Road Lighting – A New Era

Chris Corr & Kevin O’Sullivan
Thursday 27th September, 2018.
TII Road Lighting Standards, Specification & Guidance

- Design Standards
- Specification for works
- Requirements for Measuring & Pricing
- Guidance on Specification for Works
- Guidance for Measuring & Pricing
- Asset Management & Maintenance
TII Strategic Objectives

**Strategic Goal**
Secure the provision, maintenance and operation of safe, efficient and sustainable networks of national roads, light rail and metro.

**Safety**
Improve national road and light rail safety.

**Sustainability**
Incorporate sustainability principles into the development and operation of assets under TII’s care.

**People**
Promote a culture of leadership, collaboration and innovation.

**Investment**
Maximise contributions to Ireland’s development.

**Service**
Build relationships with local authorities, similar organisations and stakeholders.

**Delivery**
Secure the delivery of the nation road, light rail and metro elements of the Government’s Capital Investment Plans.
The Need to Update TII Lighting Standards & Guidance

• Last update was in 2007

• Reference to superseded Standards

• Written around older technologies (SON & SOX)

• More efficient light sources – e.g. LED

• Better methods of control – e.g. dimming

• Clarity on where to Light and Extents

• Reflect National Roads in Ireland
Updating TII Road Lighting Standards & Specifications
Key Aim Around the Update

A Balanced Approach

- Safety
- Environment
- Economy
- Integration
- Accessibility
- Physical Activity

- Bringing all lighting requirements together in one place
- Support TII statement of strategy
- Uses Industry Best Practice - ILP
- Energy Efficiency
Lighting Evaluation Tool & Justification for Lighting the Mainline
Assessment for Minor Lighting Improvement Schemes

Local Authority to complete and submit Application Form

LA seek support from TII for route lighting

LA to complete Application Form

Email Form to TII (publiclighting@TII.ie)

TII to review Application Form

TII to complete Scorecard Assessment

Approved

Refused

Rejected

Further Information/Clarity from Local Authority

Formal Letter to Local Authority

LA seek support from TII for route lighting

Amend Application

LA to complete Application Form

Email Form to TII (publiclighting@TII.ie)

TII to review Application Form

TII to complete Scorecard Assessment

Approved

Refused

Rejected

Further Information/Clarity from Local Authority

Formal Letter to Local Authority
Project Life Cycle

- Governance for Lighting during the project life cycle
- Consideration of lighting at the concept stage
- Early development to mitigate environmental impact and inform scheme estimate
- Consistency of information at each stage
- Key Performance Metrics
Lighting Provision
Lighting Extents
Consideration of National Road Requirements in Ireland
Lighting Class Selection – The right light in the right place

Parameters for the selection of M/ME lighting class.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
<th>Weighting Value VW</th>
<th>VW Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>Very High (&gt;100 km/h)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High (70 km/h to 100 km/h)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate (40 km/h to 70 km/h)</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low (&lt;40 Km/h)</td>
<td>-2</td>
<td></td>
</tr>
<tr>
<td>Traffic volume</td>
<td>Very High to High (ADT&gt;40,000)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low to Moderate (ADT between 7,000 and 40,000)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Very low (ADT &lt;7000)</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>Traffic Composition</td>
<td>Mixed with high % of non-motorised</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>(Note 1)</td>
<td>Mixed</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motorised only</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Separation of carriageways</td>
<td>No</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Junction Spacing</td>
<td>High (&lt;3km)</td>
<td>1</td>
<td></td>
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<tr>
<td>(Note 2)</td>
<td>Moderate (&gt;3km)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Parked Vehicles</td>
<td>Present</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not present</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Ambient Luminance</td>
<td>High</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>Visual guidance/ traffic control</td>
<td>Poor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate or Good</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Sum of Weighting Values

M - Lighting Class M-
The Right Light at the Right Time
## Environmental Considerations

<table>
<thead>
<tr>
<th>Zone</th>
<th>Surrounding</th>
<th>Lighting Environment</th>
<th>Examples</th>
<th>Luminous Intensity Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0</td>
<td>Protected</td>
<td>Dark</td>
<td>UNESCO Starlight Reserves, IDA Dark Sky Parks</td>
<td>G6</td>
</tr>
<tr>
<td>E1</td>
<td>Natural</td>
<td>Intrinsically Dark</td>
<td>National Parks, Areas of outstanding Beauty</td>
<td>G5 or higher</td>
</tr>
<tr>
<td>E2</td>
<td>Rural</td>
<td>Low District Brightness</td>
<td>Villages or relatively dark outer suburban locations</td>
<td>G4 or higher</td>
</tr>
<tr>
<td>E3</td>
<td>Suburban</td>
<td>Medium District Brightness</td>
<td>Small town centres or suburban locations</td>
<td>G3 or higher</td>
</tr>
<tr>
<td>E4</td>
<td>Urban</td>
<td>High District Brightness</td>
<td>Town/city centres with high levels of night time activity</td>
<td>G2 or higher</td>
</tr>
</tbody>
</table>
## Standardised Public Lighting Inventory

### Geographical Data (Street Gazetteer)

<table>
<thead>
<tr>
<th>No.</th>
<th>Category</th>
<th>M</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Street name</td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>2</td>
<td>Road number</td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>3</td>
<td>Location</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4</td>
<td>Village, town or district</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5</td>
<td>Zone</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6</td>
<td>Local Authority Lighting unit</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>7</td>
<td>T/Lighting unit</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>8</td>
<td>Tag</td>
<td>O</td>
<td>O</td>
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### Asset Data

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<tr>
<td>9</td>
<td>Equipment number</td>
<td></td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>10</td>
<td>Unit number</td>
<td></td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>11</td>
<td>Unit Type</td>
<td></td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>12</td>
<td>Unit coord - Existing</td>
<td></td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>13</td>
<td>Unit coord - Nothing</td>
<td></td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>14</td>
<td>Column manufacturer type reference</td>
<td></td>
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<td>O</td>
</tr>
<tr>
<td>15</td>
<td>Column cross section shape</td>
<td></td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>16</td>
<td>Column height (m)</td>
<td></td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>17</td>
<td>Column material type</td>
<td></td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>18</td>
<td>Column protective coating</td>
<td></td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>19</td>
<td>Column base type</td>
<td></td>
<td>M</td>
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### Risk Assessment Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Category</th>
<th>O</th>
<th>O</th>
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</thead>
<tbody>
<tr>
<td>64</td>
<td>Ground conditions</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>65</td>
<td>Stalling of road</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>66</td>
<td>Road environment</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>67</td>
<td>Environment situation</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>68</td>
<td>Wind exposure</td>
<td>O</td>
<td>O</td>
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<tr>
<td>69</td>
<td>Designed for fatigue</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>70</td>
<td>Traffic flow</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>71</td>
<td>Traffic speed</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>72</td>
<td>On a bridge</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>73</td>
<td>Pedestrian density</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

### Operational Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Category</th>
<th>MF</th>
<th>MF</th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>Date of last cyclic of maintenance visit</td>
<td>MF</td>
<td>MF</td>
</tr>
<tr>
<td>78</td>
<td>Date of last group lamp replacement</td>
<td>MF</td>
<td>MF</td>
</tr>
<tr>
<td>79</td>
<td>Date of last cycle of cleaning</td>
<td>MF</td>
<td>MF</td>
</tr>
<tr>
<td>80</td>
<td>Date of last re-application of protective coating</td>
<td>MF</td>
<td>MF</td>
</tr>
<tr>
<td>81</td>
<td>Basic structural inspection and condition level</td>
<td>MF</td>
<td>MF</td>
</tr>
<tr>
<td>82</td>
<td>Date of last structural inspection and condition level</td>
<td>MF</td>
<td>MF</td>
</tr>
<tr>
<td>83</td>
<td>Structural test certificate reference number</td>
<td>MF</td>
<td>MF</td>
</tr>
<tr>
<td>84</td>
<td>Date of Electrical Installation Test &amp; Results</td>
<td>MF</td>
<td>MF</td>
</tr>
</tbody>
</table>

### Energy Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Category</th>
<th>M</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>96</td>
<td>Reliable voltage (unmetered supplies only)</td>
<td>M</td>
<td>D</td>
</tr>
<tr>
<td>97</td>
<td>Maximum Import Capacity (M) measured in kVA</td>
<td>D</td>
<td>O</td>
</tr>
<tr>
<td>98</td>
<td>UMR billable code (unmetered supplies only)</td>
<td>D</td>
<td>O</td>
</tr>
<tr>
<td>99</td>
<td>Switching regime</td>
<td>M</td>
<td>D</td>
</tr>
<tr>
<td>100</td>
<td>Annual Burn Hours on UMR</td>
<td>M</td>
<td>O</td>
</tr>
</tbody>
</table>
To Be Issued Soon………
WP 08A
Energy MMaRC

MMaRC Lighting Business Case - NRA
Public Lighting Energy efficiency initiatives – NRA
TII/ARUP founding members of national PL steering group and are active participants

M1 J18 Street Lighting Energy Saving Assessment - NRA, Arup
M4 J6 Street Lighting Energy Saving Assessment - NRA, Arup
M7 J22 Street Lighting Energy Saving Assessment - NRA, Arup
N7 J7 Street Lighting Energy Saving Assessment - NRA, Arup
WPA101 – Prepared Asset Inventory Collection Funding
Application Tool
Motorway Lighting Pilot Project Energy Savings Technical Note

WP 08B
Energy Liaison

National Standardised Public Lighting Inventory Template - SEAI, CCMA, TII
Nationally agreed defining profile
Supporting SEAI with Asset Management Inventory Collection

WP 08C
Energy Non-MMaRC

Intelligent street lighting March 2017 – TII, RMO, SEAI, CCMA

National Street Lighting Policy - Arup
EU Directive File Note - Synopsis of EU and other relevant lighting directives on the public lighting sector in Ireland - Arup
Assessment of Pilot energy efficient PL schemes

WP 08D
Lighting Standards

Route Lighting Appraisal Tool - Arup
Design of Road Lighting for the National Road Network - TII

Lighting Standards Dashboard

There are 106 Fields in the Asset Management Inventory.
30 of which are Mandatory.

Broken down into the following:
13 Risk Assessment Data
19 Operational Data
8 Geographical Data
55 Asset Data
11 Energy Data

Mandatory. There are 87% of which are

Geographical Data

Operational Costs

Energy Data

Risk Assessment Data

Cost Breakdown %

10% 3% 17%

Risk Operation

Asset Energy

Geographical Data

8

11

19

13

100%

100%

100%

9PM 7AM

9PM 7AM

9PM 7AM

9PM 7AM

87%

100%

100%

100%

35 LUX

35 LUX

35 LUX

35 LUX

99%

99%

99%

99%
The decisions about which public lighting schemes should be funded are made with the help of a Value Management Tool. It is based on a Multi-Criteria Assessment that assigns a weighted score to each application. The final score includes parameters such as the Value for Money Assessment, the Energy Savings of the new scheme, the light type, an Environmental Assessment and other local criteria.

### 2018 Facts
- 3.5m in Funding for LA’s (130% increase on 2017);
- North West By Passes: Works On-going - 1 single contract – replacement of 1345 lanterns;
- Management of SOX;
- More projects funded;
- More energy savings;
- Further along the road to 2020 Targets;
- Part of the Public lighting in Ireland initiative.

### Annual Energy Savings

<table>
<thead>
<tr>
<th>Year</th>
<th>Energy Savings (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>598,903</td>
</tr>
<tr>
<td>2017</td>
<td>978,382</td>
</tr>
<tr>
<td>2018</td>
<td>2,263,977</td>
</tr>
</tbody>
</table>

### VM Tool

After implementation of all the schemes, energy savings will be 2,263,977 kWh per year.

### 2018 Schemes

- **Sligo**
  - N15 Sligo, Team Environ Route Lighting Improvement
  - 189 lights replaced
  - 800,684 kWh Energy savings

- **Donegal**
  - N15 Lifford Public Lighting Refurbishment
  - 116 lights replaced
  - 410,933 kWh Energy savings

- **Carlow**
  - N16 Carlow Route Lighting Improvement
  - 182 lights replaced
  - 1,342,760 kWh Energy savings

- **Offaly**
  - N16 & N20 Enniscreity Public Lighting Refurbishment
  - 91 lights replaced
  - 396,562 kWh Energy savings

- **Wexford**
  - N15 Ennistymon Public Lighting Refurbishment
  - 126 lights replaced
  - 3,586,444 kWh Energy savings

- **Kerry**
  - N20 Killarney Public Lighting Refurbishment
  - 91 lights replaced
  - 349,086 kWh Energy savings

- **Laois**
  - N18 Mountmellick Route Lighting Improvement
  - 71 lights replaced
  - 3,046,068 kWh Energy savings

**Figures represent the funded schemes per county**
The replacement of the existing lighting will achieve a number of overall objectives:
The replacement of the existing lighting will achieve a number of overall objectives:

- Energy and Economic Savings
- Compliance with NEEAP
- Reduction in Environmental Effects
Project Information

• **LED Retrofit of approx. 1000** existing public lighting lanterns

• **Performance Style** Contract

• High Mast **Lighting Columns Maintenance**

• **Measurement and Validation** of LED Lanterns (1 Year after Install)

• **29 Roundabouts and Bypasses** across 6 Counties

• Estimated **Contract Value €520k**
National Road Bypasses – North West

- N15 Donegal Bypass
- N15 Bundorran to Ballyshannon
- N17 Kilkelly Bypass
- N17 Knock to Claremorris
- N5 Swinford
- N5 Charlestown Bypass
- N5 Ballaghderreen Bypass
- N5 Collooney / Sligo Inner Relief
- N4 The Curlews
- N4 Drumsna Bypass
- N4 Dromod Rooskey Bypass
- N4/N5 Longford Bypass
- N4 Edgeworthstown Bypass
### Key Stakeholders

<table>
<thead>
<tr>
<th>Primary Client</th>
<th>Project Sponsor</th>
<th>Clients Representative</th>
<th>PSDP</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comhairle Contae Mhaigh Eo Mayo County Council</td>
<td></td>
<td>ARUP</td>
<td>ARUP</td>
<td>electricSkyline*</td>
</tr>
</tbody>
</table>

**Secondary Client(s)**
Tenderer Type / Contract Type

- Contract analysis undertaken, GCCC Dispensation
- Open Tender
- NEC3 Contract, Option B
- Suitability Assessment Questionnaire (SAQ)
  ~ as per Standard Government Contracts
Overall Projected % savings

Overall

56%

North West Lighting Bypasses
Energy Saving Lighting Project

ARUP
Castle carragh After Upgrade
Claremorris Before Upgrade
Conclusions

- NEC proved successful, managed Risk
- New Technologies
  - therefore important that a ‘partnership’ approach is adopted
- New Standard facilitating the energy saving approach
- The Industry is changing Fast!
Thank you
Any Questions