



Clearing Permit

Nanga Road

SLK 0.37 – 2.02

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1. Background

As part of the 2021/22 works budget, funds have been allocated to carry out selected removal of verge vegetation, widening of seal around bends and installation of W beam barrier on the southbound lane to mitigate the risk of vehicles leaving the road into a drop off on that side. The proposed works also include the installation of chevron markers to the outside of curves and double up of advance warning curve signage with recommended speed drop tag signage along Nanga Road between 0.37 to 2.02 straight line kilometres (SLK). Funds have been sourced through the State Black Spot Program therefore it is imperative the works are completed within the 2021/22 financial year as carry forwards under that funding model are discouraged. Nanga Road is an important tourist route for users of the Department of Biosecurity, Conservation and Attractions recreation facilities in the area. These are currently being expanded and as such traffic will only increase. While it is a winding road, the geometry is sound, and seal widening around bends will improve conditions while removal of targeted roadside obstacles will further improve conditions on the verge.

A section to the south of the subject section runs along a significant drop off littered with larger trees, combining to create a serious hazard for vehicles leaving the carriageway. Since these verge conditions are difficult to remedy, a roadside barrier is proposed for this section.

2. Road Safety Report

The Shire engaged Brad Brooksby Consulting to conduct a Road Safety Audit to outline the potential road safety risks associated with the proposed road improvement project. The full report has been included as supporting information however a few key points which will assist with the clearing requirements are outlined below.

A study of the recent crash history for a five-year period to the end of December 2020 was undertaken. There have been four reported crashes along Nanga Road for the current five-year period, two of these are within section SLK 0.37-2.02. The previous crash history which included 2015 included a fatal crash at SLK 2.02.

Below is a summary of traffic data from November 2018 for Nanga Road.

Vehicles per day/ per week (% heavy vehicles)	Vehicles per day/ Average weekend	Average Speed (km/h)	85th Speed (km/h)	Percentile
287 7.6%	1,106	56.70 km/h	67.79 km/h	

Part 2 of the Road Safety Audit outlines the findings and recommendations. A summary of the findings is listed below.

Item 2.1 Finding – Non-Frangible objects near the traffic lane.

There are large trees located on the verge, close to the traffic lane that pose a risk to vehicle occupants in the event an errant vehicle leaves the road, particularly those on the outside curves.

The recommendation is to either isolate the hazards or alternatively use the *Austroads: Guide to Road Design Part 6 – Roadside Design Safety and Barriers (2010)* Table 4.1: Clear zone distances from the edge of through travelled way and provide a suitable clear zone.

Barriers or W Beams are to be installed 600mm from the edge of seal and there should not be any trees or fixed objects with 1.0m of the barrier to allow deflection when it is hit.

Item 2.2 Finding – Insufficient Safe Intersection Sight Distance

There are several camping areas and small side-tracks with restricted sightlines due to vegetation. The limited sight distance can result in restart intersections crashes where the driver stops at the intersection, then restarts resulting in a crash.

The recommendation is to clear the vegetation to provide Safe Intersection Sight Distance as per the *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersection*.

Item 2.3 Finding- Isolated Curves of Small Radius

An isolated substandard curve causing a sudden speed reduction may catch a driver unaware. There are numerous horizontal curves, some of which were signed with curve warning signs and speed tags and others not signed.

The recommendation is to install advanced signage and delineation to guide the road user through the curve. To allow for appropriate vision of the signage vegetation will need to be mulched along the road shoulder.

Item 2.4 Finding – Gravel Shoulder

The existing gravel shoulder is very narrow and in a poor condition. There is a risk of run off road crashes because of inadequate shoulder width.

The recommendation is to widen and improve the surface of the shoulder in accordance with *Austroads Guide to Road Design Part 3: Geometric Design*.

Item 2.5 Finding – Steep Verge Batters

The batter from the gravel shoulder to the natural ground is too steep in several sections. An errant vehicle may roll over when the batter of the verge is steeper than 3:1 for cars resulting in occupants being injured.

The recommendation is to install a suitable road safety barrier along the road section when verge batters trigger a high Network Roadside Intervention Threshold as per *Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers*. This will require vegetation to be cleared 1.0m from the barrier installation as per Item 2.1 Finding – Non-Frangible objects near the traffic lane.

Item 2.6 Finding – Vegetation obscuring Warning Signs

Vegetation is close to the traffic land obscuring warning signs and guidepost. Vegetation close to traffic lanes results in drivers shying away from the edge of the road and crossing the centreline into approaching traffic land which could result in a head on crash.

The recommendation is to remove the vegetation that is close to the road and or obscures advanced warning signs and guidepost. This will require machinery mulching of the vegetation.

Item 2.7 Finding – Guidepost

Guidepost in a poor standard or missing and did not provide clear guidance to the road user.

The recommendation is to install guidepost in accordance with *Austroads Guide to Road Design Part 6B: Roadside Environment*.

Item 2.8 Finding – RAV Route

Nanga Road from 0.00 – 5.50 SLK is a Restricted Access Vehicle (RAV) Route Tandem Drive Network 3. There is a risk mixing a high number of tourists with RAV's which could result in a crash.

The recommendation is to update the conditions for RAV's using the road to be reviewed to include "No Operation on Weekends or Public Holidays".

Item 2.9 Finding – RAV Speeding

Traffic count data within the RAV sections was not available however several Road Safety Audits recently conducted at other RAV route sites have found a high percentage of RAV travelling over the restricted speed limit.

The recommendation is to install advisory signage for speed restriction for Restricted Access Vehicles along the road.

3. Proposed Clearing Works

Due to the steep verge batters on the south bound lane the benefit of removing substantial established trees is limited. Through the subject section several established trees will require removal if they are within 600 millimetres of the edge of seal however most of the native vegetation is ground cover which will be mulched by an Posi Track Mulcher or Excavator with Mulching Attachment (see images below).



Falcon Forestry Mulching Machine – 2200mm wide

Terex Positrack with Fecon Forestry Mulcher Attachment – 1900mm wide



Excavator Mulching Attachment – 1200 wide

4. Clearing Period

It is expected the clearing will not commence until October 2021 and be completed in 2021/22 financial year however to cover unforeseen circumstances the requested permit validity period is until October 2025.

5. Calculations

The road improvement zone runs from 0.37 to 2.02 SLK which is a total length of 1,650 metres. Due to the vegetation being rather dense and the clearing being limited due to the steep verge batters, the Shire is applying for an estimated hectare based on three metres from the edge of seal on both the north bound and south bound lanes. This will allow for vegetation to be mulched and removed to open the road shoulders up and for installation of barriers.

It is important to note that the estimated hectares provided is a worst-case scenario and given the limited funds for this project coupled with the cost impact of installing barriers it is extremely unlikely that the full area requested will be cleared.

Road Reserve Width:	20m
Seal Width:	6m
Clearing Zone	6m x 1650m (3m on both north and south bound lanes)
Estimated M²	9,900m ²
Estimated Hectares (1m ² = 0.0001 hectares)	0.99 hectares

In addition, the Shire has arranged for shape files to be created showing the three metres from the edge of seal and five metres from the edge of seal for major bends. The table below is a vegetation breakdown for the 1,650 metre work area.

Vegetation Breakdown		
Species	Description	Percentage
Macrozamia Riedlei	<i>Zamia palm roughly half a metre in height.</i>	3%
Eucalyptus Marginata	<i>Commonly known as Jarrah Tree</i>	1%
Genus Xanthorrhoea	<i>Commonly known as the grass tree</i>	1%
Corymbia Calophylla	<i>Commonly known as Marri tree.</i>	10%
Bossiaea Aquifolium	<i>Shrub or tree known as waster bush.</i>	20%
Pine Tree	<i>Established trees from previous plantations.</i>	5%
Pteridium Esculentum	<i>Known as Bracken Fern or bracken.</i>	60%
Total		100%

6. Aerial Map



** The Map above shows Nanga Road running north to south and identifies the finding locations as per item 2 of this document.*

7. Photos and Additional Information

All photos have been taken heading north along Nanga Road with 200-500m section.



SLK 2.02 Vegetation on south bound lane to be mulched. Limited vegetation on north bound lane due to road verge batter however the table drain on the side of the road will be cleared and some vegetation growing down the batter will be mulched to prevent sight issues as per road safety report recommendations.



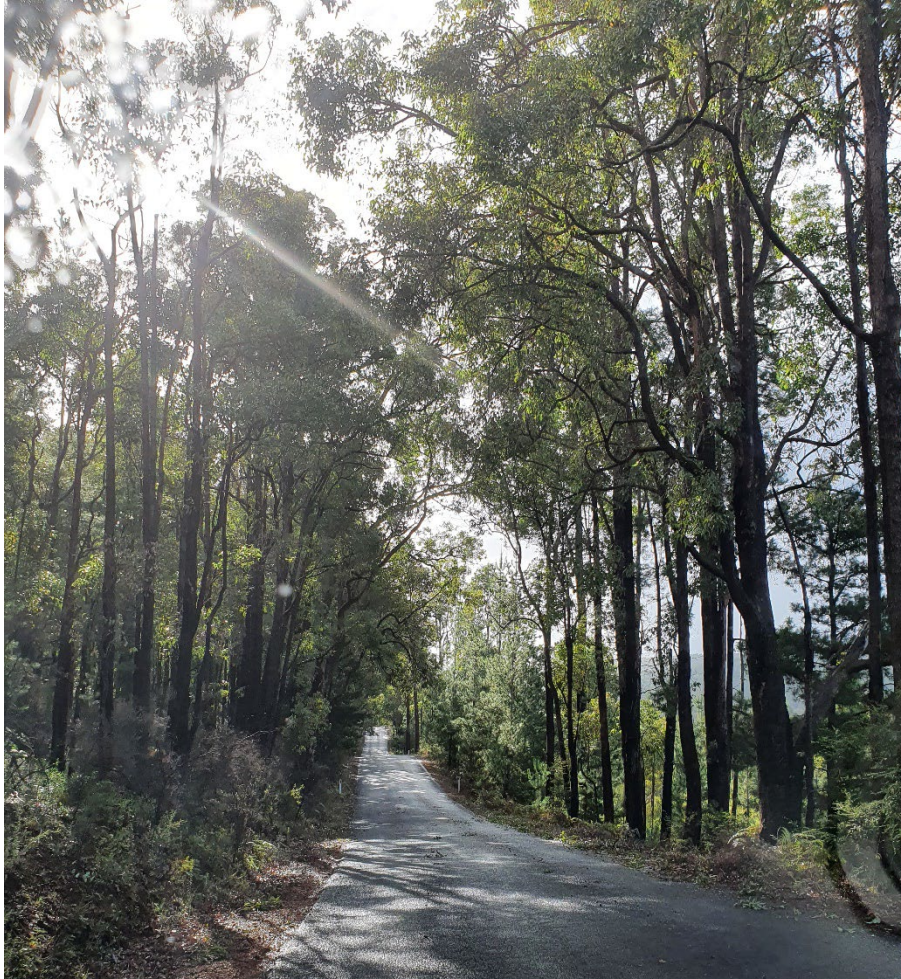
The image above shows the deep descent in the road verge batter on the south bound lane. These areas will have vegetation mulched with native trees growing within 1.6m of the edge of seal removed to allow for barriers to be installed as per *Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers*.



SLK 2.0 – The vegetation within 1.6 metres from the edge of seal on the south bound lane will be mulched and removed to allow for barrier installation as per *Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers*. The deep descent of the south bound lane road verge will limit clearing.



SLK 1.8 The vegetation on the south bound lane is limited and therefore minor vege clearing will be carried out to allow for sight lines to guideposts and advanced warning signs. The vegetation on the north bound lane will require some pruning with two or three trees that are leaning towards the road near the guidepost which may require removal.



Vegetation will require mulching to allow for sight lines to guide posts and advanced warning signs as per the Road Safety Audit recommendation 2.6 and *Austroads Guide to Road Design Part 6B: Roadside Environment*.



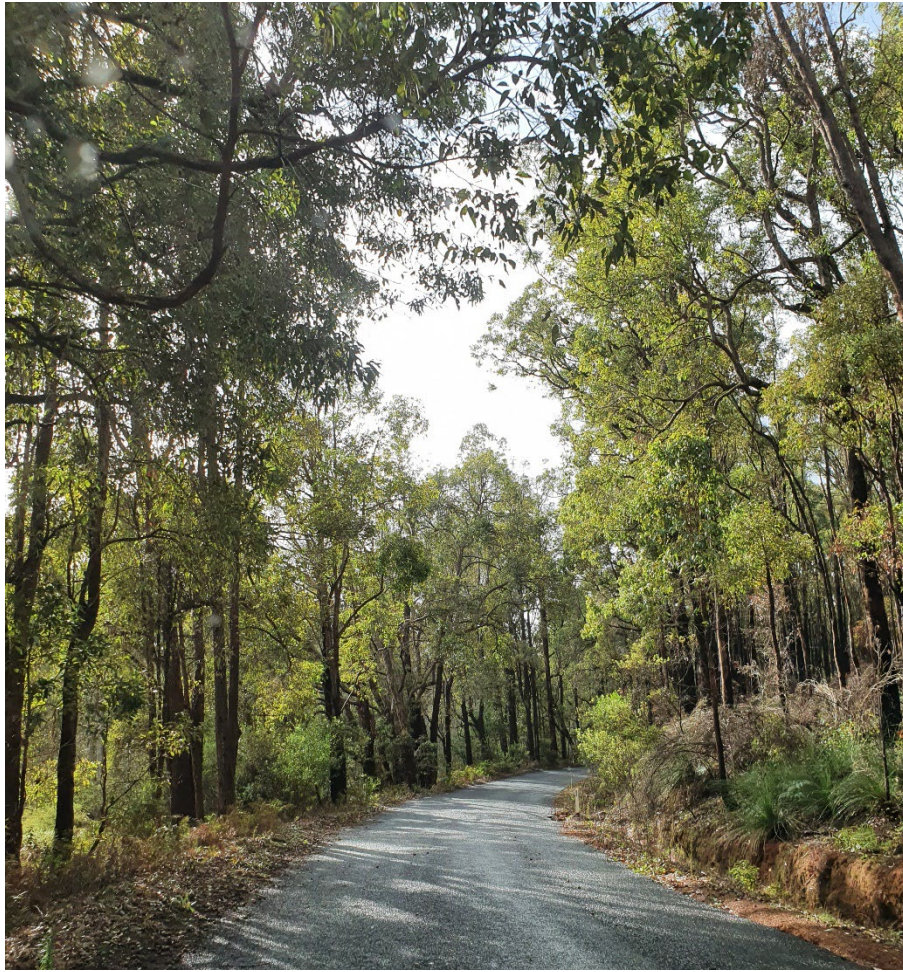
Approaching the bend as per Finding 2.1 and 2.5 of the site plan. Vegetation on both the north and south bound lanes will require mulching to ensure sight lines to guide posts and advanced warning signs are suitable. In addition barriers will be installed on the south side lane which 1.6 metres clearance as per *Austroads: Guide to Road Design Part 6 – Roadside Design Safety and Barriers (2010)*.



This section is leading up to the Mundi Bidi trail near finding 2.1 and 2.2 on the site plan. The advanced warning sign identified is becoming obstructed with the native vegetation. This section will require mulching of ground cover to allow for suitable vision of guidepost and advanced warning signs as per *Austroads Guide to Road Design Part 6B: Roadside Environment*.



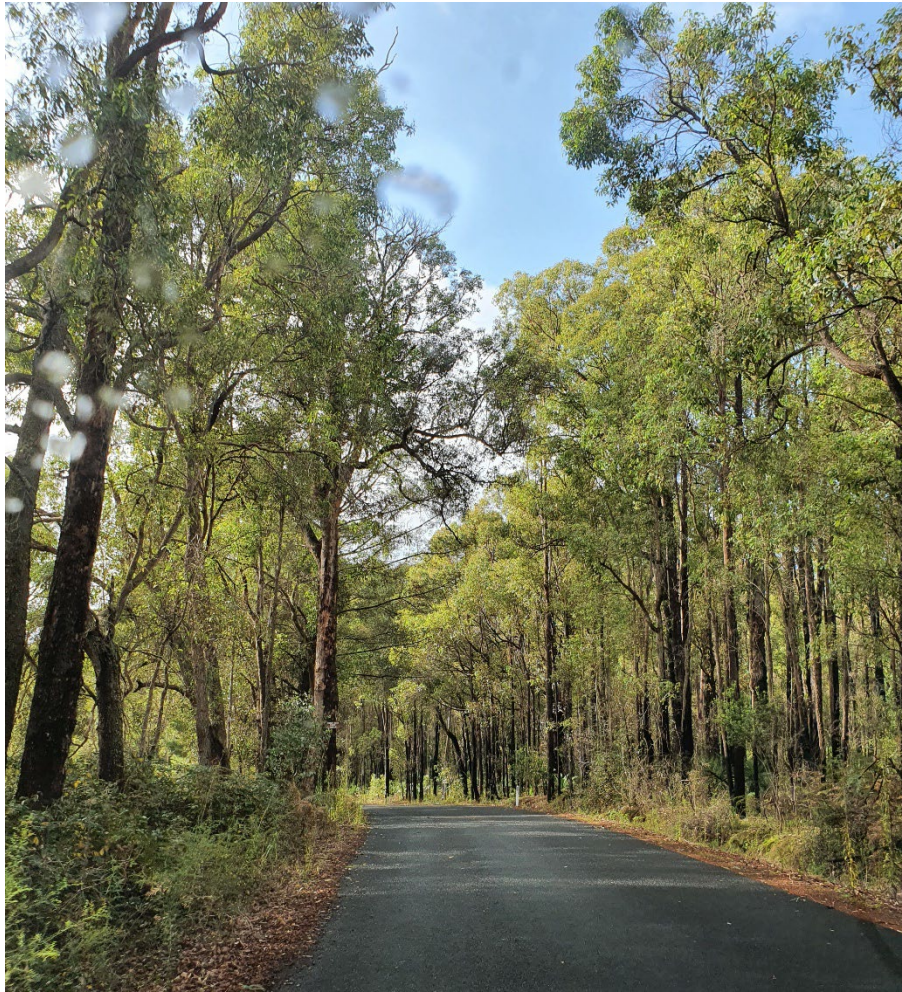
The section identified in the above photo is near finding 2.3 of the site plan. The isolated substandard curve causes sudden speed reduction which may catch a driver unaware. The ground cover vegetation will be mulched to ensure sight lines to guideposts and advanced warning signs are improved.



This section is the end of the curve as per finding 2.3 of the site plan and will require minor vegetation mulching of the ground cover along the north and south bound lane to improve sight lines to the guide posts.



The road verge batters are reasonably flat and therefore no safety barriers are required, however the sight lines to of guideposts and advanced warning signs is substandard and therefore ground cover vegetation will require mulching to improve vision as per the Road Safety Audit recommendation item 2.6. In addition to the mulching it is likley that established native trees within 600m of the edge of seal may be removed as identified in the above image.



SLK 0.30 to 0.37 the native vegetation on both the north and south bound lanes requires mulching to ensure adequate sight lines to guideposts and advanced warning signage as per the Road Safety Audit recommendation 2.6.