

## Replacement Report

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### REPORTS FROM THE DIRECTOR ENGINEERING

#### 23 [E-CM] Sealing of Gravel Roads

**SUBMITTED BY:** Roads and Stormwater

Valid



### Supporting Community Life

#### LINKAGE TO INTEGRATED PLANNING AND REPORTING FRAMEWORK:

2	Supporting Community Life
2.4	An integrated transport system that services local and regional needs
2.4.3	Ensure local streets, footpaths and cycleways are provided, interconnected and maintained

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#### SUMMARY OF REPORT:

On 20 February 2014 Council considered a report that responded to a previous notice of motion concerning the prioritisation of sealing gravel roads generally, and Round Mountain Road more specifically.

The 2014 report outlined the capital and ongoing costs of road upgrading, an assessment of relative priority of road projects and programs competing for funding allocations, including the role of Council's road asset management system.

Council resolved that the priority for upgrading gravel roads be assessed by a multi-criteria analysis including:

- Road safety
- Road alignment and width
- Traffic count
- Network hierarchy
- Transport task
- Cost benefit and environmental

This report details the outcomes of the above prioritisation process for the 130 gravel roads in Tweed Shire, in order to assist Council with the upcoming budget and Infrastructure Program deliberations for 2015/2016.

#### RECOMMENDATION:

**That Council endorses the ranking system and prioritisation list for sealing of gravel roads.**

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### REPORT:

#### Background

On 20 February 2014 Council considered a report that responded to a previous notice of motion (17 October 2013) concerning the prioritisation of sealing gravel roads generally, and Round Mountain Road more specifically.

The 2014 report outlined the capital and ongoing costs of road upgrading, an assessment of relative priority of road projects and programs competing for funding allocations, including the role of Council's road asset management system, and recommended multi-criteria analysis for the assessment of priority for upgrading gravel roads.

Council resolved the following:

**"RESOLVED** that the priority for upgrading gravel roads be assessed by a multi-criteria analysis, including:

1. *The priority for upgrading gravel roads be assessed by a multi-criteria analysis, including:*
  - *Road safety – gives higher priority to roads with a poor accident history.*
  - *Road alignment and width – give higher priority to roads where the alignment or width is below standard and/or inappropriate for the road function.*
  - *Traffic count – give higher priority to higher traffic volume.*
  - *Network hierarchy – give higher priority for higher functional class. Give higher priority to network linkages that provide connectivity around the Tweed Valley, and lower priority to no-through roads.*
  - *Transport task – give higher priority to roads that provide for the movement of traffic in support of the economy, or that are bus routes.*
  - *Cost benefit and environmental impacts.*
2. *Prioritised recommendations for sealing of gravel roads be included in the Infrastructure Program when it is reported to Council as part of its budget deliberations."*

This report details the outcomes of the above prioritisation process for the 130 gravel roads in Tweed Shire, in order to assist Council with the upcoming budget and Infrastructure Program deliberations for 2015/2016.

#### Gravel Road Assessment

The Council resolution requires a cost benefit analysis of the gravel road network in order to prioritise a potential future sealing program (which is currently unfunded).

The costs and benefits outlined in the Council resolution can be broadly grouped into the following categories:

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	CRITERIA	ASSESSMENT
<b>BENEFITS</b>	1. Safety	Accident data on gravel roads. Sealing may reduce recurrence of accidents. Alignment and width. Where gravel roads have substandard design, sealing may reduce the likelihood of accidents.
	2. Network	Road hierarchy. Higher order roads will generally provide a higher level of service if sealed.
		Road connectivity. Sealing of through roads has the capacity to benefit other lower order roads as they connect access roads to main arterials.
<b>COSTS</b>	3. Economic	Transport task. Sealing of roads servicing local industry, facilities or public transport routes provide economic and social benefits, through safer, more efficient transport.
	4. Environmental	Unit rates of construction. Costs to seal gravel roads vary throughout the shire due to proximity to materials and plant, and variations in terrain and ground conditions. Ecological sensitivity. Potential costs to environment are based on sensitivity of adjoining ecological communities.

Each gravel road has been scored against these criteria to establish a Benefit Score (B) and a Cost Score (C) to create a benefit/cost ratio (B/C). As the overall impact of these benefits and costs is proportional to the overall traffic volumes on a road, a Traffic Multiplier (T) is then applied to obtain a Sealing Index:

$$S = (B/C) \times T$$

While there are many possible ways to assess gravel roads against the criteria outlined in the Council resolution, the intent of this proposed prioritisation system is that it can be applied consistently, is reproducible, and can be improved at a later date if new or improved data becomes available.

### Scoring

#### **CRITERIA 1 - Safety**

Council receives road accident data from Roads and Maritime Services. This has been interrogated for fatality, casualty and tow away crashes for the 5 year period 2008-2013. There are limitations in this data as it only reflects reported road accidents - unreported accidents, which are common in rural areas, are not included in the analysis.

Tow away = 1 per incident

Casualty = 3 per incident

Fatality = 5 per incident

Road alignment and width is a more subjective score, unless an intensive (and costly) evaluation is done. Those roads with good alignment / width would generally benefit less from sealing than a road with a narrow, steep and winding alignment in terms of safety and sight and stopping distances. Assessment is provided by Roads and Stormwater Unit staff.

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Generally good alignment / width = 1  
Isolated sections with poor alignment/width = 3  
Overall poor alignment = 5

### CRITERIA 2 - Network

Two rural road hierarchy classifications have been considered in this analysis - "local roads" being those rural roads that provide access to properties in that immediate area, and "collector roads" being those higher order rural roads that connect multiple local roads back to the arterial road network. Council also maintains some gravel roads in urban areas, which are generally rear access laneways, in low speed environments.

Local Road = 1  
Urban Laneway = 1  
Collector Road = 5

Of these roads, those that provide through road connectivity between higher order roads around the Tweed Shire have been provided a higher ranking.

No Through Road = 0  
Through Road = 5

The primary rural industry task in Tweed Shire is the transportation of sugar cane to Condong Mill. These routes are generally identifiable by their location on the floodplain. The main transportation services utilising rural roads are school buses. These are more difficult to determine as they change from year to year based on demographics and demand across sparsely populated areas. Local bus providers have been contacted to identify their current school bus routes. Other public facilities, such as the Stotts Creek Waste Facility, or the Tweed River Sand Bypass also create a traffic demand on gravel roads, and this has also been factored into the assessment as identified.

Cane Haulage Route = 2  
School Bus Route = 5  
Facility Access = 5

### CRITERIA 3 - Economic

The major cost in sealing gravel roads is obviously the construction cost. For this exercise, it is assumed that unit rates for sealing are equal throughout the Shire. While those more remote sites will have higher establishment costs, this can usually be offset by other factors such as reduced traffic control costs. Economic cost is therefore determined primarily by the standard of the road and the extent of work required, ranging from minimal where the existing formation generally meets the necessary standard, to major, where significant works are required to attain an appropriate standard (e.g. extensive earthworks for widening).

Minimal Cost - 1  
Moderate Cost - 3  
Major Cost - 5

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Another cost consideration for upgrading of rural roads is whether or not that road is located within the gazetted road reserve. Those roads that appear to be outside of the road reserve have been assumed to require significant additional cost for road acquisition.

Within Road Reserve = 0  
Private Land Encroachment = 3

### CRITERIA 4 - Environmental

In consideration of the environmental costs and benefits of sealing gravel roads, many of the possible assessment criteria are contradictory. For example, gravel roads carry a high sediment and dust load that impact on downstream waterways and adjoining vegetation, so sealing could be assessed as being beneficial. Counter to that, vehicle speeds tend to be higher on sealed roads, which may lead to increased road kill in habitat areas. Similarly, sealed road construction involves petrochemical components and other non-renewable resources. Counter to that, sealed roads provide increased travel efficiency, reducing petrol consumption and vehicle wear. On balance, these issues were considered to be generally equivalent to all gravel roads under assessment so could not be used in the prioritisation exercise. Rather, ecological values specific to the roadside environment were assessed against the various mapping layers available in Council's GIS, such as roadside vegetation classification, koala habitat, and fauna corridors. It was then assumed that the higher the environmental score for a road, the higher the potential risk, or cost, of upgrading that road.

Roadside Vegetation Zone 3 (low) = 0  
Roadside Vegetation Zone 2 (medium) = 1  
Roadside Vegetation Zone 1 (high) = 2  
Koala Habitat = 3  
Regional / Sub Regional Fauna Corridor = 2  
SEPP14 Coastal Wetland = 3  
SEPP26 Littoral Rainforest = 3

### TRAFFIC MULTIPLIER

Where actual traffic count data is available this has been considered, however this data is very limited for gravel roads (due to difficulties in fixing traffic counters to unsealed surfaces, and relative low priority for data collection). Therefore assumed traffic counts have been calculated for each road based on the number of dwellings serviced, and applying a traffic generation rate of 6.5 trips per day used in the Tweed Road Contribution Plan (Note: the rate of 9 trips per day used in the Roads and Maritime Services "*Guide to Traffic Generating Development*" was considered too high for remote rural properties, and more applicable to urban situations). Where assumed counts are higher than actual counts, the higher assumed count has been used, as the actual counts are dated in many cases. As gravel urban laneways are not generally a property's primary access point, their traffic multiplier has been reduced by a factor of 10.

### Filters

Those roads with gravel segments less than 300m, and with traffic less than 50 vehicles per day have been filtered out of the raw results of the assessment, as these can be subjectively assessed as being low priority. Their inclusion otherwise skews some of the results.

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### Results

Based on the scoring system above, the 20 highest ranking gravel roads for sealing priority are as follows:

Ranking	Road Name
1	Bartletts Road
2	Letitia Road *
3	Reserve Creek Road
4	Cudgera Creek Road
5	McAuleys Road
6	Byrrell Creek Road
7	Rowlands Creek Road
8	Commissioners Creek Road
9	Round Mountain Road
10	Keilys Road
11	Mount Burrell Road
12	Kunghur Creek Road
13	Chilcotts Road
14	Crabbes Creek Road
15	Urliup Road
16	Palmvale Road
17	Chowan Creek Road
18	Richards Deviation
19	Hopkins Creek Road
20	Robinsons Road

\* The proposed sealing of Letitia Road has previously been dealt with by Council following significant community concern and on 13 June 2006 Council resolved as follows:

*"That Council:*

- 1. Continues to maintain the gravel surface of Letitia Road on an as needs basis having regard to other competing priorities."*

The above ranking is a "raw score" only and there are many more project specific considerations that need to be taken into account before undertaking works in many of these areas, including stakeholder consultation. These considerations will be explored in more detail as part of the Infrastructure Program recommendations.

### **OPTIONS:**

1. Endorse the Council officer's ranking system and prioritisation list for sealing of gravel roads;
2. Seek to amend the ranking system;
3. Reject the multi-criteria assessment approach previously adopted, and request a workshop on gravel road upgrades as part of the 2015/2016 Infrastructure Program deliberations.

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### CONCLUSION:

The multi-criteria approach previously adopted by Council has been applied to the gravel road network and enables informed decisions to be made regarding the relative priority of possible sealing works, subject to budget considerations.

### COUNCIL IMPLICATIONS:

**a. Policy:**

Not Applicable

**b. Budget/Long Term Financial Plan:**

Currently the Long Term Financial Plan and Infrastructure Program make no specific budget allocation towards the sealing of gravel roads.

As discussed in the February 2014 report, each additional kilometre of sealed road adds to annual maintenance requirements - sealed roads cost more than twice as much annually to maintain than gravel roads on a per kilometre basis. Adoption of a gravel road upgrade program will reallocate resources away from maintaining the existing sealed network, increasing future costs due to premature and accelerated surface deterioration of the road network. Given the high level of customer requests for road maintenance each year, Council needs to be careful in reallocating scarce resources towards sealing gravel roads.

The relative priority of cyclical road maintenance activities versus upgrading projects will be discussed at Councillor workshops as part of the 2015/2016 budget deliberations.

**c. Legal:**

Not Applicable.

**d. Communication/Engagement:**

**Inform** - We will keep you informed.

### UNDER SEPARATE COVER/FURTHER INFORMATION:

Attachment 1.

Gravel Road Prioritisation Spreadsheet (ECM 3582651).

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