7000 Acres

7000 Acres Response to the Cottam Solar Project Ltd Application on the subject of:

Flooding Concerns

Deadline 1 Submission – 17th October 2023

7000 Acres Group Representation

Cottam Solar Project Flooding Concerns

The Cottam Solar Project is divided into three areas denominated Cottam 1,2 & 3 and covering a total area of 3,137 acres of productive farmland.

Cottam 1 covers 2,209 acres and is located on the flood plain of the River Till which is pumped into the Fossdyke Navigation Canal at Odder, adjacent to the A57 east of Saxilby.

Cottam Sites 2 & 3 cover 236 acres and 602 acres respectively, located near the villages of Corringham and Blyton and are situated on the catchment area of River Eau, which flows into the river Trent at low tide on Messingham Ings.

Assuming only 50% of the total land area is covered by the 4.5-metre-high articulated panels, then the total panel surface areas are estimated to be approximately 4.5 million square metres for Cottam 1, 0.7 million square metres for Cottam 2 and 1.2 million square metres for Cottam 3, making a total of 6.4 million square metres of impermeable surface area.

The surface water runoff under storm conditions from impervious areas of this magnitude will be spectacular.

The developer's Flood Risk Assessment states:

'7.2.2 The proposed strategy aims to mimic the natural drainage conditions of the site as much as possible. The proposed solar PV panels will be held above ground individually on narrow diameter piled legs. This prevents sealing the ground with an impermeable surface beneath solar panels allowing rainfall/runoff to infiltrate to ground throughout the Scheme. As a result, it is considered that the Scheme's impermeable area will remain consistent to its pre-development state.'

NB The developer may have intended to use the word *'permeable'* instead of *'impermeable'*, but either way the assertion is entirely incorrect for the following reasons:

The kinetic energy of the sheet flow from the panels is far greater than that of the rainfall over the same area and will alter the volume, velocity, and discharge characteristic of storm water runoff, increasing the soil erosion along the drip line of the panels.

The flow of rainwater falling on the panels is concentrated at the drip line and the degree of infiltration will depend on the soil permeability immediately below.

If land drains are sited immediately below the drip line, the flow of water from the site into drainage ditches are likely to be much greater than at present.

The articulated panels are 4.5 metres high, inclined at variable angles between 20 and 50 degrees depending on the season and operated to track the sun.

Rainwater falling onto the inclined panels will run to the lowest point on each array and fall to the ground at the drip line.

On level ground, the areas beneath the panels are not available for infiltration, since they lie in the rain shadow and beyond the panel drip line.

The flow of water along the ground is governed by the hydrology, which relies on rate of rainfall, the localised permeability of the soil at the drip line, the slope of the ground and the degree of compaction of the access roadways between the arrays by maintenance traffic.

Considering the above, it is highly unlikely that the 4.5-metre-high panels will allow rainfall/runoff to infiltrate the permeable area beneath and therefore will not remain consistent to its predevelopment state.

Currently rainwater precipitation and mitigation are evenly distributed across the sites allowing gradual entry into the land drainage systems before delivery into the drainage dykes.

However, rainwater falling on the panels will gravitate towards the lowest corner of each panel, where it will fall to the ground to form rivulets and channels flowing down the rain shadows of the rows sited below, without using the whole area for infiltration as the developers claim.

Additionally, much of the existing field drainage system beneath the panels will remain underutilised and subject to damage and disturbance by the panel mountings during construction.

This will increase the rate and quantity of surface water runoff from the sites, with spectacular flooding during periods of prolonged torrential rain.

The developer's Flood Risk Assessment also states:

'7.2.4 The Scheme will provide minimal alterations to the existing topography and ground conditions on-site. Any excess peak surface water runoff generated within the site boundary will be attenuated on-site before it is infiltrated to ground. Attenuation will be provided in the form of swales and infiltration basins. These features will be strategically located based on existing overland flow routes to capture runoff. Check dams will be placed strategically within swales to optimise their potential on steeper slopes. Where the attenuation lies within the solar field, the legs of the solar panel will be extended so that the solar panel lies above the potential flooding.'

If one uses the Defra SuDS mitigation requirement of one cubic metre of storage capacity for 50 square metres of impermeable surface area, the estimated 4.5 million square metres of solar panels in Cottam 1 would require 90,000 cubic metres of storage.

Retaining this quantity of storm water by 0.6 metre deep 'swales' would require a total mitigation area of 37 acres distributed at the lowest points in each section of solar arrays, far exceeding any outline proposals for mitigation in the developer's FRA and could hardly be regarded as maintaining the existing topography.

The developer's FRA further states:

'7.2.6 The proposed surface water drainage network has been designed to accommodate runoff from all storms up to and including the 1% AER +40% for climate change. For an extreme storm event, any exceedance flows that cannot be retained by the proposed attenuation flow overland, following the existing topography, where ultimately, they will be contained within the SuDS features.'

The proposed surface water drainage is based solely on the infiltration of the land in its current condition, with an even distribution of rainfall and an uncovered exposed area of permeability, but again no consideration has been given to the sheltered areas beneath the panels, which reduces the area of direct infiltration by an estimated 50%. The runoff from the panels is concentrated at the drip line, will flow to the lowest point under gravity and will not be distributed over the total area.

In addition to the surface water from the proposed area of Cottam 1, the River Till also receives land drainage from the proposed developments at Gate Burton EP, West Burton EP and Tillbridge Solar, which in total amount to around 10,000 acres of land sited in the catchment area.

The River Till is pumped up into the Fossdyke Navigation Canal by pumps controlled by the Upper Witham Drainage Board at Odder and flows into the Brayford Pool in the centre of Lincoln city which links to the river Witham.

Under storm conditions when the water level in the river Witham is high, the Upper Witham Drainage Board, at the request of the Environment Agency, routinely turn off the transfer pumps from the river Till into the Fossdyke Canal to prevent flooding around the Brayford Pool in the centre of Lincoln, causing the river Till to overflow its flood banks and inundate the surrounding farmland.

Thousands of acres of farmland and several vital access roads were affected around the villages of Stow, Sturton by Stow, Bransby and Broxholm in November 2019, which is not an isolated incident.

The flooding in 2019 also resulted in the evacuation of horses from the Brasby Horse Rescue Centre and the inundated land being unsuitable for grazing for over 12 months.

Cottam 1 is sited in flood classification zones 2 & 3 (areas with a moderate to high level of flooding) and anecdotal evidence provided by the local farming community suggest that the inundation of farmland is relatively frequent and sufficiently prolonged to have a negative impact on agricultural practices, resulting in the land being unsuitable for arable farming and converting to pasture and hay crop.

This raises serious concerns about the restriction of access by emergency services to remote communities due to the increased flood risk arising from all four solar projects sited on the catchment area of the river Till, which will inevitably exacerbate an already existing flooding problem.

It is therefore impossible to consider the effects of flooding arising from Cottam1 in isolation from the other 3 Solar Projects currently going through the planning process and the effects each will have jointly and severally on the inundation of farmland and roadways to villages downstream of the river Till due to drains backing up and water overflowing its flood banks.

High water levels in the river Till also exacerbate flooding problems experienced over 10 miles away, due to the reduction in the hydraulic gradient resulting from rising water levels in the drainage dykes and its tributaries.

When one considers the storm water runoff from an estimated 8 square miles of impermeable glass panels from all 4 projects delivering onto the catchment area of the river Till, the flooding will be 'spectacular' and no amount of 'mitigation' will equal that already provided by the soil itself and the existing drainage systems, which have stood the test of time.

Most of the soil on the proposed development areas has a high clay content, which despite its ability to hold water in times of drought to produce high crop yields, becomes saturated during prolonged periods of heavy rain, resulting in excess water to shed off directly over the surface into the dykes.

Also, during periods of drought, clay soil becomes hard and initially impervious to rainwater until it is softened enough to allow infiltration.

Under drought conditions, its hard impervious nature of clay soil results in rainwater from a sudden storm running off faster than it can be absorbed.

The residence time, for rainwater falling over an area of the soil surface is currently much longer than would be the case when covered by 4.5-metre-high impervious solar panels, which concentrate the runoff at the drip line.

'7.2.3 It is considered that rainfall will mostly permeate into the ground where it falls, and that any runoff generated within arable fields collects in low spots where it infiltrates to ground or enters a water course as appropriate where the site drainage interacts with one.'

The developer appears to have misunderstood the hydrology of a concentrated flow of rainwater running from the inclined 4.5 metre high solar panels onto the confined area of the drip line falling onto the edge of the compacted panel maintenance lanes between the solar array and the inaccessibility of the area in the sheltered rain shadow beneath the panels, resulting in at least half the area of the development being unavailable for infiltration than is currently the case.

Also, the impingement and sheer force of the fast-moving channel of water along the panel driplines to erode the soil and mobilise clay, fine particles together with natural vegetation to enter the water courses and negatively impact aquatic invertebrates and the general ecology of the dykes, drains including the river Till.

It remains a matter of serious concern that the Environment Agency and the Upper Witham Drainage Board have not also raised concerns regarding the flooding risk, which is patently obvious.

Cottam Solar Project's Flood Risk Assessment in its Environmental Statement makes scant reference to the effect the development will have on the River Till and its tributaries and appears to concentrate mainly on the flood risk to the solar arrays and equipment within the development itself.

Nowhere in the developer's Flood Risk Assessment is there an estimate of the maximum quantity of surface water running from approximately 6 million square metres of solar panels.

Periods of heavy rain exceeding 50mm in a 24-hour period are not unknown in Lincolnshire which would produce 0.32 million cubic metres of surface water, much of which would not be absorbed along the panel drip line when the soil becomes saturated.

This quantity of water could not possibly be contained on the site even if Defra's SuDS formula were to be applied to provide 90,000 cubic metres of storage for Cottam 1 alone.

The flood risk from Cottam 1 cannot be considered in isolation and the flooding risks arising from Gate Burton EP, West Burton EP and Tillbridge Solar must also be jointly considered since they all are situated on the catchment area of the river Till and comprise approximately 10,000 acres of land in total.

Photographs of the flooding of the area around the proposed site of Cottam 1 which occurred in November 2019 are hereby attached.

Figure 1 - Area to the South East of Sturton By Stow towards Bransby & Broxholm

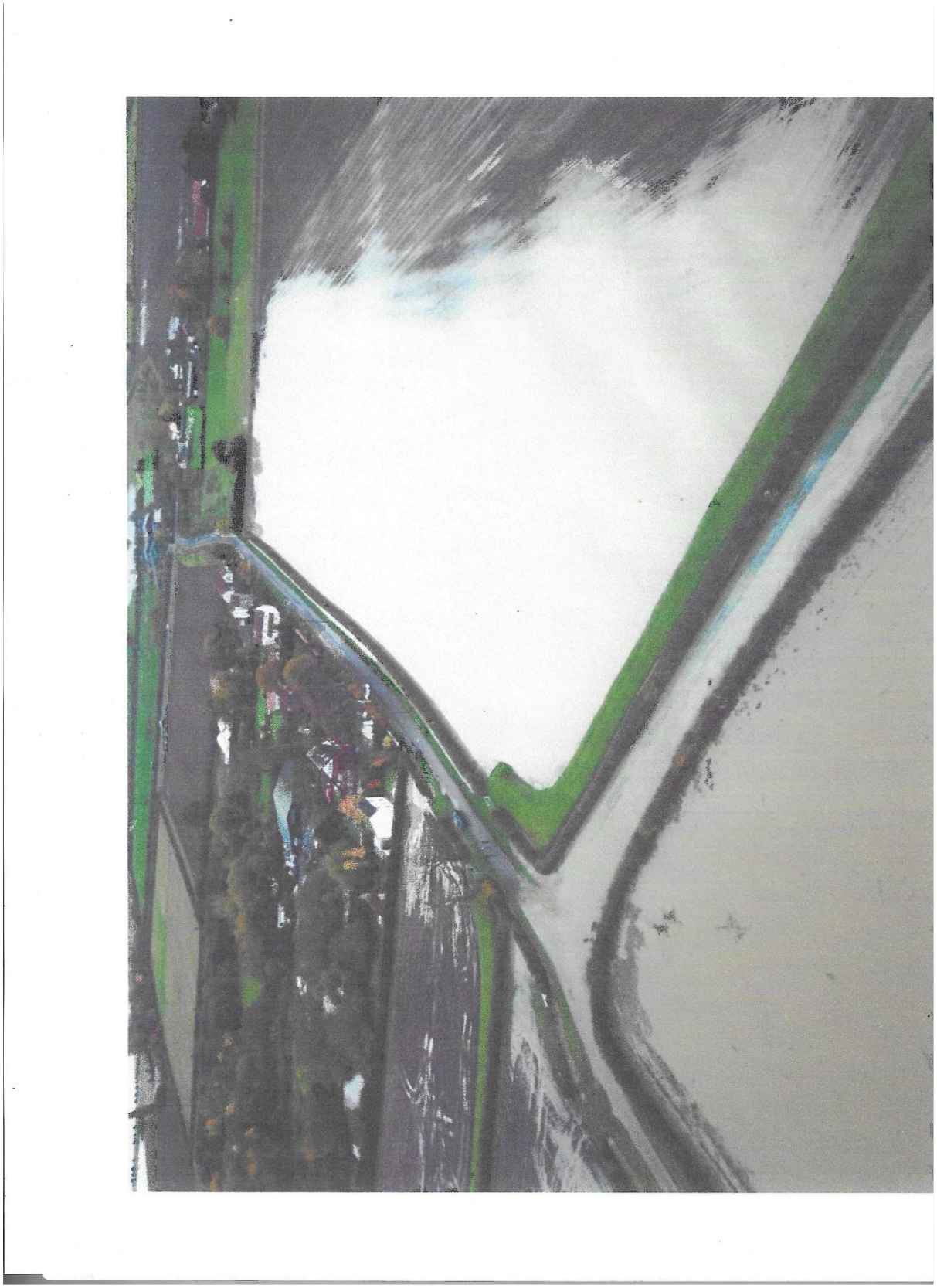


Figure 2 - Fleets Road, Sturton by Stow

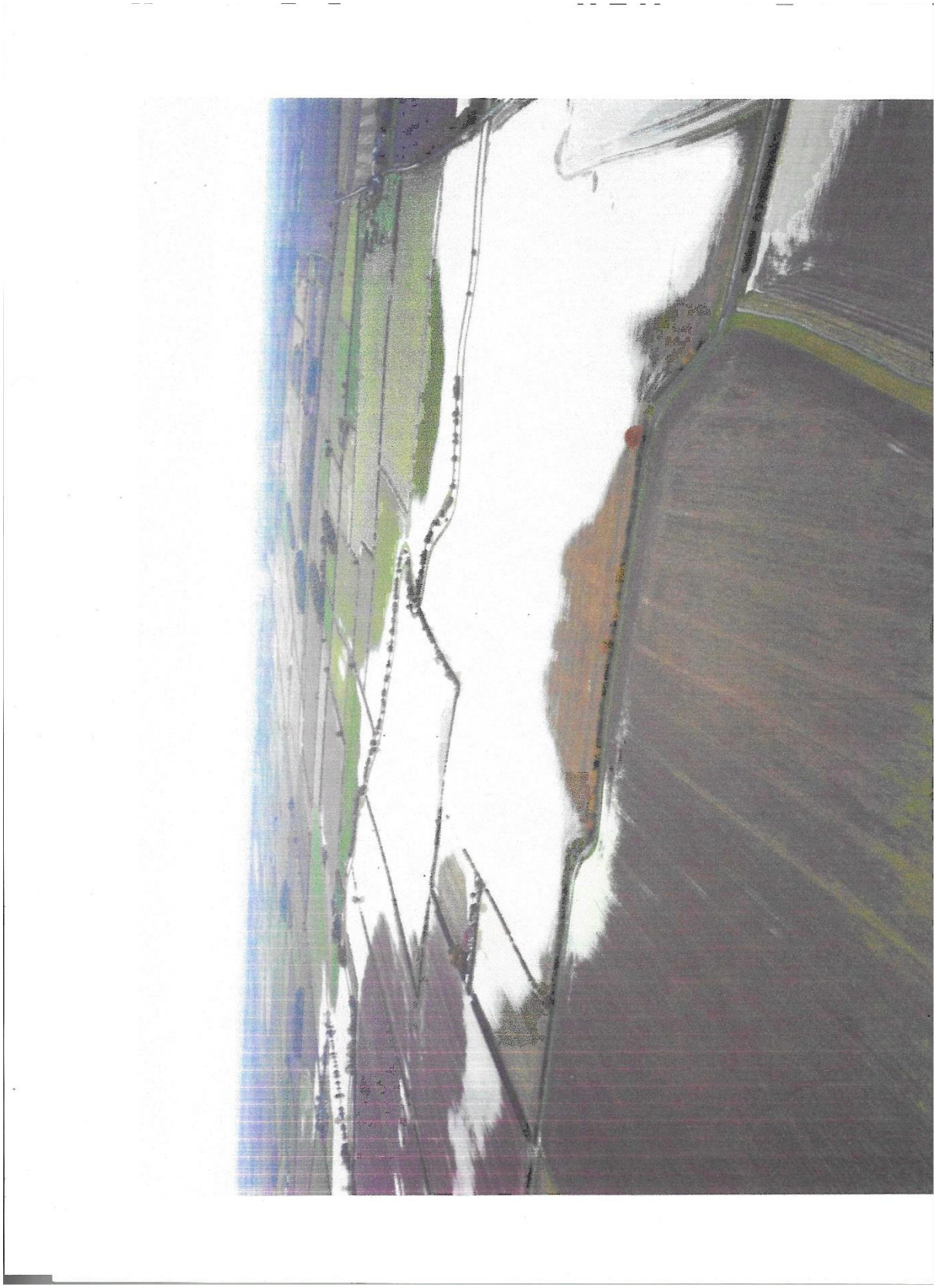
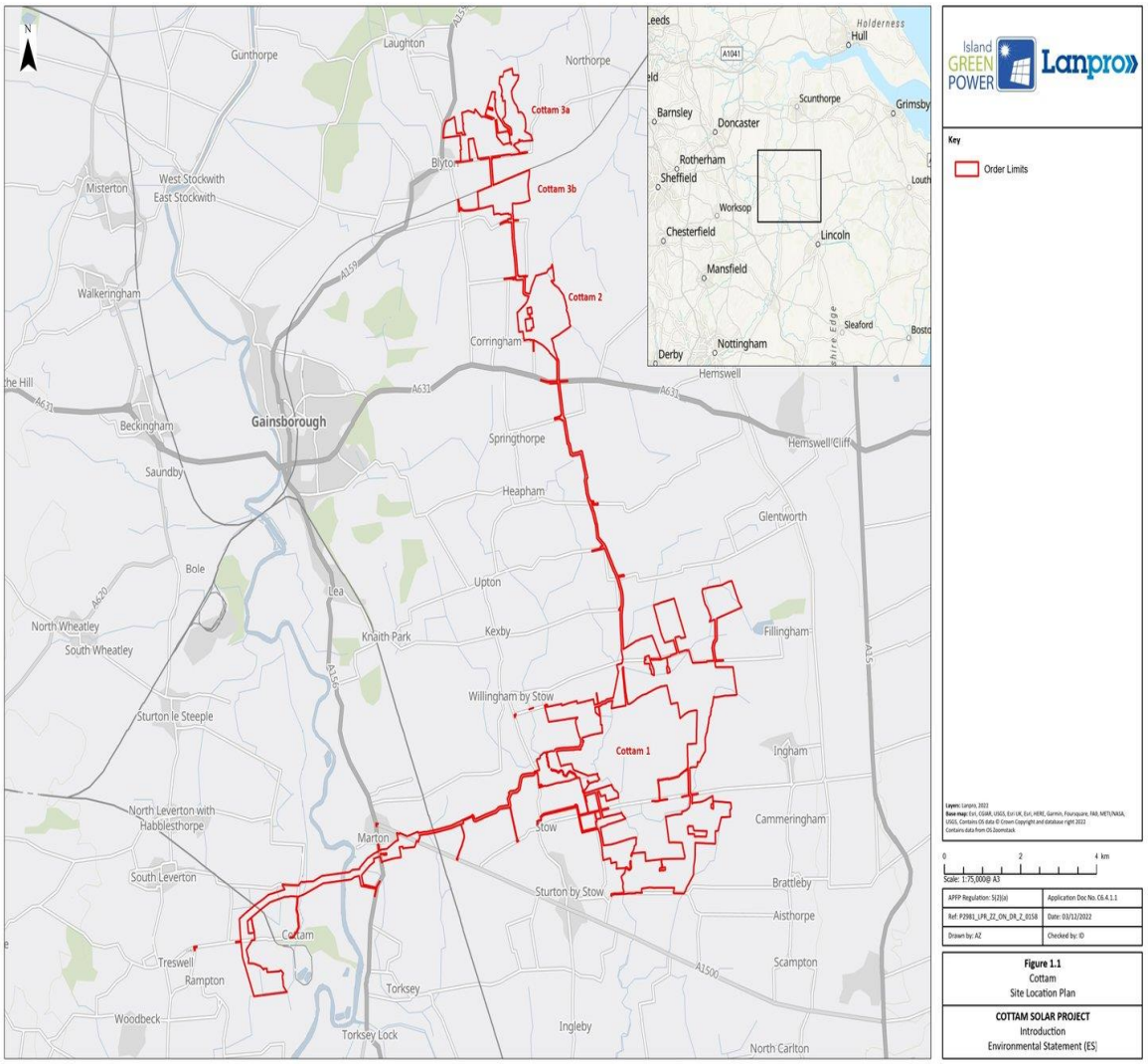


Figure 3 View to east of Sturton by Stow

Figure 4 Road leading to Stow Pasture


Cottam 3a
Cottam 3b
Cottam 2
Cottam 1
Gainsborough
Lincoln
Sheffield
Doncaster
Barnsley
Rotherham
Mansfield
Chesterfield
Worksop
Nottingham
Derby
Scunthorpe
Grimsby
Hull
Sleaford
Island GREEN POWER
Lanpro
Key
Order Limits
Figure 1.1
Cottam
Site Location Plan
COTTAM SOLAR PROJECT
Introduction
Environmental Statement (ES)