Ecological Data Exchange Specification (working title)

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Status: Draft - while the document is in draft, sections of the document may contain placeholders such as TBA and TBD.

1. Metadata

IRI	https://linked.data.gov.au/def/rlp/spec (TBC)
Title	Ecological Data Exchange Specification (working title)
Definition	This document lists the normative requirements for data aiming to conform to the TERN Ecosystem Surveillance Ecological Monitoring Protocols. It is to be used as the authoritative, human-readable list of individual requirements from which profile artefacts such as validators are derived from.
Created	2022-03-14
Modified	2022-03-16
Creator	TERN

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Further information	This document is part of the Services Agreement for the provision of standardised ecological monitoring protocols and systems for data collection, storage and management. Procurement Number (PRN): 360 000 5101 Commonwealth of Australia as represented by the Department of Agriculture, Water and the Environment ABN 34 190 894 983 (**Department**) The University of Queensland as represented by TERN ABN 63 942 912 684 (**Service Provider**)
Alternate document formats	PDF

2. Preamble

2.1. Abstract

TERN Ecosystem Surveillance have developed 19 modules to standardise ecological monitoring protocols for data collection. The working title for the monitoring protocols is *TERN Ecosystem Surveillance Ecological Monitoring Protocols*.

TERN Data Services and Analytics is developing a standardised data exchange specification to support the exchange of data collected using TERN Ecosystem Surveillance Ecological Monitoring Protocols. The working title for the data exchange specification is *Ecological Data Exchange Specification*.

The Ecological Data Exchange Specification is a profile of the ecological data model known as the TERN Ontology. Data that is conformant to the Ecological Data Exchange Specification is also conformant to the TERN Ontology.

2.2. Normative Status

This specification is normative for the exchange of data collected using TERN Ecosystem Surveillance Ecological Monitoring Protocols.

2.3. Standard Parts

This specification document is one of many resources that together form the Ecological Data Exchange Specification Profile.

Other parts of this standard include:

TBA.

2.4. Namespaces

Prefix	Namespace	Name	Description
reg:	http://purl.org/linked-data/registry#	Registry Ontology	Core ontology for Linked Data registry services. Based on ISO 19135 but heavily modified to suit Linked Data representations and applications.
sosa:	http://www.w3.org/ns/sosa/	SOSA	Sensor, Observation, Sample, and Actuator (SOSA) is a semantic data model to represent observations and samplings.
tern:	https://w3id.org/tern/ontologies/tern/	TERN Ontology	A profile of SOSA and PROV with minor additions to represent ecological field survey data.
unit:	http://qudt.org/vocab/unit/	QUDT Units vocabulary	A vocabulary of *units of measure* defined using the QUDT semantic data model.

3. Requirements

3.1. Domain Model Conformance

Requirements define the rules and constraints which data must conform to in order to be valid.

A *status* is assigned to each requirement. The *status* code list used in this document is defined by the Registry ontology and a subset of the status codes are redefined here:

- `submitted` - A proposed entry which is not yet approved for use for use. Corresponds to ISO 19135:(redraft) 'submitted'.
- `invalid` - An entry which has been invalidated due to serious flaws, distinct from retrirement. Corresponds to ISO 19135(redraft) 'invalid'.
- `stable` - An entry that is seen as having a reasonable measure of stability, may be used to mark the full adoption of a previously 'experimental' entry.

3.1.1. Plot Description Module Conformance Class Requirements

Requirements that have been accepted and are **stable** are marked with a green check mark.

For example:

Property	Value
Status	`stable` ⊘

3.1.1.1. Aspect Observation

3.1.1.1.1. Feature type

Property	Value
Identifier	`urn:shapes:plot-description:aspect:feature-type`
Label	Feature type
Definition	The value of `tern:featureType` must be `landform`.
Comment	TERN's ecologists have determined the feature type is *landform*, defined by the Australian Soil and Land Survey Field Handbook.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/aspect/shapes.ttl`
Examples	Valid: `/shapes/plot-description/aspect/valid.ttl` Invalid: `/shapes/plot-description/aspect/invalid.ttl`

3.1.1.1.2. Simple result

Property	Value
Identifier	`urn:shapes:plot-description:aspect:simple-result`
Label	Simple result
Definition	The observation's `sosa:hasSimpleResult` *MUST* have a value that is the same as the value in the value node of `sosa:hasResult`.
Comment	Value of `sosa:hasSimpleResult` must be the same as the value in `sosa:hasResult`.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/aspect/shapes.ttl`
Examples	Valid: `/shapes/plot-description/aspect/valid.ttl` Invalid: `/shapes/plot-description/aspect/invalid.ttl`

3.1.1.1.3. Site visit

Property	Value
Identifier	`urn:shapes:plot-description:aspect:site-visit`
Label	Site visit
Definition	Observations *MUST* have a value for `tern:hasSiteVisit`.
Comment	Observations following the Plot Description protocol are made in the context of a site visit.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/aspect/shapes.ttl`
Examples	Valid: `/shapes/plot-description/aspect/valid.ttl` Invalid: `/shapes/plot-description/aspect/invalid.ttl`

3.1.1.1.4. Unit of measure

Property	Value
Identifier	`urn:shapes:plot-description:aspect:unit-of-measure`
Label	Unit of measure
Definition	The result *MUST* have `unit:DEG` as the value for `tern:unit`.
Comment	Result value's unit of measure must have the value `unit:DEG`.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/aspect/shapes.ttl`
Examples	Valid: `/shapes/plot-description/aspect/valid.ttl` Invalid: `/shapes/plot-description/aspect/invalid.ttl`

3.1.1.1.5. Used procedure

Property	Value
Identifier	`urn:shapes:plot-description:aspect:used-procedure`
Label	Used procedure

Property	Value
Definition	The observation's sosa:usedProcedure *MUST* have the value https://linked.data.gov.au/def/test/dawe-cv/1ff9e97c-3bdd-44c9-bdd3-401fa31c0b32.
Comment	IRI of procedure must have the value https://linked.data.gov.au/def/test/dawe-cv/1ff9e97c-3bdd-44c9-bdd3-401fa31c0b32. https://linked.data.gov.au/def/test/dawe-cv/1ff9e97c-3bdd-44c9-bdd3-401fa31c0b32 is the IRI for "Plot Description".
Status	submitted ◯
Conformance Classes	TBA
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	/shapes/plot-description/aspect/shapes.ttl
Examples	Valid: /shapes/plot-description/aspect/valid.ttl Invalid: /shapes/plot-description/aspect/invalid.ttl

3.1.1.1.6. Value range

Property	Value
Identifier	urn:shapes:plot-description:aspect:value-range
Label	Value range
Definition	The result *MUST* have a value between 0 exclusive and 360 inclusive.
Comment	Value must be between 0 exclusive and 360 inclusive.
Status	submitted ◯
Conformance Classes	TBA
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	/shapes/plot-description/aspect/shapes.ttl
Examples	Valid: /shapes/plot-description/aspect/valid.ttl Invalid: /shapes/plot-description/aspect/invalid.ttl

3.1.1.1.7. Value type

Property	Value
Identifier	urn:shapes:plot-description:aspect:value-type
Label	Value type
Definition	The result *MUST* be an instance of tern:Float.

Property	Value
Comment	The value of `sosa:hasResult` must be a `tern:Float`.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/aspect/shapes.ttl`
Examples	Valid: `/shapes/plot-description/aspect/valid.ttl` Invalid: `/shapes/plot-description/aspect/invalid.ttl`

3.1.1.2. Slope Observation

3.1.1.2.1. Feature type

Property	Value
Identifier	`urn:shapes:plot-description:slope:feature-type`
Label	Feature type
Definition	The value of `tern:featureType` must be `landform`.
Comment	TERN's ecologists have determined the feature type is *landform*, defined by the Australian Soil and Land Survey Field Handbook.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope/valid.ttl` Invalid: `/shapes/plot-description/slope/invalid.ttl`

3.1.1.2.2. Simple result

Property	Value
Identifier	`urn:shapes:plot-description:slope:simple-result`
Label	Simple result
Definition	The observation's `sosa:hasSimpleResult` *MUST* have a value that is the same as the value in the value node of `sosa:hasResult`.
Comment	Value of `sosa:hasSimpleResult` must be the same as the value in `sosa:hasResult`.
Status	`submitted` ◯

Property	Value
Conformance Classes	TBA
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	/shapes/plot-description/slope/shapes.ttl
Examples	Valid: /shapes/plot-description/slope/valid.ttl Invalid: /shapes/plot-description/slope/invalid.ttl

3.1.1.2.3. Site visit

Property	Value
Identifier	urn:shapes:plot-description:slope:site-visit
Label	Site visit
Definition	Observations *MUST* have a value for tern:hasSiteVisit.
Comment	Observations following the Plot Description protocol are made in the context of a site visit.
Status	submitted ◯
Conformance Classes	TBA
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	/shapes/plot-description/slope/shapes.ttl
Examples	Valid: /shapes/plot-description/slope/valid.ttl Invalid: /shapes/plot-description/slope/invalid.ttl

3.1.1.2.4. Unit of measure

Property	Value
Identifier	urn:shapes:plot-description:slope:unit-of-measure
Label	Unit of measure
Definition	The result *MUST* have unit:DEG as the value for tern:unit.
Comment	Result value's unit of measure must have the value unit:DEG.
Status	submitted ◯
Conformance Classes	TBA
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	/shapes/plot-description/slope/shapes.ttl

Property	Value
Examples	Valid: `/shapes/plot-description/slope/valid.ttl` Invalid: `/shapes/plot-description/slope/invalid.ttl`

3.1.1.2.5. Used procedure

Property	Value
Identifier	`urn:shapes:plot-description:slope:used-procedure`
Label	Used procedure
Definition	The observation's `sosa:usedProcedure` *MUST* have the value `https://linked.data.gov.au/def/test/dawe-cv/1ff9e97c-3bdd-44c9-bdd3-401fa31c0b32`.
Comment	IRI of procedure must have the value `https://linked.data.gov.au/def/test/dawe-cv/1ff9e97c-3bdd-44c9-bdd3-401fa31c0b32`. `https://linked.data.gov.au/def/test/dawe-cv/1ff9e97c-3bdd-44c9-bdd3-401fa31c0b32` is the IRI for "Plot Description".
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope/valid.ttl` Invalid: `/shapes/plot-description/slope/invalid.ttl`

3.1.1.2.6. Value range

Property	Value
Identifier	`urn:shapes:plot-description:slope:value-range`
Label	Value range
Definition	The result *MUST* have a value between 0 and 90 inclusively.
Comment	Value must be between 0 and 90 inclusive.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope/shapes.ttl`

Property	Value
Examples	Valid: `/shapes/plot-description/slope/valid.ttl` Invalid: `/shapes/plot-description/slope/invalid.ttl`

3.1.1.2.7. Value type

Property	Value
Identifier	`urn:shapes:plot-description:slope:value-type`
Label	Value type
Definition	The result *MUST* be an instance of `tern:Float`.
Comment	The value of `sosa:hasResult` must be a `tern:Float`.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope/valid.ttl` Invalid: `/shapes/plot-description/slope/invalid.ttl`

3.1.1.3. Slope type Observation

3.1.1.3.1. Feature type

Property	Value
Identifier	`urn:shapes:plot-description:slope-type:feature-type`
Label	Feature type
Definition	Instances of `tern:Observation` with `sosa:observedProperty` value `TBA` *MUST* have a `tern:featureType` with the value `landform`.
Comment	TERN's ecologists have determined the feature type is *landform*, defined by the Australian Soil and Land Survey Field Handbook.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope-type/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope-type/valid.ttl` Invalid: `/shapes/plot-description/slope-type/invalid.ttl`

3.1.1.3.2. Result value

Property	Value
Identifier	`urn:shapes:plot-description:slope-type:result-value`
Label	Result value
Definition	The value of `rdf:value` *MUST* exist in the Plot slope codes controlled vocabulary.
Comment	The value in `sosa:hasResult` must be a value in `sh:in`, which is the Plot slope codes controlled vocabulary.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope-type/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope-type/valid.ttl` Invalid: `/shapes/plot-description/slope-type/invalid.ttl`

3.1.1.3.3. Simple result

Property	Value
Identifier	`urn:shapes:plot-description:slope-type:simple-result`
Label	Simple result
Definition	Instances of `tern:Observation` *MUST* have a `sosa:hasSimpleResult` where the value is the same as the `rdf:value` on the value node of `sosa:hasResult`.
Comment	Value of `sosa:hasSimpleResult` must be the same as the value in `sosa:hasResult`.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope-type/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope-type/valid.ttl` Invalid: `/shapes/plot-description/slope-type/invalid.ttl`

3.1.1.3.4. Site visit

Property	Value
Identifier	`urn:shapes:plot-description:slope-type:site-visit`
Label	Site visit

Property	Value
Definition	Instances of `tern:Observation` with `sosa:observedProperty` value `TBA` *MUST* have a value for `tern:hasSiteVisit`.
Comment	Observations following the Plot Description protocol are made in the context of a site visit.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope-type/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope-type/valid.ttl` Invalid: `/shapes/plot-description/slope-type/invalid.ttl`

3.1.1.3.5. Used procedure

Property	Value
Identifier	`urn:shapes:plot-description:slope-type:used-procedure`
Label	Used procedure
Definition	Instances of `tern:Observation` with `sosa:observedProperty` value `TBA` *MUST* have a `sosa:usedProcedure` where the value is `https://linked.data.gov.au/def/test/dawe-cv/1ff9e97c-3bdd-44c9-bdd3-401fa31c0b32`.
Comment	IRI of procedure must have the value `https://linked.data.gov.au/def/test/dawe-cv/1ff9e97c-3bdd-44c9-bdd3-401fa31c0b32`. `https://linked.data.gov.au/def/test/dawe-cv/1ff9e97c-3bdd-44c9-bdd3-401fa31c0b32` is the IRI for "Plot Description".
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope-type/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope-type/valid.ttl` Invalid: `/shapes/plot-description/slope-type/invalid.ttl`

3.1.1.3.6. Value type

Property	Value
Identifier	`urn:shapes:plot-description:slope-type:value-type`
Label	Value type

Property	Value
Definition	Instances of `tern:Observation` with `sosa:observedProperty` value `TBA` *MUST* have a `sosa:hasResult` where the value node is an instance of `tern:IRI`.
Comment	The value in `sosa:hasResult` must be a `tern:IRI`.
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope-type/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope-type/valid.ttl` Invalid: `/shapes/plot-description/slope-type/invalid.ttl`

3.1.1.3.7. Vocabulary

Property	Value
Identifier	`urn:shapes:plot-description:slope-type:vocabulary`
Label	Vocabulary
Definition	The value of `tern:vocabulary` *MUST* match the pattern `d893e669-c530-4bc3-a057-a5799ffcb5db$`.
Comment	IRI of `tern:vocabulary` in `sosa:hasResult` must have the value `https://linked.data.gov.au/def/test/dawe-cv/d893e669-c530-4bc3-a057-a5799ffcb5db`. `https://linked.data.gov.au/def/test/dawe-cv/d893e669-c530-4bc3-a057-a5799ffcb5db` is the IRI for "Plot slope codes".
Status	`submitted` ◯
Conformance Classes	`TBA`
Source	TERN Ecosystem Surveillance Ecological Monitoring Protocols
Validators	`/shapes/plot-description/slope-type/shapes.ttl`
Examples	Valid: `/shapes/plot-description/slope-type/valid.ttl` Invalid: `/shapes/plot-description/slope-type/invalid.ttl`

3.2. TERN Ontology Conformance

`TBD`.

4. Editors Notes

4.1. Working titles

Both this specification and the ecological field collection protocol do not have canonical names yet. The below will be changed and updated once formal names are provided by DAWE.

- Ecological Data Exchange Specification (this document)
- TERN Ecosystem Surveillance Ecological Monitoring Protocols

4.2. Placeholders

4.2.1. Placeholder text

Placeholder values `TBA`, `TBD` and `TBC` must be replaced with actual values.

4.2.2. Placeholder IRIs

IRIs of controlled vocabularies are currently placeholders with the namespace `https://linked.data.gov.au/def/test/dawe-cv/`. These IRIs must be replaced once the authoritative IRI is known.