Glossary for the Bioregional Assessment Programme

Processes and guidelines for the acquisition, management and publication of terms

2018

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Cover photograph

Gwydir River near Bingara, NSW, 2008

Credit: Neil Foster, NSW Department of Water and Energy

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Acknowledgements

1   Introduction

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) was established to provide advice to the federal Minister for the Environment on potential water-related impacts of coal seam gas (CSG) and large coal mining developments (IESC, 2015).

Bioregional assessments (BAs) are one of the key mechanisms to assist the IESC in developing this advice so that it is based on best available science and independent expert knowledge. Importantly, technical products from BAs are also expected to be made available to the public, providing the opportunity for all other interested parties, including government regulators, industry, community and the general public, to draw from a single set of accessible information. A BA is a scientific analysis, providing a baseline level of information on the ecology, hydrology, geology and hydrogeology of a bioregion with explicit assessment of the potential impacts of CSG and coal mining development on water resources.

The IESC has been involved in the development of *Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources* (the BA methodology; Barrett et al., 2013) and has endorsed it.

The Bioregional Assessment Programme is a collaboration between the Department of the Environment and Energy, the Bureau of Meteorology, CSIRO and Geoscience Australia. Other technical expertise, such as from state governments or universities, is also drawn on as required. For example, natural resource management groups and catchment management authorities identify assets that the community values by providing the list of water-dependent assets, a key input.

The Technical Programme, part of the Bioregional Assessment Programme, has undertaken BAs for the following bioregions and subregions:

- the Galilee, Cooper, Pedirka and Arckaringa subregions, within the Lake Eyre Basin bioregion
- the Maranoa-Balonne-Condamine, Gwydir, Namoi and Central West subregions, within the Northern Inland Catchments bioregion
- the Clarence-Moreton bioregion
- the Hunter and Gloucester subregions, within the Northern Sydney Basin bioregion
- the Sydney Basin bioregion
- the Gippsland Basin bioregion.

Technical products (described in a later section) will progressively be delivered throughout the Programme.

The overarching authority for terminology in the BAs is the the BA methodology (Barrett et al., 2013). The *Product standards* (Ahmad et al., 2018) provides language conventions, which have been developed in consultation with project teams. In addition, there are submethodologies that

provide additional context and terminology. These documents do not inform readers on the meanings of terms or provide agreement on terms used by multiple authors. Gallant et al. (2015) proposed a 'controlled, authoritative glossary service' to solve these issues and meet Programme requirements. They prescribed the use of linked data principles and semantic web technology, which will provide the mechanism to formalise this vocabulary for use in integrated products. Furthermore, Programme requirements of transparency needed to be met. Cox et al. (2014) reviewed the Linked Data Registry (LDR) software and indicated the software provides two key functions: (i) it describes the status of a vocabulary and its contents and (ii) it describes versioning history. Importantly, both of these functions are externally visible, making the provision and maintenance of the vocabulary service publicly transparent. However, LDR does have limitations: it does not provide the capability to support comment or discussion, therefore, it does not by itself support a submission, quality control and approval process that fully meets the BA requirements of transparency. As a result, both SharePoint and LDR are used to manage the review, approval, management and publication of the BA Glossary.

Gallant et al. (2015) indicated that the use of agreed authoritative sources for specific domains, is preferable over redefining each term. However, as the Programme matured, there became a requirement to define terms unique to the Programme. Therefore, the glossary for the Bioregional Assessment Programme (BA Glossary) mainly comprises unique definitions, with a small subset of terms (approximately 10%) that have been reused from authoritative sources.

The BA Glossary is published on the web and supports the publication, updating and querying of vocabularies.

The BA Glossary:

- provides a controlled and audited list of terms and definitions to reduce ambiguity for authors, editors and readers
- supports status assignment and changes, versioning and history functionality
- assigns a unique identifier (a uniform resource identifier (URI)) for each term, which is dereferenceable using standard web protocols
- provides an HTML (web browser) user interface with search and browsing features
- uses globally accepted standards for machine-to-machine interactions and formats.

Tools have been devised that interrogate the BA Glossary and allow terms to be hyperlinked to their respective definitions in products, as well as generate a print glossary for inclusion in products. This work is discussed in Chapter 7.

This document provides information on:

- proposed timeline for the delivery of existing approved BA terms to products (Chapter 3)
- roles and responsibilities for the submission, review and approval of terms (Chapter 4)
- workflow for the submission, review and approval of terms (Section 5.1)
- tools, SharePoint and LDR, and their accompanying procedures that support the workflow (Chapter 2 and Section 5.4)
- standards for terms and definitions (Chapter 6)

- tools for hyperlinking terms in products to the BA Glossary (Chapter 7).

This document serves many purposes and individual parts of the document will serve a variety of needs for individuals. As such, it is not recommended that this document be read cover to cover, but that individuals refer to sections as needed.

2 Tools supporting the creation and maintenance of the glossary for the Bioregional Assessment Programme

The tools used to support the processes for the submission, quality assurance, revision and approval of terms, as well as history and versioning, are SharePoint and the Linked Data Registry (LDR).

The writing, editing, and review and approval workflows for products are supported by SharePoint (Ahmad et al., 2018), which is also used for the pre-publication phase of glossary development, including management of term submission, quality assurance and approval of terms.

SharePoint captures the submission of new and revised terms and their definitions, and the respective discussions and comments regarding scientific quality assurance and approval. LDR (i) stores the concept (i.e. the term and its properties) once the terms and definitions have been approved, (ii) displays the status of these terms with respect to the scientific quality assurance and approval workflow, and (iii) provides version control and history for any changes made to the term after approval.

2.1 SharePoint

2.1.1 TermQueriesSubmission SharePoint list

Proposed terms (with or without definitions) or revisions to existing, approved terms are submitted to the TermQueriesSubmission SharePoint list, available at https://teams.csiro.au/sites/BA/Products/Lists/TermQueries/AllItems.aspx. This list is available to all contributors of the Programme and anyone in the Programme can submit a term for review and approval.

Table 1 lists the fields in the TermQueriesSubmission SharePoint list.

Table 1 Properties completed by term contributor in TermQueriesSubmission SharePoint list

TermQueriesSubmittion field	Details	Obligation
Logged by	Name of the person filling out the form	Mandatory
Query type	This is a dropdown menu with two options: • new term for BA Glossary • revision of existing term in BA Glossary.	Mandatory
Term (proposed)	Name of the term to be defined	Mandatory

TermQueriesSubmittion field	Details	Obligation
Synonyms	The intent is to capture an alternative lexical label for the submitted term for 'altLabel' property in LDR. This property will be valuable to authors browsing the BA Glossary to search for ideal terms to use in products. Additionally, it will be particularly useful for terms that apply to more than one discipline.	Optional
Reuse or create new definition?	This list item provides information to the Vocabulary Coordinator on the nature of the term definition. The term definition can either be pre-defined by an approved authority or created by the term contributor. This is a dropdown menu with three options: • reuse existing definition • create new definition • term submission only.	Mandatory
Authority	The name of the source providing the definition (e.g. The Australian Soil Classification)	Optional. Not all terms will reuse definitions from authorities
Authority URL	The URL for the authority – ideally for the term definition within the authority (e.g. http://www.clw.csiro.au/aclep/asc_re_on_line/ve/vertsols.htm)	Optional. Not all authorities will be web accessible
Proposed definition	The definition for the term. This can either be the definition taken from an external authority (preferred) or a definition that has been created by the term contributor (if existing definitions are unsuitable). For terms that have been submitted without definitions, submitters can input 'TBA'.	Mandatory
Discipline	The discipline in BA that is applicable to the term. This is a checkbox list in which the term contributor can select either one or multiple options: • Assets and receptors • BA – general • Ecology • Geology • Geography • Groundwater modelling • Hydrogeology • Information management • Risk and uncertainty • Surface water hydrology.	Mandatory
Published in	A tickbox list containing the methodology and/or technical product that uses this term	Optional
Comments from term contributor	Any additional information about the submission	Optional

2.1.2   Administration of TermQueriesAdmin

A SharePoint workflow is used to port the list items in TermQueriesSubmission to a separate list, TermQueriesAdmin (https://teams.csiro.au/sites/BA/Products/Lists/User%20testing%20TermQueries/Test%20view.aspx). Each list serves a purpose: (i) TermQueries Submission provides an

efficient submission process for the term contributor and (ii) TermQueriesAdmin allows the Vocabulary Coordinator to capture further information relevant to the term that is not necessary for the submission. TermQueriesAdmin also records decisions made during the scientific quality assurance and approval process. Table 2 lists the additional properties contained in TermQueriesAdmin.

Table 2 Additional properties used by Vocabulary Coordinator in TermQueriesAdmin SharePoint list

TermQueriesAdmin property	Details
Shortened version	Acronym of term
Non-preferred terms	Other terms that represent preferred term, but should not be used
Reuse or create new definition	Dropdown menu selection
Recommended definition from Vocabulary Coorindator	This will either contain a definition taken from an approved authority or a quality checked definition that was provided by the Term Contributor
Name of subregion or bioregion	Dropdown menu selection
Authority citation	The citation of the authority
Approved definition	The definition that is approved by the SLG Chairs
Name of subregion or bioregion	Refers to the BA subregion or bioregion
Published in	Refers to the product that uses this term
Comments from term contributor	For any discussions that occur with term contributor
SLG Chairs comments	For comments from SLG Chairs
SLG comments	For comments from SLG
Asset and recepts leader comments	As required
Ecology leader comments	As required
Geography leader comments	As required
Geology leader comments	As required
Groundwater modelling leader comments	As required
Hydrogeology leader comments	As required
Information management leader comments	As required
Senior Science Leaders comments	As required
SWH leader comments	As required
Risk and uncertainty leader comments	As required

TermQueriesAdmin property	Details
Status	The status of the term in the scientific quality assurance and approval workflow. This is a dropdown menu and contains these options: • Submitted • With Vocabulary Coordinator • Sent to Quality Assurer • Sent to Term Contributor • Sent to SLG for comment • Discussion • Sent to SLG Chairs for final approval • Approved – awaiting publication in product • Approved – product published • Not valid[a] • Retired[b]
Date closed	Date of approval
Closed by	Name of person who closed the list item
LDR status	Status is set to 'Stable' when terms are approved
Comments by test user	This will be removed once testing of the list is completed.
Vocabulary Coordinator comments	Any addition comments to support the proposed term and recommended definition from Vocabulary Coordinator
Term (final)	Agreed name of term
LDR ID	Refers to the notation field in Reg metadata
editorialNote	Date of approval by SLG
changeNote	As required
scopeNote	As required
URI	URI of the term

[a]'Not valid' refers to terms that were approved but then superceded by other terms in the Glossary or to terms that were proposed but never underwent the review and approval process.
[b]'Retired' refers to terms that are no longer in use in the Programme.
SLG = Senior Leadership Group

2.2 Linked Data Registry

2.2.1 Requirements

The Linked Data Registry (LDR) (https://github.com/UKGovLD/ukl-registry-poc/wiki) was selected as the tool for the BA Glossary because it enables terms to be published as 'linked data', denoted by a persistent URI, with history, versioning, and status clearly visible. It provides both a human user interface (UI) for inspecting the glossary in a web browser, and a standard programming interface (API) for machine-machine interactions. The content model and API both follow the World Wide Web Consortium (W3C) standards (W3C, n.d.) or best practices for knowledge representation.

LDR functionality meets the Programme requirements for terminology, which are:

- scientific and editorial quality of products

- transparency – governance and provenance

- persistence

- access

- compliance to standards and best practice.

Table 3 provides more information about how LDR meets the Programme requirements for terminology.

Table 3 How the Linked Data Registry (LDR) fulfils Programme requirements for terminology

Requirement	How it is met by the LDR
Scientific and editorial quality of products	Provides an audited and controlled list of terms and definitions; provides instruction on preferred terms, reducing ambiguity
Transparency – governance and provenance	Status, versioning and history functionality are accessible though both the UI and API
Persistence	Uses unique identifiers, called URIs, which are able to be dereferenced (looked up) via HTTP URIs
Access	Uses technology to provide a web-based environment and a standard interface on HTML with search and browsing features
Compliance to standards and best practice	Uses globally accepted standards (https://www.w3.org/standards/semanticweb/data) to describe terms and their properties in human and machine-readable formats (Brickley and Guha, 2004; McGuinness and van Harmelen, 2004)

API = application programming interface, UI = user interface

2.2.2 Design principles

2.2.2.1 Data models

The data structure is specified by these standard vocabularies (Table 4).

Table 4 External ontologies used by the BA Glossary

Prefix	URL	Explanation
bibo:	http://purl.org/ontology/bibo	Bibliography ontology
dct:	http://purl.org/dc/terms	Dublin Core terms
rdfs:	http://www.w3.org/2000/01/rdf-schema#	RDF schema
skos:	http://www.w3.org/2004/02/skos/core#	Simple Knowledge Organization System

The registration process is specified by the Linked Data Platform and Registry vocabularies, which is an implementation of AS/NZS ISO 19135 (Standards Australia, 2006).

RDF is the basis of the knowledge-representation tools used on the W3C 'Semantic Web'. SKOS is an RDF application for representing term vocabularies and thesauri. Each term is represented as a 'concept', denoted by a URI, with the term (and any synonyms) as a 'label' for the concept, and broader/narrower relationships within a vocabulary, and with mapping relationships to concepts

in other vocabularies. By formalising a vocabulary using RDF the vocabulary can be explicitly linked to related vocabularies, and the vocabulary content can be published as a set of web resources, which allows the vocabulary to be used to classify data in a web context.

2.2.3   Register entities

An item that has been loaded in the LDR is called a 'registered entity'. Each entity has a set of properties that are part of its definition (Figure 11).
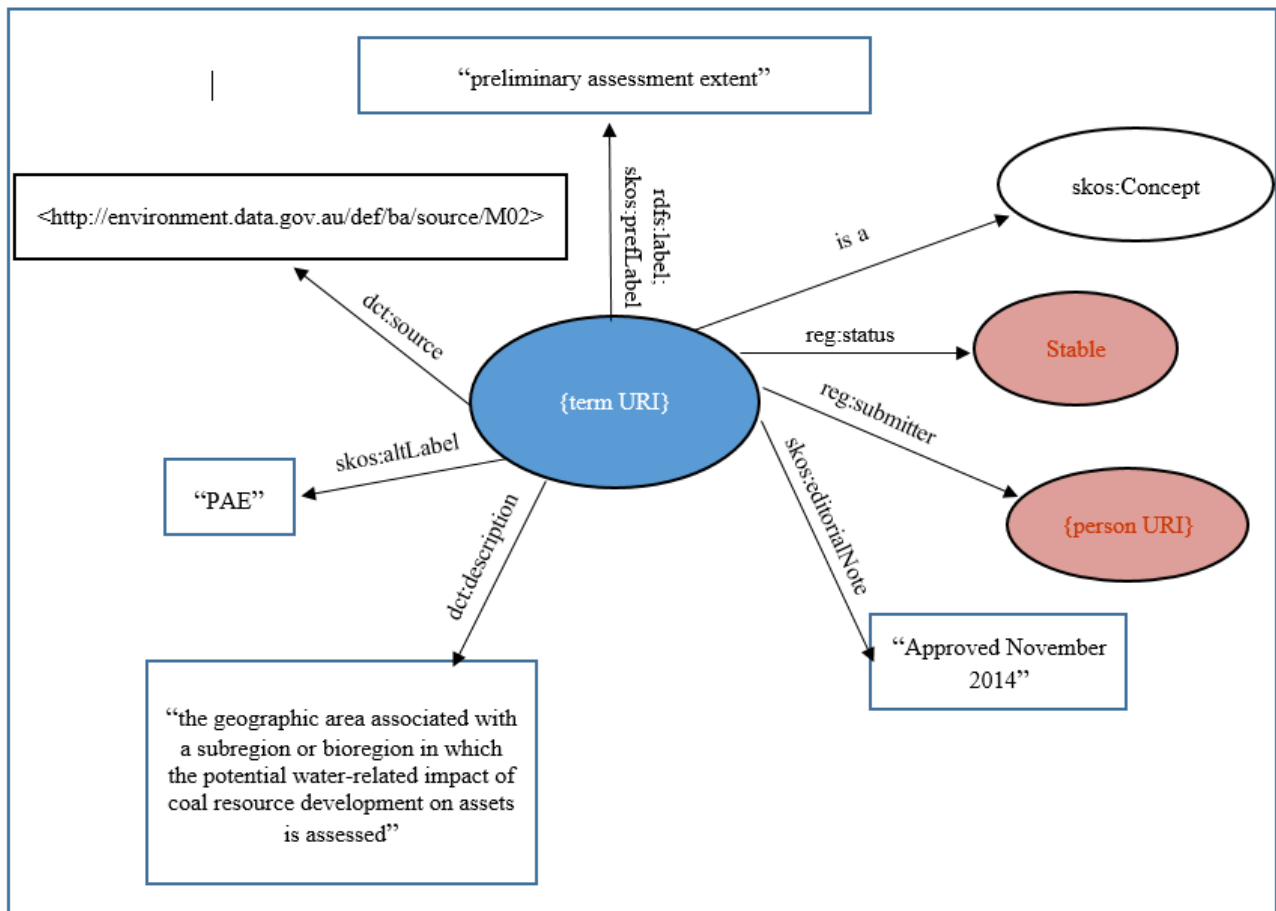
Figure 1 Representation of an entity (concept) in the BA Glossary

2.2.4   Entity properties

Table 5 describes the set of properties currently used to describe BA terms. For the purposes of the BA vocabulary, 'term' is synonymous with 'concept'. Note that these properties are all taken from the standard RDF vocabularies referred to in Table 4. Additional properties may be added to meet future requirements. Where possible these shall be taken from existing RDF vocabularies and the values of these properties are given as links to other web resources (URIs).

Table 5 Entity properties for the BA Glossary in Linked Data Registry using term 'Kurosols' as an example

Entity is available at http://environment.data.gov.au/def/ba/glossary/kurosols.

Property	Description	Example
dct:description	Definition of entity. This is the default value in LDR (because it applies to all kinds of resource types, not just skos:Concept)	'Soils other than Hydrosols with a clear or abrupt textural B horizon and in which the major part of the upper 0.2 m of the B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2 m thick) is strongly acid.'
skos:editorialNote	Information for administrative housekeeping	'Approved April 2015'
rdfs:label	A human-readable name for the entity	'Kurosols'
skos:prefLable	A human-readable name for the entity	'Kurosols'
skos:notation	A string of characters used to uniquely define an entity	'Ku'
skos:altLabel	The alternative lexical label for the entity	Not applicable
dct:rights	Information about rights held in and over the distribution	'© CSIRO 1996. You are not permitted to re-use this definition without permission from CSIRO. Further information is available at http://www.csiro.au/en/About/Footer/Copyright.'
dct:source	A related resource from which the described entity is derived	http://www.clw.csiro.au/aclep/asc_re_on_line/ku/kurosols.htm
skos:note	Used for any general notes that are cannot be fulfilled by other skos related properties that apply to notes	'This term and definition is used in technical products in the Bioregional Assessment Programme, a collaboration between the Australian Government Department of the Environment and Energy, the Bureau of Meteorology, CSIRO and Geoscience Australia. For more information see http://www.bioregionalassessments.gov.au.'
rdf:type	The entity is an instance of a class. For the BA Glossary, it is skos:Concept	skos:Concept

2.2.5 Status and life cycle

Each registered entity (concept) has a corresponding record for its registration metadata (called the 'RegisterItem'). This pertains to properties of its relationship to the registry, such as submission date, last modification date, version number, submitter ID and the item status, rather than the properties intrinsic to the concept definition detailed in Table 7.

Of particular interest is the 'status' property. The mapping of the LDR status for terms to the scientific quality assurance and approval process is described in Table 8. According to Tandy (2014), 'A registered item has an associated status within the register. This status is not an intrinsic

attribute of the entity itself but rather a statement of how the entity is regarded by the register's authority (its owner)'.

For the BA Glossary, only terms that have been approved are registered in the LDR and given the status 'stable'.

Definitions and links to related concepts may be modified during BA and during the scientific quality assurance and approval process. Provided these modifications do not imply a substantial change in the semantics of the concept, it is acceptable to continue to use the same URI to denote the concept. On the other hand, if the definition changes significantly, a new URI should be used. A concept that is no longer in use can be assigned the 'superseded' or 'retired' status.

2.2.6   History and versioning

LDR maintains a record of the history of changes to registers and registered entities. Each change that is saved to a registered entity creates a new version.

Figure 2 Display of historical versions for term 'groundwater' in Linked Data Registry

2.2.7   Namespace and URIs

Concepts in the BA Glossary are members of a single register with the following URI: http://www.environment.data.gov.au/def/ba/glossary.

This URI is used as the stem for the individual URIs for terms, such as http://www.environment.data.gov.au/def/ba/glossary/Sodosols.

Additional registers have been created to support the BA Glossary, such as lists of 'authorities' for terms, license and copyright conditions applicable to different terms:

- science http://environment.data.gov.au/def/ba/licence
- source http://environment.data.gov.au/def/ba/source
- landscape classification http://environment.data.gov.au/def/ba/landscape-classification

The domain name, 'environment.data.gov.au', is ideal because:

- It is a subsection of the Federal Government's data.gov.au digital data initiative.

- It is organisation, project and system independent thus removing the need for terms using this domain name to change when organisations, projects or systems change.
- It is designed specifically for persisting certain forms of environmental data, such as vocabularies.

2.2.8   Validation and maintenance of register entities

Administration and maintenance of registers and registered entities occur via two methods: (i) direct in the LDR via the Admin feature or (ii) through the LDR API using cURL. Section 5 describes the processes for submitting, editing, deleting and updating the status of registered entities for both methods.

3 Timeline for delivery to products and web

Table 6 describes the timeline for delivery of approved BA terms and definitions via the BA Glossary on http://environment.data.gov.au and incorporation with products. The initial batch of BA terms were derived from the BA methodology and submethodologies. Other terms were proposed by the Information Management team, and other terms are from the Australian Soil Classification (available online at http://www.clw.csiro.au/aclep/asc_re_on_line/soilhome.htm).

Although the proposed timeline indicates that only specified terms will undergo the workflow for quality assurance and approval, additional terms will be added to the BA Glossary as products are generated.

Table 6 Timeline for delivery of specified bioregional assessment terms[a] to products and website

Date	Item	Status
March 2015 and ongoing	Specified terms undergo proposed review and approval process	Ongoing
April 2015 and ongoing	Specified terms approved by Science Leadership Group Co-Chairs	Ongoing
May 2015 and ongoing	Additional specified terms undergo review and approval process	Ongoing
May 2015 and ongoing	Additional specified terms approved	Ongoing
May 2015 and ongoing	All approved BA terms uploaded to Linked Data Registry	Up to date and ongoing
May 2015	User testing of uploaded terms in Linked Data Registry; refinements to registry based on feedback	Complete
May to June 2015	Finalise testing Word macro hyperlinking glossary terms in products	Complete
May to June 2015	Devise process to hyperlink glossary terms in products and document and communicate process to Products team	Complete
November 2015	Group 2 products undergoing review and approval contain BA Glossary	Complete
February 2016	Release of Linked Data Registry to environment.data.gov.au	Complete

[a]Specified terms are: (i) terms derived from the BA methodology and submethodologies, (ii) approved data terms from the Information Management discipline and (iii) soil terms from the Australian Soil Classification System.

4   Roles and responsibilities

The roles and responsibilities of the participants involved in the workflow for the submission, quality assurance, revision and approval of terms and definitions are detailed in Table 7. The workflow roles are aligned with the roles outlined in international standard ISO 19135 *Geographic information – procedures for item registration*.

Table 7 Roles and responsibilities of each participant in the workflow for the submission, quality assurance, revision and approval of terms

Participant	ISO Standard registry role[a]	Responsibilities
Vocabulary Coordinator	Register Manager	Manage workflow for the submission, quality assurance, revision and approval of terms, including: • conducts preliminary quality assurance, and adds terms to registry, as requested by Term contributors • updates to definitions of terms in Registry and SharePoint, according to the quality assurance and approval workflow • updates to status of terms in registry, according to the quality assurance and approval workflow • recommends terms and definitions to Discipline Leaders, Senior Science Leaders and Science Leadership Group.
Term contributor (can be authors, editors, reviewers, Vocabulary Coordinator, Product Coordinators and others)	Submitting Organisation	• provides new terms and definitions to the Vocabulary Coordinator • suggests revisions on existing terms and definitions.
Discipline Leaders and Senior Science Leaders (selected on a term-by-term basis)	Special case of → Register User with immediate access to Vocabulary Coordinator	• review submissions and provides scientific quality assurance of terms, definitions • provide comments to Vocabulary Coordinator on any amendments or supports proposed terms and definitions • make recommendation to Science Leadership Group on supported terms and definitions.
Science Leadership Group	Special case of → Register User with immediate access to Vocabulary Coordinator	• determines whether terms and metadata are appropriate across disciplines and bioregions • provides comments to Vocabulary Coordinator on amendments.

Participant	ISO Standard registry role[a]	Responsibilities
Science Leadership Group Co-Chairs	Control Body	Grant final approval for release in Linked Data Registry

[a]Refers to AS/NZS ISO 19135:2006 *Geographic information – procedures for item registration*. The object of this Standard is to provide users and designers with the procedures to be followed in establishing, maintaining and publishing registers of unique, unambiguous and permanent identifiers and meanings that are assigned to items of geographic information (Standards Australia and Standards New Zealand, 2006)

5 Processes

5.1 Workflow for the submission, quality assurance, revision and approval of terms in the BA Glossary

Table 8 shows the workflow for the submission, quality assurance, revision and approval of BA Glossary terms. A diagram of this process is shown in Figure 33.

The workflow comprises the following components:

- submission of new term (or revision of existing term) to SharePoint
- preliminary quality assurance of term and definition
- scientific quality assurance
- comment from Senior Leadership Group (SLG)
- discussion (where needed)
- SLG Co-Chair approval
- submission of new term or revision of existing term in LDR.

The key points of this workflow are:

- All new and revised terms are submitted to SharePoint to activate the workflow.
- All comments and feedback are captured in SharePoint.
- Input from Discipline Leaders and/or Senior Science Leaders is essential.
- SLG Co-Chairs provide final approval.
- Only approved terms are added to LDR.
- Terms that have been approved are assigned the status 'Stable' in the BA Glossary.
- Any change to a term definition or status creates a new 'version' of the term as recorded in the LDR (e.g. http://environment.data.gov.au/def/ba/glossary/_activity:3).

Table 8 Workflow for submission, scientific quality assurance, revision and approval of bioregional assessment new and revised glossary terms

Step	Who	Action	Status of SharePoint item and/or register item in LDR
1a. New term - submission to Vocabulary Coordinator for new term	Term contributor	Submits new terms to TermQueriesSubmission for scientific quality assurance and approval	SharePoint status: 'Submitted'
1b. Existing term - submission to Vocabulary Coordinator for revision of existing term	Term contributor	Requests revision of existing definition in LDR by clicking on the 'Send comment' button or submits to TermQueriesSubmission in SharePoint.	• Register item status remains 'Stable' • SharePoint status: 'With vocabluary coordinator'
2. Preliminary quality assurance	Vocabulary Coordinator	• Edits the term record by checking accordance to BA Product Standards, checking the authority, identifies the relevant Discipline Leader(s) • For definitions created by the Term contributor: checks to see whether an existing authority is suitable. • For reused definitions: checks authority to determine if it is from an approved authority. If not, then has a discussion with Term contributor about suitability of definition from approved authority.	SharePoint status 'With vocabulary coordinator'
3. Submission to scientific quality assurers	Vocabulary Coordinator	Runs a report in SharePoint based on status and discipline and sends to scientific quality assurers as an Excel spreadsheet.	SharePoint status 'Sent to quality assurer'
4. Scientific quality assurance	Discipline Leaders or Senior Science Leaders[a]	• Scientifically quality assure the term and definition • Make recommendations to Vocabulary Coordinator on term and its definition and suggest other changes as required.	No change
	Vocabulary Coordinator	Updates term definition in SharePoint with feedback as required	No change
5. Assessment of term and definition for comment	Vocabulary Coordinator	Sends Word document containing Term contributor's submission and scientific quality assurer's recommendations by email prior to SLG meeting	SharePoint status 'Sent to SLG for comment'
	Science Leadership Group	• Determines if term and definition are appropriate across disciplines and bioregions • Sends email to Vocabulary Coordinator if changes are needed to term definition.	na
6. Discussion	Vocabulary Coordinator	If SLG do not agree with term definition: Vocabulary Coordinator identifies relevant SLG members and Discipline Leaders and initiates discussion to reach agreement on term definition	SharePoint status: 'Discussion'

Step	Who	Action	Status of SharePoint item and/or register item in LDR
7. Approval	Vocabulary Coordinator	Sends Word document with terms, definitions and related discussions to SLG Co-Chairs for final approval	SharePoint status: 'Sent to SLG Co-Chairs for final approval'
	SLG Co-Chairs	Provides decision to Vocabulary Coordinator	na
8. Discussion (only if SLG Co-Chairs are not in agreement on term definition)	Vocabulary Coordinator	If SLG Co-Chairs do not agree with term definition: Vocabulary Coordinator identifies Discipline Leaders and initiates discussion with SLG Co-Chairs to reach agreement on term definition	SharePoint status: 'Discussion'
9a. Update LDR – new term	Vocabulary Coordinator	• Creates entry in the BA vocabulary register • Enters editorialNote property in LDR: 'Approved Month Year'	• SharePoint status: 'Approved – awaiting publication in product' • Registry status: 'Stable'
9b. Update LDR – existing term	Vocabulary Coordinator	Updates LDR with notes on decision from SLG Co-Chairs, updates status of term and makes other changes to the term record if necessary editorialNote property in LDR: update to new approved date 'Approved Month Year'	• SharePoint status: 'Approved – awaiting publication in product' • Registry status: 'Stable'
9c. Update LDR – retire term	Vocabulary Coordinator	• Updates LDR with notes on decision from SLG Co-Chairs, updates status of term and makes other changes to the term record if necessary • Updates editorialNote property in LDF to retired date: 'Retired Month Year'	• SharePoint status: 'Retired' • Registry status: 'Retired'

[a]Status in LDR is based on the life cycle of status transitions https://github.com/UKGovLD/ukl-registry-poc/wiki/Principles-and-concepts#status-and-life-cycle. A typical sequence is submitted→experimental→stable→superseded; however, only 'stable' 'retired' statuses have been used for the Bioregional Assessment Glossary.
[b]Discipline Leaders provide scientific quality assurance for terms that are generated and used by a particular discipline. Senior Science Leaders review terms that are more general to all of BA.
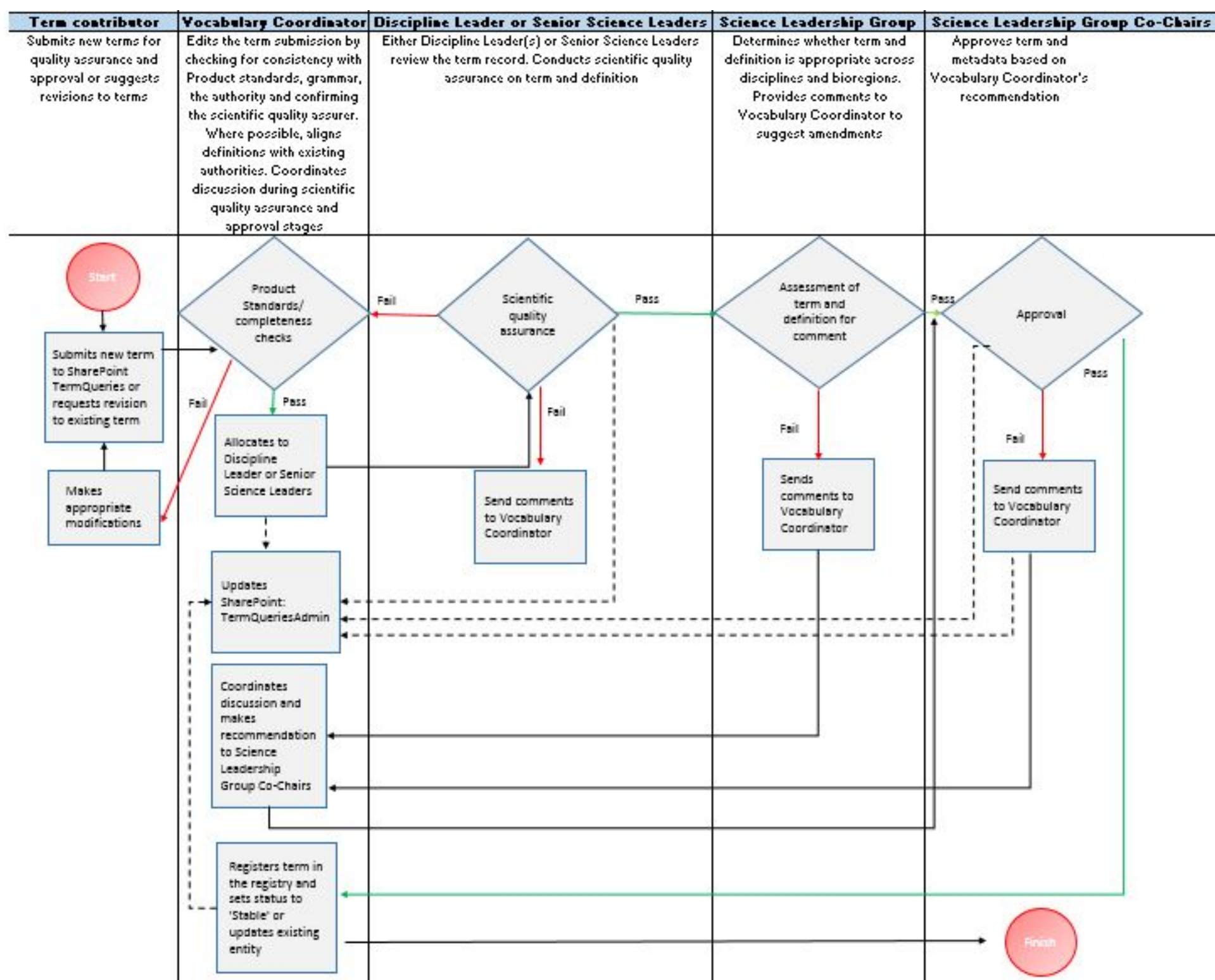
Figure 3 Diagram of workflow for submission, scientific quality assurance, revision and approval of terms

This figure has been optimised for printing on A3 paper (297 mm x 420 mm).

Terms may be submitted at any time. Terms that have undergone scientific quality assurance are submitted to the SLG for comment, and then to the SLG Co-Chairs for final approval. Submissions should be processed promptly for consideration at the earliest next possible SLG meeting to ensure a timely scientific quality assurance and approval process. As the SLG meets once a month, terms will be considered and then approved by the SLG Co-Chairs on a monthly basis.

The workflow adheres to these timeframes for completion of actions:

- scientific quality assurance can occur at any time, but must be completed a week before SLG meeting if terms are to be considered for that month's SLG
- 4 days for comment that starts from the day of the SLG meeting
- 2 to 3 days for final approval from the SLG Co-Chairs. This timeframe can be flexible if further consideration is required
- 2 days for submission to LDR.

5.2 Responsibilities of the Vocabulary Coordinator during the scientific quality assurance and approval process

Once a term is submitted to TermQueriesSubmission, the Vocabulary Coordinator receives an email alert and commences the scientific quality assurance and approval process (Table 8).

The Vocabulary Coordinator does the following:

1. **Checks the authority (Step 2).** If the Term contributor has not used one of the recommended authorities or has created a definition, then the Vocabulary Coordinator searches the list of approved authorities for a similar definition and records this information in the Vocabulary Coordinator's comments. For reused definitions: checks authority to determine if it is from an approved authority. If not, then has a discussion with Term contributor about suitability of definition from approved authority. Term definitions are presented to SLG exactly as they are displayed in the authority, with no changes, regardless of whether there are grammatical errors or defintion does not follow the *Product standards*.

2. **Sends terms, definitions and associated properties for review by Discipline Leader or Senior Science Leaders (Step 3).** Ordinarily, there are a range of terms that require scientific quality assurance for different disciplines; therefore, individual terms are emailed to the relevant scientific quality assurer. For batches of terms that require approval from the same scientific quality assurer, a list of submitted items displayed in the 'QualityAssurance' view and is exported from TermQueriesAdmin to an Excel spreadsheet. The Excel spreadsheet is saved in the 'QualityAssurance' folder in the Glossary SharePoint library using this filename convention: 'BA-Discipline name-Terms-QA-v01'.

3. **Records comments from scientific quality assurance in TermQueriesAdmin (Step 4).** The Vocabulary Coordinator records comments from the quality assurer in the relevant comment property for the term in the TermQueriesAdmin SharePoint form.

4. **Provides the SLG with a list of reviewed terms and definitions (Step 5).** The SharePoint list item status is changed to 'Sent to SLG for comment'. Two days before the SLG meeting, a Word document is created (to capture tracked changes) that contains the scientific quality

assurers' comments and saved to the SharePoint folder 'SLGcomment' under filename 'BA-terms-for-SLG-comment-DateofSLGmeeting' (i.e. 'BA-terms-for-SLG-comment-14May2015'). An email is sent to the BA Programme Coordinator and Products Team Leader advising of the new terms and definitions ready for comment. These terms are tabled at every SLG meeting and the SLG is advised on the deadline to provide comment at the meeting.

5. **Coordinates discussion (if needed) (Step 6, Step 8)**. If comments are received from SLG or if SLG Co-Chairs have differing opinions, the Vocabulary Coodinator initiates discussion with the relevant scientific quality assurer(s) to gain agreement on term definition.

6. **Sends terms and definitions to SLG Co-Chairs for final approval (Step 7).** If a discussion has occurred, once the discussion is finalised, then the terms and definitions are ready for approval. If no comments have been received from the SLG, then it is assumed that the terms and definitions are ready for final approval. The Vocabulary Coordinator sends an email to the SLG Co-Chairs, along with the final list of terms and definitions, requesting approval.

7. **Updates SharePoint list and LDR (Step 9a, 9b).** Both statuses are updated in LDR and TermQueriesAdmin to reflect the approval. In SharePoint, the list item is finalised by changing the Status to 'Approved'; updating the editorialNote field to approved, along with the date (i.e. Approved November 2017); and adding the URI for a new term (see Table 8).

5.3 Term and definition acquisition

There are several ways that terms can be acquired for the BA Glossary:

- supplied individually by the author during writing of the product
- harvested at first edit stage before internal review for technical products
- suggested by external reviewers
- gleaned from the existing methodology and submethodologies.

All terms are submitted to SharePoint to activate the scientific quality assurance and approval process.

5.4 Submitting a new term

SharePoint is used for the submission of new, proposed terms or revision of existing, approved terms. Proposed terms can also be submitted without definitions by Term contributors.

Terms are submitted via the TermQueriesSubmission SharePoint list.

Once a term has been approved, it is then submitted as a register entity in LDR.

5.4.1 Submitting new register entities in LDR

Once a term has been approved by the SLG Co-Chairs, it is submitted to LDR by the Vocabulary Coordinator. A term is submitted to the LDR by using either the Admin feature (Figure 4) in the

LDR or the 'POST' operation through the LDR API (application programming interface). A batch of terms is submitted to the LDR by uploading prepared data[1] to the existing register.

5.4.1.1 LDR Admin

New terms can be added to a register using unique forms available from the Admin feature. The process to access and complete the form, and submit a term to a register is:

1. Login to LDR.
2. Click on 'glossary' folder.
3. Click on 'Admin' from right side menu (see Figure 4).
4. Click on 'Add registration' from the register (see Figure 4).
5. Click on 'General entry form'.
6. From dropdown menus, select the 'ConceptWithMappings' form from the dropdown menu.
7. Complete the form as per .Table 9
8. Click on the 'Create and register' button at the bottom of the form.
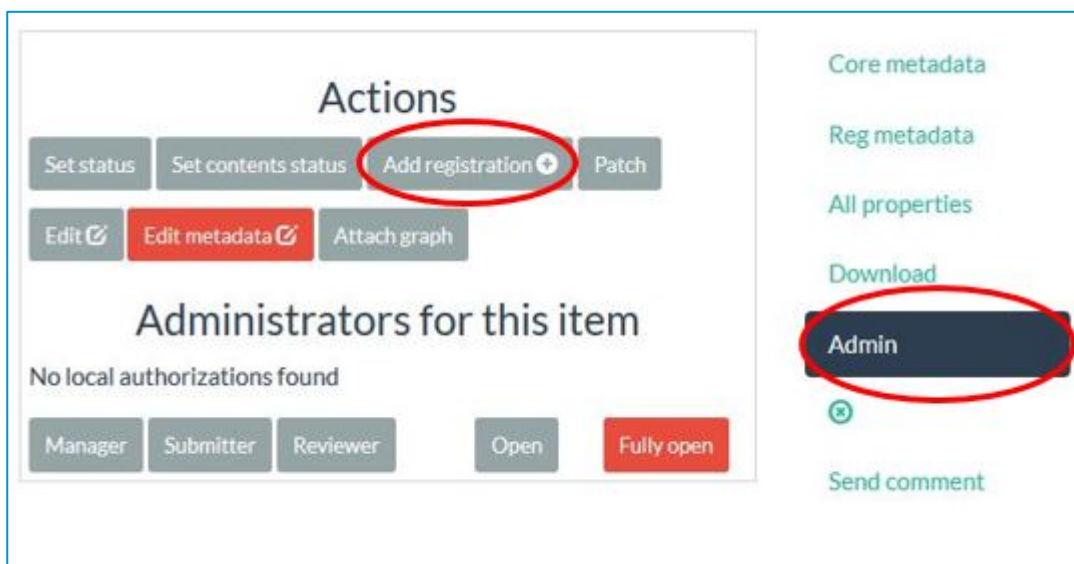

Figure 4 Admin feature and 'Add registration' button in LDR

The ConceptWithMappings form contains properties used for register items for the BA Glossary. These properties are described in Table 9.

Other properties can only be added to a register item after the form has been created (completed) and registered for the first time.

Property values can be entered as a string, URL or numerals (Figure 55). Strings and numerals must be enclosed in double quotations. URLs must be enclosed in carets. When completing the form for the first time, LDR will automatically configure strings, URLs and numerals. If additional properties

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[1]This is a multi-step process. Instructions are detailed https://confluence.csiro.au/display/VOCAB/Managing+data+in+the+LDR+through+the+API and https://wiki.csiro.au/pages/viewpage.action?pageId=683377553#Pre-conditioningRDF/SKOSforLDR-1.Pre-requisitesandscope

are added after the form has been submitted, then the user will need to configure properties accordingly (see Section 5.5).

Figure 5 Requirements for properties in the 'Edit' feature of LDR

Table 9 Fields in ConceptWithMappings general entry form – example using the term 'bioregional assessment'

Property	Example value	Mandatory (Y/N)
id	bioregional-assessment	Y
label	bioregional assessment	Y
description or definition	a scientific analysis of the ecology, hydrology, geology and hydrogeology of a bioregion, with explicit assessment of the potential direct, indirect and cumulative impacts of coal seam gas and coal mining development on water resources. The central purpose of bioregional assessments is to analyse the impacts and risks associated with changes to water-dependent assets that arise in response to current and future pathways of coal seam gas and coal mining development.	Y
preferred label	bioregional assessment	N
alternative label	BA	N
source of definition	http://environment.data.gov.au/def/ba/source/M01	N
editorial note	Approved October 2013	N
acronym, code or symbol	If not relevant, then leave empty	N
rights statement	© Commonwealth of Australia 201X. All content in this entry is provided under a Creative Commons Attribution 3.0 Australia Licence. The Bioregional Assessment Programme requests attribution as '© Commonwealth of Australia 201X (Bioregional Assessment Programme http://www.bioregionalassessments.gov.au)	N

5.4.1.2 LDR API

For the LDR API[2]:

The POST operation is used to add a new item(s):

```
curl -i -b cookie-jar -c cookie-jar -X POST -H "Content-Type: text/turtle" -T
"{item3.ttl}" http://{registry.example.org/registerA}[?status={value}]
```

The success code is HTTP 201.

The input (for example, item3.ttl) is a Turtle file, in the directory where you are running the cURL program. It should contain the following:

- declarations for **all** namespace prefixes that appear in the file
- one or more items to be added to the register, expressed as a set of RDF triples describing the item, and usually denoted by a local URI.

---

[2] Full instructions are available at https://wiki.csiro.au/display/VOCAB/Managing+data+in+the+LDR+through+the+API. Instructions can be provided upon request to those who cannot access this URL.

5.5 Editing entities in LDR

Registered entities are modified if (i) a property is modified or deleted (ii) a new property is added or (iii) the status is changed. Registered entities can only be edited by the Vocabulary Coordinator. Entries are edited through either the (i) LDR Admin or (ii) LDR API using cURL.

Note that the LDR Admin is not able to remove properties – only the values of the properties can be edited or a new property can be added. If a *property needs to be removed*, then a 'PUT' operation is performed using the LDR API (see Section 5.5.2); this will replace the existing item in the registry.

5.5.1 LDR Admin

5.5.1.1 *General editing instructions*

1. Login to LDR.
2. Click on selected registered entity in LDR.
3. Click on Admin (Figure 6).
4. In 'Actions', click on 'Edit' to edit or add properties. This will take you to the form that supports the properties for the registered entity
5. To edit, click on the value, adjust the value, click on the 'checkmark' symbol to save value against property (Figure 67)
6. Click on 'Save changes' to save your changes. If you do not want to save, then click the 'Close' button.

Figure 6 Snapsnot of the editing function in LDR

5.5.1.2 Adding and removing property values

1. To add an additional value for an existing property, click on the '+' symbol alongside the property. This will create a duplicate property with an empty field. The example in Figure 7 shows an additional value being added to the dct:description property.

2. To remove a property value, click on the '−' symbol alongside the entry. Note that this only works for property values that have been added at the time of the edit. The only option to remove a value is through the LDR API (see Section 5.5.2.1).

3. To add a new property for the registered entity click on the '+' symbol at the bottom of the form (Figure 9). This will display a new blank property field at the bottom of the form (Figure 8).

4. Enter the relevant property (e.g. 'skos:exactMatch') and the property name (string, URI or numeral) followed by clicking the checkmark, then enter the value followed by clicking the checkmark (Figure 9). Properties used in the BA Glossary are detailed in Table 5.

5. Finally, click on 'Save changes' button at the bottom of the form.

A new version of the registered entity is created.

Figure 7 Adding a new property to a registered entity

Figure 8 New property field displaying 'Empty' placeholders for property and property name

Figure 9 Adding content to new property field for registered entity

5.5.1.3 Removing a property

Properties cannot be removed using LDR Admin; they must be removed via the LDR API (see Section 5.5.2.1).

5.5.1.4 Editing the status

Changing the status of the registered entity is a similar process to editing properties, however it is a separate function in LDR.

1. Click on 'Admin' feature.
2. Click on selected registered entity in LDR.
3. Click on Set status (Figure 10 Figure).

4. Select the relevant status.

5. Click close.

A new version of the registered entity is created.
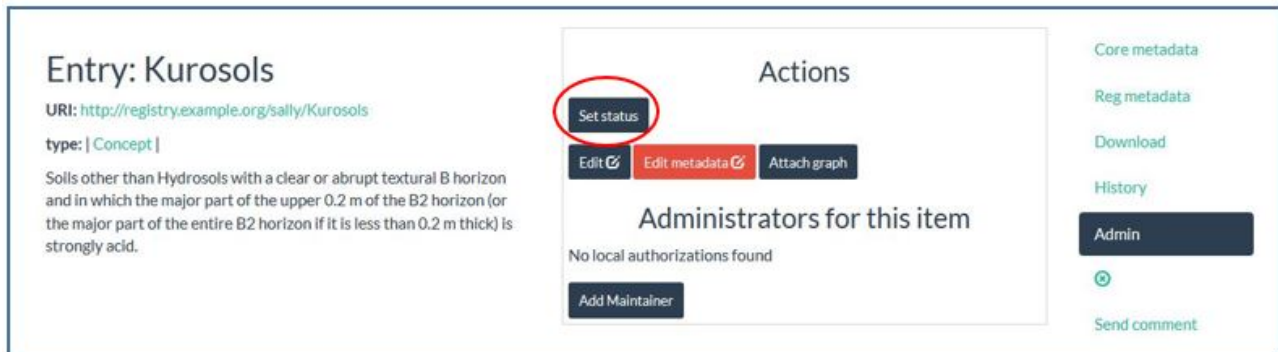
Figure 10 Set status function

5.5.2 LDR API

5.5.2.1 *Removing a property using LDR API*

As indicated previously, properties cannot be removed in LDR Admin. If a property needs to be removed, then the 'PUT' operation is used.

```
curl -i -b cookie-jar -c cookie-jar -X PUT -H "Content-Type: text/turtle" -T "{item3.ttl}"
http://{registry.example.org/registerA}[?status={value}]
```

The target URI (here http://registry.example.org/registerA/item3) is the item to be replaced. For example, if a property for the concept 'activity' needed to be removed. The target URI would be 'http://registry2.it.csiro.au/def/ba/glossary'. The input (item3.ttl) is the Turtle file for 'activity' (i.e. activity.ttl) describing the item being replaced.

The steps involved are:

1. Download the concept's Turtle file from LDR. Select plain format.

2. Open the file in Notepad++.
3. Remove the property and related values.
4. Save.
5. Run the cURL operation[3].

5.6   Deleting entities in LDR

An entity cannot be deleted from the LDR. Once an item has been registered and its URI created, it is persistent for the lifetime of the registry. However, the status can be changed to 'retired' or 'superseded', which indicates that the entity is no longer valid for use.

5.7   Retiring terms

The status 'retired' is used if terms are no longer being used by the Programme. The term remains in the BA Glossary, however, the status is visible as 'retired'.

The scope note property is updated to reflect the date the term was retired.

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[3] More detail is available at: https://confluence.csiro.au/display/VOCAB/Managing+data+in+the+LDR+through+the+API. Instructions can be provided upon request to those who cannot access this URL.

# 6	Standards for terms and definitions

## 6.1.1	Definitions and authorities

Authorities for definitions are provided by the Term Contributor and approved by the Discipline Leader via the term's quality control process.

Definitions that are reused from other authorities will not be altered.

7 Hyperlinking terms in products and the print glossary

Two tools have been created to hyperlink terms in products to the LDR:

- First instance hyperlink – generates one hyperlink per term in each product section
- Print glossary generator – generates a print glossary at the end of the product.

The products team has developed a Word macro that hyperlinks terms in products (Figure 11) to their respective registered entity in LDR and generates a print glossary at the end of the document (Figure 12). As products are available in both PDF and HTML formats, only the HTML format contains hyperlinked terms.
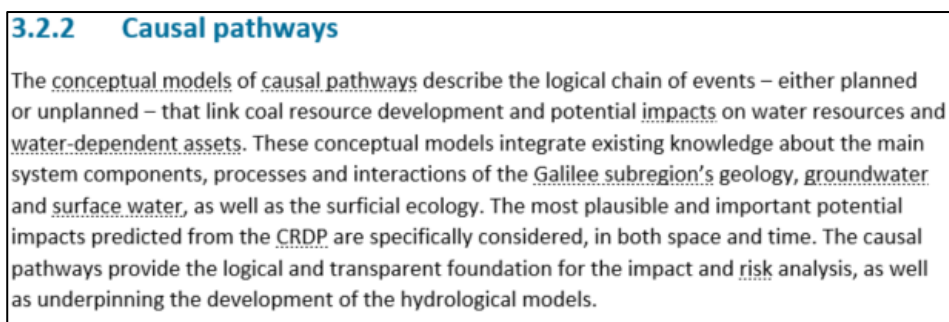

3.2.2 Causal pathways

The conceptual models of causal pathways describe the logical chain of events – either planned or unplanned – that link coal resource development and potential impacts on water resources and water-dependent assets. These conceptual models integrate existing knowledge about the main system components, processes and interactions of the Galilee subregion's geology, groundwater and surface water, as well as the surficial ecology. The most plausible and important potential impacts predicted from the CRDP are specifically considered, in both space and time. The causal pathways provide the logical and transparent foundation for the impact and risk analysis, as well as underpinning the development of the hydrological models.

Figure 11 Excerpt of hyperlinked text using the first instance hyperlink tool

Glossary

The register of terms and definitions used in the Bioregional Assessment Programme is available online at http://environment.data.gov.au/def/ba/glossary (note that terms and definitions are respectively listed under the 'Name' and 'Description' columns in this register). This register is a list of terms, which are the preferred descriptors for concepts. Other properties are included for each term, including licence information, source of definition and date of approval. Semantic relatic http://environment.data.gov.au/def/ba/ nships) are formalised for some terms, as well as linkages to oth glossary/_activity:3

Click to follow link

activity: for the purposes of Impact Modes and Effects Analysis (IMEA), a planned event associated with a coal seam gas (CSG) operation or coal mine. For example, activities during the production life-cycle stage in a CSG operation include drilling and coring, ground-based geophysics and surface core testing. Activities are grouped into components, which are grouped into life-cycle stages.

additional coal resource development: all coal mines and coal seam gas (CSG) fields, including expansions of baseline operations, that are expected to begin commercial production after December 2012
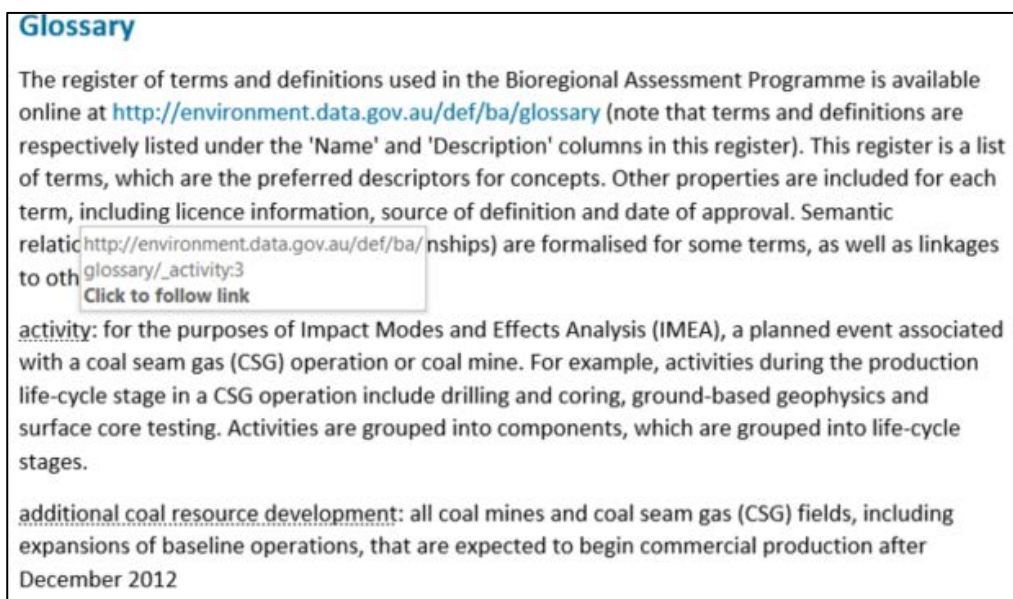
Figure 12 Representation of glossary generated by the print glossary generator tool

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www.bioregionalassessments.gov.au

Australian Government

Department of the Environment and Energy

Bureau of Meteorology

Geoscience Australia

CSIRO