we have limited funds for contractors."
- "Meeting strict requirements of our cybersecurity policy."
- "Underground utility line locators are limited in their ability to detect and identify underground utility features, or accurately locate utility features."

One respondent indicated "no issues, established business practice!". Two respondents indicated no GIS data/do not use GIS. One respondent indicated that none of these apply.

Demonstrations of Management Support for GIS Mapping
Forty-one percent of the respondents felt their managers had not shown any support for mapping buried utilities using GIS. The most frequently mentioned supportive actions by management were:
- Placing a high priority on GIS data accuracy (38 percent),
- Regularly communicating the benefits of GIS technology to the team (35 percent),
- Promoting GIS adoption as a key component of the organization's strategy (34 percent), and
- Allocating funds for implementing GIS software (29 percent).

Six respondents indicated their management supports their GIS programs in "other" ways, but none provided specific examples.

Chart 13 below provides a breakout between government and non-government survey responses.
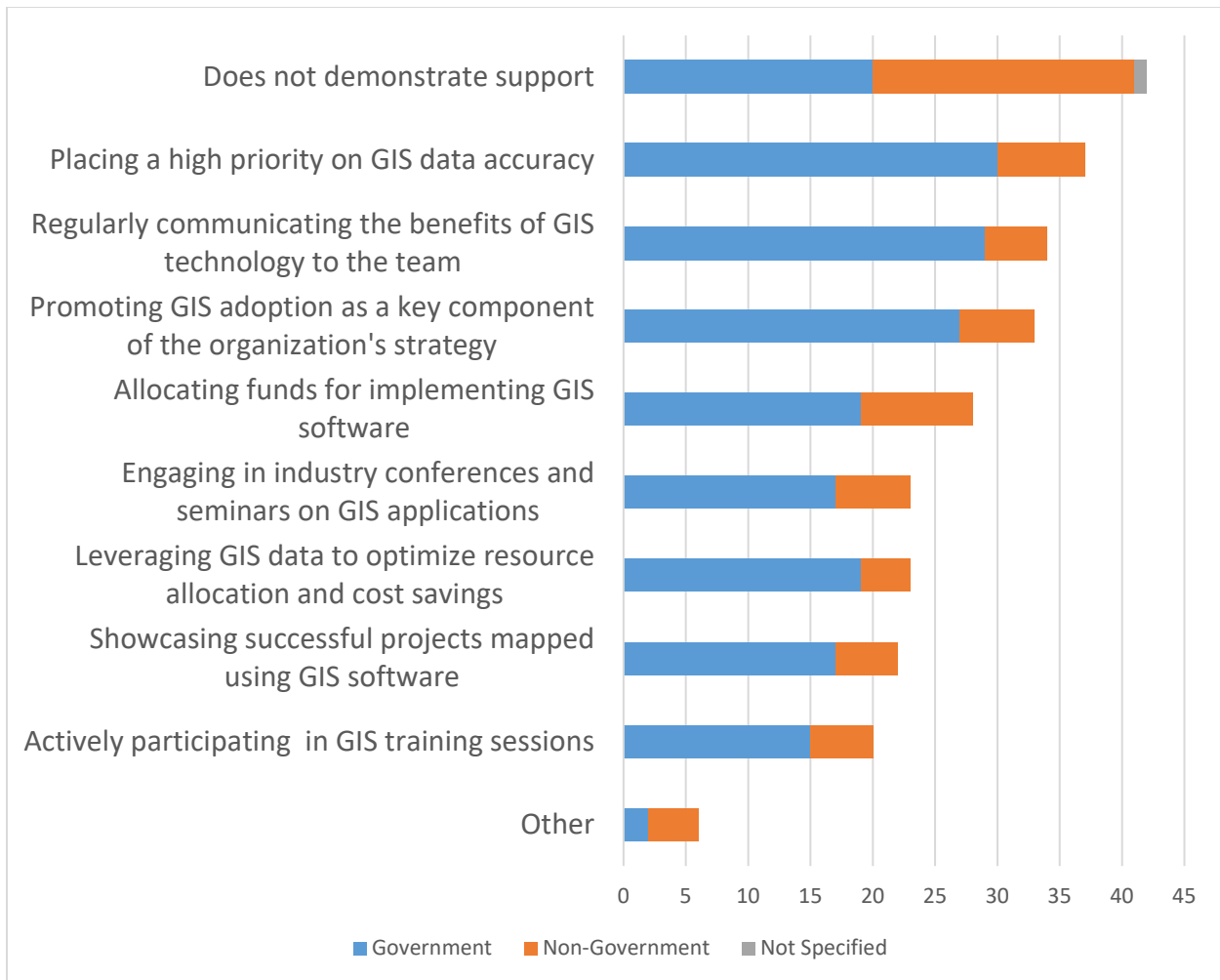
Chart 13: Survey Respondents' Views regarding Management Support for GIS Mapping

Planned Improvements or Expansions to GIS Mapping

Thirty-one percent of all respondents reported no current plans to modify the content of their GIS database or to expand uses of it. Of these, most (58 percent) were from non-governmental organizations.

The top three planned improvements or expansion from both government and non-government respondents were:

- Integrating GIS with asset management systems (34 percent),
- Integrating GIS with inspection and preventive maintenance activities (31 percent), and
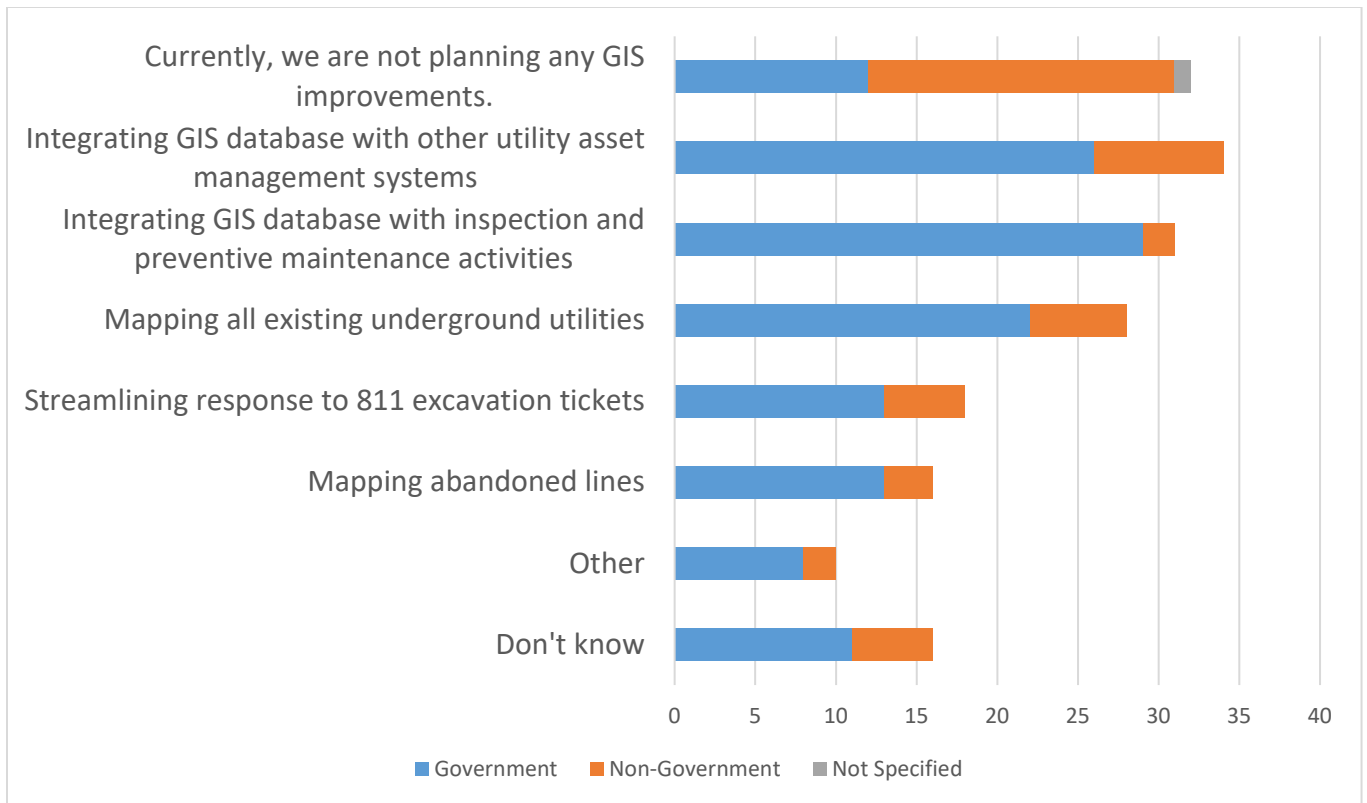- Mapping all existing underground utilities (28 percent).

Chart 14: Planned Improvements or Expanded Uses of GIS Mapping among Survey Respondents

Government entities responding to this question chose integrating GIS with inspection and preventive maintenance activities and with asset management systems as their top two plans, whereas non-government entities ranked integrating GIS with asset management systems and mapping all underground utilities as their top two priorities.

Ten respondents provided "other" examples of possible improvements and expansions, many of which were specific to the GIS software they use:

- "upgrading and migrating data to ArcPro with UPDM[5] with UN[6] and APR[7]"
- "We use Field Maps as our GIS, but our subscription needs to be reviewed so we cannot access our GIS at this time."
- "Migrating to the ESRI Utility Network"
- "Make sure all attributes are collected so we can visualize in 3D, and eventually move to the Utility Network on the ArcGIS Platform."
- "Utility Network conversion from a Geometric Network."
- "Collecting more accurate spatial location of UG assets at construction (X,Y,Z)."
- "Asset and system modeling, GIS strategic plan, Data Quality Management Plan."
- "Migration from 'current' data schema and structure of utility network in software to

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[5] Utility and Pipeline Data Model
[6] Utility Network
[7] ArcGIS Pipeline Referencing

'new and improved' data schema and structure. Plus, implementing field-based data editing where possible."
- "Improving location accuracy."
- "Attribute updates."

Summary of Additional Comments and Questions from Survey Respondents

Survey respondents provided additional information or asked questions about GIS mapping of new subsurface installations.

Questions and comments about implementing the GIS mapping law included:
- "What is GIS mapping and who pays for it?"
- "Funding for small government agencies is lacking so we do not use GIS."
- "Your desire for us to dramatically improve our GIS is not possible with our resources. Maybe you should offer us a grant to hire some temporary workers please."
- "How much time do we have to update our GIS system? Is this unfunded?"
- "Availability of free or low-cost GIS applications for governmental organizations to utilize in creating GIS mapping program."
- "How are we going to ensure responsibility and accountability for the data that is collected and analyzed and shared publicly?"
- "I think we need clear guidelines about the level of security necessary for subsurface infrastructure."

Others shared their ideas about how they could afford to implement the GIS mapping:
- "I suggest that entities mandate GIS map updating fees be included for any project that includes expansion or alteration of infrastructure."
- "We are currently working on "language" to require digital files (CAD) from improvement projects in the city. Receiving files in a digital format would eliminate the need for duplicate entry, potential errors, and quicker inputting into GIS."
- "Currently using AutoCAD (Draftsight), but converting to GIS (QDIS[8]). Need training (experience) on using QDIS and best practices for using it."

Other commentors reported their progress in adopting GIS technology:
- "Our CAD data is VERY comprehensive and accurate, so GIS has not been a high priority. However, I was brought in to change that, but I have limited time because I 'wear many hats' at our small district."
- "Our infrastructure is mapped, but our engineer does not use GIS to map."
- Our utility mapping started some 20 years ago, with slow traction to begin with, but then once one sector of Utilities gained traction, the other soon jumped aboard. There's still a way to go in predictive modeling but the goal is there."

Three commentors wanted to ensure that only qualified respondents collected spatial

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[8] May be referring to QGIS.

location data in the field:

- "Accuracy seems to be important but integrating professional surveyors into certifying accuracy is not happening."
- "See Business and Professions Code Section 8726[9]," and
- "Government Code 4216.3 (a) (6) requires location of certain underground utilities be performed by the appropriately licensed person.[10]"

One survey respondent indicated they had "no new subsurface installation, just maintaining existing." One respondent responded indicating "process for GIS mapping of plant infrastructure." One respondent indicated "its should be a requirement for everyone!"

Overall, the survey questions and comments indicate additional clarification may be needed besides defining the "new" subsurface installations.
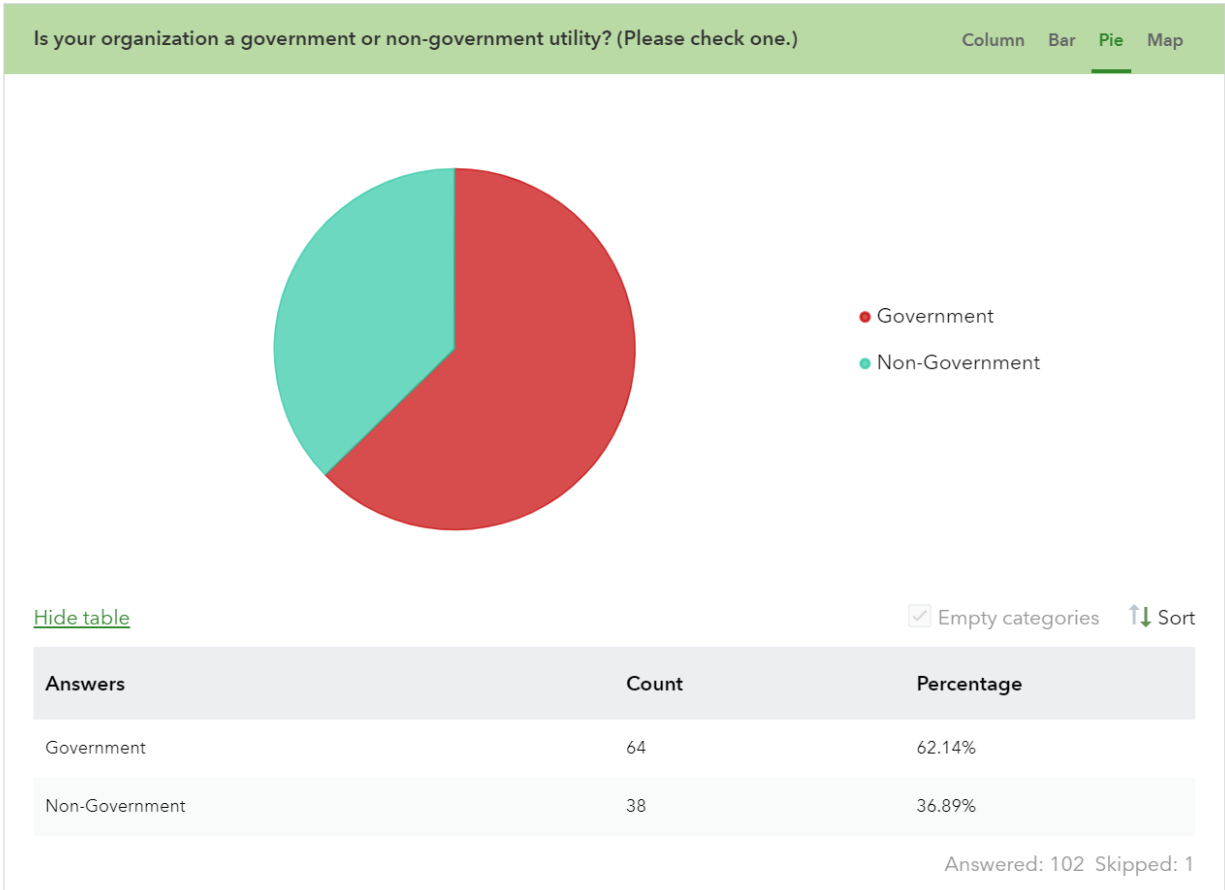
RECOMMENDATIONS

Staff recommends the Board direct staff to develop definitions for the following key terms within statute: "new subsurface installations," "geographic information system," "mapped using GIS," and "permanent records." Staff recommends the Board's GIS Mapping Committee facilitate a workshop to engage stakeholders to identify other opportunities to clarify the implementation of Government Code § 4216.3(c)(5) besides defining "new" subsurface installations.

Attachment: A) Enhancing Utility Operations with GIS Mapping Survey

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[9] California's Professional Land Surveyors' Act, Business and Professions Code Section 8726
[10] Government Code 4216.3(a)(6) referring to the California's Professional Land Surveyors' Act.

Attachment A
Enhancing Utility Operations with GIS Mapping Survey
(9/1/2023-9/25/2023)

Is your organization a government or non-government utility? (Please check one.)

- Government
- Non-Government

Hide table

Answers	Count	Percentage
Government	64	62.14%
Non-Government	38	36.89%

Answered: 102 Skipped: 1

What is your role with respect to subsurface utility infrastructure? (Check all that apply.)   Column   Bar
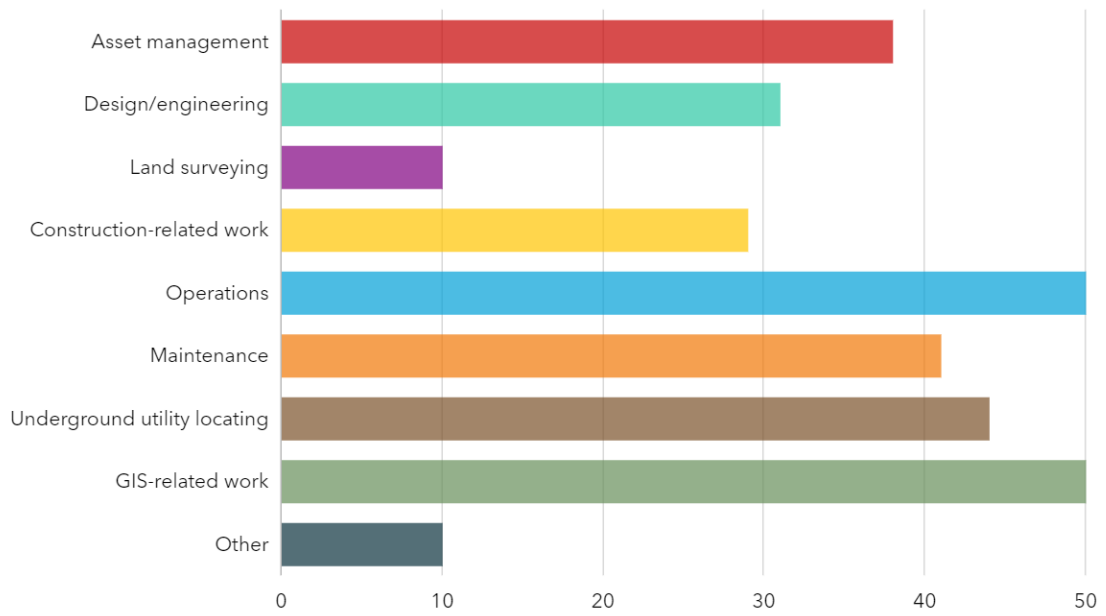
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Answers	Count	Percentage
Asset management	38	36.89%
Design/engineering	31	30.1%
Land surveying	10	9.71%
Construction-related work	29	28.16%
Operations	50	48.54%
Maintenance	41	39.81%
Underground utility locating	44	42.72%
GIS-related work	50	48.54%
Other	10	9.71%

Answered: 101 Skipped: 2

Please specify Other role:

The word cloud requires at least 20 answers to show.

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AA Show words

Response	Count
We are an aquaculture site with an underground line bringing water. We are the owners and operators	1
President of water board	1
Office Manager	1
Map Requests	1
IT	1
Forensics	1
ensuring construction projects do not interfere (break) with our services	1
Education/IT	1
damage prevention	1

Answered: 9 Skipped: 94

● **Potable water?**

● Yes

● No
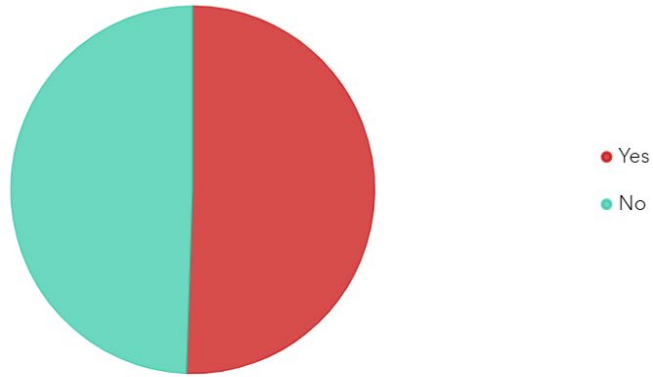
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Answers	Count	Percentage
Yes	48	46.6%
No	47	45.63%

Answered: 95 Skipped: 8

● Is potable water infrastructure being mapped using GIS software?

● Yes
● No
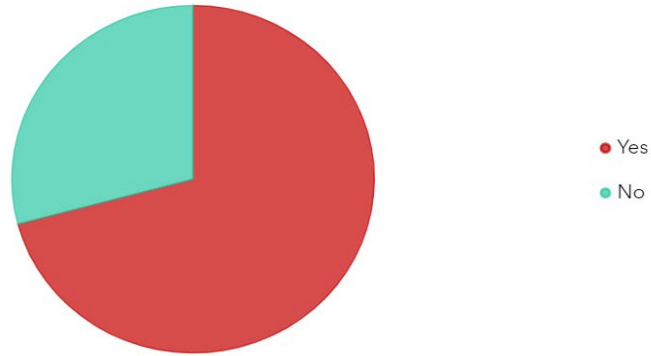
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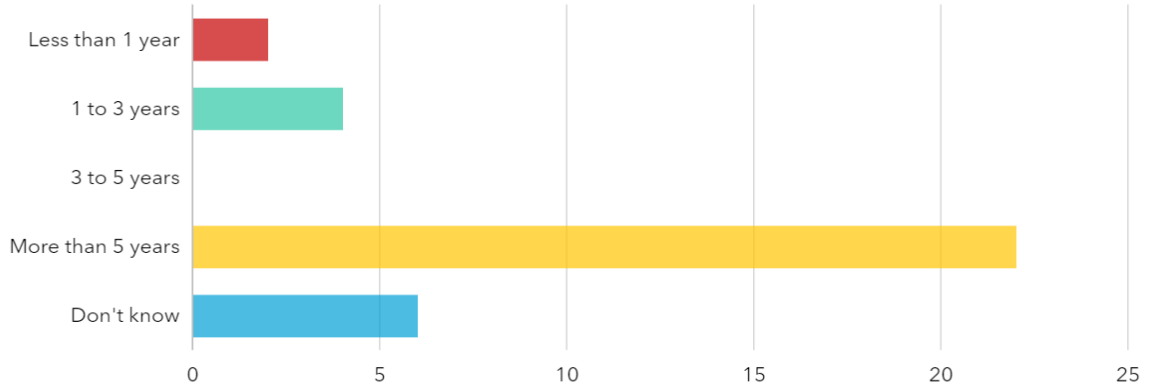
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Answers	Count	Percentage
Yes	34	33.01%
No	14	13.59%

Answered: 48 Skipped: 55

How long has your organization been mapping potable water in GIS?   Column   **Bar**   Pie   Map
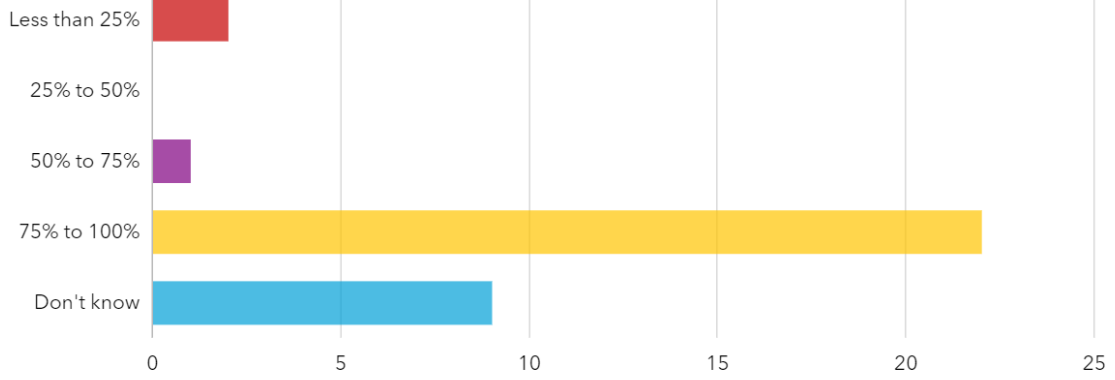

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Answers	Count	Percentage
Less than 1 year	2	1.94%
1 to 3 years	4	3.88%
3 to 5 years	0	0%
More than 5 years	22	21.36%
Don't know	6	5.83%

Answered: 34 Skipped: 69

What percentage of your potable water assets are currently mapped using GIS technology?   Column   **Bar**   Pie   Map

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Answers	Count	Percentage
Less than 25%	2	1.94%
25% to 50%	0	0%
50% to 75%	1	0.97%
75% to 100%	22	21.36%
Don't know	9	8.74%

Answered: 34 Skipped: 69

Reclaimed water?

Column   Bar   Pie   Map

- No
- Yes
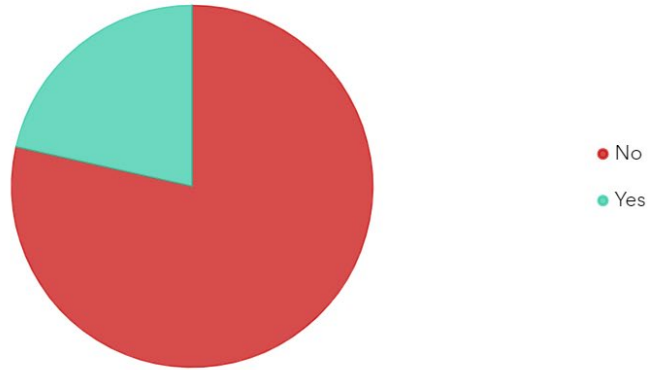
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Answers	Count	Percentage
No	73	70.87%
Yes	20	19.42%

Answered: 93 Skipped: 10

Is the reclaimed water infrastructure being mapped using GIS software?

Column   Bar   Pie   Map
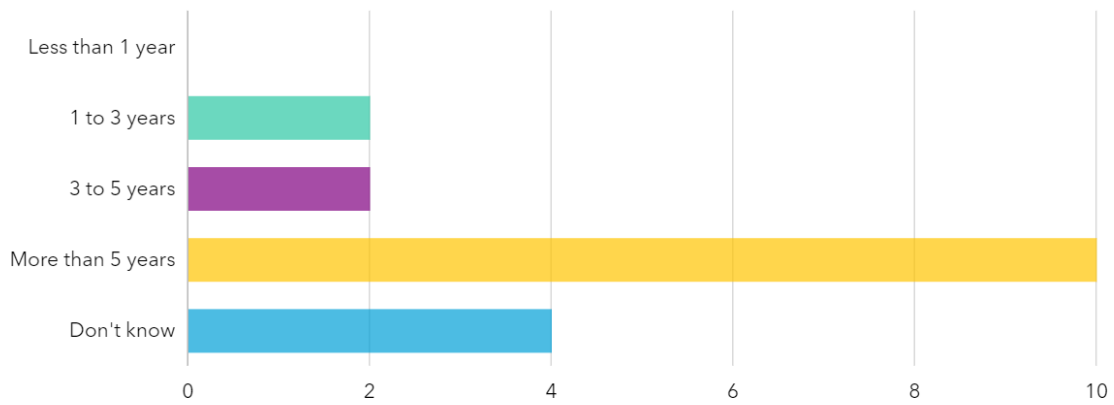

- Yes
- No
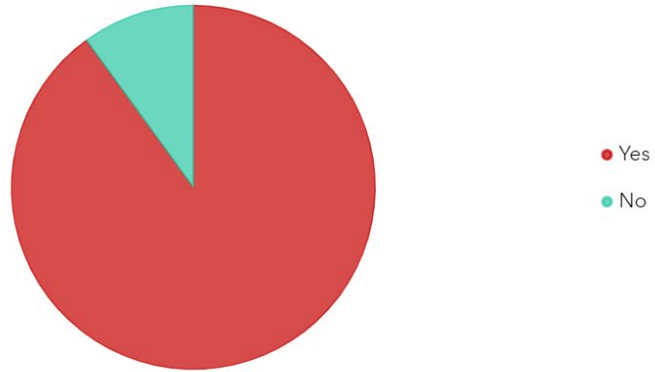
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Answers	Count	Percentage
Yes	18	17.48%
No	2	1.94%

Answered: 20 Skipped: 83

How long has your organization been mapping reclaimed water in GIS?　　　　Column　Bar　Pie　Map

Hide table　　　　　　　　　　　　　　　　　　　☑ Empty categories　⇅ Sort

Answers	Count	Percentage
Less than 1 year	0	0%
1 to 3 years	2	1.94%
3 to 5 years	2	1.94%
More than 5 years	10	9.71%
Don't know	4	3.88%

Answered: 18 Skipped: 85

What percentage of your reclaimed water assets are currently mapped using GIS technology?   Column   Bar   Pie   Map
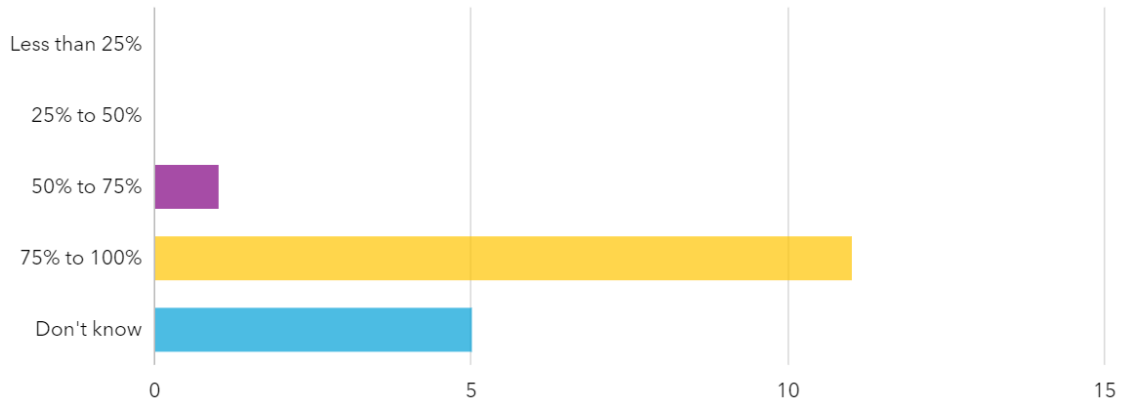
Hide table   ✓ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	0	0%
25% to 50%	0	0%
50% to 75%	1	0.97%
75% to 100%	11	10.68%
Don't know	5	4.85%

Answered: 17 Skipped: 86

● Sewer/Wastewater?

Column   Bar   Pie   Map

● No

● Yes
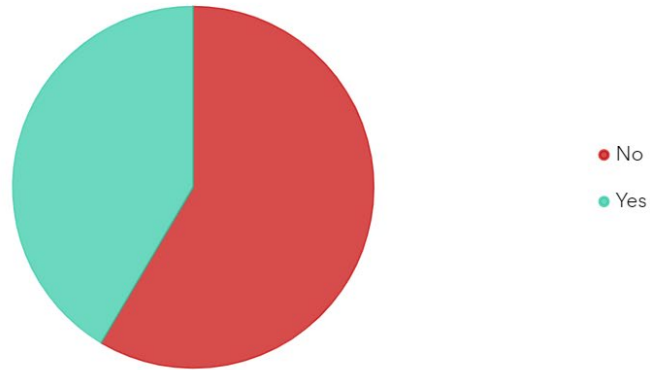
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	55	53.4%
Yes	39	37.86%

Answered: 94   Skipped: 9

● Is the sewer/wastewater infrastructure being mapped using GIS software?

Column Bar Pie Map

● Yes
● No
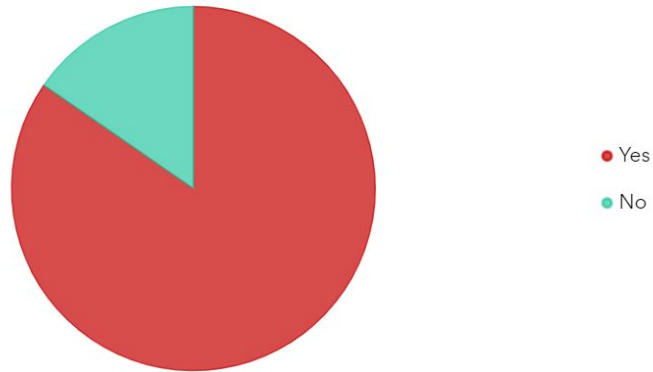
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Yes	33	32.04%
No	6	5.83%

Answered: 39 Skipped: 64

How long has your organization been mapping sewer/wastewater in GIS?

Column **Bar** Pie Map
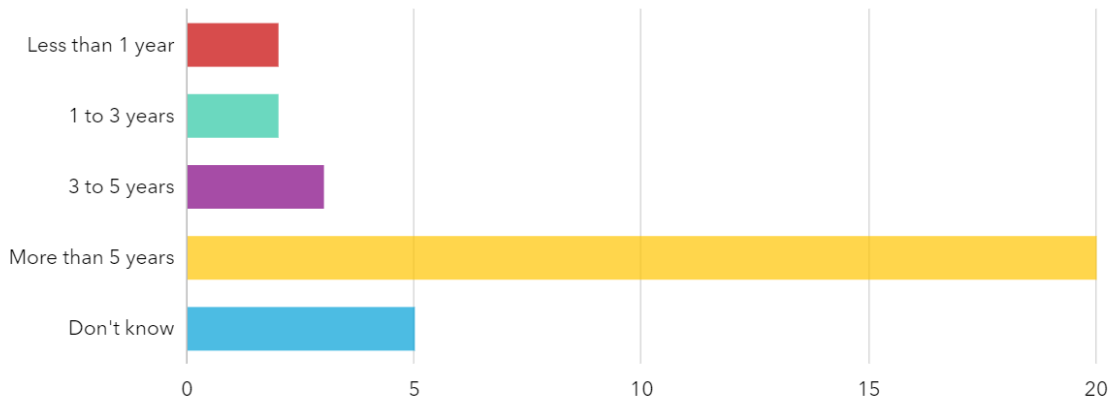
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	2	1.94%
1 to 3 years	2	1.94%
3 to 5 years	3	2.91%
More than 5 years	20	19.42%
Don't know	5	4.85%

Answered: 32 Skipped: 71

- What percentage of your sewer/wastewater assets are currently mapped using GIS...   Column Bar Pie Map

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	1	0.97%
25% to 50%	0	0%
50% to 75%	3	2.91%
75% to 100%	24	23.3%
Don't know	5	4.85%

Answered: 33 Skipped: 70

● Stormwater drains?

Column　Bar　Pie　Map
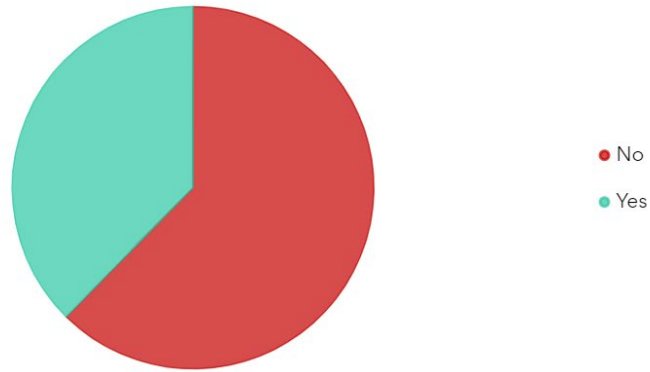
- No
- Yes

Hide table

☑ Empty categories　↑↓ Sort

Answers	Count	Percentage
No	58	56.31%
Yes	35	33.98%

Answered: 93　Skipped: 10

Is the stormwater drains infrastructure being mapped using GIS software?
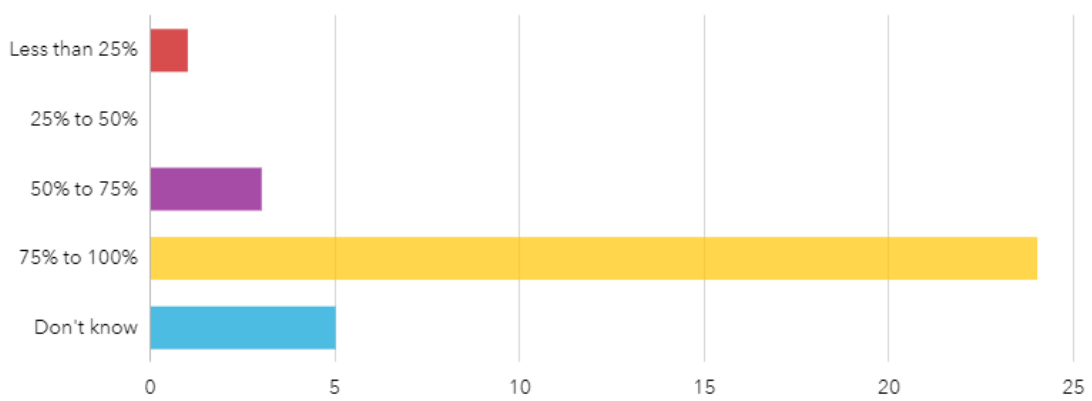
Column Bar Pie Map

● Yes
● No
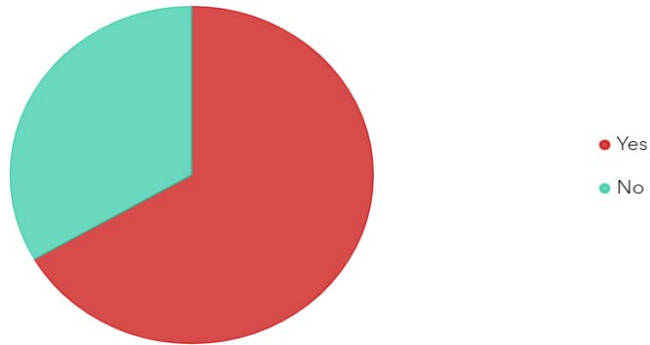
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Yes	22	21.36%
No	11	10.68%

Answered: 33 Skipped: 70

How long has your organization been mapping stormwater drains in GIS?
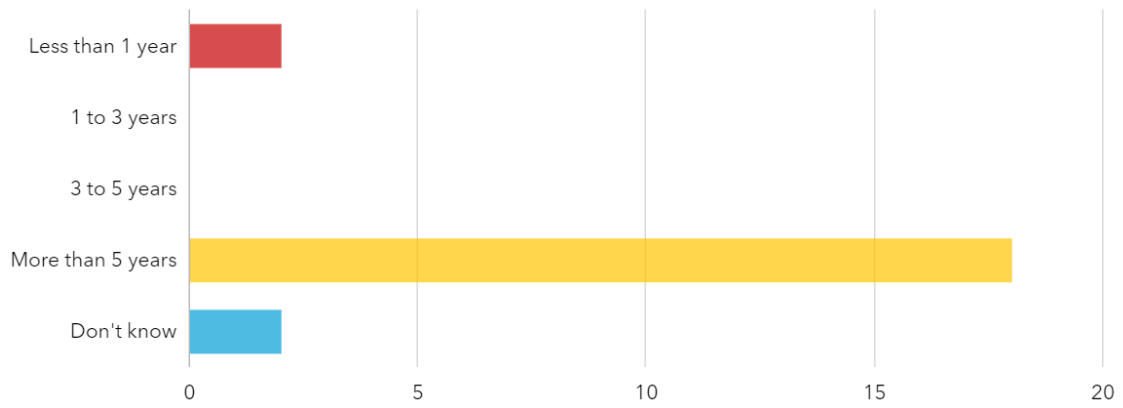
Hide table   ☑ Empty categories   ⇅ Sort

Answers	Count	Percentage
Less than 1 year	2	1.94%
1 to 3 years	0	0%
3 to 5 years	0	0%
More than 5 years	18	17.48%
Don't know	2	1.94%

Answered: 22 Skipped: 81

What percentage of your stormwater drains assets are currently mapped using GIS...   Column Bar Pie Map
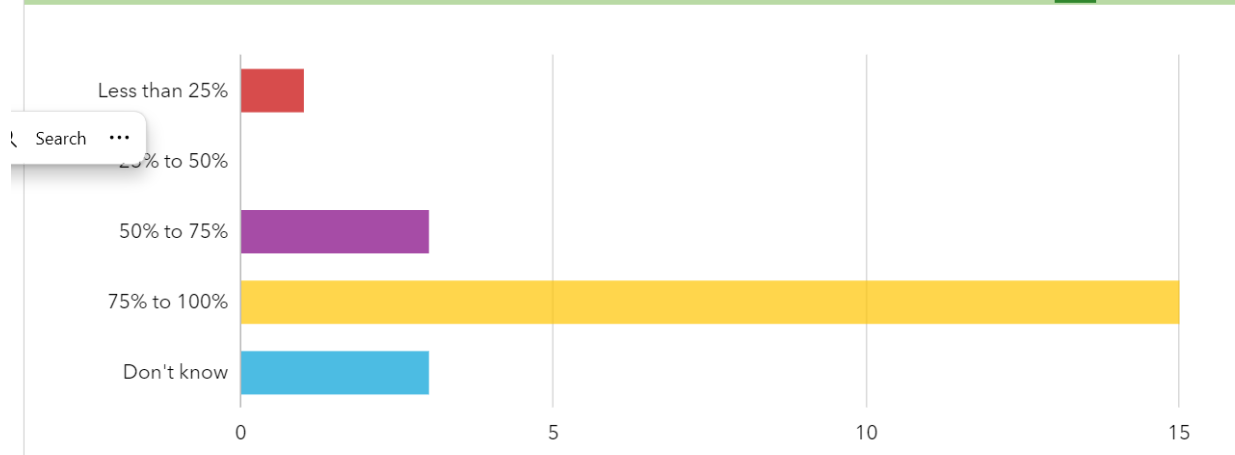
Hide table   ☑ Empty categories   ⇅ Sort

Answers	Count	Percentage
Less than 25%	1	0.97%
25% to 50%	0	0%
50% to 75%	3	2.91%
75% to 100%	15	14.56%
Don't know	3	2.91%

Answered: 22 Skipped: 81

Irrigation?

● No
● Yes
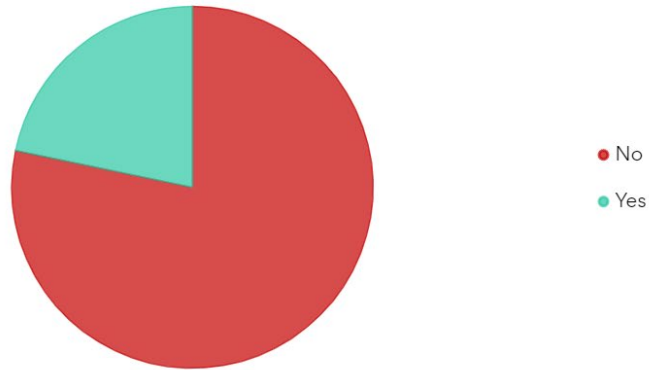
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	72	69.9%
Yes	20	19.42%

Answered: 92 Skipped: 11

● Is the irrigation infrastructure being mapped using GIS software?

Column   Bar   **Pie**   Map

● No
● Yes
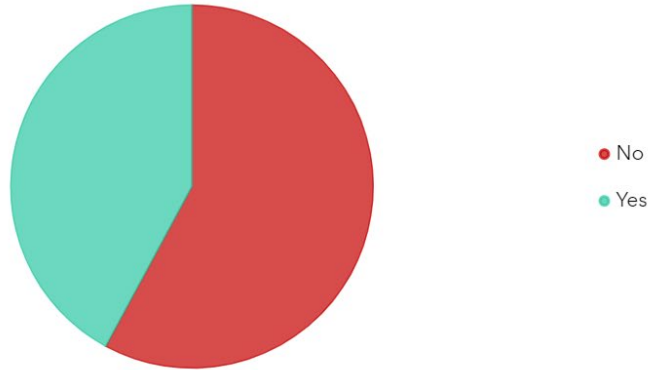
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	11	10.68%
Yes	8	7.77%

Answered: 19 Skipped: 84

How long has your organization been mapping irrigation in GIS?

Column Bar Pie Map
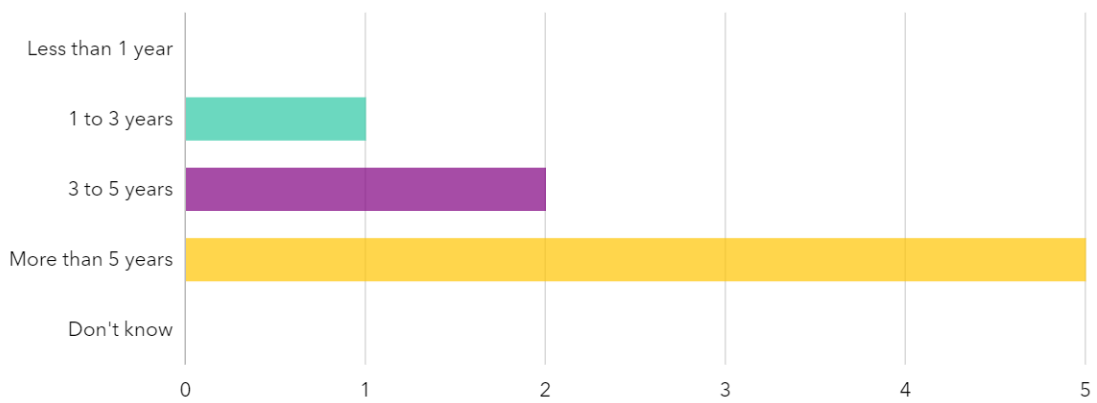
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	0	0%
1 to 3 years	1	0.97%
3 to 5 years	2	1.94%
More than 5 years	5	4.85%
Don't know	0	0%

Answered: 8 Skipped: 95

● **What percentage of your irrigation assets are currently mapped using GIS technology?**   Column Bar Pie Map
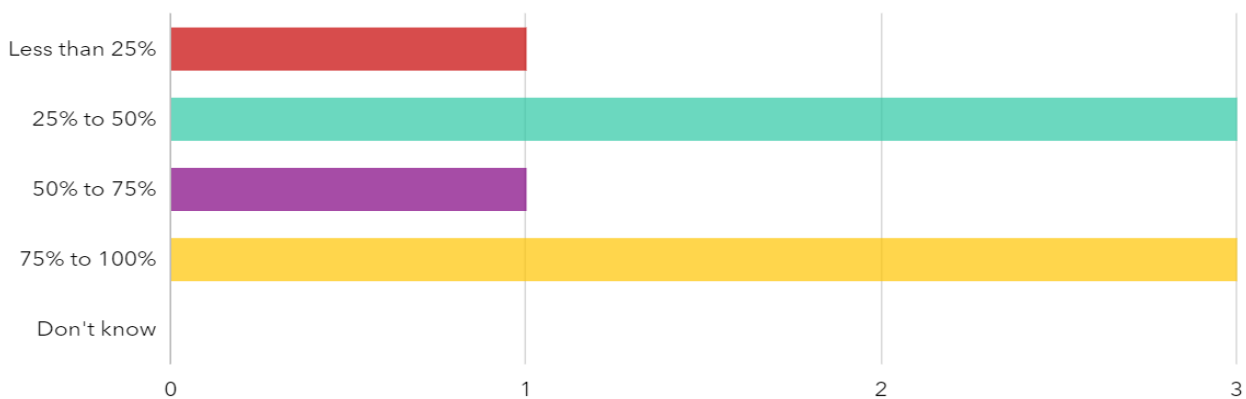
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	1	0.97%
25% to 50%	3	2.91%
50% to 75%	1	0.97%
75% to 100%	3	2.91%
Don't know	0	0%

Answered: 8 Skipped: 95

Street lights?

- No
- Yes

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	58	56.31%
Yes	35	33.98%

Answered: 93 Skipped: 10

Is the street lights infrastructure being mapped using GIS software?

Column Bar Pie Map

- Yes
- No
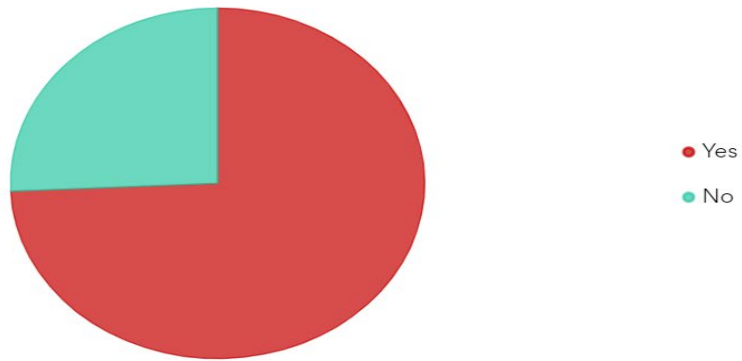
Hide table

☑ Empty categories ↑↓ Sort

Answers	Count	Percentage
Yes	26	25.24%
No	9	8.74%

Answered: 35 Skipped: 68

How long has your organization been mapping street lights in GIS?   Column **Bar** Pie Map
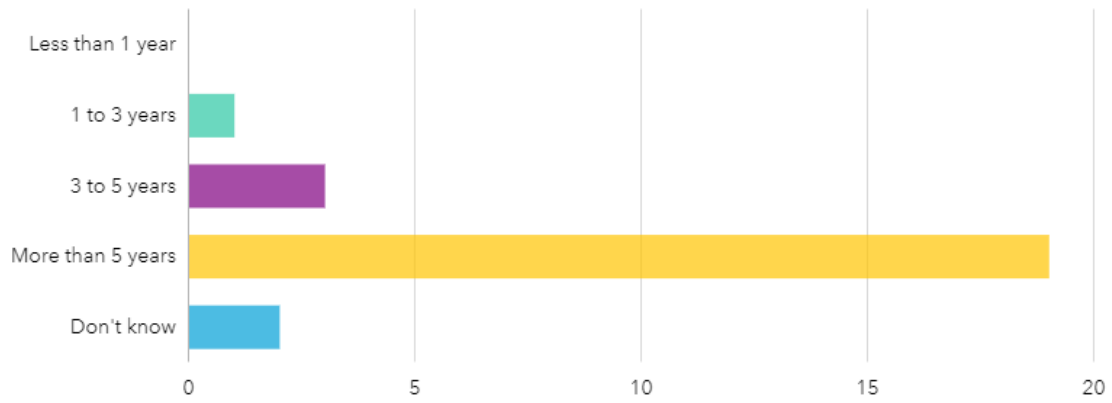
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	0	0%
1 to 3 years	1	0.97%
3 to 5 years	3	2.91%
More than 5 years	19	18.45%
Don't know	2	1.94%

Answered: 25 Skipped: 78

● **What percentage of your street light assets are currently mapped using GIS technology?**   Column   **Bar**   Pie   Map
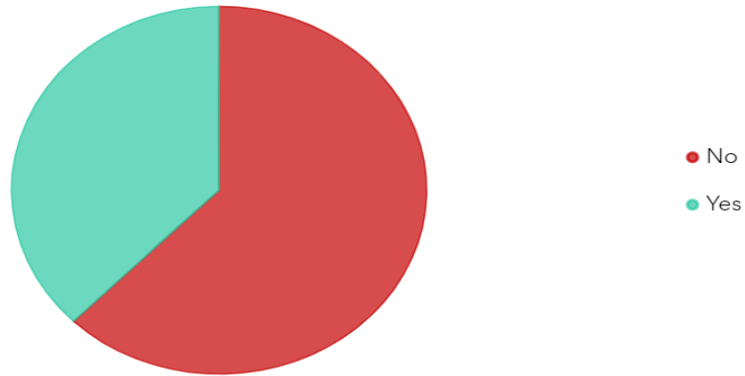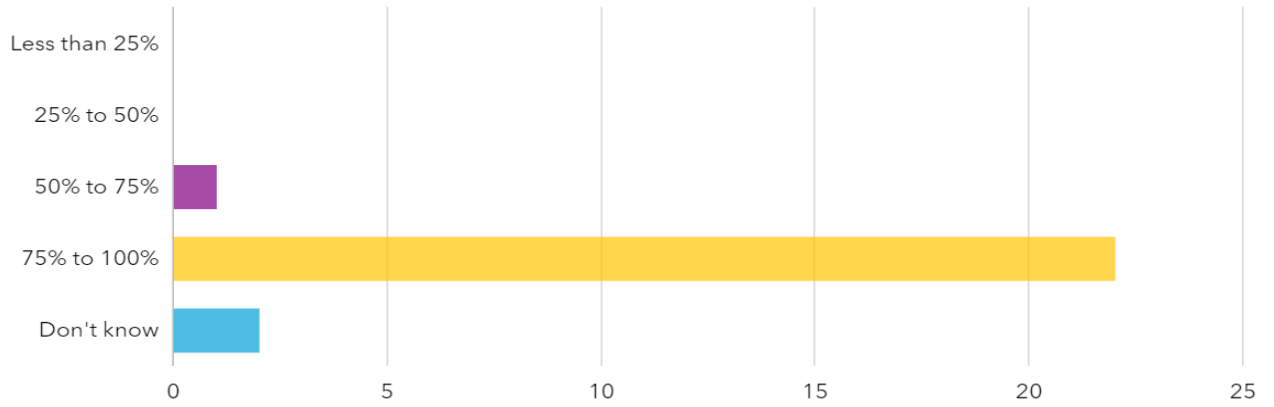

[Hide table]   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	0	0%
25% to 50%	0	0%
50% to 75%	1	0.97%
75% to 100%	22	21.36%
Don't know	2	1.94%

Answered: 25 Skipped: 78

Traffic signals?

● No

● Yes

Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	66	64.08%
Yes	26	25.24%

Answered: 92 Skipped: 11

● Is the traffic signals infrastructure being mapped using GIS software?   Column   Bar   Pie   Map

● Yes
● No
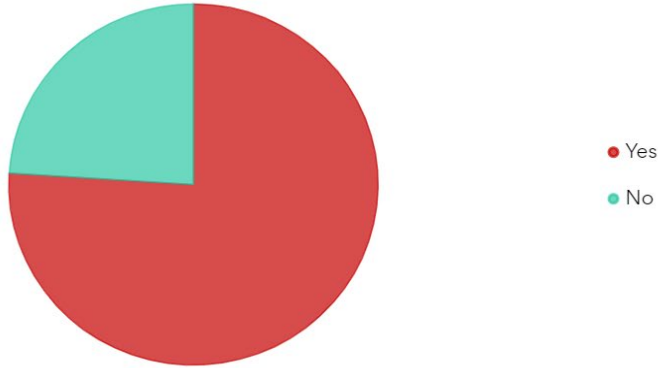
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Yes	19	18.45%
No	6	5.83%

Answered: 25 Skipped: 78

How long has your organization been mapping traffic signals in GIS?

Column **Bar** Pie Map
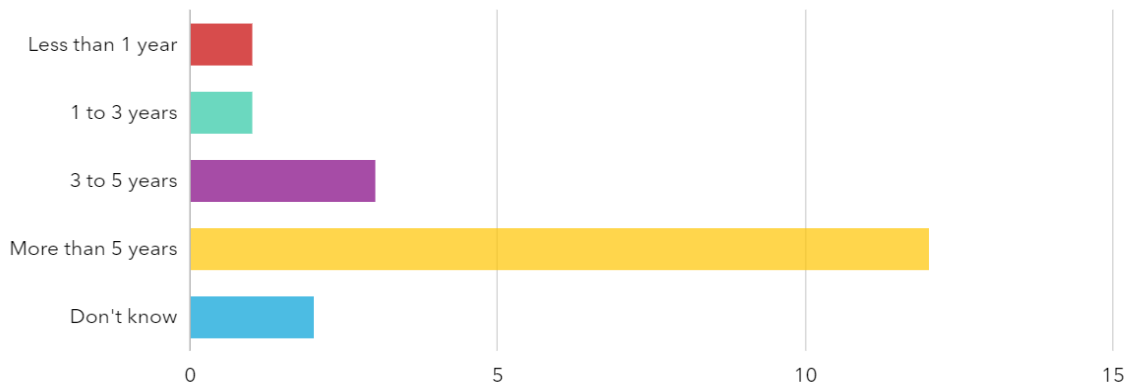
Hide table

☑ Empty categories ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	1	0.97%
1 to 3 years	1	0.97%
3 to 5 years	3	2.91%
More than 5 years	12	11.65%
Don't know	2	1.94%

Answered: 19 Skipped: 84

What percentage of your traffic signal assets are currently mapped using GIS technology?   Column Bar Pie Map
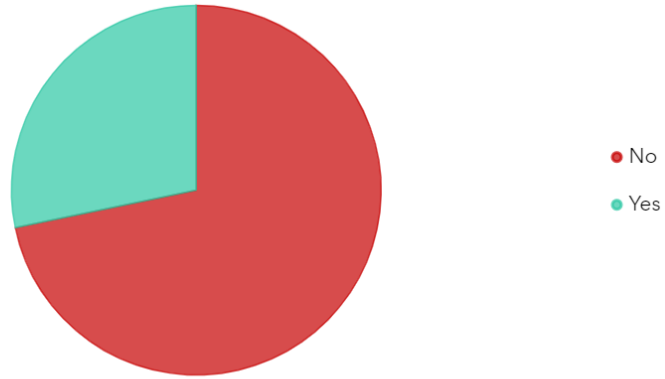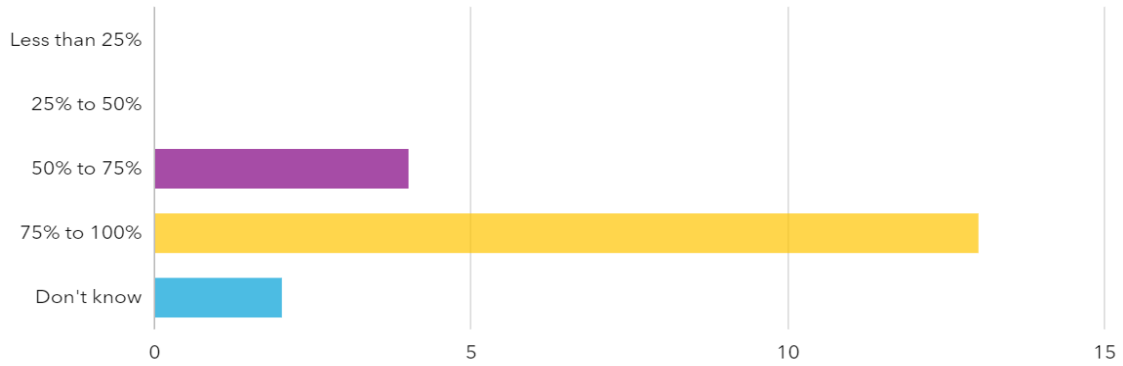

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	0	0%
25% to 50%	0	0%
50% to 75%	4	3.88%
75% to 100%	13	12.62%
Don't know	2	1.94%

Answered: 19 Skipped: 84

● Electricity?

● No

● Yes

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	74	71.84%
Yes	18	17.48%

Answered: 92 Skipped: 11

Is the electricity infrastructure being mapped using GIS software?

Column Bar Pie Map

● Yes
● No
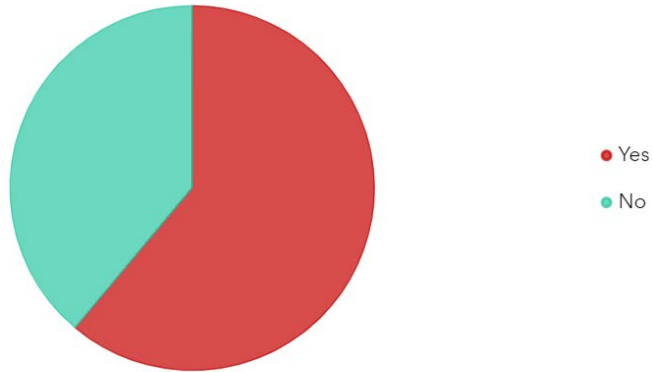
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Yes	11	10.68%
No	7	6.8%

Answered: 18 Skipped: 85

How long has your organization been mapping electricity in GIS?

Column Bar Pie Map
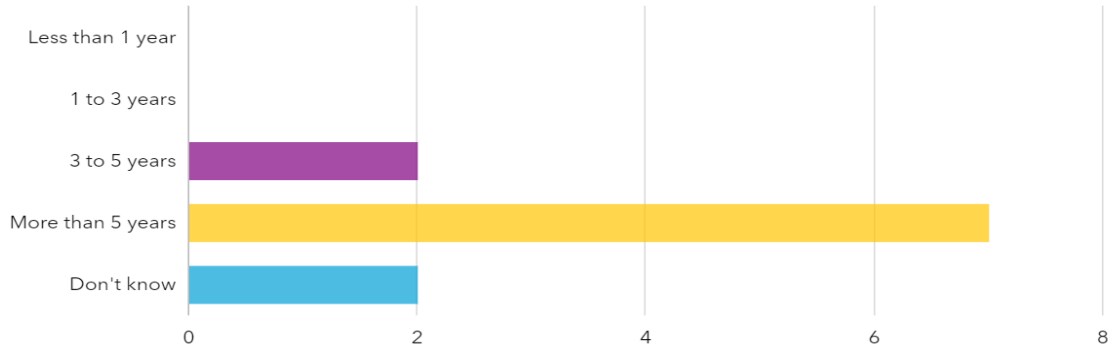
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	0	0%
1 to 3 years	0	0%
3 to 5 years	2	1.94%
More than 5 years	7	6.8%
Don't know	2	1.94%

Answered: 11 Skipped: 92

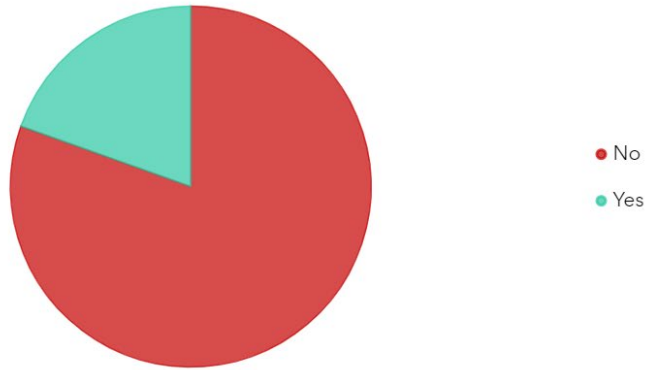**What percentage of your electricity assets are currently mapped using GIS technology?**   Column   Bar   Pie   Map
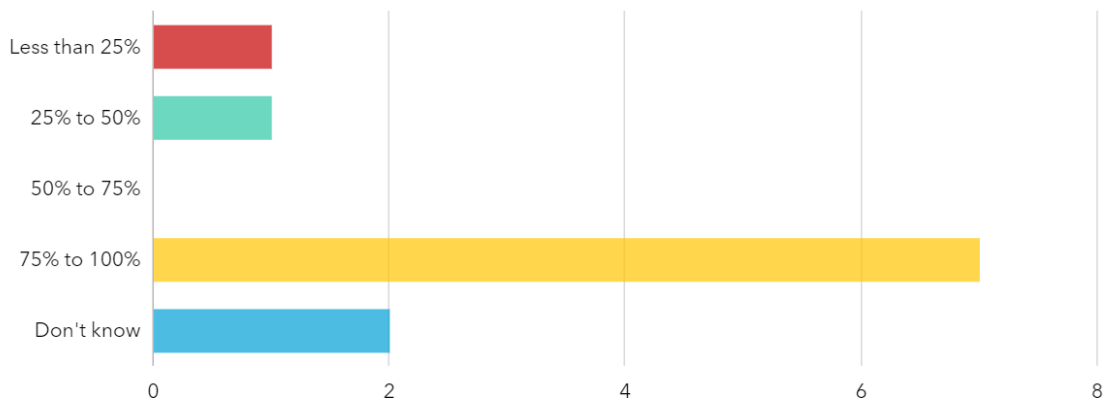
Hide table   ☑ Empty categories   ⇅ Sort

Answers	Count	Percentage
Less than 25%	1	0.97%
25% to 50%	1	0.97%
50% to 75%	0	0%
75% to 100%	7	6.8%
Don't know	2	1.94%

Answered: 11 Skipped: 92

● Natural gas?

● No
● Yes
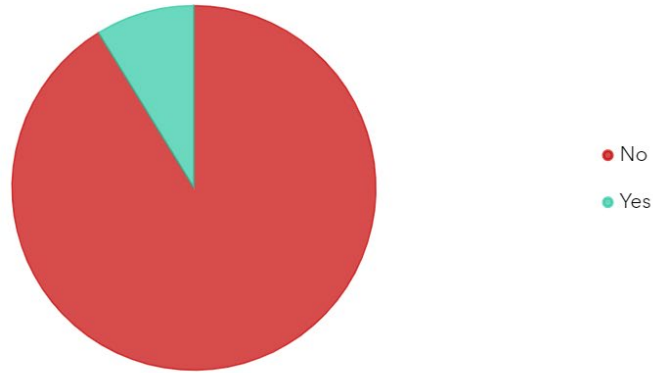
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	83	80.58%
Yes	8	7.77%

Answered: 91 Skipped: 12

Is the natural gas being mapped using GIS software?

Column   Bar   **Pie**   Map

● Yes
● No
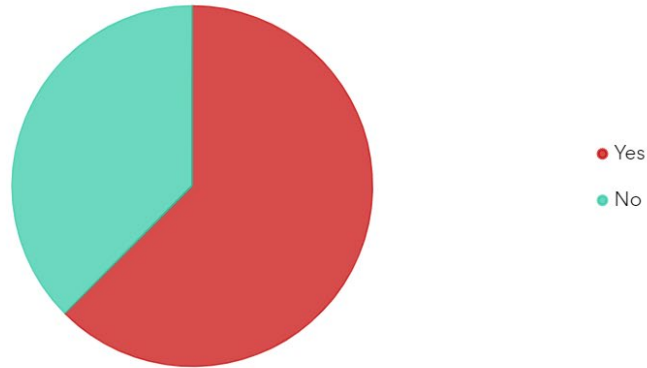
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Yes	5	4.85%
No	3	2.91%

Answered: 8 Skipped: 95

How long has your organization been mapping natural gas in GIS?

Column Bar Pie Map
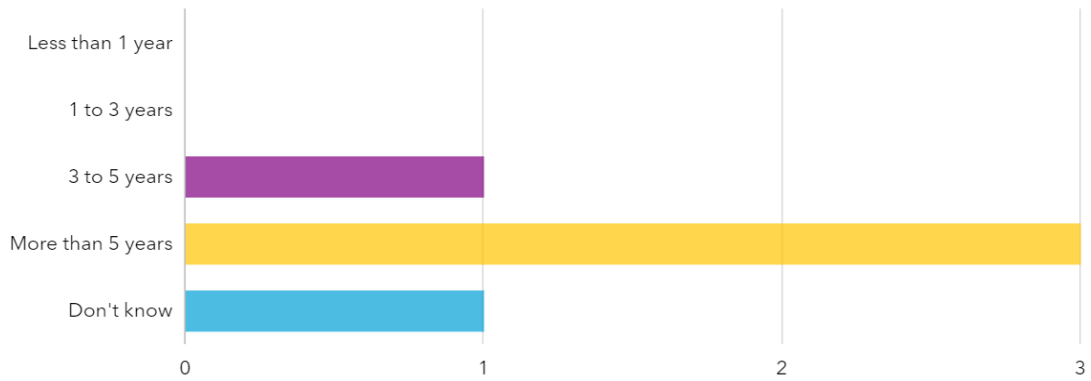
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	0	0%
1 to 3 years	0	0%
3 to 5 years	1	0.97%
More than 5 years	3	2.91%
Don't know	1	0.97%

Answered: 5 Skipped: 98

● **What percentage of your natural gas assets are currently mapped using GIS technology?**   Column   Bar   Pie   Map
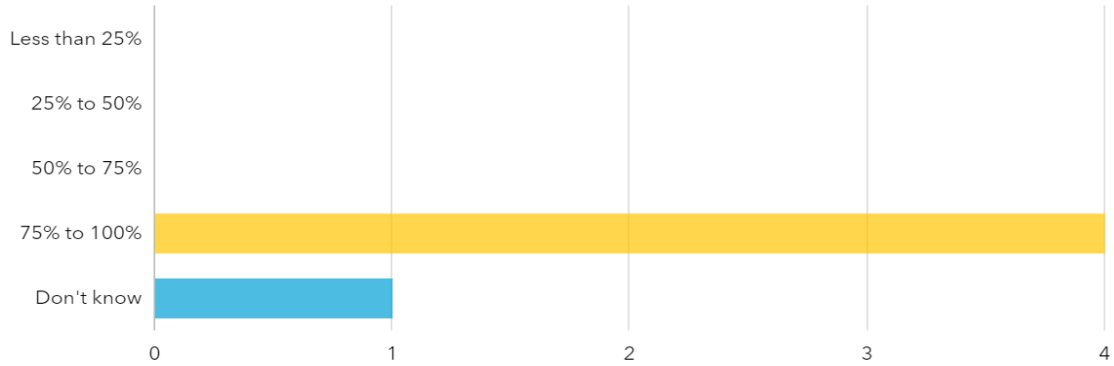
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	0	0%
25% to 50%	0	0%
50% to 75%	0	0%
75% to 100%	4	3.88%
Don't know	1	0.97%

Answered: 5 Skipped: 98

Telephone?

Column   Bar   Pie   Map

● No
● Yes
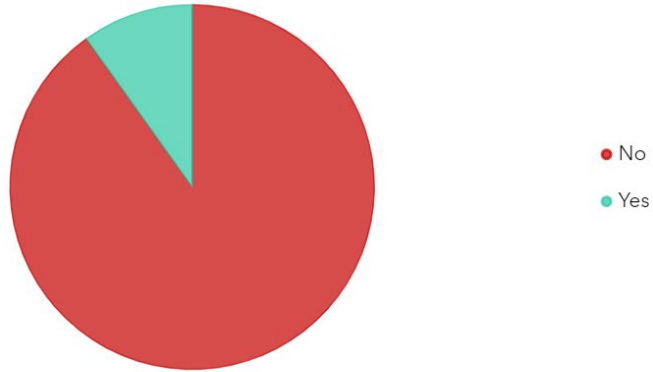
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	82	79.61%
Yes	9	8.74%

Answered: 91 Skipped: 12

Is the telephone infrastructure being mapped using GIS software?

- No
- Yes
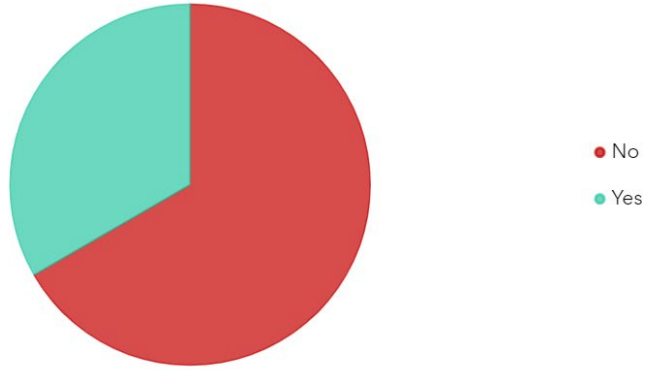
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	6	5.83%
Yes	3	2.91%

Answered: 9 Skipped: 94

How long has your organization been mapping telephone in GIS?
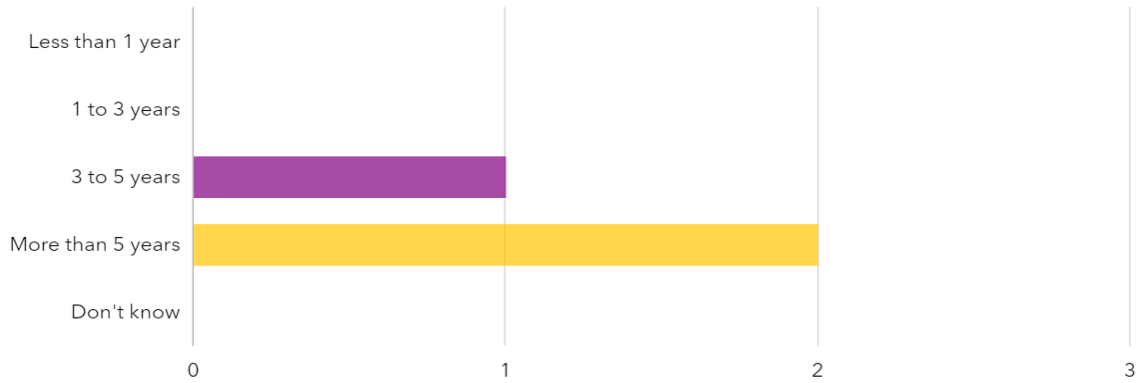
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	0	0%
1 to 3 years	0	0%
3 to 5 years	1	0.97%
More than 5 years	2	1.94%
Don't know	0	0%

Answered: 3 Skipped: 100

What percentage of your telephone assets are currently mapped using GIS technology?

Column **Bar** Pie Map

	0	1	2	3
Less than 25%				
25% to 50%				
50% to 75%				
75% to 100%				
Don't know				

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	0	0%
25% to 50%	0	0%
50% to 75%	0	0%
75% to 100%	3	2.91%
Don't know	0	0%

Answered: 3 Skipped: 100

Television?

Column   Bar   Pie   Map

● No

● Yes

Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	89	86.41%
Yes	3	2.91%

Answered: 92 Skipped: 11

Is the television infrastructure being mapped using GIS software?

- No
- Yes
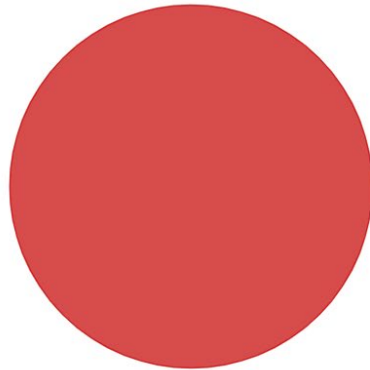
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	3	2.91%
Yes	0	0%

Answered: 3 Skipped: 100

How long has your organization been mapping television in GIS?

There are no answers to this question yet.

What percentage of your television assets are currently mapped using GIS technology?

There are no answers to this question yet.

Broadband?

- No
- Yes

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	73	70.87%
Yes	19	18.45%

Answered: 92 Skipped: 11

Is the broadband infrastructure being mapped using GIS software?

Column Bar Pie Map

- Yes
- No
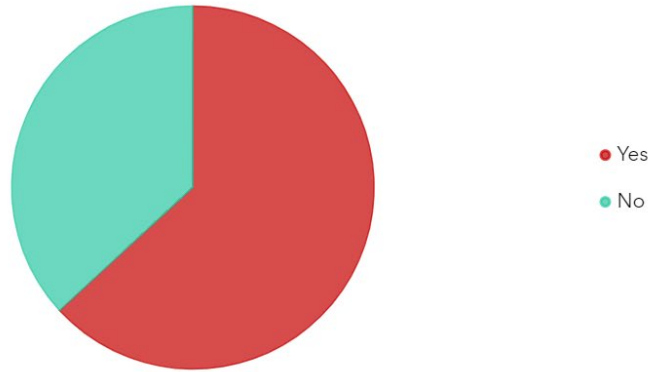
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Yes	12	11.65%
No	7	6.8%

Answered: 19 Skipped: 84

How long has your organization been mapping broadband in GIS?   Column **Bar** Pie Map
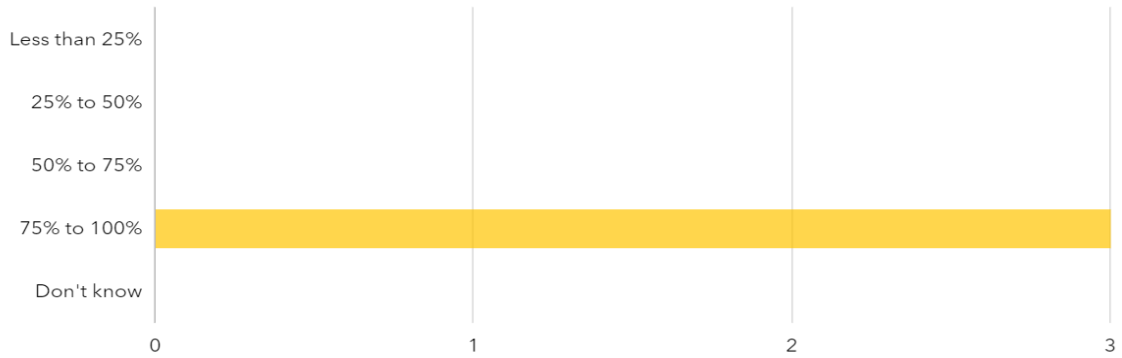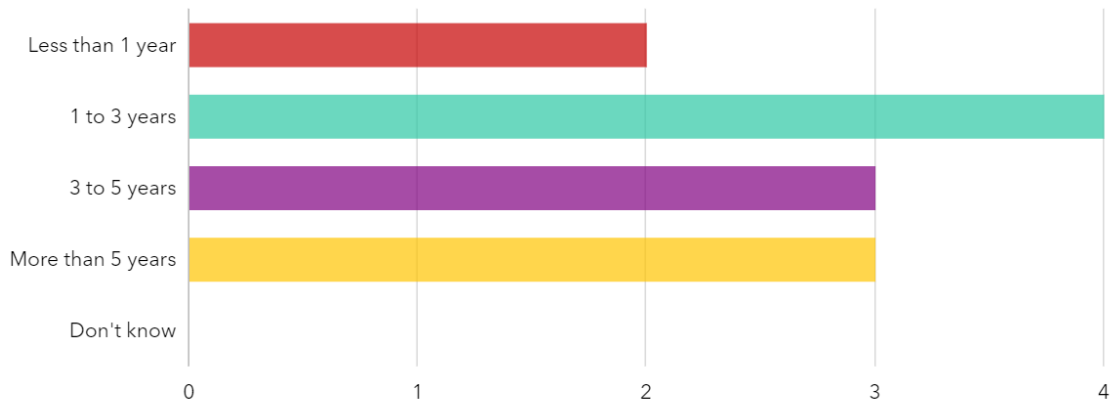

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	2	1.94%
1 to 3 years	4	3.88%
3 to 5 years	3	2.91%
More than 5 years	3	2.91%
Don't know	0	0%

Answered: 12 Skipped: 91

What percentage of your broadband assets are currently mapped using GIS technology?
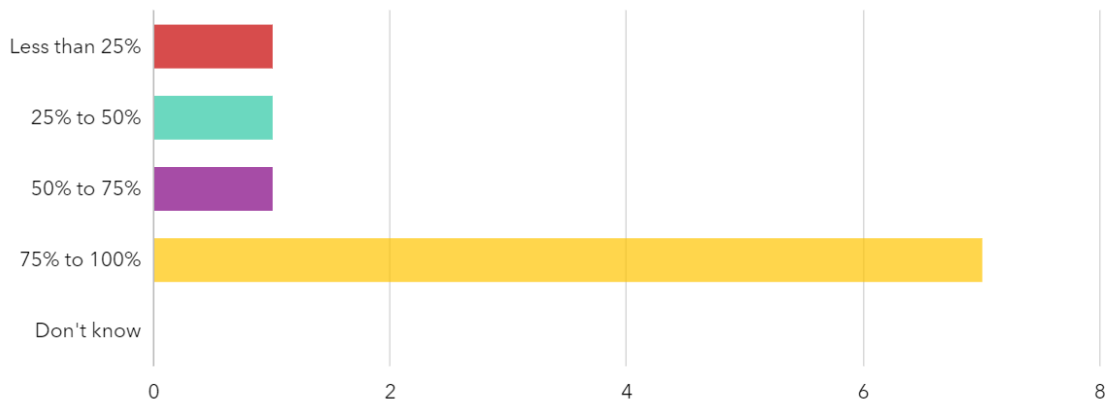
Column | Bar | Pie | Map

Hide table
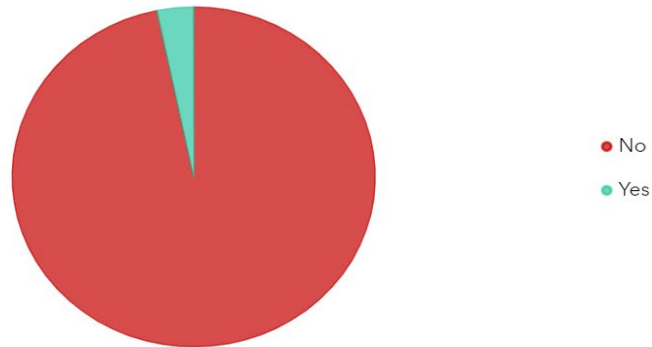
☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	1	0.97%
25% to 50%	1	0.97%
50% to 75%	1	0.97%
75% to 100%	7	6.8%
Don't know	0	0%

Answered: 10 Skipped: 93

Crude oil?

- No
- Yes
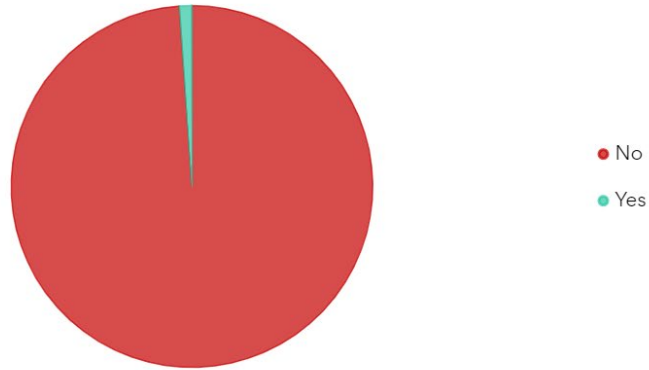
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	89	86.41%
Yes	1	0.97%

Answered: 90 Skipped: 13

Is the crude oil infrastructure being mapped using GIS software?

Column   Bar   Pie   Map

● No
● Yes
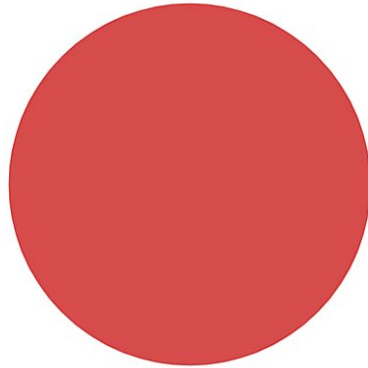
Hide table

☑ Empty categories   ↑↓ Sort

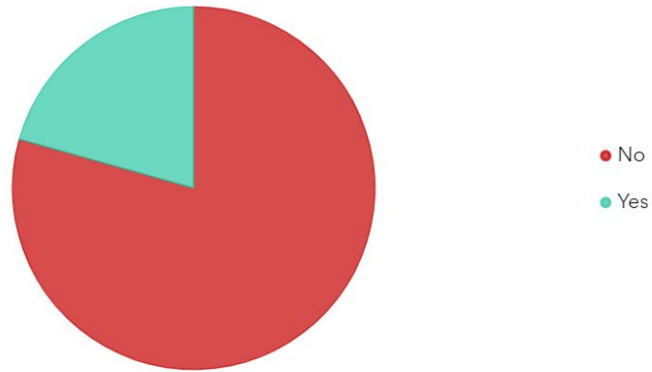| Answers	Count	Percentage
No	1	0.97%
Yes	0	0%

Answered: 1 Skipped: 102

How long has your organization been mapping crude oil in GIS?

There are no answers to this question yet.

What percentage of your crude oil assets are currently mapped using GIS technology?

There are no answers to this question yet.

## Refined petroleum products?

Column Bar Pie Map

- No
- Yes
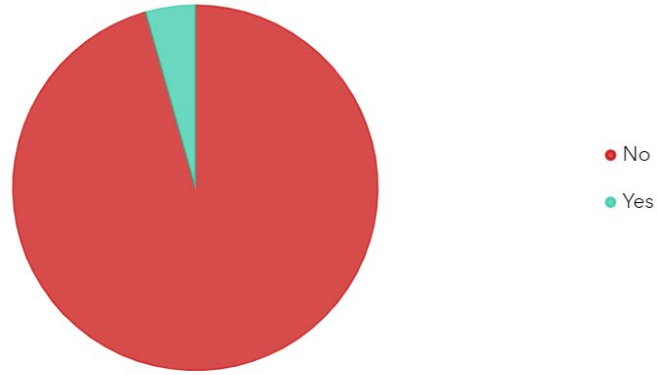
Hide table

☑ Empty categories   ↕ Sort

Answers	Count	Percentage
No	87	84.47%
Yes	4	3.88%

Answered: 91 Skipped: 12

● Is the refined petroleum product infrastructure being mapped using GIS software?

Column   Bar   Pie   Map

● Yes

● No
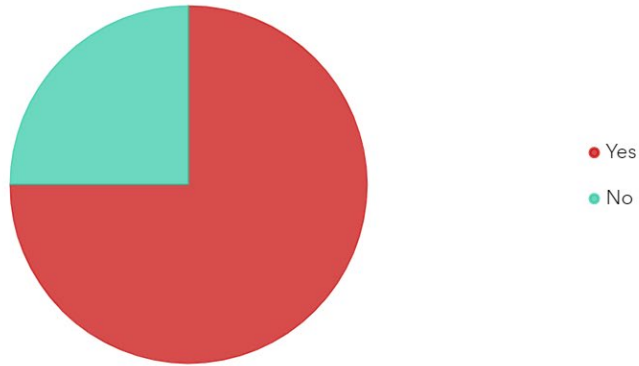
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Yes	3	2.91%
No	1	0.97%

Answered: 4 Skipped: 99

How long has your organization been mapping refined petroleum products in GIS?

Column   Bar   Pie   Map
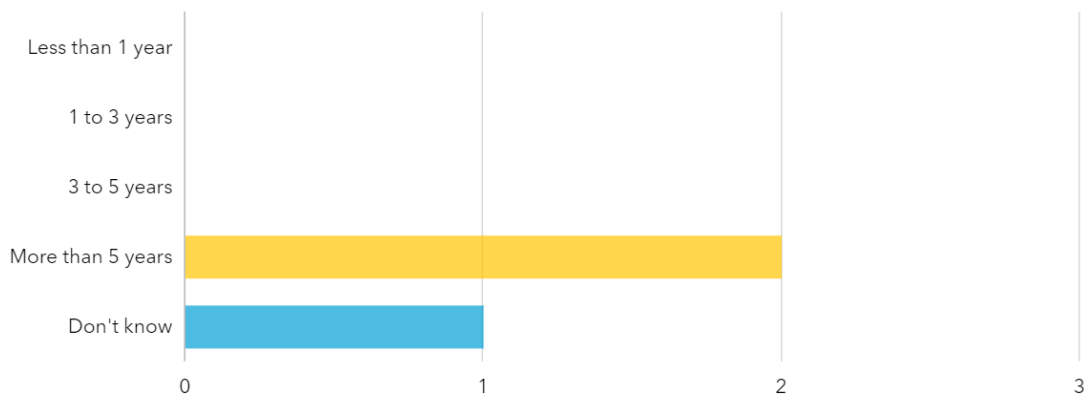
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	0	0%
1 to 3 years	0	0%
3 to 5 years	0	0%
More than 5 years	2	1.94%
Don't know	1	0.97%

Answered: 3   Skipped: 100

What percentage of your refined petroleum products assets are currently mapped using GIS…   Column   **Bar**   Pie   Map
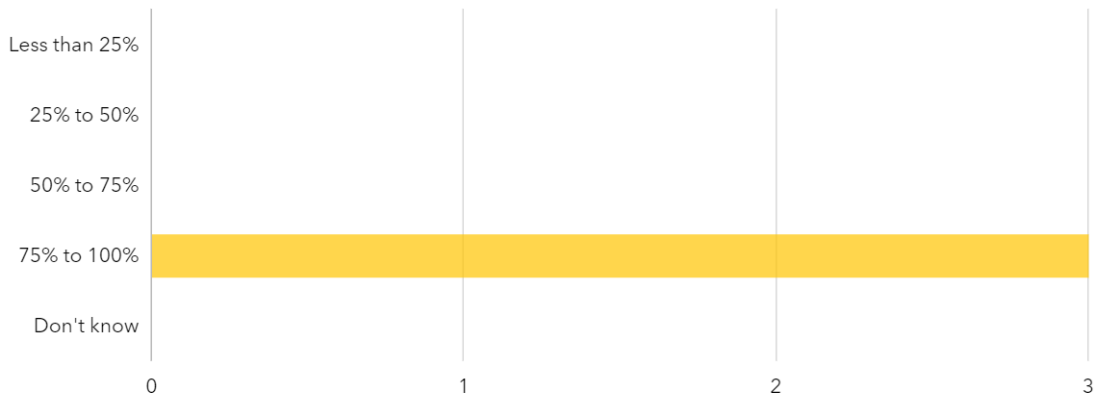
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	0	0%
25% to 50%	0	0%
50% to 75%	0	0%
75% to 100%	3	2.91%
Don't know	0	0%

Answered: 3 Skipped: 100

● Other:_____?

Column   Bar   Pie   Map

● No

● Yes
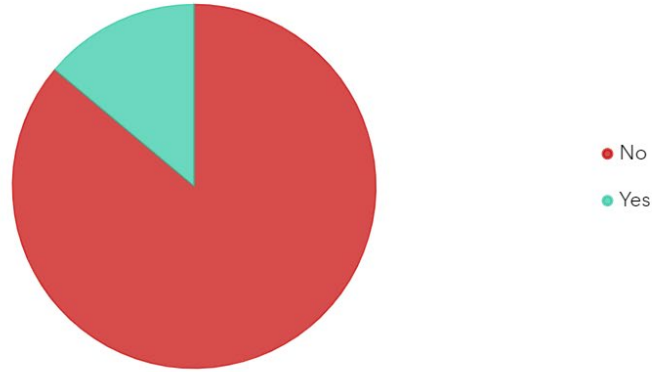
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	68	66.02%
Yes	11	10.68%

Answered: 79 Skipped: 24

Please specify other underground utility type:

The word cloud requires at least 20 answers to show.

Hide table   AA Show words

Response	Count
Fiber Optic	2
utlity fiber optic cable	1
Telecom (fiber)	1
State Water Project water	1
Private Wireless Networking (City Facility Point-to-Point)	1
groundwater (remediation)	1
Fresh water from a creek to our fish rearing facility	1
crude coconut oil	1
Creeks in pipes	1
Biogas	1

Answered: 11 Skipped: 92

Is the infrastructure being mapped using GIS software?

Column   Bar   Pie   Map

- Yes
- No
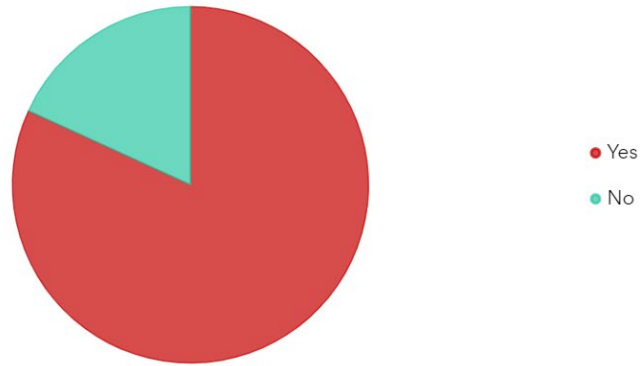
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Yes	9	8.74%
No	2	1.94%

Answered: 11   Skipped: 92

How long has your organization been mapping in GIS?   Column **Bar** Pie Map
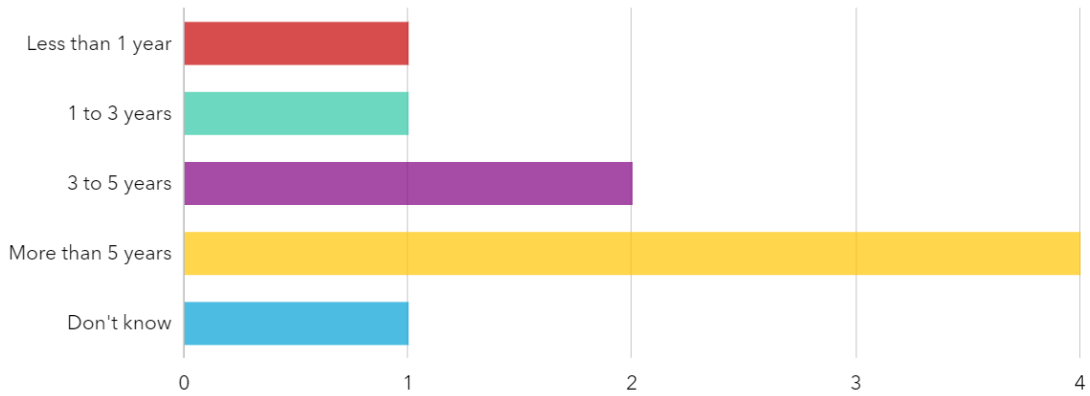
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 1 year	1	0.97%
1 to 3 years	1	0.97%
3 to 5 years	2	1.94%
More than 5 years	4	3.88%
Don't know	1	0.97%

Answered: 9 Skipped: 94

What percentage of your are currently mapped using GIS technology?   Column **Bar** Pie Map
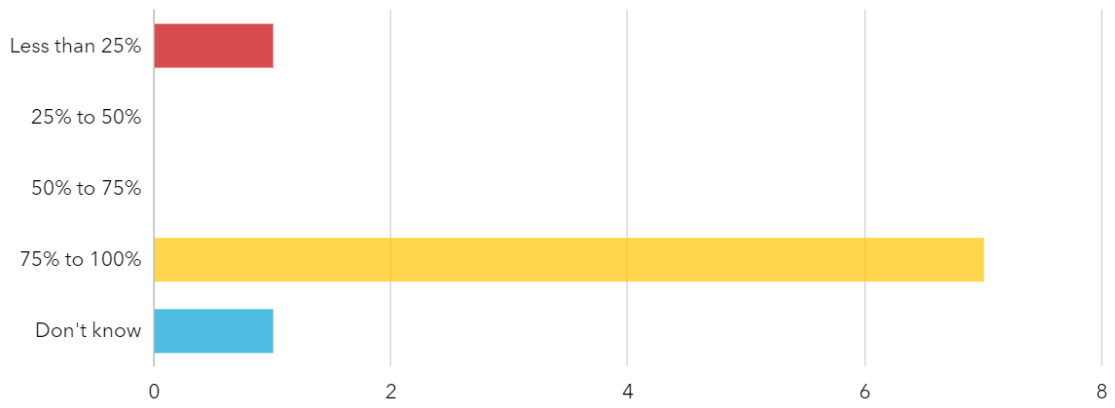
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Less than 25%	1	0.97%
25% to 50%	0	0%
50% to 75%	0	0%
75% to 100%	7	6.8%
Don't know	1	0.97%

Answered: 9 Skipped: 94

How does your organization currently store records of the physical locations of your buried...

Column | Bar | Pie | Map
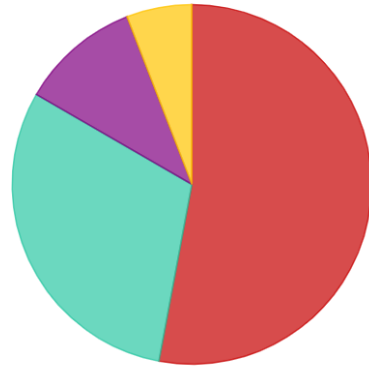
- Combination of physical and digital records.
- Digital records, including a GIS database.
- Mylar overlay maps or other physical documents.
- Don't know. This is not my area of responsibility.

Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Combination of physical and digital records.	54	52.43%
Digital records, including a GIS database.	31	30.1%
Mylar overlay maps or other physical documents.	11	10.68%
Don't know. This is not my area of responsibility.	6	5.83%

Answered: 102 Skipped: 1

How often does your organization update the GIS basemap layer for the geographical region in... Column **Bar** Pie Map
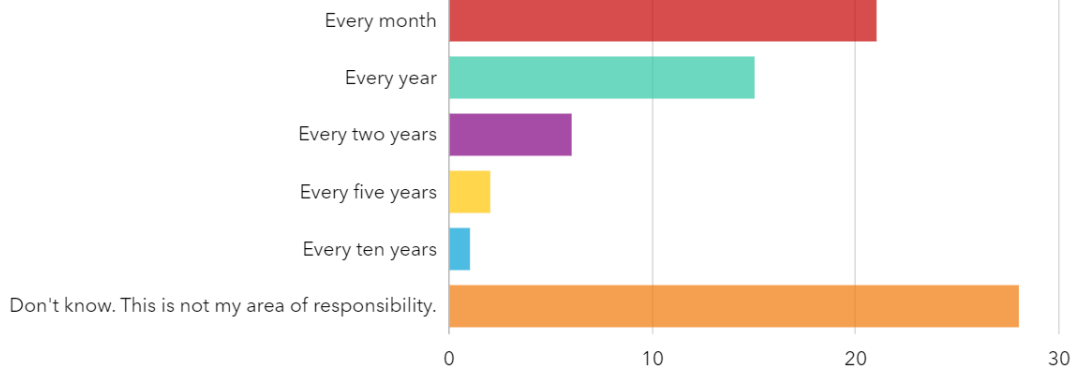
Hide table

☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Every month	21	20.39%
Every year	15	14.56%
Every two years	6	5.83%
Every five years	2	1.94%
Every ten years	1	0.97%
Don't know. This is not my area of responsibility.	28	27.18%

Answered: 73 Skipped: 30

What is your organization's standard practice for collecting and recording location data when...   Column   Bar   Pie   Map

- Approximate locations are determined by engineering staff (such as as-built drawings) and then recorded in GIS.

- We have no standard practice for collecting and recording location data of underground assets.

- A field locate of X, Y, and Z coordinates is obtained and then recorded in GIS.

- Don't know. This isn't my area of responsibility.

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Approximate locations are determined by engineering staff (such as as-built drawings) and then recorded in GIS.	48	46.6%
We have no standard practice for collecting and recording location data of underground assets.	23	22.33%
A field locate of X, Y, and Z coordinates is obtained and then recorded in GIS.	21	20.39%
Don't know. This isn't my area of responsibility.	9	8.74%

Answered: 101 Skipped: 2

How soon after buried infrastructure has been replaced or installed would a field worker be abl...   Column   Bar   Pie   Map
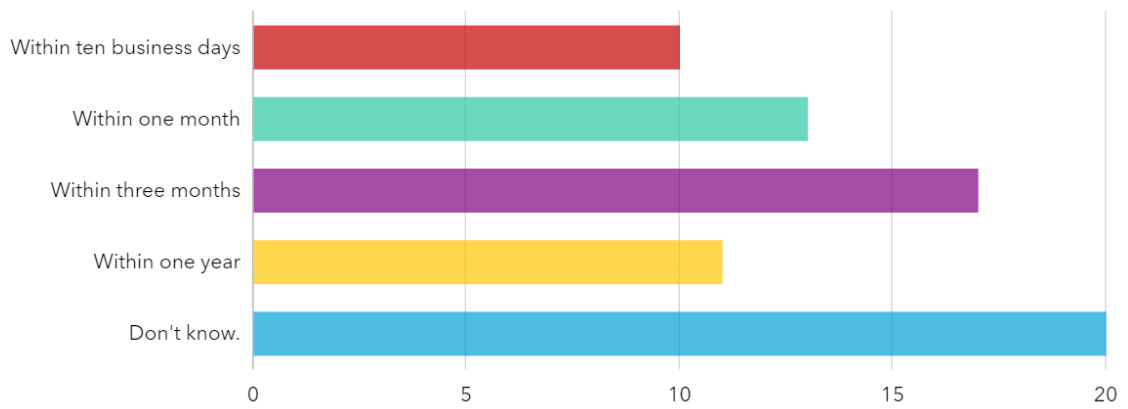
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Within ten business days	10	9.71%
Within one month	13	12.62%
Within three months	17	16.5%
Within one year	11	10.68%
Don't know.	20	19.42%

Answered: 71 Skipped: 32

How is GIS mapping being used in your operations? (Check all that apply.)   Column   Bar
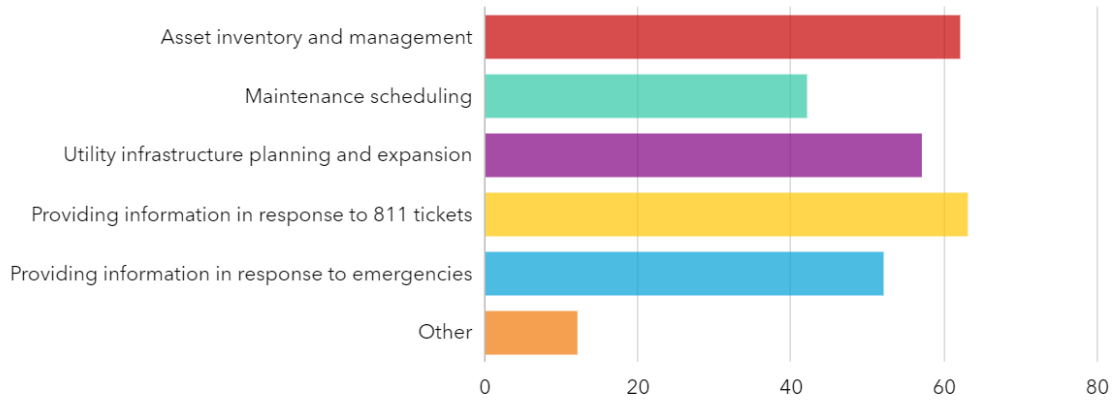
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Asset inventory and management	62	60.19%
Maintenance scheduling	42	40.78%
Utility infrastructure planning and expansion	57	55.34%
Providing information in response to 811 tickets	63	61.17%
Providing information in response to emergencies	52	50.49%
Other	12	11.65%

Answered: 94 Skipped: 9

Please specify Other GIS mapping use:

The word cloud requires at least 20 answers to show.

Hide table   AA Show words

Response	Count
We don't use GIS software	1
We do not have a GIS system or database of any kind. We have maps and photos.	1
Providing information for 811 tickets	1
Not used	1
Not in use	1
None now other than owner parcel information	1
No GIS data, just paper maps of approximate location of infrastructure	1
management of real property rights	1
GIS mapping is not used	1
As-built information for underground facilities.	1

Answered: 10 Skipped: 93
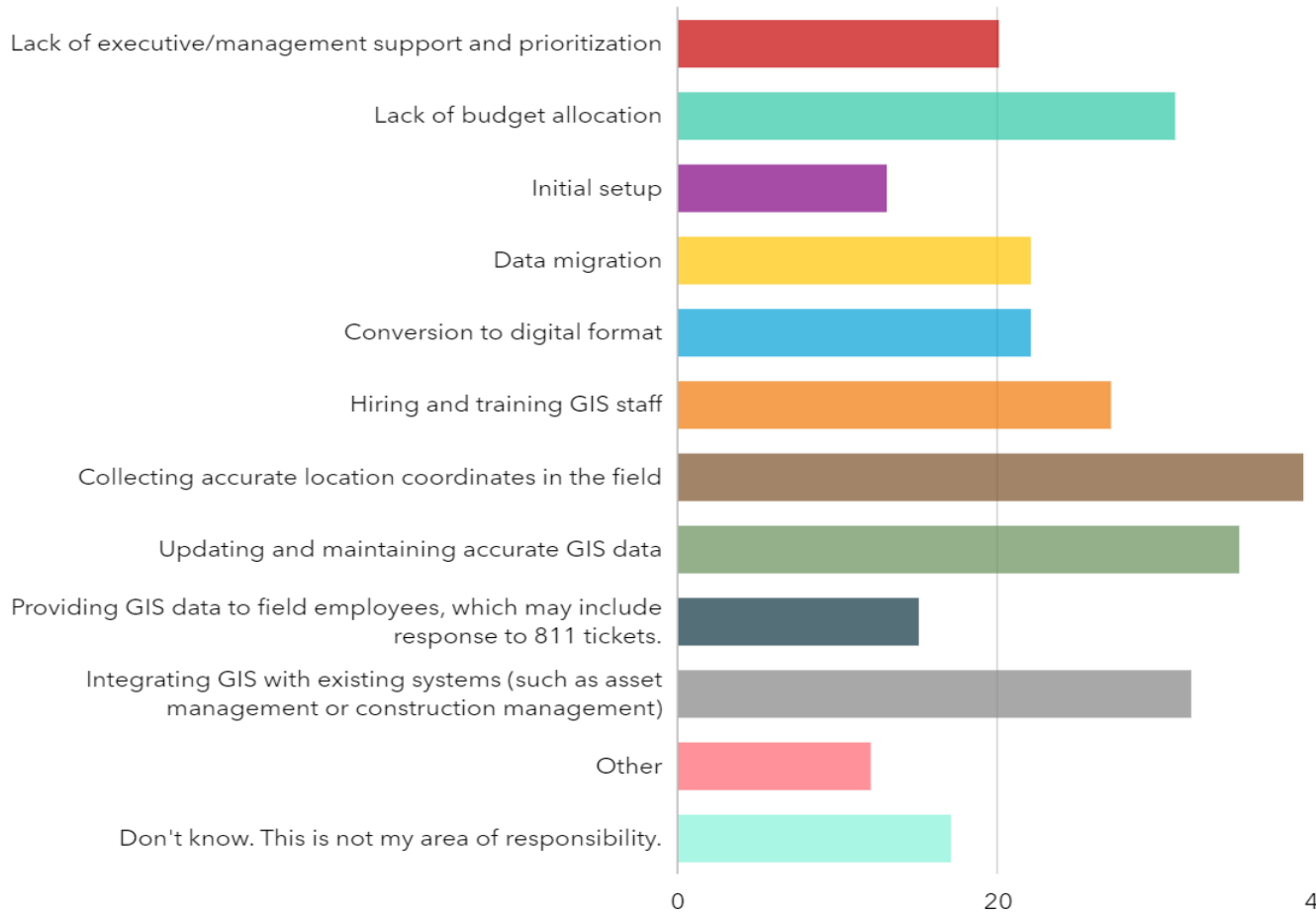
Answers	Count	Percentage
Lack of executive/management support and prioritization	20	19.42%
Lack of budget allocation	31	30.1%
Initial setup	13	12.62%
Data migration	22	21.36%
Conversion to digital format	22	21.36%
Hiring and training GIS staff	27	26.21%
Collecting accurate location coordinates in the field	39	37.86%

Updating and maintaining accurate GIS data	35	33.98%
Providing GIS data to field employees, which may include response to 811 tickets.	15	14.56%
Integrating GIS with existing systems (such as asset management or construction management)	32	31.07%
Other	12	11.65%
Don't know. This is not my area of responsibility.	17	16.5%

Answered: 97 Skipped: 6

Please specify Other main challenge:

The word cloud requires at least 20 answers to show.

Response	**Count**
We were primarily CAD based before my arrival. Converting CAD text to the attributes of GIS assets has been a challenge.	1
We have no paid staff. It's entirely a volunteer organization and we have limited funds for contractors.	1
We don't use GIS	1
Underground utility line locators are limited in their ability to detect and identify underground utility features, or accurately locate utilty features.	1
The owners/operators do not comply with the law [SB865]. They simply say they will not pay to have the work completed.	1
None of these apply	1
No issues, established business practice!	1
No GIS data	1
Meeting strict requirements of our Cyber Security Policy.	1
Lack of process to ensure that information makes it into GIS in a timely manner.	1

Keeping up with technology - software vendor's new tools require significant time and effort to train up on and then to implement via development environments etc.	1
Getting staff to utilize GIS data...some are reluctant to embrace technology	1

Answered: 12 Skipped: 91

Which areas of GIS mapping is your organization planning to improve or expand? (Check all that apply.) Column Bar
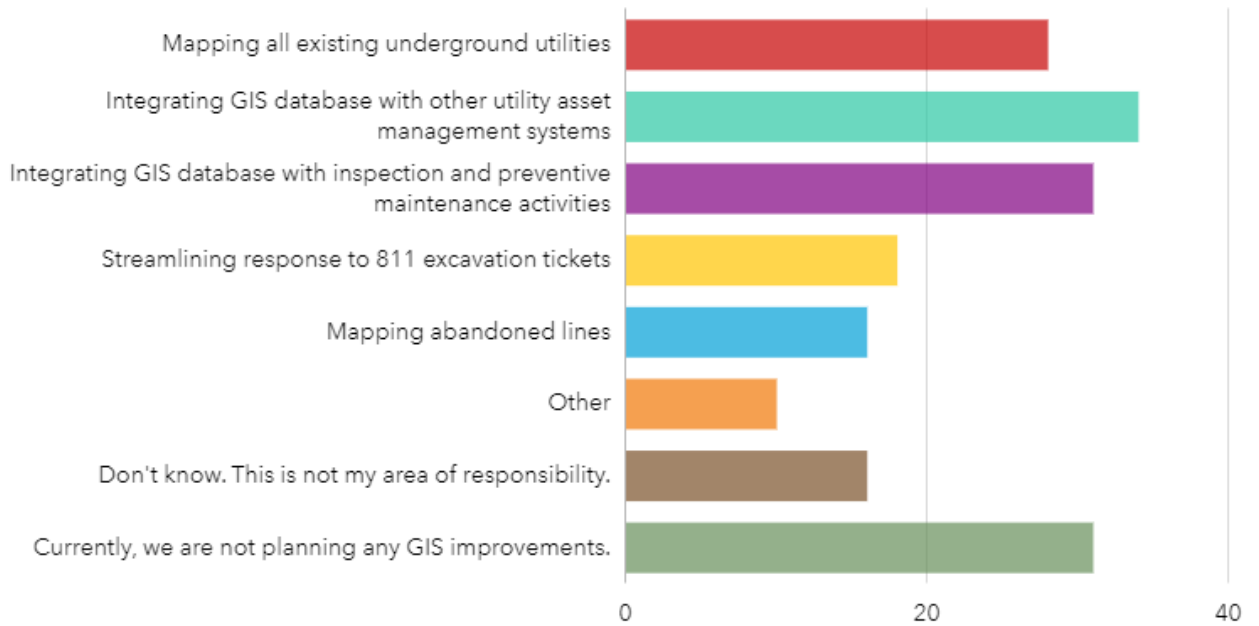
Hide table ☑ Empty categories ⇅ Sort

Answers	Count	Percentage
Mapping all existing underground utilities	28	27.18%
Integrating GIS database with other utility asset management systems	34	33.01%
Integrating GIS database with inspection and preventive maintenance activities	31	30.1%
Streamlining response to 811 excavation tickets	18	17.48%
Mapping abandoned lines	16	15.53%
Other	10	9.71%
Don't know. This is not my area of responsibility.	16	15.53%
Currently, we are not planning any GIS improvements.	31	30.1%

Answered: 100 Skipped: 3

Please specify Other planned improvements or expansions:

The word cloud requires at least 20 answers to show.

Response	Count
We use Field Maps as our GIS, but our subscription needs to be reviewed so we cannot access our GIS at this time.	1
Utility Network conversion from a Geometric Network	1
upgrading and migrating data to ArcPro with UPDM with UN and APR	1
Migration from 'current' data schema and structure of utility network in software to 'new and improved' data schema and structure. Plus, implementing field-based data editing where possible.	1
Migrating the the ESRI Utility Network	1
Make sure all attributes are collected so we can visualize in 3D, and eventually move to the Utility Network on the Arcgis Platform.	1
Improving location accuracy.	1
collecting more accurate spatial location of UG assets at construction (X,Y,Z)	1
Attribute updates	1
Asset and system modeling, GIS strategic plan, Data Quality Management Plan.	1

Answered: 10   Skipped: 93

How does your management demonstrate the importance of mapping buried infrastructure using GIS...   Column   Bar
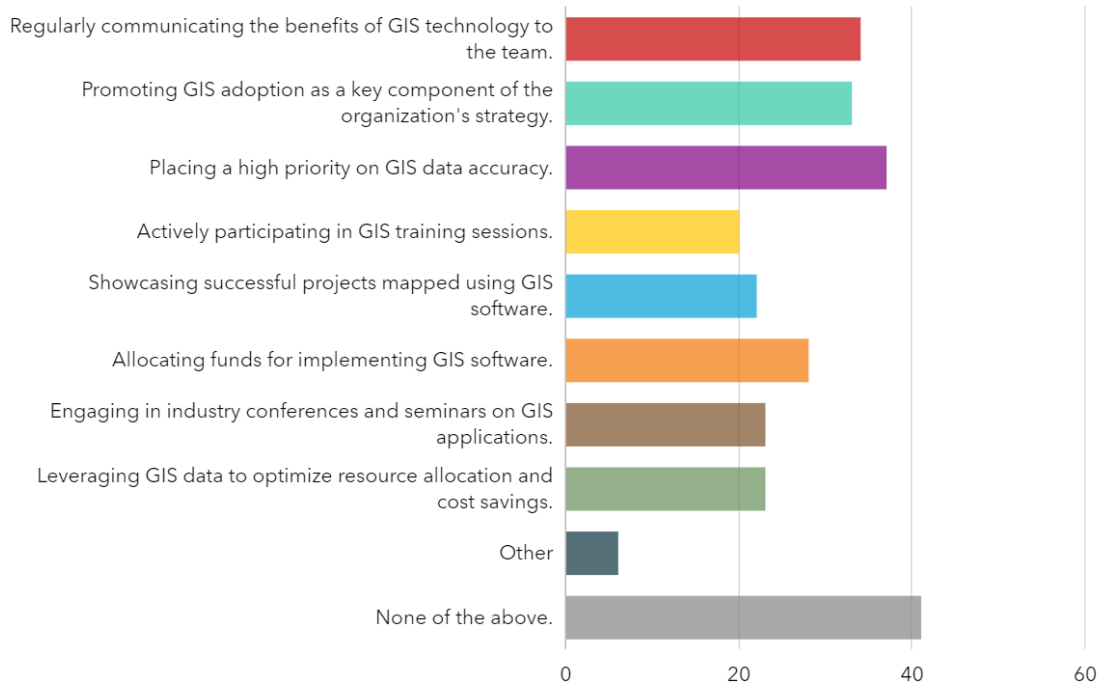
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
Regularly communicating the benefits of GIS technology to the team.	34	33.01%
Promoting GIS adoption as a key component of the organization's strategy.	33	32.04%
Placing a high priority on GIS data accuracy.	37	35.92%
Actively participating in GIS training sessions.	20	19.42%
Showcasing successful projects mapped using GIS software.	22	21.36%
Allocating funds for implementing GIS software.	28	27.18%
Engaging in industry conferences and seminars on GIS applications.	23	22.33%
Leveraging GIS data to optimize resource allocation and cost savings.	23	22.33%
Other	6	5.83%
None of the above.	41	39.81%

Answered: 98 Skipped: 5

Please specify Other

There are no answers to this question yet.

What additional information would you like to share or what questions would like answered about GIS...

Hide table   AA Show words

Response	Count
Your desire for us to dramatically improve our GIS in not possible with our resources. Maybe you should offer us a grant to hire some temporary workers please.	1
What is GIS mapping and who pays fot it?	1
We are currently working on the "language" to require digital files (CAD) from improvement projects in the city. Receiving files in a digital format would eliminate the need for duplicate entry, potential errors, and quicker inputting into GIS.	1
See Business and Professions Code Section 8726.	1
process for GIS mapping of plant infrastructure	1
Our utility mapping started some 20 years ago, with slow traction to begin with, but then once one sector of Utilities gained traction, the other soon jumped aboard. There's still a way to go in predictive modeling but the goal is there.	1
Our CAD data is VERY comprehensive and accurate so GIS has not been a high priority. However I was brought in to change that but I have limited time because I 'wear many hats' at our small District.	1
Our infrastructure is mapped, but our Engineer does not use GIS to map.	1

Answered: 22 Skipped: 81

Response	Count
No.	1
No new subsurface installation, just maintaining existing	1
Na	1
N/A	1
Its should be a requirement for everyone!	1
I think we need clear guidelines about the level of security necessary for subsurface infrastructure.	1
I suggest that entities mandate GIS map updating fees be included for any project that includes expansion or alteration of infostructure.	1
How much time do we have to update our GIS system? Is this unfunded?	1
How are we going to ensure responsibility and accountability for the data that is collected and analyzed and shared publicly?	1
Government Code 4216.3 (a) (6) requires location of certain underground utilities be performed by the appropriately licensed person.	1
Funding for small government agencies is lacking so we do not use GIS.	1
Currently using AutoCAD (Draftsight), but converting to GIS (QDIS). Need training (experience) on using QDIS and best practices for using it.	1
Availability of free or low-cost GIS applications for governmental organizations to utilize in creating GIS mapping programs	1
Accuracy seems to be important but integrating professional surveyors into certifying accuracy is not happening.	1

We would appreciate the opportunity to ask follow-up questions. Would you be willing to talk t...   Column   Bar   Pie   Map

- No
- Yes
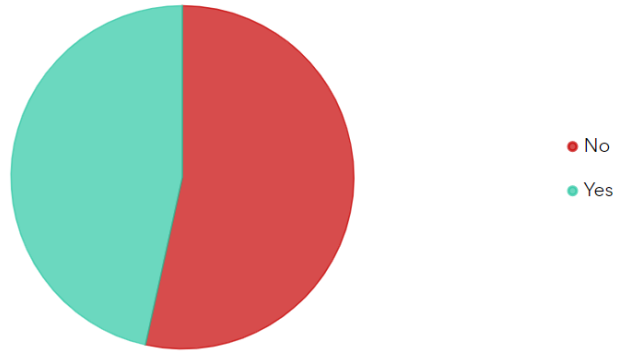
Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No	54	52.43%
Yes	47	45.63%

Answered: 101 Skipped: 2