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**Client**

Asbri Planning Ltd Ltd

**Project**

Lighting design at Herbert Road, Glen Usk

**Rev**

**Date** 10 June 2022

## **Background**

Asbri Planning Ltd is working on the development of approximately 195 residential dwellings at Herbert Road, Newport. Some of these dwellings have off-street parking areas (known as parking courts) which are accessed via a ground level “underpass” under the dwellings.

Provisional planning approval has been given by the Council subject to conditions. One of which reads: “The submitted lighting details do not demonstrate that the 'underpass' parking courts could be adequately lit in the interests of general amenity and public safety without causing unnecessary lighting nuisance to neighbouring occupiers contrary to Policy GP2 of the adopted Newport Local Development Plan 2011-2026.”

Alan Tulla Lighting is an independent lighting consultancy specialising in the outdoor environment and has been asked to provide the design for the car parks and a report demonstrating compliance with the Council’s Condition.

The daytime appearance of the lighting equipment is outside the scope of this report.

*Alan Tulla, FSSL, FILP, is a Fellow and Past President of the Society of Light and Lighting and has been awarded the CIBSE/SLL Lighting Diploma. He is also a Fellow of the Institution of Lighting Professionals, ILP and lectures for them on the topic of exterior and amenity lighting. He is author of the Society of Light and Lighting “Guide to the Exterior Environment”, LG06.*

## **Summary**

The seven car parking areas have been designed to the lowest level of illumination recommended in BS 5489 "Lighting of Roads and Public Amenity Areas". This document includes recommendations for car parks.

In a few places, the furthest extremities of the parking bays fall slightly below the uniformity required but our view is that this may well be acceptable because the users are well acquainted with the spaces and the spaces are not used by the general public.

In essence, one 13W floodlight, per parking area, is mounted on a residential building at 3m above ground

This report shows the calculated spill light, if any, into adjacent areas such as gardens. It also shows spill light, if any, onto residential windows.

The results show that the car park lighting conforms to the ILP Guidance Note on Obtrusive Light, GN01.

We have also included some suggested mitigation measures such as movement sensors and timers to further reduce any possible impact.

## **Proposed lighting design and layout**

Only building mounted floodlights are used in our design and no columns have had to be used.

Our design is based on Hammond Architectural Ltd drawing PRL-01 revision L dated January 2019. Note that North is facing to the left on this drawing. Our calculations and diagrams follow the same orientation.

We are unaware of any particular ecological issues that may affect the lighting such as the presence of bats. Similarly, we are not aware of any lighting constraints in relation to the adjacent railway line.

Both the ILP guidance on Obtrusive Light, GN01 and BS 5489 on road and car park lighting use an environmental zone classification to determine recommended illumination levels. We would assume that Herbert Road would be classified as being in an E3 Environmental Zone. This is described as “Suburban, Medium district brightness, well inhabited rural and urban settlements”. This then specifies the allowable amount of spill light, intensities, light emitted above the horizontal etc.

Based on the information supplied, we have designed the lighting to meet Table 4 of BS 5489 for areas of Light Traffic. This is described as “parking areas of shops, terraced and apartment houses, cycle parks”. This table specifies an average of 5 lux at ground level with an overall uniformity (Min/Ave) of 0.25. This is the lowest level of illumination recommended for car parks.

Note that due to the irregular shape of the car parks some of the extremities, such as the furthest corners of the parking bays, may not achieve the recommended uniformity. The standard solution would be to use additional floodlights mounted on columns.

However, since the car parks will mainly be used by residents (and therefore acquainted with the layout) and not the general public, we do not consider this to be a serious issue. It is expected that the car parks will receive considerably less traffic than those used in public spaces such as a supermarket or town centre and there can therefore be some leeway in the achieved uniformity.

If there is felt to be a concern, we recommend asking advice from the Local Authority Highways Department.

Significantly, note that there is a 1.8m high, close boarded fence surrounding the car parks and this mitigating effect is included in our calculations.

We have calculated the horizontal illumination level on all seven car parking areas. We have also calculated the spill light beyond these areas taking into account the 1.8m fence, where applicable.

We have also calculated the vertical illumination on the residential windows closest to the car parks. Note that because the car park lights are controlled by movement sensors, they are only ON for a short while. I.e. the light falling on the windows will only be for brief periods. The areas calculated are shown below.

All floodlights are mounted 3m above ground and have a 15 degree upward tilt. No light is emitted above the horizontal.

For the car parks themselves, we show isolux contour lines for 1, 2.5, 5, 10, 20 and 30 lux. Due to the enclosing fences, there is little spill beyond the car park boundaries. We show horizontal spill light for values down to 0.25 lux.

As a comparison, the illumination from a full moon is generally taken to be 0.5 lux.

The vertical calculation planes show values up to a height of 6m above ground.

Similarly, we show illumination levels on the windows down to 0.25 lux.

We have included an illustration and description of the floodlights used.

Other models of floodlights or manufacturers will give different illumination results.

### **Description of car parks**

#### Car parks 1 and 2

These are symmetrical and we show the values for CP 1. The average illumination on the car park is 5.35 lux. It can be seen that there is a small amount of spill to the east beyond the car park. Values are 0.25 lux or less.

We have also calculated the vertical illumination, up to a height of 6m, on the closest windows. I.e. Properties 131 and 132. The maximum value is < 1lux, well below the allowable limit of 5 lux.

#### Car park 3

The average illumination on the car park is 7.6 lux. Due to the fence, there is no spill into the adjacent garden 174. Neither is there any spill into residential windows because the floodlight is facing East away from the buildings.

#### Car parks 4 and 6

These are identical and we show the values for CP 4. The average illumination on the car park is 6.5 lux. There is no spill light into the adjacent gardens. We also show the vertical illumination on properties 116 and 118. Here, the maximum value is 0.3 lux. This is well below the allowable limit of 5 lux.

#### Car park 5

The average illumination on the car park is 7.5 lux. There is no spill into the adjacent garden 187 and, again, because the floodlight is facing away from the properties, no light falls on the windows.

#### Car park 7

Average illumination is 7.0 lux. As with car parks 3 and 5, there is no spill into the adjacent garden 194 and because the floodlight is facing away from the properties, no light falls on the windows.

#### Tunnel/Underpasses

These areas are less critical because the light is almost completely contained within the "underpass". Typically, a single 8W, 750 lumen, bulkhead type fitting mounted on the ceiling

will provide 10 – 15 lux. Much depends on whether the walls and ceiling are pale or dark in colour.

#### Mitigation measures

We recommend that the “underpass” luminaire is fitted with a movement sensor and linked to the adjacent floodlight. Similarly, the floodlight should also be switched with a movement sensor. In this way, pedestrians or vehicles approaching from either direction will switch on both lights.

The circuit should be fitted with a timer (this is a common feature on PIR sensors) to allow residents to unload their vehicle and walk to their front door. Typically, a value of two minutes would be used.

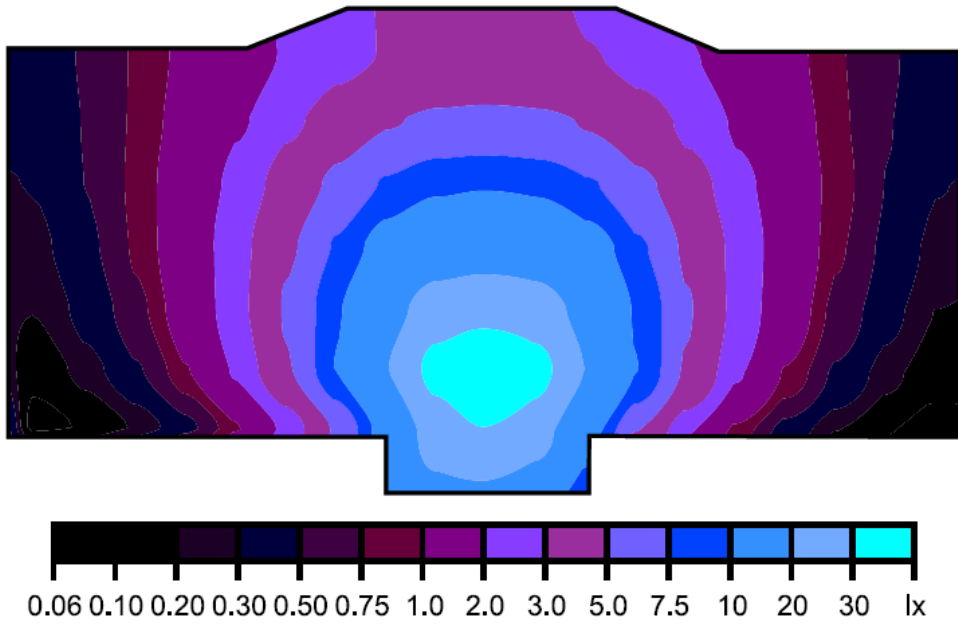
## Overview of calculation areas



The magenta areas are the parking courts which are accessed via the “underpasses”. These are described in more detail above.

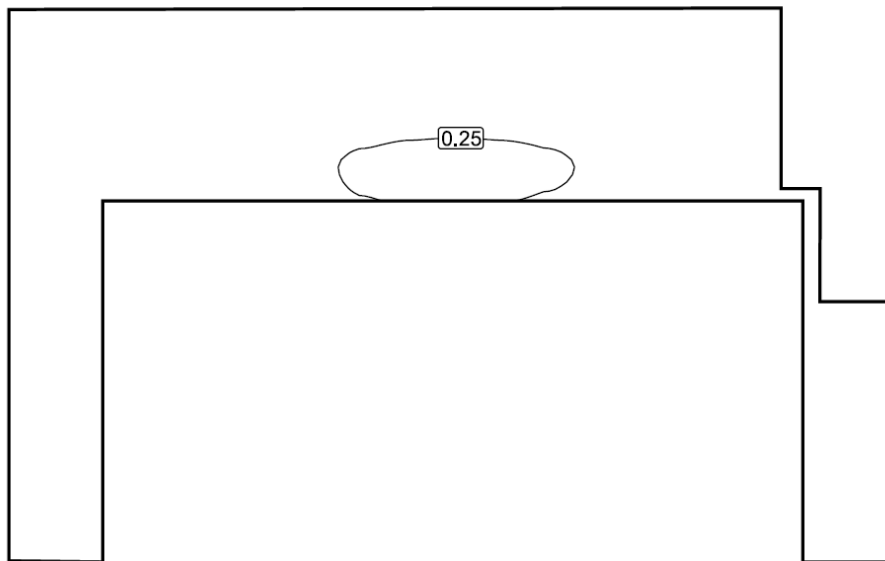


## False colours [lx]



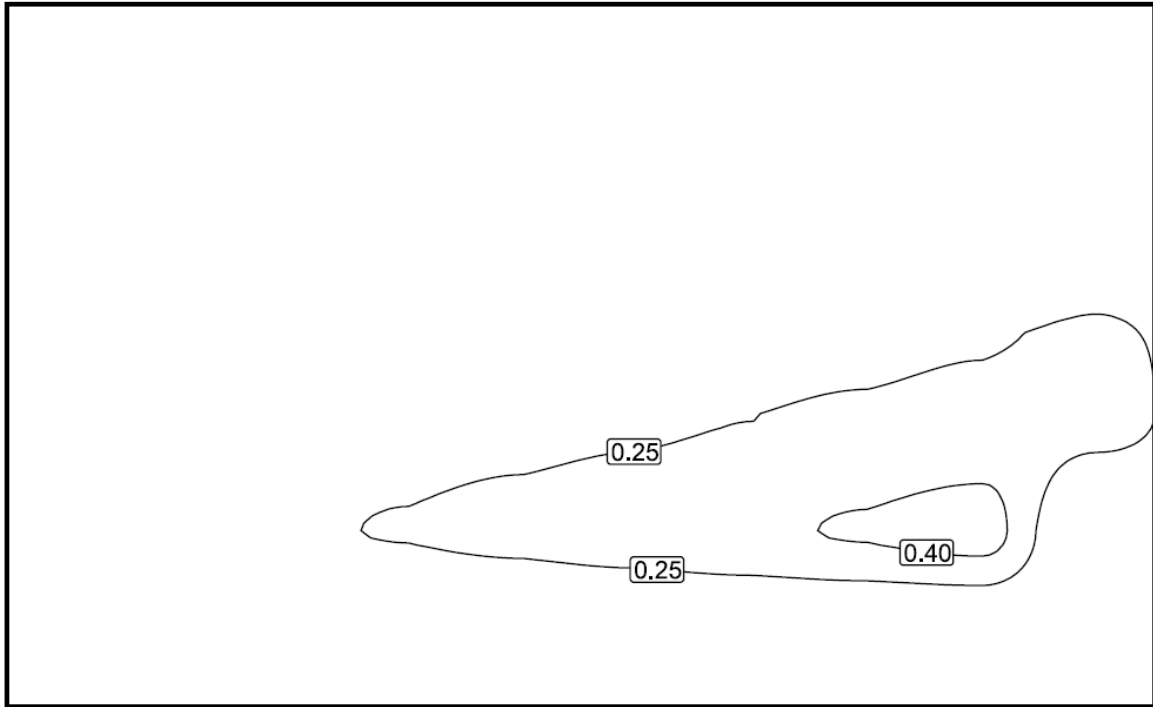
Area 1 horizontal spill shown in yellow above

## Isolines [lx]



Due to fence, this area receives 0.25 lux or less.

Area 1 vertical spill shown by red line above  
**Isolines [lx]**

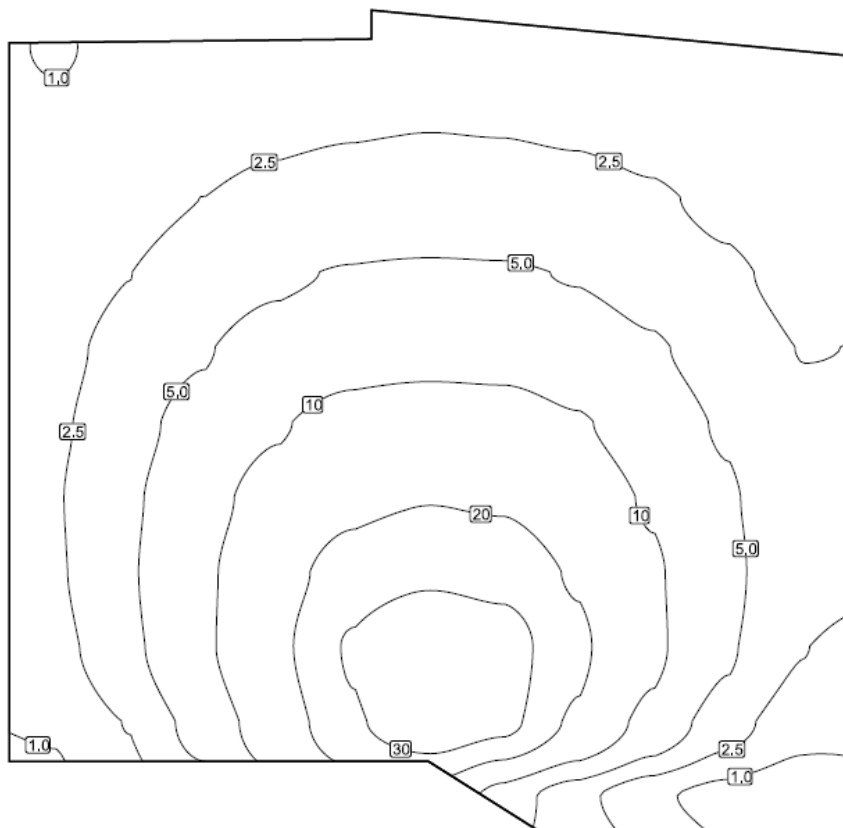


This calculation plane is 6m high and spans properties 131 and 132.

Car park 3

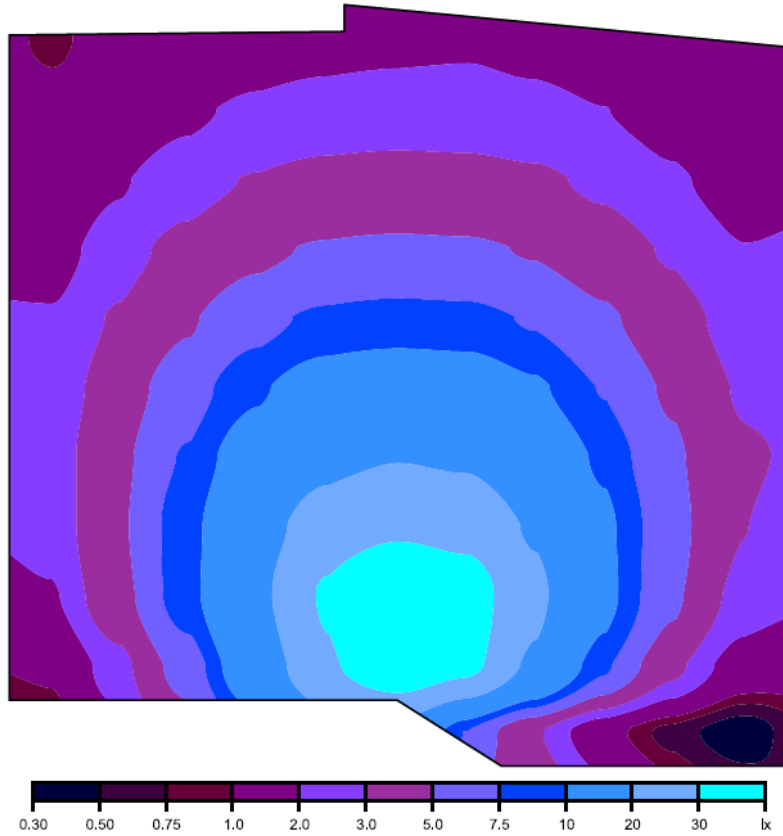


Isolines [lx]



Average of 7.6 lux.

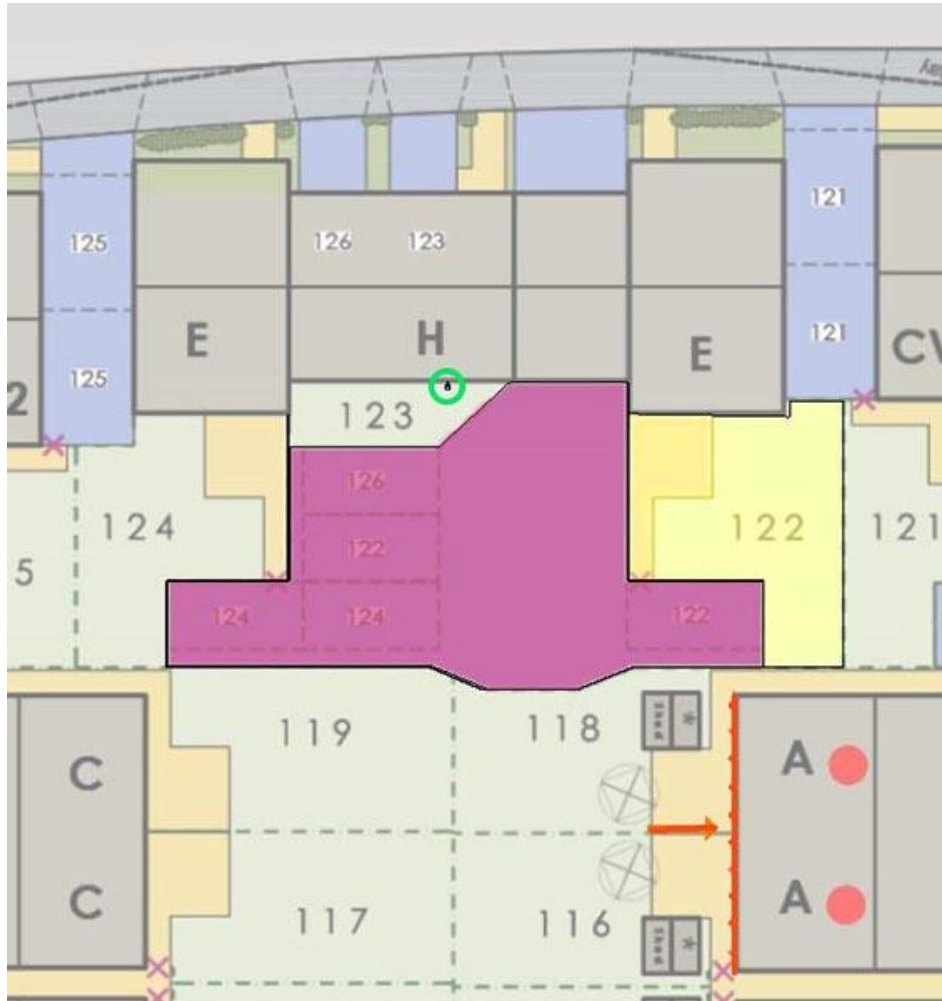
False colours [lx]



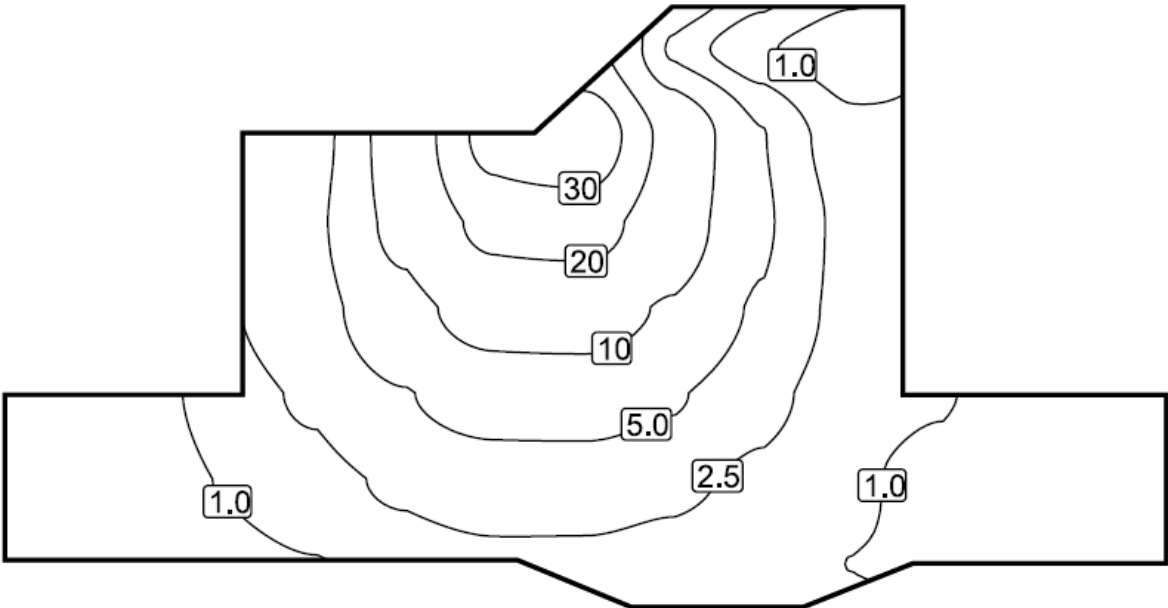
Due to the fence, there is no spill into the adjacent garden 174. Neither is there any spill into residential windows because the floodlight is facing East away from them.

Car parks 4 and 6

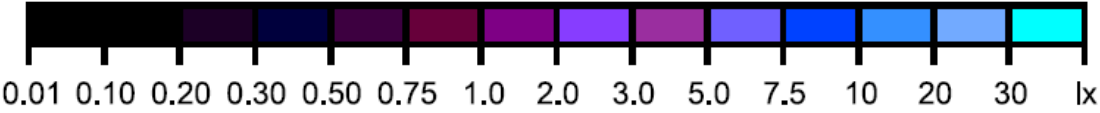
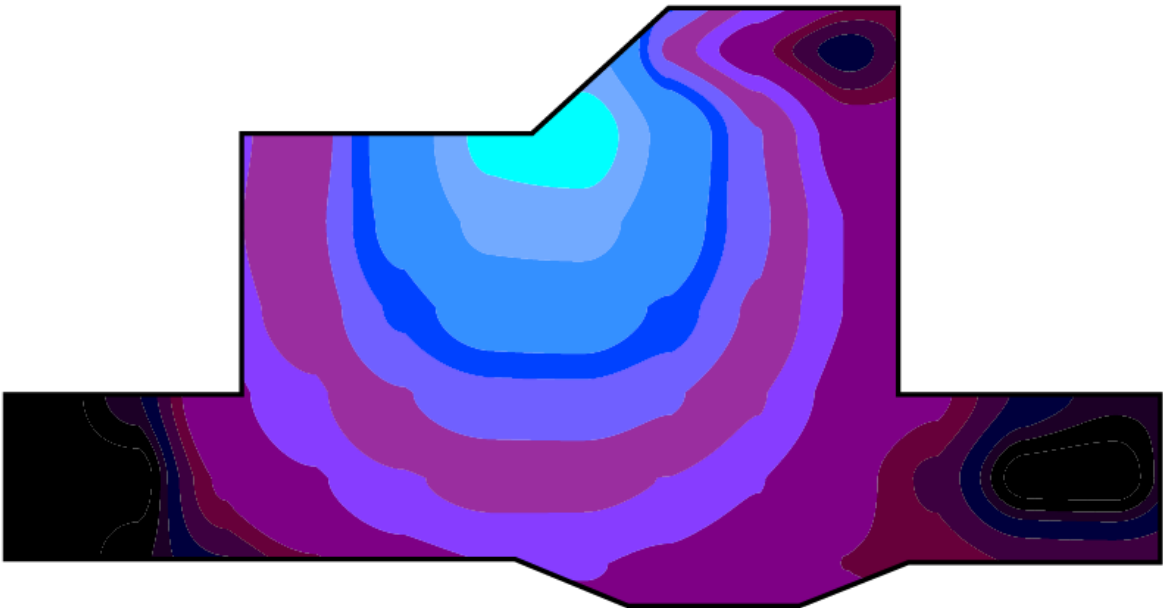
Note that these areas are symmetrical.



**Isolines [lx]**



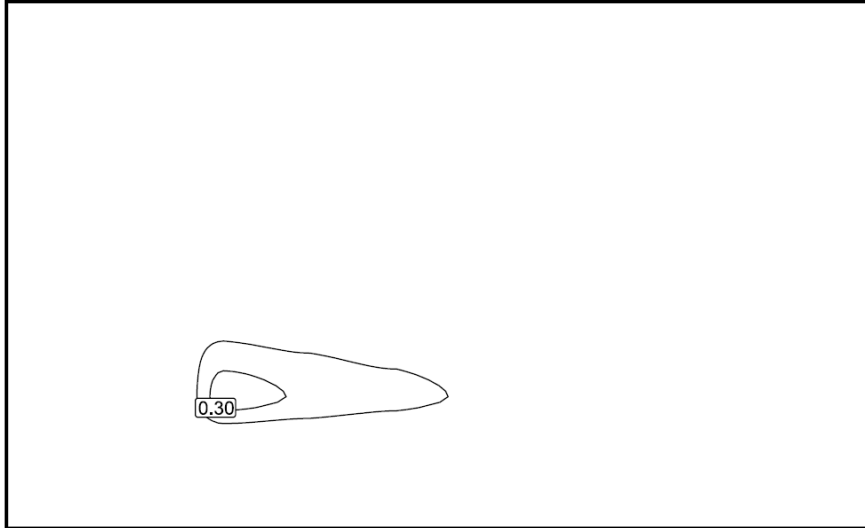
**False colours [lx]**



Average illumination is 6.5 lux. Due to the fence, there is no spill light into the adjacent gardens 122 and 124.

Area 4 vertical spill shown by red line above

Isolines [lx]

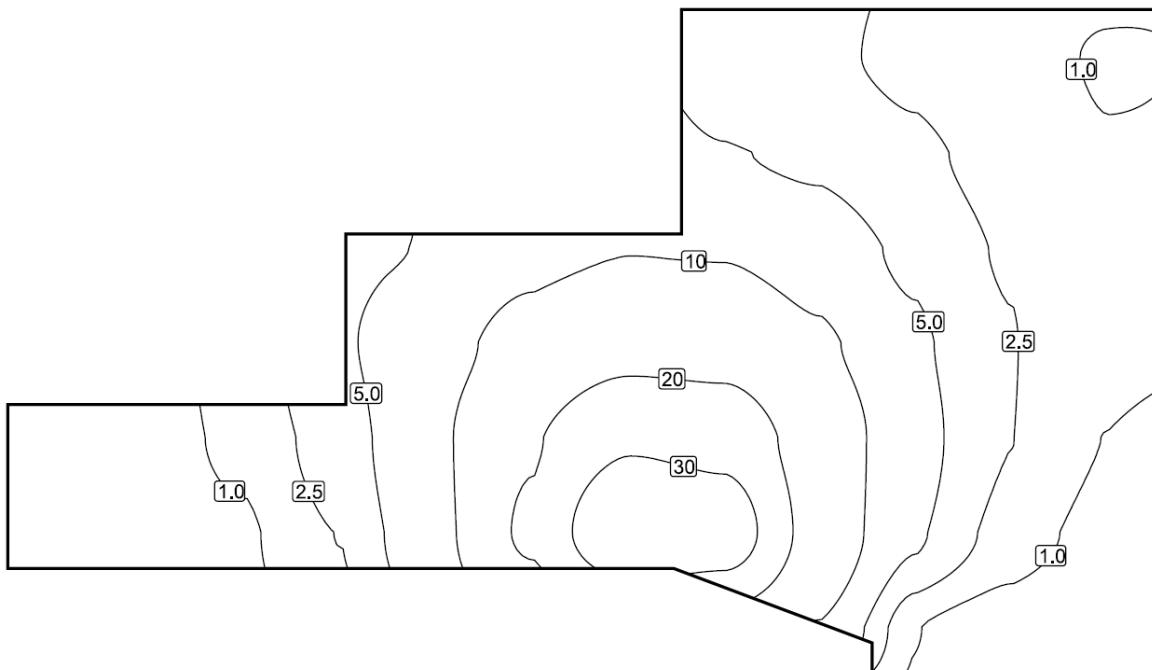


This calculation plane is 6m high the width of properties 116 and 118.

Car park 5

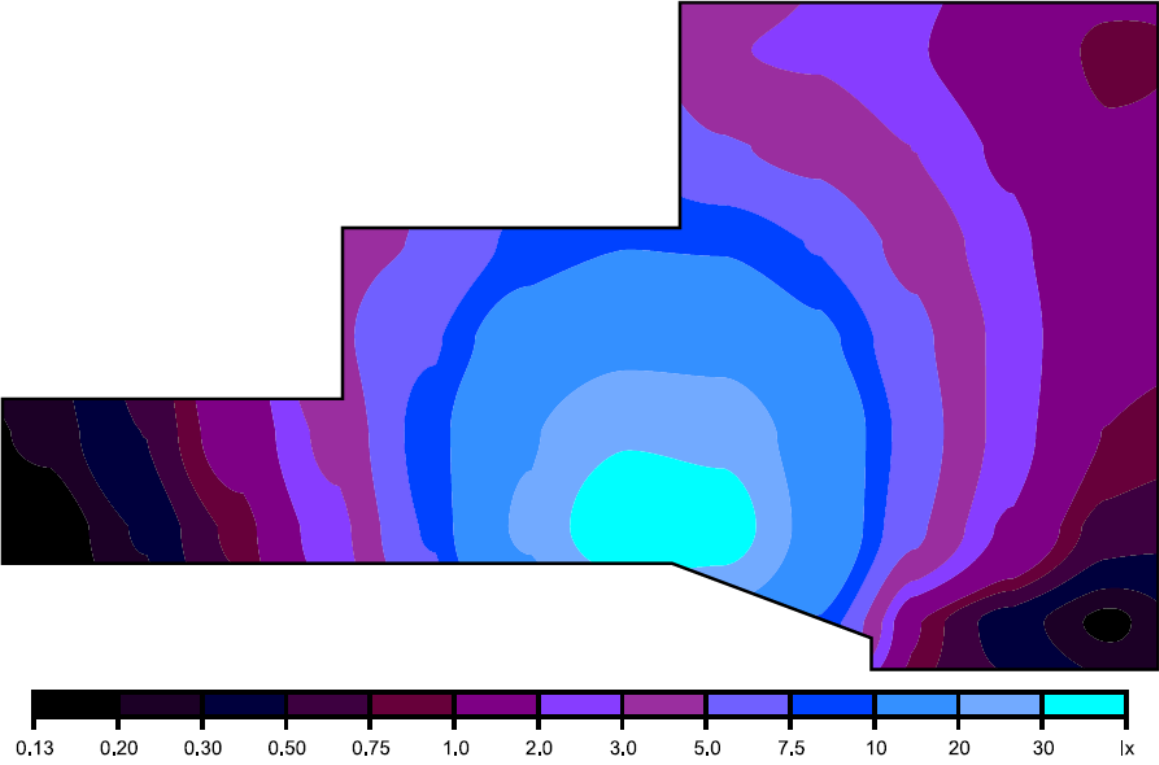


**Isolines [lx]**

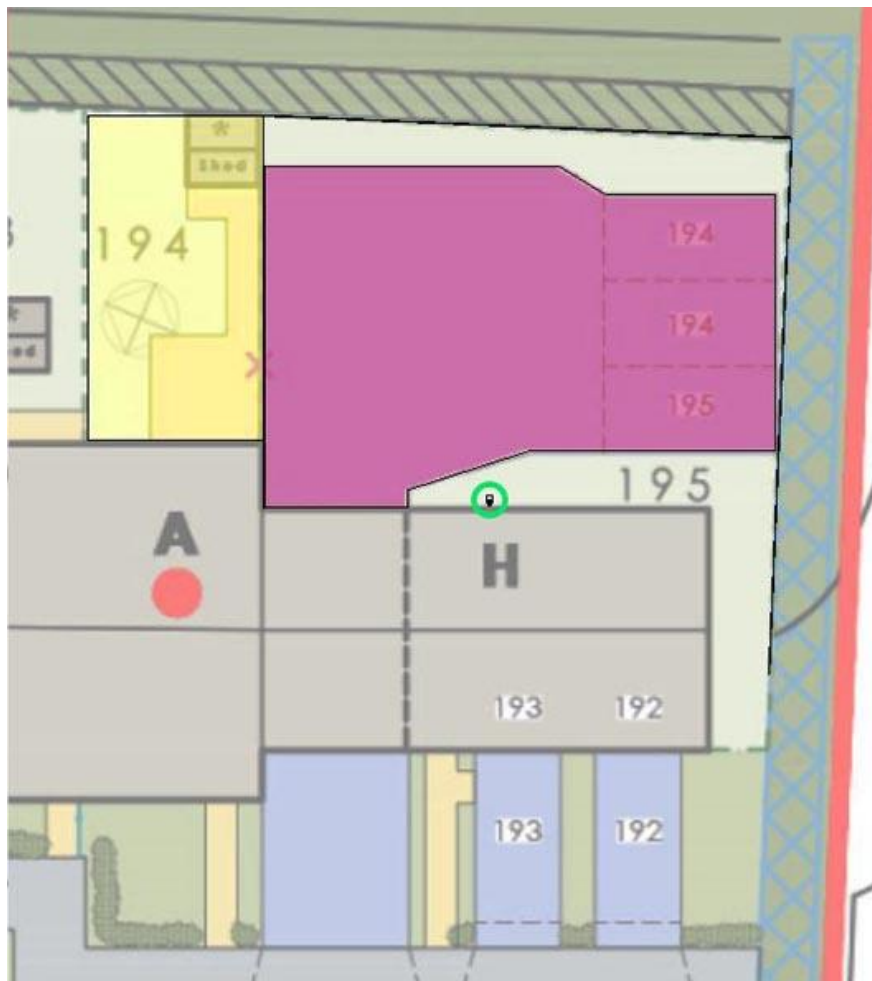


Average illumination is 7.5 lux. There is no spill into the adjacent garden 187 and because the floodlight is facing away from the properties, no light falls on the windows.

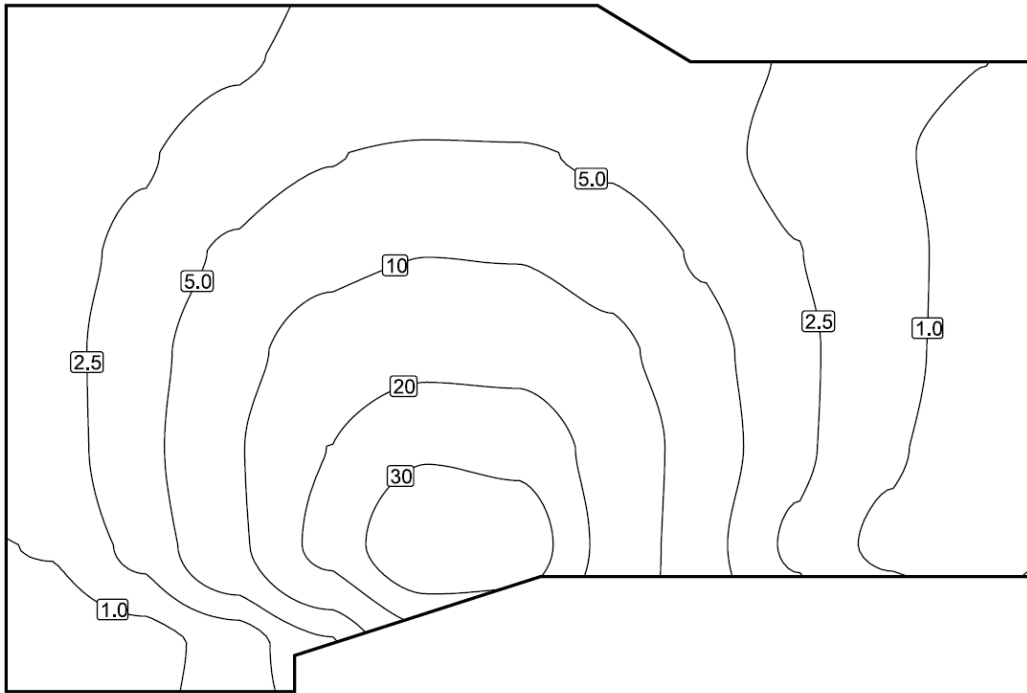
False colours [lx]



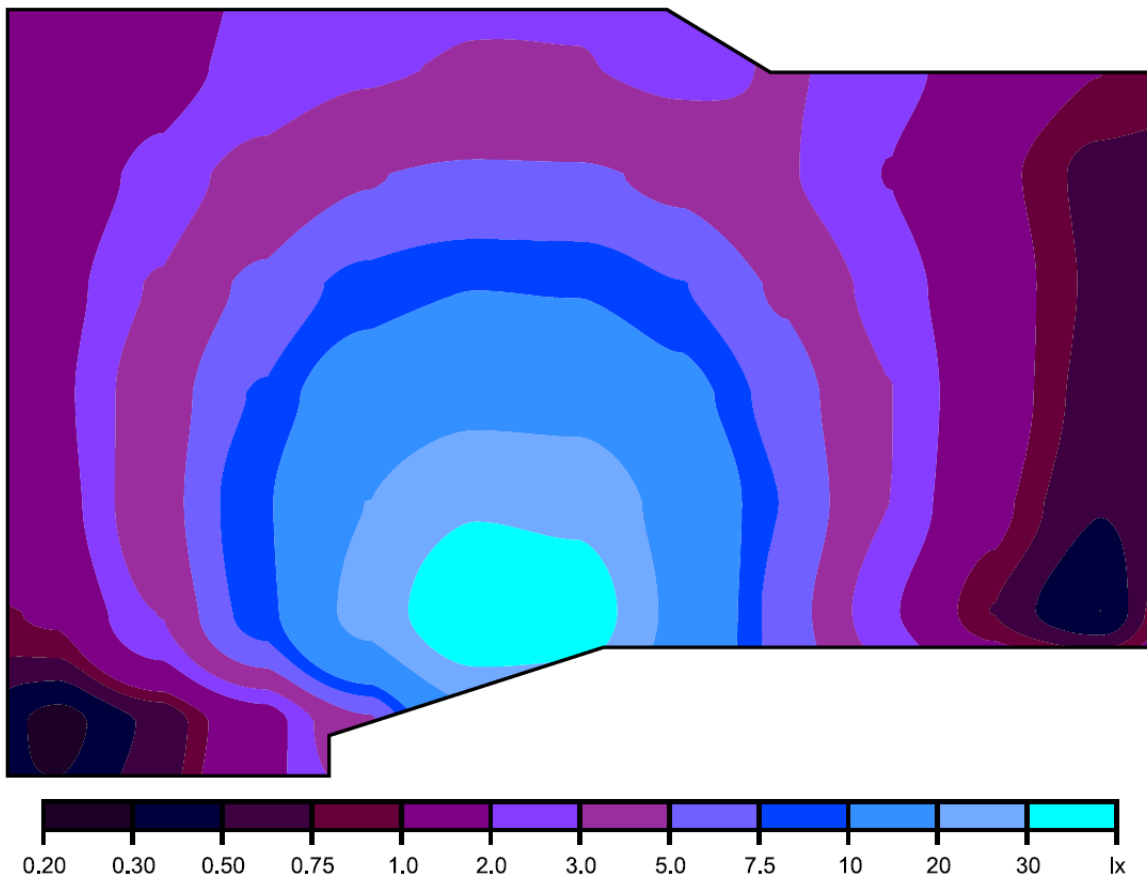
Car park 7



Isolines [lx]



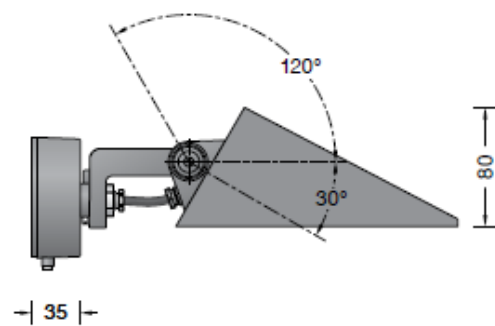
False colours [lx]



Average illumination is 7.0 lux. There is no spill into the adjacent garden 194 and because the floodlight is facing away from the properties, no light falls on the windows.

## Equipment used

### Car park lighting



This unit is 13W and uses a Warm 3000K LED source. It is manufactured by Bega, model 84256. It is mounted at 3m above ground and tilted upwards at 15 degrees in all car park locations.

### Tunnel/underpass lighting



Typical 8W, 3000K, 750 lm ceiling mounted bulkhead with polycarbonate cover. We suggest linking this with the adjacent car park fittings and switched via a motion sensor.

## Glossary of Lighting Terms

Illuminance: this is the SI term for what is normally referred to as Illumination level. It is measured in lux. It refers to the light falling on a surface. Normally this is a horizontal plane such as the ground or desktop. It can also refer to vertical surfaces such as windows and building facades. Illuminance is measured in lux.

Intensity: is measured in candelas, cd, and refers to a point source of light. Intensity values are often used in polar curves to show the distribution of light from a luminaire.

Lumen: is the SI term for luminous flux or quantity of light. A typical 8w LED “bulb” emits 600 lumens; a 1.5m fluorescent lamp emits around 5,500 lm.

Lux: is defined as an illuminance of 1 lumen/m<sup>2</sup>. A typical office would measure 300 -500 lux, a major traffic route 20 – 30 lux, a residential road 3 – 10 lux. Note that lux is normally taken to be the horizontal value but the vertical value is often relevant. E.g. vertical illuminance is important in recognising faces or light intrusion on windows.

Luminance: It is a measure of objective brightness and is a function of how much light is emitted by a luminaire or reflected off a surface. It is defined as cd/m<sup>2</sup>.

Luminaire: is the term for what is usually referred to as a light fitting. A fixture or lantern are other commonly used terms. These terms are used to distinguish them from the light source or lamp.