

Engaging Primary School Students (and Their Parents) with Surveying

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SUMMARY

Surveying 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 initiative to engage primary school students (and their parents) with surveying in a way that is both educational and fun, while also promoting community engagement and 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, contributing to the maintenance of the survey control network in New South Wales, Australia. This 'SSM spotting' 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 profile and result in more people choosing a career as a surveyor or geospatial professional.

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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 (e.g. Underwood and Powell, 2019; Cripps and Fairlie, 2024; Mwaura, 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), sometimes 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 the surveying profession. For example, in Australia, 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. The ‘Get Kids into Survey’ campaign, developed in the UK, produces marketing material aimed at promoting the profession to school aged children (Ball, 2025), e.g. via surveying-themed activity posters (Figure 1), homework projects and the Geo Squad comic. 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, 2025).

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, 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 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 New South Wales (NSW), Australia.

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 all around the world 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', which 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 2). 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 2: 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, located at the foot of Mt Panorama in Bathurst, approximately 200 km west of Sydney. 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 (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 also 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 3).

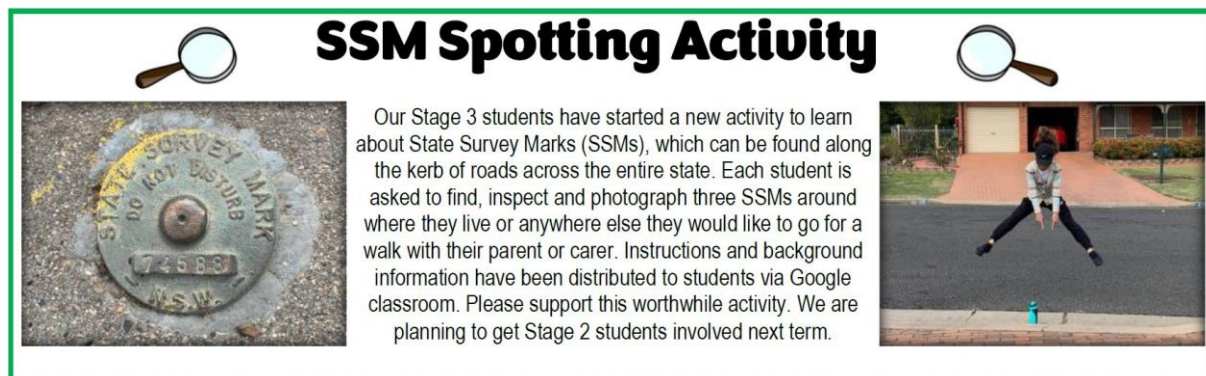


Figure 3: Promoting the SSM spotting activity in the school's newsletter.

4. INSTRUCTIONS FOR STUDENTS

Background information and instructions provided in written form and during the presentation and demonstration sessions purposely used language appropriate to the target audience. It was explained that surveyors are experts at knowing their location or position. They measure angles, distances, height differences and positions to determine where things are and how they relate to each other. Students were introduced to different types of survey marks (and their purpose) and informed that the data collected will be used by the NSW Government for the benefit of the surveying profession and the wider community.

In summary, the instructions included:

- Take a parent/carers for a walk along the footpaths in the neighbourhood and find at least three SSMs located along the kerb of the road.
- Inspect the survey mark, brush off dust if required, and write its number and health status (stable, unstable or damaged) on a notepad.
- Take up to five photos in landscape format, including a close-up of the mark itself showing its number plate and (if possible and safe to do so) a photo from each of four perpendicular directions showing the mark and any background.

- Move clockwise around the mark when taking photos and place a colourful water bottle next to the mark, so it can easily be identified in the photos (Figure 4).
- Take a photo of the simple list showing the marks spotted and their health status.
- Download the photos and rename them, so we can easily see which photo belongs to which survey mark and when it was taken (e.g. *SS123456_20230402_1.jpg* and *SSM_health.jpg*).
- Organise the files into folders and upload them to the school.
- How to use the free NSW Survey Marks smartphone app (DCS Spatial Services, 2020) to explore survey marks further or get some clues about where to find them (Figure 5).
- How to use the locality sketch plan like a treasure map to find the survey mark.
- What to bring and how to be safe.



Figure 4: 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.

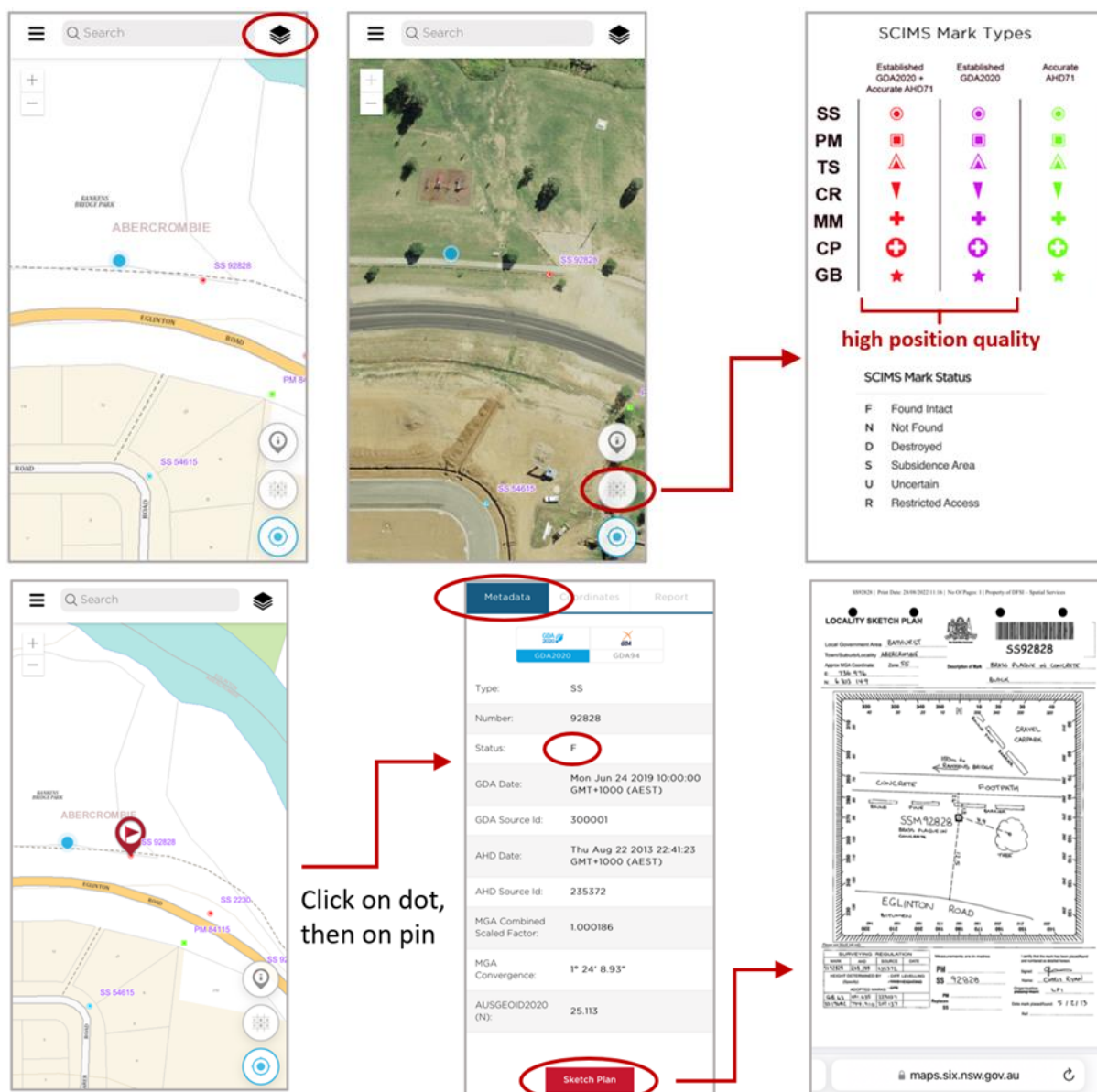


Figure 5: Using the NSW Survey Marks app.

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 5).

5. 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 6). 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.

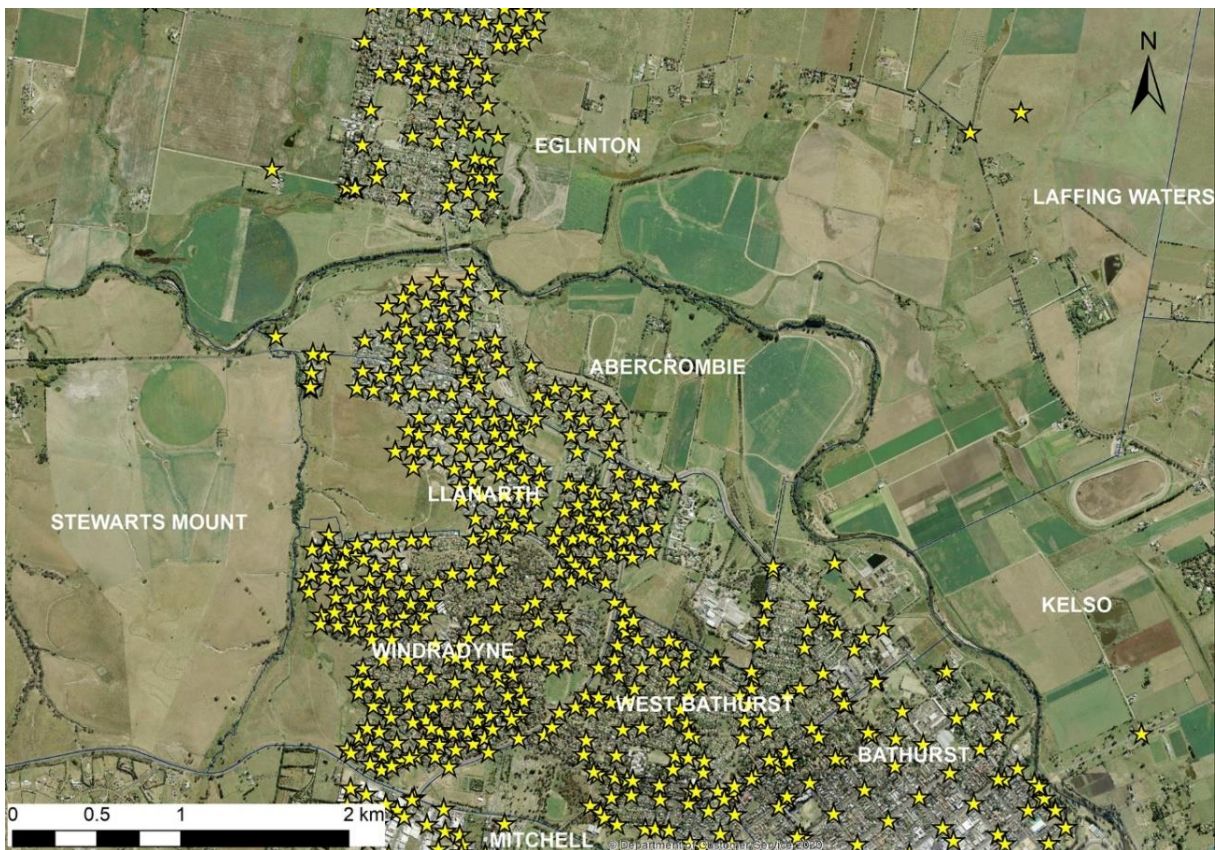


Figure 6: Aerial map of Bathurst suburbs, indicating survey marks with images archived in the DCS Spatial Services database.

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 7). For PMs, the height of the

mark below or above ground level was also measured and archived (for SSMs this value was generally zero).

The figure displays two screenshots of the SCIMS 2000 software interface, specifically the 'Manual Update' window for mark SS97647. The interface is divided into several sections: 'Mark Details', 'Mark Alias', and 'Mark Status'. The 'Mark Details' section includes fields for 'Eccs', 'Mark Type', 'Mark Location', 'Placed By', and 'Date Placed'. The 'Mark Alias' section has an 'Alias Name' field. The 'Mark Status' section includes a 'Status' dropdown, a 'Comments' text area, and a 'Date Reported' field. The top screenshot shows the initial state where 'Mark Type' is 'UNKNOWN', 'Placed By' is empty, and 'Date Placed' is '18-JAN-1999'. The bottom screenshot shows the state after a school activity, where 'Mark Type' is 'SSM TYPE 2', 'Placed By' is 'BATHURST REGIONAL COU', and 'Date Reported' is '14-JUL-2023'. The 'Comments' field now contains 'SSM SPOTTING. BATHURST SOUTH PUBLIC SCHOOL.'.

Figure 7: 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.

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, (partly) removable from the kerb, (partly) 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 recentered, enabling it to return to service.

5.1 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.

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 while children are 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.

5.2 Potential Extensions and Future Activities

SSM spotting can be adapted to students at high school, Vocational Education and Training (VET) institutions (such as TAFE in Australia) 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 in 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, the FIG community 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.

6. CONCLUSIONS

This paper has introduced an 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.

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Now a retired registered land surveyor, he was instrumental in engaging me with this wonderful profession of ours – love you, Dad.

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BIOGRAPHICAL NOTES

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