

## Item 10: Operations

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### 10.1 Road Network Maintenance

REPORT BY THE DIRECTOR OPERATIONS  
TO 20 MARCH 2024 ORDINARY MEETING  
GOV400105, GOV400022

#### RECOMMENDATION

##### That Council:

1. receive the report by the Director Operations on the Road Network Maintenance;
  2. consider allocating an additional \$300,000 per annum for maintenance grading through the 2024/25 Budget setting process;
  3. investigate a suitable location for a trial of Otta Seal to be funded from the seal extension reserve once suitable funds are available in that reserve;
  4. develop a business case for the addition of a second tar patching truck with a further report to be provided to Council on the results of the business case; and
  5. consider as part of the review of the Roads Asset Management Plan the impact of increasing the level of service provided by additional drainage maintenance and re-sheeting.
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#### Executive summary

Council at its meeting dated 20/7/2022 passed the following resolution:

*That Council receive a report for any or all opportunities to improve road network maintenance.*

This report is presented to highlight potential opportunities for improvements to local road network maintenance noting Council does not fund highway maintenance or capital upgrades for the highways.

The report should also be read in context that any suggestions will potentially need further investigation, business cases and or additional funding through future budgets.

The report covers some asset management principles as well as some concepts for consideration.

This report is not a technical paper as there are many industry-specific road maintenance optimisation study papers available from institutes like Australian Road Research Board (ARRB). These research papers cover detailed asset management principles, road maintenance economics, road safety, innovation etc.

This report concludes that Council could consider the following key initiatives to help locally improve road network maintenance:

- The addition of a second tar patching truck;
- Increase the annual grading budget;
- Funding an additional dedicated roadside drainage maintenance crew;
- Trial alternative seal methodologies i.e., Otta Seal on low volume unsealed roads to extend the sealed road network to reduce maintenance costs;
- New / improved technologies including AI.

## Disclosure of Interest

Nil

## Detailed report

### **Sealed Road Network**

#### Additional Plant

Council maintains 992kms of local and regional sealed network and 210kms of state highway. To maintain the local sealed road network Council undertakes the following activities:

- Pot hole patching - using tar patching truck and cold mix by hand;
- Shoulder maintenance - grader and small 5t excavators, paveliner;
- Heavy patching – grader, roller, water cart, paveliner and/or pavement contractors with specialist machinery such as stabilising spreader and mixer;
- Service crossings – excavator, small roller, milling machine, paveliner.

Council currently owns a single tar patching machine that is required to cover the entire 1200kms of sealed road network. An additional tar patching truck could be utilised to undertake additional pot hole repairs. Other benefits include:

- Reduce the need for hand pot hole patching reducing risk. So far this year 265t of cold mix has been put out by shovel. Patching with a jet patcher truck will provide a more permanent and better quality patch than cold mix by hand;
- Increased capacity to maintain / repair poor road service crossings i.e. water, sewer, power services;
- More capacity to undertake heavy patches on local roads;
- More capacity to maintain sealed road edges;
- Will provide much needed coverage as a backup when current machine (or either machine if two) is off the road.



An additional tar patching truck will also require a support vehicle that operates as a spotter and carries appropriate traffic control signage. The capital budget to purchase the new plant would be in the order of \$500,000 for the tar patcher truck only. It is considered that the most appropriate way forward is to develop a business case for consideration of this new plant item and the support plant and staff that are required with a further report back to council for consideration.

#### Additional drainage maintenance crew

As was seen during the previous few years of above average rainfall, roadside drainage is critical to effective performance and maintenance of roads and a prime cause of pavement failure.

Council currently undertakes roadside drainage maintenance as part of the road maintenance task however, the drainage maintenance budget caters for everything from urban concrete lined drains through to sealed road drainage, through to mitre drains on unsealed roads. Roadside drainage maintenance for sealed and unsealed roads consists of grading shoulders, reforming table drains, cleaning out culverts, de-silting and reshaping areas around causeways. For unsealed roads this task is mostly undertaken while crews are on-site grading a road and utilising a follow-up crew to finish in areas not able to be accessed by the graders.

Unfortunately, due to the funding gap between required asset maintenance and funding availability the sealed network drainage is not maintained to adequate levels and hence during wet times problems arise.

It is considered to be a more effective means of maintaining the road drainage system if a dedicated crew (in addition to undertaking these tasks while grading) is available to address drainage issues and undertake maintenance works. A drainage crew typically consists of a 5t excavator or backhoe and small tip truck to undertake table drainage maintenance works.

Council currently has a total of 4 x 5t excavators (two of which are backhoe's) with truck crews in the roads team that undertake a range of capital and maintenance tasks including roadside drainage. Increasing budget and resources to allow for an additional dedicated crew will provide a more focused resource for this activity, a more structured and planned approach to maintaining this part of the road asset and a more proactive rather than re-active maintenance plan.

An alternative to permanent resources could be to supplement these works with contract labour as the needs arise as we do with other maintenance and construction tasks. To complement the existing resources available to allow for a contract crew would require an annual operating cost of approximately \$370,000. This avoids the need for providing the capital cost of new plant.

Initiative

- Consider as part of the Roads Asset Management Plan increasing the level of service for drainage maintenance. An indicative cost that would provide the resources to maintain roadside drainage is provided below:

Drainage Maintenance Budget	Proposed increased drainage maintenance budget.
<b>\$710,000</b>	<b>\$1,080,000</b>

**Unsealed network**

There are several factors which will impact the condition of a gravel road (and the interval between when the road needs grading) these include; type of gravel in the base layer, pavement crossfall, drainage, terrain, subgrade, weather conditions and traffic volumes.

The two main activities which Council undertake to keep the unsealed network serviceable are gravel resheeting, grading and drainage maintenance. A layer of gravel is provided through gravel resheeting and then grading at intervals is undertaken to restore a smooth running surface.

Council have taken the above factors into account and assigned a desirable grading interval for all gravel roads. Each road is targeted to be graded at 12 month, 1 year, 2 year, 3 year or 4 year intervals. The above frequencies determine a grading schedule.

The yearly targeted length of road to be graded varies year to year however can be between 600 - 800km. A budget of between \$1.8M - \$2.4M is required, however reactive grading is also required ahead of schedule to overcome problems such as summer storm damage or early general wear.

In addition to grading, a resheeting program is required because the gravel layer is continually worn away. Without a depth of gravel, a satisfactory running surface cannot be provided. Gravel is required to bridge the subgrade to prevent rutting, bogging and provide satisfactory traction under wet conditions. A depth of gravel also allows a satisfactory cross fall to be re-established when grading is undertaken which allows water to drain from the surface and minimise damage.

Council's Roads Asset Management Plan 2016-2026 assumes a useful life of gravel on unsealed roads of between 14 – 25 years. Experience has shown gravel re-sheeting needs to be undertaken more frequently.

It is more likely a layer of gravel on an unsealed road will last on average approximately 10 years. Therefore, a desirable level of service is to resheet one tenth of the network per year,  $1255\text{km}/10 = 128\text{km}$  @  $\$35,000/\text{km} = \$4.48\text{M}$  per year. The re-sheeting program is currently funded at \$2.2M. The appropriate way however to deal with this item and useful life of assets is through the Roads Asset Management Plan and this is currently under review.

Council owns 9 graders and supplements operational and capital programs with contract graders and supporting plant and equipment to deliver annual programs. At times, Council can have up to 11 graders operating on the road network. Council could consider an additional grading crew however; it is considered the current circumstances of supplementing works with contract labour provides the greatest flexibility and efficiency.

Council currently funds the maintenance grading budget at \$1.85M. However, the last nine years has seen additional funds added to the grading budget through the quarterly review process to meet current level of service demands. On average, over the last 5 years we have spent \$2.2M on maintenance grading after processing increases through the Quarterly Budget process annually.

An increased budget allows the level of service the community currently receives in accordance with the grading schedule. However, it is also important to undertake a road service review of the

unsealed road network. It has been some time since a road service review was undertaken to assess overall levels of service, grading frequencies, the unmaintained network and accepted road maintenance standards.

It should be noted that like many other costs, grading and resheeting costs have increased considerably over the years due to fuel, labour, machinery and, materials costs and so on.

#### Initiative

- Consider increasing the maintenance grading budget to \$2.2M, an increase of \$300K, as part of the 2024/25 budget process to match level of service being delivered to the unsealed road network. This will form the base budget going forward.
- As part of the review of the Roads Asset Management Plan review re-sheeting lifecycle and costs.

#### Alternative seal trial

Council has undertaken a number of seal extension projects over the last 5 years funded through grants and Council's seal extension program.

Sealed roads generally should cost less to maintain than unsealed roads however the capital costs to convert unsealed roads to sealed roads is generally prohibitive particularly for low volume roads.

A different approach for providing seal on lower volume unsealed roads (less than 200 VPD) that could be more cost effective than conventional hard rock chip seal is Otta Seal. However, it needs to be remembered the bulk of the cost in sealing a road is the pavement preparation not the seal itself.

Otta seal is a bituminous road surface treatment that utilises local gravel sources in a single application rather than the two coat aggregate seal of traditional seals.

The characteristics of Otta Seals include:

- A single coat seal only.
- Uses local natural pit road gravel (screened and separately stockpiled when the pavement gravel stockpile is created) range of 0.042 to 16 mm aggregate which includes up to 10% clay fines below 0.075 mm. This aggregate and clay material are spread on the road over the bitumen in a 16 mm layer or up to 19 mm if a double Otta seal is planned.
- The seal develops after initial rubber tyre rolling and is then left for a period of 2 months followed by sweeping of any residue gravel. Initially the Otta seal has the appearance of a gravel resheet however the seal becomes more visible over the next few months as the bitumen/clay mastic rises and joins with the larger stones in the gravel.
- The Otta seal aggregates need adhesion testing using an appropriate adhesion test, for example Riedel and Weber test. Use an adhesion agent if required.
- After rolling and trafficking, the binder and fines work their way upwards through the aggregate interstices which results in a dense, durable matrix that relies on both mechanical interlock and bitumen binding for its strength - similar to a bitumen premix.

Some advantages of Otta Seal over traditional surface treatment for low volume roads:

- Flexibility: The Otta seal is more flexible with greater deflection tolerance than a conventional seal. It can be used over lesser quality base gravel pavements with deflections in the order of 1.5 mm compared to 0.6 mm for conventional seals.
- Longer economic life: An unsealed road requires gravel resheeting every 8 to 12 years, whereas a single Otta seal for a similar price can last up to 15 years. A double Otta seal 32

mm thick can last up to 30 years subject to adequate base structural sufficiency. These are generalisations requiring local design assessments.

- Less binder oxidation and associated maintenance: Oxidation of bitumen in conventional chip seal's in low traffic volume roads is a major maintenance issue whereas Otta seal binder bitumen is enclosed as a mastic bitumen/clay mix and is less exposed to binder oxidation by comparison.
- Lower material and transport costs: Some Councils have high costs to transport hard rock commercial aggregates over long distances to the road sites for the conventional seals. This together with the extra commercial cost to purchase ex quarry, together with precoating costs can create a high initial cost for conventional seals. Otta seals supply the aggregates ex local gravel pits near the road sites however with an extra screening stage to remove finer clays and silts and aggregates above 16 mm.
- Durability: An Otta seal constructed with a dense, close textured grading tends to be far less susceptible to solar radiation and consequent hardening of the binder. The open graded conventional chip seal has binder more exposed to oxidation degrading.
- Bleeding: Bleeding of an Otta seal is more easily cured by surfacing with sand compared with conventional seals because of the relative soft binder used with the Otta seal. The soft binder tends to readily coat the fine sand particles in a manner that is not possible with the hard binders used in conventional seals.



Image: Otta seal

It is recommended that a trial of Otta Seal be undertaken as the opportunity presents during the 2024/25 on a low volume local road that has higher than normal maintenance costs with a detailed report of the findings presented back to Council.

#### Technology

Staff are in the process of improving the use of technology to improve knowledge, drive efficiencies and improve customer services.

The areas under consideration are asset and defects management for local roads including the recording and reporting of accomplishments, plant location and utilisation, plant and fleet management systems.

In addition to these initiatives with the rise of AI and other automated technologies there is an opportunity to explore those options.

Two AI technologies to be investigated further is electronic survey of the road network and automatic detection of road defects like potholes.

Roads Asset Condition Systems (RACS) can undertake a high definition scan of the entire road network as well as GPS and roughness data to electronically produce a condition rating of the pavement with AI technology automatically logs road defects.

Smart technology may also be able to be implemented using dash cams and AI to fit cameras into vehicles like waste trucks to identify road defects like potholes. Generally video footage is captured by the camera then transmitted to the cloud, where AI methods are used to identify issues like potholes, cracking, line marking and signs that have defects. Similar technology is possible for use on footpaths connected to something like an e-bike.

There are councils already trialling both these technologies, the intent is to learn from those experiences and if proving successful consider if the technological fit is appropriate and cost effective for MWRC. A business case for a trial will be developed during 2024/25 financial year.

## Community Plan implications

Theme	Connecting Our Region
Goal	High quality road network that is safe and efficient
Strategy	Provide a roads network that balances asset conditions with available resources and community needs

## Strategic implications

### Council Strategies

Strategic Asset Management Plan  
Roads Asset Management Plan

### Council Policies

Not Applicable

### Legislation

Not Applicable

## Financial implications

Each of the options mentioned in this report will come at a cost and have financial implications. It is intended that if it is Council's wish to explore these options further detailed budgets, or if necessary, business cases will be developed with the costs included into the Budget process for Council's consideration against other community priorities.

Regarding the proposal to fund an additional \$300,000 for the maintenance grading program it is recommended this be considered as part of the 2024/25 Budget setting process so that the impact

on Council's unrestricted cash balance can be modelled, and considered fully as part of the 2024/25 Operational Plan.

## Associated Risks

Council maintains a significant road network that forms a large part of its asset base. There always remains the challenge of the gap between what is affordable to maintain roads to a fair condition and community expectations. Road safety is obviously an issue Council takes seriously and ensuring minimum standards are met minimises the risk of adverse outcomes. This report seeks to investigate further options to attempt to meet community expectations, ensure the best use of technology to drive outcomes to ensure Council's practices do not become outdated or present undesirable risks to Council.

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11 March 2024

*Attachments:* Nil

APPROVED FOR SUBMISSION:

BRAD CAM  
GENERAL MANAGER