SSM Spotting: Getting Primary School Kids into Surveying

Volker Janssen
DCS Spatial Services
NSW Department of Customer Service
Volker.Janssen@customerservice.nsw.gov.au

ABSTRACT

Surveying is the best job in the world. It offers a unique, interesting and rewarding career that enables exposure to cutting-edge technology, involves conducting detective work in the field and significantly contributes to society. However, it is plagued by a notorious skills shortage and continuing problems to attract enough tertiary students to feed demand. Promotion of the profession to school aged students provides surveying exposure to a wide audience and helps develop a pipeline of future surveyors. This paper presents an innovative initiative to engage primary school students (and their parents) with surveying in a way that is both educational and fun, while also delivering real-world benefits to the surveying profession. Students were asked to take their parents or carers for a walk along the footpaths in their local neighbourhood and find State Survey Marks (SSMs) located along the kerb, investigate the mark's health status and take photographs of the mark and its surroundings. This resulted in 275 survey marks being spotted and photographed, with associated metadata then updated on public record in the Survey Control Information Management System (SCIMS), contributing to the maintenance of the NSW survey control network. The 'SSM spotting' activity can easily be adapted to cater for high school or tertiary students and has the potential to target citizen science. It is hoped that this will help in the quest to educate the general public about what surveyors do, raise the profession's profile and result in more people choosing a career as a surveyor or geospatial professional.

KEYWORDS: *Innovation, education, technology, engagement, collaboration, surveying.*

1 INTRODUCTION

Surveying is a unique, interesting and rewarding career that enables exposure to cutting-edge technology, involves conducting detective work in the field and significantly contributes to society. That's why we love it and believe it's the best job in the world. While surveying offers great job prospects with the opportunity to specialise in numerous areas, it is plagued by a notorious skills shortage and continuing problems to attract a large enough number of tertiary students to feed demand. This is partly due to the general public not understanding or experiencing what a surveyor does and how many exciting and fulfilling options exist in the career of a surveyor or geospatial professional, and partly because students may be scared off by the need to master mathematics as part of their studies. The ageing demographic of the existing workforce and a lack of diversity within the profession only exacerbate these woes (Underwood and Powell, 2019; Cripps and Fairlie, 2024).

While the surveying profession has a long history of evolving and adapting to inevitable change driven by political, economic and technological factors (e.g. Enemark, 2009; Staiger, 2023), in some cases there is stubborn refusal to acknowledge that change is both inevitable and

continuous. As precise positioning technology continues to rapidly improve in the digital age, we are witnessing the democratisation of measurement and the rise of non-skilled users capturing geospatial data. For instance, this includes the use of smartphones with inbuilt Global Navigation Satellite System (GNSS) capabilities, scanners, drones and map makers by the general population. To stay relevant, the profession must identify innovative ways to add value to measurement and geospatial data and then promote this value within society to raise the public profile of the surveyor (Underwood and Powell, 2019).

Promotion of the profession to school aged students provides surveying exposure to a wide audience, makes them realise that we do more than "looking at dirt through a telescope" and helps develop a pipeline of future surveyors. Over the years, many initiatives have tried to attract young people into surveying. For example, the Surveying Taskforce was created to help combat the current shortfall of surveyors. It set up a website to capture those considering a career in surveying, has a social media presence and provides resources for presentations to school aged students (Surveying Taskforce, 2020). Surveyors can become a 'surveying ambassador', which provides opportunities to be involved in career events, school presentations, assisting with information days or hosting work experience students.

Surveying Careers (2026) is a taskforce dedicated to elevating the profile of the surveying profession. It promotes surveying as a career via targeted outreach to students, parents and educators, supported by industry partners. Engagement activities include participation in career expos, delivering career presentations for schools, facilitating work experience opportunities, and providing study pathways and teaching resources for educators.

The 'Get Kids into Survey' campaign, developed in the UK, produces marketing material aimed at promoting the profession to school aged children (Ball, 2026), e.g. via surveying-themed activity posters (Figure 1), homework projects and the Geo Squad comic (Figure 2). Again, engagement of the profession is sought via ambassadors and sponsors to utilise the available resources and reach the target audience.

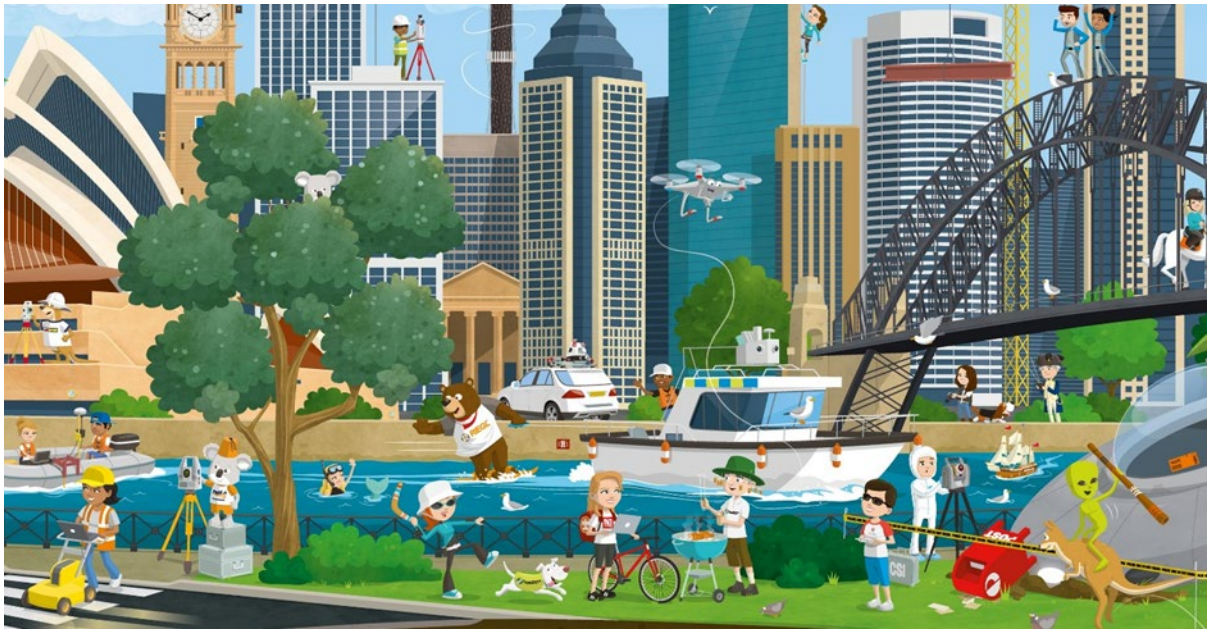

Figure 1: Detail of the Sydney-themed poster from 'Get Kids into Survey' (Ball, 2026).

Figure 2: Excerpt of the Geo Squad comic from 'Get Kids into Survey' (Ball, 2026).

Similarly, the UK Ordnance Survey (OS) gives away free maps to 11-year-olds through their schools (Owen, 2007). Each year 7 pupil in England, Scotland and Wales receives a free 1:25,000 scale OS Explorer map of their local area, resulting in more than 700,000 maps being distributed through schools every year. In the first 6-year period since the initiative's launch in 2002 to 2008, OS delivered 5 million maps to students. It now produces special paper and wall maps centred on the schools, helping children to learn geography in their own backyard and develop that all-important sense of direction.

At the university level, efforts have been undertaken to modernise the curriculum and increase student intake in various ways (e.g. Enemark, 2009; Roberts, 2016; Roberts and Harvey, 2019). Furthermore, the use of humour can improve student learning and help convey scientific information to a much wider and much more general and diverse audience (e.g. Janssen, 2012, 2019, 2023; McAlister and Hill, 2023). While many of these initiatives have been successful, unfortunately the problem persists with the capability gap in Australia reaching 1,500 surveying professionals in 2023/24 as new supply from graduates falls short of the increased demand (Consulting Surveyors National, 2023). Consequently, the education of the public and the continued promotion of the surveying profession is the responsibility of all surveyors if we want to secure the future of our profession.

This paper presents an innovative initiative to engage primary school students (and their parents) with surveying in a way that is educational, healthy and fun, while also promoting community engagement and delivering real-world benefits to the surveying profession in NSW. It provides some additional detail not contained in Janssen (2025).

2 BACKGROUND

DCS Spatial Services, a unit of the NSW Department of Customer Service (DCS), is responsible for the establishment, maintenance and improvement of the NSW survey control network, made available to users via the Survey Control Information Management System (SCIMS). SCIMS is the state's database containing more than 250,000 survey marks on public record, including coordinates, heights, accuracy classifications and other metadata, provided in the Geocentric

Datum of Australia 2020 (GDA2020, see Harrison et al., 2024), its predecessor GDA94 and the Australian Height Datum (AHD, see Roelse et al., 1971; Janssen and McElroy, 2021).

During the heights of the COVID-19 pandemic in 2020/21, people had to juggle working from home, childcare, child education and entertainment, all while observing the restrictions in force to combat the coronavirus outbreak. This was hard on all of us – kids, parents, families, friends and workplaces. We all sought ways to stay mentally and physically fit and resilient. Social media is full of ways we all bonded and tried to stay sane. In NSW, like in all parts of the world, a variety of lockdown restrictions of varying severity were imposed, e.g. mandating the maximum distance one could roam from their home and the number of people who could socialise or exercise together.

During these challenging times, the author introduced his then 8-year-old daughter to a new game: 'SSM spotting'. It was explained as a combination of a treasure hunt and the 'Spotto' game (spot a yellow car on the road and the first person to call out 'Spotto' claims the point). This included walking around the neighbourhood (exercise and mental health benefits, while practising a sense of direction) and looking for survey marks along the way (entertainment). This could also be thought of as a very specific form of geocaching. It did not take long to find many interesting types of survey marks (education): nails, drill hole and wings, survey pegs, Permanent Mark (PM) cover boxes (often with dots of yellow paint on power poles or fence posts providing clues to their location) and, of course, many State Survey Marks (SSMs) located in or on the kerb. We intentionally avoided those survey marks (PMs) that were placed in cover boxes (cast steel box with liftable lid) to avoid digging and any ants or spiders hiding under the lid.

The author took photos of all the SSMs we came across, often with his daughter performing handstands, bridges or the splits while pointing to the mark (exercise and entertainment) (Figure 3). In total, 70 SSMs were photographed, and the images added to the DCS Spatial Services archive. Later, SCIMS was updated with metadata related to these survey marks to improve the information held on public record (innovation and customer service). Note the use of a bucket hat to provide sun protection and to help make the photographed subject more anonymous.

Figure 3: Examples of SSM spotting images (the colourful water bottle is used to easily identify the mark location).

3 PRIMARY SCHOOL ACTIVITY

Bathurst South Public School is a primary school educating about 220 students from kindergarten through to year 6. In late 2021, the author approached the school's principal with a proposal to introduce SSM spotting as an activity that not only ticks the boxes of education, exercise and mental health, but also promotes community engagement. The aim was to engage

students (and their parents or carers) with surveying and encourage them to view their surroundings a little differently (as most people are oblivious to survey marks), while producing rewarding outcomes that are used by the NSW Government and the surveying profession in the real world.

The proposal was met with considerable support and enthusiasm, and it was decided to trial the activity in a single year 5/6 class in 2022. After completing the mandatory Working with Children Check, the author gave a presentation to introduce the activity, followed by a practical demonstration at two survey marks in front of the school. Soon after, a class excursion was organised where students would take turns in finding, checking and photographing survey marks while walking along residential streets surrounding the school. The excursion was well received by the students who were eager to participate in this peculiar treasure hunt.

During this time, relevant documentation and processes were refined based on the experience gained and any feedback received. This included considering the following concerns:

- Road safety: Students and their parents/carers will be used to walking on the footpaths along their local roads together, so this should not be an issue. If their residence is along a busy road, they should select a quieter area for this activity.
- Wheelchair access: Footpaths suitable for wheelchairs are available in various parts of town, providing safe access to survey marks.
- Children in photos: Parents/carers need to be made aware that the photos taken of the survey marks will be included in the NSW Government's archive of survey mark photos. Having their children shown in the photos is optional and not necessarily encouraged.
- Privacy: The names of students participating in the activity are not disclosed to DCS Spatial Services. Any file or folder names including personal information are anonymised before being passed on.
- Work Health and Safety (WHS): The activity was assessed and conducted under the school's WHS policies and insurances.

Due to the packed curriculum and other school activities taking priority, it took another year until SSM spotting was rolled out across all stage 3 (year 5 & 6) classes in 2023. Again, this was accompanied by a presentation and practical demonstration. The activity was also promoted in two issues of the weekly newsletter distributed to students and their families (Figure 4).

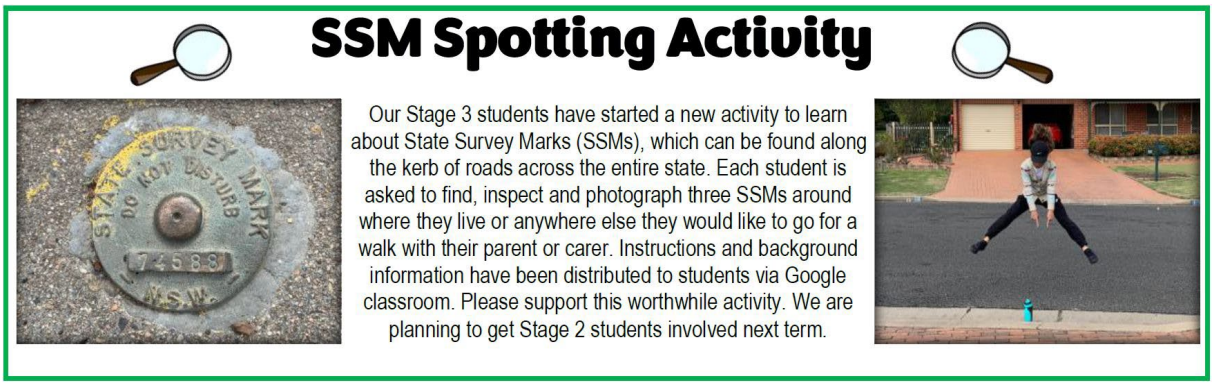

Figure 4: Promoting the SSM spotting activity in the school's newsletter.

3.1 Background Information for Students

This section summarises the written background information provided to students, purposely using language appropriate to the target audience. This information was also covered in the presentation given to students.

Everything happens somewhere. We call this place your location or position. Explorers and pirates are good at knowing their location because they don't want to get lost or lose their buried treasure. Surveyors are experts at knowing their position. They measure angles, distances, height differences and positions to determine where things are and how they relate to each other. These measurements need to connect to survey marks, so relative measurements (between things) can be turned into absolute positions (like the coordinates on a map). Survey marks are also used to relate property boundaries, road infrastructure and 3D models (such as Google Earth) to the real world.

Survey marks come in many different shapes and sizes. A Trigonometrical (or Trig) Station (TS) consists of a concrete pillar with mast and vanes generally found on the top of a hill, while a Permanent Mark (PM) protected by a steel cover box (often stamped SURVEY) is found in a concrete footpath or grass area (often hidden just below the surface). A State Survey Mark (SSM) consists of a brass or steel plate often found along the kerb of a road (newer ones are smaller and silver). These are then used as control for boundary-related marks, such as a drill hole and wing often found on the kerb (Figure 5).

Figure 5: (a) TS pilar with mast and vanes, (b) PM cover box, (c) SSM plaque and (d) drill hole and wing.

The surveyors at DCS Spatial Services are responsible for looking after the 250,000 survey marks we have across NSW. This activity will teach you a little about surveying and help those surveyors out in their quest to photograph all these survey marks and find out if they are healthy. Your photos will be included in the NSW Government's archive of survey mark photos and

thereby help maintain the NSW survey control network for the benefit of the NSW community.

3.2 Activity Instructions for Students

This section summarises the written instructions provided to students, purposely using language appropriate to the target audience. This information was also covered in the presentation and demonstration given to students.

Take your parent/carer for a walk along the footpaths in your neighbourhood and find at least three State Survey Marks (SSMs) located along the kerb of the road. For example, find the closest three SSMs to where you live or take a stroll around the block, following the kerb. If you live along a busy road with frequent traffic, then find a quieter street instead. Inspect the survey mark, brush off dust if required, note down its number (for example SS123456 – SS indicates that it is an SSM) and its health status, meaning whether it is stable, unstable (wobbling around in the concrete) or damaged (nipple damaged or missing).

Take up to five photos in landscape format, including a close-up of the mark itself showing its number plate and then (if possible and safe to do so) a photo from each of four perpendicular directions showing the mark and any background (place a colourful water bottle next to the mark, so it can easily be identified in the photos). Ideally, walk around the survey mark in a clockwise direction as shown in the example below. Make sure that the photos are not blurry and that the close-up clearly shows the survey mark number. You may want to ask your parent/carer to take the photos for you.

Once back home, download the photos you have taken and rename them, so we can easily see which photo belongs to which survey mark and when the photo was taken. Here is an example for photos taken at SS123456 on 2 April 2023 (or on 20230402):

- *SS123456_20230402_1.jpg* (close-up of the SSM plaque showing its number)
- *SS123456_20230402_2.jpg* (photo from the road if safe to do so)
- *SS123456_20230402_3.jpg* (moving clockwise around the mark by 90 degrees)
- *SS123456_20230402_4.jpg* (again moving clockwise around the mark by 90 degrees)
- *SS123456_20230402_5.jpg* (again moving clockwise around the mark by 90 degrees)

Also take a photo of the simple list showing the marks you spotted and their health status (indicating stable, unstable or damaged). Name this photo *SSM_health.jpg*. Put the photos belonging to each survey mark into a separate folder named after the mark, e.g. SS123456. Put all these mark folders (including the SSM health list) in a folder named after your name. Then upload this folder to the school via the provided link.

What you need:

- A parent or carer
- Camera, smartphone or tablet
- Small dust brush
- Notepad and pen
- Colourful water bottle
- A big smile

Be safe:

- Wear a hat (and sunscreen).
- Walk along the footpath of the road, always facing oncoming traffic, following the kerb.
- Avoid walking on the road. Step off the road if traffic is approaching.
- Only take a photo from the middle of the road if it is safe to do so. Taking photos from only three directions is fine.

Here is an example of photos taken at SS77207, which is located next to a power pole, roughly opposite the service entrance to the school (Figure 6). Note that all photos are in landscape format and how we went clockwise around the SSM, using the line of the kerb for orientation.

Figure 6: Photos taken at SS77027, showing a close-up of the SSM plaque and views from four perpendicular directions, using the kerb for orientation and a colourful water bottle indicating the mark location.

If you are interested in exploring survey marks further or would like to get some clues about where to find them, you can download the free NSW Survey Marks smartphone app (see https://www.spatial.nsw.gov.au/news/nsw_survey_marks_mobile_app for more information). The app shows you where you are on a map (represented by a blue dot) and indicates the location of surrounding survey marks (SSM numbers start with SS). You can choose between a photographic or normal map background. By clicking on a mark symbol (and on the flagging pin that then appears), you can access information such as its mark status (F means found, U means uncertain/unstable, D means destroyed), its sketch plan (this helps if you have trouble finding a particular survey mark) and its coordinates (Figures 7 & 8).

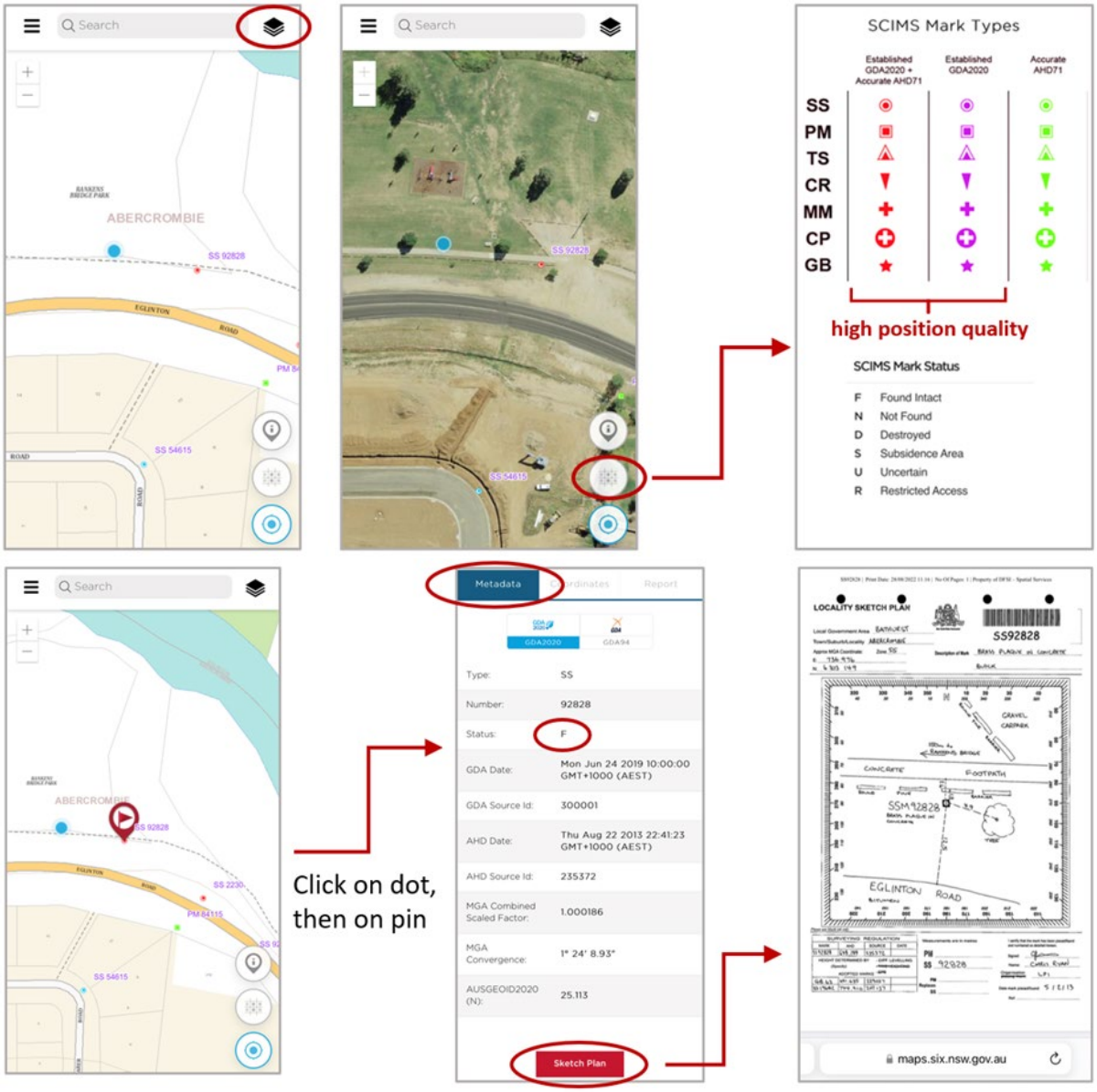

Figure 7: Using the NSW Survey Marks app.

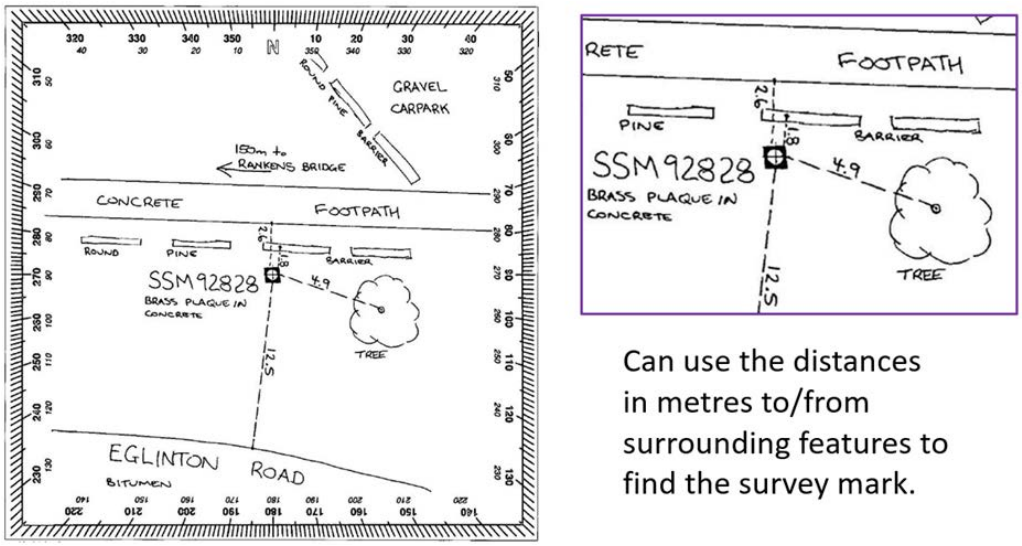

Figure 8: Using the treasure map (locality sketch plan) to find a survey mark.

The uploaded files were checked (and anonymised if required) by the school and passed on to the author at DCS Spatial Services. Data management then included ensuring correct file naming, selecting the preferred set of photographs for marks spotted by multiple students and assessing the health status of each mark based on the photographs and the students' comments. A tally was kept to document which marks were spotted and included relevant metadata required for the integration of this information into DCS Spatial Services databases and archives (see section 4).

4 RESULTS

The SSM spotting activity at Bathurst South Public School resulted in 275 survey marks (including 25 PMs) being spotted, photographed and then updated in SCIMS. The photos have been added to DCS Spatial Services' archive of survey mark photos, helping to maintain the NSW survey control network for the benefit of the NSW community. The activity has significantly increased the number of survey marks with available images in Bathurst (Figure 9). In the future, these photos may be made available to surveyors via a modernised SCIMS to assist them in survey planning, e.g. in determining whether a particular survey mark is affected by tree cover or other obstructions (negatively affecting satellite-based positioning) or whether an instrument can be set up on the mark safely and with minimal disruption to traffic. To this end, blur filters may be applied to protect the privacy of any persons in the photos if required.

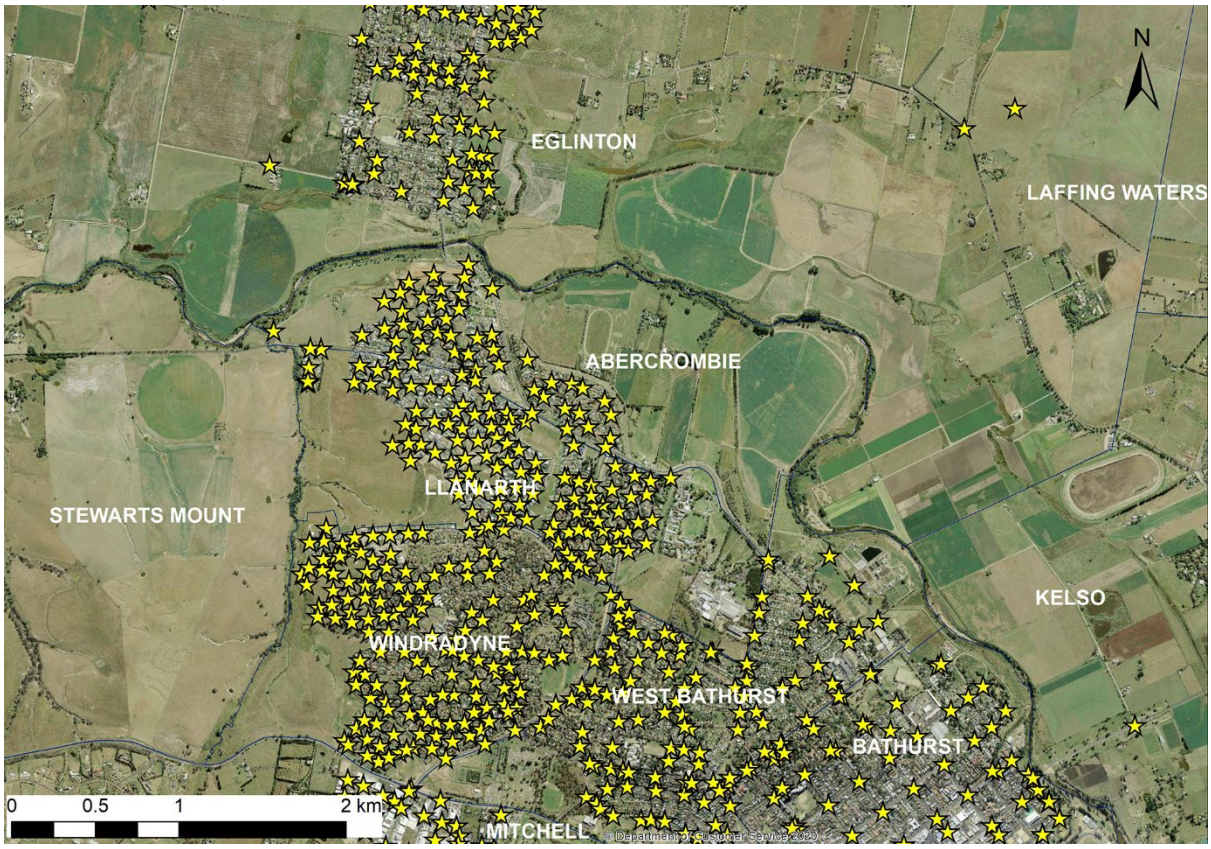

Figure 9: Aerial map of Bathurst suburbs, indicating survey marks with images archived in the DCS Spatial Services database.

The SCIMS metadata update included specifying the mark status (generally ‘found intact’) with a corresponding comment and date, along with specifying (or confirming) the mark type and entering (or confirming) information about who placed the mark and when it was placed by interrogating the locality sketch plan on public record (Figure 10). For PMs, the height of the mark below/above ground level was also measured and archived (for SSMs this value was generally zero).

Some survey marks were found damaged or in need of repair. The students’ notes on the health status of each mark in conjunction with the close-up photos taken were crucial in ascertaining whether repair work was required. For example, DCS Spatial Services performed repairs in cases where the SSM brass plaque was wobbling in the concrete, removable from the kerb, buried by recently added bitumen or where part of the mark number had been rubbed out. Some PMs were also repaired to allow easy opening and closing of the cover box, and to remove trip hazards caused by stuck or missing lids. On one occasion, a cover box that had been pushed off the mark and thereby prevented the survey mark from being occupied was recentred, enabling it to return to service (Figure 11).

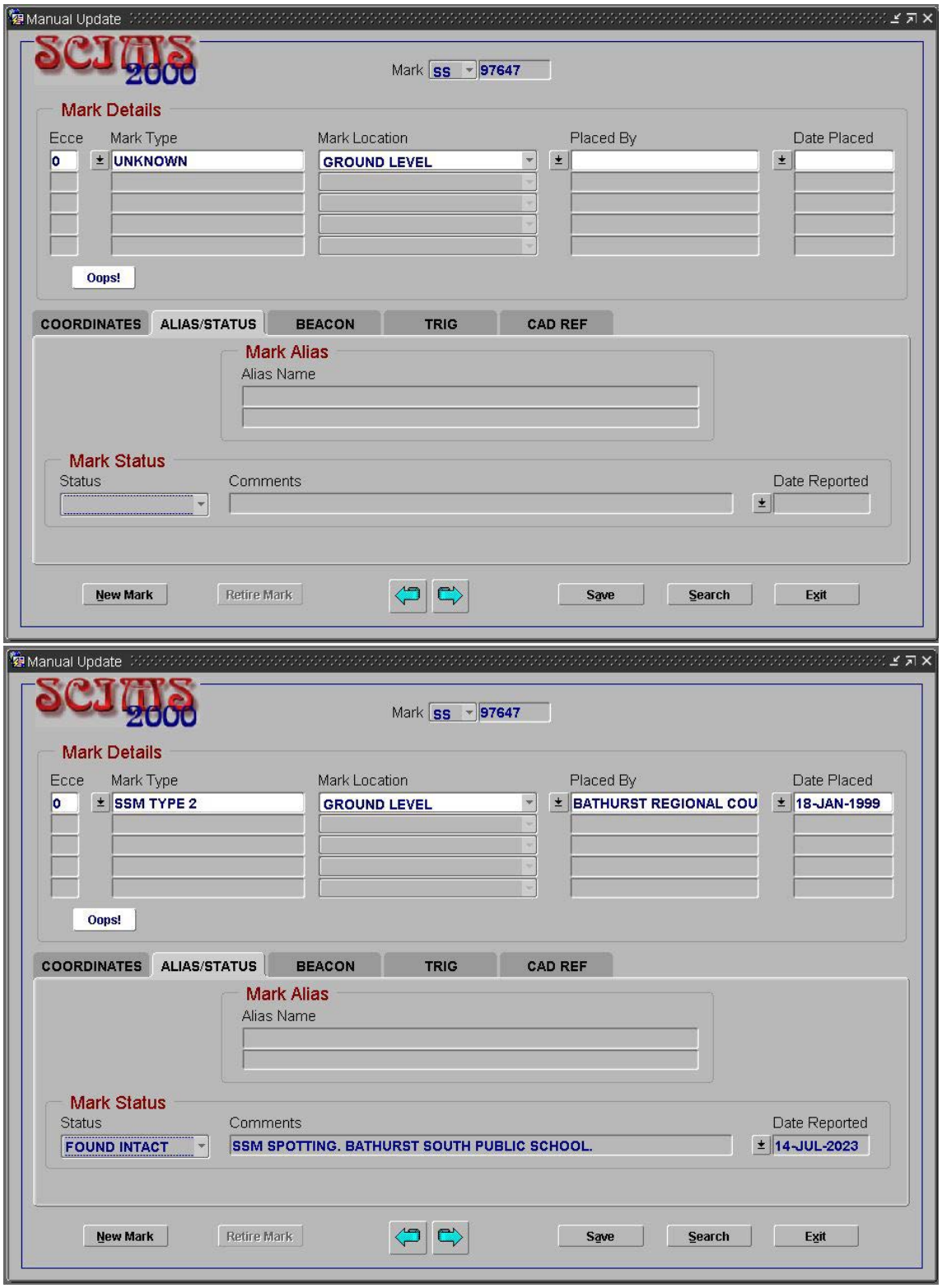

Figure 10: SCIMS metadata entry for SS97647 before and after the school activity. Note the use of the school's name, instead of the student's name, to maintain privacy.

Figure 11: Examples of spotted survey marks that required repair work by DCS Spatial Services.

5 CHALLENGES

While these results are very pleasing and encouraging, several challenges were encountered. Despite the considerable support and enthusiasm shown by the school, it proved difficult to include the SSM spotting activity in an already packed curriculum. This caused the activity to be drawn out over two school years, which may have negatively affected the interest and enthusiasm shown by the students involved in the initial pilot. Like homework, the activity was not compulsory (or not promoted as such). Unfortunately, it was not possible to include SSM spotting as an option in the suggested homework roster distributed to students for the school term. For this cohort, the activity relied on parental supervision, and parents/carers may have been more inclined to partake or adequately prepare for the activity if it were perceived as compulsory.

While there was a lot of interest among students, particularly during the very successful class excursion, only a few students followed through with the entire activity in their own time afterwards. Several students reported spotting survey marks but not taking any photos at the time or taking some photos but not uploading them to the school. The offer to help with the downloading and renaming of images in the school's computer lab was not taken up. Consequently, most marks were completed by only a few students, mainly by the author's daughter (who, understandably, became less enthusiastic as time went on). Asking a few school friends to come along increased the fun factor and extended the duration of participating in the activity. Towards the end, the author embarked on a couple of solo trips to capture the remaining survey marks in a particular area, then also focussing on PMs.

The SSM spotting activity attracted the attention of concerned residents on social media. A local neighbourhood group lit up with posts pertaining to a strange person walking around the streets, apparently taking photos of his water bottle sitting on the gutter, sometimes with children posing in the photos. While some posts were concerned about the person's mental wellbeing, others speculated that he may have a more sinister motive and was actually taking photos of people's houses to discover whether CCTV cameras are installed. The mystery was eventually solved through an explanatory post by one of the author's colleagues. A few residents made the effort to say hello to the strange person walking the streets and were promptly informed of the school activity taking place.

6 POTENTIAL EXTENSIONS AND FUTURE ACTIVITIES

SSM spotting can be adapted to students at high school, Vocational Education and Training (VET) institutions (e.g. TAFE) and university. High school students may be more suited than primary school students as they are more independent and potentially more interested in following through depending on possible job interests.

As a potential extra relating to spatial awareness, students could be asked to draw or produce a treasure or mud map of the roads searched for survey marks, indicating where each SSM was found with a symbol, labelling them accordingly and including a north arrow. For older kids, the activity could be modified by first checking SCIMS (via the NSW Survey Marks app) for suitable survey marks to track down, similar to geocaching. In urban areas, it could be expanded to include PMs in the footpath, provided the appropriate tools are carried and WHS measures are in place (e.g. including a large screwdriver to open the cover box, a glove for protection from animals and to scoop out dirt, and a measuring tape to determine the mark-to-ground-level height).

From high-school age onwards, students could be asked to measure coordinates with a smartphone or handheld GNSS unit and create a map with an open-source Geographic Information System (GIS) package like QGIS. This progression from treasure hunt to taking simple measurements not only increases the activity's challenge and complexity but also allows an introduction to coordinate types and systems.

Students starting a VET or university course in surveying could benefit from SSM spotting as an activity to get a better understanding of the different types of survey marks and their importance, along with exposure to the NSW Survey Marks app, SCIMS and the role of state government in maintaining the state's survey infrastructure. Searching for, identifying and photographing survey marks and updating their metadata could be a useful hands-on practical field exercise. Students could be required to identify a wide variety of survey marks (cadastral and survey control), including examples of 'found', 'uncertain' and 'destroyed' marks, and use the NSW Survey Marks app to submit updated metadata. In addition, they could load these as a layer into a GIS and be required to find marks not previously visited by other students.

The wider profession could also be involved in SSM spotting, e.g. while contributing to a worthy cause. STEPtember is a global health and wellness fundraising event supporting life-changing cerebral palsy research. It encourages participants of all fitness and ability levels to take part in more than 40 activities to complete a daily target of 10,000 steps, such as swimming, adaptive sports, frame running, basketball, walking, cycling, gardening, Pilates and even housework. The author encourages his colleagues and the wider profession to mimic the

primary school students and find as many survey marks as possible, while staying healthy and supporting a worthy cause.

The NSW Survey Marks app has the potential of being an important tool to help engage students and potentially foster citizen science if it is desired to target an even wider audience (such as the geocaching community). Via its report function, the app can be used by any person to easily upload photos and report on the health status of a survey mark. However, it should be noted that this provides a direct conduit to DCS Spatial Services rather than utilising a moderator as may be desired for a school or tertiary education project in order to avoid duplication.

7 CONCLUDING REMARKS

This paper has introduced an innovative initiative to engage primary school students (and their parents) with surveying in a way that is educational, healthy and fun, while also promoting community engagement and delivering real-world benefits to the surveying profession. The SSM spotting activity was conceived during the COVID-19 pandemic lockdown period and expanded to teach primary school students and their parents/carers about surveying. It encouraged participants to view their surroundings differently, develop a sense of direction and appreciate survey marks, while enjoying some fresh air, having fun and exercising (which is also beneficial for the mental health of everyone involved). As a bonus, the activity produced an outcome that is used in the real world, contributing to the maintenance and improvement of the NSW survey control network.

Students were asked to take their parents/carers for a walk, find SSMs located along the kerb, investigate each mark's health status, take photographs, organise the images, and then upload the data to the school. At Bathurst South Public School, the SSM spotting activity resulted in 275 survey marks being spotted and photographed. Associated metadata was then updated on public record, and the photos have been added to the DCS Spatial Services archive. This has helped to maintain the NSW survey control network for the benefit of the profession and the wider community. Some survey marks were reported by the students as damaged or in need of repair, prompting DCS Spatial Services to perform repair work as required.

While several challenges were encountered, SSM spotting has successfully engaged primary school students and their parents/carers with surveying and provided them with a glimpse into the work of a surveyor. The activity can easily be adapted to cater for high school or tertiary students and has the potential to target citizen science or fundraising activities. It is hoped that this will help in the quest to educate the general public about what surveyors do, raise the profession's public profile and result in more people choosing a career as a surveyor or geospatial professional.

ACKNOWLEDGEMENTS

Principal Greg Cross and his teaching staff at Bathurst South Public School (particularly Peta Connell, Rachel Vickery and David Prior) are gratefully acknowledged for their support and enthusiasm during the implementation of this school activity. Les Gardner, Senior Surveyor at DCS Spatial Services (now retired), is thanked for embracing the activity while walking his dog around various parts of Bathurst and thereby committing many additional survey mark images to our database. This paper is dedicated to my father, Bernd Janssen. Now a retired registered

land surveyor, he was instrumental in engaging me with this wonderful profession of ours – love you, Dad!

REFERENCES

Ball E. (2026) Get kids into survey, https://www.getkidsintosurvey.com/ (accessed Mar 2026).

Consulting Surveyors National (2023) Determining the future demand, supply and skills gap for surveying and geospatial professionals: 2022-2032, https://www.surveyorsaustralia.org.au/public/115/files/Resources/Research%20%26%20Studies/Surveying%20Skills/Demand%20Study%20web%20version.pdf (accessed Mar 2026).

Cripps A. and Fairlie K. (2024) How effective are initiatives to recruit women into surveying? *Proceedings of FIG Working Week 2024*, Accra, Ghana, 19-24 May, 18pp.

Enemark S. (2009) Surveying education: Facing the challenges of the future, *Proceedings of FIG Commission 2 Workshop*, Vienna, Austria, 26-28 February, 11pp.

Harrison C., Brown N., Dawson J. and Fraser R. (2024) Geocentric Datum of Australia 2020: The first Australian datum developed from a rigorous continental-scale adjustment, *Journal of Spatial Science*, 69(1), 167-179.

Janssen V. (2012) Indirect tracking of drop bears using GNSS technology, *Australian Geographer*, 43(4), 445-452.

Janssen V. (2019) Let there be rock: The AC/DC phenomenon, *Proceedings of Association of Public Authority Surveyors Conference (APAS2019)*, Pokolbin, Australia, 1-3 April, 106-125.

Janssen V. (2023) Amusing research in surveying and spatial science, *Proceedings of Association of Public Authority Surveyors Conference (APAS2023)*, Coffs Harbour, Australia, 20-22 March, 3-25.

Janssen V. (2025) Engaging primary school students (and their parents) with surveying, *Proceedings of FIG Working Week 2025*, Brisbane, Australia, 6-10 April, 15pp.

Janssen V. and McElroy S. (2021) The Australian Height Datum turns 50: Past, present & future, *Proceedings of APAS Webinar Series 2021 (AWS2021)*, 24 March – 30 June, 3-27.

McAlister C. and Hills C. (2023) Don't feed cheese to lactose intolerant volcano gods, *Proceedings of Association of Public Authority Surveyors Conference (APAS2023)*, Coffs Harbour, Australia, 20-22 March, 26-36.

Owen E. (2007) Ordnance Survey's free maps for 11 year olds scheme, *The Cartographic Journal*, 44(2), 101-110.

Roberts C. (2016) Aspiring beyond UNSW: Connecting students to industry, *Proceedings of Association of Public Authority Surveyors Conference (APAS2016)*, Leura, Australia, 4-6 April, 3-9.

Roberts C. and Harvey B. (2019) The critical importance of practical exercises in a modern surveying curriculum, *Proceedings of Association of Public Authority Surveyors Conference (APAS2019)*, Pokolbin, Australia, 1-3 April, 139-151.

Roelse A., Granger H.W. and Graham J.W. (1971) The adjustment of the Australian levelling survey 1970-1971, Technical Report 12, Division of National Mapping, Canberra, Australia, 81pp.

Staiger R. (2023) The surveyor 4.0: Which technical skills are needed today? *GIM International*, 37(1), 22-25.

Surveying Careers (2026) Surveying careers, https://www.surveyingcareers.com.au/ (accessed Mar 2026).

Surveying Taskforce (2020) A life without limits, https://www.alifewithoutlimits.com.au/ (accessed Mar 2026).

Underwood N. and Powell L. (2019) Challenging the status quo: Innovate or detonate, *Proceedings of FIG Working Week 2019*, Hanoi, Vietnam, 22-26 April, 16pp.