



# ABS Review of ANZSCO Round 2

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## Executive Summary

Australia's Geospatial sector is experiencing a national workforce skills gap at a critical point in time when industry demand for location data is at a historic high.

There is a rapidly growing demand for geospatial services across virtually every government, commercial and industrial sector of the economy including Defence, emergency response, infrastructure, mining and resources, health, agriculture, environment, building and construction. Some of these emerging and innovative services include remote sensing, digital twins, agritech, environmental management, advanced imagery, and advanced technologies for satellite and Defence communications.

However, the current representation of geospatial occupations in ANZSCO does not accurately represent contemporary growth and diversity in the geospatial fields.

Geospatial's specialised job titles, descriptions and hierarchies are mostly distributed throughout other professional fields, creating a disparate representation of one of Australia's most rapidly advancing sectors.

This is hampering all aspects of workforce development which means Australia will be unable to keep pace with national and global standards, technologies and meet demand for geospatial services.

In this submission, the Geospatial Council of Australia (GCA) presents the case for change and recommends that Geospatial be elevated to the status of a Sub-Major Group and Minor Group within the ANZSCO classification.

This structural change will enable greater transparency around the Geospatial professions, support workforce development and bring one of Australia's most significant, digital and technologically advanced sectors into alignment with the rest of the economy.

## Introduction

The Geospatial Council of Australia congratulates the Australian Government's review into the ANZSCO Classifications and welcomes the opportunity to provide a submission to the Australian Bureau of Statistics (ABS) for the second round of the comprehensive review of ANZSCO.

By actively participating in the review process, the GCA and its members can help influence the recognition and visibility of geospatial occupations, leading to improved data collection, better policy formulation, and enhanced support for the geospatial workforce. The ABS review of ANZSCO presents an opportunity to align occupational classification with the changing demands and emerging opportunities across the economy underpinned by the geospatial sector, ultimately benefiting both professionals and industries relying on geospatial expertise.

**The Geospatial Council of Australia** is the peak body representing the interests of organisations and individuals, including new and emerging professionals working across a vast range of occupations for surveying, space and spatial in the digital world.

GCA represents a direct workforce of over 20,000 professionals<sup>1</sup> and works closely with key government agencies and cross jurisdictional committees such as Geoscience Australia, Australian New Zealand Land Information Council (ANZLIC), Council of Reciprocating Surveyors Boards of Australia and New Zealand (CRSBANZ), and the relevant State and Territory agencies. Our members are professional individuals – established and emerging – or organisations including businesses, not-for-profits, universities and training organisations.

Today's geospatial professionals are leaders and innovators, advancing our industries with technologies using location-based services, drones and autonomous vehicles, 3D modelling, robotics, artificial intelligence, machine learning, virtual reality, and the Internet of Things.

GCA recommends significant structural change to the ANZSCO to reflect geospatial occupations informed by emerging skills and global standards.

## The case for change

The geospatial sector is undergoing a period of rapid expansion fuelled by substantial investments in other parts of the economy such as infrastructure, resources, communications, transport, emergency management & response, tourism, health and other services that heavily rely on geospatial data, technology and services. Unfortunately, this growth is outpacing the availability of skilled workers, creating a critical skills gap. Compounding this issue is the closure of education and training institutions that traditionally provided vital services to address this gap.

The increasing demand for geospatial professionals across the country necessitates precise data on the requirements of this specialised field. This ensures a thorough understanding and helps shape training and skills migration paths, all informed by accurate labour-force data. This data is significant in informing policy, determining strategic investments and shaping workforce development strategies.

In a recent comprehensive study commissioned by Consulting Surveyors National, titled "Determining the Future Demand, Supply and Skills Gap for Surveying and Geospatial Professionals: 2022 - 2032", it was forecast that the geospatial sector requires an additional 1,400 skilled workers each year for a decade to bridge the existing skills gap, particularly in the areas of surveyors and geospatial skills. This projected workforce shortage, if left unaddressed, threatens to hinder the sector's capacity to contribute effectively to national development goals and innovative projects across various domains.

As far back as 2013 ACIL Tasmin (now ACIL Allen) in their study titled "Surveying and Geospatial Workforce Modelling" reported that data represented in Government statistics may not reflect the full size or diversity breakdown of the workforce given it relies on individuals' identification of occupations represented in the Census data and quarterly Labour-force reports informed by ANZSCO<sup>2</sup>.

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<sup>1</sup> The actual direct workforce size remains unknown due to the current ANZSCO structure and limited occupations. GCA speculates that the actual geospatial workforce size is significantly greater than current reports indicate.

The Australian geospatial industry is experiencing significant growth underpinned by increasing demand for location data across most industry sectors of the economy including emergency response, infrastructure, government, defence, mining and resources, health, agriculture, environment, building and construction. There is a growing need for geospatial data to meet clients' needs as demand continues to increase. The current representation of surveying and spatial occupations in ANZSCO does not accurately represent the growth and diversity in the geospatial field.

GCA acknowledges that the ANZSCO describes occupations for Australia and New Zealand in a way that identifies primary tasks. GCA proposes that geospatial skills are unique and should be specifically identified as emerging skills within Data Analytic skills. Geospatial skills such as Geospatial Information System (GIS) focus on geospatial data and visualisation applied across industries of growth such as urban planning, environmental science and management, resource management, government services and emergency management.

Forecasting suggests the industry's high number of mature-aged workers (particularly cadastral surveyors) are approaching retirement with a narrow pipeline of professionals on track to be licensed/registered. This comes at a time of unprecedented investment in infrastructure with the Australian Government investing \$110 billion over ten (10) years from 2021-22 in land transport across Australia through its rolling infrastructure pipeline, \$1.8 billion South East Queensland City Deal along with a further forecast \$8.1 billion quantifiable economic and social benefits for Queensland and \$17.61 billion for Australian due to the 2032 Olympic Games<sup>3</sup>.

Due to the requirement for significant change to the ANZSCO Classifications associated with the geospatial sector, this submission presents an overview of the need for change and a recommended new structure of classifications.

## The Geospatial sector

In preparing this submission, the GCA recognises the valuable applications of the ANZSCO and considers these applications in the response. In recognising the significance of emerging skills needed to improve the nation's productivity and to strengthen Australia's competitive edge in the global market, restructuring ANZSCO to better reflect emerging occupations to prepare for growth is paramount.

GCA considered the following applications of ANZSCO in developing this submission:

**Skills Priority List:** The need to ensure occupations in shortage are presented accurately through various inputs that are broadly aligned by ANZSCO. Emerging occupations are generally not accounted for in ANZSCO resulting in inaccuracies in Skills Priority Lists to better reflect the skills needs across the economy in a timely manner. Greater accuracy and specificity inform training and education by opening up more qualifications and degree programs needed to meet the needs of industry, shaping recruitment strategies and workforce development programs, setting of Awards and informing Government procurement of services.

**Workforce Analysis:** ANZSCO provides a consistent framework for categorising occupations, providing a framework analysing the size, composition, and trends of industry workforces. This information is essential for understanding the supply and demand of skilled professionals across an industry sector and is used by employers to set recruitment bands and manage ebbs and flows in workforce needs.

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<sup>3</sup> The Australian Surveying and Spatial National Roadmap, 2022, The Surveyor's Trust. Author D Bakalich

### **Education and Training:**

ANZSCO classifications form the basis of data used to inform investments into the development of education and training programs by providing a clear taxonomy of occupations to meet the needs of industry. This is particularly needed for emerging occupations that sit within the geospatial sector. Inclusion of new occupations will inform training investment strategies and support the case for education and training institutions to build educational transitional pathway programs. The sector is significantly lacking adequate education and training providers due to perceived lack of demand. This ensures that educational institutions can offer relevant courses that align with the skills and knowledge required for specific roles within the sector.

**Skills Migration** is informed by various inputs including the Skilled Priority List. Ensuring occupations across the geospatial sector are better recognised will support greater alignment and recognition of overseas qualifications to ensure the sector's undersupply of skilled labour is supported by Government skills migration policies.

**Policy and Planning:** Government agencies and policymakers use ANZSCO classifications to inform decision-making and policy development related to the geospatial sector. ANZSCO is fundamental to assess the impact of specific policies on the workforce and identify areas that require intervention or support. Policies include State and Territory Surveyors Act's associated with Cadastral and Mining Surveying and registration for Engineering Surveying, apprenticeships and traineeships, national skills strategies, and government procurement policies associated with the supply of services.

**Statistical Analysis:** Researchers and analysts utilise ANZSCO codes to conduct statistical studies and research on the geospatial sector. This involves analysing employment trends, wage disparities, geographic distribution of workers, and other relevant insights.

**Industry Insights:** ANZSCO classifications allow for the tracking of changes and developments within the geospatial sector over time. This can provide valuable insights into emerging roles, shifts in job responsibilities, and the overall evolution of the industry.

## International and National Standards

The geospatial sector collaborates with international organisations and operates within state, national and international standards. GCA has strategic partnerships with key international organisations that set global standards associated across occupations within the geospatial sector. Elevating Geospatial to a Minor Group aligns with both international and national standards, reinforcing its importance across contexts:

1. **United Nations:** The United Nations established the Committee of Experts on Global Geospatial Information Management (UN-GGIM) in 2011 as the apex intergovernmental mechanism for making joint decisions and setting directions on the production, availability and application of geospatial information within national, regional and global policy frameworks. The UN-GGIM established the United Nations Geospatial Network with the aim to strengthen the coordination and coherence of geospatial information management within the United Nations system and to enable the efficient use and optimisation of geospatial information.
2. **International Federation of Surveyors (FIG):** FIG is the premier international organisation representing the interests of surveyors worldwide. It is a federation of the national member

associations and covers the whole range of professional fields within the global surveying, geomatics, geodesy and geo-information community. It provides an international forum for discussion and development aiming to promote professional practice and standards.

3. **International Hydrographic Organisation (IHO)**: The International Hydrographic Organisation is an intergovernmental organisation that works to ensure all the world's seas, oceans and navigable waters are surveyed and charted. Established in 1921, it coordinates the activities of national hydrographic offices and promotes uniformity in nautical charts and documents. It issues survey best practices, provides guidelines to maximize the use of hydrographic survey data and develops hydrographic capabilities in Member States including Australia. GCA is a partner of the IHO and delivers the specialist Certification, Australasian Hydrographic Surveyors Certification to international standards established by the IHO and supported by the Australian Hydrographic Office (AHO). Ensuring international relevance is essential to Australian Hydrographic Surveying occupations including:

- Safety of navigation
- Protection and management of the marine environment
- Use of marine resources: Minerals, oil & gas, renewable energy
- Maritime trade
- Coastal zone management
- Fishing, aquaculture and mariculture
- Maritime defence and security
- Tourism
- Search and rescue
- Maritime boundaries and policing
- Marine science
- Marine geospatial data infrastructure
- Recreational boating
- Tsunami flood and inundation modelling

4. **International Society for Photogrammetry and Remote Sensing (ISPRS)**: The International Society for Photogrammetry and Remote Sensing is a non-governmental member-based organisation devoted to the development of international cooperation for the advancement of photogrammetry and remote sensing and their applications.

The Society's scientific interests include photogrammetry, remote sensing, spatial information systems and related disciplines, as well as applications in cartography, geodesy, surveying, natural, Earth and engineering sciences, and environmental monitoring and protection. Further applications include industrial design and manufacturing, architecture and monument preservation, medicine and others. ISPRS promotes cooperation and coordination with related international scientific organisations.

5. **Open Geospatial Consortium (OGC)**: OGC is an international consortium of experts committed to improving access to geospatial, or location information. They connect people, communities, and technology to solve global challenges and address everyday needs. Their output involves standards development, innovation through funded collaborative projects involving researchers and industry. OGC is an important and authoritative international geospatial standards body.
6. **National Competency Standards**: ANZSCO supports the Automatic Mutual Recognition approach to licensing and registration of licensed Surveyors. The Council of the Reciprocating

Surveyors Boards of Australia & New Zealand (CRSBANZ). CRSBANZ's ongoing commitment to mutual recognition of professional registration in Australia and New Zealand and supports the Cadastre 2034 Goal 5 - achieve a cadastral system that is a federated cadastral system based on common standards.

**Recommendation:** The elevation of **Geospatial to a Sub-Major Group (in part) and a Minor Group** within the ANZSCO classification is a strategic imperative that aligns with global standards, industry needs, and economic growth. Accurate representation of geospatial occupations will enhance labour market insights, support education and training decisions, and facilitate cross-sectoral policy formulation. As the Australian economy evolves, the inclusion of geospatial occupations in ANZSCO is essential to ensuring a skilled, adaptable, and resilient workforce capable of meeting the challenges of the modern world.

## Emerging Trends Shaping Emerging Skills and Occupations

As reported by the World Economic Forum<sup>4</sup>, technology adoption will remain a key driver of business transformation in the next five years. Rapid technology adoption and emerging technology is informing skills and occupations at unprecedented rates impacting traditional occupations. Tracking and maintaining accurate data is needed to ensure labour-force data is accurate and relevant. This relates to significant changes to how government, industry and society function and co-exist. For instance, the emerging trends towards digital lodgement of survey plans, the rapid growth of smart city initiatives expected to reach a market size of US\$21 billion globally by 2025<sup>5</sup> and the emergence of Digital Twins projected to be AUD43.3 billion global market by 2025<sup>6</sup>.

The Productivity Commission identified building a skilled workforce and harnessing data and digitisation as a key component to enable a more productive Australia (Source: Productivity Commission 2023). The policy agenda, of which the geospatial sector plays a significant role for a more productive Australia includes:

- Building an adaptable workforce to supply the skilled workers for Australia's future economy
- Harnessing data, digital technology and diffusion to capture the dividend of new ideas
- Creating a more dynamic economy through fostering competition, efficiency and contestability in markets
- Lifting productivity in the non-market sector to deliver high-quality services at the lowest cost
- Securing net-zero at least cost to limit the productivity impact caused by climate change

## Recommended Changes to ANZSCO

This submission introduces additional evidence that underscores the pressing need for this classification change. The geospatial sector is currently grappling with a significant skills gap and escalating demands,

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<sup>4</sup> World Economic Forum, The Future of Jobs Report 2023

<sup>5</sup> 26 Standards Australia August 2020, Smart Cities Standards Roadmap pg 9

<sup>6</sup> ANZLIC Principles for Spatially Enabled Digital Twins of the Build and Natural Environment in Australia, 2019



and the proposed new classification structure to support a more accurate representation of the geospatial workforce.

## ANZSCO Structure and Workforce Measurement

One of the key challenges exacerbating the current skills shortage is the limitations of the ANZSCO structure to accurately measure the size and changes of the Geospatial workforce. Without precise classification and recognition of geospatial occupations, the sector's contributions and labour demands are obscured.

### Justification for Introducing New Category for Geospatial

The request to change the term "Spatial" to "Geospatial" is supported by compelling reasons rooted in global standards, international qualifications, and industry demands:

1. **Global Standardisation:** The United Nations emphasizes the use of "Geospatial" as reflected in its Geospatial Strategy. Aligning with this global standard enhances consistency in the classification and recognition of geospatial occupations across countries.
2. **International Qualifications and Recognition:** The elevation of Geospatial to a Sub-Major and Minor Group will harmonise Australian classifications with internationally recognised qualifications and professional standards, facilitating the recognition of skills and qualifications across borders.
3. **Migration and Skills Alignment:** The geospatial sector plays a critical role in various domains, including cadastral surveying, hydrography, engineering surveying, mining surveying, and Geographic Information Systems (GIS). Harmonising geospatial occupations with international standards will support skill migration and alignment with global qualifications critical to addressing skills needs across Australia.
4. **Labor Market Insights:** The current state of geospatial occupations is inadequately reflected in the ANZSCO classification. Strengthening data collection in this area will contribute to a more accurate representation of the sector's labour force, aiding policy development and workforce planning.
5. **Education and Training:** The decline in available training and education courses in geospatial fields has led to workforce pressures. Enhanced recognition of geospatial occupations will empower education and training providers to respond to market demands and offer relevant courses, thereby sustaining a skilled workforce. Increasingly, Registered Training Organisations and Universities are changing qualification and degree programs titles to Geospatial programs.
6. **Cross-Sectoral Impact:** Geospatial skills extend beyond traditional boundaries and contribute to various sectors, such as government, health, defence, emergency response, environment, retail, hospitality, and sports. Accurate classification is pivotal for informed policy-making and economic planning.

## Emerging Geospatial Skills and Occupations

The rapid emergence of geospatial skills and occupations underscores the need for their explicit classification within ANZSCO. Geospatial applications extend across diverse sectors, contributing to economic growth, technological advancement, and societal well-being. Below sets out some geospatial technology and its applications being used across industry, government and society:

**Remote Sensing:** Recent trends in remote sensing and earth observation include bringing systems together, such as Light Detection and Ranging (Lidar) being integrated with satellite, aerial, and UAV platforms. Also, 3D elevation data in the form of a Lidar point cloud with various forms of spatially corrected imagery draped over it to create a life-like model.

**Digital Twins and Technology:** Emerging skills in digital twin technologies are transforming various sectors, enhancing planning, asset management, monitoring, and operations.

**Agritech and Data Farming:** Geospatial data in the form of positioning for machine guidance and advanced imagery is vital for modern agritech, enabling precision agriculture, resource optimization, and sustainable food production.

**Advanced Imagery:** Multispectral and hyperspectral imagery enable superior insights in fields such as agriculture, environmental management, and resource exploration.

**Location-Based Services:** Spatial technologies drive location-based marketing, biosecurity, remote sensing, and maritime safety.

**Urban Planning and Infrastructure:** Geospatial skills contribute to property planning, infrastructure management, and urban planning through spatial digital twins.

**Environmental Management:** Geospatial tools aid water resource management, flood mapping, and environmental quality monitoring.

**Emerging Technologies:** Geospatial skills support autonomous vehicles, additive manufacturing, defense operations, satellite communications, and more.

### Common Skills across Geospatial roles

1. **Geographic Information Systems (GIS) Proficiency:** A fundamental skill, GIS involves managing, analysing, and visualizing spatial data. Knowledge of GIS software (such as ArcGIS, QGIS) and understanding spatial databases is essential.
2. **Spatial Analysis:** Ability to perform various types of spatial analyses, such as buffering, overlay, interpolation, and network analysis. This skill is crucial for deriving meaningful insights from geospatial data.
3. **Remote Sensing:** Understanding remote sensing technologies, satellite imagery interpretation, and working with various types of remote sensing data to extract information about the Earth's surface.
4. **Cartography and Map Design:** Designing clear and informative maps requires a good understanding of cartographic principles, including symbolisation, map scale, projection, and layout.

5. **Programming and Scripting:** Proficiency in programming languages like Python, R, or JavaScript can be valuable for automating geospatial tasks, creating custom tools, and developing web-based applications.
6. **Geodatabase Management:** Knowledge of geodatabases, spatial data formats (such as shapefiles, GeoJSON, KML), and database management systems (such as PostgreSQL, SQLite) is crucial for efficient data storage and retrieval.
7. **Geospatial Data Collection:** Familiarity with different methods of data collection, including GPS, mobile data collection apps, drones, and field surveys.
8. **Spatial Statistics:** Understanding statistical techniques that are relevant to spatial data, including spatial autocorrelation, hotspot analysis, and spatial regression.
9. **Data Visualisation:** Skill in creating compelling visualisations using geospatial data, including choropleth maps, heatmaps, and 3D visualizations.
10. **Domain Knowledge:** Depending on the industry you're working in (environmental sciences, urban planning, agriculture, etc.), having expertise in that domain will greatly enhance your ability to work effectively with geospatial data.
11. **Problem-Solving:** Geospatial professionals often encounter complex spatial problems. Strong analytical and problem-solving skills are crucial for finding innovative solutions.
12. **Communication:** The ability to communicate complex geospatial concepts and findings to both technical and non-technical audiences is important, especially when collaborating with interdisciplinary teams or presenting results to stakeholders.
13. **Project Management:** Especially for larger projects, having project management skills helps in organizing tasks, setting priorities, and meeting deadlines.
14. **Open Source Tools:** Familiarity with open-source geospatial tools and libraries like QGIS, GDAL, Leaflet, and others can be advantageous for cost-effective solutions.
15. **Machine Learning and AI:** As the industry evolves, knowledge of machine learning and artificial intelligence techniques for geospatial analysis is becoming more relevant.

## Geospatial Council of Australia's Proposed Restructure to ANZSCO

The Geospatial Council proposes ANZSCO presents greater visibility of geospatial occupations. The below sets out the recommended changes.

GCA recommends the following revisions to ANZSCO:

GCA requests that Geospatial occupations be restructured and grouped together. This will enable a more holistic approach in reviewing and updating the Classifications and enable greater transparency labour-force data indicating skills that sit across.

Occupations currently fall within the following Focus Areas:

- Architects, designers, planners and surveyors
- Building and engineering technicians
- Agricultural, medical and science technicians
- Construction and mining labourers
- Scientific Research Services

A summary of recommended structural changes to the current structure include:

1. introduce Geospatial as a classification under Sub-Minor Group (in Major Group: Technicians and Trade Workers), Minor Group 3-digit and Unit Group 4-digit
2. introduce new occupations under 6-digit aligned to Major Groups 1, 2, 3
3. A long-standing area of concern for the sector is where Hydrographer currently sits in ANZSCO, the assigned Skill level and definition. GCA recommends that the occupation Hydrographer (311415) out from Agriculture, Medical and Science Technicians (311) to the proposed Geospatial Minor Group Geospatial Information Professionals and Surveyors. Change the Occupation 6-digit to Hydrographic Surveyor and change the definition to the globally standard definition as set out in the Table.
4. Move Surveying Technicians (312199) out from 3121 Architectural, Building and Surveying Technicians into the new proposed structure
5. Move Surveyor's Assistant (821915) from Construction and Mining Labourers (821) into the new proposed structure aligned to the new definition of tasks.

## The recommended new structure (see Addendum for more information on tasks and skill levels)

### Major Group: 1 – Managers

#### Sub-Major Group: 13 – Specialist Manager

##### Minor Group: 136 - Geospatial Manager

##### Unit Group: 1361 – Geospatial Manager Specialist

Occupations: 1361XX – Chief Geospatial Officer

##### Unit Group: 1362 – Survey Manager Specialist

Occupations: 1362XX – Hydrographer of Australia

Occupations: 1362XX – Surveyor-General

### Major Group: 2 – Professionals

#### Sub-Major Group: 23 – Design, Engineering, Science & Transport Professionals

##### Minor Group: 235 – Geospatial Professionals

##### Unit Group: 2351 – Geospatial Information Professionals and Surveyors

Occupation: 2351XX – Cadastral Surveyor

2351XX – Mining Surveyor

2351XX – Engineering Surveyor

2351XX – Hydrographic Surveyor (change definition)

2351XX – Geodesist

2351XX – Photogrammetrist

2351XX – Nautical Cartographer

2351XX – Cartographer

2351XX – Geospatial Scientist

2351XX – Geospatial Solutions Architect

2351XX - Geospatial Analyst

2351XX – Geospatial Information Systems Manager

2351XX – GIS Officer

2351XX – Remote Sensing Analyst

2351XX – Remote Sensing Scientist

2351XX – Remote Sensing Technician

**Major Group: 3 – Technicians and Trade Workers**

**Sub-Major Group: 37 – Geospatial Technicians**

**Minor Group: 371 – Geospatial and Surveying Technicians**

**Unit Group: 3711 – Geospatial Draftsperson and Technicians**

**Occupation: 3711XX - Geospatial Technician**

**3711XX – Geospatial Draftsperson**

**3711XX – GIS Administrator**

**3711XX – Surveyors Assistant**

**3711XX – Surveying Technician**

## Conclusion

The Geospatial sector's skills gap and rapid expansion demand urgent attention and strategic intervention. The proposed elevation of Geospatial to a Sub-Major Group and Minor Group within the ANZSCO classification, as presented by the Geospatial Council of Australia, represents a pivotal step toward addressing these challenges. The evidence of the skills gap and industry growth further underscores the imperative for this restructuring to ensure transparency, accurate workforce measurement, and recognition of the substantial role that geospatial plays in Australia's economic and technological development.

*We appreciate your consideration of this supplementary evidence to support the elevation of Geospatial as a Minor Group within the ANZSCO classification. Your actions will contribute significantly to the ongoing success and advancement of the Geospatial sector and Australia's broader socioeconomic landscape.*

ROWS	Major Group 1-Digit	Sub-Major Group 2-Digit	Minor Group 3-Digit	Unit Groups 4-Digit	Occupations 6-Digit	Skill Level   Tasks   Licensing Requirements	Evidence for change
1	1 - Managers	13 – Specialist Manager	Change: Create new Minor Group:  136 - Geospatial Manager	Change: Create new Unit Group:  1361 - Geospatial Manager Specialist  1362 – Survey Manager Specialist	Change: Create new occupations:		
2				1361 – Geospatial Manager Specialist	1361XX – Chief Geospatial Officer	Skill Level 1  Responsible for and shapes the Geospatial strategic direction of an organisation or Government Department, provides strategic advice on policy and application of geospatial data and technologies. Provides advice and direction on how to facilitate improved decision-making and planning using geospatial data. Oversee regulation and geospatial standards.	
3				1362 - Survey Manager Specialist	1362XX – Hydrographer of Australia	Skill Level 1  This role requires authorisation and provision of Australia’s official nautical charts (including charts in electronic form) and associated services in support of maritime safety, the coordination and determination of policy and standards which cover both hydrographic surveying and nautical charting, as well as contributing to the coordination, exchange and standards related to maritime geospatial data in general.  The HoA is also responsible for providing direct support to the Australian Defence Force (ADF) by providing maritime geospatial data, products and services for Defence purposes.  The HoA directs the Australian Hydrographic Office, the entity responsible for meeting Australia’s hydrographic services obligations as expressed through the <i>Navigation Act, 2012 (Cth)</i> .	

					<p>The HoA represents Australia at the International Hydrographic Organization ensuring Australia continues to meet international obligations under the Safety of Life at Sea (SOLAS) Convention and the United Nations Convention on Law of the Sea (UNCLOS).</p> <p>Primary responsibility of the HoA is to lead the Australian Hydrographic Office to:</p> <ul style="list-style-type: none"> <li>• collect, compile, collate and manage hydrographic data</li> <li>• maintain and disseminate hydrographic data, products, publications and services</li> <li>• maintain and disseminate nautical paper and electronic charts, including authorising charts for use in Australian waters.</li> </ul> <p>Along with participating on other bodies responsible for:</p> <ul style="list-style-type: none"> <li>• law of the sea</li> <li>• geodesy</li> <li>• tides and datums</li> <li>• geographic names</li> <li>• navigation services</li> <li>• maritime spatial data management</li> <li>• standards for Australian hydrographic surveys</li> <li>• Certification of hydrographic surveyors</li> </ul>	
4				<p>1362XX – Surveyor-General</p> <p>Alternative Title:</p> <p>Director of Surveys          Director of Geospatial</p>	<p>Skill Level 1</p> <p>Registration or License required</p> <p>Surveyor-General plays a significant role in land settlement and land administration within State and Territories in Australia.</p> <p>Primary functions include set and monitor standards for land surveying (or cadastral surveying), monitors surveying matters affecting the cadastre and advises the Minister and the community on surveying matters.</p>	



5							
6	2 - Professionals	23 – Design, Engineering Science & Transport Professionals	232 – Architects, Designers, Planners and Surveyors  Change to:  Create a new Minor Group:  Take out Surveyors & change to:	2322 Surveyors and Spatial Scientists  Change to:  Create new Unit Group:	232212 Surveyor 232213 Cartographer 232214 Other Spatial Scientist  Change to:  Create new occupations:		
7			235 – Geospatial Professionals	2351- Geospatial Information Professionals and Surveyors	2351XX - Cadastral Surveyor Alternative Title: Land Surveyor	<p>Level 1 skill.</p> <p>Registration or License required</p> <p>A cadastral surveyor is responsible for accurately defining property boundaries and understanding the laws of land ownership. This may include the identification of residential or rural boundaries, re-establishing boundaries that have been previously surveyed or creating new boundaries as part of the land subdivision process. A cadastral surveyor has the skill and knowledge to interpret and advise on the location of boundaries and if there are any rights or restrictions relating to the property. The information and measurements taken by the cadastral surveyor are recorded on a survey plan which the surveyor is required to lodge with the relevant government agency.</p> <p>Contribute to the datums, infrastructure, standards and models required for accurate and reliable 4D positioning. Monitor the horizontal and vertical motion of the Australian and New Zealand landmass to contribute to the scientific effort to monitor the Earth's changing change and motion. Collect, adjust and interpret cadastral evidence for the purpose of reinstating cadastral boundaries.</p>	

8					<p>2351XX - Mining Surveyor</p> <p>Alternative Title: Mine Surveyor</p> <p>Specialities: Underground Mining Open Cut Mining</p>	<p>Skill level 1.</p> <p>Registration or License may be required (jurisdictional requirement)</p> <p>Mining surveyors work in both open cut and underground mines for the coal and minerals mining industries. The mine surveyor will have responsibility for the surface and underground plans of the entire mine site. Activities for an open cut mine may include identification of limits for excavation purposes and marking the drill patterns for blasting. In underground mines the mine surveyor will determine and control the location and direction of tunnels as well as the mapping of all underground tunnels. In both open cut and underground mines, the surveyor will prepare mine plans and calculate the volume of materials moved or minerals mined.</p>	
9					<p>2351XX - Engineering Surveyor</p> <p>Alternative Title: Construction Surveyor Deformation Surveyor (monitor movement of structures)</p> <p>Specialities: Deformation Road Rail Bridges &amp; Tunnels Major Structures</p>	<p>Skill level 1 &amp; 2.</p> <p>Certification required for Level 1</p> <p>Engineering surveyors are associated with the design and construction of new infrastructure projects. They develop accurate survey plans for infrastructure and construction projects include high-rise buildings, road freeway systems, road tunnels, airports, wharves etc. to ensure they are built in accordance with the design criteria with regards to location, size and shape.</p>	
10					<p>2351XX – Hydrographic Surveyor</p> <p>(Change the title, definition of Hydrographer and the position of the occupation in ANZSCO – see Row 25)</p>	<p>Skill level 1. Certification required.</p> <p>See line 25 for the definition and tasks.</p>	
11					<p>2351XX - Geodesist</p> <p>Alternative Title:</p>	<p>Skill level 1.</p> <p>Geodesists measure and monitor the Earth's size and shape, geodynamic</p>	

					<b>Geodetic Surveyor</b>	phenomena (tides and polar motion), and gravity field to determine the exact coordinates of any point on Earth and how that point will move over time.	
12					<b>2351XX - Photogrammetrist</b>  <b>Alternative Title:</b> <b>Aerial Surveyor</b>	Skill level 1  Photogrammetrists perform image assessment, point selection, mensuration, triangulation, orthorectification, dynamic range adjustments, and processing in order to produce image products. They increase the relative and absolute positioning accuracy of imagery from sensors to support mono and stereo exploitation. These analysts assess, evaluate, and extract elevation data from stereo imagery.	
					<b>2351XX – Nautical Cartographer</b>	Skill Level 1  Detail to be provided	
13					<b>2351XX - Cartographer</b>	Skill level 1  Applies scientific, mathematical and cartographic design principles to prepare and revise maps, charts and other forms of cartographic output.	
14					<b>2351XX - Geospatial Scientist</b>  <b>Alternative Title:</b> <b>Geospatial Analyst</b> <b>Spatial Analyst</b> <b>GIS Analyst</b>	Skill level 1  Geospatial scientist curates and analyses vast geospatial datasets such as satellite imagery, google maps, elevation data, demographic data, socio-econometric data, and topography to extract useful insights about the events happening on our planet. A Geospatial Data Scientist is required to know how to handle large image and location datasets, how to visualise and query them, and how to make predictions.  Geospatial scientists work at the intersection of cartography, programming, and data analysis. They analyse spatial data through mapping software and design digital maps with geographic data and various other data sets and engineering plans. They are	

						tasked with discovering patterns and trends through spatial mapping and developing mapping applications and tools and managing a digital library of geographic maps in various file types. They use their findings to explain geospatial trends to clients.	
15					<b>2351XX - Geospatial Solutions Architect</b>	<p>Skill level 1</p> <p>Geospatial Solutions Architect is responsible for the design and implantation of geospatial/GIS software, its configuration, building and maintaining GIS databases, creating, and maintaining process automation related to data maintenance, specifying the required hardware configuration and ongoing applications development.</p>	
16					<b>2351XX – Geospatial Analyst</b>  <b>Alternative Title:</b>  <b>GIS Analyst</b>	<p>Skill level 1</p> <p>GIS analysts assess spatial data by mapping software and discovering patterns and trends. They design digital maps with geospatial data and other sources and create shape files that merge topographical data with external data. They produce reports on geospatial data using data visualisations and perform data munging and cleaning to convert data into its desired form. GIS analysts</p>	
17					<b>2351XX – Geospatial Information Systems (GIS) Manager</b>  <b>Alternative Title:</b>  <b>Geospatial Data Engineer</b>	<p>Skill Level 1</p> <p>GIS Manager manages, plans, assigns and reviews analysts and developers' work on GIS projects. Oversees the production of reports, maps, applications and visualisations for internal or external stakeholders. Ensures proper maintenance, documentation and cleaning of GIS data, develops methods to leverage GIS data for new applications. GIS Managers manage projects.</p>	
18					<b>2351XX - GIS Officer</b>  <b>Alternative Title:</b> <b>GIS Operator</b> <b>GIS Technician</b>	<p>Skill Level 2 &amp; 3</p> <p>Tasks include performing data capture, maintenance, analysis, extraction and compilation to ensure the timely delivery</p>	

					GIS Administrator	of a range of geospatial data and mapping products and services.
20					<b>2351XX – Remote Sensing Analyst</b>  <b>Alternative Title:</b> <b>Earth Observation Analyst</b>	Skill Level 1.  Manages and coordinates remote sensing field data collection. Curates and analyses digital image data acquired from multiresolution, multiwavelength and multitemporal remote sensing systems carried on drones, aircraft and satellites platforms, and ground-based, using statistical and other analysis software and/or GIS, and the integration of other geospatial data sources including locational data, to create map-like products and digitised spatial information for a wide range of applications including geology, agriculture, urban planning, forestry, business and military intelligence, coastal monitoring, oceanography, disaster prediction, response and monitoring, and environmental monitoring.
21					<b>2351XX - Remote Sensing Scientist</b>  <b>Alternative Title:</b> <b>Earth Observation Scientist</b>	Skill Level 1.  A Remote Sensing Scientist develops new analytical techniques and associated software to process and integrate, over time and location, digital image data for GIS and other earth monitoring and management applications from multiwavelength (frequency), multiresolution, multitemporal, passive and active remote sensing systems, on drones, aircraft and satellite platforms, and ground-based data, and correcting for, and analysing locational, sensor and atmospheric effects/errors on the quality of the data and resultant information.  Develops statistical methodologies for site selection and collection of ground-based data and associated field procedures in support of remote sensing analyses.
22					2351XX – Remote Sensing Technician	Skill Level 1

						<p>A Remote Sensing Technician uses remote sensing technology such as satellites, aircraft and drones to gather and analyse data about the Earth's surface. They collect and interpret data related to natural resources, land use and environmental conditions, and use this information to create maps and other visual representations.</p> <p>Undertakes field data collection under the direction of the Remote Sensing Analyst.</p>	
23							
24	3 – Technicians and Trades Workers	31 – Engineering, ICT and Science Technicians	311 – Agriculture, Medical and Science Technicians	3114 – Science Technicians	311415 – Hydrographer  Change to:	<p>The current definition for Hydrographer assigned to this ANZSCO code is for a Field Hydrologist. These two occupations are very different and required different skill levels</p>	<p>Since 2013 the SSSI Hydrography Commission, now titled the Geospatial Council of Australia Hydrography Area of Practice, has requested the incorrect terminology used to describe a Hydrographer is changed to reflect the position to align with international standards.</p>
25					<p>Take 311415 Hydrographer out of Technicians and Trades Workers and change the definition to reflect the tasks a Hydrographer does. Change the skill level from 2 to 1. See Row 10 for correct position and apply definition and tasks as set out on Row 25.</p> <p>2352XX – Hydrographic Surveyor (new title)</p> <p>Alternative Title: Hydrographer</p>	<p><b>Skill Level 1.</b></p> <p>Requires Certification to international standards (International Hydrography Organisation).</p> <p>A hydrographic surveyor (or hydrographer) maps or charts the physical characteristics of the bed of the sea, river, lake etc. and the information derived from a hydrographic survey is processed and portrayed either on a traditional nautical chart or increasingly through the electronic navigational charts, describing that part of the Earth's surface by soundings, height and depth contours and spot heights both above and below the sea surface.</p>	<p>The United Nations defines Hydrography as the science of measuring and depicting the parameters necessary to describe the precise nature and configuration of the seabed, its geographical relationship to the landmass, and the characteristics and dynamics of the sea. The parameters encompass bathymetry, geology, geophysics, tides, currents, waves and certain other physical properties of seawater" (UN 1978, p. 67).</p> <p>Hydrography is the interpretation of seafloor data that can't actually be seen, which is obtained from a variety of measurement and classification sensors.</p> <p>Hydrography also involves the analysis of bodies of water to forecast changes within the maritime environment for the mariner. One significant hydrographic surveying output in this regard is the production of nautical charts which enable the safe navigation of waterways.</p> <p>Depth measurement is undertaken utilising a combination of physics and mathematical formulas, advanced data logging and processing computer systems that process the raw data to produce a reading of water depth as well as an accurate representation of the seabed, lakebed, or riverbed. Repeated across wide areas of the sea or ocean, this process of 'saturating the seabed with sound' or 'sweeping the ocean floor to collect soundings' results in the compilation of detailed paper/electronic charts showing the depth of the seabed relative to a particular height datum and the production of three-dimensional models of any given maritime environment.</p>

							Hydrographic surveying is undertaken from a variety of platforms including ships, crafts of opportunity, and Remotely Operated Vehicles (ROV). Hydrography is also often at the forefront of new and developing mapping and charting technologies. Airborne Laser Bathymetry (ALB) or lidar bathymetry is an alternative hydrographic surveying technique for measuring the depths of relatively shallow, coastal waters from the air using fixed wing or rotary-wing aircraft. ALB employs fixed and scanning, pulsed laser beams that reflect off the sea surface and the seabed to determine water depth as well as an accurate representation of the seabed and is now internationally recognised as being among the fastest, most cost-efficient solutions for safe and accurate bathymetric surveys in shallow water, complex coastal zones and estuarine environments.
26		Change: Add new 2-digit Sub-Major Group	Change: Add new 3-digit Minor Group:	Change: Add new 4-digit Unit Group:	Change: Add new 6-digit occupations:		
27	3 – Technicians and Trade Workers	37 – Geospatial Technicians	371 – Geospatial and Surveying Technicians	3711 – Geospatial Draftsperson and Technicians	See below – new occupations:		
28					3711XX – Geospatial Technician	Skill Level 2 or 3  Assists with the development and maintenance of GIS data resources to be utilised for public access to geographic data. Gather, create, maintain, display, and update GIS databases. Working with geospatial technology such as GNSS to assist with the data gathering, compilation, mapping, and data analysis and engineering plans. Produce accurate maps and other representations of data for public use and fieldwork activity. Go out in the field to visually locate items to resolve conflicting information and ensure the accuracy of data. Record and document details of map updates, additions, and/or deletions.	
29					3711XX – Geospatial Draftsperson  Alternative Title: BIM Draftsperson	Skill Level 2  Works with geospatial data to create maps, plans and other interpretive diagrams.	
30					3711XX – GIS Administrator	Skill Level 2 & 3	

						Tasks include performing data capture, maintenance, analysis, extraction, and compilation to ensure the timely delivery of a range of geospatial data and mapping products and services. Responsible for the maintenance and acquisition of data sets used by an organisation.	
31					<b>3711XX – Surveyor’s Assistant</b>  <b>Alternative Title:</b>  <b>Remote Sensing Field Assistant</b>	Skill Level 3  Provide support to Surveyors to undertake surveying projects.  Tasks include: Maintain and use surveying equipment. Assist surveyors in taking measurements. Record measurements manually or electronically, peg out boundaries.	
32					<b>3711XX – Surveying Technician</b>	Skill Level 2 & 3  Surveying Technicians collect, analyse data and develop plans for Surveyors to provide basic information.	
33	8 - Labourers	82 – Construction and Mining Labourers	821 – Construction and Mining Labourers	8219 – Other Construction and Mining Labourers	<b>821915 – Surveyor’s Assistant (Skill Level 5)</b>  <b>Change to:</b>		
34					<b>Move Surveyor’s Assistant to new category (see Row 32)</b>  <b>3711XX – Surveyor’s Assistant (see Row 31)</b>		
35							