Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

Geoscience Data Transformation Strategy

2021–2025

12 January 2021

Contents

Executive Summary

The Geological Survey of Western Australia's (GSWA) core business function is to provide free pre-competitive geoscience data to reduce the financial risk to explorers, attract new investment into the State, and to provide guidance to government in policy and land use decisions. The division holds a wealth of high-quality, state-of-the-art geoscience data, including both legacy and current data that have been generated in-house and externally. In a world where machine learning and data analytics are advancing at an exponential pace, it is critical for GSWA to keep pace and embrace the modern and digitally enabled exploration demands. To do so, GSWA has developed a five-year data strategy which aims to transform, modernise and rationalise the division's data storage, management and delivery. The transformation will also place the department at the forefront of pre-competitive geoscience data delivery, greatly increasing the attractiveness of the State for exploration of its vast untapped mineral and petroleum resources.

The plan identifies 13 direct actions, which also address resourcing, priorities and timelines for completion. The biggest achievements are expected to occur within the first three years of the plan's implementation.

Direct actions

1. Data will be spatially intelligent and machine-readable at the point of generation or collection.
2. All GSWA data will be hosted in a cloud-based, data-lake storage system.
3. Review current database functionality and modify with common keys to allow data interoperability and assignment of appropriate metadata before upload to the cloud.
4. Access will be provided to raw and reduced datasets to build accountability and transparency of workflows.
5. A single platform will be identified and deployed for the visualisation, interrogation and delivery of all 3D and spatial data products.
6. Quality-assured and approved data will be released in a near-to-real timeframe.
7. All hard products will be phased out and replaced by new quality-assured data releases.
8. Text and image-based data products must be spatially attributed and released in a multimedia-enabled and machine-readable format.
9. All physical assets must be catalogued, scanned and made publicly available.
10. Release the mineral drillhole and surface geochemistry database to the cloud as soon as possible in its current 'uncleaned' state.
11. In a second phase, data within the mineral drillhole and surface geochemistry database should be cleaned and quality assured for delivery as a new GSWA dataset and should be in a human and machine-readable format.
12. A commitment to ensure that GSWA data are available for viewing and interrogation in national geoscience databases.
13. The post of Chief Geoscience Information Officer and Geoscience Data Management Branch has been created to ensure accountability for data action.

Geoscience Data Transformation Strategy 2021–2025

1. Rationale

The core business function of GSWA is to provide pre-competitive geoscience data to the exploration community to reduce the financial risk to explorers and attract new investment into the State. GSWA data are also used to guide the State Government in policy and land-use decisions. These data should be easily Findable, Accessible, Interoperable and Reusable (FAIR).

GSWA's Geoscience Data Transformation Strategy addresses these core functions and will transform, rationalise and modernise its data platform. With investment in the right areas, these changes will benefit all GSWA staff, their working environment and external customers' needs, while greatly increasing the attractiveness of the State for exploration of its vast untapped mineral and petroleum resources.

The Geoscience Data Transformation Strategy complements and aligns with the department's ICT strategic framework. In particular, commonality surrounds 'reducing the complexity of the customer journey through Government' with 'use [of] digital technologies to improve the customer and staff experience'.

1.1 Drivers for change

There have been many advances in the automation of mining and mine management. Large and medium-tier exploration companies are gearing up to use 'big data' and data analytics involving machine learning (ML) or artificial intelligence (AI). These types of advanced technology require suitable data and the demand for data will grow exponentially as AI codes become increasingly more sophisticated. GSWA is aiming to be at the forefront of new technology to provide the data required by the industry. Correspondingly there is an immediate need to address both State and Australian government data strategies, as at present the data offered is not easily amenable to be 'mined' or 'learned'.

Trends for data in the coming decade:

- Increasing demand for raw and value-added products
- Non-human data users
- Expectations of connectedness of data
- Real-time or near to real-time delivery
- Self-service access
- Access to modernised and harmonised historical data
- Agnostic data for delivery platforms, software and processing.

1.2 Critical need for a data strategy

GSWA holds a wealth of high-quality, state-of-the-art geoscience data, which include both legacy and current data in a variety of formats including raw, reduced and interpreted datasets. These data are sourced directly from the division's activities, companies' annual exploration reporting, and academia data assimilated from external publications or collaborative projects. These data are currently stored in a variety of departmental, publicly-accessible databases, but are currently not amenable to ML or AI techniques. Additionally, a large proportion of data are stored on internal, private departmental network drives that are currently inaccessible to external stakeholders. Despite this, all GSWA-sourced data is high quality and has passed through rigorous quality assurance (QA) procedures and, as such, is interoperable and reusable.

The GSWA has developed a five-year data strategy to deliver a modern, streamlined and FAIR data. The strategy addresses three main issues:

- What are we doing now? This covers the types of data that GSWA currently collects, current data storage and delivery platforms, and current and near future data trends.
- What should we do in the future? This covers what types of data GSWA will collect, how the data should be stored, and how the data should be delivered.
- How do we get there? This includes data interoperability with departmental and national geoscience databases and delivery systems, the resourcing, upskilling, or recruitment of staff to manage data delivery, and key milestones and priorities for data transformation.

2. Current GSWA data collections and databases

2.1 Digital data assets

GSWA's data and knowledge holdings are managed using a number of separate databases. This material is well catalogued and curated – we know what we have and where it is stored. Each database holds information about a specific, logically self-contained GSWA dataset or collection (e.g. field observations, sample geochemistry). Some are relational databases, complete with digital, interrogable geoscience data, but many simply index and describe the contents of GSWA holdings and, though searchable, contain no intrinsic geoscience data. In many instances, however, no modern, Structured Query Language (SQL) server-based databases are available to store and effectively deliver the divisions data. There are also a variety of orphaned datasets, that reside on publicly inaccessible, internal network drives as collections of Excel spreadsheets, PDFs, JPEGs, or stored in redundant Access databases. Where these data have been published they have either been in spatially constrained digital datasets or in printed reports, and not in a machine-readable format.

2.2 Physical data assets

The Geological Survey also stores a variety of physical samples, including but not limited to drill core, cuttings, rocks, and petrographic sections. Samples from collaborative research projects and materials from third parties who have sampled the survey's collections are also stored. These collections are significant, in terms of the scientific, monetary and strategic value to the State, and their contents are currently not accessible to external stakeholders.

2.3 Interpreted data products

GSWA's interpreted or derived data products, which include but not limited to Records and Reports, virtual tours, Palaeontology Reports, for example, are available in a variety of formats including JPEGs, PDFs and KMZ files and can be accessed through the eBookshop or, in some instances, directly through a department web page. Although the products themselves may be discoverable through metadata tags such as keywords, assigned tectonic units and broad spatial attributes, much of the information contained within them is not, and cannot be readily mined or integrated with other datasets.

2.4 Database functionality and design

With respect to entering information, individual GSWA databases and systems are generally considered to be good; data is easy to enter in formats that are logical and usable. The majority of existing data are held in modern database management systems that are sophisticated enough to include automatic checks and measures to ensure the integrity of the data being entered. However, with respect to retrieving information, currently there is no way to readily query across different databases or systems and so data have to be extracted individually and reconstructed outside of these systems. Despite this, much of the stored data share common keys (e.g. location, sample IDs) that could act as a link between databases or to perform spatial intersects with other datasets.

2.5 Data collection

GSWA generates and collates data in a variety of file formats, from a number of different internal and external sources. Most data are entered directly into interoperable, spatially intelligent databases at, or close to, source, however, some datasets are generated in static format that may or may not be spatially intelligent, i.e., text and images in PDF, JPEG, or other such non-learnable formats.

2.6 Data delivery

Currently, there is no single one-stop-shop for data viewing and delivery. A large proportion of data can be viewed and queried in the online spatial platforms GeoVIEW.WA or WAPIMS, or offline through region or subject specific USB products. Much of GSWA's spatial data can also be downloaded through the Data and Software Centre, whereas interpreted and derived data products, such as maps, records and reports, can be accessed through the eBookshop. The spatial data platforms allow 2D spatial visualisation, and simple/advanced keyword/attribute searching of their component datasets. Returned searches provide basic metadata and links to individual database records that can be downloaded individually. There is currently no provision for the online visualization of 3D products or the ability to artificially 'mine' the data.

2.7 Summary

GSWA holds a wealth of high-quality geoscience and spatial information, much of which can be considered strategic to exploration and investment in the State. Although some of these datasets are compliant with the FAIR principle, there are a substantive number of improvements required to keep pace with modern, digitally-enabled exploration demands.

3. Future data collection, storage and delivery goals

GSWA's data holdings define all aspects of the State's known resources and, more importantly, contain pathfinders to undiscovered resources. They are the survey's most valuable asset and the quality and variety of the datasets are highly regarded by national and international exploration companies, as well as academic and government institutions.

The generation of in-house and externally-derived datasets is increasing every year, making it vitally important to develop and implement a new strategic vision to transform, modernise and rationalise our data storage and delivery systems.

By doing so, we will not only provide maximum value and impact of our extant data, but we will also provide a platform for the collection and seamless delivery our datasets, which, in the future, will need to be human and machine-readable and provided in a platform-independent, system-agnostic format.

Policy statements
GSWA's data holdings define all aspects of the State's known resources and, more importantly, contain pathfinders to undiscovered resources; as such they are the survey's most valuable asset.
Transforming, modernising and rationalising the survey's data storage and delivery systems will ensure GSWA's data holdings are state-of-the-art and future proof.
There are opportunities to leverage extant data for maximum value and impact in the short term.
All GSWA data should be available online to human and machine interrogation, in a format that is platform independent.

3.1 Data collection

GSWA generate and collect a variety of data types, all of which have value in defining the natural world, and as such are unlikely to change drastically in the near future. However, significant improvement to data FAIRness could be realised by ensuring that all data is spatially attributed, and in a format that is machine-readable at the point of generation or collection. Combined with a streamlined QA (quality assurance) process, this would ensure near-to-real time delivery.

ID	Key actions	Priority
1:	**All data to be spatially attributed and in a machine-readable format at the point of generation or collection**	1

Equally, different levels of reduced or interpreted data could be made available to expedite the time of data delivery, and includes 'preliminary data' or derived datasets that have not been rigorously quality assured.

3.2 Data storage

There is worldwide shift towards cloud data storage, as this presents numerous financial, practical and data safety advantages, as well as making the data available and accessible anywhere in the world at any time. Data lakes are a particular form of cloud repository which allows the storage of most data types including relational databases, semi-structured data (e.g. CSV files), unstructured data (e.g. PDFs), and binary data (e.g. images, audio and video).

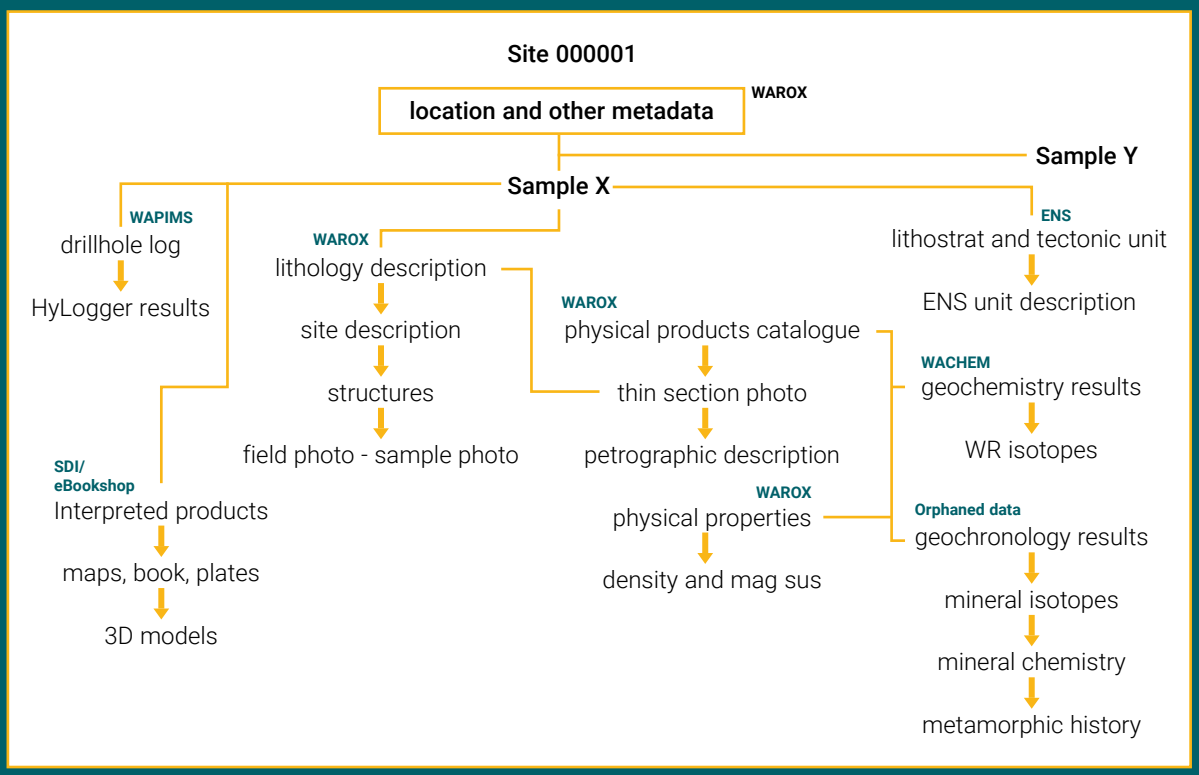
This format is particularly amenable for reporting, visualisation, data analytics and ML, and the move toward cloud storage is also a key outcome of the department generally. Data lake storage provides all the key elements required to modernise and transform GSWA data delivery and accessibility. It is proposed that all data be transferred across to publicly accessible, cloud-based, data lake storage. Apart from confidential data, all data in cloud storage should be publicly accessible.

2:	**All GSWA data to be hosted in a cloud-based, data lake storage system**	1

3.2.1 Existing databases

To transition into a data lake cloud-based system, it is imperative to identify key metadata that allow the interoperability and findability of the data. This can be managed successfully by ensuring that all data have common keys, adhere to a strict geoscience data vocabulary, include spatial attributes, and that the data are moved gradually into the lake storage. Existing databases would remain the primary interfaces for uploading data to the cloud.

3:	**Review current database functionality and modify with common keys to allow data interoperability and assignment of appropriate metadata before upload to the cloud**	1



Example of a data tree showing all the possible data associated with a single geological sample, and the various current storage locations of those data. In a data lake system, all data would be stored in a single repository, but with a common key that links all data in the tree. By searching on a particular sample (spatially or textually), through the application of a common key, all the listed data (raw, reduced and interpreted) can, and should, be retrieved for that sample. Equally, a search on a parameter(s) in any of the associated data layers (e.g. 'all samples with isotope compositions between X and X') should not only retrieve the individual sample IDs but all the associated data in the tree – for every sample with those characteristics. Currently a search on a sample ID can only be performed in WAROX, and so only the data stored within WAROX would be returned, in separate, static data tables.

3.2.2 Orphaned data

All orphaned data need to be adequately catalogued and tagged with appropriate metadata. This can be achieved by the development of a simple upload interface(s) that allows the assignment of key metadata and common keys to individual data records under a strict geoscience data vocabulary. These will upload and update the data records into simple, inter-relational data tables, or data blobs in the cloud.

3.3 Data delivery

The division provides a vast array of datasets. Currently most are released to the public in a fully interpreted format, however raw data are usually not made available for public consumption. It is proposed for all data (raw, reduced and interpreted) to be fully available to build accountability and enable the transparency of workflows, while at the same time expanding the opportunity for others to produce their own derived data products.

4:	**Provide access to raw and reduced datasets, this will build accountability by enabling transparency of workflows**	**2**

GSWA currently provides data across a number of delivery platforms, some with spatial interfaces and some as download portals. None of these platforms provide access to all available datasets, and some only provide limited download options. It is envisioned that the new data platform is capable to deliver all forms of data (point, line, polygon, 3D volume, text etc.). The platform must also allow intelligent interrogation and download delivery options, and should be the same viewing, querying and delivery system for internal and external stakeholders. Internal data upload will be managed by existing databases and newly created data upload interfaces.

5:	**Identify and deploy a single platform for the visualisation, interrogation and delivery of all 3D and spatial data products**	**2**

With a streamlined data delivery system, quality assured and approved data can be delivered to the cloud storage system in a near-to real timeframe. The rapid data delivery will negate the need for physical, static, stand-alone 'hard products' like paper maps, USBs, printed records and reports that are produced annually or biennially. This will free-up authors to produce spatially located, state-of-the-art derived data products. For example, all text-based products should have an equivalent set of metadata and common keys to all other datasets to allow data interoperability and spatially intelligent interrogation. They should be in a form so that they can contain embedded videos, animations, 3D reconstructions, interactive drone images and live data. This will push GSWA to the forefront of digital geoscience data delivery.

6:	**Release quality assured and approved data in a near-to-real timeframe**	**2**
7:	**Phase out all hard products, with new, fully quality assured data releases direct to the cloud**	**2**
8:	**Text and image-based data products must be spatially attributed, be released in a multimedia-enabled format and be machine-readable**	**2**

3.3.1 Physical assets

GSWA's physical datasets, valued in the hundreds of millions of dollars, represent a substantial public asset, but they are currently not easily findable or accessible. These assets are a significant resource that can be leveraged for a fraction of their total cost. It is proposed that:

- all physical assets are to be fully catalogued, and those lists are to be made available through the data portal;
- all petrographic, palaeontology, palynology and petroleum thin sections are to be scanned with a state-of-the-art slide scanner and the resulting images made available through the cloud and spatial systems; and
- all type macrofossils are to be 3D scanned using a state-of-the-art laser scanner and resulting images and 3D print files made spatially available.

9:	**All physical assets must be catalogued, scanned and made publicly available**	**2**

3.4 Legacy data

GSWA already provides a large amount of publicly available legacy datasets, including those submitted by companies and those generated in-house. Legacy data capture is time consuming and expensive and, for older, poorer quality data, there is a question of cost versus gain. Therefore, further investigation is required to determine whether GSWA should embark on a new period of legacy data capture. Significant, easy gains can be made, however, by leveraging pre-existing legacy data by making it spatially attributed and accessible for data analytics and machine learning.

One of GSWA's key and strategic legacy datasets is the downhole and surface geochemistry database. Cleaning the database is not a trivial or uncostly task, however the benefits to junior and mid-tier exploration companies, and to exploration and investment in the State itself, would be significant. The priority would be to release this database as soon as possible to the cloud, prior to cleansing, in a human- and machine-readable format

In a second phase, the data should be cleaned and quality assured. Appropriate methods of funding and cleaning, as well as timing and duration of these tasks should be investigated with industry, academic and data experts. Additionally, several working groups, including industry and academic experts, could be convened to audit how other datasets may be improved, or what other legacy data might be captured if considered value for money.

10:	**Release the mineral drillhole and surface geochemistry database to the cloud as soon as possible in its current 'uncleaned' state**	**1**
11:	**In a second phase, data within the mineral drillhole and surface geochemistry database should be cleaned and quality assured for delivery as a new GSWA dataset and should be in a human- and machine-readable format**	**2**

4. Five-year data transformation plan

Key to implementing the data strategy is the long-term management of data transformation, collection, management and delivery, and this is dependent entirely on adequate resourcing over a five-year period, and on an ongoing basis. Equally, the strategy is only viable if the strategic framework is aligned to, and works within, broader national, state and departmental data strategies.

Policy statements
Key to implementing the Geoscience Data Transformation Strategy is the long-term and ongoing management of data transformation, collection, management and delivery
The strategic framework must be aligned to broader national, State and departmental data strategies

4.1 Alignment with department, State, national and international data strategies

Within the past few years, the Australian and State Governments have developed long-term data strategies aimed at modernising and consolidating the way government collects, stores and delivers data, in order to reduce costs and improve customer experience. These broad goals are reflected in most government departments' strategic policies and also form the basis of the Geoscience Data Transformation Strategy, in that it aims to maximise the value and impact of the division's data while increasing ease of access and streamlining the customer experience. In detail, it speaks directly to the DMIRS vision of 'reducing the complexity of the customer journey through Government' by the 'use [of] digital technologies to improve the customer and staff experience'. The department aims to achieve this by highlighting 'location intelligence and location technology' for the purposes of 'data visualisation, data management, field mobility, monitoring real time feeds, analytics, design and planning, decision support, public engagement, and collaboration with the public and industry', all major goals of this data strategy.

On a state level, the State Government's whole-of-government approach to ICT infrastructure aims to simplify and consolidate and connect Western Australian government computer and data storage centres by utilising secure cloud services, creating a single, unified network, and modernising telecommunications. The cloud-hosted infrastructure will reduce the capital expenditure and hardware maintenance required by government agencies.

With respect to international research in the Earth Sciences, a recent statement from COPDESS (the Coalition for Publishing Data in the Earth and Space Sciences) recognises the importance of enabling FAIR geoscience data and has already gathered signatories from over 150 international organisations, individuals, communities, repositories and publishing houses. The aim is to provide easily discoverable, machine- and human-readable datasets that allow their recombination and reuse in order to test and validate data reliability.

4.2 National geoscience databases

Federal and national geoscience organisations like Geoscience Australia and AuScope provide web-based data portals like the EFTF and the AuScope portals, respectively, which provide free access to national-scale, spatial geoscience and environment datasets, including some 3D data layers and some value-added interpreted data layers. Although some of these datasets are generated in-house, most of the basic datasets are delivered via web services from other State and national organisations. Currently very few GSWA datasets are available through these systems, but it is critical from both a national and State perspective that such data is shared and available for discovery, since geology and resource wealth does not stop at borders. Therefore, provided that GSWA data are stored in a human- and machine-readable format in the cloud, these datasets should be accessible irrespective of delivery platform, and should be available for viewing and interrogation in these national geoscience databases into the distant future.

12:	**A commitment to ensure that GSWA data are available for viewing and interrogation in national geoscience databases**	**1**

4.3 Resourcing

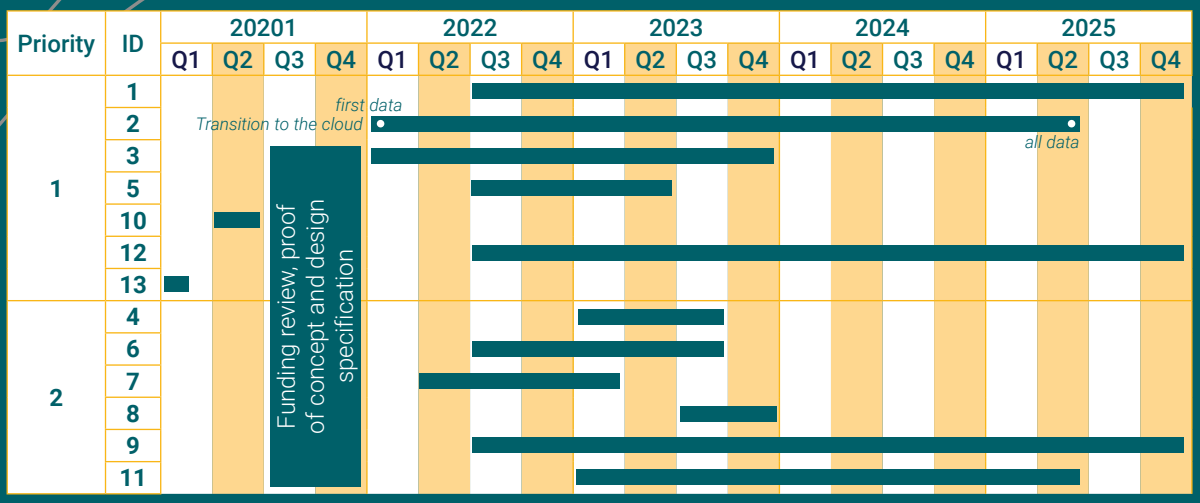
To manage and deliver the data strategy in the near future and on an ongoing basis, a new role of Chief Geoscience Information Officer (CGIO) and a Geoscience Data Management Branch have been created to be accountable for developing, implementing, and steering the five-year vision, as well as maintaining and developing the survey's data strategy beyond that term. The CGIO's team will bridge data generators with data managers, as well as liaise with dedicated officers or personnel within the department's ICT teams. It will coordinate all aspects of data storage and delivery for the survey, ensuring the compliance and integrity of the data to, and within, the cloud, as well as the efficient management of data from source through to the online spatial delivery system. The team would also work with business units to ensure training programs are developed keeping staff up-to-date with the new technologies.

13:	**The post of Chief Geoscience Information Officer and the Geoscience Data Management Branch has been created to ensure accountability for data action**	**1**

4.4 Milestones and key priorities

The key to developing and delivering any proposed strategy is a detailed framework of milestones and priorities, many of which need to be completed before others can commence. Within the 13 direct actions outlined in the document above, each have been assigned a particular priority based on the importance of the task to the completion of the data strategy, and assigned rough timelines for their completion, as shown in the Gantt chart below.

The majority of the more important structural tasks like data architecture, vocabulary, storage and delivery systems are expected to be completed within the first two years, as without these in place, the migration of data cannot be achieved. The completion of these highest priority tasks will result in the greatest impact of the strategy. The remaining, more routine tasks, most of which deal with gradual roll-out and migration of data, will run through the greater period of the five-year plan.



4.5 Readily achievable actions

The proposed five-year Geoscience Data Transformation Strategy is ambitious, but it is recognised that it is dependent on a number of factors, such as resourcing and infrastructure. Therefore, a second part of this strategy is to identify from the proposed direct actions, high-impact, low-cost tasks that could be achieved relatively easily within a short time period for maximum strategic gain.

ID	Key actions
6:	**Release quality assured and approved data in a near-to-real timeframe**
7:	**Phase out all hard products, with new, fully quality assured data releases direct to the cloud**
8:	**Text and image-based data products must be spatially attributed, released in a multimedia-enabled format and machine-readable**
10:	**Release the mineral drillhole and surface geochemistry database to the cloud as soon as possible in its current 'uncleaned' state**

Appendix 1 - Summary of recommendations

Policy statements
GSWA's data holdings define all aspects of the State's known resources and, more importantly, contain pathfinders to undiscovered resources; as such they are the division's most valuable asset.
Transforming, modernising and rationalising the division's data storage and delivery systems will ensure GSWA's data holdings are state-of-the-art and future proof.
There are opportunities to leverage extant data for maximum value and impact in the short-term.
All GSWA data should be available online to human and machine interrogation, in a format that is platform independent.
Key to implementing the Geoscience Data Transformation Strategy, is the long-term and ongoing management of data transformation, collection, management and delivery.
The strategic framework must be aligned to broader national, State and departmental data strategies.

ID	Key actions	Priority
1:	**All data to be spatially intelligent and in a machine-readable format at the point of generation or collection.**	1
2:	**All GSWA data to be hosted in a cloud-based, data lake storage system.**	1
3:	**Review current database functionality and modify with common keys to allow data interoperability and assignment of appropriate metadata before upload to the cloud.**	1
4:	**Provide access to raw and reduced datasets, this will build accountability by enabling transparency of workflows.**	2
5:	**Identify and deploy a single platform for the visualisation, interrogation and delivery of all 3D and spatial data products.**	1
6:	**Release quality assured and approved data in a near-to-real timeframe.**	2
7:	**Phase out all hard products, with new, fully quality assured data releases direct to the cloud.**	2
8:	**Text and image-based data products must be spatially attributed, be released in a multimedia-enabled format and be machine-readable.**	2
9:	**All physical assets must be catalogued, scanned and made publicly available.**	2
10:	**Release the mineral drillhole and surface geochemistry database to the cloud as soon as possible in its current 'uncleaned' state.**	1

ID	Key actions	Priority
11:	In a second phase, data within the mineral drillhole and surface geochemistry database should be cleaned and quality assured for delivery as a new GSWA dataset and should be in a human- and machine-readable format.	2
12:	A commitment to ensure that GSWA data are available for viewing and interrogation in national geoscience databases.	1
13:	The post of Chief Geoscience Information Officer and the Geoscience Data Management Branch has been created to ensure accountability for data action.	1

Glossary

AI	Artificial intelligence
AMIRA	Australian Mineral Industry Research Association
AusGIN	Australian Geoscience Information Network
CME	Chamber of Minerals and Energy of Western Australia
DMIRS	Department of Mines, Industry Regulation and Safety
eBookshop	The eBookshop is a web-based textual search engine that provides access to interpreted or derived data products, such as records and reports.
ENS	Explanatory Notes System. A digital repository that integrates stratigraphic relationships with links to all tectonic units and events recognised in Western Australia.
FAIR	Findable, Accessible, Interoperable and Reusable data.
Geoview.WA	GeoVIEW.WA is an online GIS-based mapping tool that allows users to view, query, and map various geology, resources and related datasets. These integrated Statewide data are regularly updated. Users can construct and print a customised geological map (by chosen area and scale) and incorporate other mineral and petroleum exploration datasets including mines and mineral deposits, petroleum wells, and active leases.
GeMPeT	Geoscience Thesaurus (GeMPeT) provides geoscience professionals with a standardised terminology with which to index information assets such as reports, maps and digital datasets.
GIS	Geographic Information System
GSLC	Geological Survey Liaison Committee
GSWA	Geological Survey of Western Australia
HyLogger	Hyperspectral Infrared reflectance spectrometer
ICT	Information and communications technology
MAGIX	Airborne Geophysical Index. MAGIX is a register of datasets from privately commissioned airborne geophysical surveys and government-commissioned airborne and ground regional geophysical surveys.
MINEDEX	Mines and Mineral Deposits database. MINEDEX is a spatial and textual database providing comprehensive data on mining and exploration sites and projects in WA.
ML	Machine learning
NVCL	National Virtual Core Library
QA	Quality assurance
SHRIMP	Sensitive high-resolution ion microprobe

TENGRAPH	TENGRAPH Web is a spatial enquiry and mapping system displaying the position of Western Australian mining tenements and petroleum titles in relation to other land information. It provides a current and accurate picture of land under mining activity and is used to determine ground that is available for mineral exploration.
WACHEM (GeoChemExtract)	Western Australian Geochemistry database. The GeoChem Extract application provides access to geochemical data generated from samples collected as part of the Geological Survey of Western Australia (GSWA) mapping and mineralisation programs. The data accessed by this application, which are stored in the Western Australian Geochemistry or WACHEM database, are automatically updated every weekday, and made available as comma-separated files.
WAGIM	Western Australian Geochronology, Isotope and Mineral chemistry database
WAROX	Western Australian Rock Observation database
WAMEX	Western Australian Mineral Exploration Reports system. Mineral explorers are required to report annually on their exploration projects under Western Australian legislation. After a period of confidentiality, the exploration reports and data are made available to the public. These are referred to as open-file reports. Mineral exploration open-file (public) reports are stored in the Western Australian Mineral WAMEX database.
WAPIMS	Western Australian Petroleum and Geothermal Information System, WAPIMS is a petroleum and geothermal exploration database containing data on wells, geophysical surveys, titles, and other related exploration and production data submitted by exploration companies under the various petroleum acts as well as GSWA generated data. The system also contains the Core Library (Perth and Kalgoorlie) database for both mineral and petroleum samples.

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