Green Hill Solar Farm
EN010170

Water Resources Assessment

Prepared by: Arthian

Date: May 2025

Document Reference: APP/GH7.19

APFP Regulation 5(2)(q)

Water Resources Assessment

Prepared by: Julian Shortt | Arthian Ltd

For: Green Hill Solar Farm Ltd

Site: Green Hill Solar Farm

Date: 15/05/2025

Document Ref: 313532

Issue-0.1

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Quality Assurance

Issue Record

Revision	Description	Date	Author	Reviewer	Approver
0.1	Draft for review	15/05/2025	J Shortt	J Forbes	J Forbes
0.2	Draft for review post Island Green Power Comments	19/05/2025	J Shortt	J Shortt	J Shortt
0.3	Final following Pinsent Masons Comments	21/05/2025	J Rigby	J Rigby	J Rigby

Executive Summary

Green Hill Solar Farm Limited (the "Applicant") is bringing forward a Nationally Significant Infrastructure Project comprising a new solar and energy storage development on land in North Northamptonshire, West Northamptonshire and Milton Keynes (the "Scheme"). As part of the pre-application engagement process, the Applicant has consulted with the Environment Agency in respect of potential environmental permitting associated with the Scheme. In response, the Environment Agency requested further information, which has led to the production of this Water Resources Assessment report.

This Water Resources Assessment covers the following:

- Based on information provided by the Applicant, identification of areas and quantities of site water use, where necessary calling upon data from our experience of other, similar projects and standard industry figures.
- Determination of potential sources of water for the Scheme and their potential yields (e.g. m^3/year).
- Use of the information obtained above to produce a Water Resources Assessment (the present document).

Based on estimations given currently available data regarding the Scheme, the following tables summarise anticipated water demands during the construction and operational phases of the Scheme.

Category	Value	Unit
Total construction phase water	19,475	m^3
Average construction phase water	39.45	m^3/day
Peak construction phase water	138.65	m^3/day
Average operational water demand	3.08	m^3/day
Peak operational water demand	36.9	m^3/day

Various options have been considered for the supply of these water demands, each of which have relative advantages and disadvantages. The assessment concludes that the water demands for the Scheme can be met via the following options:

- Water tankering represents a viable option for the water supply to the site
    - **This is a key conclusion of this water resources assessment, since it demonstrates there does exist a viable solution to supply the modelled water demands for the Scheme.**
    - **Furthermore, given the points made in this report regarding the large extent of the Scheme, some tankering would be required to distribute water across the site regardless of the source of this water, which supports the position that external tankering is the most viable option for the Scheme.**
    - While the use of tankering has the advantage of providing a 'mobile' supply of water and would reduce the vehicle requirements internal to the development's operations, the detailed design of

the Scheme will need to consider the inclusion of onsite storage to supply e.g. welfare facilities, tanker access, and means of transfer from tankers to this onsite storage.

- The Scheme could also consider pursuing water sources from within its boundaries. This could provide an alternative or additional means of supply. This could take the form of:
    - Seeking to use existing boreholes in the area whose ownership could be transferred to the Scheme, or some other water sharing arrangement put in place (subject to environmental permitting requirements).
    - Seeking to use existing surface water abstraction in the area whose ownership could be transferred to the Scheme, or some other water sharing arrangement put in place (subject to environmental permitting requirements).
    - Undertaking further design around the treatment and reuse of water collected in site SuDS ponds.

  However, these point sources of water would have to be coupled with some kind of tankering system to distribute the water across the Scheme.

Contents

1. Introduction

1.1 Background

Green Hill Solar Farm Limited (the Applicant) is bringing forward a Nationally Significant Infrastructure Project (NSIP) comprising a new solar and energy storage development in the form of a battery energy storage system (BESS) on land in North Northamptonshire, West Northamptonshire and Milton Keynes (the "Scheme"). As part of the pre-application engagement process, the Applicant has consulted with the Environment Agency in respect of potential environmental permitting associated with the Scheme. In response, the Environment Agency requested further information, which has led to the production of this report. Extracts of the requests relevant to this proposal are provided below in italics.

APPENDIX D: Water Resources

D1: Climate change and drought

***Issue**: To date the Environmental Impact Assessment has not considered water supply in any of the phases of the project where a number of consumptive uses of water have been identified.*

The location of this development is in an area of serious water stress (as identified in our report Water stressed areas – 2021 classification (https://www.gov.uk/government/publications/water-stressed-areas-2021-classification).

The water companies in this region are already unable to supply new non-domestic demands in targeted areas of East Anglia until new strategic supplies can be developed. We recommend that the availability of supply to any non-domestic development be explicitly checked with the water company.

Other consumptive uses of water noted from the scoping report and PEIR include wheel washing identified in chapter 13; and Horizontal directional drilling for underground cables which requires bentonite clay mixing.

***Impact**: Delays to project.*

***Solution**: If public water supply for these non-domestic activities is not available, the applicant will need to consider alternative sources of supply.*

New consumptive groundwater licences are not available at this location and surface water abstraction will be subject to conditions which restrict access to water to periods of high flow. The use of surface water on site may therefore need to consider on site storage to meet demand outside of these periods.

This should be explored within a Water Resources Assessment.

Additional narrative/explanation:

We would draw your attention to the Environment Agency's response to the Planning Inspectorate on the project's Scoping Report, which recommend that a simple water resources assessment be undertaken. Anglian Water's pre planning process now includes a Water Resources Assessment which provides the opportunity to produce a water supply strategy or options.

The text of the response mentioned above is copied below.

Increased demand on water supply is identified in Table 9.5 as a matter to be scoped in (and the supply of potable water is identified in Chapter 6 Table 6.1 as a potential source of GHG emissions). However, it is not stated whether a water supply would be required during any phase of the Proposed Development or indicated whether abstraction would be required. The Inspectorate notes that the site is located within an area

designated as 'seriously water stressed' by the EA. Reference is made only to potable water abstractions, although the EA identify (within its response contained in Appendix 2 of this Opinion) that there are a number of existing licences for other abstractions within or in proximity to the Site.

The ES should provide details of water supply and demand requirements during construction and operation (including in the context of BESS fire risk). An assessment should be provided where there is potential for LSE to occur on water resources or demonstration of the absence of LSE [Likely Significant Effect] *with agreement from the relevant consultation bodies. Anglian Water should be consulted at the earliest opportunity. The Applicant is referred to their consultation*

1.2 Scope of Work

Arthian were contracted to produce a Water Resources Assessment for the Scheme in response to the Environment Agency's request for information. The specific tasks undertaken were:

- A teleconference kick off meeting for the project with key stakeholders to agree project objectives and expected outcomes. This took place on 25 April 2025, the Green Hill Development consultant from Lanpro, the Green Hill Development Project Development Manager from Island Green Power, and Arthian in attendance.
- An Anglian Water pre-design strategic discussion assessment for early engagement.
- Issue of a data request to the Applicant for information regarding existing water demand calculations and potential sources of water supply.
- Based on this information and discussions with the Applicant, identification of areas and quantities of site water use, where necessary calling upon data from our experience of other, similar projects and standard industry figures.
- Determination of potential sources of water for the project and their potential yields (e.g. m^3/year).
- Use of the information obtained above to produce a Water Resources Assessment (the present document).

2. Site Information

2.1 General Site Information

The following points summarise key information regarding the Scheme. The majority of this information has been taken from a Chapter 4 of the Environmental Statement (Scheme Description).

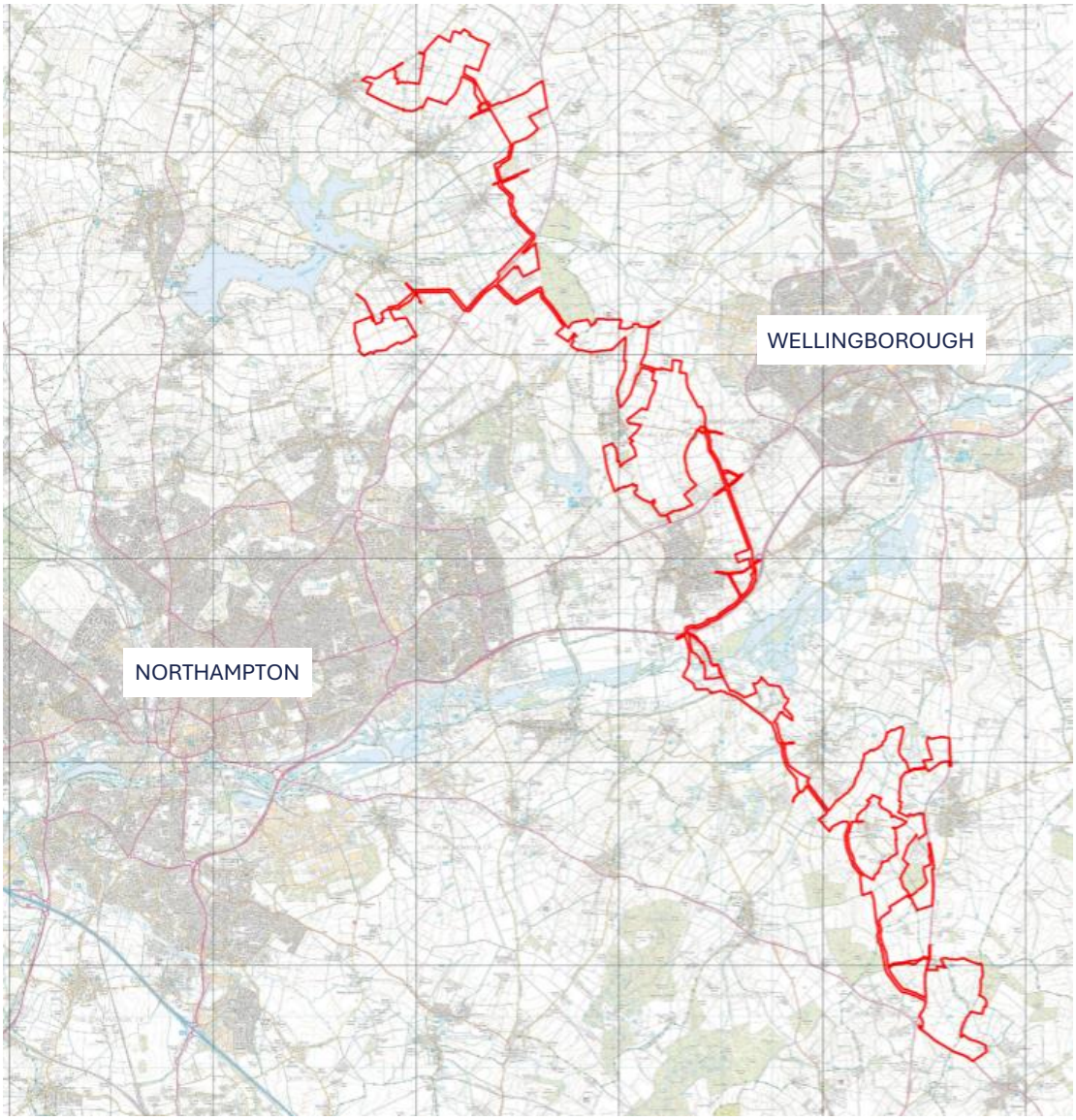
- Sites included in the Scheme:
    - Green Hill A (Solar Arrays) (173.7 ha).
    - Green Hill A.2 (Solar Arrays) (65.2 ha).
    - Green Hill B (Solar Arrays) (64.7 ha).
    - Green Hill C (Solar Arrays and BESS) (56.4 ha).
    - Green Hill D (Solar Arrays) (42 ha).
    - Green Hill E (Solar Arrays) (308.6 ha).
    - Green Hill F (Solar Arrays) (275.8 ha).
    - Green Hill G (Solar Arrays) (170.9 ha).
    - Green Hill BESS (BESS).

  There are also electrical substations associated with the scheme and a cable route corridor with a typical width of 50 m to connect the sites to the point of connection at the Grendon Substation.
- Total Scheme area: 1,441.4 ha.
- Current use of land: Primarily agricultural.
- Expected Scheme lifespan: 60 years.
- Expected construction period: 2 years.
- Expected grid connection date: 2029.

2.2 Scheme Layout

The following image provides the general extent of the Scheme.

Green Hill Solar Farm Order Scheme Limits



3. Scheme Water Demand

In order to appropriately evaluate water resources, it is important to first understand the anticipated water demand from the Scheme.

3.1 Areas of Water Demand

Water demands for the Scheme can be divided into those involved during the construction phase of the Scheme, and those involved during the operational phase. Each potential demand identified by the Applicant in each of these phases are listed below.

- Construction phase:
  - Amenity water use for construction staff.
  - Vehicle washing water.
  - Equipment cleaning water.
  - Directional drilling water
- Operational phase:
  - Amenity water use for operational staff.
  - Module cleaning water.

Further discussion and quantification of these areas of demand is undertaken in this section of this report.

It is notable that since the Scheme is at relatively early stages in the planning process, no detailed design for the elements included has been finalised. As such, a variety of estimation techniques have been used to develop the figures given be necessarily indicative.

The intention of this document is to demonstrate general feasibility of water supply to the Scheme, rather than provide specific details and detailed design regarding how this supply will be implemented.

Water demands during decommissioning of the Scheme are anticipated to be less than the demands during construction.

3.2 Previous Estimates

An initial assumption had been made for climate change calculation purposes of both construction and operation as part of the Scheme. The results of this are summarised in the following points:

- Construction water demand: 18,851 m^3.
- Operational water demand: 7,047 m^3/year.

The results produced in this document is compared to the above figures in Section 3.9.

3.3 Amenity Water Use for Construction Staff

Amenity water use consists of:

- Toilet and urinal flushing.
- Hand basin water use.
- Kitchenette water use.

BS 8551:2015 (Provision and management of temporary water supplies and distribution networks (not including provisions for statutory emergencies) - code of practice) states that for an open industrial site (e.g. construction,

quarry, without canteen), the water use is 60 litres/employee/day, or 0.06 m^3/employee/day. This figure is used in the assessment in order to provide a conservative estimate of water use. The actual usage figure could be lowered by considering options such as non-flushing chemical toilets, etc.

- The Environmental Statement Chapter 4: Scheme Description estimates the following staff numbers:
  - A total of 455 full time equivalent employees over the course of a year of construction. This is taken as an average figure for the two-year construction period, which numbers onsite fluctuating during different phases of construction (Section 4.5.19).
  - The peak construction workforce (in 2028, when construction activities are likely to include construction of the substations, cable route, and solar PV infrastructure) is estimated to be approximately 876 employees (Section 4.5.21).

Given these figures, the amenity water use for construction staff is estimated in the following table:

Category	Value	Unit
Construction staff water use	0.06	m^3/employee/day
Peak construction staff employee numbers	876	employees
Peak amenity water use for construction staff	**52.6**	**m^3/day**
Average construction staff employee numbers	455	employees
Average amenity water use for construction staff	**27.3**	**m^3/day**
Annual workdays	252	days
Annual water use	6,880	m^3/year
Construction phase duration	2	years
Total amenity water use for construction staff	**13,759**	**m^3**

3.4 Construction Phase Vehicle Washing Water

Deliveries of materials to the Scheme during construction will be made principally by heavy good vehicles (HGVs). This will vary between 16.5 m long articulated vehicles and rigid vehicles 8 – 10 m in length. Other vehicles will be used to transport staff, etc. to the site. Wheel wash facilities will be provided ahead of vehicles exiting the sites to minimise mud or debris spill on the local highway network. The number of vehicle movements have been estimated as per the tables appended to this document. Using these figures, the following table estimates construction phase vehicle washing water.

Category	Value	Unit
Total vehicle movements[1]	8,062	
Total precipitation days[2]	118	per year
Proportion of precipitation days	32.3%	
Vehicle movements on precipitation days	2,606	
Vehicle wheel wash water use[3]	0.15	m^3/vehicle
Construction phase duration	2	years
Total vehicle washing water use in construction phase	**391**	**m^3**
Annual workdays	252	
Average vehicle washing water use in construction phase	**1.6**	**m^3/day**
Peak daily vehicle movements	72	
Vehicle wheel wash water use	0.15	m^3/vehicle
Peak vehicle washing water use in construction phase	**10.8**	**m^3/day**

3.5 Construction Phase Equipment Cleaning Water

Equipment cleaning involves washing down various pieces of fixed and portable pieces of equipment during the construction phase. It will be highly variable and hence all that can be provided at this stage is an indicative estimate based on potential cleaning flows and times. It is assumed that a cleaning station will be situated in each work area listed in Section 2.1. The following table details the calculations.

Category	Value	Unit
Number of work areas	10	
Hose flow rate	1.5	m^3/hour
Average daily cleaning time	0.25	hours
Average construction phase equipment cleaning water	**3.75**	**m^3/day**
Annual workdays	252	
Construction phase duration	2	years
Total construction phase equipment washing water use	**1,890**	**m^3**
Peaking factor during peak construction	3	
Peak construction phase equipment cleaning water	**11.25**	**m^3/day**

3.6 Construction Phase Directional Drilling Water

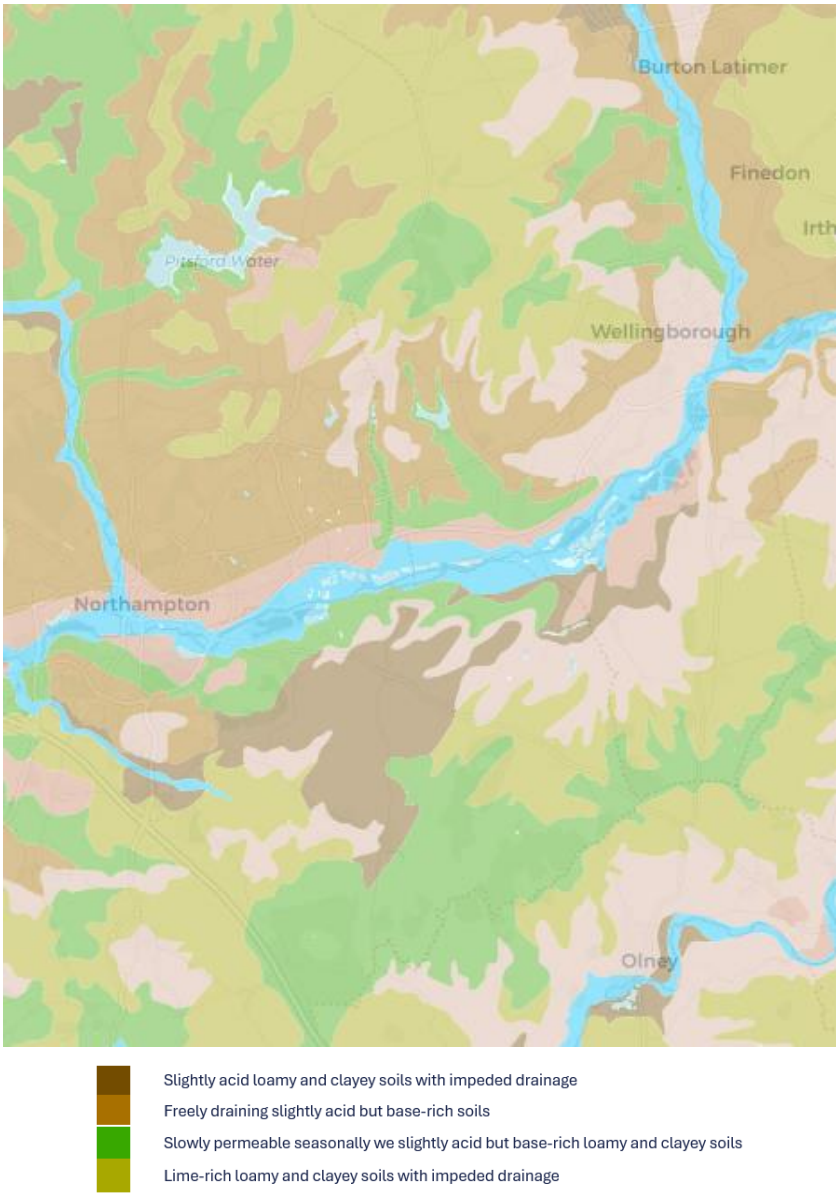
Various pieces of infrastructure (cables) will be installed as part of the Scheme using horizontal directional drilling. This avoids open cut trenching and hence can be used to installed cables, etc. under roadways, watercourses, etc; or to protect areas of significant environmental or heritage significance.

Directional drilling uses water in areas such as cooling drilling tools and removing debris and mud from the drilled channel. Estimating the volume of water used in directional drilling is based on the volume (m^3) of earth removed during the drill. A typical figure of around 2.5 m^3 of water per m^3 of earth removed[4] provides a reasonable

[1]Outline Construction Traffic Management Plan [EN010170/APP/GH7.9] Tables 5.2, 5.2 and 5.3.
[2]Northampton, Moulton Park (Northamptonshire) UK climate averages. Met Office. https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages/gcr37upbm
[3]Considerate Constructors Scheme Best Practice Hub. Dry Wheel Washing. https://ccsbestpractice.org.uk/entries/dry-wheel-wash/
[4]https://www.thedriller.com/articles/91235-calculating-fluid-volumes-pressures-for-horizontal-drilling#:~:text=In%20fact%2C%20a%20ratio%20of,inadvertent%20returns%20at%20the%20surface.

indicative estimate. However, for solids with a significant level of clay, a higher ratio of 5:1 water:earth is required. The soilscape of the Scheme has been considered and is shown in the following image.[5].

Soilscape Around Development Area



Given the mix of loamy soils with free drainage and clayey soils with impeded drainage around the Scheme area, a ratio of 4:1 water:earth is used to estimate directional drilling water usage.

Based on Scheme information, the following table estimates directional drilling demands over the course of the construction. To estimate the peak water usage for the purposes of this report, it is assumed that only one directional drill will occur at a time and maximum of one drill will occur each day.

[5] https://www.landis.org.uk/soilscapes/

Category	Value	Unit
Number of channels directionally drilled	18	
Length per drill	100	m
Average width per channel	12	m
Minimum drill distance in channel	3	m
Drills per channel	3	m
Total drilled length	5,400	m
Diameter of drills	0.45	m
Volume of earth removed	859	m^3
Fluid ratio	4	
Total construction phase directional drilling water	**3,435**	**m^3**
Average construction phase directional drilling water	**6.8**	**m^3/day**
Volume of water used per drill	64	m^3
Peak construction phase directional drilling water	**64**	**m^3/day**

In order to produce a conservative estimate of water demands for the development, the above is included in the overall water demand calculations for it. However, in practice it is may be that that horizontal directional drilling contractors will come equipped with their own mobile bowsers of water to undertake the work.

3.7 Amenity Water Use for Operational Staff

Like in the construction phase, operational amenity water use consists of:

- Toilet and urinal flushing.
- Hand basin water use.
- Kitchenette water use.

Welfare facilities will be required at the substations. It is not proposed to have a permanent discharge to sewer. Any wastewater will be removed via tanker to local licenced wastewater treatment works. During operation, self-contained portable welfare units which store foul/wastewater for collection/emptying by specialist licenced contractors would be deployed on an ad hoc basis (e.g. if required by maintenance crews). The same water per capita figure of 60 litres/employee/day, **or 0.06 m^3/employee/day has** been applied here. This figure is used in the assessment in order to provide a conservative estimate of water use.

The Environmental Statement Chapter 4: Scheme Description states that (4.6.10) *It is anticipated that the Scheme will create in the region of 15 Full Time Equivalent staff jobs per annum. It is expected that these staff will not be permanently based on site but will visit as and when required during the operational phase*. Based on this, it is assumed that there will be three staff onsite on an average day using amenity facilities, and 15 staff at peak times.

Given these figures, the amenity water use for operational staff is estimated in the following table:

Category	Value	Unit
Operational staff amenity water use	0.06	m^3/employee/day
Average operational staff employee numbers	3	employees
Average operational staff amenity water use	**0.18**	**m^3/day**
Peak operational staff numbers	15	employees
Peak operational staff amenity water use	**0.90**	**m^3/day**

3.8 Operational Phase Module Cleaning Water

In order to maintain the effectiveness and energy generation efficiency of the solar modules, it is necessary to clean them. De-ionised water would be used as a preference. The frequency of cleaning is to be confirmed, but for the purposes of this assessment it is assumed to occur once per year. The following table summarises the expected water demands for the cleaning process. According to the latest information provided, the cleaning will occur over a one-month period each year.

Category	Value	Unit
Number of solar modules	990,000	
Surface area per solar module	2.7	m^2
Total surface area of solar modules	2,628,418	
Cleaning water requirements for solar modules[6]	0.27	litres/m^2/year
Total operational phase module cleaning water	722	m^3/year
Annual workdays	252	
Average operational phase module cleaning water	**2.9**	**m^3/day**
Module cleaning workdays per year	20	
Peak operational phase module cleaning water	**36.0**	**m^3/day**

In order to produce a conservative estimate of water demands for the Scheme, the above is included in the overall water demand calculations for it. However, in practice it may be that module cleaning contractors will come equipped with their own mobile bowsers of water to undertake the work.

3.9 Summary

The following table summarises water demands during the **construction phase** of the project:

Category	Value	Unit
Total amenity water use for construction staff	13,759	m^3
Total vehicle washing water use in construction phase	391	m^3
Total construction phase equipment washing water use	1,890	m^3
Total construction phase directional drilling water	3,435	m^3
Total construction phase water	**19,475**	**m^3**
Category	Value	Unit
Average amenity water use for construction staff	27.3	m^3/day
Average vehicle washing water use in construction phase	1.6	m^3/day
Average construction phase equipment cleaning water	3.75	m^3/day
Average construction phase directional drilling water	6.8	m^3/day
Average construction phase water	**39.45**	**m^3/day**
Category	Value	Unit
Peak amenity water use for construction staff	52.6	m^3/day
Peak vehicle washing water use in construction phase	10.8	m^3/day
Peak construction phase equipment cleaning water	11.25	m^3/day
Peak construction phase directional drilling water	64	m^3/day
Peak construction phase water	**138.65**	**m^3/day**

[6] https://iopscience.iop.org/article/10.1088/1742-6596/2433/1/012025/pdf

This estimate is significantly higher than the initial estimate referred to in Section 3.2. However, that estimate did not include for directional drilling water demand, due to it being completed earlier in the development planning process. If directional drilling water demand is excluded from the above, the total construction water demand is 16,041 m^3/which is closer to the initial estimate in Section 3.2.

The following table summarises water demands during the **operational phase** of the Scheme:

Category	Value	Unit
Average operational staff amenity water use	0.18	m^3/day
Average operational phase module cleaning water	2.9	m^3/day
Average operational water demand	**3.08**	**m^3/day**
Category	Value	Unit
Peak operational staff amenity water use	0.9	m^3/day
Peak operational phase module cleaning water	36.0	m^3/day
Peak operational water demand	**36.9**	**m^3/day**

The water required to fill external firefighting water storage tanks has been excluded from this report as the water demand is not on a per day/year basis during operation.

This assessment will now turn its focus to possible means of satisfying these demands.

4. Site Water Supply

4.1 Introduction

During construction, the water demands of the Scheme are both relatively high, but also dispersed – the large extent (1,441.4 ha) and various areas involved (as listed in Section 2.1) mean that a 'traditional' approach to industrial water supply (that is, a point water source with a piped distribution system) is not suitable.

The key consequence of this is that point sources such as a mains water connection or a single borehole or watercourse abstraction which provides water for only one point at the site will be insufficient to service the entire Scheme. Given the large extent of the site, a distribution network of underground pipework is not feasible. Thus, regardless of the water source used, some kind of vehicular transport system for the water (e.g. tankering) will be required to transport water to the various demands across the Scheme.

This suggests that tankering of water from a source external to the Scheme may be the most feasible means of supplying water to it. This is considered in Section 4.6 of this report.

4.2 Mains Water

The mains water supplier for the development area is Anglian Water. A teleconference meeting was held with Anglian Water on 13 May 2025 to discuss the potential for a mains water connection for the Scheme.

This resulted in the following outcomes:

- Anglian Water confirmed that to apply for a mains water connection for the Scheme, they typically require submission of a Water Resources Assessment Form, which collects detailed information about how water will be used and whether the connection is temporary or permanent. This enables Anglian Water to assess feasibility of supply.
- Anglian Water stated that typically due to the water stressed nature of the area, new connections are capped at 20 m^3/day, though there is some flexibility for projects such as nationally significant infrastructure projects.
- Anglian Water also noted that typically solar schemes such as the Scheme use private supply or abstraction arrangements without Anglian Water involvement.

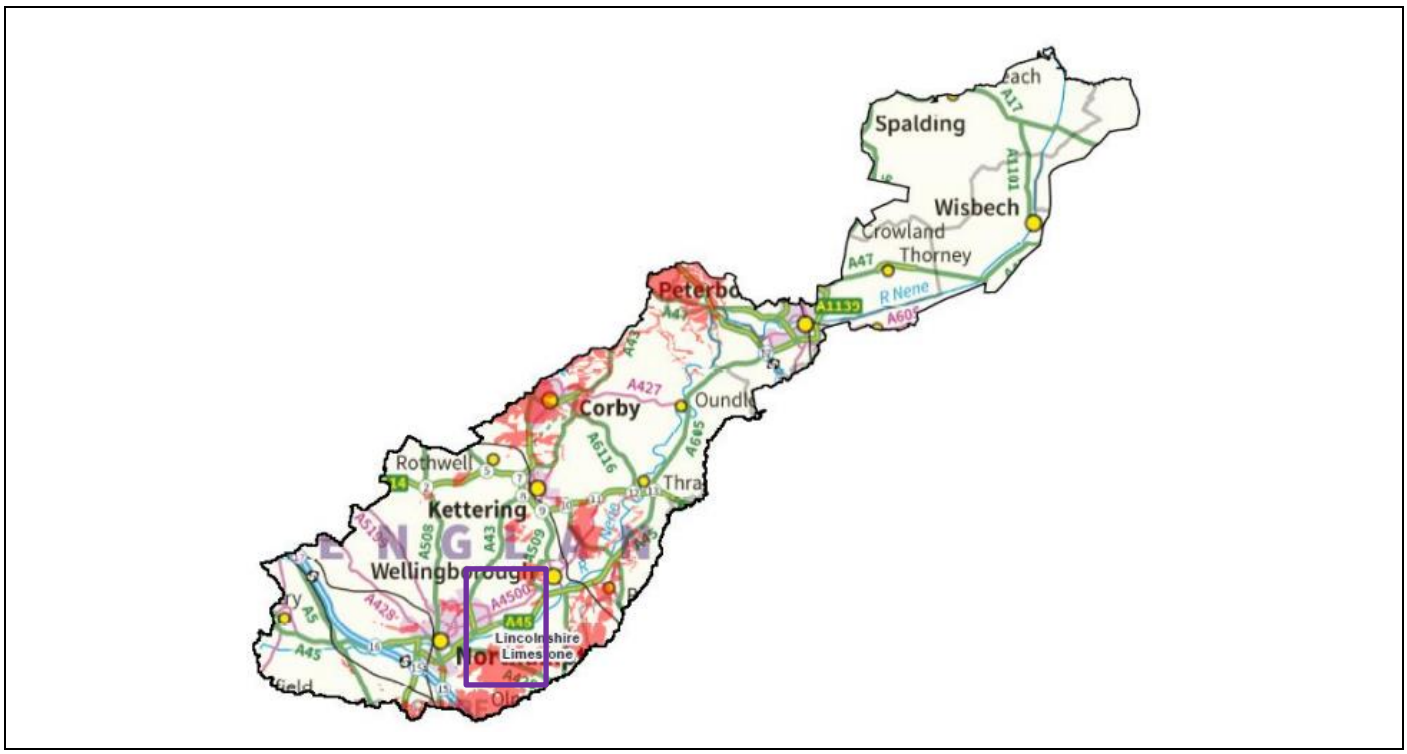
Given the above information, particularly the fact the even with some flexibility the 20 m^3/day figure give is below average construction demand and well below peak construction and operational phase water demand for the Scheme, it is considered unlikely that mains water represents a feasible supply option for Scheme.

4.3 Borehole Water

Borehole water is obtained from pumping from underground aquifers. The information in Appendix B of this report indicates there is a productive aquifer in the area. However, as noted in the EA response at statutory consultation, new groundwater licenses are not thought to be available for the Scheme area. This is supported by Environment Agency's Nene Catchment Abstraction Licensing Strategy (March 2021)[7] which includes the following map and description of water resource availability (approximate scheme location outlined in purple):

Borehole Abstraction Resource Availability (approximately scheme location shown

7 https://assets.publishing.service.gov.uk/media/606d91e28fa8f57359cf4346/CAMS-Nene-Catchment-Abstraction-Management-Strategy.pdf



This plan shows exclusively red areas around the Scheme location. With respect to these red areas, the aforementioned Strategy states:

> *Groundwater unit balance shows more water has been abstracted based on recent amounts than the amount available. We will not grant further consumptive licences. Non-consumptive licences will be considered on a case-by-case basis.*

Thus the potential to use borehole water onsite would be restricted to seeking other parties who already have existing licences in place and seeking to transfer ownership or enter into sharing arrangements. This makes a reliance on borehole water for the Scheme unlikely to be suitable.

However, should the use of existing boreholes be pursued, the following steps would need to be undertaken:

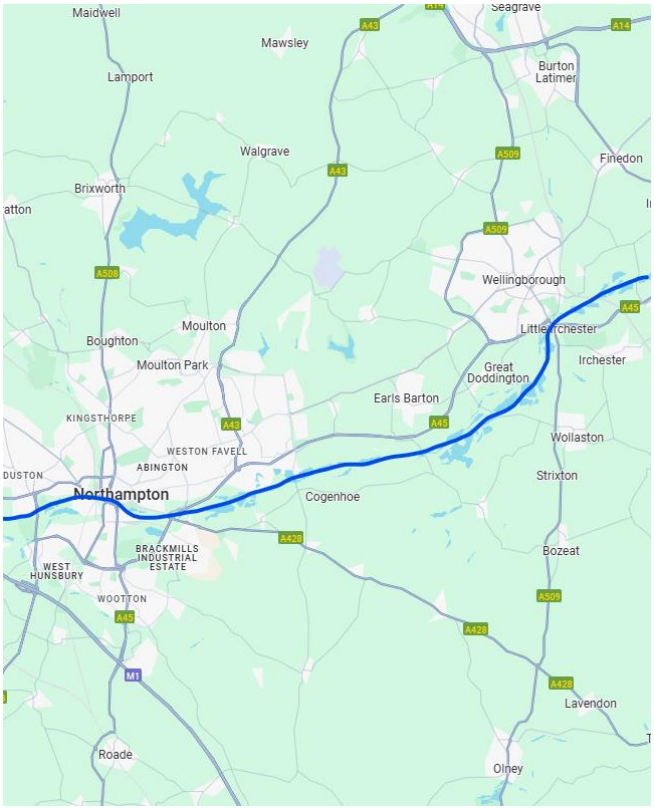
- Use the British Geological Society's borehole record information hub to identify boreholes located in areas of interest.
- Negotiate with current abstraction licence holders to determine available water.
- Undertake borehole yield testing to confirm available water and take water chemistry samples according to drinking water guidelines.
- Use these yield tests and sampling to determine treatment requirements, depending on which demands the water is to be used to satisfy.
- Investigation of means of transporting the water to the various site demands, e.g. amenities.
- Proceed with detailed design of treatment and distribution networks.

4.4 Surface Water (Watercourses)

Surface water from watercourse can be obtained by pumping out of rivers, streams, etc.

The most significant watercourse and the watercourse with the most potential for abstraction which runs through the site is the River Nene. The approximate course of this river is shown in the following marked up map.

River Nene, Wellingborough to Northampton



However, the Environment Agency's Nene Catchment Abstraction Licensing Strategy (March 2021)[8] states that for this area of the River Nene:

> *If all licensed water is abstracted there will not be enough water left for the needs of the environment. No new consumptive licences would be granted. It is likely we'll* [the Environment Agency] *be taking action to reduce full licensed risks. Water may be available if you can 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder*

Thus, as in the case of borehole water, the potential to use surface water from watercourses onsite would be restricted to seeking other parties who already have existing licences in place and seeking to transfer ownership or enter into sharing arrangements. This makes a reliance on existing surface water licences for the Scheme unlikely to be suitable

Should the use of existing surface water licences be pursued, the following steps would need to be undertaken:

[8] https://assets.publishing.service.gov.uk/media/606d91e28fa8f57359cf4346/CAMS-Nene-Catchment-Abstraction-Management-Strategy.pdf

- Use publicly available abstraction license information to identify abstractions located in areas of interest.
- Negotiate with current abstraction licence holders to determine available water.
- Take water chemistry samples according to drinking water guidelines.
- Use these tests and sampling to determine treatment requirements, depending on which demands the water is to be used to satisfy.
- Investigation of means of transporting the water to the various site demands, e.g. amenities.
- Proceed with detailed design of treatment and distribution networks.

4.5 Surface Water (Runoff)

Given the large extent of the Scheme, it is likely to generate significant amounts of surface water from the rainfall it receives. Arthian have conducted drainage assessments of the various areas included in the Scheme, including preliminary modelling of sustainable drainage systems (SuDS) pond volumes. These SuDS ponds are designed to fill during significant rainfall events, in order to reduce the risk of flooding caused by high runoff flows.

Taking Green Hill C as an example, Arthian's modelling indicates that a SuDS pond with a volume of 4,847m^3 to attenuate flows and thus reduce downstream flood risk. If full, this represents a significant volume of water and thus has the potential to provide a water source for the site for certain activities. A total area of 55,879 m^2 of hardstanding area drains into this SuDS pond. Assuming a runoff coefficient of 0.9 and given Northampton's average annual rainfall of around 650 mm[9], this would generate 32,690 m^3 of water, or 168% of the overall estimated demand of the construction phase of the development.

This suggests that using surface water runoff from the Scheme may provide a viable water source for it. However, various constraints mean that it cannot provide the sole option for meeting the water demands of the Scheme . This includes:

- The timing of construction across the development, to ensure that water will be collected and available during construction or if it will only be available during operation.
- Identification of an alternative water source available for the beginning of construction, i.e. before the first SuDS basin has been constructed.
- Treatment requirements for runoff water making the water only suitable for certain activities.
- Means of transporting the water to the various site demands, e.g. amenities.

9 Northampton, Moulton Park (Northamptonshire) UK climate averages. Met Office. https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages/gcr37upbm

4.6 Water Tankering

Contact was made with the following water tankering companies during the production of this report in order to check the availability of potential suppliers for the Scheme:

- Greens H_2O (greensh2o.co.uk)
- Tardis H_2O onsite (www.tardish2o.co.uk/)
- Water2u (water2u.uk)
- Watertanker (watertanker.co.uk)
- Aquaforce Concrete Services (aquaforceconcreteservices.co.uk)
- Bulk Water Tankers (bulkwatertankers.co.uk)

Details regarding the proposed level of supply was provided to these suppliers. A positive response was received from one supplier who confirmed via email that they were capable of meeting a peak demand for the scheme of 150 m^3/day, which equates to five of their articulated water tankers (this represents the 137 m^3/day estimated peak demand with a 10% contingency added to it).

This confirmation means that there is a viable water supply for the Scheme.

Furthermore, the supplier confirmed that they also offer deionised water in tankers, which would obviate the need for onsite treatment; something which the other solutions investigated in this assessment would have to provide for.

4.7 Conclusions

Various water supply options have been considered in the previous sections, each of which has advantages and disadvantages. These are summarised in the following table.

Supply Option	Advantages	Disadvantages
Mains Water	•Reliable supply. •High water quality, little further treatment required. •Relatively low capital costs.	•No new mains connections available in Scheme area. •Relatively high unit costs (per m^3). •Would require planning for distribution of water, e.g. tanker hire. •Would require a deionisation system for module cleaning
Borehole Water	•Moderately reliable supply, depending on nature of aquifer. •Relatively good water quality, some treatment required.	•No new borehole licenses available in Scheme area. •Uncertain capital. costs due to requirement to acquire existing licenses. •Uncertain unit costs (per m^3) due to requirement to acquire existing licenses. •Would require planning for distribution of water, e.g. tanker hire. •Would require a deionisation system for module cleaning

Surface Water (Watercourses)	•Moderately reliable supply, depending on nature of watercourse.	•No new abstraction licenses available in Scheme area. •Relatively low water quality, significant further treatment required. •Uncertain capital. costs due to requirement to acquire existing licenses. •Uncertain unit costs (per m^3) due to requirement to acquire existing licenses. •Would require planning for distribution of water, e.g. tanker hire. •Would require a deionisation system for module cleaning
Surface Water (Runoff)	•Moderately good water quality, some treatment required. •Moderate unit costs (per m^3). •Would require less planning for distribution of water, e.g. tanker hire due to multiple SUDS basins across site.	•Low reliability of supply, due to variations in rainfall. •No supply during initial phases of construction as SuDS basins are being constructed. •Higher capital costs due to multiple SuDS basins, each requiring treatment. •Would require planning for distribution of water, e.g. tanker hire. •Would require a deionisation system for module cleaning
Water Tankering	•Reliable supply. •High water quality, little further treatment required. •No capital costs. •Includes a distribution system by its very nature. •Would not require planning for distribution of water, e.g. tanker hire. •Would not require a deionisation system for module cleaning.	•High unit costs (per m^3). •

5. Conclusions

Based on estimations given currently available data regarding the Scheme, the following tables summarise anticipated water demands during the construction and operational phases of the Scheme.

Category	Value	Unit
Total construction phase water	19,475	m^3
Average construction phase water	39.45	m^3/day
Peak construction phase water	138.65	m^3/day
Average operational water demand	3.08	m^3/day
Peak operational water demand	36.9	m^3/day

Various options have been considered for the supply of these water demands, each of which have relative advantages and disadvantages. The assessment concludes that the water demands for the Scheme can be met via the following options:

- Water tankering represents a viable option for the water supply to the Scheme.
    - **This is a key conclusion of this water resources assessment, since it demonstrates there does exist a viable solution to supply the modelled water demands for the Scheme.**
    - **Furthermore, given the points made previously in this report regarding the large extent of the Scheme, some tankering would be required to distribute water across the site regardless of the source of this water, which suggests that external tankering is the most viable option for the Scheme.**
    - While the use of tankering has the advantage of providing a 'mobile' supply of water and would reduce the vehicle requirements internal to the Scheme's operations, the detailed design of the Scheme will need to consider the inclusion of onsite storage to supply e.g. welfare facilities, tanker access, and means of transfer from tankers to this onsite storage.
- The Scheme could also consider pursuing water sources from within its boundaries. This could provide an alternative or additional means of supply. This could take the form of:
    - Seeking to use existing boreholes in the area whose ownership could be transferred to the Scheme, or some other water sharing arrangement put in place (subject to environmental permitting requirements).
    - Seeking to use existing surface water abstraction in the area whose ownership could be transferred to the Scheme, or some other water sharing arrangement put in place (subject to environmental permitting requirements).
    - Undertaking further design around the treatment and reuse of water collected in site SuDS ponds.

  However, as noted these point sources of water would have to be coupled with some kind of tankering system to distribute the water across the Scheme.

Appendix A: Vehicle Movement Data

The following tables are taken from the KMC Transport Planning authored document Green Hill Solar Farm Transport Assessment Environmental Statement Chapter 13, Appendix 13.3, May 2025.

Forecast HGV construction vehicle movements – Solar Sites and BESS

Construction activity	Vehicle type	Green Hill A	Green Hill A.2	Green Hill B	Green Hill C / BESS	Green Hill D	Green Hill E	Green Hill F	Green Hill G	BESS
Construction Period (Working Days)		358	211	211	169	133	473	498	370	360
Modules and Batteries	16.5m Articulated	226	107	108	48	44	355	390	299	500
Mounting Structures	16.5m Articulated	178	84	85	38	34	279	307	235	40
Conversion units	16.5m Articulated	10	5	5	2	2	15	16	13	N/A
Access Track	10m Tipper/ 10m Rigid	182	86	87	39	35	287	315	241	39
General - fencing, landscaping		400	189	190	85	77	628	690	528	85
Total		995	471	475	212	191	1,564	1,719	1,315	664
Average daily HGV movements		3	2	2	1	2	3	4	4	2
Peak HGV daily movements		8	9	9	5	9	9	9	9	4
Peak HGV daily movements (two-way)		15	18	18	10	18	18	17	19	8

Summary of construction worker forecast vehicle movements – Solar Sites and BESS

	Green Hill A	Green Hill A.2	Green Hill B	Green Hill C / BESS	Green Hill D	Green Hill E	Green Hill F	Green Hill G	BESS
Total Workers by Grouping	330			259			367		
Average workers	169	80	81	28	25	206	208	159	55
% Travel by shuttle	44%	56%	56%	54%	60%	51%	51%	47%	27%
Travel by shuttle	75	45	45	15	15	105	105	75	15
Travel by car / van	94	35	36	13	10	101	103	84	40
Number of shuttles	5	3	3	1	1	7	7	5	1
Number of cars and vans	63	24	24	9	7	68	69	57	27
Total vehicles	**68**	**27**	**27**	**10**	**8**	**75**	**76**	**62**	**28**
Total two-way vehicles	**136**	**54**	**54**	**20**	**16**	**150**	**152**	**124**	**56**

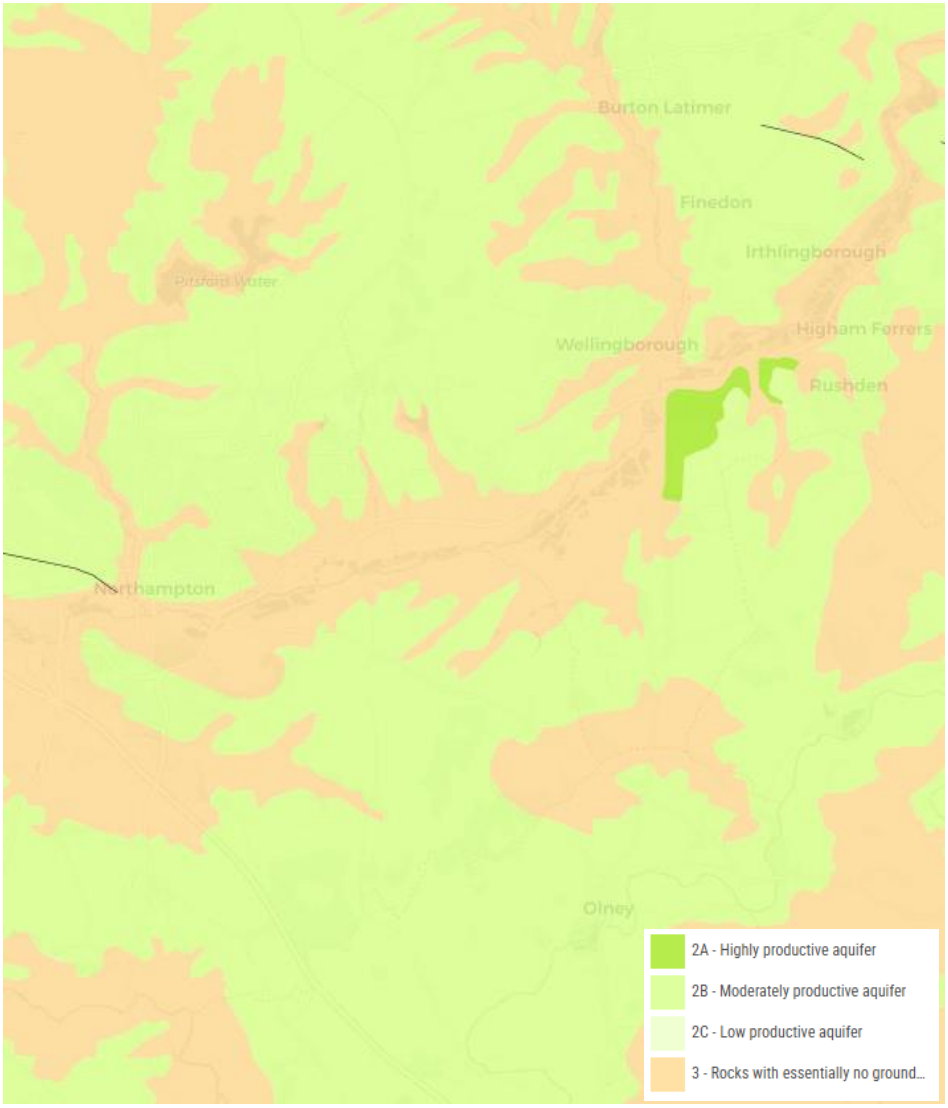
Summary of cable route compound construction workers and forecast vehicle movements

	CC1	CC2	CC4
Average workers	24	24	24
% Travel by shuttle	50%	50%	50%
Travel by shuttle	12	12	12
Travel by car / van	12	12	12
Number of shuttles	1	1	1
Number of cars and vans	8	8	8
HGVs	11	11	11
Total vehicles	**25**	**25**	**25**
Total two-way vehicles	**50**	**50**	**50**

Appendix B: Groundwater Resources

The following plan shows groundwater productivity levels in the area surrounding the Scheme.

Groundwater Productivity Levels – Northampton Area



As per the legend included with this image, ground water production levels range from rocks with essentially no groundwater through moderately productive aquifers and a small area of highly productive aquifers. The following table defines these terms.

Aquifer designation	Description
Highly productive aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
Moderately productive aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Low productive aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

Rocks with essentially no groundwater	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

These definitions give a guide to the level of groundwater available to the site.