

# Spatial Safety: The How and Why Requires a Team Effort

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## ABSTRACT

*Driven by the Work Health and Safety Road Map for NSW 2022, a NSW Government 6-year strategy aligned with the Australian Work Health and Safety (WHS) Strategy to reduce work-related fatalities, serious injuries and illness sustained in the workplace, the NSW Surveyor General (SG) and Deputy Surveyor General (DSG) facilitated and empowered their organisation to “do safety differently”. Without knowingly doing so at the start, the SG and DSG had to, in the words of Prof. Sidney Dekker (Safety Science Innovation Lab, Griffith University), “see people not as a problem to control but as a resource to be harnessed ... avoiding always telling people what to do, instead asking them what they needed to be successful.” Drawing on resources from industry leaders in WHS, collaboration by both experienced and lesser experienced staff across the organisation in the development of WHS policies, procedures and tools, and seeking periodical feedback from the end user over 18 months, assisted in understanding, refining and improving the final WHS product. This paper outlines how implementing platforms such as Survey123 by ArcGIS, SharePoint and Microsoft Flow to assist in planning, communicating, reporting and reviewing WHS considerations for all field projects has resulted in a comprehensive, innovative and purpose-built WHS system, developed solely for survey teams within DCS Spatial Services.*

**KEYWORDS:** *Work Health and Safety Road Map, WHS, purpose, collaboration, innovation.*

## 1 INTRODUCTION

What does Work Health and Safety (WHS) mean to you? Do you think it is a help or a hindrance to your organisation or in your workplace? Why would you spend time and resources developing a WHS system for your organisation? If you did, who would, and how would you develop and implement a WHS system? What would it look like? Would the WHS system work and would anybody really want to use it?

30 years ago, WHS was almost non-existent in the public service, particularly for field surveyors, where certain work locations and work activities, in today’s terms, would be considered some of the most dangerous workplaces. Most WHS policies and procedures, particularly within government organisations, were written by office-based workers for office workers, and counterintuitively for field-based workers, where the policy writers have little if any experience in those field operations.

DCS Spatial Services is a business unit within the NSW Department of Customer Service (DCS) and home to the Survey Operations field staff under the Office of the Surveyor General. 30 years ago, DCS Spatial Services, in its previous incarnations, had minimal WHS policies and procedures relating to survey field operations. New starters either learnt by ‘trial and error’,

or, if they were lucky, were given some direction by more experienced staff who had learnt the same way.

Over the years, small gains were made in this space. However, mainly on a ‘reactionary basis’ after the fact, when other public authorities and larger private sector companies were being ‘pro-active’, implementing major changes and prioritising safety across their organisations. The safety culture, or lack of, within this organisation was symptomatic of management and staff having only ever worked for the one organisation, and “things were done the way they’ve always been done”.

This was in stark contrast to what the author experienced when working within arguably two of the most safety-regulated industries (resource sector and civil road construction), where ‘compliance and regulation’ at times felt very restrictive and onerous. However, a few years ago, things were about to change in the public service.

Without knowing it at the time, collectively DCS Spatial Services started on the path to do “safety differently” by “relying on people’s expertise, insights and the dignity of work as actually done, to improve safety and efficiency” (Dekker, 2017), which would satisfy the Work Health and Safety Regulation 2017 (NSW Legislation, 2021), that of the person conducting a business or undertaking (PCBU), but most importantly providing a comprehensive, innovative and purpose-built WHS system, developed solely by its surveyors for its surveyors.

This paper outlines how implementing platforms such as Survey123 by ArcGIS, SharePoint and Microsoft Flow have assisted in planning, communicating, reporting and reviewing such a WHS system at DCS Spatial Services.

## **2 LEADERSHIP COMES FROM THE TOP**

The NSW Surveyor General (SG), shortly after her appointment, and considering her background with Road and Maritime Services (RMS, now Transport for NSW), had identified the need for a review of the WHS processes within DCS Spatial Services. This coincided with the ongoing implementation of the NSW Government’s Work Health and Safety Roadmap for NSW 2022 (NSW Government, 2018), which commits NSW to nationally agreed targets including a 20% reduction in work-related fatalities and a 30% reduction in serious injuries, illness and musculoskeletal injuries/illness between 2012 and 2022. With initial success exceeding these targets, the targets were revised to 30% and 50% respectively.

Funding and resources were committed and ‘invested’ in what was required to create a comprehensive WHS system for DCS Spatial Services’ Survey Operations field staff. Survey Operations sits within the Office of the Surveyor General (OSG) and includes the metropolitan, regional, geodetic, cadastral management, legal metrology and SCIMS & CORS teams.

Along with the SG, the Deputy Surveyor General (DSG), and his Senior Surveyors, demonstrated leadership, knowledge of Survey Operations and dedication to the task whilst having empathy for the blend of youth and experience of office and field based survey staff during the development of a practical, robust and universal WHS system. This required an understanding of organisational and individual needs for OSG continuing to provide a high level of quality service to their clients, but also allowing maximum input and feedback from the ‘frontline’ end users of the system.

A Project Support Officer was tasked to assist the SG, DSG and WHS project group in the development of the WHS system. This included arranging regular meetings, taking minutes at these meetings, distributing project communications, reviewing submitted policy and procedure documents from the WHS project group, creating the project schedule and ensuring that the project team remained on track according to this schedule.

### **3 WHERE DO WE START?**

#### **3.1 WHS Framework**

Collins dictionary describes ‘framework’ as “a particular set of rules, ideas, or beliefs which you use in order to deal with problems or to decide what to do”. The SG, DSG and senior members of the WHS project group embarked on the first steps of what would become an 18-month journey, setting up the initial framework of a ‘fit for purpose’ WHS system suitable for *all* survey staff across the organisation. Particular emphasis was given to the fact that the organisation had, in recent times, experienced a large generational change, with more retirements to come in the near future. However, this challenge brought with it more positives than negatives.

There were four main elements that were identified as essential if DCS Spatial Services’ Survey Operations was to have a stand-alone WHS system for its surveyors in the field:

- Overarching WHS policy (the policy).
- Upgraded Safe Work Method Statement (SWMS).
- Expanded and enhanced Risk Assessments (RAs).
- Traffic Management Plan (TMP) specific to our surveyors.

In addition to these four main WHS elements, WHS project senior members selected individuals from across their teams, which included a mixture of ages, roles and industry experience – this is where the ‘magic’ happened. The inclusion of additional WHS project members provided a ‘melting pot’ of youthful enthusiasm, experience, innovative ideas, but most importantly ‘buy-in’ for the creation of a WHS system by staff for staff.

#### **3.2 WHS System**

The Oxford dictionary describes a ‘system’ as “a set of principles or procedures according to which something is done; an organised scheme or method”. It had been identified in the late 2000s that Survey Operations required some type of a WHS document of its own, which became the first version of the Safe Work Method Statement (SWMS) for Survey Operations. In 2014, this was reviewed and enhanced (Lock and Sussanna, 2014).

However, although this review was aiming to achieve a reduction in documentation, by value-adding to the front-end SWMS document, which all staff were to complete prior to the start of a project or field trip, and the ‘simplification’ of associated Risk Assessments (RAs), similar problems remained. WHS remained a process of ‘ticking boxes’ with staff rarely (if ever) referring to RAs, now deficient of detail and context. These RAs may be understood by longer-serving staff, but were of little use to a new starter, or a lesser experienced surveyor, who may be asked to carry out certain work, but may not be aware of the full range of hazards that may be associated with the task at hand.

From the author’s perspective, over many years and for various reasons, DCS Spatial Services was not able to develop a ‘safety culture’ within the organisation. However, this changed when the SG and DSG provided the time, resources and a cooperative mantra that created an environment that nurtured the infancy of a safety culture within survey field staff. Input from the younger surveyors on the WHS project team identified several themes which they felt would help them better understand the risks in the workplace, whilst leading innovation in access to, delivery of, documenting and reporting all things WHS for our organisation.

## 4 TRAINING

It was apparent that junior staff desired formal training in several field activities that they would encounter in their day-to-day survey life with Survey Operations. The SG, DSG and some managers had already identified this need, and developed a business case to source funding for essential training to be rolled out to *all* field staff.

Providing training for newer or less experienced staff, along with refreshing the skills of more senior staff, was not only required from a PCBU point of view. It was fundamental in providing ‘context’ for all staff contributing to, interpreting and providing feedback on WHS policy and procedure documentation developed, which would be created by nominated survey field staff over the next 18 months.

Metropolitan and Regional staff attended various training courses in several locations across NSW, in small-to-medium size groups containing a balanced cross-section of experiences (Table 1). While training can never cover every aspect of any particular subject matter in the time allocated to be deemed competent, it allows experienced staff to ask more informed questions of respective trainers or allude to particular scenarios that may not have been covered during the course. This enhanced and provided context of training for co-workers, and what can be encountered in their roles. This partly addressed the old saying “You know what you know, you know what you don’t know, but you don’t know what you don’t know.”

Table 1: Training courses attended.

<b>Training Courses</b>	<b>Components</b>	<b>Requirements</b>
<b>Senior First Aid</b>	<ul style="list-style-type: none"> <li>• Provide first aid</li> <li>• Provide cardiopulmonary resuscitation</li> </ul>	Compulsory for all field staff
<b>General Induction for Construction Work in NSW</b>	<ul style="list-style-type: none"> <li>• Prepare to work safely in the construction industry</li> </ul>	Compulsory for all field staff
<b>Implement Traffic Control Plans</b>	<ul style="list-style-type: none"> <li>• Work safely and follow WHS policies and work procedures</li> <li>• Implement Traffic Control Plans (TCPs)</li> <li>• Communicate in the workplace (radio communications)</li> </ul>	Compulsory for all field staff
<b>Prepare Work Zone Traffic Management Plans</b>	<ul style="list-style-type: none"> <li>• Create and amend TCPs</li> <li>• Plan and prepare Traffic Management Plans (TMPs)</li> </ul>	Selected staff
<b>Chainsaw Operations</b>	<ul style="list-style-type: none"> <li>• Maintain chainsaw</li> <li>• Trim and cut felled trees</li> <li>• Fall trees manually (basic)</li> </ul>	Not compulsory for all field staff (most field staff participated in training)
<b>Off-Road Four Wheel Drive (4x4)</b>	<ul style="list-style-type: none"> <li>• Operate a 4WD on unsealed roads</li> <li>• Recover 4WD vehicles</li> </ul>	Compulsory for all field staff
<b>Working at Heights</b>		As required

## **5 INNOVATING WHS DELIVERY IN THE DIGITAL AGE**

### **5.1 SharePoint**

During 2018, many of the department's delivery platforms, departmental documentation and file storage began migration from traditional file-explorer based file systems to Microsoft's SharePoint application. OSG is at the forefront of utilising this flexible stage for its file storage needs.

SharePoint is a web-based collaborative platform that integrates with Microsoft Office. Launched in 2001, SharePoint is primarily sold as a document management and storage system, but the product is highly configurable, and usage varies substantially among organisations. SharePoint allows a flexible way to access secure departmental information remotely using multi-factor authentication on various devices, without the hassle of departmental network security access. SharePoint became the repository for Spatial Services' WHS policy and procedures that allowed our innovators to craft the systemised WHS delivery.

### **5.2 Microsoft Flow (now Power Automate)**

Initially, the WHS project group had a vision of not only automating the delivery, capture and storage of WHS documentation, but incorporating it within a holistic 'trackable' survey project system. To this end, the power of Microsoft Flow was investigated, harnessed and applied through SharePoint.

Microsoft Flow, now called Power Automate, is cloud-based software that allows employees to create and automate workflows and tasks across multiple applications and services without help from developers. Automated workflows are called flows. To create a flow, the user specifies what action should take place when a specific event occurs. This software was used to innovate and automate the way field surveyors and management create, deliver, track, view and report job or project specific details and WHS requirements.

#### **5.2.1 Job Tracker**

Within SharePoint, a project leader can generate a job number simply by selecting 'new', populating essential Job Tracker components and selecting from the following 'drop-down' options:

- Town / approximate location.
- Job type (e.g. levelling, GNSS, LiDAR ground control).
- Status (what stage the job is at, e.g. planning or fieldwork completed).
- Requestor (internal or external client requiring survey services).
- Assigned to (who will be responsible for the task).
- Unit responsible (which OSG entity).

The staff member who has been allocated the task is responsible for updating the 'status' of the job.

#### **5.2.2 Fieldtrip Tracker**

As above, the project leader will generate a Fieldtrip Tracker identification (ID) number similar to that of Job Tracker, but multiple Job Tracker IDs can be selected and added to a Fieldtrip ID.

This accounts for multiple jobs which may be performed during a single field trip. Fieldtrip components required are:

- Title (name of the fieldtrip project).
- Party leader (who is responsible for the job).
- Associated jobs (includes all jobs, i.e. job tracker IDs, that will be included in the project).
- Other field officers (includes all field staff).
- Start dates.
- Expected completion date.
- Vehicles (all vehicles used in the project).

Microsoft Flow generates files within the Fieldtrip Tracker folder comprising SWMS template, which the project leader completes and has all field staff sign, travel application forms, RA templates and SharePoint hyperlinks to current TMPs, general and elevated RAs, and what Survey123 app updates are required. This document is emailed to *all* field staff involved on a particular project (Figure 1).

All project-specific WHS documentation, incident reports, risk assessments carried out or digital WHS safety report outputs will be located within the OneDrive Fieldtrip folder created by ‘the flow’.

Field Preparation Documents		Forms for the Field																
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Figure 1: Email generated for all field staff involved in the project.

### 5.3 Survey123 by ArcGIS

DCS Spatial Services has used ArcGIS for many years, so it made sense to utilise the Survey123 application. This versatile and powerful database tool not only allowed the organisation to move away from paper-based forms for surveying (towards Observn8, a digital GNSS logsheet and

survey mark metadata form) but also to use this flexible tool for other applications across our WHS system.

Survey123 allows the user to create simple or more complex surveys (a series of questions), which can be tailor-made for any particular purpose, to capture relevant information on the surveyor's device in the field (smartphone or tablet). Data is georeferenced, real-time and date specific (Figure 2). Data captured can easily be shared, analysed and interrogated, when required, from the web-based platform. Permissions can be set to discourage tampering of data, but still allow everyone in the organisation to view, filter and export captured data. Data captured through these surveys can be exported in CSV, Excel, KML, Shapefile or File geodatabase formats to be used for reporting or on other mapping platforms.

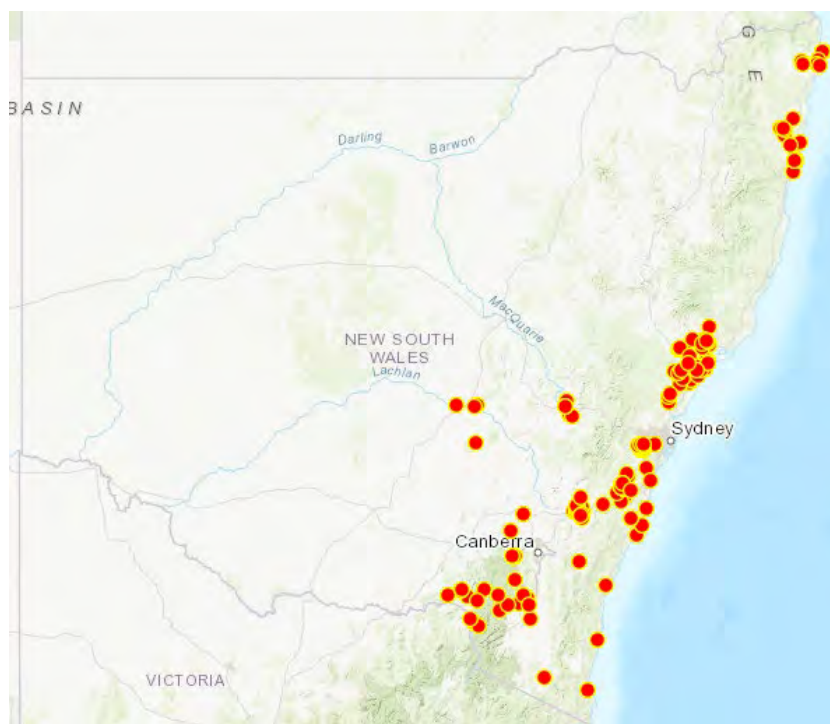


Figure 2: Recent georeferenced points of a Survey123 survey on the 'data page'.

## 6 MAJOR WHS ELEMENTS

### 6.1 WHS Policy

The Survey Operations Fieldwork Health & Safety Policy (the policy) is intended to introduce new staff and refer existing staff to all the components related to Work Health and Safety in the field (the WHS system). The policy was designed specifically for the fieldwork undertaken by the Survey Operations division of DCS Spatial Services and is used in conjunction with other relevant department policies.

The policy outlines when each component of the WHS system is to be utilised, and the responsibilities and accountabilities of field staff and their managers. It also outlines safety-related competency checks and formal training requirements for all staff undertaking field operations, and when recertification is needed.

The Survey Operations Fieldwork Health & Safety Policy includes:

- Policy statement (objectives, scope and ethical conduct).
- Policy components (responsibilities of all involved under the WHS policy).
- Definitions.
- WHS flow diagram.
- Training (objectives, policy, formal and informal training).
- Personal Protective Equipment – PPE (objectives and policy).
- First Aid (objectives and policy).
- Safe Work Method Statement – SWMS (objectives, components and policy).
- Risk Assessments – RAs (objectives and policy).
- Standard Operating Procedures – SOPs (objectives and policy).
- Traffic Management Plan – TMP (objectives and policy).
- Communication protocols (objectives, components and policy).
- Take 5 (objectives, components and policy).
- Emergency response (objectives, components and policy).
- Incident and injury reporting (objectives, components and policy).
- Land access: Dealing with general public and land owners (objectives and policy).
- Competency logs (objectives and policy).
- Material safety (objectives, components and policy).
- Reference policy and documents.
- Document control.
- Appendices (Survey Operations WHS and incident/injury reporting flow diagrams).

Figure 3 outlines the WHS flow diagram, indicating required actions across administration, induction, office preparation, field procedures and post-field procedures.

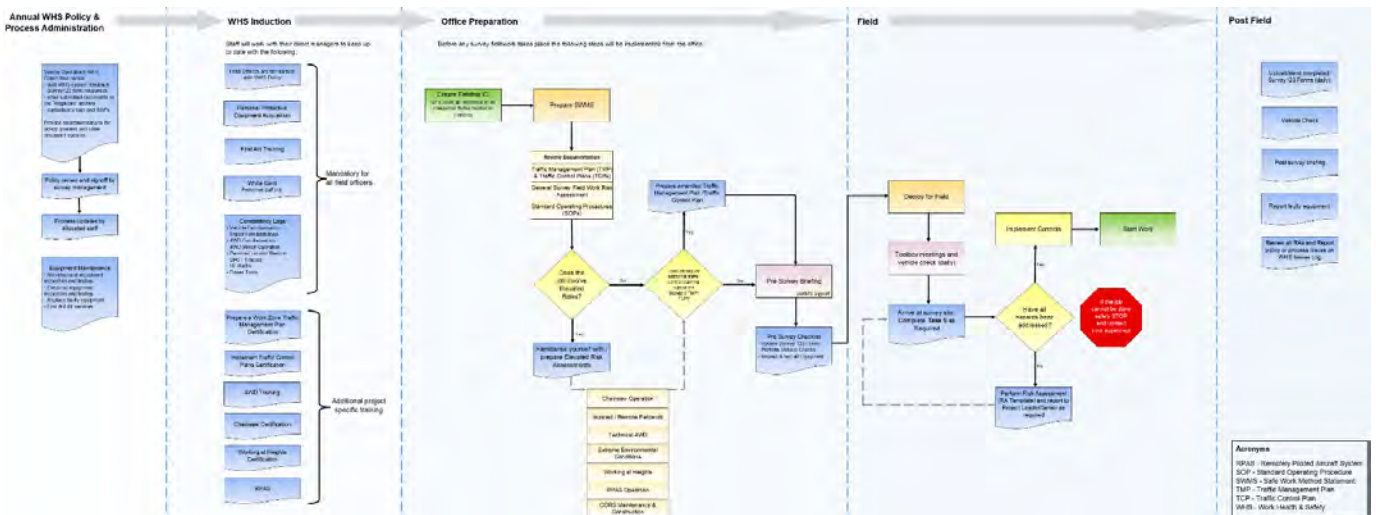


Figure 3: Survey Operations WHS flow diagram.

## 6.2 Safe Work Method Statement (SWMS)

The Survey Operations SWMS is an intuitive Excel spreadsheet (Figure 4). The project-specific document, created by ‘the flow’ when generating a Fieldtrip ID and with section one of the SWMS populated with relevant information during that process, is completed by the project leader. After a pre-survey toolbox meeting with all field staff, this SWMS is read and signed by all field party members.





### 6.3 Risk Assessments (RAs)

Risk Assessments are designed to provide field officers with guidelines and reference materials when considering the hazards faced during field operations, and the controls that can be applied to assist in reducing the perceived risk rating of a task to ‘as low as reasonably practicable’ (ALARP). These RAs were created utilising historic Survey Operations documentation, whilst being mindful of current industry standards and content, and tailored to the particular tasks of Survey Operations’ fieldwork, so survey staff have the majority of likely hazards and their controls accounted for. However, it is the field officer’s responsibility to select the appropriate RAs, familiarise themselves with them and ensure the current hazards specific to their project are being addressed.

Where a hazard or activity is not addressed in the current RAs (Table 2), a new one must be completed using the Risk Assessment template and the Spatial Services risk matrix (see section 6.3.1). These new RAs are completed, reviewed and added to existing RAs if required for future use. This is part of the Take 5 process (see section 7.1), and any new RAs must be attached to a Take 5 survey or recorded in the Fieldtrip folder for access during WHS review periods.

Table 2: Current Risk Assessments.

RA1	General Survey Fieldwork
RA2	Technical 4WD
RA3	Chainsaw Operation
RA4	Remote & Isolated Fieldwork
RA5	Extreme Environmental Conditions
RA6	Working at Heights
RA7	CORS Maintenance and Construction
RA8	COVID-19

#### 6.3.1 Risk Matrix

The Survey Operations risk matrix is based on a risk matrix kindly provided by Roads and Maritime Services (RMS, now Transport for NSW), which was adapted for use with Survey Operations RAs. The Survey Operations risk matrix allows for each risk to have a unique ID and numerical value calculated (risk rating), which relates to an activity or task, and the likelihood and consequence of an accident occurring (Figure 5).

Each survey activity or task within a RA has a risk rating calculated without any controls (safe work methods) being applied. After consideration of controls being applied to a survey activity or task, a ‘residual’ risk rating is determined. The aim is to achieve a score ALARP. Most residual risk ratings fall into the ‘low’ category, with several tasks remaining with a ‘medium’ risk rating. All residual risk ratings were reviewed and approved by Survey Operations management.

#### 6.3.2 Hierarchy of Approvals

During survey fieldwork, if a survey activity or task is new, outside what is contained in existing RAs (both general and elevated), or when a Take 5 determines a RA is required before proceeding with a task, a new RA is required. A Risk Assessment template is utilised, where the surveyor uses ‘paint-by-numbers’ guidelines within the document, following the same principles which created existing RA documents.

The flexibility in this process is that it is tailored to the individual, as each person interprets risks differently, as survey staff experience, confidence and comfort carrying out the activity or task may be rather different from person to person. The hierarchy of approvals (Figure 6) was introduced so that the surveyor knows when their new RA requires approval before carrying out the task, if a threshold of residual risk is exceeded.

Spatial Services Risk Matrix						
The Spatial Services Risk Matrix provides a unique risk rating based on the consequences and likelihood of a particular hazard. Qualitative expectations listed below the table will assist users in determining the most appropriate level of consequence and likelihood of a hazard occurring allowing previous experience, work history and research to be taken into account.						
Risk Matrix	CONSEQUENCE					
	Minor	Moderate	Serious	Major	Severe	Catastrophic
LIKELIHOOD						
Frequent	Medium (16)	High (22)	High (27)	Very High (31)	Very High (34)	Very High (36)
Likely	Medium (11)	Medium (17)	High (23)	High (28)	Very High (32)	Very High (35)
Possible	Low (7)	Medium (12)	Medium (18)	High (24)	High (29)	Very High (33)
Unlikely	Low (4)	Low (8)	Medium (13)	Medium (19)	High (25)	High (30)
Rare	Low (2)	Low (5)	Low (9)	Medium (14)	Medium (20)	High (26)
Improbable	Low (1)	Low (3)	Low (6)	Low (10)	Medium (15)	Medium (21)

CONSEQUENCE	Consequence -Qualitative Expectation	LIKELIHOOD	Likelihood - QUALITATIVE EXPECTATION
Minor	Minor injury/illness not requiring medical treatment (e.g. First Aid applied)	Frequent	10 or more times per year You expect it will almost definitely be a regular or repeated feature of the project life
Moderate	Minor injuries or illnesses requiring medical treatment	Likely	1 to 10 times per year You would expect it will occur more likely than not occur during the project life
Serious	Minor injuries or illnesses resulting in lost time	Possible	Once each Year You expect it very likely to occur during the project life
Major	1 to 10 serious injuries/illnesses*	Unlikely	Once every 1 to 10 years You would expect it will more likely not occur than occur during the project life
Severe	Single fatality and/or 10 - 20 serious injuries/illnesses*	Rare	Once every 10 to 100 years You don't expect it to occur during the project life
Catastrophic	Multiple fatalities or >20 serious injuries/illnesses*	Improbable	Less than once every 100 years You don't expect it to ever occur during project life

Figure 5: Survey Operations risk matrix.

Spatial Services Risk Matrix - Hierarchy of Approvals			
The Spatial Services Risk Matrix allows for a pre and post evaluation of an activity based on the controls applied to a specific hazard. The Risk Assessment assumes a reasonable number of controls are being applied to a risk to reduce to it to as low as reasonably practical. A post rating - aka residual risk rating – is then applied which will categorise the hazard and therefore activity into one of four areas of risk – Low, Medium, High and Very High.			
Survey Operations staff must observe a Hierarchy of Approvals based on the residual rating of any activity. This means that based on the post rating of a hazard, additional approvals from management needs to be obtained before the activity can be carried out. Details are provided below			
Low	Medium	High	Very High
1. The task can be carried out without approval.	<ol style="list-style-type: none"> <li>Stop and reassess the task.</li> <li>When reassessing, aim to bring the rating down to <i>Low</i> if possible.</li> <li>If the rating is down to <i>Low</i>, the task can be carried out without approval.</li> <li>If the rating is still <i>Medium</i> after reassessment, find another mark/location if possible.</li> <li>Reassess at the new mark/location. If <i>Low</i> carry out task without approval.</li> <li>If rating is still at <i>Medium</i> following this process, contact and discuss with Senior Surveyor. Allow 24hrs and re-plan.</li> </ol>	<ol style="list-style-type: none"> <li>Stop and reassess the task.</li> <li>When reassessing, aim to bring the rating down to <i>Medium</i> or <i>Low</i> if possible.</li> <li>If the rating is down to <i>Low</i>, the task can be carried out without approval.</li> <li>If the rating is still <i>High</i> or <i>Medium</i> when reassessing, find another mark/location if possible.</li> <li>Reassess at the new mark/location. If <i>Low</i> carry out task without approval.</li> <li>If rating is still at <i>Medium</i> following this process, contact and discuss with Senior Surveyor. Allow 24hrs and re-plan.</li> </ol>	1. Do not attempt task.
<b>Required Formal Training to Complete Task/s</b> <ul style="list-style-type: none"> <li>Provide First Aid                             <ul style="list-style-type: none"> <li>HLTAID001 Provide Cardiopulmonary Resuscitation</li> <li>HLTAID002 Provide Basic Emergency Life Support</li> <li>HLTAID003 Provide First Aid</li> </ul> </li> <li>White Card                             <ul style="list-style-type: none"> <li>CPCWHS1001 Prepare to Work Safely in the Construction Industry</li> </ul> </li> </ul>		<b>Applicable Codes of Practice, Legislation, Standards</b> <ul style="list-style-type: none"> <li>SS Survey Operations WHS Policy</li> <li>Work Health and Safety Act 2011</li> <li>Work Health and Safety Regulation 2017</li> <li>First Aid in the Workplace Code of Practice 2012</li> <li>Traffic Control at Work Sites Manual</li> </ul>	

Figure 6: Hierarchy of approvals for Risk Assessments carried out in the field.

## 6.4 Traffic Management Plan (TMP)

The purpose of the Traffic Management Plan is to provide all field officers with a safe system of work while working within road reserves under the jurisdiction of both local councils and Transport for NSW. A subject matter expert (SME) was engaged during the development of the Survey Operations TMP. This included creation of survey-specific Traffic Control Plans (TCPs) and TMP Risk Assessments.

The main objectives of this TMP are:

- Provide protection to workers and the general public from traffic hazards that may arise as a result of surveying activities being conducted.
- Minimise any adverse impacts on users of the road reserve and adjacent properties and facilities during surveying operations.
- TMP and TCPs are complemented by Survey123 geo-referenced surveys.

## 7 MINOR WHS ELEMENTS

### 7.1 Take 5

The Take 5 concept, known by many names, is used daily throughout Australian workplaces. It was introduced as a simple 5-step tool to assist in reducing injuries and fatalities within some of the most high-risk environments, such as the mining and civil construction industries. Its simplicity and success in reducing injuries in those industries now sees its use filtering down into many workplaces keen to reduce workplace injuries.

The Take 5 tool creates safer work habits over time by asking the user to *stop* for no more than 5 minutes, *think* about the task at hand, *identify* what the hazards and risks are, *plan* what controls (in SWMS and RA) can be implemented to reduce any risks, and then *proceed* with the task, knowing that the worker has introduced controls or followed procedures to reduce the risk of carrying out a work activity to as low as reasonably practicable (ALARP).

Survey Operations utilised the ArcGIS Survey123 platform (see section 5.3) to create a customised digital version of the traditional Take 5 printed booklet. This provided a more convenient, flexible, all-inclusive survey, tailor-made to Survey Operations. In addition to included advantages of Survey123 such as geo-referencing, database storage and reporting of Take 5 responses, the digital format allowed inclusion of digital file attachments like photos of hazards and site-specific RAs.

The Take 5 survey can be used in pre-project briefings, daily toolbox and pre-start meetings or for individual tasks that are within the Survey Operations SWMS ‘elevated’ RAs, or tasks that are not included in, or variations on, the Survey Operations General Survey Fieldwork Risk Assessment.

### 7.2 Standard Operating Procedures (SOPs) and Manuals

Safe operation and effective use of vehicles, 4WD vehicles and their recovery equipment, trailers, emergency communication equipment, radio communications, emergency location devices, power tools and protocols for emergency response and fatigue management were identified as key items that should be given consideration within the WHS system, for new

through to experienced staff.

Due to the diversity and nature of Survey Operations field service delivery, it was important to cater for internal and external clients, public or private entities throughout NSW, time that may have elapsed since a surveyor’s last remote field trip, and the use of various vehicles, tools and radio/emergency communication devices. In some cases, little or no exposure to certain pieces of equipment used in Survey Operations will require ‘refreshing’ as the Survey Operations WHS induction may be the only time staff have seen or used certain equipment.

For this reason, product manuals and Standard Operating Procedures (SOPs) for the use of these varied pieces of equipment were either digitally captured or created by Survey Operations field staff as reference material for all Survey Operations staff. These manuals and SOPs are located on SharePoint and stored on individual survey vehicle tablet devices (Table 3).

Table 3: Manuals and Standard Operating Procedures (SOPs).

<b>Document</b>	<b>Type</b>
Communication and Emergency Response Guidelines	Manual
Personal Locator Beacon (PLB)	Manual
SPOT Tracker User Guide	Manual
HF Radios	Manual
AEG Portable Power Tools	Manual
Ford Ranger	Manual
Take 5 (Survey123)	Manual
UHF Radios	Manual
Digital Vehicle Checklist (Survey123)	Manual
Electric Trailer Brake Controller	Manual
Chainsaw Operation & Tree Felling	Manual
Vehicle Maintenance	SOP
Vehicle Operation (4WD)	SOP
Advanced 4WD Recovery Techniques	SOP
HF Radio	SOP
SPOT Gen3 Tracker	SOP
Personal Locator Beacon (PLB)	SOP
Chainsaw Operation	SOP
Trailer	SOP
Fatigue	SOP

### 7.3 Competency Logs (CLs)

Competency logs (CLs) were created as an ‘annual refresher resource’ for new and existing staff (Table 4). Reading and comprehension of these documents, as well as demonstrating knowledge in how use each of the communication devices, emergency devices and safe operation of vehicle and attachments, will make up part of the Survey Operations annual WHS ‘sign-off’ in future years. Survey staff may not frequently use departmental transport, radio communication, emergency communication equipment or power tools, and will benefit from being reminded of their safe and effective use.

Several of these competencies are still in draft format, with the newly formed WHS Committee entrusted to prioritise completion of documentation and delivery format for ‘testing’ of staff for each CL, prior to being implemented into the Survey Operations WHS system. One-on-one, group, virtual and self-testing delivery formats were considered to allow for the most efficient, timely and effective roll-out and ongoing competency testing of staff.

Table 4: Competency Logs (CLs).

<b>Competencies</b>	<b>Delivery</b>
Vehicle familiarisation	Induction for new starters
Trailer familiarisation	Induction for new starters & refresher for existing staff when requested
Personal Locator Beacon (PLB)	Induction for new starters & annual refresher required for existing staff
SPOT tracker	Induction for new starters & annual refresher required for existing staff
HF radio	Induction for new starters & annual refresher required for existing staff
Power tools	Induction for new starters & refresher for existing staff when requested

During 2020, CL documentation for the two most important emergency communication devices, SPOT Gen3 Tracker and Personal Locating Beacon (PLB), were completed and delivered virtually (due to the COVID-19 pandemic) via Microsoft Teams at our Survey Annual Training Session (SATS) in November 2020. Further CLs will be completed and introduced to the WHS system in 2021, with priority given to our complex HF radio systems.

#### **7.4 Digital Vehicle Checks (DVCs)**

Most organisations have various types of reporting systems for vehicles. Many likely still use paper-based reporting for running sheets, equipment checklists and reporting damage. While some of this is also true for Survey Operations vehicles, Digital Vehicle Checks (DVCs) have been developed within the ArcGIS Survey123 platform to provide an easy and convenient tool for safety purposes and reporting, whilst providing accountability from the vehicle custodian to Survey Operations and fleet management.

##### **7.4.1 Daily Vehicle Check**

The daily DVC is a fast and convenient application that can be completed in 2-5 minutes, depending on the user and the amount of information required to complete the survey. The survey focuses on the vehicle and is utilised for short one-off trips, or weekly survey operations that are carried out from the vehicle custodian's office or base on a daily basis.

The obvious information collected, such as location of DVC, purpose of vehicle use, vehicle registration and driver carrying out the check, is auto-populated or can be saved to (or recalled from) 'favourites' for current or future DVC surveys. The aim is to capture the condition of key safety items on the vehicle, which may contribute to (or detract from) the safe operation of the vehicle.

##### **7.4.2 Pre-Project Vehicle Check**

The pre-project DVC is a comprehensive survey that covers all facets of the daily DVC, with additional focus on mechanical and fluid checks, emergency communication equipment checks, surveying and auxiliary equipment checklists when working for up to 2 weeks away from the office and usually in rural and remote areas. The survey can be completed within 20-30 minutes, depending on the user, the survey field project location and duration, which determines the amount of information required to complete the survey.

## **8 STAFF FEEDBACK AND REVIEWS**

### **8.1 Policy Document and Procedure Reviews**

Initial review of the ‘preliminary draft’ Survey Operations WHS policy document, RAs and TMP were allocated to staff nominated by management. As many of the WHS documents were authored by staff members with limited field experience compared to more senior colleagues, this served as an excellent learning and mentoring opportunity within the organisation.

The initial feedback phase stood as an excellent one-on-one process to review and revise draft WHS documents, prior to the Survey Operations WHS pilot period. Survey staff were then exposed to the draft WHS policy and associated documents, which they would work under, and constructive feedback was requested from field staff to assist in filling any gaps, critiquing language or processes, getting a feel for the documents and generally having their say prior to the WHS pilot period.

### **8.2 Testing Digital Field Safety Tools**

Beta versions of all ArcGIS Survey123 digital field safety surveys were rolled out to staff over 12 months prior to the Survey Operations WHS pilot period for use, critique and feedback. This enabled the WHS project group to refine, improve and debug each digital survey design to be the most effective tool to assist in a safer workplace, and identify trends and incident reporting to the WHS committee and management at the backend.

In the 12 months prior to the WHS pilot period, limited staff tested the digital field safety tools. This was a combination of office workload, a reduction of internal client demand for field services, and probable resistance for ‘uptake’ of additional WHS processes. However, several field staff did provide valuable critique and feedback, which enabled the creators of the digital tools to improve their respective Survey123 products for the upcoming WHS pilot period. Evolution of other WHS elements led to several revisions of the digital safety tools being required, mainly to accommodate compliance for TMP and TCP use.

## **9 TRIAL WHS PILOT PERIOD**

### **9.1 Testing the System**

The WHS pilot period was undertaken in March and April 2019. Survey Operations field staff, which were not involved in the WHS project group, were asked to review draft WHS documentation, particularly the major WHS elements, WHS policy, RAs and TMP, as well as implementing the digital safety tools before and during their survey field operations.

Other minor WHS elements of the WHS system, such as manuals, SOPs and workflows, were reviewed and used on a ‘needs’ basis. Staff who may have had an interest, experience or expertise in a particular area of Survey Operations, and had a willingness to contribute, were encouraged to provide comments, questions or critique all documents, tools and procedures.

### **9.2 Review Log**

A WHS pilot review log was created within SharePoint, allowing staff to place comments, questions and suggestions for all of the various elements of the WHS system. This was the best

opportunity for survey staff to have their say, seek clarification, receive feedback and have any concerns address by the WHS project group. The review log also demonstrated ‘trends’ to the WHS project group regarding which areas created the most amount of confusion or apprehension within Survey Operations field staff.

### 9.3 Refining the WHS System

During the WHS pilot period and the months leading into the Survey Operations WHS induction for *all* survey field staff, regular monthly WHS project group meetings were held to address many items entered into the review log. During these meetings, the WHS project group addressed each item within the review log. Routine issues with merit were dealt with during the meeting, with WHS system authors tasked to revise their particular WHS elements where required.

The DSG and Senior Surveyors would convene to address ‘upper level’ decisions on issues raised in the review log in the monthly Survey Managers Operational Meeting (OPSO). These review log items included processes or language that may have legal ramifications for the PCBU once the WHS system was ‘rolled out’ across the organisation. These items would either be addressed by a senior staff member or by working with the relevant WHS author once consensus was reached by senior management.

## 10 WHS INDUCTION

### 10.1 Spatial Services Survey Operations WHS System Induction

In September 2019, 18 months after committing to the development and introduction of a WHS system for Survey Operations, a 1-day WHS induction was held for all Survey Operations field staff, in person and via Skype (Table 5). This was an opportunity for presenters not only to convey the content of the WHS element they were responsible for, but to communicate with context the how and why to follow or implement these components of the WHS system in daily survey work.

Table 5: Induction agenda.

<b>Morning Session</b>
Overview of the induction, importance of WHS and the process and expectations (15 mins)
WHS policy document overview (30 mins)
SWMS - prepare form and field trip (30 mins)
<b>Break</b>
Risk Assessments, elevated RAs and template RA (30 mins)
TMP and TCPs (20 mins)
SOPs (20 mins)
Communications and emergency protocol (20 mins)
Take 5 (10-15 mins)
<b>Lunch</b>
<b>Afternoon Session</b>
Summary of morning session (45 mins)
SWMS spreadsheet demonstration (20-30 mins)
Take 5 demonstration (10 mins)
RA demonstration (20-30 mins)
<b>Break</b>
Q&A to the panel of all presenters
Next steps and close



## **10.2 Absentee Inductions**

Obviously, not every survey field staff operative was able to attend the 1-day WHS induction. However, for the benefit of absent staff and ‘future-proofing’ of the induction process for new starters in coming years, induction slides and video recordings of the entire induction presented on the day were captured and archived on SharePoint. As absent staff did not have the benefit of being involved in the Q&A sections of the WHS induction, a senior staff member (or the relevant presenter/author) would make themselves available to clarify any concerns raised after the staff member had the opportunity to watch and digest the WHS induction proceedings.

## **10.3 Induction Sign-Off**

All survey field staff were given a calendar month to both complete viewing the recording and slides of the induction (if absent) and review the major elements of the WHS system (i.e. WHS policy, RAs and TMP) after the WHS induction date. Survey staff were also required to read minor WHS elements relevant to their area of operation or (as a minimum) understand where to find manuals, competencies, SOPs and have current digital WHS tools loaded on their devices.

Within the same period, field staff were required to sign the ‘induction sign-off’ register, confirming they understand the contents of the WHS induction presented and have read and understood the major elements of the WHS system. Only after the above tasks had been completed, survey staff could continue field operations.

## **10.4 Final Document Review**

A number of survey field staff members, for whatever reason, had not reviewed draft WHS system documents, major elements and minor elements during the WHS pilot period or prior to the induction. As a consequence, legitimate queries were made during the Q&A session of the WHS induction and discussed in a WHS project team meeting. Again, these logged items were delegated to the appropriate authors for minor amendments to the WHS documentation.

However, with the ‘accountability’ required to sign off by survey field staff, as having understood the WHS major and minor elements within the month or before entering the field, many more items were entered by staff into the newly created WHS Ongoing Review Log (see section 11.2). These items needed to be addressed by the WHS project team in subsequent project team meetings, both at the WHS project team and OPSO level, as was the case during the WHS pilot period.

# **11 ONGOING REVIEWS AND WHS REPORTING**

## **11.1 WHS Committee**

With the hard work of the WHS project team now completed, a WHS committee (the committee) has been formed to manage the WHS system and ongoing review log, WHS data management, incident reporting, document creation and control, and forward WHS recommendations to Survey Operations management on behalf of staff within Survey Operations.

To allow for a seamless transition from WHS project team to the committee, management selected a few key WHS project team members and introduced a few new faces from within OSG to form the committee. Also, staff from outside Survey Operations (but within Spatial Services) were invited onto the committee to allow for cross-collaboration on WHS matters when required.

The committee is chaired by the Project Support Officer responsible for management of the WHS project team. The committee convenes on a monthly basis, with committee members serving for 12 months on a rotational basis. Survey Operations staff can self-nominate for their involvement on the committee. Management will ultimately recommend or select staff deemed suitable to represent the organisation on WHS matters, under consideration of Survey Operations structure and operational need.

### **11.2 Ongoing Review Log**

As the name suggests, the Ongoing Review Log is now in place for current survey field staff and any new staff inducted to enter queries, deficiencies or suggestions to improve the WHS system into the future. This enables the WHS system to learn from experience and evolve and adapt as technology and tasks change.

### **11.3 Reporting Tools**

The introduction of digital WHS tools utilising the ArcGIS Survey123 platform, including Take 5 surveys with their associated risk assessment and the digital vehicle checklists, will enable the WHS committee members to produce reports periodically, based on the Take 5 surveys that field staff complete on a daily basis. The committee will disseminate any relevant trends and recommendations to Survey Operations management and staff when required. The committee may also be responsible for extracting reports from these digital databases for ‘at cause’ if a survey staff member has an incident or accident, which may help in improving safety processes to avoid similar incidents in the future.

## **12 COVID-19 PANDEMIC**

When the COVID-19 pandemic arrived in Australia in early 2020, it added a new dimension to the way Survey Operations conducted business. COVID-19 safety protocols, communicated by the NSW Premier and NSW Chief Health Officer to safeguard public servants and the general public, were implemented across the whole of NSW Government.

Considering Survey Operations field staff work throughout the state of NSW, COVID-19 safe work guidelines were deemed necessary for field staff to continue their survey activities safely, particularly during the ‘lockdown’ period, while working under regional travel limitations, in or around COVID-19 cluster ‘hot-spots’ and when dealing in person with the public. Due consideration also needed to be applied to field staff using pool vehicles, restricting the number of staff per vehicle and avoiding shared survey equipment.

Early in the pandemic, Survey Operations management outlined key points for which the WHS committee was to develop a new risk assessment. Consequently, RA8 (COVID-19) was created as a dynamic document, containing hygiene protocols that would be deemed as constants going forward but also logistical considerations to be amended periodically during the pandemic, in

line with directions provided by NSW Health, DCS management and Survey Operations management.

### **13 CONCLUDING REMARKS**

The development and implementation of a practical, fit-for-purpose WHS system for Survey Operations, made by staff for staff, has been a major achievement for the organisation, and one that we can be proud of. Investment of funds, time and effort by OSG and Survey Operations, the WHS project team, Survey Operations management, WHS system contributors, Survey Operations staff involved in reviewing documentation, and all staff involved in the WHS induction process will benefit current Survey Operations staff, and those who join the organisation in future years.

The commitment shown by OSG and Survey Operations management helped the WHS project team and contributors to the system forge through the 80/20 rule when WHS fatigue set in, while operational commitments, both internal and external, demanded their time over the 18-month journey. The benefits to staff directly or indirectly involved in the development of the Survey Operations WHS system, who had little or no exposure to industry standard WHS prior to the start of this process, are immeasurable. Without this 18-month process, survey field staff would not have the deep understanding of and appreciation for their own area of WHS contribution, their own safety and their workmate's safety.

From wanting to be involved or being asked to be involved in the development of the WHS system, the majority of the WHS working group were younger staff, who evolved through the WHS system process. Where creative licence was given within the framework set out by management, staff were exposed to many opportunities, all of which benefit not only these staff members but also the organisation as a whole:

- Learning and understanding.
- Investigation and implementation of new and available software applications.
- Policy document creation and development of SOPs and manuals.
- Mentoring and collaboration.
- Presenting and communicating to small and large groups.
- Being challenged with difference of opinion.
- Growing in confidence and respect amongst peers.

The learned awareness and willingness to implement processes into the daily workflow, which would ultimately create a safer workplace for staff and their co-workers, is sure to develop a 'safety culture' where doing things safely is just a habit, not a hassle.

### **ACKNOWLEDGEMENTS**

The entire WHS project group is thanked for their enthusiasm, hard work and contribution to this paper. The current WHS committee members are thanked for their ongoing commitment to creating a safer workplace for themselves and their work mates.

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