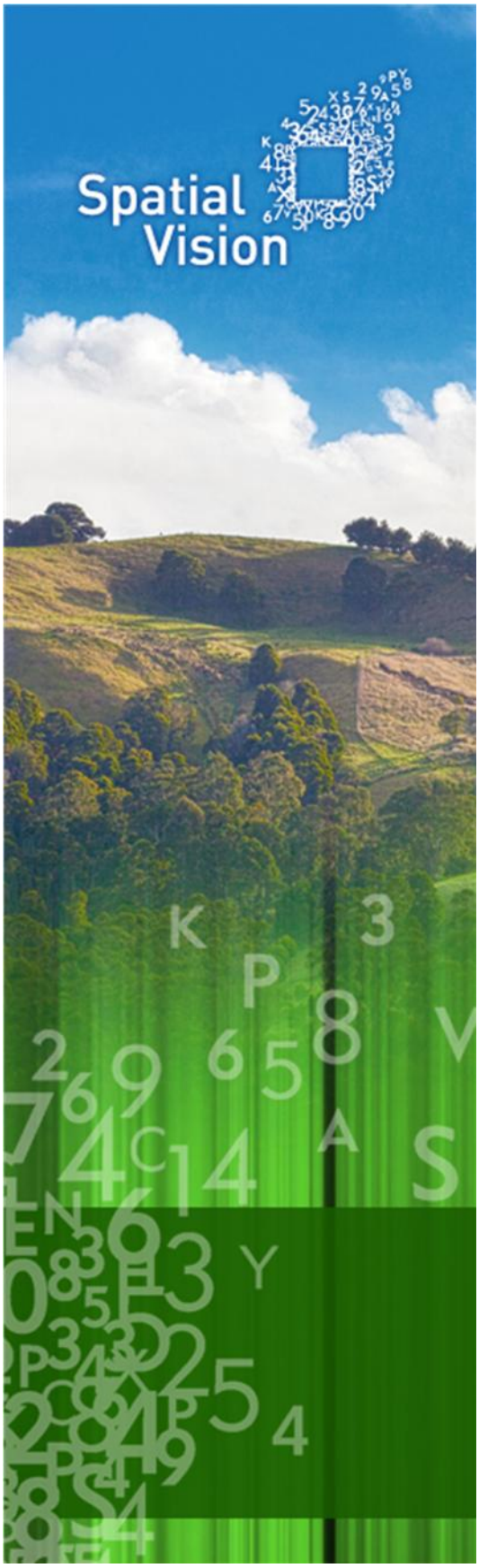

NSW NATIVE VEGETATION MAP PRODUCT SPECIFICATIONS

USER REQUIREMENTS SPECIFICATION

Final 2.2

Developed for the NSW Office of Environment and Heritage

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APPENDICES

EXECUTIVE SUMMARY

Digital spatial data representing native vegetation is fundamental to making informed decisions to manage NSW's ecological values.

Currently no broadly agreed native vegetation map product standard exists in NSW. Recognising this, the NSW Office of Environment and Heritage (OEH) is seeking to standardise the acquisition, management and delivery of native vegetation type mapping products in NSW through the development of detailed map product standards. OEH engaged Spatial Vision to consult with a range of stakeholders on their requirements for native vegetation map products and to develop a set of specifications for two standard NSW native vegetation map products.

The purpose of this report is to define the business needs and expectations of a broad range of stakeholders representing state, local and national government agencies as well as commercial and not-for-profit organisations. These specifications document the business drivers and activities that require native vegetation information.

The main sources of information for this report were an online questionnaire and a series of consultation workshops and meetings, conducted between January and March 2013. The questionnaire was focussed on documenting the existing use of native vegetation mapping and was completed by 190 people. Six workshops and several interviews were held across the state with a broad range of people and organisations on their requirements for potential future native vegetation mapping.

The consultation raised many issues that are not necessarily directly related to their own requirements or the product specification, but are nonetheless important:

1. Lack of consistent Native Vegetation map products currently in use
2. Significant investments continuing to be made in map products
3. Strong demand for fine-scale mapping
4. Strong demand for map information driven by regulatory requirements
5. Locating Threatened Ecological Communities (TEC)s is a key requirement for a large number of stakeholders
6. Confusion about the appropriate use of native vegetation map information
7. Range of views on the level of classification detail required
8. Many users are dissatisfied with past efforts by OEH to provide vegetation map products
9. Communication and availability of vegetation map information is inadequate
10. Existing lack of engagement and knowledge about existing vegetation map data standards

The products that will be defined in this project are native vegetation type maps which describe the vegetation community and extent at a single point in time. The vegetation type maps that are currently being used by people consulted varied in line-work detail and classification resolution from fine, detailed maps to more regionally focused, broadly classified maps. The maps also varied in vegetation type classification. However, there was strong recognition that Plant Community Type (PCT) should be adopted as the standard classification for fine-scale products and this should directly relate to regional-scale products and the state-wide (Keith) classification.

The requirements identified a series of key characteristics that should be set as standards for the map products. These standards include defining a level of accuracy (or reliability) for line work and attribution. A further requirement was the implementation of an efficient and robust

feedback and update process for the map products that will build confidence and improve quality of map products over time.

The majority of people consulted stated that they needed high quality fine-scale mapping for their area of interest as they undertake operational or planning activities at the property scale. In part, the impetus to require fine-scale mapping is also driven by the existing regulatory tools used in NSW that require the identification of Plant Community Types.

However, fine-scale maps are expensive to commission. Whereas well-resourced organisations continue to commission fine-scale maps to meet their local needs, many organisations are unable to afford these maps and are reliant on whatever is available. In many situations, decisions are made in absence of appropriate native vegetation information. In the absence of standard map products organisations have created their own maps which has led to each organisation developing their own priorities and processes. At a regional-scale these organisations' priorities do not necessarily align with adjacent jurisdictional, regional and state-wide priorities.

The lack of a state-wide native vegetation map product that identifies vegetation communities and their conservation value in a consistent manner from contemporary data limits OEH from effectively identifying and setting state-wide conservation priorities.

Clearly there is an opportunity for the organisation's conservation priorities to be more consistently aligned with state and regional priorities by the creation and maintenance of a set of standard, state-wide native vegetation map products.

GLOSSARY

Term	Definition
OEH	New South Wales Office of Environment and Heritage
VIS	NSW Vegetation Information System (VIS) is a system for managing native vegetation information including maps, classifications and surveys for New South Wales. The VIShas standardised Plant Community Type descriptions and implemented a process for maintaining these descriptions over time.
High Conservation Value (HCV)	High Conservation Value vegetation defines areas of land that contain important environmental values. Vegetation type, percentage cleared, reservation status, threatened species and communities, old growth and vegetation types with small areas are often used as inputs to the process of determining High Conservation Value areas.
Pre European Extent, Extant Vegetation, Clearing Statistics and Conservation Status	A set of related and derived native vegetation information products. Pre European extent is the modelled extent of native vegetation type prior to European settlement. This dataset is combined with the current extent of native vegetation as determined by remote sensing to show the current extent of native vegetation type. By comparing the pre-European extent with the current extent it is then possible to estimate how much of each vegetation type has been cleared. The % cleared is then a key input in assigning a conservation status to each native vegetation type map unit.
Plant Community Type (PCT)	Plant Community Type is the most detailed classification system used to describe the type of native vegetation communities in New South Wales. The Plant Community Type classification integrates the Biometric descriptions and the Vegetation Classification and Assessment (VCA) descriptions. The PCT classification is maintained in the VIS Classification database.
Threatened Ecological Community (TEC)	Threatened Ecological Communities are defined in the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and also the New South Wales Threatened Species Conservation Act 1995. The term Threatened Ecological Community is used as the overarching term to describe a number of categories of designation in either or both acts. Threatened Ecological Community designation is the principal means the Australian and New South Wales governments can: • Identify and list an ecological community as threatened • Develop conservation advice and recovery plans for ecological communities • Develop and register critical habitat • Recognise key threatening processes • Develop abatement plans for threatening processes In NSW the TEC process is by public nomination, overseen by the NSW Scientific Committee of 11 scientists. TECs are described in textual form and their definitions do not rely on mapped information.
Endangered Ecological Community (EEC),Critically Endangered Ecological Community, Threatened Ecological Community (TEC)	Communities listed as Threatened Ecological Communities under both the NSW Threatened Species Conservation Act and The Commonwealth EPBC Act can be given the following classifications, which prioritises the status of the community: • Critically Endangered Ecological Community • Endangered Ecological Community • Vulnerable Ecological Community The term Threatened Ecological Community (TEC) is used as an umbrella term for all vegetation community classifications under the EPBC and TSC acts.

Term	Definition
Regional Vegetation Community (RVC) and Broad Vegetation Type (BVT)	Historically the RVC classification has been used to compile a set of existing of maps into a new consistent map. The aim of the Regional Vegetation Communities classification is to be equivalent to Plant Community Type classification (and its equivalent Biometric Vegetation Types) as the next classification level up – Native Vegetation Classes were considered too broad to be used in mapping. In practice however the Biometric Vegetation Types (PCTs) have been found to be too fine to be reliably mapped, leading to the development of RVC classifications that are broader than the PCTs and sit between PCTs and Native Vegetation Classes in the classification hierarchy.
National Vegetation Information System (NVIS)	The Commonwealth Department of Sustainability, Environment, Water, Population and Communities maintains a national spatial database of native vegetation map information. The NVIS database is a collaborative project between the state and federal governments where the various state government native vegetation data are combined into a standardised national collation. The NVIS system groups native vegetation information into six hierarchical levels based on the level detail of the structural and floristic information contained in the description of the vegetation type.
YETI	YETI is a colloquial term for the NSW OEH standard database used to store plot-based vegetation survey information i.e. VIS Flora Survey Module. The database holds more than 50,000 records across the state. It is web based application with a centrally stored SQL Server database that can be accessed by registered users from around the state.
NSW Native Vegetation Class (Keith) Class, Formation and Classification Hierarchy	The NSW VIS describes native vegetation in a hierarchy containing 3 levels of classification detail. The Keith Class classification is the middle classification and describes New South Wales vegetation as 99 classes. Native vegetation formations describe the vegetation in the broadest terms with 16 descriptions for the state. At the most detailed level Plant Community Types describe the native vegetation of NSW in an estimated 1500 types.
Bio Banking	The Biodiversity Banking and Offsets Scheme addresses loss of biodiversity values by setting up a market for trading and managing land for conservation. Bio Banking provides a means for landowners to generate credits by entering into agreements that enhance and protect biodiversity values. These credit can be sold to generate an income for landowners. Buyers can purchase credits in order to offset biodiversity losses from development or credits may be bought by other philanthropic organisations to achieve improvement in biodiversity values.
Biodiversity Certification	Biodiversity Certification is a streamlined biodiversity assessment process for planning authorities such as local government. Biodiversity Certification is undertaken at the strategic planning stage for areas that are marked for development. The Biodiversity Certification process identifies areas of conservation value that require protection as well as areas where development may proceed. Once the Biodiversity Certification process has been completed in an area development can proceed without the usual requirements of the Environmental Planning and Assessment Act 1979 where a threatened species assessment would be required for each site as it is developed.
Local Environmental Plan (LEP)	Local Environment Plans are a legal instrument used by local government to control development and set aside areas for reservation as open space, schools, transport and other public purposes, notably the protection of native vegetation and trees. They are a means to implement strategies – normally comprised of a written document and set of accompanying maps

1. Introduction

This report documents the user requirements for native vegetation map products in New South Wales (NSW).

1.1 Context

There is currently no broadly agreed native vegetation map product standard available in NSW. Recognising this as an issue, the Office of Environment and Heritage is seeking to standardise the acquisition, management and delivery of native vegetation type mapping products in NSW through the development of detailed map product standards.

The NSW Office of Environment and Heritage (OEH) engaged Spatial Vision to consult with a range of stakeholders on their requirements for native vegetation map products and to develop a set of specifications for two standard NSW Native Vegetation map products.

Specifically the project has five main objectives:

1. Engage with a representative range of stakeholders from government, industry and non-government organisations (NGOs) to ensure their participation, awareness and ownership in the development and on-going use of native vegetation map products;

2. Define the specific business needs and expectations of stakeholders including such factors as: level and type of descriptive detail associated with map features; spatial precision, thematic accuracy; data currency; map maintenance, user access and data delivery;

3. Undertake analyses to evaluate and define the types of vegetation maps required to effectively and efficiently meet the broadest range of users' business needs with the least number of map products;

4. Develop detailed specifications to support the implementation of a state wide regional-scale native vegetation map product, and

5. Develop detailed specifications to support the implementation of a fine-scale native vegetation map product.

The purpose of this report is to define the business needs and expectations of a broad range of stakeholders representing state, local and national government agencies as well as commercial and not-for-profit organisations. The report also evaluates and defines the categories of vegetation information required by different groups and activities.

This report fulfils objectives 1 and 2 and begins to address objective 3. These user requirements will inform subsequent development and documentation of specifications for each of the fine-scale and regional-scale native vegetation map products.

1.2 Requirements Consultation

The main sources of information for this report were an online questionnaire and a series of consultation workshops and meetings, conducted between January and March 2013.

1.2.1 Stakeholder Identification

The Office of Environment and Heritage (OEH) identified the stakeholders for this report through open invitation to participate on the online questionnaire and workshops, communicated via the CMA Chairs, Ecological Consultants Association of NSW newsletter, Local Government and Shires Association newsletter, and OEH contact lists.

1.2.2 Questionnaire

An online questionnaire was made available to agencies and the public from November 2012 to March 2013. The questionnaire was broadly promoted through a series of channels to particularly encourage responses from OEH, other State Government agencies, Catchment Management Authorities (CMAs), Local Government Authorities (LGAs), consultants and Non-Government Organisations (NGOs).

The questionnaire was focussed on documenting the existing use of native vegetation mapping. The purpose of the questionnaire was to identify:

- Which organisations rely on native vegetation maps;
- Why organisations use native vegetation maps; what specific activities do they do and what are their underlying business drivers?
- How do they use native vegetation maps to undertake specific business activities?
- What existing native vegetation datasets are used and how fit for purpose are they?

190 people completed the online survey.

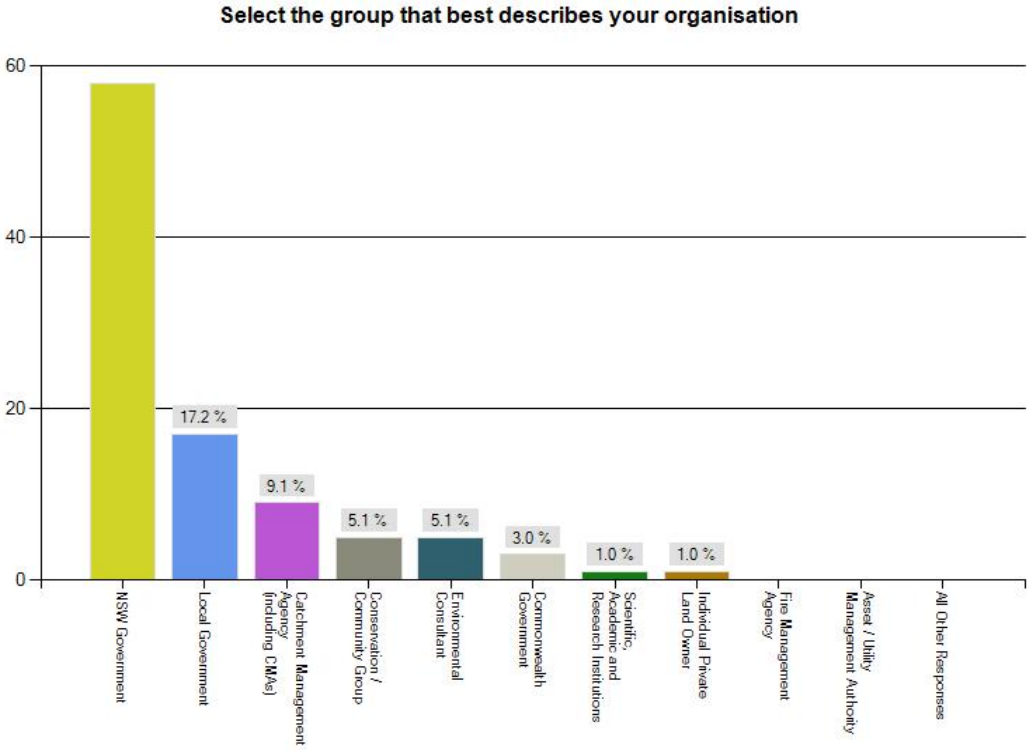

Figure 1: The number of respondents by organisation type.

1.2.3 Workshops

Six workshops were held across NSW at Coffs Harbour, Armidale, Newcastle, Dubbo, Queanbeyan and Sydney.

The purpose of the workshops was to seek input from a broad range of people and organisations on their requirements for potential future native vegetation mapping, and in particular:

- Why native vegetation mapping is important

- Levels of information required to support business functions
- Characteristics and attributes of the information products

Some of the specific characteristics and attributes discussed included:

- Source resolution
- Classification system required
- Thematic (classification) accuracy
- Coverage (area included in the map)
- The feedback update cycle required

1.2.4 Interviews

Interviews were undertaken in Sydney, Tamworth, Coffs Harbour, Albury and Queanbeyan where there were fewer stakeholders or groups with non-use roles in native vegetation map information such as the OEH mapping staff. These stakeholders were interviewed in an informal setting where questions were developed for each specific stakeholder.

2. Issues Raised

2.1 Introduction

Workshop and meeting participants raised many issues throughout the consultation period of the project that are not necessarily directly related to their own requirements or to the product specifications, but are nonetheless still important. A summary of these issues identified is described below.

2.2 Issues

1. **Lack of consistent native vegetation map products**

   The existing lack of consistent native vegetation map products means that some users are making decisions without information or having to commission their own maps or consultants for individual projects. The lack of information also results in the use of old data or data that is not at an appropriate scale. A consistent mappable view of conservation priority across jurisdictions at standard scales is an important requirement that needs to be addressed by future native vegetation map datasets.

2. **Significant investments continuing to be made**

   Many organisations are continuing to make significant investments in native vegetation map products across the state. These efforts mostly do not follow a standard approach and are not coordinated across organisational jurisdictions. Many organisations such as Local Governments and Catchment Management Authorities are creating their own vegetation information, using their own classification systems and standards in the absence of standard state-wide native vegetation information. This includes native vegetation maps, survey plots and rapid surveys.

3. **Strong demand for fine-scale mapping**

   People consulted in the workshops and in the questionnaire expressed a strong need for fine-scale mapping of their areas of interest. Most users expressed that they desire maps between 1:5,000 and 1:25,000 and for these to be highly accurate.

4. **Strong demand for map information for regulatory requirements**

   There is a strong demand for map information to support existing NSW regulatory tools such as the Bio Banking, Biometric and the Bio Certification processes in a standard format. The regulatory tools require map information at the Plant Community Type (PCT) classification focused on the property scale at a high level of accuracy.

5. **Locating TECs is a key requirement for a large number of stakeholders**

   Many users are required to assess and manage TECs listed under NSW State and Federal legislation. Organisations require clear processes and means to identify where these communities are within their jurisdictions. There was a clear message from stakeholders about the need for a strong process for locating TECs so that determinations and management activities are consistent, comprehensive and robust. Many users expressed a need for maps showing the locations of TECs.

6. **Broad range of users, drivers and uses of Native Vegetation Map Products**

   Users identified a broad range of activities that require native vegetation map information. These activities vary in their requirements for map information, according

to the scale of application, the need for classification accuracy, line work precision and minimum polygon size, level of descriptive detail and data currency.

Many organisations are creating their own fine-scale mapping products. The requirements for fine-scale map products were consistent amongst a range of survey and workshop participants, notably Local Government and the OEH National Parks and Wildlife staff.

The requirements for broader scale map products at the regional and state-wide level were more divergent with a range of views expressed by workshop participants.

7. **Confusion about the appropriate use of native vegetation map information**

   There is confusion about the appropriate use of native vegetation map products, particularly in regard to the selection and interpretation of products for particular uses and scales – for example site property scale versus regional-scale. The absence of consistent state-wide map products has led to spatial information (maps) being under-utilised to set policy and priorities.

8. **Range of views on the level of classification detail required**

   For property-scale activities the consultation participants consistently indicated the Plant Community Type classification was appropriate.

   There are a range of views on which classification system should be the base classification in the regional map product. Many users stated the need for the regional map product to show detailed descriptions of native vegetation at the Plant Community Type level. Other participants raised concerns that at this level of detail it was difficult to achieve satisfactory levels of classification accuracy in the regional map product. Other potential users of regional map products expressed that broader classification systems such as groups of Plant Community Types, Regional Vegetation Communities or Keith Class were suitable for their needs with the notable exception of identifying TECs. Broad regional maps were not seen as being very useful in identifying and managing TECs and these either required on-site field validation or fine-scale maps.

9. **Users dissatisfaction with past efforts by OEH**

   Users reported dissatisfaction with past attempts by OEH to deliver products that were fit for purpose.

10. **Communication and availability of information inadequate**

    Participants reported that communication and availability of information about existing native vegetation map resources and this project was inadequate.

11. **Lack of engagement and knowledge about existing standards**

    There is a lack of knowledge about existing standards for collecting native vegetation information and insufficient incentives and requirements to adopt these standards for the range of organisations who collect and manage native vegetation information.

3. Organisations that Rely on Native Vegetation Information

3.1 Organisations

The following organisation types were identified and consulted.

- Catchment Management Authorities (CMAs)
- Local Governments
- National Parks and Wildlife Service (NPWS) - OEH
- State of the Environment and Monitoring Evaluation and Reporting Group (MER) – OEH
- Vegetation Information Systems (VIS) Group – OEH
- Science Division (SD) – OEH
- Wetlands Unit– OEH
- Regional Operations Group – OEH
- Armidale Modelling Unit - OEH
- Rural Fire Service (RFS)
- State Forests of New South Wales
- Environment Protection Authority (EPA)
- NSW Department of Planning and Infrastructure
- NVIS Group Federal Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) Canberra
- Consultant Ecologists

3.2 Main Drivers

Organisations use native vegetation map information for a range of reasons, ranging in scale, level of detail, extent, policy and operational need. For government organisations native vegetation map information is used in developing and implementing legislation. Legislative drivers for native vegetation in NSW are:

- Native Vegetation Act 2003
- Environmental Planning and Assessment Act 1979
- Threatened Species Conservation Act 1995
- National Parks and Wildlife Act 1974
- Rural Fires Act 1997
- Catchment Management Authorities Act 2003
- Native Vegetation Regulation 2005

Other drivers for native vegetation information use in NSW are:

- Fire plans and operations
- Catchment plans
- Biodiversity and threatened species
- Wetlands

- Urban development
- State Policy
- Commercial Need

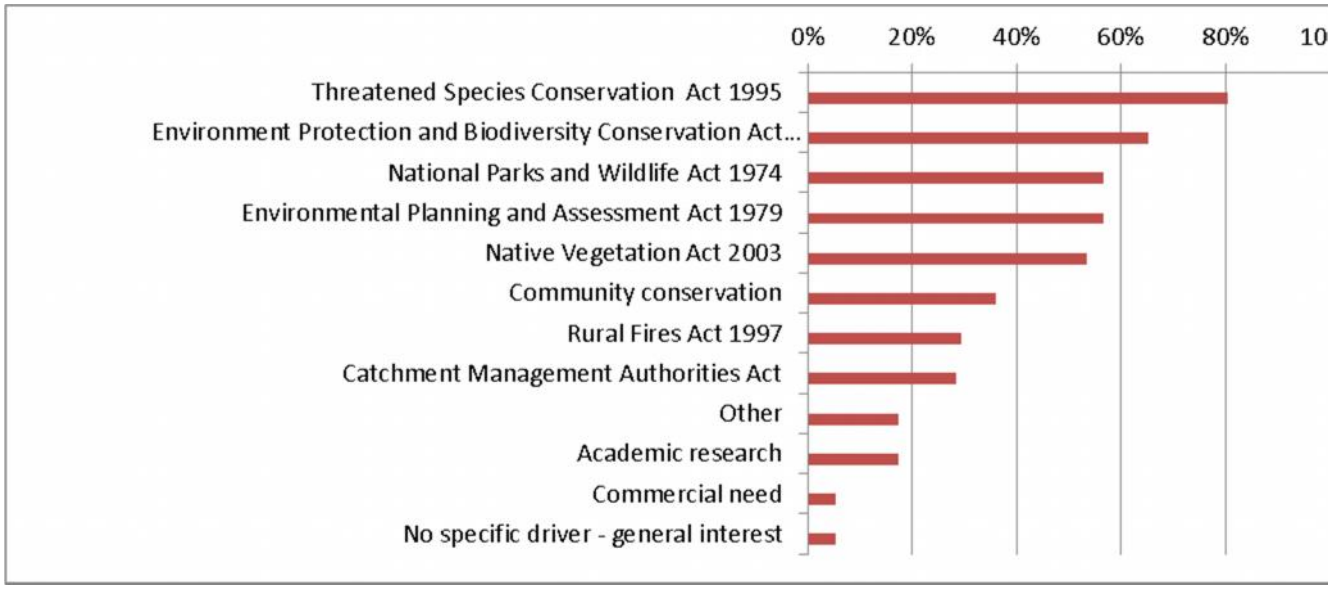

Figure 2: Survey responses showing organisations' drivers for using native vegetation map information products.

3.3 Activities of Organisations that use Native Vegetation Information

Native vegetation information is a vital resource for many organisations underpinning a range of activities. Table 1 summarises the activities undertaken by organisations that use native vegetation map products in New South Wales.

Organisations / *Activities*	*Local Government*	*CMAs*	*NPWS*	*OEH Wetlands Unit*	*OEH MER Reporting*	*RFS*	*Consultants*	*Federal DSEWPaC*	*OEH Regional Operations and EPA*	*State Forests*	*NSW Dept. Planning and Infrastructure*
Fire Management	■		■	■		■				■	
Wildfire Behaviour Modelling			■	■		■					
Bush Fire Risk Assessment for Assets	■		■	■		■				■	
Bush Fire Risk Assessment for Ecological Impacts	■		■	■		■				■	
Bush Fire Risk Treatments	■		■	■		■				■	
Bush Fire Development Control	■		■	■		■					■
Atmospheric Dispersion Modelling						■					
Science & Policy	■	■	■	■	■	■				■	■
Evaluating the Conservation value of Plant Community Types	■	■	■	■			■		■	■	■
Evaluating threats acting on Plant Community Types	■	■	■	■		■	■		■	■	■
Determination of endangered and threatened ecological communities and critical habitat	■	■	■	■			■	■	■	■	■
Map or identify the location of threatened and endangered ecological communities and critical habitat	■	■	■	■		■	■	■	■	■	■
Selection of sites based on conservation values	■	■	■	■			■		■	■	
State of the Environment or related Reporting		■			■			■	■	■	
Land Management	■	■									
Property Owner - Grant Applications	■	■					■				
Property Planning	■	■					■				
Native Vegetation Restoration	■	■									
Natural Area Management	■	■									

Organisations	*Local Government*	*CMAs*	*NPWS*	*OEH Wetlands Unit*	*OEH MER Reporting*	*RFS*	*Consultants*	*Federal DSEWPaC*	*OEH Regional Operations and EPA*	*State Forests*	*NSW Dept. Planning and Infrastructure*
Activities											
Pest Management (large Herbivores)			■	■							
Weed Management	■	■	■	■			■				
Reserve Plans of Management	■	■	■	■			■				
Education	■	■				■	■		■	■	■
Education - community	■	■				■	■		■	■	■
Education - property owners	■	■				■	■				
Planning, Development & Assessment	■	■					■				■
Regional Land Use Planning	■	■					■		■		■
Development Control - Site Assessment	■	■					■				■
Development Control - Offset sites	■	■					■				■
Environmental Planning Instruments e.g. LEPs and SEPPs	■					■	■		■		■
Native Vegetation Compliance	■	■					■		■		
Catchment Planning		■					■				
Water Management	■	■	■	■			■				
Assessment of wetland health	■	■		■			■				
Mapping and classification of wetlands	■	■	■	■			■				

Table 1: Each organisation or individual has a specific set of uses for native vegetation map products.

For further information about each of these activities, the role of native vegetation information and the required characteristics, refer to Appendix B.

4. Native Vegetation Information Products

4.1 Introduction

The primary products that will be defined in this project are native vegetation type maps at fine-scale and regional-scale. The native vegetation type maps describe the vegetation community and extent at a single point in time.

Related to the Type map are a series of map products that range in importance for native vegetation planning, management and reporting activities. The main related or derived, additional native vegetation products are:

- Native Vegetation Condition,
- Modelled Pre-European Extent, Clearing Statistics and Conservation Value
- Mapped Threatened Ecological Communities
- Monitoring and Reporting of Native Vegetation Extent Change.

These related products are discussed in section in section 5.8.

4.2 Required Attributes for Native Vegetation Type Map Products

The vegetation type maps being used by workshop attendees varied in line-work detail and classification resolution from fine, detailed maps to more regionally focused, broadly classified maps.

Users were asked about their specific needs for vegetation type mapping products in relation to the following attributes:

4.2.1 Classification System

The main classification systems used in NSW are:

Plant Community Type (PCT)

The Plant Community Type classification system was developed in 2011 to establish the reference, master community-level classification for native vegetation mapping in NSW. The PCT classification consolidates two older classifications – the Vegetation Classification and Assessment Database (VCA) and the Biometric Vegetation Types database. The Plant Community Type descriptions maintained in the VIS Classification database are available for the whole state. A standard database and maintenance process for the PCT descriptions is now in place and PCTs are currently undergoing a series of regional upgrades. Plant Community Type is the most detailed classification that was considered in this project.

Rationalised / Edited Plant Community Types

Previous mapping projects have highlighted that some existing Plant Community Type descriptions are too fine to be mapped reliably, even with an intensive, fine-scale mapping effort. Additionally some Plant Community Types have proved difficult to recognise in the field. In these circumstances an argument can be made that the PCT classification should be edited by permanently grouping a number of PCTs into a single PCT that can be mapped and recognised in the field. The Vegetation Information System (VIS) supports this through it's inbuilt PCT change control process.

Map Mosaic of Plant Community Types

In cases where Plant Community Type descriptions are too fine to be mapped because they are too similar to other Plant Community Types, another option is map groups or mosaics of Plant Community Types. In this scenario a polygon on the native vegetation

map will relate to a number of Plant Community Types rather than just a one to one relationship. This option would not permanently merge the descriptions within the classification – it is just the map that shows the spatial group of PCTs.

Regional Vegetation Community (RVC) / Broad Vegetation Type (BVT)

Regional Vegetation Community classification and the equivalent Broad Vegetation Type classification have historically been used in mapping programs for Catchment Management Authorities (CMAs). Compared to PCT descriptions they are often less detailed. These descriptions are created so that they can be easily mapped – usually by re-attributing existing line work. There is no state-wide standard for creating RVC/BVT descriptions. Each mapping project creates its own classification meaning that Regional Vegetation Community descriptions are not necessarily consistent across jurisdictions. Generally maps that use RVC classifications are related back to Plant Community Types and Native Vegetation Classes, although in the case of PCTs, RVCs often relate to more than one PCT, similar to the map mosaic / grouping of PCT described in the paragraph above.

NSW Native Vegetation (Keith) Class

The NSW (Keith) Class classification contains 99 descriptions of vegetation for the whole state of New South Wales. NSW Class descriptions group a set of Plant Community Type descriptions in the VIS database.

NSW Native Vegetation (Keith) Formation

16 Vegetation Formation descriptions are the broadest standard for describing native vegetation type in NSW.

4.2.2 VIS Classification Hierarchy

The Vegetation Information System (VIS) has standardised the classification system used in New South Wales. Plant Community Type descriptions are being standardised so that they can be related up through the heirarchy to Vegetation class descriptions and Vegetation formations. Where Plant Community Types haven't been mappable they have been grouped and mapped as a group, although the VIS does have a standardised system for grouping Plant Community Types.

The 3 hierarchy levels in VIS cover a wide range of detail in describing vegetation. At the most detailed level an estimated 1500 PCT descriptions describe the vegetation in NSW compared to next level up where the state wide Native Vegetation is described by approximately 100 classes.

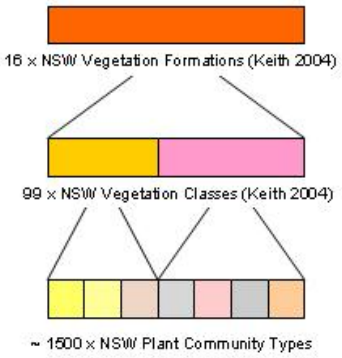

Figure 3: The NSW Vegetation Information System (VIS) Hierarchy.

4.2.3 Target Scale of Use (published scale)

Native vegetation maps are used at a range of scales in NSW. Some organizations will use whatever scale mapping is available to them whereas others are actively investing in new maps at scales that are best suited to their purposes.

People consulted in this project reported using native vegetation maps at a range of scales. For site focused applications, a detailed native vegetation map is used at scales of 1:1000 or 1:5000 and is based upon very detailed aerial imagery and plot survey data. In this report, these maps are referred to as fine or site scale products.

At the regional level, uses of map information ranged in scale from 1:25,000 to 1:100,000. At the state-wide extent the broadest scale reported by users was between 1:250,000 and 1:1,000,000 as shown on the Keith class map.

4.2.4 Minimum Polygon Size

Minimum polygon size ranges from 0.25 ha at the site scale to 5 ha at regional /state - wide scale. 40% of survey respondents described their mapping needs being at fine-scales indicating that the maps they require need to have a minimum polygon size of less 0.25 ha. Approximately 31% indicated a polygon size of between 0.25 and 2 ha would be suitable for their needs and less than 3% indicated a polygon size of between 2 and 5 ha would be preferred.

4.2.5 Minimum Classification Accuracy

Minimum classification accuracy refers to how correct the description of the Plant Community Type or Vegetation Class is for a selected polygon. Classification accuracy is typically analysed using a *Confusion Matrix* that rates the magnitude of each error by comparing how different the stated classification is from the control or known correct classification.

The range in required accuracy reported by stakeholders varied between a minimum of >70% to 90%. An important consideration is that to achieve a target minimum level of accuracy, more detailed classifications such as the Plant Community Type classification require greater survey and validation effort compared to less detailed classifications for example at the Class level. Similarly, the ability to attain high accuracy levels is dependent on the quality of the underlying classification. Any error or uncertainty in the underlying classification will increase the error and uncertainty of the final map product.

While users identified the need for high accuracy maps – these requirements will need to be considered in the context of resources available for mapping and the need for mapping to be completed within a timely manner for the whole state of NSW to support state-wide policy and planning and reporting requirements.

4.2.6 Area of Coverage

The area of coverage of a map product varies from small individual sites to large scale projects, Local Government Area, Catchment Management Authority Areas and Bioregions to State-wide and National extents.

4.2.7 Feedback, Update and Versioning Process

Users identified that a range of update frequencies were required for native vegetation map products. Where mapping information is key to important public decision making processes, a regular update process was commonly identified as an important requirement for building confidence and acceptance of the map product. Users identified few examples of existing map products that already had a comprehensive feedback, update and versioning processes. Coffs Harbour Local Government Area mapping was one example of a map with such a process which was seen to be essential to improving the quality and developing acceptance and confidence in the map amongst the Coffs Harbour community.

4.3 Required Map Product Attributes for Organisational Activities

The following table lists the attributes of map products for the activities identified in Section 3.3.

Activities / *Required Vegetation Type Map Attributes*	*Classification System*	*Minimum Classification Accuracy*	*Scale of Use - Source Imagery Scale*	*Minimum Polygon Size*	*Area of Coverage*	*Feedback, Update and Versioning Process*
Fire Management						
Wildfire Behaviour Modelling	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	
Bush Fire Risk Assessment for Assets	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	
Bush Fire Risk Assessment for Ecological Impacts	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	3 year update to coincide with Park / Other planning cycle
Bush Fire Risk Treatments	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	
Bush Fire Development Control	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	
Science & Policy						
Evaluating the Conservation value of Native Vegetation	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	Continuous to 2 year to support site focused planning and management
Evaluating threats acting on Native Vegetation	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
Determination of Threatened Ecological Communities and critical habitat	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
Map or identify the location of threatened ecological communities and critical habitat	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
Selection of sites based on conservation values	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
State of the Environment or related Reporting	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	3 year to coincide with the SOE reporting cycle.

Required Vegetation Type Map Attributes	*Classification System*	*Minimum Classification Accuracy*	*Scale of Use - Source Imagery Scale*	*Minimum Polygon Size*	*Area of Coverage*	*Feedback, Update and Versioning Process*
Activities						
Atmospheric Dispersion Modelling	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	
Land Management						
Property Owner - Grant Applications	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
Property Planning	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
Native Vegetation Restoration	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
Natural Area Management						
Pest Management (large Herbivores)	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
Weed Management	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
Reserve Plans of Management	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	2 year or match to planning cycle
Education						
Education - community	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	
Education - property owners	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	
Planning, Development & Assessment						
Regional Land Use Planning	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	Created / Updated as each regional land use plan is prepared.
Development Control - Site Assessment	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	Continuous – 2 year update -
Development Control - Offset sites	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	
Environmental Planning Instruments e.g. LEPs and SEPPs	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	Prior to update of each LEP/ SEPP eg. 5 years.
Native Vegetation Compliance	Plant Community Type	>80%	1:5000 – 1:25,000	0.25 ha	Park or Site	

Required Vegetation Type Map Attributes	*Classification System*	*Minimum Classification Accuracy*	*Scale of Use - Source Imagery Scale*	*Minimum Polygon Size*	*Area of Coverage*	*Feedback, Update and Versioning Process*
Activities						
Catchment Planning	Native Vegetation Class	>70%	1:100,000	2 ha	Region / State	
Water Management						
Assessment of wetland health	Plant Community Type	>80%	1:1000 – 1:25,000	0.25 ha	Park or Site	
Mapping and classification of wetlands	Plant Community Type	>80%	1:1000 – 1:25,000	0.25 ha	Park or Site	

Table 2: Required Attributes for native vegetation map products

Table 2 shows that requirements for native vegetation map information vary in the level of detail and target scale of use across the range of activities. Taking this project's objective to define specifications for two map products – a fine-scale map product and regional-scale map product, it is possible to begin to define the range of requirements that the two products will be defined within - see Figure 4 below.

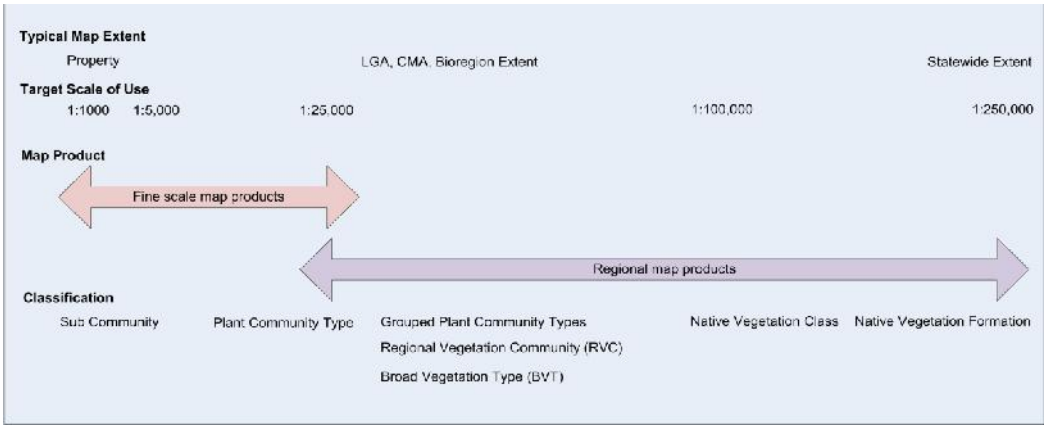

Figure 4: Defining the range of extents, scales of use and classification systems for a set of fine-scale map products and a set of regional-scale map products. Note that the divisions between the groups are continuous – for example requirements for the regional product vary in target scale from 1:25,000 to 1:250,000 and from an LGA extent to a state-wide extent.

4.4 Fine-Scale Map Products

Workshop participants identified a large number of activities that require a fine-scale map of native vegetation for decision making. The target scale of use of these activities varied from 1:1,000 to 5,000 up to 1:25,000 with minimum polygon sizes ranging from 0.04 ha to 5 ha and with a typical minimum polygon size of 0.25 ha. Participants mostly used the Plant Community Type classification or an equivalent local classification and sometimes sub community / species classification. These fine-scale activities require a high level accuracy (for example > 85%) and existing examples of these maps have generally used extensive on-ground survey and validation to achieve these high levels of classification accuracy. Existing examples of fine-scale mapping range in extent from individual properties to an entire Local Government Area.

4.5 Regional-Scale Map Products

The user consultation phase identified a smaller number of activities that use broader-scaled maps. Catchment planning, fire management and planning, state and national Reporting were the main activities that use broader, regionally scaled map products. For activities such as the State of Environment Reporting it was essential to have a map that covered the state extent. The scale range for these activities varied from 1:25,000 (with overlapping with fine-scale maps at similar scales) to 1:250,000 and 1:1,000,000 as shown on the existing Keith map.

The classification system required by users for this regionally focused product was more varied compared to the fine-scale activities. Some users reported that their requirements would be met only by Plant Community Type descriptions while others indicated grouped Plant Community Type or Regional Vegetation Community / Broad Vegetation Type classifications are required while others indicated their activities required Native Vegetation Class and Native Vegetation Formation classifications.

Workshop participants stated that their required minimum classification accuracy for the regional product was between 70% and 90%, with most emphasising the need for higher accuracy and guidance about the appropriate use of products to maintain confidence and encourage use of the map products.

There is currently only one standard 'native vegetation digital map products' that covers the extent of NSW which is Keith's high-level Class map.

4.6 Relationship between Fine-scale and Regional-scale products

Stakeholders reported the need for products to be compatible across classification systems and in geometry. Numerous stakeholders reported a strong preference for using Fine-scale mapping where it is available to construct the regional map and the need for consistency and compatibility between the two different map products. The classification system between the maps should be hierarchical in that the detailed classification system of the fine-scale map should aggregate up systematically to the classification system of the regional-scale map. Users also reported that the line work of the maps targeting different scales of use should be compatible. That is, the polygons shown on the fine-scale map should be the same or contained within the polygons shown on broad scale maps (zoomed out).

4.7 High Level Allocation of Activities to Fine-scale or Regional-scale Map Products

The following table lists the scale of map products required to support the activities identified in Section 3.3.

Activities	*Primary Vegetation Type Map Product Used*	*Comments*
Fire Management		
Wildfire Behaviour Modelling	State-wide / Regional	Existing fire management activities mostly use Native Vegetation Class maps, although more detailed map information could be used if it was more widely available.
Bush Fire Risk Assessment for Assets	State-wide / Regional	

Activities	*Primary Vegetation Type Map Product Used*	*Comments*
Bush Fire Risk Assessment for Ecological Impacts	Site / Fine-scale	NPWS require fine-scale information about the location and type of native vegetation when planning and evaluating the impact of fire management activities.
Bush Fire Risk Treatments	State-wide / Regional	
Bush Fire Development Control	State-wide / Regional	
Atmospheric Dispersion Modelling	State-wide / Regional	
Science & Policy		
Evaluating the Conservation value of Plant Community Types	Site / Fine-scale	Most activities that require information about conservation value of native vegetation use the Plant Community Type classification and require high levels of classification accuracy and line-work detail.
Evaluating threats acting on Plant Community Types	Site / Fine-scale	
Determination of threatened ecological communities and critical habitat	Site / Fine-scale	Decision making about TECs and threatened species habitats require fine-scale, high accuracy information.
Map or identify the location of threatened ecological communities and critical habitat	Site / Fine-scale	TEC descriptions are highly detailed in describing species and site attributes and the determination of critical habitat require detailed map information.
Selection of sites based on conservation values	Site / Fine-scale	Park planning and reserve acquisition activities require detailed, fine-scale information about native vegetation type and location.
State of the Environment or related Reporting	State-wide Regional	State of the Environment and related reporting activities require map information that provides a broad state-wide view of vegetation that can be updated frequently with a consistent and robust process.
Land Management		
Property Owner - Grant Applications	Site / Fine-scale	Land management activities require detailed information about native vegetation located on properties. These activities are supported by site visits and expert opinion with native vegetation map information often being used a preliminary desktop analysis to guide and prioritise further work.
Property Planning	Site / Fine-scale	

Activities	*Primary Vegetation Type Map Product Used*	*Comments*
Native Vegetation Restoration	Site / Fine-scale	Native vegetation restoration requires native vegetation information about vegetation type and extent. Where available restoration activities would be supported by detailed native vegetation condition information including derived information about recoverability and resilience. Information about the pre-European type and extent of vegetation would assist in planning native vegetation restoration activities.
Natural Area Management		
Pest Management (large Herbivores)	Site / Fine-scale	Natural Area Management involves detailed planning of activities at a site / park focused scale. Management of pest animals, weeds and the planning of other activities requires fine-scale, high accuracy mapping.
Weed Management	Site / Fine-scale	
Reserve Plans of Management	Site / Fine-scale	
Education		
Education - community	State-wide / Regional	Community education requires a range of products each targeted at a particular audience. Native vegetation map products for use by the general public are likely to be different in presentation and detail compared to maps being used by for example community groups involved native vegetation restoration activities.
Education - property owners	State-wide / Regional	
Planning, Development & Assessment		
Regional Strategic Land Use Planning	Site / Fine-scale	Maps showing detailed information about native vegetation at the Plant Community Type classification are required for Strategic Regional Land Use Planning projects. Generally they have been prepared on an as needed basis for each project. These strategic plans would be informed by a state-wide regional map product with respect to state-wide priorities and native vegetation status.
Development Control - Site Assessment	Site / Fine-scale	Local and state government planning authorities require property scale, detailed information about native vegetation type and condition. This information is usually supplemented by site inspection and expert evaluation, although better map products if they were available may help to reduce the overhead of requiring onsite field inspection and validation.
Development Control - Offset sites	Site / Fine-scale	Offset sites require detailed information about native vegetation usually determined by site visit to determine equivalence between development and offset sites.

Activities	*Primary Vegetation Type Map Product Used*	*Comments*
Environmental Planning Instruments e.g. LEPs and SEPPs	Site / Fine-scale	Local Environmental Plans and State Environmental Planning Policies require detailed information about native vegetation information. LEPs require robust information about the type and importance of native vegetation and require high levels of accuracy in the context of creating legal planning instruments. SEPPs that are concerned with biodiversity conservation require detailed native vegetation information including species information to assist in locating where they apply.
Native Vegetation Compliance	Site / Fine-scale	Native vegetation compliance as administered by OEH, the EPA and Local Government requires fine-scale, accurate information about the type and extent of native vegetation information.
Catchment Planning	State-wide / Regional	A range of views were presented on requirements for Catchment Planning. Most stakeholders indicated a need for regional products to undertake catchment planning activities, however some indicated finer scale map products are required for catchment planning. The need to consider TECs in Catchment Planning required fine scale, detailed map information.
Water Management		
Assessment of wetland health	Site / Fine-scale	The OEH wetlands group plans, monitors and reports on wetlands at a detailed level. Maps of vegetation and vegetation condition including monitoring are at the Plant Community Classification and updated frequently from remote sensed imagery.
Mapping and classification of wetlands	Site / Fine-scale	

Table 3: High level required map products.

This information indicates the strong requirement for native vegetation maps at fine-scale and regional-scale. A state-wide view is required at the regional-scale to support planning and prioritising activities.

4.8 Derived and Related Map Products

An additional set of map products are used in the activities of organisations that are involved in native vegetation planning and management. These products are:

1. Conservation value based upon clearing statistics, reservation status, threatening processes, extent and baseline modelled pre-European vegetation extent;
2. Mapped Threatened Ecological Communities;
3. Native vegetation condition;
4. Native vegetation extent change tracking and reporting.
5. Growth stage including old growth status, remnant / regrowth status and structural information
6. Remote sensed imagery – aligned in scale, extent and location to the Vegetation Type map.

These products help organisations to determine the status, significance and management of native vegetation in the landscape. While this document does not fully specify the requirements for these additional products, they are described below to provide context and understanding about the needs of native vegetation information users. Cadastre showing roads and property boundaries were also described as important datasets used in native vegetation planning and management activities – particularly for site scale activities.

4.8.1 Pre European Extent / Clearing Statistics / Conservation Value

Cleared and remaining percentages of vegetation types across the landscape are widely used in determining the conservation significance of native vegetation. These measures are used in the existing NSW native vegetation regulatory tools and as part of determining the conservation value of native vegetation in organisations such as Local Government and Catchment Management Authorities. In order to estimate the amount remaining of a vegetation type a dataset which models a baseline extent of native vegetation is required. This is usually the Pre-European extent but may be some other later baseline date. The areas of vegetation type from this Pre-European extent are then compared the current areas of vegetation type to determine the extent of clearing of each native vegetation type. The cleared / remaining percentages are then a key input into determining the conservation value of existing native vegetation.

4.8.2 Mapped Threatened Ecological Communities

Threatened Ecological Communities (TEC) are defined using a nomination and expert review process that is independent of mapping processes. While Native Vegetation Community descriptions may have been considered in writing the definition of a TEC, its location in the landscape does not necessarily correspond with the Plant Community Type descriptions or other native vegetation type maps.

Users widely raised that they have problems identifying TECs in their jurisdictions and that they lack either expertise within their organisation or the mapping information to adequately identify and manage TECs. They pointed to the need for TECs to either be mapped as an independent dataset or mapped by associating the TEC with a Plant Community Type description or polygon. Any future work in defining how TECs are mapped should consider that OEH has already undertaken significant work in associating TECs to PCTs descriptions.

4.8.3 Native Vegetation Condition

Native vegetation condition was raised by many workshop participants as an important input into activities and decisions involving native vegetation. For example, condition was reported to be important in prioritising investment in native vegetation management activities such as restoration and for deciding the conservation significance of existing native vegetation. At the state-wide level monitoring change in native vegetation condition, is one of the high level objects of the State of Environment (SOE) and Monitoring, Evaluation and Reporting (MER) programs.

It was suggested that any attempt to address condition needed to be meaningful, and should include a threshold beyond which biodiversity or ecological function will be lost.

A range of condition classification measures and techniques from broad indicators to detailed benchmark site validated values were discussed at the workshops. At its most fundamental level, vegetation condition determines whether a stand of vegetation is native or not native. The next level of detail in describing condition assigns nominal classes to native vegetation. For example the Vegetation Assets States and Transitions (VAST) framework assigns six classes to describe native vegetation condition – 1) native residual, 2) native modified, 3) native transformed, 4) non-native transformed, 5) non-native replaced, 6) non-native removed. For property scale condition assessment the Biometric tools and assessment process contains sets of benchmark parameters for each vegetation type against which detailed condition scores can be recorded for a patch of vegetation. The Biometric process relies on field inspection to determine the condition

scores. There is not an equivalent standard process for mapping vegetation condition at the Biometric / Plant Community Type level of detail.

4.8.4 Extent Change Detection and Reporting

Some activities such as the SOE reporting require the current extent and change in native vegetation extent to be reported. The State of Environment reporting requirements are at a broad level of detail, using Native Vegetation (Keith) or Native / Non Native, Woody / Non Woody classification. Detection of change for Non Woody Native vegetation still requires more research to achieve a reliable, repeatable method.

Many regionally focussed activities such as Catchment Action Planning would benefit from the wider availability of change detection and reporting at more detailed classification levels. For example users expressed that they need and would use information about change in extent and status of Plant Community Types if that information was available. This information would also be widely useful if it were used to update clearing statistics, threats acting on native vegetation and conservation value.

4.8.5 Growth Stage and Structural Attributes

Private Native Forestry (PNF) regulations and compliance requires the special consideration and protection of rainforest and old growth native vegetation. In the absence of definitive mapping that shows old growth and rainforest extent many PNF applications have relied on older Regional Assessment Forestry Type Inventory (CRAFTI) maps prepared in 1990s. Local government, OEH and other state agencies also have requirements regarding old growth and rainforests map information that contains these attributes as derived from structural information.

In rural areas the Native Vegetation Act 2003 (NVA) regulates the clearing of remnant vegetation that is not regrowth. A number of consultation participants pointed to the need for maps to show where native vegetation is regrowth versus remnant so that this requirement of the NVA can be implemented in a robust way that is not open to interpretation.

4.8.6 Associated Remote Sensed Imagery

Native vegetation type maps are usually created from a base remote sensed image. Many workshop participants highlighted the need to refer to the base imagery that the vegetation map is based upon as being an essential tool for decision making and desktop study. The main remote sensed imagery products available in NSW are:

Landsat

25m resolution. Landsat imagery has been used historically as the basis for the SLATs program and has been widely used in New South Wales. It is available for the state extent and will continue to be used in the future with the launch of the Landsat Data Continuity Mission.

Spot 5

10m resolution – Is being developed as the basis for state-wide vegetation monitoring program (SLATs). The product is also available as 2.5m and 5.0m pan sharpened products.

Airborne Digital Sensor (ADS40)

The NSW Government's ADS40 program provides the most detailed widely available remote sensed product in NSW, although the entire state has not yet been covered. ADS40 has a resolution of 50cm and has been captured for the eastern, central divisions and selected parts of the western divisions of NSW.

Local aerial imagery

Organisations such as Local Government have commissioned their own remote sensed imagery products as required. Commercial organisations regularly capture urban centres on the NSW east coast at resolutions of 10 – 20 cm.

4.9 Requirements for Related and Derived Products

The consultation period of this project described a range of needs regarding the related and derived map products. Many organisations have their own processes for creating these related products, particularly organisations such as local governments that already have fine-scale map products and clear processes for planning and managing biodiversity at the property and site scale.

Almost all native vegetation map users indicated a need for clearer processes and guidance on locating and managing TECs. The lack of definitive information about the location of TECs including maps was identified as an issue for most organisations. Some stakeholders questioned whether TEC and PCT classifications could be aligned to provide users with a single consistent classification.

Access to Remote Sensed Imagery that matches native vegetation maps (that is the source imagery used to generate native vegetation maps) was the most requested related product in the stakeholder survey.

Apart from TECs the consultation results showed that native vegetation users have divergent views on requirements for these related products, particularly in regard to requirements for Native Vegetation condition.

A key question arising out of the consultation period is to determine which of the primary Vegetation Type maps the related products will be aligned with. There are competing requirements where clearing statistics and conservation value are needed at the state-wide context for State of Environment Reporting while at the same time the conservation value of Plant Community Types is required for fine-scale decision making at the local and property scale.

The table below describes the requirements for related and derived products for each of the activities identified in Section 3.3.

	Products	*Vegetation Condition*	*Clearing Stats / Conservation Value*	*Mapped TECs*	*Extent Change Update and Reporting*	*Remote Sensed Imagery*
	Requirements Key	*Not Required*	*Not Required*	*Not Required*	*Not Required*	*Not Required*
		Broad indicator required eg. VAST	*Related to Regional (eg. Keith Class)*	*Possibility indicator*	*Broad (eg native / non-native / Keith class)*	
Activities		*Detailed condition description required (eg. Biometric benchmark)*	*Related to Fine-scale (eg. Plant Community Type)*	*Mapped (eg 1:1 PCT assoc.)*	*Change reported at PCT level*	*Required*
Fire Management						
	Wildfire Behaviour Modelling					

	Products	Vegetation Condition	Clearing Stats / Conservation Value	Mapped TECs	Extent Change Update and Reporting	Remote Sensed Imagery
	Bush Fire Risk Assessment for Assets					
	Bush Fire Risk Assessment for Ecological Impacts					
	Bush Fire Risk Treatments					
	Bush Fire Development Control					
Science & Policy						
	Evaluating the Conservation value of Native Vegetation					
	Evaluating threats acting on Native Vegetation					
	Determination of threatened ecological communities and critical habitat					
	Map or identify the location of threatened ecological communities and critical habitat					
	Selection of sites based on conservation values					
	State of the Environment or related Reporting					
	Atmospheric Dispersion Modelling					
Land Management						
	Property Owner - Grant Applications					
	Property Planning					
	Native Vegetation Restoration					
	Natural Area Management					

	Products	*Vegetation Condition*	*Clearing Stats / Conservation Value*	*Mapped TECs*	*Extent Change Update and Reporting*	*Remote Sensed Imagery*
	Pest Management (large Herbivores)					
	Weed Management					
	Reserve Plans of Management					
Education						
	Education - community					
	Education - property owners					
Planning, Development & Assessment						
	Regional Strategic Land Use Planning					
	Development Control - Site Assessment					
	Development Control - Offset sites					
	Environmental Planning Instruments e.g. LEPs and SEPPs					
	Native Vegetation Compliance					
	Catchment Planning					
Water Management						
	Assessment of wetland health					
	Mapping and classification of wetlands					

Table 4: Requirements for Related and Derived Map Products

5. Consultation Findings

5.1 Introduction

This section summarises the main findings from consultation and the main issues that will be addressed in the next steps of the project aimed at defining the specifications for the Fine-scale and Regional-scale Vegetation Map Products.

5.2 Outcomes

The following issues need to be addressed in selecting the best options for designing the standard map products.

5.2.1 Scale of use

The activities identified in the consultation period span a wide range of target scales from the fine-scale property extent to a regional-scale map with a state-wide extent. While this report describes these activities, definition of a fine-scale and regional-scale map product should be based on a prioritised selection of the activities that the map products will be targeting. Selection and prioritisation of these tasks will be an essential underlying task in developing the product specifications.

A majority of people consulted stated that they required fine-scale native vegetation maps – with most saying a scale of between 1:5000 and 1:25,000. This can be explained by:

- Most people consulted were responsible for the implementation of operational or on-ground activities that require fine-scale information.
- The historic / legacy of the long period of time that NSW has not had a state-wide map that has suitable for use or widely accepted.
- The regulatory tools have mostly focused on fine-scale – for example the Property Vegetation Planning, Biometric and Threatened Ecological Community designation process all require fine-scale, highly detailed site based or map information.

5.2.2 Consistency across jurisdictions and scale

In the absence of standard map products organisations have created their own maps which has led to each organisation developing their own priorities and processes. At a regional-scale these organisations priorities do not necessarily align with adjacent jurisdictional, regional and state-wide priorities. For example regional conservation priorities such as corridors are not necessary aligned across LGA, CMAs and OEH, NPWS within the same region. Development of standard map products, particularly the regional-scale map product provides an opportunity for OEH to improve the consistency and efficiency of priority setting at the regional level.

5.2.3 Classification

Regulatory processes and tools such as Bio Banking, Biometric and Property Vegetation Planning, development approvals, local planning and management of biodiversity are based upon the Plant Community Type classification. These processes drive the need for map products to be classified using the Plant Community Type classification. However detailed classifications such as Plant Community Type system require a large investment of resources and time for mapping, particularly for large regional or state-wide extents. OEH will need to decide the priority for aligning map products with existing regulatory and legislative requirements of the NSW government while balancing the competing need to complete regional and state-wide maps to support strategic planning, prioritisation and reporting needs.

5.2.4 Accuracy, Reliability and Confidence

Classification accuracy was raised as an important attribute for native vegetation map products by many users consulted in the preparation of this report. High levels of accuracy were reported as essential including for highly detailed classifications such as Plant Community Type.

When it comes to developing map products it is likely that limited resources and time constraints will require careful consideration of what accuracy levels are achievable for a given classification system. Clear targets for classification accuracy and robust, repeatable and externally verifiable methods of reporting error are required to build confidence in the map products. An important element of selecting a classification system for the regional and fine-scale map products will be level of effort and resources required

to achieve the target level of classification accuracy. More detailed classifications will require greater levels of effort and resources to achieve target levels of classification accuracy.

The consultation for this project highlighted the value of incorporating a feedback and update process for native vegetation map projects. This feedback process allows users to challenge and request updates to maps where they believe they are incorrect. After a review process, if agreed by the organisation the map can be updated and corrected to reflect the feedback, thereby building confidence in the map product.

It is important to note that users were asked about their requirements without having to consider the cost implications of their requirements that is it was asking what their requirements would be in an ideal world where costs is not considered. It is understandable in this context users would report a need for maps that are both highly accurate and detailed.

5.2.5 Field Inspection and Verification

Most site or property focused activities described by native vegetation users require on-site validation of native vegetation type, extent and condition. Even with highly accurate and detailed maps available organisations who are administering legally binding planning instruments such as Local Government and CMAs generally require field inspection to verify native vegetation information. While the legal focus is on site assessment the function of the vegetation map in this context is often a practical one. For example to assist spatial examination of options for locating potential development or conservation, or for targeting investment in conservation offsets.

5.2.6 Hierarchy and Consistency Between Different Scaled Map Products

Many users described the need for the regional-scale product to be based on fine-scale mapping where it is available. The degree to which the fine-scale map products will be used to create regional-scaled map products requires consideration. In deciding whether the fine-scale maps will be used OEH will need to consider the responsibility and resources required to compile and aggregate the fine-scale maps into a regional-scale product. There are potentially some significant data maintenance and curation issues to be worked out in developing processes for maintaining the classification hierarchy and line-work consistency across the differently scale products. Also the regional-scale product will need to be updated frequently for use in the state-wide reporting and other activities. Across versions the regional-scale product will need to use a consistent and repeatable method.

5.2.7 Responsibility for Creating and Maintaining Map Products

In specifying the fine-scale and regional-scale map products OEH will need to consider the resourcing arrangements for each. For each product determining who will be responsible for creation, maintenance and how standards will be enforced and / or encouraged across different organisations.

5.2.8 Feedback and Update Process

Developing an efficient and robust feedback and update process for the map products will be essential to building confidence and improving quality of map products over time.

5.2.9 Availability (affordability)

There are trade-offs between effort and classification detail and accuracy. It should be recognised that users were asked about their requirements without having to consider the resources required to meet their stated needs. It is likely that not all needs expressed in the workshops will be met by an OEH mapping program.

Specification and implementation of mapping program to develop new map products will require trade-offs and prioritisation of user needs against likely resource availability and target timelines for completion of products and updates. Documentation of map products

will need to be clear about which user needs are being met by each map product and the appropriate use of each product.

There is also potential to rationalise the number of map products required by providing standard map products. For example a high quality regional-scale map if it were widely available may be sufficient for users which previously, in the absence of a standard map, required one-off fine-scale maps to be prepared for each project.

Many organisations and activities are currently done with little or no map information available. The nature of the activities that organisations undertake is that they use whatever information is available. From the workshops it was clear that for many organisations any information is better than no information pointing to the need for efficient and timely development of map products.

5.2.10 TECs

The identification and location of TECs was a key issue for stakeholders consulted in this project. How or whether TECs are mapped is inconsistent. The program for determining TECs is independent from the program to define Vegetation Community Classification (PCT) and the alignment between PCTs, map units and TECs is inconsistent. Both TEC and the Vegetation Community Classification are used to determine vegetation conservation significance in NSW regulatory planning and assessment programs. This creates complexity for users and in managing the data.

A systematic approach to the identification and delineation of TECs and High Conservation Value (HCV) native vegetation types is needed. This could conceptually be achieved by:

- Mapping TECs as standalone entities;
- Associating TECs more closely with Plant Community Type descriptions (as has already been done) and mapping the PCTs; or
- Through a more fundamental and radical alignment of the two programs.

A clearer relationship with native vegetation map information would assist users, many of whom are not expert in identifying species on the ground, to identify and manage TECs.

5.2.11 Related Products

Compared to the native vegetation type products, stakeholder views of the related and derived native vegetation map products were much more varied.

While the consultation period of this project identified the need for maps showing native vegetation condition, more work is needed to describe requirements and define a product that will meet user needs in condition.

The product specifications will require a decision about whether the fine-scale and / or regional-scale map product will include clearing statistics and conservation value. There is an opportunity for OEH to provide a more consistent view of conservation status and priority by including these attributes in the Regional-Scale product.

Monitoring and reporting change in vegetation extent is clearly defined at the state-wide /regional-scale and could be incorporated into production of the Regional-Scale map product. The extent to which this monitoring and reporting of change is incorporated into finer scale mapping (to enable to the reporting of change at the Plant Community Type classification as users described as being important) requires further consideration.

5.2.12 Documentation and Training

Native vegetation information users described a need for more guidance about the appropriate use of map products for the types of decision making and activities they do. For example map product documentation could include guidance on when field inspection and validation may be required for local decision-making. They described a need for map products to be more accessible and the need for better information about native

vegetation map information. Future map products should be documented to describe their appropriate use and attributes.

5.2.13 Derived Products

Many users use primary native vegetation map products to create derived products such as their own High Conservation Value or Critical Habitat maps. These users need to access the map products in a form that supports derivation processes. Given the wide range of end users and needs for native vegetation map products it is likely that a range of outputs will be required. For example a state-wide view of native vegetation for viewing by the general public could be symbolised and classified differently to the same map information being used by GIS expert to prepare the NSW State of Environment Report, even though both will be using the same underlying data.

6. Conclusions

The main conclusions that can be drawn from the consultation and analysis of these findings are as follows:

Clear need for fine-scale mapping by most people consulted

The majority of people consulted in this project stated that they need high quality fine-scale mapping for their area of interest. Most people undertake operational activities at the property scale and planning activities are often undertaken at detailed scales of 1:25,000 or better by local and regional organisations such as local government, the National Parks and Wildlife Service and Catchment Management Authorities. Clearly there will be ongoing need for fine-scale map information.

Well-resourced organisations continue to commission fine-scale maps to meet these local and operational needs. There are a number of issues associated with these fine-scale maps being commissioned by organisations:

- Fine-scale maps do not necessarily use a standard classification. Many organisations create their own classification at the commencement of the mapping project. This classification is not necessarily compatible with other classifications such as the NSW Plant Community Types. Maps created by overlapping and adjacent organisations do not necessarily correspond with each other.
- Fine-scale maps are being prepared using many different methods with no set standards for intended scale of use, quality, attribution and target use. In many cases fine-scale maps overlap wasting resources and effort. With each map being different there is little opportunity to combine maps or re-use maps for other purposes, in other products or by other organisations. Opportunities for sharing information across organisations are also limited by each having different formats.
- Organisations responsible for planning and managing native vegetation understandably use their own map if they have one available to set priorities and implement operational activities. With maps covering discrete areas there is little coordination of priority setting across organisations at regional and state extents.
- Fine-scale maps are expensive to commission, particularly to the high level of accuracy stated by people consulted. This results in highly variable access to map information – some organisations and areas have high quality fine-scale maps and other organisations, particularly in the west of the state have no or poor native vegetation map information.
- Organisations vary in their level of expertise to interpret and use fine-scale map information. Less resourced organisations reported that they do not have the resources or expertise to interpret and implement highly detailed, fine-scale native vegetation information.

The stated need for fine-scale mapping reflects the profile of people who responded to the survey and consultation phase of the project. Most people were operational users who are responsible for planning and implementing activities at property and local scales. State-wide strategic and policy needs were less represented in the survey and consultation.

There are few alternatives currently available to local fine-scale mapping. While the Keith map does provide a valuable state-wide view of native vegetation it is variable in source, scale, collection date and quality, limiting its usefulness for operational activities. For most activities the information contained in the Keith map is too broad. The fire planning tools are an exception to this and feedback from people involved in fire planning and management describes the Keith map as being suitable for use in these activities.

In many cases the impetus to acquire fine-scale mapping is driven by strategic land-use assessment and urban planning, often using the existing regulatory tools in NSW. For example the Property Vegetation Planning and the Biometric tools, TEC definitions were described in the consultation feedback as key drivers for fine-scale native vegetation map information.

Lack of access to suitable map information

Less resourced organisations reported that they are not as able to commission their own fine-scale maps of native vegetation and must undertake their operational and planning activities with absent, partial, out of date or inappropriately scaled native vegetation map information. The absence of adequate information means that these organisations must either commission consultants to determine each individual project, accept information submitted to them by stakeholders and proponents without review or make decisions without due consideration of all native vegetation information and priorities.

Lack of a consistent up-to-date, state-wide coverage

Access to map information about native vegetation varied widely between people consulted in this project. Some people from organisations with less resources that haven't commissioned their own maps reported that they don't have access to any suitable native vegetation map information.

The Monitoring, Evaluation and Reporting Program which produces the State of Environment and the State of Catchments report currently only provides an overview of the status and extent of native vegetation. As stated by people consulted in this project and in the NSW State of the Environment Report 2012 reporting on the location and status of ecosystems is limited by the lack of consistent, more detailed map information of vegetation type across the state.

Inconsistencies in locating TECs

People consulted in this project consistently reported that they have difficulty in locating and incorporating TECs within their planning and management activities. For organisations that have their own maps of native vegetation they reported that relating TEC descriptions to map units of native vegetation is not straight forward and requires expert interpretation. Organisations and people that don't have their own suitable maps also reported problems in locating and considering TECs. These organisations must either commission consultants to locate TECs for each project on an as needed basis or where resources are more limited rely solely on proponents information without verification. Some organisations reported that they just don't have the resources to adequately locate and consider TECs in their planning and management activities.

Setting State-wide Conservation Priorities

The lack of a state-wide native vegetation map product that identifies vegetation communities and their conservation value in a consistent manner from contemporary data limits OEH from effectively identifying and setting state-wide conservation priorities.

Many organisations reported that they have their own process for setting and implementing conservation priorities within their jurisdiction. While the Biometric tools do provide some indication of conservation status based on cleared extent within Catchment Management Areas these analyses were reported to be not consistently applicable. The relevance of these statuses is further reduced by the merging of the Catchment Management Authorities with the Land Protection Boards and the redrawing of the Catchment Management Authority boundaries.

Clearly there is an opportunity for organisations' conservation priorities to be more consistently aligned according to state and regional priorities with the creation and up keep of state-wide native vegetation map products.

Appendix A:
Workshop and Meeting Schedule

Workshops & Meetings Schedule

Consultation #	Format	Date	Location	Duration (hours)
1.	Workshop	23 October 12	Sydney	2.5
2.	Workshop	4 February 13	Coff's Harbour	4.5
3.	Interview	4 February 13	Coff's Harbour	1.0
4.	Interview	5 February 13	Armidale	2.0
5.	Interview	6 February 13	Tamworth	2.0
6.	Workshop	12 February 13	Newcastle	4.0
7.	Interview	11 February 13	Sydney	1.0
8.	Interview	11 February 13	Sydney	1.0
9.	Workshop	18 February 13	Sydney	5.0
10.	Interview	18 February 13	Sydney	1.0
11.	Workshop	19 February 13	Sydney	2.0
12.	Interview	19 February 13	Hornsby	2.0
13.	Interview	20 February 13	Hurstville	1.0
14.	Interview	20 February 13	Hurstville	1.0
15.	Interview	20 February 13	Hurstville	1.0
16.	Interview	20 February 13	Hurstville	1.0
17.	Workshop	21 February 13	Dubbo	5.0
18.	Interview	21 February 13	Dubbo	1.0
19.	Workshop	27 February 13	Queanbeyan	5.0
20.	Interview	27 February 13	Queanbeyan	1.0
21.	Interview	1 March 13	Albury	2.0

Workshop and Meeting Attendees

Name	Organization
Consultation #1: 23 Oct 12, Sydney	
Ron Avery	NSW OEH
Jeremy Black	NSW OEH
Joanna Muldoon	NSW OEH
Scott King	NSW OEH
Bob Denholm	NSW OEH
Dominic Siversten	NSW OEH

Name	Organization
Graeme Martin	Spatial Vision
Ishara Kotiah	Spatial Vision
Consultation #2: 4 Feb 13, Coff's Harbour	
Ron Avery	NSW OEH
Jeremy Black	NSW OEH
Joanna Muldoon	NSW OEH
Annie Blaxland Fuad	NSW OEH
Dianne Brown	NSW OEH
Janet Cavanaugh	NSW OEH
Tim Danaher	NSW OEH
Sandy Eager	NSW OEH
Ian Gaskell	Ballina LGA
Guy Hodgson	NSW OEH
Penny Kendall	NSW OEH
Kim Luckie	NSW OEH
John Nagle	Northern Rivers CMA
Phil Redpath	NSW OEH
Jeff Thomas	NSW OEH
Luke Williams	NSW OEH
Nigel Cotsell	Coffs Harbour City Council
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Consultation #3: 4 Feb 13, Coff's Harbour	
Ron Avery	NSW OEH
Jeremy Black	NSW OEH
Ernst Kemmerer	NSW EPA
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Consultation #4: 5 Feb 13, Armidale	
Ron Avery	NSW OEH
Rod Ruffio	NSW OEH
Glenn Manion	NSW OEH
Vicki Logan	NSW OEH
Megan McNellie	NSW OEH
Martin Dillon	Border Rivers - Gwyder CMA
Luc Farago	Border Rivers - Gwyder CMA

Name	Organization
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Consultation #5: 6 Feb 13, Tamworth	
Ron Avery	NSW OEH
Natasha Soar	Tamworth Regional Council
Megan Purkis	Tamworth Regional Council
Donna Ausling	Liverpool Plains Shire Council
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Consultation# 6: 12 Feb 13, Newcastle	
Ron Avery	NSW OEH
Bill Peel	LGA (Port Macquarie)
Skye Moore	CMA (Hunter-Central)
Joe Thompson	CMA (Hunter-Central)
Stephen Bell	Consultant
Alex Cockerill	Consultant
Ryan Parsons	Consultant
Robert Payne	Ecolsurvey
Mary Greenwood	Hunter Council
Meredith Laing	Hunter Council
Paul Taylor	LGA (Cessnock)
Ian Turnbull	LGA (Cessnock)
Alan Keown	LGA (Gloucester)
Matt Bell	LGA (Great Lakes)
Robbie Economos	LGA (Lake Macquarie)
Sarah Warner	LGA (Lake Macquarie)
Felicity Charlton	LGA (Newcastle)
Rodney Hardwick	LGA (Newcastle)
Anthony Marchment	LGA (Port Stephens)
Ben Nicholson	LGA (Singleton)
Doug Beckers	NSW OEH
Lucas Grenadier	NSW OEH
Steve Lewer	NSW OEH
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Consultation #7: 11 Feb 13, Sydney	

Name	Organization
Ron Avery	NSW OEH
Sharon Bowen	NSW OEH
Susy Cenedese	NSW OEH
Rod Ruffio	NSW OEH
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Consultation #8: 11 Feb 13, Sydney	
Ron Avery	NSW OEH
Rod Ruffio	NSW OEH
Mike Cavanagh	NSW OEH
Jeffrey Bradley	NSW OEH
Danielle Murphy	NSW OEH
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Consultation #9: 18 Feb 13, Sydney	
Ron Avery	NSW OEH
Max Beukers	NSW OEH
Susannah Bilous	RFS
Matthew Chy	ESRI
Penny Colyer	LGA (Ku-Ring-Gai)
Phil Craven	NSW OEH
Gareth Debney	LGA (North Sydney)
Tom Farrow	ESRI
Lew Haley	LPI
Heather Tuesday	LGA (Shellharbour)
Ross Johnson	LGA (Ryde)
Tanya Leary	NSW OEH
Jedda Lemmon	NSW OEH
Kim Macqueen	LGA (Pittwater)
Kirsty McIntyre	LGA (Assocn)
John Patten	NSW OEH
Dave Robson	NSW OEH
Greg Steenbeeke	NSW OEH
Rachael Thomas	NSW OEH
Graham Turner	NSW OEH
Graeme Martin	Spatial Vision

Name	Organization
Lindsay Smith	Spatial Vision
Consultation #10: 18 Feb 13, Sydney	
Sharon Burrow	Wetlands Group OEH
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Ron Avery	OEH
Consultation #11: 19 Feb 13, Sydney	
Ron Avery	NSW OEH
Jeremy Black	NSW OEH
Linda Bell	NSW OEH
Rick Noble	NSW OEH
Ian Oliver	NSW OEH
Michael Pennay	NSW OEH
Julie Ravallion	NSW OEH
Tony Roper	NSW OEH
Alex Waterworth	NSW OEH
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Ishara Kotiah	Spatial Vision
Consultation #12: 19 Feb 13, Hornsby	
Ron Avery	NSW OEH
Daniel Connolly	NSW OEH
Diane Campbell	Hornsby City Council
Lindsay Smith	Spatial Vision
Ishara Kotiah	Spatial Vision
Consultation #13: 20 Feb 13, Hurstville	
Ron Avery	NSW OEH
John Benson	Consultant
Lindsay Smith	Spatial Vision
Ishara Kotiah	Spatial Vision
Consultation #14: 20 Feb 13, Hurstville	
Ron Avery	NSW OEH
Daniel Connolly	NSW OEH
Lindsay Smith	Spatial Vision
Ishara Kotiah	Spatial Vision
Consultation #15: 20 Feb 13, Hurstville	

Name	Organization
Ron Avery	NSW OEH
Joanna Muldoon	NSW OEH
Verity	NSW OEH
Lindsay Smith	Spatial Vision
Ishara Kotiah	Spatial Vision
Consultation #16: 20 Feb 13, Hurstville	
Ron Avery	NSW OEH
David Keith	NSW OEH / UNSW
Lindsay Smith	Spatial Vision
Ishara Kotiah	Spatial Vision
Consultation #17: 21 Feb 13, Dubbo	
Ron Avery	NSW OEH
Jeff Bradley	NSW OEH
Peter Christie	NSW OEH
Garry Germon	NSW OEH
Richard Hicks	NSW OEH
Dave Robson	NSW OEH
Robert Taylor	NSW OEH
Stephen Wolter	CMA (Western)
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Consultation 18: 21 Feb 13, Dubbo	
David Robson	NSW OEH
Andrew xx	CMA (Western)
Garry Germon	NSW OEH
Lynton	Dubbo LGA
Jeff Bradley	NSW OEH
Robert Taylor	NSW OEH
Stephen Walter	CMA (Western)
Peter Christie	NSW OEH
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Ron Avery	NSW OEH
Consultation #19: 27 Feb 13, Queanbeyan	
Ron Avery	NSW OEH
David Anthony	LGA (Palerang)

Name	Organization
Matt Bolton	ERIN
Liz Clark	CMA
Tobi Edmonds	NSW OEH
Peter Ewin	NSW OEH
Lynette Finch	NSW OEH
Simon Holloway	LGA (Palerang)
Natalie Lyons	ERIN
Jason MacKenzie	A.C.T.
Owen Maguire	Consultatnt
Heather Mason	CMA (Murrumbidgee)
Kym Nixon	LGA (Yass Valley)
Michael Pennay	EPA
Paula Pollock	LGA (Eurobodalla)
David Read	LGA (Wagga)
Geoff Robertson	NSW OEH
Gary Saunders	NSW OEH
Rod Sewell	NSW OEH
Mark Sheehan	NSW OEH
Virginia Thomas	NSW OEH
Mike Thompson	Consultant
Jacinta Tonner	LGA (Queanbeyan)
Graeme Martin	Spatial Vision
Lindsay Smith	Spatial Vision
Consultation #21: 1 Mar 13, Albury	
Ron Avery	NSW OEH
Matt Cameron	NSW OEH
David Parker	NSW OEH
Simon Campbell	CMA
Alison Skinner	CMA
Lindsay Smith	Spatial Vision
Ishara Kotiah	Spatial Vision

Appendix B:
Uses of Native Vegetation Map Information

Appendix B: Uses of Native Vegetation Map Information

This section describes the activities of organisations that require native vegetation map products.

Fire Management

1. Wildfire Behaviour Modelling

Attribute	Description
Description of activity	Modelling of wildfire behaviour and planning of fire response activities
Drivers	Rural Fires Act 1997 National Parks and Wildlife Act 1974
Role of Native Vegetation Information	Native vegetation type and extent information is used to derive modelling inputs regarding the fuel type, accumulation curves and structural characteristics of native vegetation that determine fire behaviour. Native vegetation maps can provide location information about areas to shelter from fire and the locations where control activities should be directed – for example rainforests.
Organisations	Rural Fire Service NPWS, OEH
Importance	27 (29%) of survey responses indicated the Rural Fires Act is a driver for their use of native vegetation map products.
Existing Native Vegetation Information used	Native Vegetation (Keith) Class and Formation maps
Existing limitations	Past work by OEH has identified a need to standardise on a national approach by adopting NVIS Classification instead of Class and Formation. Conversion of vegetation class information into fire classes is not necessarily consistent across regions. Access to map information varies according area and resources available. Many map used currently are old or do not cover the required extents. Widely available standard map products would improve the consistency of application by different organisations.
Required Scale of Use	1:25,000 to 1:250,000. 23 % of survey responses indicated a minimum polygon size of less than .25 ha. 65 % of responses indicated a minimum polygon size of between 0.25 ha and 5 ha.
Required Classification	Keith class and formation
Required Accuracy	Moderate accuracy (70-80%) at the Keith class level
Related Products	Fuel type and fire threshold information

2. Bush Fire Risk Assessment for Assets

Attribute	Description
Description of activity	Bush Fire Risk Management Planning and Risk Assessment
Drivers	Rural Fires Act 1997
Role of Native Vegetation Information	Native vegetation map information is used to derive risk parameters associated with fuel type, accumulation curves and structural characteristics of native vegetation.
Organisations	Rural Fire Service National Parks and Wildlife Service
Importance (from survey)	A number of other activities such as Local Environmental Planning , development approvals indicated that risk assessment for assets from fire was an important sub component of those activities. 30% of survey responses indicated that they undertake asset bushfire risk assessment in the stakeholder survey.
Existing NVI used	Keith class and formation map
Existing limitations	The existing Keith class map is compiled from a range of data sources with varying data quality and currency. Maps with a recent and consistent source would improve the quality and defensibility of outputs used Fire Management Plans etc.
Indicative Scale of Use	1:25,000 to 1:250,000. 25 % of survey responses indicated a min polygon size of less 0.25 ha while 60% indicated less than 5ha would be suitable.
Classification	Keith class and formation
Accuracy	Moderate accuracy (70-80%) at the Keith class level
Related Products	Aerial photography, road, property datasets

3. Bush Fire Risk for Ecological Impacts

Attribute	Description
Description of activity	National Parks manage prescribed burn activity according to a set of fire thresholds for Vegetation Classes. Each threshold has been designed to protect the biodiversity value of the vegetation class. Threatened species and TECs require that burns be planned in a way that they are protected.
Drivers	National Parks and Wildlife Act 1974 Threatened Species Conservation Act 1995 Environmental Planning and Assessment Act 1979 Rural Fires Act 1997
Role of Native Vegetation Information	Native vegetation maps are used as a key input into determining the ecological thresholds for prescribed burning and minimising the impacts of hazard reduction burning.
Organisations	Rural Fire Service State Forests NPWS – OEH
Importance	92% of the 14 respondents who undertake this activity indicated that native vegetation map information is important to this activity.
Existing NVI used	Fine-scale maps commissioned for individual parks where available. Where map information is not available local knowledge and field inspection are used.
Existing limitations	Not all parks have maps completed
Indicative Scale of Use	1:5000 – 1:25000 for National Parks and Wildlife Service Rural Fire Service operates at less detailed scale For example 1:100,000 to 1:250,000. The survey indicated scales of use was distributed across the range with approximately an equal number of responses for a minimum polygon size of 0.25 ha, 1 ha and 2-5 ha.
Classification	Native Vegetation (Keith) Formation and Class Plant Community Type
Accuracy	National Parks and Wildlife reported a high degree of accuracy (80% - 90%) is required. Rural Fire Service require moderate (70-80%) accuracy at the Keith class level
Required coverage	State-wide for broader measures. Site / Park to Regional (LGA) for detailed impacts at the site scale.
Related Products	Native vegetation condition is a key related dataset for determining the risk and impact of bush fire on ecological assets.

4. Bush Fire Risk Treatments

Attribute	Description
Description of activity	Planned hazard reduction burning for reducing the risk of bushfire. Community education, property planning, wildfire suppression planning, fire trail management.
Drivers	Rural Fires Act 1997 National Parks and Wildlife Act 1974 Threatened Species Conservation Act 1995
Role of Native Vegetation Information	Native vegetation map data is used to determine which areas should be burned and managed for hazard reduction. Vegetation maps are used to determine Fuel Type and ecological threshold which are inputs into the fire hazard reduction planning process.
Organisations	Rural Fires Service (RFS) NPWS, OEH
Importance	85% of 14 responses indicated that native vegetation map information was a key input to the activity.
Existing NVI used	Native Vegetation (Keith) Formation and Class maps
Existing limitations	Limited map information available about Endangered and Threatened Ecological Communities. The planning and approval process for operations in the absence of available map information can overlook candidate TECs.
Indicative Scale of Use	1:25,000 to 1:100,000. 31% of survey responses required a minimum polygon size of less than 0.25 ha. 45% required less than 2 ha as the minimum polygon size.
Classification	Native Vegetation (Keith) Formation and Class
Accuracy	>80% at Native Vegetation Class level.
Related Products	Remote sensed imagery. Topographic maps Fuel load attributes Fire histories Land use zones Maps showing TECs were consistently identified as being key inputs into all of the Fire Management activities undertaken by organisations.

5. Bush Fire Development Control

Attribute	Description
Description of activity	Rural fire service provides advice to other agencies such as Local Government about development approvals that are located in areas of high wildfire risk.
Drivers	Rural Fires Act 1997 Environmental Planning and Assessment Act 1979 State Environmental Planning Policy Exempt and Complying Development Codes (2008)
Role of Native Vegetation Information	Vegetation Class information is one of four variables used to determine high risk wildfire zones.
Organisations	Local government Rural Fire Service
Importance	All responses (3) who undertake this activity indicated native vegetation maps are essential to completing this activity.
Existing NVI used	Keith Native Vegetation formation
Existing limitations	Lack of available, up to date, consistent information for all areas. Councils with resources have created their own maps. Councils with less resources use out of date mapping or do not use any map information.
Required Scale of Use	Varies from fine-scale to regional-scale (1:25,000 to 1:100,000)
Required Classification	Native Vegetation (Keith) Formation and Class Plant Community Type
Required Accuracy	> 80% classification accuracy at Keith Class level.
Related Products	Remote sensed imagery Cadastre (Property, Roads) Topographic Mapping Slope, Aspect Maps Last Burnt Fire History

Science and Policy

6. Determining the Conservation Value of Native Vegetation

Attribute	Description
Description of activity	Determine which areas of native vegetation require prioritisation for conservation and active management. The conservation value of native vegetation is critical to prioritising where investment should be made in native vegetation management activities and in approving and monitoring activities
Drivers	Native Vegetation Act 2003 Catchment Management Authorities Act 2003 National Parks and Wildlife Act 1974 Threatened Species Conservation Act 1995 TECs Nomination Process
Role of Native Vegetation Information	Maps of vegetation type and extent are critical in determining priorities based upon rarity, depletion, level of existing reservation and impact of threatening processes.
Organisations	Local government Catchment Management Authorities National Parks and Wildlife Service Office of Environment and Heritage State Forests Consultant Ecologists
Importance	Almost all activities undertaken by survey participants indicated the need to be able to determine the conservation significance of native vegetation. 68% of responses indicated that they undertake this activity.
Existing NVI used	Many organisations reported that they do not have adequate map information available – forcing them to use on site visits or old map information for this activity. Well-resourced organisations have created their own maps for determining conservation value and management priorities. Organisations with their own maps have generally created fine-scale (1:5000-1:25000 map information with detailed (e.g. Plant Community Type) classification.
Existing limitations	Each organisation / jurisdiction creates its own maps and has had its own method for describing the vegetation type and determining the conservation value of native vegetation within its area of interest. No map product currently provides the regional or state context to these maps and priorities. Existing maps used do not necessarily align with the image layer used. Lack of a relationship between TECs and PCT risks overlooking their existence, under-prioritising their management and increasing the effort required to locate them.
Required Scale of Use	Varies – 1:5000 to 1:250,000. Priorities can be set at the site, regional or state level.
Required Classification	Varies from Plant Community Type to Keith Class. Depends upon related regulatory requirements and the requirement or need to use map products in those activities.
Required Accuracy	Conservation value is in part determined by analysing areas of vegetation remaining, cleared and protected in reserves. Accurate mapping of the extent of vegetation types is needed to correctly derive conservation value and inform planning and decision making.
Related Products	Conservation value requires information about threatened species location and habitat.

Attribute	Description
	Source remote sensed imagery, aligned to map Vegetation condition data is used as an input to determining conservation value – e.g. high condition vegetation can have a higher conservation value. Pre-computed statistics in supporting documentation such as % area covered or remaining of each vegetation type. Critical habitat maps TEC location and associations.

7. Evaluating Threats Acting on Native Vegetation

Attribute	Description
Description of activity	Threatening processes such as clearing for agriculture and urban development and weeds are actively managed by range of organisations.
Drivers	Catchment Management Authorities Act 2003 Native Vegetation Act 2003 National Parks and Wildlife Act 1974 Environmental Planning and Assessment Act 1979 Threatened Species Conservation Act 2005
Role of Native Vegetation Information	Maps that describe type, extent and condition of native vegetation are a key dataset in evaluating threats to native vegetation. Regularly updated native vegetation extent mapping is a key dataset for monitoring the rate of clearing happening at the regional and state-wide extent. At a site level, information about the current extent of weeds and the condition of native vegetation is important in determining appropriate management and assigning priorities to native vegetation management activities.
Organisations	Local Government National Parks and Wildlife Service Catchment Management Authorities Regional Operations Group OEH
Importance	Tracking change in vegetation extent and condition at the state level is the key biodiversity reporting indicator contained in the State of Environment Report. At a Park / Reserve Management focus most Reserves Plans of Management and management activities are focused on evaluating and managing threats such as weeds and pests. Catchment Management Authorities are also responsible for evaluating and managing threats at a catchment scale such as changes in water regimes for wetlands, weeds and clearing for agriculture and development.
Existing NVI used	Local maps, consultants reports commissioned for a project. MER and SLATS program data outputs.
Existing limitations	Lack of a consistent condition dataset that supports concepts of resilience and recoverability and is applicable to the detailed scales at which some of the threatening processes operate – for example local weed infestations and rate of spread. Clearing information from SLATs could be better incorporated in regional and local environmental activities. In the absence of native vegetation maps activities like the 'State of the Parks' report is qualitative rather than quantitative and relies on the expert opinion of local rangers. Activities such as Property Vegetation Planning could be better informed and made more robust by the availability of native vegetation information targeted for property decisions. Without this information authorities must accept information as supplied or devote resources to on-site inspection and validation.
Required Scale of Use	Varies from state-wide(e.g. 1:250,000) to site scale: (e.g. 1:5000)
Required Classification System	Varies - Woody / Native / Non Native at a State-wide extent

Attribute	Description
	Native Vegetation (Keith) class at regional-scales Plant Community Type and detailed VQA benchmark data at a property scale.
Required Accuracy	Varies – Higher tolerance for broader estimates at the state-wide level. Site based assessment have high accuracy requirements (80% to 90%).
Required Related Products	Native Vegetation Condition inspections (Biometric benchmark) Aerial Photography SLATs woody extent change detection

8. Determination, mapping and locating Endangered and Threatened Ecological Communities and Critical Habitat

Attribute	Description
Description of activity	The NSW Scientific Committee designates communities of native species as Endangered Ecological Communities. The committee uses Plant Community Type descriptions as one of the datasets it consults when creating a new TEC designation. Organisations such as CMAs and Local Government are required to locate and specifically manage TECs within their boundaries.
Drivers	Threatened Species Conservation Act 1995 National Parks and Wildlife Act 1974 Catchment Management Authorities Act 2003
Role of Native Vegetation Information	The designation of threatened ecological communities does not currently depend upon Native Vegetation Map Products. TECs are described in text where descriptions of the native vegetation form a part of the overall description of the TEC.
Organisations	National Parks and Wildlife Service EPA - OEH Office of Environment and Heritage NSW Department of Planning and Infrastructure Catchment Management Authorities Local Government State Forests
Importance (from survey)	TECs were the most raised requirement throughout the stakeholder survey and in the consultation workshops and interviews.
Existing NVI used	Local native vegetation maps where they exist. Native Vegetation (Keith) Formation and Class maps Old maps created for other purposes such as CRAFTI
Existing limitations	Users have limited ability to interpret TEC descriptions on the ground. Many organisations have created their own maps of TECs by attributing their vegetation maps with TEC identifiers. Some TEC descriptions do not have a direct correlation with Plant Community Types or the other classification descriptions used on the map. Many organisations do not have the staff or resources to determine, locate or manage TECs.
Required Scale of Use	Varies e.g. 1:5,000 to 1:250,000
Required Classification	Varies from Plant Community Type to Native Vegetation Class and Formation
Required Accuracy	Accuracy needs for TEC designation vary between stakeholders requiring definitive maps to situations where just a possible TEC association with a mapping unit was useful for their activities.
Related Products	Native Vegetation Condition assessments Plot survey data containing species information Growth stage / Old Growth status Threatened species locations and critical habitat.

9. Selection of sites based on conservation values

Attribute	Description
Description of activity	Reserve planning and acquisition is undertaken across a range of operational scales. State-wide priorities for reserve planning require a consistent State-wide dataset. At regional-scales reserve planning activities require maps that show the entire extent of the planning region – for example the bioregion – so that the relative conservation value of land can be determined and prioritised in the reserve planning process. At the individual property scale reserve planning and acquisition programs focus on the detailed conservation values of the property and require information about the Plant Community Types, TECs and threatened species.
Drivers	National Parks and Wildlife Act 1974 Native Vegetation Act 2003 Environmental Planning and Assessment Act 1979
Role of Native Vegetation Information	Maps of native vegetation type, extent and conservation value are required across a range of scales to inform reserve planning and acquisition programs. State-wide priorities for reserve establishment and planning require a State-wide dataset. Regional process require a maps at the full extent of the planning extent and at local site scales detailed information about the biodiversity values of the site are required in the form of survey, reports and / or maps. Maps are used to determine the Comprehensive, Adequate and Representative status of native vegetation.
Organisations	National Parks and Wildlife Service Local Government OEH EPA - OEH
Importance	Reserve planning and acquisition programs require maps of native vegetation that show conservation significance across large extents and jurisdictions. Availability of consistent local and regional datasets would help to improve the consistency and efficiency of reserve planning and priority setting by the various levels of administration such as NPWS, Local Government and CMAs within a region.
Existing NVI used	Keith map is used although limited in its suitability Regional and local maps are used where they are available. Field inspection and local knowledge is used where map information is not available.
Existing limitations	Keith map is not of a suitable scale and currency for many site focused acquisition decisions, although maps at this scale inform by providing regional / state context. Local, detailed maps are not available for all areas and for a consistent set of planning units such as Bioregions. Regional maps are not consistent in their classification systems and are not available for all areas. Each organisation has their own method for setting conservation priorities.
Required Scale of Use	Varies from 1:25,000 to 1:100,000
Required Classification	Varies – Keith class for the State-wide maps to Plant Community Type along the coast and tablelands. Areas that have a higher level of clearing or are under land use or environmental change pressure require fine-scale mapping using the Plant Community Type classification. Reserve planning and acquisition at the property level requires fine-scale mapping to identify TECs, Plant Community Types and

Attribute	Description
	conservation value.
Required Accuracy	Classification accuracy 70 to 90%. Field inspection and checking will be required for acquisition programs. Planning requires good accuracy in order to reliably determine current extent of plant types and classes.
Related Products	Remote sensed imagery Cadastre – Property Native Vegetation Condition Site Survey and Consultant Reports Local Maps

10. State of the Environment or Related Reporting including State of the Catchments Reporting and National Vegetation Information System Reporting

Attribute	Description
Description of activity	State of the Environment Reporting, State of the Catchments Reporting The NSW State of Environment and State of the Catchment Reports using data collected by the CMAs and the Monitoring Evaluation and Reporting (MER) group of OEH. The document considers the status and condition of the major environmental resources of NSW and examines associated environmental trends. Native vegetation extent and condition are key measures reported in the State of Environment Report. NVIS Reporting. The Commonwealth government maintains a national native vegetation dataset that is compiled from the various state government datasets. This dataset is used as the basis for reporting for a number of national reports including the National State of Forests and National State of the Environment Report.
Drivers	Protection of the Environment Administration Act 1991
Role of Native Vegetation Information	The status of native vegetation information is a key topic in the report and native vegetation information is a key input for many of the other indicators in the State of the Environment Report.
Organisations	Environment Protection Authority (EPA) Monitoring Evaluation and Reporting Unit –OEH (MER) Office of Environment and Heritage (OEH) Federal Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).
Importance	The extent, condition and change in native vegetation is a key reporting indicator in the State of the Environment Report. A consistent, frequently updated view of state-wide vegetation is required to support state-wide and National Reporting functions of the NSW government.
Existing NVI used	NSW Natural Resource Monitoring Extent Map and The State-wide Land cover and Trees Study (SLATS) change in woody vegetation extent map datasets. Keith Class and Formation Map Remote sensed imagery Land use mapping as a surrogate for native vegetation condition using the VAST categories. A range of datasets are used as input into the NVIS system. New South Wales NVIS dataset lacks a single state wide view of native vegetation at the required level of detail.
Existing limitations	Reporting of change is limited to reporting change in woody extent as detected by the SLATs program. Changes in extent of native, non woody vegetation are not currently reported. With no regularly updated state-wide native vegetation map, changes in the extent and status of vegetation classes or community types is limited. Reporting is of a general qualitative nature due to the limited consistent map products currently available at a State-Wide coverage. NVIS dataset requires completion and update with consistently attributed map information. Each catchment management organisation uses its own map. Maps belonging to different organisation do not use the same classification system – resulting in inconsistencies across spatial boundaries and in compiling information at the state level. Threatened Ecological Communities (TECs) are often not mapped making required reporting of their level of

Attribute	Description
	protection and extent difficult for the State of the Catchments report. A range of native vegetation map products are used by different organisation depending upon availability. Some Catchment Management Authorities have commissioned native vegetation maps while others rely on older maps or do not have a complete coverage of maps depicting native vegetation.
Required Scale of Use	1:100,000 to 1:250,000. Some products such as extent could be delivered at finer scales such as 1:25,000.
Required Classification	Keith Formation and Class and NVIS classifications 1 to 6.
Required Accuracy	Consistency of reporting methods across reporting cycles at a moderate level of accuracy at broad Keith Class level.
Related Products	SLATs program outputs such as Woody Native Vegetation Change, Vegetation Condition, Remote Sensed Imagery, Native Vegetation Condition. Land use mapping as a surrogate for condition / pressure. CMAs have a requirement to report on the extent and protection status of TECs. Commonwealth funded projects often require reporting of the protection and status of EPBC listed communities.

Land Management

11. Property Planning including Grant Applications and Property Vegetation Planning (PVPs), Biobanking and Biocertification Offset Sites.

Attribute	Description
Description of activity	CMA's and landowners can enter into voluntary legally binding agreements that protect native vegetation or approve clearing activities of remnant and protected regrowth native vegetation on their land. Property owners may also request funding from the State and Federal governments to protect native vegetation. Property vegetation plans are created for the following reasons: Applying for native vegetation incentive funding To protect native vegetation for future generations To confirm that native vegetation is regrowth and does not require clearing approval To change the regrowth date of native vegetation To confirm that existing management means that a clearing approval is not required To obtain clearing approval Biometric is the tool that assists in assessing terrestrial biodiversity at the patch, paddock and property scale.
Drivers	Native Vegetation Act 2003 Native Vegetation Regulation 2005
Role of Native Vegetation Information	Native vegetation maps are used as supporting information for the PVP process. Map information where it is available is used in desktop analysis prior to field inspection. PVPs generally require on-site inspection of native vegetation since they are legally binding agreements.
Organisations	Catchment Management Authorities Local Government Developers, Consultants and Property Owners Regional Operations OEH
Importance	Property planning was raised particularly by CMA staff as a key activity requiring better native vegetation information. Many CMA stakeholders reported that better information would improve the transparency, consistency and quality of decision being made at the property planning scale.
Existing Native Vegetation Information used	A range of existing native vegetation map products are used. Landholders often commission consultants to prepare Property Vegetation Plans and identify the biodiversity values of the property. The process heavily relies on field inspection.
Existing limitations	Staff lack the expertise to determine the type of native vegetation on site leading to a blind acceptance of the map description of native vegetation at the property scale. A lack of map information means that CMA staff do not have the means to cross check information that is being submitted or to guide desktop studies prior to field inspection.
Required Scale of Use	Property scale e.g. 1:5000 to 1:25,000. Minimum polygon size of 0.25 ha
Required Classification	Plant Community Type . Often survey based with information collected by site visit.
Required Accuracy	Stakeholder confidence in map products is critical. On site verification of vegetation type and condition is required for property scale decision. A range of accuracy was reported as required at strategic decision making scales ranging from 70

Attribute	Description
	to 90% classification accuracy. Detailed classification systems were noted to sometimes be more prone to interpretation or classification error.
Related Map Products	The existence of TECs is an important requirement for PVP and for giving approval for PVPs. Maps of TEC extent would assist in formulating and approving PVPs. Condition of native vegetation determined by expert site inspection.

Other Consultation Notes about Property Planning

Key requirements of native vegetation map products for Property Vegetation Plans

1. Native vegetation maps are a key background information product for Property Vegetation Plans. As part of the property vegetation plan, CMA staff must determine the type, extent, condition and conservation value including whether the vegetation is a TEC.
2. Existing native vegetation maps are used as initial background documents in determining these attributes of the native vegetation, however workshop participants identified the need to visit the site and confirm native vegetation type, condition and extent for Property Vegetation Planning activities.
3. Description of Plant Community Type (PCT) on the map was seen as being essential to the PVP process.
4. Using Plant Community Type as the description for maps used in Property Vegetation Planning was required by the legislation. However some participants in the workshops identified that this required staff with expertise in identifying native vegetation to create Property Vegetation Plans and that some organisations had difficulty in determining and verifying map descriptions of vegetation type, particularly in degraded areas.

12. Native Vegetation Restoration

Attribute	Description
Description of activity	The restoration of native vegetation condition through active management such as stock control, weed control, replanting, water management or other management activity.
Drivers	Catchment Management Authorities Act 2003 Threatened Species Conservation Act 1995 Environmental Planning and Assessment Act 1979
Role of Native Vegetation Information	Requires detailed description of Plant Community Type. In order to rehabilitate degraded sites pre 1750 mapping of native vegetation type is also required. Condition measures suitable for determining the recoverability or feasibility of restoration in map or site survey form.
Organisations	Local government National Parks and Wildlife Service Catchment Management Authorities Community Groups
Importance	Catchment Management Authorities reported the need to report on the amounts of restoration activities undertaken. Native vegetation information was essential for determining priorities for limited resources to be allocated to restoration activities. Restoration through active management is a key activity for Local Government and CMAs for protecting high conservation native vegetation.
Existing Native Vegetation Information used	Existing fine-scale maps where they are available, on a site by site or project basis. Lack of available datasets means that many activities must rely on site inspection and expert opinion.
Existing limitations	Suitable map information is available for limited extents – usually in well-resourced Local Government Areas.
Required Scale of Use	1:5,000 to 1:10,000, 0.25 ha minimum polygon size
Required Classification	Sub Community or Plant Community Type
Required Accuracy	80% or greater
Related Products	Site based native vegetation condition measures

Natural Area Management

13. Pest Management

Attribute	Description
Description of activity	National Parks and Wildlife Group manage pest animals within the NSW parks estate. Pest animals are a key threatening process to many of the biodiversity values of parks.
Drivers	NSW National Parks and Wildlife Act 1974 Environmental Planning and Assessment Act 1979 NSW Threatened Species Conservation Act 1995
Role of Native Vegetation Information	Information that detects and reports on the impact of pest animals upon native vegetation is required. This will usually be detailed map and field based information about specific areas within parks. NPWS does also have a requirement to report on status of pest animal and their management. This is done with local field based observation of pest animals and their impacts.
Organisations	NPWS – OEH Regional Operations Group - OEH
Importance	Native vegetation maps are used to determine the priority areas for management of pest animals and to determine the value of native vegetation that is impacted by pest animals as a threatening process.
Existing Native Vegetation Maps used	The Parks and Wildlife Group commission fine-scale maps for individual parks as resources and needs arise. For example the Bongil National Park has a fine-scale at the Plant Community Type classification. Other parks rely on field inspection and do not have fine-scale up to date maps available.
Existing limitations	Park mapping has been undertaken using different classification systems. Some parks do not have suitable fine-scale mapping products available. Limited resources are available for updating fine-scale maps for the entire parks estate. Where fine-scale maps have been completed they can be expensive and take some time to develop. Under resourced organisation do not have suitable map products to inform planning processes and at best rely on local knowledge or local field inspection.
Required Scale of Use	1:5000 – 1:25,000.
Required Classification	Fine-scale classification at the Plant Community Type level is required, although for some parks where no mapping exists a broader classification would be an improvement over the current situation.
Required Accuracy	Classification accuracy of greater than 80%.
Related Products	Maps and surveys of vegetation condition and threatened species habitat / locations are key inputs into developing reserve plans of management. Only some maps contain TEC and threatened species associations.

14. Weed Management

Attribute	Description
Description of activity	Weeds are a significant threatening process in NSW National Parks. The National Parks and Wildlife Group must identify areas within parks that are being impacted by weeds and manage them to minimise the impact of weeds on biodiversity and amenity values.
Drivers	NSW National Parks and Wildlife Act 1974 Environmental Planning and Assessment Act 1979 NSW Threatened Species Conservation Act 1995
Role of Native Vegetation Information	Detailed map information at the Plant Community Type classification level to a high degree of accuracy is essential to formulating reserve plans of management and to prioritise investment in management activities.
Organisations	NPWS OEH Local Government
Importance	Native vegetation maps are used as the basis for determining the management and value of native vegetation within reserves.
Existing Native Vegetation Maps used	Maps showing the location and spread of weeds as well as maps showing the location of TECs, High Conservation Value Native Vegetation, Native Vegetation Condition all inform the process of managing weeds and prioritising management actions. Weed management requires up to date information about current native vegetation and condition at a detailed site focussed scale. Often weed management will rely on local knowledge and field based assessment.
Existing limitations	Lack of detailed, updated maps describing native vegetation condition including weed presence. Only some parks have fine-scale mapping available that identifies plant community types and conservation value.
Required Scale of Use	1:5000 – 1:25,000.
Required Classification	Fine-scale classification at the Plant Community Type level is required, although for some parks that no mapping a broader classification would be an improvement.
Required Accuracy	Classification accuracy of greater than 80%.
Related Products	Remote Sensed Imagery Field survey and consultant reports

15. Reserve Plans of Management

Attribute	Description
Description of activity	Parks and Wildlife Group are required to prepare plans of management for the entire National Parks estate of NSW. This requires knowledge of the type of native vegetation present, its regional and intrinsic significance, potential management impacts such as bushfire hazard reduction burning regimes, and threats such as weeds and pest animals. Local governments prepare reserves plans of management that set the management actions required to maintain biodiversity and other values.
Drivers	NSW National Parks and Wildlife Act 1974 Environmental Planning and Assessment Act 1979 NSW Threatened Species Conservation Act 1995
Role of Native Vegetation Information	Detailed map information at the Plant Community Type classification level to a high degree of accuracy is essential to formulating reserve plans of management and to prioritise investment in management activities.
Organisations	NPWS OEH Local Government
Importance	Native vegetation maps are used as the basis for determining the management and value of native vegetation within reserves.
Existing Native Vegetation Maps used	The Parks and Wildlife Group commission fine-scale maps for individual parks as resources and needs arise. For example the Bongil National Park has a fine-scale at the Plant Community Type classification. Local governments use map products to varying degrees in developing reserve plans of management with well-resourced local governments using comprehensive, detailed maps to develop reserve plans.
Existing limitations	Park mapping has been undertaken using different classification systems. Some parks do not have suitable fine-scale mapping products available. Limited resources are available for updating fine-scale maps for the entire parks estate. Where fine-scale maps have been completed they can be expensive and take some time to develop. Under resourced organisation do not have suitable map products to inform planning processes and at best rely on local knowledge or local field inspection.
Required Scale of Use	1:5000 – 1:25,000.
Required Classification	Fine-scale classification at the Plant Community Type level is required, although for some organisation who have no mapping a broader classification would be an improvement.
Required Accuracy	Classification accuracy of greater than 80%.
Related Products	Location of TECs is a key related requirement for reserve plans of management. Maps and surveys of vegetation condition and threatened species habitat / locations are key inputs into developing reserve plans of management. Only some maps contain TEC and threatened species associations.

Education

16. Education of Community and Property Owners

Attribute	Description
Description of activity	Education of property owners is a key means by which compliance with the Native Vegetation Act can be achieved. Property owners who require information about the type and significance of the native vegetation on their land and their rights and responsibilities under the various acts, particularly the Native Vegetation Act. Community and interested parties with an interest in biodiversity, threatened species and the environment generally. Education about the risks of fire for landholders is a key activity of the Rural Fire Service and the type and extent of native vegetation as described in maps is a key element of the materials needed for these fire awareness activities.
Drivers	NSW National Parks and Wildlife Act 1974 Native Vegetation Act 2003 Environmental Planning and Assessment Act 1979 Environment Protection and Biodiversity Conservation Act 1999 NSW Threatened Species Conservation Act 1995
Role of Native Vegetation Information	Native vegetation maps are an important means by which property owners and the community can find detailed information about the type of native vegetation on their properties or areas of interest. Maps that show TECs, Threatened species, high conservation value vegetation are key datasets in improving the management of native vegetation on private land and guiding community activities such as restoration and other active management.
Organisations	NPWS OEH CMAs Local Government Rural Fire Service Regional Operation Group - OEH
Importance	Property owners and the general community are responsible for much of the activity that positively and negatively impacts upon native vegetation in NSW. Education through the publication of appropriately targeted map based information is essential to guiding the activities of these groups of people and achieving the state governments stated objectives in relation to biodiversity outcomes and other important initiatives such as managing fire risk on private property.
Existing Native Vegetation Maps used	A range of existing products are used where they are available. A consistent set of map products would assist in reducing the confusion created by the existing large number of map products, classification systems and duplicate processes.
Existing limitations	Lack of consistent information about vegetation type and extent at a state and regional extent. Many existing classifications used is confusing to non-expert landholders and community groups.
Required Scale of Use	Varies across the entire range from site to state.
Required Classification	Varies with the target application. Maps should be published for the variety of backgrounds and expertise that are involved in native vegetation management. For example education

Attribute	Description
	materials and maps targeting the preparation of detailed Property Vegetation Plans may require different classification systems compared to an organisation like the Rural Fire Service running a Bush Fire Risk education program.
Required Accuracy	Varies
Related Products	Aerial photography Cadastre – Property Fire history mapping

Planning, Development and Assessment

17. Regional Land use Planning

Attribute	Description
Description of activity	Regional land use planning is undertaken to provide an upfront strategic evaluation of land use including which areas are suitable for development and deciding which areas should be protected. The Regional Strategic Land Use Planning approach follows the Bio-certification methodology and is a systematic process for identifying: Areas of high biodiversity value not suitable for development Priority areas for offset and investment. Once a strategic land use plan is completed development can proceed on a site by site basis without the usual requirements to assess threatened species impacts under the Threatened Species Conservation Act.
Drivers	Strategic Land Use Policy and Strategic Regional Land Use Plans Threatened Species Conservation Act 1995 EPBC Act 1999 Native Vegetation Act 2003
Role of Native Vegetation Information	The strategic land use planning process requires maps classified to the Plant Community Type level. Vegetation maps form the core data layer that identifies TECs, potential threatened species habitats, connectivity, fragmentation levels and corridors. Existing land use plans being prepared are developing their own vegetation maps tailored to the strategic planning process.
Organisations	Department of Planning and Infrastructure Office of Environment and Heritage Local Governments
Importance	Maps of native vegetation are the principal means of assessing biodiversity values and locating areas for protection and offsets. Strategic land use plans require preparation of fine-scale, accurate map products.
Existing NVI used	Mapping information is being created specifically for the Strategic Land Use Planning process. Fine-scale mapping would be used if available in a standard format
Existing limitations	Lack of availability of recent, detailed map products inhibits that ability to identify all relevant values upfront. Existing vegetation maps are not of sufficient detail to match other layers used in the strategic plans including cadastre, current zoning, infrastructure and other resources.
Required Scale of Use	1:5000 – 1:25000

Attribute	Description
Required Classification	Plant Community Type
Required Classification Accuracy	High level of accuracy (>80%)
Related Products	Maps of NSW Threatened Ecological Communities and Commonwealth Endangered Ecological Communities are required. Native vegetation condition information preferably in the form of maps that allow the identification of offset sites that are recoverable. Accurate, reliable site-presence and abundance data for any other threatened entities (including both species and populations).

18. Development Control - Site Assessment and Offset Sites

Attribute	Description
Description of activity	Local government planning activities for properties and sites including development approvals. Use of the Native Vegetation Regulation tools including: Bio Banking Biodiversity Certification Offset Identification Environmental Outcomes Assessment Methodology (EOAM)
Drivers	Environmental Planning and Assessment Act 1979 Native Vegetation Act 2003 Threatened Species Conservation Act 1995 Federal Environment Protection and Biodiversity Conservation (EPBC) Act 1999 Biodiversity Certification under the Native Vegetation Act 2003 Native Vegetation Regulation 2005
Role of Native Vegetation Information	Site Assessments requires detailed maps of the native vegetation extent, condition and type at the same classification level as the regulatory tools and legislation. Plant Community Type maps to a high level of accuracy are needed to inform property development control decisions, although many decisions are validated and supplemented by expert opinion and on-site validation.
Organisations	Local Government Rural Fire Service NSW Department of Planning and Infrastructure EPA –OEH Regional Operations Group - OEH
Importance	The regulatory tools are a key component and driver for creating and using fine-scale native vegetation maps. 43 % of survey responses indicated that they use native vegetation maps in site development control activities. Of these responses 97% indicated that native vegetation map information is very important or important to the activity. The identification of threatened species habitat, TECs was a key requirement for organisations who must implement development controls.
Existing Native Vegetation map products used	Access to suitable native vegetation map products varies according to the resources available at the local council. Many local governments have commissioned their own maps, others rely on older maps created for other purposes and some councils do not have any suitable maps available.
Existing limitations	Varies according to council. Fine-scale accurate maps in well resourced councils are used extensively in property planning and development processes to prioritise and guide planning matters. In local governments that do not have maps, aerial photography is used as a fall-back or planning and development processes must rely on field inspection, commissioned consultants or on information submitted by proponents.
Required Scale	Between 1:1000 and 1:25,000. More than 90% of responses indicated a minimum polygon size less than 2 ha is required including 40% who indicated the minimum polygon size of the data should be less than 0.25 ha.

Attribute	Description
Required Classification	The regulatory tools use Plant Community Types as the classification system. Maps used for site based assessment and the regulatory tools need to use Plant Community Types as the classification system given the current regulations.
Accuracy	On site verification of vegetation type and condition is usually required for property scale decisions that result in legally binding arrangements and for use in the regulatory tools. Highly accurate maps are required for the map products used in site development control and the regulatory tools. Development control decision made based on map information can be challenged in court.
Related Products	Development approvals and other activities at the site level require assessment of the extent and condition of Endangered and Threatened Ecological Communities and information about the location of Threatened Species and critical habitat.

19. Environmental Planning Instruments - Local Environment Plans (LEP) and State Environmental Planning Policies (SEPPs)

Attribute	Description
Description of activity	A Local Environment Plan (LEP) applies to a whole or part of a local government area and imposes development controls over the land. LEPs are used to reserve land for open space, schools and other public purposes and to protect native vegetation and biodiversity. They are an instrument for implementing strategies for local government. SEPPs are a NSW state planning instrument for state-wide planning policies that are implemented by Local Government and the Department of Planning.
Drivers	Environment Planning and Assessment Act 1979
Role of Native Vegetation Information	Native vegetation information is a key input for developing a LEP particularly in regard to the goals of ensuring the proper management, development and conservation of natural resources, natural areas, forests and promoting a better environment. LEPs define areas where Environmental Protection Zones (E1-E4) are located and inform planning decisions on environmental conservation, environmental management and development.
Organisations	Local Government, Minister for Planning
Importance	Many local government respondents nominated LEPs as a key activity to be supported by native vegetation information products.
Existing Native Vegetation map products used	Fine-scale maps where available. Many local governments do not have suitable native vegetation maps available.
Existing limitations	Councils with limited resources do not have suitable maps available. In these case they can use aerial photography or advice from OEH. Alternatively they commission consultants to prepare the LEP. Some existing LEPs do not have associated mapping.
Required Scale	Various - 1:5000 to 1:25000
Required Classification	Plant Community Type (PCT)
Required Accuracy	High (>80%)
Related Products	Aerial photography Regional Conservation Status TEC Equivalence Threatened Species Association Growth Stage Condition

20. Native Vegetation Compliance

Attribute	Description
Description of activity	OEH is the responsible authority for ensuring compliance with the Native Vegetation Act. OEH must monitor and regulate the illegal clearing of Native Vegetation in NSW.
Drivers	Native Vegetation Act 2003 Native Vegetation Compliance and Enforcement Strategy
Role of Native Vegetation Information	Native vegetation information is used to detect illegal clearing and verify the type, condition and status of native vegetation information.
Organisations	EPA Regional Operations -OEH Scientific Services Division – OEH
Importance	Compliance with the Native Vegetation Act is a key component of achieving the NSW state policy objectives relating to Native Vegetation and Biodiversity, particularly in regard to the goal to end broad-scale clearing of native vegetation in NSW.
Existing NVI used	Remote sensed imagery showing clearing and change Ecological assessment of land undergoing clearing Public nominations of illegal clearing activities
Existing limitations	Regulations require the differentiation of regrowth and mature vegetation, but accurate, definitive maps of this are not available. This is up to interpretation on a project by project basis.
Required Scale of Use	Varies according to scale of compliance issue – property scale 1:5000 to regional-scale 1:25,000. Monitoring can occur at 1:100,000 scale
Required Classification	Detailed -Plant Community Type
Required Accuracy	Highly accurate information in the form of field validated maps and site survey information is required for compliance activities.
Related Products	Remote Sensed Imagery Site Survey

21. Catchment Planning including Catchment Action Plans and CMA Biodiversity Strategies

Attribute	Description
Description of activity	Catchment Action Plans set out priorities for investment in the management of natural resources, such as biodiversity, native vegetation and water resources across the catchment. The plans must be updated and released every three years. Bio forecasting is a tool used by CMAs to prioritise management activities and areas within CMA boundaries.
Drivers	Legislation - Catchment Management Authorities Act 2003
Role of Native Vegetation Information	Catchment Action Plans require native vegetation management activities to be prioritised across the catchment based on the native vegetation type, conservation significance and threats. Native vegetation maps are a direct input into many of the key targets and activities of Catchment Action Plans.
Organisations	Catchment Management Authorities
Importance	50 of 180 respondents (28%) described the CMA Act as a business driver.
Existing Native Vegetation map products used	CMAs vary in their access to suitable Native Vegetation Map products. Some CMAs have commissioned their own maps while others rely on older maps created for other purposes. Some have complete consistent map coverage of their jurisdictions and others only have partial or an inconsistent classification coverage.
Existing limitations	Lack of available maps results in the use of inappropriately scaled or dated maps. Priorities are assigned in isolation from state and adjacent jurisdictions.
Required Scale of Use	Scale ranges vary between each organisation. 1:25,000 to 250,000
Required Classification	CMAs currently use a range of Vegetation classification systems; Plant Community Type (PCT) Regional Vegetation Communities (RVC) Broad Vegetation Type (BVT) Keith Class and Formation.
Required Accuracy	Stakeholder confidence in map products is critical. On-site verification of vegetation type and condition is required for property scale decision. A range of accuracy was reported as required at strategic decision making scales ranging from 70 to 90% classification accuracy. Detailed classification systems were sometimes noted to be more prone to interpretation or classification error.
Related Products	Maps showing broad indicators of Native Vegetation Condition were seen by CMA's as essential for prioritising Native Vegetation Management and restoration activities by supporting the concept of recoverability. Condition was also a key component for assigning conservation value to remnant native vegetation. Determining conservation value requires modelled Pre-European native vegetation extent and statistics about % cleared and remaining. The level of protection of Threatened Ecological Communities is a common key target and activity of Catchment Action Plans. Maps showing the extent of TECs were a critical need for many CMAs.

Other notes from the consultation period for catchment action planning:

1. A catchment wide, consistent view of native vegetation so that CMAs can set priorities across the catchment. Many CMA's don't presently have a consistent map of native vegetation across their catchments.
2. A clear, defensible delineation of state and federally listed Threatened Ecological Communities (TECs) and a consistent approach for determining the relative conservation value of native vegetation. Modelled pre European native vegetation types and percentage clearing statistics were identified as key inputs into determining the conservation value of native vegetation.
3. Catchment Management Authorities use a variety of map classification types for Catchment Action Planning, often depending upon what is available. A number of workshop participants from CMAs identified that a classification system that is broader than Plant Community Type (PCT) is appropriate for input into the Catchment Action Planning process. Staff training and the difficulty to differentiate degraded remnant vegetation into detailed classification levels was problematic for some organisations. Some CMAs have used Keith class for their catchment action plans, some Regional Vegetation Types and some Plant Community Types, particularly in the coastal, eastern division of the state.
4. CMA workshop participants identified native vegetation condition as being an important input into their planning and prioritisation of activities. Condition was seen as being an important component for determining the recoverability of degraded native vegetation and the priority for investing in the management and restoration of native vegetation.

Water Management

22. Mapping and Classification of Wetlands and Assessment of Wetland Health

Attribute	Description
Description of activity	The OEH Wetlands Unit monitor the extent, type and condition of wetlands and guide their management across NSW. The MER group report on a set of the most important wetlands using a set of qualitative and quantitative measures of wetland condition and health.
Drivers	Legislation - Catchment Management Authorities Act 2003 Threatened Species Conservation Act 1995 Native Vegetation Act 2003 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Environmental Planning and Assessment Act 1979 RAMSAR Convention
Role of Native Vegetation Information	Native Vegetation maps are created to describe the location and extent of wetlands. Detailed change detection and remote sensing based monitoring of wetland condition has been done for a number of important wetlands sites. Native vegetation maps have been crucial in describing the significant rate of loss of wetlands in NSW over the past 20 years.
Organisations	Wetlands Unit -OEH Local Government Monitoring Evaluation and Reporting Group OEH Catchment Management Authorities
Importance	Native vegetation maps are a key input into monitoring and reporting on the condition, loss and status of wetlands in NSW. The State Government has a specific Wetlands Policy to promote the sustainable conservation, management and use of wetlands in NSW.
Existing Native Vegetation map products used	Detailed fine-scale maps of native vegetation wetland types have been created for specific areas containing wetlands.
Existing limitations	Lack of available maps results in the use of inappropriately scaled or dated maps. Wetlands are being cleared and lost before being adequately mapped.
Required Scale of Use	Fine-scale : 1:5000 to 1:25,000
Required Classification	Plant Community Type (PCT) scaling up to a suitable system for reporting on wetland health, extent and type for the State-wide extent.
Required Accuracy	High accuracy - > 80%
Related Products	Regularly updated condition as determined by: Remote sensing of flooding regimes. Land use Watering infrastructure Water regime history