



Dorset Innovation Park LDO

Lighting Impact Assessment

For Purbeck District Council

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1. INTRODUCTION

Hydrock Consultants has been appointed by Purbeck District Council to provide planning stage advisory services in relation to the design and construction of the proposed Dorset Innovation Park. This document informs the Local Development Order and the Assessment will inform the drafting of the parameters, conditions and Design Guidance which, when read together, will ensure that appropriate development proposals are brought forward for consideration under applications for prior approval.

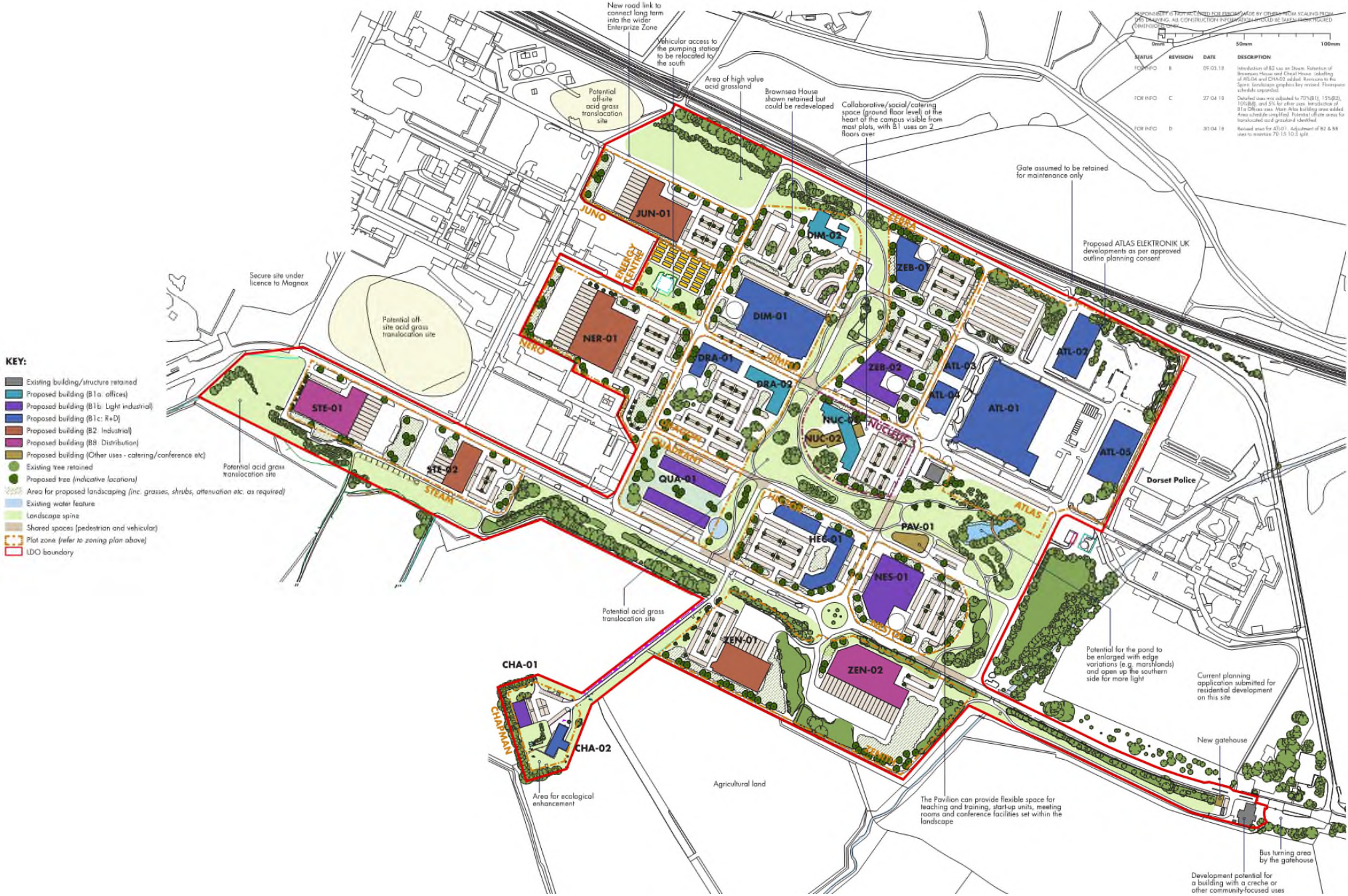
1.1 Purpose of Report

The following design statement is provided for planning purposes to describe the existing light levels on site. This statement will serve as a guide to ensure the future external lighting scheme is as unobtrusive as possible, complies with guidelines for the reduction of light pollution and to satisfy the local planners and the local community.

1.2 Development Details

Dorset Innovation Park is a new innovation park that is being developed on the site of the former Winfrith nuclear energy test facility on the edge of Wool village near Wareham. The whole development will consist of a mixture of buildings housing light industrial, research & design, industrial and distribution.

Technical assessments relating to the proposed development are based upon an Illustrative Masterplan. This is set out in Figure 1 and is appended to the Statement of Reasons. The Illustrative Masterplan presents one potential development scenario and is reflective of the urban design and development plot principles set out within the Design Guide. The masterplan shows a scheme of 14 plots, consisting of 26 buildings.



2. LEGISLATION, POLICY AND GUIDANCE

2.1 National Legislation

National Legislation is given in the following documents:

- Environmental Protection Act 1990;
- Clean Neighbourhood and Environment Act 2005;

The statutory regime within these documents has been amended to include the light spill glare from lighting installations within different premises: 'artificial light emitted from premises so as to be prejudicial to health and nuisance'.

Under Section 79 of the Environmental Protection Act 1990, local authorities have a duty to take notice and act accordingly to investigate any complaint regarding artificial lighting of statutory nuisance. Once statutory nuisance may occur, local authorities must issue an abatement notice requiring that the nuisance cease or be abated within a set timescale.

2.2 National Planning Policy

The National Planning Policy Framework (NPPF) 2018 states that: "Planning policies and decisions should also ensure that new development is appropriate for its location taking in account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

The Planning Policy Guidance (PPG) states that: "Artificial light provides valuable benefits to society, including through extending opportunities for sport and recreation, and can be essential to a new development. Equally, artificial light is not always necessary, has the potential to become what is termed 'light

pollution' or 'obtrusive light' and not all modern lighting is suitable in all locations. It can be a source of annoyance to people, harmful to wildlife, undermine enjoyment of the countryside or detract from enjoyment of the night sky. For maximum benefit, the best use of artificial light is about getting the right light, in the right place and providing light at the right time."

2.3 Local Planning Policy

The local policies are summarised in the Purbeck Local Plan adopted on 13th November 2012. Policy D: Design states that:

- The council will expect proposals for all development and other works to:
 - » Positively integrate with their surroundings;
 - » Avoid and mitigate effects of overshadowing, overlooking and other adverse impacts including light pollution from artificial light on local amenity; and
 - » Demonstrate support for biodiversity through sensitive landscaping and through in-built features, which provide nesting and roosting facilities for bats and birds.

Policy LHH: Landscape, Historic Environmental and Heritage states that:

- Proposals for development and other works will be expected to conserve the appearance, setting, character, interest, health and vitality of the landscape (including trees and hedgerows) and heritage assets - be these locally, nationally or internationally designated or otherwise formally identified by the Local Planning Authority. In considering the acceptability of proposals the Council will assess their direct, indirect and cumulative impacts relative to the significance of the asset affected, and balance them against other sustainable development objectives.

- Proposals that would result in an unacceptable impact of light pollution from artificial light on intrinsically dark landscape and nature conservation will not be permitted.

2.4 Legislation and Guidance for Lighting Effects on Bats

In the United Kingdom, all bats are protected by law. The following documents form the legislative framework for the protection of bats:

- The Wildlife and Countryside Act 1981;
- The Conservation of Habitats and Species Regulations (2017).

According to the above mentioned documents, it is illegal to:

- Intentionally or recklessly disturb a bat while it is occupying a structure or place of shelter or protection;
- Intentionally or recklessly obstruct access to a structure or place used by a bat for protection or shelter.

The Bat Conservation Trust has published documents that offer guidance on artificial lighting for new or existing developments around bat sensitive areas.

Landscape and Urban Design for Bats & Biodiversity make the following recommendations:

- No bat roost should be directly illuminated;
- The type of lamp specified does not have an adverse impact on bats foraging and commuting patterns;
- The height of the lighting columns should be as low as possible;
- The light should be as low as guidelines permit;
- Road and trackways in areas important for bat foraging and commuting areas should provide stretches left unlit to avoid isolations of bat colonies.

2.5 Ecological Mitigation Report

A preliminary ecological appraisal has been prepared by Lindsay Carrington Ecological Services, and summarised here:

- The site is immediately adjacent to the internationally protected Dorset Heathlands Special Protection Area (SPA) and Ramsar, Dorset Special Area of Conservation (SAC) and Winfrith Site of Special Scientific Interest (SSSI) therefore consideration to the potential impacts on site habitat and their qualifying features will be required. Natural England have confirmed that with suitable access restriction from the site that they do not consider potential recreational impacts to be an issue given the nature of the proposals;
- Lowland Dry Acid Grassland Priority habitat, a Habitat of Principal Importance (HoPI) under the Natural Environment and Rural Communities Act (2006) has been recorded at various locations around the site and includes the nationally scarce bearded fescue (Edwards, B. 2016). This should be retained in the first instance but where this is not possible, a mitigation strategy will need to be agreed;
- A country level importance bat assemblage has been recorded foraging and commuting on the site which includes the Annex II species greater horseshoe and barbastelle. The dark corridors around the site will be retained, additional foraging and commuting habitat will be designed into the landscaping proposals and a sensitive lighting strategy designed;
- Low populations of sand lizard, smooth snake and grass snake, good populations of common lizard and slow worm are present primarily at the boundaries of the site in habitats that will not be impacted by proposals;

- Signs of badger have been recorded on the site although no setts have been identified.
- Otter and potential water vole are present on the stream to the east of the site boundary which is unlikely to be impacted by proposals.

3. BASELINE LIGHTING SURVEY

The baseline survey consists of a desk top survey of the site and a night-time on-site survey of the area, identifying and commenting on the existing lighting profile across the entire site and immediately adjacent areas. This is completed through:

- An assessment of the site, adjacent areas and sensitive receptors;
- On site measurements of typical existing lighting conditions in terms of lighting levels (lux), light quality and possible existing light pollution issues;
- Establishing the site and surrounding area Environmental Zone ratings as per Institute of Lighting Professionals (ILP) guidance.

The survey and report clarifies the known light pollution issues and will enable a review of the results against the criteria identified by the various lighting and environmental bodies, national and local policy and standards.

3.1 Desk Study

Guidance Notes for the reduction of Obstructive Light GN01:2011 classifies environmental zones into five categories, shown in Table 1.

The lighting limitations for each environmental zone are described in Table 2, extracted from the same document. A survey of the site and Environmental Zone classification of the site's receptors are described in the next section.

3.2 Site Study

The survey was undertaken on Wednesday 14th February 2018 between 6:30pm and 12:30pm. At the start of the survey, the weather was wet with heavy cloud coverage however this developed into to a dry but clouded sky with very little visible moonlight.

The proposal of the survey has been to review any existing artificial lighting on or near the site, the illumination of the adjacent roads and external lighting of nearby residential buildings. The data collected will serve to determine the impact of the development's eventual proposed lighting strategy. A good understanding of the future nature of the site, the surrounding areas and any potential sensitive areas is needed to determine the right external lighting solutions.

The measurements have been taken using a handheld lux meter. Both horizontal and vertical illuminance measurements were taken at each location, at 0m and 1.5m above ground respectively.

Spot and line measurements have been taken throughout the site to record average lux levels and to assess the lux profile of the existing luminaires.

More detailed measurements have been taken along the Northern, Southern and Western boundaries of the site as these are the locations of the light sensitive bats.

These areas are shown more clearly in Figure 2.

No photos were permitted on site at the time of the survey.

3.3 Site Description

As the site is currently home to existing businesses, a variety of lighting is found on the site. The key illuminance sources visible during the survey were provided by street lighting columns along the main roads located within the site. The survey focused on the following locations, which are also indicated in Figure 3.

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically	National Parks, Areas of Outstanding Natural Beauty
E2	Rural	Low District Brightness	Small Town centres or suburban locations
E3	Suburban	Medium District Brightness	Small Town centres or suburb locations
E4	Urban	High District Brightness	Town/City centres with high levels of night-time activity

Table 3: Environmental Lighting Categories

Zone	Sky Glow ULR (Max %)	Light Intrusion (into windows) E _v (Lux)		Luminaire intensity I (candelas)		Building Luminance L (Pre-curfew)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average L (cd/m2)
E0	0	0	0	0	0	0
E1	0	2	0(1*)	2500	0	0
E2	2.5	5	1	7500	500	5
E3	5	10	2	10000	1000	10
E4	15	25	5	25000	2500	25

Table 4: Obtrusive Light Limitations for Exterior Lighting Installations - General Observers.
(ULR = Upward Light Ratio of the installation; E_v = Vertical illuminance in lux; I = Light intensity in candelas; L = Luminance in candelas per square meter.
*permitted only from public road lighting installations.)

3.4 Receptor Assessment

All measurements have been captured in drawings DIP-HYD-00-GF-DR-E-9000 to 9003, shown in Appendix A. Each area has been analysed and categorised into respective Representative Environmental Zones based on Tables 1 and 2.

	Receptors	Description
1	Security & Monterey Avenue (East)	Main entrance road
2	Willow Road and Laboratory	Road; Car Park
3	Monterey Avenue (West) to Gate	Road;
4	Unnamed road to the north, adjacent to train line	Farmland
5	Willow Road (East)	Open Space/Parkland

Table 2: Areas analysed in baseline survey.

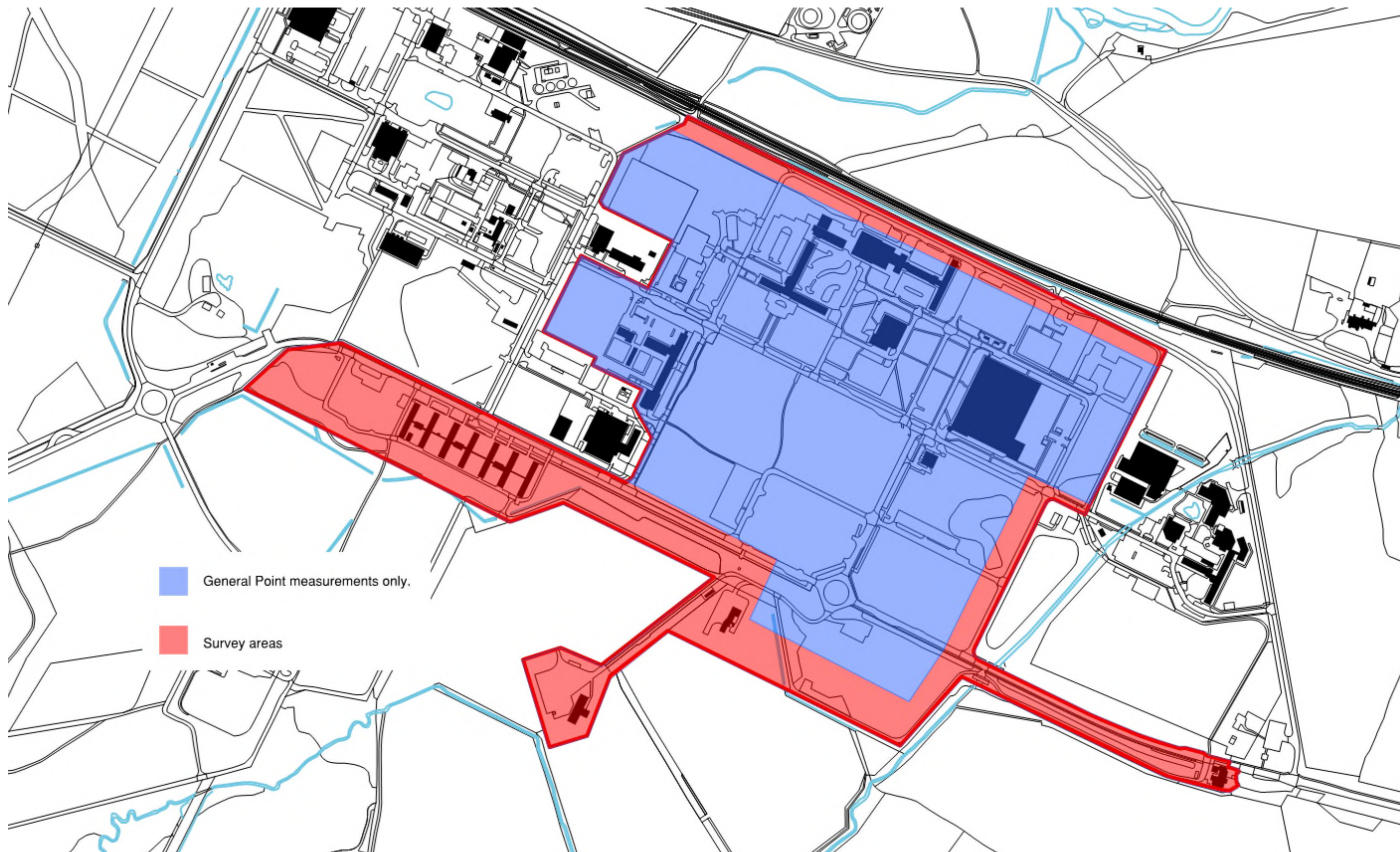


Figure 2: Areas analysed in baseline light survey.

Site Location	Lux Levels Recorded	Lamp Type	Representative Environmental Zone	Comments
Entrance Security and Monterey Avenue	An average of 24 lx along Monterey Avenue.	LED column luminaires.	E3 - Suburban	14no. column luminaires illuminate Monterey Avenue from the security entrance to the first roundabout. They provide an average illuminance of 24 lx however these columns have varying intensities and colour temperatures. A thin strip of foliage separates Monterey Avenue from a pathway, this prevents light spill onto the pathway which has an average illuminance of 0.98 lx. The security building itself houses two batten luminaires which provide intense illumination just behind the building [71.2 lx]. A floodlight is also situated just outside of the site, directing light onto the main entrance barrier to provide enough illuminance for clear facial recognition.
Willow Road (South)	Mostly 0 lx, illuminance levels rise around security light.	1no. wall mounted security lighting present, fluorescent lamp.	E2 - Rural	No street lighting present along Willow Road, only source of illuminance from 1 no. security light affixed to small building at the top of the road.
Weatherford Labs	Mostly 0 lx, lux levels rise around security light and drop off into car park.	3no. wall mounted security lighting present, fluorescent lamps.	E2 - Rural	No street lighting present in the car park. 3no. security lights affixed to Weatherford Labs building. Strong illuminance directly underneath lamps [av. 166 lx] however this drops quickly approximately 3m away [av. 4.48 lx].
Monterey Avenue (West) to Magnoux Gate	An average of 20.3 lux on road, drops off to 0 lux on demolished building site and to the south.	LED column luminaires.	E2 - Rural	17no. column luminaires illuminate Monterey Avenue to the west of the site up to Magnoux Gate. They provide an average lux level of 20.3 lx however these columns have varying intensities and colour temperatures. The columns are mostly facing inwards towards the centre of the site, this allows the lux levels quickly drop off to 0 lux, with the southern edge of the site receiving no light spill.
Unnamed Road to the North	An average of 16.9 lx along the road, dropping to an average of 0.9 lx roughly 5m in from the road.	LED column luminaires.	E3 - Suburban	13no. column luminaires provide an average of 16.9 lx along the road, this is a lower level than most roadways found on the site. As the train line is located directly adjacent to the road (due north), all column luminaires are facing inwards towards the centre of the site, this along with dense foliage to the north of the road greatly reduce the light spill onto the train line.
Willow Road (East)	An average of 22.4 lux on road, dropping to an average of 1.8 lx roughly 10m in from the road.	LED column luminaires.	E3 - Suburban	8no. column luminaires provide an average of 22.4 lux on the road. The road is well lit with columns facing both inwards to the centre of the site and outwards to the east. A tall evergreen treeline prevents the light spill of these luminaires from impacting Dorset Police Headquarters land.
Centre of Site	Average 26.8 lx on roadways, dropping to 0 lux roughly 20m in on open spaces.	LED column luminaires present throughout the centre of the site, some buildings also have existing wall mounted or bollard luminaires to provide a welcoming entrances and safe access.	E3 - Suburban	The centre of the site is generally well lit with column luminaires along most roads providing an average lux level of 26.8 lx. A few roads are not currently lit, or the columns were not switched on during the survey. The columns have a variety of intensities and colour temperatures throughout the site. The lux levels drop to 1 to 2 lux roughly 5m in from the road, and finally down to 0 lux roughly 20m in from the road.

Table 5: Summary of baseline lighting survey findings.

3.5 Baseline Survey Conclusion

The site existing lighting levels have been recorded and the most important surrounding areas have been identified. These areas have been categorised according to the environmental indices mentioned above.

Throughout the centre of the site, existing lux levels are moderately high due to existing street lighting. New development in these areas should not change the existing light levels or impact on the nearby environment noticeably.

However, care should be taken in the northern, eastern and southern edges of the site specifically, as various species of light sensitive bats have been recorded in these areas. The light levels in these areas are very low, mostly < 0.5 lux, and any new development should seek to not increase these levels further.

3.5.1 Design Guidance

The following documents should be consulted and adhered to when designing the external lighting strategy for the scheme:

- ILP Guidance Notes for the Reduction of Obtrusive Light GN01:2011;
- CIBSE Lighting Guide 6 (LG6) – Outdoor Environment;
- CIBSE SLL Code for Lighting 2012;
- BS 5489-1:2013 – Code of Practice for Design of Road Lighting;
- CEN/TR 13201-1: Road Lighting – Part 1: Selection of Lighting Classes;
- CIE – Guidelines for minimising Sky Glow;
- Bat Conservation Trust: Artificial Lighting and Wildlife Interim Guide 2014;
- Royal Commission on Environmental Pollution – Artificial Light in the Environment.
- The ILP Guide for the Reduction of Obtrusive Lights is the primary document

used by most local councils and planning departments to categorise the provision of external lighting. External lighting should be compliant to Dark Sky requirements and to Lighting Environmental Zone CIE E2.

3.5.2 Potential Recommendations for Future External Lighting Proposals

- The use of directional, LED lamps is recommended to both save energy and ensure that light is only directed to the required areas.
- The use of timeclocks and photocells are recommended as a minimum to control the times that the external lighting is switched on. Passive Infrared Sensors (PIRs) can also be used, mainly on building perimeters, to only switch external lighting on when activated.
- To protect bat sensitive areas, the best strategy is to avoid lighting the area at all, only using artificial illuminance if deemed necessary. However, the use of cowls can be introduced in bat sensitive areas to ensure that light is not directed into areas where it is not needed. Bat sensitive areas should not be lit above 0.5 lux.
- To allow bats to cross the site to forage for food, bat corridors of 0 lux can be accommodated into the street lighting strategy.
- A range of lamp colour temperatures were found on site, from < 2,700 K to 4,000 K. It is recommended that any new fittings use a similar colour temperature to create continuity throughout the site. A warm white such as 3,000 K is recommended to create a warm, welcoming environment and reduce the emission of white and blue wavelengths of the light spectrum.
- Woodland planting and landscape screening around the edges of the site can help mask the light spill from the external

lighting, and improve the ecology of the site.

- The above measures are incorporated into the Design Guide for the site.

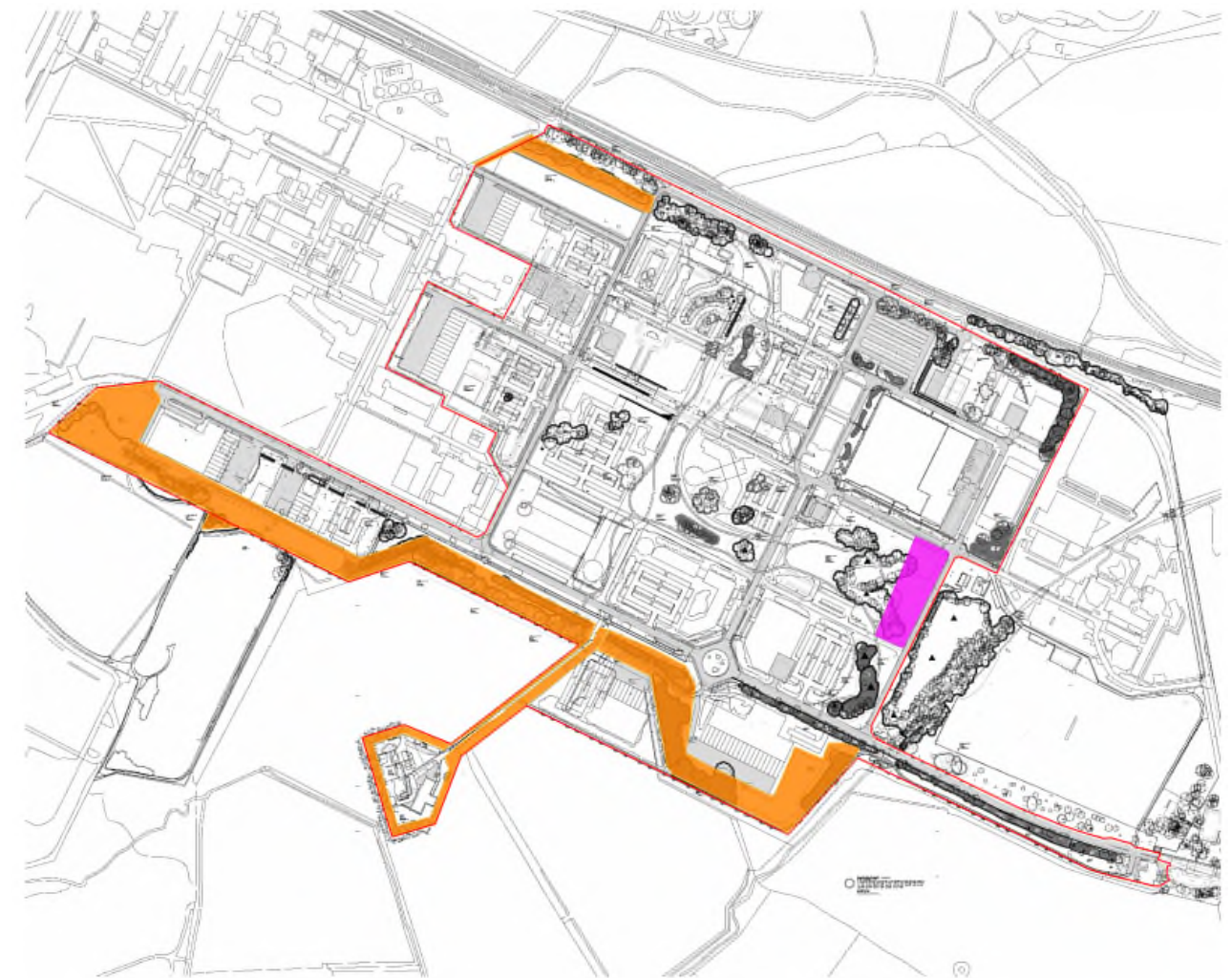


Figure 3: Site constraints plan (Landscape and Ecological Management Plan (LEMP) courtesy of Tyler Grange, 2018).

- Site boundary
- Existing dark corridors retained (<0.5 lux)
- Existing lux levels to be reduced (<0.5 lux)