Submission ID: SBC59959F

Please find attached the following documents.
1.My document on my flooding concerns
2.Our expert produced flood report
3. A 500 word summary of the above report
4. An email exchange between myself and Green Hill Solar, as referenced in my report.

Flooding Concerns – Site G (Greenhill Solar)

Correspondence with GHS

Between September and October 2024, we exchanged several emails with the GHS team outlining our concerns about increased flooding affecting both our property and Lavendon Village, following the installation of the solar farm at Site G.

In their email dated **1 October 2024**, GHS detailed several proposed actions to address these concerns. These included:

- Preparation of a **site-specific Flood Risk Assessment (FRA)** for Area G.
- Assessment of the **potential offsite flood risk impacts** (if any).
- Development of a **comprehensive SuDS drainage strategy** to limit surface water discharge, including the installation of on-site storage.

However, these proposals have **not been incorporated** into the GHS formal planning submission for Area G, specifically sub-area **G13**. The reason provided is that these fields are classified as **Flood Zone 1**, with **permeable ground conditions**, and that studies indicate a **negligible impact on flood risk**, both on- and off-site.

We **disagree** with this conclusion. Area G has **complex, largely non-permeable ground conditions** that lead to significant surface water run-off during intense rainfall events, posing a genuine flood risk.

Location

Our property, **Lower Farm**, lies at the **southernmost point** of the Greenhill Solar Site G map, within a shallow valley at the end of **Castle Road, Lavendon**. The farm comprises **24 acres of pasture**, directly adjacent to **Site G13**.

Lower Farm, originally established in **1675**, has a long history of flooding due to a large fluvial drainage channel that runs through the property on two sides and drains the entirety of Site G and surrounding areas. **Lavendon Village**, located approximately **1 km to the south**, also has a well-documented history of flooding, as the same drainage channel continues southward beneath the **A428** via a culvert.

The entire length of this drainage route—including its banks through Area G, Lower Farm, and Lavendon Village—falls within **Flood Zone 3a**.

A **site-specific Flood Risk Assessment (FRA)** carried out at Lower Farm in **2016** confirmed that under a **1-in-200-year flood event plus 60% climate change allowance**, the property would flood despite existing defences. These defences were subsequently redesigned and rebuilt, and revised modelling confirmed that stormwater under the same criteria would be contained within the **6m-wide, 2m-deep** channel, flowing beneath the access bridge at **6 m^3/s**.

New **Environment Agency flood criteria issued in 2025** have since changed the standard to a **1-in-100-year event with a 45% climate change uplift**, which GHS has applied to some areas of the solar farm.

Ground Conditions

Our livery stables and grazing land occupy **18 acres north** of the drainage channel—directly opposite Area G13—and a further **3 acres south**, immediately adjacent.

From extensive excavation work for foundations, a manège, and fencing, we are intimately familiar with the **challenging ground conditions** here. The **clay and stony topsoil** varies in depth from **0–200 mm**, thinning toward the drainage channel, and overlays **dense limestone layers** extending to depths of **3–5 m**. Beneath these are **pockets of blue clay**, exposed as shallow as **1.5 m** below the surface.

The **water table** near the drainage channel sits at approximately **1 m** below ground level, and there are **four natural springs** across our fields. The topsoil is **highly compactible**, and during heavy rain, surface water flows rapidly into the drainage channel, causing a sharp rise in water levels that subside soon after rainfall ends. These conditions demonstrate **very low permeability**, unsuitable for adequate infiltration or attenuation of surface water.

Reference to Research and GHS Reports

Greenhill Solar frequently cites research by **LM Cook and McCuen (2013)** on flood risks associated with solar farms. This research concludes that solar panels installed on **well-maintained, deep-rooted grassy fields** (e.g., wildflower meadows) have **minimal impact** on surface water run-off. Accordingly, solar farms on **permeable land** may not require extensive stormwater management.

However, the same research also states that where **ground cover changes**—for example, in areas with **patchy grass or bare soil**—the **hydrological response changes significantly**, and surface run-off can **increase by up to 100%** during peak rainfall.

GHS does **not reference this qualification** in their use of the study. Yet, in their own report (**GH 6.3.10.10 – Hydrology, Flood Risk and Drainage, Chapter 10**), they acknowledge that Area G's **natural permeability is low**, and that **imported graded topsoil (to top up to 400 mm depth)** will be required to improve conditions.

To achieve this across Area G13, GHS would need to import approximately **57,000 tonnes of graded topsoil**—an additional **200 mm** over **44 acres**. This equates to roughly **4,000 deliveries by 32-tonne lorries**, an **environmentally unacceptable** level of activity.

Summary

If Greenhill Solar proceeds with the installation on Area G without addressing the **poor soil permeability**, it is inevitable that the development will **increase stormwater run-off** beyond

existing levels. This will **exacerbate flooding** risks to both **Lower Farm** and **Lavendon Village**, contrary to the stated aims of the planning submission.

Engineering Report: Assessment of Surface Water Runoff from Proposed Green Hill Solar Farm (Green Hill G)

To: Relevant Stakeholders

From: Mark Shepherd CEng/PrEng

Date: 19 October 2025

Subject: Preliminary Opinion of Surface Water Runoff and Contribution to Localised Flooding from the Proposed Green Hill Solar Farm (Green Hill G)

1.0 Introduction

This report presents an engineering opinion of the potential for increased surface water runoff and localized flooding associated with the Green Hill G (Lavendon) section of the proposed Green Hill photovoltaic (PV) solar farm. The analysis evaluates the hydrological impacts of converting a predominantly permeable, natural landscape into a development featuring substantial impervious surfaces, with particular focus on Site G-13.

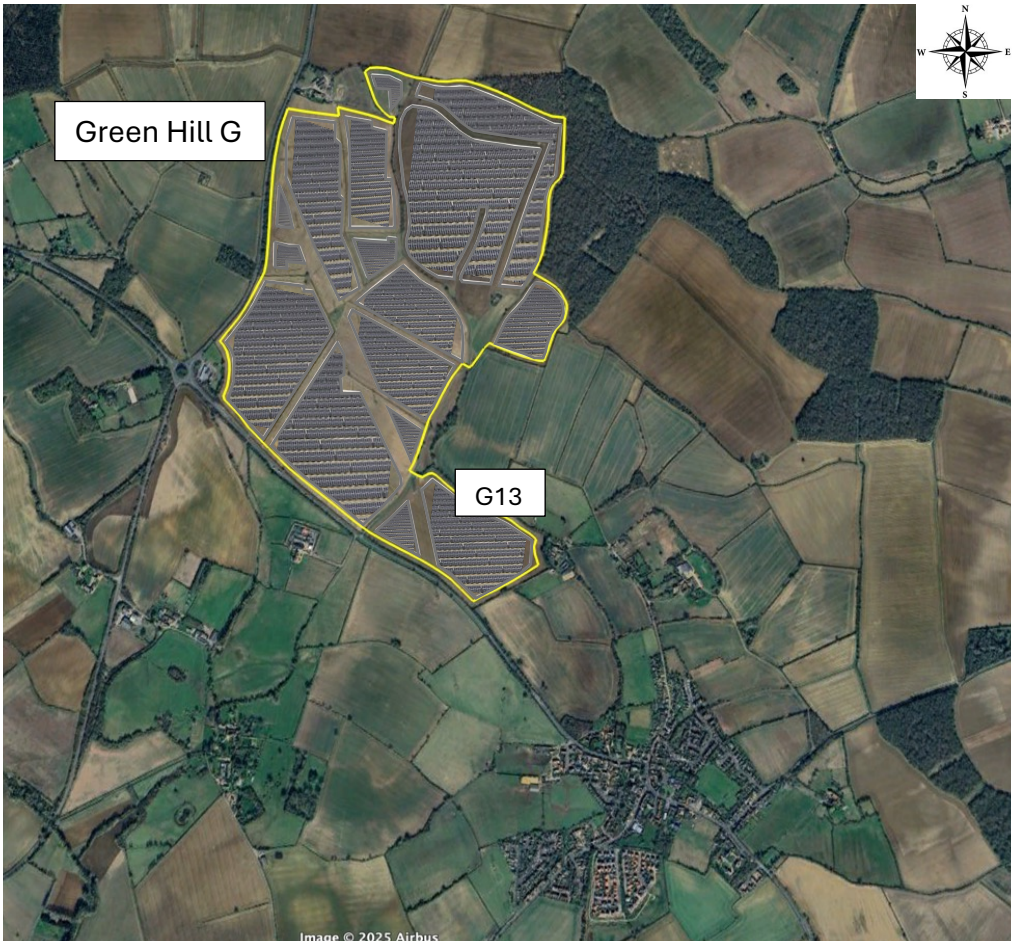
A review of documentary evidence—including reports and research from Lavendon Parish Council, Milton Keynes City Council, the Planning Inspectorate, the Environment Agency (EPA), independent consultants, and documentation from the Developer's Application—has revealed multiple inconsistencies, deficiencies, and omissions. These findings strongly indicate the need for more comprehensive hydrological investigations by the Developer.

This document constitutes a preliminary opinion. A full, detailed hydrological study is currently in preparation. In the interim, this report presents relevant anecdotal and factual evidence to support a high-level evaluation suitable for inclusion in any objection materials pertaining to the proposed Green Hill Solar Farm, with reference to Site G and specifically area G-13.

All reference sources are listed at the end of this report. At this stage, certain statements, inconsistencies, and conclusions identified within the Developer's documentation are highlighted here and will be examined in greater detail in the forthcoming independent study.

2.0 The Proposed Green Hill Solar Farm Site G

The proposed site for the Green Hill Solar Farm that forms the basis of this report is Green Hill G in relation to the Village of Lavendon is as follows:

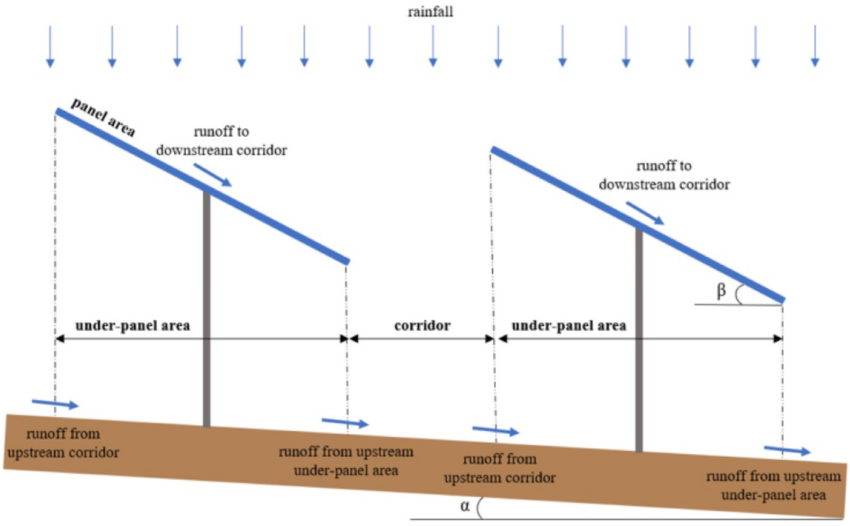


3.0 Observations on Hydrological Impact of Solar Farms

The construction of a ground-mounted solar farm alters the natural hydrologic cycle of a site. A vegetated, permeable surface, such as agricultural land or pasture, allows for the natural infiltration of rainfall into the soil, replenishing groundwater and slowing down surface flow. The presence of a solar farm introduces two primary changes:

- Impervious Surfaces**:** While the land between and under the panels may remain permeable, the panels themselves are an impervious surface. Rainwater that falls on the panels is no longer able to infiltrate directly below them. Instead, it is collected and channelled off the panels' surface.

- Concentrated Flow: Rainfall that would have been distributed evenly over the land is now channelled to the bottom edge of the panels. This concentrates water into a narrow strip of land, increasing the velocity and volume of flow in specific areas. This can lead to the formation of rills and gullies, causing soil erosion.



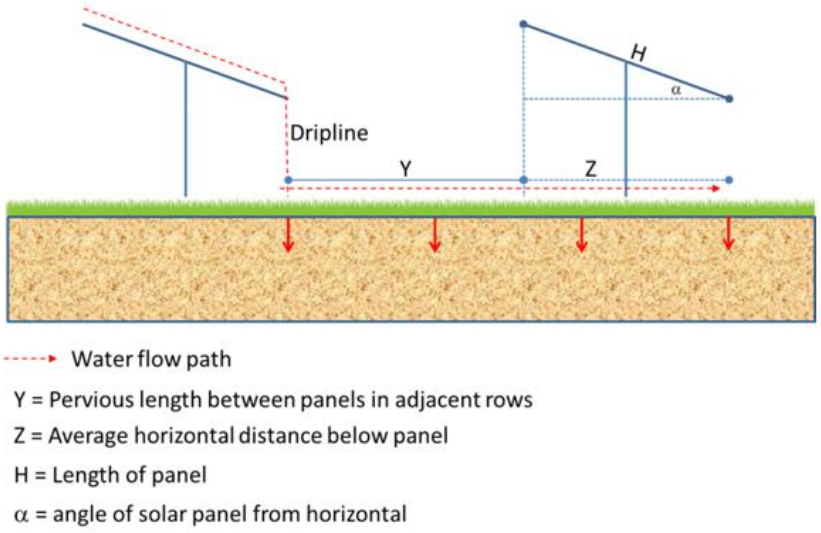
4.0 Observations on the Analysis of Soil Conditions and Moisture

The impact of a solar farm on surface water runoff is highly dependent on the existing soil conditions of the site.

- Soil Type: Soil types are categorized into Hydrologic Soil Groups (HSGs) (A, B, C, D) based on their infiltration rate. Group A soils (e.g., sandy loam) have high infiltration rates and a low potential for runoff, while Group D soils (e.g., clay) have very low infiltration rates and a high potential for runoff. A solar farm's impact would be most significant on a site with Group A or B soils, as it would disrupt a highly permeable natural state. On a site with Group D soils, which are already prone to runoff, the panels would exacerbate an existing problem.
- Soil Moisture Content / Soil Moisture Deficit: The ability of soil to absorb water is directly related to its moisture content. A soil moisture deficit refers to the amount of water required to bring the soil to its field capacity.
    - High Soil Moisture: During periods of sustained rainfall or in winter months, the soil may be saturated. In this state, its ability to absorb additional water is minimal, and runoff is already high. The addition of a solar farm would increase this runoff, as the panels would provide a direct, fast-flow path for rainwater.

- Low Soil Moisture (High Deficit): In dry summer months, soil has a high capacity to absorb water. The panels, by channelling water to specific areas, prevent the broad-scale replenishment of soil moisture across the footprint of the array. The concentrated flow may also run over the dry soil too quickly to be absorbed, leading to increased runoff volumes despite the overall soil moisture deficit.

The replacement of a permeable surface with an essentially impervious surface (the panels) fundamentally alters the pre-development hydrological balance. Even with the land between panels remaining pervious, the concentrated runoff from the panels themselves can overwhelm the infiltration capacity of the ground below, leading to increased peak flows and potential for localised flooding.



5.0 Observations on the Quantification of Runoff Increase

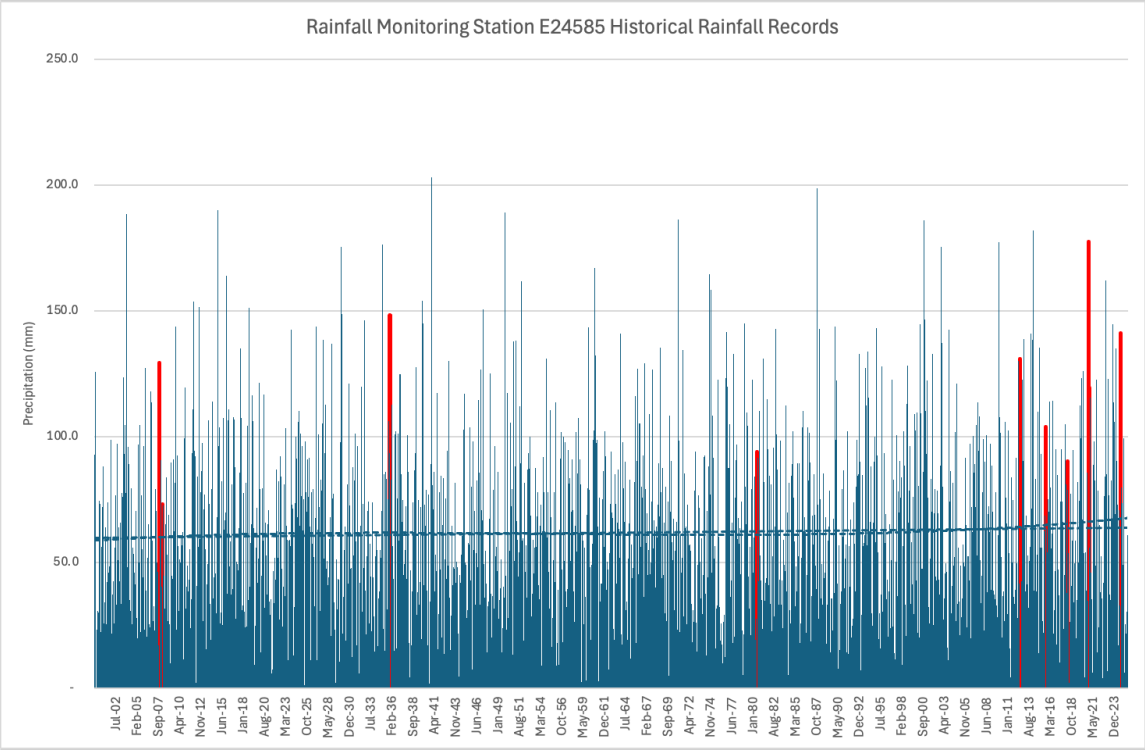
Developer's Reports supporting large PV projects usually focus on overall flood risk and water resource models but rarely look closely at particular parts of a site that may need different or more detailed assessment to get a true picture of local conditions.

Determining the exact percentage increase in runoff contribution can be complex but feasible using established hydrological models. Method for this include the use of the simplified Rational Method, the Wallingford Procedure or the Natural Resources Conservation Service (NRCS) Curve Number (CN) method, all of which are widely accepted models for estimating direct runoff from rainfall.

6.0 Localised Flood Events in Lavendon

There has been a long history of documented flood events in and near Lavendon, with the earliest sourced by the author being August 1875: "*As a natural result of the heavy and continuous rainfall of Saturday night last the Ouse became swollen to an unusual degree. During Sunday night especially the rise was so rapid that the lowlands lying on each bank of the river were speedily covered to a considerable depth. An immense volume of water came sweeping down from the upper part of the river..*"

Direct weather station data for Lavendon is unavailable. To provide historical context, rainfall records from Rainfall Monitoring Station E24585 were sourced, covering the period from January 1900 to the present, and are presented in the following graph (together with a 3rd order polynomial) to visually illustrate long-term meteorological trends.

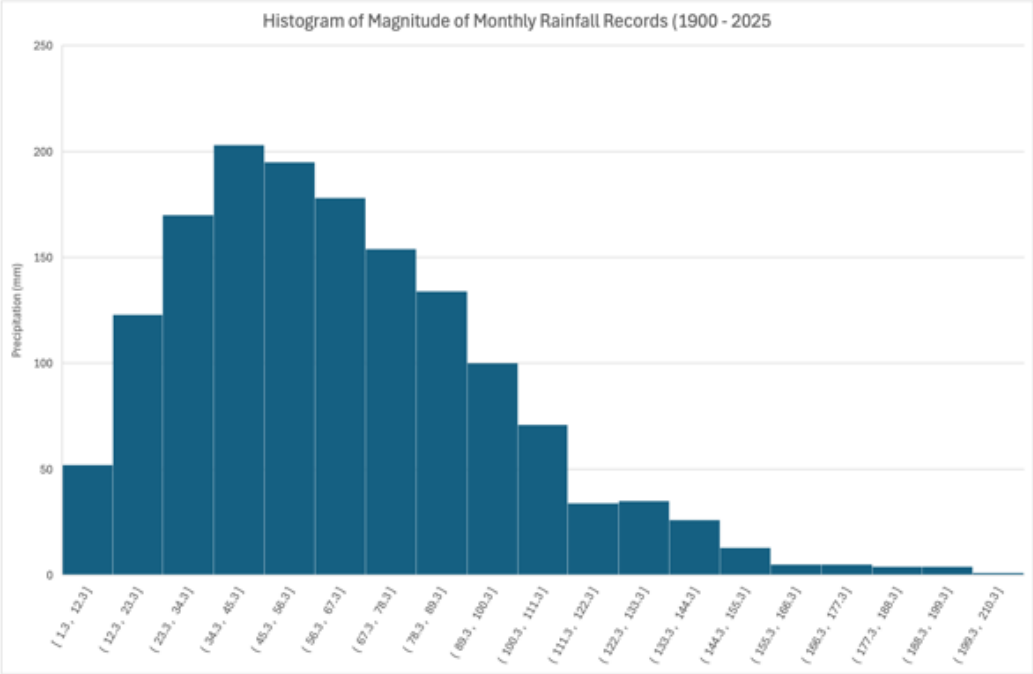


Each data point highlighted in red (a total of 11) represents a major flood event in Lavendon, recorded as follows:

- October 1907
- April 1908
- August 1935
- August 1980

- July 2012
- October 2012
- August 2015
- May 2018
- October 2020
- December 2020
- September 2024

Of these 11 flood events, a total of five have occurred in the last 10 years. A histogram of the monthly precipitation intensity over the period 1900 to 2025 is shown below.



The most recent floods (in September 2024) were well publicised in local, regional and national news. This flood had a devasting impact on the village, captured in the following images:








7.0 Initial Observations on Developer's Relevant Reports

These are observations directly related to the content of the Developer's Reports relating to the assessment of flood risk. Again, at this point, these are only preliminary comments directly related to the Developer Reports but may include cross-references to external or third-party documents, the naming of which have been included in the Sources of Information at the end of this document.

7.1 Document Reference: APP/GH7.16: Design Approach Document

Cross Reference Clause	Statement	Comment
3.9.1	Green Hill D, E, F and G are mostly located within Flood Zone 1, however there are limited areas of Flood Zone 3 across these sites related to unnamed watercourses.	Use of terms “mostly” and “limited areas” are not terms used without clarification or definition and should not be used as a blanket statement in order to avoid potentially necessary investigations.

7.2 Document Reference: APP/GH7.22: Water Framework Directive Assessment

Cross Reference Clause	Statement	Comment
2.3.4/ 2.3.6	.. with Green Hill G located within in the Upper and Bedford Ouse Management Catchment. However, the Scheme is located wholly within the Anglian Management Catchment.	There are contradictory statements contained in later reports concerning information in the Anglian River Basin District Flood Risk Management Plan 2021 to 2027.
5.2.8	Green Hill G is located in the north-western extent of this Operational Catchment. The majority of the catchment comprises arable farmland and improved grassland, with urbanised area surrounding the towns Bedford, Kempston and Olney which largely comprising commercial, residential and industrial land [sic]	The majority of the catchment is not representative of Green Hill G.
5.3.4	The Great Ouse Bedford has poor coverage of readily available hydrology data… Annual average rainfall for the region is 655mm and 641mm for the periods 1941-1970 and 1961-1990 respectively.	Nearby alternative rainfall monitoring stations have monthly precipitation records dating back to 1900.
5.4.15/ 5.4.16	Due to the size of the catchment, many soil designations are identified, therefore only the sites have been summarised. Green Hill G is largely underlain by ‘Lime-rich loamy and clayey soils with impeded drainage’, with an area to the north underlain by ‘Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils’ and an area to the south	Geological reports based on 1:50,000 scale cannot be used for the resolution required for any study. No physical survey of the geology in field G-13 has been completed, and the local geology does <u>not</u> correspond to the blanket statement included in this clause.

Cross Reference Clause	Statement	Comment
	identified as being underlain by 'Freely draining lime-rich loamy soils'.	
5.6.1 Table 2	Groundwater: Upper Bedford Ouse Principle Oolite 2 Overall Water Body is rated "Poor".	This contradicts information contained in later reports for Green Hill G and seems to be omitted or downplayed.
7.1.2 Table 7	Construction/ Decommissioning Phase Temporary Increase in Impermeable Area This includes, where practicable, limiting the increase in impermeable surfaces and, where necessary, implementing a temporary surface water drainage system to manage runoff during construction activities. If appropriate mitigation guidance is not strictly followed, such as implementing a temporary surface water drainage system where necessary, there is a high potential for uncontrolled runoff. This could result in sediment transport, pollution of watercourses, and overloading of existing land drainage systems.	Acknowledgement that impermeable area will increase, there is a risk of uncontrolled runoff, overloading existing land drainage systems.
	As the Scheme progresses, the reliance on temporary measures is expected to decrease, with permanent surface water drainage infrastructure being installed to accommodate the increased impermeable area and manage associated runoff effectively.	Acknowledgement that there will be increased impermeable area (not included in Green Hill G report).
	Following the implementation of temporary construction and decommissioning drainage systems, the residual effect on surface water and land drainage is assessed to be negligible.	Cannot make a blanket statement "assessed to be negligible" without evidence.
	Operational Phase Increase in Permanent Impermeable Area Given the nature of the Scheme, the increase in permanent impermeable area on the Site will be negligible, however equipment such as the proposed substations and energy storage areas will generate increased surface water runoff when compared to the current use of the Scheme.	Acknowledgement that there will be an increase in permanent impermeable area but "negligible" (no supporting evidence in Green Hill G reports). Acknowledgement that there will be increased surface water runoff (not covered sufficiently in Green Hill G reports).

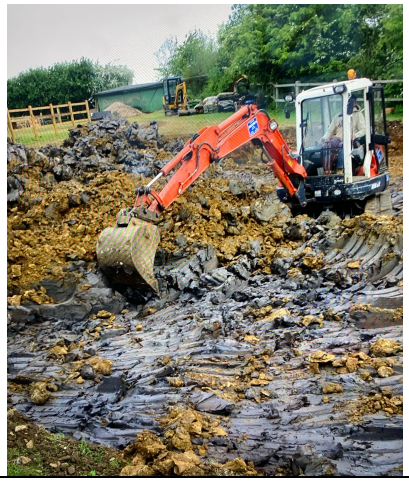
Cross Reference Clause	Statement	Comment
	This could potentially increase localised surface water flooding throughout the Scheme, as well as increase flood risk to people and property in the immediate surrounding area and downstream.	Acknowledgment that increased localised surface water flooding throughout the Scheme and increased flood risk to people and property in immediate and downstream areas. This important statement is downgraded to "potentially". Although mentioned in Section 1.1.5 of Document Reference: APP/GH6.3.10.1: Environmental Statement Appendix 10.1: Flood Risk Assessment and Drainage Strategy, there does not seem to be any adequate investigation into the impact of the Scheme on flood risk elsewhere.
	Operational Phase Increase in Discharge to Local Watercourses An increase in the volume of water discharged into local watercourses may elevate the risk of flooding in areas downstream of the Scheme.	Acknowledgment that there will be an increase of water discharged into receiving bodies, but which may elevate the risk of flooding. This statement contradicts the row above.
8.2.1 Table 8	Construction/Decommissioning Phase Temporary Increase in Impermeable Area After applying a temporary drainage system during construction or decommissioning, the remaining impact is considered to be Negligible.	Applying a "temporary" system during decommissioning is not a permanent solution.
	Construction/Decommissioning Phase Compaction of Soils Topsoil should be cultivated in-line with BS 3882: 2015 to a minimum depth of 400mm over all planting areas or to a fine tilth over all areas to be seeded and include basic levelling with levels graded to fall.	Green Hill G-13 only has 100mm to 150mm existing topsoil layer. Is this going to be built up? 
	Operational Phase Increase in Permanent Impermeable Area The solar panels have the potential to concentrate rainfall under the	

Cross Reference Clause	Statement	Comment
	leeward edge of the panels themselves. Research in the United States by Cook & McCuen (Ref 8.2.1), suggested this increase would not be significant however, there is a potential increase in silt ladened runoff. With the implementation of suitable planting (such as a wildflower or grass mix) the underlying ground cover is strengthened and is unlikely to generate surface water runoff rates beyond the baseline scenario. Maintaining the existing surface water run-off regime by utilising permeable surfacing for the Site access, lined gravel surfacing at any proposed infrastructure (substations and batteries) and wildflower planting at the leeward edge of solar panels will ensure that the Scheme is unlikely to generate surface water runoff rates beyond the baseline scenario.	Alternative research suggests otherwise. Green Hill G-13 only has 100mm to 150mm existing topsoil layer so how would suitable planting be "unlikely" to generate surface water runoff rates beyond the baseline scenario. This would remain a problem with site G-13. See comment above.

7.3 Document Reference: APP/GH6.3.2.1: Environmental Statement Appendix 2.1: EIA Scoping Report (Part 1 of 9)

Cross Reference Clause	Statement	Comment
9.4.1	The risk of fluvial flooding has been interpreted from the EA's online Flood Map for Planning (Ref.1). The risk of surface water flooding has been assessed from the EA Long Term Flood Risk Map (Surface Water) (Ref.2).	There are other sources for assessing fluvial flooding risk. Macro-assessments should not be applied generically without taking into consideration local conditions, especially as is relevant to Green Hill G.
Fluvial Flood Risk 9.4.56	There is a network of land drains which join and flow southwards through the centre of Green Hill G. The land drains become a more rational watercourse flowing through Lavendon to the south and ultimately discharges to the River Great Ouse approximately 2km south of Green Hill G.	Acknowledgment that fluvial flooding flows through Lavendon and could impact on flood risk elsewhere. But no information on this could be found in Chapter 10 and annexures.

Cross Reference Clause	Statement	Comment
9.4.57	Fluvial flooding could occur if the land drains overtopped their banks during or following an extreme rainfall event.	“Could” should be “has”. There is ample evidence to support this.
9.4.58	The majority of Green Hill G is situated in Flood Zone 1 and therefore has less than a 1 in 1,000 annual probability of river or sea flooding. However, a limited area to the southern boundary is identified as being in Flood Zone 3, associated with the land drain and unnamed Ordinary watercourse. The EA ‘Historical Flood Map’ indicates that Green Hill G has not historically flooded and neither has the Site’s near vicinity.	Green Hill site G-13 happens to fall inside Flood Zone 3. Although “limited”, the consequences of ignoring this has a significant impact on our village. The ”Historical Flood Map” apparently does not acknowledge the actual flood events of 1907, 1908, 1980, 2012, 2015, 2018, 2020 or 2024. Section 6.0 includes supporting evidence to this effect.
9.4.59	Green Hill G is therefore considered to be at low risk of fluvial flooding; the proposed solar panels will be raised above surrounding ground levels with associated power infrastructure appropriately located out of the flood zone and protected.	Green Hill G-13 is definitely not at low risk of fluvial flooding. It appears as though the nature and extent of localised flooding (with significant impacts) has been omitted due to a blanket high-level assessment. See comments on alternative research concerning the actual impact of lifting solar panels.
Surface Water Flood Risk 9.4.60	The EA ‘Flood Risk from Surface Water’ map indicates that Green Hill G ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).	The EA “Flood Risk from Surface Water” map does not take into consideration the nature and extent of parameters relevant to site G-13.
9.4.61	As described in the fluvial section above, the surface water flooding extents largely match the courses of the land drainage ditches.	Refer to comments related to the description in the fluvial section.
9.4.62	Based on the above and considering the embedded mitigation as part of the design of the solar panels, the overall risk of surface water flooding is considered to be Low. The proposed solar panels will be raised	Green Hill G-13 is definitely not at low risk of fluvial flooding. It appears as though the nature and extent of localised flooding (with significant impacts) has been omitted due to a blanket high-level assessment.

Cross Reference Clause	Statement	Comment
	above surrounding ground levels and will be appropriately protected thereby reducing the potential to be impacted in the event of surface water flooding.	See comments on alternative research concerning the actual impact of lifting solar panels.
10.4.1	The baseline conditions associated with the soil and groundwater conditions have been obtained from a desktop review (Preliminary Geo-Environmental Risk Assessment (PRA), including the identification of the environmental setting, a review of historical and present-day maps and a review of regulatory information.	The baseline conditions have been obtained from a desktop review. No physical survey of the geology in field G-13 has been completed and would contradict a desktop study if carried out.
10.4.74 and 10.4.75	BGS data indicates Green Hill G to be underlain by superficial Diamicton of the Oadby Member (central and northern portions of Green Hill G). Superficial deposits are not mapped in the southern portion of Green Hill G. The bedrock is mapped as the Cornbrash Formation- Limestone, the Kellaways Clay Member and Kellaways Sand Member .	Actual data from site G-13 suggests to the contrary, which is a shortcoming of a desktop assessment.  

7.4 Document Reference: APP/GH6.2.10: Environmental Statement Chapter 10: Hydrology, Flood Risk and Drainage

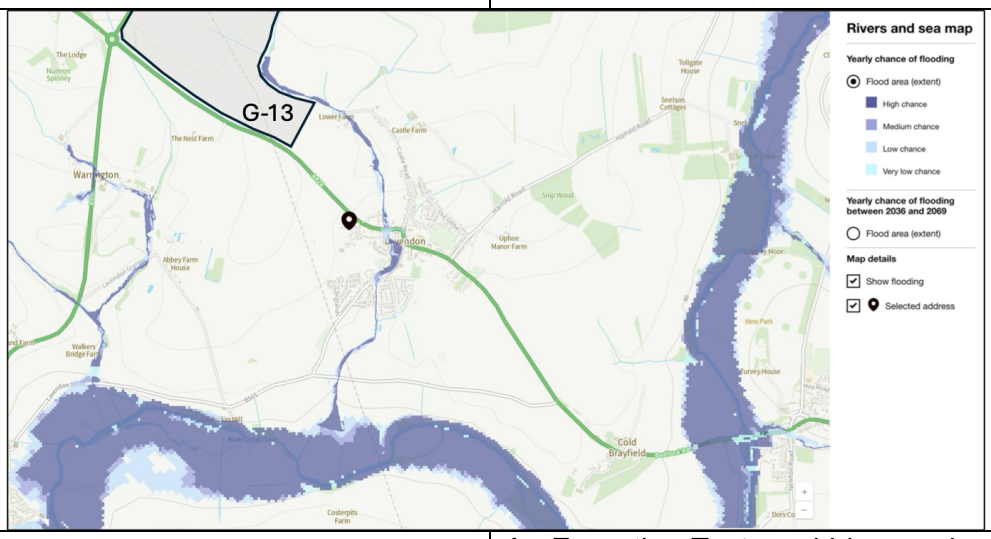
Cross Reference Clause	Statement	Comment
10.2.3 Table 10.2	Lavendon Parish Council stated that Lavendon Village has experienced major flooding events in 2020 and 2024, partially due to water flow from the proposed solar farm site. Response from Developer was that "Hydraulic modelling is also currently being undertaken in the Lavendon area (separate to the DCO submission), this will provide a clear understanding of the impacts of the development on the village". Developer also notes that the response is considered in Section 10.6 and within Appendix 10.11.	This response seems to be in deference to the Developer's comment 9.4.58 in Document Reference: APP/GH7.22: Water Framework Directive Assessment. There has been no indication as to when the report on this activity will be provided for consultation and feedback. The response in Section 10.6 is the same as that included in Section 9.4.58 and 9.4.60 of Document Reference: APP/GH7.22: Water Framework Directive Assessment, so the response has not been considered. Appendix 10.11 does not refer to Green Hill G
10.6.84	According to the EA's updated Flood Map for Planning, the entirety of Green Hill G is situated in Flood Zone 1 with the exception of a limited area within Field GF13 which is identified as being in Flood Zone 3, associated with a land drain and unnamed ordinary water course. However, these extents remain outside of any areas of proposed development. The EA Historical Flood Map indicates that Green Hill G has not historically flooded and neither has the area nearby.	Refer to comments on Section 9.4.58 in Document Reference: APP/GH6.3.2.1: Environmental Statement Appendix 2.1: EIA Scoping Report (Part 1 of 9).
10.6.85	Green Hill G is therefore considered to be at low risk of fluvial flooding.	Green Hill G13 cannot be considered as being at low risk of fluvial flooding.
10.6.86	The EA 'Flood Risk from Surface Water' map indicates that Green Hill G ranges from a very low risk of surface water flooding (less than 0.1% annual probability) to low risk of	Refer to comments on Section 9.4.60 in Document Reference: APP/GH6.3.2.1: Environmental Statement Appendix 2.1: EIA Scoping Report (Part 1 of 9).

Cross Reference Clause	Statement	Comment
	surface water flooding (between a 1% and 0.1% annual probability) to medium risk of surface water flooding (between a 3.3% and 1% annual probability) to high risk of surface water flooding (greater than 3.3% annual probability).	

7.5 Document Reference: APP/GH6.3.10.1: Environmental Statement Appendix 10.1: Flood Risk Assessment and Drainage Strategy

Cross Reference Clause	Statement	Comment
1.1.1	On the Environment Agency (EA) Flood Map for Planning, the Scheme is largely shown to be located wholly within Flood Zone 1 on the EA Flood Map for Planning (updated in March 2025) however Sites A, D, E, F, G, the BESS Site and the Cable Route Corridor (CRC) are shown to be partially encroached by Flood Zone 3. These areas of encroachment are limited in extent and generally confined to peripheral field margins or low-lying boundary areas. The Scheme is in excess of 1 hectare and therefore the application requires a Flood Risk Assessment and Sustainable Drainage Strategy is required to support the Development Consent Order (DCO) application in line with the National Policy Statements (NPS) EN-1, EN3-3 and EN-5 for Energy	This was stated in this report but as per Section 10.2.3 of Document Reference: APP/GH6.2.10: Environmental Statement Chapter 10: Hydrology, Flood Risk and Drainage, this has not been done for Green Hill G. There has been no indication as to when the report on this activity will be provided for consultation and feedback.
1.1.5	The aim of this report is to assess the potential flood risk to the Scheme, the impact of the Scheme on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified risk.	In terms of Green Hill G, particularly G-13, there has been no investigation into the impact of the Scheme on flood risk elsewhere. Refer to comments on Section 1.1.1.
2.2.2	Paragraph 5.8.15 provides the minimum requirements for flood risk assessments. They should: • consider and quantify the different types of flooding (whether from natural and human sources and	The joint and cumulative effects for Green Hill G, and in particular G-13, have not been quantified. There is no

Cross Reference Clause	Statement	Comment
	including joint and cumulative effects) and include information on flood likelihood, speed-of-onset, depth, velocity, hazard, and duration; • include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that these risks can be safely managed, ensuring people will not be exposed to hazardous flooding… information should include: i) explain how run-off from the completed development will be prevented from causing an impact elsewhere • be supported by appropriate data and information, including historical information on previous events.'	information on speed-of-onset, depth, velocity, hazard, and duration. Methods such as included in Section 4: Observations on the Quantification of Runoff Increase have not been completed. Refer to comments on 1.1.5. From all previous comments it is not felt that the data used is appropriate for Green Hill G (in particular G-13), and that historical information on previous events have been omitted.
2.2.16	Paragraph 5.8.26 – "Sites should cope with events that exceed design capacity"	It is not clear if the models used with worst-case scenario are representative of events that exceed design capacity.
2.2.36	The assessment of flood risk is based on the definitions of flood zones in Table 2-1 of the PPG, and these zones shown on the EA Flood Map (flood risk from rivers or the sea): • Zone 3a "High probability of flooding" – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. This land is shown in dark blue on the Flood Map;	The Developers have conceded that parts of Green Hill G fall within Flood Zone 3, but no associated flood risk assessment has appeared to be completed.

Cross Reference Clause	Statement	Comment
		
2.2.38 Table 1		An Exception Test would be required for those portions of Green Hill G i.e. G-13.
2.3.4	"Policy FR1: Managing Flood Risk: F. The FRA should include an assessment of flood risk to and from the proposed development, and demonstrate how the development will be safe, will not increase flood risk elsewhere and where possible will reduce flood risk overall in accordance with the NPPF and PPG"	It appears as though due consideration has not been given to the requirements of not increasing flood risk elsewhere and will <u>reduce</u> flood risk overall in relation to the impact from Site G-13.
4.1.4 and 4.1.5	Research undertaken in the United States by Cook and McCuen recommend that the vegetation cover beneath the panels is well maintained or that a buffer strip be placed after the most down gradient row of panels.	See comments on Section 9.4.59 of Document Reference: APP/GH6.3.2.1: Environmental Statement Appendix 2.1: EIA Scoping Report (Part 1 of 9) alternative research concerning the actual impact of lifting solar panels. Also refer to comments on Section 8.2.1 Table 8 on Document Reference: APP/GH7.22: Water Framework Directive Assessment
5.3.3	Where rainwater drips onto the ground below, the energy of the flow from the surface of the panels is likely to be greater than that of the rainfall (especially where rainwater collects at the bottom edge of the solar array before dripping onto the ground below) which could result in the erosion of ground without appropriate mitigation. The erosion of the ground could then result in the formation of	"… which could increase the speed of runoff throughout the Site". The joint and cumulative effects for Green Hill G, and in particular G-13, have not been quantified. There is no information on speed-of-onset, depth, velocity, hazard, and duration. Methods such as included in Section 4: Observations on the Quantification

Cross Reference Clause	Statement	Comment
	rivulets which could increase the speed of runoff throughout the Site.	of Runoff Increase have not been completed.
5.3.4	In order to mitigate against potential erosion, the existing intensively managed agricultural land will be replaced by planted wildflower and grassland below the solar panels. The planted surface will act as a level spread / energy dissipater to promote low erosivity sheet flow during the operation of the solar farm. The vegetation will be managed and will either be mowed or used for sheep grazing.	Refer to comments on Section 8.2.1 Table 8 on Document Reference: APP/GH7.22: Water Framework Directive Assessment

7.6 Document Reference: APP/GH6.3.10.10: Environmental Statement Appendix 10.10: Flood Risk Assessment and Drainage Strategy Annex I: Green Hill G

Cross Reference Clause	Statement	Comment
1.6.1 and 1.6.2	Reference to the British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the Site is underlain by superficial deposits of Oadby Member generally comprising Diamicton (Figure 3). The superficial deposits are identified as being underlain by Cornbrash Formation consisting of Limestone.	Refer to comments on 5.4.15 and 5.4.16 from Document Reference: APP/GH7.22: Water Framework Directive Assessment. Refer to comments on 10.4.74 and 10.4.75 from Document Reference: APP/GH6.3.2.1: Environmental Statement Appendix 2.1: EIA Scoping Report (Part 1 of 9).
1.6.3	The closest historical BGS borehole record (BGS Ref: SP95SW29) is located approximately 165m east of GF13 (the Site) (NGR 491259, 253962). The borehole record indicates that the following geology was encountered: • Topsoil to 0.3m below ground level (bgl); • Bedded sandy and shelly limestone from 0.3m to 0.55m bgl; • Light brown clayey, silty, sandy limestone from 0.55m to 1.25m bgl;	Refer to comments on 5.4.15 and 5.4.16 from Document Reference: APP/GH7.22: Water Framework Directive Assessment. Refer to comments on 10.4.74 and 10.4.75 from Document Reference: APP/GH6.3.2.1: Environmental Statement Appendix 2.1: EIA Scoping Report (Part 1 of 9). Personal observations have been that topsoil does not exceed ~0.15m bgl; limestone from ~0.15m to ~2.5 – 3.0m bgl; underlain by blue clay.

Cross Reference Clause	Statement	Comment
	• Medium dense clayey sand with limestone gravel from 1.25m to 1.70m bgl; • Dark greyish-brown sandy, shelly limestone from 1.70m to 2.10m bgl.	
2.2.3, 2.2.5 and 2.2.6		Refer to comments on Section 9.4.58 in Document Reference: APP/GH7.22: Water Framework Directive Assessment.
2.3.4	It should be noted that the EA 'Flood Risk from Surface Water' map covering the Site is produced at a low resolution, which may not accurately represent Green Hill G's actual risk of surface water flooding.	Undermines the basis of all content related to the EA 'Flood Risk from Surface Water' map. Implied acknowledgment that all relevant reports may be based on inaccurate information.
2.3.7	The NaFRA surface water mapping indicates that the majority of Green Hill G has flood depths mainly below 0.3m, which is considered passable by vehicles and people. Only within the watercourses and the immediate areas surrounding them do depths exceed 0.3m, typically associated with topographic depressions.	Refer to Section 6.0 Localised Flood Events in Lavendon
2.3.8	There is no indication within relevant third party reports (listed in 'Sources of Information' on the Covering Report) to suggest that the Site has historically experienced surface water flooding.	Refer to Section 6.0 Localised Flood Events in Lavendon
2.3.9	Based on the above and considering the embedded mitigation as part of the design of the solar panels, the overall risk of surface water flooding at Green Hill G is considered to be Low. The proposed solar panels will be raised above surrounding ground levels and will be appropriately located out of the flood zone and waterproofed thereby reducing the potential to be impacted in the event of surface water flooding.	Based on the above, incomplete and inaccurate information, omissions in reports, blanket statements and no due consideration being given to anecdotal or regulatory information/ guidelines, it cannot be accepted that the overall risk of surface water flooding at Green Hill G (and in particular G-13) is considered to be low.
3.1.2	Green Hill G is located within Flood Zone 1 on the Environment Agency (EA) 'Flood Map for Planning (Rivers and Sea)' – an area considered to	Incorrect and misleading comment as there are several mentions of parts of Green Hill G being within Flood Zone 3.

Cross Reference Clause	Statement	Comment
	have the lowest probability of fluvial and tidal flooding.	
3.1.3	The risk of flooding from all sources has been assessed and the flood risk is considered to be Negligible to Low and therefore does not require Site-specific mitigation measures.	Incorrect and misleading conclusion with far-reaching consequences for our village. Refer to comments 1.1.1, 2.2.2, 2.2.16, 2.2.36 and 2.3.4 on Document Reference: APP/GH6.3.10.1: Environmental Statement Appendix 10.1: Flood Risk Assessment and Drainage Strategy

8.0 Conflict of Interest

The Author confirms that they have no past, present, or prospective financial, fiduciary, professional, or personal relationship with the Developer, any Consultants, the Landowners, any related party, or any other entity or individual directly involved in or benefiting from the outcome of the subject matter of this document.

The opinions and conclusions presented in this document are based strictly on the objective and impartial application of data, facts, professional judgment, and accepted standards of practice. The Author confirms there are no circumstances or relationships that constitute, or could reasonably be perceived as constituting, a conflict of interest that would compromise the independence and integrity of the conclusions presented.

9.0 Preliminary Conclusion

The proposed development of Green Hill Solar Farm for the Green Hill G (and in particular G-13) has a demonstrable potential to increase surface water runoff and contribute to localised flooding. Information used in the Developer's Reports has been notably incomplete and may negatively contribute towards any decision made in the pursuit of construction of the solar farm.

As mentioned in the beginning of this document, this is a preliminary assessment until such time as a more detailed assessment can be completed and made available. Appropriate, informed and detailed investigations are required to provide a more comprehensive assessment for consultation and comment. The available report

content and conclusions in their current form do not provide sufficient evidence that the Developer has adequately addressed all aspects of the impact of the development.

I would therefore object to the continuance of Green Hill G as an option for inclusion in the proposed development, and in particular site G-13.

Submitted in my personal capacity as Mark Shepherd on 19 October 2025.

10.0 Professional Disclaimer

The comments and observations contained within this document (or memorandum/submission) are provided solely by the undersigned in their individual and personal capacity. These comments are based on the Author's general professional experience as an engineer and are intended purely to provide supplemental, informational context.

These comments do not constitute, and should not be construed as, a formal critique, professional review, validation, or independent check of the original reports drafted by consultants on behalf of the Developer.

Specifically, the Author has not been retained to perform a due diligence review, verify underlying data, or assume any professional duty or liability for the original reports' conclusions. The information and opinions expressed herein are strictly non-binding, non-certifiable, and are offered without the customary duty of care or professional liability that would attach to a formal, paid engineering review.

Sources of Information (in chronological order):

1. Oxford Archaeotechnics Specialist Field Evaluation Lavendon, Buckinghamshire Magnetic Susceptibility, Magnetometer & Auger Survey, May 1992
2. Cook, L.M, et al "Hydrological Response of Solar Farms" Journal of Hydrological Engineering (ASCE), May 2013
3. Environment Agency Department for Environment Food & Rural Affairs, "Rainfall Runoff Management for Developments Report SC030219", October 2013
4. Aecom on behalf of Milton Keynes Council, "Milton Keynes Council Surface Water Management Plan Final Report", April 2016
5. EWE Associates Ltd, "Proposed Residential Conversion Lower Farm Lavendon Buckinghamshire Flood Risk Assessment" Final RevA October 2016
6. WSP UK on behalf of Milton Keynes City Council, "Flood Investigation Report 2014" (covering 14 July 2012 flooding event), 2016 (final version)
7. Lavendon Parish Council, "Lavendon Neighbourhood Plan Chapter 2019 to 2031 Regulation 15, Submission Version Chapter 7: Flood Risk", June 2019
8. Aecom on behalf of Milton Keynes Council, "Independent Flood Review Milton Keynes – 27th May 2018 Flood Event", September 2019
9. Environment Agency, "Report on December 2020 Flooding in the Great Ouse catchment Appendix B and Appendix C"
10. David Smith Associates, Flood Investigation Report Lavendon, 23 December 2020
11. Buckinghamshire Fire & Rescue Services, "Flooding in North Buckinghamshire and Milton Keynes", 23 December 2020
12. Environmental Agency "Anglian River Basin District Draft Flood Risk Management Plan 2021 to 2027", October 2021
13. Baiamonte, G et al "Impact of Solar Panels on Runoff Generation Process", Hydrological Processes Journal, 2023
14. Wang, F. et al, "How photovoltaic panels impact rainfall-runoff and soil erosion", Journal of Hydrology, 2023
15. Gullotta, A, et al "Modelling Stormwater Runoff Changes Induced by Ground-Mounted Photovoltaic Solar Parks: A Conceptualisation in EPA-SWMM", Journal of Water Resources Management (2023) 37:4507-4520
16. Gov.uk press release Department for Environment, Food and Rural Affairs together with Environmental Agency, "Frequently Flooded Allowance: Funding for repeatedly flooded communities", 5 April 2023
17. Mulla, D. et al, "Measuring and modelling soil moisture and runoff at solar farms", Vadose Zone Journal, 2024
18. NREL PV-SmaRT, "Photovoltaic Stormwater Management Research and Testing Project Report", 2024

19. Chesapeak Bay Foundation, “Best management practices to minimize impacts of solar development”, 2024
20. The Planning Department, Scoping Opinion: Proposed Green Hill Solar Farm Case Reference EN010170, 30 August 2024
21. Milton Keynes City Council Communication ex Head of Development Management Planning Application by Green Hill Solar Farm Limited (the Applicant) for an Order granting Development Consent for the Green Hill Solar Farm (the Proposed Development), 17 September 2024
22. BBC News, “Major roads closed after heavy rain hits towns”, 22 September 2024
23. Buckinghamshire Fire & Rescue Services, “Flooding Related Incidents”, 23 September 2024
24. Milton Keynes City Council, Agenda Item September 2024 Floods and subsequent Notices of Motions – Motivation 4 September 2024 Floods, 4 November 2024
25. The Bucks Herald, “Buckingham hit by flash floods”, 24 December 2020
26. MK Citizen, “’Underwater’ village where even the church gets flooded begs Milton Keynes council for help”, 4 February 2025
27. Milton Keynes City Council Environmental & Place Scrutiny Committee, “Scrutiny Report Flood and Water Management Annex C Lavendon Flood Actions Public Realm and Environmental Scrutiny Report: Lavendon Flood Actions Prior to 2020 Flood Event”, 27 March 2025
28. Milton Keynes City Council, Annex C Lavendon Flood Actions Public Realm and Environmental Scrutiny Report, 27 March 2025
29. Lanpro Services, “Document EN010170 Design Approach Document”, May 2025
30. Arthian Ltd, “Document EN010170 Water Framework Directive Assessment, May 2025
31. Lanpro Services, Document EN010170 Environmental Statement Appendix 2.1: EIA Scoping Report (Part 1 of 9), May 2025
32. Lanpro Services, Document EN010170 Environmental Statement Appendix 2.1: EIA Scoping Report (Part 3 of 9), May 2025
33. Lanpro Services Document EN010170 Environmental Statement Appendix 2.2: EIA Scoping Opinion, May 2025
34. Arthian Ltd, Document EN01070 Environmental Statement Appendix 10.1: Flood Risk Assessment and Drainage Strategy, May 2025
35. Arthian Ltd, Document EN01070 Environmental Statement Appendix 10.10: Flood Risk Assessment and Drainage Strategy Annex I: Green Hill G, May 2025
36. Arthian Ltd, Document EN01070 Environmental Statement Chapter 10: Hydrology, Flood Risk and Drainage, May 2025
37. Milton Keynes City Council “MHA PSP4 MKCC Section 19 Flood Investigation Report: 21st – 29th September 2024 Flood Event”, August 2025

38. Representation by Lavendon Parish Council, Parish Councils, 4 August 2025
39. Milton Keynes Conservatives, “Conservative Cllr Peter Geary Demands Action for Flooded Lavendon Residents”, 20 November 2025
40. Milton Keynes Council Preliminary Flood Risk Assessment (2011 PFRA) (Covering Green Hill G)
41. Milton Keynes Local Flood Risk Management Strategy (2016 LFRMS) (Covering Green Hill G)
42. Milton Keynes City Council Strategic Flood Risk Assessment (2024 SFRA) (Covering Green Hill G)
43. JBA Consulting on behalf of Milton Keynes City Council, Unknown Report “Appendix M – Summary of Flood Risk in Milton Keynes”, unknown date
44. Videos of the September 2024 floods have been attached hereto in the files “Lavendon Flood_1.mp4” through to “Lavendon Flood_20.mp4”.
45. EA online flood maps
46. British Geological Society (BGS) Interactive Map
47. MAGIC Interactive Map

Summary: Engineering Report – Assessment of Surface Water Runoff from Proposed Green Hill Solar Farm (Green Hill G)
Author: Mark Shepherd CEng/PrEng
Date: 19 October 2025

This preliminary engineering report assesses the potential for increased surface water runoff and localised flooding associated with the proposed Green Hill Solar Farm, specifically the Lavendon section (Site G, area G-13). It reviews documentation from the developer, local councils, the Environment Agency (EA), and independent consultants. The report identifies significant inconsistencies, data gaps, and methodological flaws in the developer's hydrological assessments and concludes that more detailed, site-specific studies are required before the project can be safely approved.

1. Hydrological Impacts of Solar Farms

Solar farms alter natural drainage patterns by introducing impervious surfaces. Although the land beneath the panels may remain permeable, the panels themselves divert rainfall into concentrated flows at their lower edges. This increases surface velocity, erosion, and the likelihood of runoff exceeding soil infiltration capacity—particularly problematic during heavy rainfall or on saturated ground.

2. Soil Conditions and Runoff

The effect on runoff depends heavily on soil type and moisture content.

- **Soil Groups:** Green Hill G includes "lime-rich loamy and clayey soils with impeded drainage," consistent with Hydrologic Soil Group D (low infiltration). This condition already promotes runoff, which solar development would exacerbate.
- **Moisture Content:** Saturated winter soils would generate excess runoff due to the panels' impervious surfaces, while dry soils in summer may prevent even distribution of infiltration, leading to localised erosion and flooding.

3. Historical Flooding in Lavendon

Lavendon has a long record of flooding, dating back to 1875, with eleven major flood events since 1900—five of them since 2015. The most recent (September 2024) caused severe village flooding, documented by local councils, the Environment Agency, and media. These data contradict the developer's claims that Green Hill G has no history of flooding and is predominantly within "low-risk" zones.

4. Evaluation of Developer's Reports

The report highlights recurring deficiencies across the developer's submissions:

- Overreliance on **desktop studies** without site surveys for soil and geology, especially for G-13.
- **Misuse of EA flood maps**—low-resolution models were applied without verifying local conditions.

- **Contradictions** between documents regarding flood zones, catchment classification, and rainfall data.
- **Lack of quantification** of runoff increases using recognised hydrological models (e.g., NRCS Curve Number or Rational Method).
- **Dismissal of Flood Zone 3 risk** for field G-13, despite evidence it lies within a high-risk drainage corridor flowing through Lavendon to the River Great Ouse.
- **Unsubstantiated claims** that the increase in impervious area and resultant runoff will be "negligible."

5. Preliminary Conclusion

The proposed solar development at Green Hill G—particularly Site G-13—poses a credible risk of increasing surface water runoff and contributing to downstream flooding in Lavendon. The developer's assessments are incomplete, inconsistent, and rely on inadequate or inaccurate data. No robust modelling of runoff dynamics, cumulative effects, or mitigation measures has been presented.

Mark Shepherd therefore concludes that the developer's current hydrological evidence is insufficient to support planning consent and formally objects to the inclusion of Green Hill G (especially G-13) in the project until comprehensive, independent investigations are completed.

From: richard gregory [redacted]
Sent: 12 September 2024 12:44
To: Green Hill Solar <info@greenhillsolar.co.uk>
Subject: Green Hill Solar Farm adjacent to Lower Farm Lavendon MK464JG

Dear Sirs,

We refer to your recent Newsletter.

We own the properties [redacted] at the Southern most point on your map as site G. This consists of [redacted] and an equestrian livery stables business together with 24 acres of paddock land. We [redacted] have owned these properties since 1983.

A 6 metre wide drainage channel passes through the North and Eastern boundaries of the properties very close to the residential buildings which creates a primary flood risk. The higher part of the site which includes part of the livery stables business is noted as being in Zone 1 on the EA flood map. However the site slopes down to the drainage channel which moves our [redacted] into Zone 2. [redacted] and grounds which ar very close to the channel are in Zone 3 which under current climate change conditions provides a real risk of flooding.

In 2016 as part of a planning application to upgrade the livery stables and carry out a barn conversion we were required to carry out a site specific flood risk assessment based on 1plus 200 year including climate change 35% and 65% events. Early modelling by consultants indicated that a Victorian bridge structure spanning the channel at the entrance to our property would create an obstruction to the flow of flood water passing under at 6 cubic metres a second. Permission was therefor granted to demolish and build a new RC large span bridge structure and at the same time raising the earth mounding on part of the channel banks in calculated risk locations.

The final 30 page report confirmed that with a 1 in 200 year plus 65% climate change event the flood water would remain in the channel. However, on several occasions over the past 3 years after heavy prolonged rainfall and saturated fields we have watched the flood water in the channel rise to a dangerous level and at the same time houses in Lavendon village have been flooded.

Will you please confirm that a site specific flood risk assessment will be carried out for the Zone 3 areas using the latest climate change percentages for our property and Lavendon village. If this confirms that the increase speed of flood water into the drainage channel caused by the solar panels will increase the flood risk will you design mitigating measures such as new land drainage systems diverting the speed of water into balancing ponds or similar thus restricting the flow into the channel.

Kind regards,

Richard Gregory.

Subject: RE: Green Hill Solar Farm adjacent to Lower Farm Lavendon MK464JG
Date: 1 October 2024 at 09:02:43 BST
To: richard gregory

Dear Richard,

Thank you for your email and patience while we gathered information from the Flood Risk Consultants.

We can confirm the site-specific Flood Risk Assessment (FRA) for each part of the development will address the flood risk to the site from all sources, as well as provide comment on the potential impact of the development on flood risk offsite (if any). The latest climate change percentage increases will be considered in line with Environment Agency guidance.

Generally, Flood Risk Assessments for solar farms reference relevant studies which conclude that there will be a negligible impact on flood risk as only a very small proportion of solar farms are in direct contact with the ground. We will carry out detailed hydraulic modelling in areas of the site that are at higher risk of flooding. This will help us ensure the site does not negatively impact neighbouring areas.

The outcomes of the site-specific Flood Risk Assessment will be available to view in the statutory consultation, currently scheduled for winter.

Our application will also include a drainage strategy. This strategy will aim to ensure the site mimics the existing undeveloped sites and where necessary limit surface water discharge and use Sustainable Drainage Systems (SuDS) to store water on-site.

Please do not hesitate to contact me if you have any further questions.

Kind regards,

[redacted]
Community Relations