



Sequential Test
Gas Fuelled Capacity Mechanism Embedded
Generation Plan to support the National Grid

Site: Land south of Sub Station
Burghfield Road, Reading

Ref: ENSO/BU/2/2

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1. Site Location

- 1.1 The proposed embedded gas generation site is shown edged red on the site location plan (1425_PL_02 Rev 6), which accompanies this planning application and which is presented here as Figure 1.



Figure 1 – Location Plan

- 1.2 The development is located at the southern boundary of the city and Unitary Authority of Reading with the Borough of West Berkshire situated to the south and west of the site. The developed area would occupy 0.39 ha of an area of a field, immediately to the north of which is the Burghfield substation and north of that is the Exeter to London railway line. To the south of the site runs a series of pylons and overhead electricity cables, with Burghfield road to the east of the site connecting Reading with the village of Burghfield to the south.
- 1.3 The site, along with a wide area to the south of Reading is located within an area identified by the Environment Agency Flood Map as being in Flood Zone 3 i.e. being at the greatest risk of flooding. This is illustrated in **Figure 2** which is an extract from the online Environment Agency Flood Map for Planning.

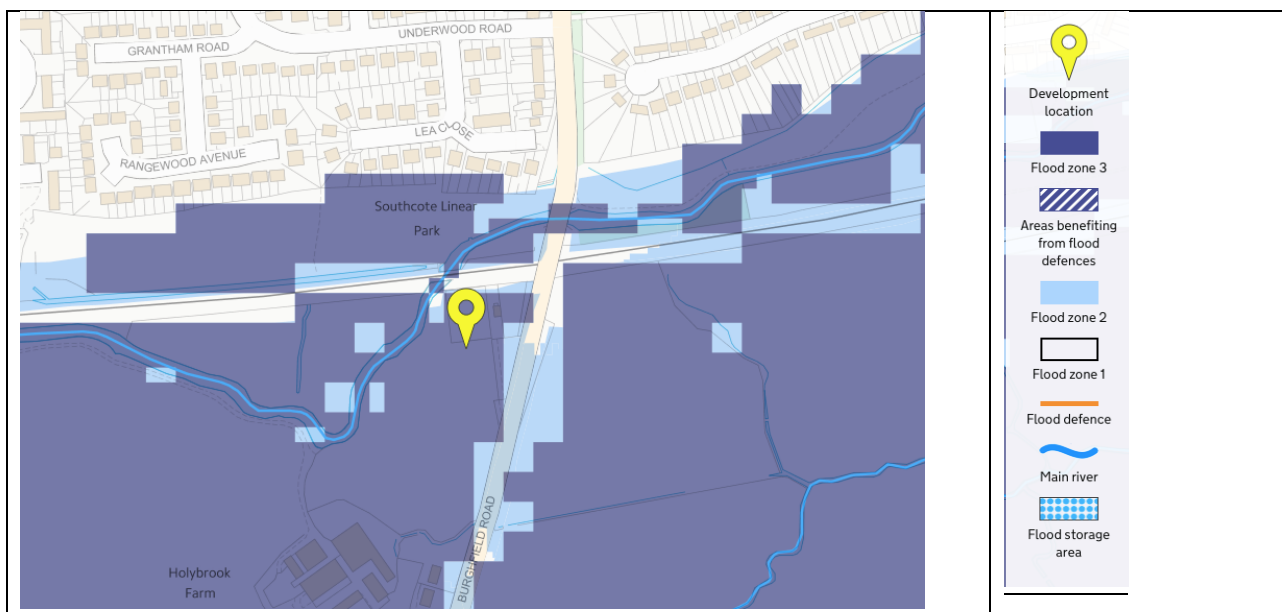


Figure 2 Environment Agency Flood Map

- 1.4 The Reading Borough Council Strategic Flood Risk Assessment (March 2009) indicates that the site falls within Flood Zone 3b (functional floodplain), illustrated in Figure 3 below. It can be seen that the whole of the area within the search area that falls within Reading Borough Council area and is not occupied by residential housing falls within Flood Zone 3b. Similarly the Strategic Flood Risk Assessment for West Berkshire Council, identifies the area to the south of the site also as Flood Zone 3b, however no extract from this plan is provided due to the poor image resolution when zoomed in to close range.

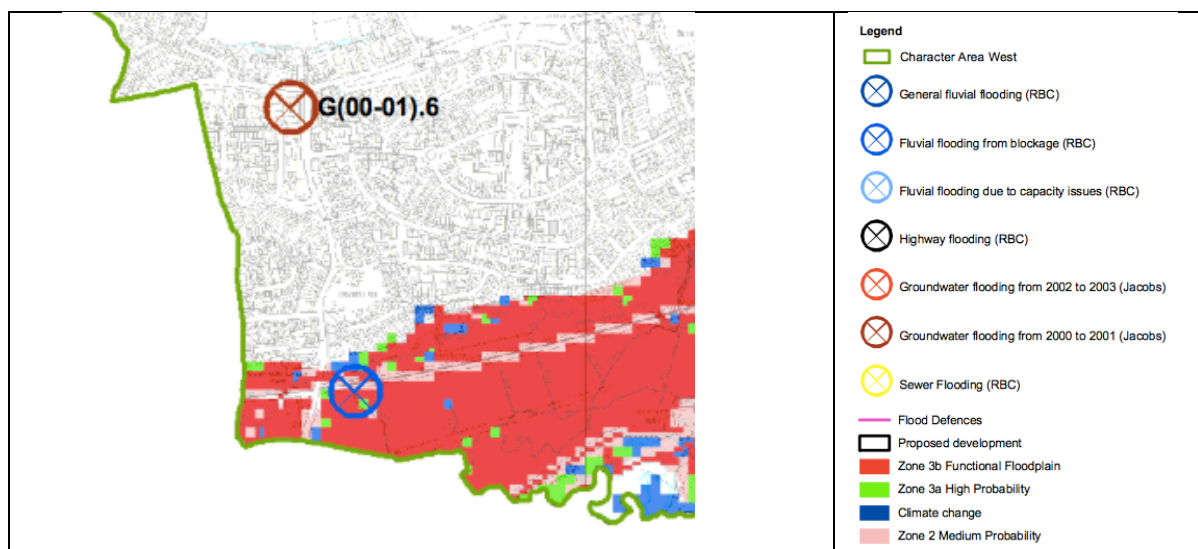


Figure 3: Extract from Reading Borough Council Strategic Flood Risk Assessment

- 1.5 Flood Zone 3b is classified as Functional Floodplain – defined as land where water has to flow or be stored in times of flood

2 The Sequential Test

- 2.1 As set out in the National Planning Policy Framework (NPPF), inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. However where development is necessary, it should be made safe without increasing flood risk elsewhere.
- 2.2 The aim is to achieve this by applying the Sequential Test. Local Planning Authorities apply the sequential approach which allows the determination of site allocations based on flood risk and vulnerability. Development should be directed to Flood Zone 1 wherever possible, and then sequentially to Flood Zone 2 and then Flood Zone 3, and to the areas of least flood risk within Flood Zones 2 and 3.
- 2.3 Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

3 Site Selection Methodology

- 3.1 In order to satisfy the sequential test this report sets out the site selection process for the proposed development and demonstrates that there are no reasonably available in Flood Zones 1 and 2.
- 3.2 A site selection study has been undertaken to identify the most appropriate location. This comprised a number of stages:
 - 1. Identification of potential sites with proximity to the electricity and gas supply networks and located outside statutory/national designated areas.
 - 2. Detailed land availability, technical, economic and environmental constraints.

4 Site Selection – Initial Site Identification

- 3.1 The applicant has identified in excess of 1,200 prospective sites nationally. After applying an initial planning filter for top-level planning constraints such as National Parks and AONBs, Conservation Areas and around 900 sites were left.

Electricity connection constraints

- 3.1 If part of the network is operating at full capacity then no new generation can be connected into it so that whilst a site may appear to be appropriate for the proposed development, if the network has insufficient available capacity the site is rendered unsuitable.
- 3.2 The applicant has analysed fully, all the DNO networks across England and Wales and spoken to all of the DNOs to identify where their networks can accept embedded generation. This has been done in consultation with the local DNOs and National Grid's engineers and their asset management teams.
- 3.3 Of the sites located outside national/statutory designations, fewer than 100 were found to have a viable grid connection. The network in which the Burghfield substation is located is one of the very few places that a connection of an embedded power plant is practical and where the site has sufficient capacity to accept this generation.

Gas Connectivity constraints

- 3.4 Assessing the remaining sites further, approximately half had insufficient gas connectivity. This type of embedded generation scheme cannot connect to the low pressure network due to its high gas usage. If connected to the low pressure network, the gas supply to other customers would be taken up by the generator. The preferred connection is the Medium Pressure network (although connection can sometimes be made to Intermediate Pressure and High Pressure networks) and can only be made on a section of pipe which has sufficient capacity for the loads that are required.

Site Search Radius

- 3.5 A connection for a project of this scale to both electricity and gas networks means that the area of search is severely restricted, particularly as the electrical connection

is to a 66kV circuit and a Local Medium Pressure gas main. In this case whilst 2km from either connection on its own would potentially be possible (outer red circle in Figure 4), the reality is that to be viable, the site would need to be located within approximately 1km of the gas and electric connections (inner red circle). However, For the purposes of completeness, this section will consider sites within full 2km radius as illustrated in **Figure 4** below.

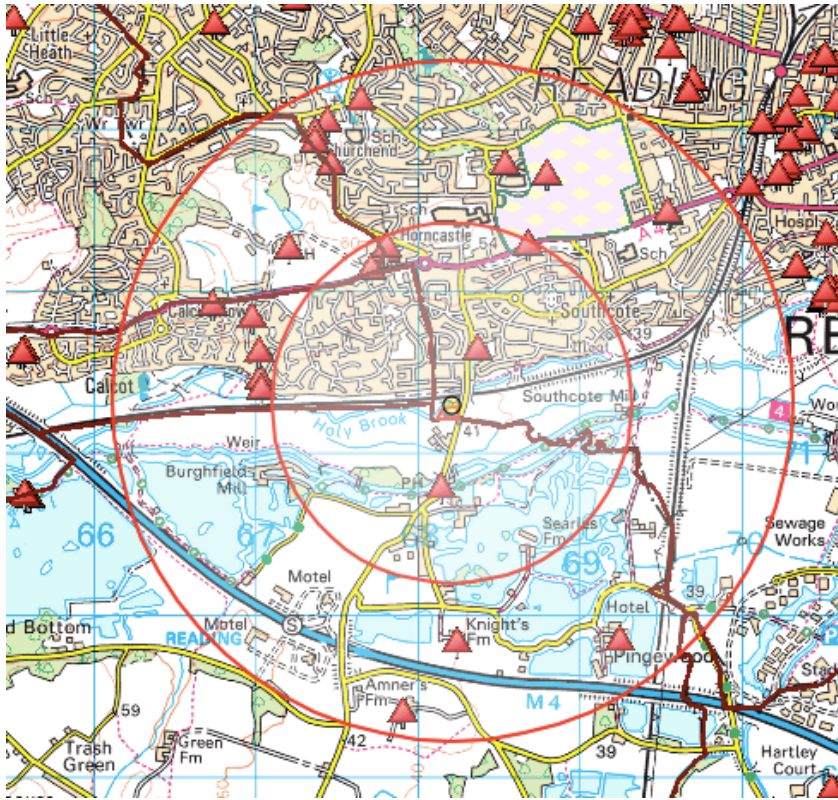


Figure 4 Site constraints map (data obtained from www.magic.gov.uk)

5 Site Selection – Detailed Constraints

- 5.1 Figure 4 illustrates that the 2km search area is dissected west to east by the main railway line between Exeter and London. The M4 Motorway runs west to south east through the 2km search area. Immediately to the north of the site is the Burghfield substation, with numerous lines of pylons and high voltage overhead lines alongside, and in the wider vicinity of this substation. There is also a telecommunications mast located between the substation and the proposed development site.
- 5.2 Comparison of the 2km area of search shown in Figure 4 with the areas of Flood Zones 2 and 3 as illustrated in Figures 2 and 3 demonstrates that the majority of the search area falls within Flood Zone 3. Only the area to the north of the A4 falls within Flood Zone 1.
- 5.3 The site assessment for the purpose of Sequential Assessment has therefore focused on the land within the 2km search area that falls outside of Flood Zones 2 and 3 i.e. the land north of the A4.

Environmental Constraints

- 5.4 There are no nationally, internationally or locally designated sites of nature conservation importance within the part of the search area identified as Flood Zone 1 that would restrict the location of the proposed development.

Land Availability

- 5.5 Much of the northern half of the search area is occupied by the residential suburbs of south Reading to the east and Calcot to the west. Within the residential areas there are gaps however these are occupied by pocket parks and other green spaces, and areas identified within the West Berkshire Strategic Housing Land Availability Assessment (SHLAA) or with planning permission for residential development and as such are also unavailable for the type of development proposed.
- 5.6 There are large areas within the search area not currently occupied by housing or associated infrastructure, however these are the Grade II listed Prospect Park (a Registered Park and Garden) and Calcot Park golf course. As such these areas are also unavailable for development of this type.

Neighbour Impacts

- 5.7 Apart from the physical availability of land within the residential areas of south Reading, a key issue for consideration when selecting appropriate sites for this type of development is proximity to sensitive receptors, particularly nearby areas of housing that could experience perceived or real 'bad neighbour issues' associated with the emissions and noise, albeit, at relatively low levels. Approximately half of the search area is high density residential urban areas and locating the proposed development immediately alongside suburban residential development is not considered to be compatible.

Development Costs

- 5.8 The part of the search area that is located outside Flood Zones 2 and 3 is separated from the proposed electrical and gas connections by the London to Exeter railway line. Developing to the north of the railway line would require the need for a railway crossing of each service to the point of connection, this renders the connections and, therefore, the project unviable. There are phenomenally high costs and complications of securing crossings of Network Rail land as well as the intrinsic costs of connecting to the 66kV and Medium Pressure gas network; as here is no additional tolerance for crossing Network Rail within the project.

6 Conclusion

- 6.1 The Project team has undertaken a detailed site selection process, which takes into account many factors, which influence the suitability of a site for embedded gas generation to support the National Grid. This has identified that whilst there are relatively few sites with potential for this type of development, there are suitable gas and electricity connection points to the south of the substation on Burghfield Road.
- 6.2 Only sites located within 2km (ideally within 1km) of the connection points are economically viable in which to locate the gas generation site. The majority of land within the 2km search area is located within Flood Zones 3b, with only very small pockets of land located within either Flood Zone 2 or Flood Zone 3a.
- 6.3 The part of the search area that is identified as Flood Zone 1 falls within the densely populated urban area of Calcot and South Reading and are occupied by residential (existing, approved and proposed), education and transport infrastructure or are recreational or heritage sites.
- 6.4 As such it can be concluded that there are currently no reasonably available sites to the development within the 2km search area in Flood Zones 1, 2 or 3a and the site has passed the sequential test. The nature of the proposed development means that it is classified as 'essential infrastructure' and is permitted development within Flood Zone 3b provided that it is designed and constructed to:
- remain operational and safe for users in times of flood;
 - result in no net loss of floodplain storage;
 - not impede water flows and not increase flood risk elsewhere.
- 6.5 The Flood Risk Assessment that accompanies this application demonstrates that the proposed development achieves the above criteria.