One Earth Solar Farm

Preliminary Environmental Information Report [EN010159]

Chapter 8: Hydrology and Hydrogeology

May 2024

One Earth Solar Farm Ltd

Planning Inspectorate Scheme Ref: EN010159

Contents

8. Hydrology and Hydrogeology

Summary of Preliminary Likely Significant Effects

8.1. This Chapter concludes there are no likely significant environmental effects of our Project on flooding from the River Trent, surface water flooding, water quality or groundwater flow during the construction, operation and decommissioning phases.

Introduction

8.2. This Chapter of the PEIR has been prepared by Logika and presents the preliminary likely significant environmental effects of our Project upon Hydrology and Hydrogeology. The experience of the consultants that have prepared this Chapter, who are competent experts for the purpose of the EIA Regulations, is set out in **Appendix 1-1** in **Chapter 1-6**. It is informed by the environmental information we have collected to date (which is detailed in this Chapter), as well as the current description of our Project, as set out in **Chapter 4: Our Project**.

8.3. This Chapter is supported by the following detailed information:

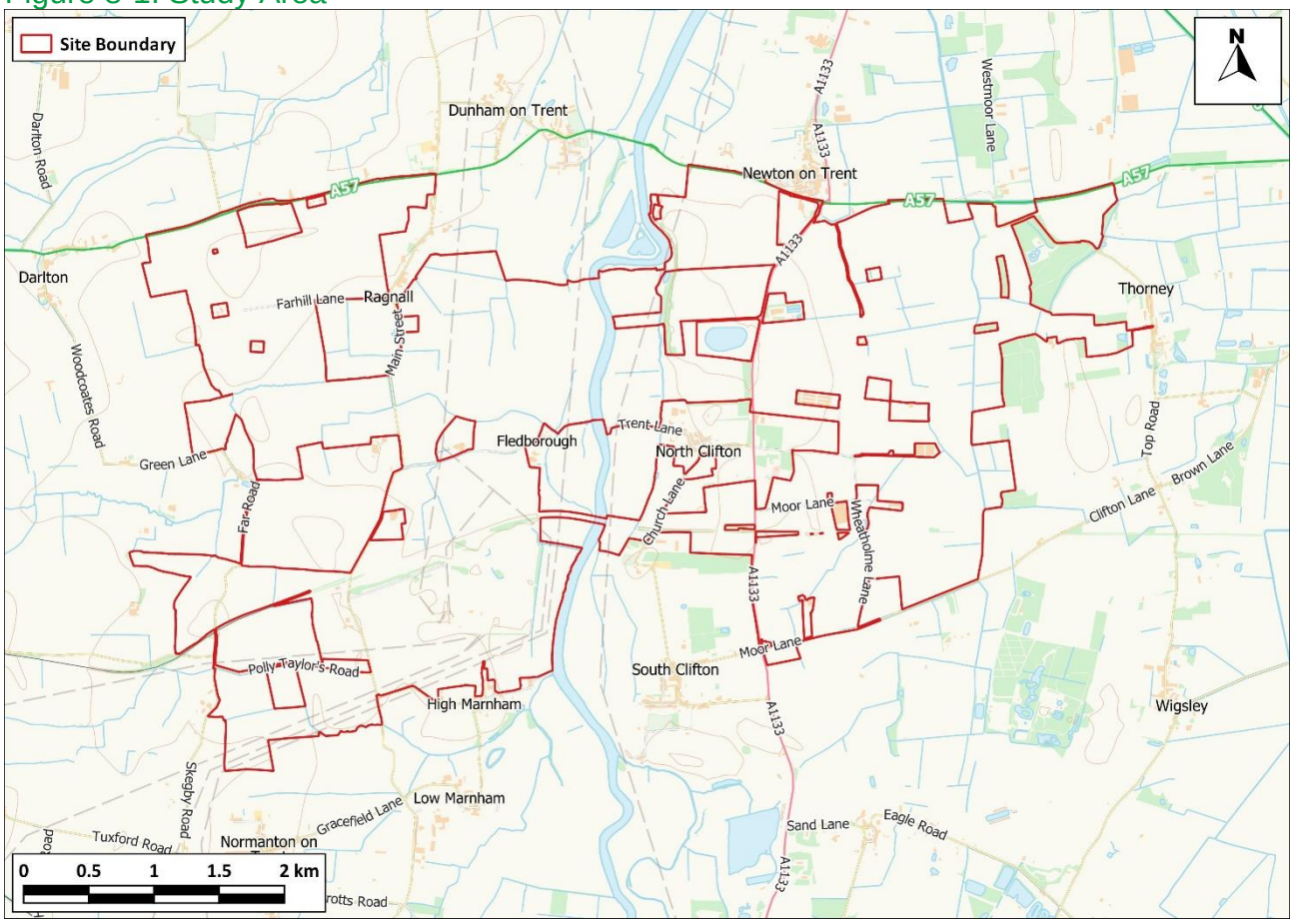
- **Appendix 8-1**: Hydrology and Hydrogeology Specific Legislation and Policy

Current Hydrology and Hydrogeology Conditions

Study Area

8.4. Given the nature of hydrology and hydrogeology (i.e. the flow of water), it is difficult to define a study area with confidence. The assessment of the baseline and proposed conditions therefore focusses on the site of our Project as shown in **Figure 8-1**, but consideration of the impacts that could occur in the wider area has been made (with regards to impacts to flood risk, groundwater and water quality for example).

Figure 8-1: Study Area



Collection of Hydrological and Hydrogeological Data

8.5. The following sources and data sets have been used to assess baseline flood risk and drainage at our Site:

- The Environment Agency (EA) Flood Map for Planning
- EA Long Term Flood Risk Mapping (including surface water and reservoir mapping)
- The EA Hydraulic Model for the River Trent
- British Geological Survey (BGS) Online Geology Mapping and Borehole Records
- BGS Aquifer Designation Data
- EA Groundwater Vulnerability Mapping
- EA Groundwater Source Protection Zone (SPZ) Mapping
- Bassetlaw Level 1 Strategic Flood Risk Assessment (SFRA)

8.6. In addition to the above, consultation and meetings have been held with the EA to discuss baseline flood risk at the Site as well as proposed mitigation.

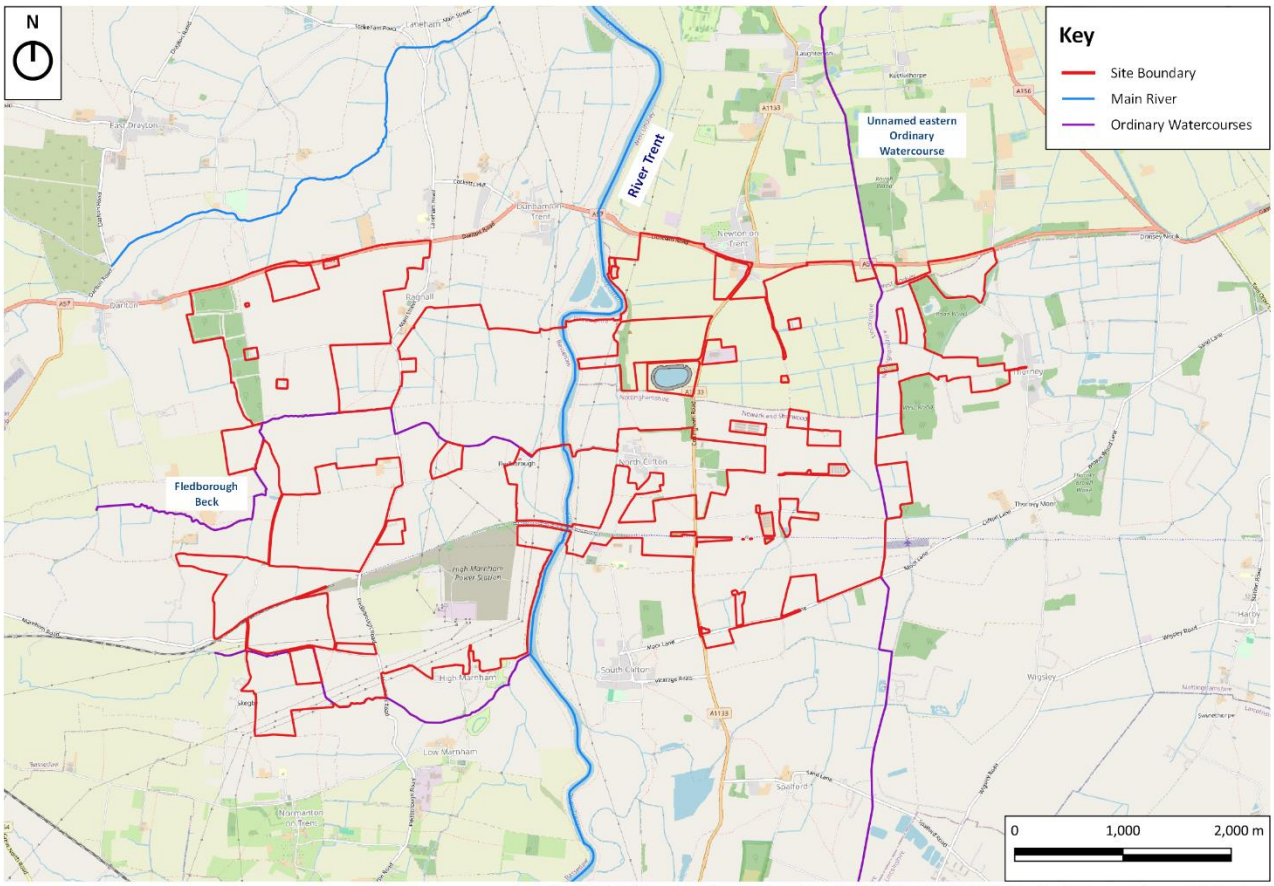
Hydrological and Hydrogeological Baseline Conditions

Existing Watercourses and Drainage Arrangement

8.7. As set out in **Figure 8-2** below, the River Trent flows through the centre of our Site. The River Trent is classified as a Main River[1] by the EA and although there are tidal influences associated with the watercourse, at our Site this is considered to be fluvially dominated i.e. water levels are generally dictated by rainfall within the river catchment rather than tidal fluctuations.

8.8. In addition to the River Trent, there are a number of ordinary watercourses[2] located within the Site boundary as illustrated in **Figure 8-2**.

Figure 8-2: Existing Watercourses



Google Maps (2024). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 05 APRIL 2024)

[1] Main rivers are usually larger rivers and streams. The EA carries out maintenance, improvement or construction work on main rivers to manage flood risk.

[2] Ordinary watercourses are other river and streams that are not considered to be main rivers, these are typically smaller watercourses. The Lead Local Flood Authority, District Council and Internal Drainage Boards carry out flood risk management work on ordinary watercourses.

8.9. The vast majority of our Site is greenfield in nature (this includes the agricultural uses) and therefore is not anticipated to have any formal surface water drainage networks in place. It is anticipated that precipitation at our Site simply infiltrates to the ground with any additional runoff being directed to the existing network of ordinary watercourses and field drains which ultimately discharge to the River Trent.

Ground Conditions

8.10. **Chapter 9: Land and Soils** indicates the following with regards to the underlying geology at our Site:

- Superficial geology is present across much of our Site, although there are areas with no mapped deposits, predominantly in the western part of our Site, and more restricted areas to the east of the River Trent.
- Superficial deposits of Holme Pierrepoint Sand and Gravel member are present around Low Marnham, from Fledborough to Woodcoates, in bands to the west and east of the River Trent and in a more widespread distribution further east.
- Alluvium is present along the route of the River Trent and in more limited extents along more minor watercourses throughout our Site. An area of Devensian Till (mainly clay) is shown in the north west of our Site, between Ragnall and Darlton. To the east of the River Trent, there are some deposits of Blown Sand.
- Bedrock geology is dominated by mudstone from the Mercia Mudstone Group. This comprises mainly red mudstone with some layers of siltstones or halite-bearing units. Thin sandstone beds may be present. A small section of our Site at the far eastern extent is underlain by mudstones from the Penarth Group. These are grey to black mudstones with occasional limestone or sandstone layers.

Hydrogeology

8.11. With regards to aquifer[3] designation, British Geological Survey (BGS) data illustrated within MagicMap indicates the following:

- The bedrock geology of Mercia Mudstone is classified as a secondary B aquifer meaning they may store and yield limited amounts of groundwater.
- The bedrock geology of Penarth Group is classified as secondary undifferentiated, meaning it is not possible to attribute either category A or B to a rock type. In most cases this means the layer has previously been designated as both minor and non-aquifer due to variable characteristics of the rock type.
- Where superficial deposits are present, they are predominantly categorised as Secondary A aquifers meaning that there are permeable layers present that are capable of storing water at a local rather than strategic scale. The only exception to this is a localised area between Ragnall and Darlton where superficial deposits are classified as secondary undifferentiated aquifer.

[3] An aquifer is a body of permeable rock which can contain or transmit groundwater

BGS groundwater vulnerability mapping illustrated on MagicMap indicates the following:

- The bedrock geology is predominantly shown to have a high groundwater vulnerability classification meaning these are high priority groundwater resources that have very limited natural protection. This results in a high overall pollution risk to groundwater from surface activities. Operations or activities in these areas are likely to require additional measures over and above good practice pollution prevention requirements to ensure that groundwater isn't impacted.
- There are localised areas within our Site where a medium groundwater vulnerability classification is noted. This indicates that these are medium priority groundwater resources that have some natural protection resulting in a moderate overall groundwater risk. Activities in these areas should as a minimum follow good practice to ensure they do not cause groundwater pollution.
- The superficial deposits have a medium-high groundwater vulnerability classification indicating these are high priority groundwater resources that have limited natural protection. This results in a medium-high overall pollution risk to groundwater for surface activities. Activities in these areas may require additional measures over and above good practice to ensure that they do not cause groundwater pollution.

8.12. As set out in **Chapter 9: Land and Soils**, there are five groundwater abstraction points located close to the River Trent, east of Ragnall. In terms of SPZs[4], each of these comprises a small central Zone 1 protection area, surrounded by a slightly larger Zone 1 (subsurface activity) area, and then a larger Zone 2 (subsurface activity). One of these inner zones is mainly within the Site boundary, with its associated Zone 2 partly inside and partly outside the Site boundary. Two of the others are close together, with combined Zone 1 areas that are partly within the Site boundary. The associated Zone 2 is also partially within the Site boundary. The inner zones for the other two SPZs are outside the Site boundary, with the Zone 2 just encroaching on the far north western corner of our Site.

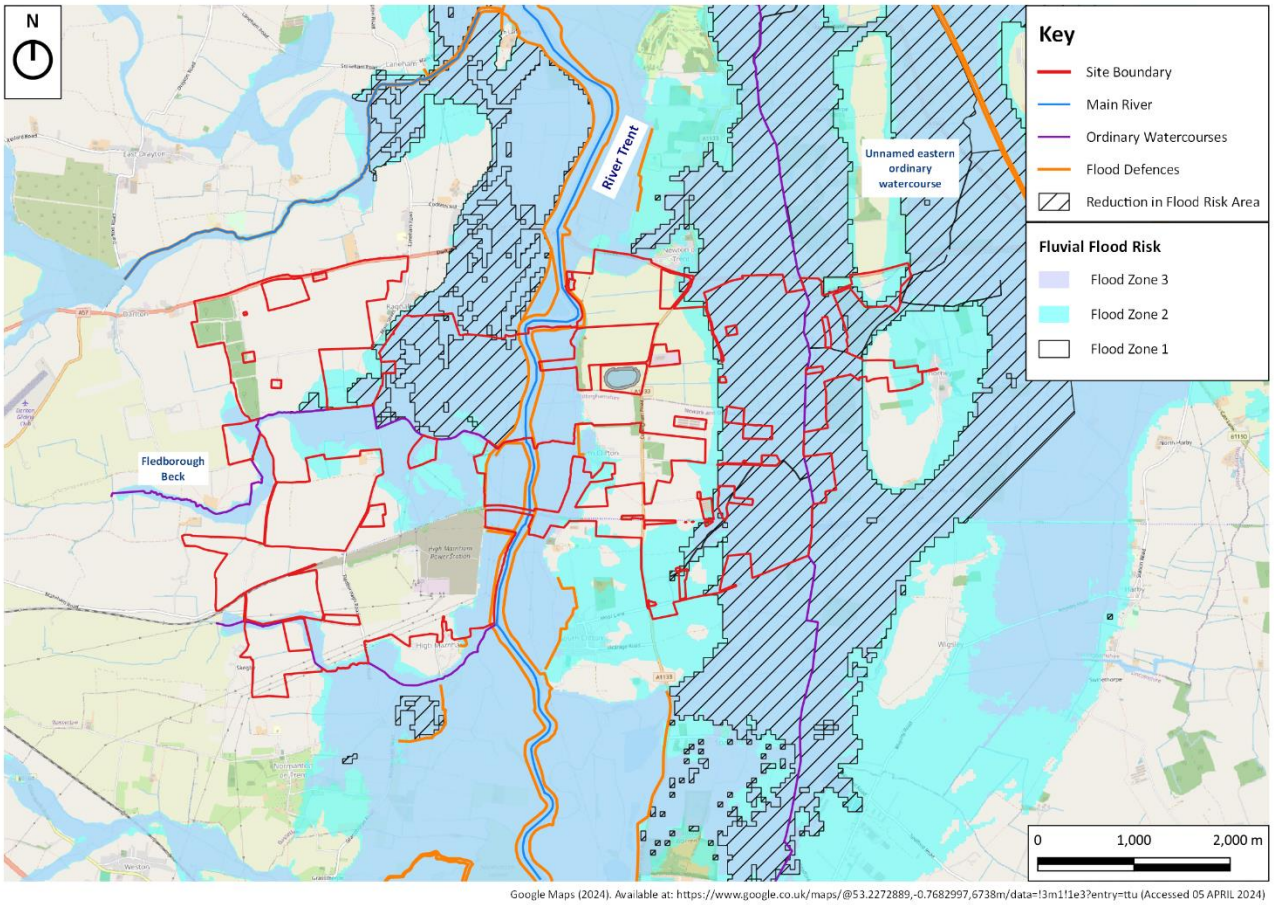
Flood Risk from All Sources

Fluvial and Tidal

8.13. According to the EA's Flood Map for planning (**Figure 8-3**), large areas of our Site are shown to be within Flood Zones 2 and 3, indicating a medium to high probability of flooding from rivers and the sea. This flooding is considered to originate and be predominantly associated with the River Trent which flows through the centre of our Site, however as set out previously, there are a number of ordinary watercourses within our Site which are hydraulically connected to the River Trent.

[4] Groundwater sources represent wells, boreholes and springs which are used to supply drinking water. The Zones show the level of risk to the source from contamination. Zone 1 is defined as an area with a 50 day travel time from pollutant to source. Zone 2 is defined as an area with a 400 day travel time from pollutant to source.

Figure 8-3: Flood Map for Planning



Google Maps (2024). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 05 APRIL 2024)

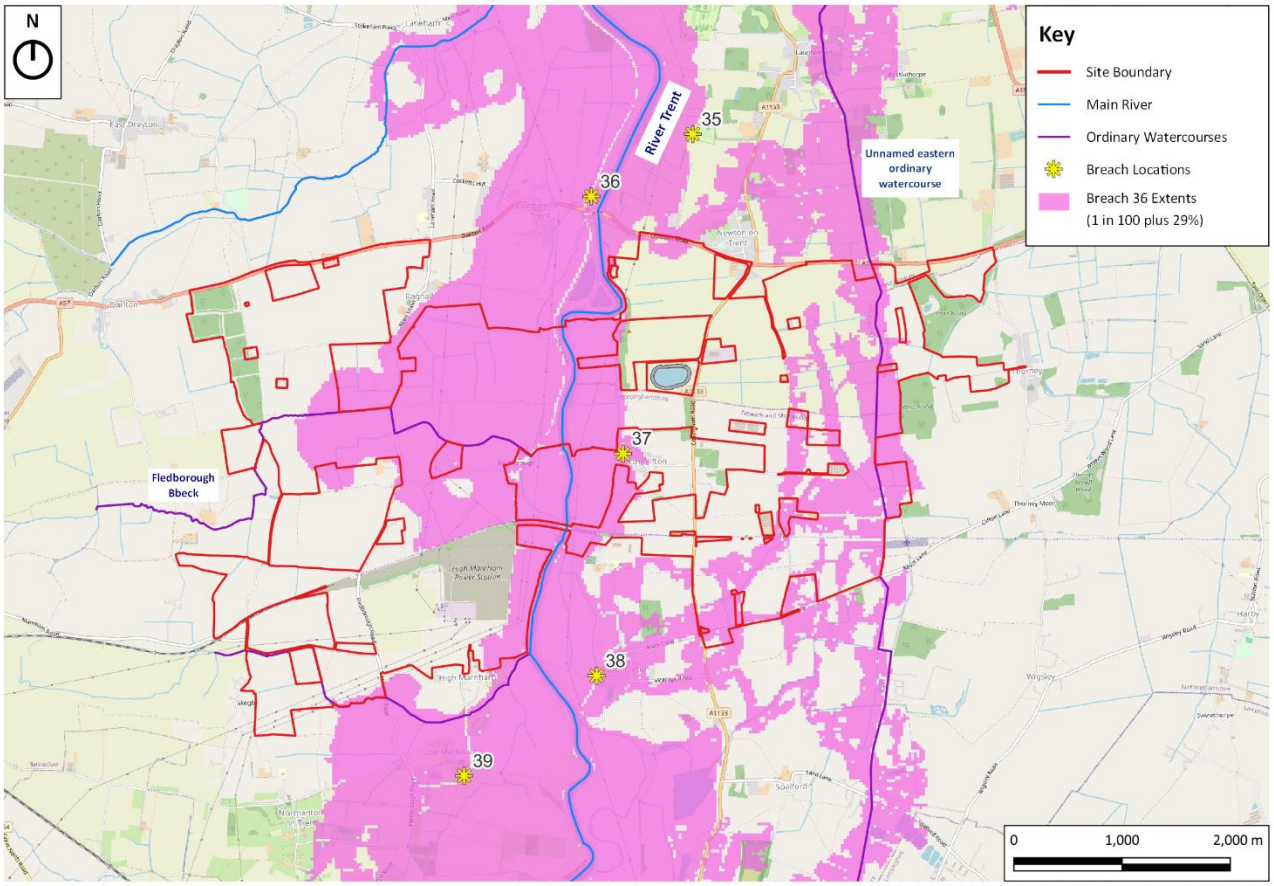
8.14. The EA's Flood Map for Planning shows the presence of flood defences, both on the banks of River Trent and set back from its main channel. The Standard of Protection (SoP) that these defences provide varies along length of the watercourse and is dependent on the water and defence level. A number of areas within our Site therefore benefit from these defences and these areas are illustrated in **Figure 8-3** by the hatch indicating "Reduction in Flood Risk Area".

8.15. Based on an assessment of the hydraulic modelling for the River Trent, it is confirmed that flooding at our Site is fluvially dominated rather than occurring from tidal sources.

8.16. In addition to the Flood Map for Planning, the EA have also modelled a residual event that considers the extent of flooding should there be a breach (failure) of the river defences. A number of breach locations and scenarios are included in the EA modelling, however location 36 is considered to have the largest extent at our Site in 1 in 100 year plus climate change event[5] and this is illustrated in **Figure 8-4**.

[5] Refers to a flood event with a 1 in 100 year probability of occurring in any given year and includes for an increase of 29% in river flows to allow for climate change.

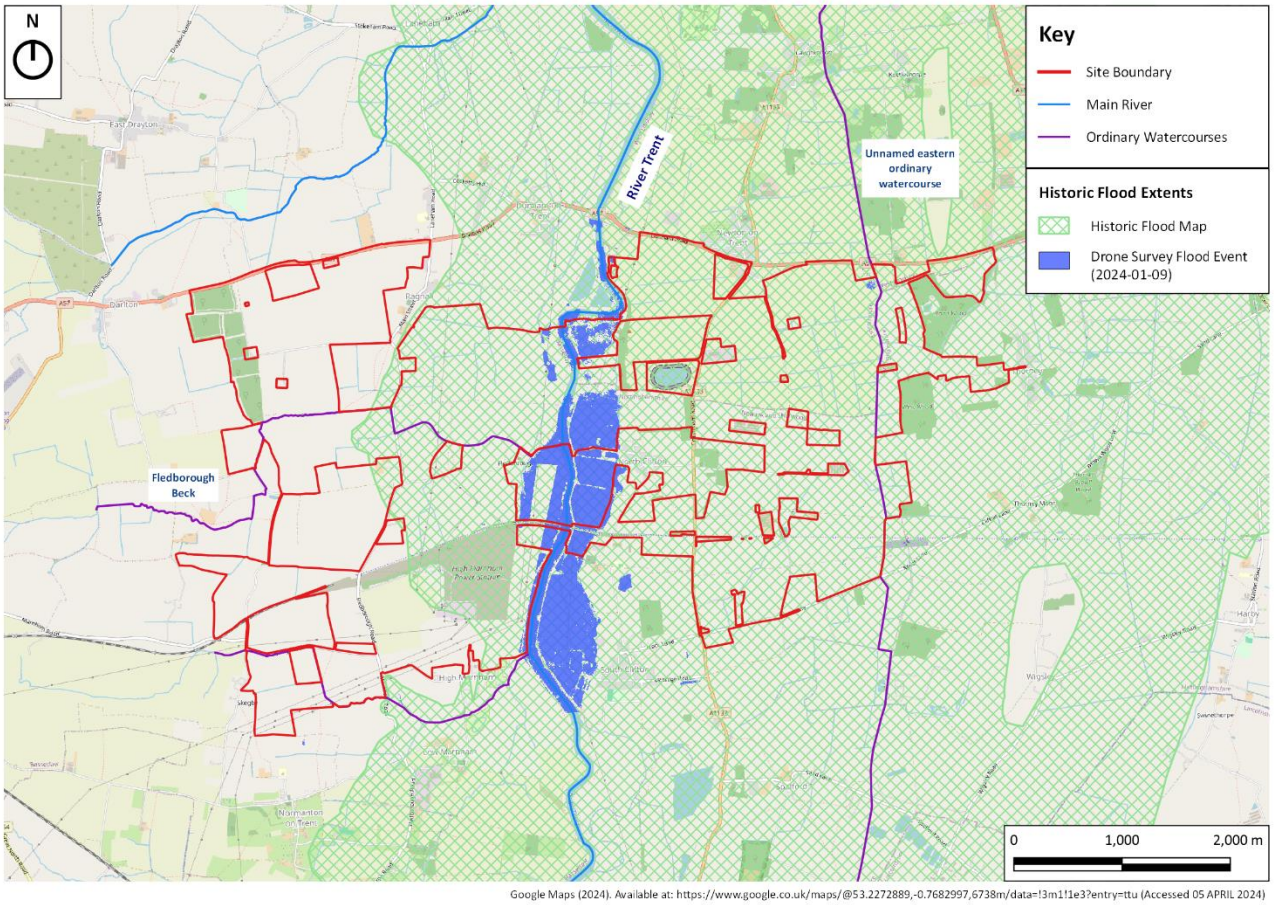
Figure 8-4: Residual (Breach) Flood Extents



Google Maps (2024). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 05 APRIL 2024)

8.17. Historic flood records providing by the EA (**Figure 8-5**) indicate that there are recorded flooding events at the Site. Most recently, flooding at our Site occurred in January 2024 as a result of high water levels within the River Trent and ordinary watercourses, the extent of this flooding was captured via drone survey and is included in **Figure 8-5** below. It is worth noting that the drone survey was undertaken after the peak of the flooding and the extent illustrated may therefore not be the maximum that occurred.

Figure 8-5: Historic Flood Extents



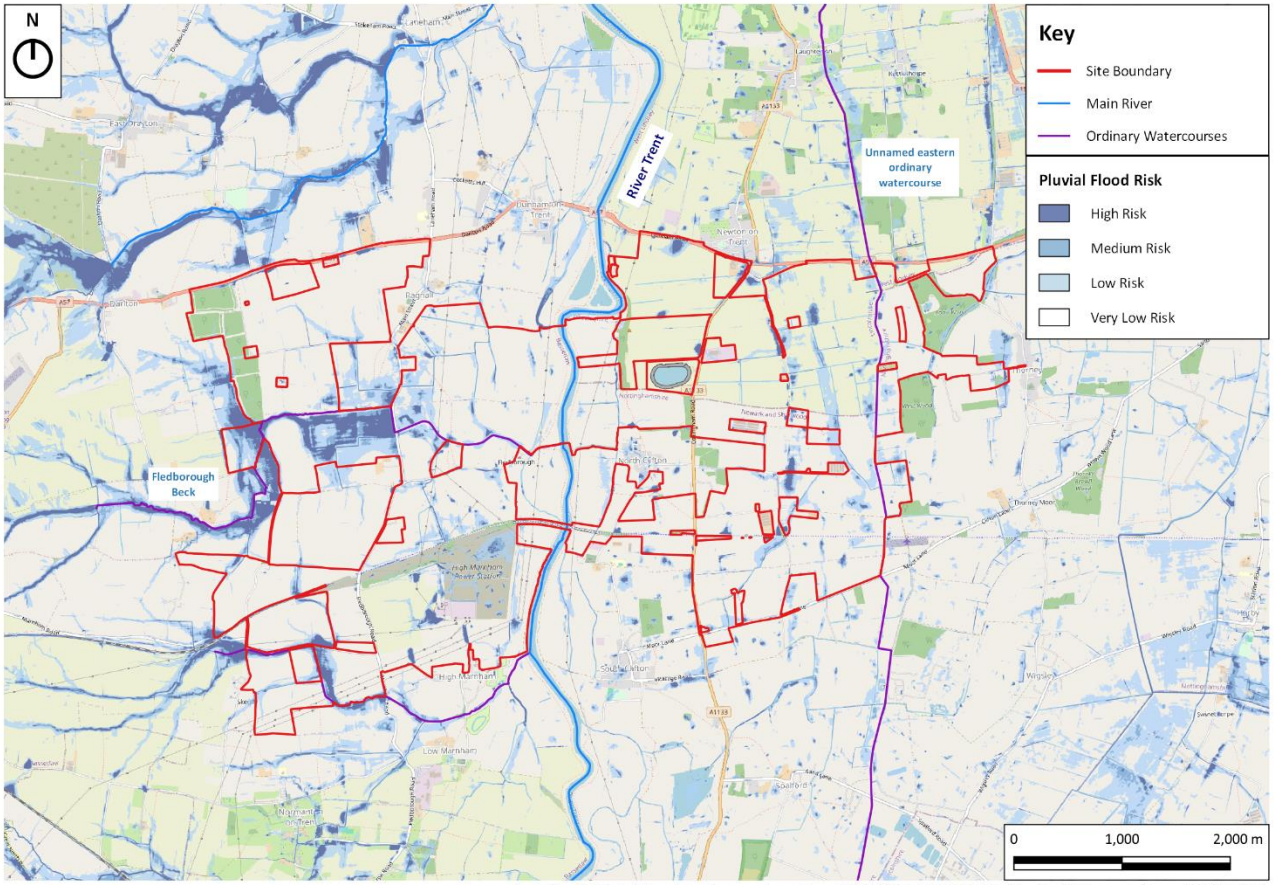
Google Maps (2024). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 05 APRIL 2024)

8.18. The baseline risk of flooding from fluvial sources is therefore considered to be medium to high.

Pluvial

8.19. The EA Flood Risk from Surface Water mapping indicates the majority of our Site is at very low risk of flooding from fluvial sources (see **Figure 8-6**). There are however localised areas within our Site which are shown to be at low, medium and high risk, which are largely associated with the Fledborough Beck in the west and unnamed Ordinary Watercourses in the southwest and east of our Site.

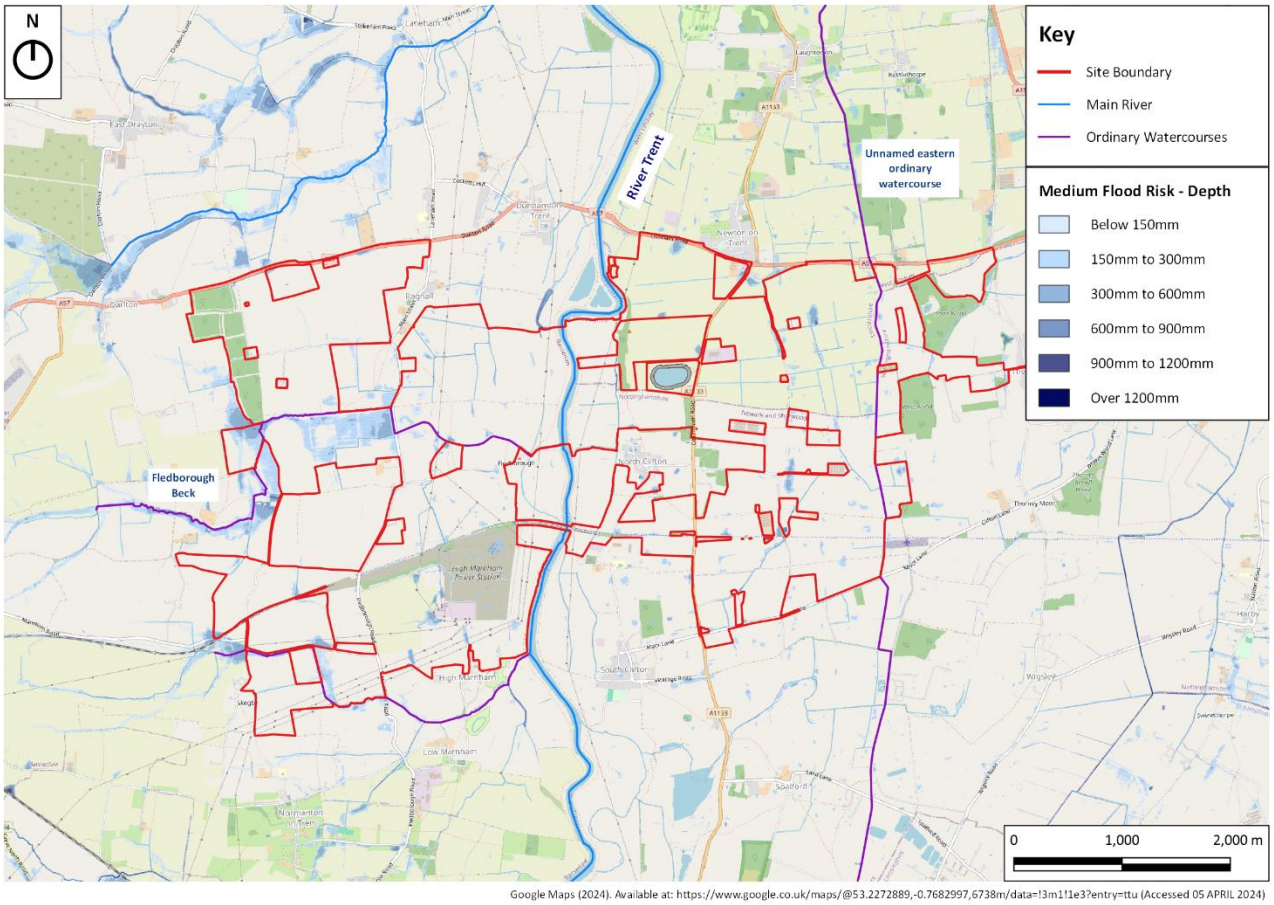
Figure 8-6: Flood Risk from Surface Water



Google Maps (2024). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 05 APRIL 2024)

8.20. Review of the Medium Risk Surface Water Flood depth map shows that flood depths outside of these channels are generally below 300mm, however there are localised areas where flood depths of up to 900mm are experienced (see **Figure 8-7**).

Figure 8-7: Flood Risk Depth from Medium Risk



Google Maps (2024). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 05 APRIL 2024)

The risk of flooding from surface water is therefore in general considered to be low.

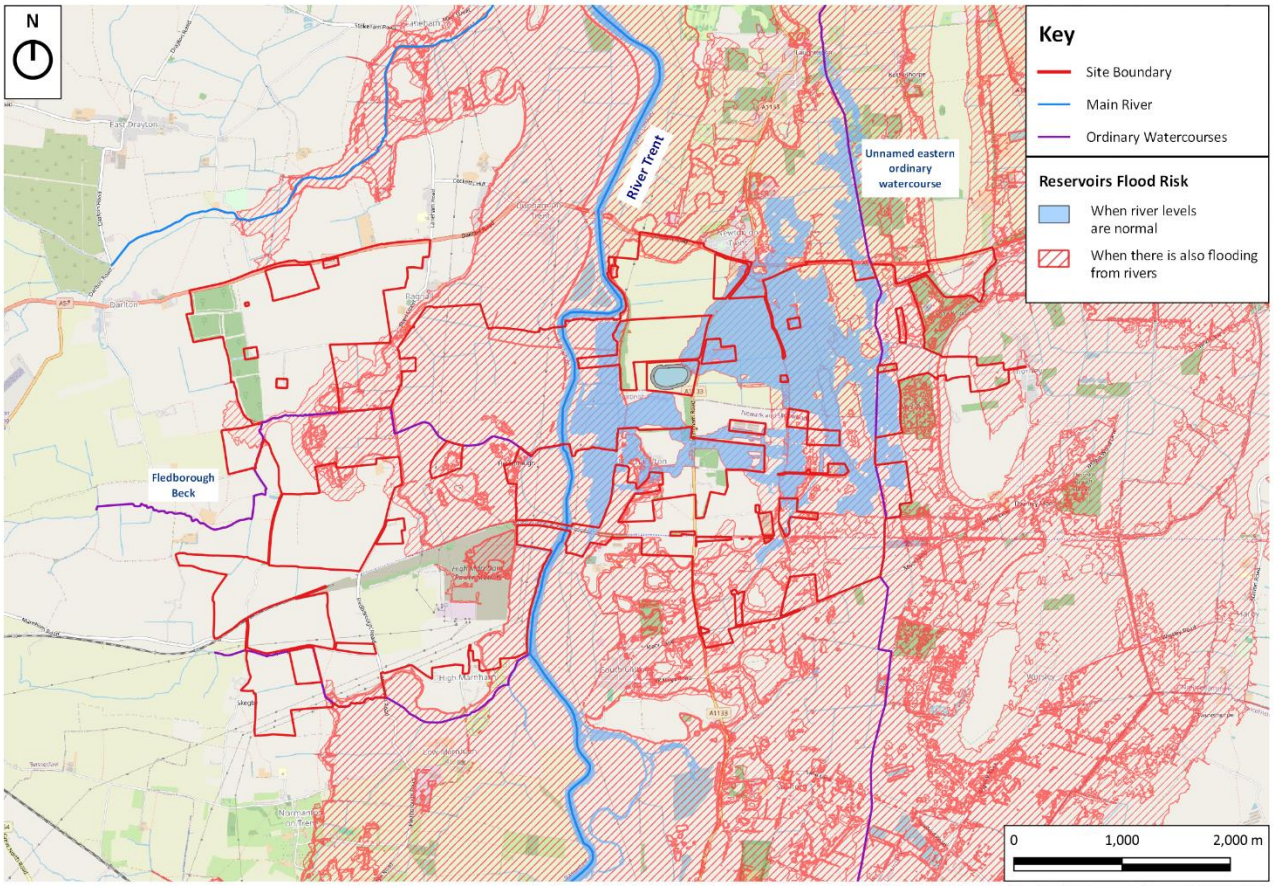
Groundwater

8.21. Mapping from the Bassetlaw Level 1 SFRA shows that the areas of our Site west of the River Trent lie where there is a susceptibility to groundwater flooding ranging from greater than 75% to less than 25%. The areas of highest susceptibility are closest to the Trent's western bank, which is anticipated to be due to the permeable Alluvium superficial deposits.

Artificial Sources

8.22. The EA Flood Risk from Reservoirs mapping indicates that no flooding would be experienced at our Site when river levels are normal. When there is also flooding from rivers however, large areas within the central and eastern areas of our Site are affected by flooding from reservoirs (see **Figure 8-8**). It is worth noting that reservoirs are maintained to a high standard and are inspected regularly, and as such the chance of reservoir failure is considered to be extremely low.

Figure 8-8: Flood Risk from Reservoirs



Google Maps (2024). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 05 APRIL 2024)

Future Hydrological and Hydrogeological Conditions

8.23. It is considered that there would be very minimal changes to our Site in the future baseline scenario. The main implications would occur as a result of climate change impacts on fluvial and surface water flood extents, as well as a natural increase in the greenfield runoff rate as a result of increased rainfall intensity.

8.24. For clarity, the climate change requirements to allow for increases in rainfall intensity and peak river flows are set out below:

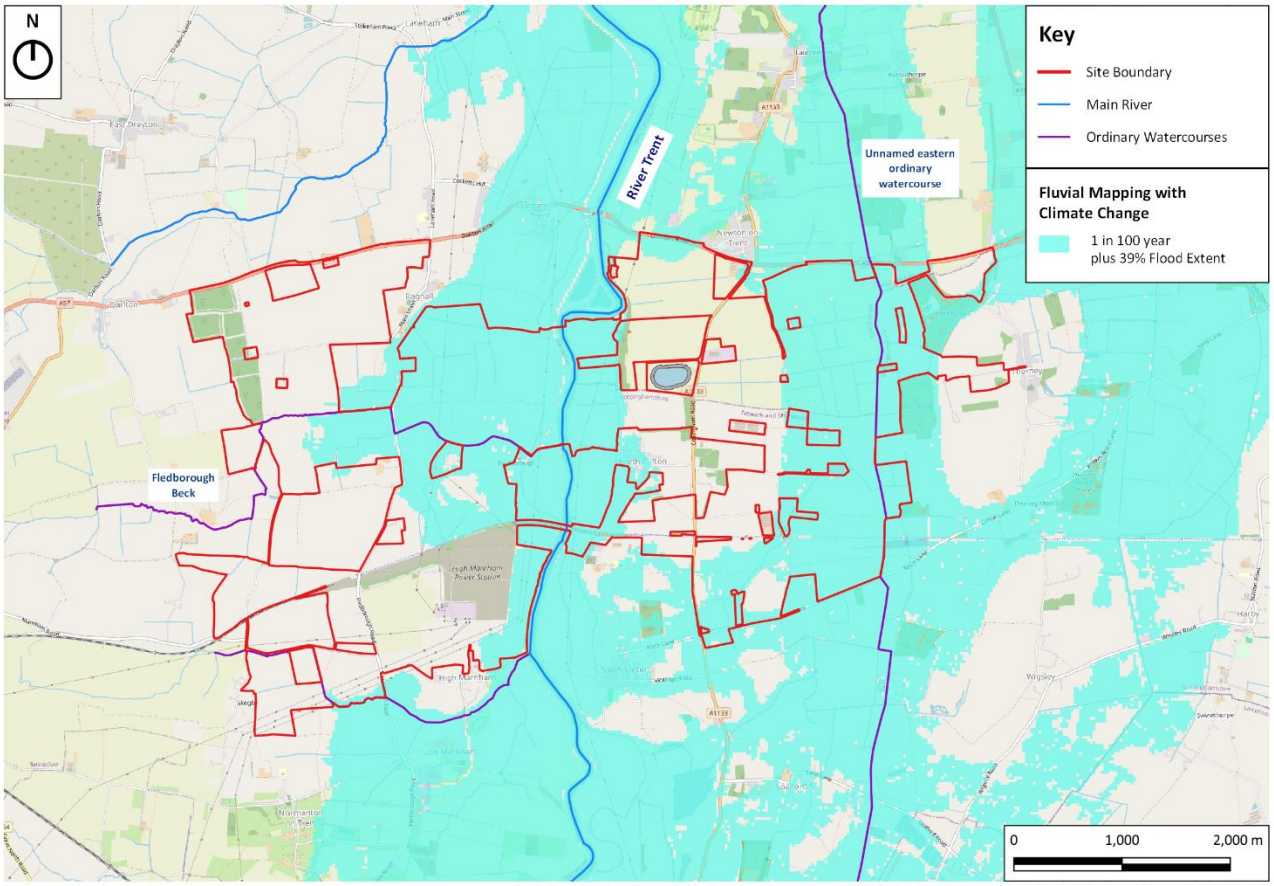
- 40% increase in rainfall intensity when assessing surface water flood risk and drainage systems.
- 39% increase in peak river flows when assessing fluvial flood risk.

8.25. The climate change requirements noted above are both applied to what is referred to as the “design flood event” which for our Project is the 1 in 100 year event.

Future Predicted Results

8.26. The hydraulic modelling from the EA includes results for the 1 in 100 year plus 39% climate change event and the extents in this event are summarised in **Figure 8-9** below.

Figure 8-9: Fluvial Mapping with Climate Change



Google Maps (2024). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 05 APRIL 2024)

8.27. Mapping illustrating the extent of surface water flooding as a result of climate change events are not available as these have not typically been modelled.

Environmental Measures

Embedded Mitigation during Construction and Decommissioning

8.28. An Outline Construction Environment Management Plan (oCEMP) and a Decomissioning Management Plan (DMP) will set out the best practice measures to be followed, and will be adopted to minimise the environmental impacts of the construction and decommissioning works. A more detailed list of mitigation measures is provided in the Construction Environmental Measures Register detailed in **Appendix 4-2** in **Chapter 1-6**, however a high level summary of items that are anticipated to be covered in the oCEMP and oDMP are provided below.

- Any potential changes to the existing fluvial or surface water flow routes will be addressed within the oCEMP and DMP which will outline any temporary measures that would be put in place to control flood flows (such as preventing flows from entering open excavations). No machinery or spoil/materials would be stored within the identified flood extent, to ensure no impact on contractors, or deviation in flow routes due to the proposed works.

- Although there will be some changes to the drainage regime as a result of construction and decommissioning activities on Site (i.e. due to storage areas, facilities, and temporary changes in ground level), these will be addressed within the oCEMP and DMP. The oCEMP and DMP will outline any temporary measures that will be put in place to control surface water runoff (such as through temporary attenuation features) and reduce the risk of polluted surface water from discharging to ground or entering the ordinary watercourses on Site (such as through the use of environmental capture techniques and silt traps).

Embedded Measures for Watercourses

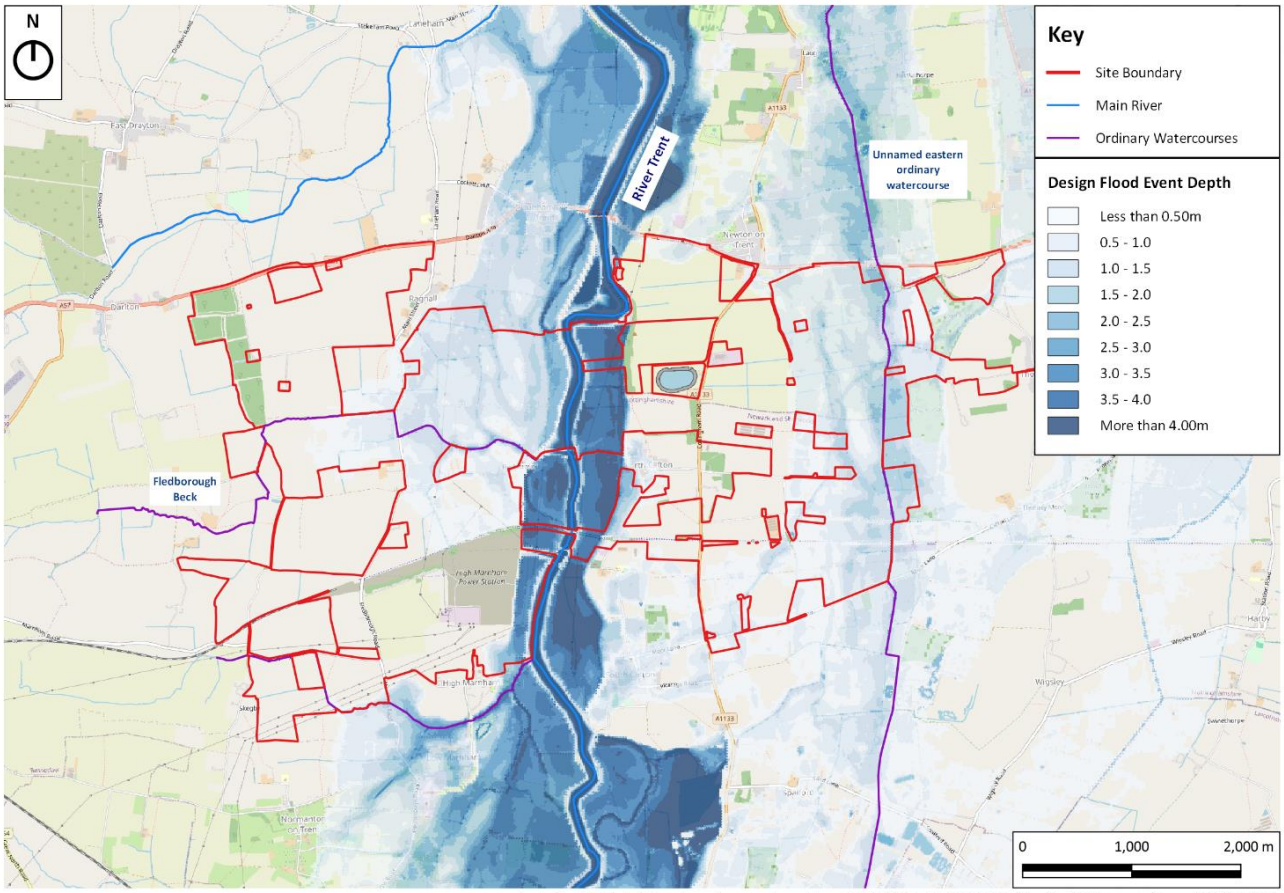
8.29. As detailed in the Design Principles of our Project (which are listed in **Appendix 4-1** in **Chapter 1-6**), it is proposed that suitable offsets (a minimum of 10m from water bodies; 8m from ordinary watercourses such as drains; and 16m from the River Trent) will be provided from the top of bank of all main rivers and ordinary watercourses within our Site to ensure that ecological corridors are maintained and access for maintenance works to the watercourses are provided.

Fluvial Embedded Measures

8.30. As set out previously, the design fluvial flood event for our Site is the 1 in 100 year plus 39% climate change scenario and this has been considered in assessing flood risk and any mitigation required as part of the design.

8.31. The flood depths for this event are summarised in Figure 8-10 below which illustrates that significant depths (greater than 4m) would occur adjacent to the River Trent on the eastern bank and that depths elsewhere generally range from less than 0.5m to 2.0m.

Figure 8-10: Design Flood Event Depth Mapping



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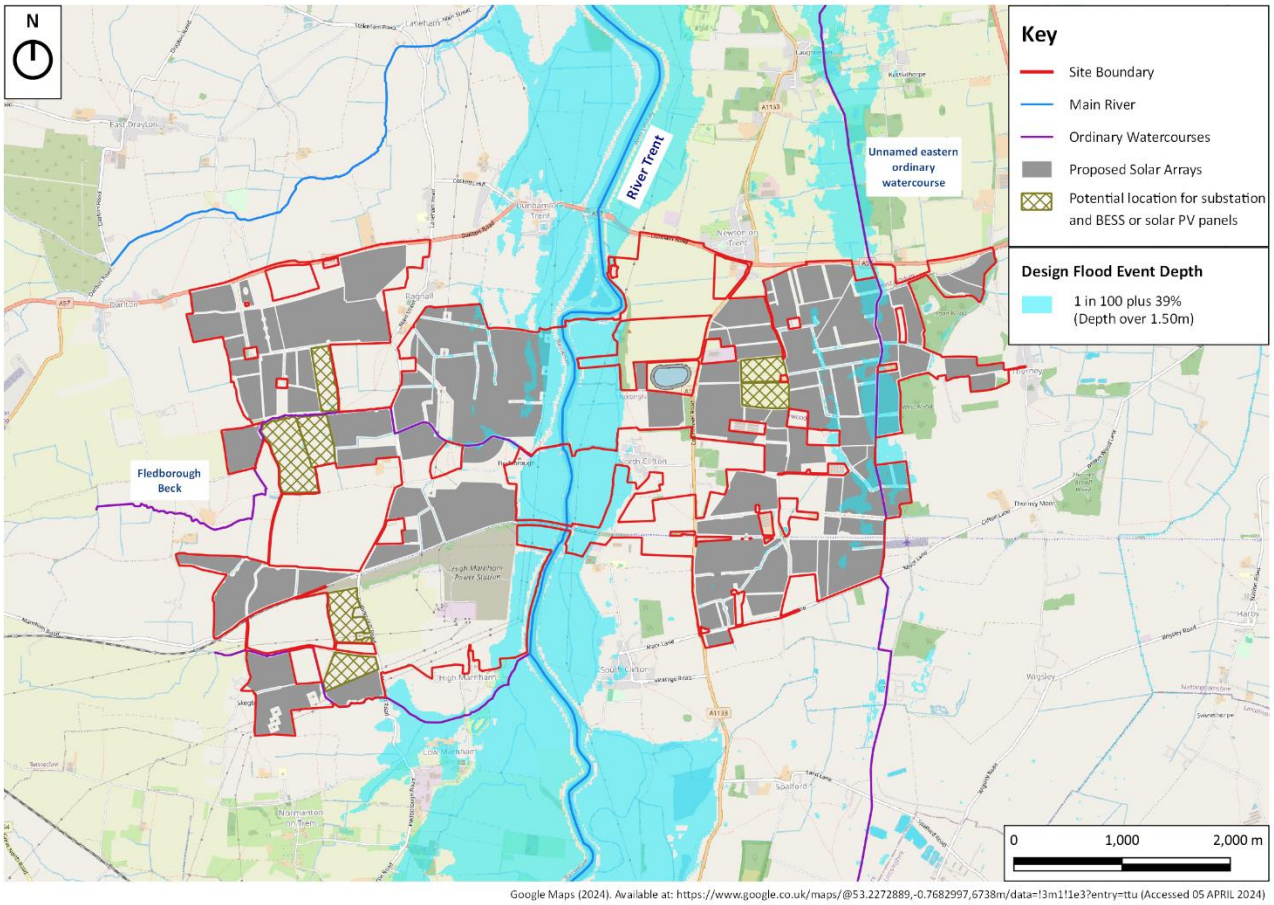
8.32. Based on discussions with the EA, there is a requirement to raise the solar panels to be above the design flood level and an assessment of what height of raising is feasible has been undertaken, whilst taking into account other technical disciplines such as visual impacts.

8.33. The conclusion of this assessment is that the base of the flood panels can be reasonably raised to be 1.8m above ground level. Taking into account a 300mm freeboard (i.e. gap between the flood level and base of the panels to allow for debris in the event of flood to pass beneath the solar panels), the depth of flooding that has been used to inform where panels can be located is 1.5m and the extent of these depths is shown in **Figure 8-11** below.

Figure 8-11: Design Flood Event Depth Greater than 1.5m



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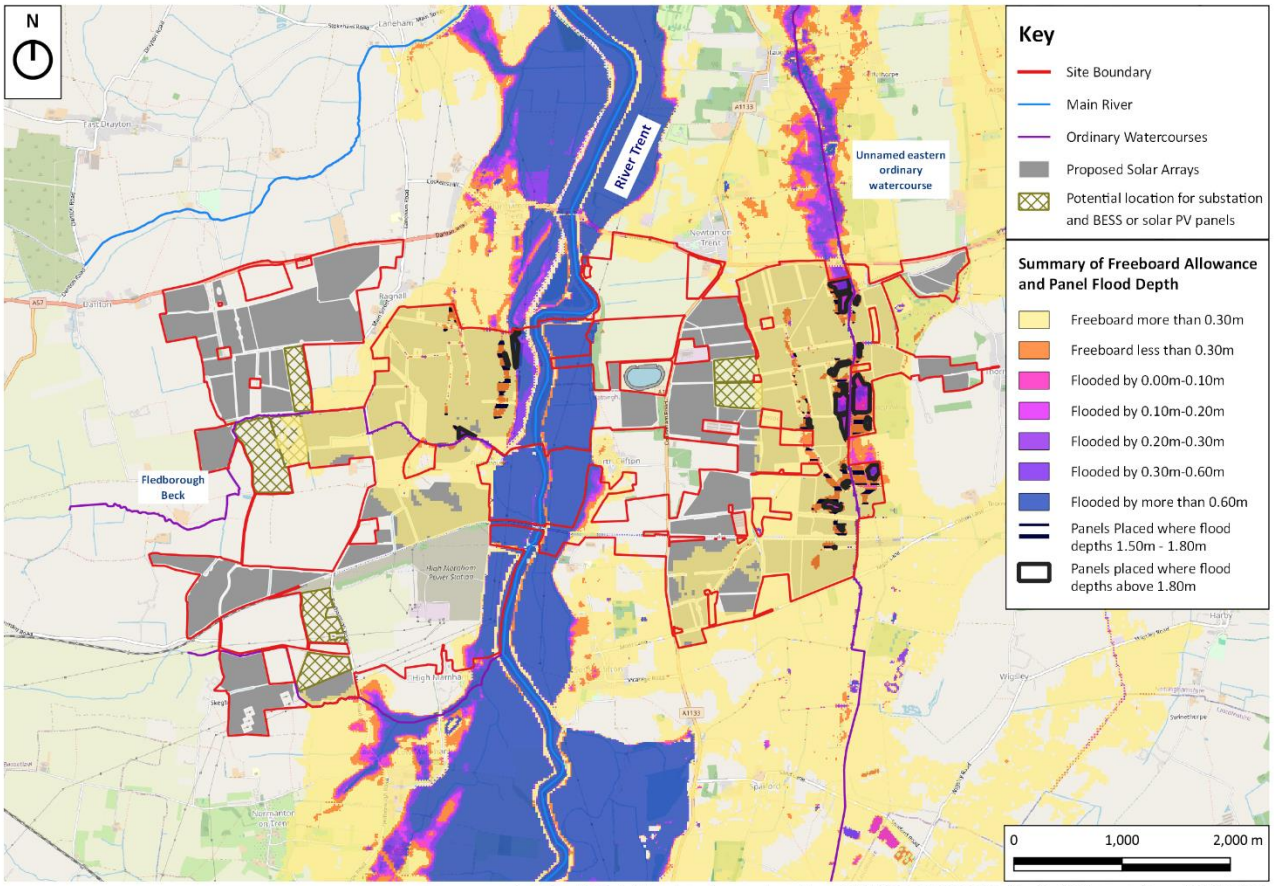
8.34. In general, it is proposed that within our Project solar panels will not be located in areas where flood depths exceed 1.5m to ensure that the solar array will remain operational in flood conditions and the freeboard allowance will ensure there is no significant blockage to flood flows.

8.35. There are however some localised positions within our Project where this is not feasible, namely to the far eastern boundary of our Site and on the western banks of the River Trent. Although in these locations, the depth of flooding will be greater than 1.5m, many of the panels set at 1.8m above ground will still be above the flood level but will have a freeboard of less than 300mm. Only a small portion of the solar panels would experience flooding at their base and the depth of flooding to the panels will be limited, as illustrated in **Figure 8-12**.

8.36. It is worth noting that panels will only be raised to the maximum height of 1.8m above ground level where this is necessary. In locations where flood depths are lower, the panels will be raised accordingly to a lower height above ground level.

8.37. This approach has been discussed and agreed in principle with the EA.

Figure 8-12: Summary of Freeboard Allowance and Panel Flood Depths



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8.38. With regards to the impact in a residual (breach) event (i.e. the flood defence banks along the River Trent failing), a similar assessment of depths greater than 1.5m and freeboard considerations has been undertaken. With regards to the depths greater than 1.5m, within our Project the extent to the east is no worse in the breach scenario when compared to the design flood event, meaning that the conclusions outlined for this area remain. For the areas to the west of the River Trent within our Project, the extent of flooding greater than 1.5m in depth is larger than in the design event however, a freeboard will still be provided for the majority of the area, it is just that this freeboard is less than 300mm. Although there will be a greater portion of solar panels experiencing flooding at their base in the breach scenario, this is considered to be a residual event and the risk of occurrence and impact to our Project is considered to be acceptable. This approach has been discussed and agreed in principle with the EA.

8.39. Wherever possible, within our Project, sensitive equipment (such as BESS and substations) is proposed to be located outside of the flood extents.

8.40. In addition wherever possible, it is proposed that no land raising will be undertaken as part of our Project to ensure that there is no increase in flood risk to our Site or surrounding areas. There may be some limited locations where land raising within the floodplain is required to provide protection to proposed infrastructure (such as inverters) that cannot be located outside the floodplain. To accommodate for these areas and ensure there is no increase in flood risk, level for level floodplain compensation will be provided. This would be assessed within the next stages.

Surface Water Flooding (Pluvial) Embedded Measures

8.41. The impact that surface water flooding will have on our Project has been considered within the parameter plan and Design Principles (see **Appendix 4-1** in **Chapter 1-6**), and where possible the solar infrastructure has been located outside of areas of surface water flooding. It is noted that the above fluvial embedded measures will also provide mitigation to surface water flooding.

Surface Water Drainage Embedded Measures

8.42. For the solar array, it is proposed that rainfall hitting the panels will simply discharge to the retained natural ground beneath, therefore having little to no effect when compared to the greenfield scenario. It is however proposed that Sustainable Drainage Systems (SuDS) will be incorporated wherever practicable to provide multi-functional benefits associated with water quantity, quality and biodiversity. SuDS are designed to mimic natural drainage as closely as possible and include features such as ponds, swales (managed ditches) and filter drains, all of which provide multifunctional benefits.

8.43. For the larger areas of hardstanding (such as the BESS and substation), a quantified drainage strategy will be produced, confirming the attenuation requirements in order to restrict runoff to match the greenfield rates before discharging to the surrounding watercourses. By restricting to the greenfield rate, it will ensure that there are no negative impacts with regards to flood risk and existing watercourses. Again, SuDS features will be incorporated within these areas to provide water quantity, quality and biodiversity benefits.

Stakeholder Consultation

Table 8-1: Overview **of Stakeholder Consultation**

Stakeholder	Date of Consultation	Relevant Considerations for the PEIR
EA	13/09/2023	Embedded mitigation for fluvial flood risk in the design flood event agreed.
EA	27/02/2024	Updates to our Project provided and approach to mitigation/impacts in a breach scenario agreed.
LLFA	02/05/2024	Approach to surface water drainage embedded measures agreed in principle.

Potential Likely Significant Effects Scoped Out

8.44. **Table 8-2** presents the elements which have been scoped out as it is considered no likely significant effects will occur.

Table 8-2: Effects Scoped Out

Effects Scoped Out	Justification
Foul Water	No assessment is proposed of the effect that increased foul flows will have on the capacity of the surrounding Anglian Water and Severn Trent network and wastewater treatment works. Construction impacts will be temporary and using existing foul water infrastructure or more often, would be served by welfare facilities that are unconnected to the mains, thus meaning that there would be only very limited foul flow increases. The potential for increases during operation are also limited with maintenance of our Project being undertaken by a small number of people and comprising only repairs and cleaning of the panels and other infrastructure. As a result, it is proposed to scope out the effect of changes to the foul water network from detailed assessment, which has been agreed by PINs in the scoping opinion (see Volume 3: Scoping Consultation).

Preliminary Environmental Assessment

Construction and Decommissioning Phase

Construction and Decommissioning – Flood Risk and Drainage

8.45. The potential flood and drainage risks associated with the construction and decommissioning are summarised below:

- Increased localised flood risk due to earthworks
- Impacts to water quality due to silts and sediments
- Impacts to water quality due to chemical spillages
- Impacts to water quality due to cement and concrete dust

Approach

8.46. There is no specific quantitative methodology that allows the flood risk and drainage effects to be assessed, however the assessment is based on technical understanding of flood risk at our Site and how runoff will be managed during construction and decommissioning.

8.47. With this in mind, determining the effects of both the construction and decommissioning is based on professional judgement and is qualitative. The experience of the consultants that have prepared this chapter, who are competent experts for the purpose of the EIA Regulations, is set out in **Appendix 1-1** in **Chapter 1-6**.

Receptors and Receptor Sensitivity

8.48. Receptors for any increased flood risk are as follows:

- Users of the Site
- Areas surrounding our Site and residents in these areas

8.49. Receptors relating to water quality are as follows:

- The existing watercourses within and adjacent to Site
- Groundwater

Receptor sensitivity classifications have been determined based on professional experience and are summarised below.

- High - High importance and rarity, national scale, and limited potential for substitution
- Medium - Medium or high importance and rarity, regional scale, limited potential for substitution
- Low - Low or medium importance and rarity, local scale
- Negligible - Very low importance and rarity, local scale

Defining Impacts

8.50. The likely construction and decommissioning effects are based upon understanding of the construction and decommissioning works, including the optionality of the cable crossing the River Trent. A qualitative assessment of likely effects has been carried out.

Preliminary Assessment

8.51. As set out previously, an oCEMP will be adopted to minimise the environmental impacts of the construction and an ODMP will be adopted setting out best practice measures which will be incorporated during the decommissioning works. A detailed list of mitigation measures relating to the construction phase is provided in **Appendix 4-2** in in **Chapter 1-6**.

8.52. Following the implementation of these environmental management plans, there will be no likely significant effects to the receptors during construction or decommissioning.

Operational Phase

Flood Risk Effects on Users of the Site

Approach

8.53. As set out previously, there is no specific quantitative methodology that allows the flood risk and drainage effects to be assessed. Determining the effects of the completed development is therefore based on professional judgement and is qualitative.

Receptors and Receptor Sensitivity

8.54. The receptor for this effect are the users of our Project, such as electrical engineers undertaking works on Site. The sensitivity of this receptor is outlined in **paragraph 8.48** above.

Defining Impacts

8.55. The effects have been defined using professional judgement, by considering numerous factors including the magnitude of impact the operational development could have on flood risk at our Site, taking in to account the environmental measures that will be implemented.

Preliminary Assessment

8.56. A Flood Risk Assessment (FRA) will be submitted as part of our DCO application. This will set out the technical details to ensure that flood risk is not increased as a result of our Project.

8.57. Although our Project is located in an area with medium to high risk of flooding, the embedded mitigation measures noted previously that will be incorporated within the design will ensure there is no increase in flood risk to users of our Site (see **Appendix 4.1** in **Chapter 1-6** relating to the Design Principles of our Project). In addition, an Outline Operational Environmental Management Plan will set out the measures to be undertaken in the event of a flood during the operational phase of our Project.

8.58. Our Project will be implemented in line with the Design Principles and the measures set out in our FRA (which will be submitted as part of the DCO application), and as such, there will be no likely significant effects to the receptors during operation.

Next Steps

8.59. The FRA will be prepared and submitted with the DCO application. The FRA will:

- Assess flood risk in greater detail;
- Outline the specific measures that will be adopted to ensure that flood risk is not increased as a result of our Project;
- Outline the management measures for surface water runoff to ensure there is no increase in flood risk or pollution potential as a result of our Project; and
- Assess the hydrogeology and impact of our Project on groundwater flows in greater detail;

Flood Risk Effects to Areas off Site

Approach

8.60. As set out previously, there is no specific quantitative methodology that allows the flood risk and drainage effects to be assessed. Determining the effects of our Project is therefore based on professional judgement and is qualitative.

Receptors and Receptor Sensitivity

8.61. The receptor for this effect is the areas surrounding our Site and residents in these areas that could be impacted by any changes in flood risk. The sensitivity of this receptor is outlined in **paragraph 8.48** above.

Defining Impacts

8.62. The effects have been defined using professional judgement, by considering numerous factors including the magnitude of impact our Project could have on flood risk at and in the vicinity of our Site, taking in to account the environmental measures that will be implemented.

Preliminary Assessment

8.63. As set out previously, one purpose of the FRA is to ensure that flood risk is not increased as a result of our Project.

8.64. Although our Project is located in an area with medium to high risk of flooding, mitigation measures will be embedded into the design to ensure there is no increase in flood risk to areas off Site (see **Appendix 4.1** in **Chapter 1-6** for further details on the Design Principles).

8.65. This includes raising of solar panels to limit the potential for blockages of flood flows and minimising any raising of land within our Site. As set out previously, should land raising within the floodplain be required, floodplain compensation will be provided to ensure there is no increase in flood risk.

8.66. Our Project will be implemented in line with the Design Principles and the measures set out in our FRA (which will be submitted as part of the DCO application), and as such, there will be no likely significant effects to areas off Site during operation.

Next Steps

8.67. We will be preparing the FRA which will be d submitted as part of the DCO application and will continue to engage with the relevant consultees including the Environment Agency and the host authorities, on the design of our Project relating to flood risk and drainage design.

Effects of Changes in Quality and Quantity of Surface Water Runoff

Approach

8.68. As set out previously, there is no specific quantitative methodology that allows the flood risk and drainage effects to be assessed. Determining the effects of our Project is therefore based on professional judgement and is qualitative.

Receptors and Receptor Sensitivity

8.69. The receptors for this effect are:

- Watercourses within and adjacent to our Site i.e. the River Trent and ordinary watercourses that accommodate surface water runoff from our Site in the operational phase.
- Areas surrounding our Site and residents in these areas that could be impacted by any changes to quantity and rate of discharge as a result of our Project during the operational phase.

8.70. The sensitivity of these receptors are outlined in paragraph 8.48 above.

Defining Impacts

8.71. The effects have been defined using professional judgement, by considering numerous factors including the magnitude of impact the operational development could have on water quality and runoff from our Site, taking in to account the environmental measures that will be implemented.

Preliminary Assessment

8.72. As set out previously mitigation measures will be embedded into the design of our Project to ensure that the quantity and quality surface water runoff is sufficiently managed. This includes the use of SuDS to provide treatment and attenuation where necessary to ensure that runoff rates are restricted to match the natural runoff rate.

8.73. As part of the FRA, the management of surface water runoff will be discussed and outlined in detail to ensure that there is no increase in flood risk or pollution potential as a result of our Project. As above, the FRA will be submitted as part of our DCO application.

8.74. Our Project will be implemented in line with the Design Principles, including the measures set out in our FRA (which will be submitted as part of the DCO application), and as such, there will be no likely significant effects to changes in the quality and quantity of surface water runoff during operation.

Next Steps

8.75. We will be preparing the FRA which will provide further detail on our surface water drainage strategy along with the water treatment. The FRA will be submitted as part of the DCO application.

Hydrogeology and Groundwater Flows

Approach

8.76. There is no specific quantitative methodology that allows the hydrogeology and groundwater effects to be assessed. Determining the effects of our Project is therefore based on professional judgement and is qualitative.

Receptors and Receptor Sensitivity

8.77. The receptor for the effect is groundwater quality and groundwater flood risk to our Site/surrounding area that could be impacted as a result of potential pollution or impacts to groundwater flows.

8.78. The sensitivity of these receptors are outlined in **paragraph 8.48** above.

Defining Impacts

8.79. The effects have been defined using professional judgement, by considering numerous factors including the magnitude of impact our Project could have on groundwater quality and flows, taking in to account the environmental measures that will be implemented.

Preliminary Assessment

8.80. As set out previously, the management of surface water runoff, including treatment will be detailed within the FRA, which will be submitted as part of our DCO application, to ensure that the potential for pollution to groundwater is minimised.

8.81. With regards to groundwater flows, with the exception of foundations (for the solar panels and associated infrastructure such as sub-stations and battery storage) and cable routes, there will be no below ground structures included within our Project. The potential for impacts to groundwater flow is therefore anticipated to be limited however this will be assessed in greater detail within the FRA.

8.82. It is anticipated that there will be no likely significant effects to the receptors during operation.

Next Steps

8.83. The FRA will be prepared – see paragraph 8.59 for further information.

Potable Water Demand[6]

Approach

8.84. As set out previously, there is no specific quantitative methodology that allows potable water effects to be assessed. Determining the effects of our Project is therefore based on professional judgement and is qualitative.

[6] Water taken from the water suppliers which can be used for human consumption

Receptors and Receptor Sensitivity

8.85. The receptor for this effect is the capacity of the Anglian Water and Severn Trent water network.

8.86. The receptor sensitivity classifications are in line with those set out in **paragraph 8.48**.

Defining Impacts

8.87. The effects have been defined using professional judgement, by considering numerous factors including the magnitude of impact the operational development could have on water capacity.

Preliminary Assessment

8.88. All developments have a duty to reduce water consumption and to operate efficiently. This is not however, a matter for EIA, because water consumption is a strategic policy matter and that the overall supply and demand to sustain planned growth, without posing a risk of environmental deterioration is Anglian Water and Severn Trent Water's statutory responsibility under their Water Resource Management Plans (these plans set out the proposals to ensure continued delivery of a secure and reliable supply of water within the regions).

8.89. Given it is the responsibility of Anglian Water and Severn Trent Water to provide water and to ensure that any increase will have no negative impacts on environmental receptors it is anticipated therefore that there will be no likely significant effects during operation.

Next Steps

8.90. We will be providing further details on water consumption because of our Project. Where possible we will quantify the amount of portable water currently used within our Site and the amount of portable water required for our Project. We will also consider any measures to reduce the use of water for our Project (such as rainwater harvesting for any landscaping watering).

8.91. Potable water demand will be quantified and discussions will be held with Anglian Water and Severn Trent Water to determine any capacity concerns.

Conclusions

8.92. **Table 8-3** presents a summary of the preliminary likely significant effects, with further information. It also includes the next steps to be undertaken as part of the Environmental Impact Assessment.

Table 8-3: Summary of Likely Significant Effects

Element	Preliminary Likely Significant Effect	Further Information	Next Steps
Construction and Decommissioning – Flood Risk and Drainage	No likely significant effects	The adoption of a oCEMP and outline Decommissioning Environmental Management Plan will mitigate any significant effects.	
Operational Phase – Flood Risk Effects on Users of our Site	No likely significant effects	Following the principles of the FRA and FEMP will ensure flood risk mitigation is provided.	Flood risk will be quantified in greater detail within the FRA where the embedded mitigation will also be outlined.
Operational Phase – Flood Risk Effects to Areas off Site	No likely significant effects	Following the principles of the FRA and FEMP will ensure flood risk mitigation is provided.	Flood risk will be quantified in greater detail within the FRA where the embedded mitigation will also be outlined.
Operational Phase – Effects of Changes in Quality and Quantity of Surface Water Runoff	No likely significant effects	Following the principles of the FRA and Drainage Strategy will ensure mitigation is provided.	The surface water drainage strategy along with the water treatment will be quantified within the FRA.

Operational Phase – Hydrogeology and Groundwater Flows	No likely significant effects	Following the principles of the FRA and Drainage Strategy will ensure mitigation is provided.	The hydrogeology and impact on groundwater flows will be assessed in greater detail within the FRA.
Operational Phase – Potable Water Demand	No likely significant effects	Environmental assessments and permitting to be undertaken by Anglian Water to ensure increased demand will have no negative impacts on environmental receptors.	Potable water demand will be quantified and discussions will be held with Anglian Water to determine any capacity concerns.

Appendices

Appendix 8-1: Hydrology and Hydrogeology Legislation and Policy

Appendix 8-1: Hydrology and Hydrogeology Legislation and Policy

Review of Policy, Legislation and Relevant Guidance

Legislation, planning policy and guidance relating to hydrology and hydrogeology, and pertinent to our Project comprises:

Legislation

The European Water Framework Directive (WFD) (2000)

The WFD establishes a framework for the protection of inland surface waters, transitional waters, coastal waters, and groundwater. It requires:

- environmental objectives should be set to ensure that good status of groundwater is achieved and that its deterioration is avoided. This includes any upward sustaining trend in the concentration of a pollutant must be identified and reversed;
- a good status of groundwater requires early action and stable long-term planning of protective measures, owing to the natural time lag in its formation and renewal; and
- monitoring programmes should cover monitoring of the chemical and quantitative status of groundwater.

Environmental Protection Act (1990)

Part 2A provides a statutory regime for the identification and remediation of 'Contaminated Land'. It introduces a statutory definition of 'contaminated land' based on significant harm or the likelihood of significant harm or the pollution or likely pollution of controlled waters (all groundwater, inland waters, and estuaries, excluding water perched above the zone of saturation). Local authorities are the primary regulators under the Part 2A regime, with a duty to identify contaminated land in their area.

Water Resources Act (1991) (as amended)

This Act, specifically Part 3 sets controls of pollution of water sources. It contains information about water quality objectives, powers to prevent and control pollution and pollution offences. This Act requires the Environment Agency to giver consent for works in, over, under or adjacent to 'main rivers'. Main rivers are classified watercourses over which the EA has jurisdiction.

Land Drainage Act (1991)

This Act requires that landowners maintain the flow of water in watercourses.

Environment Act (1995)

This Act established the Environment Agency and transferred to it powers over the control of pollution and the conservation and enhancement of natural resources and the environment.

The Groundwater (England and Wales) Regulations (2009)

Under these regulations, rules are set out for the approval/granting of Environment Agency permit, consent to which is under other regulations. Through these regulations, further enforcement powers are given to the Environment Agency, detail penalties and offences, if discharge of a hazardous substance or non-hazardous pollutant into a watercourse occurs without a permit.

The Flood Risk Regulations (2009).

Protecting the community from the risk and impact of flooding is at the centre of the Floods Directive 2007/60/EC. This Directive, implemented via these Regulations in the UK, provides a new approach to managing flood risk on a catchment-wide scale which applies to all sources of flooding (river, lakes, flash floods, urban floods, coastal floods, including storm surges).

National Planning Policy

Overarching National Policy Statement for Energy (EN-1) (2023)

This provides overarching government policy on energy NSIPs, how planning applications relating to energy will be assessed, and the way in which any impacts and mitigation measures will be considered. Part 5, Section 5.8 of this policy statement specifically relates to Flood Risk.

Paragraph 5.8.13 states that *"A site-specific flood risk assessment should be provided for all energy projects in Flood Zones 2 and 3 in England or Zones B and C in Wales. In Flood Zone 1 in England or Zone A in Wales, an assessment should accompany all proposals involving:*

- *sites of 1 hectare or more;*
- *land which has been identified by the EA or NRW as having critical drainage problems*
- *land identified (for example in a local authority strategic flood risk assessment) as being at increased flood risk in future;*
- *land that may be subject to other sources of flooding (for example surface water); and*
- *where the EA or NRW, Lead Local Flood Authority, Internal Drainage Board or other body have indicated that there may be drainage problems."*

National Policy Statement for Renewable Energy Infrastructure (EN-3) (2023)

This provides specific government policy on how renewable energy NSIPs should be assessed an determined, and the way in which any impacts and mitigation measures will be considered. Specific extracts relating to our Project are as follows:

Paragraph 2.10.84 states that *"Where a Flood Risk Assessment has been carried out this must be submitted alongside the applicant's ES. This will need to consider the impact of drainage. As solar PV panels will drain to the existing ground, the impact will not, in general, be significant."*

Paragraph 2.10.154 states that *"Water management is a critical component of site design for ground mount solar plants. Where previous management of our Site has involved intensive agricultural practice, solar sites can deliver significant ecosystem services value in the form of drainage, flood attenuation, natural wetland habitat, and water quality management."*

National Policy Statement for Renewable Energy Infrastructure (EN-5) (2023)

There are no policies that specifically relate to hydrology and hydrogeology.

National Planning Policy Framework (2023)

The National Planning Policy Framework (NPPF) is an overarching document which sets out government planning policy for development outside of the NSIP regime in England, and how this is expected to be applied by local authorities and developers. The NPPF can be an important and relevant consideration for NSIPs as well, but in the event of any conflict, the NPS policy prevails.

Section 14 sets out the Government's over-arching planning policies in relation to meeting the challenge of climate change, flooding and coastal change.

Local Planning Policy

Local planning policy relevant to our Site is set out below. Local policies can be an important and relevant consideration for NSIPs as well, but in the event of any conflict, the NPS policy prevails.

Newark and Sherwood District Council (2023) Local Development Framework, Amended Allocations and Development Management Development Plan Document (AADMDPD), Submission Version, January 2024

This amended local Development Plan Document (DPD) has been compiled to ensure that the wider development framework within Newark and Sherwood District Council sufficiently allocates land for development to meet the needs of the area, up until 2033.

Relevant to our Project is Policy DM5(b) 10. Flood Risk and Water Management, states:

"The Council will, in line with Policy DM5(c)aim to steer new development away from areas at highest risk of flooding. Development proposals within Environment Agency Flood Zones 2 and 3 and areas with critical drainage problems will only be considered where it constitutes appropriate development and it can be demonstrated, by application of the Sequential Test, that there are no reasonably available sites in lower risk Flood Zones.

Where development is necessary within areas at risk of flooding it will also need to satisfy the Exception Test by demonstrating it would be safe for the intended users without increasing flood risk elsewhere and where possible, pursue opportunities to reduce flood risk overall.

All application for new development shall demonstrate that all surface water discharges have been carried out in accordance with the principles laid out within the drainage hierarchy, in such that a discharge to the public sewerage systems are avoided, where possible.

All major developments shall ensure that Sustainable Drainage Systems (SuDS) for the management of surface water run-off are put in place unless demonstrated to be inappropriate.

All schemes for the inclusions of SuDS should demonstrate they have considered all four aspects of good SuDS design, Quantity, Quality, Amenity and Biodiversity, and the SuDS and development will fit into the existing landscape.

The completed SuDS schemes should be accompanied by a maintenance schedule detailing maintenance boundaries, responsible parties and arrangements to ensure that the SuDS are maintained in perpetuity.

Where possible, all non-major development should look to incorporate these same SuDS principles into their designs."

In addition Policy DM5(c) Sequential Test states:

"In-line with Core Policy 10 of the Amended Core Strategy, the Council will follow a sequential approach to development and flood risk, seeking to steer new development away from those areas at highest risk. Development will not be permitted if there are reasonably available sites appropriate for the proposed development in areas at lower risk of flooding.

The area of search within which to undertake the Test will normally be District-wide, unless it is appropriate for this to be further refined having had regard to relevant policy objectives within the Development Plan and/or any valid functional requirements of the proposed use. With specific regard to housing development, the presence of a settlement-level housing needs assessment will not normally justify restricting application of the test to that location, except in the circumstances outlined below.

In order to help maintain the viability and vitality of rural villages below the Principal Village level of the Settlement Hierarchy greater flexibility will be provided, where the presence of large areas in Flood Zones 2 and 3 constrains the availability of suitable land and the proposed development is necessary to sustain the existing community. To demonstrate that housing development is necessary to sustain an existing community, proposals will be expected to be supported by:

- *An up-to-date and appropriately constituted Housing Needs Survey, specific to that community and identifying a form of need which the proposal would contribute towards meeting; and/or*
- *Provision of a robust case that the proposal would make a meaningful contribution towards the sustaining of services and facilities in that community.*

Where a 'made' Neighbourhood Plan provides support for housing development within a defined settlement boundary, or for rural affordable housing adjacent to that boundary under Core Policy 2, then this will provide justification for restriction of the Test to the Neighbourhood Area.

Where the undertaking of the Test is necessary then applicants are encouraged to positively engage with the District Council at an early stage in order to agree appropriate parameters."

Newark & Sherwood District Council, Amended Core Strategy Development Plan (2019)

The Amended Core Strategy for Newark and Sherwood District is part of the Local Development Framework for the area. This strategy outlines the overarching issues and objectives to address over a 20-year period, contextualising this into wider vision, series of objectives and core policies toward delivery.

Core Policy 9 "Sustainable Design" states that *"The District Council will expect new development proposals to demonstrate a high standard of sustainable design that both protects and enhances the natural environment and contributes to and sustains the rich local distinctiveness of the District. Therefore all new development should:*

…

- *Through its design, pro-actively manage surface water including, where feasible, the use of Sustainable Drainage Systems…*

The District Council will prepare an SPD which provides guidance to developers on the sustainable design of development and the consideration of making homes fit for purpose over their lifetime including ensuring adaptability and provision of broadband."

Core Policy 12 "Biodiversity and Green Infrastructure" is relevant to our Project and states that *"The District Council will seek to conserve and enhance the biodiversity and geological diversity of the District by working with partners to implement the aims and proposals of the Nottinghamshire Local Biodiversity Action Plan, the Green Infrastructure Strategy and the Nature Conservation Strategy. The District Council will therefore:*

Expect proposals to take into account the need for continued protection of the District's ecological, biological and geological assets. With particular regard to sites of international, national and local significance, Ancient Woodlands and species and habitats of principal importance identified in Section 41 of the Natural Environment and Rural Communities Act 2006 and in the Nottinghamshire Local Biodiversity Action Plan;

Seek to secure development that maximises the opportunities to conserve, enhance and restore biodiversity and geological diversity and to increase provision of, and access to, green infrastructure within the District;

Promote the appropriate management of features of major importance for wild flora and fauna;

Provide for Suitable Alternative Natural Green Space to reduce visitor pressure on the District's ecological, biological and geological assets, particularly in the Newark area and for 5kms around the Birklands and Bilhaugh Special Area of Conservation;

…."

Central Lincolnshire Local Plan (2023)

The Local Plan for the central Lincolnshire area sets out the approach to planning policy and overarching development allocations to drive growth in the area over a 20-year period. The Local Plan is contextualised into a wider vision, series of objectives and core policies toward delivery.

Specific policies detailed in the Local Plan and are relevant to our Project, as below.

Policy S20 “Resilient and Adaptable Design” states that:

the nature of the development makes it impracticable to incorporate a green roof.

Adaptable design

Applicants should design proposals to be adaptable to future social, economic, technological and environmental requirements in order to make buildings both fit for purpose in the long term and to minimise future resource consumption in the adaptation and redevelopment of buildings in response to future needs. To meet this requirement, applicants should undertake the following, where applicable:

…

8. Is resilient to flood risk, from all forms of flooding (see Policy S21).”

Policy S21 “Flood Risk and Water Resources” states that:

“Flood Risk

All development proposals will be considered against the NPPF, including application of the sequential and, if necessary, the exception test. Through appropriate consultation and option appraisal, development proposals should demonstrate:

> *a) that they are informed by and take account of the best available information from all sources of flood risk and by site specific flood risk assessments where appropriate;*
>
> *b) that the development does not place itself or existing land or buildings at increased risk of flooding;*
>
> *c) that the development will be safe during its lifetime taking into account the impacts of climate change and will be resilient to flood risk from all forms of flooding such that in the event of a flood the development could be quickly brought back into use without significant refurbishment;*
>
> *d) that the development does not affect the integrity of existing flood defences and any necessary flood mitigation measures have been agreed with the relevant bodies, where adoption, ongoing maintenance and management have been considered and any necessary agreements are in place;*
>
> *e) how proposals have taken a positive approach to reducing overall flood risk and have considered the potential to contribute towards solutions for the wider area; and*

f) that they have incorporated Sustainable Drainage Systems (SuDS)/ Integrated Water Management into the proposals unless they can be shown to be inappropriate.

Protecting the Water Environment

Development proposals that are likely to impact on surface or ground water should consider the requirements of the Water Framework Directive. Development proposals should demonstrate:

g) that water is available to support the development proposed;

h) that adequate mains foul water treatment and disposal already exists or can be provided in time to serve the development. Non mains foul sewage disposal solutions should only be considered where it can be shown to the satisfaction of the local planning authority that connection to a public sewer is not feasible;

i) that they meet the Building Regulation water efficiency standard of 110 litres per occupier per day or the highest water efficiency standard that applies at the time of the planning application (see also Policy S12);

j) that water reuse and recycling and rainwater harvesting measures have been incorporated wherever possible in order to reduce demand on mains water supply as part of an integrated approach to water management (see also Policy S11);

k) that they have followed the surface water hierarchy for all proposals:

i. surface water runoff is collected for use;

ii. discharge into the ground via infiltration;

iii. discharge to a watercourse or other surface water body;

iv. discharge to a surface water sewer, highway drain or other drainage system, discharging to a watercourse or other surface water body;

v. discharge to a combined sewer;

l) that no surface water connections are made to the foul system;

m) that surface water connections to the combined or surface water system are only made in exceptional circumstances where it can be demonstrated that there are no feasible alternatives (this applies to new developments and redevelopments) and where there is no detriment to existing users;

n) that no combined sewer overflows are created in areas served by combined sewers, and that foul and surface water flows are separated;

o) that development contributes positively to the water environment and its ecology where possible and does not adversely affect surface and ground water quality in line with the requirements of the Water Framework Directive;

p) that development with the potential to pose a risk to groundwater resources is not located in sensitive locations to meet the requirements of the Water Framework Directive;

q) how Sustainable Drainage Systems (SuDS)/ Integrated Water Management to deliver improvements to water quality, the water environment and to improve amenity and biodiversity net gain wherever possible have been incorporated into the proposal unless they can be shown to be impractical;

r) that relevant site investigations, risk assessments and necessary mitigation measures for source protection zones around boreholes, wells, springs and water courses have been agreed with the relevant bodies (e.g. the Environment Agency and relevant water companies);

s) that suitable access is safeguarded for the maintenance of watercourses, water resources, flood defences and drainage infrastructure; and

t) that adequate provision is made to safeguard the future maintenance of water bodies to which surface water and foul water treated on our Site of the development is discharged, preferably by an appropriate authority (e.g. Environment Agency, Internal Drainage Board, Water Company, the Canal and River Trust or local Council).

In order to allow access for the maintenance of watercourses, development proposals that include or abut a watercourse should ensure no building, structure or immovable landscaping feature is included that will impede access within 8m of a watercourse, or within 16m of a tidal watercourse. Conditions may be included where relevant to ensure this access is maintained in perpetuity and may seek to ensure responsibility for maintenance of the watercourse including land ownership details up to and of the watercourse is clear and included in maintenance arrangements for future occupants."

Bassetlaw District Council (2011) Publication Core Strategy and Development Management Policies.

The Core Strategy for the Bassetlaw District sets out the overarching vision for the area up until 2026, including the policy approach to deliver this.

Policy DM12 "Flood Risk, Sewerage and Drainage" is related to our Project and states:

"A. Flood Risk

Proposals for the development of new units in Flood Zones 2, 3a, and 3b that are not defined by national planning guidance (43) as being suitable for these zones will not be supported while development sites remain available in sequentially superior locations across the District. Reference should be made to the Council's Strategic Flood Risk Assessment when making assessments about likely suitability. Site-specific Flood Risk Assessments will be required for all developments in flood risk areas, even where flood defences exist, as defined on the Proposals Map. Where suitable redevelopment opportunities arise, the Council will require, in liaison with the Environment Agency, the opening up of culverts, notably in Worksop and Retford, in order to reduce the blocking of flood flow routes. Particular support will be given to the Flood Alleviation Scheme for Retford Beck.

B. Sewerage and Drainage

All applications for new development (other than minor extensions) in:

- *Beckingham*
- *Clarborough and Hayton*
- *East Drayton*
- *East Markham*
- *Harworth*
- *Bircotes*
- *North Leverton*
- *North Wheatley*
- *Misterton*
- *South Wheatley*
- *Sturton-le-Steeple*
- *Welham*
- *Walkeringham*

will be required to contain a Surface Water Drainage Assessment, to be produced in discussion with the District Council. This Assessment must show to the Council's satisfaction that the proposed development will not exacerbate existing land drainage and sewerage problems in these areas.

All new development will be required to incorporate Sustainable Drainage Systems (SuDS) and provide details of adoption, ongoing maintenance, and management. Proposals will be required to provide reasoned justification for not using SuDS techniques, where ground conditions and other key factors show them to be technically feasible.

Preference will be given to systems that contribute to the conservation and enhancement of biodiversity and green infrastructure in the District."

Draft Bassetlaw Local Plan 2020-2038: Main Modifications Version, August 2023.

This Local Plan sets out Bassetlaw District's planning and policy framework, development strategy and site allocations to inform effective delivery of the overall vision up until 2038.

Policies set out in the Local Plan relate to our Project are:

Policy ST52 “Flood Risk and Drainage” states that:

“1. Proposals are required to consider and, where necessary, mitigate the impacts of the proposed development on flood risk, on-site and off-site, commensurate with the scale and impact of the development. Proposals, including change of use applications, must be accompanied by a Flood Risk Assessment (where appropriate), which demonstrates that the development, including the access and egress, will be safe for its lifetime, without increasing or exacerbating flood risk elsewhere and where possible will reduce flood risk overall.

2. Where relevant, proposals must demonstrate that they pass the Sequential Test and if necessary the Exceptions Test in Flood Zones 2 and 3 and ensure that where land is required to manage flood risk, it is safeguarded from development.

River Ryton Flood Management Impact Zone

3. All development within the River Ryton Flood Management Impact Zone, as identified on the Policies Map, will need to demonstrate through a Design and Access Statement that they will not prejudice the delivery of a future flood management scheme for the River Ryton catchment through prior agreement with the Environment Agency.

Surface Water Flood Risk

4. All development (where practicable) should incorporate sustainable drainage systems (SuDS) in line with national standards. These should:

> *a) be informed by the Lead Local Flood Authority, sewerage company and relevant drainage board;*
>
> *b) have maintenance arrangements in place to ensure an acceptable standard of operation and management for the development’s lifetime;*
>
> *c) prevent surface water discharge into the sewerage system;*
>
> *d) maximise environmental gain through: enhancing the green/blue infrastructure network, including urban greening measures; contributing to biodiversity net gain where possible; and, securing amenity benefits along with flood storage volumes;*
>
> *e) seek to reduce runoff rates in areas at risk from surface water flooding, and that any surface water is directed to sustainable outfalls.”*

Policy ST53 “Protecting Water Quality and Management” states that:

“1. In line with the objectives of the Water Framework Directive, the quantity and quality of surface and groundwater bodies will be protected and where possible enhanced. Development adjacent to, over or in, a main river or ordinary watercourse will be supported where proposals consider opportunities to improve the river environment and water quality where possible by:

> *a) actively contributing to enhancing the status of the waterbody through positive actions or ongoing projects;*
>
> *b) naturalising watercourse channels;*

c) improving the biodiversity and ecological connectivity of watercourses;

d) safeguarding and enlarging river buffers with appropriate habitat in accordance with Policy ST39; and

e) mitigating diffuse agricultural and urban pollution.

Proposals within a Source Protection Zone will need to demonstrate that any risk to the Sherwood Sandstone Principal Aquifer and its groundwater resources and groundwater quality will be protected throughout the construction and operational phase of development, by demonstrating the satisfactory resolution of all relevant identified impacts.

3. All proposals must ensure that appropriate infrastructure for water supply, sewerage and sewage treatment, is available or can be made available at the right time to meet the needs of the development. Proposals should:

a) utilise the following drainage hierarchy:

i. into the ground (infiltration);

ii. to a surface water body;

iii. to a surface water sewer, highway drain, or another drainage system; to a combined sewer.

b) ensure that foul and surface water flows are separated with foul water being disposed to a public sewer or to a private self-treatment plant and that the design of the waste disposal system will be safe over the lifetime of the development.

c) ensure that development that discharges water into a watercourse incorporates appropriate water pollution control measures;

d) ensure that drainage design take into account an appropriate climate change allowance as agreed with the relevant authority(s);

e) ensure that infiltration-based SuDS incorporate appropriate water pollution control measures;

f) consider use of water recycling, rainwater and storm water harvesting, wherever feasible, to reduce demand on mains water supply.

National Guidance

Planning Practice Guidance (2023) Flood Risk and Coastal Change Planning Practice Guidance (PPG) (updated 2022)

This guidance sets out how practitioners and assessors can account for and address risks associated with flooding and coastal change. Relevantly, it provides commentary on the sequential test, site-specific requirements for flood risk assessment (including a checklist), the role of the EA and local authorities in assessing planning applications, addressing residual risk and sustainable drainage.

DEFRA Non-statutory technical standards for sustainable drainage systems (2015)

This DEFRA guidance focuses on standards for sustainable drainage systems from a non-statutory perspective and should be used by practitioners in tandem with the NPPF and PPG. The standards listed in this report focus on peak control flow, volume control, flood risk within the development, structural integrity, maintenance and construction.

Construction Industry Research and Information Association (CIRIA) Report C753 The SuDS Manual (2015)

This report sets out key guidance for local authorities and developers to assist with the implementation of SuDS within new and existing infrastructure projects. This further covers the cycle of SuDS from design to maintenance. Overarching supporting information also looks at the effectiveness of SuDS to help maximise benefits.

Local Guidance

Bassetlaw District Level 1 Strategic Flood Risk Assessment (SFRA) (2019)

An SFRA is a requirement under Planning Policy Statement 25 on “Development and Flood Risk” and is a tool to account for all sources of flooding and climate change impacts to inform local development outcomes. An SFRA is further used to refine data on specific areas which may flood, which is further contextualised into mapping outputs.

Newark and Sherwood District Level 1 SFRA (2016)

The completed SFRA for Newark and Sherwood District provides an assessment of the overall risk of flooding and associated implications for land use planning and local development outcomes, within the overall District. This is a requirement under Planning Policy Statement 25 on “Development and Flood Risk.”

West Lindsey Level 1 SFRA (2009)

The completed SFRA for West Lindsey provides an assessment of the overall risk of flooding and associated implications for land use planning and local development outcomes, within the overall District. This is a requirement under Planning Policy Statement 25 on “Development and Flood Risk.”

Lincolnshire Sustainable Drainage Design and Evaluation Guide (2018).

This guidance document takes a similar approach to the CIRIA SuDS manual guidance and applies it to a local context. This guide aims to align the design approach to SuDS with the planning process in Lincolnshire. The guidance further details three stages to SuDS design and what it should demonstrate at each stage.

one earth

solar farm