



12 REHABILITATION AND DECOMMISSIONING

12.1 EPA Objective

The EPA's objective for rehabilitation and decommissioning is to ensure that premises are decommissioned and rehabilitated in an ecologically sustainable manner (EPA, 2015a).

It should be noted that the proposal itself is intended to provide permanent infrastructure and is unlikely to be closed and decommissioned. However, at the completion of construction some areas will require revegetation and this term has been used throughout the PER.

12.2 Landscaping Objectives

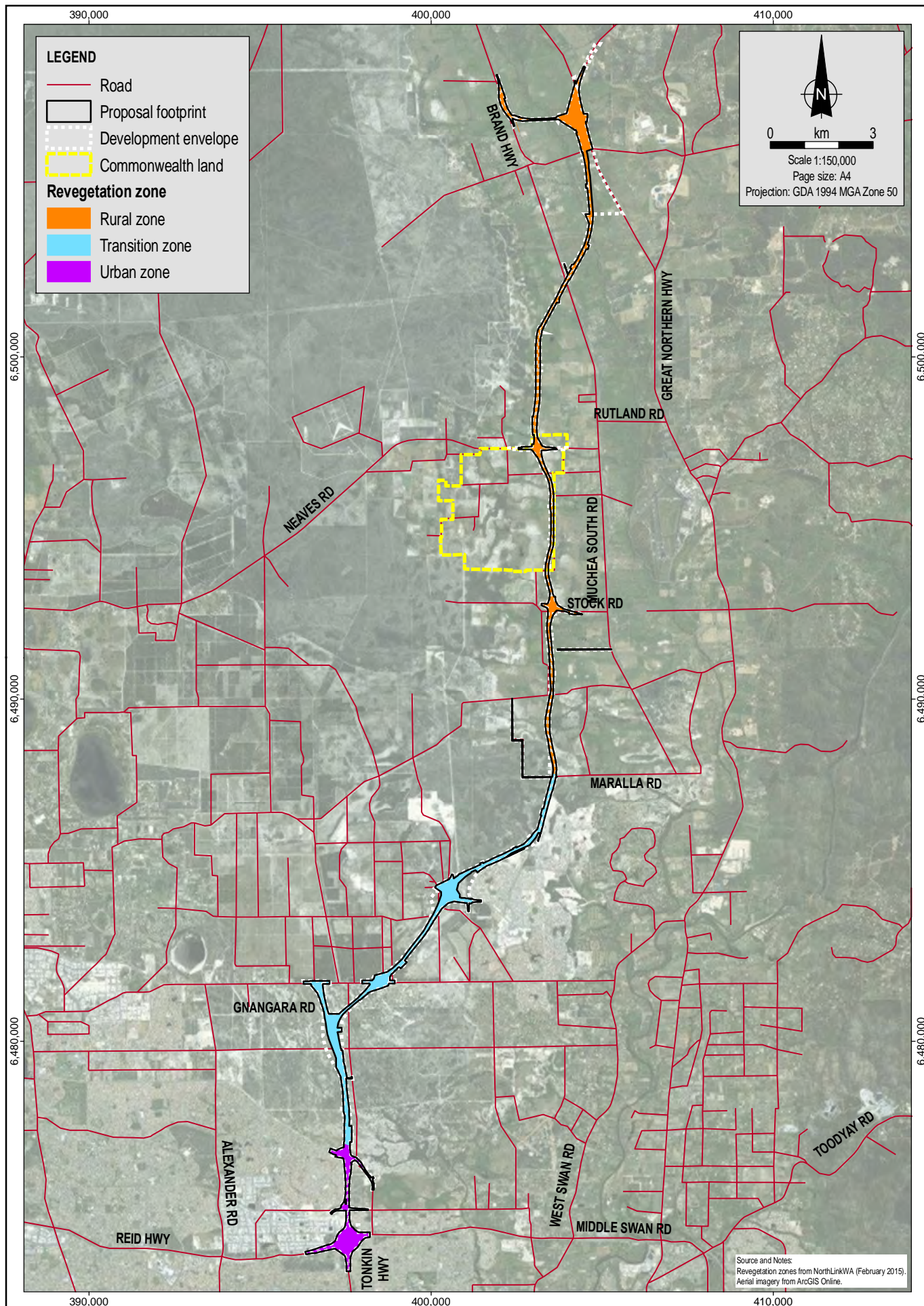
Appropriate landscaping forms part of the revegetation plan. The landscaping, urban design and aesthetics planning objectives that will be implemented for the proposal include:

- Provide a landscape consistent with the vegetation types and classes of the proposal footprint.
- Provide an urban experience for road users, creating a 'journey' through the road corridor.
- Provide a road corridor development with high quality urban design and aesthetic structures.
- Provide a soft landscaped road alignment in keeping with the varied site context of the corridor.
- Provide landscape and urban design treatments that are sustainable and maintainable.
- Provide landscape and urban design treatments that provide amenity for adjoining landholders and provide management of the roadway's visual impacts.

12.3 Revegetation Strategy

The revegetation strategy considers the existing landscapes of the proposal footprint, which have been divided into three zones according to the current vegetation and land use along the alignment. Revegetation will focus on using native provenance vegetation in each of these zones that are suited to the surrounding landscape characteristics and land use. Starting at the northernmost section of the proposal, the landscaping types and extent are as follows (Figure 12.1):

- Rural zone – The northern boundary of the proposal footprint to Maralla Road. This zone is commonly characterised by arid landscapes with pasture grass, where large portions of land have been cleared of native vegetation. Revegetation will use pasture species and drainage swales will be planted with native reeds and sedges to link with watercourses and reduce pollutant build-up from road runoff as per the drainage strategy developed for the proposal (BG&E, 2015) (Appendix H).
- Transition zone – Maralla Road to Hepburn Avenue. This zone, particularly around the Ellenbrook area, contains pockets of pristine vegetation, including woodland vegetation such as Banksia (see Figure 8.3). Revegetation will match adjoining woodland vegetation and existing Banksia woodland will be protected and retained.



- Urban zone – Hepburn Avenue to the southern boundary of the proposal footprint. This zone contains existing transport corridors with vegetation consisting of mid to low grassland. Revegetation will complement existing vegetation with plantings of Marri and Grass trees. Species that complement the road corridor and its structural elements will be selected. Plant selection will be used to contribute to headlight screening, noise attenuation, distant views and mitigation of visual impacts where practicable.

The revegetation strategy for each of the three zones is outlined below.

12.3.1 Rural Zone Revegetation

The revegetation strategy for the rural zone includes (Figure 12.2):

- Verge batter landscaping to focus on dry grassing and tree planting.
- Revegetation treatments to reinforce provenance species adjacent to wetlands and watercourses. Roadside swales will incorporate limited revegetation with native provenance wetland species.
- Landscaping along this section will consist predominantly of tree planting to reinforce and complement the existing character.
- The species suggested to be used for revegetation in the rural zone include *Xanthorrhoea preissii*, *Melaleuca raphiophylla*, *Corymbia calophylla* and *Eucalyptus wandoo*.

12.3.2 Transition Zone Revegetation

The revegetation strategy for the transition zone includes (Figure 12.3):

- Utilising native provenance species for revegetation wherever possible.
- Ensuring planting themes reflect native vegetation types of adjacent areas, with emphasis on characteristic species in new landscaping.
- Concentrating wetland planting in roadside swales and where drainage systems (i.e. existing wetlands, drainage and creek lines) within the proposal footprint are located.
- Ensuring provenance in planting mixes adjacent to ecologically significant retained bushland.
- Ensuring revegetation landscaping provides connectivity between remnant bush landscapes.

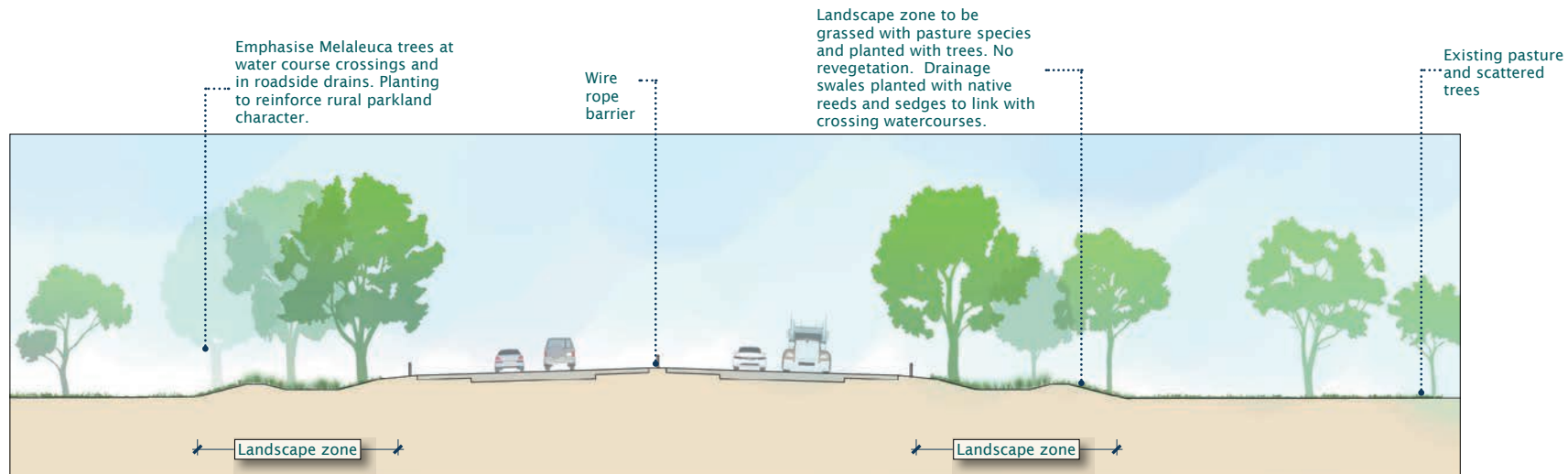
The species suggested for revegetation in the transition zone include *Xanthorrhoea preissii*, *Melaleuca raphiophylla*, *Corymbia calophylla*, *Banksia attenuata* and *Banksia menziesii*.

12.3.3 Urban Zone Revegetation

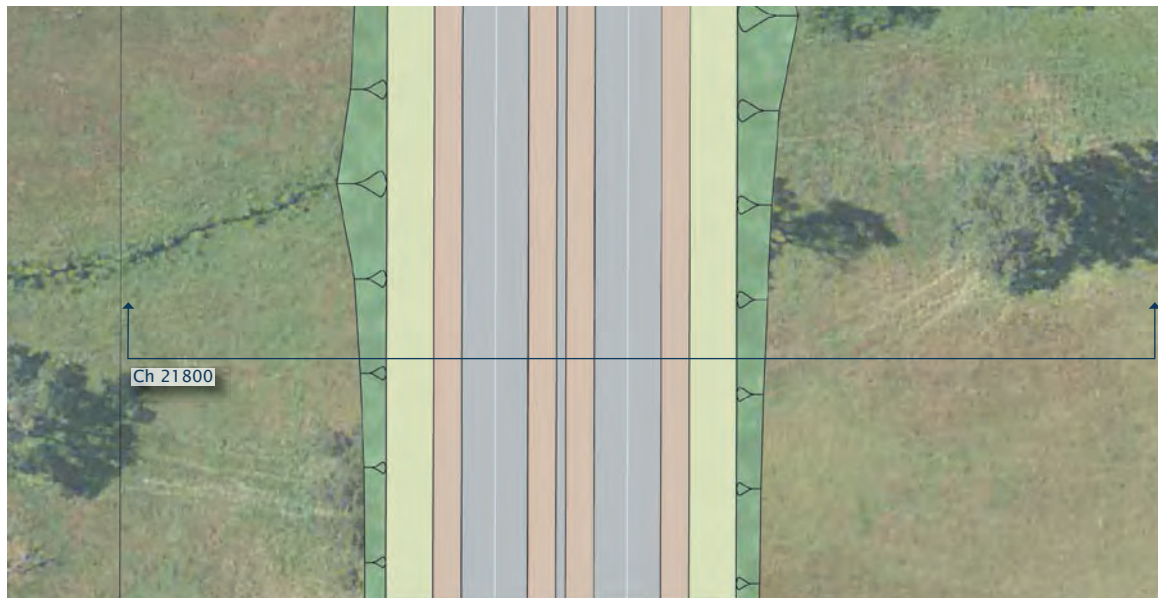
The revegetation strategy for the urban zone includes (Figure 12.4):

- Selecting species to complement road corridor and its structural elements. Plant selection will be used to contribute to headlight screening, noise attenuation, distant views and mitigation of visual impacts where practicable.
- Combining revegetation treatments using provenance native species with horticulturally proven cultivars to enhance amenity in focal zones and ensure robust performance.
- Ensuring provenance in planting mixes adjacent to ecologically significant retained bushland including that found in the Reid/Tonkin Interchange and remnant wetlands.

The species suggested for revegetation in the urban zone include *Xanthorrhoea preissii*, *Melaleuca raphiophylla*, *Corymbia calophylla*, *Banksia attenuata*, *Banksia menziesii*, *Eucalyptus gomphocephala*, *Eucalyptus tottiana* and *Eucalyptus marginata*.



Preliminary Section 1:300



Roadway Treatments - 1:500



Key Plan - Central

Note: Drawing is not to scale and is for illustrative purposes only.



Date:
07.07.2015

File Name:
4483_P03_F12.02_GL_5

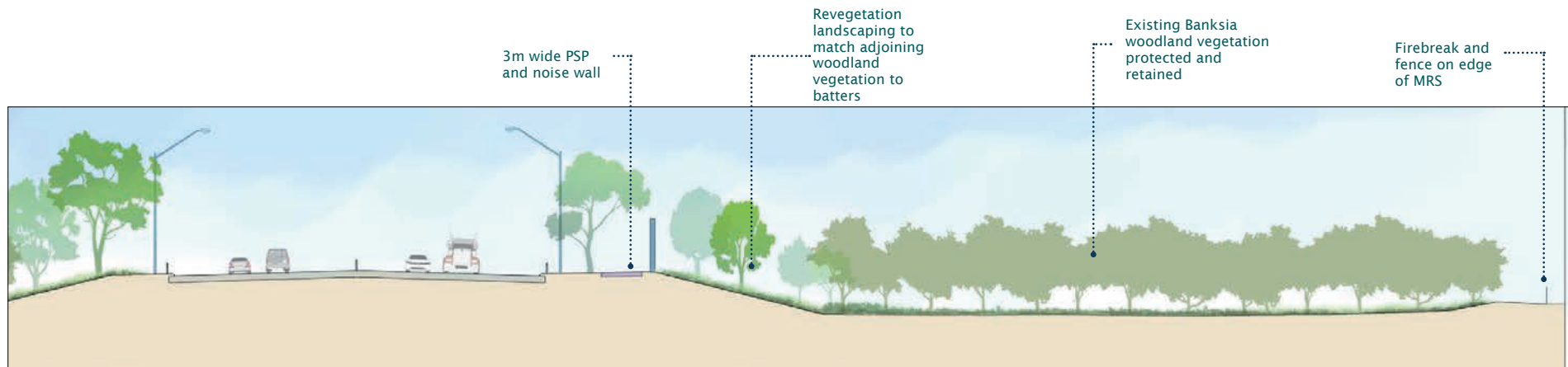
Main Roads WA
Public Environmental Review
Perth-Darwin National Highway

NorthLinkWA

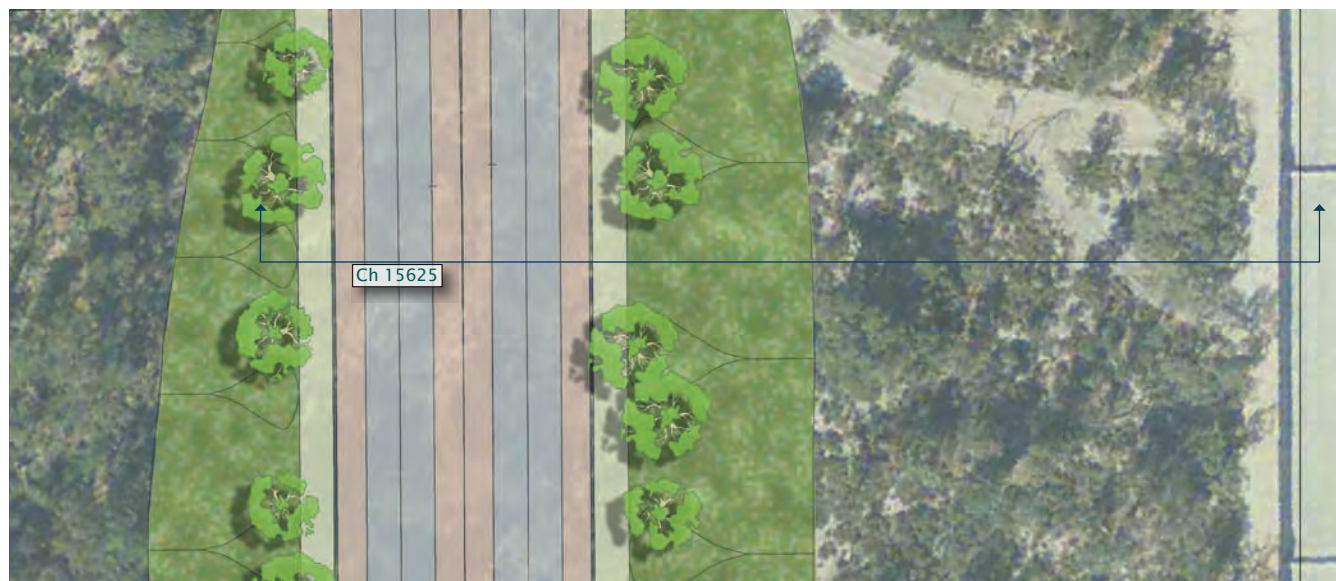
Illustrative plan for revegetation
(Rural zone)

Figure No:

12.2



Preliminary Section 1:300



Roadway Treatments - Type 5 - 1:500



Key Plan - Central

Note: Drawing is not to scale and is for illustrative purposes only.



Date:
13.02.2015

File Name:
4483_P03_F12.03_GL_3

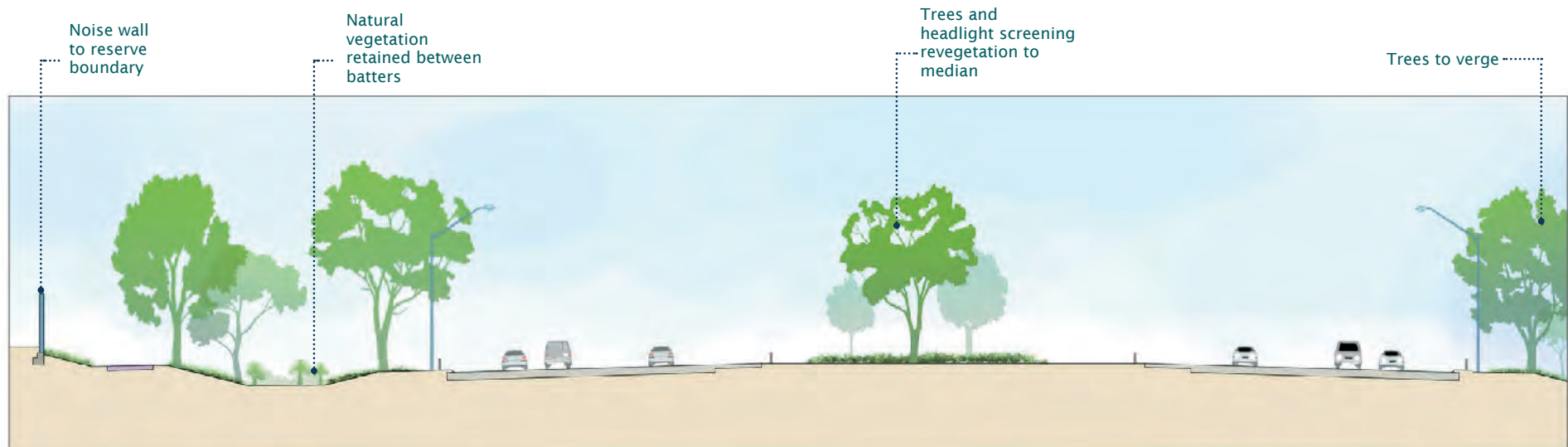
Main Roads WA
Public Environmental Review
Perth-Darwin National Highway

NorthLinkWA

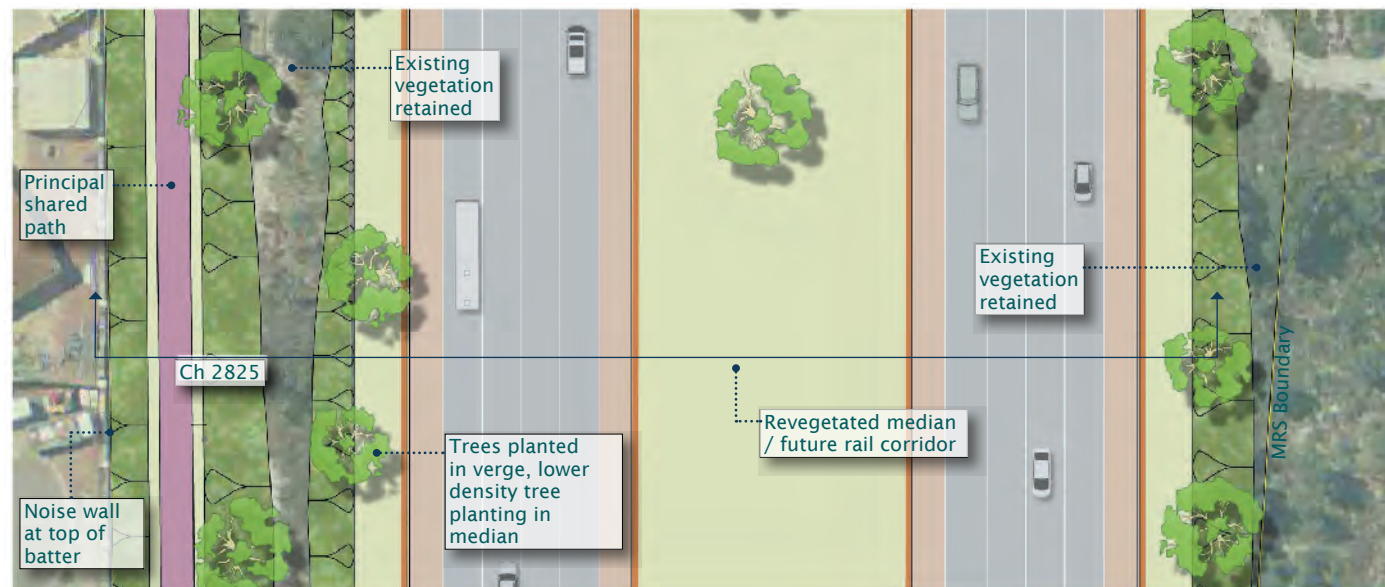
Illustrative plan for revegetation
(Ellenbrook)

Figure No:

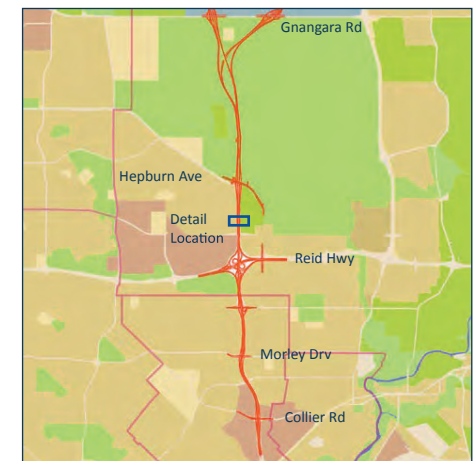
12.3



Preliminary Section 1:300



Landscape 2 - 1:500



Key Plan - South

Note: Drawing is not to scale and is for illustrative purposes only. Railway is shown only to illustrate future possible use of central median and is not proposed as part of this proposal.



Date:
18.06.2015

File Name:
4483_P03_F12.04_GL_6

Main Roads WA
Public Environmental Review
Perth-Darwin National Highway

NorthLinkWA

Illustrative plan for revegetation
(Reid Highway - Hepburn Avenue)

Figure No:

12.4



12.3.4 Revegetation Setbacks and Placement

Revegetation for the proposal will be in compliance with MRWA Vegetation Placement within the Road Reserve Doc. No. 6707/022 (MRWA, 2013b). This guide outlines the recommended setbacks and clearance requirements from all driving surfaces and at intersections and crossings, that apply to all revegetation or landscaping associated with new road construction.

Restrictions apply to the placement of vegetation near road infrastructure, in particular, to maintain road safety. These rules also minimise ongoing maintenance to control vegetation growth and maintain a standard amenity level for road users. The proposal will incorporate these restrictions when undertaking revegetation, in particular, the consideration of a roadside maintenance zone and a clear zone.

The roadside maintenance zone can be variable in width and is maintained on both sides of the roadway to retain clear sightlines and lateral clearances from the roadway and for functional off road drainage. The clear zone is a safety zone adjacent to both sides of the roadway used to maintain clearance to utilities and to help reduce the severity of accidents if vehicles run off the road. Restrictions apply for trees and fixed objects within this band of variable width.

12.4 Potential Impacts

Failure to rehabilitate a proposal site or poor site rehabilitation can have a number of impacts on the environment (Government of Western Australia, 2014) including:

- Reduction in the quality and quantity of habitats.
- Reduction in ecosystem functions.
- Impacts to adjacent natural vegetation and the economic value of sites.
- Contaminated water from road runoff into swales.

12.5 Mitigation and Management


To ensure that impacts to rehabilitation present within the proposal footprint are minimised and that the relevant EPA objectives can be met, MRWA commits to the following outcomes:

- All areas of temporary disturbance will be revegetated by the re-establishment of a cover of vegetation suited to the location.
- Rehabilitation of the road verge will improve the amenity of the site, the stability of unpaved surfaces and promote ecological sustainability.

While various management measures are proposed in this PER to achieve these desired outcomes, alternative management strategies may arise with further design, investigations and project planning. MRWA is committed to achieving environmental outcomes through appropriate management measures that are relevant to specific conditions on-site and which may vary from those described in this document. This approach is consistent with the Environmental Assessment Guideline for Recommending environmental conditions (EPA, 2013a).

The following mitigation and management strategies have been developed to achieve the above commitments and have been informed by relevant MRWA environmental guidelines and corporate procedures:

- An EMP will be developed and implemented during construction.

- 
- A detailed revegetation plan will be developed outlining a clear timeframe for mitigation and management measures, monitoring actions and completion targets.
 - Retain topsoil for placement on areas where revegetation will be undertaken. In the absence of adequate topsoil, suitable growth medium will be used. If additional topsoil is required, materials must be contaminant and weed free.
 - Dieback hygiene procedures will be implemented to ensure no cross-contamination of dieback free material occurs.
 - Weed hygiene procedures will be implemented to minimise the risk of introducing weeds into rehabilitated areas.
 - Conserving and where possible chipping good quality vegetation, during clearing, for reuse as mulch.
 - Treating or disposing unsuitable topsoil and cleared vegetation during the clearing works.
 - Landscaping will be undertaken in accordance with the landscaping types and extent present in the proposal footprint (rural zone, transition zone and urban zone).
 - Local provenance native species that represent the floristic formations of the proposal footprint will be selected for revegetation.
 - Scheduling rehabilitation progressively where practicable. Timing of activities will, however, be dependent on optimal seasons.
 - Ongoing maintenance will form part of the regional Maintenance Program and will be the responsibility of the Asset Manager.

12.6 Residual Impacts

At a minimum, revegetation will achieve roadside stability and minimise ongoing maintenance.

Revegetation will, in the long term, enhance the ecological function of vegetation immediately adjacent to the proposal footprint and assist in conservation of local biodiversity values.

Successful revegetation will assist in meeting community expectations relating to local amenity and aesthetics.

Implementation of the revegetation strategy and associated management measures will meet the EPA's objective to ensure that the proposal footprint is rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State.

A summary of the proposal's residual impacts on revegetation following the implementation of mitigation and management measures is provided in the following Table 12.1.

Table 12.1 Summary of residual impacts on revegetation following implementation of management and mitigation measures

Aspect	Predicted impacts	Management and mitigation	Residual impacts
Failure to rehabilitate a proposal site or poor site rehabilitation	Reduction in the quality and quantity of habitats, ecosystem function and adjacent natural vegetation.	<ul style="list-style-type: none"> • An EMP will be developed and implemented during construction, which includes a detailed revegetation plan, outlining a clear timeframe for mitigation and management measures, monitoring actions and completion criteria. • Topsoil will be retained and vegetation removed (topsoil materials must be contaminant and weed free). • Dieback hygiene procedures will be implemented. • Weed hygiene procedures will be implemented, to minimise the risk of introducing weeds into rehabilitated areas. • Conserving and where possible chipping good quality vegetation, during clearing, for reuse as mulch. • Treating or disposing unsuitable topsoil and cleared vegetation during the clearing works. • Landscaping will be undertaken in accordance with the landscaping types and extent present in the proposal footprint (rural zone, transition zone and urban zone). • Local provenance native species that represent the floristic formations of the proposal footprint will be selected for revegetation. • Scheduling rehabilitation progressively where practicable. Timing of activities will however be dependent on optimal seasons. • Ongoing maintenance will form part of the regional Maintenance Program and will be the responsibility of the Asset Manager. 	<ul style="list-style-type: none"> • Achievement of roadside stability and minimised ongoing maintenance. • Enhancement of the ecological function of vegetation immediately adjacent to the proposal footprint and assist in conservation of local biodiversity value.



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13 ABORIGINAL HERITAGE

13.1 EPA Objectives

The EPA's objective for heritage is to ensure that historical and cultural associations, and natural heritage, are not adversely affected (EPA, 2015a).

Aboriginal heritage was not identified in the ESD by the EPA as a preliminary key environmental factor. However, heritage was identified as one of two other environmental factors which require consideration in the PER. In addition, MRWA recognises the significance of Aboriginal heritage and a survey was commissioned in this regard. A desktop study, followed by a field survey and consultation, was carried out in accordance with the *Aboriginal Heritage Act 1972* (AH Act) and Guidance Statement No. 41 Assessment of Aboriginal Heritage (Amergin, 2014, 2015) (Appendices P and Q).

13.2 Existing Environment

The proposal is located on a combination of alluvial soils and Bassendean sands, both of which have been identified as having higher numbers of archaeological sites than other areas on the Swan Coastal Plain. These sites are often found on sandy crests near water sources and are moderate to large in size (Amergin, 2014).

At the time of European colonisation the land in the southwest of Western Australia was occupied by the Nyungar people. The Nyungar people lived a hunter-gatherer lifestyle. The area around Perth was part of the territory of the Whadjuk or Whadjug (Amergin, 2014). Within the Whadjug, there were a number of bands, which in turn comprised of a number of families.

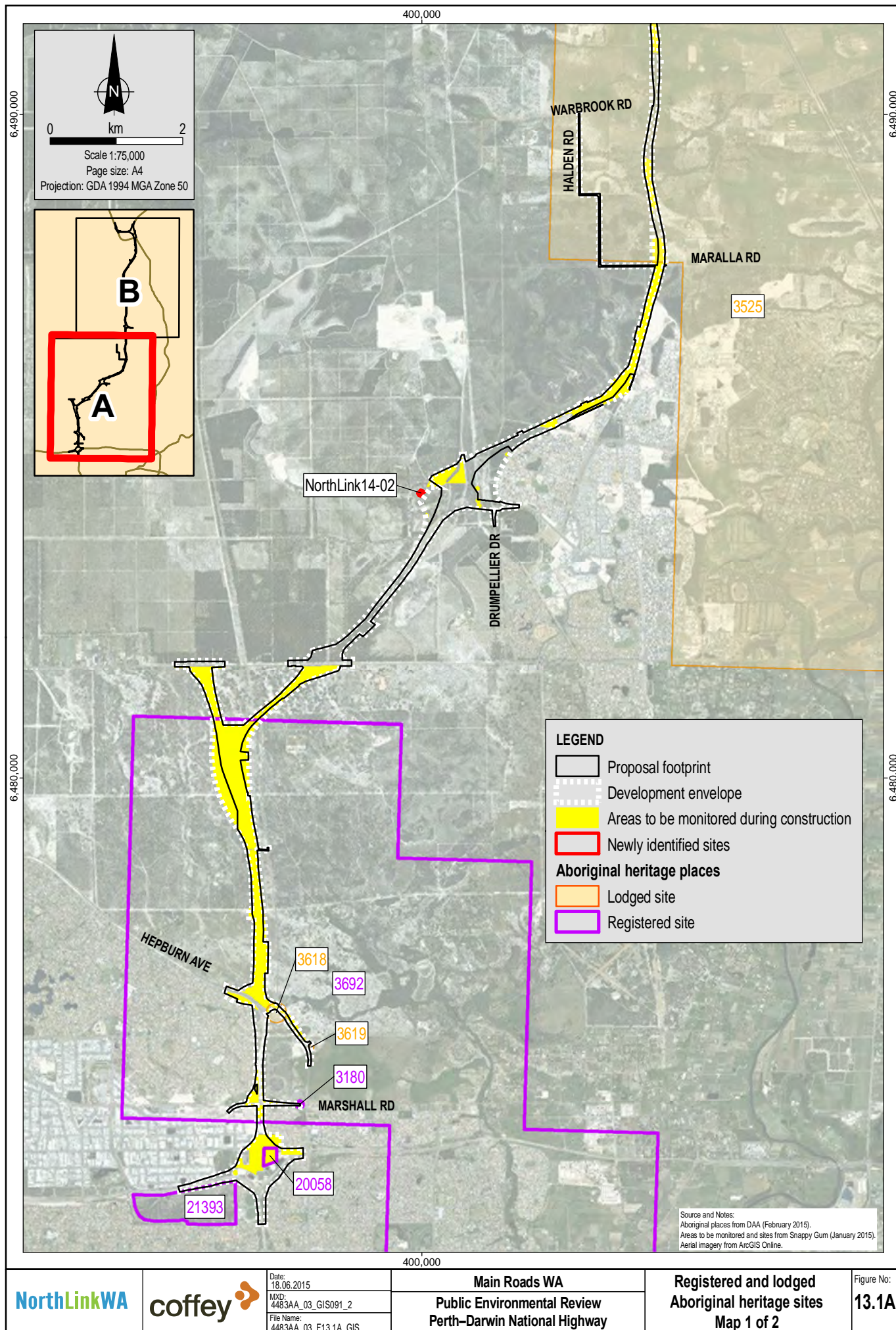
Archaeological evidence of the use of the country by Aboriginal people in historic times is manifested in historical artefacts such as stone artefact scatters, flaked glass, clay pipes or matchbox and tobacco tins. Other connections include the continuing use of bush resources such as medicinal plants and the transmission of cultural knowledge.

Other historical sites such as farm camps, burials, fringe camps, missions and other institutions now since closed also have contemporary importance to local Aboriginal communities (Snappy Gum, 2015a).

There are currently no determined Native Title Holders over the development envelope. However, it is encompassed by one registered Native Title Claim, namely the 'Whadjuk People' Native Title Claim (WC2011/09) which is represented by the South West Aboriginal Land and Sea Council (SWALSC).

13.2.1 Registered Aboriginal Sites

The field survey identified four sites that could potentially be impacted by the proposal footprint (Table 13.1 and Figure 13.1) (Amergin, 2015) (Appendix Q).



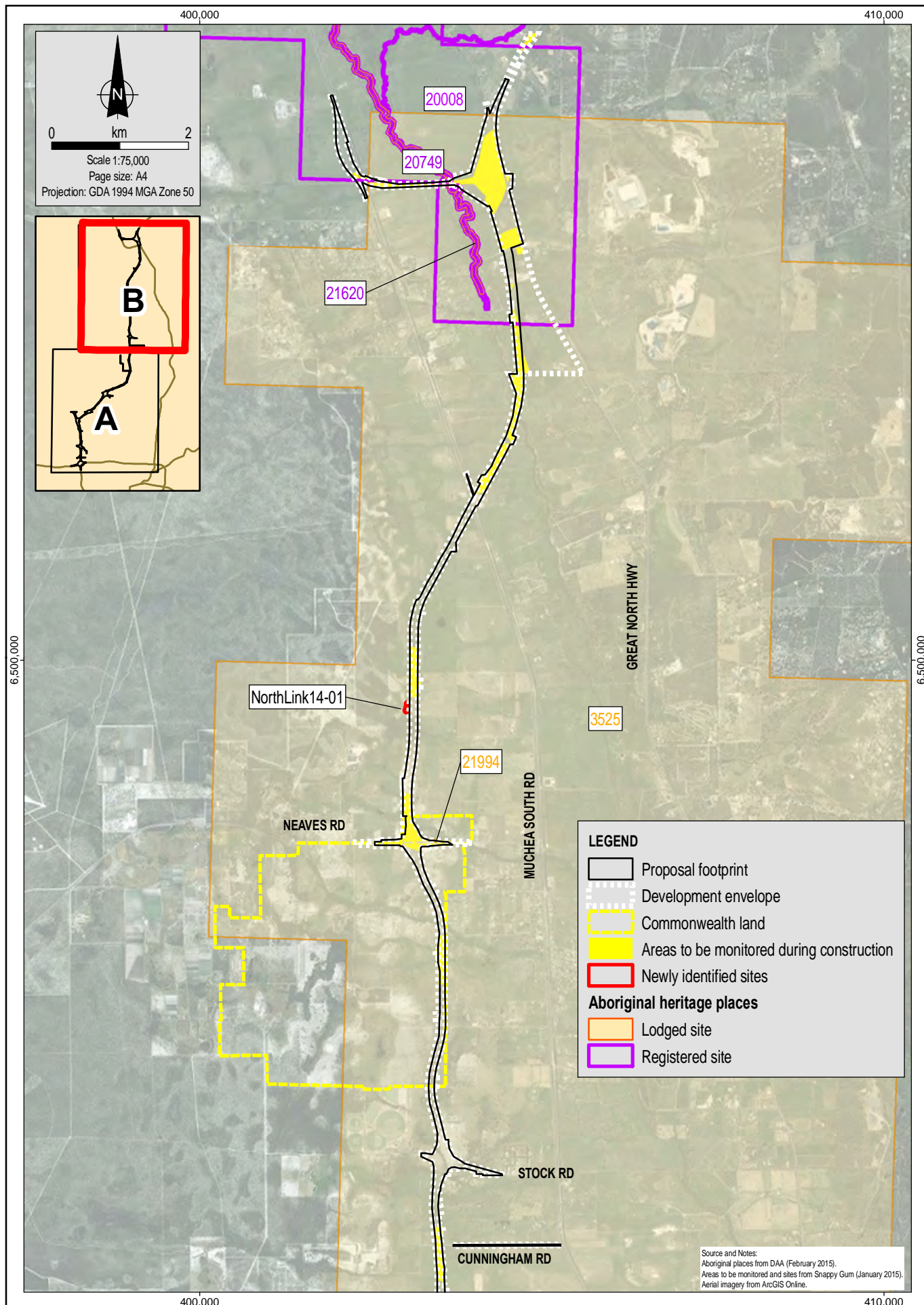


Table 13.1 Registered Aboriginal sites overlapping the proposal footprint

Site ID	Site name	Site type	Additional information
3692	Bennett Brook in Toto	Mythological	Restricted site
20058	Temporary Camp	Camp	Destroyed in the 1990s
21393	NOR/02 Lightning Swamp	Ceremonial, Mythological	Archaeological deposit, meeting place, plant resource, camp, Hunting place, natural feature, water source
21620	Chandala Brook	Mythological	Part of DAA Complex 42

13.2.1.1 Site 3692: Bennett Brook in Toto

This ethnographic site is a restricted¹ site. The site is recorded to include the brook and the banks on either side (see Figure 13.1). The entire brook is of significance because it was formed by the Waugal, whose spiritual essence is believed to exist there. The site extends approximately 7 km from Bennett Brook/Swan River converging at Mussel Pool in Whiteman Park, and also includes the tributary of Bennett Brook (O'Connor cited in Amergin, 2014). A review of the site file confirmed that two tributaries of Bennett Brook have previously been mapped as part of the registered site and are intersected by the proposal footprint to the west of Beechboro Road, north of Hepburn Avenue.

13.2.1.2 Site 20058: Temporary Camp

This site was recorded in 1994 as a former camping area and is in the vicinity of Tonkin/Reid interchange (see Figure 13.1). This site is considered to be an important former camping site (Amergin, 2014).

13.2.1.3 Site 21393: NOR/02 Lightning Swamp

The site was reported as a “place of high cultural significance” following a survey in 2009 (Amergin, 2015). The wetland was reported to be part of the Bennett Brook system and the bushland surrounding it a place of camping and hunting. The site was also previously reported as a meeting place for cultural activities. The development envelope marginally intersects the site’s boundary.

13.2.1.4 Site 21620: Chandala Brook

This is an ethnographic site, and forms part of DAA site Complex 42, which comprises all of the wetlands and watercourses between Bullsbrook and Moore River (Amergin, 2014).

13.2.2 Lodged Aboriginal Sites

The desktop study identified six sites that were considered as part of the field survey; however, of those that were investigated, only one site occurs in the proposal footprint (Table 13.2 and Figure 13.1) (Amergin, 2015).

¹ Restricted sites are those sites that have been afforded protection from disclosure of information in the public arena. Information about sites is often restricted by being held by the Traditional Owners and possibly even restricted to only some key people within the group of Traditional Owners.

Table 13.2 Lodged Aboriginal sites overlapping the proposal footprint

Site ID	Site name	Site type	Additional information
3525	Ellen Brook, Upper Swan	Mythological	Waterways and wetlands between Bullsbrook and Moore River (restricted site)

13.2.3 Newly Identified Sites

Two previously unrecorded artefact scatters (NorthLink 14-01 and NorthLink 14-02) were identified during a field survey (Snappy Gum, 2015a) (Appendix R). These sites were identified as being potential 'Aboriginal sites' owing to the presence of a range of artefact sizes and types, the close proximity of lithologically-similar artefacts and areas that suggest some site integrity.

Both NorthLink 14-01 and NorthLink 14-02 were identified as occurring in close proximity to but still outside the proposal footprint and are unlikely to be impacted (Amergin, 2015) (Appendix Q).

- NorthLink 14-01 had an estimate of 60 visible artefacts, comprising both quartz and silcrete assemblages. It is considered to have archaeological significance for its ability to address the pattern and nature of Aboriginal occupation of this portion of the SCP, particularly addressing archaeological concerns related to post-colonial contact.
- NorthLink 14-02 had an estimate of 100 visible artefacts comprising mostly quartz, a single piece of fossiliferous debris and a silcrete flake. This site is considered to have archaeological significance for its ability to address the pattern and nature of Aboriginal occupation of this portion of the SCP including research questions about the spatial distribution and technological change in fossiliferous chert assemblages.

13.3 Potential Impacts

The sites that fall within the proposal footprint are likely to be disturbed by construction activities and no physical evidence will remain. Views expressed by Aboriginal participants in the survey are detailed in Appendix Q.


13.4 Management and Mitigation

To reduce the proposal's impacts to Aboriginal heritage, the mitigation hierarchy (i.e. avoid, minimise, rehabilitate/restore and offset – see Chapter 7) has been applied during proposal design and in the development of appropriate mitigation and management strategies and offsets.

To ensure that impacts to Aboriginal heritage present within and in the proposal footprint are minimised and that the relevant EPA objectives can be met, MRWA commits to the following outcomes:

- No disturbance to any Aboriginal heritage site outside of that approved under Section 18 of the AH Act.
- Minimise impacts to unknown Aboriginal heritage sites.

While various management measures are proposed in this PER to achieve these desired outcomes, alternative management strategies may arise with further design, investigations and proposal planning. MRWA is committed to achieving environmental outcomes through the implementation of appropriate management measures that are relevant to specific conditions on-site and which may vary from those described in this document.



This approach is consistent with the Environmental Assessment Guideline for Recommending Environmental Conditions (EPA, 2013a).

Mitigation and management strategies summarised below that can be applied to achieve the above environmental commitments:


The following management measures will be incorporated into an Aboriginal Heritage Management Plan and apply to Aboriginal sites in the proposal footprint:

- An application under Section 18 of the AH Act will be submitted to the DAA to obtain approval from the Minister of Aboriginal Affairs to disturb these sites within the proposal footprint.
- All relevant staff/contractors will be informed about the presence and location of Aboriginal archaeological sites NorthLink 14-01 and NorthLink 14-02, which may be considered Aboriginal sites under Section 5(a) of the AH Act.
- Other stakeholders such as landowners will be informed about any sites on their property.
- Prior to nearby ground disturbance, sites NorthLink 14-01 and NorthLink 14-02 will be clearly delineated using physical markers and/or fencing and existing induction programmes/materials altered to alert staff in the area about the restrictions in entering or working near these heritage areas. Physical barriers may require periodic maintenance to ensure effectiveness.
- SWALSC and other relevant Aboriginal people will be consulted before commencing work within the boundaries of Stored (archaeological) place 3552. Otherwise, there are no legal impediments for proposed work at this place.
- Should any ground disturbance be proposed for Registered (archaeological) Sites/Lodged Places DAA Place ID 3692, DAA Place ID 20058, DAA Place ID 21393, DAA Place ID 21620, NorthLink 14-01 and NorthLink 14-02:
 - MRWA will seek formal, written advice from the DAA as to whether Ministerial consent is required under Section 18 of the AH Act for the proposed works.
 - Consultation with SWALSC and other relevant Aboriginal people will take place.
 - An application will be made under Section 18 of the AH Act to use the ground on which the sites are located, where necessary.
- Monitoring by archaeologists and/or appropriately trained members of the Noongar community will take place in areas that have high potential for sites with some archaeological integrity.

13.5 Residual Impact

It is expected that, even following the implementation of the management and mitigation measures discussed above in Section 13.4, the sites located in the proposal footprint will be disturbed or cleared.

The wetlands and watercourses in the vicinity of the proposal footprint were identified by Aboriginal representatives as being “sacred”, primarily through their association with the Waugal (a spirit ancestor), and of special significance. The proposal makes allowance for sufficient water crossings and culverts to ensure the flow in these watercourses are not permanently impacted through the construction of the proposal. Although Ellen Brook and other watercourses may reasonably be considered as Aboriginal Sites by the DAA, the temporary disturbance of these watercourses is not regarded to have a significant effect on Aboriginal heritage values. As such, the proposal is likely to meet the EPA’s objectives in this regard.



Approximately 1.2 ha of Lightning Swamp (DAA Place ID 21393) adjacent to Reid Highway will be impacted through construction of the proposal. However, the impact was not described by Aboriginal representatives as significant and it is considered that the proposal is likely to meet the EPA's objective with implementation of appropriate management measures.

The registered Aboriginal Site DAA Place ID 20058 is not extant as it was destroyed in the 1990s and construction will have no additional impact and is therefore considered to meet the EPA's objective in regards to heritage.

A summary of the proposal's residual impacts on Aboriginal heritage following the implementation of mitigation and management measures is provided in Table 13.3.

Table 13.3 Summary of residual impacts to Aboriginal heritage following implementation of management and mitigation measures

Aspect	Predicted impacts	Management and mitigation	Residual impacts
Ground disturbance associated with excavation of road cuttings and other construction activities.	<p>Disturbance to Aboriginal heritage sites.</p> <ul style="list-style-type: none"> Registered sites: <ul style="list-style-type: none"> Bennett Brook in Toto (ID 3692). Temporary camp (ID 20058). NOR/02 Lightning Swamp (ID 21393). Chandala Brook (ID 21620). 	<ul style="list-style-type: none"> Should any ground disturbance be proposed for Registered (archaeological) sites: <ul style="list-style-type: none"> MRWA will seek formal, written advice from the DAA as to whether Ministerial consent is required under Section 18 of the AH Act for the proposed works. Consultation with the SWALSC and other relevant Aboriginal people will take place. An application will be made under Section 18 of the AH Act to use the ground on which the sites are located, where necessary. Prior to nearby ground disturbance, sites NorthLink 14-01 and NorthLink 14-02 will be clearly delineated using physical markers and/or fencing and existing induction programmes/materials altered to alert staff in the area about the restrictions in entering or working near these heritage areas. Monitoring by archaeologists and/or appropriately trained members of the Noongar community will take place in areas that have high potential for sites with some archaeological integrity. MRWA will continue to consult with SWALSC and other relevant Aboriginal people on the documentation and management of Aboriginal sites. 	Disturbance and clearance of Aboriginal heritage values in proposal footprint.



14 EUROPEAN HERITAGE

14.1 EPA Objectives

The EPA's objective for heritage is to ensure that historical and cultural associations, and natural heritage, are not adversely affected (EPA, 2015a).

European heritage was not identified in the ESD by the EPA as a preliminary key environmental factor and no specific objectives were set for this. However, heritage was identified as one of two other environmental factors that require consideration in the PER. In addition, MRWA recognises the significance of European heritage and a survey was undertaken for the proposal footprint. No listed heritage places that have been afforded statutory protection were identified within the proposal footprint (Appendix S).

14.2 Existing Environment

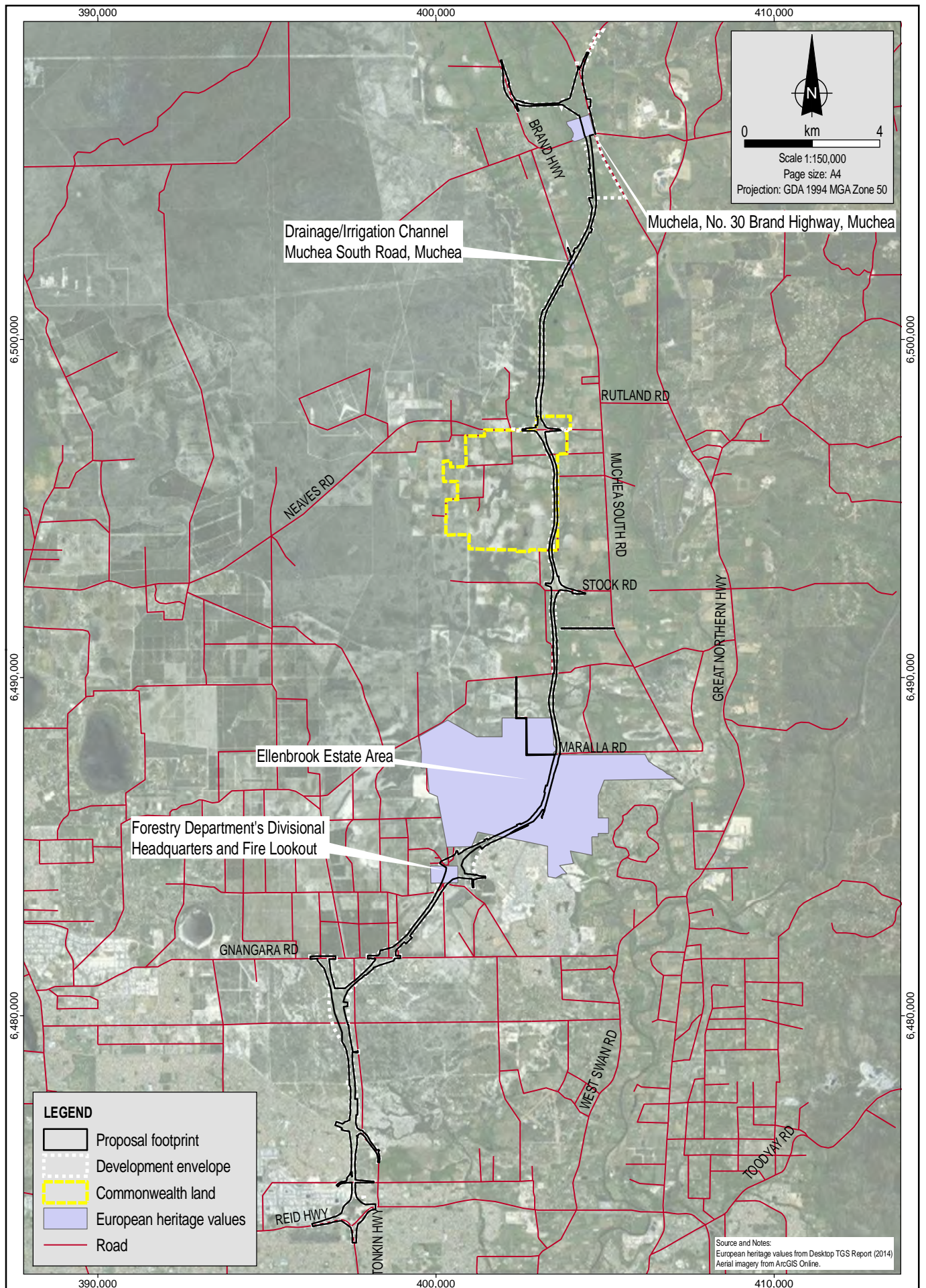
Various heritage database searches were undertaken to identify if any European heritage values listed on the statutory national, state or local heritage lists exist within the study area (TPG, 2015a). No places on any of the statutory national or state heritage lists were identified within the proposal footprint.

Two places on the Shire of Chittering's Heritage List (Figure 14.1) were identified:

- Muchela – No. 30 Brand Highway, Muchea. The site has significance as it was first selected by George Fletcher Moore, who named it Muchela, after which the town of Muchea was named.
- Drainage/Irrigation Channel – The various sites are significant for their association with early drainage practices in the Muchea district.

These places were assigned a Management Category No. 5, which means they are 'of some cultural significance to the Shire of Chittering'. However, little or no tangible evidence of their cultural significance remains (TPG, 2015a).

The Ellenbrook Estate Area is included on both the National Trust List of Classified Places and the Register of the National Estate (both are non-statutory) (TPG, 2015a). Although this property is not on any of the statutory lists, the portion of the place within the proposal boundary will be subject to the Government Heritage Property Disposal Process (GHPDP) as it meets the criteria whereby it is 'already on an existing heritage list'. The Ellenbrook Estate Area was included on the above lists as a result of the area being considered significant due to the presence of large continuous remnant native vegetation, Threatened and Priority plant species, Priority Fauna species and a good representation of ecosystems on leached sands and seasonally inundated alluvial plains (TPG, 2015a).



In addition, the desktop assessment identified the Forestry Department's Divisional Headquarters and Fire Lookout located west of Ellenbrook (TPG, 2015a). The place was initially thought to have potential significance in terms of historic and scientific value, even though it was largely demolished sometime between 1980 and 1995. An archaeological survey was also undertaken (Snappy Gum, 2015b; see Appendix T) to provide a more complete understanding of the archaeological potential and scientific value of the subject place. Using aerial imagery and field investigations it was ascertained that the Forestry Department Lookout has little archaeological significance and that it is no longer considered a place of archaeological potential. In addition, TPG (2015b) (Appendix U) found that all former buildings at the location have been removed and the social value of the site is limited and not of State-wide significance. The site does have some historic value associated with its use by the Forestry Department, however, its condition and authenticity have been eroded to the point where its former use is no longer apparent. It was concluded that the place is not likely to have sufficient value to be included on the State Register of Heritage Places; however, this decision is one to be made by the Heritage Council of Western Australia and must go through due process under the GHPDP.

14.3 Potential Impacts

There are a number of European heritage values located in the proposal footprint that will require demolishing as a result of the proposal (see Figure 14.1). These heritage values are described in Table 14.1.

Table 14.1 European heritage values impacted by the proposal

Places	Heritage list	Requirement
Muchela – No. 30 Brand Highway, Muchea	Shire of Chittering-Municipal Heritage Inventory	<ul style="list-style-type: none"> Planning approval potentially required under the Shire of Chittering's Local Planning Scheme No. 6. May trigger GHPDP as meets the criteria whereby it is "already listed on an existing heritage list".
Drainage/Irrigation Channel, Muchea South Road, Muchea	Shire of Chittering-Municipal Heritage Inventory	<ul style="list-style-type: none"> Planning approval potentially required under the Shire of Chittering's Local Planning Scheme No. 6. May trigger GHPDP as meets the criteria whereby it is 'already listed on an existing heritage list'.
Ellenbrook Estate Area	Register of the National Estate List of Classified Places (the National Trust)	<ul style="list-style-type: none"> May trigger GHPDP as it meets the criteria whereby it is 'already listed on an existing heritage list'.
Forestry Department's Divisional Headquarters and Fire Lookout	Not heritage listed	<ul style="list-style-type: none"> May trigger GHPDP as the place has potential significance in terms of historic value; however, it was largely demolished sometime between 1980 and 1995.

There were a number of locations adjacent to the study area that were identified as having some protection through the Local Planning Scheme Heritage list (statutory) and on Local Government Inventory list (non-statutory). Care should be taken throughout the proposal to ensure that the works do not adversely impact on these places, most importantly those with statutory protection. Should the study area boundaries change, steps should be taken to ensure that these places are not adversely impacted or altered without undertaking proper consultation with the relevant local government authority.



14.4 Management and Mitigation

To reduce the proposal's impacts to existing European heritage sites, the mitigation hierarchy (i.e. avoid, minimise, rehabilitate/restore and offset) discussed in Chapter 7 has been applied during proposal design and in the development of appropriate mitigation and management strategies and offsets.

To ensure that impacts to European heritage values present within and in close proximity to the proposal footprint are minimised and that the relevant EPA objectives can be met, MRWA commits to the following outcomes:

- No disturbance to any European heritage site outside of the proposal footprint.

While various management measures are proposed in this PER to achieve these desired outcomes, alternative management strategies may arise with further design, investigations and proposal planning. MRWA is committed to achieving environmental outcomes through the implementation of appropriate management measures that are relevant to specific conditions on-site and which may vary from those described in this document.

This approach is consistent with the Environmental Assessment Guideline for Recommending Environmental Conditions (EPA, 2013a).

Mitigation and management strategies summarised below that can be applied to achieve the above environmental commitments:

- Comply with the GHPDP through preparing a letter to the State Heritage Office advising of further clearance of the Ellenbrook Estate Area, Muchela, the Drainage/Irrigation Channel and the Forestry Department's Divisional Headquarters' and Fire Lookout site.
- Inform the Shire of Chittering and advise that the proposal is occurring and will directly impact on two locally listed heritage places: Muchela and the Drainage/Irrigation Channel. Clarification is required on the status of these places on the Shire's Heritage List and what process is required to enable the further clearance of this site.
- Clearly mark the European heritage values identified adjacent to the study area on future mapping for the proposal in order to ensure that all construction personnel are aware of their location and the need for care during construction or with any future boundary changes.
- Inform the City of Swan, Shire of Chittering and City of Bayswater that the proposal is occurring and that it is occurring in close proximity to locally listed heritage places.

14.5 Residual Impacts

European heritage places within the proposal footprint will not be retained and will be demolished (or cleared) as a result of construction and no evidence will remain. The European heritage in the proposal footprint is of limited archaeological or cultural value and is not included on any Commonwealth or State statutory heritage lists. The demolition/clearing of these places is not likely to adversely affect any historical or cultural associations. As such, the proposal is expected to meet the EPA's objectives.

A summary of the proposal's residual impacts on European Heritage following the implementation of mitigation and management measures is provided in Table 14.2.

Table 14.2 Summary of residual impacts to European heritage following implementation of management and mitigation measures

Aspect	Predicted impacts	Management and mitigation	Residual impacts
Ground disturbance associated with excavation of road cuttings and other construction activities.	<p>Disturbance to European heritage sites:</p> <ul style="list-style-type: none"> • Muchela – No. 30 Brand Highway, Muchea. • Drainage/Irrigation Channel, Muchea South Road, Muchea. • Ellenbrook Estate Area. • Forestry Department's Divisional Headquarters and Fire Lookout. 	<ul style="list-style-type: none"> • A site visit will be undertaken to enable external photographs to be taken of the Ellenbrook Estate Area, Muchela and the Drainage/Irrigation Channel that may be subject to the GHPDP. The site visit should enable an understanding of the nature and extent of original/historic fabric remaining on-site. • The GHPDP will be complied with by preparing a letter to the State Heritage Office advising of further clearance of the Ellenbrook Estate Area, Muchela, the Drainage/Irrigation Channel and the Forestry Department's Divisional Headquarters' and Fire Lookout site. • The Shire of Chittering will be advised that the proposal is occurring and that it will directly impact on two locally listed heritage places, Muchela and the Drainage/Irrigation Channel. Clarification is required on the status of these places on the Shire's Heritage List and what process is required to enable the further clearance of this site. • The European Heritage values identified adjacent to the study area will be clearly marked on future mapping for the proposal to ensure that all construction personnel are aware of their location and the need for care during construction or with any future boundary changes. • The City of Swan, Shire of Chittering and City of Bayswater will be informed that the proposal is occurring and that it is occurring in close proximity to locally listed heritage places. 	Disturbance and clearance of European heritage values in proposal footprint.



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