

TYDD SOLAR SCHEME FIRE RISK STATEMENT

HM2545/rw/03pfe
27th November 2023

INTRODUCTION

Background

It is proposed to develop a solar farm near Gorefield and Sutton St Edmund in both Lincolnshire and Cambridgeshire. The proposed site will occupy approximately 141.6 hectares of land. The site will consist of solar panels, a battery storage system and a small transformer station.

The proposed site is shown below in Figure 1.

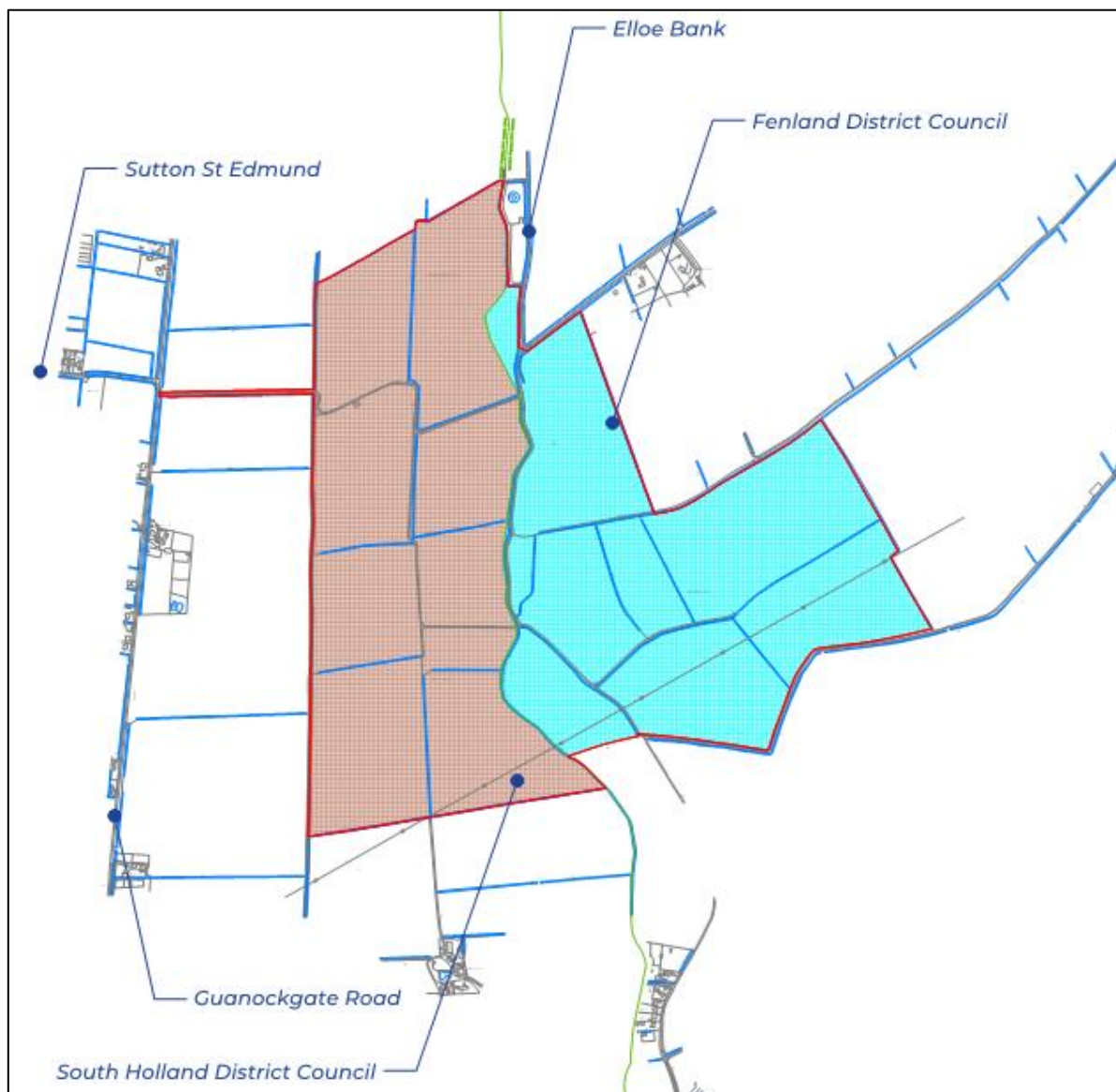


Figure 1: Proposed Site

Aim of Report

This technical note summarises an assessment of the fire risks that will be considered during the design development, in order to ensure that the site achieves a satisfactory standard of safety for occupants on the site and firefighters, as well as minimising the impact on the local community and environment.

This report is intended for use at the planning stage, with the detailed and technical design to be developed at a later stage.

The final fire strategy design for the site will need to be agreed with the local Building Control and both the Lincolnshire and the Cambridgeshire Fire and Rescue Service.

This technical note addresses life safety only, not property protection.

BUILDING REGULATIONS AND GUIDANCE

There is limited official Building Regulations guidance which is specific to the fire safety planning of solar farms in the UK, however all new building works (regardless of use class) should comply with the functional requirements of the Building Regulations, for fire safety, that is the B1 to B5 requirements. This includes:

- B1 – Means of Warning and Escape
- B2 – Internal Fire Spread (Linings)
- B3 – Internal Fire Spread (Structure)
- B4 – External Fire Spread
- B5 – Access and Facilities for the Fire Service

Additional non-government third party guidance specific to the risks associated with battery storage, will be appropriately considered as the scheme progresses. This includes guidance such as the 'Grid Scale Battery Energy Storage System planning – Guidance for FRS' guidance from the National Fire Chiefs Council and the 'Battery energy storage systems: commercial lithium-ion battery installations' guide from the Fire Protection Association. Any relevant additional or new guidance will also be incorporated into the scheme as the design develops. This approach will ensure that the development meets the functional requirements of the Building Regulations from a life safety perspective, with the specific risks associated with batteries and solar farms captured.

BATTERY STORAGE PROPOSALS

Site Location

The existing site currently consists of farmland with limited road access. The site location is shown in Figure 2. The layout of the proposed site is shown below in Figure 3 which shows that most of the land will be used for solar panels. Figure 4 shows a detailed plan of the battery storage and transformer facilities.



Figure 2: Site Location

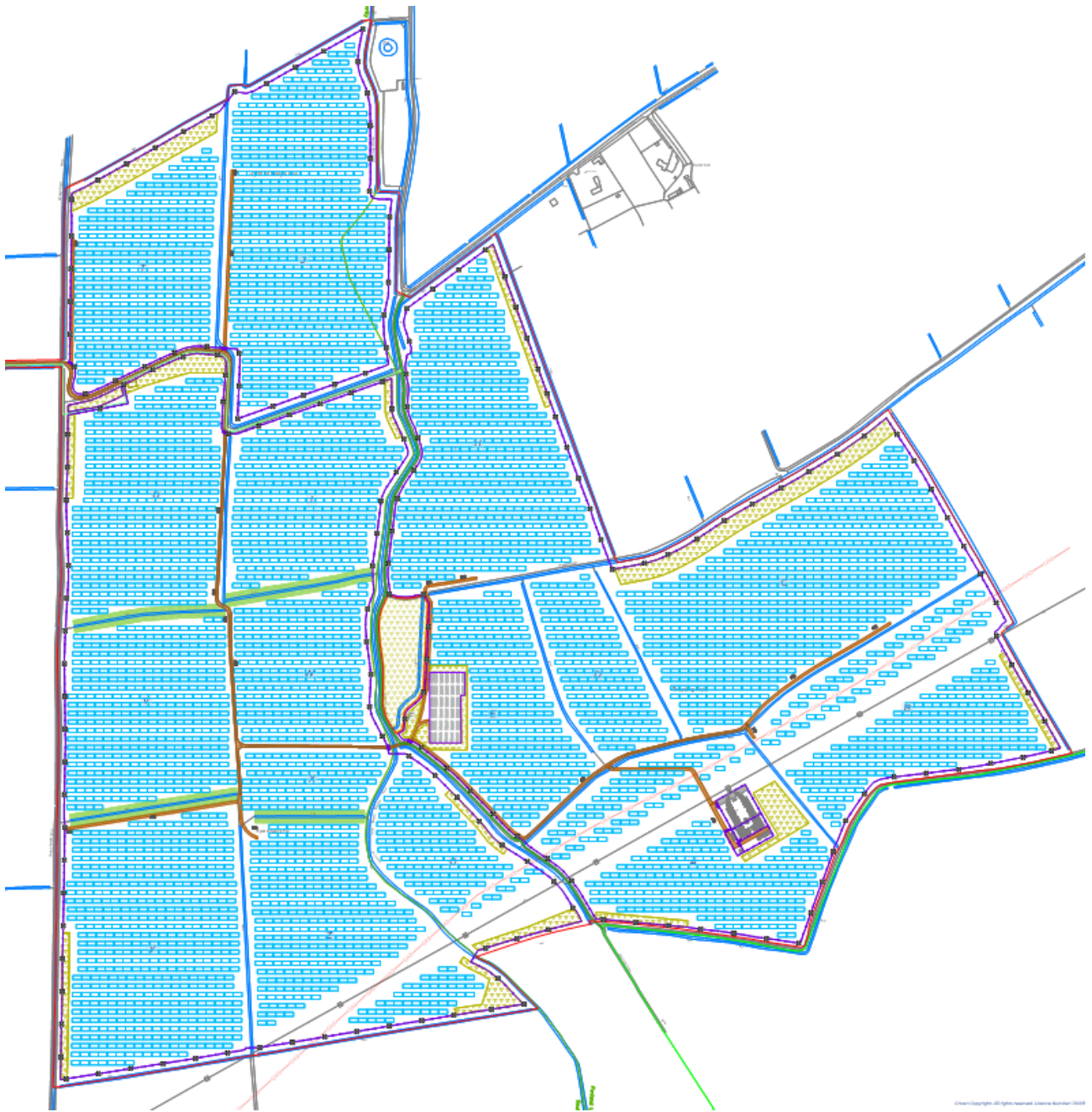


Figure 3: Proposed Extent of Solar Site – Detailed Site Plan

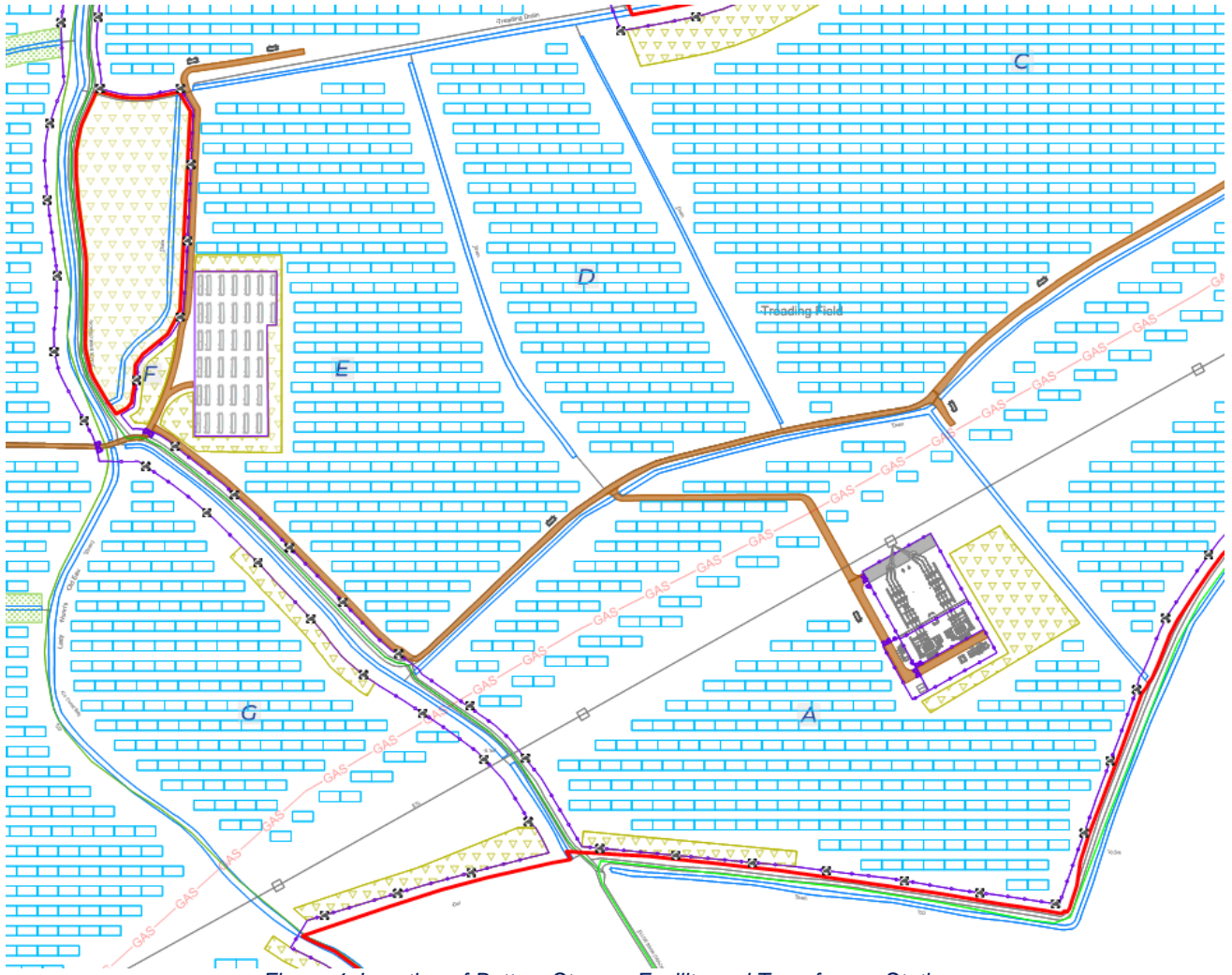


Figure 4: Location of Battery Storage Facility and Transformer Station

Battery Storage Design

The battery storage solution i.e. battery rack layout, clusters, housing etc will be developed as the scheme progresses.

Means of Escape

The means of escape from the battery storage area, transformer station and site will be assessed based on travel distances and the available number of exits as well as the required safe escape distances away from the fire load. The means of escape assessment will account for the additional risks posed by the storage of batteries and other high-risk areas located on site.

Fire Safety Measures

Control

Control methods including the type of battery management system used and any additional measures such as the disconnection of the affected battery/batteries upon detection of a fault will be developed as the scheme progresses.

Automatic Fire Detection and Alarm

An automatic fire detection and alarm system will be an effective and appropriate method of early detection and warning of fire. Battery fault detection will also be considered in order to detect issues which could be a precursor to a battery fire e.g. sensors to detect internal battery temperature, battery amperage, battery voltage etc and automatically shutdown to prevent risks escalating. Any additional measures such as any detection for the build-up of combustible gases, or battery risk specific smoke/heat detector devices and the level of detection and alarm coverage will be assessed further as the scheme progresses.

Measures to alert of the Fire Service at an early stage of fire development will also be considered and agreed with the local Fire Service.

Automatic Fire Suppression

Fire suppression will be an advantage for life safety, business continuity, asset protection and firefighter operations and will be considered as part of the design. Any design that does not include automatic fire suppression, if permitted, will include other fire safety mitigation in order to ensure a satisfactory standard of safety is achieved e.g. increased fire separation.

The selection of the appropriate automatic fire suppression system will be carried out by a suppression specialist and consider the appropriate design for a battery fire risks e.g. suppression medium, capacity and duration of the system, system operation, coverage and design etc.

Structure and Internal Linings

The combustibility of the structure and internal linings will be assessed as the design develops and the need for any stricter requirements to address a battery fire risk, limit internal fire spread and ensure the structure maintains its integrity for a sufficient period to support escape and firefighting.

Separation/Compartmentation and External Fire Spread

Typically, under Building Regulations guidance, it is sufficient to limit fire spread to a building and/or site of origin. However, this approach may not be appropriate for such a large site, as a fire over such a vast area could present a significant issue for local firefighting operations and resources, and impact the local area. Therefore, the fire strategy design of the site will consider the risk of a fire becoming out of control and spreading throughout the site. This will take into account several factors, including:

- The need or benefit of fire enclosing/fire separating battery units or battery clusters from each other.
- The required fire performance of fire resisting construction, e.g. 1 hour vs 2 hour fire protection, the need for integrity and insulation performance.
- Separation distances required to limit fire spread between battery units/clusters, fire spread between PV units/clusters.
- The impact and benefit of any automatic fire suppression and/or venting.
- Vegetation location and management to avoid brush/grass fire risks.
- Prevailing wind direction.

This assessment will be carried out in the context of:

- The maximum fire size must be limited in size and extent to prevent significant fire spread.
- The maximum fire size that the local fire and rescue service can reasonably accommodate, without limiting firefighting services to the wider local region.
- Occupants escaping safely.

Ventilation

The need and benefit of ventilation in the battery storage area and any other enclosed environments will be assessed and will consider:

- The need for ventilation to support occupants escaping.
- The need for ventilation to support firefighting operations.
- The need for ventilation to reduce the chance of more batteries becoming involved in the fire i.e. to provide cooling.
- The type of ventilation e.g. natural, mechanical, and to consider the specific risks of a battery fire e.g. typical smoke venting is based on dealing with hot buoyant smoke, however battery fires release denser gases compared to typical fires and therefore the system's ability to deal with this will need to be assessed.
- The need for venting to address explosion risk.

The amount, type and design of any ventilation system will be carried out by the relevant specialists.

Firefighting

Vehicle Access

Suitable road access will be provided so that firefighters can safely access the battery storage and transformer facilities. The road access strategy will ensure that the road is designed to support fire vehicle tracking e.g. weight limits, road width, turning facilities etc.

The access and hose length strategy to the PV units will need to be considered and developed as the scheme progresses and agreed with the Fire Service.

Water Provisions

As existing, there appears to be no suitable existing natural water supply on site which could serve as a water supply for the Fire Service. The location and operation of existing fire hydrants will need to be confirmed as the scheme progresses. However, given the greenfield land use, it is expected that there will not be sufficient existing fire hydrants serving this land to support a new solar farm use. Therefore, the design development will assess the need and location of additional local fire hydrants and/or the need for permanent onsite water storage. The position and provisions of water storage and outlets etc will be agreed with the local Fire Service and should be suitable for supporting the proposed firefighting activities.

Water Run-Off

Fire water runoff (including from sprinklers and firefighting operations) and the contamination risk to the local environment will be also considered during the design development. Guidance concerning fire water run off can be found in the following guidance documents amongst others:

- *Containment systems for the prevention of pollution (C736F)* by CIRIA
- *Managing Fire Water and Major Spillages: PPG18* by the Environmental Agency for England and Wales
- *NFCC (National Fire Chief's Council) National Operation Guidance for fire water*

Multiple Fire Service Districts

The site is split over two counties and will therefore fall into the jurisdiction of two different firefighting authorities. It will be ensured that the fire strategy design is agreed with both authorities as well as ensuring that the fire strategy design is sufficient for the particular firefighting operations/facilities of both jurisdictions, or a common approach will be agreed.