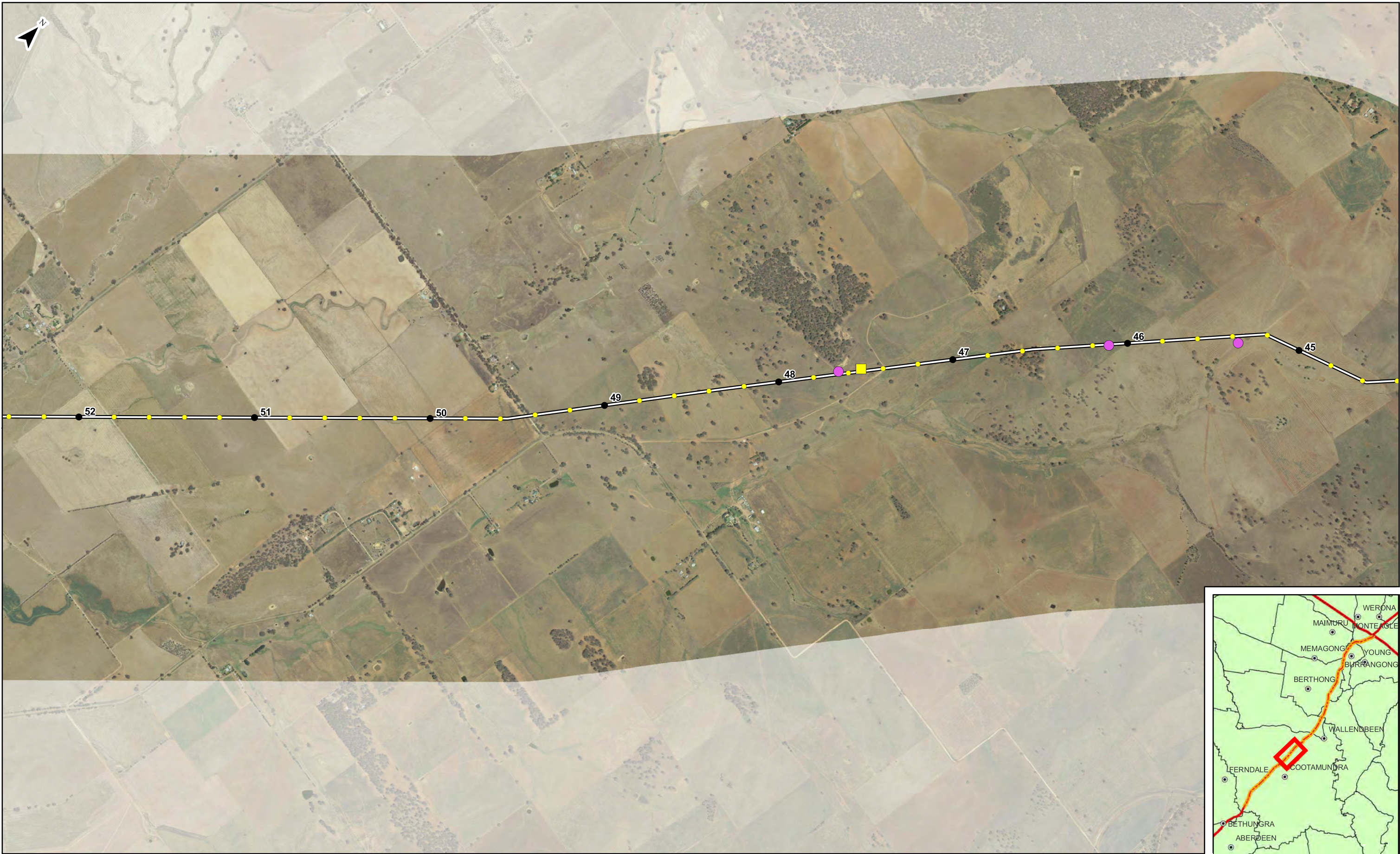
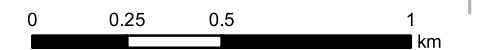




- Gas Pipeline Section 2
- 1km KP marker
- 200m marker
- Hollow-bearing tree
- Other habitat features
- TSC Act Box-Gum Woodland
- TSC Act and EPBC Act Box-Gum Woodland

**YOUNG - WAGGA WAGGA PIPELINE SECTION 2
Habitat and Threatened Ecological Communities Map**

Source: LPMA (2010), StreetPro (2009)



GDA94 - MGA Zone 55

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Fig. **10G**

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- Gas Pipeline Section 2
- 1km KP marker
- 200m marker
- Hollow-bearing tree
- Other habitat features
- TSC Act Box-Gum Woodland
- TSC Act and EPBC Act Box-Gum Woodland

YOUNG - WAGGA WAGGA PIPELINE SECTION 2
Habitat and Threatened Ecological Communities Map

Source: LPMA (2010), StreetPro (2009)

0 0.25 0.5 1 km

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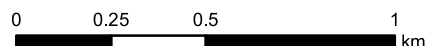
Fig. 10H



- Gas Pipeline Section 2
- 1km KP marker
- 200m marker
- Hollow-bearing tree
- Other habitat features
- ▨ TSC Act Box-Gum Woodland
- ▨ TSC Act and EPBC Act Box-Gum Woodland

YOUNG - WAGGA WAGGA PIPELINE SECTION 2
Habitat and Threatened Ecological Communities Map

Source: LPMA (2010), StreetPro (2009)



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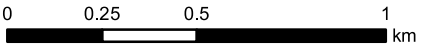
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- Gas Pipeline Section 2
- 1km KP marker
- 200m marker
- Hollow-bearing tree
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YOUNG - WAGGA WAGGA PIPELINE SECTION 2
Habitat and Threatened Ecological Communities Map

Source: LPMA (2010), StreetPro (2009)



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Fig. 10J

8.3 Potential Impacts on Biodiversity Values

The potential impacts discussed below are based on desktop studies of the proposal site and field investigations of the sites within the proposal site that were considered most at risk of significant impacts from construction and maintenance activities. Assessments of significant impact on environmental values (i.e. threatened species and ecological communities) are summarised in this chapter. Further details can be found in Appendix B of the Flora and Fauna report.

It is noted that the most wide-spread impact likely to arise from the proposal is the loss of native vegetation, however this is largely a reversible impact. Once the proposed pipeline has been constructed, tree, shrub and understorey vegetation will naturally re-establish the area adjacent to the pipeline and shallow-rooted vegetation will establish directly over the pipeline itself. Figure 10 shows a section of the ROW of the previous looping project (outside of the current proposal study area) approximately six months after completion of construction showing the revegetation which has occurred, and the mature eucalypts retained during construction (note the line of sight markers located within the middle of the ROW).



Figure 10 – Section of Stage 1 ROW where construction has been recently completed

Keeping up to a 5 m strip on either side of the proposed pipeline free of trees and shrubs may be all that is necessary to protect the pipe from potential root damage and facilitate ongoing pipeline inspection and necessary maintenance. As such, subject to landholder property management practices, it is expected that over the medium term (10 to 50 years) significant portions of the proposed pipeline construction footprint would naturally regenerate. Recommendation 8 in Section 8.4 describes methods to assist revegetation of native species.

While the loss of native vegetation is largely a reversible impact, there are still potential immediate and short term impacts from this loss and other potential impacts. The potential immediate and short term impacts from the proposal considered include:

- Loss of native vegetation;
- Loss of hollow-bearing trees;
- Removal of dead and fallen timber;
- Removal of rock;

- Creation of edge effects;
- Spread of environmental weeds;
- Easement maintenance;
- Soil excavation;
- Soil compaction;
- Barrier effects to wildlife movement;
- Alterations to hydrology;
- Wild fire;
- Construction waste; and
- Erosion, sedimentation and dust emissions.

For the purposes of this EA these impacts are summarised and discussed below. Greater detail of the potential impacts is provided in the Flora and Fauna report.

8.3.1 Loss of Native Vegetation

The most wide-spread impact likely to arise from the Proposal is the loss of native vegetation. Impacts potentially arising from removal of native vegetation have particular relevance in this proposal for threatened ecological communities, threatened flora species and threatened fauna species that have been recorded in the proposal site or wider locality.

There are numerous threatened species, populations and ecological communities which may be adversely affected by the clearing of native vegetation. “*Clearing of native vegetation*” is listed as a key threatening process in Schedule 3 of the TSC Act and “*Land Clearing*” is listed as a key threatening process under the EPBC Act.

The total disturbance footprint is a maximum of 210 ha, based on a pipeline route 70 km in length and a 30 m ROW. Much of that area is pastoral land. Based on available VCA and CMA mapping, approximately 2.3 km of remnant native vegetation is transected by the proposed pipeline route. The proposed pipeline route would require clearing of up to 6.9 ha of remnant vegetation, assuming clearance of a 30 m ROW for the proposed pipeline construction.

The actual area of clearing is likely to be lower than this estimate, as:

- The ROW would be able to largely utilise existing cleared infrastructure corridors through remnant vegetation;
- Pipeline construction will be reduced to 20 m ROW width within certain sections of remnant vegetation to ensure minimal impact;
- Disturbance of remnant vegetation beside major watercourses and major roads may be avoided by the local adjustment of the pipeline route; and
- Disturbance of remnant vegetation may be avoided within some vegetated areas through sensitive construction techniques.

Clearing may also be required for other construction requirements (e.g. access tracks, stockpile and storage areas etc.). Storage areas for materials (such as pipe sections) will be minimal as materials will to be brought directly to construction sites in so far as is possible. While exact locations for these requirements were unknown at the time of reporting, it is anticipated that these would be located in existing cleared areas (and existing facility areas managed by APA) as far as possible to reduce the total area of vegetation loss.

Threatened Communities

Eight sections of the proposal site contain White Box-Yellow Box-Blakely's Red Gum Woodland meeting the criteria of the TSC Act EEC and three sections contain woodland meeting the criteria of the EPBC Act CEEC, White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland. Impacts on these communities posed by the potential loss of native vegetation during construction of the proposal are detailed below:

White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland - EPBC Act

Three sections of the proposal site meet the definition of White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland. The construction ROW within these areas would be reduced to 20 m to reduce the disturbance. The total length of this CEEC transected by the proposal site is 0.83 km, assuming the entire 20 m ROW meets the definition for the CEEC and is cleared, a maximum of 1.66 ha of EPBC Act listed CEEC White Box-Yellow Box- Blakely's Red Gum Woodland and Derived Native Grassland would be disturbed. The proposed pipeline would follow the existing pipeline and share the existing ROW. This minimises the amount of mature remnant vegetation required to be cleared, but it also limits alternative options for avoiding and minimising potential impacts. An Assessment of Impact Significance of the proposal on the CEEC (Appendix D of the Flora and Fauna report) indicated that a EPBC Act Referral of Proposed Action should be made to DSEWPaC specifically regarding the proposed removal of three sections of EPBC Box-Gum Woodland (this Referral has subsequently been lodged).

Any residual loss of the CEEC potentially will require compensation in the form of biodiversity offsets, subject to the requirements of DSEWPaC.

The potential impacts to this CEEC as a result of loss of native vegetation could be considered significant if they were not mitigated, therefore, Recommendations 1, 2 and 3 in Section 8.4 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

White Box-Yellow Box-Blakely's Red Gum Woodland - TSC Act

Eight sections of the proposal site meet the TSC Act definition of the White Box-Yellow Box- Blakely's Red Gum Woodland. If the full 30 m ROW was to be cleared, a maximum of 2.46 ha of White Box-Yellow Box-Blakely's Red Gum Woodland would be removed. This represents about 0.09% of this endangered community within the total extent of the 5 km buffer based on VCA and CMA mapping. The proposed pipeline would follow the existing pipeline and share the existing ROW. This would minimise the amount of clearing required in sections of remnant vegetation to a maximum width of 10 m, but it would also limit options for avoiding and minimising potential impacts.

A seven-part test assessment of potential impacts to this EEC that could occur is provided in Appendix B of the Flora and Fauna report. The potential impacts to this EEC as a result of loss of native vegetation could be considered significant if they were not mitigated, therefore Recommendations 1, 2 and 3 in Section 8.4 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

Furthermore, any residual loss of TSC Box-Gum Woodland potentially would require compensation in the form of a biodiversity offset, subject to the requirements of OEH (see Section 8.5 for further details).

Threatened Species

The removal of remnant vegetation could potentially impact 34 species listed as threatened under the EPBC Act and / or TSC Act and 9 species listed as Migratory under the EPBC Act. The potential impacts to these species as a result of loss of native vegetation were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendations in Section 8.4 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.2 Loss of Hollow-bearing Trees

Some hollow-bearing trees may be removed by the proposal (Section 8.2.4). "*Loss of hollow bearing trees*" is listed as a key threatening process under Schedule 3 of the TSC Act. Impacts potentially arising from a loss of hollow-bearing trees have particular relevance in this proposal for up to one fauna population and 19 threatened fauna species listed under the TSC and EPBC Acts that are dependent on hollows and definitely or potentially occur in the study area or locality. The potential impacts to these species as a result of loss of hollow-bearing trees were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendation 4 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.3 Removal of Dead and Fallen Timber

Fallen logs were observed within the proposal site at a number of sites, and are assumed to occur elsewhere in the study area (Section 4.5.3). Impacts potentially arising from the removal of ground debris have particular relevance in this proposal for a number of threatened fauna species, in particular a large suite of woodland birds that are reliant on fallen timber and have been recorded or have the potential to occur in the study area.

This potentially could have direct and indirect impacts on up to three ecological communities and up to 15 fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality. The potential impacts to these species as a result of removal of dead and fallen timber were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendation 5 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.4 Removal of Rock

Areas containing rock outcrops and rocky escarpments within the proposed pipeline were limited but were found on occasion. Impacts potentially arising from the removal of rock could have direct and indirect impacts on up to six fauna species threatened under the EPBC Act and / or TSC Act that potentially occur in the proposal site or locality.

Recommendation 6 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate potential impacts that might arise in the event that areas of bush rock are encountered in the proposed construction footprint.

8.3.5 Creation of Edge Effects

Impacts potentially arising from edge effects have little relevance in this proposal because the proposal site does not run through or immediately adjacent to sizable intact tracts of timbered habitats. Since the majority of the proposed route has been cleared previously and the landscape is highly fragmented, the potential impacts are not considered to be significant.

8.3.6 Alterations to Hydrology

Impacts potentially arising from alteration to the natural flow regimes potentially could have direct and indirect impacts on up to five fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality. Impacts on hydrology from the proposal will be dependent on the method of crossing that is chosen for each site where the proposed pipeline intersects an aquatic feature.

The potential impacts to these species resulting from alterations to hydrology were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendation 7 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.7 Habitat Connectivity and Barrier Effects to Wildlife Movement

Habitat connectivity is defined as the degree to which the landscape facilitates ecological flow and movement. The existing landscape is highly fragmented by agricultural lands and linear infrastructure.

In some circumstances, linear infrastructure projects can create barriers to wildlife movements, in particular terrestrial and arboreal fauna species. In buried pipelines such as the current proposal, only the most sedentary species would be affected and the impacts would be largely short-term, resulting from disturbance and temporary loss of vegetation cover. The impacts are largely reversible with restoration of vegetation cover.

Considering that the existing environment already presents a relatively poor connectivity and that the proposed development will be located within the existing easement, potential impacts from the proposal are unlikely to have long-term effects on the regional habitat connectivity.

As a result the proposal is considered unlikely to have significant or long-term adverse impacts to environmental values as a result of creation of barrier effects to wildlife movement. Nevertheless, Recommendation 8 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.8 Soil Excavation

To facilitate the laying of the pipeline, an open trench would be required. The trenching would be progressive and therefore the full length of the proposed pipeline would not be open at any given time. The open trench provides a temporary barrier to movement of ground-dwelling fauna and also poses a risk of falling into the trench and becoming trapped. Fauna entrapment within proposed pipeline trenches has been recognised as a key environmental issue by the Australian Pipeline Industry Association Code of Environmental Practice (APIA, 2005).

This potential entrapment and other impacts associated with soil excavation (such as damage to underground food sources for fauna, and potential unearthing / destruction of habitat) could potentially have direct and indirect impacts on up to two ecological communities, up to six flora species and up to 11 fauna species listed as

threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality. The potential impacts to these species as a result of soil excavation were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendations 9 and 10 in Section 8.4 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.9 Soil Compaction

Soil compaction as a result of construction can have potential impact on flora species in the form of reduced resilience to fire and impaired regeneration capabilities.

This potentially could have direct and indirect impacts on up to two ecological communities, up to six flora species and up to nine fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these species as a result of soil compaction were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendation 10 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.10 Spread of Environmental Weeds

Several noxious weeds and numerous environmental weeds are present in the proposal site. There is potential to spread weeds and increase their areas of infestation during the construction phase of the proposed development, during ongoing maintenance activities, and through modified drainage patterns.

The proposed pipeline, if it contributes to the spread of weeds, could potentially have direct and indirect impacts on up to two ecological communities, up to nine flora species and up to 22 fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality. The potential impacts to these species as a result of spread of environmental weeds were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendation 11 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.11 Easement Maintenance

Activities associated with maintenance of the easement (such as slashing, clearing of regrowth, spraying of weeds, fire, and trampling by vehicles and machinery) could potentially have direct and indirect impacts on up to two ecological communities, up to nine flora species and up to nine fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality. The potential impacts to these species as a result of easement maintenance were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendation 13 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.12 Bushfire

Construction activities could create unintended bushfires in the project area. Fires have the potential to spread rapidly and well beyond the intended project footprint. Bushfires could also be started by vegetation maintenance activities in the proposed pipeline easement throughout the operational phase of the proposed project. Conversely, the pipeline easement may act as a fire break and retard bushfire in some areas.

Impacts potentially arising from changes to the local regime of bushfire potentially could have direct and indirect impacts on a up to two ecological communities, up to one fauna population, nine flora species and up to 15 fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality. The potential impacts to ecological values resulting from bushfire were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated.

Therefore, Recommendations 2 and 13 in Section 8.4 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.13 Construction Waste

Construction activities can generate large amounts of waste (e.g. wrapping and packaging from construction materials, domestic waste from crew members, etc). Linear infrastructure projects provide the potential to strew this waste extensively across a landscape.

Impacts potentially arising from construction waste could have direct and indirect impacts up to two ecological communities and up to six fauna species listed as threatened under the EPBC Act and / or the TSC Act that

potentially occur in the proposal site or locality. The potential impacts to ecological values resulting from spread of construction waste were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendation 12 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

8.3.14 Erosion, Sedimentation and Dust Emissions

Earthworks, vegetation clearing, vehicle movements on unformed tracks and other machinery operations have the potential to cause erosion and dust emissions. Erosion is of particular concern in waterways and steep areas. Erosion and dust can cause sedimentation of waterways, including streams and freshwater wetlands.

Impacts potentially arising from erosion, sedimentation and dust emissions potentially could have direct and indirect impacts on up to two ecological communities, nine flora species and up to nine fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality.

The potential impacts to ecological values resulting from erosion, sedimentation and dust emissions were assessed (Appendix B and C of the Flora and Fauna report) and could be considered significant if they were not mitigated. Therefore, Recommendation 12 in Section 8.4 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

8.4 Proposed Mitigation Measures

Recommendations to be implemented during the pre-construction, construction and operational phases of the proposal to mitigate the potential impacts (as discussed in Section 8.3) are shown in Table 11 below. Further details can be found in Section 6 of the Flora and Fauna report.

Table 11 – Proposed mitigation measures and recommendations

Potential Impact(s)	Proposed Mitigation Measures
Pre-Construction Phase	
Loss of native vegetation	Recommendation 1: Develop and Implement best-practice site management measures within a CEMP framework. - Incorporate impact mitigation and environmental management measures into a CEMP for the proposed development and include provisions for the preconstruction, construction and operational stages of the development. - In the CEMP detail specific management strategies to be implemented during the construction phase of the proposed development, including strategies and protocols relating to soil and water management, protection of vegetation to be retained, fauna protection, rehabilitation strategies, containment of waste, and an emergency response program for accidental spills and other emergencies. - Include a number of detailed management strategies in the CEMP sufficient to facilitate the implementation and auditing of all the mitigation measures recommended in the Flora and Fauna report. - Develop an induction program for the CEMP and induct all site workers involved in construction activities (whether directly or indirectly) into the CEMP program prior to their commencement of duties.
Construction Phase	
Loss of native vegetation; and risk of bushfire	Recommendation 2: Minimise clearing of native vegetation during construction works and manage bushfire risks. The following general measures are recommended to minimise impacts on native vegetation: - Locate site compounds and parking areas, site-offices, stockpiles and other ancillary works areas in existing cleared areas, away from waterways or other sensitive areas; - Restrict access from the construction area into adjacent areas of native vegetation and waterways.

Potential Impact(s)	Proposed Mitigation Measures
	- Minimise clearing of native riparian vegetation at watercourses by utilising existing clearings (where present) and reducing the width of the ROW. - Minimise clearing of native vegetation within road reserves when crossing roads by utilising clearings (where present) and reducing the width of the construction footprint. - When transecting native vegetation, utilise existing cleared areas and reduce the width of the ROW to no more than 20 m. - As necessary, avoid removal of large paddock trees wherever feasible. - Fit spark arresters on diesel vehicles used in construction. - Ensure fire extinguishers and personnel trained in fire fighting are on-hand during welding operations to minimise damage caused by accidental fires.
Loss of hollow-bearing trees	Recommendation 3: Minimise the impacts arising from removal of large hollow-bearing trees. Avoid the removal of large-hollow-bearing trees wherever possible. Figures of the hollow bearing trees identified within the proposal site are located in Appendix E of the Flora and Fauna report. Where removal cannot be avoided conduct wildlife clearance surveys and where practical, and safe, recycle hollows that are felled in timbered areas by strapping them to trees adjacent to the project footprint, in consultation with OEH.
Removal of dead and fallen timber	Recommendation 4: Minimise the impact of removing dead trees and fallen timber wherever possible. Avoid felling standing dead trees (stags) wherever possible. Figures of the stags identified within the proposal site are located in Appendix E of the Flora and Fauna report. Avoid disturbing, removing or breaking up fallen timber (especially larger logs) wherever possible. Figures of the fallen timber identified within the proposal site are located in Appendix E of the Flora and Fauna report. Wherever it is unavoidable to disturb fallen timber, either relocate it to adjacent areas of native vegetation or stockpile it and return to the ROW following completion of earthworks. Where possible, recycle timber cleared from the ROW by placing logs on the ground in the ROW following construction.
Spread of environmental weeds	Recommendation 11: Develop and implement a weed management approach. Develop and implement a detailed weed management approach as part of the EMP. Include measures to control the spread of weeds into adjacent native vegetation (i.e. weed hygiene). Weed control measures would be particularly important where the proposed development traverses large, intact stands of vegetation, in riparian areas, and around freshwater wetlands. Following ROW clearing weed management measures are likely to be able to be scaled back, provided following works remain within the cleared ROW. Include in the plan, as a minimum, the following measures: - Remove existing noxious weeds within the project footprint; - Destroy weed material removed from construction sites; - Develop weed quarantine zones along the proposed pipeline route based on weed distribution and sub-catchments, for application of weed hygiene activities; - Wash down vehicles, machinery and equipment moving between weed quarantine zones, especially after clearing activities and earthworks in weed infested areas; - Implement a certification process to ensure that all vehicles and plant are weed-free whenever entering or leaving the site and whenever moving between weed quarantine zones within the site; Minimise the potential for the transport of weeds in soil, by not transporting excavated soil further than the nearest stockpile locations;

Potential Impact(s)	Proposed Mitigation Measures
	- Use shredded native plant material (uncontaminated by weeds) removed from the site as a mulch and groundcover on disturbed soil surfaces to reduce the potential for weed establishment; - Use sediment control fencing to prevent soil contaminated with weed seeds from washing into waterways and wetlands; and - Conduct weed management works and monitor for at least two years following construction.
Operational phase	
Easement maintenance; and bushfire	Recommendation 13: Develop and implement detailed strategies to minimise the impacts of operations. Develop and implement best-practice site management measures within an OEMP framework. A specific OEMP should be developed for operation and maintenance for the transmission gas pipeline. The OEMP should include strategies and protocols relating to soil and water management, protection of retained vegetation and rehabilitation areas, fauna protection, site closure and rehabilitation strategies, containment of waste, an emergency response program for accidental spills and other emergencies, and monitoring / auditing protocols. Integrate strategies with activities conducted by other users of the sites and surrounding land managers (e.g. electrical supplier, graziers, NPWS). Develop induction programs for the OEMP and induct all site workers involved in operation and maintenance activities (whether directly or indirectly) into the appropriate OEMP prior to their commencement of duties. Specific strategies should include, but not necessarily be limited to: - Access protocols for operations and maintenance personnel; - Fire management (e.g. ignition suppression devices such as spark arrestors on equipment, fire-fighting equipment, fuel load control around assets, planned burns); - Installation, monitoring, maintenance and repair of sediment and erosion control devices including matting to minimise the compaction and / or erosion of soft or erodible soils in sensitive areas such as watercourses and wetlands; - Track and firebreak maintenance and repair procedures and schedules; - Vegetation control protocols within easements and around assets (e.g. slashing, herbicide application, tree lopping and trimming); - Weed management and hygiene; - Maintenance of any rehabilitation areas created during construction; - Monitoring areas of natural vegetation with high ecological values and / or sensitivity within or adjacent to the development (e.g. Endangered Ecological Communities, wetlands, riparian areas, important habitats for protected wildlife); - Containment of contaminants such as gross pollutants, acid leachates, weed seeds, fuels and oils, chemicals, etc.; and - Contact details for qualified veterinarian staff to assess and treat or euthanase (as necessary) any large native vertebrates that are seriously injured.

8.5 Preliminary Offset Strategy for Residual Impacts

As identified, there is the potential for a number of direct and indirect impacts to occur on biodiversity values as a consequence of the Proposal. The majority of these impacts have been either avoided, minimised through design decisions or can be adequately mitigated or managed. Although the mitigation and management measures are generally adequate for the impacts, there are some impacts that cannot be adequately mitigated. There are likely to be the following residual impacts:

- A loss of native vegetation including vegetation which comprises the Box-Gum Woodland endangered ecological community.
- Potential loss of habitat for a variety of native fauna species including threatened woodland birds.

To address the residual impacts of the Proposal, APA is proposing to implement an offset strategy that would contribute to the long term conservation of biodiversity. Based on results of the ecological assessments undertaken for the preparation of the Environmental Assessments and the discussion of impacts, a preliminary offset strategy is presented hereafter.

This strategy consists of a set of actions which could be implemented to offset the residual biodiversity impacts. The objective of the final strategy would be to offset the residual impacts of the Proposal on biodiversity, particularly on Box-Gum Woodland and habitat for threatened species so as to ensure an improvement in biodiversity values in the area in the long term.

The APA is proposing a direct offset for the identified likely loss of vegetation via securing a patch of land within close proximity to the proposal. This patch would then need to be managed in perpetuity to maintain or improve the biodiversity values potentially impacted. Specific details of the patch of woodland and associated management arrangements are currently being worked through, in consultation with OEH and other relevant stakeholders. At this stage options being investigated include:

- Purchasing an appropriate patch of woodland, and transferring the ownership and management responsibility of that land to a third party.
- Potentially working with an interested landholder (e.g. as part of the Box Gum Community Network) to contribute to the enhancement of biodiversity values within a given patch, and in perpetuity.

Liaison to date with OEH has indicated that this approach is appropriate. OEH has also indicated that it would work with the APA to refine the detailed approach enabling an appropriate offset strategy to be finalised prior to construction.

8.6 Conclusion

The majority of the proposed pipeline is cleared, with a dense ground cover of exotic pasture grasses. Most cleared areas have very few trees, but regrowth of native tree species was observed in some areas. Based on field and desktop information, approximately 67.7 km (96.7%) of the proposed pipeline ROW has already been cleared (taking into account the additional 10 m width during the construction period). Assuming a 30 m ROW would be cleared along the proposal site; the total disturbance area would be approximately 210 ha.

Based on available CMA and VCA mapping approximately 2.3 km of remnant native vegetation is transected by the proposed 70 km pipeline route. The proposed pipeline route would require clearing of up to 6.9 ha of remnant vegetation, assuming clearance of a 30 m ROW for the proposed pipeline construction. However the actual area of clearing is likely to be lower than this estimate. This clearing of vegetation would potentially impact 2.46 ha of one Endangered Ecological Community listed under the TSC Act. The proposed removal of this EEC potentially will require compensation in the form of a biodiversity offset, subject to the requirements of OEH.

The clearing of vegetation would also impact one Critically Endangered Ecological Community listed under the EPBC Act with the proposed removal of 1.66 ha of EPBC Box-Gum Woodland and Derived Native Grassland in three sections (KP 34, 55.2 and 65.55). As indicated in Section 6.5.1 the Commonwealth formed an opinion that the proposal will not have a significant impact on this community.

No threatened fauna species listed under the EPBC Act or the TSC Act were found within the proposal site. However, an assessment of potential habitat suggests that 34 threatened fauna species could have potential habitat within the proposal site, and five of these species were identified as likely to occur within the proposal site following assessment of species distribution and suitable habitat.

The proposed pipeline construction and operation would have direct impacts on threatened flora and fauna, and other important natural values of the proposal site. Mitigation measures proposed during the pre-construction, construction and operational phases are designed to avoid, minimise and / or mitigate these potential impacts.

9.0 Heritage

Potential impacts to Aboriginal heritage from the proposal were assessed and documented in a specialist heritage assessment, which provides detailed methodology, potential impacts and recommendations. The heritage specialist report can be found in Appendix C.

Summary of Potential Impacts on Heritage

There were 18 indigenous Heritage sites identified across the Proposals study area during a review of recorded sites and a survey of the study area.

Two of the six of heritage items identified with high scientific significance were found to be potentially impacted by the proposal. Other potential impacts exist for 11 of the 18 Aboriginal sites identified with low to medium scientific significance.

The old Nubba Homestead, located 200 m to the east of the pipeline easement, was identified as a historical heritage item with historical, technical and associative significance. It was determined that the site would not be directly impacted by the construction of the proposed pipeline.

Summary of Recommendations for Heritage Impact Mitigation Measures

Following identification of potential impacts a number of mitigation and management measures have been developed to manage the impacts. The measures include:

- Surface collection of artefacts;
- Fencing of vulnerable larger items such as scarred trees: and
- Salvage excavations.

9.1 Aboriginal heritage

9.1.1 Aboriginal Consultation

The successful identification, assessment and management of Aboriginal cultural heritage values need to be completed with an inclusive and transparent consultation process. Aboriginal consultation was conducted at every stage of the heritage assessment process. The consultation was conducted in accordance with the *Aboriginal Consultation Guidelines 2010*. The process included notification (including Newspaper advertisements) and registration of Aboriginal Stakeholders to identify who may hold cultural knowledge relevant to determining the cultural significance of the study area.

9.1.2 Assessment Methodology

Following the engagement of Aboriginal stakeholders, interested parties were sent details regarding the proposed survey methodology, consultation and assessment process to be agreed and accepted before any further progression. The next steps included collecting relevant documents and coordinating of fieldwork. Fieldwork was conducted between the 6 June and 10 June 2011 with the field survey team identified in Table 12. The engagement process, identification of impacts and mitigation measures were developed in accordance with the guidelines *Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005).

Table 12 – Field Survey Team

Organisation	Representative(s)
AECOM Australia Pty Ltd (AECOM)	Luke Kirkwood & Luke Atkinson
Individual/Young LALC	Enid Clarke
Individual/Young LALC	Krystal Ingram
Individual/Young LALC	Keith Freeman
Individual/Young LALC	Jirrah Freeman

The fieldwork to identify, record and map Aboriginal heritage values within the study area was conducted in accordance with the *Part 3A EP & A Act, Guidelines for Aboriginal cultural heritage impact assessment and community consultation*. After considering a number of key influences on the sampling strategy, it was decided that a targeted survey strategy would be employed (for further details on methodology see Appendix C).

Significance assessment criteria

The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999) is the key policy document that underpins the policies for the conservation of heritage items in NSW. Accordingly, the significance of Aboriginal heritage was assessed on two levels:

- 1) Site by site basis; and
- 2) Archaeological distribution basis.

Other relevant considerations in assessing the level of significance are the assemblage content and whether the landscape pattern differs from that already established.

The significance of the sites identified in the assessment was qualified considering a range of values that may be attributed to the sites or objects identified. Values considered included scientific, social and cultural values. Aboriginal values identified within the study area were derived from the physical evidence of past Aboriginal activity. The scientific values of heritage also have cultural value to the local Aboriginal community through strong interest in the tangible connection it represents with pre-European Aboriginal cultural life and land use.

9.1.3 Existing Environment

Prior to European settlement the study area was occupied by the Wiradjuri language group, one of the largest in Australia. The Wiradjuri country straddled three of NSW inland rivers providing their livelihood and an abundance and consistence of food provisions.

Aboriginal Archaeological sites are intimately connected to the nature and distribution of the existing environmental context. The study area is generally gently undulating with an elevation ranging between 210 m and 310 m. AHIMS-registered Aboriginal sites are often located near or adjacent to influential geomorphology in the area such as river or creek lines and their easements. There a number of major creek lines in the study area including: McHenrys Creek, Stony Creek, Birrangong Creek, Tumbleton Creek, Cunningham Creek, Muttana Creek, Cootamundra Creek, Cunjegong Creek. However, due to the gentle sloping of the landscape, often the presence of dams is the only indication of any water flow or historic land uses. The study area is located within the South Western Slopes Bioregion. The vegetation of the area has been subject to extensive clearing for agricultural activity leaving very little of the original woodland vegetation intact.

Known Aboriginal heritage sites and items

There have been a number of surveys conducted in relation to areas subject to development acknowledged in a review of previous archaeological studies conducted in the study area.

A search of records within the NSW Office of Environment and Heritage's Aboriginal Heritage Information Management System (AHIMS) database was conducted concerning the study area on the 10th February, 2011. Seven sites were identified to be located within the 1 km wide buffer zone (Figure 11). All AHIMS records were identified during a survey conducted by Witter in 1980. Six artefact scatters and one scarred tree were identified and recorded during the survey. Surveys conducted during this assessment identified an additional eleven archaeological sites. The sites were considered for significance and classified accordingly. Results for the sites identified are presented in Table 13.

Table 13 – Summary of Archaeological Scientific Significance

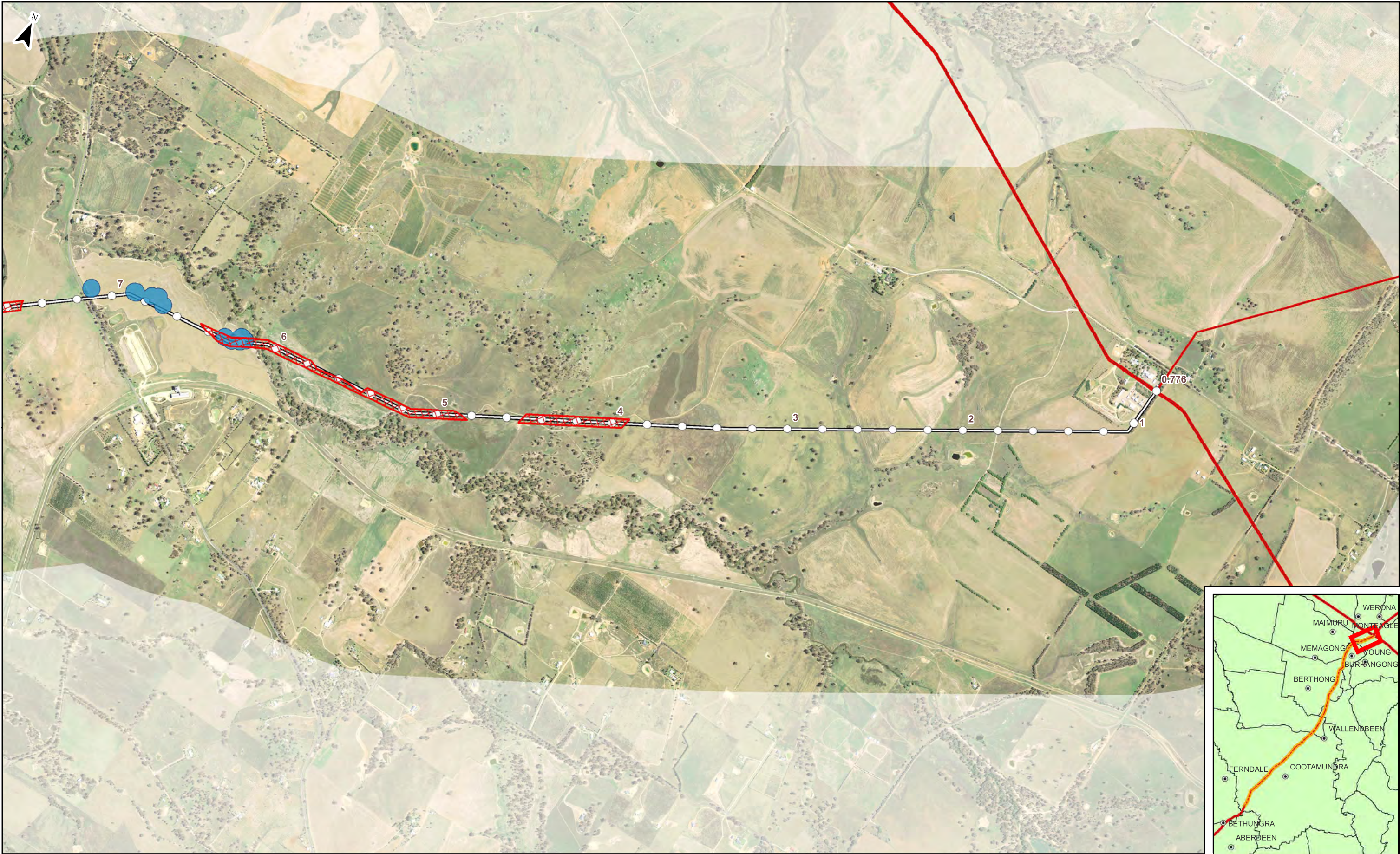
AHIMS ID	Site Name	Site Type	Scientific Significance
50-3-0002	Young (BY/12)	Artefact Scatter	Medium
50-3-0003	Stony Creek (BY/13)	Artefact Scatter	Medium
50-3-0004	Wombat (BY/14)/ Tumbleton Creek	Artefact Scatter	Medium
50-5-0007	Frampton (BY/9)	Artefact Scatter	Low
50-6-0002	Cootamundra (BY/10)	Artefact Scatter	Low
50-6-0003	Muttama Creek (BY/11)	Artefact Scatter	High

AHIMS ID	Site Name	Site Type	Scientific Significance
50-6-0004	Connaughtmans Creek/Wallendbeen (BY/16)	Scarred Tree	Destroyed
	APA-AS1-11	Artefact Scatter	Low
	APA-AS2-11	Artefact Scatter	Low
	APA-AS3-11	Artefact Scatter	Low
	APA-IA1-11	Isolated Artefact	Low
	APA-IA2-11	Isolated Artefact	Low
	APA-IA3-11	Isolated Artefact	Low
	APA-ST1-11	Scarred Tree	High
	APA-ST2-11	Scarred Tree	High
	APA-ST3-11	Scarred Tree	High
	APA-ST4-11	Scarred Tree	High
	APA-ST5-11	Scarred Tree	High

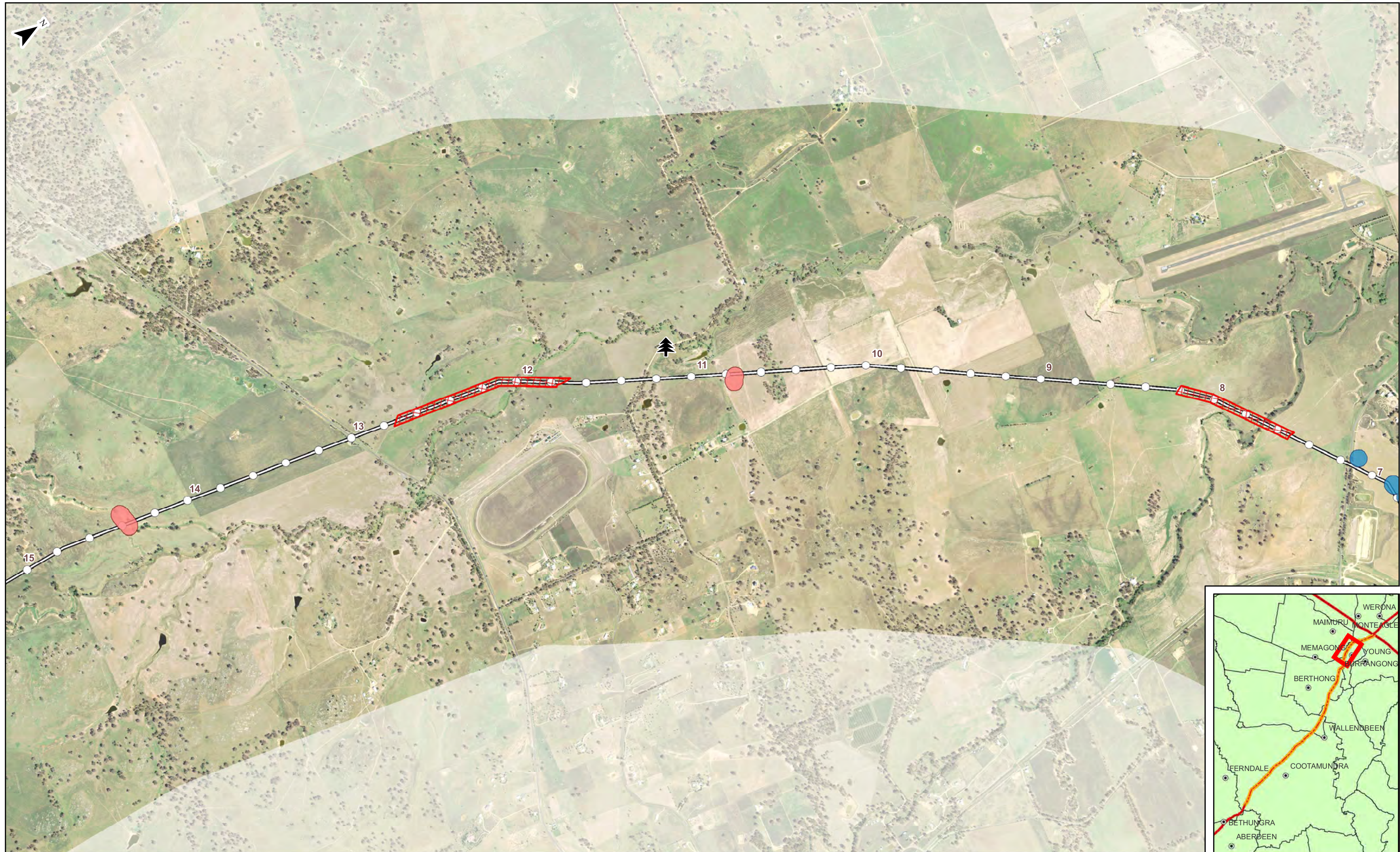
Summary of predictive modelling

Previous archaeological works and site information formed the foundation for predictive modelling of site types and any likely locations in the study area of the Proposal. The archaeological work conducted in the region to date indicates that occupation sites were certainly more frequent in higher-order water course valleys. Results of modelling have indicated areas targeted in the subsequent fieldwork. These results included:

- Open chipped stone artefact scatters and isolates would be the dominant site types;
- The dominant raw material for chipped stone artefact production would be quartz & tuff;
- Chipped stone artefact assemblages would be dominated by knapping by-products, with retouched implements or tools comparatively rare;
- The majority of surface scatters would contain less than 20 artefacts. Larger surface scatters would be rare;
- Scarred trees are only likely to occur near established watercourses and then only in areas with limited land clearance;
- Most sites would occur within 200 m of creek lines;
- Higher order streams would have higher subsurface artefact densities and more continuous distributions than lower order streams; and
- Subsurface artefact densities on creek flats prone to flooding would be fairly low.



- | | | |
|---------------------|----------------------------|--------------------|
| Archaeological Site | Gas Pipeline Section 2 | Scarred Tree |
| Salvage Excavation | Historic Site Monitoring | Aborist Inspection |
| Surface Collection | Historic Site | Fenced |
| 200m Interval Point | Aboriginal Site Monitoring | No Direct Impacts |

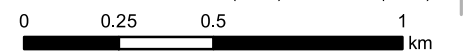


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|---------------------|----------------------------|--------------------|
| Archaeological Site | Gas Pipeline Section 2 | Scarred Tree |
| Salvage Excavation | Historic Site Monitoring | Aborist Inspection |
| Surface Collection | Historic Site | Fenced |
| 200m Interval Point | Aboriginal Site Monitoring | No Direct Impacts |

YOUNG - WAGGA WAGGA PIPELINE SECTION 2

Management Recommendations

Source: LPMA (2010), StreetPro (2009)



GDA94 - MGA Zone 55

19 Sep 2011

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Fig. 11B

AECOM\\naubr\\p001\\Projects\\60189491\\APA_Gas_Pipeline_EIA\\4. Tech work area\\4.7. GIS\\Maps\\G001_01_HeritageAssessment_MapSeries_110919.mxd Drafted: 19/09/2011