

# Winchcombe CSEC - Flood Risk Assessment

National Grid Cotswolds Visual Impact Provision (VIP)

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# VERSION CONTROL

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#### LLFA Consultation Record

## Abbreviations

| Acronym | Definition                                         |
|---------|----------------------------------------------------|
| AEP     | Annual Exceedance Probability                      |
| AIMS    | Asset Information Management System                |
| AOD     | Above Ordnance Datum                               |
| AONB    | Area of Outstanding Natural Beauty                 |
| BGS     | British Geological Survey                          |
| CSEC    | Cable Sealing End Compound                         |
| DEFRA   | Department for Environment, Food and Rural Affairs |
| EA      | Environment Agency                                 |
| FEH     | Flood Estimation Handbook                          |
| FRA     | Flood Risk Assessment                              |
| GCC     | Gloucestershire County Council                     |
| LLFA    | Lead Local Flood Authority                         |
| NaFRA   | National Flood Risk Assessment                     |
| NGR     | National Grid Reference                            |
| NPPF    | National Planning Policy Framework                 |
| OHL     | Overhead Lines                                     |
| OS      | Ordnance Survey                                    |
| PFRA    | Preliminary Flood Risk Assessment                  |
| PPG     | Planning Practice Guidance                         |
| RFO     | Recorded Flood Outlines                            |

| Acronym | Definition                          |
|---------|-------------------------------------|
| SFRA    | Strategic Flood Risk Assessment     |
| SSSI    | Site of Special Scientific Interest |
| SuDs    | Sustainable Drainage System         |
| VIP     | Visual Impact Provision             |

## Executive Summary

This report documents the approach taken to assess sources of flood risk to the Winchcombe Cable Sealing End Compound (CSEC), proposed as part of the Cotswolds Visual Impact Provision (VIP) Project, which is necessary to facilitate a connection between new underground cables and the existing overhead line (OHL). The assessment also considers the associated permanent access road and bellmouth to the CSEC in addition to temporary bellmouths proposed on classified roads to support construction of the wider project, which are included within the planning application redline boundaries.

Land within the redline boundaries is located within the hydrological catchment of the River Isbourne and the Environment Agency Flood Map for Planning (Rivers and Sea) shows that the site is almost wholly located in Flood Zone 1, with a low risk of fluvial flooding. A very small area within the redline boundaries is located in Flood Zones 2 and 3, at medium to high risk of river flooding.

This assessment has used published data sources to consider flood risk from a range of possible sources, namely fluvial flooding, surface water and groundwater flooding, as well as flooding from reservoirs, canals and other artificial sources.

Consultation with the Environment Agency and the Lead Local Flood Authority (LLFA), Gloucestershire County Council, has been ongoing during the preparation of this report. Further consultation would be undertaken with reference to any required Ordinary Watercourse Consent, which would be prepared post planning consent.

This assessment has shown that the Proposed Project is at generally low risk of flooding from groundwater, sewers and artificial sources. Very small parts of the Proposed Project are shown to be at higher risk of fluvial and surface water flooding. This assessment has outlined suitable management measures required to ensure that the Proposed Project is safe from flooding and that any effects on third party flood risk will be avoided.

# 1 Introduction

## 1.1 Overview

- 1.1.1 Arcadis Consulting (UK) Limited ("Arcadis") has been commissioned by National Grid ("the Client") to prepare a Flood Risk Assessment (FRA) to inform the proposed Winchcombe Cable Sealing End Compound (CSEC), its associated permanent access route (including permanent bell-mouth) and temporary bellmouths to facilitate construction of the wider Cotswolds Visual Impact Provision (VIP) Project, located in Gloucestershire. The proposed CSEC and the associated works forming part of the planning application are hereafter referred to as the 'Proposed Project'.
- 1.1.2 The Proposed Project forms part of the wider Cotswolds VIP Project (referred to as the 'wider project'), the purpose of which is to underground a section of 400kV overhead electricity transmission lines, to mitigate the visual impact of existing electricity infrastructure through part of the Cotswolds National Landscape (previously known as Area of Outstanding Natural Beauty). The wider project is located immediately south of the B4632 and from Breakheart Plantation, runs in a south-westerly direction to the east of Cleeve Common Site of Special Scientific Interest (SSSI), past Wontley, Drypool and Wood Farms, towards Dowdeswell Wood.
- 1.1.3 The Environment Agency (EA) Flood Map for Planning (Rivers and Sea)<sup>1</sup> shows that almost all land within the redline boundaries is located in Flood Zone 1, with an annual chance of flooding from rivers and the sea less than 1 in 1,000 (0.1%). A very localised area, where a crossing of the River Isbourne is proposed to facilitate access, is located in Flood Zones 2 and 3. Land in Flood Zone 2 has an annual chance of flooding from rivers of between 1 in 100 (1%) and 1 in 1000 (0.1%) or from the sea of between 1 in 200 (0.5%) and 1 in 1,000 (0.1%). Land in Flood Zone 3 has an annual chance of flooding from rivers greater than 1 in 100 (1%) or greater than 1 in 200 (0.5%) from the sea.
- 1.1.4 In line with requirements of the National Planning Policy Framework (NPPF)<sup>2</sup> all proposals for new development in Flood Zones 2 and 3 should be supported by an appropriate FRA that considers the risk of flooding from all sources.

## 1.2 Terminology

- 1.2.1 Flood risk is a product of both the likelihood and consequence of flooding. Throughout this report, flood events are defined according to their likelihood of occurrence. Floods are described according to an 'annual chance', meaning the chance of a particular flood occurring in any one year. This is directly linked to the probability of a flood. For example, a flood with an annual chance of 1 in 100 (a 1 in 100 chance of occurring in any one year on average), has an Annual Exceedance Probability (AEP) of 1%.

## 1.3 Limitations

- 1.3.1 This report has been informed by several data sources which Arcadis believes to be trustworthy. However, Arcadis is unable to guarantee the accuracy of information provided by others. The report is based on information available at the time of writing.

## 2 Background

### 2.1 Project Location

- 2.1.1 The proposed CSEC is located in Postlip, approximately 1.8km southwest of Winchcombe in Gloucestershire, as shown in Figure 1 below, centred approximately at National Grid Reference (NGR) SP 01026 27055. The whole redline boundary would occupy an area of approximately 4.6 hectares (ha) in total.
- 2.1.2 The proposed CSEC site is adjacent to Postlip Mills, in a rural setting, surrounded by agricultural fields and woodland. The River Isbourne flows adjacent to the northern boundary of the site and is modified by a series of sluices, which have been used to form a mill pond adjacent to the Mill. The CSEC would be accessed via a new permanent access road from local roads off the B4632, to which localised works are proposed in the vicinity of Postlip Lodge. This permanent access road is within the redline boundary and crosses the River Isbourne.
- 2.1.3 The Proposed Project falls under the Lead Local Flood Authority (LLFA) of Gloucestershire County Council (GCC).

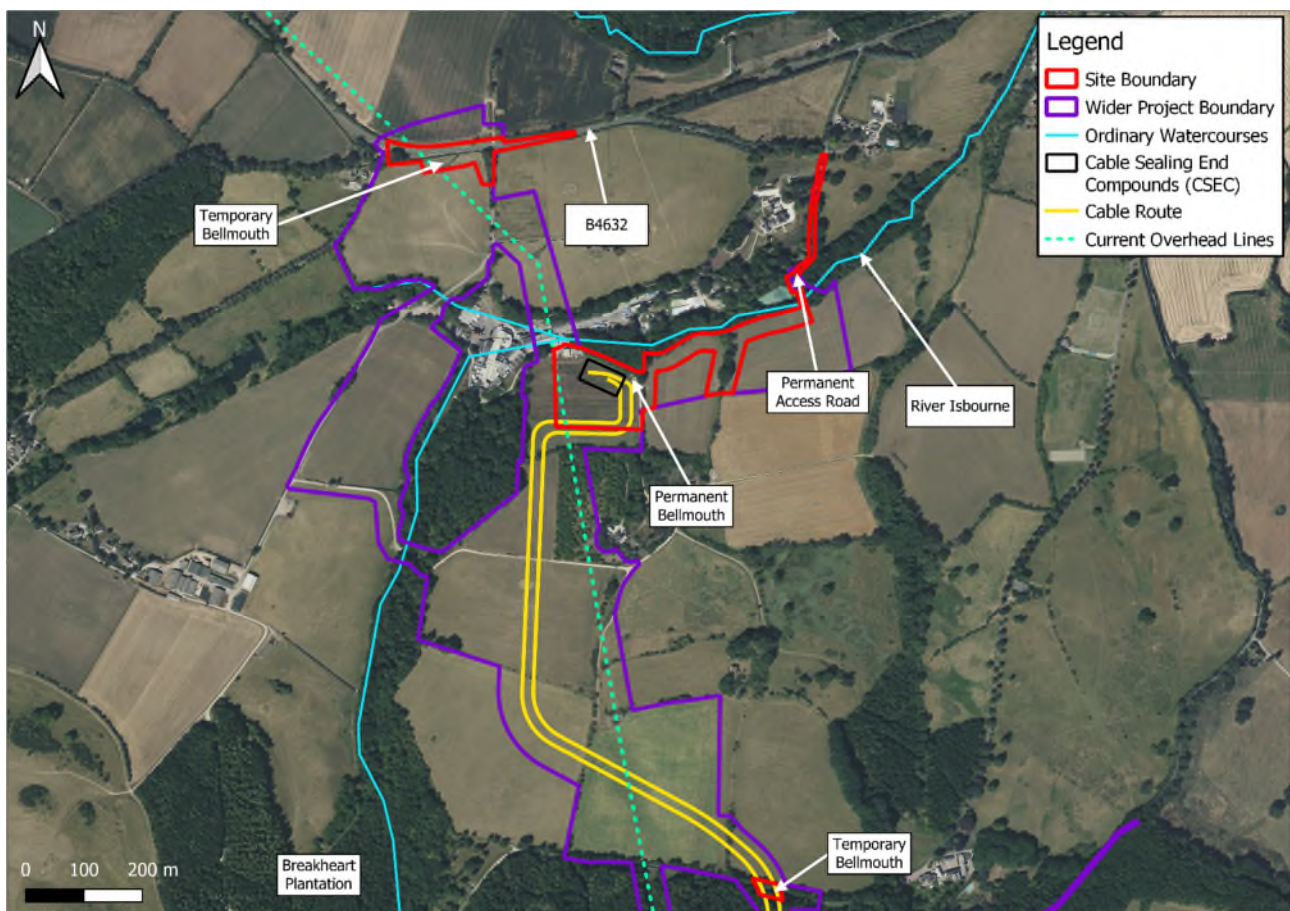


Figure 1: Winchcombe CSEC Location Overview

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## 2.2 Project Description

- 2.2.1 The Proposed Project forms part of the wider Cotswolds VIP Project (the 'wider project'), the purpose of which is to underground a section of 400kV overhead electricity transmission lines, to mitigate the visual impact of existing electricity infrastructure through part of the Cotswolds National Landscape (previously known as Area of Outstanding Natural Beauty). The wider project is located immediately south of the B4632 and from Breakheart Plantation, runs in a south-westerly direction to the east of Cleeve Common Site of Special Scientific Interest (SSSI), past Wontley, Drypool and Wood Farms, towards Dowdeswell Wood.
- 2.2.2 The wider project will comprise:
- The removal of a section of overhead lines (OHL), including the permanent removal of 16 pylons (18 pylons will be removed in total, however, two will be replaced under Permitted Development).
  - Underground cabling of approximately 7km in length.
  - Two new cable sealing end compounds (CSECs) at each end (north and south) and associated replacement terminal pylons (as mentioned above), to connect the new underground cables to the remaining existing overhead line.
  - Associated temporary works to facilitate construction, including temporary/permanent access junctions and roads, a temporary haul road, construction compounds, material storage and welfare facilities.
  - Ancillary off site infrastructure (including installation of arcing horns and shunt reactor installation / connection).
- 2.2.3 The majority of the works will be undertaken using Permitted Development rights under Schedule 2 of the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended), however, the CSECs require planning permission.
- 2.2.4 The scope of this report is for the Winchcombe CSEC only. and associated works including the permanent access road (and permanent bell-mouth) to the CSEC, in addition to a temporary bell-mouth created to support the cable construction along a classified road and a temporary bell-mouth to facilitate the construction of the temporary access road (referred to as the 'Proposed Project').
- 2.2.5 The proposed works within the Winchcombe CSEC redline comprise:
- Installation of a terminal pylon to connect the new underground cables to the remaining existing overhead line (note: the pylon is Permitted Development);
  - CSEC infrastructure;
  - Underground cabling from the Winchcombe CSEC towards the Whittington CSEC (note: this is Permitted Development);
  - A permanent access road to the CSEC, including a bell-mouth and turning area;
  - A hardstanding area where the overhead line meets with the new underground cables;
  - A retaining wall;
  - New screening comprising native trees, woodland and scrub planting; and
  - Temporary bell-mouths with the B4632 and a classified road to facilitate construction.

## 2.3 Topography

2.3.1 LiDAR data from the National LiDAR Programme<sup>3</sup>, presented in Figure 2 below, indicates that ground levels at the proposed CSEC site are relatively uniform between approximately 119 metres (m) Above Ordnance Datum (AOD) and 125mAOD, grading towards the River Isbourne. Land within the redline boundary at the B4632 is at a higher elevation, between approximately 134mAOD and 140mAOD. The temporary bellmouth south of the CSEC lies between approximately 211mAOD and 219mAOD. The prevailing topography of the study area slopes towards the river valley of the Isbourne.

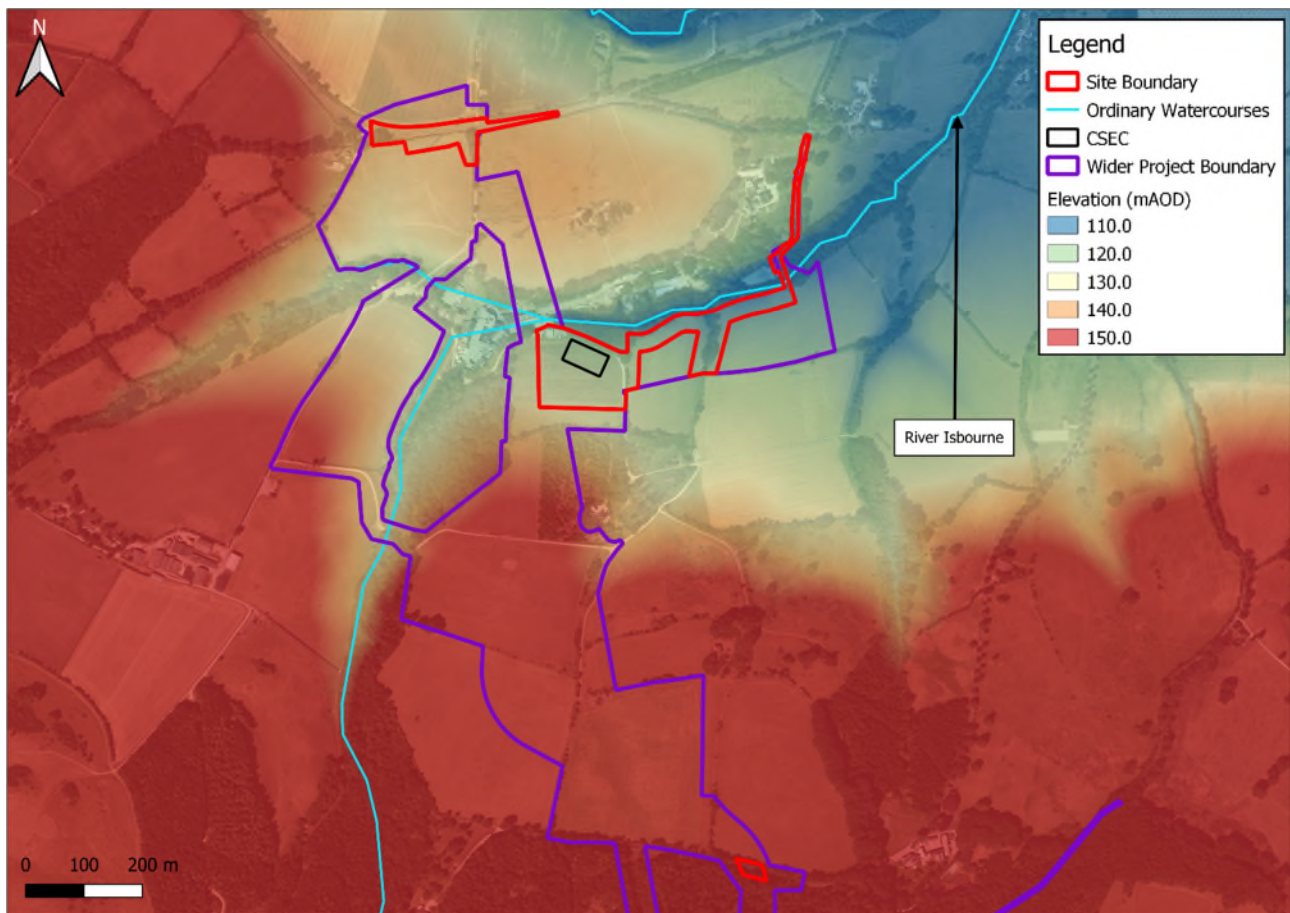


Figure 2: Winchcombe CSEC Topography

Contains map data ©2023 Bing. Contains Department for Environment, Food, and Rural Affairs (DEFRA) Lidar data downloaded April 2024

<sup>3</sup> National Lidar Programme, accessed May 2024, <https://www.data.gov.uk/dataset/f0db0249-f17b-4036-9e65-309148c97ce4/national-lidar-programme>

## 2.4 Catchment Description

- 2.4.1 The EA Catchment Data Explorer<sup>4</sup> indicates the Proposed Project is located in the Avon – Midlands West operational catchment and drains to the headwaters of the River Isbourne, as illustrated in Figure 3. The Isbourne headwaters flow immediately to the north of the CSEC site and are classified as Ordinary watercourses.
- 2.4.2 The British Geological Survey (BGS) online geology viewer<sup>5</sup> indicates the proposed CSEC site and redline boundary is underlain by bedrock geology comprising of varying siltstone and mudstone formations while the southern temporary bell-mouth is underlain by Birdlip limestone which is classified as a principal aquifer according to the Department for Environment, Food and Rural Affairs (DEFRA) Magic Map<sup>6</sup>. Principal aquifers are defined as exhibiting high permeability and/or providing a high level of water storage and they can support abstraction and/or river base flow on a strategic scale. There are no superficial deposits overlying the bedrock.
- 2.4.3 Soils<sup>7</sup> are typically slowly permeable seasonally wet, slightly acid but base rich loamy and clayey in nature.

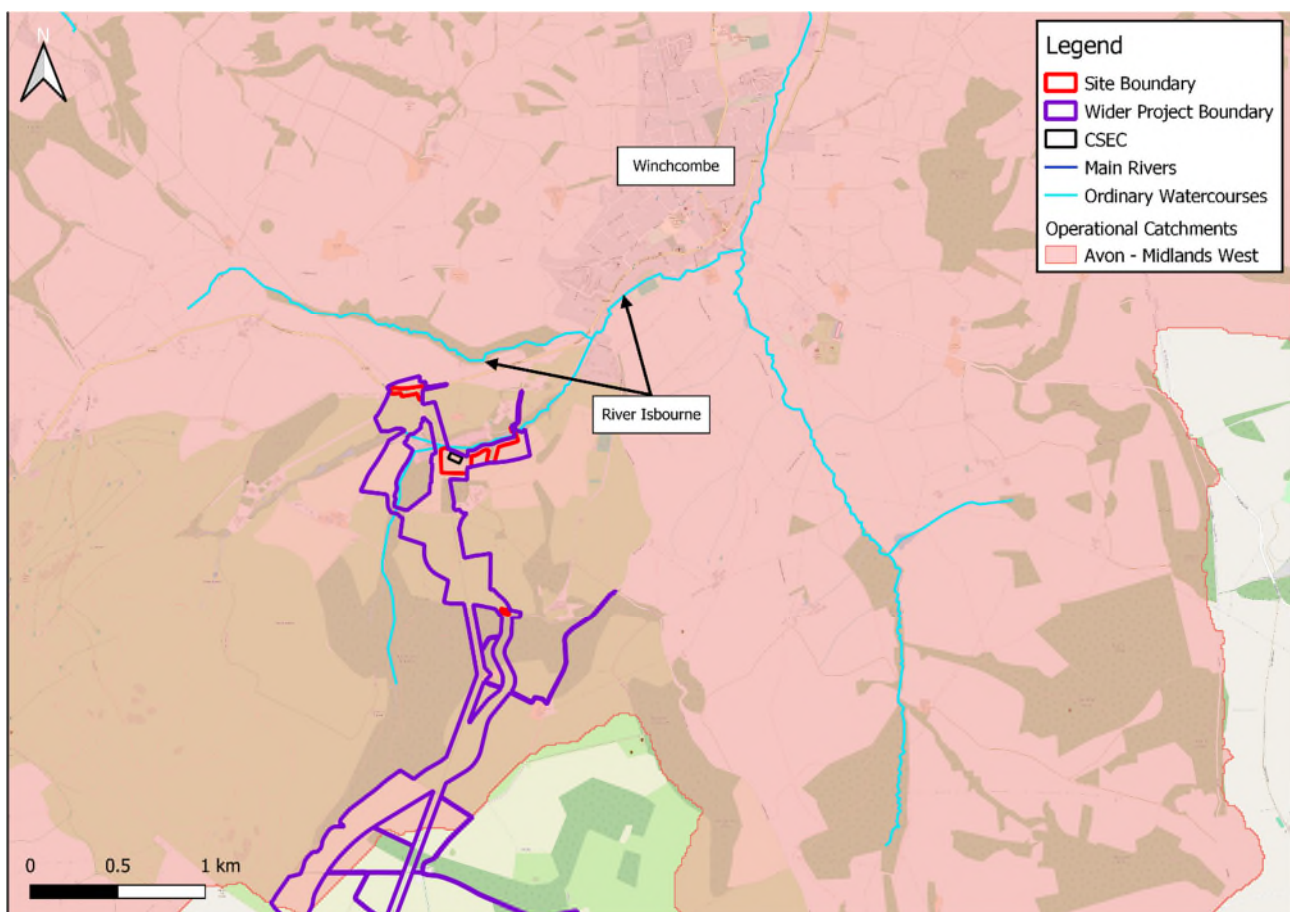


Figure 3: Catchment Overview

River data sourced from the EA Statutory Main River Map and Ordnance Survey (OS) Open Rivers. Contains Environment Agency information © Environment Agency and/or database right. Background map contains data © OS Mapping.

## 2.5 Flood History and Defences

- 2.5.1 The EA Historic Flood Map<sup>8</sup> and the EA Recorded Flood Outlines<sup>9</sup> (RFO) datasets show areas of land that have previously been subject to flooding. These datasets have been reviewed and they do not show any flood events at the Proposed Project location since records began in 1946.
- 2.5.2 The Tewkesbury Council Level 1 SFRA<sup>10</sup>, and the GCC Preliminary Flood Risk Assessment (PFRA)<sup>11</sup> indicate no history of flooding at the Proposed Project location. Although both mention extensive flooding across the region in summer 2007, it is unclear whether the areas within the Proposed Project location were affected. Consultation with GCC, as the LLFA, confirm they do not have any records of flooding incidents at or near the project location (Appendix A).
- 2.5.3 The EA Asset Information Management System (AIMS) Spatial Flood Defences dataset<sup>12</sup> and the EA Reduction in Flood Risk from Rivers and Sea map<sup>13</sup> show flood management assets and defences. The EA AIMS dataset indicates there no flood defences along the River Isbourne within the study area.

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<sup>4</sup> EA Catchment Data Explorer, accessed May 2024, <https://environment.data.gov.uk/catchment-planning>

<sup>5</sup> BGS Geology Viewer, accessed May, 2024, [https://geologyviewer.bgs.ac.uk/?\\_ga=2.77399765.1766386697.1699958121-313685352.1699958121](https://geologyviewer.bgs.ac.uk/?_ga=2.77399765.1766386697.1699958121-313685352.1699958121)

<sup>6</sup> DEFRA Magic Map, accessed May 2024, <https://magic.defra.gov.uk/magicmap.aspx>

<sup>7</sup> Soils Scapes Viewer, accessed May 2024, <http://www.landis.org.uk/soilscapes/>

<sup>8</sup> EA Historic Flood Map, accessed May 2024, <https://www.data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map>

<sup>9</sup> EA Recorded Flood Outlines, accessed May 2024, <https://www.data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-flood-outlines>

<sup>10</sup> Tewkesbury Council SFRA, accessed May 2024, <https://teewkesbury.gov.uk/services/planning/planning-policy/evidence-base/>

<sup>11</sup> GCC PFRA, accessed May 2024, [https://www.gloucestershire.gov.uk/media/5737/1\\_gcc\\_pfra\\_-\\_report\\_-\\_rev\\_4\\_-\\_november\\_2011-49979.pdf](https://www.gloucestershire.gov.uk/media/5737/1_gcc_pfra_-_report_-_rev_4_-_november_2011-49979.pdf)

<sup>12</sup> EA AIMS Spatial Flood Defences, accessed May 2024 dataset <https://www.data.gov.uk/dataset/cc76738e-fc17-49f9-a216-977c61858dda/aims-spatial-flood-defences-inc-standardised-attributes>

<sup>13</sup> EA Reduction in Flood Risk from Rivers and Sea, accessed May 2024, <https://www.data.gov.uk/dataset/dcdcf96b-3293-4987-8ca8-9b8827f5ccf8/reduction-in-risk-of-flooding-from-rivers-and-sea-due-to-defences>

## 3 Planning Policy Context

### 3.1 NPPF and Flood Risk

3.1.1 The NPPF was first published in 2012 and most recently updated in December 2023. Along with its accompanying Planning Practice Guidance (PPG)<sup>14</sup>, the NPPF sets out the government's planning policies for England and how these are expected to be applied. The principal aim of the NPPF is to achieve sustainable development. This includes ensuring that flood risk is considered at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from those areas where risks are highest. Where development is necessary in areas of flooding, the NPPF aims to ensure that it is safe, without increasing flood risk elsewhere.

3.1.2 Early adoption of, and adherence to, the principles set out in the NPPF and its Technical Guidance<sup>15</sup>, with respect to flood risk, should ensure that detailed designs and plans for developments take due account of flood risk and the need for appropriate mitigation, if required.

### 3.2 The Sequential and Exception Test

3.2.1 The NPPF identifies four Flood Zone classifications, as detailed in Table 1.

Table 1: Flood Zones (PPG, Flood Risk and Coastal Change, Table 1)

| Flood Zone               | Annual Probability of Flooding Fluvial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Annual Probability of Flooding Tidal |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1 Low Probability        | <0.1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <0.1%                                |
| 2 Medium Probability     | 0.1-1.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.1-0.5%                             |
| 3a High Probability      | >1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | >0.5%                                |
| 3b Functional Floodplain | <p>Land where water must flow or be stored in times of flood as identified by local authorities in SFRAs</p> <p>Identification of functional floodplain should take account of local circumstances and not be solely defined on rigid probability parameters.</p> <p>Functional floodplain normally comprises land having &gt;3.3% annual probability of flooding (with any existing flood risk management infrastructure operating effectively); or</p> <p>Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).</p> |                                      |

<sup>14</sup> NPPF PPG, accessed May 2024, <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

<sup>15</sup> Technical Guidance to the National Planning Policy Framework, accessed May 2024, [Technical Guidance to the National Planning Policy Framework \(publishing.service.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/115114/Technical_Guidance_to_the_National_Planning_Policy_Framework.pdf)

- 3.2.2 The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed. The PPG provides further guidance on the compatibility of each land use classification in relation to each of the Flood Zones as summarised in Table 2.

Table 2: Flood Risk Vulnerability Classification (PPG, Flood Risk and Coastal Change, Table 2)

| Flood Zone | Essential Infrastructure | Highly Vulnerable       | More Vulnerable         | Less Vulnerable | Water Compatible |
|------------|--------------------------|-------------------------|-------------------------|-----------------|------------------|
| 1          | ✓                        | ✓                       | ✓                       | ✓               | ✓                |
| 2          | ✓                        | Exception test required | ✓                       | ✓               | ✓                |
| 3a         | Exception test required  | ×                       | Exception test required | ✓               | ✓                |
| 3b         | Exception test required  | ×                       | ×                       | ×               | ✓                |

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

- 3.2.3 When a development site falls partly within multiple Flood Zones, the highest risk Flood Zone should be used when assessing development vulnerability as in Table 2. As described in Section 3.3 the Project location does cover multiple zones, therefore for the purposes of this FRA, the vulnerability of the development has been assessed against Flood Zone 3.
- 3.2.4 If it is not possible for development to be located in zones with a lower risk of flooding, the Exception Test may have to be applied. For the Exception Test to be passed, it should be demonstrated that:
- 1) the development would provide wider sustainability benefits to the community that outweigh flood risk; and
  - 2) the development would be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall.

### 3.3 Flood Zone Classification

- 3.3.1 The EA Flood Map for Planning (Rivers and Sea) as in Figure 4 shows that most of the land within the redline boundaries is in Flood Zone 1, equivalent to an annual chance of less than 0.1% (1 in 1000) of flooding from rivers and sea. There is a very small area which lies within Flood Zones 2 and 3b (Functional Floodplain as defined by the SFRA), equivalent to an annual chance of flooding between 0.1% (1 in 1000) and 1% (1 in 100) and more than 1% (1 in 100) respectively. The source of risk is the River Isbourne.

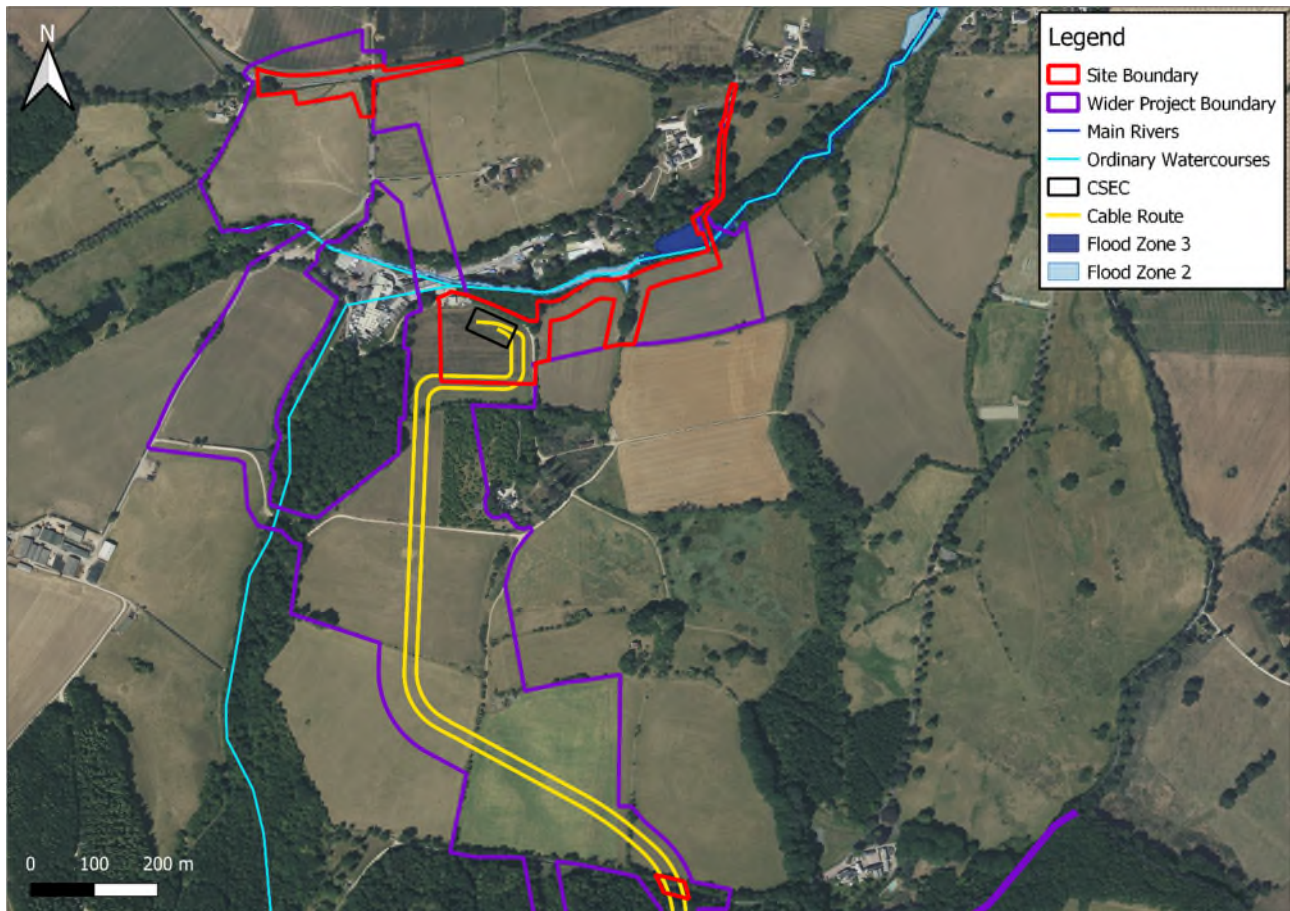


Figure 4: EA Flood Map for Planning (Rivers and Sea) – Flood Zones 2 and 3

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## 3.4 Application of the Sequential and Exception Test

- 3.4.1 The Proposed Project is classified as 'essential infrastructure' in accordance with the NPPF. 'Essential infrastructure' is deemed appropriate in Flood Zones 1 and 2, with reference to Table 2. 'Essential infrastructure' is permissible in Flood Zone 3b subject to satisfaction of the Exception Test. Evidence for the satisfaction of this test is presented in Section 4, which assesses all relevant sources of flood risk to the Project over its lifetime and the potential for the Project to increase flood risk elsewhere.

## 4 Potential Sources of Flooding

### 4.1 Overview

4.1.1 An overview of the sources of flooding and their brief description can be found in Table 3.

Table 3: Sources of flooding

| Source of Flooding                                             | Description                                                                                                                                           |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flooding from rivers (fluvial)                                 | Floodwater originating from a nearby watercourse when the amount of water exceeds the channel capacity of that watercourse.                           |
| Flooding from the sea (tidal)                                  | Flooding originating from the sea or a connected waterbody when seawater overflows onto land through extreme tidal conditions, storm surge or breach. |
| Flooding from surface water (pluvial)                          | Flooding caused by intense rainfall exceeding the available infiltration and/or drainage capacity of the ground.                                      |
| Flooding from groundwater                                      | Flooding caused when groundwater levels rise above ground level following prolonged rainfall.                                                         |
| Flooding from sewers                                           | Flooding originating from surface water, foul, or combined drainage systems, typically caused by limited capacity or blockages.                       |
| Flooding from reservoirs, canals, and other artificial sources | Failure of infrastructure that retains or transmits water or controls its flow.                                                                       |

### 4.2 Fluvial Flooding

4.2.1 The EA Risk of Flooding from Rivers and Sea Map<sup>16</sup> is informed by the EA National Flood Risk Assessment (NaFRA), which takes account of flood defence survey information and modelled river levels, factoring in a risk of overtopping or failure of raised defences where they exist, to provide a probabilistic assessment of flooding on a relatively coarse 50m grid. The flood risk categories are summarised in Table 4.

<sup>16</sup> EA Risk of Flooding from Rivers and Sea, accessed May 2024, <https://www.data.gov.uk/dataset/bad20199-6d39-4aad-8564-26a46778fd94/risk-of-flooding-from-rivers-and-sea>

Table 4: Flood risk categories for the EA Risk of Flooding from Rivers and Sea

| Flood Risk | Description                                                                          |
|------------|--------------------------------------------------------------------------------------|
| Very Low   | There is a chance of flooding of less than 0.1% (1 in 1000) in any year              |
| Low        | There is a chance of flooding between 0.1% (1 in 1000) and 1% (1 in 100) in any year |
| Medium     | There is a chance of flooding between 1% (1 in 100) and 3.3% (1 in 30) in any year   |
| High       | There is a chance of flooding of greater than 3.3% (1 in 30) in any year             |

- 4.2.2 As indicated in Figure 5, the majority of the land within the redline boundaries is at very low risk of fluvial flooding. There is one area which is at medium to high risk of flooding from rivers, associated with the permanent access route to the CSEC, which crosses the River Isbourne in the northeast corner of the site. Given use of the existing crossing, or should this prove not to be practicable, design and construction of a new crossing of suitable dimensions, there would be no adverse impacts on baseline fluvial flood risk at this location. Also, access to the CSEC during its operation would mainly be required for planned maintenance only, therefore use of the crossing could be planned to avoid times of flood if required.
- 4.2.3 The permanent bell-mouth at the CSEC site and the temporary bell-mouths to the north west and south of the CSEC are not within the floodplain.
- 4.2.4 Overall, fluvial flood risk is considered to pose a very low risk to most of the Proposed Project. There is one area at the existing crossing of the River Isbourne, where fluvial flooding does pose a medium to high risk, however the CSEC is located outside this area.

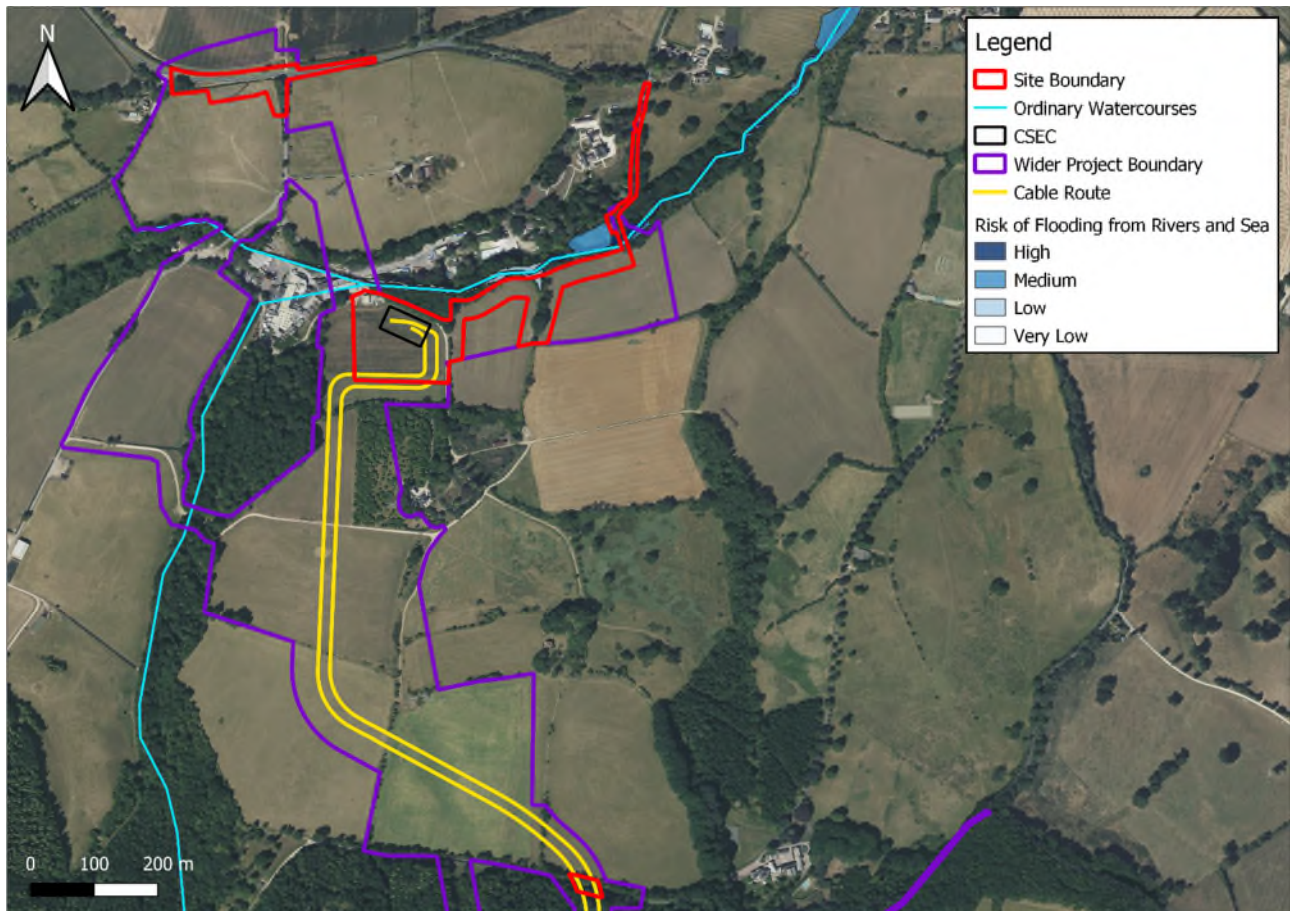


Figure 5: Risk of Flooding from Rivers and Sea

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## 4.3 Tidal Flooding

4.3.1 The Proposed Project is located approximately 90km from the coast and 30km from a tidally influenced waterway, at an elevation exceeding 100m AOD.

4.3.2 **The Proposed Project is not at risk of flooding from tidal sources.**

## 4.4 Flooding from Surface Water

4.4.1 The EA Risk of Flooding from Surface Water Map (RoFSW)<sup>17</sup> is informed by 'direct rainfall' modelling undertaken at a high (2m) spatial resolution. It illustrates the areas at elevated risk of surface water flooding, in low spots down-gradient of sloping ground or in topographic valleys associated with current or former watercourses.

4.4.2 As shown in Figure 6, the majority of the land within the redline boundaries is at very low risk of flooding from surface water, equivalent to a less than 0.1% (1 in 1000) chance of flooding in any year. This includes the CSEC site. Localised areas of land are at medium and high risk of flooding from surface water. These areas all form part of surface water flow routes towards the watercourses in line with Lidar information in Section 2.3.

- 4.4.3 There would be a temporary increase in impermeable land cover associated with the provision of temporary tarmac bellmouths from the highways (including the B4632), and a permanent increase in impermeable land cover associated with the provision of a turning area at the CSEC and the CSEC access. These increases would have negligible impacts on the surface water run off regime.
- 4.4.4 Overall, it is considered that the Proposed Project is at very low risk of surface water flooding. Further, considering the measures proposed to manage surface water runoff, described in Section 5.1, the Proposed Project will have little temporary or permanent impact on existing surface water flow regimes and flood risk from this source, satisfying the requirements of the Exception Test.

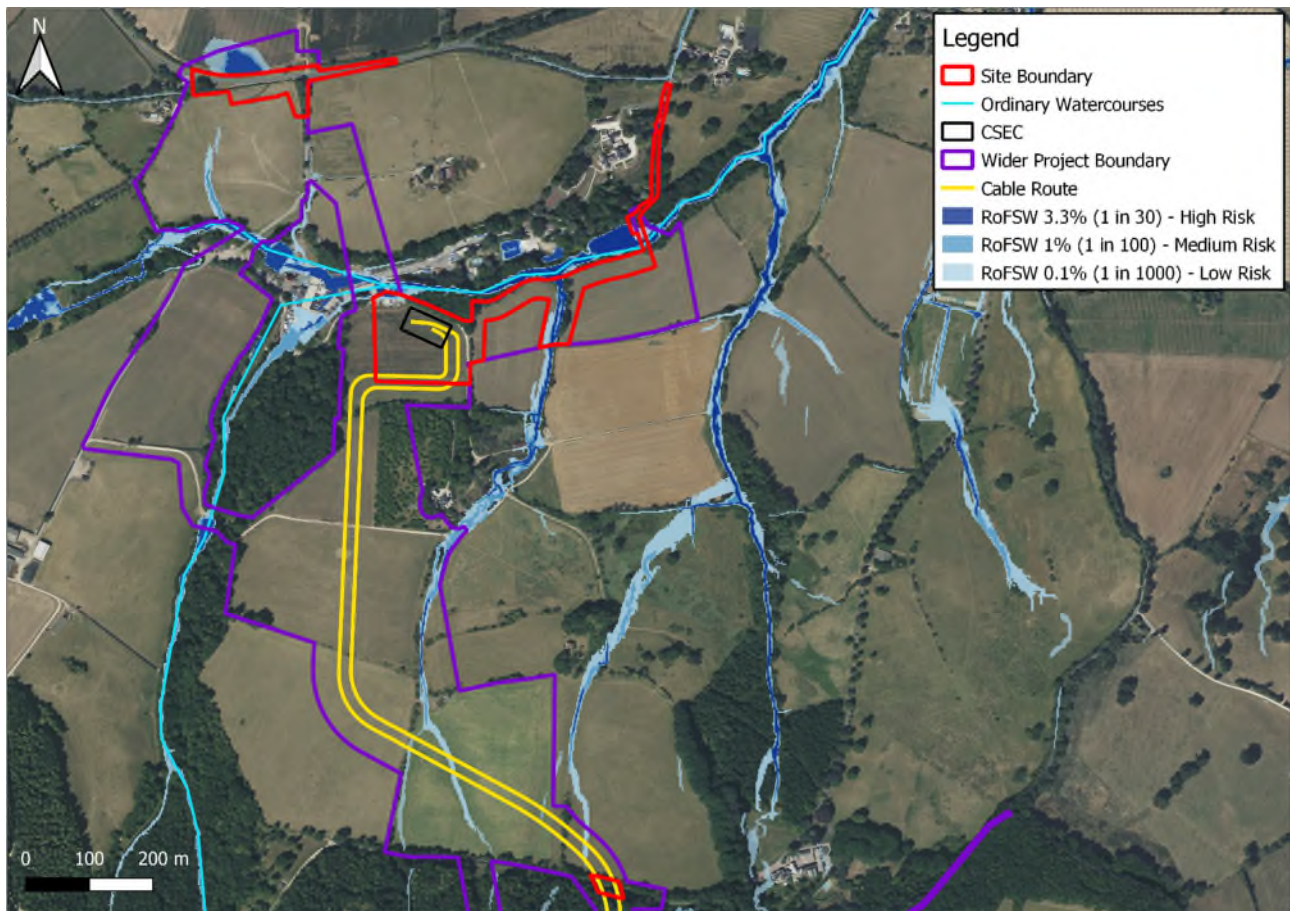


Figure 6: EA Risk of Flooding from Surface Water

Contains map data @ 2024 Bing. Contains Environment Agency Information © Environment Agency and/or database right.

## 4.5 Flooding from Groundwater

- 4.5.1 Groundwater flooding occurs when groundwater rises to the ground surface. There are generally two forms of groundwater flooding. 'Clearwater flooding' is associated with the water table rising to the surface in areas of permeable bedrock geology such as chalk. 'River-groundwater interaction' flooding occurs where river levels interact with permeable superficial deposits within river valleys, flooding areas far from the river without necessarily overtopping raised riverbanks.
- 4.5.2 According to the BGS online mapping<sup>5</sup>, land within the redline boundaries is largely underlain by bedrock of varying siltstone and mudstone formations, as discussed in Section 2.4. These are classified as Secondary A, Secondary Undifferentiated aquifer (where neither Category A or B can be applied given the variability) and unproductive strata. Birdlip Limestone formations are also present in areas of the Proposed Project. This bedrock geology is classified as a Principal Aquifer, hence 'Clearwater flooding' is possible, in particular in the location of the southern temporary bell-mouth.
- 4.5.3 There are no superficial deposits and whilst the proposed CSEC is located in relatively close proximity to the River Isbourne, flooding from 'River-groundwater interaction' is considered a low risk. If groundwater emergence did occur, given the nature of the topography of the CSEC site, which slopes towards the Isbourne, it is considered that floodwater would not accumulate to significant depths on the site.
- 4.5.4 Given the small impermeable footprint of the operational Project there is not expected to be any significant change in existing groundwater recharge patterns, and so no increase in groundwater flood risk to third parties.
- 4.5.5 **The Project is considered to be at moderate risk but is of low vulnerability to groundwater flooding.**

## 4.6 Flooding from Sewers

- 4.6.1 Flooding from sewers can result from lack of sewer capacity, blockages within the sewer network or failure of infrastructure such as pumps. Any area that benefits from sewerage infrastructure has a potential risk of flooding, but the likelihood and consequences are increased by topographic constraints such as low spots or flow paths that could influence the behaviour of floodwater originating from sewers.
- 4.6.2 The Cotswolds District SFRA includes records of incidents of flooding from sewers by postcode. Therefore, there is limited potential to identify if any of the recorded incidents occurred at the Proposed Project site.

- 4.6.3 However, in the absence of specific information on sewer flooding, the EA Risk of Flooding from Surface Water Map can aid understanding of how a failure of sewer infrastructure could impact the Proposed Project. The limited 'ponding' of surface waters within the Proposed Project shown by Figure 6, and the typically sloping topography of the site, suggest that it is unlikely that a sewer breach would result in significant flood depths within the redline boundaries.
- 4.6.4 **Overall, given the rural location of the Proposed Project, it is not considered to be at risk from sewer flooding.**

## 4.7 Flooding from Reservoirs, Canals, and other Artificial Sources

- 4.7.1 The EA Risk of Flooding from Reservoirs Map<sup>18</sup> illustrates the potential flood extent resulting from the failure of large, raised reservoirs and release of the water that they hold. The map shows that no land within the redline boundaries is at risk of flooding from this source.
- 4.7.2 There are several artificial ponds along the River Isbourne located in the vicinity of Postlip Mills. While the CSEC lies a minimum of 30m from the River Isbourne, in places it lies only 1m higher in elevation than it. Therefore, if these ponds were to overtop, the CSEC could be at risk of flooding from this source. However, water levels in the ponds are controlled by a series of sluices, therefore this risk is considered to be low.
- 4.7.3 There are no canals within the proximity of the redline boundaries.
- 4.7.4 **Based on the available information it is concluded that the Proposed Project is at low risk of flooding from artificial sources.**

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<sup>18</sup> EA Risk of Flooding from Reservoirs, accessed May 2024, <https://check-long-term-flood-risk.service.gov.uk/map>

## 5 Management and Mitigation of Flood Risk

### 5.1 Introduction

- 5.1.1 Given the localised flood risk from fluvial and surface water sources identified for small parts of land within the redline boundaries, appropriate flood risk management and mitigation measures are outlined below. These measures align with CIRIA guidance C688: "Flood resilience and resistance for critical infrastructure"<sup>19</sup>.

### 5.2 Surface Water Flooding

- 5.2.1 An Outline Construction Environmental Management Plan (CEMP) has been produced and includes measures to manage surface water runoff during construction.

#### Existing land drainage

- 5.2.2 As part of the pre-construction works, the location and condition of existing land drainage would be established, and a record of condition compiled. Where necessary, and subject to agreement with the landowner/occupier, new or restored field drains would:

- Enable farmers' current drainage system to continue working throughout the period of construction.
- Help prevent damage to the soil structure.
- Aid recovery after completion of the construction activity.
- Maintain the site work areas as dry as practicable.

- 5.2.3 The design of these drainage schemes would be agreed by National Grid, the contractor, and the landowners/occupiers.

#### CSEC

- 5.2.4 The construction of the turning area at the CSEC and the CSEC access would be the only works that would result in a permanent increase in impermeable land take. Any new land take resulting in the addition of impermeable surface would be drained in accordance with the planning policy requirements/local Sustainable Drainage Systems (SuDS) guidance of the LLFA.
- 5.2.5 Overall, considering the management / mitigation measures above, it is concluded that surface water can be suitably managed throughout construction and operation to ensure no long-term detriment to the existing land drainage regime and surface water flood risk.
- 5.2.6 Where the permanent access route to the CSEC from the B4632, to the northeast of the CSEC within the red line boundary, crosses the River Isbourne, the existing crossing route is proposed to be used. Where this not practicable, provision of a new crossing, designed to convey flows under both flood and low flow conditions, would avoid any adverse impact on baseline flood risk and the

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<sup>19</sup> CIRIA C688 Flood resilience and resistance for critical infrastructure, accessed May 2024, <https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/flood-resilience-and-resistance-for-critical-infrastructure>

hydromorphology of the watercourse. Works would be undertaken in accordance with relevant consents. These would require that the works would cause no detriment to the flow regime of the watercourse and no increase in flood risk either upstream or downstream. Therefore, undertaking the works in accordance with the permit/consent would ensure no increase in flood risk.

- 5.2.7 Overall, considering the management/mitigation measures outlined above, it is concluded that the construction of the Proposed Project can be undertaken to ensure the fluvial flood risk to the Proposed Project would be acceptable and that it would not increase third party fluvial flood risk.
- 5.2.8 During operation, no impacts on fluvial flood risk from the Proposed Project are anticipated.

## 6 Conclusions

6.1.1 This FRA has been prepared for the Winchcombe CSEC, its permanent access route and bellmouth, and temporary bellmouths required to facilitate construction of the wider project discussed in Section 2.2. Flood risk for the Proposed Project has been assessed from all sources. The key conclusions are as follows:

- The majority of the land within the redline boundaries, including the whole of the CSEC site, lies within Flood Zone 1 and is considered to be at very low risk of fluvial flooding.
- There is a localised area of works (in the area of the permanent access track crossing over the River Isbourne) that would take place in Flood Zones 2 and 3.
- The majority of the Proposed Project is at very low risk of surface water flooding, equivalent to less than 0.1% (1 in 1000) chance in any year. There are small areas at medium and high risk of surface water flooding, equivalent to a 1% (1 in 100) and 3.3% (1 in 30) chance of flooding in any year respectively. Where surface water flooding does occur, it forms surface water flow routes towards watercourses, ponding of surface water is limited.
- There is a potential risk of flooding from river-groundwater interaction and clearwater flooding at the southern temporary bell-mouth. However, vulnerability to groundwater flooding is low and given the small impermeable footprint of the operational Proposed Project, there is not expected to be any significant change in existing groundwater recharge patterns, and so no increase in groundwater flood risk to third parties.
- Where the permanent access route crosses the River Isbourne to the northeast of the CSEC, the existing crossing route is proposed to be used. Where this not practicable, provision of a new crossing, designed to convey flows under both flood and low flow conditions, would avoid any adverse impact on baseline flood risk and the hydromorphology of the watercourse. Works would be undertaken in accordance with relevant consents of the EA and LLFA where applicable to ensure no increase in flood risk. These would require that the works would cause no detriment to the flow regime of the watercourse and no increase in flood risk either upstream or downstream.
- The turning area at the CSEC and CSEC access are the only works that would result in a permanent increase in impermeable land area. Any new permanent land take at the CSEC would be drained in accordance with the planning policy requirements/local SuDS guidance of the LLFA.
- All other sources of flooding assessed in this FRA are considered to pose a low risk.
- It is considered that, subject to the implementation of appropriate flood mitigation/ management measures, the flood risk to the Proposed Project would be acceptable and the Proposed Project would not increase third party flood risk, thus satisfying the Exception Test in line with the NPPF requirement.

# Appendix A

## LLFA Consultation Record

RE: Data request: Cotswolds VIP Project

Flood Risk Management <FloodRiskManagement@gloucestershire.gov.uk>

Wed 10/25/2023 6:49 PM

Hi [REDACTED]

We don't have any records of flooding in this area; however, we only have records of flooding that is reported to us, so this doesn't guarantee it hasn't occurred. I have also attached a copy of our pre-app advice.

Kind regards,

**Flood Risk Management Officer**  
Flood Risk Management (Strategic Infrastructure)  
Gloucestershire County Council  
1st Floor (West), Block 5, Shire Hall, Gloucester, GL1 2TH

Go to [www.gloucestershire.gov.uk](http://www.gloucestershire.gov.uk) to find information on any County Council service.  
It couldn't be easier to find information instantly and in some cases apply for services online.



You can now report property flooding online using **FORT**

If your home or business has been affected by flooding and you would like the Council to investigate the cause, you can report the incident on FORT. Click here or visit "Flooding and Drainage" at [www.Gloucestershire.gov.uk](http://www.Gloucestershire.gov.uk).

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From [REDACTED]@arcadis.com>  
Sent: Wednesday, October 18, 2023 9:18 AM  
To: Flood Risk Management <FloodRiskManagement@gloucestershire.gov.uk>  
Subject: Data request: Cotswolds VIP Project

Good morning,

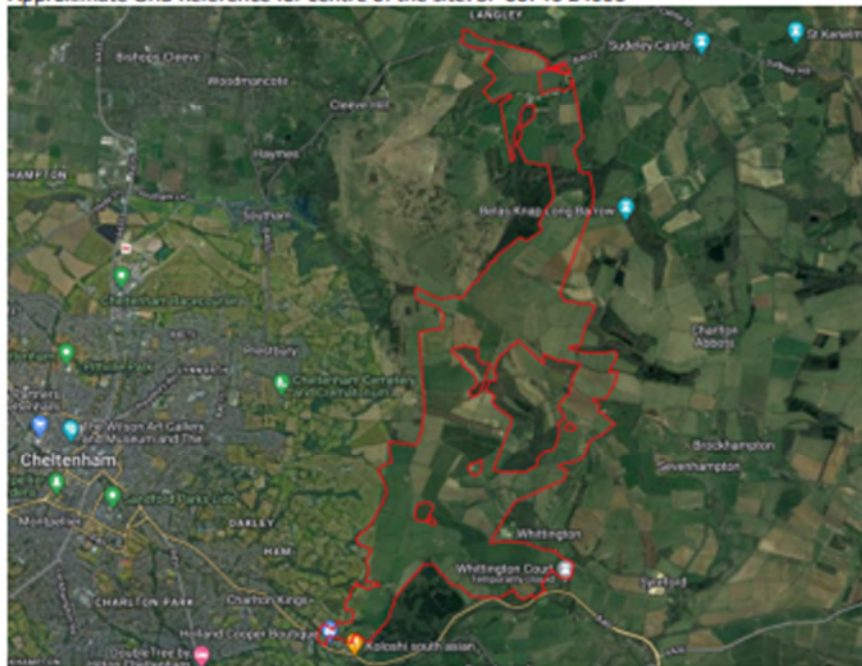
Arcadis are undertaking a Flood Risk Assessment on behalf of National Grid. Please could you provide any information regarding previous flooding or historic flood records for the area shown

below. We are interested in the area marked by the redline.

**Site details**

From Langley Brook (SO 99951 27994) to the A40 (SO 98032 19920)

Approximate Grid Reference for centre of the site: SP 00746 24606



Many thanks,



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