

OMEXOM

VINCI
ENERGIES

J&P RICHARDSON
INDUSTRIES
Electrical Contractors & Engineers



ACT Smart Lighting

SUSTAINABLE TERRITORIES

SUSTAINABLE CITIES AND STREETLIGHTS - PAST, PRESENT AND FUTURE FOR CANBERRA

Danny Bettay – Smart Streetlighting Electrical Engineer (OMEXOM)
| PhD Candidate (Australian National University)

SUSTAINABILITY

MORE THAN SMART, SUSTAINABLE CITIES ARE OUR FOCUS



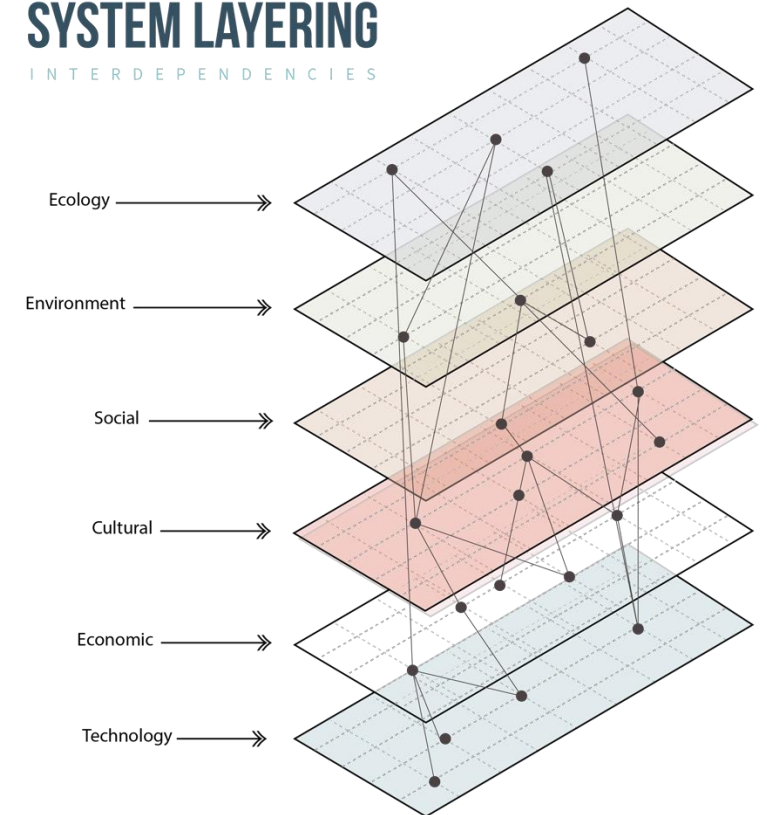
Sustainable Cities
are Smart Cities

Cities that are resilient and sustainable in their actions and culture, and by doing so continue to balance the needs and requirements of current and future generations of humans, more-than-humans and the planet without negatively impacting the ecosystems that provide them.

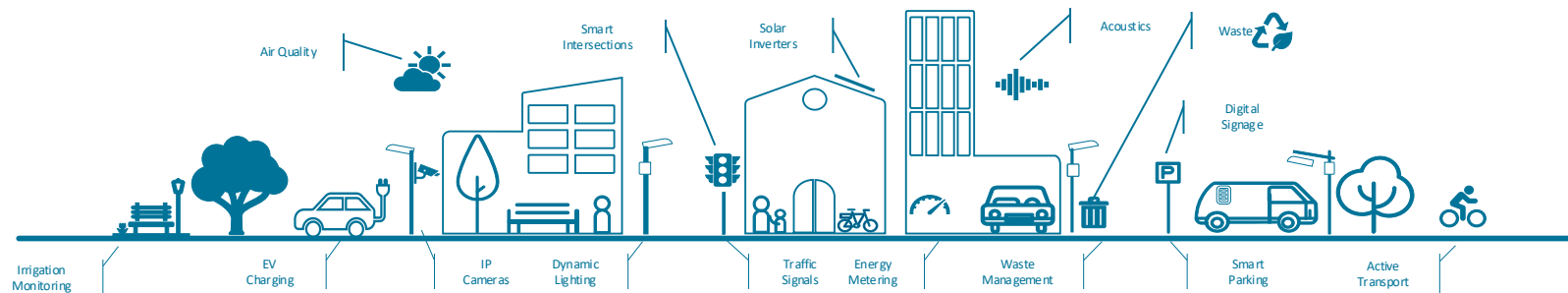
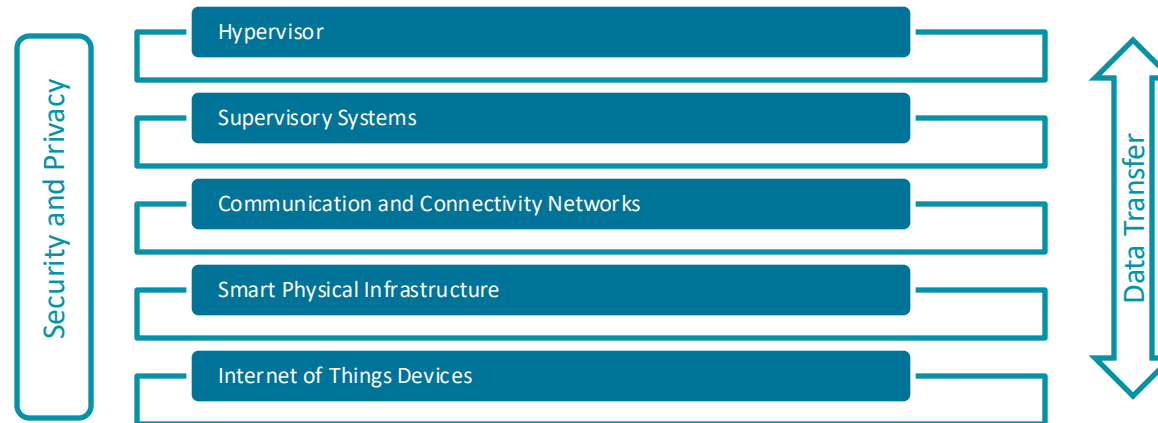


SYSTEM LAYERING

INTERDEPENDENCIES

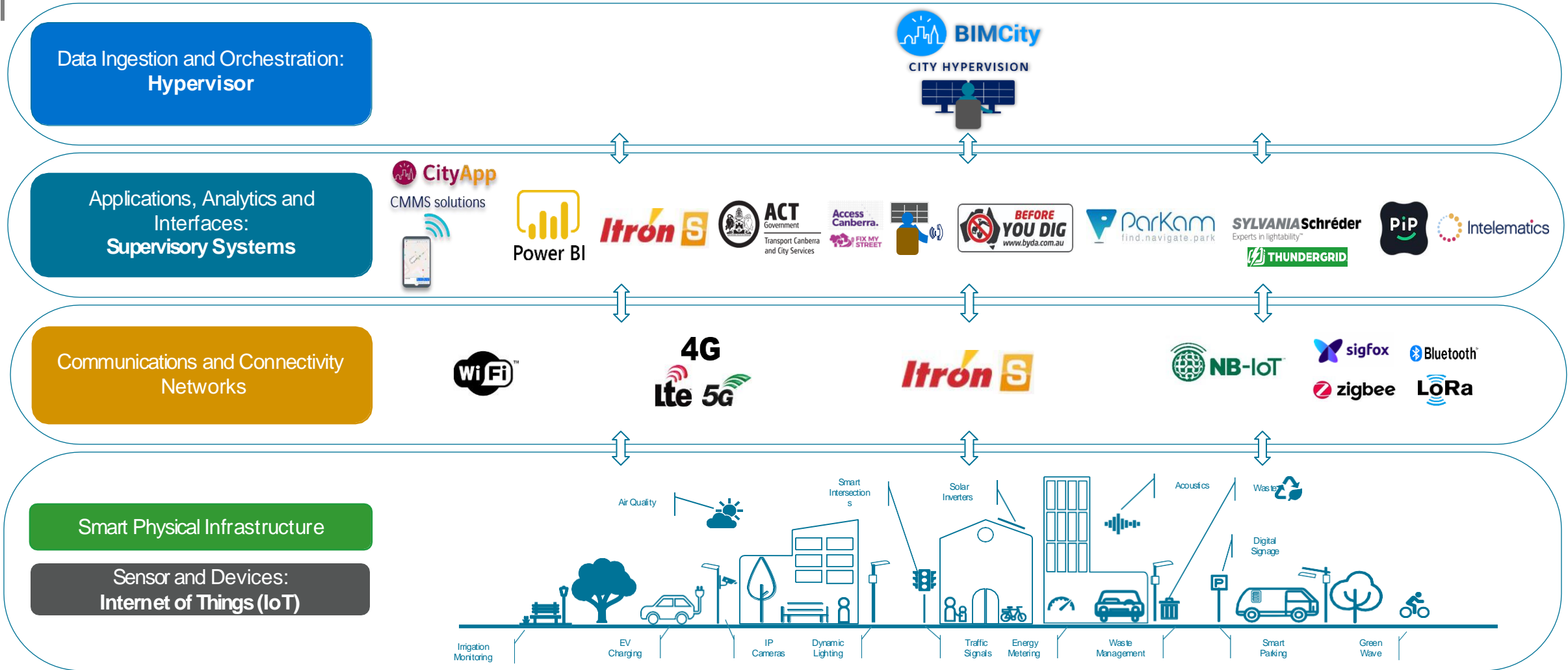


SMART/SUSTAINABLE CITY FRAMEWORK



SMART/SUSTAINABLE CITY FRAMEWORK

ACT ENVIRONMENT



Evolution of luminaire to sustainably manage light, emissions & energy



Source: McDonaldObservatory.org

HID		LED		SMART CONTROL	
UNCONTROLLED	SHIELDING	LED UPGRADE	COLOUR TEMPERATURE (CCT)	INTENSITY	ADAPTIVE
BASIC	EMERGING	EVOLVING		DYNAMIC	MASTERING
	Light Pollution Reduction No Energy or CO ₂ Reduction,	≥ 50% Energy, CO ₂ & Light Pollution Reduction	Additional Light (Blue) Reduction – No Energy or CO ₂ Reduction	Trimming - 5% Energy & CO ₂ Reduction. 2.5% Light Pollution Reduction Constant Light Output – 10% Energy & CO ₂ Reduction. 5% Light Pollution Reduction	Time Based – 15% Energy & CO ₂ Reduction. 7.5% Light Pollution. Dynamic - ≥ 15% Energy & CO ₂ Reduction. 7.5% Light Pollution Tunable CCT – Reduce Light Pollution

SUSTAINABILITY

LIGHT POLLUTION STUDY



- Collaboration with Australian National University – Mt Stromlo Research Observatory
- Dr Brad Tucker - Astrophysicist and Cosmologist, Research School of Astronomy & Astrophysics

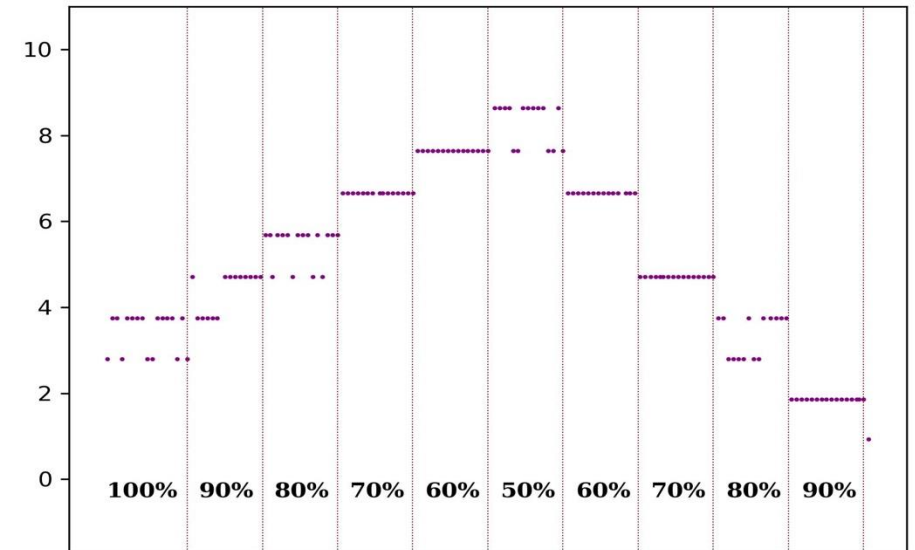
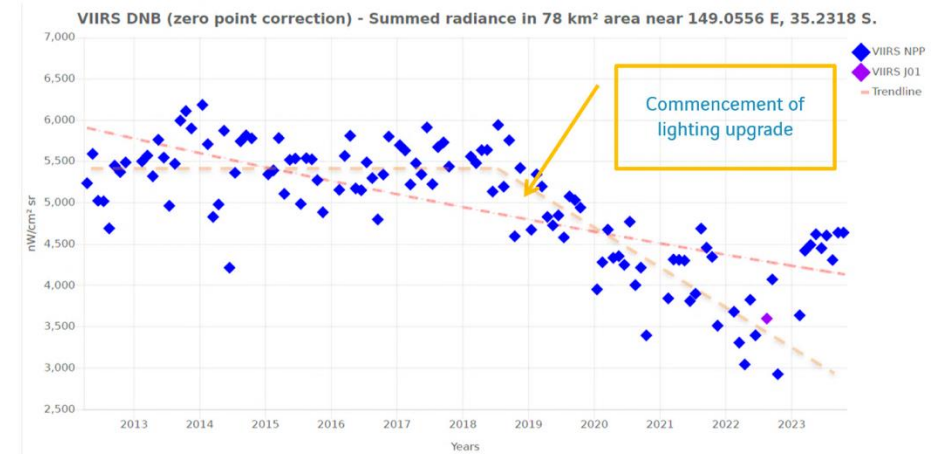


Upgrade to LED reduced sky glow (light pollution) by up to 50%



Study of adaptive lighting on sky glow (light pollution)

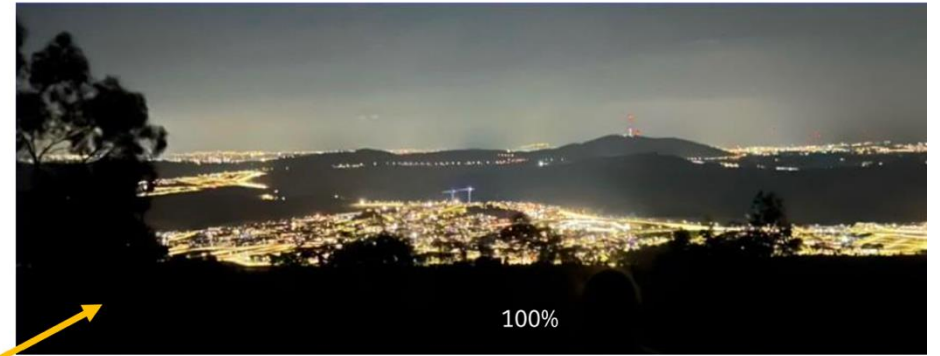
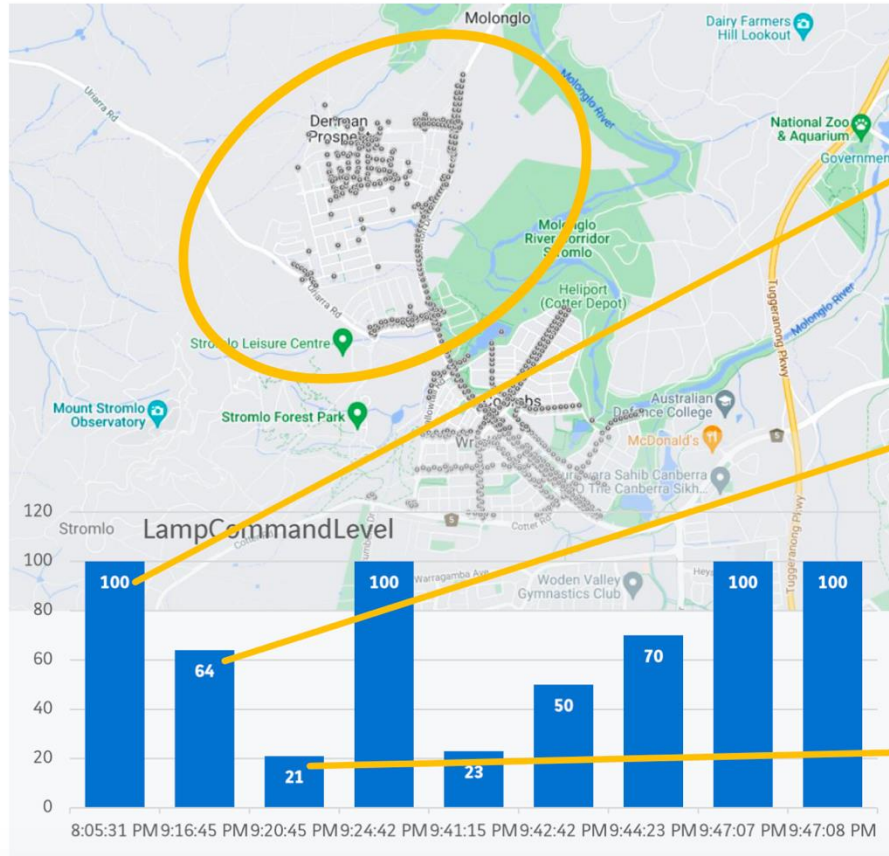
- 6 Month Duration
- Dimming in 10% increments – 100% to 50% to 100%
- Measurement of Visual, Blue, Red & Clear
- Results – Every 10% dimming reduced sky glow by 5%



SUSTAINABILITY

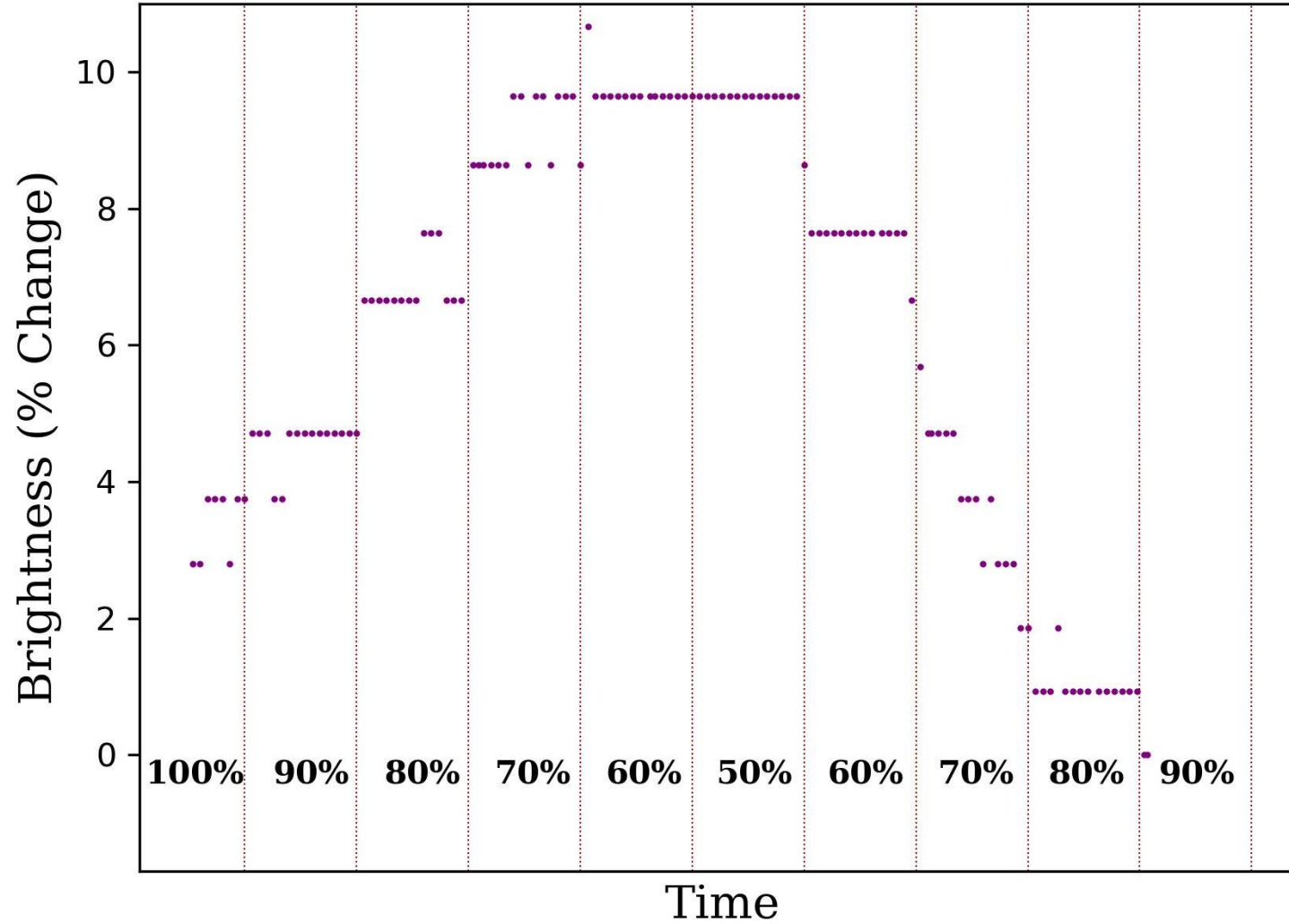
LIGHT POLLUTION STUDY

Denman Prospect Dimming



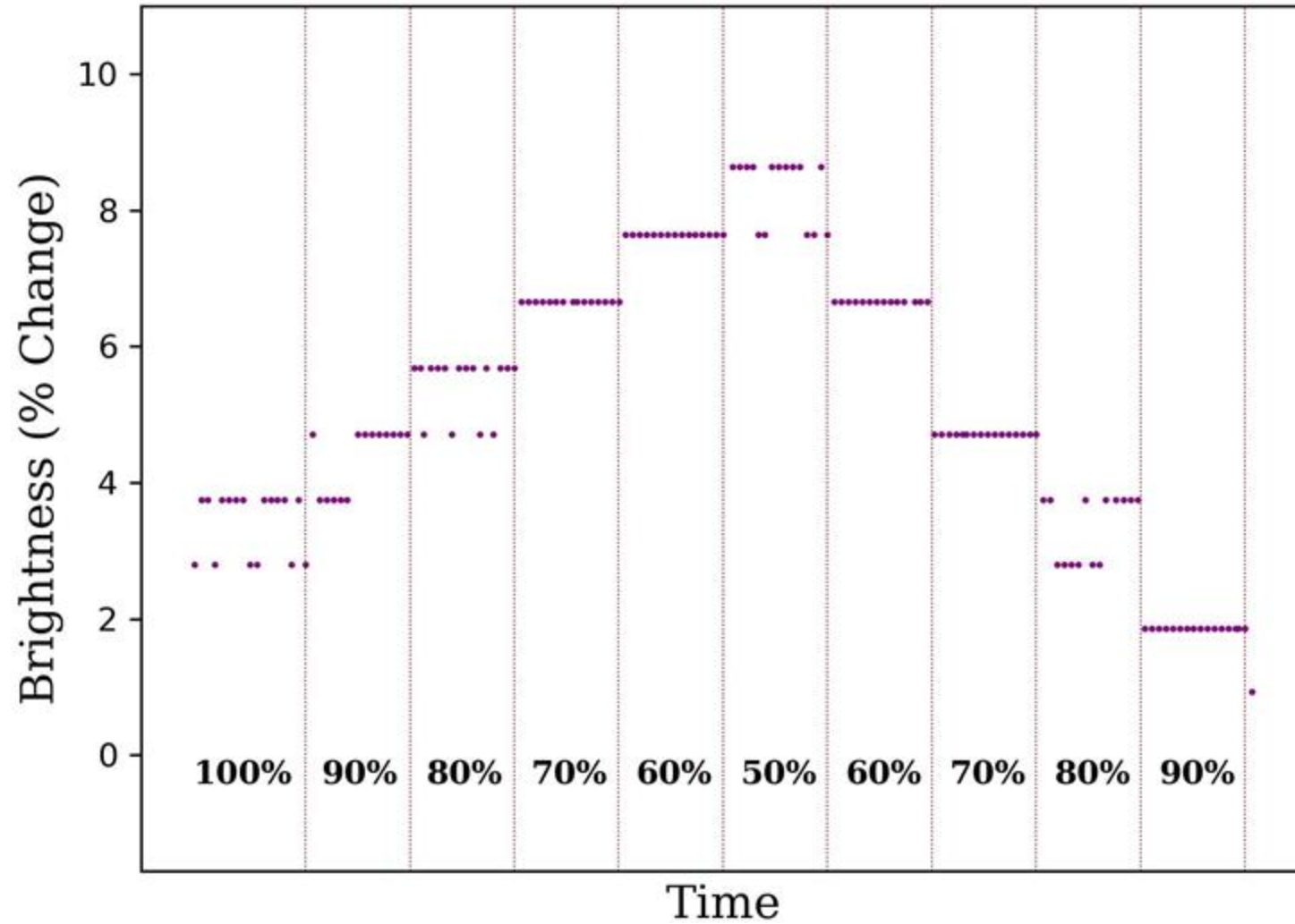
ADAPTIVE LIGHTING

2024 05 16



ADAPTIVE LIGHTING

2024 06 13



ADAPTIVE LIGHTING PROJECT

CANBERRA'S SUSTAINABLE STREETLIGHTS

A project collaboration between OMEXOM, the Australian National University's School of Cybernetics and Research School of Astronomy and Astrophysics, and the ACT Government

01 STREETLIGHT TECHNOLOGY
EXAMINING DYNAMIC AND ADAPTIVE STREETLIGHTING CAPABILITIES; AND OTHER CPS.

02 ECOLOGY
TESTING SYSTEMS, FRAMEWORKS, AND MODELS TO ASCERTAIN DATA ON ECOLOGICAL IMPACTS FROM STREETLIGHTS AND OTHER URBAN TECHNOLOGIES

03 SOCIAL
TESTING SYSTEMS, FRAMEWORKS, AND MODELS TO ASCERTAIN DATA ON SOCIAL IMPACTS FROM STREETLIGHTS AND OTHER URBAN TECHNOLOGIES

04 RESOURCE/ ENVIRONMENTAL
TESTING SYSTEMS, FRAMEWORKS, AND MODELS TO ASCERTAIN DATA ON RESOURCE AND ENVIRONMENTAL IMPACTS FROM STREETLIGHTS AND OTHER URBAN TECHNOLOGIES

05 TECH
SCALING TECHNOLOGICAL SYSTEMS ACROSS STREETLIGHTING INFRASTRUCTURE TO UNDERSTAND AND IDENTIFY FUTURE POTENTIALS



PHASE 00 TESTING **PHASE 01 TESTING - SCALING** **PHASE 02 TESTING - ECOLOGICAL** **PHASE 03 TESTING - SOCIAL** **PHASE 04 TESTING - RESOURCE / ENVIRONMENTAL** **PHASE 05 TESTING TECH** **PHASE 06 TESTING - COMBINED** **FINAL PHASE COMMISSIONING**

PHASE 01

PHASE 02

PHASE 03

PHASE 04

PHASE 05

PHASE 06

FINAL PHASE

01 DETAILS

TESTING
TESTING TECH CAPABILITIES AND SCALABILITY

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

02 DETAILS

TESTING
TESTING TECH CAPABILITIES AND SCALABILITY

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

03 DETAILS

TESTING
TESTING TECH CAPABILITIES IN THE CONTEXT OF ECOLOGY-CENTERED DESIGN

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

03 DETAILS

TESTING
TESTING TECH CAPABILITIES IN THE CONTEXT OF SOCIAL/HUMAN-CENTERED DESIGN

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

04 DETAILS

TESTING
TESTING TECH CAPABILITIES IN THE CONTEXT OF RESOURCES AND BROADER ENVIRONMENTAL IMPACTS

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

05 DETAILS

TESTING
IDENTIFYING AND TESTING FUTURE TECH CAPABILITIES ACROSS THE VARIOUS DOMAINS AND OBJECTIVES

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

06 DETAILS

TESTING
FINAL TESTING AND ADJUSTMENTS OF REQUIREMENTS ACROSS THE VARIOUS DOMAINS AND OBJECTIVES

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

FINAL DETAILS

TESTING
FINAL COMMISSIONING OF SYSTEMS AND AGREEMENT ACROSS THE VARIOUS DOMAINS AND OBJECTIVES

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

START

FINISH

SUSTAINABILITY

CURRENT STUDY – MULLIGANS FLAT LIGHT STUDY

- Lighting Study adjacent to Mulligans Flat Nature Reserve
- Two Types of Luminaire:
 - CCT Adjustable Luminaire – 4000k to 2200k
 - Vary light intensity throughout the night
 - Dual Socket Luminaire – Movement Sensor
 - Adjacent lighting controlled via movement sensors
- ANU Mt Stromlo Research Observatory – Measure effect of:
 - Upward Spill Light – Light Pollution
 - Blue, Red, Green & Clear Light Measurements
 - Nocturnal Animal Study

WELCOME TO MULLIGANS FLAT WOODLAND SANCTUARY

Welcome to Canberra's conservation jewel, where we work to restore, learn and inspire in the battle to reverse biodiversity loss. Take a step back in time to see what Australia's woodlands were like before foxes, cats and clearing took our unique wildlife.

GET THE FREE APP
Enrich your Mulligans Flat experience with an interactive map and audio tours through the landscape.

POPULAR WALKS

WETLANDS WALK
60 minutes return | Easy walk | Start at Wildbark
A gentle walk along a boardwalk and around our wetlands. Sighting birdlife here is guaranteed. The boardwalk section is suitable for prams and wheelchairs.

GROUND TO SKY WALK
90 minutes return | Moderate hills | Start at Wildbark
This walk takes you on a journey to the top of Sammy's Hill for panoramic views of the Sanctuary and the city.

WOODLAND WALK
60 minutes return | Easy walk | Start at the Woolshed
Uncover the secrets hidden in the woodlands on this gentle walk. Take a peak inside the iconic woolshed on the way.

A WALK THROUGH TIME
60 minutes return | Easy walk | Start at Wildbark
Walk through the Dunganvon valley and visit the ruins of Inglewood homestead.

AUSTRALIA HAS THE WORST MAMAL EXTINCTION RATE IN THE WORLD.
SAY #NOTOEXTINCTION

VOLUNTEER: Be on the front lines of conservation.
JOIN: Members support ground-breaking research into woodland restoration.
DONATE: Your support will help provide a safe haven for threatened species.

Learn more at wildbark.org

KEY

- Woodland Walk
- Wetlands Walk
- Ground to Sky Walk
- Other Walking Trails
- A Walk Through Time
- Centenary Trail
- Fox-proof Fence and Track
- Bike-Friendly Tracks
- Sanctuary Gate
- Parking
- Toilets
- Information
- Lookout
- No dogs or pets allowed.

You are walking in the footsteps of the ancestors of the Traditional Custodians, the Ngunawal People. They have lived with this ancient landscape for tens of thousands of years and their connection to this area is still as strong today. This country was a significant meeting place for neighbouring nations, the Gundungurra and Wiradjuri people. Ceremonies, trade, marriage and Law between tribes took place during such gatherings.



THANK YOU & QUESTIONS