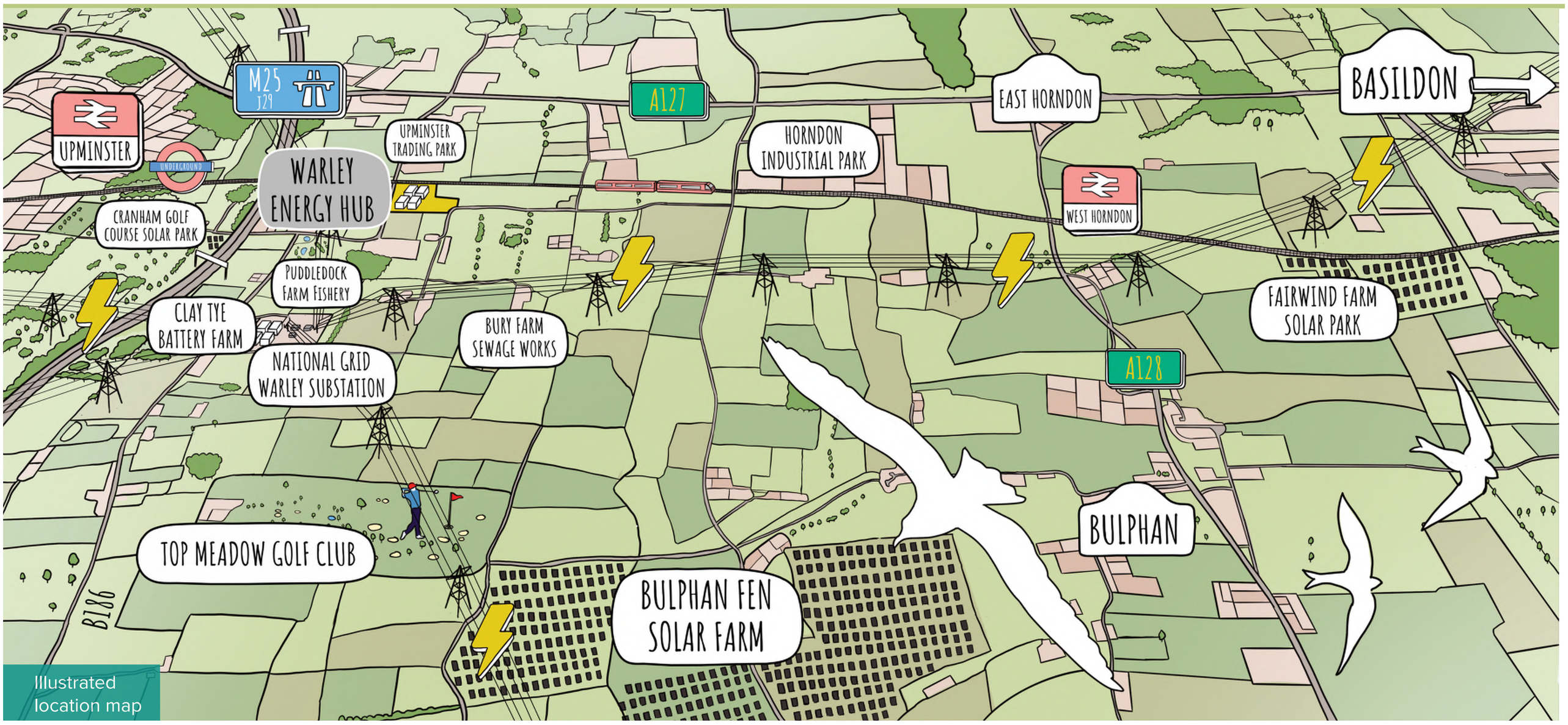
CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY



Illustrated location map

WELCOME

WELCOME TO OUR PUBLIC EXHIBITION FOR WARLEY ENERGY HUB

Clearstone Energy is proposing to develop the **Warley Energy Hub** - a 200MW battery energy storage facility in the London Borough of Havering.

As we move to a clean and low cost UK electricity system, powered by renewable energy, the Warley Energy Hub would help to provide a dependable local electricity supply by storing excess electricity when generation from the UK's wind turbines and solar farms is higher than demand and releasing that energy back onto the grid when demand is higher than generation.

This network balancing is currently achieved by turning off wind farms when there's too much electricity and turning on gas-fired power plants when there's not enough. The deployment of battery energy storage in the UK is reducing our reliance on gas fired power stations for electricity generation and helping to meet climate change objectives set by Havering Borough and the UK Government.

The project is located on Warley Street on the outskirts of Upminster. It will connect via underground power cable to the National Grid substation off Clay Tye Road which is the electricity supply point for homes and business in Havering, Thurrock and the wider region.

Clearstone Energy submitted a planning application for the project to the London Borough of Havering in November 2024. **(reference: P1498.24). Further details can be found on the Havering website.**

Please take your time to read about our proposals and ask any questions that you may have. Further details can be found at:

https://www.clearstoneenergy.com/project/warleyenergyhub/

CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY

WHO WE ARE

Clearstone Energy is a leading British renewable energy project developer.

We are working with National Grid to develop solar generation and battery energy storage projects that are building a new UK energy system based on clean, low cost and renewable energy.

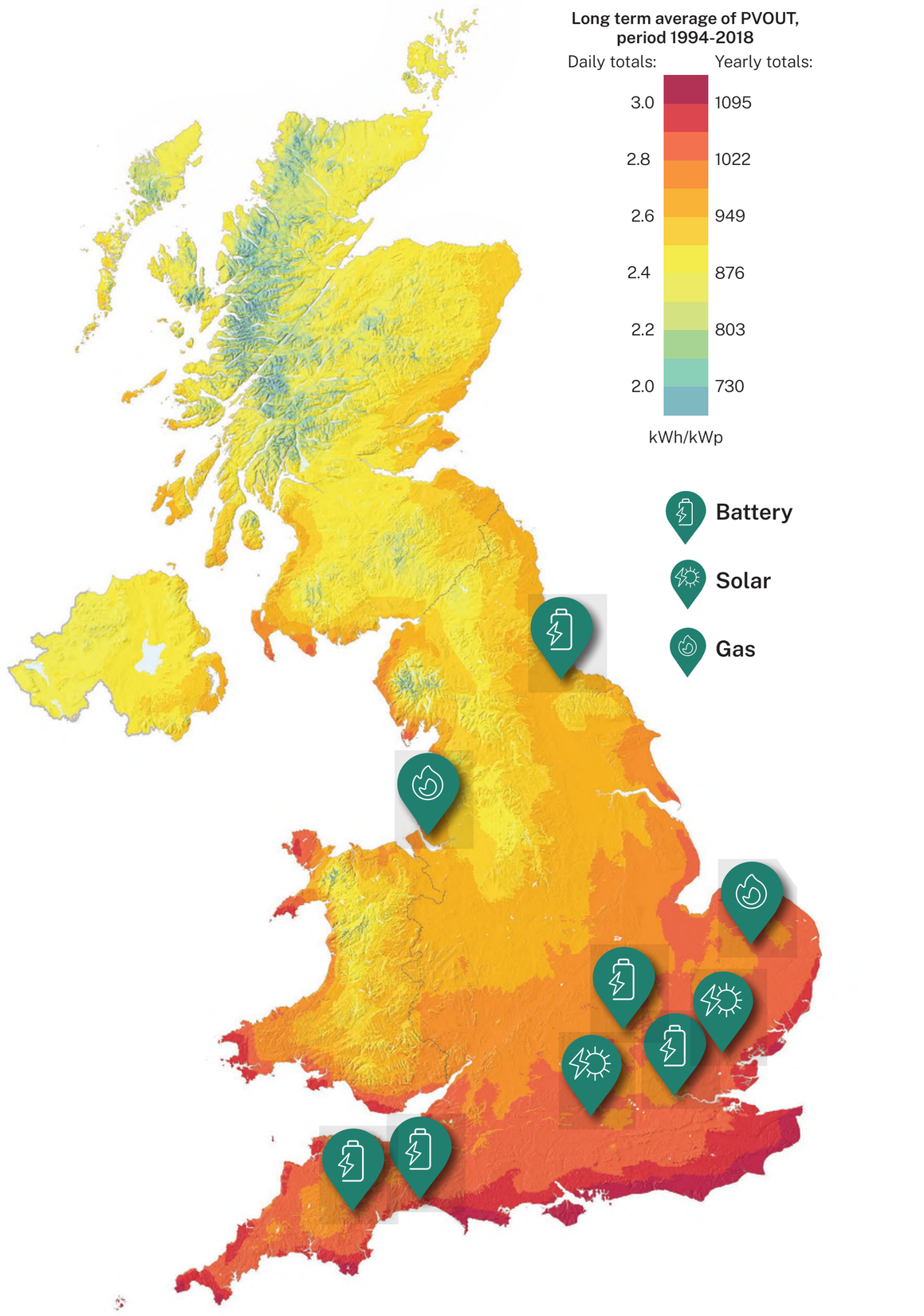
Since founding in 2016, Clearstone Energy has developed nine energy projects in the UK. Two are operational and seven are in construction.

With ten battery energy storage projects under development, Clearstone Energy is playing a pivotal role in modernising the UK electricity network to ensure we can deliver a carbon emissions free UK electricity supply by 2035.

We believe that our projects can do more than energy generation and storage. They support the adoption of renewable energy and energy efficiency technologies in the communities that host them. They provide opportunities to build habitats for wildlife and contribute to the preservation of local ecosystems. They also provide support for community energy projects.

We value your input and feedback in shaping this project proposal. Thank you.

OUR PROJECTS



1000 MW
Low carbon energy projects delivered in the UK to date

2000 MW
Solar and battery projects in active development

1500 MW
Projects at early stage development

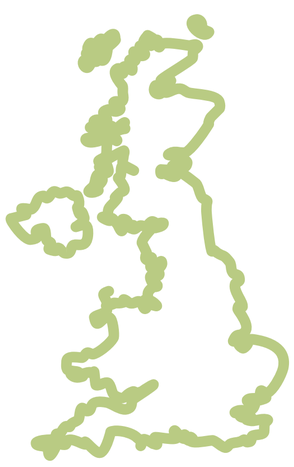
CLEAN POWER 2030 ACTION PLAN: A NEW ERA OF CLEAN ELECTRICITY

What is it?

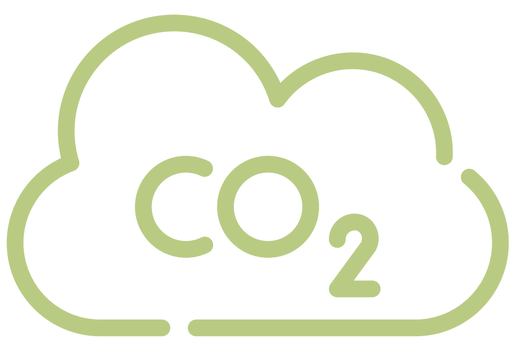
This action plan sets out the pathway to a clean and low cost UK electricity system, powered by renewable energy; what Government will do to support the projects required to deliver this new system; and how Government will work with communities and energy project developers to get there.

What will it deliver?

Reduced energy costs for homes and businesses (through lower costs of generation)

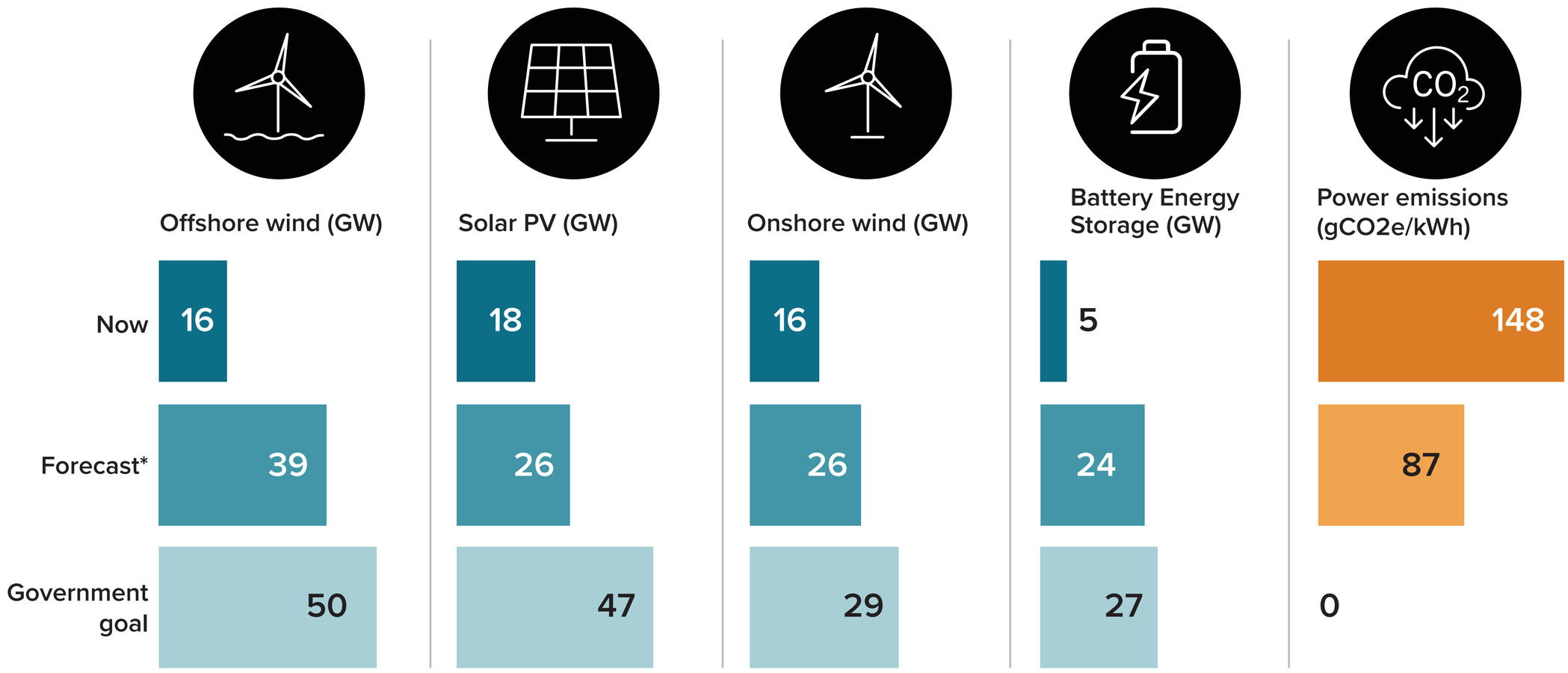


Increased UK energy security (through reduced reliance on imported gas supplies)



Reduced UK carbon dioxide emissions (in support of climate change efforts)

UK's 2030 energy targets require increases in the pace of deployment for all energy technologies



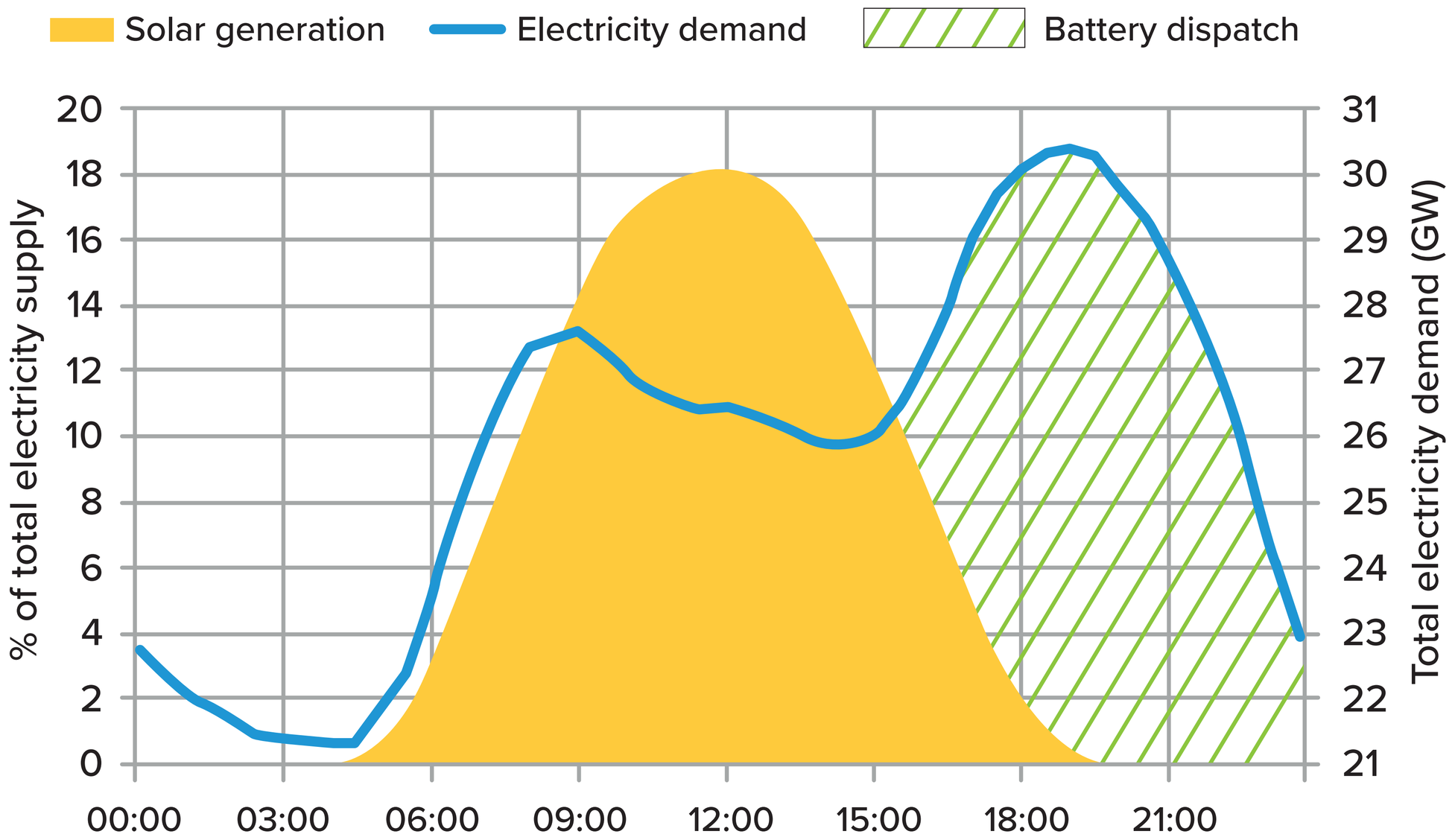
*S&P Global Commodity Insights Dec-23 Planning Case and Rystad Energy Renewable Solution Report Apr-23

CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY

ROLE OF BATTERY STORAGE IN CLEAN POWER 2030



Battery Storage means we can rely on weather dependent renewable energy sources:

3x
Wind

3x
Solar

5x
Battery Storage

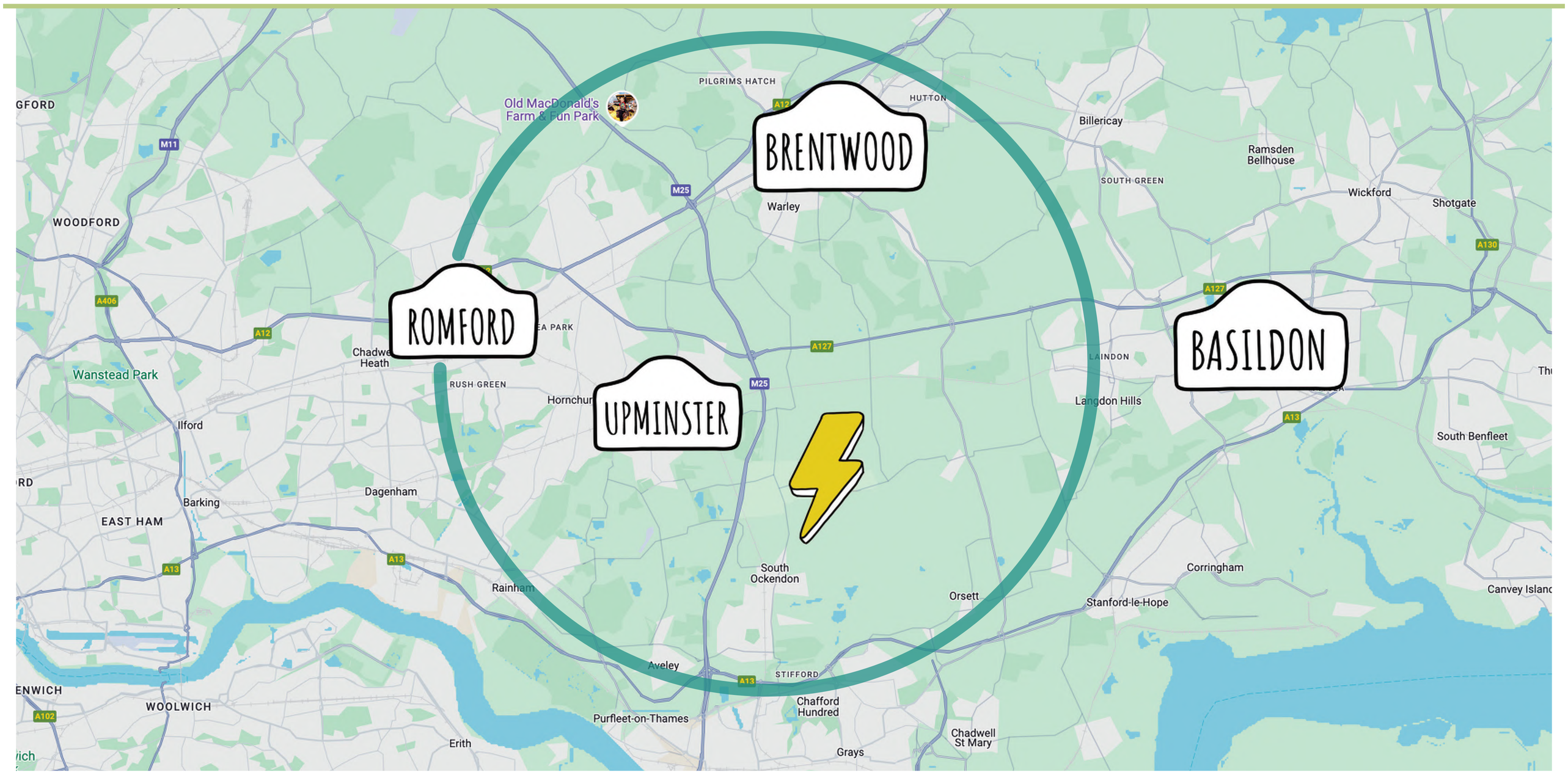
The government's Clean Power 2030 Action Plan sets a target capacity of 27 gigawatts of batteries by 2030, a five fold increase from the 5 gigawatts installed today. The Warley Energy Hub will make a significant contribution towards this target.

This expansion in battery energy storage capacity is critical to ensure the smooth functioning of the power system as Britain builds more renewable wind and solar power to hit its 2030 power decarbonisation goal. Batteries can store surplus generation for use when the wind doesn't blow and the sun doesn't shine.

CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY



ROLE OF WARLEY ENERGY HUB IN CLEAN POWER 2030

Warley substation is the grid supply point for local electricity supplies across Havering, Basildon, Brentwood and Thurrock, with **a population of over 350,000 people within 10km of the substation.**

The Warley Energy Hub would take electricity from the nationwide transmission network when there's more being generated than demand. It would deliver that energy back on to the grid when demand is higher than generation helping to ensure a dependable electricity supply for local homes and businesses.

Warley Energy Hub is currently scheduled to connect to the National Grid in 2029, meaning that it will make a significant contribution to the Governments 2030 and 2050 clean energy targets.

CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY

Indicative image not representative of scheme design

HOW DOES A BATTERY ENERGY SYSTEM WORK?

The basic building blocks of a Battery Energy Storage System (BESS) are the same well-known Lithium-Ion batteries found in everything from cordless vacuum cleaners to smart phones. These individual battery cells are connected together to form larger units that are housed in individual containers.

Each one of those containers is a 2.6 metre cube that can power 1,500 homes for one hour. Each container is connected via an inverter – to convert the electricity from direct to alternating current – to a substation on the site, which acts as the interface between the project and the electricity distribution grid.

Almost everything is manufactured offsite to reduce construction times and disruption. The prefabricated containers housing the batteries and inverters are lifted into place on top of shallow concrete pads, and everything is connected together before final testing.

Inverter

Constructed Battery Site

CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY

NO INCREASE IN NOISE WHEN OPERATIONAL

Clearstone has worked with a specialist Noise Consultancy to undertake comprehensive modeling to understand the noise impact of the project on surrounding homes and businesses.

The consultants undertook baseline noise monitoring over the course of 36 hours to establish existing background noise levels at key points around the proposed development site. This background noise assessment was undertaken in accordance with the industry standard BS4142.

Clearstone Energy then worked with the consultants as the design developed to simulate how the equipment and layout on site would emit noise in the context of the existing background noise, landscape, and the surrounding conditions. The noise emitted from the batteries is primarily from the cooling equipment on the battery and inverter systems.

Based on this modeling, the consultants concluded that the impact of operational noise from the equipment will be low and no additional noise attenuation is required.

These calculations are based on the battery storage units running at the highest noise levels throughout the daytime and night-time periods. This is conservative and is particularly onerous for nighttime as cooling equipment will not generally run at full capacity at night when ambient temperatures are generally lower.

Table 1: Comparison of daytime operational noise levels against ambient noise levels

Receptor	Predicted daytime operational noise level, dBL_{Aeq}	Daytime ambient noise level, dBL_{Aeq}	Predicted operational noise level - existing ambient, dBL_{Aeq}	Source + Ambient noise level, dBL_{Aeq}	Increase in Ambient noise level, dBL_{Aeq}
R1	43	54	-11	54	0
R2	40	54	-14	54	0
R3	37	54	-17	54	0

Table 2: Comparison of night-time operational noise levels against ambient noise levels

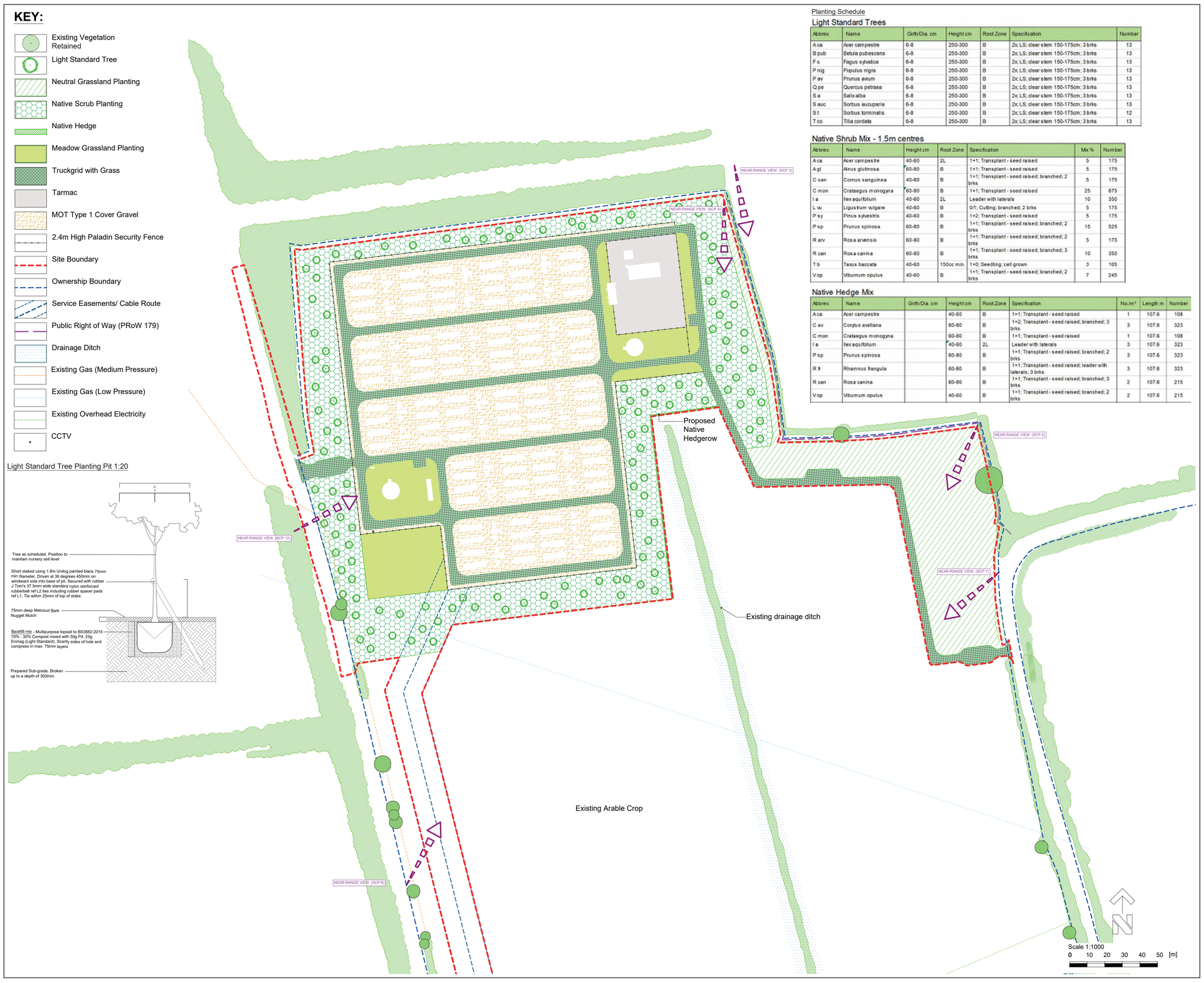
Receptor	Predicted night-time operational noise level, dBL_{Aeq}	Daytime ambient noise level, dBL_{Aeq}	Predicted operational noise level - existing ambient, dBL_{Aeq}	Source + Ambient noise level, dBL_{Aeq}	Increase in Ambient noise level, dBL_{Aeq}
R1	43	50	-7	51	1
R2	41	50	-9	51	1
R3	33	50	-12	50	1

An increase in ambient noise level of up to 3 dB(A) is not considered to be perceptible

CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY



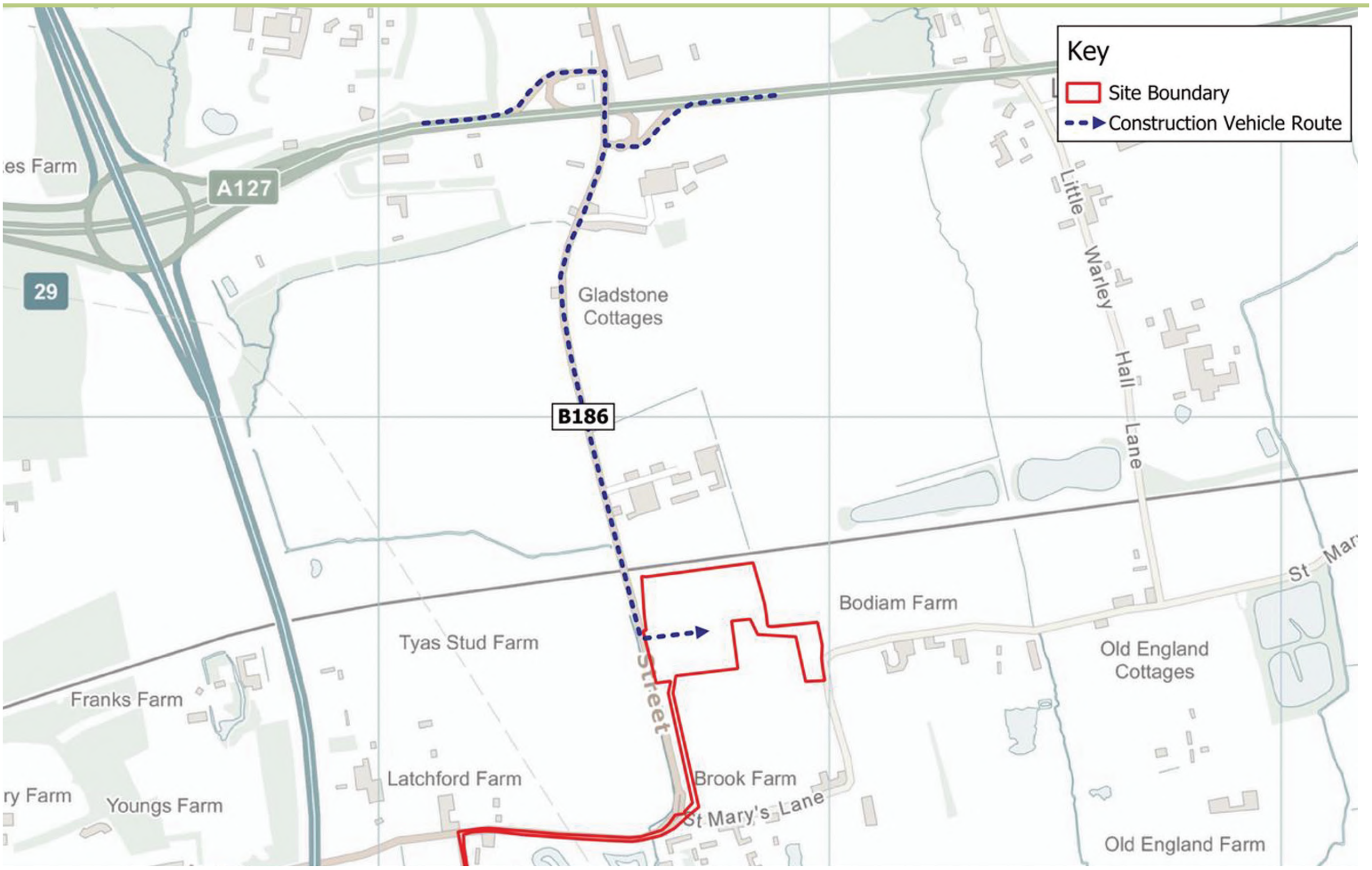
PROTECTING AND ENHANCING BIODIVERSITY

The Site is currently farmed fields with established hedgerow boundaries. The hedgerows do provide wildlife habitats and will be retained and bolstered with additional planting.

There are many studies showing that intensive farming has a negative impact on wildlife and biodiversity. The landscaping and planting plan for the facility would increase local biodiversity by taking the land outside of the battery area out of agriculture and creating new, long-term habitats for wildlife.

Specifically, this will have a positive impact on both permanent and visiting bird populations.

It is important that wildlife is protected during the construction phase of the project. If the project receives planning consent we will produce a detailed plan for safeguarding wildlife which will be overseen on the ground by ecologists. This plan will need to be approved by Havering Council before work can start.



CONSIDERATE CONSTRUCTION

The contractor will introduce measures to minimise the impact resulting from construction activities. It will be the responsibility of the Project Manager and Site Manager to oversee the implementation of the management measures.

Management measures will include:

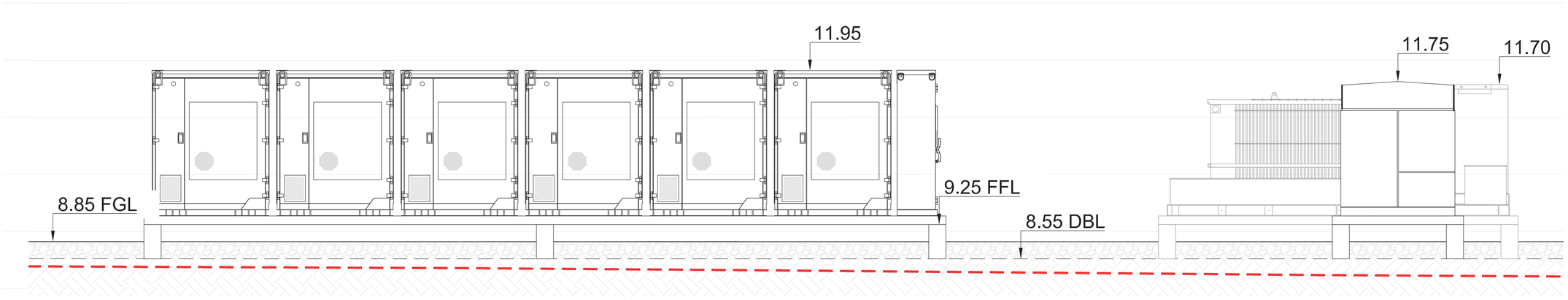
- Clear signage for construction traffic
- Vehicle movements to be coordinated to avoid peak time deliveries and manage access/ egress
- Wheel wash facilities will be provided to ensure vehicles are not carrying debris onto the highway
- Construction activities will be undertaken during prescribed hours

The construction route to site has been selected to minimise the number of nearby homes that vehicles will pass on the way to the site and to avoid causing congestion on local roads.

The details of the Construction Site Manager will be provided to the local highway authority in advance of any work being carried out.

The Construction Site Manager's details will also be provided on a Site-board at the Site access. If anyone in the local community has any issues during the construction phase, the Site Manager will be available to discuss.

NO INCREASE IN FLOOD RISK



The designs submitted to Havering Council ensure that existing issues would not be made worse by the construction of the facility.

The majority of the proposed facility falls outside of the designated Flood Zones. Where there are batteries in flood zones they will be on raised steel frames to allow water to pass beneath. This will ensure that the project would not increase the risk of flooding elsewhere.

The proposed drainage strategy has been designed to ensure that the land will continue to drain at a similar rate to currently. Further, additional planting and passive management of rainwater runoff, rather than annual intensive farming operations, may also help to reduce flooding by slowing down the flow of rainwater, increasing the absorption of rainwater, and reducing soil erosion.

The Environment Agency and the Lead Local Flood Authority has been consulted as part of the planning application process.

SAFETY BY DESIGN

HOW PREVALENT ARE BATTERY SAFETY INCIDENTS?

There are billions of Lithium-Ion batteries in use around the world. They power a huge range of devices, from laptops to the International Space Station. Failure rates are incredibly low, and new standards and guidance has been introduced that will reduce this risk even further. Estimates of the probability of the sort of critical failure in a Lithium-Ion battery cell that can lead to a fire is 1 in 40 million.

WHAT CAUSES A LITHIUM-ION BATTERY FIRE?

The process that leads to a Lithium-Ion battery catching fire is called a thermal runaway. A failed battery cell enters a process of chemical reactions that cause rapid temperature rises within the cell and possibly a fire. Thermal runaway can be triggered by an internal cell failure or external factors such as damage, extreme heat or overcharging.

HOW ARE BATTERY ENERGY STORAGE SITES DESIGNED TO ENSURE SAFETY?

STEP 1 - MINIMISE THE RISK OF AN INCIDENT OCCURRING

The Lithium-Ion batteries used in battery energy storage facilities are designed with multiple layers of fire prevention technology, including:

- Cabinets and enclosures are designed to protect the batteries inside from the impact damage that could cause a battery cell failure.
- Both batteries and cabinets have integrated cooling systems to manage temperatures.
- A sophisticated battery management system (BMS) continually monitors individual battery cells for faults and abnormal temperatures. If anything unusual is detected, the BMS disconnects the enclosure containing that cell and alerts engineers.
- Battery enclosures are fitted with sensors to detect the build-up of flammable gases and automatically trigger an integrated venting system to clear the gases.

STEP 2 - MINIMISE THE RISK OF A FIRE SPREADING

In the unlikely event that a battery unit does catch fire, battery enclosures and battery storage facilities are designed to contain the fire to that individual unit.

- Each battery cabinet or enclosure has a fire suppression system. This is automatically triggered as soon as a fire is detected and uses integrated water sprinklers or a gas-based fire suppression system to extinguish or contain the fire.
- Battery cabinets and enclosures are designed to minimise heat transfer so that a fire in one cabinet does not lead to adjacent cabinets overheating.
- Facilities are also carefully designed around standards for the safe separation distances between battery containers and between containers and combustible materials, such as trees and hedges, to prevent a fire from spreading beyond a single battery unit.

International safety standards - UL9540 and NFPA 855 - ensure that battery units have undergone testing to demonstrate the effectiveness of these safety systems.

The UK National Fire Chiefs Council (NFCC) standards extend to ensuring that a battery energy storage system is designed to enable Fire & Rescue Service (FRS) personnel to tackle any incident effectively. This includes a site layout that provides a secondary access point and unencumbered access to all areas for fire engines and personnel, suitable water supply and easy access to any fire fighting equipment on site.

STEP 3 - MINIMISE THE RISK TO PEOPLE, PROPERTY AND THE ENVIRONMENT

Clearstone Energy's battery safety standards and best practices extend beyond fire suppression and containment to ensure that people, property and the environment are protected in the event of a fire.

- NFCC guidelines include safe distances from battery units to site boundaries, public footpaths and occupied buildings to ensure that the general public are protected in a fire situation.
- Protecting emergency services personnel is paramount, and we are collaborating with The London Fire Brigade to ensure the site meets their needs including safe working distances, appropriate access and water supplies.
- Battery storage sites are designed with containment and drainage systems to collect firefighting water that can be isolated from the public water courses and sewers in the event of a fire.

CLEARSTONE ENERGY

Warley Energy Hub

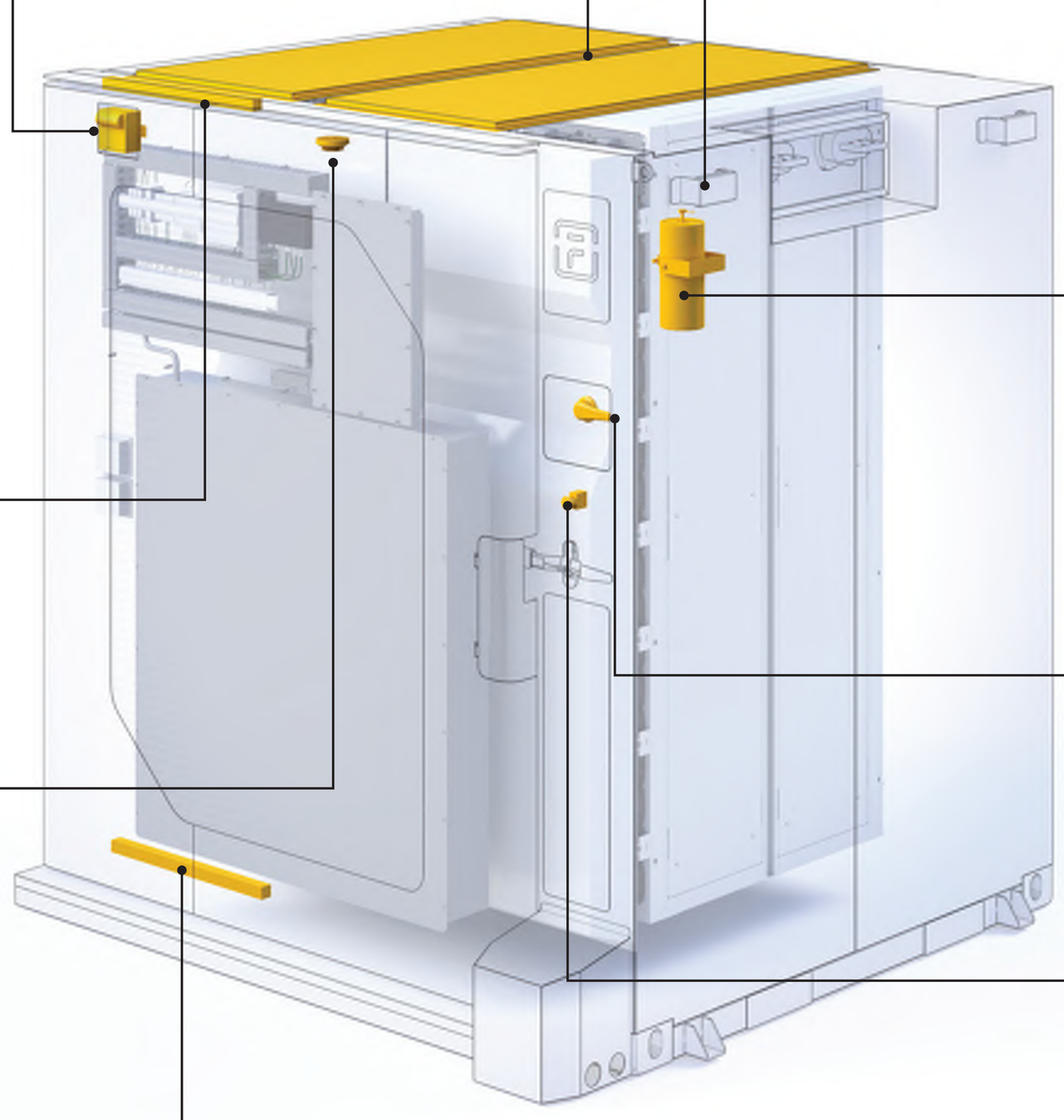
ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY

EXAMPLE SAFETY SYSTEMS

5.
Deflagration Panels
Automatic vents are used to stop the build up of flammable gases in a cabinet. Deflagration panels ensure that gases and flames are directed upwards and away from first responders in the event of a fire.

1.
Battery Management System (BMS)
Continuously monitors battery cells to identify potential cell failures.

4.
Fire Detection and Suppression System
Water sprinklers are typically used to prevent a fire in one battery module spreading to others in the cabinet.



4.
Fire Detection and Suppression System
Aerosol suppressants are typically used to extinguish electrical fires and protect battery cells.

7.
Open Door Sensor

6.
Lockable Disconnect Switch

3.
Incipient Gas Detection
Monitors for the presence of gases that would indicate a possible battery cell failure.

2.
Emergency Shutdown (Fast Stop)
Automatically triggered by the BMS or gas detection monitor.

8.
Sliding Door Lock

CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY

WARLEY ENERGY HUB COMMUNITY COMMITMENT

The Warley Energy Hub project will offer £50,000 of funding annually (£2 million in total) to promote energy saving, community projects and help tackle cost-of-living locally.

This could include:

- Renewable energy and energy efficiency retrofit projects for community buildings closest to the site.
- The implementation of energy saving measures for low-income households (11% of households in Havering Borough are in fuel poverty).
- Support for community projects focused on improving community services, enhancing nature and increasing energy efficiency.

This is in addition to an estimated £500,000 per year in business rates for reinvestment in local initiatives.

YOUR IDEAS FOR COMMUNITY PROJECTS WARLEY ENERGY HUB COULD SUPPORT

PLEASE SHARE YOUR IDEAS WITH US HERE...

CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY

MINIMISING LANDSCAPE AND VISUAL IMPACT

As constructed

This image provides landscape and visual context only

Vegetation at 5 years

Vegetation at 15 years

CLEARSTONE ENERGY

Warley Energy Hub

ACCELERATING HAVERING'S TRANSITION TO RENEWABLE ENERGY

MINIMISING LANDSCAPE AND VISUAL IMPACT

As constructed

This image provides landscape and visual context only

Vegetation at 5 years

Vegetation at 15 years