



Digital Compliance for Low-Risk Plumbing and Drainlaying Work Pilot

Evaluation Findings

Contents

Contents	2
Executive Summary	3
Context	5
Evaluation objectives	5
Limitations of the evaluation	5
Approach	6
Analysis of a sample of digital records	6
Stakeholder interviews	6
Review of Digital Records	7
The Artisan tool provides an effective platform to review digital records, but these records are only as good as those using the platform.....	7
The majority of digital records reviewed had room for improvement, though many of these issues were minor	7
While no examples were found in this review, high trust practices like using digital records for remote inspection could create opportunities for bad actors	8
Stakeholder Interviews.....	9
Stakeholders are positive about Artisan as a tool to create digital records.....	9
While there are key differences in using Artisan, it utilises the same skillset as in-person inspections	9
Creating digital records for use in determining compliance with the building code leads to significant efficiency gains for BCAs and plumbers	9
Artisan supports increased flexibility into stakeholders’ workdays	10
Artisan changes how plumbers and BCAs work with each other	10
Artisan provides opportunities for raising competency of plumbers.....	11
The digital records created using Artisan are being used by stakeholders outside of the immediate determination of compliance with the building code	11
Some plumbers worried about the potential for misuse of the system, but BCAs were less concerned	11
While those interviewed were broadly positive about Artisan, they also had suggestions for how it could be improved	12
Conclusions.....	13
Does the digital record keeping provide sufficient information to determine whether the work complies with the building consent issued under the Building Act 2004?	13
Are there sufficient benefits to using remote inspection tools for Building Consent Officials and plumbers?	13
Appendix 1: Changes in Pilot Scope	14

Executive Summary

This report summarises the evaluation of a Pilot project focused on using the BRANZ Artisan tool for the creation of digital records of low-risk plumbing and drainlaying (plumbing) work.

The evaluation included a review of 93 digital records of plumbing work by an independent subject matter expert, and 13 interviews with BCA inspectors and plumbers participating in the pilot. The key limitations of this evaluation are that the Pilot was tested in only two BCAs, and participation was only offered to high-performing plumbers. As a result, care should be taken when using these findings to make statements about plumbers nationally.

Artisan is an effective tool for creating digital records of low-risk plumbing work

BCA representatives and plumbers interviewed for this evaluation were unanimously positive about their experience of using Artisan to create digital records. Following a review of a sample of digital records, an independent subject matter expert also felt that Artisan enabled production of high-quality digital records.

BCA interviewees noted that the use of Artisan for creating digital records, and reviewing them as part of remote inspections, was a good fit with the largely digital processes involved in the building consent system. BCAs interviewees felt that there could be pushback from a small number of inspectors who prefer to work face-to-face on building sites and could struggle with inspections being undertaken remotely as a desk exercise.

All plumbers interviewed felt that Artisan was simple to learn and that the process of creating digital records was intuitive. The creation of digital records is an extension of existing practices for many plumbers, who already take photos of their work. The benefits Artisan offer over current practice is that the photos are organised, able to be annotated, easier to reference in the future if required, and that the digital records are recognised by the BCA enabling remote inspections of work.

A key factor in the success of Artisan, and uptake by plumbers, is in the level of buy-in from BCA staff.

While the digital records reviewed were high quality, most of them had aspects which could be improved upon – notably missing information

The independent reviewer noted that while they felt the digital records created in Artisan were of a high quality, most of the records (around 80%) could be improved. Most of the issues identified with the digital records related to missing information: 32 of 93 records were assessed as 'not covering the full scope of work', and 67 of 93 records were assessed as 'not having sufficient notes or comments'. The missing information in question was typically either minor or likely to be included in other building consent documentation.

It's important to note that the independent reviewer was assessing the digital records in isolation. In contrast when making determinations about compliance with the building code, BCA inspectors will have a range of other information sources (e.g. contextual information about the work, supporting documentation, and conversations with plumbers and other stakeholders).

One BCA interviewee described how the process of using digital records to determine compliance largely mimics the process of in-person inspections. Inspectors won't conduct detailed inspection and testing of every component but will instead look at a sample of components and make a determination of compliance. Artisan includes a 'shot list' for each job, directing plumbers to take a series of specific photographs, providing a sample of work for the BCA inspectors to review.

Creating and using digital records provides significant efficiency gains for plumbers and BCA inspectors

BCA respondents and most plumbers interviewed noted that using Artisan to create digital records results in significant efficiency gains.

Digital records created in Artisan significantly reduced the time BCA inspectors spent traveling to and between building sites to conduct inspections. One BCA respondent also noted that when conducting an in-person inspection, a failure would almost always require scheduling and undertaking another inspection to inspect the failed elements. Whereas a failure in Artisan could be resolved more quickly, for example through requesting a better angle on an existing photograph. As a result, a remote inspection using a digital record created in Artisan could be replacing two or more in-person inspections and the associated travel time.

A widely shared view among the plumbers interviewed was that Artisan was more time efficient than the traditional method of in-person site inspections. Respondents noted that using Artisan to create and submit digital records was significantly faster than booking, and waiting for, in-person inspections. While the detailed shot lists required some effort to compile, feedback from plumbers interviewed was that the benefits of using Artisan far outweighed the small time cost associated with ensuring the digital record was complete.

All stakeholders described how the use of Artisan to create digital records had supported increased flexibility in how they structure their workdays.

Some stakeholders felt the high-trust nature of digital records and remote inspections introduced risk associated with misuse of the system

Several plumbers noted the potential for misuse of the Artisan system. A key concern was that it was possible to meet the requirements of the shot list set by the BCA while still misrepresenting or omitting relevant details (e.g. the fall of a pipe, or adjacent pipes that may pose a risk). To mitigate this concern, some respondents suggested quality assurance measures such as random in-person inspections.

BCAs were less concerned about this, primarily because they saw access to Artisan as something they controlled rather than being open to all. BCAs selected pilot participants based on their demonstrated capability, for example low fail rate over a sustained period. One BCA noted that they see Artisan as a useful tool to streamline how they work with their high-performing plumbers, and not as something that should be rolled out to everyone. They commented that if bad behaviour was detected, for example people looking to cut corners and reusing photos, they would have their ability to use Artisan removed and return to in-person inspections.

This finding raises the issue that if Artisan is provided as an option to all plumbers, rather than those selected by BCAs, sufficient checks and a functioning sanction system should be in place to ensure no misuse of the system.

Context

This report provides key findings from the evaluation of the Digital Compliance for Low-Risk Plumbing and Drainlaying Work Pilot (the Pilot). The purpose of the Pilot was to test the use of a digital record-keeping application for low-risk plumbing work, enabling remote inspections and determinations of compliance with building consents issued under the Building Act 2004.

This evaluation was carried out by the Building System and Tenancy Team, Evidence & Insights, at the Ministry of Business, Innovation and Employment. Governance for this project included representation from Master Plumbers, BRANZ, and participating local councils.

At the time this evaluation was undertaken, several Building Consent Authorities (BCAs) were already regularly making use of remote inspection tools, some of which include digital record-keeping functionality. This evaluation assumes these remote inspection processes are reliable and can result in efficiencies for stakeholders (see Appendix 1 for more information), and instead focuses solely on evaluating the viability and value of the digital record-keeping component.

The remote inspection tool used in the Pilot is the BRANZ Artisan application.¹ The Artisan application allows BCAs to establish 'shot lists' of required photographs for a given job type, which plumbers/drainlayers² then take on-site and upload to the application. This digital record can be reviewed by BCAs, enabling remote inspections to be undertaken. The Artisan application enables BCAs to seek clarification or request additional information from plumbers.

Evaluation objectives

The objective of the Pilot was to test the viability of digital record-keeping by plumbers using the BRANZ Artisan tool. Specifically, it aimed to describe the benefits and risks of using this tool and identify any issues or recommendations for change. The key evaluation question was:

- How viable are remote inspection tools for facilitating plumbers to compile a digital record of their work?
 - Does the digital record keeping provide sufficient information to determine whether the work complies with the building consent issued under the Building Act 2004?
 - Are there sufficient benefits to using remote inspection tools for Building Consent Officials and plumbers?

Limitations of the evaluation

The following limitations should be considered when interpreting findings from this evaluation:

- The evaluation was conducted in collaboration with two BCAs, and as such should not be considered representative of all BCAs' experiences with remote inspections and digital compliance. That said, participating BCAs were selected to ensure a variety of experiences. One participating BCA represented a large almost exclusively urban area, while the other was a smaller BCA and covered a mix of small urban and rural areas.
- Plumbers and drainlayers included in the pilot were selected by BCAs based on previous experience and should not be considered representative of all individuals in these trades. BCAs were clear that in moving to a higher trust form of inspection, they were selective about who would be offered this option.
- All digital records assessed during this evaluation were created using the Artisan tool. There are other remote inspection platforms currently being used by BCAs in New Zealand. The functionality and features vary considerably between platforms. As such, findings in this report apply to digital records created using the Artisan tool.

¹ <https://www.branzartisan.nz/>

² For ease of reading, plumbers and drainlayers are collectively referred to as 'plumbers' throughout the report.

Approach

The evaluation utilized two key methodologies in collecting data:

- Third-party quantitative analysis of a sample of digital records captured using the Artisan tool, undertaken by a subject matter expert.
- Stakeholder interviews with relevant BCA staff and plumbers.

Analysis of a sample of digital records

The analysis of a sample of digital records was intended to provide a quantitative account of the extent to which digital records enabled determinations of compliance to be made.

BCAs provided access to digital records of a sample of plumbing work entered into the Artisan system. These records were reviewed in detail by a third-party subject matter expert, with significant experience as a plumber, as well as in multiple roles associated with the building consent system. Rather than being a random sample, cases provided to the third-party expert were purposively sampled to include a range of job types, as well as a mix of cases that passed on their first submission and those that required additional clarification from plumbers before a determination of compliance could be made.

A total of 93 cases were reviewed by the third-party expert. The information included in each digital record was assessed using five questions exploring the quality of the digital record:

- Is the visual clarity of all the photos sufficient to assess the work?
- Do the photos cover the full scope of what is being assessed?
- Is there sufficient information to identify any environmental, structural or safety risks associated with the work?
- Is there sufficient information to understand what each photo refers to?
- Are there sufficient notes/comments where needed to support demonstrating compliance?

These five questions were then summed up in an overall assessment:

- Is there room to improve the quality of the digital record to demonstrate the work complies with the building code?

It's important to note that this assessment was not assessing whether it was possible or appropriate to have made a determination of compliance. Each case had already been assessed by a BCA, and a determination of compliance made. This assessment is focused on the quality of the digital record as a stand-alone article.

Stakeholder interviews

The stakeholder interviews were intended to draw out narratives from the two key stakeholder groups: Building Consent Officials and plumbers. These narratives provide evidence about the extent to which Pilot objectives are being achieved.

Interviews were conducted with a senior Building Consent Official most suited to discuss the use of the Artisan tool from each of the two participating BCAs. BCAs were asked to provide a list of plumbers who were using the Artisan tool, from which to select interview respondents. A total of 11 plumbers were interviewed across the two regions included in the Pilot. Interviewees were selected to ensure a range of experience levels, from trainee plumbers through to experienced certifying plumbers.

Topics covered in the plumber interviews included:

- their experience using Artisan to create and reference digital records
- benefits and costs of using Artisan – efficiency, how they structure their day, interaction with the council
- any changes they would make to Artisan or how it is used for creating digital records.

Review of Digital Records

This section provides an overview of key findings from the expert review of a sample of digital records created using the Artisan tool. These digital records were reviewed in isolation. In contrast, when reviewing these records to make a determination of compliance with the building code, BCA officials will have a range of information sources about the plumbing work and broader building work.

The Artisan tool provides an effective platform to review digital records, but these records are only as good as those using the platform

The expert reviewer found that Artisan is a useful tool to enable the creation and review of digital records. The reviewer also noted that the platform was intuitive and can be picked up with only a short training session.

The quality of digital records varied considerably between records. Some of this variation was a result of different requirements or points of clarification sought between the two BCAs. However, most of this variation was due to differences between the practices of individuals lodging the records. Both BCAs had stand-out examples of practitioners whose cases were consistently completed to a high standard – with clear photos and supporting information provided in commentary. Likewise, both BCAs had records which lacked necessary clarity or detail.

There may be value in documenting the practices of high-performers and including these ‘tips and tricks’ in future training sessions. For example, if a digital level is not being used in photographs the fall/angle of a pipe should always be included in notation for each photo. Requirements such as this can be stipulated in the Artisan shot list at the discretion of the local BCA.

The majority of digital records reviewed had room for improvement, though many of these issues were minor

Around 80 percent of records reviewed as part of this evaluation were found to have aspects that could be improved (see Table 1, following page). The expert reviewer also noted that, while widespread, the issues with digital records were typically minor and easily addressed.

Most of the issues identified with the digital records related to missing information: 32 of 93 records were assessed as not covering the full scope of work, and 67 of 93 records were assessed as not having sufficient notes or comments. While a large proportion of records were assessed as having missing information, the missing information in question was typically either minor or likely to be included in other consenting documentation such as detailed plans.

The review found only minor issues associated with visual clarity, the inclusion of sufficient information to consider contextual risks, or sufficient information to understand what each photo refers to.

The following points provide an overview of issues identified for the criteria assessed by the review:

- **Visual clarity:** The review found the quality of almost all photos to be of a high standard. Where there were issues related to the visual clarity of photos included in the digital record, it typically related to the photo being taken on a poor angle or was a photo of a photo - making it difficult to read measuring tape or determine the incline of a pipe.
- **Scope of work:** Around one-third of digital records were assessed as not including photos that cover the full scope of work being assessed. Typically, this information had been requested in Artisan but was not provided by the individual lodging the record.
- **Contextual elements:** The reviewer identified only a single case where the record did not include sufficient information to identify any environmental, structural, or safety issues associated with the work.
- **Identifiable subject:** The reviewer identified two cases where it was not possible to identify the subject of the photo. In both cases, the lack of notes or markings on pipes made it impossible to determine whether pipes included in the digital record were for sewer or stormwater.

- **Supporting information:** The most frequently identified issue was the lack of sufficient supporting notes or comments in digital records. Most of these cases were the result of information requested by Artisan but not provided by individuals lodging the record. For example, the percentage of fall/angle on pipes. In a smaller number of cases the instructions were framed in a way that did not elicit sufficient information. For example, a prompt for hot water pipework asked for the size of pipe but failed to ask for details necessary to establish the volume and energy efficiency of the system.

Many of the issues identified above could be addressed by inclusion of appropriate prompts or stipulations in the Artisan shot lists. Local BCAs can customise the requirements included in Artisan shot lists to meet their needs.

Table 1: Summary of expert reviewer ratings

Assessment criteria	Yes	No
Visual clarity: Is the visual clarity of all photos sufficient to assess the work?	87	6
Scope of work: Do the photos cover the full scope of what is being assessed?	61	32
Contextual elements: Is there sufficient information to identify any environmental, structural or safety risks associated with the work?	92	1
Identifiable subject: Is there sufficient information to understand what each photo refers to?	91	2
Supporting information: Are there sufficient notes/comments where needed to support demonstrating compliance?	26	67
Overall: Is there room to improve the quality of the digital record to show the work complies with the building code? ³	18	75

While no examples were found in this review, high trust practices like using digital records for remote inspection could create opportunities for bad actors

Using digital records of low-risk plumbing work is a high trust practice, relying on the honesty of the individuals lodging the records. The expert reviewer noted that in considering a digital record, the assumption must be made that the photos are accurate and representative of the site in question. While there was no evidence of dishonesty in the records reviewed, the reviewer felt it was important to note this potential risk with adopting a digital compliance process. Note that Artisan captures GPS coordinates and user device information to help identify any fraudulent behaviour.

In discussing this possibility with BCAs, they were clear that while this is something that has been considered, they are confident that it will not create significant issues. The use of digital records for remote inspection is not something that has been opened to all tradespeople. Instead, it has been offered as an alternative to those with a consistently high level of performance. One BCA noted that if there were instances of dishonesty uncovered, those providers would lose the ability to use digital records in the future.

This could indicate that if this process is adopted for all plumbers, rather than at the discretion of the BCA, sufficient checks should be in place to detect dishonest behaviour.

³ Note that this assessment varies considerably from how a BCA would determine compliance, as: 1) this assessment was done solely based on the information contained in the Artisan record, while Building Consent Officials have access to additional information, and 2) this assessment adopts a strict pass/fail criteria, while BCAs will likely adopt a risk-based assessment.

Stakeholder Interviews

This section provides an overview of interviews undertaken with BCA staff and plumbers participating in the Pilot.

Stakeholders are positive about Artisan as a tool to create digital records

Both BCAs and plumbers saw value in using Artisan to create digital records of low-risk plumbing work. General feedback included that the tool was intuitive and easy to use, and that the ability to create a digital record was a key benefit of the Artisan platform. Plumbers commented that the phone-based application worked well as they already do a lot of administration and record-keeping on their phones, making it more of an extension of existing practices.

While they felt it would be suitable for most stakeholders working in this space, one BCA respondent noted that the digital nature of the platform may be a barrier for some potential users (both BCA inspectors and plumbers). The BCA respondents had no concerns about the competency of inspectors in using the Artisan tool, as most BCA processes are already digital, requiring some level of technological competency. However, they felt that some inspectors could struggle to make the transition to a more desk-based role using Artisan, in contrast to regularly being out on building sites conducting inspections face-to-face.

One BCA respondent felt that some plumbers could lack the necessary technological skills to engage with Artisan, and that this could limit the ability to implement this more widely across the trade. This concern was not reflected in the interviews with plumbers, who were all confident in using the application despite varying levels of confidence in their more general digital capability. While training was provided to all participants in the pilot, many plumbers commented that they primarily learnt how to use the tool through trial-and-error. This trial-and-error learning period typically only lasted a “couple of jobs” as the tool is straightforward and intuitive.

Plumbers felt well-supported in using the tool throughout the pilot, noting timely and relevant feedback from BCA inspectors.

While there are key differences in using Artisan, it utilises the same skillset as in-person inspections

BCAs noted that the process of reviewing a digital record is similar to an in-person inspection with a few key differences. Respondents noted that for many in-person inspections you will not undertake a detailed inspection of every element, instead relying on a detailed inspection of a sample of building elements. This is the same process that is undertaken using Artisan, where you receive a set of photographs intended to represent the completed job.

A key difference in reviewing digital records created in Artisan is that most photos are wide-angle shots intended to capture large segments of work. These photos can preclude a detailed interrogation of elements of the work, e.g. reviewing things from multiple angles. BCA respondents noted that the functionality in Artisan enables a “back and forth” discussion with the plumber, where additional photos or details can be requested to address any concerns they may have.

All plumbers interviewed thought that Artisan created an accurate digital record of their work.

Creating digital records for use in determining compliance with the building code leads to significant efficiency gains for BCAs and plumbers

BCA respondents and most plumbers interviewed noted that using Artisan to create digital records results in significant efficiency gains. BCA respondents discussed how digital records created in Artisan supported remote inspections, significantly reducing time spent traveling to and between building sites to conduct inspections. One BCA respondent also noted that the ability to have a “back and forth” discussion with plumbers within the Artisan tool resulted in fewer failed inspections. In contrast, when conducting an in-person inspection, a failure would almost always require scheduling and undertaking

another inspection to inspect the failed elements. As a result, a remote inspection using a digital record created in Artisan could be replacing two or more in-person inspections and the associated travel time.

Yeah, so the avoidance of traffic is a huge, huge, benefit from this. I think it's understated a lot.
– BCA interview respondent

A widely shared view among the plumbers interviewed was that Artisan was more time efficient than the traditional method of in-person site inspections. Respondents noted that using Artisan to create and submit digital records was significantly faster than booking, and waiting for, in-person inspections. One respondent commented that it saved time by reducing the need to keep sites open. Some plumbers noted that to achieve efficiency gains out of using Artisan, the application needs to be set up properly to ensure the on-site process runs smoothly. When set-up properly, it just becomes something that fits into existing work on site but if things need to be updated or changed in the application, it becomes more work. Several plumbers noted that time could be wasted by other parties on-site not having Artisan access organised.

One BCA respondent noted that they had received complaints from some plumbers about the added time taken to ensure all the required photographs are included in the digital record. In contrast, feedback from plumbers interviewed was that the benefits of using Artisan far outweighed the small time cost associated with ensuring the digital record was complete.

Artisan supports increased flexibility into stakeholders' workdays

All stakeholders described how the use of Artisan to create digital records had supported increased flexibility in how they structure their workdays.

For BCA respondents, the shift from scheduled in-person inspections to digital submissions was significant. While set turnaround time is not a built-in feature of Artisan, some BCAs have found it useful to assure those lodging records that they will be reviewed within a given timeframe. One BCA described how rather than having a specific time to visit a site in-person, for digital records they provide an assurance that submitted work will be reviewed within 24 to 48 hours depending. As a result, inspectors have more control over how they structure their day.

That means you can do multiple within a day, and better structure your days and what you work on. We might do it straight up when they have submitted it or we might do it the next day.
- BCA interview respondent

The key flexibility Artisan introduces for plumbers was the ability to take the necessary photos and then move on to the next job without the need to try and coordinate the necessary people for an in-person inspection. Plumbers noted it was relatively easy to incorporate Artisan into their standard workday, with photographs required in the shot list taken as the work is undertaken. One plumber commenting that using Artisan “becomes part of the process of the job” (Plumber interview respondent).

Artisan changes how plumbers and BCAs work with each other

From the perspective of the plumbers we interviewed, the relationship with their BCA had either stayed the same, or improved, because of using Artisan. Where the relationship had improved, it was due to a greater level of positive interactions with BCA personnel (e.g. assistance with using the app, advice on other aspects of the building code).

It made it easier for us to work with the council and easier for them to work with us.
– Plumbing interview respondent

In contrast, some respondents noted that while they appreciated the greater sense of autonomy that Artisan afforded them, they missed the connections fostered by onsite inspections. One plumber noted that in-person inspections had been key in developing relationships with individuals at the BCA, as well as enabling them to demonstrate the quality of their work and establishing themselves as a trusted practitioner.

What is clear from interviews with all stakeholders is that strong BCA buy-in and support in using Artisan is essential to the success of the use of the platform.

Artisan provides opportunities for raising competency of plumbers

BCAs noted the significant opportunity for raising the capability of plumbers through the process of creating digital records in Artisan. Primarily, they saw this being achieved through the use of shot lists to draw attention to common pain points and critical aspects of a given plumbing task.

[We're] almost forcing them to look through their lens as an inspector. And when we first started rolling out Artisan there were so many people saying "well I didn't know that you looked at this" or ... "I didn't know that was non-compliant." So it increased their level of knowledge.

- BCA interview respondent

This finding is supported by feedback from some plumbers. With continued use of Artisan to create digital records and receive feedback from inspectors, some plumbers noted an increased ability to pre-empt and remedy potential issues before finalising the digital record for the BCA. For example, after some initial "back and forth" with BCA inspectors, plumbers knew to include descriptions and ensure the subject of photos was clear. One plumber noted that they used feedback via Artisan as an opportunity to ask the BCA inspector about aspects of the building code they were unsure about.

Several plumbers discussed how they appreciated the raised level of accountability provided by using Artisan to create digital records. Some respondents noted that ensuring they have all items required in the shot lists supports a greater attention to detail with their work. One plumber noted that digital records created in Artisan was a useful way to check trainees' work.

The digital records created using Artisan are being used by stakeholders outside of the immediate determination of compliance with the building code

The primary use of digital records created in Artisan is for remote inspections to determine compliance with the building code. However, respondents discussed other uses of the digital records.

One BCA respondent described how they are required to include rationale for compliance decisions. Digital records created in Artisan are being attached in their entirety as evidence for compliance decisions, and the respondent noted that this is a much more comprehensive rationale than had been included in the past. The detailed evidence and accompanying notes form a clear record of the work and the rationale for compliance decision, potentially aiding in future disputes.

Several plumbers described how Artisan was supporting them to keep far more detailed and relevant records than they had in the past. While it is common practice for some plumbers to take photographs of elements of work, this practice had been ad hoc, and these photos were seldom filed in any organised way. This more detailed, organised record of work was seen as a key benefit by many plumbers. Many of these respondents described referencing the digital record created in Artisan during discussions with builders and/or clients. One interviewee noted that they used the shots for social media advertising.

Some plumbers worried about the potential for misuse of the system, but BCAs were less concerned

Several plumbers noted the potential for misuse of the Artisan system. While they felt that digital records created in Artisan presented an accurate representation of their work, they were concerned others could take advantage of the high-trust process. Several respondents commented that it was possible to meet the requirements of the shot list while still misrepresenting or omitting relevant details (e.g. the fall of a pipe, or adjacent pipes that may pose a risk). To mitigate this concern, some respondents suggested quality assurance measures such as random in-person inspections. Note that BCAs can determine and update the requirements in shot lists to ensure necessary information is included.

BCAs described how pilot participants were selected based on their demonstrated capability, for example low fail rate over a sustained period. One BCA noted that they see Artisan as a useful tool to

streamline how they work with their high-performing plumbers, and not as something that should be rolled out to everyone. They commented that if bad behaviour was detected, for example people looking to cut corners and reusing photos, they would have their ability to use Artisan removed and return to in-person inspections.

While those interviewed were broadly positive about Artisan, they also had suggestions for how it could be improved

Specific suggestions for changes to the Artisan application included:

- A commonly cited issue was that uploading photos in areas without internet coverage was a significant issue. There was confusion as to how to manage this issue. Some plumbers took a series of photographs and then added them to Artisan when in an area with coverage. However, others noted that the application uses GPS data to record where photographs were taken, and they were reluctant to submit the shots away from the site. As a result, some of these plumbers reported that they scheduled in-person inspections for these sites. This finding reflects a common misunderstanding of mobile phone users of Global Positioning Satellite (GPS) data requiring cellular network coverage. Artisan gathers GPS data from a satellite and queues the photos with their GPS data to automatically upload when the mobile device is next connected to a cellular or Wi-Fi network.
- Plumbers reported that the shot-lists were typically easy to use, with the sole exception of shots requiring depth measurement (e.g. the lowest point of a drain). These shots typically required more than one person to take; one to hold the measuring tape or spirit level and another to take the photo.
- One plumber noted it would be useful to have the option to submit incomplete inspections, rather than having to wait until all the information was compiled.
- Integration with existing systems was identified by both BCA and plumber interviewees. BCAs noted that currently there is no integration between Artisan and the various systems they use, and as a result manual transfer of information is required. Plumbers noted that when a remote inspection isn't an option the ability to book inspections via the app would be useful.
- One plumber noted that drainage jobs should be added to Artisan. Currently some of their work is in scope for Artisan, but the other work requires in-person inspections. Given these can be for the same building site, this can significantly reduce the efficiency gains of using Artisan. Note that drainage shot lists are included in Artisan, and it is at the discretion of BCAs whether these are used.

Conclusions

This section draws on the evidence from the expert review of plumbing records, and stakeholder interviews, to address the key evaluation questions.

Does the digital record keeping provide sufficient information to determine whether the work complies with the building consent issued under the Building Act 2004?

Digital records created in Artisan have the potential to provide sufficient information to determine compliance with the building consent. However, the quality of digital records is only as good as the plumbers compiling them, and the parameters and shot lists defined by the responsible BCA.

The BCAs we spoke with were positive about the potential for digital records to be used in remote inspections for low-risk plumbing work. Many BCAs (including both BCAs interviewed for this evaluation) already conduct remote inspections for non-plumbing work, and as such this Pilot represented an extension of current practice rather than a significant change. The quality and value of the digital record created in Artisan was seen as a significant benefit over current practice.

Plumbers were also interested in continuing to use Artisan. The creation of digital records in Artisan supported efficiency gains through enabling remote inspections, provided opportunities to upskill, and was seen as a valuable record of work to replace more ad hoc current practices.

The expert reviewer felt that Artisan was an effective application for creating digital records of low-risk plumbing work. However, they also noted that approximately 80 per cent of cases reviewed could be improved. Primarily these issues related to missing information. This may call into question the ability for the digital records to be a stand-alone record of compliance, without greater vigilance from BCAs in ensuring all shot list requirements are met. In making decisions about compliance with the building code, BCA inspectors have additional information outside Artisan to draw on. If the digital record is to be considered a standalone record of compliance, then attention must be paid to ensuring all necessary contextual information is provided.

Stakeholder interviews made it clear that that strong BCA buy-in and support in using Artisan is essential to the success of the use of the platform.

Are there sufficient benefits to using remote inspection tools for Building Consent Officials and plumbers?

Stakeholder interviews identified a range of benefits of using Artisan to create digital records. Other than time taken to for training to use the application, there were no substantial costs to Pilot participant for using the Artisan tool. The level of enthusiasm from both BCA inspectors and plumbers is a clear indication that the net benefit associated with using Artisan to create digital records are sufficient to see continued use. A key factor contributing to the strong buy-in from stakeholders is that creating and reviewing digital records in Artisan is an evolution of existing practices, rather than a new task to learn and integrate into the working day.

The primary benefit of using Artisan to create digital records is in enabling remote inspections to be undertaken, and the associated efficiency gains in replacing one or more in-person inspections. However, a range of other benefits were identified by stakeholders, indicating the creation of digital records using Artisan could be an effective tool for both plumbers and BCA inspectors:

- Using Artisan to create digital records appears to support better communication and improved working relationships between plumbers and BCA inspectors.
- Compiling digital records in line with Artisan shot lists was seen as a way of upskilling plumbers, helping ensure focus on common pain points / failures in plumbing work. Plumbers noted that this new perspective of “what’s important” helps them avoid failed inspections.
- Beyond facilitating remote inspections, the digital records created in Artisan also provide useful records of work for plumbers.

Appendix 1: Changes in Pilot Scope

Over the course of the evaluation of the pilot, significant changes were made to the scope of the project. This section provides a short overview of these changes.

- The initial scope for this evaluation was to test the **feasibility of remote inspections** for low-risk plumbing and drainlaying work. Following initial discussions with BCA staff it became clear that remote inspections had been a commonly used tool for many years. As such evaluating the feasibility of remote inspections didn't seem sensible – they were widely used and as such must be feasible.
- From the outset of the Pilot, key members of the Governance Group were strongly in favour of a focus on self-certification for plumbers and drainlayers. However, as the pilot didn't involve self-certification this evaluation is unable to draw any conclusions about self-certification for these occupation groups. However, as noted at the time, remote inspections and digital compliance are seen by many stakeholders as 'stepping stones' towards self-certification. While not the focus of this evaluation, the issue of self-certification would be discussed with stakeholders as appropriate.
- The Governance Group for the evaluation was presented with a reframed evaluation plan, focused on determining the **reliability of remote inspections**. The reframed evaluation would require considerable commitment of resources from BCAs to robustly assess the reliability of remote inspections.
- The Governance Group reconvened to discuss the proposal, as questions had been raised about both the utility of the focus on reliability of remote inspections, and the ability for BCAs to commit sufficient resources. BCAs determine their own processes, are known to be relatively risk averse, and given many were using remote inspections they were already sufficiently confident in the reliability of inspections.
- Following the second substantial shift in scope, the Governance Group settled on a focus on the **viability of remote inspection tools (namely Artisan) for creating digital records**.