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Executive Summary

Digital integration of real time information for Australian producers presents a massive value uplift for informed and timely decision making on a property. At a fundamental level, enabling digital information to be integrated for producers requires a consistent spatial property database containing accurate boundaries of Australian agriculture producing properties. Currently, no complete and maintained dataset exists in Australia. In addition, no unified definition of agricultural property exists which would act as bounds within which to create this dataset.

This Agricultural Property Definition report analyses the findings from stakeholder consultation in the form of workshops, phone interviews and an online survey. Insights from the analysis have enabled the proposal of a realistic definition of agriculture property for Australia. The proposed definition is supported by description of the terminology used within it (and closely associated with it) and statement of a clear purpose and value proposition for the definition and dataset.

Driver and Value Proposition

All methods of the stakeholder consultation conducted (workshops, phone interviews and online survey) highlighted biosecurity as the key use case for a national agricultural property definition, data model and dataset. These results have established biosecurity as the key driver for this project. It has the broadest set of requirements of any application hence necessitates a very broad, inclusive definition of agricultural property. For the purposes of biosecurity, the size and scale of a farming operation are not important, rather the locations of all crops and even single livestock are important for traceability and the management of pests and diseases. It should be noted however that biosecurity is a very significant issue that this definition and dataset alone will not solve. Such a broad driver introduces the risk that requirements become too broad and complex and inhibit the development of the dataset. Hence, sub-classes have been adopted for the definition which are associated with stages of development along with levels of completion and accuracy.

A nationally consistent definition of agricultural property and an associated data model will improve efficiency, minimise risk, and increase profitability for countless agricultural use cases by creating an accessible, authoritative source of current, consistent and complete agricultural property data. Agricultural property data is a foundation dataset enabling many applications. Ultimately, the industry benefits are economic, but this is comprised of process and system improvements.

KEY DRIVER

Biosecurity

VALUE PROPOSITION

A nationally consistent definition of agricultural property and an associated data model will improve efficiency, minimise risk, and increase profitability for countless agricultural use cases by creating an accessible, authoritative source of current, consistent and complete agricultural property data.

Proposed Definition of Agricultural Property

The overarching, broad definition proposed for agricultural property is:

An agricultural property is a land parcel, or a collection of land parcels, with common ownership and an agricultural usage.

As biosecurity is the key driver of the definition of agricultural property in this report, the term "agricultural usage" is adopted within the overarching definition instead of "primary production". For this purpose, agricultural usage is broader than primary production and encompasses all existing and emerging sectors of agriculture, businesses and hobbies, with no minimum property size or value output, including for example hobby farms, peri-urban and urban properties with single livestock, fruit trees and vegetable gardens, farmers markets and travelling stock routes etc. Common agricultural usage means operating as a single farm, although areas within a property may have varied uses such as grazing and crop rotation. The agricultural usage can also change over time.

With biosecurity as the key driver, the definition of agricultural usage must be inclusive of all sectors of agriculture as well as both agricultural businesses and hobbies. However, as capturing information on backyard vegetable patches and single livestock kept as pets will be extremely difficult (if not impossible) unless mandated (e.g. through regulation or legislation), limits will still be required for both livestock and crops. It is suggested the limits be achieved with the three sub-classes

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'Primary production', 'Moderate/Hobby Agricultural Usage' and 'Casual/Urban Agricultural Usage' highlighted below. These classes will have different levels of accuracy and completion for the initial minimum viable data product. However, without key regulation and legislation such as the PIC reform, the necessary inputs to enable this dataset won't be available. Hence the dataset would likely be incomplete, expensive to maintain and consequently unsuccessful over the longer term.

OVERARCHING DEFINITION

An agricultural property is a land parcel, or a collection of land parcels, with common ownership and an agricultural usage.

DEFINITION SUB-CLASSES

• Class 1 – Primary production

- Class 2 Moderate/Hobby Agricultural Usage
- Class 3 Casual/Urban Agricultural Usage

Stakeholder Consultation Insights

An initial expression of interest (EOI) stakeholder communication was sent out to a curated database of 657 contacts. 86 responses were received and subsequently, 23 phone interviews were conducted, three workshops were held with one each in Perth, Canberra and Brisbane, and the online use case survey was released. The interviews, workshops and use case survey responses provided insights into stakeholder's experiences with and use cases for agricultural property definitions and data, the potential benefits of a nationally consistent definition and dataset, and stakeholders' requirements for the new agricultural property definition and data model. These insights facilitated the development of the proposed definition of agriculture property along with the supporting terminology and driver. The key insights from interviews, workshops and survey responses are summarised below.

WORKSHOP KEY INSIGHTS

- Broad, inclusive definition that can be filtered down to the detail
- Clear descriptions of terminology, driver, value proposition and terms of use
- Build the dataset based on the benefit to those required to input data rather than to users of the data

USE CASE KEY INSIGHTS

- The principal use case is Biosecurity and Compliance
- Grazing, Cropping and Intensive Animal Production are the main agricultural activity types
 - The primary basis for current definitions and data are the Cadastre and PIC
- The main frustrations are the inefficiency of accessing, collating and using data from different sources,
 - especially if non-spatial and/or from different jurisdictions
 - The key benefits will be increased efficiency and enablement of many applications

DEFINITION KEY INSIGHTS

- Broad definition, inclusive of all agricultural activity types, kept as simple as possible
 - Keep it simple yet comprehensive; an overarching definition with sub-classes
 - Important complications to be aware of are privacy, uptake and maintenance

DATA MODEL KEY INSIGHTS

• Data model should align with the cadastre and the PIC reform

• Property boundaries are key, parcel and paddock boundaries would also be useful to a lot of stakeholders

- Key attributes should be part of the model, which should also consider compatibility with existing datasets
 - Data history is important but not critical to most applications, currency is more important
 - Data contributors should be minimised to reduce complexity in creation and maintenance
 - Access levels are essential, with a level of open data recommended
 - As much metadata as possible should be included, adopting an existing standard
 - MVP that can be accurately created and maintained, leverage existing data

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1. Introduction

Digital integration of real time information for Australian producers presents a massive value uplift for informed and timely decision making on a property. At a fundamental level, enabling digital information to be integrated for producers requires a consistent spatial property database containing accurate boundaries of Australian agriculture producing properties. Currently, no complete and maintained dataset exists in Australia. The land parcel component defining accurate boundaries of property is well defined and accessible (land cadastre), yet it is not optimised to provide a holistic linked view into all land parcels that constitute a producing property, nor tagged to allow filtering to agricultural properties. In fact, the definition of a 'producing property' (or agriculture property) for all types of agri-foods (i.e. grain, horticulture, livestock, hobby farms etc.) is not clear or consistent across organisations. For example, hobby farms may not be captured at all if they do not meet the considerations for a primary producing property, yet still produce agriculture outputs of noteworthy scale.

Having a single property database for producing properties seems like an obvious requirement, yet the challenge of having a clear definition of what is a producing property is still not clear. Simply put, a land-based definition is different to an operational based definition and once again different to a commercial definition of what may be classed as an agriculture property.

This project seeks to collaboratively source and propose a definition of agricultural property so that all agriculture properties across Australia can be identified and linked to their fundamental information, such as property ownership or business classification. Only by having a consistent definition could a future authoritative agriculture property dataset be generated and used across all stakeholders who are required to report on agriculture land use in Australia.

This Agricultural Property Definition report analyses the findings from stakeholder consultation in the form of workshops, phone interviews and an online survey. Insights from the analysis of consultation results have enabled the proposal of a realistic definition of agriculture property for Australia. The proposed definition is supported by description of the terminology used within it (and closely associated with it) and statement of a clear purpose and value proposition for the definition and dataset.

Acknowledgements

This research project would now have been possible without the generous support and contributions from many organisations and individuals. Most notably, the project was sponsored by Meat and Livestock Australia in partnership with Geoscape Australia, with these organisations also supporting the Project Review Group. We would also like to acknowledge the contributions of the many people who were interviewed, attended workshops, or provided survey contributions to this process.

2. Terminology

To propose a definition of agricultural property that is clear, nationally consistent and useable, the terminology supporting the definition must be explained. Hence, Table 1 provides description of the terminology supporting the proposed definition of agricultural property and Table 2 describes the relationships between various terms in Table 1.

Table 1 Terminology descriptions

Term	Description/Definition
Address	An address is a structured label - usually containing a property number, a road name and a locality name - used to identify a plot of land, a building or part of a building, or some other construction (Hirst et al., 2018). Geocoded addressing is the process of associating an address with coordinates such as a latitude and longitude to enable it to be readily mapped and related to other spatial data. Geoscape Australia's G-NAF geocoded address dataset contains all physical addresses in Australia.
Agricultural activity type (Land use)	The type of agricultural activity or land use conducted on land, for example the Australian Land Use and Management (ALUM) Classification system includes the classes: Grazing natural vegetation, Production forestry, Dryland cropping, Irrigated horticulture, Intensive animal and plant production etc. See also "Land use".

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Agricultural usage	As biosecurity is the key driver of the definition of agricultural property in this report (see section 3), the term "agricultural usage" is adopted within the definition instead of "primary production". For this purpose, agricultural usage is broader than primary production and encompasses all existing and emerging sectors of agriculture, businesses and hobbies, with no minimum property size or value output, including for example hobby farms, peri-urban and urban properties with single livestock, fruit trees and vegetable gardens, farmers markets and travelling stock routes etc. Emerging sectors include native plants such as kakadu plum, seaweeds and native pepper, as well as newer additions to Australian agricultural flora such as quinoa, hazelnuts and coffee. Emerging animal industries including sea urchin, camel milk, game birds, working dogs, alpaca and crocodile (AgriFutures Australia, n.d.).
Biosecurity	Biosecurity involves science-based quarantine assessments and policy advice designed to prevent, respond to and recover from pests and diseases that threaten the economy and environment, as well as protect animal, plant and human populations against harmful biological or biochemical substances. (Department of Agriculture, Water and the Environment, 2020)
Business	 The ATO describes factors that indicate a business as including (Australian Taxation Office, 2019): Registration of a business name or obtaining an ABN Intention to (eventually) make a profit Repetition of similar types of activities Size or scale of the activity is consistent with other businesses in the industry The activity is planned, organised and carried out in a businesslike manner. This may include keeping business records and account books, having a separate business bank account, operating from business premises, having licenses or qualifications, having a registered business name.
Cadastre (Parcel)	A cadastre is an official register showing details of ownership, boundaries and the value of real property in a district, made for taxation purposes. A cadastral map displays how boundaries subdivide land into units of ownership. Digital Cadastral DataBases (DCDBs) are modern versions of 'the cadastre' and provide spatial views of land parcels. (ICSM, 2019b)
Hobby farm	A hobby farm is generally considered by banks to be a non-income-earning rural property usually between 10 to 100 hectares (Home Loan Experts, 2019). However, it is possible to earn a small amount of money selling things like eggs and vegetables at a market. The ATO describes a hobby as having no intent, plan or system to make a profit; being motivated by personal pleasure; having no repetition or regularity of sales; not carried on in the same manner as a normal business activity; of small scale; and any produce is sold to friends and relatives and not to the public at large (Australian Taxation Office, 2011).
Holding	A land holding is a term used in NSW to refer to a collection of non-contiguous parcels that are under common ownership. (Hirst et al., 2018)
Land	Land is often referred to as 'real property', which, in very basic terms, means property that is fixed and immovable — as distinct from personal property which, again in basic terms, means property (as in goods and chattels) that is not fixed and can be moved. (ICSM, 2019b)
Land cover	Land cover refers to the physical surface of the earth, including various combinations of vegetation types, soils, exposed rocks and water bodies as well as anthropogenic elements, such as agriculture and built environments. Land cover classes can usually be discriminated by characteristic patterns using remote sensing. (ABARES, 2016)
Land status / tenure	Land status refers to the land tenure or legal regime under which land is owned. In Australia it includes freehold (including forms of freehold land tenure that are held by traditional owner groups including Aboriginal and Torres Strait Islander land) and non-freehold land or Crown land, which may either be leased or licensed. (Australian Trade and Investment Commission, 2019)

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Land use	Land use is the purpose to which the land cover is committed. Some land uses, such as agriculture, have a characteristic land cover pattern for many (but not all) agricultural uses. These usually appear in land cover classifications. Other land uses, such as nature conservation, are not readily discriminated by a characteristic land cover pattern. For example, where the land cover is woodland, land use may be timber production or nature conservation. National land use mapping in Australia is conducted broadly at two scales: national scale and catchment scale. Both land use mapping methods use the Australian Land Use and Management (ALUM) Classification system. (ABARES, 2016)						
Land value drivers	The drivers for land value include attributes such as whether the land is arable or non-arable, access to the property, water supply, water rights, pasture condition, vegetation types, soil type, license areas, zoning and overlay information and so on.						
Lease (agricultural)	An agricultural lease is any lease of land for the purpose of production, growing, harvesting and farming of produce. Tenancy Acts vary between states/territories.						
	Some of the most common types of lease are (The Farm Table, 2020):						
	 fixed cash: the tenant pays a fixed amount of rent/hectare on a monthly, bi-annually or yearly basis flexible cash lease: this is a variation to the above and involves the final rental payment 						
	 being tied to the actual yield and/or selling price of the commodity. This ties in the expense for the tenant to profitability and the landowner shares in the risk/return crop or livestock share lease: the landowner may supply some of the production inputs (e.g. Cropping: seed, labour, chemical, fertiliser or Livestock: equipment, feed costs) and then may receive a portion of the final crop or livestock income/weight gain 						
Lot or Lot on plan	Lot on plan is a legal parcel description or a parcel identifier. The codes used vary by						
(Parcel)	state/territory.						
Manager	In terms of agriculture, manager may refer to the property (land) manager i.e. the person responsible for the management of the property, or the farm manager i.e. the person responsible for the agricultural activity e.g. husbandry of the livestock or the management and biosecurity of the crops.						
Owner	In terms of agricultural property there are two types of owner: the property (land) owner, and the agricultural activity (crop or livestock) owner. These may or may not be the same.						
	Ownership is having the better rights to possession i.e. ownership means more than possession the example of a rented property where the tenant has rights to possession, but the owner carend the lease provided legal requirements have been adhered to (Craddock Murray Neumann Lawyers Pty Ltd, 2014).						
	Owner, of land, means the following (Hirst et al., 2018):						
	a. if the land is freehold land - the registered owner of the landb. if the land is the subject of a lease registered under the relevant land title Act - the lessee of the land						
	c. if the land is the subject of a registered lease of state-owned land (State Owned Land Leases) - the lessee of the land						
	 d. if the land is a reserve - the trustee of the reserve e. if a person has occupation rights in relation to the land under a licence or permit - the 						
	 f. If land is state-owned land administered by a state agency for a specific use (e.g. state forest, national park) – the state agency 						

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Paddock (field)	The smallest unit of production of a property being a field or plot of land enclosed by fencing or defined by natural boundaries. Paddock is used more frequently when referencing open areas th are fenced in, with livestock such as cows, sheep and horses in them. Field is used more frequer when referencing an area in which crops are grown.				
Parcel (also known as block)	A land parcel is an area of land with defined boundaries, under unique ownership for specific real property rights (ANZLIC, n.d.).				
	The Geoscape Australia CadLite cadastre theme contains parcels which are <i>essentially the smallest area of land capable of sale without further approval to subdivide</i> . It may consist of more than one piece (e.g. if split by an easement). A parcel defines the area of land that is owned, each parcel is referenced by a land title which defines who the owner is and the conditions of ownership. A CadLite Cadastral Parcel (CAD) will usually only have 1 polygon defining its boundary. However, in some cases it is necessary to have many polygons defining a CAD's boundary. These cases are usually when road/river easements run through the CAD (CadLite Product Description, 2017).				
PIC	A property identifier (or property identification code) is the basis of a traceability system. State or territory governments currently issue PICs to properties with livestock. Each state/territory currently has different rules relating to PICs but there is a national reform underway. (Department of Agriculture, Water and the Environment, 2019)				
Polygon	A polygon is any 2-dimensional shape formed with straight lines.				
Primary production (agricultural)	Primary production involves acquiring raw materials e.g. metals and coal, oil, rubber, foodstuffs, fish. Agricultural primary production is a subset of this for agricultural products. For tax purposes, a primary producer is an individual, partnership, trust or company operating a primary production business if they undertake: plant and/or animal cultivation, fishing and/or pearling, or tree farming and/or felling (Australian Taxation Office, 2018).				
Property (land)	The PIC reform and CRCSI report <i>Understanding and defining property spatial data</i> agree on the definition of 'property', however the CadLite Product Description differs in that parcels do not have to be contiguous (touching).				
	 PIC Reform: A property will consist of one or more parcel(s) of land that are contiguous or sufficiently proximate, operated as a single business under the same ownership or management arrangement (Australian Government Department of Agriculture, 2019). CRCSI Report: A property is a land parcel, or a collection of contiguous land parcels (parcels separated, or divided, by a road, watercourse or railway may be considered to be contiguous), with single ownership used for a common usage by a single entity (Hirst et al., 2018). CadLite: A property is an area of land recognised by Local Government (or equivalent agency in the ACT) as a singularly valued/rateable entity. It may comprise one or more cadastral parcels or part of a parcel with boundaries not needing to align between the two (although commonly this is the case). Where the property is comprised of multiple parcels, the parcels do not have to be contiguous. A CadLite Property may have many polygons defining its boundary (CadLite Product Description, 2017). 				
	Hence for the purposes of the definition of agricultural property, the definition of property used will be a land parcel, or a collection of contiguous or non-contiguous land parcels, with single ownership used for a common usage. As states and territories handle contiguousness differently, permitting both will allow jurisdictions to retain their current methods. This is in line with Principal 2 (especially 2.3 and 2.6) of the PIC reform draft principles ad business rules (Australian Government Department of Agriculture, 2019).				
Title	The foundation of property rights under Australian law (Craddock Murray Neumann Lawyers Pty Ltd, 2014). Property legislation in all states and territories is based on the Torrens principle of registration of title. Each state and territory has a central register of all land in the state which				

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	shows the owner of the land. The land title is the official record. It can also include information about mortgages, covenants, caveats and easements. (Australian Government, 2020)
Traceability	Traceability is the ability to follow the movement of a product through stages of production, processing and distribution. It is very important for biosecurity. (International Standards Organisation, 2007)

Table 2 Relationships between terms

Terms	Relationship					
Address - Property	A property can have zero or many addresses. An address must be unique and therefore can be assigned to only one property, however an address, of some form, should be assigned to each property.					
Agricultural activity type – Land use	Agricultural activity types can be categories of land use. Not all land uses are agricultural, and existing land use classification descriptions may not cover the detail of all agricultural activity types.					
Cadastre – Parcel	Parcels are the spatial boundaries of the cadastre. The cadastre contains additional information of ownership and value.					
Lot on plan – Parcel	Lot on plan is a legal parcel description or a parcel identifier.					
Paddock - Parcel	There are three relationships existing between a paddock and a parcel;					
	 where one paddock is equal to one parcel where many paddocks make up one parcel where one paddock contains many parcels 					
Property - Business	There can be zero, one or multiple businesses on a property. A business may also own one or more properties.					
Property - Parcel	 The Property theme of CadLite provides a national dataset that identifies the three relationships existing between a property and a cadastral parcel (CadLite Product Description, 2017). These are: 1. where one cadastral parcel is equal to one property 2. where many cadastral parcels make up one property 3. where one cadastral parcel contains many properties 					
Title – Parcel	Each parcel is referenced to a land title which defines the owner and conditions of ownership.					
Title - Lot on plan	Some properties may have one title but many lots-on-plan within that title.					
Title - Property	A property may have one title or multiple titles.					
PIC - Business	One or multiple PICs can be controlled by one business.					
PIC - Property	Each state/territory currently handles PICs differently (see below for examples). All state/territory governments currently require PICs for properties related to livestock. There is a national reform underway to extend PICs to plant production as well as create consistency between jurisdictions.					
	 In NSW a property usually has its own PIC, but on approval by Local Land Services (LLS) there can be multiple properties per PIC if the properties are used for a common purpose (e.g. grazing the same livestock) and are adjoining or nearby. In the NT, PICs are permanently attached to the parcel of land and stay with the property, not with the owner. 					
	• In SA, one PIC is required per property if the property has multiple parcels of land within 100km, however if parcels are more than 100km apart each must register a different PIC.					

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In VIC, a single PIC can be allocated to a property consisting of more than one parcel of land, provided the blocks are part of the one enterprise and are within the same or adjacent localities. Home gardeners are not required to apply for a PIC.
 Three relationships exist between PIC and property:

 one property can have one PIC
 one property can have multiple PICs
 multiple properties can have the one PIC

3. Driver and Value Proposition

The need for this project was discussed in the *Initial Assumptions Report* and is supported by the consultation results which revealed that 94% of online survey respondents and 61% of interviewees have frustrations with existing agricultural property definitions and data (see section 5.2). Currently, no complete and maintained agricultural property data model or authoritative dataset exists in Australia and there is no consistent definition of what an agricultural property is. A consistent national definition is required in order to accurately model and authoritatively spatially define agricultural properties. In order to develop a definition, the key driver behind it needs to be outlined.

All methods of the stakeholder consultation conducted (workshops, phone interviews and online survey) highlighted biosecurity as the key use case for a national agricultural property definition, data model and dataset. These results have established biosecurity as the key driver for this project. It has the broadest set of requirements of any application hence necessitates a very broad, inclusive definition of agricultural property. For the purposes of biosecurity, the size and scale of a farming operation are not important, rather the locations of all crops and even single livestock are important for traceability and the management of pests and diseases. It should be noted however that biosecurity is a very significant issue that this definition and dataset alone will not solve. Such a broad driver introduces the risk that requirements become too broad and complex and inhibit the development of the dataset. Hence, sub-classes have been adopted for the definition which are associated with stages of development along with levels of completion and accuracy.

A nationally consistent definition of agricultural property and an associated data model will improve efficiency, minimise risk, and increase profitability for countless agricultural use cases by creating an accessible, authoritative source of current, consistent and complete agricultural property data. Agricultural property data is a foundation dataset enabling many applications. Ultimately, the industry benefits are economic, but this is comprised of improvements to processes and systems including;

- Biosecurity
 - Tracking animal movement for biosecurity and compliance
 - o Compliance and risk management for crops
 - Automating biosecurity planning
 - Managing incidents across state boarders
- Emergency Response
 - o Enabling forward planning, prioritisation and incident response
 - Natural disaster support e.g. mapping where feed drops are required for stock and damage assessment for government funding support
 - Managing incidents across state boarders
- AgTech
 - Minimising effort in manual property delineation at the onboarding stage will increase the adoption of AgTech across the sector
 - Enabling start-ups and AgTech businesses that want to provide services anywhere in Australia
 - Focussed business intelligence information to help producers with productivity
 - Enabling smart tags and virtual fencing
 - o Understanding feed base availability and stocking rates
 - Providing boundaries for remote sensing analytics for land performance in terms of soil moisture and yield
 - Microclimate predictions using property boundaries to leverage local weather stations more accurately
- Markets

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- o Access to market information systems and planning
- Traceability and accountability for international product sales
- Statistics
 - Streamlining agricultural surveys and reporting
 - o Assisting the ABS agricultural census & ABARES statistics
- Mapping
 - National level mapping programs for land use mapping
 - Geoscape Australia reseller community and direct user products supporting insurance, real estate, finance and other types of service delivery
 - o Determining who and where compulsory government levies are coming from
- Farms
 - $\circ \quad \mbox{ Managing social license to operate }$
 - \circ $\,$ Managing farming operations that cross over state boarders

KEY DRIVER

Biosecurity

VALUE PROPOSITION

A nationally consistent definition of agricultural property and an associated data model will improve efficiency, minimise risk, and increase profitability for countless agricultural use cases by creating an accessible, authoritative source of current, consistent and complete agricultural property data.

4. Proposed Definition of Agricultural Property

The overarching, broad definition proposed for agricultural property is:

An agricultural property is a land parcel, or a collection of land parcels, with common ownership and an agricultural usage.

Property, parcel and ownership for the purpose of this definition are described in Table 1. As biosecurity is the key driver of the definition of agricultural property in this report (see section 3), the term "agricultural usage" is adopted within the overarching definition instead of "primary production". For this purpose, agricultural usage is broader than primary production and encompasses all existing and emerging sectors of agriculture, businesses and hobbies, with no minimum property size or value output, including for example hobby farms, peri-urban and urban properties with single livestock, fruit trees and vegetable gardens, farmers markets and travelling stock routes etc. Common agricultural usage means operating as a single farm, although areas within a property may have varied uses such as grazing and crop rotation. The agricultural usage can also change over time.

There is no established institutional framework for identifying collections of land parcels as properties. Instead, the concept of property recognises that owners may elect to take action to formalise the treatment of a collection of parcels as a property. This may relate to the provision of services (e.g. mail, electricity) or for rating or taxation. A property can expand or contract over time, as the owner acquires more land parcels for the same usage, or disposes of land parcels, respectively (Hirst et al., 2018). It should also be noted that the owner of the property may be the same or different to the manager of the property.

The overarching, broad definition of agricultural property proposed above provides flexibility to be subset for different applications or use cases of agricultural property. For example, agencies such as the ABS and ATO will be able to filter the resulting broad dataset based on class (see below) and attributes (e.g. Estimated Value of Agricultural Operations (EVAO) or Australian Business Number (ABN)) to suit their use case. If agricultural property were defined without reference to agricultural usage, this would produce a limited realisation of agricultural property data based purely on owner. Similarly, if

the meaning of owner within the definition included a business where the land parcel(s) have been assigned an ABN, this would produce a limited realisation of property with an emphasis on businesses.

With biosecurity as the key driver, the definition of agricultural usage must be inclusive of all sectors of agriculture as well as both agricultural businesses and hobbies (Table 1). However, as capturing information on backyard vegetable patches and single livestock kept as pets will be extremely difficult (if not impossible) unless mandated (e.g. through regulation or legislation), limits will still be required for both livestock and crops. However, without key regulation and legislation such as the PIC reform, the necessary inputs to enable this dataset won't be available. Hence the dataset would likely be incomplete, expensive to maintain and consequently unsuccessful over the longer term.

Animals considered as livestock can be identified at <u>https://www.farmbiosecurity.com.au/livestock/</u> and plants considered crops can be identified at <u>https://www.farmbiosecurity.com.au/crops/</u>. It is suggested these limits be achieved with the subclasses described in Table 3, that are based on existing definitions and linked to land use classifications from the ALUM Classification Version 8 (2016), the ANZSIC 2006 Division A - Agriculture, Forestry and Fishing, and agricultural property types mentioned by the PIC reform. These classes will have different levels of accuracy and completion for the initial minimum viable data product. Sub-classes based purely on PICs were also considered and the below schema should be reviewed based on the outcomes from the PIC reform process.

Table 3 Sub-Classes of the overarching	agricultural proper	ty definition
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	Class 1 – Primary Production	Class 2 – Moderate/Hobby Agricultural Usage	Class 3 – Casual/Urban Agricultural Usage
Description	Primary production businesses undertaking plant and/or animal cultivation, fishing and/or pearling, or tree farming and/or felling as defined by the ATO (refer to Appendix 5 – ATO Definition of a Primary Producer).	Moderate or hobby scale agricultural usage. This includes plant and livestock production and supply chain participants as described in the below three table rows and peri-urban hobby farms as described in the section 2 Terminology table.	Food produced casually for personal consumption and not sold. This includes relatively small 'backyard' vegetable gardens, fruit trees and livestock kept as pets (e.g. 3 chickens) in cities, urban, peri-urban and regional towns where the property is not already part of Class 1 or 2.
Data Status	Class 1 should be complete in the initial minimal viable product dataset and will be of the highest accuracy of the three classes.	Class 2 is likely to be incomplete in the initial minimal viable product dataset (e.g. properties may only be captured if they have a PIC) and will be of lower accuracy than Class 1.	Class 3 will not be captured in the initial minimal viable product dataset (or some properties may be if they have an associated PIC e.g. livestock kept as pets).
ALUM Classes	 2.1.0 Grazing native vegetation 2.2.0 Production native forests 3.1.0 Plantation forests 3.2.0 Grazing modified pastures 3.3.0 Cropping 3.4.0 Perennial horticulture 3.5.0 Seasonal horticulture 4.1.0 Irrigated plantation forests 4.2.0 Grazing irrigated modified pastures 	 1.3.0 Other minimal use (1.3.2) 3.6.0 Land in transition 4.6.0 Irrigated land in transition 5.3.0 Manufacturing and industrial (5.3.2, 5.3.4, 5.3.5) 5.4.0 Residential and farm infrastructure (5.4.2, 5.4.5) 5.5.0 Services (5.5.5 if livestock and/or crop related) 	 5.4.0 Residential and farm infrastructure (5.4.1, 5.4.3, 5.4.4 if produce food or keep livestock as pets)

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	• • • • •	 4.3.0 Irrigated cropping 4.4.0 Irrigated perennial horticulture 4.5.0 Irrigated seasonal horticulture 5.1.0 Intensive horticulture 5.2.0 Intensive animal production 6.1.0 Lake (6.1.2, 6.1.3 if fishing and/or pearling) 6.2.0 Reservoir/dam (6.2.2 if fishing and/or pearling) 6.3.0 River (6.3.2, 6.3.3 if fishing and/or pearling) 6.5.0 Marsh/wetland (6.5.2, 6.5.3 if fishing and/or pearling) 6.6.0 Estuary/coastal waters (6.6.2, 6.6.3 if fishing and/or pearling) 	•	5.7.0 Transport and communication (5.7.1, 5.7.2, 5.7.3, 5.7.4 if livestock and/or crop related)	
ANZSIC Subdivisions		01 Agriculture 02 Aquaculture 03 Forestry and Logging 04 Fishing, Hunting and Trapping	•	05 Agriculture, Forestry andFishing Support Services11 Food ProductManufacturing14 Wood ProductionManufacturing15 Pulp, Paper andConverted Paper ProductManufacturing46 Road Transport (461 iflivestock and/or croprelated)47 Rail Transport (471 iflivestock and/or croprelated)48 Water Transport (481 iflivestock and/or croprelated)49 Air and Space Transport(490 if livestock and/or croprelated)52 Transport SupportServices 521, 522, 529 iflivestock and/or croprelated)53 Warehousing andStorage Services (530 iflivestock and/or croprelated)69 Professional, Scientificand Technical Services (691,	n/a as they are Industrial Classifications for businesses

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			697 if livestock and/or crop related)	
Pic Reform	 Properties used for k livestock (cattle, buff sheep, goat, pig, equ camelid and deer, po and others, as prescr harvested feral anima harvested rangeland emus/ostriches, inclu saleyards and feedlot Properties used for g or propagating plants (propagation materia including tissue cultu nursery plants; fruit, vegetables and herbs and pasture crops; g and seeds; nuts; natu fibres; flowers and bu forestry and other crops 	eeping alo, ine, Jultry, bed: Is e.g. goats, ding s) rowing re; ; grass ain Iral Ilbs; pps) •	Hobby farms Properties within the supply chain for livestock domestic consumption or export (travelling stock routes, abattoirs, ports (shipping and air freight), transit centres/holding yards, veterinary premises where animals can be held overnight, export holding facilities, equine facilities, showgrounds, exhibited animals premises (where housed normally), pounds, knackeries, stock agents, cattle sale operators, meat processors) Zoos, research facilities, agricultural schools, and like property where livestock are present. Properties within the supply chain for plant domestic consumption or export (packing sheds, stock food manufacturers, wholesale and retail nurseries, retail and wholesale fruit and vegetable suppliers, food businesses (excluding hospitality businesses), export facilities, farmers markets, showgrounds and treatment facilities).	n/a (unless the PIC reform includes backyard produce and/or livestock kept as pets)

It is recommended that the proposed definition and sub-classes go out to stakeholders for further consultation and review. This is due to the restrictive timeline available for the completed consultation (see Appendix 1 - Expression of Interest Communication and Responses) and potential bias this may have introduced into the feedback, the ongoing PIC reform process (which ends 2022), and the concerns stakeholders raised that the project method of employing a third party rather than establishing a group committee type approach may limit the buy in from stakeholders and ability to implement lasting change, as stakeholders don't feel they have ownership in the process. The definition and sub-classes should also be reviewed when automated paddock data is more mature and authoritative.

OVERARCHING DEFINITION

An agricultural property is a land parcel, or a collection of land parcels, with common ownership and an agricultural usage.

DEFINITION SUB-CLASSES

- Class 1 Primary production
- Class 2 Moderate/Hobby Agricultural Usage
- Class 3 Casual/Urban Agricultural Usage

5. Stakeholder Consultation Insights

An initial expression of interest (EOI) stakeholder communication was sent out to a curated database of 657 contacts including contacts specifically targeted for the project, plus a subset of FrontierSI's contact database (around 2,800 contacts) filtered by organisation. 86 responses were received and the response to the EOI is summarised in Appendix 1 – Expression of Interest Communication and Responses. Subsequently, 23 phone interviews were conducted (questions and interviewees provided in Appendix 2 – Phone Interview Questions & Interviewees), three workshops were held with one each in Perth, Canberra and Brisbane (agenda and participants provided in Appendix 3 – Workshop Agenda & Participants), and the online use case survey was released (questions and a summary of results and respondents provided in Appendix 4 – Use Case Survey, Results Summary and Respondents).

The interviews, workshops and use case survey responses provided insights into stakeholder's experiences with and use cases for agricultural property definitions and data, the potential benefits of a nationally consistent definition and dataset, and stakeholders' requirements for the new agricultural property definition and data model. These insights have facilitated the development of the proposed definition of agriculture property in section 4 along with the supporting terminology and driver in sections 2 and 3. The insights from interviews, workshops and survey responses have been summarised in the following sections, with survey results shown in orange and interview results in blue. An overview of the workshops is given first as the online survey was also completed by workshop participants as part of each workshop. The online survey mainly focused on current use cases, with limited questions directly probing what should be included in the new definition and data model, however this can be inferred from current use case information.

5.1. Workshop Summaries

The Perth workshop was a small but productive event with participants mostly from Landgate and the WA Department of Primary Industries and Regional Development (DPIRD). The key message from this workshop was that an inclusive definition is required for biosecurity purposes. Agencies such as the ATO can then filter the resulting broad dataset based on attributes, to suit their specific purpose. Landgate already have a weekly automated process to filter the cadastre to agricultural properties and DPIRD add to this data. Attendees were keen to see the dataset include or link to as many attributes as possible, with address and ownership information of high value. It was highlighted that clear description of the terminology used is important along with clear definition of the terms of use of the data.

The Canberra workshop had a bigger attendance primarily from federal government agencies including the ABS, ABARES, the Department of Agriculture, Water and the Environment and Geoscience Australia. Participants were users of the data with most interested in aggregating data for reporting purposes. They require a stable, consistent definition for compilation of Environmental Economic Accounts over decades. Again, it was suggested that the definition be broad with the ability to be filtered down to the detail. The detail should be provided using existing classes such as the ALUM classification which has a long history and broad consultation. The cadastre was suggested as the center point of the model which should only include data elements that can realistically be supported. It was also highlighted that a clear value proposition is required.

The Brisbane workshop had slightly higher attendance than Perth with a mix of mostly state government agencies and AgTech representatives. A key insight was that the dataset should be built based on the benefit to those required to input data rather than the benefit to users of the data. The reason for this is to encourage contributors such as producers to input

data, as this was highlighted as a difficulty. However, Biosecurity QLD have a good approach for this which may be leveraged. A broad, simple definition is required and what is included depends on the purpose of the definition. Hence the project must determine the fundamental problem to be solved and develop a minimum viable product for this with clear terms of use. Linking property and ownership information to the type of agricultural activity is also important.

WORKSHOP KEY INSIGHTS

- Broad, inclusive definition that can be filtered down to the detail
- Clear descriptions of terminology, driver, value proposition and terms of use
- Build the dataset based on the benefit to those required to input data rather than the benefit to users of the data

5.2. Current Experiences and Use Cases

Existing Use Cases and Agricultural Activity Types

Question three of the online survey asked: "What is your primary use case for agricultural property data?". The free text responses have been categorised and summarised as per Figure 1. The primary use case for online survey respondents is *Biosecurity and Compliance* at 26% followed by *Mapping* (20%) and *Improved Agricultural Production* (14%) (Figure 1). *Biosecurity* was also highlighted as important by 57% of those interviewed by phone, while 26% of phone interviewees mentioned *Emergency Response* (e.g. to bushfires or floods) as an important use case in terms of being able to access properties and contact owners. The key agricultural activity types for these use cases are shown in Figure 2 (survey) and Figure 3 (interviews). Both consultation methods indicated *Grazing, Cropping* and *Intensive Animal Production* were the prevalent agricultural activity types, which is largely indicative of the agricultural sectors of the stakeholder base consulted. This could be a result of the database of stakeholders targeted, or that there are higher levels of interest in the project from these sectors.



Figure 1 Online survey: summary of use cases



Figure 2 Online survey: agricultural activity type



Figure 3 Phone interview: agricultural activity type

Existing Definitions and Data

Question six of the online survey asked: "What definition of agricultural property do you use within this use case?". The free text responses have been categorised and summarised as per Figure 4. The primary basis for the current definition used by online survey respondents is the *Cadastre* or *Parcel and Lot on Plan* information at 40% followed by *PIC* information (28%) and *Land Use Codes* (15%). This is similar to phone interviews results which had *PIC* most used as the basis for the current definition at 23%, and *Cadastre* or *Parcel and Lot on Plan* information, *Land Use Codes*, and *Farmer Defined* all at 12%, with 19% not currently using any definition (Figure 5). The agricultural property data currently used are also shown in Figure 4 (survey) and Figure 5 (interviews). Both consultation methods indicated *PIC, Cadastre* or *Parcel and Lot on Plan* information, and *Farmer Defined* as being the main sources of agricultural property data. It should also be noted that 69% of survey respondents and 56% of interviewes had government reporting requirements which may have compatibility implications for the data model.

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Figure 4 Online survey: basis of current definition summary (left) and current agricultural property data (right)



Figure 5 Phone interview: basis of current definition summary (left) and current agricultural property data (right)

Barriers and Frustrations

94% of survey respondents indicated they had issues, barriers or frustrations with agricultural property definitions and data related to their use case and 61% of interviewees. Some of the barriers and frustrations mentioned, organised into data access, data use and attributes include;

Data Access

- Creating agricultural property data is currently manual and time intensive
- Accessing existing sources of agricultural property data is inefficient
 - due to inconsistent interpretation of what constitutes a property
 - can take weeks dealing with multiple agencies, especially across boarders
 - differences in data management, data standards and datasets between jurisdictions effect access
- Encouraging primary producers to provide their property details to systems and keep them current is very difficult

- A lot of current platforms/data are not spatial, only address based which is limiting from a spatial point of view
- Data access models limit the sharing and use of some data

Data Use

- Collating data from numerous sources is time consuming due to compatibility and consistency issues between existing datasets, especially if non-spatial or from different jurisdictions
- Using existing sources of agricultural property data that are inconsistent and have similar or limited information, is inefficient
- Cadastral agricultural data is not granular enough
- It is difficult to identify non-livestock agricultural properties e.g. for emergency response
- o There aren't clear spatial relationships between property, parcel and paddock boundaries
- o Need accurate property boundaries for livestock tag movement alerts to accurately trigger

• Attributes

- Names registered to PICs don't match names on titles
- PIC address' not representative of properties
- o A PIC can include multiple non-contiguous properties and multiple PICs can be controlled by one business
- o Inconsistent identifiers for Cadastral parcels across jurisdictions
- Current property data is not connected to the agricultural business (can be multiple business' on a property)
- o Need clear relationships between owner and farm gate address information
- Need reliable attribution of primary land use
- o Currency of ownership and land management information including postal address for all parties

Potential Benefits

69% of interviewees were able to suggest potential benefits of a consistent national agricultural property definition and dataset. Some of the benefits mentioned include;

- Simplifying access and increasing efficiency as will only need to deal with one agency
- Increase efficiency of use as won't have to collate different property data
- Single, standardised source of truth providing users confidence
- Foundation data enabling many applications e.g.
 - Natural disaster support, mapping impact on stock and where feed drops are required and damage assessment for government funding support
 - o Biosecurity
 - Traceability and accountability for international product sales
 - Genetic optimisation in crops
 - Enable better outcomes for agriculture through productivity gains
 - Streamline agricultural surveys and reporting
 - National level mapping programs for land use mapping etc.
 - Determining who and where compulsory government levies are coming from

Similarities and Differences

There are a lot of differences between use cases as there are many stakeholders from different organisation types who have different applications for the definition and data and work across different agricultural sectors. The main similarities between use cases are highlighted as part of the key insights for this section.

USE CASE KEY INSIGHTS

- The principal use case is Biosecurity and Compliance
- Grazing, Cropping and Intensive Animal Production are the main agricultural activity types
 - The primary basis for current definitions and data are the Cadastre and PIC
 - The main frustrations are the inefficiency of accessing, collating and using data from different sources, especially if non-spatial and/or from different jurisdictions
 - The key benefits will be increased efficiency and enablement of many applications

5.3. Definition Requirements

Principles Identified

As part of the phone interviews, stakeholders were asked to identify principles the research team could use to make decisions on what to include in the definition. The two main principles suggested were for the definition to be broad and inclusive (31%) and for it to be kept as simple as possible (19%) (Figure 6). It should be noted that these were the two principals used to prompt stakeholders which likely swayed results however the requirement to be broad does align to workshop outcomes. As the principal use case identified from the online survey was biosecurity and compliance, it can be inferred that survey respondents also require a broad definition.



Figure 6 Phone interview: principles to use to guide the definition

Agricultural Activity Types to Include/Exclude

Within the phone interviews, stakeholders were asked what agricultural activity types should be included in or excluded from the definition. 64% of interviewees thought *All* agricultural activity types should be included, and in keeping with this the most frequent response to what should be excluded was *None* (38%) (Figure 7). Another prevalent response as to what to include and exclude was that it depends on what the driver of the definition is (which was still to be determined at the consultation stage of the project). In terms of the online survey, Grazing, Cropping and Intensive Animal Production were the main agricultural activity types identified. However, all agricultural activity types provided in the survey question were identified as important, with the minimum number of responses to the *Fishing, Hunting and Trapping* category being four, and *Other* responses largely indicating all types as important. Hence it can be inferred that survey respondents would also want to the definition to be inclusive of all sectors of agriculture.



Figure 7 Phone interviews: agricultural activity types to include (left) and exclude (right)

Classification Schema

Phone interviewees were also asked whether they thought a single definition would be possible or whether a classification schema might be necessary. 54% of people indicated they thought a schema would be required, with an additional 17% suggesting an overarching definition along with sub-categories within a schema (Figure 8). The online survey did not ask respondents this question.



Figure 8 Phone interviews: single definition or classification schema

Restrictions/Complications

The most mentioned complications and restrictions associated with creating a new definition (and data model) all at 17% were privacy of sensitive information, maintenance and currency of the dataset, uptake of the new definition and dataset, and tension between different types of stakeholders with different drivers (Figure 9). The *Other* types of complications noted (22%) were the difficulty in understanding commodities and land uses on a property, the continuity of data and being able to perform trend analysis, and less common agricultural activities such as beehives in national parks, pony clubs, agistments, leases, aquaculture, horse training facilities, abattoirs and farmers markets. The online survey did not ask respondents this question.



Figure 9 Phone interviews: potential restrictions and complications

DEFINITION KEY INSIGHTS

- Broad definition, inclusive of all agricultural activity types, kept as simple as possible
- To keep it simple yet comprehensive, use an overarching definition with sub-categories as part of a classification schema
 - Important complications to be aware of are privacy, uptake and maintenance

5.4. Data Model Requirements

Principles Identified

As part of the phone interviews, stakeholders were asked to identify principles the research team could use to make decisions on what to include in the data model. The two main principles suggested were for the definition to align to the cadastre (38%) and the PIC reform (23%) (Figure 10). It should be noted that these were the two principals used to prompt stakeholders which likely swayed results however these requirements do align to the data currently used by online survey respondents. This also suggests that stakeholders believe the data set should be authoritative and align with official government business and institutional frameworks, rather than being incongruent.



Figure 10 Phone interview: principles to use to guide the data model

Spatial Representation

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Question nine of the online survey asked: "What are your ideal spatial data requirements for the use case?". Respondents could select multiple answers hence the total percentage is greater than 100. *Property boundaries (polygon)* was selected by 89% of people, followed by *Parcel boundaries* (74%) and *Paddock boundaries* (57%) (Figure 11). All respondents had spatial data requirements. Phone interview responses align with the survey results putting *Property* boundaries as most important (38%), but with *Paddocks* (29%) indicated as higher priority than *Parcels* (17%) (Figure 12).



Figure 11 Online survey: spatial data requirements



Figure 12 Phone interviews: spatial data requirements

Attributes

Question ten of the online survey asked: "What are the attribute requirements for the agricultural property data used and is there other data it needs to connect to?". Respondents could select whether the attribute should be part of the dataset itself or be linked to in another data set either via an identifier, spatially, or if they were unsure how it should be linked. Therefore, results are displayed in two ways below: results for attributes required as part of the dataset as these are probably most important (Figure 13), and weighted averages of all the categories for each attribute (Figure 14). *PIC* was the most requested attribute required within the dataset at 55%, followed by *Cadastral Property ID* (54%) and *Business Address* and *Business Entity* both at 52%. For the weighted average results, *Financial Outputs* was highest at 2.93, followed by *Ground Cover* (2.89) and *Annotations (chemical store etc.)* (2.81) with *Landscape Status* (2.79) and *ABN* (2.78) also rated highly. Phone interviewees did not have a list of attributes to choose from, but the most suggested attributes were land *Owner/Manager contact* information (16%), *Agricultural activity/Land use* and *PIC* (14%) and *ABN* (12%). There are a lot of different attributes that are important to different stakeholders and applications, so to make the dataset useful to a wide



range of stakeholders, compatibility and linkages with existing datasets containing these attributes needs to be considered. Only key attributes should be part of the data model initially to ensure the dataset can be accurately created and maintained.

Figure 13 Online survey: attributes required within the dataset

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Figure 14 Online survey: weighted average of all attribute requirements



Figure 15 Phone interviews: attribute requirements

Data History

Question 11 of the online survey asked: "Is data history important to the use case? i.e. spatial boundary history and/or attribute history for specific attributes?". 84% of respondents indicated that data history is important, for both the spatial boundary and attributes such as crops, land use, stock numbers, productivity, property prices and sales, and land owner and manager. 36% of phone interview responses stated that data history is important and an additional 36% that it is important but not critical.



Figure 16 Online survey: data history

Figure 17 Phone interviews: data history

Contributors and Supply Channels

Phone interviewees were asked what organisations they thought will need to be part of creating or inputting into the dataset on an ongoing basis. Responses included the following;

- Federal government departments e.g. Dept. Ag, ABARES, ABS, ATO, GA
- State government land registries and valuer generals
- State government land/agriculture/natural resource departments and departments that manage PIC data e.g. Biosecurity QLD
- Local governments e.g. if putting up greenhouses and covered horticulture
- Primary producers and property owners
- NLIS
- Peak industry bodies e.g. MLA, GRDC, VFF, NFF
- Private business may contribute i.e. farm record keeping companies (up to 60% of farmers use these platforms)

It was highlighted that the more contributors there are to the dataset, the more complex it will be to create and maintain. Primary producers may be the only source of a lot of relevant information, but experience shows it is very difficult to encourage them to supply data, especially on an ongoing basis. Producers would need to obtain considerable value from the dataset in order to see benefit in providing their information. If producers are part of the supply channel to the dataset, they may need regulatory or commercial incentive to report changes. The Brisbane workshop noted that Biosecurity QLD have a good approach for encouraging producers to supply information and this approach could be leveraged.

Access Levels

Phone interviewees were asked who should be able to access the data and whether access levels may be required. 100% of responses indicated that access levels are required with 32% of people advocating for a level of open data access (Figure 18). It was suggested the open data access level be to property boundaries and any attribute information that is already freely available from other sources. As privacy was highlighted as a big concern, several interviewees proposed primary producers should be able to nominate what information pertaining to their property is made available. It was also noted that relevant government organisations should have access to sensitive information (e.g. contact, property access, numbers of livestock etc.) in the case of biosecurity and emergency response. The idea of an aggregated, deidentified version of the dataset for statistics, planning and economic growth reporting was also floated. Access levels were also mentioned not only in terms of users of the data but in terms of who should be able to edit the data.

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Figure 18 Phone interviews: access levels

Metadata

Question 12 of the online survey asked: "Are there metadata requirements for the agricultural property data used?". 63% of respondents indicated that knowing the positional accuracy of the data is important and 53% indicated attribute accuracy, data custodian, data source and update frequency as important metadata. All categories of metadata listed received at least eight responses indicating that having as much metadata available as possible is preferred. An existing metadata standard such as ISO 19115 for spatial metadata could be adopted.



Figure 19 Online survey: metadata

Future Proofing and Maintenance

Phone interviewees were asked how the dataset could be future proofed and maintained. It was highlighted by many that maintaining the accuracy and currency of such a dataset is very important and very difficult. Responses included the following;

- Use a commercial model for data access but cost must be accessible to ensure a viable product
 - Requires financial investment/funding, sources suggested;
 - Federal government
 - State government
 - o RDCs who benefit
- Need an incentive-based scheme for primary producers to provide information plus a QA process
- Ideally should be managed by a publicly funded company owned by the industry sector
- Need clear and transparent workflow of data creation and update
- Have a mechanism to allow users to suggest new attributes and apply for amendments
- Need an automated update process
- Establish memorandums of understanding with data providers
- Engineer the dataset to be compatible with existing data sources
- Require long term commitment to store and maintain the data
- Consider the safety of having the dataset owned and/or hosted onshore/offshore
- As much as possible link to things that are mandated e.g. requirements for people selling eggs or milk to register
- Only create a minimum viable product (MVP) so that it is possible to maintain it
- Beware of reverse incentive like users entering fewer animals to pay less rates
- Leverage data that already exists to avoid duplication
- Need a structure, update process, and governance framework for setup, maintenance and storage
- Intergovernmental agreement required if it becomes part of regulations

DATA MODEL KEY INSIGHTS

- Data model should align with the cadastre and the PIC reform
- Property boundaries are key, parcel and paddock boundaries would also be useful to a lot of stakeholders
- Key attributes should be part of the data model, which should also consider compatibility with existing datasets to enable linkages to the many other useful attributes
- Data history is important but not critical to most applications, currency is more important
- Data contributors should be minimised to reduce complexity in creation and maintenance
 - Access levels are essential, with a level of open data recommended
 - As much metadata as possible should be included, adopting an existing standard
 - MVP that can be accurately created and maintained, leverage existing data

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7. Appendices

Appendix 1 – Expression of Interest Communication and Responses

A marketing communication was developed and sent out to stakeholders on Wednesday 15th January in the form of a project information page and short online EOI survey to gauge the level of interest of participation in the project. Stakeholders were given a week to respond to the EOI with a reminder provided. It is noted that the timing of this EOI may have restricted responses given some people were still away on Christmas leave, some were tied up in the bushfire response, and the period for response was restricted due to the project timeline. However, 86 people responded to the EOI with 53 requesting phone interview, 37 interested in attending a workshop, and 60 indicating they would like to contribute via the online use case survey.

Q1 Individual (or organisation group) phone interview of approximately 1-hour, conducted early February 2020



Q2 Full day workshop at either of the following locations:



Q3 Online survey to contribute your use cases



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Appendix 2 – Phone Interview Questions & Interviewees

Interview Questions

Experience with Agricultural Property Definitions/Data

- 1. What is your experience/application/use case for agricultural property data?
 - a. What is the agricultural activity type? (i.e. cropping, grazing, intensive animal production)
 - b. What is the reason for or benefit to your business of this use case? (i.e. bio-security, compliance)
 - c. What definition of Agricultural Property do you currently go by? (i.e. properties with PICs, legislative)
 - d. What Agricultural Property data/information do you currently use? (i.e. PICs, cadastre)
 - e. How do you use the data? (i.e. as a boundary for pasture biomass estimation)
 - f. Does your use case have government reporting requirements? (i.e. NLIS)
 - g. Does your use case need to be compatible with existing digital systems? (i.e. NLIS)
 - h. Are there any documents/resources you can provide that will provide us more information?
- 2. What do you see as the benefits of an agricultural property dataset? (i.e. foundation data for many applications)
- 3. What barriers or frustrations do you have with the current situation? (i.e. not consistent)
- 4. Would a new definition and dataset change your use case or enable new use cases for you?

New Agriculture Property definition

- 5. What principles should the research team use to make decisions on what to include in the definition? (i.e. keep it simple, inclusive of all sectors)
 - a. What types of land use / property / agricultural activity type should the definition include? (i.e. forestry, horse agistments)
 - b. What types should be excluded, if any? (i.e. hobby farms, minimum property size?)
 - c. Do we need a single definition, or a classification schema? (i.e. intensity based hobby, moderate, intense, or output value based <\$40k, \$40-500k, >\$500k)
- 6. What are the potential restrictions / complications for a new definition? How can they be managed?

New Data Model

- What principles should the research team use to make decisions on what to include in the data model? (i.e. align to cadastre, align to PIC reform)
 - a. What is the spatial representation needed for an agriculture property dataset? (i.e. boundaries for all land involved in primary production, boundaries of ag parcels, boundaries of individual paddocks, buildings, property features like dams)
 - b. What attributes/information elements does it need to include or link to? (i.e. PIC, ABN, physical property addresses etc.)
 - c. Is data history important? (i.e. spatial boundary history and/or attribute history)
- 8. What organisations do you think will need to be part of creating or inputting into the dataset on an ongoing basis? (e.g. valuer generals, land registry etc)
- 9. Who should be able to access the data? And should there be access levels? (i.e. none for foreign powers, limited for commercial organisations, full for property owners to their own info or gov for biosecurity)
- **10.** How could the dataset be future proofed and maintained? (commercial models)

Interviewees

Stakeholders who participated in phone interviews were from a range of organisation types and representative of all states/territories (except Tasmania) but were predominantly state government (43%) and representative of NSW (43%).

Table 4 List of stakeholders interviewed

No.	Date	Name	Organisation	State	Туре
1	6/02/2020	Johan Boshoff	UNE	NSW	Research/University
2	6/02/2020	Noel Brismead	AgForce	QLD	Peak Industry Body
3	6/02/2020	Adrian Dignam	Sentient Hubs	NSW	Engineering/Spatial
4	7/02/2020	Matthew Knight	Agriculture Victoria	VIC	State Government
5	7/02/2020	Terry Beutel	DAF	QLD	State Government
6	7/02/2020	Olga Ozols & Greg Tom	DPI	NSW	State Government
7	10/02/2020	Tony Hope	DCS	NSW	State Government
8	10/02/2020	Harmen Romeijn	Spatital Vision	VIC	Engineering/Spatial
9	11/02/2020	Joel McKechnie	DES (Land Use Mapping)	QLD	State Government
10	11/02/2020	Ben Baghurst	PIRSA	SA	State Government
11	11/02/2020	Angus Whyte	Gatlet (Livestock farmer)	NSW	Farmer
12	11/02/2020	Alex Bakunowicz	NT Gov	NT	State Government
13	12/02/2020	Bart Davidson	Maia Technology	NSW	Precision Ag
14	13/02/2020	Tim Neale	Data Farming	NSW	AgTech
15	14/02/2020	Doug Marcina	DELWP - VG	VIC	State Government
16	14/02/2020	Richard Heath	Australian Farm Institute	NSW	Research/University
17	18/02/2020	Dianna Watkins (Group)	DPI	NSW	State Government
18	18/02/2020	Ivana Ivanova	Curtin Uni	WA	Research/University
19	18/02/2020	Paul Dellow	GHD	NSW	Engineering
20	18/02/2020	Alastair James	Australian Livestock Exporters Council	ACT	Peak Industry Body
21	19/02/2020	Justin Crosby	GRDC	ACT	RDC
22	19/02/2020	Alistair Byrom	Veris & SIBA	QLD	Engineering/Spatial
23	19/02/2020	Kathryn Sheffield	Agriculture Victoria	VIC	State Government



Figure 20 Phone interviewee organisation type and state/territory representation

Appendix 3 – Workshop Agenda & Participants

Agenda

9am – 12.30pm MORNING SESSION

- Overview, Need, Other Projects, Goals (30min)
- The Current Situation (1hr)
 - Existing Definitions and Data
 - Barriers and Frustrations
- Stakeholder Use Cases (2hrs)
 - Examples
 - Use Cases Survey
 - Similarities and Differences

12.30pm – 1pm LUNCH

1pm – 4.00pm AFTERNOON SESSION

- Principles of Decision Making (30min)
- The Definition (30min)
 - Classification Schema
- The Data Model (30min)
 - Components
- Other Considerations (1.5hrs)
 - Input Data Sources and Supply Channels
 - Data Access Levels
 - Data Ownership and Legalities

Participants

Perth Workshop 5th February 2020

No.	Name	Organisation	State	Туре
1	Glenn McTaggart	Nutrien Ag Solutions	WA	Precision Ag
2	Heather Percy	Department of Primary Industries and Regional Development	WA	State Government
3	Adrian Carroll	Landgate	WA	State Government
4	Allan Campbell	Landgate	WA	State Government
5	Murray Dolling	Landgate	WA	State Government
6	Beth Green	Department of Primary Industries and Regional Development	WA	State Government
7	Mark Sander	Department of Primary Industries and Regional Development	WA	State Government
8	Francesco Merenda	Zadco	WA	Private Agricultural

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Canberra Workshop 13th February 2020

No.	Name	Organisation	State	Туре
1	Shaun Copley	Australian Bureau of Statistics	ACT	Federal Government
2	Neil Thompson	ABARES	ACT	Federal Government
3	Peter Wilson	CSIRO Agriculture and Food	ACT	Research/University
4	Hamish Anderson	Geoscience Australia	ACT	Federal Government
5	Matthew Jakab	Geoscience Australia	ACT	Federal Government
6	Rob Walter	Australian Bureau of Statistics	ACT	Federal Government
7	Tom Walter	Department of Agriculture, Water and the Environment	ACT	Federal Government
8	Alie Cowood	Department of Agriculture, Water and the Environment	ACT	Federal Government
9	Terry Hills	Department of Agriculture, Water and the Environment	ACT	Federal Government
10	Natalie Souness	Department of Agriculture Water and the Environment	ACT	Federal Government
11	Laura McGrath	Department of Agriculture Water and the Environment	ACT	Federal Government
12	Jonathan Medway	Charles Sturt University	NSW	Research/University
13	Dee Trainham	Department of Industry, Science, Energy and Resources	ACT	Federal Government
14	Martin Brady	Australian Bureau of Statistics	ACT	Federal Government
15	Katrina Phillips	Department of Agriculture, Water and the Environment	ACT	Federal Government
16	Ben Mulder	Australian Bureau of Statistics	ACT	Federal Government
17	Bill Hirst	Independent Consultant	ACT	Engineering/Spatial

Brisbane Workshop 14th February 2020

No.	Name	Organisation	State	Туре
1	Steve Brown	Department of Natural Resources, Mines and Energy	QLD	State Government
2	Alan Thomson	Food Agility CRC	QLD	Research/University
3	Bomber Lancaster	Department of Agriculture and Fisheries	QLD	State Government
4	Lewis Frost	Ceres Tag Pty Ltd	QLD	AgTech
5	David Smith	Ceres Tag Pty Ltd	QLD	AgTech
6	Ben Fahy	Agriculture Victoria	VIC	State Government
7	Marcus Toyne	Department of Agriculture and Fisheries	QLD	State Government
8	Philip Tickle	Cibo Labs Pty Ltd	QLD	AgTech
9	Heidi Perrett	Ceres Tag Pty Ltd	QLD	AgTech

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Appendix 4 – Use Case Survey, Results Summary and Respondents

Survey Questions

PAGE 1: Introductory Information

Q1: What type of organisation are you representing?

Q2: Would you be happy to discuss your use case further if required?

PAGE 2: Use Case 1

Q3: What is your primary use case for agricultural property data? (short description e.g. Tracking animal movement for bio-security and compliance)

Q4: What are the key agriculture activity types for this use case?

Q5: What is the reason for, or the benefit to your business of this use case? (e.g. bio-security and compliance)

Q6: What definition of agricultural property do you use within this use case? (e.g. any property that has a Property Identification Code (PIC) is considered agricultural property, or a definition under a state or federal regulation)

Q7: What agricultural property data does your use case currently use?

Q8: How does your use case use the agricultural property data? (e.g. as a boundary for pasture biomass estimation, or as a line in a table)

Q9: What are your ideal spatial data requirements for the use case? (i.e. if not constrained by current data)

Q10: What are the attribute requirements for the agricultural property data used and is there other data it needs to connect to? (leave row blank if N/A or you don't know)

Q11: Is data history important to the use case? i.e. spatial boundary history and/or attribute history for specific attributes?

Q12: Are there metadata requirements for the agricultural property data used? (for example to help documentation lineage, quality or accuracy requirements)

Q13: Who are the stakeholders involved in the use case?

Q14: Are there digital systems (e.g. database, online tool i.e. NLIS) the agricultural property data needs to be compatible with? (briefly describe the system and any key requirements)

Q15: Does the use case have government reporting requirements?

Q16: Are there currently any issues/barriers/frustrations with the use case process related to the agricultural property definition or data?

Q17: Any other comments about your agricultural property use case or its requirements?

Q18: Do you have another agricultural property data use case?

PAGE 3: Use Case 2

As per Use Case 1

Survey Results Summary

- Overall 58 responses (32 complete), 55% completion rate, 11mins average time spent
- Online survey 34 responses (12 complete)
- Perth workshop 7 responses (7 complete)
- Canberra workshop 12 responses (8 complete)
- Brisbane workshop 5 responses (5 complete)

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Respondents

Stakeholders who participated in the online survey were from a range of organisation types but were predominantly state government (43%).



Figure 21 Online survey stakeholder organisation type

Appendix 5 – ATO Definition of a Primary Producer

The ATO defines a primary producer as an individual, partnership, trust or company operating a primary production business if they undertake: plant and/or animal cultivation, fishing and/or pearling, or tree farming and/or felling (Australian Taxation Office, 2018).

Plant and animal cultivation include cultivating or propagating plants, fungi or their products or parts; maintaining animals to sell them or their produce; and manufacturing dairy produce from raw material. Fishing and pearling include conducting operations relating directly to taking or catching fish, turtles, dugong, bêche-de-mer, crustaceans or aquatic molluscs; and taking or culturing pearls or pearl shell. Tree farming and felling include planting or tending trees in a plantation or forest that are intended to be felled; felling trees in a plantation or forest; and transporting trees or parts of trees felled in a plantation or forest. Hobbies, forms of recreation or sporting activities are not considered a business.

Please refer to https://www.ato.gov.au/Business/Primary-producers/Primary-production-activities/.