



Partnerships That Drive Innovation

How Terra Firma and VicRoads Delivered
Safer Roads and Long-Term FRP Adoption

Introduction

Major infrastructure projects demand more than just durable products. They require trusted partnerships, innovative thinking, and solutions that evolve with changing needs. The M80 Ring Road upgrade is a clear example of this, where Terra Firma worked closely with VicRoads to address real on-site challenges and deliver safer, smarter outcomes. From tackling the limitations of traditional concrete pit lids to developing lightweight, high-performance FRP alternatives, this collaboration demonstrates infrastructure imagined differently built on long-term relationships, adaptability, and a commitment to future-ready solutions.

Today, that same spirit of innovation continues under the updated BTN 033 framework, which sets rigorous standards for pit lids and access covers across Victoria's road network. Terra Firma's BTN 033-listed products not only meet these requirements but also reaffirm the company's role as a trusted partner in delivering infrastructure that is safer, more sustainable, and aligned with evolving demands.



From Concrete Challenges to FRP Success

How the M80 Upgrade Delivered Safer, Smarter Pit Lid Solutions

Problem

The M80 Ring Road is a crucial transportation route, managing heavy traffic volumes, including 142,000 vehicles daily, with over 22,000 trucks. VicRoads invested \$2.25 billion into enhancing the road's infrastructure, including lane additions, improved interchange layouts, and an electronic freeway management system for safety and efficiency. Concrete pit lids weren't up to the job, problems included a high rate of failures under heavy loads, significant risk of worker injuries during installation and maintenance due to their weight, and the resulting high costs for repairs and replacements.

The consequences of these failings are extensive, and include:

- Higher frequency of breakages. Concrete lids originally used on the M80 were based on old VicRoads standard with a Class A rating of 60 kN, and – under truck loads – will break on average at five-year intervals.
- More breakages equals more replacements, and more replacements means more costs associated with removing broken lids and installing new ones.
- Heavy lids also increase costs as they are more difficult to open, inspect, and maintain. The time required – as well as the team and equipment – can easily blow out maintenance budgets and dramatically affect traffic management plans.
- Heavy lids put workers at greater risk of manual handling injuries, with concrete covers weighing in excess of 100kg.

Manual handling of heavy concrete lids injuries carry a huge economic and personal cost under Occupational Health & Safety (OH&S). To illustrate how significant the OH&S problem of concrete pit lids is, take note of the following facts:

- Labourers are the group with the highest rate of serious workers compensation claims in Australia
- Workers handling concrete lids work in construction which has industry claim rates substantially above the national average
- Manual handling claims for concrete services employees are double the industry rate
- 41% of all compensation claims are for manual handling injuries
- The median time away from work is four weeks
- The median payment for serious claims is \$58,001





Solution

To tackle the problems that were identified when concrete pit lids are installed, VicRoads set up a Network Integration team, whose responsibilities included whole-of-life solutions for the freeway and consistency along the M80 corridor; including Tulla Sydney Alliance (TSA) Section.

By observing the success of Terra Firma composite-fibreglass lids in local council roads, MNW recommended the use of composite products as an alternative to meet the challenges presented by both concrete and ductile iron.

At the time of the M80 design phase (2009), Terra Firma only had a B-Class composite cover. These unique fibreglass covers used in local government roads needed to be of a higher specification for freeways. Recognising the potential of this innovative design, the project asked Terra Firma to develop composite solution that could cope with incidental freeway traffic and comply with AS3996:2019 standards.

Terra Firma developed an innovative C-Class composite access cover to meet the challenge. Weighing just 25kg compared to over 100kg for concrete, the C-Class cover reduced manual handling OH&S risks during installation and inspection and allowed for quicker, easier installation while meeting AS3996:2019 standards. Since 2010 over 110 Terra Firma lids have been installed along the M80, with positive feedback indicating substantial improvements.

Need

The Network Integration Manager emphasised the need for an innovative solution that would not only support the freeway’s increasing traffic loads but also streamline maintenance, thus reducing associated risks for workers on-site. A lightweight, durable, and safer lid material was essential in ensuring ongoing safety and operational efficiency for the M80 corridor.

The solution needed to work within VicRoads 11 project KRAs (Key Result Areas):

- Environment and Urban Design
- Sustainability
- Quality
- Traffic Operations
- Stakeholder Relations
- Functionality
- Schedule
- Safety
- Network Integration
- Value for Money
- People
- Legacy

“ A challenge of the M80 Upgrade is to build a road that can withstand increasing volumes of traffic and heavier vehicles, as well as consider ongoing maintenance and whole-of-life costs.

Bill Sibahi
Network Integration Manager
M80 Upgrade, VicRoads



ROI Comparison

Criteria	Terra Firma Composite C150	Concrete Lids
Physical Life	Minimum life expectancy of 20 years	Average life estimated at 10 years
Installation Costs	\$75 Labour and lifting truck hire cost \$100 traffic management cost for every 12 Terra Firma pit lids installed	\$183 Labour and lifting truck hire cost \$200 traffic management cost for every 6 concreted lids installed
Maintenance Cost	\$1,870 per lids; significant savings noted	\$4,776 per lid
Whole-of-life Costs*	Total: \$494,892 for 180 lids	Total cost: \$1,089,599 for 180 lids
OH&S and other Intangible costs	85% rated excellent for OH&S benefits	57% rated poor for OH&S benefits
Sustainability	Environmentally friendly; fewer breakages	Higher breakage rates; more energy required for transport

**For a typical 20-year period including capital and ongoing maintenance costs.*

For additional details, please refer to Appendices



A Long-Standing Relationship with VicRoads

The success of the M80 upgrade highlights more than product performance. It reflects Terra Firma's long-standing partnership with VicRoads, built on evolving with changing demands, innovating solutions, and imagining infrastructure differently.

Building on that foundation, the C150 composite pit lid was developed in response to current on-site challenges, reinforcing Terra Firma's role as a trusted partner across Victoria's road network. With products now listed under the updated BTN 033, councils, road authorities, and contractors can directly specify Terra Firma composite pit lids and access covers. As traditional materials like concrete and cast iron fall out of favour due to durability and safety concerns, the updated BTN 033 underscores Terra Firma's role in driving the broader adoption of FRP technologies in Australian infrastructure.

What the updated BTN 033 means for Victorian projects

VicRoads has reinstated its detailed and thorough product approval process to ensure consistent quality and performance across the state's public road network. BTN 033 compliance outlines the structural, load, and safety standards required for pit lids and access covers used in road and drainage infrastructure, ensuring they are suitable for different traffic and site conditions.

Terra Firma's BTN 033-listed pit lids and access covers are designed, certified, and manufactured to meet the highest quality standards (BTN 033 and AS 3996:2019). These three products are now available for specification and purchase under the updated framework:

- C150 to suit clear opening 1000x750 Class C
- D240 to suit clear opening 900x600 Class D
- D400 to suit clear opening 600 & 760 round Class D



C150 Class C



D240 Class D



D400 Round Class D



About Terra Firma Industries

At Terra Firma, we imagine infrastructure differently.



Imagine halving time to deploy,
Imagine lowering capital costs by up to 60%,
Imagine infrastructure that lasts up to 10 times longer
across its whole-of-life,
Imagine reducing OH&S incidents 200 fold versus
traditional alternatives.

For over 30 years Terra Firma have led the transition
from heavy, traditional materials to create the solution
category for smarter, safer and more sustainable pit
lid, access cover and FRP grating solutions based on
composite designs.

Take a look next time you're walking past your favourite
restaurant, enjoying the scenery in your local park,

launching a boat at your marina, refuelling your car at
the local service station or performing a maintenance call
at your water of energy utility, with hundreds of locations
and thousands of deployments, chances are you will see
Terra Firma in action.

From custom designs to pre-engineered solutions,
our dedicated team provide you the tools, expertise
and support to help engineers, project managers and
operators reduce costs, save time and lower OH&S risk.
We're not just supplying advanced materials and
technologies – at Terra Firma we're setting the standards
for how they will be deployed into the future.



Appendices

Appendix A: Whole-of-life costs

The whole-of-life costs include capital and ongoing maintenance costs.

The table below illustrates the PV of M80 capital cost and savings for concrete lids and Terra Firma lids assuming 20 years asset life, considering;

- Purchase cost at site for each Terra Firma pit lid was \$395 against \$250 for concrete lid
- Labour plus lifting truck hire cost for installation of each Terra Firma pit lid was estimated \$75.00 against \$183.00 for concrete lid
- It is assumed that per day, 6 concrete lids can be installed compared to 12 Terra Firma lids.
- Heavy weight concrete lids would require a lifting truck and one licensed operator with two labourers, where as lightweight Terra Firma lids would only require two labourers with no trucks
- Traffic Management per pit installation: M80 Traffic management for lid installation carried out mostly in association with other road works. Assuming 6 concrete lids and 12 Terra Firma lids installed per day, traffic management cost per concrete lid installation is estimated at \$200 and \$100 per Terra Firma lid installation
- Surrounding filling and finishing costs during installation are assumed \$100 per Terra Firma lid and \$50 per concrete pit lid

Pit Lid Type	PV of Capital Cost (\$)			
	Per Unit	For 110 lids under TSA Section	For 70 lids for Edgars - Plenty Road Section	M80 Total to date For 180 lids
Concrete	\$ 1,277	\$ 140,508	\$ 89,414	\$ 229,922
Terra Firma	\$ 879	\$ 96,680	\$ 61,524	\$ 158,204
Savings	\$ 398	\$ 43,828	\$ 27,891	\$ 71,719

Table 1: Capital cost - PV of concrete and Terra Firma pit lid and savings

Appendices

Appendix B: Maintenance costs

The maintenance costs include labour, equipment, and traffic management costs for inspection access and regular maintenance.

- Labour plus lifting truck hire cost total for inspection and regular maintenance of each
- Terra Firma pit lid was estimated \$75.00 against \$183.00 for each concrete lid
- Traffic Management per pit inspection/maintenance: M80 Traffic management for lid inspection/ maintenance can be carried out mostly in association with other road works.

- Occasionally, a single pit may require emergency inspection on a freeway where traffic management is very expensive – this has not been considered in the model. Assuming 6 concrete lids and 12 Terra Firma lids regular maintenance per day, traffic management cost per concrete lid maintenance is \$200 versus \$100 per Terra Firma lid.
- The table below illustrates the PV of M80 Maintenance cost and savings for concrete lids and Terra Firma lids assuming 20 years asset life.

Pit Lid Type	PV of Capital Cost (\$)			
	Per Unit	For 110 lids under TSA Section	For 70 lids for Edgars - Plenty Road Section	M80 Total to date For 180 lids
Concrete	\$ 4,776	\$ 525,358	\$ 334,319	\$ 859,676
Terra Firma	\$ 1,870	\$ 205,754	\$ 130,934	\$ 336,688
Savings	\$ 2,905	\$ 319,604	\$ 203,384	\$ 522,988

Table 2: Maintenance cost - PV of concrete and Terra Firma pit lid and savings



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