ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

DAVE JOHNSON

ADEPT Street Lighting Group chair

ADEPT Engineering Board member

UKLB member

TfL Contracts Development Manager

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

- Financial impact of converting to LED
- Use of Central Management Systems to profile lighting levels
- Street Lighting as an Asset; Smart Cities and Infrastructure Developments

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY, PLANNING AND TRANSPORT

Representing directors from county, unitary and metropolitan authorities, & Local Enterprise Partnerships.

Maximising sustainable community growth across the UK.

Delivering projects to unlock economic success and create resilient communities, economies and infrastructure.

http://www.adeptnet.org.uk

CSS Wales

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

SOCIETY OF CHIEF OFFICERS OF TRANSPORTATION IN SCOTLAND

Department for Infrastructure

An Roinn Bonneagair

CSS Wales

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

SOCIETY OF CHIEF OFFICERS OF TRANSPORTATION IN SCOTLAND

Bedford Borough Council	Gloucestershire County Council	Peterborough City Council
Blackburn with Darwen Council	Hampshire County Council	Plymouth County Council
Bournemouth Borough Council	Hertfordshire County Council	Portsmouth City Council
Bristol City Council	Hull City Council	Solihull MBC
Buckinghamshire County Council	Kent County Council	Somerset County Council
Calderdale Council	Kirklees Council	South Gloucestershire Council
Cambridgeshire County Council	Leeds City Council	Southend on Sea Borough Council
Central Bedfordshire Council	Leicestershire County Council	Staffordshire County Council
Cheshire West & Chester Council	Lincolnshire County Council	Suffolk County Council
City of London Corporation	Luton Borough Council	Surrey Council
City of Wolverhampton	Newcastle City Council	Telford & Wrekin Council
City of York Council	Norfolk County Council	Thurrock Council
Cornwall Council	North Somerset Council	Transport for London
Derbyshire County Council	North Yorkshire County Council	Trafford Council
Devon County Council	Northamptonshire County Council	Wakefield Council
Doncaster (Met Borough)	Northumberland County Council	Walsall Council
Dorset County Council	Nottingham City Council	Warrington Borough Council
Durham County Council	Nottinghamshire County Council	Warwickshire County Council
East Sussex County Council	Oxfordshire County Council	Wiltshire Council
Essex County Council		Wokingham Borough Council

Department for Infrastructure

An Roinn Bonneagair

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Financial impact of converting to LED

Worked example 1km - A12 – Eastern Ave

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Financial impact of converting to LED

Urban 40 mph Dual Carriageway.

Typically using 250w SON

Columns spaced 30m apart

33 columns, 66 luminaires.

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Financial impact of converting to LED

33 columns, 66 luminaires.

250w SON typically consume 300w

4,200 burn hours / annum

12.5p / kWh

£10,400 p/a in energy costs

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Financial impact of converting to LED

Typical replacement for a 250w SON

Phosco P862 64 LED @800ma = 151w

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Financial impact of converting to LED

Phosco P862 64 LED = 151w

4,200 burn hours / annum

12.5p / kWh

£5,200 p/a saving in energy costs

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Financial impact of converting to LED

Capital costs

Phosco P862 ≈ £250

Say ≈ £150 fix (max)

≈ £400 supply and fix

66 units ≈ £26,500

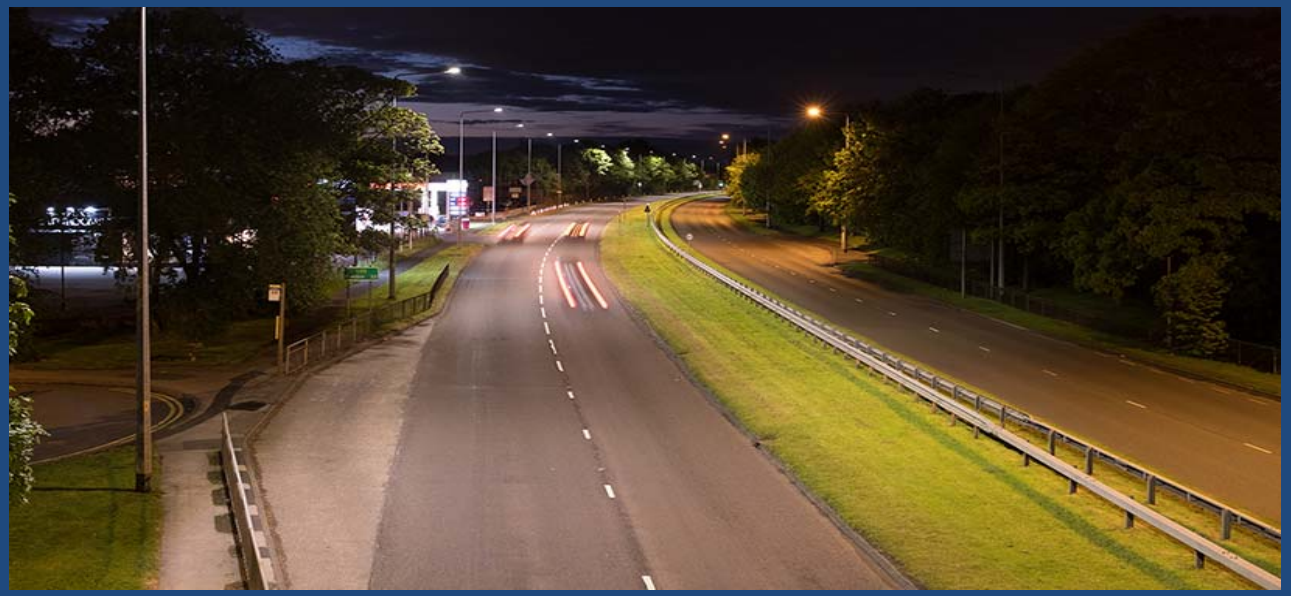
ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Cost / benefit

≈ £26,500 / £5,200 p/a

≈ 5 year payback



ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Other benefits

- 100,000 hours ≈ 20 year life expectancy
- Reduction in night scouting
- Elimination of bulk lamp change

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Salix finance :-

5 year interest free loans,

- The project must pay for itself from energy savings within a 5 year period (projects exceeding this can be part funded)
- The cost of CO2 must be less than £120 per tonne over the lifetime of the project.

https://www.salixfinance.co.uk/loans/street-lighting

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Is that all we can do ?

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

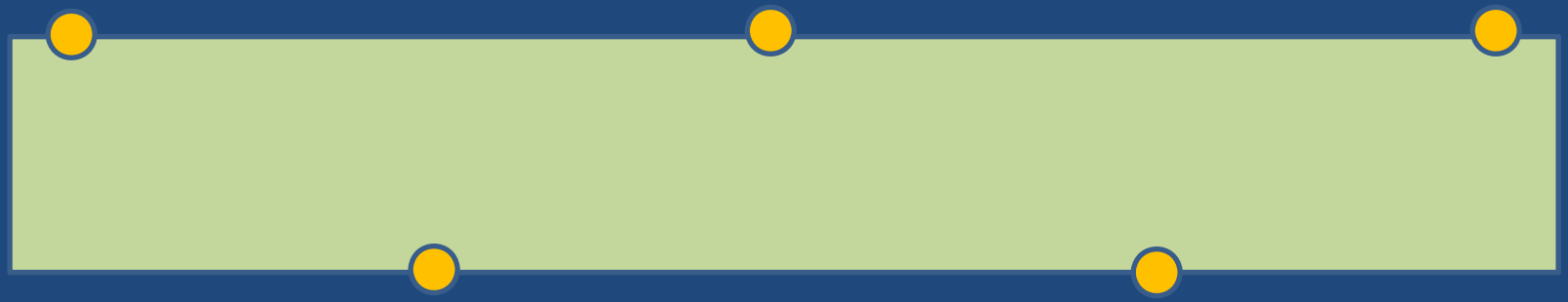
Use of CMS to profile lighting levels

Central Management Systems enable remote monitoring and control of light switching / power levels.

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Use of CMS to profile lighting levels

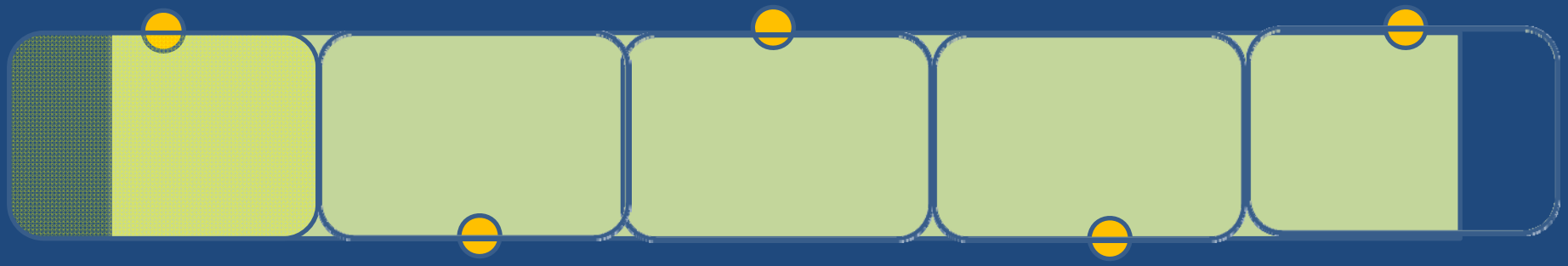


Optimum column spacing

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Use of CMS to profile lighting levels

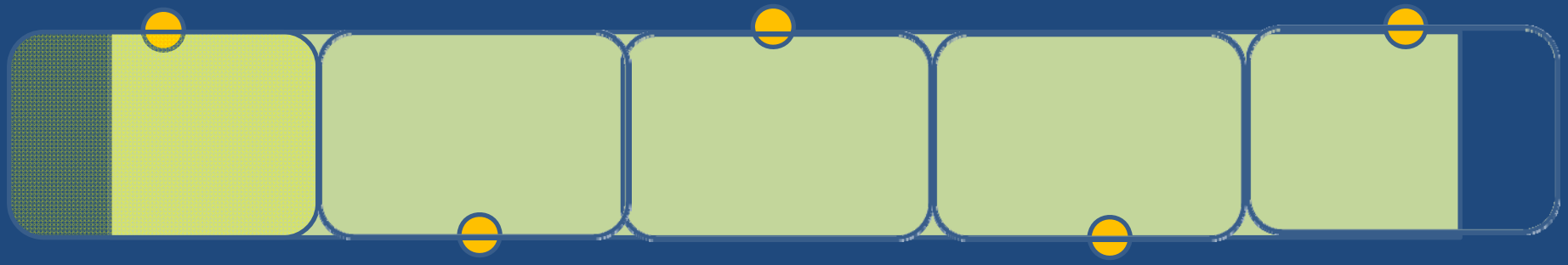


Optimum column spacing

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Use of CMS to profile lighting levels

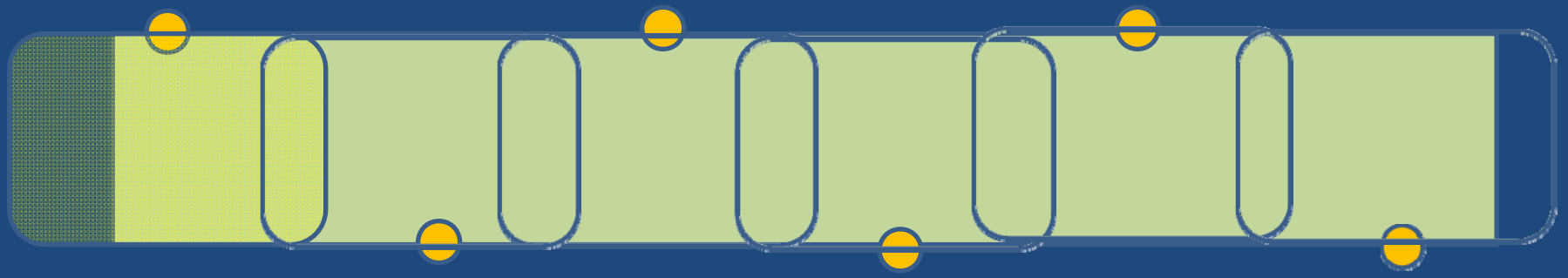


Street trees, driveways, junctions, basements all hinder column spacing

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Use of CMS to profile lighting levels

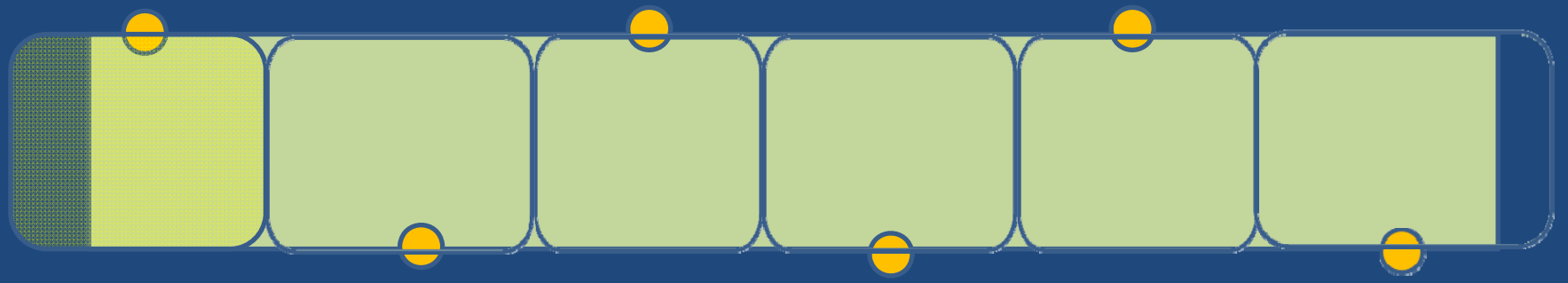


Resulting in patchy lighting

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Use of CMS to profile lighting levels



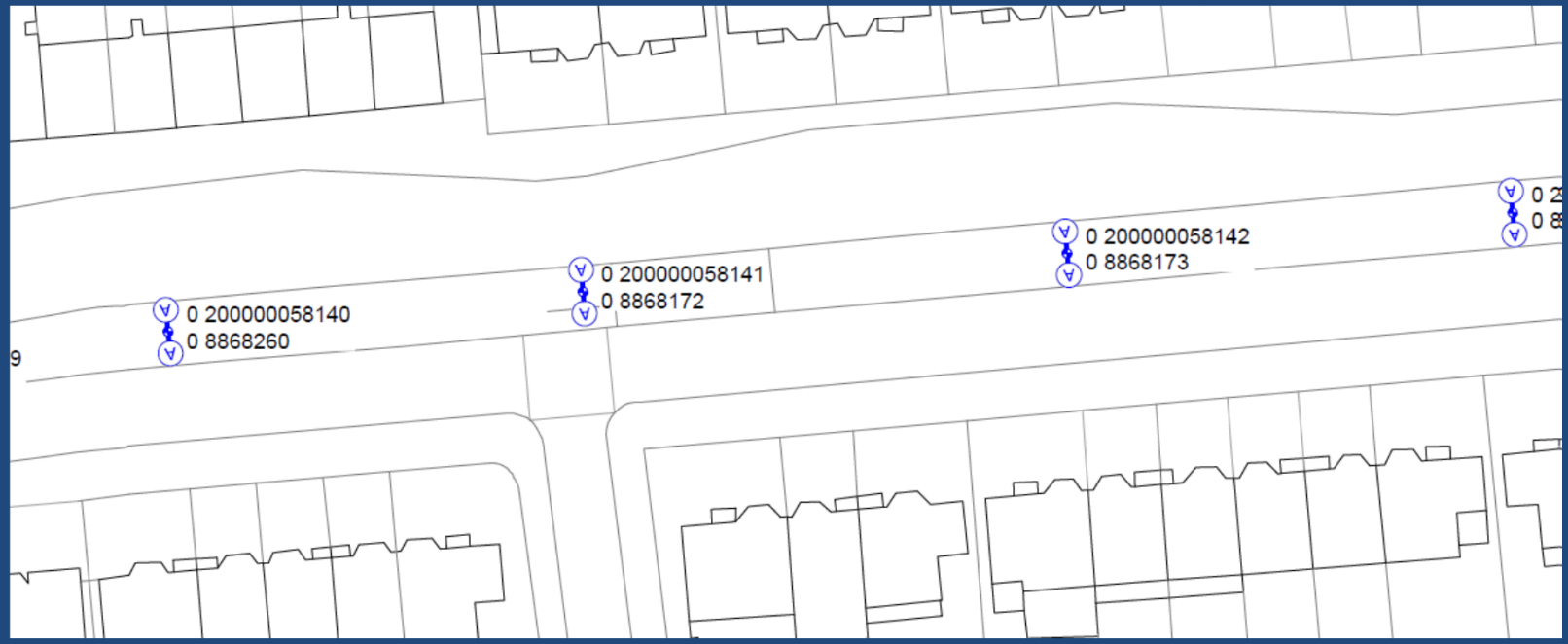
CMS can control individual power levels (as can optics).

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Back to the A12

Ringway Jacobs design shows the scheme under consideration.



ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

It uses Orangetek MLE160 and MLE 80 luminaires. For our typical 1km, to achieve the designed light level only 6 would operate at full power, 55 at 75% and 4 at 55%. This achieves a 25% energy saving compared to operating all units at full power.

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Using a CMS to Set Profiles for Traffic Routes

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

BS 5489-1:2013, the CoP for the design of road lighting recognises that having designed a lighting scheme based on the highest traffic flows, then through the hours of darkness there may be times when it becomes appropriate to vary those lighting levels to reflect varying use.

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

In terms of traffic flow the code defines traffic levels as high, moderate or low and on traffic routes lighting classes are influenced by that categorisation.

TA 79/99 *Traffic Capacity of Urban Roads*, shows the capacities that can be achieved for different road types.

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

High speed roads, +40 - 60 mph, mixed traffic use							
Road type		Traffic Flow v/hour *					
		flow ≤	Power level	flow ≤	Power level	flow ≤	Power level
Dual 4 lane c/w	UM	7,200	100%	4,680	75%	2,520	50%
Dual 3 lane c/w	UM	5,600	100%	3,640	75%	1,960	50%
Dual 2 lane c/w	UAP 1	3,600	100%	2,340	75%	1,260	50%

Moderate speed roads, 30 - 40 mph, mixed traffic use							
Road type		Traffic Flow v/hour *					
		flow ≤	Power level	flow ≤	Power level	flow ≤	Power level
Dual 3 lane c/w	UAP2	4,800	100%	3,100	75%	1,700	50%
Dual 2 lane c/w	UAP2	3,200	100%	2,100	75%	1,100	50%
Single c/w 4+ lanes	UAP2	2,700	100%	1,200	75%	400	50%
Single c/w 4 lane	UAP2	2,100	100%	950	75%	300	50%
Single c/w 3 lane	UAP3	1,620	100%	750	75%	250	50%
Single c/w 2 lane	UAP3	1,300	100%	600	75%	200	50%

* traffic flow measured in v/hour, one way in the busiest direction

These tables interpolate from BS5489-1:2013 tables A.2 and A.3 together with table 2 of TA 79/99.

ADEPT

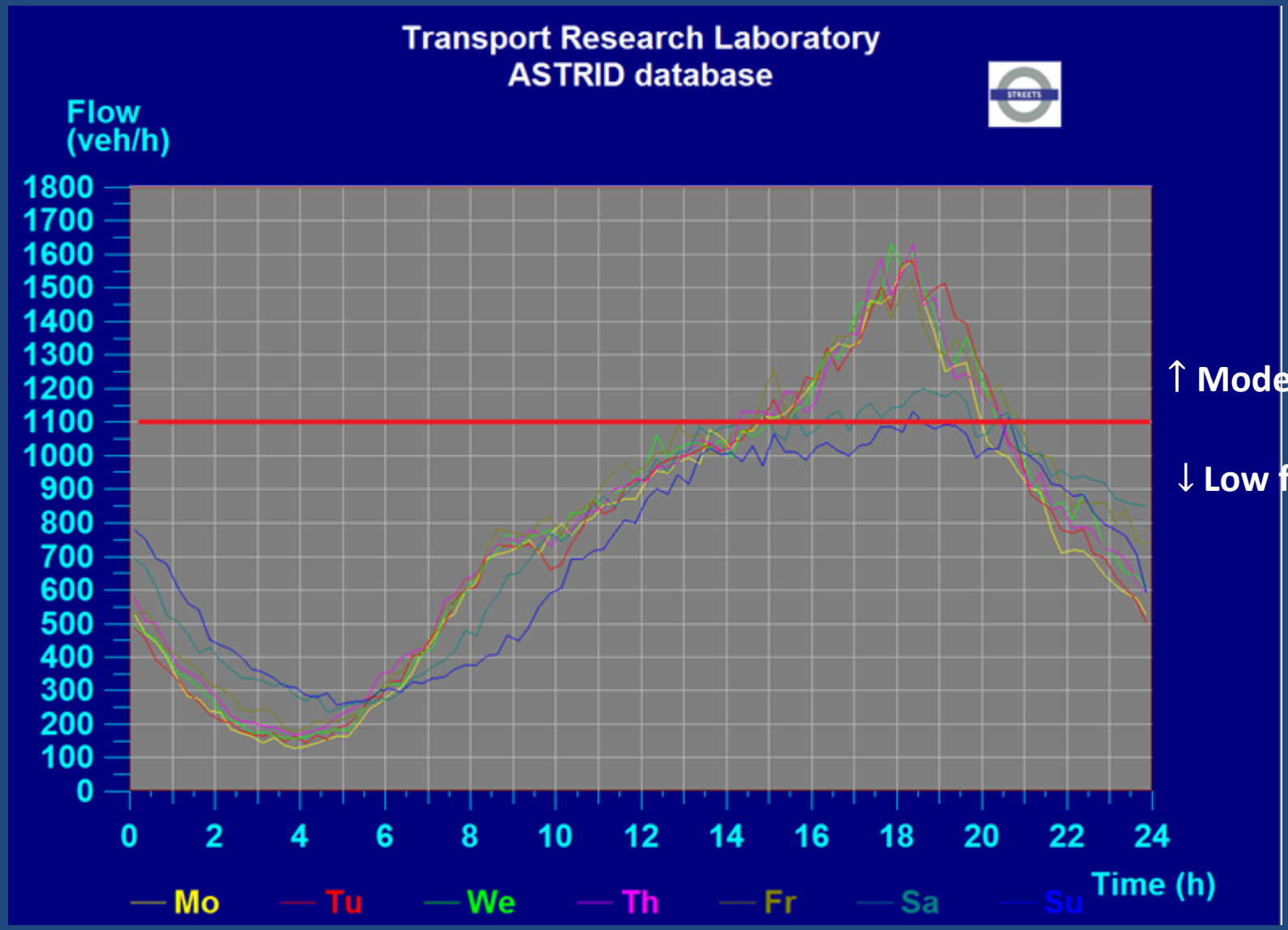
ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

High speed roads, +40 - 60 mph, mixed traffic use							
Road type		Traffic Flow v/hour *					
		flow ≤	Power level	flow ≤	Power level	flow ≤	Power level
Dual 4 lane c/w	UM	7,200	100%	4,680	75%	2,520	50%
Dual 3 lane c/w	UM	5,600	100%	3,640	75%	1,960	50%
Dual 2 lane c/w	UAP 1	3,600	100%	2,340	75%	1,260	50%

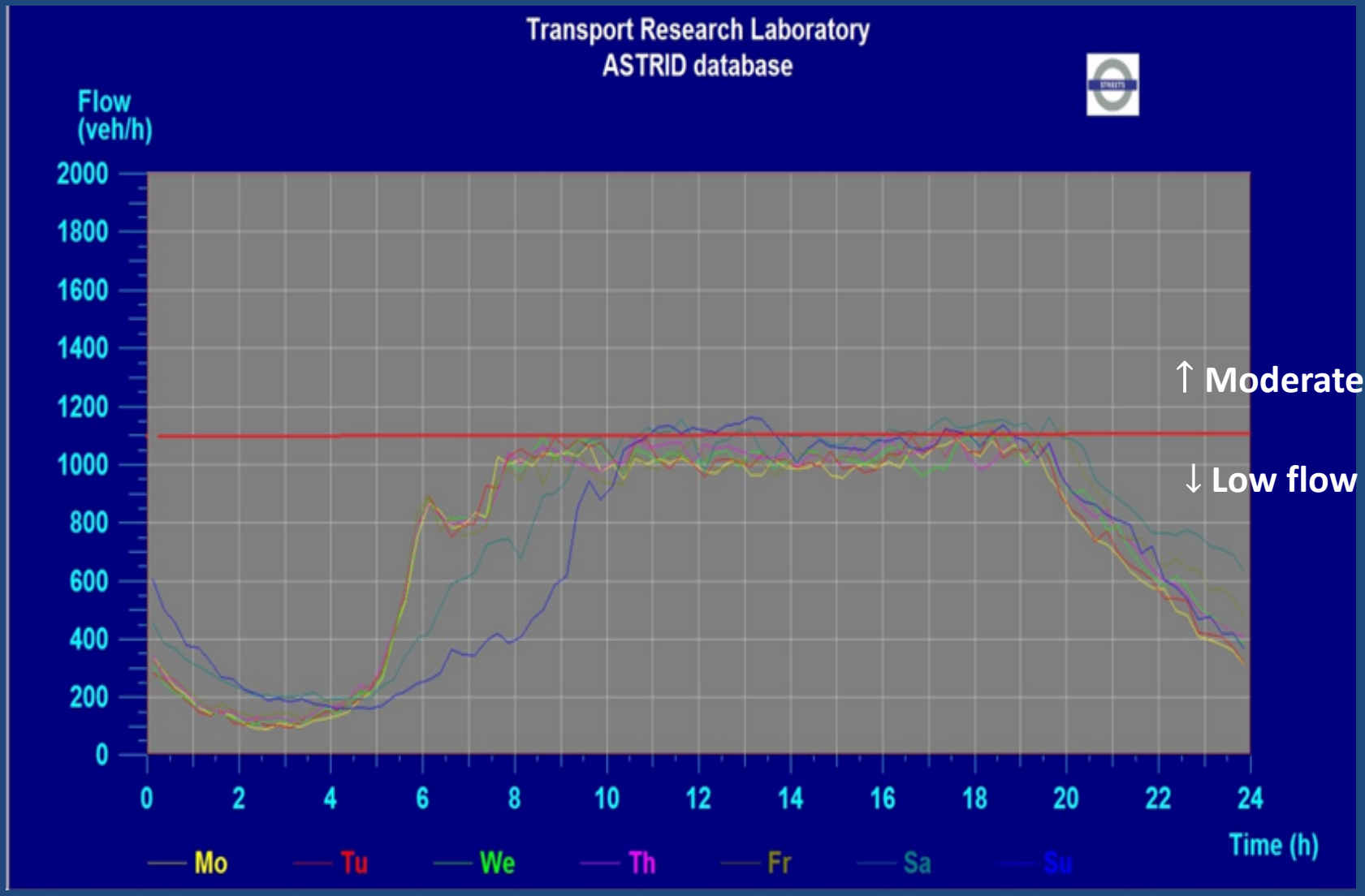
Moderate speed roads, 30 - 40 mph, mixed traffic use							
Road type		Traffic Flow v/hour *					
		flow ≤	Power level	flow ≤	Power level	flow ≤	Power level
Dual 3 lane c/w	UAP2	4,800	100%	3,100	75%	1,700	50%
Dual 2 lane c/w	UAP2	3,200	100%	2,100	75%	1,100	50%
Single c/w 4+ lanes	UAP2	2,700	100%	1,200	75%	400	50%
Single c/w 4 lane	UAP2	2,100	100%	950	75%	300	50%
Single c/w 3 lane	UAP3	1,620	100%	750	75%	250	50%
Single c/w 2 lane	UAP3	1,300	100%	600	75%	200	50%

* traffic flow measured in v/hour, one way in the busiest direction

These tables interpolate from BS5489-1:2013 tables A.2 and A.3 together with table 2 of TA 79/99.



A12 - Eastbound traffic flows



A12 - Westbound traffic flows

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Subject to a sense check and risk assessment, power settings for this section of the A12 would be set at 75% of the design levels, adjusted to 50% when traffic levels are clearly low, 9 p.m to 6 a.m.

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Profiled lighting cost : benefit implications

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Profiled lighting cost implications

CMS node , install, commission

Estimate £200 / unit x 66 = £13,200

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Profiled lighting benefits

£1,300 p/a to achieve set design level (25%)

£1,500 p/a from profiled lighting (≈ 40% of £3,900)

£2,800 p/a total saving in energy costs

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Profiled lighting cost : benefit implications

Cost = £13,200

Annual saving = £2,800

Payback within 5 years

ADEPT

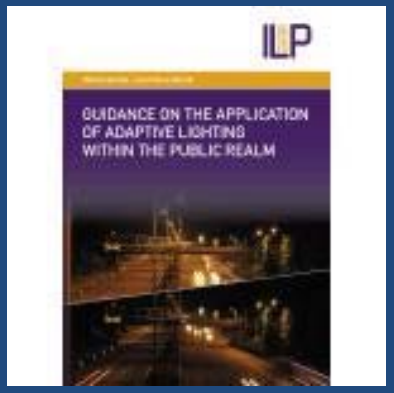
ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Profiled lighting

ILP Guidance PLG08

The document gives a clear direction to the application of the existing BS and EU Standards BS5489-1:2013 and BS EN 13201:2015.

It highlights conditions and trigger points where changes in lighting performance can be considered, such as reduction of road traffic flow and where the road can be reclassified under the Standards.



ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

- **Street Lighting as an Asset; Smart Cities and Infrastructure Developments**

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

- **Street Lighting as an Asset; Smart Cities and Infrastructure Developments**
- **Wi-Fi / small cells**
- **EV Trickle charging (mCMS)**
- **Monitoring equipment**

  (air quality, traffic flow, parking, maintenance, etc)
- **CCTV**

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

- Street Lighting as an Asset; Smart Cities and Infrastructure Developments
- Most street lighting is unmetered
- Subject to connection agreement
- Energy settlement via inventory
- All equipment must have a Charge code

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

Reference material on ADEPT website

http://www.adeptnet.org.uk/groups/street-lighting-working-group

ADEPT

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY PLANNING AND TRANSPORT

THANK YOU

Dave Johnson

Dave.Johnson@TfL.Gov.uk