Future Water
MJJV Ltd

Portsmouth Water

Havant Thicket Reservoir

Construction Lighting Strategy

16 June 2024 | Rev P02.2

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1. Introduction and Scope

1.1 Introduction

1.1.1 This Construction Lighting Strategy (CLS) supports the planning application submitted to Havant Borough Council (HBC) and East Hampshire District Council (EHDC) on behalf of Portsmouth Water. The application pertains to Reserved Matters and the fulfilment of Planning Conditions concerning the construction of the Main Reservoir Works, including the Main Embankment, Wetlands Embankment, Wetland Structures and Culvert, in association with the Hybrid Planning Permission (reference to APP/20/00990 and 51680/001). This permission relates to the construction of a reservoir and its associated infrastructure, known as the Approved Scheme, situated on land at Havant Thicket. This location is adjacent to Sir George Staunton Country Park and Middle Park Way in Havant.

Table 1.1

Location	Havant Thicket Reservoir, Havant Thicket, Havant.PO9 4ET NAR
Expected Start and Finish Dates	Estimated completion date May 2029
Brief Explanation of Works	Future Water MJJV has been appointed to undertake: Construction of new reservoir at Havant Thicket; installation of a new Northern and Southern Access Track, complete with control house and visitor centre; construction of new drawdown and fill pipeline; modifications at Bedhampton pumping station; new pipeline route to Farlington WTW; and treatment modifications to existing works at Farlington WTW, Various culverts and drainage. Construction of the site compound at the end of the Northern Construction of Access Track and Satellite Compound Access route, highlighted in blue below as 'Main Compound'
Neighbouring Occupiers	North – Forestry Commission land East – Forestry Commission land & B2149 South – Staunton Country Park & residential East – Residential & public right of way

1.1.2 The Main Reservoir Site, comprising the main reservoir embankment, wetlands embankment, Wetland Structures, cut-offs and Culvert, is located to the north of the town of Havant, in Hampshire. The Main Reservoir Works lie within the two local planning authorities of Havant Borough Council (HBC) and East Hampshire District Council (EHDC).

1.2 Purpose of this document

1.2.1 This Construction Lighting Strategy (CLS) sets out mitigation measures to be applied to the construction activities being undertaken as part of the Havant Thicket Reservoir works, to reduce the potential for significant impacts from light emissions. This document has been produced to mitigate the impacts of construction lighting to residents and fauna to fulfil planning condition 20 which states:

1.2.2 "No phase of the development approved under Condition 4 shall commence until a Lighting Strategy for that phase or parcel has been approved by the local planning authority. The Strategy must include: - Proposed specifications for external lighting of service areas, parking, buildings, signs, open space and access junctions.

1.2.3 The purpose of this CLS is to ensure that the construction activities for the Havant Thicket Reservoir comply with relevant European and UK legislation, LPA conditions, environmental commitments as set out in the Environmental Statement (ES), and environmental and construction best practice.

1.2.4 This CLS will outline measures to prevent obtrusive light to residents and distraction of motorists, and measures to minimise light pollution that could affect wildlife.

1.2.5 The measures contained herein will form part of the contractual agreement between Portsmouth Water and its Principal Contractor (Future Water) and the implementation and compliance will be monitored by the Construction Management Team. These measures will only be revised with the agreement of East Hampshire County Council (EHCC) and Havant Borough Council (HBC).



Figure 1: Site Plan

2. Construction Details

2.1 Construction Works Over view – HTR

2.1.1 The construction works related to the Havant Thicket Reservoir Project are to be carried out within the 160ha Main Reservoir Works (MRW) site boundary. The works require several phases of construction within the site to construct the Reservoir that are broken down as follows:

Enabling Works – Drainage, archaeological investigation, ground remediation, Northern Access, Site Compound and temporary workers accommodation
Access track and satellite compound construction
Wetlands Retaining Structure (Earthworks)
Wetlands flow control structures
Main Embankment Earthworks
Main Embankment Culvert
Control House
Valve Tower (Inc Secondary Means of Access)
Installation of MEICA (Mechanical, Electrical, Instrumentation, Control & Automation) and associated fit out
Southern Access Road
Spillway
Soft and Hard Landscaping
Raising of existing Forestry England track & construction of 2nr new culverts

2.1.2 Further breakdown of construction methodology can be found in the Construction Method Statement (HTR-FUW-RZ-RE-MS-W-0505).

2.2 Establishment of Site Compounds

2.2.1 The Main Site compound will be created by excavating soil, overseen by ecologists and archaeologists, and carried out in accordance with the measures to protect and conserve in-situ soils resources set in the Soil Management Plan (HTR-FUW-P2-RE-RM-W-0006) submitted separately pursuant to Condition 39. Cut and fill requirements will be met, and below-ground ducts and drainage installed. Tarmac surfaces will cover car parks and access roads. Foundations for project accommodation will be established, surrounded by a 2m high chain-link fence with controlled access. A satellite compound for the workforce will be built. Double-stacked units will arrive on lorries, craned into place. Utilities connected, offices fitted, and deliveries coordinated to avoid traffic congestion. Line marking completes the site compound establishment.

2.3 Construction of temporary drainage system, access track & haul roads

2.3.1 Before commencement of the main site works, grass in designated areas will be cut supervised by an ecologist and project ECOW (Ecological Clerk of Works). Excavators and bulldozers will strip topsoil and subsoil according to an agreed scheme with the County Archaeologist. Material will be moved to stockpiles by ADTs. Temporary drainage, culverts, and lagoons will be shaped following approved designs. Haul roads will be constructed with crushed stone and geogrids or site-won materials. Watercourses will be diverted, including installation of settlement ponds for water treatment. Culvert crossings for construction traffic will be installed.

2.4 Construction of Wetlands Earth Embankments & Control Structures

2.4.1 Material for the Wetlands Embankment will be sourced from on-site borrow pits. Excavators and bulldozers strip topsoil and subsoil, following an agreed scheme with the County Archaeologist. Clay is excavated, loaded into ADTs, transported to deposition points, and then compacted in layers using bulldozers and rollers, guided by GPS. Testing ensures adherence to specifications, and control structures for water levels are built within the embankment. After completion, topsoil is placed on slopes, and an access track is constructed.

2.4.2 Control structures will be built within the embankment to maintain the required water levels in the area when the reservoir is operational. Where possible these will be constructed from pre-cast concrete elements to reduce the amount of assembly and construction on site. Elements will be delivered to the compound and taken to the workface by excavator & installed.

2.5 Construction of Reservoir Earth Embankment

2.5.1 The primary embankment construction involves excavating clay from on-site borrow pits, transporting it via haul roads, and compacting it using bulldozers and rollers. GPS-guided equipment ensures precise placement. Clays undergo testing to meet specifications, with a geotechnical engineer overseeing the process. Ground improvement precedes embankment work, and drainage materials are imported, placed, and compacted. Throughout the earthworks season (March to September), GPS aids in trimming embankment zones. Topsoil is added for protection between seasons. The multi-season project expects completion in 3-4 years, with ongoing winter water management on-site while civil works persist. No earthworks occur in winter, but teams manage water, ensuring environmental preservation.

2.6 Construction of Reservoir Culvert

2.6.1 The scheme involves constructing new reinforced concrete control structures, with the embankment culvert and valve tower being the most significant. For their construction, a 20m-wide working platform will be created along the culvert's centreline. The platform's footprint will be excavated, lined with stone mattress and blinding, ensuring a level working base. Excavated material will be retained for testing and reuse. Reinforced concrete structures will follow standard procedures, with lattice-boomed crawler cranes, excavators, and concrete pumps assisting. Below-ground structures will use proprietary excavation support systems, subject to Temporary Works approval and design.

2.7 Valve Tower Construction

2.7.1 After culvert construction, the valve tower will be built following industry standards – fixing reinforcement, erecting formwork, placing concrete, curing, and removing formwork. Lattice-boomed crawler cranes, excavators, and concrete pumps will assist. Concrete, delivered by road-going drum mixer lorries via the NAR (Northern Access Road), and on-site haul roads, will be discharged and washed out into a system filtering and reusing cement-laden water. Proprietary excavation support systems ensure safe working conditions for below-ground structures and pipework installation, with subsequent backfilling and support removal undertaken using tracked excavators and crawler cranes.

2.8 Southern Access Road

2.8.1 The Southern Access Road (SAR) will be tarmacked, requiring a 278 agreement and traffic management at the Swanmore Road interface. Lane control with 2-way lights on the Eastbound carriageway near the bell-mouth is proposed, pending approval. The SAR's footprint will be stripped, prepared, and receive subbase, edgings, or kerbs. A drainage ditch and culvert will manage surface water, subject to OWC and Local Flood Authority approval. Construction progresses systematically, utilising small excavators, dumpers, and imported materials. Once completed, white lining and signage will follow the approved design.

2.9 Control House Construction

2.9.1 Before construction, the control house and courtyard footprint will be excavated, and a granular sub-base platform created. The control house, atop mass concrete strip foundations and a culvert outlet chamber, will follow standard procedures for reinforced concrete construction. The courtyard, surrounded by RC retaining walls, will serve as material laydown during construction. Lattice-boomed crawler cranes, excavators, and concrete pumps will assist in lifting materials. Concrete delivery will be via road-going drum mixer lorries, using on-site wash-out systems for environmental sustainability. Excavated material will be stored on-site for landscaping, and proprietary support systems ensure safe working conditions.

2.10 Reservoir Pipeline – Outlet

2.10.1 The Reservoir Pipeline comprises dual fill and extraction pipes, terminating at Bedhampton and the reservoir. Constructed in two parts, the Bedhampton-to-reservoir section is handled separately by Ward & Burke, while the Main Reservoir section is completed by Future Water. This section carries the buried inlet pipe from a reception pit, traversing the embankment and entering the reservoir. Open-cut excavation using tracked excavators creates a trench, and after shoring installation, the prefabricated pipe sections are laid and backfilled. The pipe will be tested and commissioned in stages for handover prior to use.

2.11 Spillway Construction

2.11.1 After completing the main embankment, the spillway is cast in situ with reinforced concrete. Trimmed to formation level, the footprint minimizes arisings, using blinding for a stable working area. Constructed in sections, standard procedures include fixing reinforcement, erecting formwork, placing concrete, curing, and removing formwork.

2.12 Hard and Soft Landscaping

2.12.1 Soft landscaping will follow a phased timetable aligned with construction progress; utilising materials delivered via the NAR. Soft landscaping will be the final phase in the finishing and aesthetic works on the main embankment, wetlands and remediated areas. Hard landscaping, including fencing, walling, and the Avenue staircase, will commence after earth embankment works. Materials, delivered via the NAR, will be distributed using access tracks, with small telehandlers and dumpers conveying materials for installation by hand or small excavators.

2.13 Access/Egress

2.13.1 All access for the main works will be via the Northern Access Route (NAR) as noted in section 2. A Traffic Management Plan (HTR-FUW-RZ-RE-HS-W-506) will be produced and issued for approval to the LPA. This will be issued to discharge condition 12. This will

detail the access routes, procedures and timings for deliveries and staff traffic to site to minimise impact. Please refer to the Construction Traffic Management Plan for more details.

3. Lighting During Construction

3.1.1 The majority of construction activities will occur during daylight hours without artificial lighting, except when necessary for safety. Limited 24-hour operations may require temporary lighting, crucial in winter with shorter daylight hours. Nightly use of temporary external lighting may occur during continuous tasks (e.g., concrete pouring), for site security, abnormal load deliveries, and potential emergency works. This lighting may impact nearby residents, ecological receptors, visual amenity, and distract passing motorists, prompting considerations for mitigating disturbances.

3.1.2 Without careful design and mitigation, lighting from these sources has the potential to have the following impacts:

- Intrusive lighting impacting nearby residents causing disturbance and annoyance, particularly with regard to sleep patterns
- Impact on ecological sensitive receptors from light spill
- Impact on visual amenity due to the illumination of the night sky
- Lighting on surrounding roads distracting passing motorists

3.2 Types and Positioning Requirements

3.2.1 Adequate lighting is essential for safe work, facility use, and movement, minimizing eye strain. Derived from the Health and Safety Executive (HSE) document Health and Safety Guidance 38 (HSG38) 'Lighting at Work' (1997), Table 1 outlines the recommended minimum lighting levels based on work activity and location. It provides suggestions for average illuminance across the work area and the minimum measured illuminance at any specific position within it.

Table 1 Recommendations for Minimum Lighting Levels (adapted from HSE document HSG38 (Lighting at Work).

Table 3.1

Activity	Typical locations/ types of work	Average illuminance measured (lux) 1x	Minimum illuminance measured (lux) 1x
Movement of people, machines and vehicles	Accesses, haul roads and vehicle compound/parking areas.	20	5
Background work including movement of people, machines and vehicles in Hazardous areas; rough Work not requiring perception of detail	Construction site Clearance, excavation and soil work.	50	20
Task based lighting and work requiring limited perception of detail	Where specific work tasks are required to focus on a particular point or feature.	100	50

3.3 Hours of Lighting

3.3.1 The need for artificial lighting will be dependent on seasonality and will be switched on 30 minutes before sunset (which will change through the winter) to the end of the shift. It will also be switched on at the start of the shift to up to 30 minutes after sunrise. Again, this is dependent on seasonality and will change through the winter months and with daylight savings adjustments. Temporary construction lighting will be also provided during working hours only at times where natural light is not sufficient to carry out specific works to ensure safe working conditions.

3.3.2 Any works within 50m of any sensitive ecological receptors (e.g. woodland edge) would commence no earlier than half an hour after sunrise and would be completed no later than half an hour before sunset on any given day.

3.3.3 Working hours will comply with Planning Condition 11, which states:

Construction Working Hours

11 "no nighttime working shall take place, unless otherwise in accordance with a scheme submitted to and approved in writing by the Local Planning Authority. Night-time works to be carried out strictly in accordance with the approved scheme."

There may be a requirement for artificial lighting on emergency works, which in any case will need to comply with the minimum requirements for safe work operations, the guidance and standards (Section 6) and mitigation measures avoiding or minimising the impacts on sensitive visual and ecological receptors.

At the main site compound, site security will be 24 hours with limited lighting specific to compound offices and parking area and will be required when the compound is in operation.

3.4 Construction Lighting Strategy Implementation

3.4.1 Prior to the commencement of construction, an Environmental Clerk of Works (ECoW) will be appointed by Future Water to advise and monitor the implementation of the CLS. Contact details for the ECoW are provided in the Construction Environmental Management Plan (HTR-RHD-P2-RE-PL-Z-0018)

3.5 Guidelines and Standards

This CLS has been developed in accordance with the following guidance and standards:

- Institution of Lighting Professionals (ILP), 2020, Guidance Note for the Reduction of Obtrusive Light, (ILP, 2020);
- British Standard BS EN 12464-2:2014 Light and lighting. Lighting of workplaces. Outdoor workplaces;
- British Standard BS 5489-1:2020 Code of practice for the design of road lighting. lighting of roads and public amenity areas;
- Health and Safety and Executive (HSE), Health and Safety Guidance 38 (HSG38) 'Lighting at Work' (HSE, 1997);
- Guidance Note GN08/23 Bats and Artificial Lighting at Night (ILP, 2023), published by the Institution of Lighting Professionals (ILP).

4. Potentially Sensitive Receptors

4.1.1 Potentially sensitive receptors that could be affected by temporary external artificial lighting during construction works include visual and ecological receptors.

4.2 Visual receptors

4.2.1 Sensitive visual receptors for light from the reservoir construction works include occupiers of residential properties and people working or enjoying the adjacent countryside. A review to identify potentially sensitive receptors that could be affected by external artificial lighting considered all buildings within 250m of the site. The closest visual receptors are remote from the main and satellite compounds, and so short-term lighting of specific site works would be the main activity to be considered. These receptors are:

VISUAL RECEPTORS	NEAREST COMPOUND	NEAREST WORKS
Swanmore Road	Main (750m)	Embankment (70m)
Harbridge Court	Satellite (800m)	Embankment (80m)
Durrants Road	Satellite (980m)	Embankment (120m)
Well Meadow	Satellite (800m)	Embankment (200m)
Winterslow Drive	Satellite (600m)	Control Building (100m)

4.2.2 At the identified distances, light intrusion/nuisance and spill light are not considered to be significant, particularly for Swanmore Road and Harbridge Court where street lighting stands between the properties and the site. Light control measures to protect visual receptors will therefore relate to limitation of light from bright luminaries in the field of view and also sky glow. A map of the receptors is shown in Appendix B.

4.2.3 Public Rights of Way are located adjacent to the site shown in Figure 2. At times when construction work is proceeding with artificial lighting the users of rights of way are likely to be carrying a torch and construction lighting would not be a nuisance.

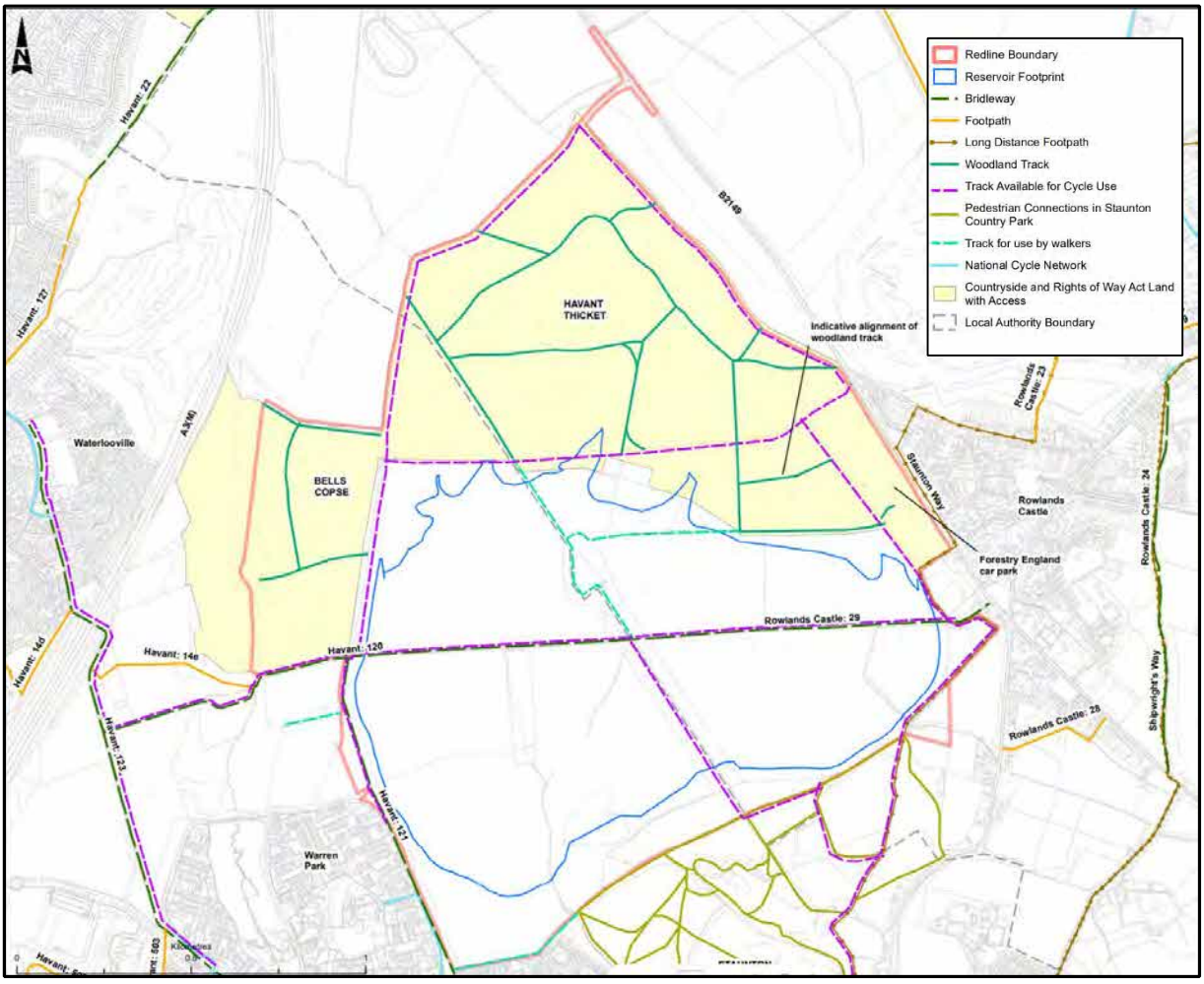


Figure 2: Site Access

A map of designations and ecological constraints can be found in Appendix A.

4.3 Ecological Receptors

4.3.1 Light spill and intrusive lighting from night-time works could potentially disturb ecologically sensitive receptors which includes nocturnal species. A range of nocturnal protected species have previously been identified on site including glow worms, dormice, badgers, owls and nightjars. The habitats that support these species (woodland, hedgerows, scrub and grassland) are the habitats which support bats. By ensuring optimal mitigation for light impacts on bats and their habitats on site, suitable mitigation is also provided for all other nocturnal species associated with the site.

Bats

4.3.2 Thirteen bat species have been recorded within the Havant Thicket Reservoir (HTR) site including Bechstein's bat Myotis bechsteinii (one of the UK's rarest species), with a maternity roost recorded on the southeastern Site boundary.

4.3.3 A bat mitigation licence to carry out works for the Project has been obtained from Natural England (Licence number 2020-50625-EPS-AD2-4). Future Water are obliged to ensure compliance with the conditions of all protected species licences obtained at all times. Ecological considerations during the development of the Lighting Strategy are presented in Appendix E. Bat roost areas and buffer zones are shown in Appendix F.

5. Objectives

5.1.1 The objectives and performance outcomes for this CLS are detailed below in Table 5-1.

Table 5.1

Objectives	Performance Outcomes
•To ensure temporary lighting installations are positioned so as to avoid light spill directly towards roads, residences and other potential viewing locations or ecological receptors. •To ensure the potential impacts from light emissions on haul roads for mobile equipment are reduced so far as practicable. •To utilise existing vegetation screens to minimise the impact of any light spill in the direction of roads, residences and other viewing locations or ecological receptors. •To use directional lighting to reduce light spill and minimise light emissions from night-time construction works to retain dark night skies. •To ensure procedures are in place to record and effectively respond to any complaint in respect to lighting. •To record and report the effectiveness of lighting emission controls. •To utilise appropriate mitigation measures to reduce glare.	•Minimum levels of lighting are used which provide sufficient lighting to ensure that safety is not compromised. •External lighting complies with relevant UK legislation, environmental commitments as set out in the 2020 ES and environmental and construction best practice. •The safety of external traffic on nearby roads is not affected by light sources on site. •Impacts from light emissions from the works on nearby sensitive visual receptors is avoided or minimised where avoidance is not possible. •Impacts from light emissions from the works on ecological receptors are avoided or minimised, where avoidance is not possible. •Complaints are responded to quickly and effectively. •The effectiveness of lighting emission controls is reported.

6. Mitigation

6.1.1 The HTR Project necessitates illuminated construction areas, particularly the Main Compound and a satellite construction compound. The Main Compound, active year-round, includes temporary workers accommodation, planned for use until the main earthworks' completion in 2026. Prescribing an appropriate lighting strategy is crucial for Health & Safety and impact mitigation to sensitive receptors. Dense tree cover does not mitigate light's negative impact on bats, necessitating bespoke lighting specifications for the entire HTR site. These include:

- LED luminaires will be used where possible;
- Metal halide, fluorescent sources will not be used;
- Column heights will be carefully considered to minimise light spill;
- Narrow spectrum light sources will be used to lower the range of species affected by lighting;
- Light sources that emit minimal ultra-violet light will be selected;
- Lights will peak in wavelength higher than 550nm;
- White and blue wavelengths of the light spectrum will be avoided to reduce insect attraction and where white light sources are required in order to manage the blue short wavelength content, they will be of a warm / neutral colour temperature, ideally <2700Kelvin;
- Only luminaires with an upward light ratio of 0% and with good optical control will be used;
- External security lighting will be set on motion-sensors with short (1 minute) timers.

6.2 Mitigation Specific to Ecology

- All lighting selected to avoid UV elements when manufactured.

- Metal halide, compact fluorescent sources will not be used.
- LED lighting units will be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white light source (2700Kelvin or lower) will be adopted to reduce blue light component.
- Light sources will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
- Internal lighting will be recessed (as opposed to using a pendant fitting) where possible, in proximity to windows to reduce glare and light spill.
- Waymarking inground markers (low output with cowls or similar to minimise upward light spill) should delineate path edges.
- Column heights adjusted to minimise light spill and glare visibility.
- Only lighting with a negligible or zero Upward Light Ratio, and with good optical control, will be used.
- Lighting will always be mounted horizontally, with no light output above 90° and/or no upward tilt.
- Where appropriate, external security lighting will be set on motion sensors and set to as short a possible a timer as the risk assessment will allow. For most purposes a 1-minute timer shall be deployed on lighting; however, in some situations a 2-minute timer may be required for safety. The area being lit shall be risk assessed depending on several factors, such as, length of time under light, terrain, obstacles, and any other hazards that may require a longer illumination.
- Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed. However, due to the lensing and fine cut-off control of the beam inherent in modern LED luminaires, the effect of cowls and baffles is often far less than anticipated and so should not be relied upon solely.

6.2.1 The location, orientation and height of newly built structures relative to each other can have a considerable impact on light spill. Buildings and hard landscaping will be sited and designed so as to block light spill from reaching important bat habitats and features. Bats will benefit from minimising light spill away from Havant Thicket Woodland and its' associated edge (buffer) habitats. Mitigation measures to further minimise light spill include:

- A reduction of the number of windows that directly face key and buffer habitats will be implemented to permanently limit light spill.
- Using curtains and/ or blinds on the temporary workers accommodation windows during the evening/night-time period.
- Column mounted luminaires will be located so that the rear shields are adjacent to habitats, or narrow optics selected that direct light into the task area where needed.
- Light spill will be screened through landscaping and the installation of fences. Windbreak mesh / dust-type netting to the inside of the compound boundary fence will help to further reduce light spill.
- On-site lighting controlled by dimming or switching either diurnally, seasonally, or according to human activity (light on demand) will be utilised.
- Lighting will be set to a low output state by default, to turn up to a predetermined output in response to a trigger and be combined with a timeclock or photocell to further add an element of seasonal or diurnal control. For example, passive infrared, AI enabled cameras, on demand controls, or pressure sensors may be used to trigger lights to come on or dim in response to movements, either by vehicles or pedestrians. Inbuilt timeclocks or photocells can ensure that this response only occurs during a set window of hours after sunset and before sunrise, or during certain months.

- Alternative lighting designed for subtle waymarking, rather than illumination will also be considered, for example very low wattage, solar-powered, ground-level luminaires. This lighting has an added benefit that there is no requirement for cabling. However, it should be noted that these systems depend on regular maintenance for them to be successful, as well as a clear view of the sky for solar-powered options.

6.2.2 The construction works at Havant Thicket Reservoir have been carefully designed to minimise impacts on the environment. The reuse of site won material for construction will minimise the need for additional construction works and associated artificial lighting.

6.2.3 Permanent lighting will comprise appropriate luminaires directed away from vegetation, particularly the boundary hedgerows and treelines to avoid any light spill onto retained vegetation. Lighting will follow good practice current at the time of detailed design. The new lighting will be task-related, associated with the visitor centre and associated car park and with no lighting on the access roads. The lux level will be as low as possible to meet their purpose safely and effectively. The lighting for each phase or parcel shall be carried out in accordance with the approved Lighting Strategy and shall be retained and maintained as such thereafter.

6.2.4 In mitigating for bats, all nocturnal species have been considered.

7. MONITORING AND REPORTING

7.1 Monitoring

7.1.1 Regular inspections of lighting mitigation measures will be undertaken by the Principal Contractor's construction management team, the ECoW and ecological specialists where required, to ensure effective implementation and report any non-compliances. If non-conformity with any control and mitigation measures is identified, it will be recorded, and appropriate remedial action will be implemented.

7.1.2 The inspection shall be completed on a 12-weekly basis and shall be completed after sunset (when lights become effective), the purpose of the inspection is to ensure all mitigation measures are in place and functioning as designed. The inspection shall also be used to inspect for damage or tampering with mitigation measures and to ensure no supplementary lighting has been installed. In accordance with Section 7.1.1 any changes shall be raised in a non-conformance & action taken. The inspection shall be undertaken by a member of the site management team and recorded in an inspection report. The frequency of inspections may be adjusted by the ECoW as required and recorded in the Future Water monthly site inspection report. The inspections shall be completed around the time of daylight savings clock change, and at the mid-point between i.e., 12-weeks after clocks change.

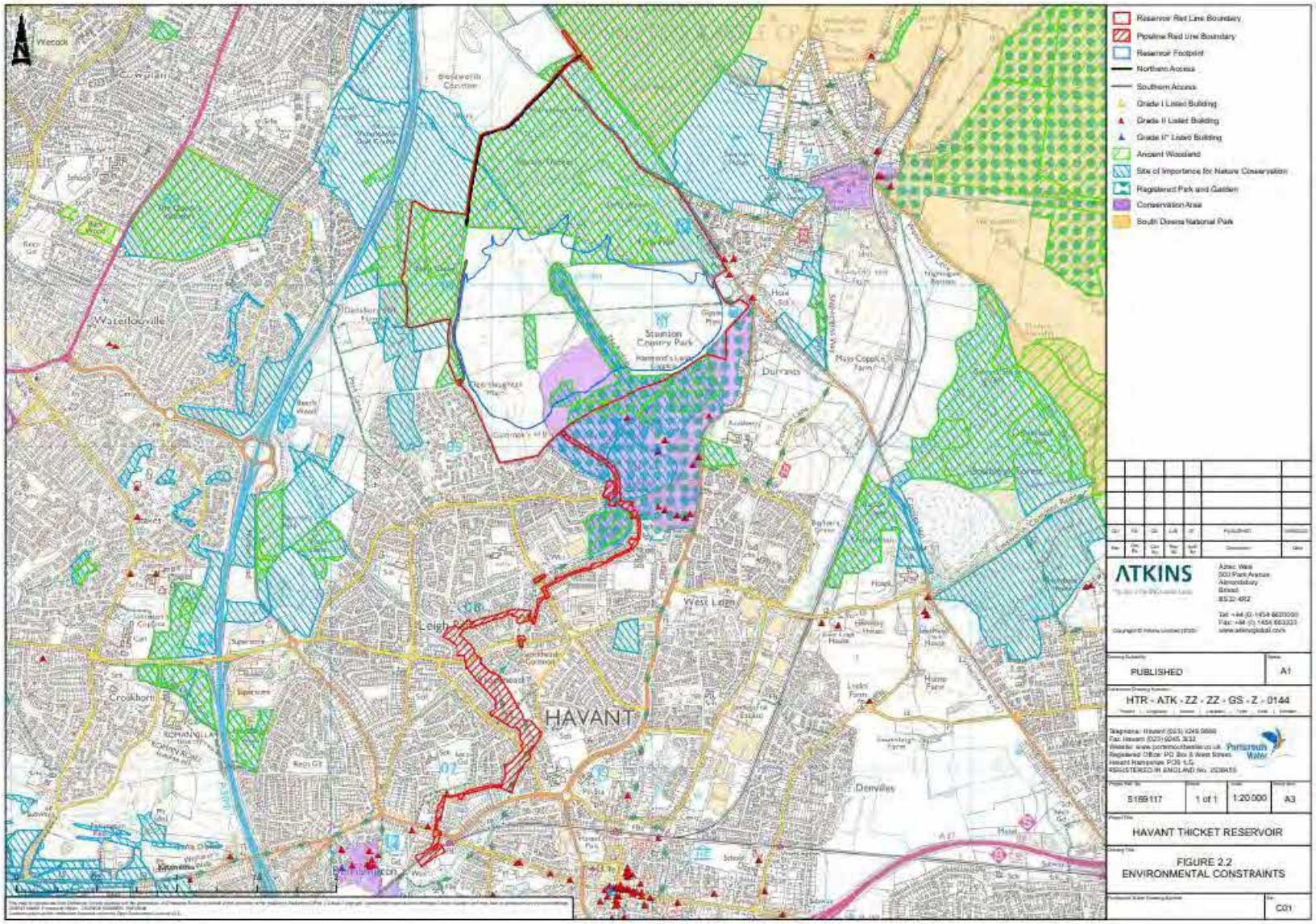
7.1.3 Any complaint regarding lighting of the construction works will be directed to the Site Environmental Manager who will in turn notify Portsmouth Water. The Site Environmental Manager will investigate the complaint and provide a response to the complainant and Portsmouth Water within 7 days. Investigation will include checking that luminaires remain directional and suitable for the application. If the complaint is justified a solution will be found to prevent reoccurrence, such as use of hoardings or other barriers to contain light spill. This may include investigation of alternatives, such as the use of lower wattage lighting, or re-direction of lighting or re-positioning shielding.

7.1.4 Should any Schedule 1 or other bird species be found to be nesting within the vicinity of the proposed construction works, an exclusion zone will be implemented specific to that species in accordance with the Ecological Management Plan (HTR-RHD-ZZ-ZZ-PL-Z-0001).

7.2 Reporting

7.2.1 The effectiveness of lighting controls will be reported in the Site Inspection and Audit Reports. Inspections will be undertaken by the ecological specialists, where required and will be reported to the Site Environmental Manager.

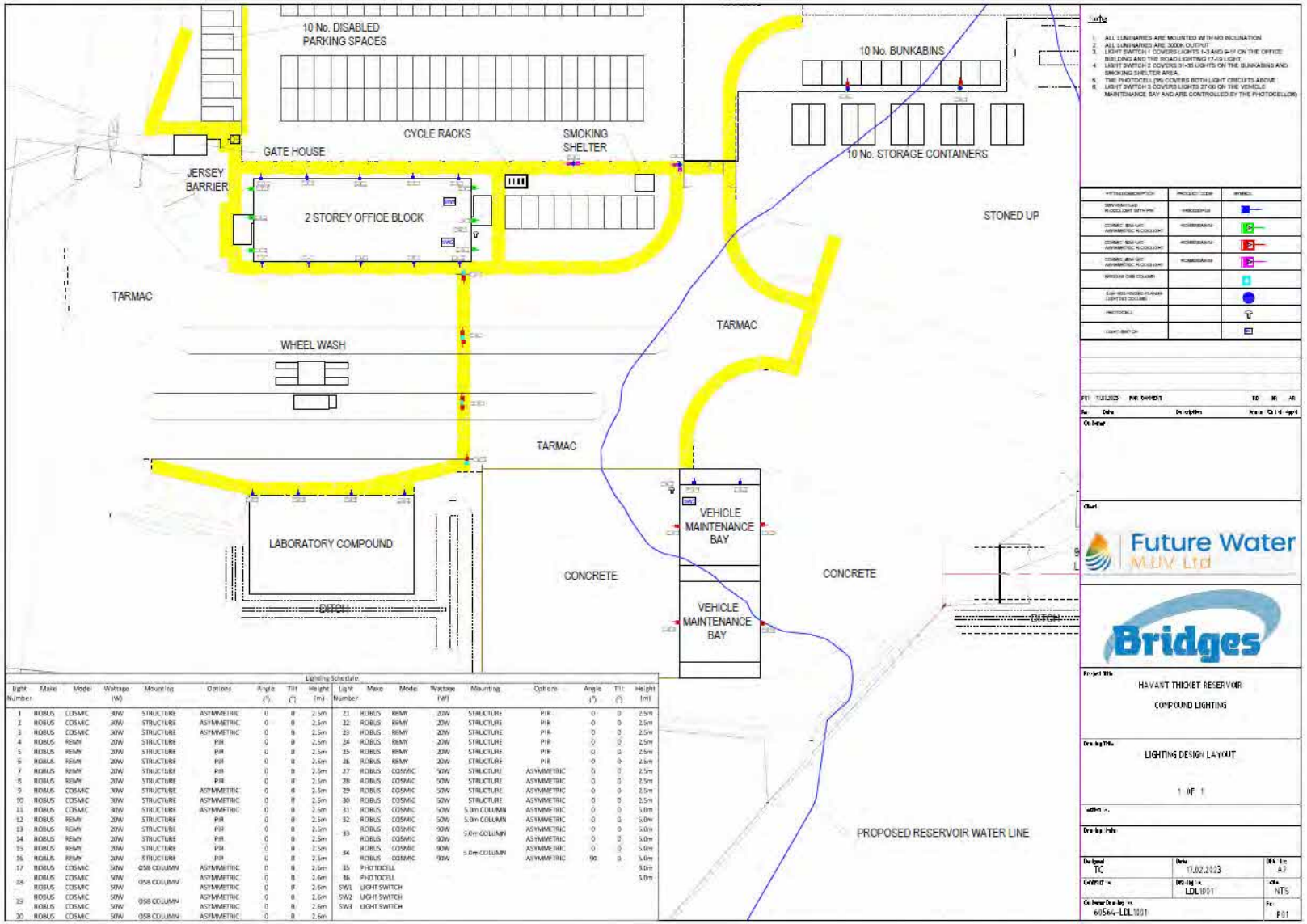
Appendix A - Environmental Constraints Drawing



Appendix B- Receptors



Appendix C – Lighting Layout Compound



Appendix D – Lighting Layout – Temporary Workers Accommodation

TBA on Receipt of Design

HAVANT THICKET RESERVOIR

SITE TEMPORARY ELECTRICAL WORKS

ELECTRICAL BUILDING SERVICE SPECIFICATION



CLIENT: Future Water MJJV

- Mackley Engineering, Jones Bros Civil Engineering UK

PREPARED BY: DAVID MURPHY

CHECKED BY: KEVIN DODD

APPROVED BY: DAVID MURPHY

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Crouch Waterfall and Partners Limited has prepared this report in accordance with the instructions of the above-named Client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

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1 PROJECT SUMMARY

This document outlines the temporary site electrical & lighting installations for the Main Project Offices and Satellite Compound required during the construction phase of the new Havant Thicket Reservoir, Hampshire.

Havant Thicket Reservoir

- Temporary Power and External Lighting design for main site and satellite compounds (MDU, Electrical Cubicles, External Lighting to Car Park, Walkways, external compounds, etc.)
- Power supplies for Site Offices, Accommodation (caravans and Bunkabins) drainage pumps, Vehicle Maintenace Workshop Wheel Wash, and EV Chargers (5no.)
- External Lighting to Car Park and Walkways, all 2700oK ("bat friendly").
- Associated Civils design and Containment systems (i.e. cable ducts, column foundations, cubicle slabs), for power, external lighting and CCTV system.

A new 800 kVA Scottish and Southern Electricity (SSE) networks has been arranged by Future Water for use for this site, with an agreed supply capacity of 554 kVA, with Future Water applying for an increase supply capacity of 680kVA (approx. 1000A TPN) for use for the site's temporary power supplies.

A10 PROJECT PARTICULARS

Installation of temporary site electrical & lighting installations for the Main Project Offices and Satellite Compound during the construction phase of the new Havant Thicket Reservoir, Hampshire.

Havant Thicket Reservoir

Main Contractor:	Future Water MJJV Ltd
Electrical Engineers:	Crouch Waterfall (CW) and Partners Limited
Client:	Portsmouth Water

A12 THE SITE/ EXISTING BUILDINGS

The existing construction site modular offices and containers are to be provided with new site temporary electrical supplies as defined in this specification and drawings.

A13 DESCRIPTION OF THE WORK

The site consists of Future Water's Main Site Compound and a Satellite Compound, both requiring temporary site electrics and lighting for the duration of the construction of the new reservoir.

This includes:

Main Compound:

- Main Site Offices (2 stories).
- Site Security Cabin
- Main Car Park – Lighting and EV chargers
- Grinder Pumps
- Accommodation – Caravan park and Bunkabins
- Containers supplies
- Vehicle Maintenance Workshop
- Socotec Laboratory
- Supply for Ward & Burke compound.

Satellite Compound:

- Site Accommodation (welfare and offices)
- Drainage Pumps
- General use supplies

A33 QUALITY STANDARDS/ CONTROL

All systems will be installed in accordance with Statutory Requirements, DNO (SSE) requirements, IET Wiring Regulations, and in compliance with Building Regulations.

IET Wiring Regulations BS 7671:2018+A2:2022 (Corrigendum May 2023)

BS EN 61439-4:2013 Low-voltage switchgear and controlgear assemblies. Particular requirements for assemblies for construction sites (ACS)

BS EN 61643-11 Surge protective devices connected to low-voltage power systems - requirements and tests

External Lighting Design

BS EN 12464-2:2014 - Lighting of outdoor work places

ILP Guidance Note 08/18 – Bats and artificial lighting in the UK.

A34 SECURITY/ SAFETY/ PROTECTION

The Main Contractor will provide their own CCTV cameras and Security measures, from a new Site Security Cabin which will be location next to the Main Site Compound Offices.

Provide containment only for the CCTV system, as shown on the drawings, providing split ducts around the perimeter of the site, fixed to the perimeter fencing.

Refer to the Main Contractor Safety and Protection policies and procedures, which are to be followed during the duration of these works.

A52 NOMINATED SUPPLIERS

Main Items of plant will be supplied and provided by (or similar and approved):

Temporary Electrical Distribution Cubicles	Blakley Electrics Ltd https://www.blakley.co.uk/
Lighting, Luminaires and Controls:	ASD Lighting Plc. https://asdlighting.com/

A53 WORK BY STATUTORY AUTHORITIES

Electricity

A new 800kVA Scottish & Southern Electricity (SSE) Networks transformer will be provided for these works, arranged by the Main Contractor.

Allow to connect to and use this supply for electrical power requirements for this project.

Electrical Utilities Metering

Connect to the Main Site LV Electrical Cubicle and liaise with the Main Contractor for provision of the Energy Shippers Electrical Meter, either in a separate enclosure or integrated into the main LV electrical cubicle.

Telecoms

The Main Contractor will arrange their own Telecoms (telephone, data, broadband) for the site, with their own Telecoms provider.

C20 ALTERATIONS AND DEMOLITIONS

There are no demolitions envisaged. There are some minor alterations to be made to enable these works, allow to fully engage with the Main Contactor for all Civils element required for this project.

ELECTRICAL SUPPLY/ POWER/ LIGHTING SYSTEMS

V12 LV SUPPLY/ PUBLIC UTILITY SUPPLY

Electricity

A new 800kVA Scottish & Southern Electricity (SSE) Networks transformer will be provided for these works, arranged by the Main Contractor.

Allow to connect to and use this supply for electrical power requirements for this project.

Electrical Utilities Metering

Connect to the Main Site LV Electrical Cubicle and liaise with the Main Contractor for provision of the Energy Shippers Electrical MID Approved Meter, either in a separate enclosure or integrated into the Main LV electrical cubicle.

V20 LV DISTRIBUTION

Provide a new Main LV Electrical Distribution Cubicle, complete with metering (kWh) as shown on the electrical schematic.

1000 Main LV Distribution Cubicle

Provide an external Mains LV distribution cubicle in accordance with BS EN 61439-4 manufactured for outdoor environments.
1250A TPN 16-Way IP44 Rated, free-standing, padlocked doors, weatherproof gland plates for incoming and outgoing cables. 900mm ground clearance recommended (i.e. complete with extension stand).
Bus Bars short circuit rating of 50kA (ASTA certified).

Provide Main LV cubicle complete with:
250A TPN MCCB - Electronic Surge protection Device (SPD) – Type 1 to Main LV cubicle/panel
200A TPN MCCB – For Future Power Factor Correction (PFC) equipment.
Utilities Electricity Shippers MID Meter CTs (Meter may be in a separate enclosure)
kWh (non-MID) meter on the main incomer.

Outgoing Distribution

Provide the following outgoing ways:

1	Site Electrical Power Supply		
	SSE Substation - 800kVA	1250A TPN 4P MCCB	Incomer Protection Device
	ESP (Surge Protection)	250A TPN MCCB	Furse Surge Protection Device (Type 1,2 & 3 protection).
2	Main Site Compound Electrical Supplies	1250A TPN 16-Way Panel	Outgoing Supply
2.01	PFC (Power Factor Correction)	200A TPN MCCB	For Future PFC circuit
2.02	Site Project Office	250A 4P MCCB Variable Type A RCD protection	DB SPO Re-use existing 630A TPN Cubicle
2.03	EV Charging (3 no. 7.4kW, 1 x 22kW)	100A TPN 4-Way Cubicle Variable Type A RCD protection	DB EV 3x 32A SPN, 1x 32A TPN
2.04	Bunkabins & Containers	160A TPN 6-Way Cubicle Variable Type A RCD protection	DB BC 12x 32A SPN
2.05	Vehicle Maintenance Workshop	100A TPN 6-Way Cubicle Variable Type A RCD protection	DB VMW 100A TPN 6-Way Board
2.06	Caravan Site Lighting & Power	250A TPN 6-Way Cubicle Variable Type A RCD protection	DB C 10x 63A SPN Caravan Hook-ups and lighting
2.07	Ward & Burke Compound	100A TPN Supply/isolator only	
2.08	Satellite Compound	250A TPN Supply to Satellite Compound Variable Type A RCD protection	
2.09	Pan Assembly	160A 4P MCCB Variable Type A RCD protection	Feeding an integral 12 Way TP pan assembly within segregated compartment.
	Pan Assembly equipment with MCBs for		
2.10	Grinder Pumps Circuits	63A TP MCB Type C	DB P 2 no. Grundfos (grinder) pumps

2.11	Socotec Laboratory	63A TP MCB Type C	DB SL Socotec Laboratory 63A TPN 4-Way Cubicle
2.12	Security Gate House	32A SP MCB Type C	DB SGH 32A SPN Supply to Internal Security DB (40A SPN 6-Way)
2.13	Car Park Lighting	32A SP MCB Type C	DB CPL
2.14	Spare	frame only	rated up to 250A
2.15	Spare	frame only	rated up to 250A
2.16	Spare	frame only	rated up to 250A

Distribution kWh metering
Provide manually read non-MID check kWh meters to all outgoing distribution ways.

Test Sockets
Within the Main LV Distribution Cubicle incoming compartment, provide 5no. panel mounded test Sockets connected to the supply side of the incoming MCCB.
In each outgoing compartment, provide 2no. test sockets connected to the load side of each MCN/RCD. Provide a common earth socket.
All test sockets protected by BS88 fuses.
Note: The Surge protection and PFC circuits are not required to have RCD protection or associated test sockets.

2000 Satellite Compound LV Distribution Cubicle
Provide an external Satellite Compound LV distribution cubicle in accordance to BS EN 61439-4 manufactured for outdoor environments.
IP54 Rated, free-standing, padlocked doors, weatherproof gland plates for incoming and outgoing cables. 900mm ground clearance recommended (i.e. complete with extension stand).

Provide Satellite LV cubicle complete with:

Outgoing Distribution

Provide the following outgoing ways:

3	Satellite Compound Electrical Supplies	400A (250A) TPN 8-Way Cubicle	
	DB SC	400A (250A) TPN 4P MCCB	Incomer Protection Device

3.01	Pan Assembly	250A 4P MCCB Variable Type A RCD protection	Feeding an integral 8 Way TP pan assembly
	Pan Assembly equipment with MCBs for		
3.02	Satellite Compound Accommodation	63A TP MCB Type C	DB SCA 63A TPN Supply to Satellite Accommodation DB
3.03	Satellite Compound Pump No.1	63A TP MCB Type D	63A TPN supply (32kW pump)
3.04	Satellite Compound Pump No.2	63A TP MCB Type D	63A TPN supply (32kW pump)
3.05	Satellite Compound - Auxiliary	63A TP MCB Type C	DB SCA1 63A TPN 4-Way Cubicle, for 2 x 32A SPN supplies
3.06	Spare	frame only	rated up to 250A
3.06	Spare	frame only	rated up to 250A

Distribution kWh metering
Provide manually read non-MID check kWh meters to all outgoing distribution ways.

Test Sockets
Within the Satellite LV Distribution Cubicle incoming compartment, provide 5no. panel mounded test Sockets connected to the supply side of the incoming MCCB.
In each outgoing compartment, provide 2no. test sockets connected to the load side of each MCN/RCD. Provide a common earth socket.
All test sockets protected by BS88 fuses.

3000 Site Electrical Cubicles.
To distribute electrical power at various locations around the site, provide the following external electrical cubicles and distribution boards.
All external electrical cubicles to be Temporary Site Power Mains Distribution Assembly (MDA) Panels or similar, complete with integral 4P incoming switches and rated at IP54.
To be complete with stands to allow for ease of cable entry and exit into these cubicles.

3001 Site Project Office Cubicle – DB SPO
Reuse and re-supply the existing 630A TPN 8 Way cubicle present, which currently supplies 3x 100A TPN (Existing) supplies to the Site Project Office.

3002 EV Charging Cubicle – DB EV
Provide a new 100A TPN 4-Way Cubicle, to provide electrical supplies to the Electric Vehicle chargers.
Provide 4 no. electrical charger points:
3x 32A SPN and 1x 32A TPN

The Main contract has two single phase Easee One (7.4kW) EV chargers for free issue and use on this site. Refer to section V34 for details on EV charging requirements.

3003 Caravan Site Lighting & Power Cubicle – DB C
Provide a new 250A TPN 6-Way Cubicle, with 10 x 63A SPN outgoing ways to supply the 10 no. Caravan Hook-up units.
Provide a 63A SPN supply for a future Shower/WC block for the caravan site.

3004 Bunkabins & Containers Cubicle – DB BC
Provide a new 160A TPN 6-Way Cubicle, a Mains Distribution Assembly (MDA) with 12x 32A SPN IEC 309 IP67 socket outlets for the 10no. Bunkabins and 2 no. Container supplies.

3005 Vehicle Maintenance Workshop – DB VMW
Provide a 100A TPN 6-Way Cubicle for power supplies for the Vehicle Maintenance Workshop.

3006 Drainage Grinder Pumps – DB P
Provide a new 63A TP 2-way boards, for the two 2 x 10A TPN MCB Type D Grundfos grinder pump supplies, via 2 x 16A TPN IEC 309 IP67 sockets.

3007 Socotec Laboratory
Provide a new 63A TPN supply for the Socotec Laborary, to supply the internal Socotec Laboratory 63A TPN 4-Way Cubicle/distribution board.

3008 Security Gate House,
Provide a new 32A SPN supply for the Security Gate House, to supply the 32A SPN Internal Security DB (40A SPN 6-Way)

3009 Main Car Park
Provide a new Car Park 32A SPN 6-Way Cubicle to supply the car park lighting. Complete with simple solar compensating time clock (i.e. Sangamo) mechanism with a manual override facility.

<u>Satellite Compound</u>
3010 Provide a 250A TPN 8 Way cubicle, to supply the Satellite Compound electrical supplies.
A 250A 4P MCCB supplying an integral 8 Way TP pan assembly with 4 x 63A TPN IEC 309 socket outlet:

- 63A TPN IEC 309 socket – for Satellite Accommodation/Office
- 63A TPN IEC 309 socket – for 32kW Pumps No. 1
- 63A TPN IEC 309 socket – for 32kW Pumps No. 2
- 63A TPN IEC 309 socket – for Satellite Compound Auxiliary Cubicle.

3011 Provide a Satellite Compound – Auxiliary Electrical Cubical – a 63A TPN 4-Way Cubicle, a Mains Distribution Assembly (MDA) with 2x 32A SPN IEC 309 socket outlets.

V22 GENERAL LV POWER

1000 Caravan Hook-ups

Provide 10no. 4 x 16A socket and RCBO caravan hook-up units as shown on the drawings.

In addition to the 4 x 16A RCBOs, provide a 6A RCBO for supply to the light fitting located above this hook-up unit.

2000 Bunkabins & Containers Sockets

Provide a 160A TPN 6-Way Cubicle, a Mains Distribution Assembly (MDA) with 12x 32A SPN IEC 309 socket outlets for the 10no. Bunkabins and 2 no. Container supplies.

3000 Drainage Grinder Pumps Sockets

Provide a new 63A TP 2-way board, for the two 2 x 10A TPN MCB Type D Grundfos grinder pump supplies, via 2 x 16A TPN IEC 309 sockets.

4000 Satellite Compound

4010 Provide a 250A TPN 8 Way cubicle, to supply the Satellite Compound electrical supplies.
A 250A 4P MCCB supplying an integral 8 Way TP pan assembly with 4 x 63A TPN IEC 309 IP67 socket outlet:

- 63A TPN IEC 309 socket – for Satellite Accommodation/Office
- 63A TPN IEC 309 socket – for 32kW Pumps No. 1
- 63A TPN IEC 309 socket – for 32kW Pumps No. 2
- 63A TPN IEC 309 socket – for Satellite Compound Auxiliary Cubicle.

4020 Provide a Satellite Compound – Auxiliary Electrical Cubical – a 63A TPN 4-Way Cubicle, a Mains Distribution Assembly (MDA) with 2x 32A SPN IEC 309 socket outlets.

V34 - ELECTRICAL VEHICLE CHARGING EQUIPMENT

Install 4 no. Electrical Vehicle (EV)charger point, in the designated car parking bays in the main car park.

Provide:

- 3no. Single Phase Easee One (7.4kW) chargers
- 1no. Three Phase Easee Charge (22kW) charger.

Note – the contractor has 2no. single phase Easee One chargers for free-issue for install at this site. The Electrical contractor to supplement this with one new single phase EV charger and a new three phase EV charger.

V41 EXTERNAL LIGHTING

Provide new external site lighting, to the following areas. Note that all lighting is to be compliant to the ecological (i.e. bat friendly) requirements for this site:

BS EN 12464-2:2014 - Lighting of outdoor work places

ILP Guidance Note 08/18 – Bats and artificial lighting in the UK.

- 2700oK (or generally less than 3000oK)
- 100% downlight content.

1010 Main Site Car park

External Lighting to provide 10 lux (average) with a uniformity of 0.25

Provide new ASD luminaires:

Type A – ASD Diamond Highway Elite – M2 optic 2700oK

3 LED 45W mounted at 7.0m high (1m cube plus 6m column)

Car park lighting is to be controlled by a simple solar compensating time clock (i.e. Sangamo) mechanism with a manual override facility.

1020 Walkways Main Site Car park

External Lighting to provide 5 lux (average) with a uniformity of 0.25

Provide new ASD luminaires:

Type B – ASD Diamond Highway Elite – M2 optic 2700oK

3 LED 26W mounted at 7.0m high (1m cube plus 6m column)

Generally, supply these walkway luminaries from the building and electrical cubicle power supplies. Walkway lighting is to be controlled either by a simple solar compensating time clock (i.e. Sangamo) mechanism with a manual override facility, or manually controlled from within buildings.

1030 Caravan Site

External Lighting to provide 5 lux (average) in immediate area of caravan hook-ups.

Provide new ASD luminaires:

Type B1 – ASD Micro Diamond Elite – M2 optic 2700oK

3LED 26W mounted at 2.5m high (column mount)

Fix and integrate these luminaires into a common lighting pole/column as part of the caravan hook up power modules.

Caravan Park lighting is to be controlled by a simple external PIR, to automatically control lights on presence detection. Motion Sensors to have short duration (1 - 2 minutes) timers.

1040 General Site Building Walkways

External Lighting to provide 5 lux (average) along walkways and in front of site buildings.

Provide new ASD luminaires, generally attached to the existing site buildings and cabins on site:

Type C - ASD Micro Diamond Elite – M2 optic 2700oK

3LED 26W mounted at 2.5m high (building mounted arm/bracket)

Generally, supply these luminaries from the building's electrical power supplies. Lights will be manually controlled from within buildings.

1050 Lighting Control

In line with the required Construction Lighting Strategy Document (HTR-FUW-ZZ-ZZ-PL-W-0534, rev P01 05/12/23):

- LED Luminaires used throughout
- No metal halide or fluorescent light sources used
- 100% downlight (Zero uplight from luminaires)
- 2700oK light colour temperature ("warm-white")
- Luminaires mounted horizontally, no upward tilt.

External security lighting to be set on Motion Sensors with short duration (1 minute) timers.
Solar compensating time clock (i.e. Sangamo) mechanism to be used, to provide seasonal control of the lighting during set hours after sunset and before sunrise.

W10 TELECOMMUNICATIONS

The Main Contractor will provide all Telecommunication lines and equipment to suit their own operational requirements.

W42 CLOSED CIRCUIT TELEVISION

The Main Contractor will employ a specialist to install and provide the CCTV system.

The Main Contractor will provide their own CCTV cameras and Security measures from a new Site Security Cabin which will be location next to the Main Site Compound Offices.

These works consist of containment only for the CCTV system, as shown on the drawings, providing split ducts around the perimeter of the site fixed to perimeter fencing.

W43 GENERAL SECURITY

No modification or additions to any electronic security system is intended as part of these works.

W51 EARTHING AND BONDING

Earthing and bonding to all electrical systems will be carried out to BS 7971 IET Wiring Regulations.

W52 LIGHTNING PROTECTION

No specific Lighting Protection System or requirements have been requested by the Client. Ensure all site temporary electrics are bonded to earth in compliance with the IET wiring regulations.

W53 ELECTROMAGNETIC COMPATABILITY AND SCREENING (EMC)

All installed plant and equipment will be supplied and installed compliant to BS EN IEC 61000.

W60 CENTRAL CONTROL/ BUILDING MANAGEMENT

No Central control or Building Management System (BMS) has been requested by the Client.

No automatic Energy Metering System (EMS) has been requested by the Client.

Appendix 1 – Site Temporary Electric Cubicles - Mains Distribution Assembly (MDA)

As Blakley products, or similar and approved. www.blakley.co.uk

- Blakley quotation for MDA for:
  - B7 General Assembly for the Main Site Compound panel
  - B4 General Assembly for the Satellite Compound panel.

Appendix 2 - Easee Electric Vehicle Chargers

3no. Single Phase Easee One (7.4kW) chargers

1no. Three Phase Easee Charge (22kW) charger

Easee Charge

Easee Charge maximises the available electrical capacity within the building using dynamic load and phase balancing. The ultimate solution for delivering EV-Charging at scale for workplace, apartment blocks, car parks and fleet.



Why choose Easee Charge?

Innovative commercial charging



Benefits

- Fully dynamic charging power 1.4 - 22kW (1 and 3 phase charging)
- Reduces capacity requirements by up to 90%.
- Load balancing of up to 101 chargers per fuse
- Automatic queuing system
- The load and phase balancing works offline
- WIFI connectivity
- Integrated eSIM in each box, free subscription included for life
- Permanent locking of the Type 2 cable
- Integrated earth fault protection - (Integral-type B RCD)
- Integrated RFID reader (NFC / ISO 14443 and MiFare Classic)
- Supports whitelisting of RFID tags, approved tags is automatically stored locally in each charging robot
- Energy measurement (+/- 3%), -for reading charge consumption
- Developed and manufactured in Norway
- The box is 69% smaller than other solutions and weighs only 1.5kg
- 3 year warranty, from the day the charger is installed
- Universal, fits all types of electric cars & power supplies
- Manual and digital control (Free Easee app)
- You choose the colour

Why choose Easee Charge?

22kW

Full of power

The charger can charge on both 1 and 3 phase and supports charging up to 22 kW. It has a Type 2 standard charging connector.

10 1pcs

Load balancing

Easee enables load balancing of up to 101 pcs. charging robots on a single circuit. It can operate both online and offline. Requires wifi mesh in larger facilities for 100% offline guarantee.

10 x

Quick charge

With Easee Charge, you can charge up to 10x* times faster than with a regular outlet. It charges as quickly as possible with the available capacity and provides you with the highest charging power. *10x times faster charge requires a 3-phase installation. With 1 phase you will still get 3 times faster charge.

eSIM

Internet access

All our charging robots are connected to the internet through mobile network*. If you buy now you get a internet subscription included for life. That means you don’t have to worry about having wifi coverage in your garage.
*Assuming cellular coverage is available.

69%

Small

The charging robot is 69% smaller and lighter than other electric chargers, with similar functionality. It weighs only 1.5kg! This means that we save the environment at least 4 kilos of copper and plastic per produced charger.

24/7

Always updated

The charging robot is updated with new features continuously. This way, you know that you have purchased a safe and future-proof product.

5x

A colorful choice

We have covers in five different colors; White, Anthracite, Red, Blue and Black. The choice is yours.

3yr

Warranty

We want you as a customer to have confidence that you have bought lasting quality. A product from Easee comes with a 3 year warranty.

Why choose Easee Charge?

Easy to scale

We have made it easy and affordable to invest in modern and forward-looking charging infrastructure. With “Easee Ready” docking station you get a completely EV ready charge point at low cost. By pre-installing the infrastructure within the building, upon demand Easee Charge can subsequently be deployed with our innovative “Plug & Play” technology at no additional installation cost.

The charging robot acts as an intelligent junction box and it supports the expansion of multiple charging stations on the same cable. This allows you to easily scale the system.



Fair charge and cost distribution

The Easee Charge have a fully autonomous load balancing system built-in ensuring that the power draw is evenly balanced. The intelligent queuing system ensures that all cars are charged without overloading the available power supply.

The Easee Charge measures accurate power consumption through its built-in power meters. When a charging station has multiple owners, you keep track of the power consumption of each one, by registering their charge with a RFID chip or through the app.



Why choose Easee Charge?

Made in Norway
- for Norwegian weather conditions

We develop and manufacture our products in Norway. Our products are developed for being able to withstand harsh environments. Not only is it tough it is also small! Our charging robot is 69% smaller than other ev-chargers. It only weights 1,5kg. We have strived to contribute to a sustainable future and are saving the enviroment for 4 kilos of copper and plastics per produced charger.

The charger thrives just as well on the outside of a house as inside a garage. Its components are of high quality and is composed in a very special way. It is IP56 certified and designed to withstand the Norwegian climate.

We want you as a customer to have confidence that you have bought lasting quality. One product from Easee comes with a 3 year warranty.



Feel safe

We've added 3 extra levels of security, so that we can sleep well at night, knowing that you can do it too. Safety is an important part of the design.

With an Easee Charging Robot you can be assured that charging is done safely. The charging robot is designed to the latest standards. In addition, there is built-in electronic earth fault protection that ensures detection of DC and ground faults.

The charging robot is also equipped with temperature sensors and protection to prevent overheating. You also don't have to worry about crooks, the charging cable can be permanently locked in the box via the app or the local wifi interface.



Specifications

Measurement
in mm



Technical

General

Dimension (mm): H: 256 x W: 193 x D: 106
Wall mounting (mm): cc H: 160 x W: 125
Operating temperature: - 30°C to + 40°C
Weight: 1.5 kg

Charging

Charging power: 1.4 - 22 kW
6A 1 phase - 32A 3 phase (automatically adjusted in relation to available capacity)
Up to 7.36kW at 32A 1 phase
Up to 22kW at 32A 3 phase (TN grid)
Number of phases: 1 and 3 (fully dynamic)
Charging connector: Type 2, Female (IEC 62196-2)
Voltage: 230V / 400V AC (+ -10%)
Load balancing of up to 101 pcs. charging robots per fuse
Load and phase balancing works offline
Automatic locking of charging connector
Built-in energy meter

Connectivity

Built-in eSIM (2G / 4G / GPRS / Cat-M1)
WiFi 2.4 GHz b / g / n connection
Control charging with the Easee app
RFID / NFC reader
OCPP 1.6 via our API

Sensors and indicators

Light strip showing the status of the charger
Touch button for manual adjustment
Brightness control sensor
Temperature sensors in all main contacts

Colours

White Antrachite Red Blue Black

Safety

Protection

Built-in Type-B ground fault protection (30mA AC / 6mA DC)
Enclosure degree: IP54 (electronics module)
Impact resistance: IK10
Fire class: UL94
UV resistant
Insulation class: II
Over voltage category III (4,5kV AC and 6kV impulse insulation tolerance)

Theft Protection

Electronics can be deactivated and tracked in case of theft.
The electronics can be permanently locked using a padlock (not visible).
The charging cable can be locked permanently in the charging station.

Complies with the following standards

2014/30/EU (EMC)
2014/35/EU (LVD)
2011/65/EU (RoHS)
EN 50412-2-1: (2005)
EN 55014-1: (2017)
EN 55014-2: (2015)
EN 55024: (2016)
EN 61851-1: (2019)
EN 61851-22: (2002)
EN 61000-3-2: (2019)
EN 61000-3-3: (2013)
EN 61000-3-11: (2000)
EN 61000-3-12: (2011)
EN 61000-6-2: (2016)
EN 61000-4-13: (2002) +A1:09+A2:16
EN 62196-1: (2014)
EN 62196-2: (2017)
EN 62321-1: (2014)
EN IEC 63000: (2019)
EN 300 328 v.2.1.1
EN 301 489-1 v.2.1.1
EN 301 489-17 v.2.1.1
IEC 61439-1: (2011)
IEC 61439-7: (2018)
IEC 62233: (2005)
Radio Equipment Directive 2014/ 53/EU
ROHS directive 2011 /65/EU
CE Konform

Installation

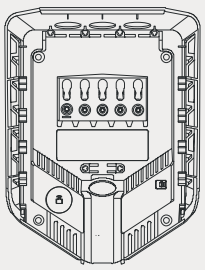
Power grids and fuses

Installation network: TN, IT and TT (detected automatically)
Installation circuit breaker: Max 63A overload protection. The short-circuit current at the charging point (IkMax) must not exceed 10kA.
If required by the installation, class A earth fault protection can be used for the circuit.

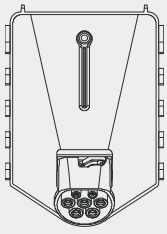
Integrated circuit in backplate

Cable cross-section:	1.5-10 mm2
Cable diameter:	8-22 mm
Terminal Tightening:	5 Nm
Cable Strip Length:	12 mm

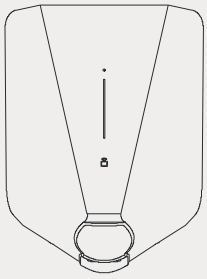
The product contains



Backplate



Chargeberry



Cover

Distribution UK

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June 2020 - Version 1.05

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Easee One

Built to comply with UK regulations, the Easee One comes with both integrated RCD protection (AC 30mA / DC 6mA) and open PEN conductor protection.



Why choose Easee One?

Forward-looking home charging



Benefits

- Integrated open PEN conductor protection, i.e., no need for earth rod
- Reduced cost and time to install
- Fully dynamic charging power 1.4–7.4 kW
- Load balancing of up to 3 units per fuse by integrated wireless communication
- Automatic queuing system
- Offline proof load balancing
- Integrated eSIM in each box, lifetime free subscription
- Possibility of WiFi connection
- Permanent locking of the Type 2 cable
- Integrated earth fault protection (RCD)
- Integrated RFID reader (NFC / ISO 14443 and MIFARE Classic®)
- Energy measurement (+/- 2 %), for reading charge consumption
- The box is 69 % smaller than other solutions and weighs only 1.5 kg
- 3 year warranty
- Universal, fits all types of electric cars and mains
- Full control with the Easee app or local WiFi interface, and open API
- Tethered or untethered, at the click of a button
- Compliant with The Electric Vehicles (Smart Charge Points) Regulations 2021

Why choose Easee One?

3x

Optimized charging effect

You can have up to 3 Charging Robots on one fuse. All connected cars can be charged at the same time, and the available power is distributed automatically and dynamically between the vehicles. The total load will thus never exceed the set limit for the fuse.

eSIM

Internet access

All our Charging Robots are connected to the internet through mobile network*. If you buy now you get free mobile internet access throughout the lifetime of the product. In order to get software updates and increased redundancy, we recommend installing a local WiFi network, if there is no cellular coverage. The local WiFi network must be connected to the Internet.
*Assuming cellular coverage is available.

69%

Small

The Charging Robot is 69 % smaller and lighter than other electric chargers, with similar functionality. It weighs only 1.5 kg! This means that we save the environment at least 4 kg of copper and plastic per produced charger.

24/7

Always updated

The Charging Robot is updated with new features continuously. This way, you know that you have purchased a safe and future-proof product.

5x

A colourful choice

Available in Black as standard, we have 4 other front covers available to purchase: White, Anthracite, Red and Blue

3yr

Warranty

We want you as a customer to have confidence that you have bought lasting quality. A product from Easee comes with a 3 year* warranty.
*Some countries may have extended warranty.

Why choose Easee One?

Made in Norway
- for harsh weather conditions

We develop and manufacture our products in Norway. Our products are developed for being able to withstand harsh environments. Not only is it tough, it is also small! Our Charging Robot is 69 % smaller than other EV-chargers. It only weights 1.5 kg. We have strived to contribute to a sustainable future and are saving the enviroment for 4 kg of copper and plastics per produced charger.

The charger thrives just as well on the outside of a house as inside a garage. Its components are of high quality and is composed in a very special way. It is IP54 certified.

We want you as a customer to have confidence that you have bought lasting quality. One product from Easee comes with a 3 year warranty.



Feel safe

We've added 3 extra levels of security, so that we can sleep well at night, knowing that you can do it too. Safety is an important part of the design.

With an Easee Charging Robot you can be assured that charging is done safely. The Charging Robot is designed to the latest standards. In addition, there is built-in electronic earth fault protection that ensures detection of DC and ground faults.

The Charging Robot is also equipped with temperature sensors and protection to prevent overheating. You also don't have to worry about crooks, the charging cable can be permanently locked in the box via the app or the local WiFi interface.



Why choose Easee One?

Easy when you get two electric cars

We have made it easy and affordable to invest in modern and forward-looking charging infrastructure. With “Easee Ready” docking station you get a completely EV ready charge point at low cost. By pre-installing an Easee One charge point, it is possible upon demand to subsequently deploy our innovative “Plug & Play” technology.

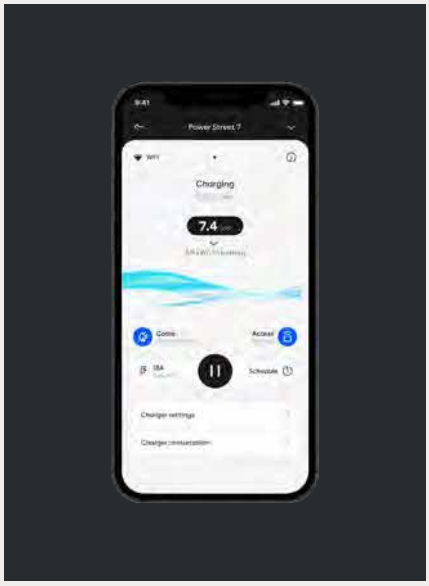
The Charging Robot acts as an intelligent junction box and it supports the expansion of multiple charging stations on the same cable.



Easee App

With the Easee app it is possible to control and plan when your car is charging. You can see live values for the current charge session and get an overview of your consumption. If you want to avoid finding the charging cable every time you charge the car, you can easily lock the cable permanently in the Charging Robot through the app.

You get full control over who can charge and when they can charge. We update the app periodically to make your Charging Robot even smarter. Additionally, with the Easee API further integrations and extended possibilities are available.



Specifications

Measurement
in mm



Technical

General

Dimension (mm): H: 256 x W: 193 x D: 106
Wall mounting (mm): c/c H: 160 x W: 125
Operating temperature: -30 °C to +50 °C
Weight: 1.5 kg

Charging

Charging power: 1.4–7.4 kW (6 –32 A)
Number of phases: 1
Connection point: Type-2 socket (IEC 62196-2)
Voltage: 230 V AC –single phase (±10 %)
Mains frequency: 50/60 Hz
Advanced load distribution
Up to 3 Charging Robots on the same circuit
Accuracy of built-in energy meter (±2 %)

Connectivity

Built-in eSIM (LTE Cat M1/ 2G /GPRS)
WiFi 2.4 GHz b/g/n connection
Easee Link RF™
Control charging with the Easee app
RFID/NFC reader
OCPP 1.6 via our API
Open API

Sensors and indicators

Light strip showing the status of the charger
Touch button for manual adjustment
Temperature sensors in all main contacts

Colours

Black*

*Compatible with other Easee front covers in White, Anthracite, Red or Blue.

Safety

Protection

Integrated overload protection according to EN IEC 61851-1:2019
Built-in RCD for ground fault protection (30 mA AC/ 6 mA DC) according to EN 61008-1 and IEC 62955
Integrated broken PEN lead protection according to BS 7671:2018/A1:2020
Degree of protection: IP54 (the backplate is IP22 without cover)
Impact resistance: IK10
Insulation class: I
Over voltage category III

Theft Protection

Electronics can be deactivated and tracked in case of theft (contact support if your device has been stolen).
The electronics can be permanently locked using a padlock (not included).
The charging cable can be locked permanently in the charging station.

Complies with the following regulations

2014/53/EU (RED)
2011/65/EU (RoHS)
2014/30/EU (EMC)
2014/35/EU (LVD)
The Electric Vehicles (Smart Charge Points) Regulations 2021
See DoC for details at easee.support

Installation

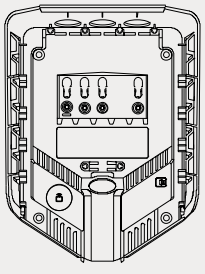
Power grids and fuses

Installation network: TT, TN-S, TN-C and TN-C-S
Installation circuit breaker: Max 40 A overload protection.

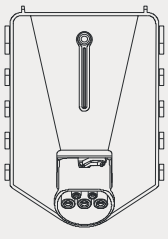
Integrated circuit in backplate

Wire cross-section: up to 16 mm^2 (single cable)/ up to 10 mm^2 (parallel connection)
Cable diameter: 8–22 mm
Terminal tightening: 5 Nm
Cable strip length: 12 mm

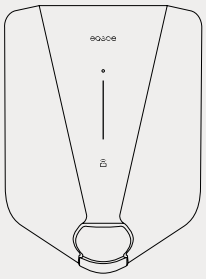
The product contains



Backplate



Chargeberry



Cover

Distribution UK

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Appendix 3 – Caravan Hook-up Connection Units

4 x 16A Sockets with RCBOs

1 x 6A RCBO for luminaire, controlled via local PIR.



ROLEC

HOOK-UP CONNECTION UNITS

Electrical solutions for caravan and holiday parks

Designed & Stocked in the UK

HOOK-UP CONNECTION UNITS

Electrical solutions for caravan and holiday parks

These cost effective and hard-wearing hook-up units are suitable for all caravan and holiday parks requirements. With its IP44 interlock sockets, these hook-up units ensure a safe and secure electrical connection.

Every unit is complete with an IP65 weatherproof polycarbonate enclosure, RCBO providing overload and 30mA fault current protection, which is accessible via a waterproof customer re-set flap, and built-in cable terminals.

MID compliant kWh metered units provide accurate billing information for park operators. Smartcard metered units allow visitors to pay upfront for their electricity consumption, encouraging them to be more energy conscious and reducing unnecessary electricity usage.





Product features

- IP44 interlock sockets
- Available in 6A, 10A, 16A or 32A versions
- 1way, 2way, 3way & 4way versions
- 18th edition regulations compliant
- Optional MID compliant kWh & pre-paid smartcard metering
- Built-in overload and 30mA fault current protection
- IP65 weatherproof polycarbonate enclosure
- Built-in cable terminals
- Switchgear access flap
- Optional galvanised mounting post
- Easy to install & maintain
- IP Rated & UV stabilised
- Fire retardant
- Designed & stocked in the UK





Solutions for all locations

Ideal solution for touring and static caravan sites, holiday parks and camping sites.

IP44 interlock sockets

Safe and secure electrical connection, with units offering up to four sockets.

Easy to install & maintain

Modular design with easy access to internal components allowing for maintenance and future upgrades.

Accurate billing

Optional built-in MID-approved energy metering ensures accurate consumption reading.

Significant cost savings

Smartcard metering options allow customers to pay upfront, reducing unnecessary electricity usage.

Strong, durable & compliant

IP rated, UV stabilised, fire retardant and compliant with 18th edition wiring regulations.

Specifications

Product Overview:

Connection Type	Metering Type	Power Output	Fault Protection	Product Code	Enclosure Size
1x IP44 interlock sockets	N/ A	1x 16A	1x 16A 30mA RCBO	LSHU0010	Small
		1x 10A*	1x 10A 30mA RCBO	LSHU0010-10A	
		1x 32A	1x 32A 30mA RCBO	LSHU0015	
	1x 45A kWh meter	1x 16A	1x 16A 30mA RCBO	LSHU0110	
		1x 10A*	1x 10A 30mA RCBO	LSHU0110-10A	
		1x 32A	1x 32A 30mA RCBO	LSHU0115	
	1x 63A Class 1 smartcard meter	1x 16A	1x 16A 30mA RCBO	LSHU0210	Large
		1x 32A	1x 32A 30mA RCBO	LSHU0215	
2x IP44 interlock sockets	N/ A	2x 16A	2x 16A 30mA RCBOs	LSHU0020	Small
		2x 6A**	2x 6A 30mA RCBOs	LSHU0020-6A	
		2x 10A*	2x 10A 30mA RCBOs	LSHU0020-10A	
		2x 32A	2x 32A 30mA RCBOs	LSHU0025	
	2x 45A kWh meters	2x 16A	2x 16A 30mA RCBOs	LSHU0120	
		2x 10A*	2x 10A 30mA RCBOs	LSHU0120-10A	
		2x 32A	2x 32A 30mA RCBOs	LSHU0125	
3x IP44 interlock sockets	N/ A	3x 16A	3x 16A 30mA RCBOs	LSHU0030	Large
		3x 10A*	3x 10A 30mA RCBOs	LSHU0030-10A	
	3x 45A kWh meters	3x 16A	3x 16A 30mA RCBOs	LSHU0130	
		3x 10A*	3x 10A 30mA RCBOs	LSHU0130-10A	
4x IP44 interlock sockets	N/ A	4x 16A	4x 16A 30mA RCBOs	LSHU0040	
		4x 10A*	4x 10A 30mA RCBOs	LSHU0040-10A	
		4x 32A	4x 32A 30mA RCBOs	LSHU0045	
	4x 45A kWh meters	4x 16A	4x 16A 30mA RCBOs	LSHU0140	
		4x 10A*	4x 10A 30mA RCBOs	LSHU0140-10A	

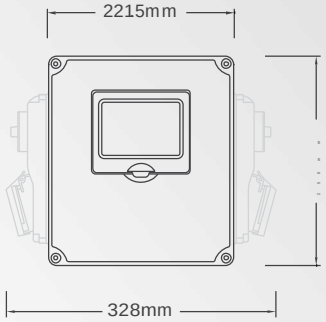
*Supplied with 16A socket(s) restricted to a 10A output

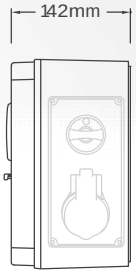
**Supplied with 16A socket(s) restricted to a 6A output

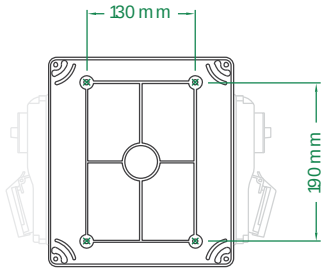
Specifications

Unit Dimensions:

Small Enclosure:

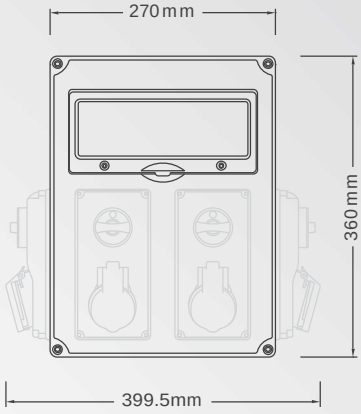


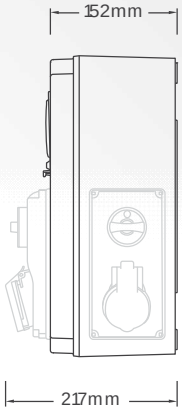


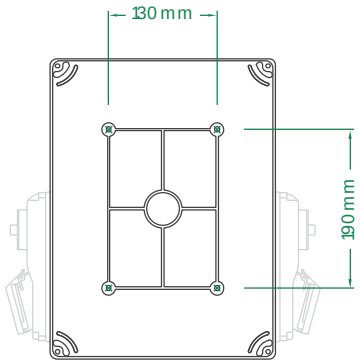


Fixing Points

Large Enclosure:

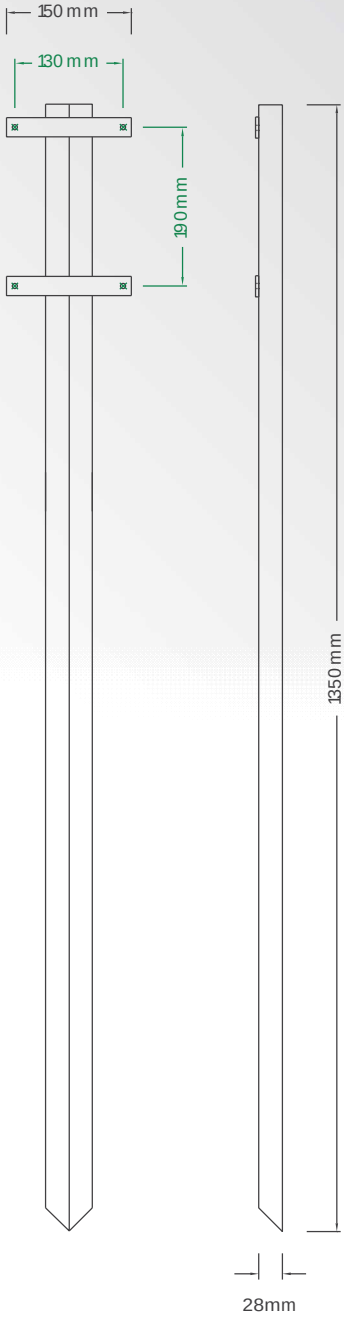






Fixing Points

Optional Mounting Post:



Specifications

Technical Data:

Built-in Protection	AC overload & fault current protection –30mA Type A RCBO (per socket) (6A, 10A, 16A or 32A as appropriate)
Input Voltage	Single phase - 220 to 250V AC / 50Hz
Cable Terminals	Single Phase –3x 50mm Tunnel terminals fitted as standard –1P + N + E (other sizes available on request)
Earthing	Brass Earth plate & Earth terminals
Energy Metering	Integrated Class 1 MID compliant metering (model dependant)
Dimensions	Excluding sockets/connectors: • Small Enclosure –221.5mm x 250mm x 142mm (W x H x D) • Large Enclosure –270mm x 360mm x 152mm (W x H x D)
Weight	• Small Enclosure –< 3kg (model dependant) • Large Enclosure –< 5.7kg (model dependant)
Environmental	• Ingress protection –Enclosure IP65, Socket IP54 • Impact protection –IK08 • Operating temperature –-25°C to +60°C • Operating humidity –5% to 95%
Materials	Enclosure –Polycarbonate (UV Stabilised)
Unit Colour	Light grey
Certifications & Compliances	• Wiring Regulations (where applicable) –18th Edition BS7671:2018+A1:2020 • Safety Compliance (LVD) –2014/35/EU, SI 2016/1101 • Environmental Protection –BS EN 60529:1992+A2:2013 • Enclosure –EN 60670-1, EN 60670-22 • Socket(s) (where applicable) –BS EN 60309-2:1999+A2:2012 • Cables (where applicable) –BS 6004 • Flame Retardance –IEC 60695-2-11:2014 • Impact Rating –BS EN 62262:2002+A1:2021 • Metering (where applicable) –EN50470-1, EN50470-3, MID B+D Certified, 2014/32/EU, SI 2016/1153 • RoHS –2011/65/EU, SI 2012/3032 • REACH –1907/2006 • Certification Markings –CE & UKCA
Warranty	12 Months

Options & accessories

Product Code	Item Description
LSAF0060	1350mm galvanised steel post to suit small & large hook-up connection unit enclosures
ACEQ0030	C6A 30mA 1P+N 2MOD Type A (6KA) RCBO
ACEQ0070	C10A 30mA 1P+N 2MOD Type A (6KA) RCBO
ACEQ0110	C16A 30mA 1P+N 2MOD Type A (6KA) RCBO
ACEQ0160	C32A 30mA 1P+N 2MOD Type A (6KA) RCBO
ACEA0020i	16A 230V IP44 Interlock panel socket
ACEA0090i	32A 230V IP44 Interlock panel socket
ACLG0050	Photocell kit to control park lighting
ACEU0160	63A 1Phase Class 1 MID smartcard meter
ACEU0170	Blank reusable smartcard (printing/branding available)
LSAF0180	Smartcard meter system software and reader/writer



ACEU0160


Branding available

ACEU0170



LSAF0060


LSAF0180



ACLG0050

Smartcard metering & management



Rolec's smartcard metering is the ideal solution to efficiently control and manage a park's electric supplies. The smartcard meter includes a built-in electrical contactor that automatically switches the electricity supply on/off as credit becomes available or expires. Visitors pay upfront for their electricity consumption and any unused credit on the meter can be transferred back to the smartcard and returned to the office computer for a refund.

The smartcard meter system is an available option for the entire range of hook-up solutions and is perfect for caravan/holiday parks and similar locations that do not have the desire or capacity to install data cables or a networked management system.



- Pre-paid smartcard operated
- Class 1 accurate smartcard meter with digital display
- MID compliant
- Re-usable waterproof smartcards
- Easy to operate software
- USB card reader/writer
- Secure tariff management
- Audible & visual low credit warning
- Unused credit can be returned to the smartcard
- Smartcards are unique to each sites computer software



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LSHUD-V01-R0 Hook-Up Connection Units Data Sheet

Designed
& Stocked
in the UK

ROLEC

t: 01205 724754
e: enquiries@rolecserv.co.uk

www.rolecserv.com

Appendix 4 – ASD Lighting

Highway Diamond Elite Range.

Note: 2700oK colour temperature luminaires required.

LIGHTING

Datasheet

Highway Diamond™Elite Range



- ◇ UK Manufactured
- ◇ High Specification
- ◇ High Efficacy
- ◇ 10 Day Average Delivery
- ◇ IP66 / IK10
- ◇ UKCA / CE
- ◇ ENEC
- ◇ TM66 Data Available

The Highway Diamond Elite range by ASD Lighting offers a complete family of luminaires with an unsurpassed flexibility of lumen outputs, optical distributions and specification features.

It is suitable for use in a multitude of locations, from rural villages through to modern 24 hour smart cities, main roads, motorways and infrastructure projects.

Five body sizes with modern sympathetic styling to ensure architects, planners and designers can follow an integrated design with a homogenous family of luminaires.

ASD Lighting PLC
Mangham Road, Barbot Hall Industrial Estate, Rotherham, S61 4RJ, UK

T: 01709 374898
E : info@asdlighting.com
W: asdstreetlighting.com

Highway Diamond™Elite Range

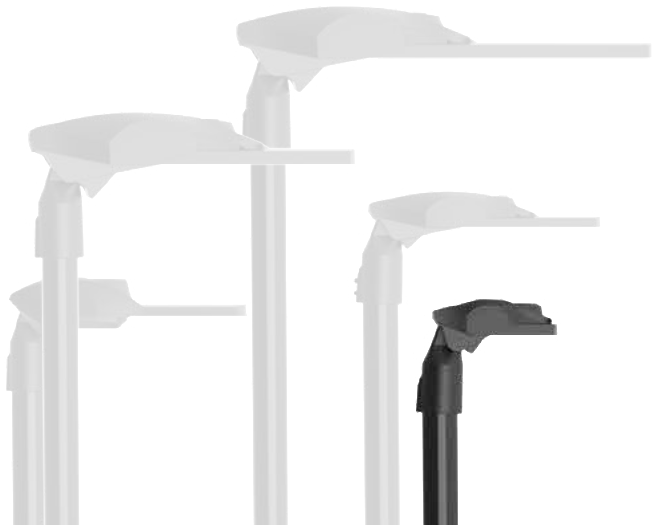


Technical Data	Standard Features	Additional Detail
LED	∏	Designed solely for an LED light source
Driver	∏	DALI 2, Programmable, CMS Compatible, NFC, DALI 4i on Request
Driver Current	Various	200 - 1000 mA
Dimming	∏	Multiple Step / Part Night
Constant Light Output or Constant Flux	∏	
Photometric Lens Options	∏	Inc. Narrow / Medium / Wide / Extra Wide / Pedestrian Crossing
Luminaire Materials (Excluding HWD ECO)	LM6 Marine Grade Die-Cast Aluminium	Housing / Spigot / Fixing Clip
Luminaire Materials (ECO)	LM6 Marine Grade Die-Cast Aluminium & Acrylonitrile Styrene Acrylate	Housing / Spigot (LM6 Marine Grade Die-Cast Aluminium) Control Gear Cover (ASA)
RAL Colours	Black / Light Grey	RAL 9005 / 9006 (Other Colours Available on Request)
Correlated Colour Temperature	Various	Warm White / Neutral White / Cool White
Colour Rendering	> 80 > 72	Warm White Neutral White / Cool White
Ingress Protection Rating	IP66	Gear & LED Compartments
Impact Protection Rating	IK10	Optical Cover
Optical Cover	∏ Flat Cover	UV Stable Polycarbonate
Entry to Gear Compartment	Tool Free Excluding HWD3 ECO & HWD3+ ECO+	Tool Free Fixing Clip Simple Tool Required
Driver Replacement	∏	Tool Free (HWD Mini, HWD6 Midi, HWD8 Maxi) Simple Tools (HWD2 Micro, HWD3 ECO & HWD3+ ECO+)
Inbuilt Anti-Tamper Facility	∏	
Protection Class	Class 1	
Warranty Period	Standard 5 Years	Extended Warranties Available
Certification	∏	Inc. UKCA / CE / ENEC
Design Life	100,000 hr	> L90, < F10
Mains Voltage	220-240 V / 50-60 Hz	
Operating Temperature Range	-40 to +55°c	Based on Ambient External Temperature
Surge Protection	Inbuilt Driver	10 kV (1 pulse) / 8 kV
Vibration Tested	∏	Certificates - EN 60068-2-6 & EN 60068-2-64
Manufacturing Location	UK	Rotherham, South Yorkshire

Footpath | Residential | Cycle Routes | Car Parks | Traffic Routes | Pedestrian | Rail | Infrastructure | Motorway

Micro

Highway Diamond™Elite



The Micro Highway Diamond is the smallest luminaire in the family. It is a high specification, high efficacy, UK manufactured luminaire delivering up to 5,000 lumens. Detailed below are some of the options and further features the Micro Highway Diamond has to offer.

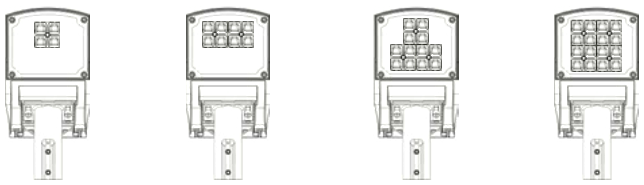
All features previously listed in the Highway Diamond Elite Range (page 2) apply to this product.

Technical Data	Features	Additional Detail
LED Configuration	4 / 8 / 12 / 16	
System Power Watts	4 –40 W	
Delivered Lumens	300 - 5000 lm	
Weight (Excluding Spigot)	3.1kg	
Weight (Including Spigot)	3.5kg	
Windage	< 0.02m^2	
Mounting & Tilt Options	Post top Post top tilt Side entry Side entry tilt Side entry Side entry tilt	Ø 60 mm –Ø 76 mm 0° / 5° / 10° / 15° / 20° Ø 60 mm –Ø 76 mm -5° / 0° / 5° / 10° / 15° Ø 28 mm –Ø 42 mm -10° / -5° / 0° / 5° / 10°

Options			Extras
Luminaire Colour	Any RAL colour available. Including but not limited to: RAL9003 RAL5015 RAL6003 RAL6005 RAL6013 BS480000A01	 White Sky Blue Olive Green Moss Green Reed Green Oyster Grey	1 2
Switching	3 & 7 Pin NEMA Sockets Mini Cell Zhaga Book 18 Socket (Top only)		2
Pre-Wired	Π	Lengths and cable specification as requested	2
Surge Protection	Π	Additional surge protection available on request	1 2

1 Specifiy at time of order, may affect lead time.

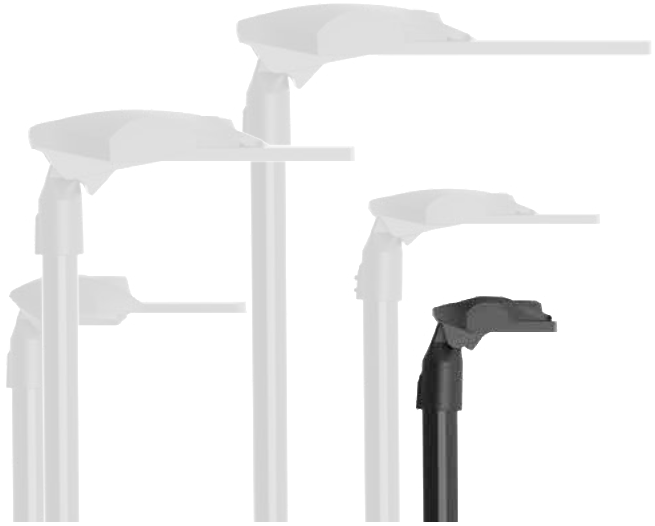
2 Specifiy at time of order, may incur an additional charge.



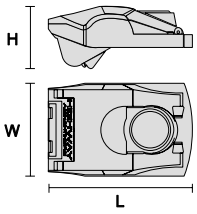
4 LED 8 LED 12 LED 16 LED

Micro

Highway Diamond™Elite



Code	
HWD2/ HWD2P/ HWD2S/ HWD2X/ HWD2XP/	60 - 76mm Spigot (Set as side entry) 60 - 76mm (Set as post top pre-wired only) 28 - 42mm Spigot (Set as side entry) 60mm Spigot (Set as side entry) 60mm (Set as post top pre-wired only)
Colour Finish	
B J	Black (RAL 9005) Light Grey (RAL 9006) Others available on request
Correlated Colour Temperature	
22K 27K 3K 4K	2200 Kelvin 2700 Kelvin 3000 Kelvin 4000 Kelvin Others available on request
LED Quantity	
04 08 12 16	4 LED 8 LED 12 LED 16 LED
Drive Current (200 - 850mA)	
20 30 35 40 50 60 70 80 85	200mA 300mA 350mA 400mA 500mA 600mA 700mA 800mA 850mA
Constant Flux / Light Output	
- L	Constant Flux Constant Light Output
Switching if requested	
NS 7NS C ZT	NEMA Socket 7 Pin NEMA Socket Mini Cell Zhaga Book 18 & DALI 4l Driver Other switching systems available on request.
Optics	
-S4 As above Insert optic code required	S4 Optic S0 / S1 / S2 / S3 / S5 / S6 / S7 / S8 / M1 / M2 / M3 / M4 / M5 / M6 / M7 / M8 / F0 / F1 / F2 / F3 / F4 / A1 / A2 / A3 / A4 / A5 / N1 / N2 / N3 / N4 / ZL / ZR
Pre-Wired if requested	
-W7 -2W7 -AW7 -2AW7	7 metre Pre-wired 3 core flex (1.5mm) 7 metre Pre-wired 3 core flex (2.5mm) 7 metre Pre-wired Arctic flex (1.5mm) 7 metre Pre-wired Arctic flex (2.5mm) Other cable types & lengths on request



Size	
Length	255mm
Width	165mm
Height	111mm

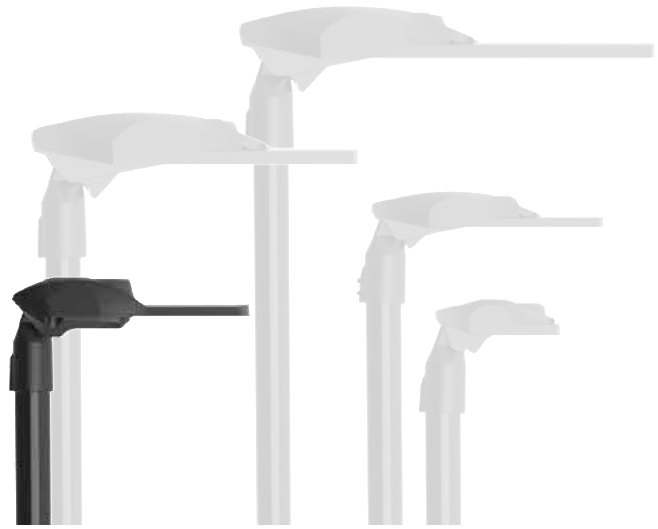
Code Example

HWD2P/B22K0850L7NS-S1-W7

Micro Highway Diamond Elite™60-76mm Spigot Set as Post Top, Black Finish, 2200K, 8 LED, 500mA, Constant Light Output, 7-Pin NEMA Socket, S1 Optic, 7m Pre-wired 1.5mm flex.

ECO & ECO+

Highway Diamond™Elite



The Highway Diamond ECO is the latest addition to the family. It is a high specification, high efficacy, UK manufactured luminaire delivering up to 10,000 lumens. Detailed below are some of the options and further features the Highway Diamond has to offer.

All features previously listed in the Highway Diamond Elite Range (page 2) apply to this product.

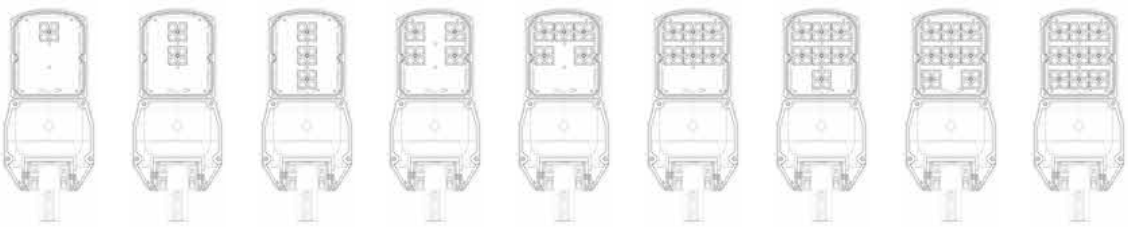
Technical Data	Features	Additional Detail
LED Configuration	4 / 8 / 12 / 16 / 20 / 24 / 28 / 32 / 36	
System Power Watts	4 –70 W	
Delivered Lumens	300 - 10,000 lm	
Weight (Excluding Spigot)	4.27kg 4.47kg	4 –16 LED 20 –36 LED
Weight (Including Spigot)	4.57kg 4.97kg	4 –16 LED 20 –36 LED
Windage	< 0.04m^2	
Mounting & Tilt Options	Post top Post top tilt Side entry Side entry tilt Side entry Side entry tilt	Ø 60 mm –Ø 76 mm -15° / -10° / -5° / 0° / 5° / 10° / 15° / 20° Ø 60 mm –Ø 76 mm -20° / -15° / -10° / -5° / 0° / 5° / 10° / 15° Ø 28 mm –Ø 42 mm -30° / -25° / -20° / -15° / -10° / -5° / 0° / 5° / 10°

Options			Extras
Switching	3 & 7 Pin NEMA Sockets Mini Cell Zhaga Book 18 Socket/s (Top & Underside)		1 2
Pre-Wired	Π	Lengths and cable specification as requested	2
Surge Protection	Π	Additional surge protection available on request	1 2

Optional Features			
PIR	Π		1 2

1 Specifiy at time of order, may affect lead time.

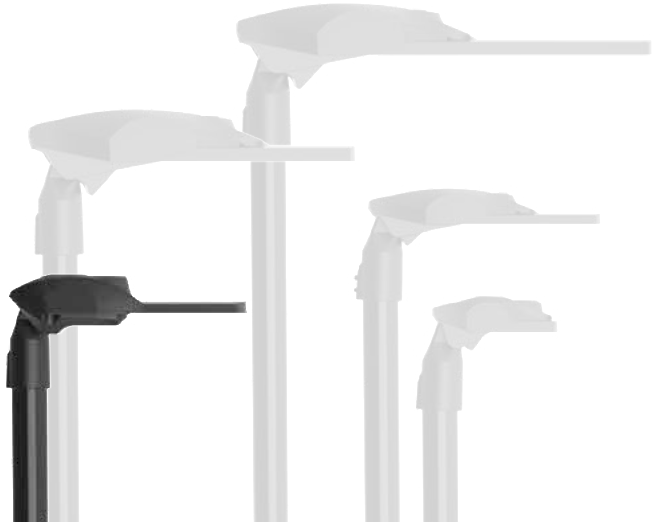
2 Specifiy at time of order, may incur an additional charge.



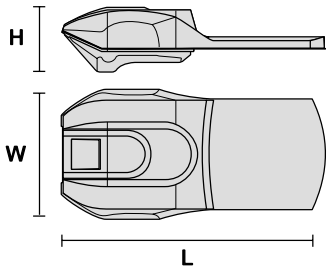
4 LED | 8 LED | 12 LED | 16 LED | 20 LED | 24 LED | 28 LED | 32 LED | 36 LED

ECO & ECO+

Highway Diamond™Elite



Code	
HWD3/ or HWD3+/ HWD3P/ or HWD3+P/ HWD3S/ or HWD3+S/ HWD3X/ or HWD3+X/ HWD3XP/ or HWD3+XP/	60 - 76mm spigot (Set as side entry) 60 - 76mm (Set as post top pre-wired only) 28 - 42mm spigot (Set as side entry) 60mm Spigot (Set as side entry) 60mm (Set as post top pre-wired only)
Colour Finish	
B J	Black (RAL 9005) Light Grey (RAL 9006) Others available on request
Correlated Colour Temperature	
22K 27K 3K 4K	2200 Kelvin 2700 Kelvin 3000 Kelvin 4000 Kelvin Others available on request
LED Quantity	
04 08 12 16 20 24 28 32 36	4 LED 8 LED 12 LED 16 LED 20 LED 24 LED 28 LED 32 LED 36 LED
Drive Current (200 - 1000mA)	
20 30 35 40 50 60 70 80 90 100	200mA 300mA 350mA 400mA 500mA 600mA 700mA 800mA 900mA 1000mA
Constant Flux / Light Output	
- L	Constant Flux Constant Light Output
Switching if requested	
NS 7NS C ZT / ZB	NEMA Socket 7 Pin NEMA Socket Mini Cell Zhaga Book 18 & DALI 4I Driver Other switching systems available on request.
Optics	
-S4 As above Insert optic code required	S4 Optic S0 / S1 / S2 / S3 / S5 / S6 / S7 / S8 / M1 / M2 / M3 / M4 / M5 / M6 / M7 / M8 / F0 / F1 / F2 / F3 / F4 / A1 / A2 / A3 / A4 / A5 / N1 / N2 / N3 / N4 / ZL / ZR
-W7 -2W7 -AW7 -2AW7	7 metre Pre-wired 3 core flex (1.5mm) 7 metre Pre-wired 3 core flex (2.5mm) 7 metre Pre-wired Arctic flex (1.5mm) 7 metre Pre-wired Arctic flex (2.5mm) Other cable types & lengths on request



Size	
Length	481mm
Width	239mm
Height	120mm

Code Example

HWD3/B4K3670L7NS-S1-W7

Highway Diamond ECO 60-76mm Spigot Set as Side Entry, Black RAL9005, 4000K, 36 LED, 700mA, CLO, 7 Pin NEMA Socket, S1 Optic, 7m Pre-wired 1.5mm flex.

Mini
Highway Diamond™Elite



The Highway Diamond is the original luminaire in the family. It is a high specification, high efficacy, UK manufactured luminaire delivering up to 14,500 lumens. Detailed below are some of the options and further features the Highway Diamond has to offer.

All features previously listed in the Highway Diamond Elite Range (page 2) apply to this product.

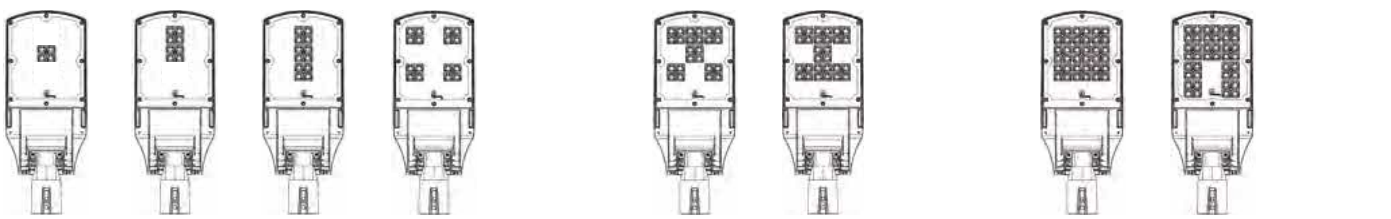
Technical Data	Features	Additional Detail
LED Configuration	4 / 8 / 12 / 16 / 20 / 24 / 28 / 32 / 36 / 40 / 44	
System Power Watts	4 –121 W	
Delivered Lumens	300 - 14500 lm	
Weight (Excluding Spigot)	4.27kg 4.47kg	4 –16 LED 20 –44 LED
Weight (Including Spigot)	4.57kg 4.97kg	4 –16 LED 20 –44 LED
Windage	< 0.04m²	
Mounting & Tilt Options	Post top Post top tilt Side entry Side entry tilt Side entry Side entry tilt	Ø 60 mm –Ø 76 mm 0° / 5° / 10° / 15° / 20° Ø 60 mm –Ø 76 mm -5° / 0° / 5° / 10° / 15° Ø 28 mm –Ø 42 mm -10° / -5° / 0° / 5° / 10°

Options			Extras
Luminaire Colour	Any RAL colour available. Including but not limited to: RAL9003 RAL5015 RAL6003 RAL6005 RAL6013 BS480000A01	White Sky Blue Olive Green Moss Green Reed Green Oyster Grey	1 2
Switching	3 & 7 Pin NEMA Sockets Mini Cell Zhaga Book 18 Socket/s (Top / Underside)		2
Pre-Wired	Π	Lengths and cable specification as requested	2
Surge Protection	Π	Additional surge protection available on request	1 2

Optional Features			
Auto Disconnect	Π	Switches unit off upon opening	2
PIR	Π		1 2

1 Specifiy at time of order, may affect lead time.

2 Specifiy at time of order, may incur an additional charge.



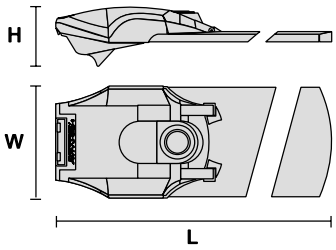
4 LED 8 LED 12 LED 16 LED 20 LED 24 LED 28 LED 32 LED 36 LED 40 LED 44 LED

Mini

Highway Diamond™Elite



Code	
HWD/ HWDP/ HWDS/ HWDX/ HWDXP/	60 - 76mm Spigot (Set as side entry) 60 - 76mm (Set as post top pre-wired only) 28 - 42mm Spigot (Set as side entry) 60mm Spigot (Set as side entry) 60mm (Set as post top pre-wired only)
Colour Finish	
B J	Black (RAL 9005) Light Grey (RAL 9006) Others available on request
Correlated Colour Temperature	
22K 27K 3K 4K	2200 Kelvin 2700 Kelvin 3000 Kelvin 4000 Kelvin Others available on request
LED Quantity	
04 08 12 16 20 24 28 32 36 40 44	4 LED 8 LED 12 LED 16 LED 20 LED 24 LED 28 LED 32 LED 36 LED 40 LED 44 LED
Drive Current (200 - 1000mA)	
20 30 35 40 50 60 70 80 90 100	200mA 300mA 350mA 400mA 500mA 600mA 700mA 800mA 900mA 1000mA
Constant Flux / Light Output	
- L	Constant Flux Constant Light Output
Switching if requested	
NS 7NS C ZT / ZB	NEMA Socket 7 Pin NEMA Socket Mini Cell Zhaga Book 18 & DALI 4I Driver Other switching systems available on request.
Optics	
-S4 As above Insert optic code required	S4 Optic S0 / S1 / S2 / S3 / S5 / S6 / S7 / S8 / M1 / M2 / M3 / M4 / M5 / M6 / M7 / M8 / F0 / F1 / F2 / F3 / F4 / A1 / A2 / A3 / A4 / A5 / N1 / N2 / N3 / N4 / ZL / ZR
Pre-Wired if requested	
-W7 -2W7 -AW7 -2AW7	7 metre Pre-wired 3 core flex (1.5mm) 7 metre Pre-wired 3 core flex (2.5mm) 7 metre Pre-wired Arctic flex (1.5mm) 7 metre Pre-wired Arctic flex (2.5mm) Other cable types & lengths on request



Size	
Length	476mm
Width	233mm
Height	116mm

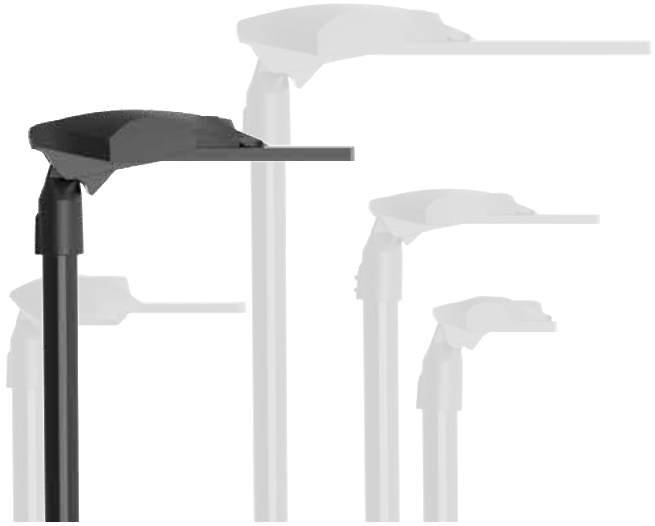
Code Example

HWD/B4K0835C-S1-W7

Highway Diamond Elite™60-76mm Spigot Set as Side Entry, Black Finish, 4000K, 8 LED, 350mA, Mini Cell, S1 Optic, 7m Pre-wired 1.5mm flex.

Midi

Highway Diamond™Elite



The Midi Highway Diamond, part of the Highway Diamond Elite range with enhanced high specification features. It is a high efficacy, UK manufactured luminaire delivering up to 25,000 lumens. Detailed below are some of the options and further features the Midi Highway Diamond has to offer.

All features previously listed in the Highway Diamond Elite Range (page 2) apply to this product.

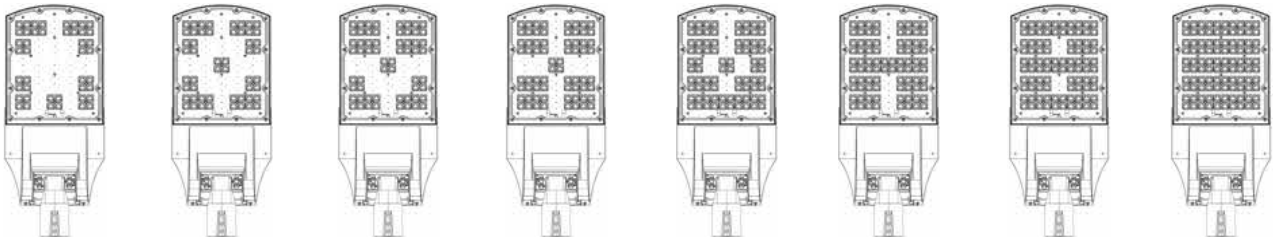
Technical Data	Features	Additional Detail
LED Configuration	44 / 52 / 60 / 68 / 76 / 84 / 92 / 100	
System power watts	48 –211 W	
Delivered lumens	4,832 - 24,341 lm	
Weight (Excluding Spigot)	< 11.5kg	44 –100 LED (Weight varies dependent on driver configuration)
Weight (Including Spigot)	< 12.5kg	44 –100 LED (Weight varies dependent on driver configuration)
Windage	< 0.11m^2	
Mounting & Tilt Options	Post top Post top tilt Side entry Side entry tilt	Ø 60 mm –Ø 76 mm -5° / 0° / 5° / 10° / 15° Ø 60 mm –Ø 76 mm -10° / -5° / 0° / 5° / 10° / 15° Insert reducers available for smaller diameters
Auto Disconnect	Π	Switches unit off upon opening

Options			Extras
Luminaire Colour	Any RAL colour available. Including but not limited to: RAL9003 RAL5015 RAL6003 RAL6005 RAL6013 BS480000A01	White Sky Blue Olive Green Moss Green Reed Green Oyster Grey	1 2
Switching	3 & 7 Pin NEMA Sockets Mini Cell Zhaga Book 18 Socket/s (Top/underside)		2
Pre-Wired	Π	Lengths and cable specification as requested	2
Surge Protection	Π	Additional surge protection available on request	1 2

Optional Features			
PIR	Π		1 2

1 Specifiy at time of order, may affect lead time.

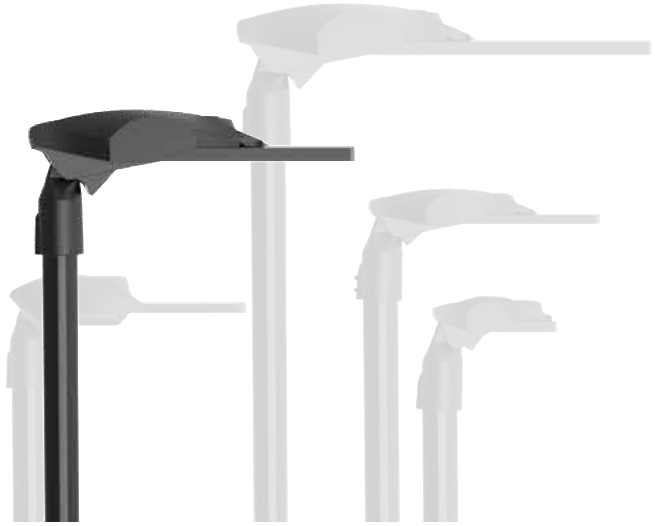
2 Specifiy at time of order, may incur an additional charge.



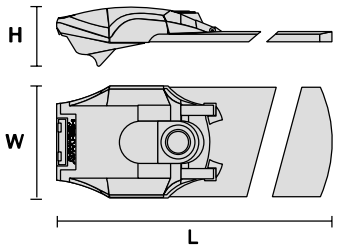
44 LED | 52 LED | 60 LED | 68 LED | 76 LED | 84 LED | 92 LED | 100 LED

Midi

Highway Diamond™Elite



Code	
HWD6/ HWD6P/ HWD6R/ HWD6X/ HWD6XP/	60 - 76mm Spigot (Set as side entry) 60 - 76mm (Set as post top pre-wired only) 28 - 42mm (Reducer included) 60mm Spigot (Set as side entry) 60mm (Set as post top pre-wired only)
Colour Finish	
B J	Black (RAL 9005) Light Grey (RAL 9006) Others available on request
Correlated Colour Temperature	
22K 27K 3K 4K	2200 Kelvin 2700 Kelvin 3000 Kelvin 4000 Kelvin Others available on request
LED Quantity	
44 52 60 68 76 84 92 100	44 LED 52 LED 60 LED 68 LED 76 LED 84 LED 92 LED 100 LED
Drive Current (200 - 1000mA)	
20 30 35 40 50 60 70 80 90 100	200mA 300mA 350mA 400mA 500mA 600mA 700mA 800mA 900mA 1000mA
Constant Flux / Light Output	
- L	Constant Flux Constant Light Output
Switching if requested	
NS 7NS C ZT / ZB	NEMA Socket 7 Pin NEMA Socket Mini Cell Zhaga Book 18 & DALI 4I Driver Other switching systems available on request.
Optics	
-S4 As above Insert optic code required	S4 Optic S0 / S1 / S2 / S3 / S5 / S6 / S7 / S8 / M1 / M2 / M3 / M4 / M5 / M6 / M7 / M8 / F0 / F1 / F2 / F3 / F4 / A1 / A2 / A3 / A4 / A5 / N1 / N2 / N3 / N4 / ZL / ZR
Pre-Wired if requested	
-W7 -2W7 -AW7 -2AW7	7 metre Pre-wired 3 core flex (1.5mm) 7 metre Pre-wired 3 core flex (2.5mm) 7 metre Pre-wired Arctic flex (1.5mm) 7 metre Pre-wired Arctic flex (2.5mm) Other cable types & lengths on request



Size	
Length	672mm
Width	329mm
Height	173mm

Code Example

HWD6/B4K6850-M1-W11

Midi Highway Diamond Elite™60-76mm Spigot Set as Side Entry, Black Finish, 4000K, 68 LED, 500mA, M1 Optic, 11m Pre-wired 1.5mm flex.

Maxi

Highway Diamond™Elite



The Maxi Highway Diamond is the latest member of the Highway Diamond Elite family, with the same enhanced high specification features of the Maxi Highway Diamond. It is a high efficacy, UK manufactured luminaire delivering up to 40,000 lumens. Detailed below are some of the options and further features the Maxi Highway Diamond has to offer.

All features previously listed in the Highway Diamond Elite Range (page 2) apply to this product.

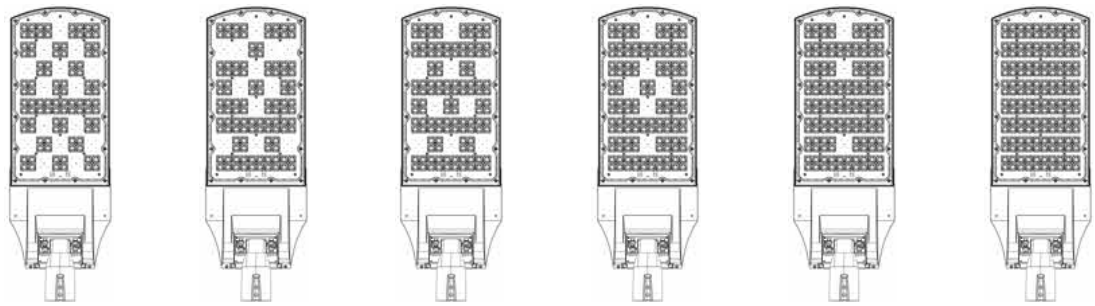
Technical Data	Features	Additional Detail
LED Configuration	100 / 112 / 124 / 136 / 148 / 160	
System Power Watts	106 –338 W	
Delivered Lumens	11,515 - 39,608 lm	
Weight (Excluding Spigot)	<14.5kg	100 –160 LED (Weight varies dependent on driver configuration)
Weight (Including Spigot)	<15.5kg	100 –160 LED (Weight varies dependent on driver configuration)
Windage	< 0.12m^2	
Mounting & Tilt Options	Post top Post top tilt Side entry Side entry tilt	Ø 60 mm –Ø 76 mm -5° / 0° / 5° / 10° / 15° Ø 60 mm –Ø 76 mm -10° / -5° / 0° / 5° / 10° / 15° Insert reducers available for smaller diameters
Auto Disconnect	Π	Switches unit off upon opening

Options			Extras
Luminaire Colour	Any RAL colour available. Including but not limited to: RAL9003 RAL5015 RAL6003 RAL6005 RAL6013 BS480000A01	White Sky Blue Olive Green Moss Green Reed Green Oyster Grey	1 2
Switching	3 & 7 Pin NEMA Sockets Mini Cell Zhaga Book 18 Socket/s (Top / Underside)		2
Pre-Wired	Π	Lengths and cable specification as requested	2
Surge Protection	Π	Additional surge protection available on request	1 2

Optional Features			
PIR	Π		1 2

1 Specifiy at time of order, may affect lead time.

2 Specifiy at time of order, may incur an additional charge.



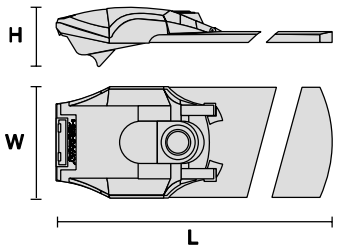
100 LED | 112 LED | 124 LED | 136 LED | 148 LED | 160 LED

Maxi

Highway Diamond™Elite



Code	
HWD8/ HWD8P/ HWD8R/ HWD8X/ HWD8XP/	60 - 76mm Spigot (Set as side entry) 60 - 76mm (Set as post top pre-wired only) 28 - 42mm Spigot (Reducer included) 60mm Spigot (Set as side entry) 60mm (Set as post top pre-wired only)
Colour Finish	
B J	Black (RAL 9005) Light Grey (RAL 9006) Others available on request
Correlated Colour Temperature	
22K 27K 3K 4K	2200 Kelvin 2700 Kelvin 3000 Kelvin 4000 Kelvin Others available on request
LED Quantity	
100 112 124 136 148 160	100 LED 112 LED 124 LED 136 LED 148 LED 160 LED
Drive Current (200 - 1000mA)	
20 30 35 40 50 60 70 80 90 100	200mA 300mA 350mA 400mA 500mA 600mA 700mA 800mA 900mA 1000mA
Constant Flux / Light Output	
- L	Constant Flux Constant Light Output
Switching if requested	
NS 7NS C ZT / ZB	NEMA Socket 7 Pin NEMA Socket Mini Cell Zhaga Book 18 & DALI 4I Driver Other switching systems available on request.
Optics	
-S4 As above Insert optic code required	S4 Optic S0 / S1 / S2 / S3 / S5 / S6 / S7 / S8 / M1 / M2 / M3 / M4 / M5 / M6 / M7 / M8 / F0 / F1 / F2 / F3 / F4 / A1 / A2 / A3 / A4 / A5 / N1 / N2 / N3 / N4 / ZL / ZR
Pre-Wired if requested	
-W11 -2W11 -AW11 -2AW11	11 metre Pre-wired 3 core flex (1.5mm) 11 metre Pre-wired 3 core flex (2.5mm) 11 metre Pre-wired Arctic flex (1.5mm) 11 metre Pre-wired Arctic flex (2.5mm) Other cable types & lengths on request

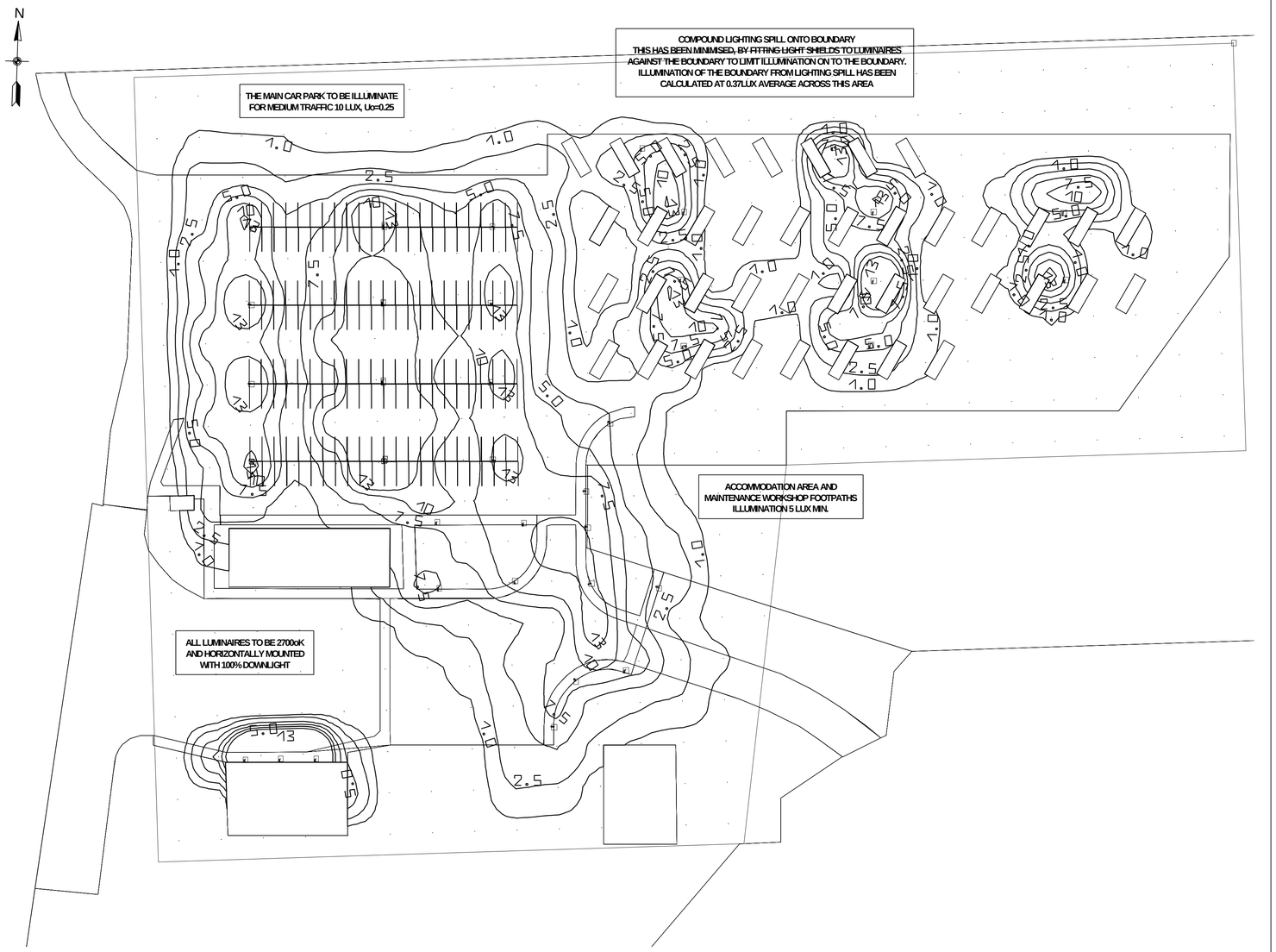


Size	
Length	858mm
Width	329mm
Height	173mm

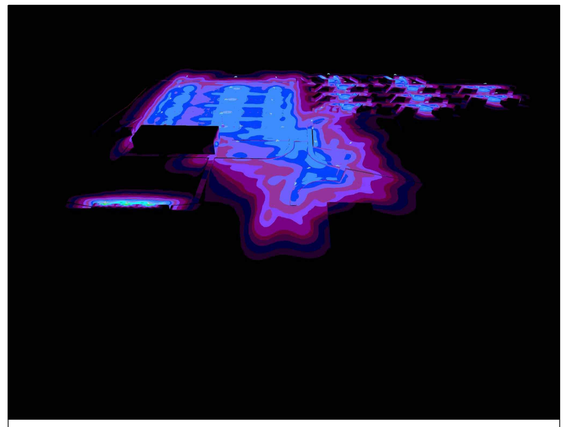
Code Example

HWD8/B4K16050-M1-W15

Maxi Highway Diamond Elite™60-76mm Spigot Set as Side Entry, Black Finish, 4000K, 160 LED, 500mA, M1 Optic, 15m Pre-wired 1.5mm flex.

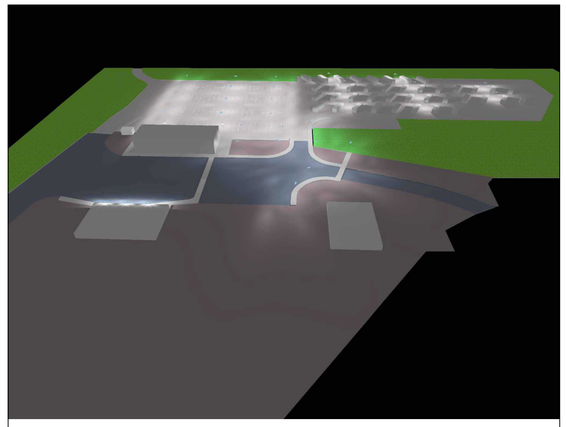


DETAIL 'A'
LUX ISOLINE ILLUMINATION VALUES



KEY LUX: 0.10 0.20 0.30 0.50 0.75 1.00 2.00 3.00 5.00 7.50 10.0 20.0 30.0 50.0 75.0 100.0 200.0 300.0 500.0

DETAIL 'B'
FALSE COLOUR LIGHT ILLUMINATION VALUES



DETAIL 'C'
VISUALISATION OF ILLUMINATION

20 0 20 40 60 80
100mm ON ORIGINAL DRAWING

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LOCATION PLAN:

REV	AMENDMENT	DRN	CHK	APP	DATE
T02	SECURITY GATEHOUSE LIGHTING OMITTED	PR	MN	DRM	20/03/24
T01	TENDER ISSUE	PR	MN	DRM	19/03/24

TENDER

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cardiff@crouchwaterfall.co.uk

CROUCH WATERFALL

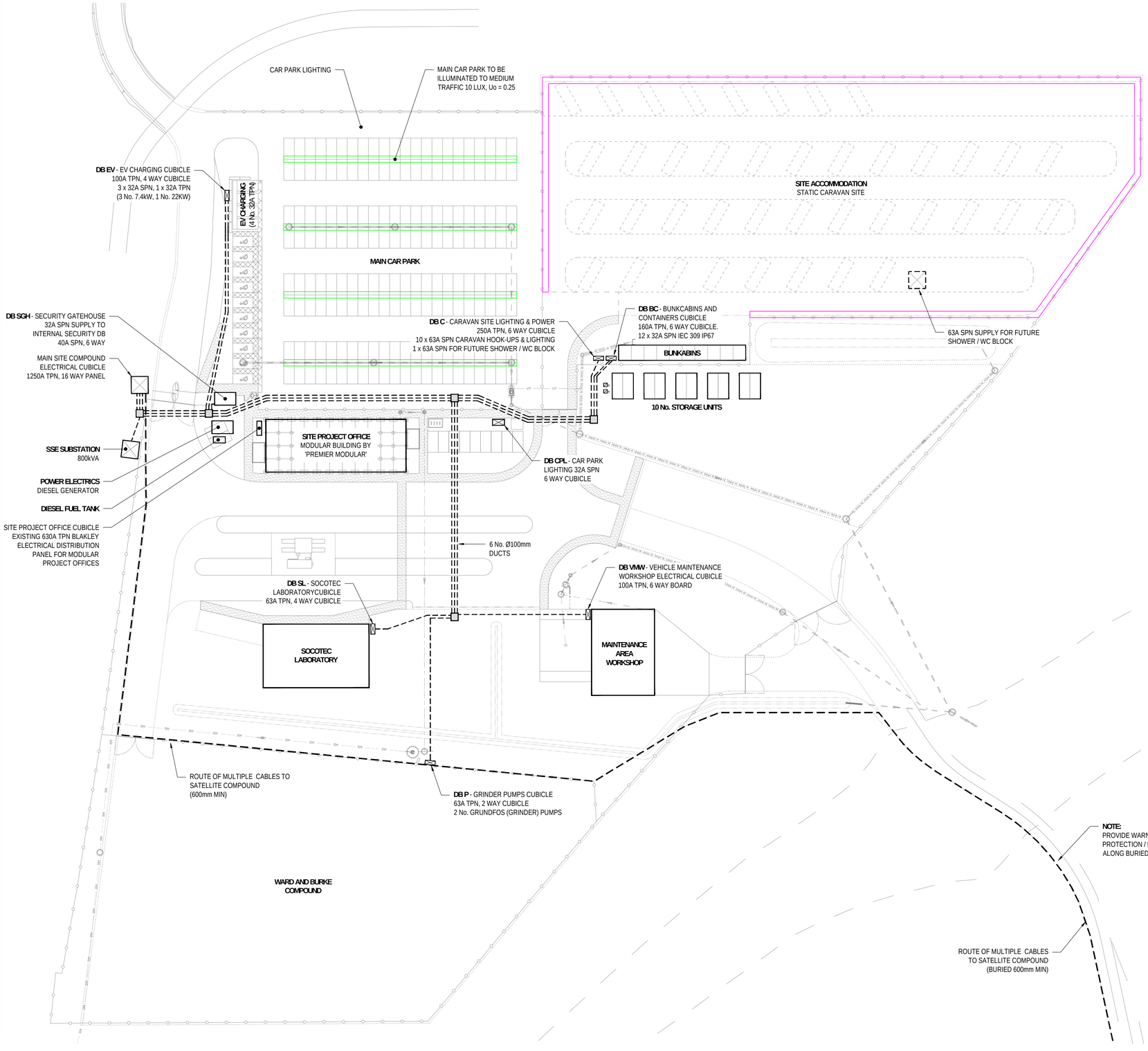
CLIENT: MACKLEY

PROJECT TITLE: HAVANT THICKET RESERVOIR

DRAWING TITLE: MAIN COMPOUND GENERAL ILLUMINATION LEVELS

DRN	CHK	APP	DATE	SCALE
PR	MN	DRM	MAR '24	NOT TO SCALE

JOB No.	DRG. No.	REV
23374C	E-007	T02



20 0 20 40 60 80

100mm ON ORIGINAL DRAWING

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NOTES:

THE CONTRACTOR TO PROVIDE SITE EXTERNAL LIGHTING TO THE FOLLOWING AREAS.

- BAT FRIENDLY LIGHTING
- USE LED LUMINAIRES
- LOW UV CONTENT
- WARM / WHITE <3000K
- 100% DOWNWARD LIGHT (ZERO UPLIGHT)

REV	AMENDMENT	DRN	CHK	APP	DATE
T01	TENDER ISSUE	PR	CW	DRM	05/03/24
P01	PRELIMINARY ISSUE	PR	CW	DRM	20/02/24

TENDER

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cardiff@crouchwaterfall.co.uk

CROUCH WATERFALL

CLIENT

MACKLEY

PROJECT TITLE

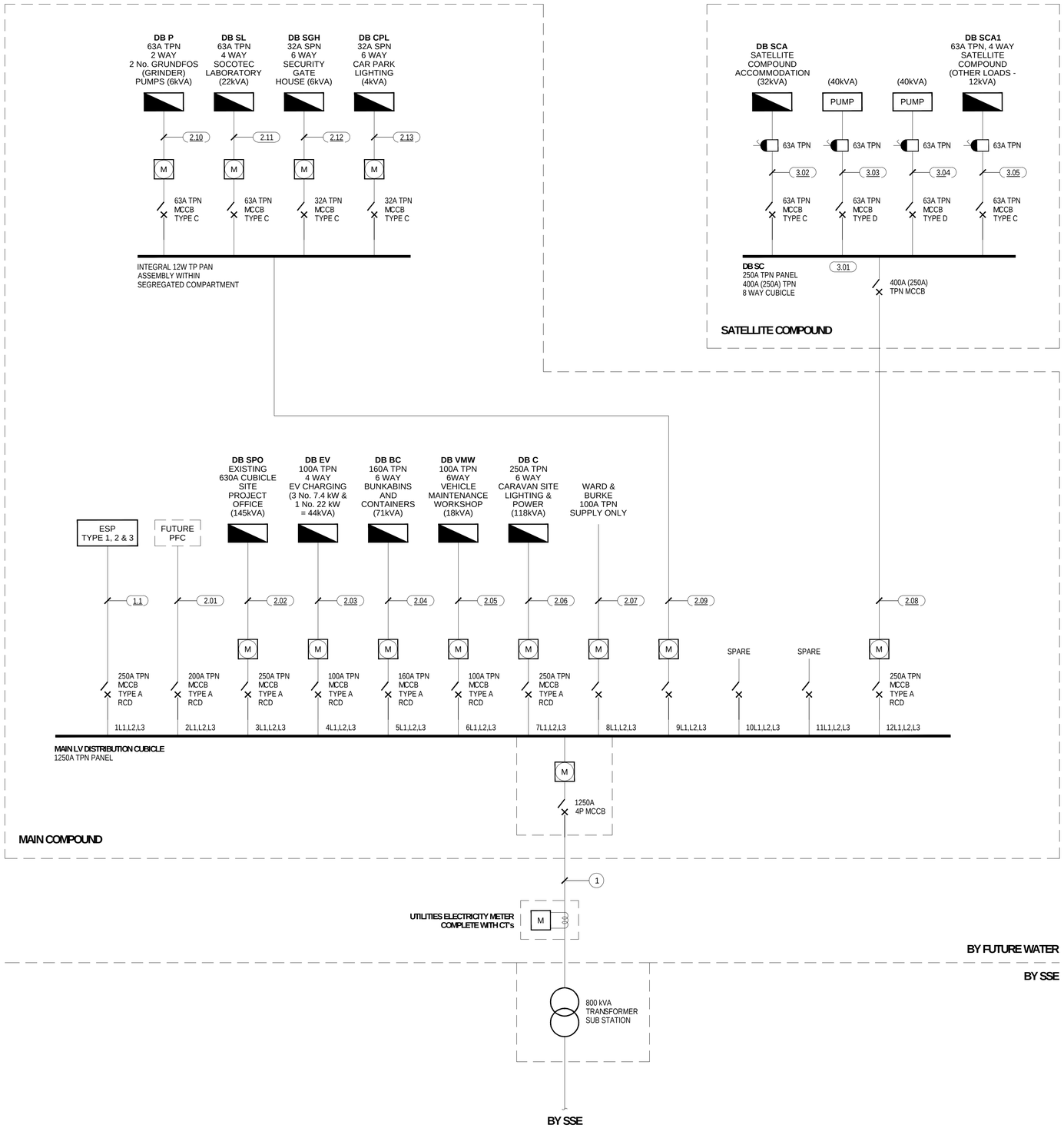
HAVANT THICKET RESERVOIR

DRAWING TITLE

SITE PLAN
M&E SERVICES LAYOUT

DRN	CHK	APP	DATE	SCALE
PR	CW	DRM	JAN '24	1:500 @ A1

JOB No.	DRG. No.	REV
23374C	E-001	T01



LEGEND:

	IP65 DISTRIBUTION BOARD
M	ELECTRICITY METER
M	UTILITY ENERGY SHIPPER MID COMPLIANT kWh METER
	MOULDED CASE CIRCUIT BREAKER
PFC	POWER FACTOR CORRECTION CAPACITOR BANKS
ESP	ELECTRICAL SURGE PROTECTION
**A SPN	IEC 309 "COMMANDO" SOCKET IP67 (RATING AS SHOWN)

NOTE:
REFER TO CABLE SCHEDULE FOR CABLE TYPES AND SIZES

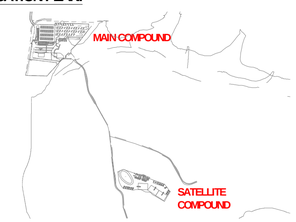
20 0 20 40 60 80

100mm ON ORIGINAL DRAWING

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LOCATION PLAN:



TENDER

REV	AMENDMENT	DRN	CHK	APP	DATE
T01	TENDER ISSUE	PR	CW	DRM	05/03/24
P01	PRELIMINARY ISSUE	PR	CW	DRM	20/02/24

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bristol@crouchwaterfall.co.uk

CROUCH WATERFALL

CLIENT

MACKLEY

PROJECT TITLE

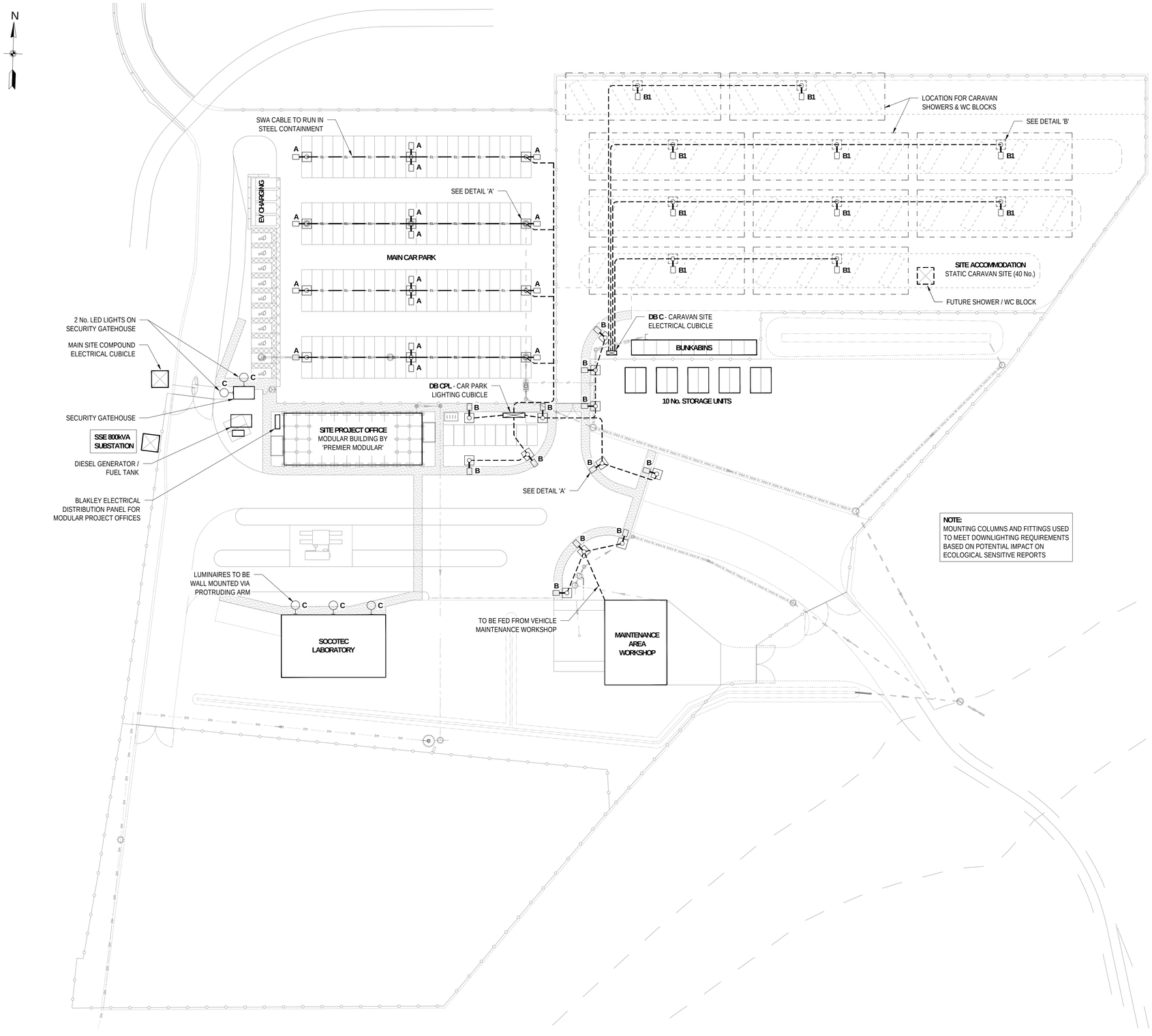
HAVANT THICKET RESERVOIR

DRAWING TITLE

ELECTRICAL DISTRIBUTION SCHEMATIC

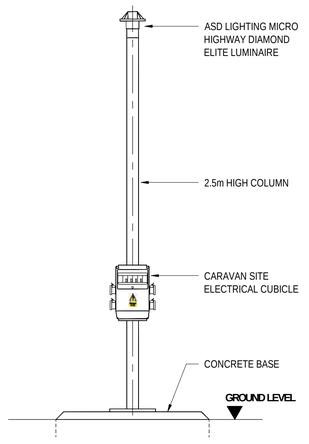
DRAWN	CHK	APP	DATE	SCALE
PR	CW	DRM	FEB '24	NTS @ A1

JOB NUMBER	DRAWING NUMBER	REVISION
23374G	E-002	T01





DETAIL 'A'
1m HIGH CONCRETE BASE



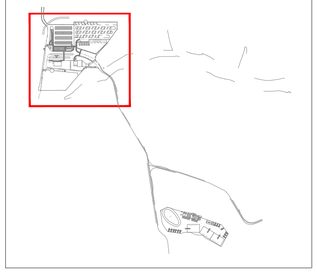
DETAIL 'B'
CARAVAN SITE POWER AND LIGHTING ARRANGEMENT

20 0 20 40 60 80
100mm ON ORIGINAL DRAWING

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LOCATION PLAN:



LEGEND:

A	ASD MICRO HIGHWAY DIAMOND ELITE, 3 LED, 45W 2700k MOUNTED ON CONCRETE BASE AND COLUMN AT 7m
B	ASD MICRO HIGHWAY DIAMOND ELITE, 3 LED, 26W 2700k MOUNTED ON CONCRETE BASE AND COLUMN AT 7m
B1	ASD MICRO HIGHWAY DIAMOND ELITE, 3 LED, 26W 2700k MOUNTED ON 2.5m COLUMN
C	ASD MICRO HIGHWAY DIAMOND ELITE, 3 LED, 26W 2700k WALL MOUNTED USING A PROTRUDING ARM
	ELECTRICAL CUBICLE
	CABLE ROUTE BURIED DIRECT
EL	CABLE ROUTE ON SURFACE PROTECTED BY STEEL CONTAINMENT

REV	AMENDMENT	DRN	CHK	APP	DATE
T01	TENDER ISSUE	MB	CW	DRM	05/03/24
P01	PRELIMINARY ISSUE	PR	CW	DRM	20/02/24

TENDER

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Trafalgar House
5 Fitzalan Place
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CF24 0ED

Tel 07971 032018 & 07530 065952
cardiff@crouchwaterfall.co.uk

CROUCH WATERFALL

CLIENT: MACKLEY

PROJECT TITLE: HAVANT THICKET RESERVOIR

DRAWING TITLE: MAIN COMPOUND PROPOSED LIGHTING LAYOUT

DRN	CHK	APP	DATE	SCALE
PR	CW	DRM	FEB '24	1:500 @ A1

JOB No.	DRG. No.	REV
23374C	E-003	T01

N

EACH GROUP OF 4 No. CARAVANS SUPPLIED FROM 1 No. HOOK UP UNIT C/W 4 No. 16A SOCKET OUTLETS

SEE DETAIL 'A'

DB EV - EV CHARGING CUBICLE
100A TPN, 4 WAY CUBICLE
3 x 32A SPN, 1 x 32A TPN
(3 No. 7.4kW, 1 No. 22KW)

1 No. TPN AND 3 No. SPN EV CHARGERS

EV CHARGING

EXISTING BURIED DUCTS TO EV CHARGERS TO BE MADE REDUNDANT

MAIN CAR PARK

DUCTS TO EV CHARGING CUBICLE TO BE BROKE INTO EXISTING BURIED DUCTS AT THIS LOCATION AND ROUTED TO CUBICLE

SITE ACCOMMODATION
STATIC CARAVAN SITE (40 No.)

63A SPN SUPPLY FOR FUTURE SHOWER / WC BLOCK

DB SGH - SECURITY GATEHOUSE
32A SPN SUPPLY TO INTERNAL SECURITY DB
40A SPN, 6 WAY

DB C - CARAVAN SITE LIGHTING & POWER
250A TPN, 6 WAY CUBICLE
10 x 63A SPN CARAVAN HOOK-UPS AND LIGHTING
1 x 63A SPN FOR FUTURE SHOWER / WC BLOCK

DB BC - BUNKCABINS AND CONTAINERS CUBICLE
160A TPN, 6 WAY CUBICLE
12 x 32A SPN IEC 309 IP67

BUNKABINS

MAIN SITE COMPOUND ELECTRICAL CUBICLE
1250A TPN, 16 WAY PANEL

12 DUCTS (PLUS SPARES) TO BE BURIED UNDER GATEHOUSE ROAD

10 No. STORAGE UNITS

2 No. 32A SPN (7.4kVA EACH) POWER SUPPLIES FOR STORAGE CONTAINER POWER

SSE 800kVA SUBSTATION

SITE PROJECT OFFICE
MODULAR BUILDING BY 'PREMIER MODULAR'

DB CPL - CAR PARK LIGHTING 32A SPN
6 WAY CUBICLE

DIESEL GENERATOR / FUEL TANK

6 No. Ø100mm DUCTS

SITE PROJECT OFFICE CUBICLE
EXISTING 630A BLAKLEY ELECTRICAL DISTRIBUTION PANEL TO BE RETAINED FOR MODULAR PROJECT OFFICES

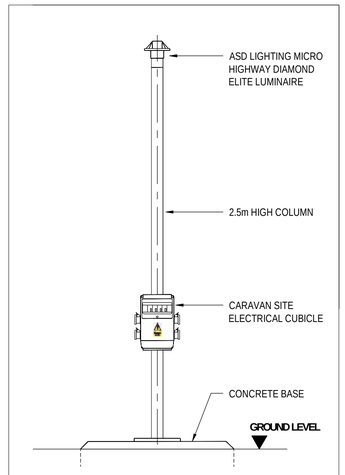
DB SL - SOCOTEC LABORATORY CUBICLE
63A TPN, 4 WAY BOARD OR 63A TPN SUPPLY DIRECT TO INTERNAL DB

DB VMW - VEHICLE MAINTENANCE WORKSHOP ELECTRICAL CUBICLE
100A TPN, 6 WAY CUBICLE
100A TPN BOARD

SOCOTEC LABORATORY

MAINTENANCE AREA WORKSHOP

DB P - GRINDER PUMPS CUBICLE
63A TPN, 2 WAY CUBICLE
2 No. GRUNDFOS (GRINDER) PUMPS
2 x 16A TPN IEC 309 IP67 SOCKETS



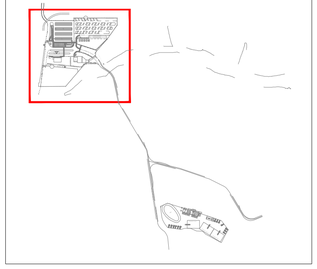
DETAIL 'A'
CARAVAN SITE POWER AND LIGHTING ARRANGEMENT

20 0 20 40 60 80
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LOCATION PLAN:



LEGEND:

- HOOK UP UNIT C/W 4 No. 16A SOCKET OUTLETS & RCBO MOUNTED ON CONCRETE BASE AND 2.5m COLUMN
- ELECTRICAL CUBICLE
- 32A TPN (22kW) 'EASEE CHARGE' EV CHARGER
- 32A SPN (7.5kW) 'EASEE ONE' EV CHARGER
- **A TPN POWER SUPPLY
- **A SPN POWER SUPPLY
- CABLE / DUCT ROUTE BURIED DIRECT
- CABLE ROUTE ON SURFACE PROTECTED BY SPLIT DUCT

REV	AMENDMENT	DRN	CHK	APP	DATE
T01	TENDER ISSUE	PR	CW	DRM	05/03/24
P01	PRELIMINARY ISSUE	PR	CW	DRM	20/02/24

TENDER

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CROUCH WATERFALL

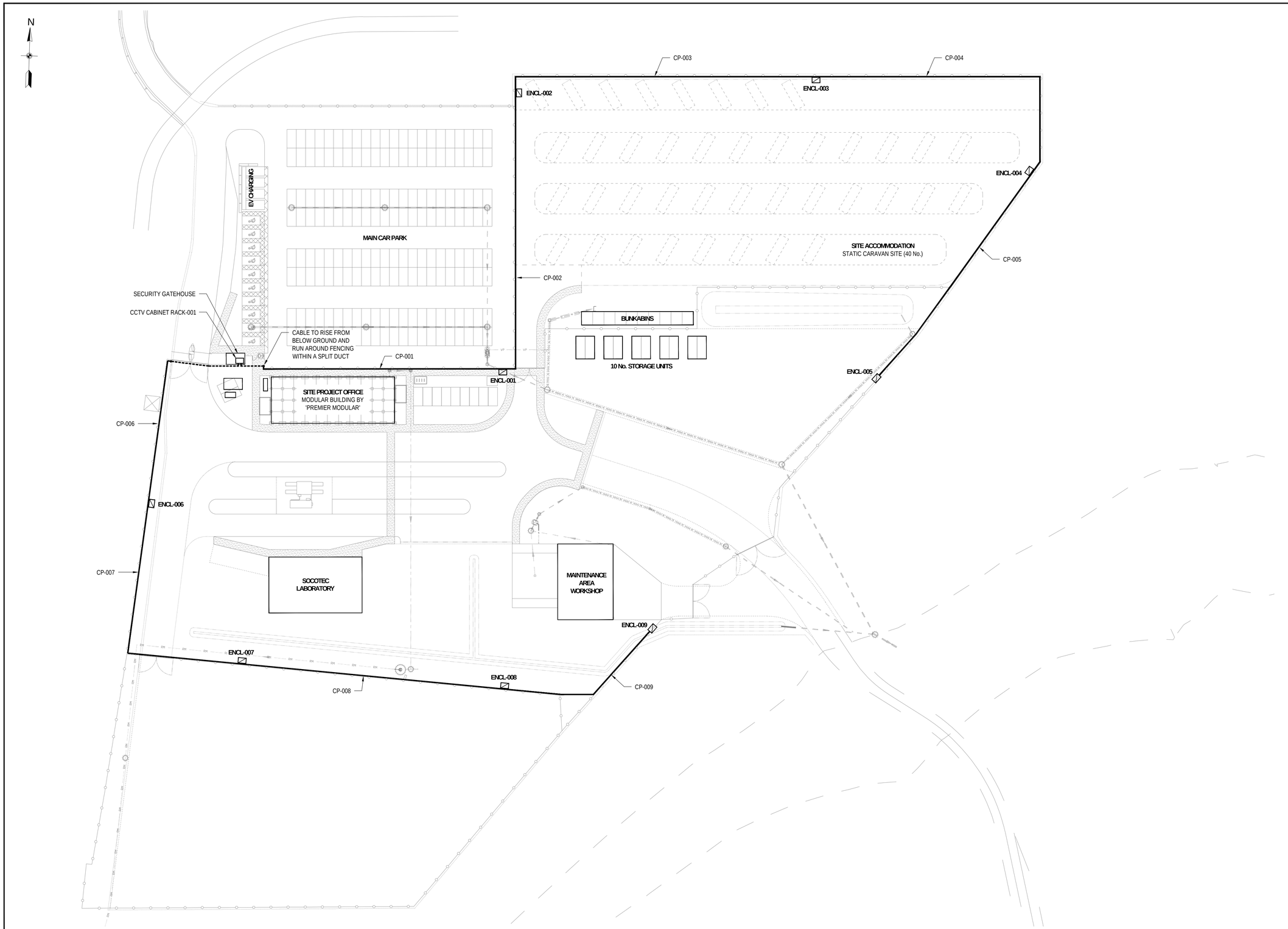
CLIENT: MACKLEY

PROJECT TITLE: HAVANT THICKET RESERVOIR

DRAWING TITLE: MAIN COMPOUND PROPOSED POWER LAYOUT

DRN	CHK	APP	DATE	SCALE
PR	CW	DRM	FEB '24	1:500 @ A1

JOB No.	DRG. No.	REV
23374C	E-004	T01



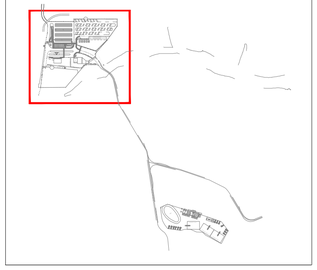
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LOCATION PLAN:



LEGEND:

- CCTV CABINET
- CCTV ENCLOSURE
- CABLE ROUTE BURIED DIRECT
- CABLE ROUTE ON SURFACE PROTECTED BY SPLIT DUCT

REV	AMENDMENT	DRN	CHK	APP	DATE
T01	TENDER ISSUE	PR	CW	DRM	01/03/24
P01	PRELIMINARY ISSUE	PR	CW	DRM	20/02/24

TENDER

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CROUCH WATERFALL

CLIENT

MACKLEY

PROJECT TITLE

HAVANT THICKET RESERVOIR

DRAWING TITLE

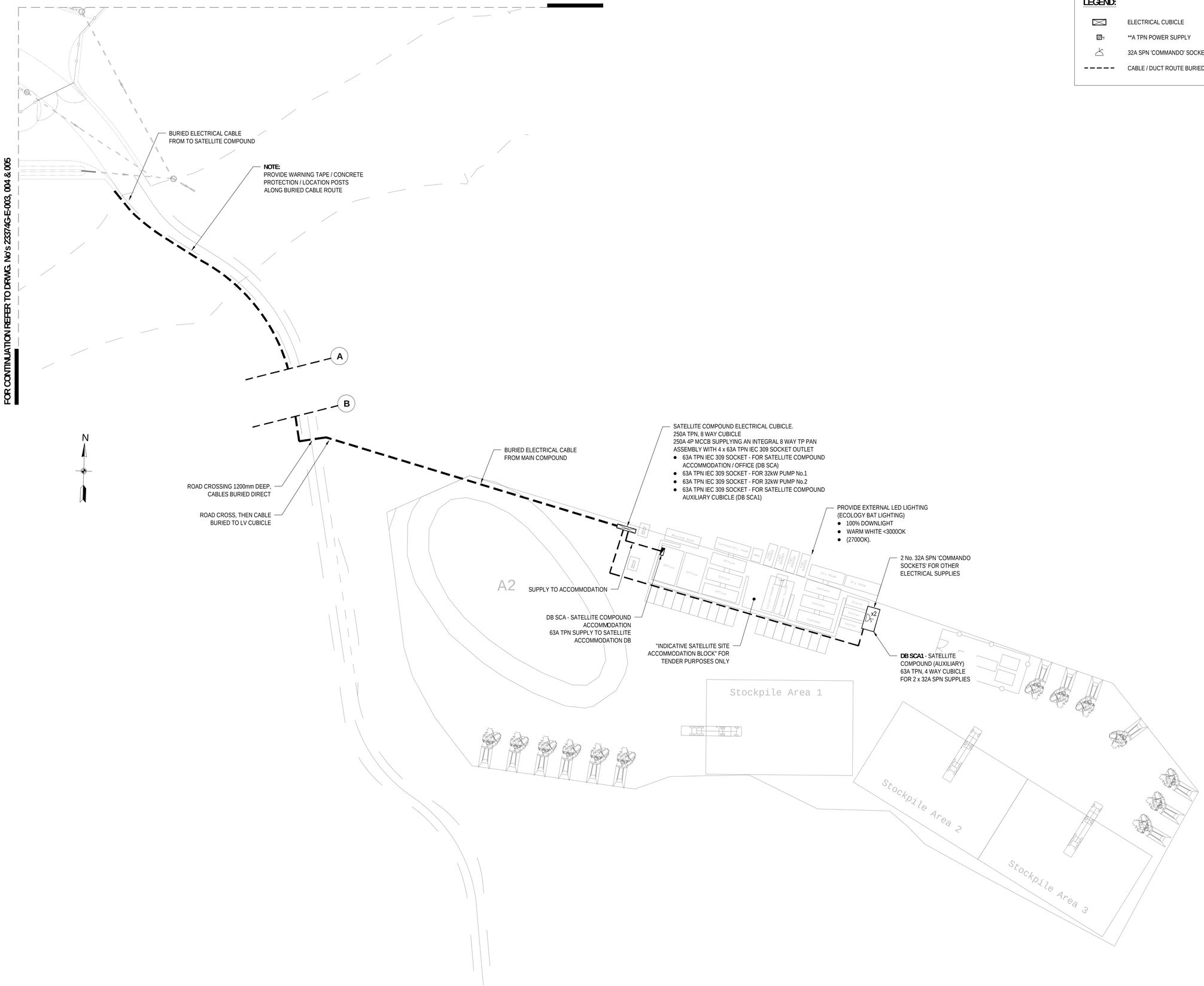
MAIN COMPOUND
PROPOSED CCTV LAYOUT

DRN	CHK	APP	DATE	SCALE
PR	CW	DRM	JAN '24	1:500 @ A1

JOB No.	DRG. No.	REV
23374C	E-005	T01

FOR CONTINUATION REFER TO DRWG. No's 23374G-E-003, 004 & 005

FOR CONTINUATION REFER TO DRWG. No's 23374G-E-003, 004 & 005



LEGEND:

- ELECTRICAL CUBICLE
- **A TPN POWER SUPPLY
- 32A SPN 'COMMANDO' SOCKET
- CABLE / DUCT ROUTE BURIED DIRECT

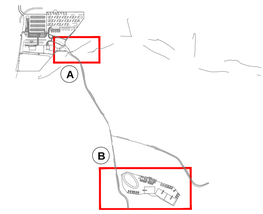
20 0 20 40 60 80

100mm ON ORIGINAL DRAWING

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.
3. ALL DIMENSIONS AND LEVELS SHALL BE CHECKED ON SITE PRIOR TO ANY WORKS BEING PUT IN HAND.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE EXISTING STRUCTURE AT ALL TIMES DURING THE WORKS.
5. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER CONTRACT DRAWINGS AND RELEVANT STRUCTURAL SPECIFICATIONS.
6. ANY DISCREPANCIES BETWEEN THE INFORMATION GIVEN SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AS SOON AS POSSIBLE.
7. ALL MATERIALS USED IN THE WORKS SHALL BE TO BRITISH STANDARDS OR OTHER APPLICABLE SPECIFICATIONS.
8. ALL WORK IS TO BE CARRIED OUT TO B.S. CODES OF PRACTICE AND IN ACCORDANCE WITH GOOD WORKMANSHIP PRACTICE.
9. ALL PROPRIETARY MATERIALS USED IN THE WORKS SHALL BE USED IN COMPLETE ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
10. ALL BURIED, SURFACE AND OVERHEAD SERVICE INFORMATION CONTAINED WITHIN THIS DRAWING IS SHOWN INDICATIVELY. THE SERVICES SHOWN MAY NOT REPRESENT THE ENTIRETY OF ALL SERVICES THAT MAY BE ENCOUNTERED. ALL SOURCE INFORMATION SHOULD BE REFERRED TO PRIOR TO UNDERTAKING WORKS ON SITE. CROUCH WATERFALL ACCEPT NO RESPONSIBILITY FOR OMISSIONS OR ERRORS IN THE POSITIONING OF THE SERVICES PRESENT ON SITE. REFER TO ALL RELATED ENGINEERING DRAWINGS, FORMS AND SPECIFICATIONS FOR FURTHER INFORMATION. REFER TO THE RESIDUAL/DESIGNERS RISK ASSESSMENT FOR ACTIONS TO MINIMISE AND MITIGATE RISK ASSOCIATED WITH KNOWN AND UNKNOWN SERVICES ON SITE

LOCATION PLAN:



TENDER

REV	AMENDMENT	DRN	CHK	APP	DATE
T01	TENDER ISSUE	MB	CW	DRM	05/03/24
P01	PRELIMINARY ISSUE	PR	CW	DRM	20/02/24

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CROUCH WATERFALL

CLIENT

MACKLEY

PROJECT TITLE

HAVANT THICKET RESERVOIR

DRAWING TITLE

SATELLITE COMPOUND
ELECTRICAL SERVICES LAYOUT

DRAWN	CHK	APP	DATE	SCALE
PR	CW	DRM	FEB '24	1:500 @ A1

JOB NUMBER	DRAWING NUMBER	REVISION
23374G	E-006	T01

Appendix E – Ecology Technical Note

Havant Thicket Reservoir – Ecological considerations during the development of the Lighting Strategy (planning condition 26)

Overview of effects of artificial lighting on bats

This document draws significantly from Guidance Note GN08/23 Bats and Artificial Lighting at Night[1] (ILP, 2023), published by the Institution of Lighting Professionals (ILP).

Bats have highly sophisticated echolocation systems over 50 million years that allow them to 'see' their environment in complete darkness. Artificial lighting can increase the chances of predation, for example by owls. At roosting sites, illumination can cause disturbance, and this may result in the bats delaying their emergence resulting in less foraging time, deserting the roost, or even becoming entombed within it. Lighting would therefore be considered an obstruction under the legislation protecting bats and their roosts.

Severing a key flightpath some distance from the roost could cause desertion in its own right, and this loss of a roosting site could constitute an offence under the legislation. Artificial lighting can affect the feeding behaviour of bats. Many night-flying species of insect that bats hunt are attracted to light, especially non-LED light sources that emit an ultraviolet component or have a high blue spectral content (this can include LEDs).

For those more manoeuvrable slower-flying species, more typically associated with cluttered dark environments such as woodlands, the key dark habitats where they can avoid predation have been drastically reduced. These 'clutter space' species are considered to be more 'light averse'. Only the faster-flying species, traditionally considered to be 'light opportunistic' are now found throughout our towns and cities.

Many clutter space species, including long-eared, Brandt's, whiskered, Daubenton's, Natterer's, Bechstein's, barbastelle, greater and lesser horseshoe, avoid commuting and foraging routes illuminated with a variety of different street luminaires. Consequently, these species are put at a competitive disadvantage and are less able to forage successfully and efficiently, impacting fitness and breeding success.

Myotis species (Brandt's, whiskered, Daubenton's, Natterer's and Bechstein's) are known to avoid lit areas below 1 lux, and up to 25m from the light source and, in particular, avoid blue, white, orange and green spectrum light, but not 'red-light' sources, i.e. long wavelength light above 600nm with an RA value of 60.

Bats at Havant Thicket Reservoir

Thirteen bat species have been recorded within the Havant Thicket Reservoir (HTR) site including Bechstein's bat Myotis bechsteinii (one of the UK's rarest species), with a maternity roost recorded on the southeastern Site boundary.

A bat mitigation licence to carry out works for the Project has been obtained from Natural England (Licence number 2020-50625-EPS-AD2-4). Future Water are obliged to ensure to comply with the conditions of all protected species licences obtained at all times.

Other protected species at Havant Thicket Reservoir

A range of nocturnal protected species have previously been identified on site including glow worms, dormice, badgers, owls and nightjars. The habitats that support these species (woodland, hedgerows, scrub and grassland) are the habitats which support bats. By ensuring optimal mitigation for light impacts on bats and their habitats on site, suitable mitigation is also provided for all other nocturnal species associated with the site.

Relevant Project Documents

Several Scheme documents highlight the importance of potential negative impacts to protected species with regard to lighting. In accordance with the Project's Ecological Management Plan - Main Reservoir Works (HTR-RHD-ZZ-ZZ-PL-Z-0001), the following applies during the construction phase:

> Control of construction lighting to reduce impacts on roosting bats. Mitigation will be provided for lighting during construction and operation. FW will prepare a Lighting Strategy for the main site compound. Any temporary lighting required during construction will be designed to minimise light spill. Lighting will follow current good practice. Construction lighting will be task related. The lux level will be as low as possible to meet their purpose safely and effectively.
>
> To avoid indirect effects on bats arising during the Works, all temporary lighting will be cognisant of the BCT Guidance Note 8/23, Bats and Artificial Lighting at Night (BCT, 2023).

The Project's Construction Environment Management Plan - Enabling Works Phase (PC2625-RHD-ZZ-XX-RP-Z-0001-HTR-EW-CEMP) prescribes that:

> Where construction lighting may be required during works, control using directional lighting will be employed to reduce impact on sensitive receptors such as bats.

The Records of Environmental Actions and Commitments (REAC) in the OEMP, included in the Environmental Statement for the Scheme, and included in Appendix D of the Construction Environmental Management Plan for the Main Reservoir Works (HTR-RHD-P2-RE-PL-Z-0018), includes a commitment to ensure the protection of bats from indirect harm:

> Mitigation will be provided for lighting during construction and operation
>
> Any temporary lighting required during construction will be designed to minimise light spill.

Proposed lighting at the main compound and temporary workers accommodation

The HTR Project requires certain construction phase areas to be lit for imperative Health & Safety reasons. This includes the 'Main Compound' that is currently being constructed in the northwestern section of the site, incorporating temporary workers accommodation, close to Havant Thicket Woodland. The satellite construction compound, which will be located approximately in the centre of the main reservoir worksite, will also require lighting.

The main compound will be used throughout the year for the duration of the construction phase, and the reservoir visitor centre is proposed to be located in this area. The temporary workers accommodation would be in use all year round, with peak use occurring between the months of March and October inclusive during the main earthworks construction season and would remain in use until

the main earthworks on site has been completed, currently planned for 2026. Outside of the main earthworks season, fewer staff would use the temporary workers accommodation.

In prescribing the appropriate lighting strategy for the construction phase compound and the temporary workers accommodation, it is important to note that dense tree cover alone does not mitigate the negative impacts of light on bats, particularly on Myotis species. Therefore, appropriate lighting specifications for entire HTR site, including the main compound and temporary workers accommodation, will need to include the following:

All lighting should lack UV elements when manufactured.

Metal halide, compact fluorescent sources should not be used.

LED lighting should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.

A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component.

Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.

Internal lighting should be recessed (as opposed to using a pendant fitting) where installed in proximity to windows to reduce glare and light spill.

Waymarking inground markers (low output with cowls or similar to minimise upward light spill) should delineate path edges.

Column heights should minimise light spill and glare visibility.

Only lighting with a negligible or zero Upward Light Ratio, and with good optical control, should be used.

Lighting should always be mounted horizontally, with no light output above 90° and/or no upward tilt.

Where appropriate, external security lighting should be set on motion sensors and set to as short a possible a timer as the risk assessment will allow. For most purposes, a 1- or 2-minute timer is appropriate.

Use of a Central Management System (CMS) with additional web-enabled devices to light on demand should be considered.

The use of bollard or low-level downward-directional lighting is strongly discouraged. This is due to a considerable range of issues, such as unacceptable glare, poor illumination efficiency, unacceptable upward light output, increased upward light scatter from surfaces and poor facial recognition.

Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed. However, due to the lensing and fine cut-off control of the beam inherent in modern LED luminaires, the effect of cowls and baffles is often far less than anticipated and so should not be relied upon solely.

The location, orientation and height of newly built structures relative to each other can have a considerable impact on light spill. Buildings and hard landscaping should be sited and designed so as to block light spill from reaching important bat habitats and features. Bats will benefit from minimising light spill away from Havant Thicket Woodland and its' associated edge (buffer) habitats. Mitigation measures to further minimise light spill include:

A fifteen-metre buffer zone, 'dark corridor' will be implemented between the accommodation units and any surrounding Woodline.

A reduction of the number of windows that directly face key and buffer habitats will be the most effective way to permanently limit light spill.

Using curtains and/ or blinds on the temporary workers accommodation windows during the evening/night-time period.

Column mounted luminaires should be located so that the rear shields are adjacent to habitats, or narrow optics selected that direct light into the task area where needed.

Light spill can be successfully screened through landscaping and the installation of fences. to ensure that fencing makes a long-term contribution, it is recommended that it is supported on concrete or metal posts. Windbreak mesh / dust-type netting to the inside of the compound boundary fence will help to further reduce light spill.

On-site lighting controlled by dimming or switching either diurnally, seasonally, or according to human activity (light on demand) will be of clear benefit to bats.

A Central Management System (CMS), specified by a lighting engineer, to dim or turn off individual or groups of luminaires when not in use or during less busy times should be considered. Dimming can be precisely controlled.

Lighting should be set to a low output state by default, to turn up to a predetermined output in response to a trigger and be combined with a timeclock or photocell to further add an element of seasonal or diurnal control. For example, passive infrared, AI enabled cameras, on demand controls, or pressure sensors may be used to trigger lights to come on or dim in response to movements, either by vehicles or pedestrians. Inbuilt timeclocks or photocells can ensure that this response only occurs during a set window of hours after sunset and before sunrise, or during certain months.

Alternative lighting designed for subtle waymarking, rather than illumination should also be considered, for example very low wattage, solar-powered, ground-level luminaires. This lighting has an added benefit that there is no requirement for cabling. However, it should be noted that these systems depend on regular maintenance for them to be successful, as well as a clear view of the sky for solar-powered options.

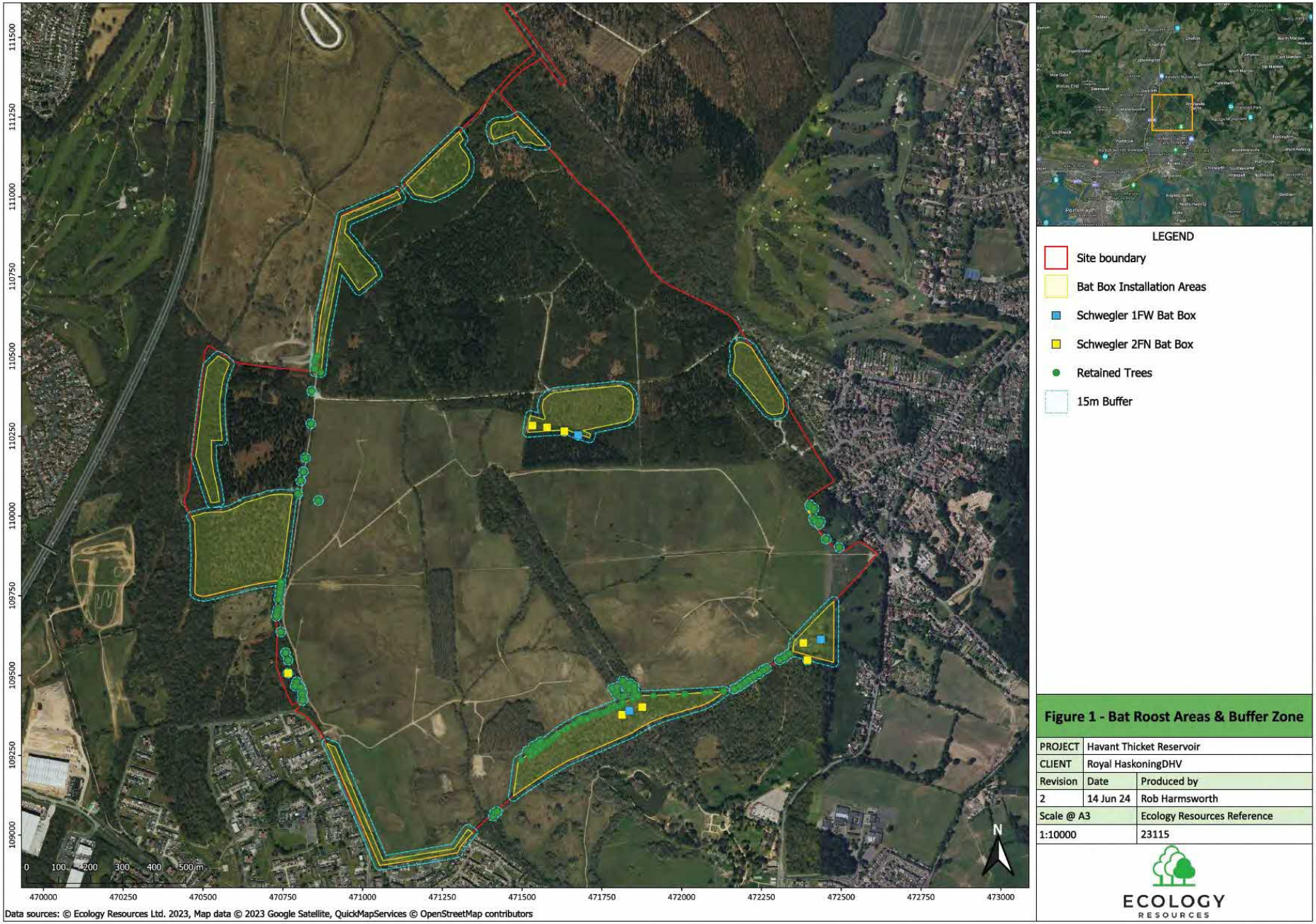


Figure 1 - Bat Roost Areas & Buffer Zone

PROJECT	Havant Thicket Reservoir	
CLIENT	Royal HaskoningDHV	
Revision	Date	Produced by
2	14 Jun 24	Rob Harmsworth
Scale @ A3		Ecology Resources Reference
1:10000		23115

ECOLOGY RESOURCES