7. IMPACT ASSESSMENT METHOD

This section describes the methods used by technical specialists to undertake the assessment of impacts of the construction, operation and maintenance and decommissioning activities of the Surat Gas Project. It introduces the structure of subsequent impact assessment sections that present the findings of the technical study reports appended to this environmental impact statement (EIS).

Cumulative impacts associated with the proposed development, existing projects within the region (including the Dalby Expansion Project) and sources of contamination that have the potential to exacerbate the potential impacts identified for each environmental aspect are presented in the impact assessment chapters 9 to 27. Chapter 28, Cumulative Impacts provides an overall assessment of the cumulative impacts of the project in combination with other planned developments or sources of contamination.

The potential impacts of the proposed development on environmental values for each environmental aspect have been assessed using one of three methods: significance assessment, risk assessment and compliance assessment. Figure 7.1 shows how each method was applied to the impact assessment process, which is reflected in the structure of each of the subsequent sections.

Significance assessment was adopted for technical studies where an understanding of the vulnerability of the environmental asset or resource was important to the assessment. For example, an understanding of the sensitivity of ecosystems in their current state provides a sound basis for determining the severity of potential impacts. Potential impacts that arise through the management of materials and substances (e.g., waste) are more appropriately assessed using the principles of risk management. Compliance assessment was adopted for environmental aspects regulated by statutory guidelines, e.g., air and water quality, noise and vibration. Application of these methods requires an understanding of the affected environmental values. A definition of environmental value and a description of each impact assessment method is set out in the following sections.

7.1 Environmental and Social Values

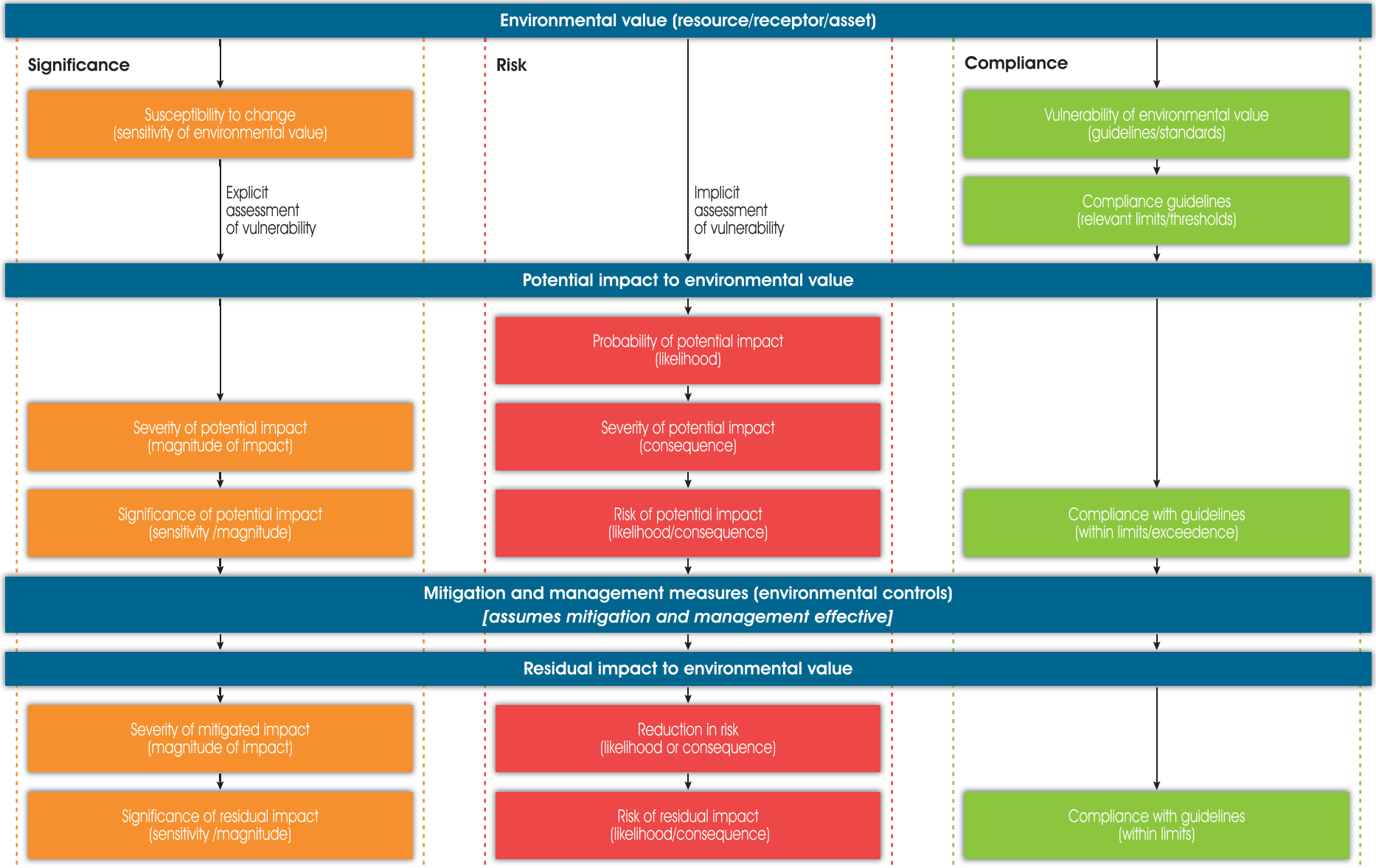
Integral to each method is an understanding of the environmental values potentially affected by the proposed development. Environmental values encompass the qualities, characteristics and conditions of the physical, biological, social, cultural and economic environments.

The environmental values were defined by the technical specialists, having regard to the definition provided in the *Environmental Protection Act 1994* (Qld), which states that an environmental value is:

(a) a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety; or

(b) another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.

The technical specialists adopted environmental values set out in statutory guidelines or policy, and where not provided, they defined values based on their experience and accepted practice.



	coffey environments	Job No: 7040 File Name: 7040_04_F07.01_JO	Arrow Energy Surat Gas Project	arrow energy go further	Environmental impact assessment methods	Figure No: 7.1

Social values potentially affected by the proposed development relate to the locations of sensitive receptors. A sensitive receptor is an area or structure sensitive to a predicted environmental impact (usually from air emissions or noise), such as a dwelling, a library, childcare centre, kindergarten, school, college, university or other educational institution; a hospital, surgery or other medical institution; a protected area or an area identified under a conservation plan as a critical habitat or an area of major interest under the *Nature Conservation Act 1992* (Qld); a marine park under the *Marine Parks Act 2004* (Qld); or a park or garden that is open to the public.

The identification, ground truthing and mapping of sensitive receptors within the project development area is integral to the assessment of a number of the environmental and social aspects. Topographic maps, aerial photographs, satellite imagery, local knowledge, and information from stakeholder consultation were all used to identify sensitive receptor locations. Sensitive receptor locations were 'ground-truthed' in targeted areas to inform early development of the project GIS and to allow 'calibration' of assumptions that had made purely on the basis of desktop observations. Sensitive receptors are illustrated in Figures 7.2a, b and c.

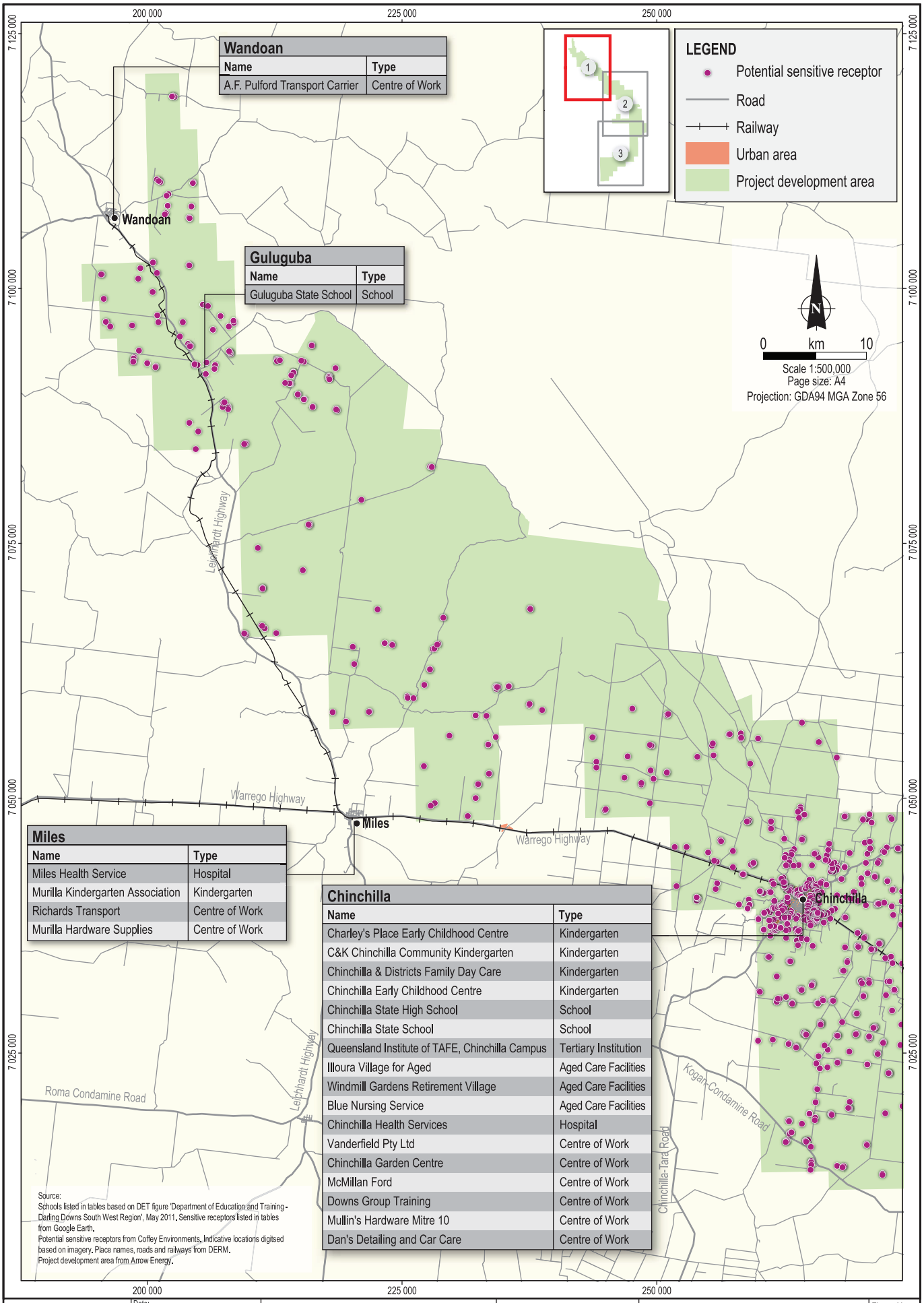
7.2 Significance Assessment Method

An explicit assessment of the vulnerability of the environmental value (resource or sensitive receptor) is the basis of the significance assessment method. It assumes the impact will occur and that the worst case will be identified and assessed. The significance of an impact is assessed by considering the vulnerability or sensitivity of the environmental value and the magnitude of the impact, before and after the application of mitigation and management measures. The significance of the residual impact is assessed assuming successful implementation of proposed mitigation and management measures.

7.2.1 Sensitivity of an Environmental Value

The sensitivity of an environmental value is determined from its susceptibility or vulnerability to threatening processes, and as a consequence of its intrinsic value. Model attributes that define sensitivity were revised by the technical specialists to reflect the specific focus of the technical study. The model attributes of sensitivity are:

- **Conservation Status.** The conservation status of an environmental value is assigned by governments (including statutory and regulatory authorities) or recognised international organisations through legislation, regulations and international conventions.
- **Intactness.** An assessment of how intact an environmental value is. It is a measure (with respect to its characteristics or properties) of its existing condition, particularly its representativeness.
- **Uniqueness or Rarity.** An assessment of its occurrence, abundance and distribution within and beyond its reference area e.g., bioregion/biosphere.
- **Resilience to Change.** An assessment of the ability of an environmental value to adapt to change without adversely affecting its conservation status, intactness, uniqueness or rarity.
- **Replacement Potential.** An assessment of the potential for a representative or equivalent example of the environmental value to be found to replace any losses.



Wandoan

Name	Type
A.F. Pulford Transport Carrier	Centre of Work

Guluguba

Name	Type
Guluguba State School	School

Miles

Name	Type
Miles Health Service	Hospital
Murilla Kindergarten Association	Kindergarten
Richards Transport	Centre of Work
Murilla Hardware Supplies	Centre of Work

Chinchilla

Name	Type
Charley's Place Early Childhood Centre	Kindergarten
C&K Chinchilla Community Kindergarten	Kindergarten
Chinchilla & Districts Family Day Care	Kindergarten
Chinchilla Early Childhood Centre	Kindergarten
Chinchilla State High School	School
Chinchilla State School	School
Queensland Institute of TAFE, Chinchilla Campus	Tertiary Institution
Illoura Village for Aged	Aged Care Facilities
Windmill Gardens Retirement Village	Aged Care Facilities
Blue Nursing Service	Aged Care Facilities
Chinchilla Health Services	Hospital
Vanderfield Pty Ltd	Centre of Work
Chinchilla Garden Centre	Centre of Work
McMillan Ford	Centre of Work
Downs Group Training	Centre of Work
Mullin's Hardware Mitre 10	Centre of Work
Dan's Detailing and Car Care	Centre of Work

Source:
Schools listed in tables based on DET figure 'Department of Education and Training - Darling Downs South West Region', May 2011. Sensitive receptors listed in tables from Google Earth.
Potential sensitive receptors from Coffey Environments. Indicative locations digitsed based on imagery. Place names, roads and railways from DERM.
Project development area from Arrow Energy.

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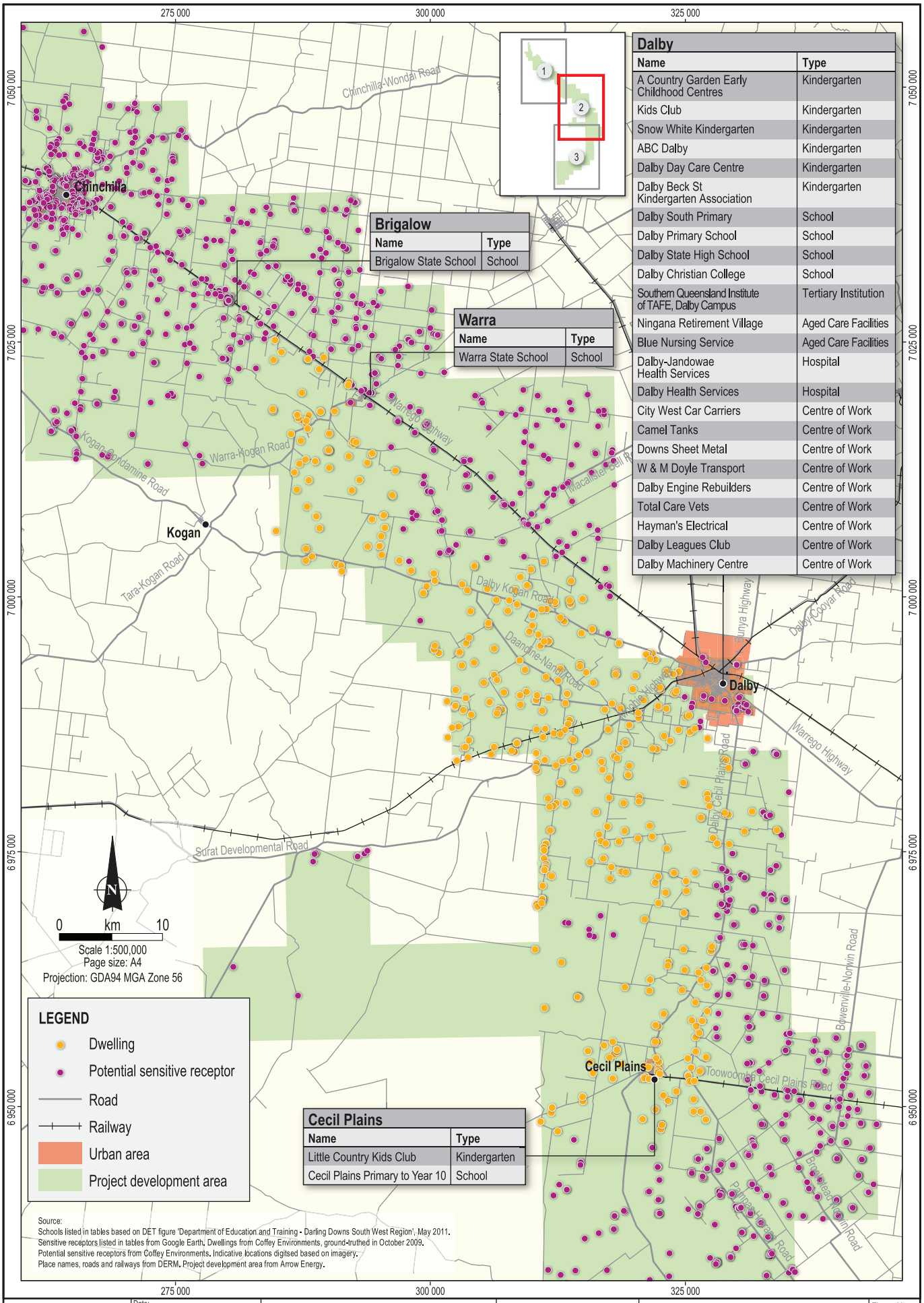
Sensitive receptors (northern project development area), Map 1 of 3

Figure No: 7.2a



Brigalow

Name	Type
Brigalow State School	School

Warra

Name	Type
Warra State School	School

Dalby

Name	Type
A Country Garden Early Childhood Centres	Kindergarten
Kids Club	Kindergarten
Snow White Kindergarten	Kindergarten
ABC Dalby	Kindergarten
Dalby Day Care Centre	Kindergarten
Dalby Beck St Kindergarten Association	Kindergarten
Dalby South Primary	School
Dalby Primary School	School
Dalby State High School	School
Dalby Christian College	School
Southern Queensland Institute of TAFE, Dalby Campus	Tertiary Institution
Ningana Retirement Village	Aged Care Facilities
Blue Nursing Service	Aged Care Facilities
Dalby-Jandowae Health Services	Hospital
Dalby Health Services	Hospital
City West Car Carriers	Centre of Work
Camel Tanks	Centre of Work
Downs Sheet Metal	Centre of Work
W & M Doyle Transport	Centre of Work
Dalby Engine Rebuilders	Centre of Work
Total Care Vets	Centre of Work
Hayman's Electrical	Centre of Work
Dalby Leagues Club	Centre of Work
Dalby Machinery Centre	Centre of Work

Cecil Plains

Name	Type
Little Country Kids Club	Kindergarten
Cecil Plains Primary to Year 10	School

Source:
Schools listed in tables based on DET figure 'Department of Education and Training - Darling Downs South West Region', May 2011.
Sensitive receptors listed in tables from Google Earth. Dwellings from Coffey Environments, ground-truthed in October 2009.
Potential sensitive receptors from Coffey Environments. Indicative locations digitsed based on imagery.
Place names, roads and railways from DERM. Project development area from Arrow Energy.

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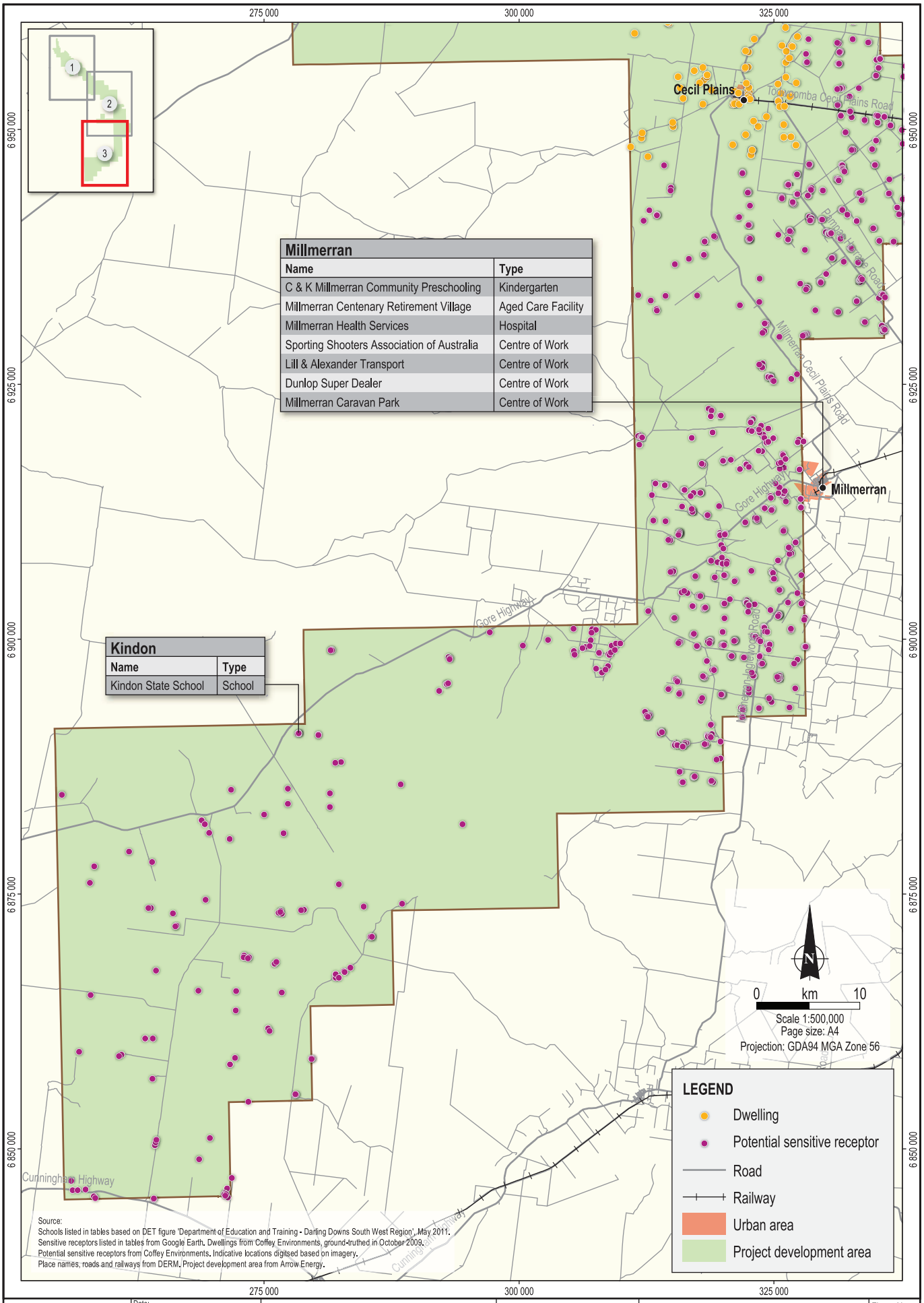
Sensitive receptors (central project development area), Map 2 of 3

Figure No: 7.2b



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Date: 01.12.2011
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File Name: 7040_04_F07.02c_GIS_FT

Arrow Energy

Surat Gas Project

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Sensitive receptors (southern project development area), Map 3 of 3

Figure No: 7.2c

Applying these attributes enables the sensitivity of an environmental value to be ranked as high, moderate or low. Table 7.1 lists the model criteria adopted for sensitivity.

Table 7.1 Criteria for sensitivity

Sensitivity	Description
High	• The environmental value is listed on a recognised or statutory state, national or international register as being of conservation significance. • The environmental value is intact and retains its intrinsic value. • The environmental value is unique to the environment in which it occurs. It is isolated to the affected system/area which is poorly represented in the region, territory, country or the world. • It has not been exposed to threatening processes, or they have not had a noticeable impact on the integrity of the environmental value. Project activities would have an adverse effect on the value.
Moderate	• The environmental value is recorded as being important at a regional level, and may have been nominated for listing on recognised or statutory registers. • The environmental value is in a moderate to good condition despite it being exposed to threatening processes. It retains many of its intrinsic characteristics and structural elements. • It is relatively well represented in the systems/areas in which it occurs but its abundance and distribution are limited by threatening processes. • Threatening processes have reduced its resilience to change. Consequently, changes resulting from project activities may lead to degradation of the prescribed value. • Replacement of unavoidable losses is possible due to its abundance and distribution.
Low	• The environmental value is not listed on any recognised or statutory register. It might be recognised locally by relevant suitably qualified experts or organisations e.g., historical societies. • It is in a poor to moderate condition as a result of threatening processes which have degraded its intrinsic value. • It is not unique or rare and numerous representative examples exist throughout the system/area. • It is abundant and widely distributed throughout the host systems/areas. • There is no detectable response to change or change does not result in further degradation of the environmental value. • The abundance and wide distribution of the environmental value ensures replacement of unavoidable losses is achievable.

The assessment of sensitivity undertaken by the technical specialists informed the constraints analysis and mapping that has been and will continue to be used by Arrow in site and route selection for coal seam gas infrastructure, and the management of potential impacts of construction, operation and maintenance and decommissioning activities.

7.2.2 Magnitude of Impact

The magnitude of an impact on an environmental value is an assessment of the geographical extent, duration and severity of the impact. These attributes are defined as follows:

- **Geographical Extent.** An assessment of the spatial extent of the impact where the extent is defined as site, local, regional or widespread (meaning state-wide or national or international).
- **Duration.** The timescale of the effect, i.e., if it is short, medium or long term.
- **Severity**. An assessment of the scale or degree of change from the existing condition, as a result of the impact. This could be positive or negative.

Applying these attributes enables the magnitude of an impact to be ranked as high, moderate or low. Table 7.2 lists the model criteria adopted for magnitude.

Table 7.2 Criteria for magnitude

Magnitude	Description
High	An impact that is widespread, long lasting and results in substantial and possibly irreversible change to the environmental value. Avoidance through appropriate design responses or the implementation of site-specific environmental management controls are required to address the impact.
Moderate	An impact that extends beyond the area of disturbance to the surrounding area but is contained within the region where the project is being developed. The impacts are short term and result in changes that can be ameliorated with specific environmental management controls.
Low	A localised impact that is temporary or short term and either unlikely to be detectable or could be effectively mitigated through standard environmental management controls.

7.2.3 Significance of an Impact

The significance of an impact on an environmental value is determined by the sensitivity of the value itself and the magnitude of the impact it experiences. The model significance assessment matrix below (Table 7.3) shows how, using the criteria above, the significance of an impact is determined.

Table 7.3 Model significance assessment matrix

	Sensitivity of Environmental Value		
Magnitude of Impact	**High**	**Moderate**	**Low**
High	**Major**	**High**	**Moderate**
Moderate	**High**	**Moderate**	**Low**
Low	**Moderate**	**Low**	**Negligible**

The classifications (major, high, moderate, low or negligible) for significance of an impact are as follows:

- **Major Significance of Impact.** Arises when an impact will potentially cause irreversible or widespread harm to an environmental value that is irreplaceable because of its uniqueness or rarity. Avoidance through appropriate design responses is the only effective mitigation.
- **High Significance of Impact.** Occurs when the proposed activities are likely to exacerbate threatening processes affecting the intrinsic characteristics and structural elements of the environmental value. While replacement of unavoidable losses is possible, avoidance through appropriate design responses is preferred to preserve its intactness or conservation status.
- **Moderate Significance of Impact.** Although reasonably resilient to change, the environmental value would be further degraded due to the scale of the impact or its susceptibility to further change. The abundance of the environmental value ensures it is adequately represented in the region, and that replacement, if required, is achievable.
- **Low Significance of Impact.** Occurs where an environmental value is of local importance and temporary and transient changes will not adversely affect its viability provided standard environmental management controls are implemented.

- **Negligible Significance of Impact.** Impact on the environmental value will not result in any noticeable change in its intrinsic value and hence the proposed activities will have negligible effect on its viability. This typically occurs where the activities occur in industrial or highly disturbed areas.

Application of the model criteria for sensitivity and magnitude may produce inconsistent designations. For example, the magnitude of impacts might be assessed as widespread (large geographical extent) but readily reversible (short-term duration and low severity). In these instances, technical specialists used their professional judgement to determine the overall sensitivity of the environmental value or magnitude of impact.

The model significance assessment matrix and model criteria for sensitivity and magnitude were refined by the technical specialists to reflect the specific focus of each technical study that used this assessment method. This included adding additional classifications (e.g., a five by five matrix) and revising the criteria to reflect the focus of the study.

7.2.4 Application of Significance Assessment Method

The sensitivity of an environmental value once determined does not change unless proposed actions or activities reduce the vulnerability of the value to adverse effects. An example is programmed road upgrade works that occur or are scheduled to occur prior to the commencement of a project, as a result of forecast growth in traffic or a road reaching its design life. In these instances, the works improve the road condition making it more resilient to the impacts of traffic generated through the construction and operation of the proposed development.

The magnitude of an impact is assessed prior to and after the application of mitigation measures. Combining this assessment with the sensitivity of the environmental value enables the significance of the impact to be determined and, following the application of mitigation, the significance of the residual impact. The change in significance is a measure of the effectiveness of the proposed mitigation.

The significance of impacts has been assessed by the technical specialists and presented in their reports. In reporting the findings of the technical studies in this EIS, individual assessments made by the technical specialists have, where appropriate, been consolidated to provide an overall assessment of significance for each of the key impacts.

7.3 Risk Assessment Method

The principles of risk management described in AS/NZS 31000:2009 Risk Management – Principles and Guidelines (Standards Australia, 2009a), and its companion documents: HB 436:2004 Risk Management Guidelines Companion to AS/NZS 4360:2004 (Standards Australia, 2004b) and HB 203:2006 Environmental Risk Management – Principles and Process (Standards Australia, 2006), were adopted in the risk assessment method.

Qualitative risk assessment was used to assess the likelihood of harm to the environment from construction, operation and maintenance and decommissioning activities, and the consequence of those impacts on the environment. Quantitative risk assessment was used to evaluate aspects of the hazards and risks associated with the proposed development.

Model qualitative criteria developed to rank the likelihood and consequence of potential impacts are set out in Tables 7.4 and 7.5 respectively.

Table 7.4 Qualitative criteria for likelihood

Descriptor	Description
Common Almost certain or common	Will occur, or is of a continuous nature, or the likelihood is unknown. There is likely to be an event at least once a year or greater (up to 10 times per year). It often occurs in similar environments. The event is expected to occur in most circumstances.
Has happened Likely, has occurred in recent history	There is likely to be an event on average every one to five years. Likely to have been a similar incident occurring in similar environments. The event will probably occur in most circumstances.
Could happen Possible, has occurred in the past but not common	The event could occur. There is likely to be an event on average every 5 to 20 years.
Not likely Unlikely or uncommon	The event could occur but is not expected. May have heard it discussed as a possibility but an extremely unusual one. A rare occurrence (once per 100 years).
Practically impossible Rare or practically impossible	The event may occur only in exceptional circumstances. Very rare occurrence (once per 1,000 years). Unlikely that it has occurred elsewhere; and, if it has occurred, it is regarded as extremely unique.

Table 7.5 Qualitative criteria for consequence

Descriptor	Description
Severe Widespread serious long-term effect	Extreme permanent changes to the environment, major public outrage, or the consequences are unknown. Serious environmental harm that causes actual or potential environmental impacts that are irreversible or of high impact or widespread. Likely prosecution by regulatory authorities.
Major Wider spread, moderate to long-term effect	Substantial and significant changes that will attract public concern, are only partially able to be rehabilitated or uncertain whether it can be successfully rehabilitated. Actual or potential environmental harm either temporary or permanent, requiring immediate attention. Possible prosecution by regulatory authorities.
Moderate Localised, short-term to moderate effect	Significant changes that may be rehabilitated with difficulty. Direct or indirect environmental impacts beyond location (onsite or offsite). Repeated public concern. Reportable to the government.
Minor Localised short-term effect	Some limited consequence but no significant long-term changes, may be easily rehabilitated.
Negligible No impact or no lasting effect	Possible impacts but without noticeable consequence. Temporary or short-term reversible environmental impact, localised event, location of little environmental value.

The level of risk of each environmental impact is determined by combining likelihood and consequence in a matrix. Table 7.6 was derived from the environmental impact aspect of Arrow's risk matrix.

Consistent with the requirements of AS/NZS 31000:2009 Risk Management – Principles and Guidelines and its companion documents, the technical specialists, in some instances, revised the descriptors, descriptions and categories to reflect the needs and specific objectives of the studies. Proposed changes were reviewed by Coffey Environments to ensure that the revised criteria were consistent with the model criteria, i.e., the descriptors and descriptions adequately differentiated the levels of risk. The likelihood and consequence criteria, and risk matrix used by the technical specialists are described in the relevant technical study reports.

Table 7.6 Qualitative risk assessment matrix

		Likelihood				
		Rare or practically impossible	**Unlikely or uncommon**	**Possible, has occurred in the past but not common**	**Likely, has occurred in recent history**	**Almost certain or common**
Consequence		**Rare**	**Unlikely**	**Possible**	**Likely**	**Almost certain**
Widespread, serious long-term effect	**Severe**	Medium	High	High	Very high	Very high
Wider spread, moderate to long-term effect	**Major**	Medium	Medium	High	High	Very high
Localised, short-term to moderate effect	**Moderate**	Low	Medium	Medium	Medium	High
Localised short-term effect	**Minor**	Very low	Low	Low	Medium	Medium
No impact or no lasting effect	**Negligible**	Very low	Very low	Low	Low	Medium

Source: Based on Arrow Energy's risk matrix.

Where appropriate, risk assessments undertaken by the technical specialists for individual impacts have been consolidated to provide an overall assessment of the risk of key environmental impacts. In these instances Tables 7.4, 7.5 and 7.6 were used for the overall assessment of risk of environmental harm.

7.4 Compliance Assessment Method

Statutory guidelines set out in environmental protection policies and other regulatory documents are designed to protect the relevant environmental values. The guidelines include an implicit assessment of the vulnerability of the environmental value through the setting of limits or thresholds or provide the framework for determining the vulnerability of an environmental value, e.g., cultural heritage management plan or agreement under the *Aboriginal Cultural Heritage Act 2003* (Qld). Limits and thresholds set out in the guidelines are generally based on established scientific knowledge and societal aspirations relating, in most instances, to the quality of life. They can also be indicators of ecosystem health, as evidenced by water quality standards. Requirements in cultural heritage management plans or agreements typically reflect the contemporary beliefs and inherited knowledge of Indigenous people of their heritage including its physical and cultural aspects. These elements contribute to a determination of the significance by the Indigenous people of the cultural material or sites.

Assessments using this method typically use modelling to predict emissions or discharges from project infrastructure and operations enabling compliance with published limits or thresholds to be determined before and, if necessary, after the application of mitigation and management measures. In the case of Indigenous cultural heritage, assessments are based on the retained

knowledge of Indigenous people and the guidance of archaeological and anthropological experts. Compliance is demonstrated through implementation of the duty of care provisions of the Aboriginal Cultural Heritage Act, and the cultural heritage management plan or agreement.

7.5 Impact Assessment Section Structure

Each impact assessment section adopts a standard set of headings to provide a uniform discussion of the potential impacts for each of the environmental aspects. In some instances, the subsection heading changes to reflect the particular environmental aspect. For example, the heading Existing Environment and Environmental Values would be revised to Existing Environment and Social Values for the social impact assessment chapter. The content of each subsection is described below under the subsection headings. Information about the application of the relevant impact assessment method is provided in the relevant subsections.

Each section is prefaced with a brief description of the environmental aspect, details of the impact assessment (technical) study from which the information is drawn, and the environmental protection objectives for the management of potential environmental impacts.

7.5.1 Legislative Context and Standards

This section describes the applicable policy, legislation, regulations, standards and guidelines for the protection of the environmental values, management of impacts and, in some instances, the conduct of technical investigations, e.g., noise measurement standards.

7.5.2 Assessment Methods

The study methods that were used to understand, describe and assess potential impacts on the environmental values are detailed in this section, along with any assumptions and/or limitations. Methods include desktop studies, field investigations, modelling and stakeholder consultation.

The impact assessment method adopted for the technical study is described. Where relevant, information is provided on the ranking criteria and assessment matrix used, particularly if they vary significantly from the model criteria and matrix described in this section. Where the compliance method was adopted, the limits or thresholds set out in applicable standards or guidelines are detailed.

7.5.3 Existing Environment and Environmental Values

The existing environment, including applicable baseline or background information, and the identified environmental values are described in this section. The geographic extent of the area potentially affected by the project is described, along with the physical, biological, cultural and social environments. If the significance approach to impact assessment was adopted, the sensitivity of the environmental values is described. Where compliance assessment was adopted, the baseline or background limits determined through field measurement and sampling are listed.

7.5.4 Issues and Potential Impacts

Project activities that may have an impact on the identified environmental values are described in this section, along with the assessment of the potential impacts of those activities. This section focuses on the key impacts of the proposed development, with the comprehensive assessment of all impacts detailed in the relevant technical study.

The significance of a potential impact or risk of environmental harm is described through discussion of the findings of the assessment carried out by the technical specialist. Where significance assessment was adopted, the magnitude of the impact is described, along with the

results of application of the significance assessment matrix. Where risk assessment was used, the likelihood and consequence of environmental harm from project activities are described and the assessed risk from application of the risk matrix presented. Compliance with statutory guidelines is reported where that method was adopted.

7.5.5 Environmental Protection Objectives

The environmental protection objectives that describe the commitment to protect the identified environmental values from potential impacts are detailed in this section. The environmental protection objectives are measurable and auditable, so that achievement of the desired outcomes can be demonstrated by a comparison against proposed performance indicators.

7.5.6 Avoidance, Mitigation and Management Measures

This section describes the avoidance, mitigation and management measures that will be implemented to avoid or reduce potential impacts to as low as reasonably practicable, based on the hierarchy of avoid, minimise, manage and offset. The aim of these measures is to protect identified values and achieve the environmental protection objectives. Measures will be implemented through project design, construction methods, operating and maintenance procedures, and decommissioning methods.

Many measures to avoid, mitigate and manage potential impacts have been built into Arrow's processes as part of its core business systems. The core business aspects of environmental management constitute the base case prior to the implementation of the identified mitigation measures.

Mitigation and management measures proposed in this section will be incorporated in, and implemented through, Arrow's health, safety and environmental management system (HSEMS). This will be the case whether the measures are generic and applicable to a range of project activities, wherever they occur, or are measures that are specific to a location, area, or activity. The mitigation and management measures set out in this EIS are Arrow's commitments to the effective management of the potential environmental and social impacts of the project.

The mitigation and management measures set out in this EIS, as indicated by a commitment number in square brackets (e.g., [C013]), are Arrow's commitments to the effective management of the potential environmental and social impacts of the project.

7.5.7 Residual Impacts

The residual impacts to the identified environmental values assuming the effective implementation of the proposed avoidance, mitigation and management measures are described in this section.

Where significance assessment has been adopted, the magnitude of the residual impact is assessed and used in the significance matrix to determine the significance of the residual impact, which reflects the effectiveness of the proposed mitigation.

Evaluation of the likelihood and consequence of the residual impact and application of the adopted risk assessment matrix provides a measure of the effectiveness of mitigation and resultant risk of environmental harm where that method was adopted.

Modelling of emissions and discharges with proposed mitigations in place will determine whether those potential sources of pollutants or contaminants comply with the applicable guidelines, thereby satisfying regulatory requirements and demonstrating the protection of relevant environmental values.

7.5.8 Inspection and Monitoring

This section describes proposed inspection and monitoring, as indicated by a commitment number in square brackets (e.g., [C511]), that will assist Arrow to achieve the environmental protection objectives. The programs will observe and report on the performance of the proposed mitigation and management measures, with a focus on facilitating early intervention and remediation of identified non-conformances or the implementation of adaptive management when trigger levels are reached.

The proposed methods, parameters, locations, frequency and performance indicators are described in the Environmental Management Plan (Attachment 5) and Social Impact Management Plan (Attachment 6).