Amended Information:

FLOOD RISK ASSESSMENT

Fenndyke Solar Farm, Sutton St James

September 2014

Submitted on behalf of Fenndyke Solar Limited

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NOTE BY BE RENEWABLES LIMITED

This planning application is a resubmission of the documents for planning application ref: H20-0017-14 which was unanimously rejected at the South Holland District Council (SHDC) Planning Committee Meeting under Decision Notice dated 11th July 2014.

Following the rejection of the application – BE Renewables Limited (BERL) held a meeting with SHDC's Mr Richard Fidler and Mr Paul Jackson. BERL proposed an amended development boundary. It was agreed that rather than proceed to an appeal against the rejection of the previous planning application, BERL would prepare a revised scheme based upon the amended boundary for consideration by SHDC Planning Department and subsequent Planning Committee.

This report was prepared to accompany and assess the area of land associated within the development land boundary area for the previously submitted application. As this is a resubmission, with an amended development boundary (a reduced area from within the original boundary) it is appropriate to retain the use of this Landscape and Visual Impact Assessment.

Please note: BERL has **not** changed or amended the Flood Risk Assessment conclusions. However – we would like to highlight that any figures or % given would now be **reduced** due to the reduced size of the development area.

The report is submitted simply to accompany the amended planning application as the overall findings are still relevant and applicable to the resubmission.

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CHAPTER ONE: INTRODUCTION

1.1 Background:

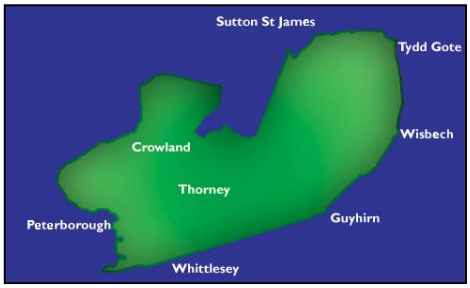
This report is in response to the Environmental Agency response letter received 5th February 2014 (Appendix (i)). It is an amended Flood Risk Assessment (FRA) which covers the deficiencies highlighted within the letter and demonstrates that the development will not increase risk elsewhere.

1.2 Site Location:

The site is located in a rural area south west of the village of Sutton St James, Lincolnshire. The site covers an area of approximately 33Ha. The site is currently used for arable agriculture. Access to the site can be achieved by any of the surrounding roads;

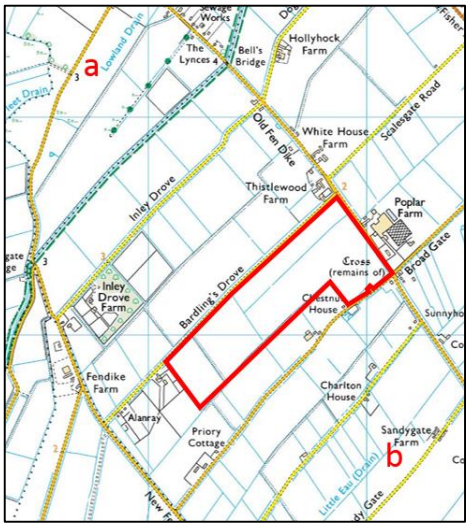
- Bardlings Drove
- Old Fen Dike
- Broad Gate

The North Level District Internal Drainage Board (IDB) manages the drains in Sutton St James area (Figure 1:1).



(Figure 1:1 – North Level District Internal Drainage Board District Map. Ref 1.1)

The site at Fenndyke lies between two main drains - Lowland (a) and Little Eau (b) (Figure 1:2);



(Figure 1:2 - Drains Surrounding Proposed Site © Crown copyright and database rights 2013. Ordnance Survey 0100031673)

Little Eau Drain (a) is approximately 1km south east of the centre of the site. Lowland Drain (b) is approximate 1.2km North West of the centre of the site.

The topographical survey (17.04.2013) of the site is included within the appendices of the full submitted planning application (Appendix 17).

1.3 Permeability of the Site:

The entire site is considered to be permeable. Most rainfall on the area generally soaks well into the underlying sub soils. The site has the advantage of some installed land drains but the condition of these drains is not known and we understand that they have not been maintained for several years. These drains discharge to the field ditches that surround the field boundaries. These field drainage ditches are assumed to link into the IDB managed drains.

The area is drained through permeation of the rainfall through the underlying soils with any excess surface water run-off from the surrounding agricultural land entering the North Level District IDB network of drains via Fenndyke. Ultimately, surface water is discharged by a number of pumping installations to the River Nene via the South Holland Drain.

The applicant proposes to develop a commercial scale solar PV farm. This is essentially the erection on metal support structures that in turn are supported by metal posts augured into the ground with solar PV panels fixed on top of the support structure to form a sloping table. This method of construction means that the existing ground conditions beneath the solar panels is left largely undisturbed and in its existing and current state. The underlying ground shall remain grassed and would be managed throughout the development's lifetime to ensure that the area of the solar farm remains suitably vegetated. South Holland District Council (SHDC) have advised that the development lifetime of the proposed development would initially be for 25 years as a condition of any planning consent granted for this application and as such the PV panels will be removed after a period of 25 years operation. However, this does not preclude the extension of the lifetime of development beyond 25 years if additional future planning applications are granted (Appendix (iii)).

There are no proposed amendments to the access to the site and any site traffic will use the existing access points. There will be a 4m wide permeable access track constructed as shown on the development plans. However the permeable nature of its construction would mean the existing ground characteristics for discharging rainwater would remain unaffected.

The development will also involve the erection of;

- 7 small inverter kiosk stations (approximately 507.7m^2),
- 1 substation building (approximately 46.8m^2),
- Approximately 15,763 solar panel table supports, totalling approximately 278.6m^2,
- 4 CCTV poles, totalling 0.0531m^2 for the mounting of infra-red camera,
- The additional area of impermeable surfaces as a result of the development will be approximately 833m^2,
- The total area of the development is 330,000m^2, and

- The impermeable surface area is less than 0.25% of the development area.

Please Note: The area of the solar panels that is impermeable will discharge rainwater through the rainwater gaps and along the drip line. This water will then be able to permeate through the subsoil in much the same way as the rain water does in the pre-development conditions. Therefore the area of the solar panels has not been included as an impermeable surface.

The nearest significant surface water feature to the site is the Little Eau Drain. The drain is located south east of the site. Water levels in the Little Eau drain are maintained with extensive freeboard. Any flooding posed by the Little Eau drain would be due to overtopping of the embankments.

The North Level District IDB is '*responsible for the maintenance and improvement of 613 km of drains in the area and for the maintenance and operation of 12 pumping stations. The majority of the area is pumped into the River Nene and River Welland with only approximately 1,000 hectares draining via gravity into the tidal Nene. The level of flood protection for the Boards drainage network is between 1 in 50 and 1 in 100 year event'* (Ref 1.2) For the drain to 'over top' at Fenndyke there would realistically need to have been a failure of the pumping stations in the vicinity of this drain that prevented water from discharging resulting with an increase in water level within the drain. This could lead to areas becoming flooded. However the likelihood of such an event is extremely low. Such an event would not be influenced by the proposed development of the solar farm (indeed the outcome of any such event would be identical). Any over-topping of the Little Eau drain or other managed IDB drains in the area would involve widespread flooding of the wider area, but depth of flood would typically be quite low as a result of the generally low level nature of the land permitting widespread flood water dispersal.

This Flood Risk Assessment (FRA) has been prepared in accordance with the National Planning Policy Framework (NPPF) and associated Environment Agency (EA) standing advice on flood risk for new development. The NPPF replaced Planning Policy Statement 25 (PPS25) on Development and Flood Risk; however, many of the flood risk requirements have been retained, particularly the PPS25 Practice Guide.

CHAPTER TWO: RELEVANT PLANNING POLICIES

According to PPS25 - Annex D: Flood Risk Vulnerability Classification, the existing site at Fenndyke is *'less vulnerable… land and buildings used for agricultural and forestry'* (Ref 2.1). The proposed development classification is *'essential infrastructure…including electricity generating power stations and grid and primary substations'*. This application is consistent with the Local Development Plan (LDP).

Policy SG9 – Development and Flood Risk states *'in areas of flood risk planning permission will only be granted where a flood risk assessment has been carried out… proposals shall, where necessary, include details of measures designed to reduce the risk and consequences of flooding'* (Ref 2.2).

The requirements for a FRA are provided through the NPPF and the associated technical guidance. These Policies became effective in March 2012. The polices state that flood risk is a material consideration that must be taken into account when considering all planning applications. In addition the applicant must consider the requirements of the EA and the local Strategic Flood Risk Assessment (SFRA).

The NPPF replaced PPS25 but many of the flood risk requirements have been retained, significantly the PPS25 Practice Guide.

Paragraph 103 of the NPPF requires that a site specific FRA should be submitted with any planning application for all sites greater than 1Ha in a Flood Zone 1, or for sites of any size within Flood Zone 2 or 3 (Ref 2.3).

CHAPTER THREE: FLOOD ZONE CLASSIFICATION

Inspection of the EA Flood Map for Planning and the SHDC's SFRA (2010) (Ref 3.1) shows that the development site is located within Flood Zone 3.

The Flood Risk Vulnerability Classification is used to classify the type of development (Table 3:1);

FLOOD RISK VULNERABILITY CLASSIFICATION
Essential infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly vulnerable • Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent4. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as "essential infrastructure").
More vulnerable • Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan*.
Less vulnerable • Police, ambulance and fire stations which are *not* required to be operational during flooding. • Buildings used for shops, financial, professional and other services,

(Table 3:1 - Flood Risk Vulnerability Table. Taken from 'Technical Guidance to the National Planning Policy Framework' March 2012. Department for Communities and Local Government)

Solar farm developments are not specifically mentioned in the Flood Risk Vulnerability Classification. However they are 'essential infrastructure' projects. Table 3:2 details that proposed development of this nature is acceptable following the completion of an acceptable 'exception test'. As such the project should be supported provided that the above site satisfies the 'sequential and exception test' the following sections of the FRA show that this test is satisfied in the context of a FRA.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

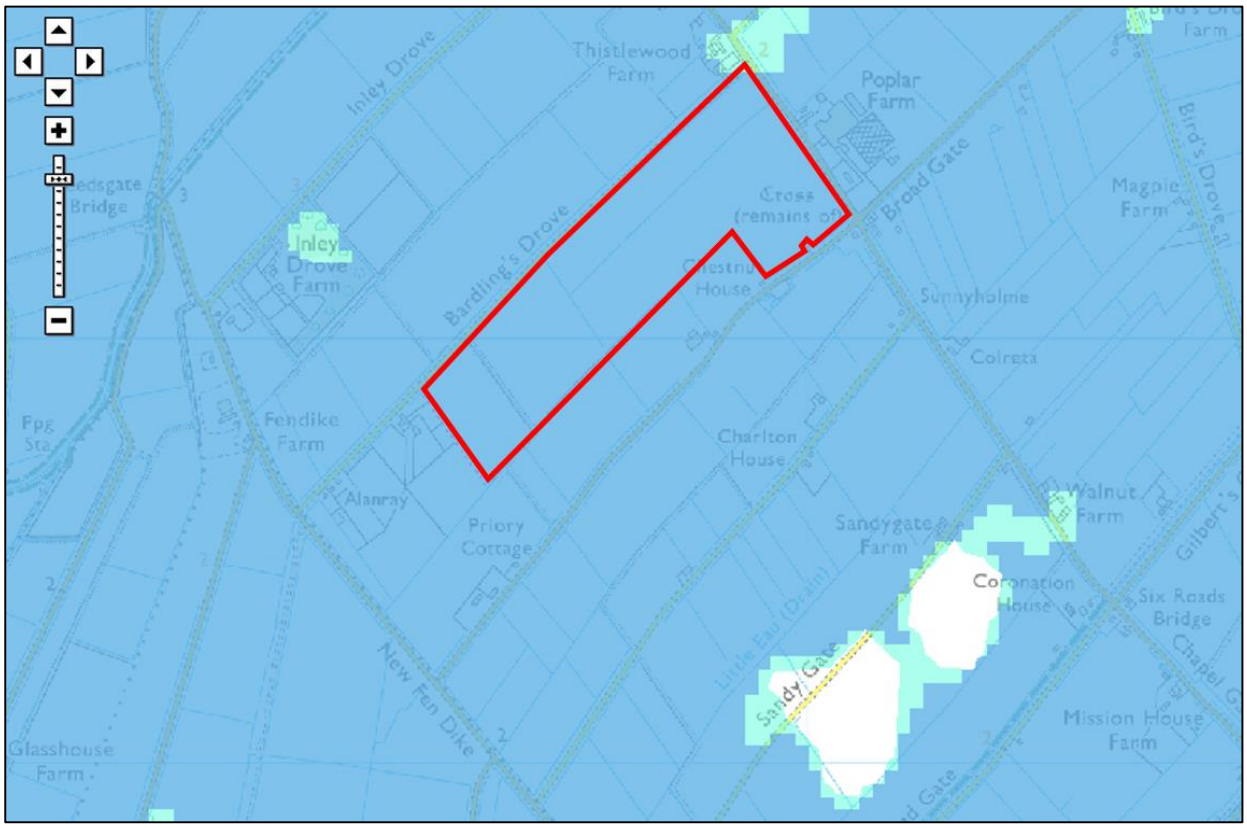
Key: ✓ Development is appropriate.
× Development should not be permitted.

(Table 3:2 - Flood Risk Vulnerability and Flood Zone 'Compatibility' - Taken from Technical Guidance to the NPPF).

CHAPTER FOUR: FLOODING POTENTIAL

Flooding can come from rivers and the sea, directly from rainfall on the ground surface and from rising groundwater, overwhelmed sewers and drainage systems. The site at Fenndyke is low lying with elevations of approximately 1-2m Above Ordnance Datum (AOD). It has the potential to be affected by the Main Rivers (the River Nene, River Welland, River Glen and South Forty Foot Drain) and the South Holland Main Drain, as well as other small adjoining drains such as Little Eau and Lowland, which surround the site. Flooding can result when these drains are overwhelmed by heavy rainfall, become blocked or are of inadequate capacity, and will continue until the water drains away.

Protection against flooding within the South Holland District relies on an internal drainage system of channels, pumping stations and gravity outfalls. The internal drainage system is under the responsibility of IDBs. Raised embankments are part of the flood defence provision here. A universal theme from the IDBs is that they consider there should be no flooding problems associated with their drainage systems (even for the 1 in 100 year event). The drains normally operate with a considerable freeboard between water level and land level. In high rainfall events this freeboard would be reduced but 'bank full' conditions or overtopping only happens in small isolated cases. The flood protection standards adopted for agricultural land are set to serve agricultural purposes. In practice this means that a considerable target freeboard, often 1.2m, is desired so effective water management of the land can be achieved.



(Figure 4:1 – EA Flood Map for Planning - Taken from Environmental Agency Interactive Maps).

Figure 4:1 shows the proposed development according to the EA Flood Map for Planning. The dark blue colour shows '*the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:*

- *from the sea by a flood that has a 0.5 per cent (1 in 200) or greater chance of happening each year;*
- *Or from a river by a flood that has a 1 per cent (1 in 100) or greater chance of happening each year'*.

This information comes from the EA's database, which uses;

- Ground levels,
- Predicted flood levels,
- Information on flood defences,
- Local knowledge.

The site lies at approximately 1-2m AOD and drainage is controlled by ditches and natural permeation. The site is well ditched and the water maintained well below ground level in the main drains. However due to the low altitude the site could flood if the sea walls are ever breached or if the pumps fail for significant periods.

More than 50% of the District is within Flood Zone 3. However, the actual risk of flooding in the district from primary sources such as rivers and the sea was assessed as being of medium probability and low consequence (due to rural nature of the district) and medium probability from secondary sources such as sewers and drainage systems. However the IDB states that providing the drainage systems are operated and maintained properly, they are unlikely to pose a significant degree of flood risk.

The applicant made enquiries to the EA and as a result the EA provided the 'Flood Hazard Mapping' for the proposed Fenndyke Solar Farm. They confirmed that the site is *not* affected by breach for the present day (2006) 0.5% and 0.1% scenarios nor for overtopping for the 2006 or 2115 0.5% and 0.1% scenarios. However, parts of the proposed site at Fenndyke are affected by the Hazard Mapping extents for the 2115, 0.5% and 0.1% breach scenario, with a 0.1% scenario flood depth of up to 1m potentially affecting parts of the site. The assessment can be viewed in Appendix (ii).

The PV panels and Finished Floor Levels (FFLs) of substations and any other infrastructure elements should be at a minimum of 300mm above the 2115 0.5% breach scenario flood level – approximately 1.25m AOD - in areas shown as being affected. Depending on exact location on site, FFLs and infrastructure may need to be a minimum of 0.55m above existing ground level, ie., 1.550m AOD.

Developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, as well as the appropriate application of SUDs.

The project has been designed to retain all existing field boundaries. There are no plans to remove any existing vegetation, which will minimise any likely changes in the water course during the operational phase of the solar farm. The scheme does not interfere with any existing water course. The solar panels are angled at 20 degrees, so rainwater can flow off easily. SUDs will be put in place during the construction period.

The history of flooding in the area of the site has been investigated using the British Hydrological Society Database which is a historical flood events record. No specific data has been found for this site or

adjacent land that has records of any flood events. Furthermore the SHDC SFRA does not record any historic flooding for the site.

Other sources of flooding include;

- **Overland Flow** – overland flow from the surrounding areas is not considered an exposure to flood risk. The soils are consistently permeable and the pattern of field boundary drainage ditches provides an enlarged area to intercept and surface water run-off.
- **Sewer Network** – there are not known to be any local public sewers in the vicinity of the site.
- **Groundwater** – groundwater table is controlled by the North Level District IDB in maintaining a level of freeboard within their managed drains. In reference to the operating regime and responsibilities of the North Level District IDB flooding as a posed risk from groundwater is therefore a negligible risk.
- **Climate Change** – the threat of flooding as posed by increased rainfall arising as a result of changes to the rainfall pattern and intensity is not considered to be a significant threat. The site surface will be managed grassland and will provide a sustainable drainage solution similar to the existing site conditions. Any rainfall will permeate through the soil and any surface run-off will be intercepted by the pattern of field boundary ditches. These ditches are to remain and will be maintained for this purpose. The impact of climate change on rising sea levels and river levels has been considered by the EA and their response can be reviewed in Appendix (ii). The EA has indicated that the site is at increased risk of flooding due to climate change as set out in the 2115 Hazard Mapping information provided for this site.
- **Coastal and River Flooding** – in response to enquiries the EA have confirmed that the site is considered to be at risk of flooding.

CHAPTER FIVE: DRAINAGE ASSESSMENT

5.1 Runoff Rates and Volumes for Proposed Development:

Rainwater falling on the existing site currently falls onto a grassed or arable crop surface and infiltrates naturally into the soil. The solar panels will intercept rainwater and shed it onto the ground on the lower edge of each panel, also known as the drip-line. Whilst the panels would result in a concentration of rainwater along the drip-line of each row, water would be intercepted by the grass growing in-between and underneath the panels and allowed to infiltrate into the underlying soils in much the same way as the existing site conditions. The solar panels are arranged in two row portrait with a 'rain gap' between each panel. Rain will therefore not all be collected on the bottom edge of the array.

There will be 0.25% of impermeable surface area due to the installation, mitigated by the incorporation of SUDs throughout the site and within the design of the substation drainage system.

5.2 Potential for Soil Erosion:

Natural England's Technical Information Note (TIN) 101 (Ref 5.1) provides guidance on solar farms giving an overview of the potential effects and possible mitigation measures for soil erosion and increased runoff (as well as others). TIN101 states that *'the key to avoiding increased run-off and soil into watercourses is to maintain soil permeability and vegetative cover. Permeable land surfaces underneath and between panels should be able to absorb rainfall as long as they are not compacted and there is some vegetation to bind the soil surface'.*

The solar PV panels will be arranged into rows with a pitch of approximately 7m. The distance between the rows will be approximately 4m. This will allow appropriate gaps for natural rain water to permeate the ground. During the construction phase the erection of the solar panels will require the use of light machinery, however, it is anticipated that this would not lead to an irreversible compaction of soils on the site. Therefore, infiltration should not be limited by compaction of soils.

Solar installations have been in Germany since as early as 2000 and this has shown the importance of maintaining the vegetation that grows between and underneath the panels. Where there is no vegetation management, the panels have become over-grown and shaded, reducing their efficiency. The climate in the UK (similar to Germany) is expected that vegetation, in this instance grass, would grow underneath and between the panels thereby binding the soil surface together. Fenndyke Solar Limited will encourage the use of small livestock, such as sheep, to help maintain the land in between the solar panels.

TIN101 concludes that *'the risks of run-off and soil erosion are lowest on low gradient land with cohesive soils and highest on dry, sandy and steeply sloping soil surfaces'*; highlighting the effect of slope on runoff rates. The slope aspect of the land can also have an effect on runoff rates and soil erosion. The aspect of the solar panels will be south-facing but both north and/or south facing slopes will result in runoff flowing in a parallel direction to that of the runoff from the

panels. It is unlikely to result in concentrated flows that could cause soil erosion, particularly with the vegetation covering that will be maintained throughout the operational life of the project. With regard to the proposed development the site slopes would not require any mitigation for soil erosion. However if during the lifetime of the development, small rivulets form from the concentration of overland flow and cause soil erosion, then shallow swales would be put in place to intercept and dissipate the energy of any overland flow. Regardless, given that the site slopes to the north and south (parallel to the slope of the panels), but is generally level and the fact that the soil surface will remain grassed, the likelihood of soil erosion occurring as a result of the development is considered minimal.

5.3 Proposed Drainage Strategy:

It is proposed to allow the development to drain naturally, through the soil surface, where infiltration into the underlying soils would occur. This would mimic the existing hydrological characteristics of the site and result in minimal ground disturbance facilitating its return to its original state after the lifetime of the development.

Run-off from the roof of the substation and control room building would be controlled in filter drains on the downslope side of the buildings, to store and infiltrate runoff during extreme rainfall events.

Based on the conceptual drainage strategy outlined in this FRA, the hydrology of the site post-development would remain essentially the same as for the existing land use, with runoff rates from the site not exceeding the estimated greenfield runoff rates for the existing site (with and without climate change).

5.4 Designing for Exceeding Events:

Current best practice guidance on flood risk requires an evaluation of how rainfall events beyond the design capacity of the proposed drainage system would be managed and what effects they are likely to have on flood risk at the site or surrounding areas.

For the drainage proposals described above, should a rainfall event exceed the usual, then it is expected that water would behave in a similar manner as it would for the existing site. There are no existing buildings or infrastructure located that would be adversely affected. The surface water runoff would be collected in the surrounding field boundaries and dissipated across the open expanse of the grassed areas of the solar farm, much in the same manner as that for the existing agricultural situation.

CHAPTER SIX: SUSTAINABLE URBAN DRAINAGE SYSTEM (SUDs)

6.1 Design Best Practice:

The design of the SUDs is to be carried out in line with best practice and industry standard design procedures. There are a number of publications which cover design, analysis and best practice guidance which will be applied to develop the final drainage infrastructure. This includes;

- **CIRIA – THE SUDS MANUAL:** The SUDS Manual (c697) provides best practice guidance on the planning, design, construction, operation and maintenance of Sustainable Drainage Systems (SUDS) to facilitate their effective implementation within developments.
- **BUILDING REGULATIONS PART H:** This provides the design and installation of surface water and foul water systems. All private drainage installations should be designed and installed in accordance with this document.
- **NPPF:** This contains the policy relates to the appropriate assessment of flood risk within the UK.

Current best practice guidance on flood risk requires an evaluation of how rainfall events beyond the design capacity of the proposed drainage system would be managed and what effects they are likely to have on flood risk at the site or surrounding areas.

For the drainage proposals described above, should a rainfall event exceed the usual, then it is expected that water would behave in a similar manner as it would for the existing site. There are no existing buildings or infrastructure located that would be adversely affected. The surface water runoff would be collected in the surrounding field boundaries and dissipated across the open expanse of the grassed areas of the solar farm, much in the same manner as that for the existing agricultural situation.

6.2 Background:

SUDs aim to incorporate long term environmental and social factors to design sustainable surface water drainage systems. They take into account the quantity and quality of surface water runoff, and the value of this to the surrounding areas. Many pre-existing drainage systems can cause problems of flooding, pollution or damage to the environment and so it is the aims of SUDs to prevent this happening again.

6.3 Percolating Testing:

A percolation test is a test to determine the absorption rate of soil for a septic drain field. Put simply, it is observing how quickly a known volume of water dissipates into the subsoil of a drilled hole of known surface area. There will be a negligible impact in the surface water runoff rates and so a percolation test has not been conducted.

Additionally, the design of the SUDs across the site will have two functions;

1. Intercept, store and redistribution of the runoff from the site.

2. Infiltrate this into the system.

6.4 Surface Water Drainage:

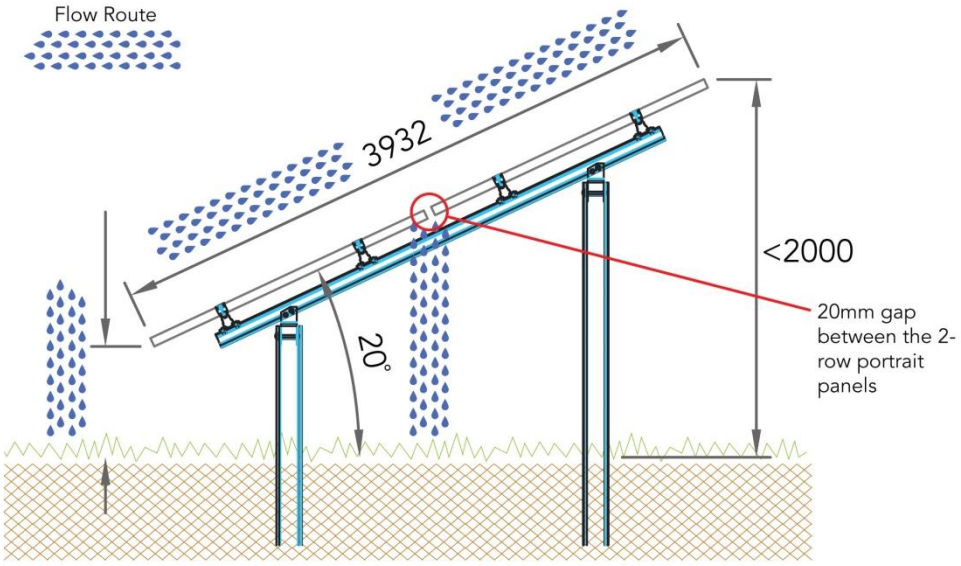
Solar panel arrays, foundations, inverters and substation could cause run off, but this poses a low environmental risk. Any waste from maintenance will be disposed of elsewhere.

There is a small risk of pollution to local watercourses if;

- **TOP SOIL IS DISRUPTED** - This could be from the use of heavy plant on the arable land.
- **INTENSE RAINFALL** – This could cause silt laden

Due to the small 0.25% of impermeable surface area, no formal drainage is required. The practical approach has been to promote infiltration and create storage across the site. This involves the installation of swales, as well as utilising the existing field drainage network, which can be used to manage surface water runoff, filter pollutants and increase rainwater infiltration. During the small construction phases, silt fences can be installed to maximise the interception of silt laden runoff.

The solar panels are located on a sloped frame, approximately 600mm above ground level. Rain will fall onto the solar panel table and runoff the panels, flowing (infiltrating) in the sheltered rain shadow area underneath the down slope modules. Additionally, the 1956mm x 992mm x 40mm modules will be aligned 'portrait' in rows of 2. This gap will allow water to drain off each module (Figure 6:1);



(Figure 6:1 Example of Flow Route – Property of BE Renewables Limited)

Intensification of the runoff could occur beneath the lower end of the panels where the panels are aligned at variance to the contours. This would mean a slight increase than perhaps would occur at the undeveloped site. However due to the flat topography of the site it is not considered to be a significant issue at the proposed development.

The access and maintenance roads will be constructed using permeable materials, allowing infiltration of water on these areas; therefore they will not increase surface water runoff rates from the existing scenario.

CHAPTER SEVEN: CONCLUSION

A review of the EA's Flood Map for Planning and the SHDC SFRA classification map for the area has demonstrated that the site lies within Flood Zone 3.

The proposed development would have a percentage impermeable surface area at ground level by no more than 0.25%, so it is proposed to allow the proposed development to drain through the soil surface, where infiltration into the underlying soils would occur, mimicking the existing hydrological characteristics of the site. This would result in minimal ground disturbance facilitating its return to its original state after the lifetime of the development.

Should overland flow occur, this would be routed naturally to the drainage ditches that flow through the site, as it would for the existing site. The current or grassed surface of the site will be maintained to reduce the likelihood of overland flow or soil erosion occurring. However if during the lifetime of the development, small rivulets form from the concentration of overland flow and cause soil erosion, these will be intercepted by the existing perimeter drainage ditches that will act as shallow swales and will dissipate the energy of any overland flow.

The relatively low gradient of the site and the fact that the soil surface will remain grassed, the likelihood of soil erosion occurring as a result of the development is considered to be minimal.

Runoff from the roof of the substation and control room building would be controlled in filter drains on the downslope side of the buildings, to store and infiltrate runoff during extreme rainfall events.

Based on the conceptual drainage strategy outlined in this FRA, the hydrology of the site post-development would remain essentially the same as for the existing land use, with runoff rates from the site not exceeding the greenfield runoff rates for the existing site.

The response from the EA indicates that the site is *not* affected by breach for the present day (2006) 0.5% and 0.1% scenarios nor for overtopping for the 2006 or 2115 0.5% and 0.1% scenarios. However, parts of the proposed site at Fenndyke are affected by the Hazard Mapping extents for the 2115, 0.5% and 0.1% breach scenario, with a 0.1% scenario flood depth of up to 1m potentially affecting parts of the site. Overall, in comparison to other available sites within the area the site is an appropriate selection and is considered to satisfy the requirements that there are no sequentially preferable sites.

This Flood Risk Assessment has demonstrated that the development would be safe and would *not* increase flood risk to the site or elsewhere. The site enhances the sustainability of the area as a result of its generation of low-carbon renewable energy whilst also permitting the increase value resulting from the bio-diversity improvements and retaining some agricultural use.

CHAPTER EIGHT: REFERENCES AND APPENDICES

8.1 References:

CHAPTER ONE

1.1 **North Level Internal Draingage Board -** http://www.northlevelidb.org/about/district-map

1.2 **NORTH LEVEL DISTRICT INTERNAL DRAINAGE BOARD** - STRATEGY PLAN 2013 (January 2013)

CHAPTER TWO

2.1 **Planning Policy Statement 25 (PPS25) -** http://webarchive.nationalarchives.gov.uk/+/http:/www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement25

2.2 **South Holland District Council -** http://www.sholland.gov.uk/localplan/text/03_sg_corestrat.htm#sg9

2.3 **National Planning Policy Framework -** www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

CHAPTER THREE

3.1 **South Hollands Strategic Flood Risk Assessment 2010 -** http://www.sholland.gov.uk/lfra/SouthHollandUpdateofSFRAFinalReportJan2010.pdf

CHAPTER FIVE

5.1 **Natural England's Technical Information Note (TIN) 101** - http://publications.naturalengland.org.uk/publication/32027

8.2 Appendices:

Appendix (i) - Environmental Agency Response to Planning Application

Appendix (ii) - Environmental Agency Flood Risk Assessment Enquiry

Appendix (iii) - 25 Years Development Lifetime Issue