CMAA
CONCRETE MASONRY
ASSOCIATION OF AUSTRALI

BENEFITS AND APPLICATIONS O

PERMEABLE PAVIN

Building Leaders Brief Industry 2

19th February 2

Michael Koungras, Senior Eng

Design Pave

Perm Pave

BUILDING PRODUCTS INDUSTRY COUNCIL

BOUT CMAA

The Concrete Masonry Association of Australia
Peak body representing the concrete masonry manufacturers of Australia.
These include bricks, blocks, pavers and retaining walls.

CMAA

MANUALS, STANDARDS & CODE BOARDS

RESEARCH

University of South Australia

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

QUT Queensland University of Technology

ADVOCACY & POLICY

BUILDING PRODUCTS INDUSTRY COUNCIL

safe work australia

NEPC National Environment Protection Council

TRATEGIC VISION

CMAA
CONCRETE MASONRY
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EY STRATEGIES

CMAA
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THINK BRICK AWARDS 2020

ENGAGEMENT WITH ARCHITECTS
Promotion of bricks, concrete masonry and roof tiles

ENGAGEMENT
with engineers, specifiers and Standards Australia t
ensure our members' products are used in construct
and are constructed correctly

MEMBER ENGAGEMENT
Roadshows
Technical Committee

EXTERNAL EDUCATION & ENGAGEMENT
through universities and foundations

YOUNG ENGINEERS
Recruit and provide industry experience and opportunities

GOLDEN TROWEL

GOLDEN TROWEL AWARDS
Encourage excellence among brick and block la
apprentices and recognise the valuable skills of y
people

MAA MEMBERS

SPONSORING MEMBERS

Adbri Masonry
adbrimasonry.com.au

Austral Masonry
australmasonry.com.au

STATE MEMBERS

Brikmakers
brikmakers.com

Boral Masonry
boral.com.au

National Masonry
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Cowra Concrete Products
cowraconcreteproducts.com.au

Island Block and Paving
islandblock.com.au

BCP Building Products
bcpbuildingproducts.com.au

Urban Stone
urbanstonecentral.com.au

ASSOCIATES

Bliss & Reels
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Columbia Concrete Block Machine
columbiamachine.com

BlockAid
blockaid.com.au

Cathay Industries
cathayindustries.com.au

GuardIT Solutions
guarditsolutions.com.au

Besser
besser.com

safeTEC SOLUTIONS
safetecsolutions.com.au

BASF / Chem
chemtall.com

REE RESOURCES AND TECHNICAL HOTLINE

PLEASE VISIT OUR WEBSITE FOR A COMPREHENSIVE CATALOGUE OF:

- TECHNICAL MANUALS
- RESEARCH PAPERS AND
- CASE STUDIES.

THESE RESOURCES ARE AVAILABLE FROM OUR WEBSITE AS A FREE PDF DOWNLOAD

TECHNICAL HOTLINE | 1300 667 617
WEBSITE | CMAA.COM.AU

EPPINGTON BUS DEPOT

ENEFITS OF PAVERS

VERSATILITY

RECYCLABILITY

STRENGTH &
DURABILITY

SOLAR REFLECTANCE

EASE OF
MAINTENANCE

LIFE CYCLE COSTS

WATER SENSITIVITY

TRAFFIC CALMING

AESTHETICS

ENEFITS OF PAVERS

ATILITY: Pavers have been successfully used in a wide range of applications.

Carparks

Roads

Airport Hardstands

Intermodal Terminals/Container Yards

ENEFITS OF PAVERS

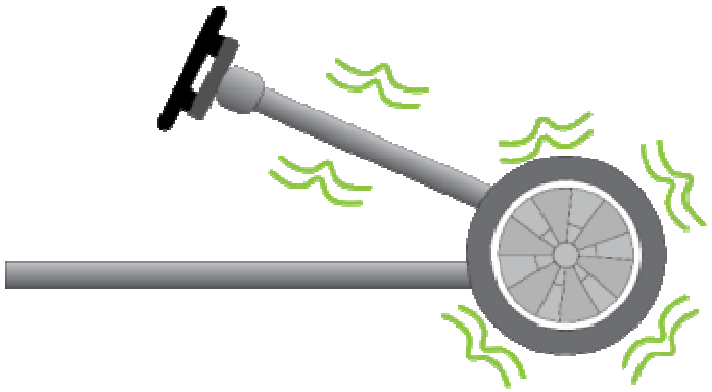
NGTH & DURABILITY: Pavers are designed to carry all types of traffic including light vehicles, heavy plant and aircraft.

ENEFITS OF PAVERS

TENANCE: Pavers have low maintenance requirements because they are easy to clean, maintain, and replace (if needed).

ENEFITS OF PAVERS

FIC CALMING: The surface of segmental pavers naturally induce a traffic calming function through increased vibration.



EED FOR A CBP SOFTWARE

Unlike conventional pavements, CBP can be pervious/impervious

Exhibits 'inter-locking' action

Become stiffer and stronger due to progressive loading

Different rutting and fatigue criteria suitable for block pavements

Not covered in Austroads

NTERNATIONAL STANDARDS & GUIDES

CMAA

BRITISH STANDARD

BS 7533-2:2001
Incorporating
Corrigendum No. 1

Pavements constructed with clay, natural stone or concrete pavers —

Part 2: Guide for the structural design of lightly trafficked pavements constructed of clay pavers or precast concrete paving blocks

BSI

December 2008

Uniclass L534

heavy duty pavements

THE STRUCTURAL DESIGN OF HEAVY DUTY PAVEMENTS FOR PORTS AND OTHER INDUSTRIES

EDITION 4

Interpave

THE PRECAST CONCRETE PAVING AND KERB ASSOCIATION

www.paving.org.uk

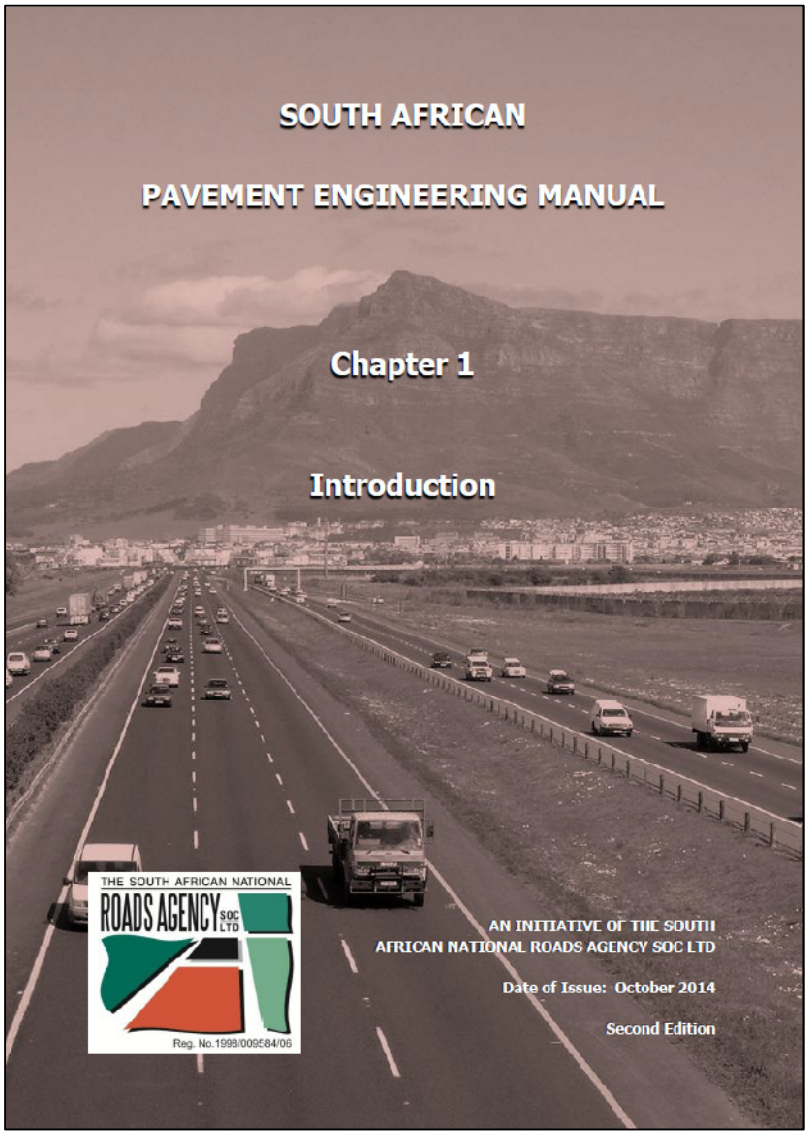
AASHTO GUIDE FOR

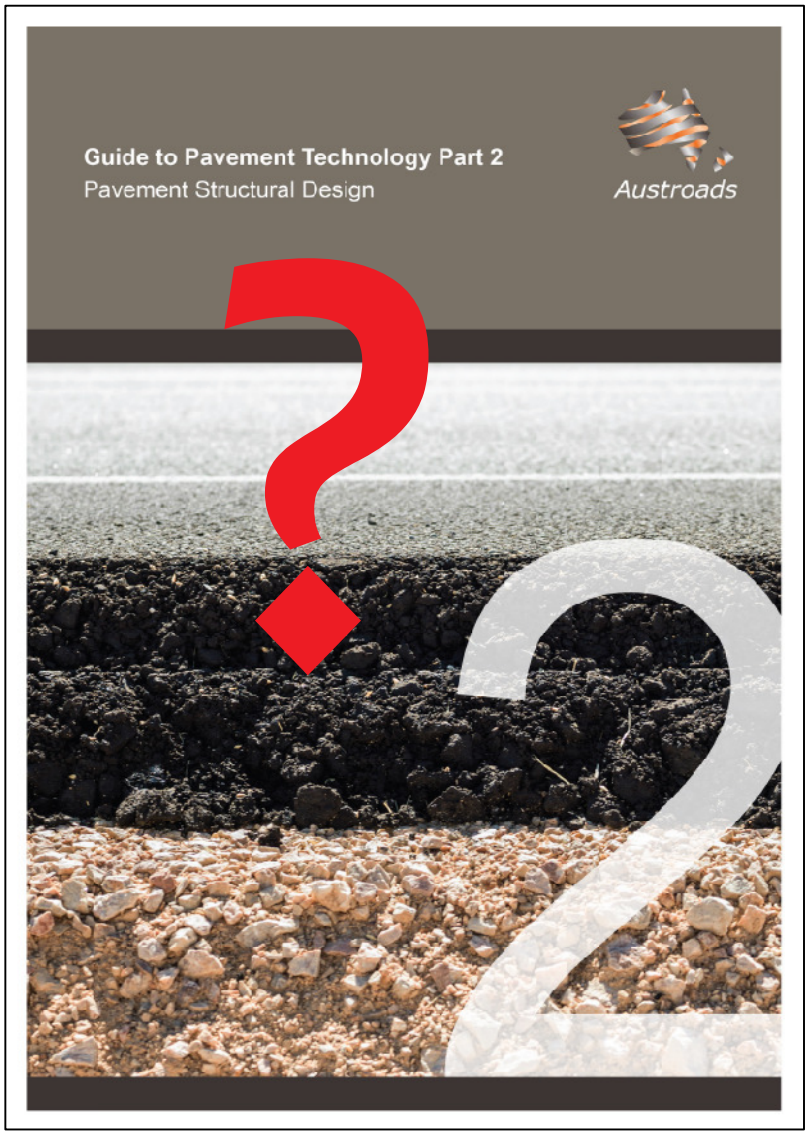
Design of Pavement Structures

PUBLISHED BY THE

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFI

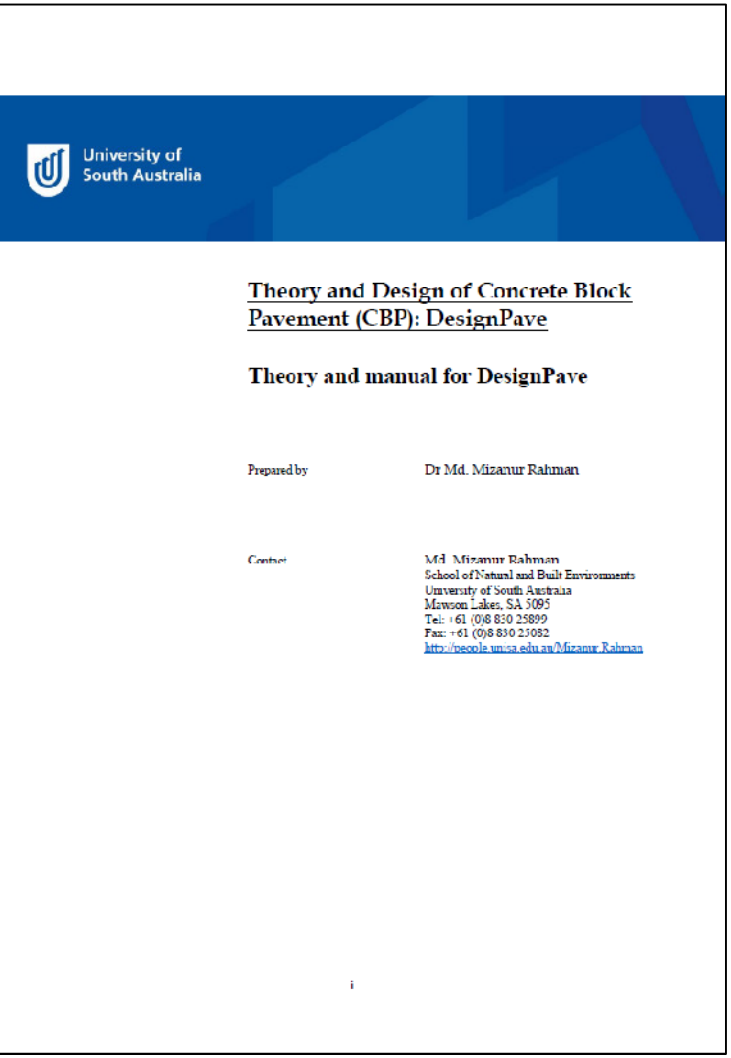
NTERNATIONAL STANDARDS & GUIDES





ESIGN THEORY

search performed by UniSA was used as the basis to create the DesignPave software



University of South Australia

Theory and Design of Concrete Block Pavement (CBP): DesignPave

Theory and manual for DesignPave

Prepared by Dr Md. Mizanur Rahman

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School of Natural and Built Environments
University of South Australia
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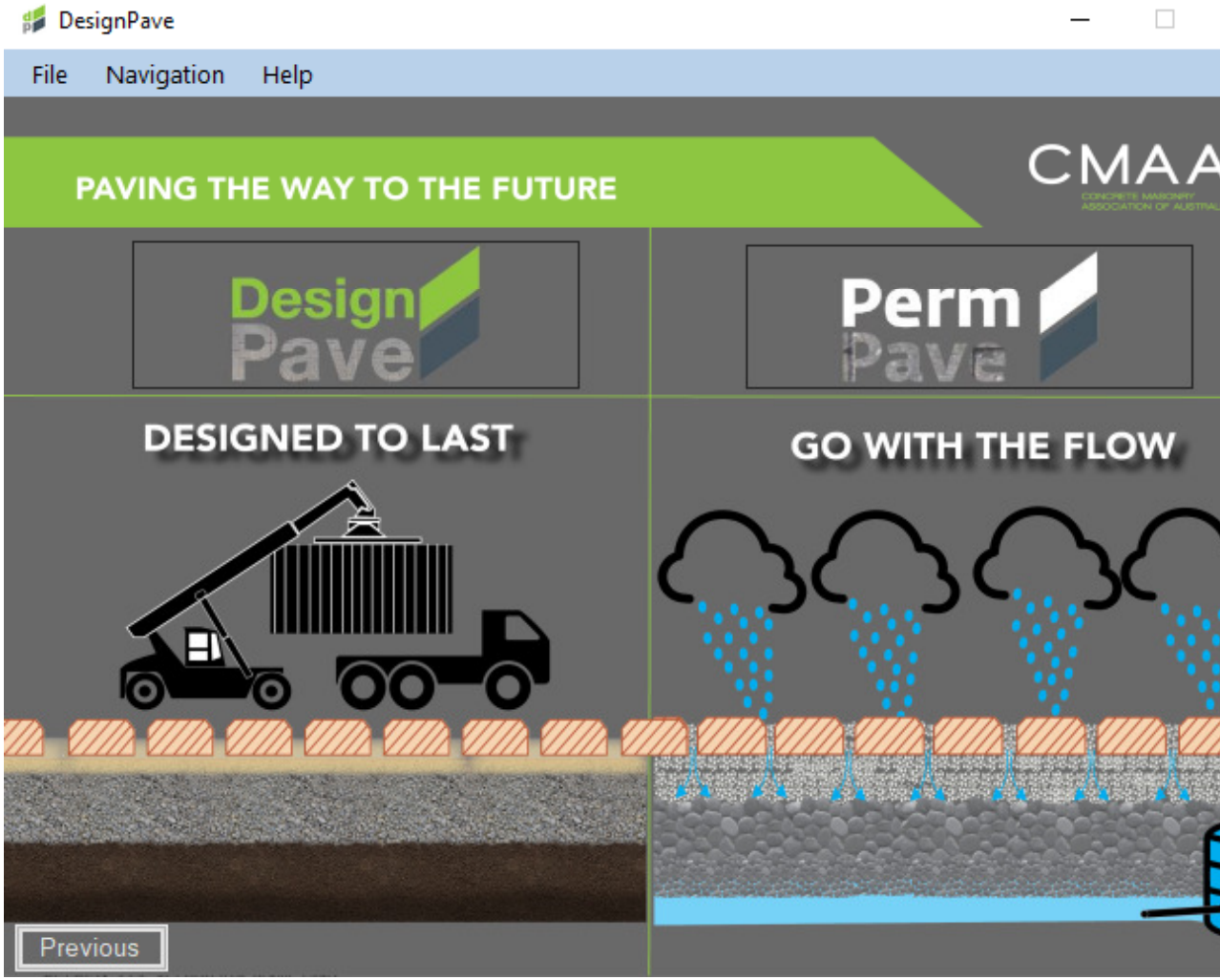
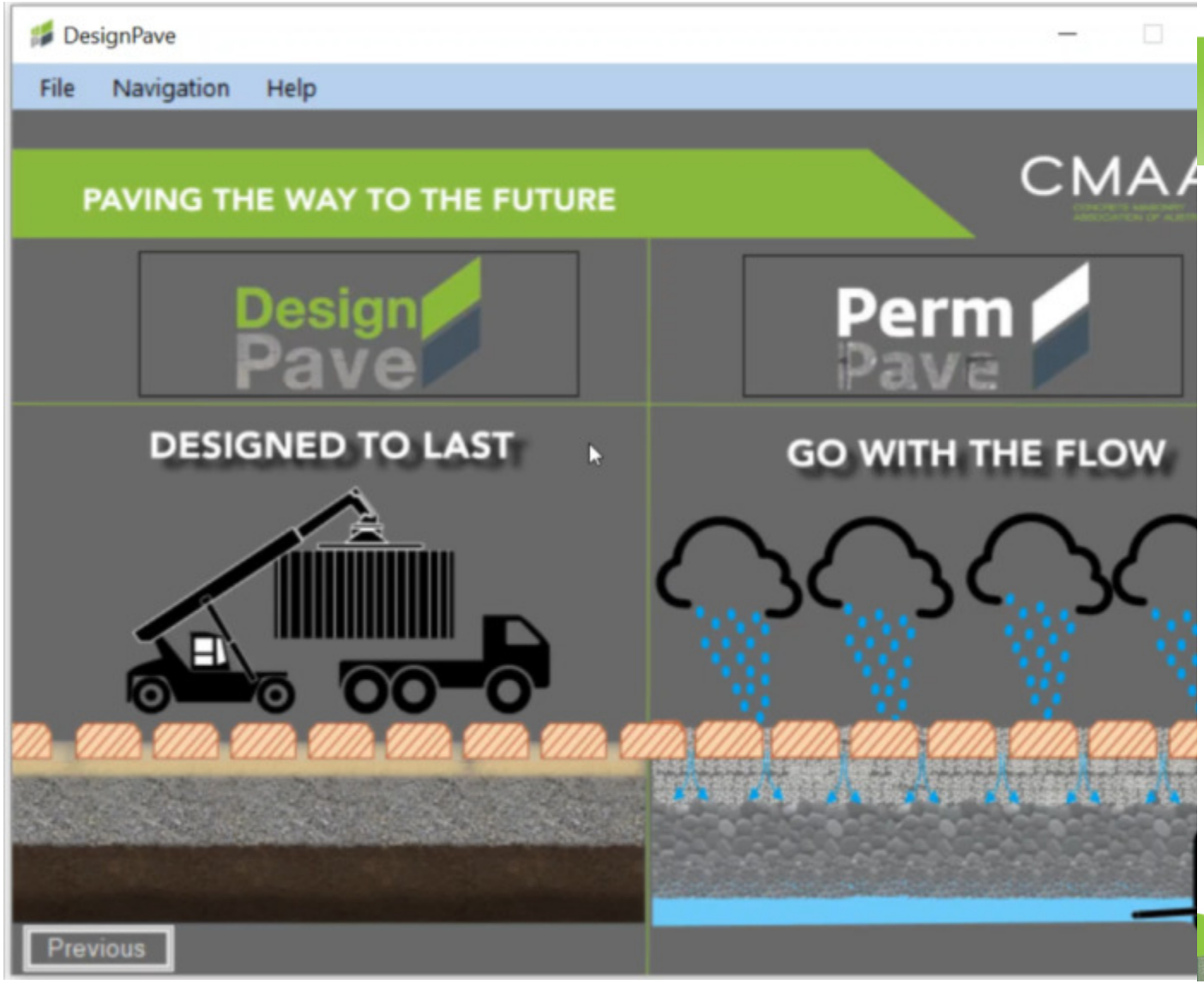


ESIGNPAVE SOFTWARE



design pave

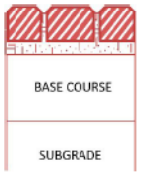
Report for Concrete Segmental Pavement Design: Residential

Client Details

Contact person:	Katalin Richter
Client company name:	Wanerroo Council
Address:	23 Dundebar Road, Wannerroo, WA 6065
Phone	0894055895
email:	Katalin.Richter@wanneroo.wa.gov.au

Details of the designer

Designer's name:	Michael Koungras
Company name:	Concrete Masonry Association Australia
Address:	PO Box 275, St Leonards, NSW 1590
Phone	0408 032 782
email:	michael@thinkbrick.com.au



Pavement structure
Layer system with base

Calculated parameters:

Thickness (m); Eq.1	Vertical stress (KPa); Eq.2	Radial stress (KPa); Eq.3	Vertical strain; Eq.5	N; Eq.6-7
0.955	25.14	0.695	0.000492	10522560

Pavement design details

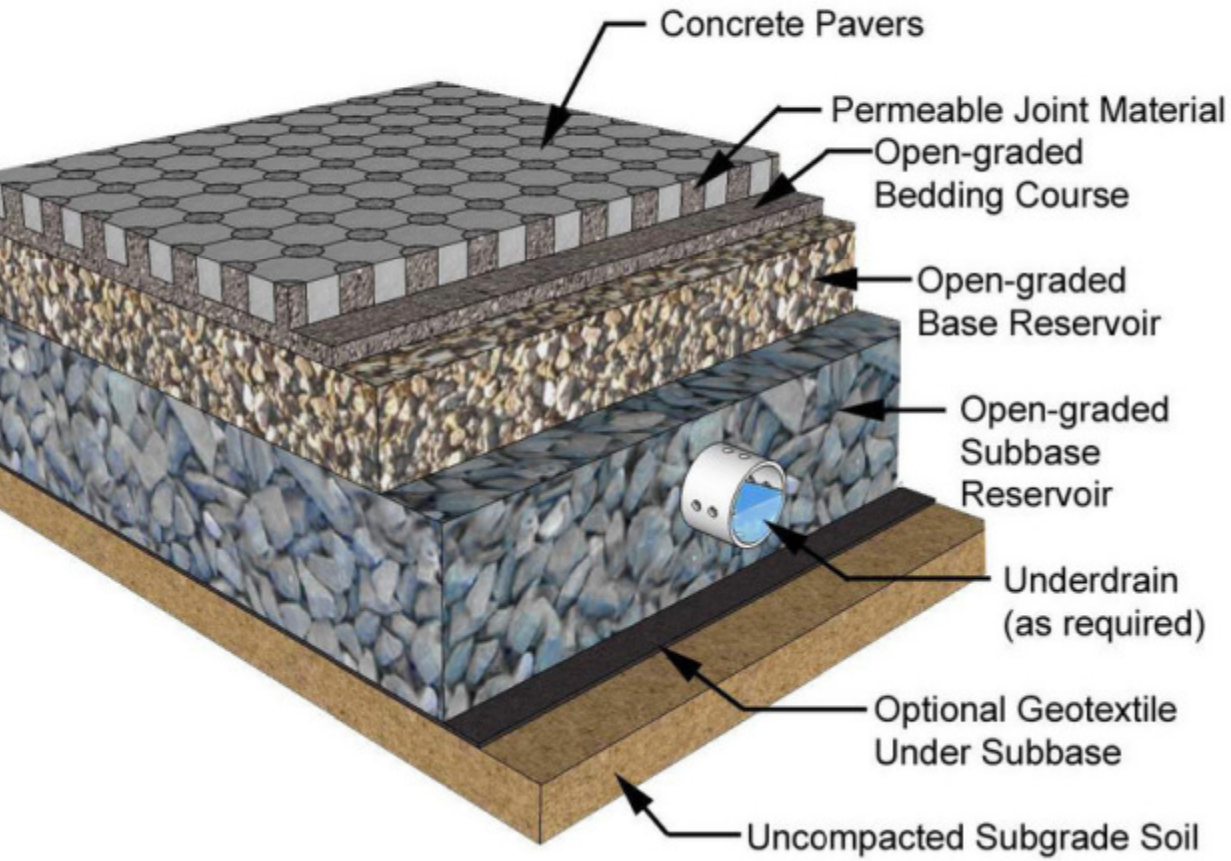
ESA	Tire pressure, (KPa)	Subgrade CBR
10000	700	5

Pavement layers	Layer thickness (mm)	Material modulus (MPa)	Material Poisson ratio
Paving layer	80	3200	0.30
Bedding sand layer	20	200	0.35
Base course layer	185	250	0.35
Subgrade layer	---	50	0.40

ESIGNPAVE USERS

ERMEABLE PAVING

nent which allows water to penetrate the surface and stored within the voids of the base.



PPLICATIONS OF PERMEABLE PAVING

eable paving can be used almost anywhere traditional pavements are used.

Driveways

Roads

Carparks

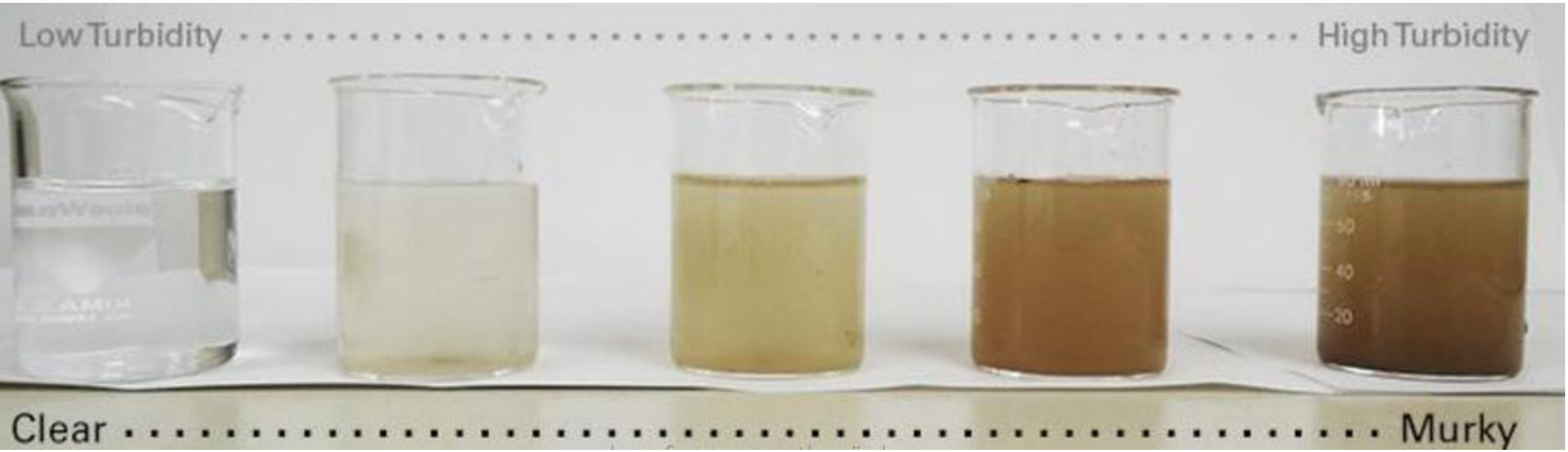
Intermodal/Port Terminals

/ATER HARVESTING

mising land use by minimizing above ground water storage requirements

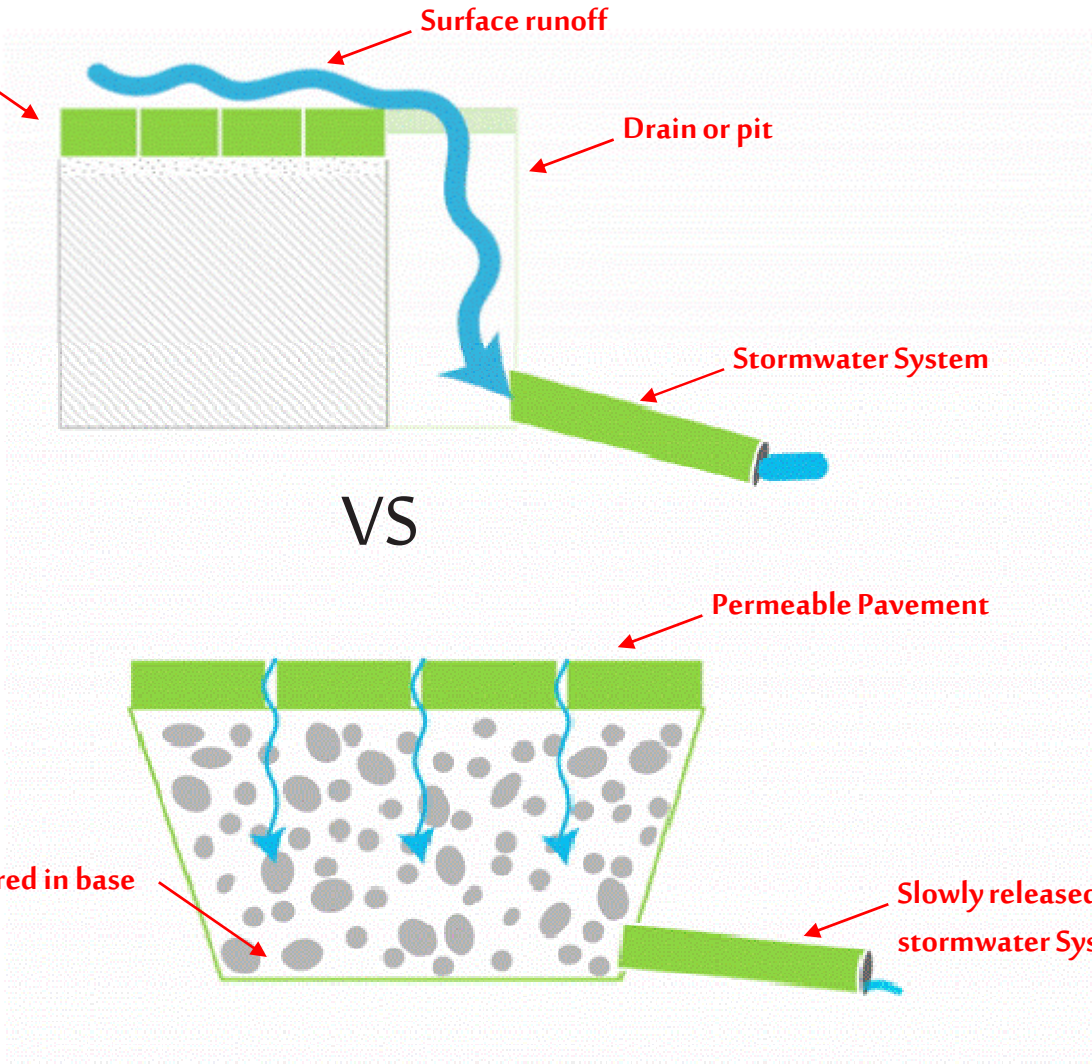
MPROVING WATER QUALITY

uce the amount of Total Suspended Solids (TSS), Total Phosphates (TP), Total Nitrates (TN) entering the stormwater system.



LOOD CONTROL

gation of flooding potential in areas where the surrounding stormwater system is blocked or at near capacity.



INIMISE DRAINAGE INFRASTRUCTURE

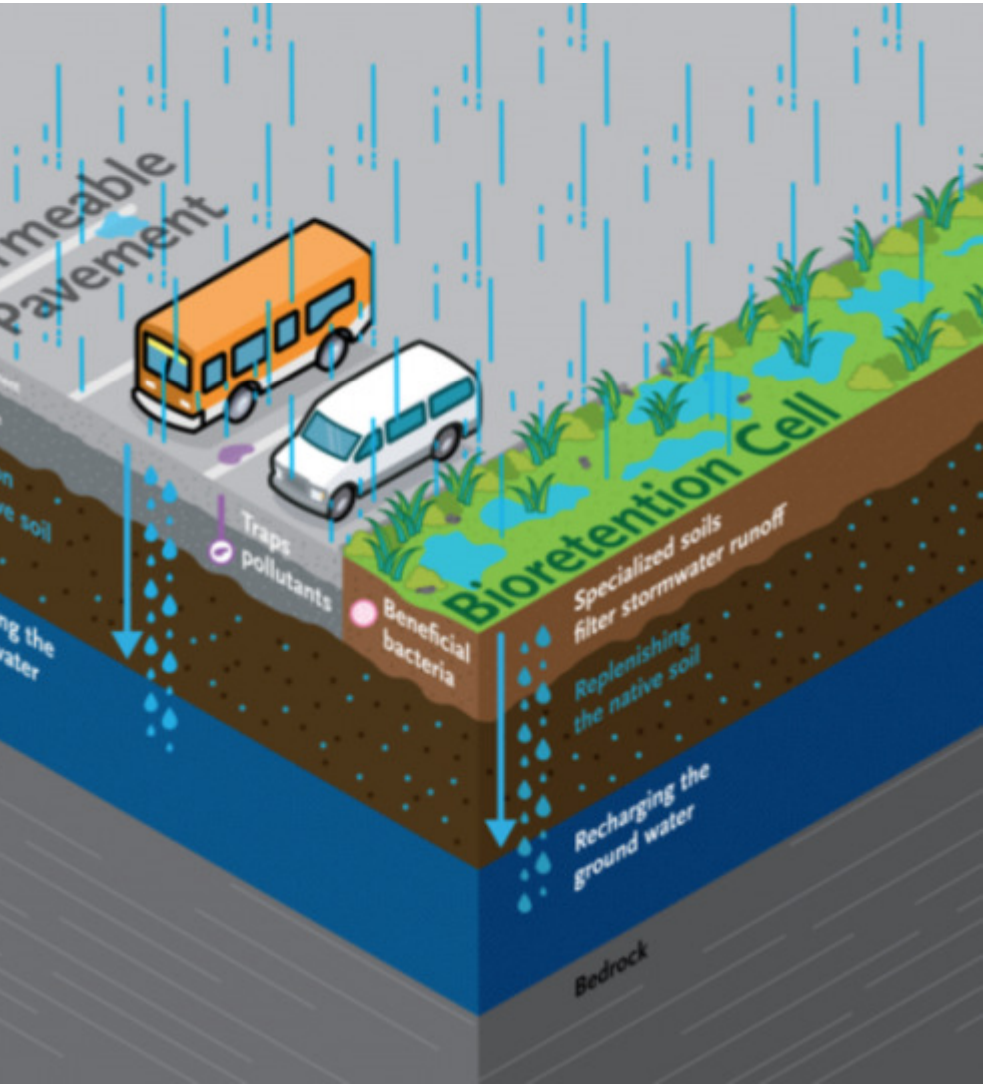
imisation of drainage infrastructure required (drains, pits and pipes)

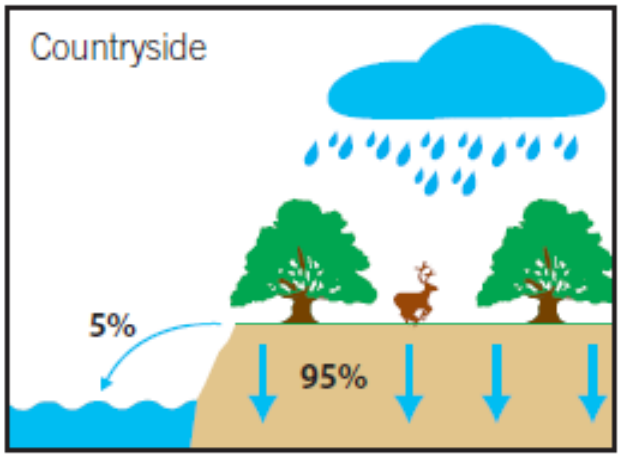
INIMISE DRAINAGE INFRASTRUCTURE

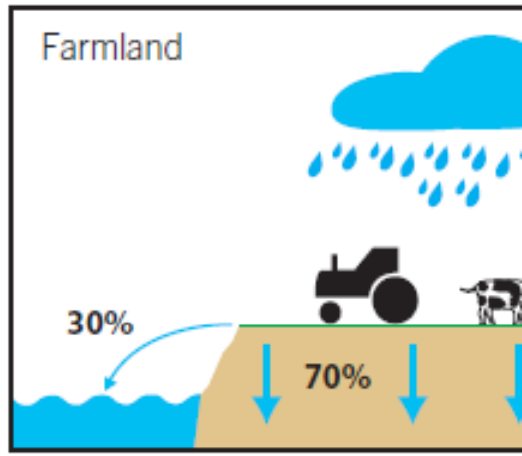
underground services, no ongoing maintenance

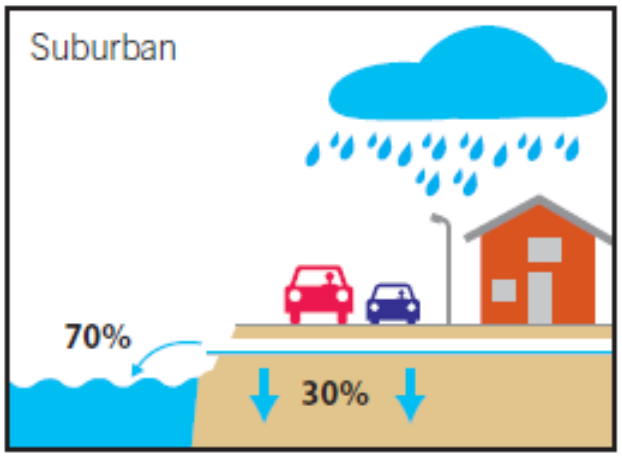
ECHARGE GROUND WATER

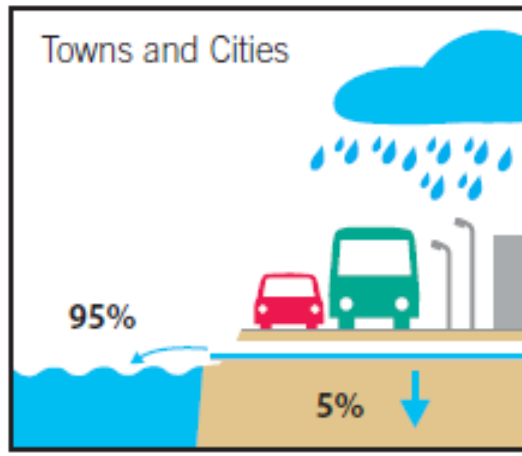
rge ground water where greenfield land needs to be replaced by a paved surface











REE SURROUNDS

eable paving eliminates tree roots pushing up pavement

REE SURROUNDS

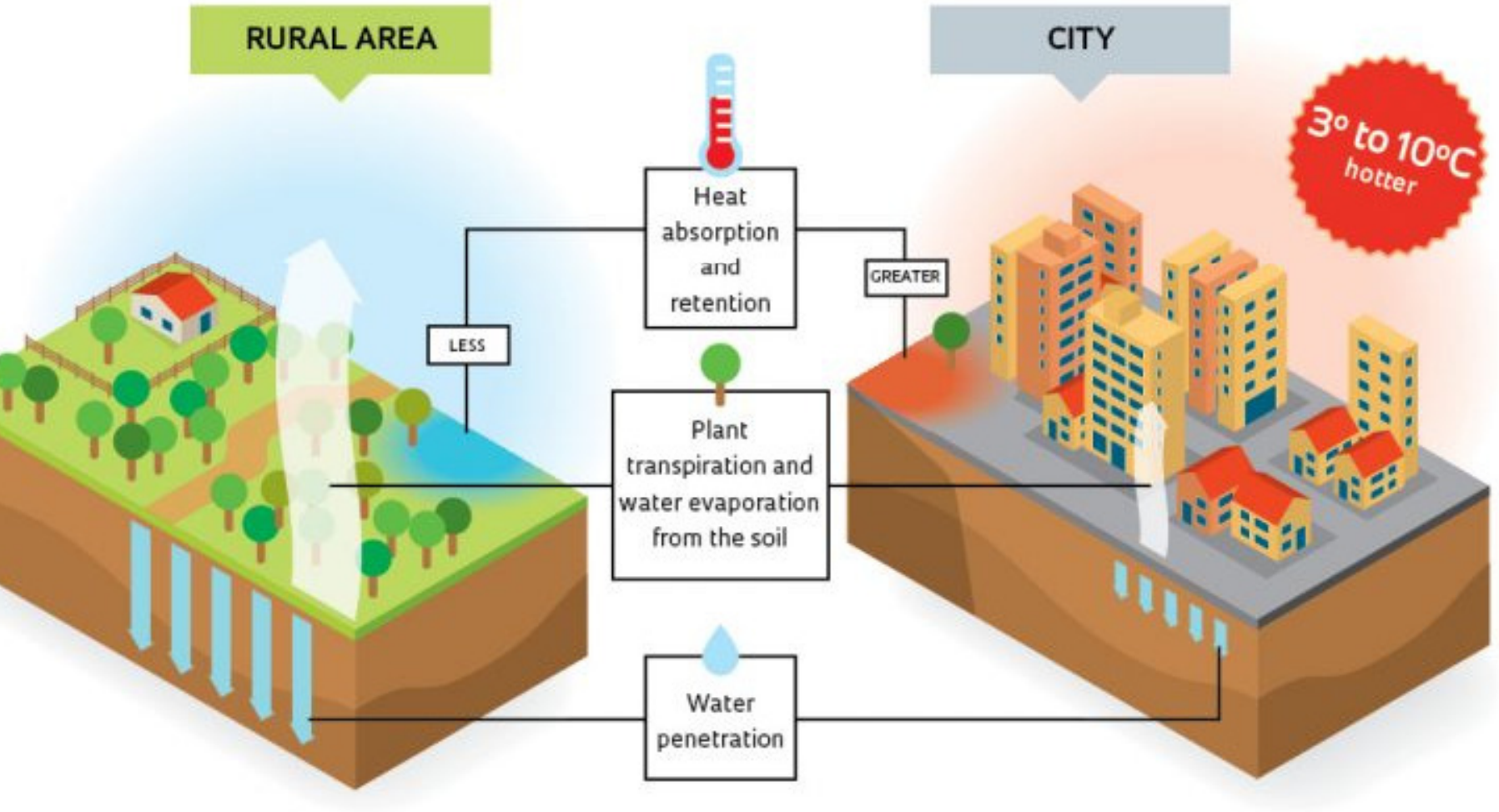
oots find water within the base layer and grow below the surface

REE SURROUNDS

BEFORE

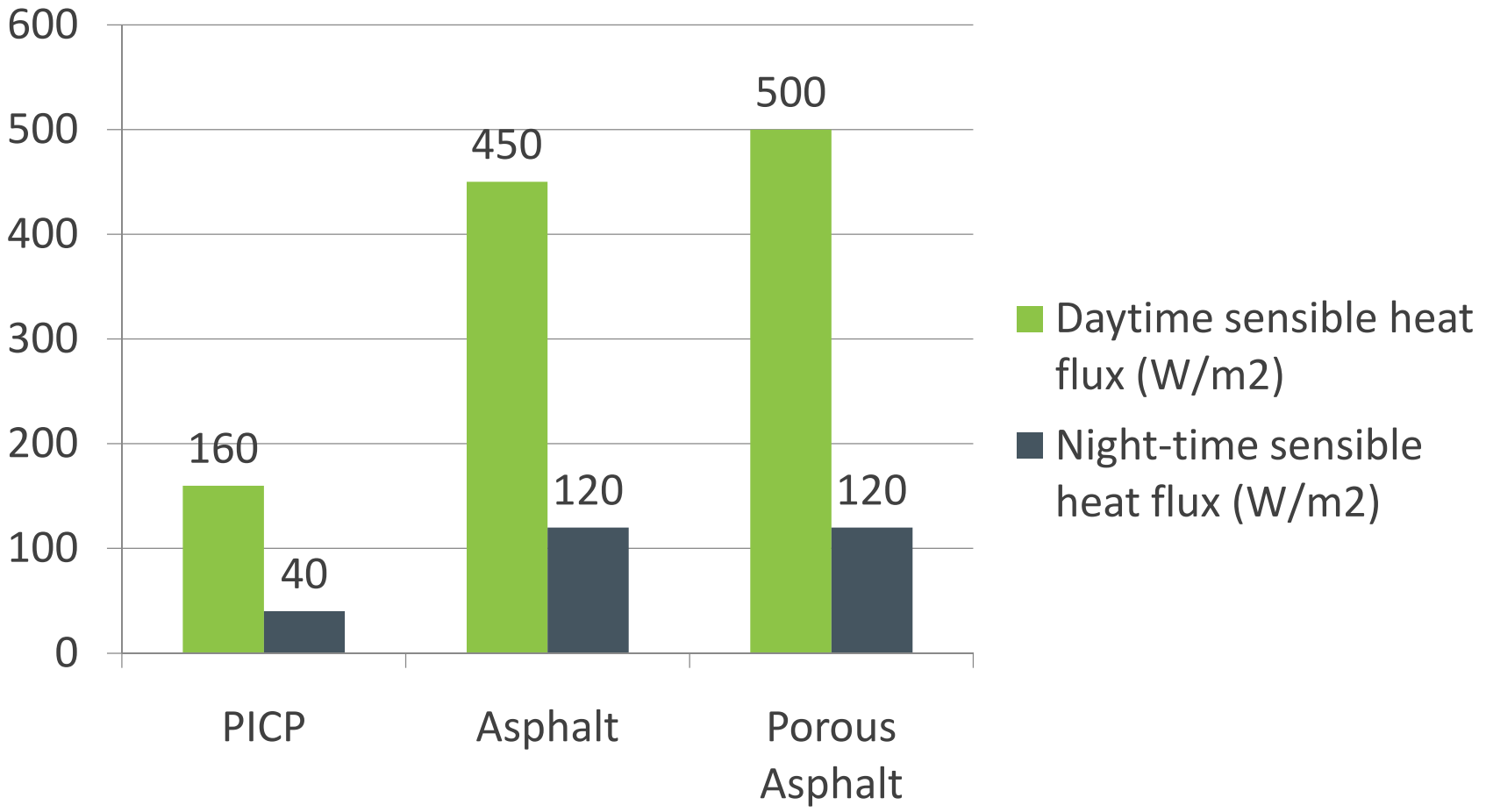
AFTER

RBAN HEAT ISLAND EFFECT



RBAN HEAT ISLAND MITIGATION

compared to other materials, using a Permeable Interlocking Concrete Pavement (PICP) will reduce the heat absorption and retention capacity, thus the as a much lower surface heat flux

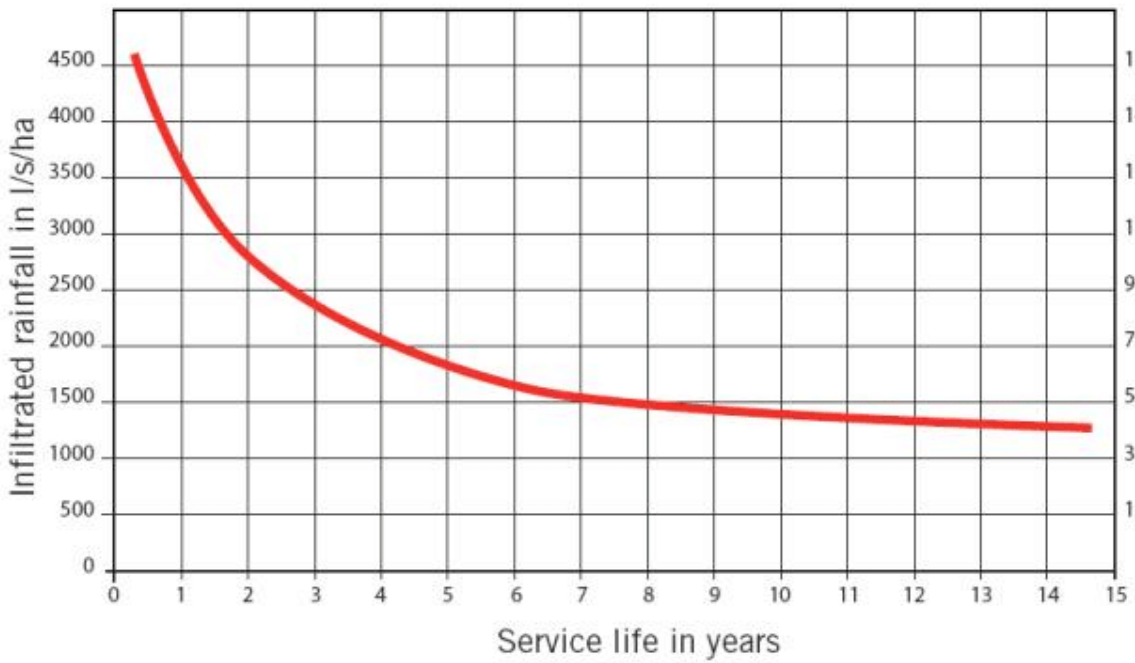


AINTENANCE

aintenance of permeable paved surfaces is easy. Studies have shown a street sweeper every 6 months is adequate to maintain an adequate level of e infiltration.

ners should use long-term surface infiltration rates which allow for partial clogging of voids

Surface Infiltration Rate for Unmaintained PICP

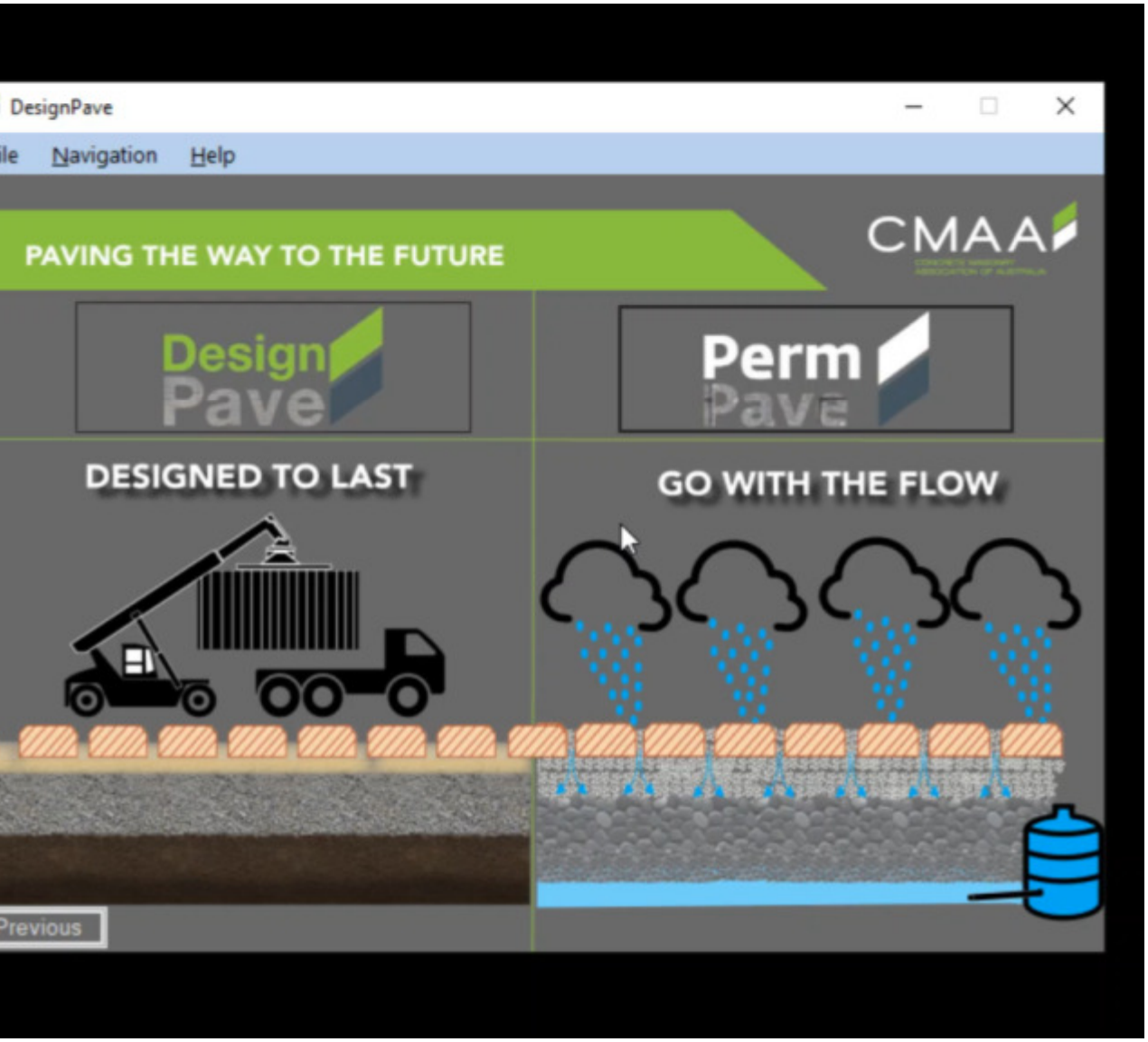


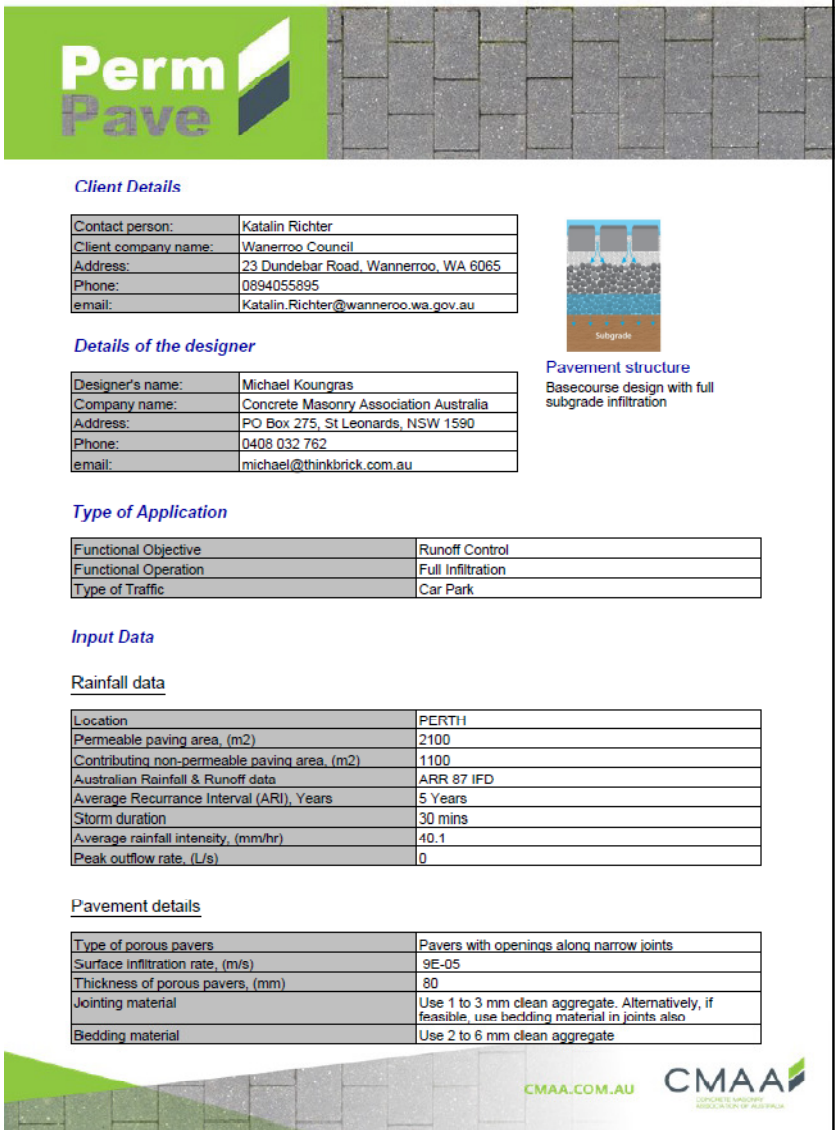
PPROVED INSTALLER PROGRAM

MAA delivers the Approved Installer Program to councils and paver contractors to ensure pavements are being designed and installed to current industry b
ce standards

APPROVED
INSTALLER
ACCREDITED BY
CMAA

ERMPAVE SOFTWARE





Perm Pave

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Phone:	0894055895
email:	Katalin.Richter@wanneroo.wa.gov.au

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Phone:	0408 032 762
email:	michael@thinkbrick.com.au

Subgrade

Pavement structure

Basecourse design with full subgrade infiltration

Type of Application

Functional Objective	Runoff Control
Functional Operation	Full Infiltration
Type of Traffic	Car Park

Input Data

Rainfall data

Location	PERTH
Permeable paving area, (m2)	2100
Contributing non-permeable paving area, (m2)	1100
Australian Rainfall & Runoff data	ARR 87 IFD
Average Recurrance Interval (ARI), Years	5 Years
Storm duration	30 mins
Average rainfall inteneity, (mm/hr)	40.1
Peak outflow rate, (L/s)	0

Pavement details

Type of porous pavers	Pavers with openings along narrow joints
Surface infiltration rate, (m/s)	9E-05
Thickness of porous pavers, (mm)	80
Jointing material	Use 1 to 3 mm clean aggregate. Alternatively, if feasible, use bedding material in joints also
Bedding material	Use 2 to 6 mm clean aggregate

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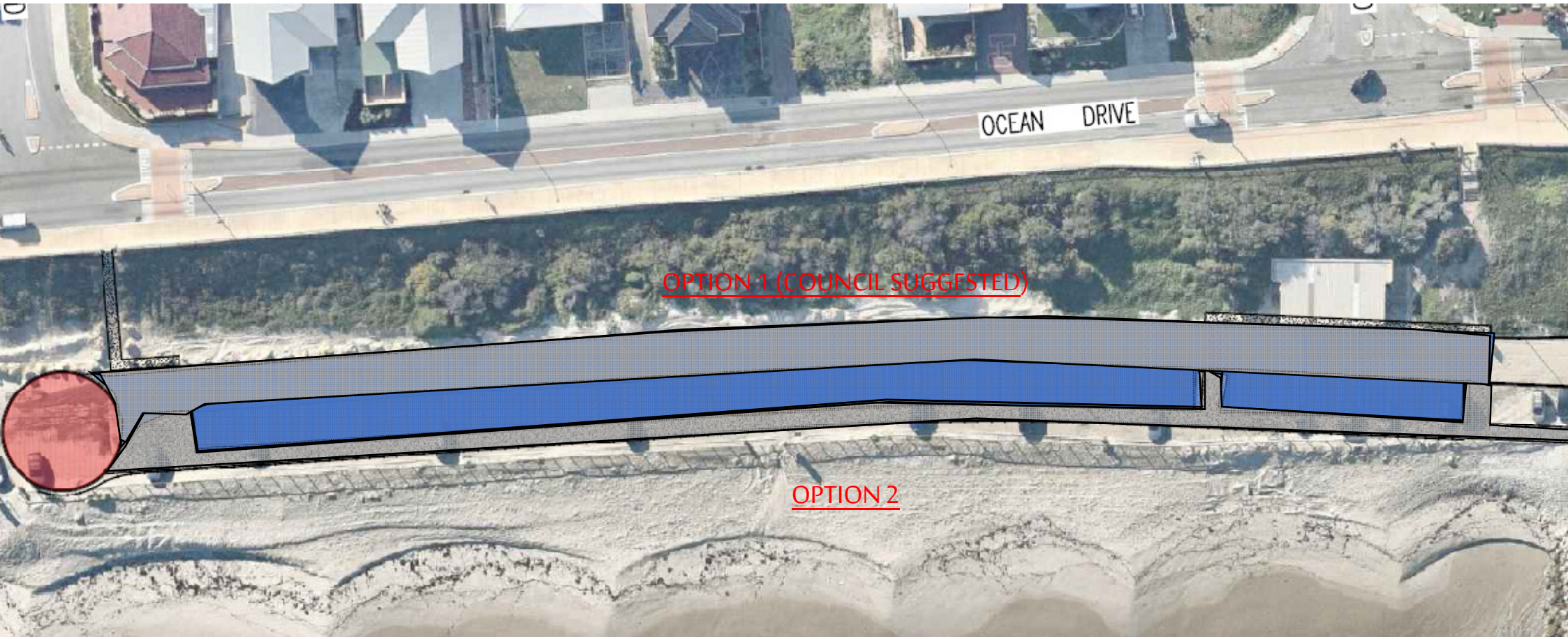
UINNS BEACH CARPARK CONCEPT



UINNS BEACH CARPARK SUMMARY

Benefit	Option 1 (Entire Carpark)	Option 2 (Parking Bays Only)
Water Outflow – IMPORTANT!	0L/s	0L/s
Water Quality (TSS)	82% Reduction	62% Reduction
Water Storage	210kL	66kL
Aesthetics	✓	✓
Maintenance	✓	✓
Traffic Load	10,000ESA	10,000ESA
Urban Heat Island Effect	Better	Good
Total Cost	$90/m^2	$69/m^2

HANK YOU

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www.cmaa.com.au/engineering-pavement-software