Lime Down
Solar Park

Outline Water Resources Strategy

September 2025

Revision 1

Planning Inspectorate Reference: EN010168

Document Reference: APP/7.25

APFP Regulation 5(2)(q)

Executive Summary

1.1.1 Lime Down Solar Park Limited (the 'Applicant') is progressing with the development of a new solar and energy storage project in Wiltshire, known as the 'Scheme'. This **Outline Water Resources Strategy [EN010168/APP/7.25]** provides an early-stage evaluation of quantities of water required for the Scheme during construction and operation and where the Applicant is likely to resource these demands.

1.1.2 This Outline Water Resources Strategy covers the following:

- Identification of areas and quantities of Scheme water use, where necessary calling upon data from 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); and
- Demonstrate that there are feasible and sufficient sources to supply the estimated water demands of the Scheme.

1.1.3 Based on information provided for the Scheme, the following table summarises anticipated water demands during the construction and Operational and maintenance phases of the Scheme.

Category	Value	Unit
Total construction phase water	19,209	m^3
Average construction phase water	44.95	m^3/day
Peak construction phase water	155	m^3/day
Average operational water demand	2.12	m^3/day
Peak operational water demand	25.6	m^3/day

1.1.4 Note that there may be additional water demands from the decommissioning phase of the Scheme. However, these will be lower than the requirements for construction, and hence any water supply in place to satisfy construction will also satisfy decommissioning. Furthermore, the Scheme lifespan is 60 years, meaning that any estimates of decommissioning activities in approximately 2085 would be highly speculative.

1.1.5 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:

Mains Water Connection in Lime Down A

1.1.6 A mains water connection in Lime Down A, the possibility of which has been confirmed by Bristol Water. This is a key conclusion of this Outline Water Resources Strategy, since it demonstrates there does exist a viable solution to supply the modelled water demands for the Scheme. It is therefore recommended that:

- The Scheme approaches Bristol Water to begin the process of putting this connection in place as soon as possible and continues communications with Wessex Water to determine if a further connection is possible in the part of the Scheme in their area of supply.
- The Scheme considers what infrastructure and equipment is needed to transport this water to its different point source water demands and how mobile water demands can fill from the mains water connection point(s).
  - Note that even though this would require that the Scheme purchases its own tanker(s), this may be less expensive than using a tankering company due to their typically high unit cost of water compared to mains water.
- The Scheme confirms that the additional vehicle movements this implies are permitted by the relevant authorities. Given a tanker size of 30m^3, this implies an approximately 450 tankering trips over the Scheme's two-year construction period for the relevant water uses (i.e. those for which an external contractor would be expected to provide water).

Water Tankering

1.1.7 Water tankering also represents a viable option for the water supply to the Scheme, as indicated via discussions with tankering operator Greens H_2O. This is a further key conclusion of this Outline Water Resources Strategy, since it demonstrates there exists a second independently viable solution to supply the modelled water demands for the Scheme.

1.1.8 It is therefore recommended that:

- The Scheme maintains contact with identified water tankering supplier(s) to confirm their availability as the construction phase approaches.
- The Scheme confirms that infrastructure such roadways and connection points are incorporated and are of nature which permits transport and delivery of this tankered water.
- The Scheme confirms that the additional vehicle movements this implies are permitted by the relevant authorities.

Overall Conclusions

1.1.9 Given the possibility of a mains water connection and water tankering for the Scheme have been confirmed, progression of options for borehole water, surface water abstraction and surface water runoff harvesting are not a priority for the Scheme.

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1.2 Consultation

1.2.1 As part of the Statutory Consultation feedback received by the Environment Agency it was recommended that water requirements were considered in more detail for the Scheme in the form of a Water Resource Strategy (including further detail on whether abstraction licenses are likely to be required). The relevant feedback is provided in **Table 1-1:**

Table 1-1 Environment Agency Statutory Consultation Feedback

Relevant Topic	Feedback Received
Water Resources	*"WR1 – Water Demands of the Scheme* *Document Reference(s): Lime Down Solar Park PEIR* *Chapter 3, Section 3.4.12 and 3.4.41-3.4.42* *Issue: Water requirements of the Scheme during construction are estimated to be 4,905m3 for welfare facilities and other uses. It is unclear what the scope of other uses includes.* *Impact: Whilst activities such as wheel and concrete washing can require relatively small quantities, dust suppression during the summer months and bentonite clay mixing and driving of HDD can require larger volumes of water. If water demands are underestimated ahead of the commencement of the construction phase, then licences may not be in place in time and potential limitations to water access may not have been planned for.* *Solution: Produce a water resources strategy which breaks down the water demands by activity and location to ensure all have been considered. An options appraisal of the sources of supply available can then provide the most practical solutions, if for example licences come with restrictions"*

Existing Abstraction License	*"WR2 - Existing Abstraction Licence* *Document Reference(s): Lime Down Solar Park PEIR Chapter 3, Section 3.4.42* *Issue: Sources of supply considered for water resources strategy to the site include the use of an existing abstraction licence. Some activities (such as dust suppression) are considered to be high loss water uses (very little of the water is returned to the environment). If the existing licence conditions do not accurately reflect these uses of water, a formal variation of the licence will be required.* *Impact: This may impose additional conditions if the abstraction is determined to be made more impactful as a result of these changes.* *Solution: As part of a water resources strategy, consider the existing licence conditions and implications for formally varying it to ensure that any restrictive conditions can be planned for, and security of supply ensured."*

2 Scheme Information

2.1 The Scheme and Order Limits

2.1.1 The Scheme comprises a solar photovoltaic (PV) electricity generating station of over 50 megawatts (MW) and 'associated development' comprising up to 500MW export capacity Battery Energy Storage System (BESS), grid connection infrastructure and other infrastructure integral to the construction, operation and maintenance, and decommissioning phases. Further description of the scheme is provided in **ES Volume 1, Chapter 3: The Scheme [EN010168/APP/6.1].**

2.1.2 The PV electricity generating station and BESS would be contained within five land parcels referred to as Lime Down A, B, C, D and E (hereafter collectively referred to as the 'Solar PV Sites') (refer to **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]).**

2.1.3 The Cable Route Corridor is the area within which the export connection cables (hereafter referred to as the 'Grid Connection Cables') would be located to connect the Solar PV Sites to the National Grid at the existing Melksham Substation (hereafter referred to as the 'Existing National Grid Melksham Substation') and the area within which cables connecting the Solar PV Sites would be located (hereafter referred to as 'Interconnecting Cables') (refer to **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]).**

2.1.4 The Scheme also includes works at the Existing National Grid Melksham Substation and inclusion of Highway Improvement Areas (refer to **ES Volume 2, Figure 2-1: Elements of the Site [EN010168/APP/6.2]).** All the above elements of the Scheme would be contained within the 'Order Limits' or 'the Site'.

2.1.5 Key Scheme information relevant to this report is as follows:

- The Scheme is located on primarily agricultural land;
- The expected lifespan is 60 years;
- The construction period is anticipated to last two years (expected 2027-2029);
- As per the Work Packages set out in **ES Volume 1, Chapter 3: The Scheme [EN010168/APP/6.1]** the construction phase is anticipated to be split out into 10 different phases of development; and
- The Operational and Maintenance phase is expected to commence in 2029.

3 Scheme Water Demand

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

3.2 Areas of Water Demand

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

- Construction phase:
  - Amenity water use for construction staff (e.g. for hand washing);
  - Vehicle washing water;
  - Equipment cleaning water;
  - Directional drilling water; and
  - Dust suppression water.
- Operational and maintenance phase;
  - Amenity water use for operation and maintenance staff; and
  - Solar panel cleaning water.

3.2.2 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 consenting 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.

3.2.3 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.

3.2.4 Note that this report does not assess the change in water demand from transitioning from agricultural land to solar infrastructure but rather the specific needs of the Scheme to meet its construction and operational requirements.

3.3 Previous Estimates and Assumptions

3.3.1 Previous estimates have been developed for some areas of water use. These are:

- An estimated 6,564 m^3 total of water during construction to support welfare facilities onsite and other uses, or approximately 1,005 m^3 during peak months; and
- The Solar PV Panels would be cleaned using water only. Up to 2,945m^3 would be required for panel cleaning per cycle.

3.3.2 The results produced in this document are compared to the above figures in Section 3.11.

3.4 Amenity Water Use for Construction Staff

3.4.1 Amenity water use consists of:

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

3.4.2 British Standard (BS) 8551:2015: Provision and management of temporary water supplies and distribution networks (not including provisions for statutory emergencies) - 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 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.

3.4.3 The following staff numbers are estimated for the Scheme:

- A total of 268 full time equivalent employees over the course of a year of construction; and
- A peak construction workforce of 622 employees.

3.4.4 Given these figures, the amenity water use for construction staff is estimated in **Table 3-1:**

Table 3-1 Construction Water Demand

Category	Value	Unit
Construction staff water use	0.06	m^3/employee/day
Peak construction staff employee numbers	622	employees

Peak amenity water use for construction staff	**37.3**	**m^3/day**
Average construction staff employee numbers	268	employees
Average amenity water use for construction staff	**16.1**	**m^3/day**
Annual workdays	252	days
Annual water use	4,052	m^3/year
Construction phase duration	2	Years
Total amenity water use for construction staff	**8,104**	**m^3**

3.5 Construction Phase Vehicle Washing Water

3.5.1 Deliveries of materials to the Scheme during the construction phase will be made principally by heavy good vehicles (HGVs). This will vary between 16.5m long articulated vehicles and rigid vehicles 8 to 10m in length. Other vehicles will be used to transport staff, etc. to the Scheme. Wheel wash facilities will be provided ahead of vehicles exiting the construction areas 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, **Table 3-2** estimates construction phase vehicle washing water.

Table 3-2 Vehicle Washing Water Demand

Category	Value	Unit
Total vehicle movements	28,086	
Total precipitation days (Ref 1)	160	per year
Proportion of precipitation days	43.84%	
Vehicle movements on precipitation days	11,435	
Vehicle wheel wash water use (Ref 2)	0.15	m^3/vehicle
Construction phase duration	2	Years
Total vehicle washing water use in construction phase	**3,430**	**m^3**
Annual workdays	252	
Average vehicle washing water use in construction phase	**13.6**	**m^3/day**
Peak daily vehicle movements	148	
Vehicle wheel wash water use	0.15	m^3/vehicle
Peak vehicle washing water use in construction phase	**22.2**	**m^3/day**

3.6 Construction Phase Equipment Cleaning Water

3.6.1 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, with some additional work areas assigned to e.g. HDD locations and to compensate for the long length of the cable route. This led to a conservative estimate of work areas of 10 being used. **Table 3-3** details the calculations.

Table 3-3 Equipment Cleaning Water Demand

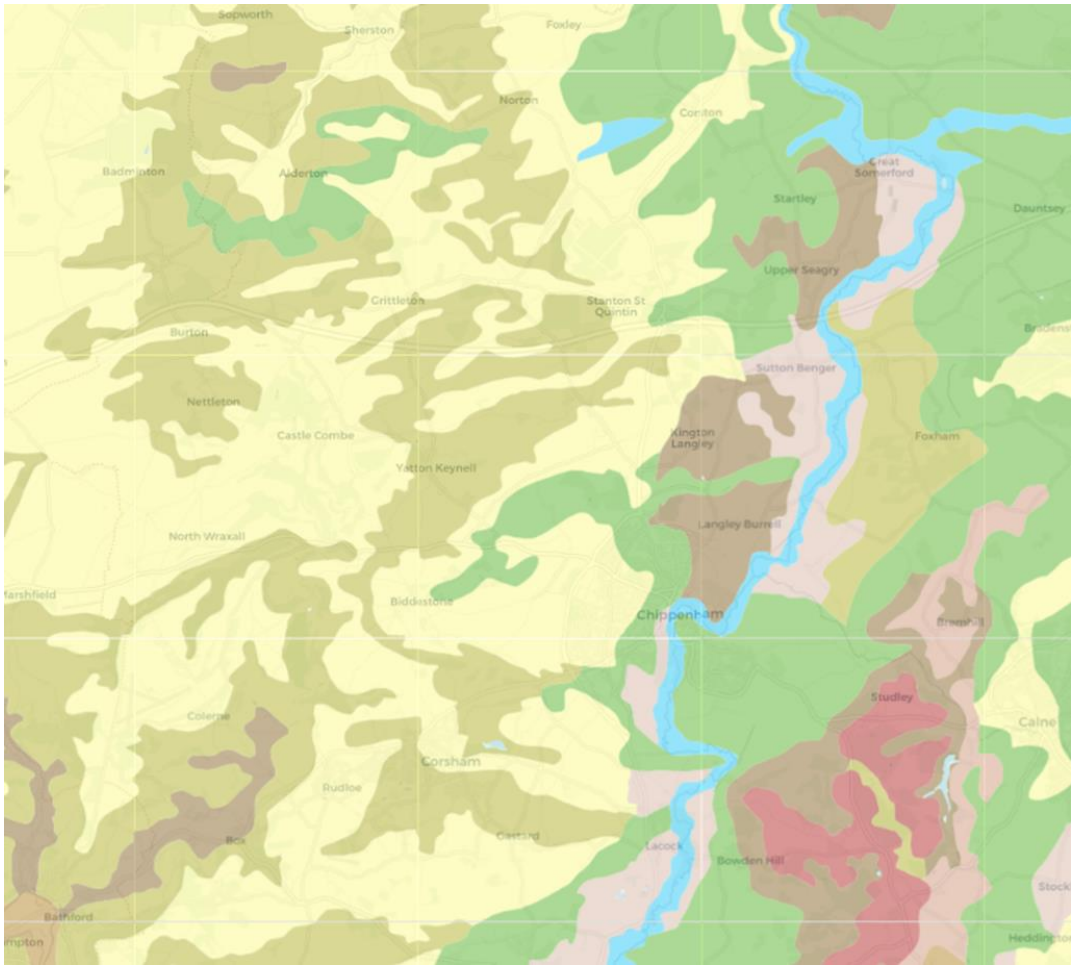
Category	Value	Unit
Number of work areas	10	
Hose flow rate	1.5	m^3/hour
Average daily hose water use	0.25	hours
Average construction phase equipment cleaning water	**3.75**	**m^3/day**
Annual workdays	252	
Construction phase duration	2	years
Total construction phase equipment washing water use	**1,890**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

3.7 Construction Phase Directional Drilling Water

3.7.1 Some of the Grid Connection Cables will be installed using horizontal directional drilling (HDD). 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.

3.7.2 HDD uses water for tasks such as cooling drilling tools and removing debris and mud from the drilled channel. Estimating the volume of water used by HDD is based on the volume (m^3) of earth removed during the drill. A typical figure of around 2.5m^3 of water per m^3 of earth removed (Ref 3) provides a reasonable 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 **Figure 1** (Ref 4).

Figure 1: Soilscape Around Development Area



3.7.3 Given the mix of lime rich loamy and clayey soils and shallow lime rich soils around the Scheme, a ratio of 3:1 water:earth is used to estimate HDD water usage.

3.7.4 Based on Scheme information, **Table 3-4** estimates HDD demands over the course of the construction based on the Avoidance Areas shown in **ES Volume 2, Figures 3-2-1 to 3-2-10: Key Construction Phase Features [EN010168/APP/6.2].** 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.

Table 3-4 HDD Water Demand

Category	Value	Unit
Total construction phase directional drilling water	1,145	m^3
Average construction phase directional drilling water	2.3	m^3/day
Volume of water used	38	m^3
Peak construction phase directional drilling water	38	m^3/day

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

3.8 Construction Phase Dust Suppression Water

3.8.1 Water can be used to suppress dust and control Scheme air quality during the construction phase. The key area of water use for dust suppression is the use of hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. **Table 3-5** estimates the total, average and peak water use associated with this demand, nothing that dust suppression requirements are highly weather dependent and hence any such estimates are indicative.

Table 3-5 Dust Suppression Water Demand

Category	Value	Unit
Total area of hard surfaced road (track)	116,000	m^2
Estimated peak requirement for dust suppression	10%	/day
Estimated peak area of hard surfaced road requiring suppression	11,600	m^2/day
Dust suppression water requirements	0.004	m^3/m^2
Peak dust suppression water requirements	**46.4**	**m^3/day**
Estimated applications of dust suppression over entire hard surfaced area	5	/year
Estimated dust suppression water requirements	**2,320**	**m^3/year**
Total construction phase dust suppression water requirements	**4,640**	**m^3**
Average construction phase dust suppression water requirements	**9.2**	**m^3/day**

3.8.2 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 dust suppression contractors will come equipped with their own mobile bowsers of water to undertake the work.

3.9 Amenity Water Use for Operational and Maintenance Staff

3.9.1 As with the construction phase, operational and maintenance amenity water use consists of:

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

3.9.2 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 and maintenance, 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 used in the construction estimates 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.

3.9.3 The following staff numbers are estimated for the scheme:

- A total of 15 full time equivalent employees based offsite.

3.9.4 Given these figures, the amenity water use for operational and maintenance staff is estimated in the **Table 3-6:**

Table 3-6 Operational and maintenance phase Amenity Water Demand

Category	Value	Unit
Operational and maintenance staff amenity water use	0.06	m^3/employee/day
Average operational and maintenance staff employee numbers (based on 20% site attendance per day)	3	employees
Average operational and maintenance staff amenity water use	**0.18**	**m^3/day**
Peak operational and maintenance staff numbers	15	employees
Peak operational and maintenance staff amenity water use	**0.90**	**m^3/day**

3.10 Operational and Maintenance Phase Solar PV Panel Cleaning Water

3.10.1 In order to maintain the effectiveness and energy generation efficiency of the Solar PV Panels, it is necessary to periodically clean them. De-ionised water would be used as a preference. The frequency of cleaning is annual. **Table 3-7** summarises the expected water demands for the cleaning process. According to the latest information provided, the cleaning will occur over a one-month period.

Table 3-7 Cleaning Water Demand

Category	Value	Unit
Total surface area of solar panels	1,832,368	
Cleaning water requirements for solar panels (Ref 6)	0.27	Litres/m^2/cycle
Total operational and maintenance phase panel cleaning water	495	m^3/cycle
Annual workdays (annual cleaning cycle)	252	
Average Operational and maintenance phase panel cleaning water	**1.94**	**m^3/day**
Panel cleaning workdays per year	20	
Peak Operational and maintenance phase panel cleaning water	**24.7**	**m^3/day**

3.10.2 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 panel cleaning contractors will come equipped with their own mobile bowsers of water to undertake the work.

3.11 Summary

3.11.1 **Table 3-8** summarises water demands during the construction phase of the Scheme:

Table 3-8 Summarised Construction Water Demand

Total Construction Water Use	Value	Unit
Total amenity water use for construction staff	8,104	m^3
Total vehicle washing water use in construction phase	3,430	m^3
Total construction phase equipment washing water use	1,890	m^3
Total construction phase directional drilling water	1,145	m^3
Total construction phase dust suppression water	4,640	m^3

Total construction phase water	**19,209**	**m^3**
Average Construction Water Use	**Value**	**Unit**
Average amenity water use for construction staff	16.1	m^3/day
Average vehicle washing water use in construction phase	13.6	m^3/day
Average construction phase equipment cleaning water	3.75	m^3/day
Average construction phase directional drilling water	2.30	m^3/day
Average construction phase dust suppression water	9.2	m^3/day
Average construction phase water	**44.95**	**m^3/day**
Peak Construction Water Use	**Value**	**Unit**
Peak amenity water use for construction staff	37.3	m^3/day
Peak vehicle washing water use in construction phase	22.2	m^3/day
Peak construction phase equipment cleaning water	11.25	m^3/day
Peak construction phase directional drilling water	38.0	m^3/day
Peak construction phase dust suppression water	46.4	m^3/day
Peak construction phase water	**155.15**	**m^3/day**

3.11.2 The estimate above of 8,104m^3 for total amenity water use for construction staff accords approximately with the estimate of 6,564m^3 provided in Section 3.3. The estimate above of 37.3m^3/day for peak amenity use for construction staff implies a peak monthly use of around 820m^3 and thus also accords approximately with the estimate of 1,005m^3 provided in Section 3.3. This document retains the 8,104m^3 total and 820m^3 peak estimates.

3.11.3 It is notable that, as shown in the table above, the peak construction phase water use is calculated as the sum of the peak use of each element of usage. Thus, the estimate is conservative in that it is unlikely that each element of usage would peak simultaneously.

3.11.4 **Table 3-9** summarises water demands during the Operational and maintenance phase of the Scheme. Note that the total operational water use is not included (as it was for construction) because the Scheme lifespan of 60 years means that any estimates of longer-term water use over the operational period would be highly speculative, but could be expected to reduce rather than increase, due to potential technological developments in this long timeframe resulting in improved water efficiency:

Table 3-9 Summarised Operational and Maintenance Water Demand

Average Operational Water Use	Value	Unit
Average operational and maintenance staff amenity water use	0.18	m^3/day
Average operational and maintenance phase panel cleaning water	1.94	m^3/day
Average operational water demand	**2.12**	**m^3/day**
Peak Operational Water Use	**Value**	**Unit**
Peak operational and maintenance staff amenity water use	0.9	m^3/day
Peak operational and maintenance phase panel cleaning water	24.7	m^3/day
Peak operational and maintenance water demand	**25.6**	**m^3/day**

3.11.5 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 and maintenance.

3.11.6 The estimate in Section 3.10 of 495m^3 for total panel cleaning water is significantly lower than the estimate of 2,945m^3 given in Section 3.3. The key variable used to estimate this is the cleaning water requirements for solar panels. A figure of 0.27litres/m^2/year is used in this report, which is sourced from a published journal (Ref 6), and hence this estimate is retained for the Scheme, rather than the higher estimate undertaken previously.

3.11.7 Section 4 outlines means of satisfying these demands.

4 Scheme Water Supply

4.1 Introduction

4.1.1 During the construction phase, the water demands of the Scheme are both relatively high, but also dispersed – the large extent and various areas involved (as listed in Section 3) mean that a 'traditional' approach to industrial water supply (that is, a point water source with a piped distribution system) is not suitable.

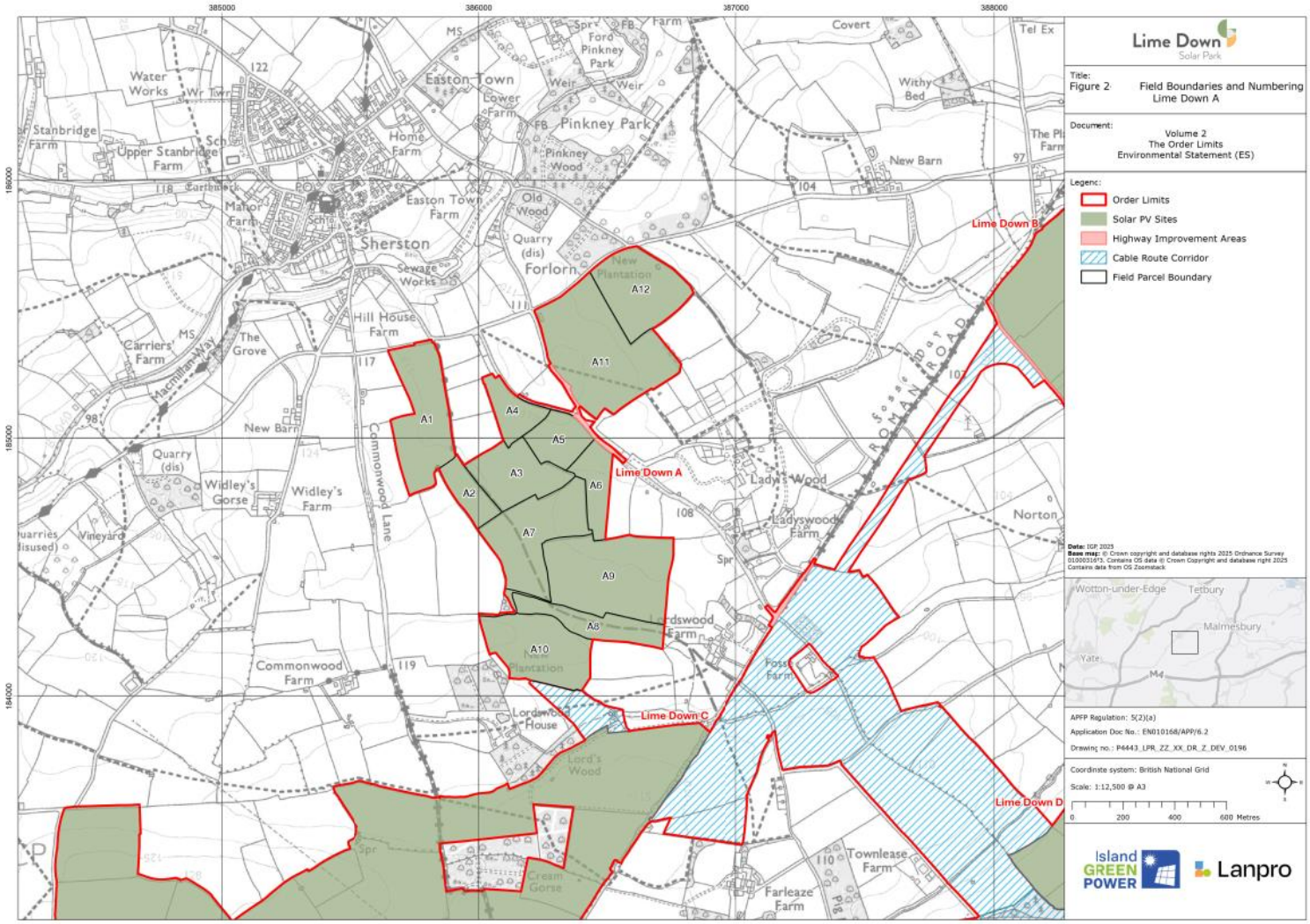
4.1.2 The key consequence of this is that point sources such as a mains water connection or a single borehole or watercourse abstraction which provides water for only one point at the Scheme will be insufficient to service it in its entirety. Given the large extent of the Scheme, a distribution network 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.

4.2 Mains Water

4.2.1 The Scheme straddles two mains water supplier areas, Bristol Water and Wessex Water. Both these parties were contacted during the production of this report. A response from Wessex Water had not been received at the date of issue of this report.

4.2.2 However, Bristol Water confirmed that they are able to provide a water connection from an existing 4-inch cast iron water main in a location close to field A1 of the Scheme near Sherston. Bristol Water also confirmed that a flow of 7m^3/hour was possible from this connection, which is sufficient to provide the 169m^3/day peak water demand required for the Scheme during its construction phase, especially given the conservative estimation of water demands used in this assessment. Parcel A1 is shown below, with a likely connection point being on the northern side of the parcel.

Figure 2: Scheme Layout Showing Parcel A1



4.2.3 This confirmation means that there is a viable water supply for the Scheme to meet its peak, total and average water demands.

4.2.4 Note however, as outlined in Section 4.1, this represents a point water supply source. The Scheme will therefore have to incorporate some means of transporting this water to the various point demands (such as amenity blocks) around the Scheme and also put in place filling infrastructure so any mobile water demands (which do not bring their own filled tankers) can fill at this point. Given a tanker size of $30m^3$, this implies an approximately 450 tankering trips over the Scheme's two-year construction period for the relevant water uses (i.e. those for which an external contractor would be expected to provide water). These estimates have been captured within **ES Volume 3, Appendix 13-1: Transport Assessment [EN010168/APP/6.3].**

4.3 Water Tankering

4.3.1 Contact was made with a number of water tankering companies during the production of this report in order to check the availability of potential suppliers for the Scheme.

4.3.2 Details regarding the proposed level of supply were provided to these suppliers. A positive response was received from one supplier (Greens H_2O) who indicated that they were capable of meeting a peak demand for the scheme of $169m^3$/day, which equates to six of their articulated water tankers.

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

4.3.4 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.

4.4 Borehole Water

4.4.1 Borehole water is obtained from pumping under licence from underground aquifers. **Figure 3** shows groundwater productivity levels around the Scheme.

Figure 3: Groundwater Productivity Levels (Ref 7)

4.4.2 Thus, there are significant areas of highly productive aquifers around the Scheme, as shown in the figure above which illustrates the majority of the area surrounding the order limits contains “Highly productive aquifer”. Therefore, depending on factors such as aquifer depth, the number of existing boreholes, and their total abstraction volumes, a borehole water source may be possible for the Scheme.

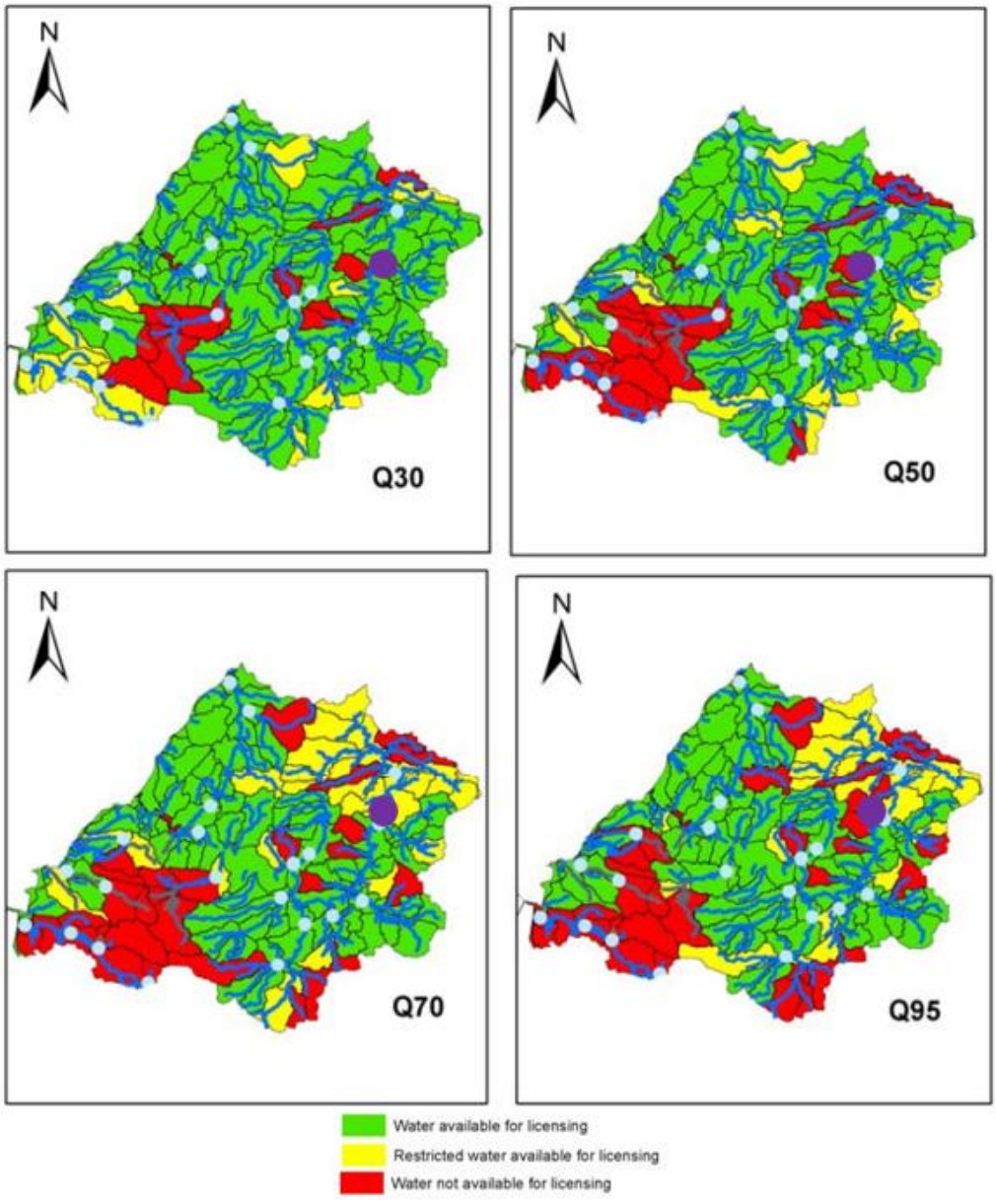
4.4.3 To investigate this further, a borehole prognosis report from the British Geological Society could be pursued. This report gives a preliminary borehole prognosis plus information on the availability, quantity and quality of water that is likely to be abstracted at the chosen location. With this information, the potential for a borehole water source and its potential yield will become clearer. Based on obtaining this information, further steps such as test drilling and practical yield testing could be planned.

4.4.4 However, given the possibility of a mains water connection and water tankering for the Scheme, progressing a borehole is not seen as a priority.

4.5 Surface Water (Watercourses)

4.5.1 Surface water from watercourse can be obtained by pumping out of rivers, streams, etc. Abstraction can occur under licenses issued by the Environment Agency. **Figure 4** shows the general level of licencing availability in the region around the Scheme (approximate scheme location shown in purple).

Figure 4: Abstraction Licencing Availability



4.5.2 Flow statistics are expressed as the percentage of time that flow is exceeded. Resource availability is calculated at four different flows, Q95 (lowest), Q70, Q50 and Q30 (highest). This map shows that there may be some potential for water abstraction at the areas around the Scheme, especially for higher flow conditions. To investigate this further, a specific location should be identified where abstraction could occur (such as at the from the River Avon near Sherston), and discussions opened with the Environment Agency to determine the specific licencing conditions.

4.5.3 However, given the possibility of a mains water connection and water tankering for the Scheme, progressing a surface water abstraction is not seen as a priority.

4.6 Surface Water (Runoff)

4.6.1 Given the large extent of the Scheme, it is likely to generate significant amounts of surface water from rainfall. Drainage assessments have been produced for the Scheme, (**ES Volume 3, Appendix 11-1 Flood Risk Assessment and Drainage Strategy Covering Report [EN010168/APP/6.3]**) including preliminary modelling of sustainable drainage systems (SuDS) systems. However, to maintain the natural environment around the Scheme, no infrastructure, e.g. large SuDS basins, from which surface water could easily be harvested are included in the Scheme.

4.6.2 Given this and the possibility of a mains water connection and water tankering for the Scheme, progressing a surface water abstraction from runoff is not seen as a priority.

4.7 Conclusions

4.7.1 Various water supply options have been considered in the previous sections, each of which has advantages and disadvantages. These are summarised in **Table 4-1.**

Table 4-1 Water Source Relative Advantages and Disadvantages

Supply Option	Advantages	Disadvantages
Mains Water	• Reliable supply. • High water quality, little further treatment required. • Relatively low capital costs. • Bristol Water have confirmed possibility of connection, Wessex Water response forthcoming.	• Relatively high unit costs (per m^3). • Would require planning for distribution of water, e.g. tanker hire. • Would require a deionisation system for panel cleaning.
Water Tankering	• Reliable supply. • High water quality, little further treatment required. • No capital costs. • Includes a distribution system by its very nature, so would not require planning for e.g. (empty) tanker hire. • Would not require a deionisation system for panel cleaning.	• High unit costs (per m^3). • Increased vehicle movements to and from the Scheme.
Borehole Water	• Moderately reliable supply, depending on nature of aquifer. • Relatively good water quality, some 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 panel cleaning.
Surface Water (Watercourses)	• Moderately reliable supply, depending on nature of watercourse.	• 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 panel cleaning.

Surface Water (Runoff)	• Moderately good water quality, some treatment required. • Moderate unit costs (per m^3).	• Low reliability of supply, due to variations in rainfall. • SuDS ponds do not form part of Scheme drainage plan. • Would require planning for distribution of water, e.g. tanker hire. • Would require a deionisation system for panel cleaning.

5 Conclusions

5.1.1 Based on the data currently available for the Scheme, **Table 5-1** summarises anticipated water demands during the construction and Operational and maintenance phases of the Scheme.

Table 5-1 Summarised Scheme Water Demands

Category	Value	Unit
Total construction phase water	19,209	m^3
Average construction phase water	44.95	m^3/day
Peak construction phase water	155	m^3/day
Average operational and maintenance water demand	2.12	m^3/day
Peak operational and maintenance water demand	25.6	m^3/day

5.1.2 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:

Mains Water Connection in Lime Down A

5.1.3 A mains water connection in Lime Down A, the possibility of which has been confirmed by Bristol Water. This is a key conclusion of this Outline Water Resources Strategy, since it demonstrates there does exist a viable solution to supply the modelled water demands for the Scheme. It is therefore recommended that:

- The Scheme approaches Bristol Water to begin the process of putting this connection in place as soon as possible and continues communications with Wessex Water to determine if a further connection is possible in the part of the Scheme in their area of supply; and
- The Scheme considers what infrastructure and equipment is needed to transport this water to its different point source water demands and how mobile water demands can fill from the mains water connection point(s).
  - Note that even though this would require that the Scheme purchases its own tanker(s), this may be less expensive than using a tankering company due to their typically high unit cost of water compared to mains water.

- The Scheme confirms that the additional vehicle movements this implies are permitted by the relevant authorities.

Water Tankering

5.1.4 Water tankering also represents a viable option for the water supply to the Scheme, as indicated via discussions with tankering operator Greens H_2O. This is a further key conclusion of this Outline Water Resources Strategy, since it demonstrates there exists a second independently viable solution to supply the modelled water demands for the Scheme.

5.1.5 It is therefore recommended that:

- The Scheme maintains contact with identified water tankering supplier(s) to confirm their availability as the construction phase approaches.
- The Scheme confirms that infrastructure such roadways and connection points are incorporated and are of nature which permits transport and delivery of this tankered water.
- The scheme confirms that the additional vehicle movements this implies are permitted by the relevant authorities.

Overall Conclusions

5.1.6 Given the possibility of a mains water connection and water tankering for the Scheme have been confirmed, progression of options for borehole water, surface water abstraction and surface water runoff harvesting are not a priority for the Scheme

6 References

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