APPENDIX ONE – Technical Notes (TN)

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1. *Carbon Reduction Strategy*
   Locogen (April 2021)
2. *Wind Feasibility Study – GA Pet Foods*
   Renewables First (Locogen) (December 2021)
3. *'Renewable Generation Feasibility & Optimisation Study'*
   8-Minute Consulting Ltd (June 2024)
4. *'Wind & Site Engineering Report - Energy Yield Estimation and Site Suitability Assessment'*
   Enercon April 2024
5. *'Agricultural Land Classification Site A Asland Walks'*
   ADAS July 2020

ILLUSTRATIONS (Fig) – within text

A. Introduction

1. GA is a family-owned company which has evolved as a diversification of agricultural business based at Plocks Farm. The principal objective is to "Make and Deliver the World's Finest Pet Food", which involves a continuing process to improve both production methods and products, whilst achieving the highest standards of care for the workforce, the environment, and the community of which the business is part.

2. Energy efficiency is a fundamental part of this. GA has a high demand for power and is thus vulnerable to global forces and energy trends, influenced by the Global Climate Emergency and the pledge to reach Net Zero by 2050. To reach this target GA is committed to a strategy of doing everything it can (and as quickly as possible) to produce its pet food in a sustainable and carbon neutral way.

3. In 2020 GA pledged to halve its carbon emissions every decade to reach Net Zero by 2050. Improvements to the production plant and a move away from use of gas as the energy source has been a prime consideration in recent developments at Plocks Farm, particularly those which followed the 2015 Masterplan Consent. However, the strategy would gather pace if GA was able to generate its own zero-carbon energy through wind and solar - this would significantly reduce and stabilise energy costs and safeguard the future of the business, and the local people employed. The goal of the project is thus to substitute high-cost grid electricity with low cost, zero carbon solar energy, delivering immediate savings and long-term value for the end users.

4. Preliminary reviews suggested that this would achieve an estimated 65-70% decarbonisation of GA's electrical demand : further research and investment in other locally generated energy systems would also be considered as energy technologies developed, achieving further decarbonisation and progress towards the Net Zero objective.

5. A further assessment of more recent 2024 energy demand and 2025 usage projections estimate that a 4.2 MW wind turbine combined with approximately 6 MW of solar generation will be sufficient to achieve 100% decarbonisation of GA's electrical demand and meet the 5% Bretherton supply requirement. This is primarily due to substantial energy efficiency improvements at Plocks Farm and a concurrent reduction in production tonnage.

6. However, GA's remaining ≈35 GWh/yr of natural gas demand still requires decarbonisation. The remaining 6 MW of solar would contribute around 20% to the decarbonisation needs, addressing the equal need for decarbonisation on the existing gas demand.

7. (Whilst outside the scope of this application, but for context - GA are mindful of the available roof space in its premises and are progressing plans to install roof mounted solar PV at both of its sites (Plocks Farm and R2 Buckshaw Village), in addition to the Asland Walk Energy Park renewable installation. At Plocks Farm it is proposed to install 1.43 MWp providing a solar contribution of 6% of total site demand : at Buckshaw Village, 200 kWp of roof mounted solar panels and 92kWh BESS is proposed to be installed).

B. Initial Feasibility and site studies

8. In 2020 GA in partnership with Locogen (Renewable Energy Consultants) began assessing its site / production demand and the potential for renewable generation, producing the *'Carbon Reduction Strategy, Technical Support'* study (April 2021)[Ref 1]. This document provided future projections of energy demand up to 2050 and the potential carbon emissions and set out various Scenarios exploring the renewable technologies available.

9. The key report findings included –

    - The most reliable and efficient means for decarbonisation and electricity would be by a combination of wind and solar: wind turbines typically produce most of their annual yield during winter months whereas solar power production peaks during summer months.

    - This could be supplemented by biogas production through anaerobic digestion of GA's organic waste, also using energy crops to be produced on surrounding agricultural land: this would initiate gas usage decarbonisation.

- All key findings would produce significant economic and environmental benefits.
- The Plocks Farm site could not accommodate a wind turbine or sufficient solar at ground level. Roof mounted solar was considered to be an option; however, this would provide insufficient power on its own to satisfy the demand, thus requiring additional facilities off-site.

10. A crucial part of the Locogen study was the assessment of potential available wind sites to GA. Three sites were assessed for wind turbines at Sollom (Site A), Carr Brook (Site B), and Haunders Lane (Site C) : a further option was considered for an anaerobic digestion plant at Carr House Lane (Site D). These locations were selected on account of land ownership and proximity to Plocks Farm allowing a feasible 'private wire' connection back to Plocks Farm to feed the existing network (production centre) and grid connection. The locations are identified in Fig 1 -

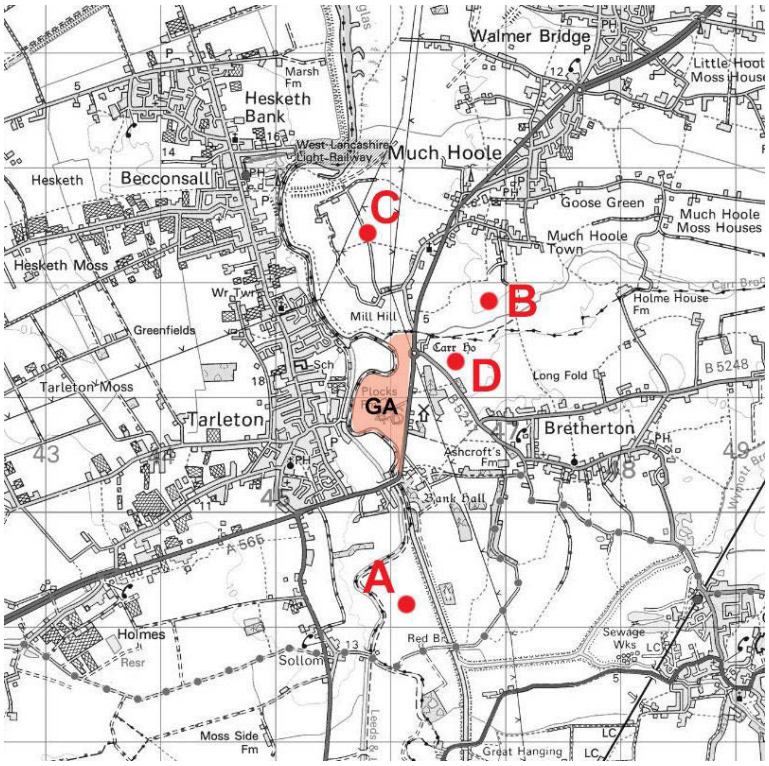


Fig 1 –
Potential Site Options for Green Energy Development

SITE NAME	Area (ha)	Comments / Assessment Summary
Site A – Sollom (Asland Walks)	**39.70**	**Wind Turbine(s) and Solar** ○ Located in area already well screened by mature woodland and hedgerows. ○ Few receptors – only a small number of dwellings adjacent to, and having views of, the site ○ No conflict with existing services.
Site B – Carr Brook	**45.46**	**Wind Turbine(s) and Solar** ○ Close to Much Hoole village. ○ Site is falling south towards Carr Brook and thus visible to housing (Much Hoole and North Bretherton) ; prominent in views from Liverpool Road (A59) and Carr House Lane (B5247) ○ Visible from housing on higher land at the east edge of Tarleton. ○ No conflict with existing services. ○ Poor ground conditions - potential turbine thus located off-site to southeast.
Site C – Haunders Lane	**40.77**	**Wind Turbine(s) and Solar** ○ Fragmented field pattern causing inefficient solar layout. ○ Area is blighted by nationally significant service routes running NW-SE across the area (two National Grid overhead transmission lines, and two Shell Oil underground pipelines) ○ Study revealed it was impossible to include wind turbine due to conflict with overhead transmission lines, with solar locations compromised by pipeline locations and easements. ○ Close to Much Hoole village, and visible from housing on the east edge of Tarleton.
Site D – Carr House Lane	**12.0**	**Anaerobic Digestion Plant for Biogas** ○ Concept and preliminary plant design discussed with local community /consultation events ○ Not favoured by local community - prime concerns centred on visual appearance, increase in traffic on Carr House Lane, noise, and general road safety. ○ Option thus rejected

11. In summary –

    i) Haunders Lane (C) was ruled out for a wind turbine/s due to proximity of the overhead cables to turbine blade movement: the potential areas for solar arrays were compromised by the easements required for the underground pipelines.

    ii) Carr Brook (B) was not further assessed due to the proximity to the nearby residential areas in Much Hoole and Bretherton which would cause noise and shadow flicker impacts: poor ground conditions was a further issue.

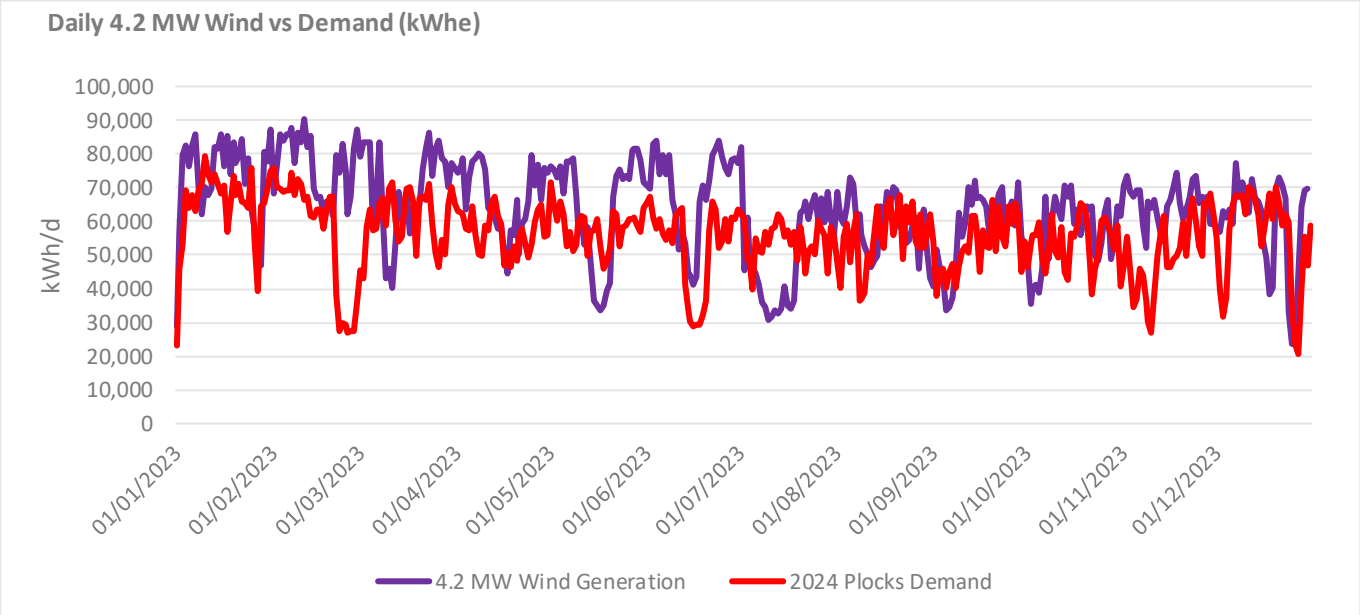
    iii) Sollom (A) was assessed and considered suitable for further wind turbine technical assessments. The site was subsequently renamed 'Asland Walks' being the historic name of the local river before this was adopted as the line of the Leeds-Liverpool Canal (Tarleton Branch) and diverted as the canalised River Douglas on the east side of the site.

    iv) Carr House Lane (AD Plant) – the potential of anaerobic digestion as a component of the net zero energy project was discussed with the Parish Council in August 2021; however, the PC requested that this was not to be considered as an option, owing to concerns of increased traffic, odours, and safety.

C. Technical Wind and Solar Studies

12. Following this work Renewables First carried out a technical feasibility study for wind turbine/s on the Asland Walks site (A). The *'Wind Feasibility Study'* [Ref 2] assessed various arrangements and models of wind turbines, evaluating economics, impacts, generation potential against demand and overall feasibility.

13. The study concluded that for efficient energy generation output (primarily reaching the more reliable wind speeds at 111m and above) and considering the constraints imposed by a telecommunications easement and the 'best practice' proximity (500m) to nearby dwellings, one E138 4.2 MW turbine on the Asland Walks field would be the best turbine option out of several which were evaluated. A second opinion on this was requested from Enercon, who concluded this to be the best option and provided their own feasibility study of this turbine arrangement [Ref 4]. This reliable and efficient wind turbine energy generation, which demonstrates significantly close correlation to demand is demonstrated in the chart below;



14. During this period GA also commissioned Solar South West (SSW) to carry out a further technical feasibility to assess ground-mounted solar generation at the Asland Walks site. The *'2022 Planning Design and Feasibility'* study [Ref 3] assessed the site for potential sizing, evaluating economics and generation potential vs demand.

15. Study outcomes and discussions with SSW concluded the Asland Walks site could accommodate 27MWp of solar generation, requiring an area of 35.84 hectares. The concept arrangement is shown in Fig 2 below -

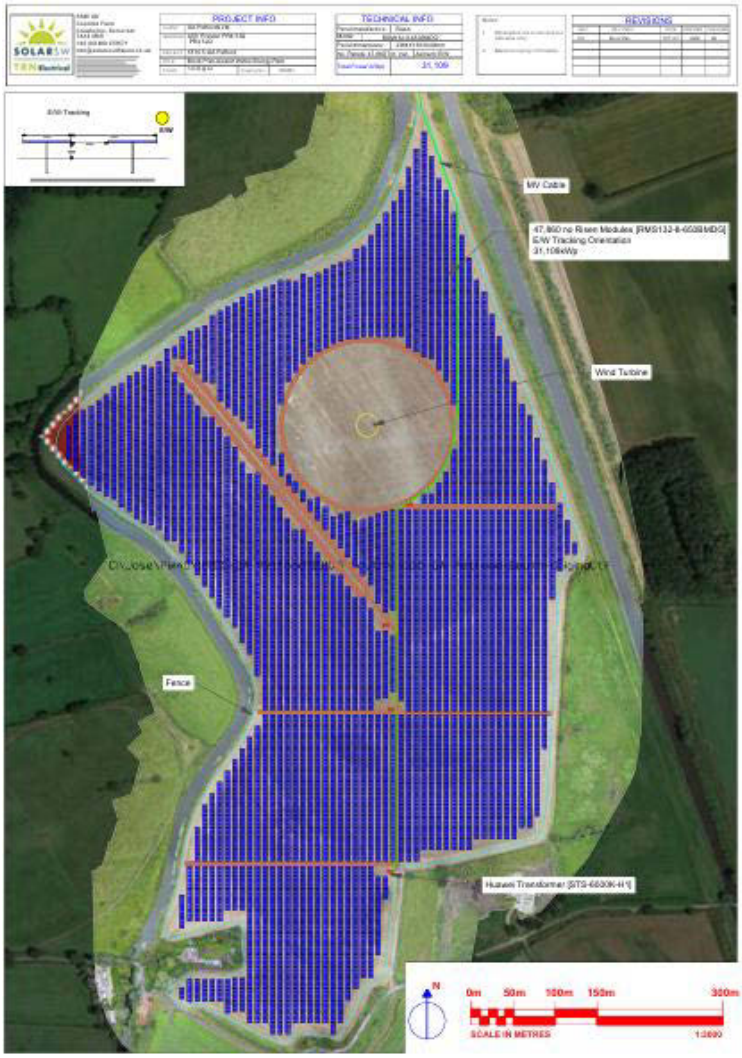


Fig 2 –
Initial Concept Arrangement

(Maximum) capacity of the Asland Walks Site – single turbine (located centrally) and 27MWp solar arrays.

Export to Grid required for surplus

Area 35.84ha

D. Further Sizing Analysis

16. A key requirement from the Renewables First *'Wind Feasibility Study'* [Ref 2] was to gain onsite wind speed data at Asland Walks : GA purchased and installed a Lidar ZX 300 (onshore wind monitoring station) which enabled the recording of wind speed at the following heights - 200m, 160m, 131m, 122m, 111m, 92m, 78m, 69m, 59m, 38m and 36m. This data was collected from 1st January 2023 (and is still ongoing).

17. Following 12 months of wind monitoring, this on-site wind speed data was converted into wind power generation, which was then further assessed by 8 Minute Energy : this study also assessed the solar generation using local solar datasets (being the industrial practice due to its reliability for solar modelling)

18. The potential generation 'yield' was then evaluated relative to the power demand of Plocks Farm. The 8 Minute Energy report '*Renewable Generation Feasibility and Optimisation Study*' [Ref 4] considered this 'yield' in the context of GA's production requirements - site layouts, electrical infrastructure, equipment types, and economics. This detailed report further advanced the site layout plan options, providing several Scenarios for generation based on export amounts, storage capacity, self-sufficiency, and CO^2 reduction.

19. Through consultation with 8 Minute Energy and other consultants, the 'Zero Export' Scenario '4' was selected as the preferred renewable and storage sizing design for the initial phase of the project development. This decision was based on the Scenario '4' sizing as having the highest self-sufficiency, appropriate to the existing grid connection and highest CO^2 reduction within the 'zero-export situation' modelled, i.e. the renewable generation and storage is sized for GA to utilise as much energy as possible whilst not over generating and having to sell the surplus to the National Grid : moreover, Scenario '4' had the most significant CO^2 reduction for net zero targets within the associated models.

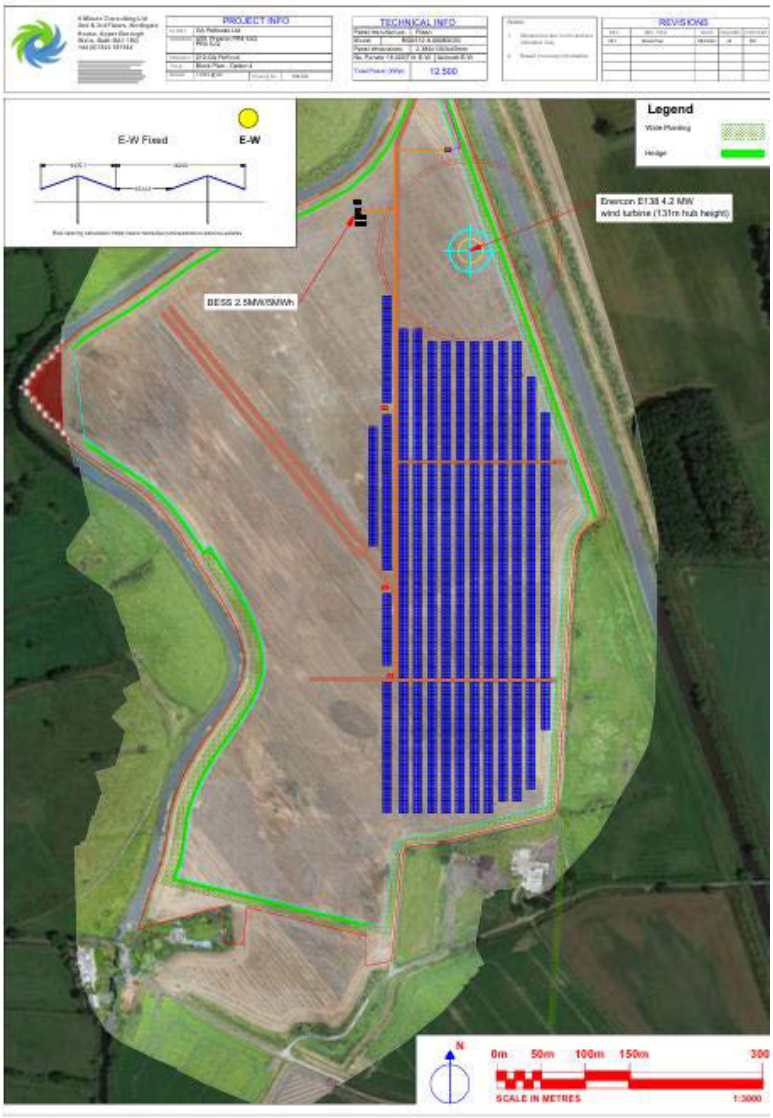


Fig 3 –
Rationalised Capacity of the Asland Walks Site, following appraisal of layout shown Fig 2

Sizing of generation and storage as - single turbine (located towards the north), with 12.6MW solar arrays and 5MWH Battery Storage

Zero Export Option

Area 39.57ha

20. Fig 3 shows the proposed site layout at the time of the 2024 Optimisation Study [Ref 4].

21. The study also identified the benefit of the solar PV panels being orientated east to west (E/W) as opposed to south facing. Whilst this would minimise the peak generation at midday (and reduce overall production by 8%) the E/W panels would generate energy for a longer duration throughout the day, providing more a more constant supply, meaning GA would be able to better match the supply to the demand, thus not wasting and exporting to grid. A further benefit is that the E/W panel orientation significantly minimises the overall footprint in comparison to south facing PV panels.

22. The wind speed data assisted the decision made to reduce the height of the turbine from an overall 199.76m (131m hub height) to 179.80m (111m hub height). Whilst this reduced the power generation it brought the overall height within the 200m stipulated by BAE Warton Aerodrome as being the threshold above which objections would be raised as to the interference with their instrument flight procedures (IFP). The initial proposal at the higher would have provided minimal tolerance to this threshold, with the likelihood of a formal objection: a proposal to sink the turbine below existing ground level by 4.2m would have met this criterion but provide no margin of safety, whilst also introducing complications in the structural design. The proposed reduction in height was thus primarily instigated by the requirement to address air traffic safety, with the reduced generation being a necessary consequence.

23. This height review also promoted a more efficient foundation design limiting construction impacts at the site.

E. Site Layout – Location of Turbine

24. The location of the turbine was considered in the light of further constraints imposed by the need to maintain radio 'corridors' for use by statutory authorities, noted by JRC in their Report (*'GA Pet Food Partners Wind Turbine JRC Consultation Response'* (Renewables First October 2025) –

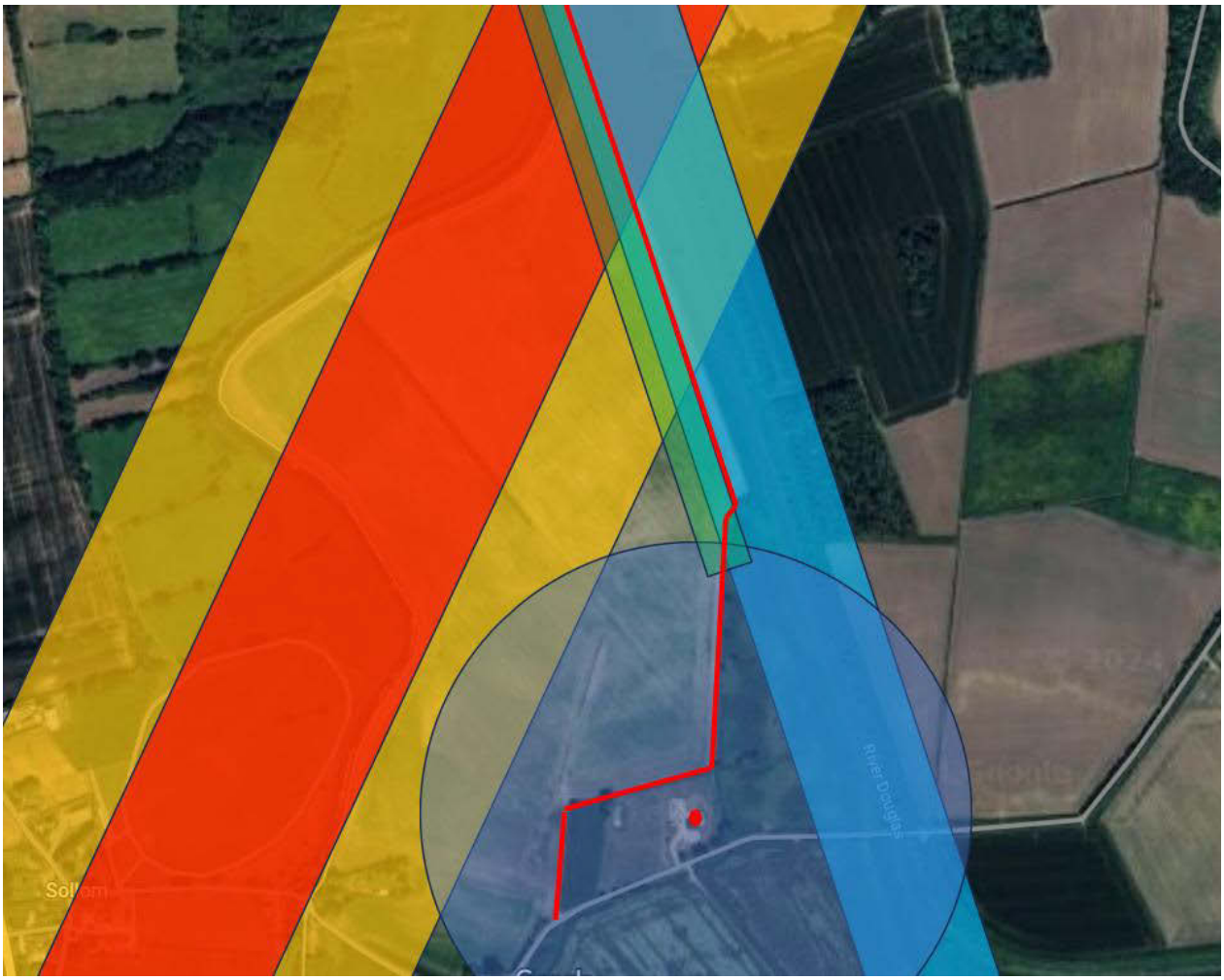


Fig 4 – Location Constraints (Turbine) –

Yellow / red – easement required for telecommunications
Light blue – easement for the River Douglas
Dark blue circle – 500m noise buffer from nearest property (Red Bridge Farm)(as 'best practice')
Green strip along river – linear woodland – 61m offset required to turbine to safeguard bat foraging
Red line / site boundary – turbine blade cannot oversail the site boundary

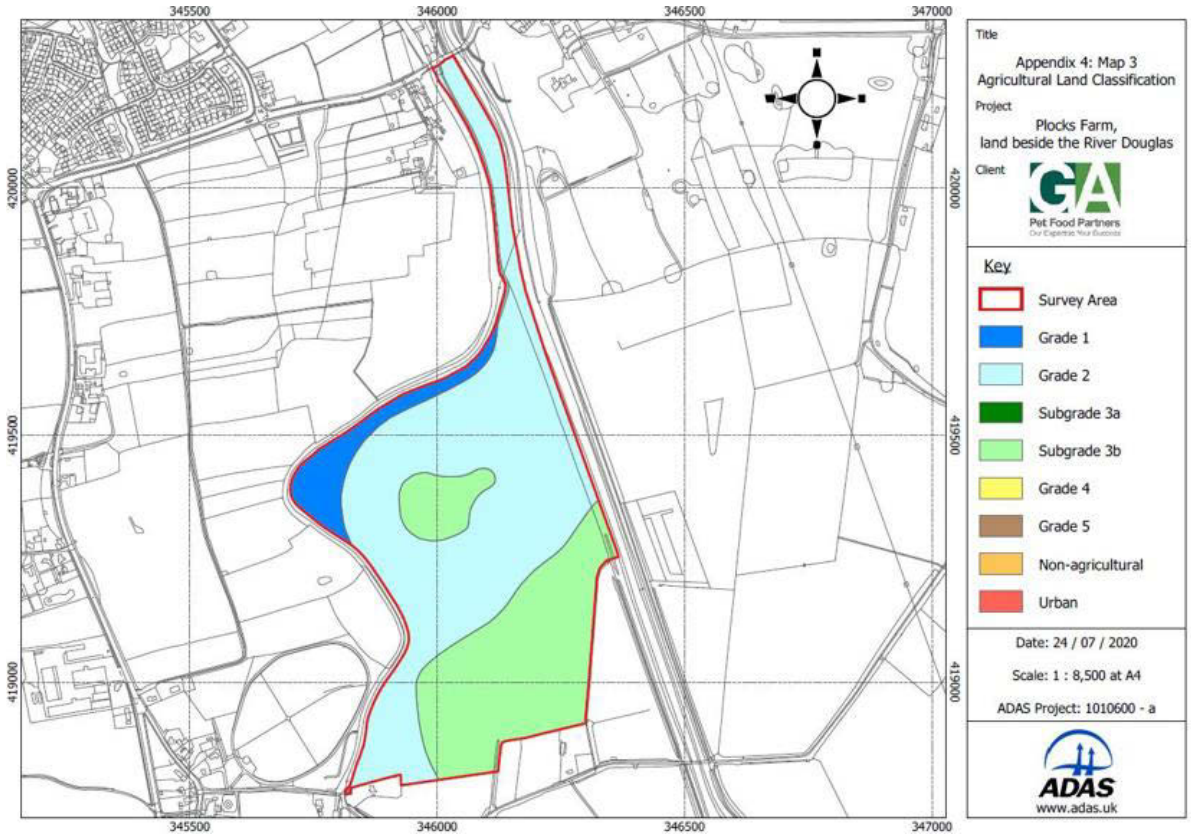
25. The one zone available for the location for the Turbine is thus identified

F. Site Layout – Location of Solar Arrays

26. The area of solar arrays (as Fig 3) is less constrained than the turbine and altogether more flexible in terms of location. The principal consideration here is the limitation of the impact on 'Best and Most Versatile Land', ie minimising the use of Grade 1,2, and 3a land.

27. In 2020, ADAS undertook an Agricultural Land Classification (ALC) Survey [Ref 5] to establish the land quality within Asland Walks. This identified the location of the 'Best and Most Versatile' land (Grades 1- 3A) as well as other grades –

Fig 5 – Agricultural Land Classification Grades – Distribution



Analysis (full Application Site of 39.57ha) –

ALC Grade 1 - 2.63ha (6.64% of Site area)
ALC Grade 2 - 23.78ha (60.10% of Site area)
ALC Grade 3b – 13.16ha (33.26% of Site area)

There is no Grade 3a / 4 / 5 or non-agricultural land within the Site

Solar arrays on ALC subgrade 3b land

Solar arrays on ALC Grade 2 land

Battery Compound on ALC Grade 2 land

Wind Turbine on ALC Grade 2 land

Full assessment of areas as DAS para 8.9

28. In response to this the solar array has been relocated from the centre (east) location shown in Fig 3. It is thus mainly sited on the lowest soil grade of the field being the ALC Grade 3b land to the south of the site, with the remaining higher soil grades areas available for agriculture and/or ecological enhancement.

29. The green energy infrastructure is a 25-year project: on completion the solar area and the wind turbine can be removed and the area returned to full agricultural land use

G. Bretherton Battery System (BESS)

30. The terms of the agreement with the Bretherton Energy Cooperative (BEC) community requires the supply of 5% of the renewable generation to the village. This is via a direct electrical cable from Asland Walks to the two substations in Bretherton (being the existing Bretherton 'North' and the proposed Bretherton 'South' substations). The battery installation is an integral part of the transmission design.

31. The electricity generated from the turbine and solar installation will be used to charge the proposed Bretherton BESS to be provided near to the existing substations (53.67780 -2.79251) which currently supply Bretherton residents.

32. This renewable electricity will then be switched to allow the BESS to connect to the low-voltage side of the two substations and to supply the Bretherton residents. The demand of the BEC members will be mapped based on smart meter consumption patterns, and the BESS will discharge the same amount of electricity into the local LV electricity network to match this BEC resident demand.

33. If the 5% supply from the batteries is unavailable, the residents will continue to receive electricity supplies from the Electricity North-West grid supply point (as per the current arrangement). This 'back-up' will not require any switching and so there will be no electricity supply interruption. The batteries will be recharged from Asland Walk s when windspeed and/or solar intensity allows. The diagram (Fig 6 below) illustrates the principles version of this relationship

Fig 6 –
Schematic Illustration of the principles of the Final Design

H. Final Layout –

34. The specific surveys and assessments undertaken for AW thus identified the optimum provisions for wind and solar power generation, balanced with the needs of GA (as the business user) and Bretherton (as the community user). The requirements were considered in the light of possible constraints, and refined to consider how these could be addressed and mitigated through the detail design. The design development was thus an iterative process in which amendments were proposed to address these, then re-evaluated and refined if necessary to produce a final design comprising a single 4.2 MW wind turbine at a specific location (E:346225, N:419368) and an adjacent solar PV layout.

35. The final layout in principle is shown in Fig 7 below.

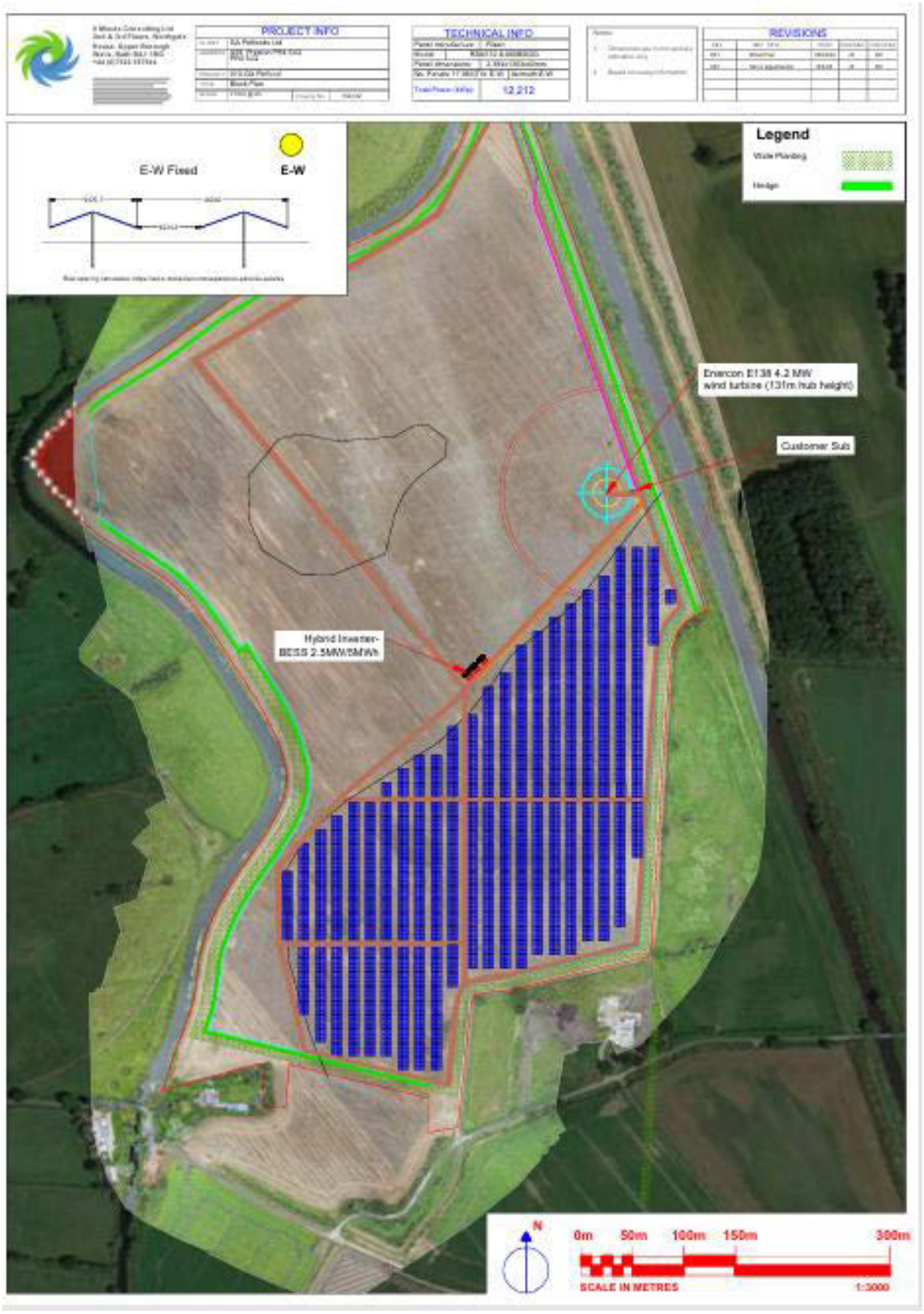


Fig 7 –
Final Concept Plan, following development appraisal of generation capacity layout as Fig 3.
Sizing of generation and storage as - single turbine with 12.6MW solar arrays and 5MW Battery Storage

Zero Export Option - Turbine located in 'constraints-free' zone identified on Fig 4

B - Solar arrays located to south, primarily on ALC Grade 3b land.

C - Battery storage located N boundary of solar area

Area 39.57ha

CONTENTS :

REFERENCES

1. *Wind Feasibility Study – GA Pet Foods*
   Renewables First (Locogen) (December 2021)
2. *Wind Energy in Power Systems* (p. 61). Manwell, J. F., McGowan, J. G., & Rogers, A. L. (2002). John Wiley & Sons.
3. *'Renewable Generation Feasibility & Optimisation Study'*
   8-Minute Consulting Ltd (June 2024)

A. Introduction

1. This Note provides further detail to explain the rationale for the specification of the Wind Turbine and the Solar Panels as the key components of the Application proposals.

2. The Initial appraisal of the requirements[1] lead to the choice of Enercon (https://www.enercon.de/en/wind-turbines/product-portfolio) as the supplier of the turbine. For the solar panels – the current proposal is based on the use of Risen 660 Wp modules (https://en.risen.com/) ; however, it is highly likely that a different model but same sized module will be used when installation commences due to the continuous improving solar technology sector.

3. The wind turbine heights are expressed as 'hub heights' being the industry-standard means of clarifying the size of the turbine tower – thus from ground level to the centre point of the turbine blade

B. Wind Turbine – Influence of Hub Heights

4. This section document summarises the parameters and details of the differing hub heights for turbines considered feasible for the Asland Walks Green Energy site (AW) and their relationship with wind speed. The hub height is critical in that it directly impacts the power output because wind speed generally increases with height.

5. All wind turbines feasible for the AWEP site are within the International Electrotechnical Commission (IEC) IIA wind class due to the site geography and average wind speeds. In this class (as per Enercon guidance and technical advice), the hub heights available are - 131m, 111m, 92m and 78m : there are no turbine options lower than 78m (the wind turbine market is generally going 'bigger', as the energy output increases with height). Of these, GA's proposal is for the 111m height, primarily as it brings the overall height of the turbine (179.8m to tip of blade) within the threshold of 200m stipulated by BAE Warton as an acceptable margin of safety for their instrument flight procedures (IFP).

6. Fig 1 below summarises the data from the AW site for the turbine specification at the varying heights available : this data has been verified by Renewables First. The figures are modelled on wind generation output on the Enercon E-138 EP3 E3 4.2 MW wind turbine, this being the most feasible model for the site.

Fig 1 - AW wind speed and generation data from on-site lidar measurements

Hub Height (m)	Wind Generation (kWh/yr)	Wind generation grid value (£/yr)	Annual Remaining electricity import req. (kWh/yr)	Average Wind Speed (m/sec)	Max Wind Speed (m/sec)
131	16,053,178.85	£3,210,636	5,800,123.65	7.38	28.30
111	15,072,999.74	£3,014,600	6,780,302.76	7.18	27.71
92	13,929,068.85	£2,785,814	7,924,233.65	6.79	26.50
78	12,916,462.19	£2,583,292	8,936,840.31	6.52	26.44

C. Wind – Influence of Wind Speed

7. The standard reference for the relationship between wind speed and power output is Manwell, McGowan, and Rogers[2]. Page 61 (onwards) of this sets out the relationship in equations : for a wind turbine this is exponential and is the single most important factor determining a wind turbine's electricity production. The theoretical power (P) available in the wind is proportional to the cube of the wind speed (v), as per the following –

Fig 2 – Theoretical Power Output

$$P = \frac{1}{2} \cdot \rho \cdot A \cdot v^3$$

Where -

- P is the power in Watts (W).
- rho (rho) is the air density (in kg/m^3)
- A is the swept area of the rotor blades (in m^2)
- v^3 is the wind speed cubed (in m/s) i.e. the cubic law.

8. **The Cubic Law** - the v^3 relationship (the Cubic Law) means that a small increase in wind speed results in a very large increase in available power:

   - Doubling the wind speed increases the power potential by 2^3 = 8 times
   - Tripling the wind speed increases the power potential by 3^3 = 27 times

9. **The Power Curve (Actual Output)** - while the formula describes the available power, the actual electrical power output of a real-world turbine follows a characteristic Power Curve due to its mechanical and electrical limits:

    - Cut-in Speed: The minimum wind speed (typically 2.7 m/s) required to overcome friction and start generating power.
    - Generating Range: Above the cut-in speed, power output increases rapidly according to the cubic law until it hits the rated speed.
    - Rated Speed: The wind speed at which the turbine reaches its maximum or rated power output. The turbine's pitch control system limits the power beyond this point to protect the generator and drive train.
    - Cut-out Speed: The maximum safe wind speed (typically around 28 m/s) at which the turbine is shut down for safety to prevent structural damage.

10. The E-138 EP3 E3 is a "medium-wind" turbine, and its best average wind speed is typically in the range of 7m/sec to 8.5 m/sec at hub height to maximize its annual energy production and economic viability (depending on the exact variant installed). The installation includes 'Cut-out Wind Speed' (Shut-down), to protect the turbine from damage, whereby it automatically shuts down when wind speeds reach 28 m/s : all turbine variants fall within the scope.

11. The appraisal thus concludes the 111m wind turbine would be the most feasible for site selection due to an average wind speed of 7.18 m/sec and max wind speed of 27.71 m/sec.

D. Wind - Reduced Ground Friction

12. Wind near the ground is slowed by friction from the Earth's surface, a phenomenon known as the Wind Shear effect. Obstacles like trees, hills, and buildings create turbulence and decrease the wind speed. By raising the hub height, the turbine accesses air currents that are:

    - Faster: Less affected by surface friction.
    - Less Turbulent: Smoother, more consistent flow, which reduces mechanical stress and fatigue on the turbine's components.

E. Wind - Quantitative Relationship

13. The increase in wind speed with height is often modelled using the Power Law Profile –

Fig 3 –Power Law Profile

$$\frac{v_{\text{hub}}}{v_{\text{ref}}} = \left(\frac{h_{\text{hub}}}{h_{\text{ref}}}\right)^{\alpha}$$

Where -

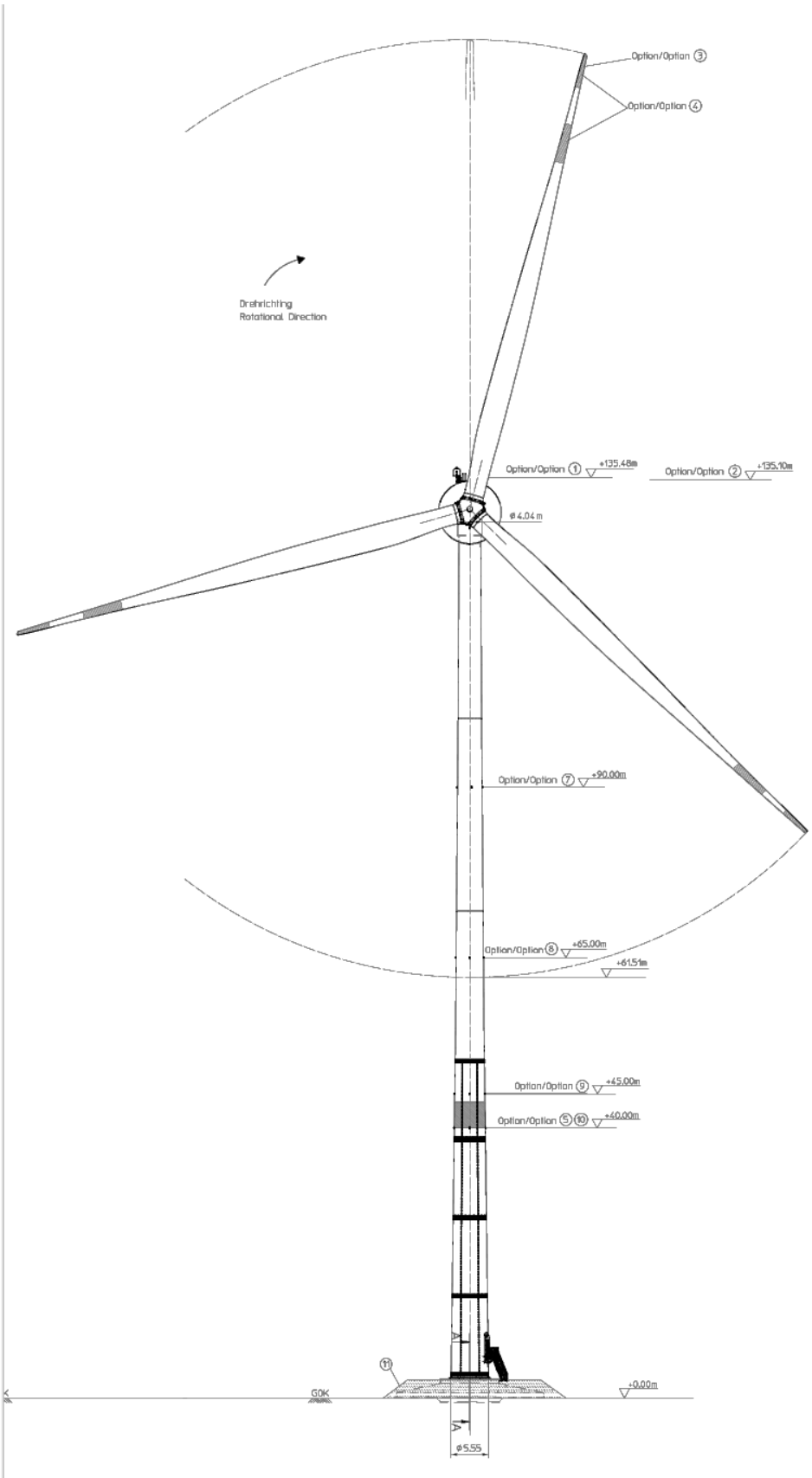
- V hub is the wind speed at hub height (h hub).
- V ref is the wind speed at a reference height (h ref)
- α (alpha), the Power Law Exponent (typically between 0.1 and 0.3), depends on the terrain roughness.

14. As the power output is proportional to the cube of the wind speed (v^3), even a modest increase in wind speed gained by using a taller tower results in a disproportionately larger increase in energy yield and overall profitability for the wind power. This is the primary reason modern utility-scale wind turbines are continuously growing taller.

15. As seen in table 1 this power output relationship is reflected the wind generation across the varying hub heights, showing relatively large differences in power output (generation), with a difference of 2.162 gWh/yr between the 111m and 78m heights : this difference represents 11% of GA's annual electrical demand, emphasising the benefit of using the taller tower.

F. Wind Turbine – General Arrangement

Fig 4 - Enercon 111m Turbine -



Lower Turbine (nominal overall height 180m) – PROPOSED AMENDMENT as Addendum Statement January 2025		

HEIGHT–	Actual	Height AOD
Wind Turbine Industry Height Reference - 111m		
Foundation Level	-	5.10m
Tower Height	108.47m	116.27m
Hub Height	110.64m	118.44m
Height to top of nacelle	114.93m	122.73m
Height to tip of blade	179.80m	186.60m
Length of turbine blade (unchanged)	67.87m	-

LOCATION –		
E : 346225 / N : 419368		

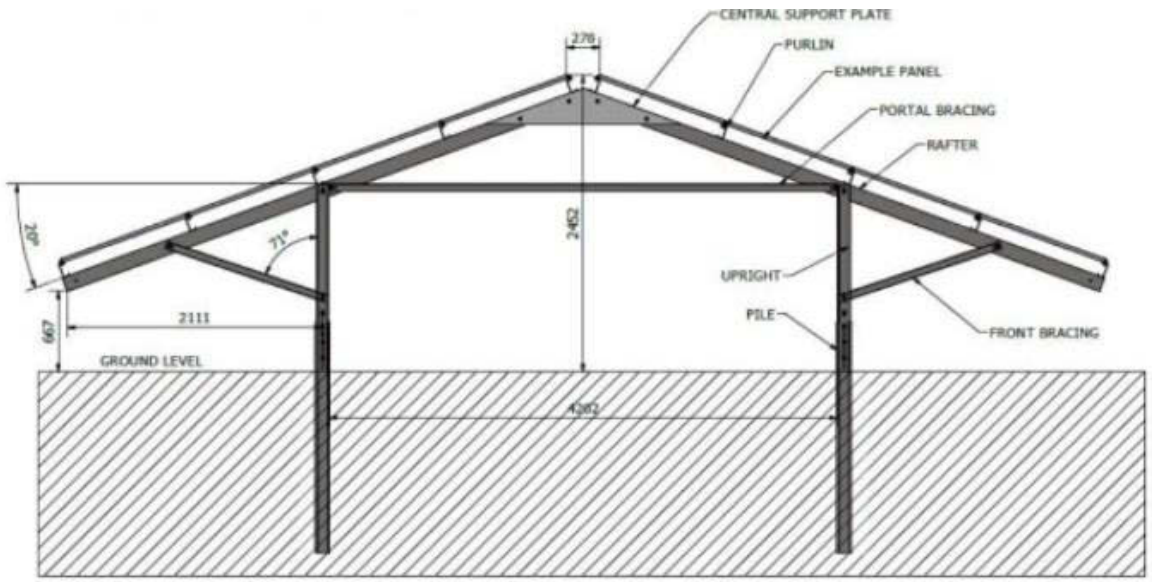
G. Solar Panels

16. Solar modules are essential components of solar photovoltaic (PV) systems, converting sunlight into electricity. There are several types of solar modules : the appraisal of the options considered for AW is noted in the summary report *'Renewable Generation Feasibility & Optimisation Study'* (8-Minute Consulting Ltd June 2024)[3]

17. The report considers several scenarios, with Scenario 4 was selected. This is a 'no export' option ie with no surplus power generated for export to the National Grid and being the most appropriate in terms of space required – the location within AW is thus more flexible, allowing the panels to be placed to minimise the effect on other issues (such as Agricultural Land Quality, landscape quality, and visual).

18. The panels are ground mounted, orientated east to west as a preference over the more commonly used south facing panels. This does minimise the peak generation at midday, and the east-west panels will produce around 8% less energy per day ; however, energy will be generated for a longer duration throughout the day, suiting GA's requirement for power, avoiding the potential mid-day peak and improving the output morning and evening. GA are thus able to use this energy more efficiently in their production and avoid power wastage or export to grid. A further benefit is that the east-west panel arrangement significantly minimises the footprint required in comparison to south facing PV panels.

Fig 5 – Solar Panel Dimensions



CONTENTS :

ILLUSTRATIONS (Fig)

A. Introduction

1. This Technical Note summarise the infrastructure which conveys the power to the end users at Plocks Farm (GA's production centre) and to Bretherton village to serve the community.

B. Battery Energy Storage System (BESS)

2. The purpose of the electrical battery system (BESS) is to provide the flexibility to cope with the natural fluctuations inherent in weather-dependent wind and solar sources. It has a 2.5 MW power (instantaneous input/output) and 5 MWh power capacity, which means it can deliver up to 2.5 MW of power, with enough stored energy to maintain this for 2 hours (2.5 MW / 5MWH). The installation thus evens out the flow of power in times of a shortfall by continuing the supply from this export capacity, with the capability to store the surplus solar and/or wind electrical generation when more is generated than required.

3. The BESS is located on the north edge of the solar arrays, within a fenced compound (area 0.09ha) as shown on the drawing 2022-143-011H *General Arrangement to Solar Farm*. The equipment is housed in seven separate units on an elevated mesh platform, supported by beams and placed on concrete pillars (precast concrete manhole sections) 1.5m above the local ground level : this achieves the level of 6m AOD to comply with the Environment Agency requirement for electrical equipment within a Flood Risk Zone 3 area (ref the DAS at 5.20). Fig 1 shows the general arrangement of the compound, referenced to the following facilities -

   A. 1 no MV Switch Room (GRP Cabinet 8m long x 4m wide x 3m high (internal), aligned on a NE-SW 'grain'

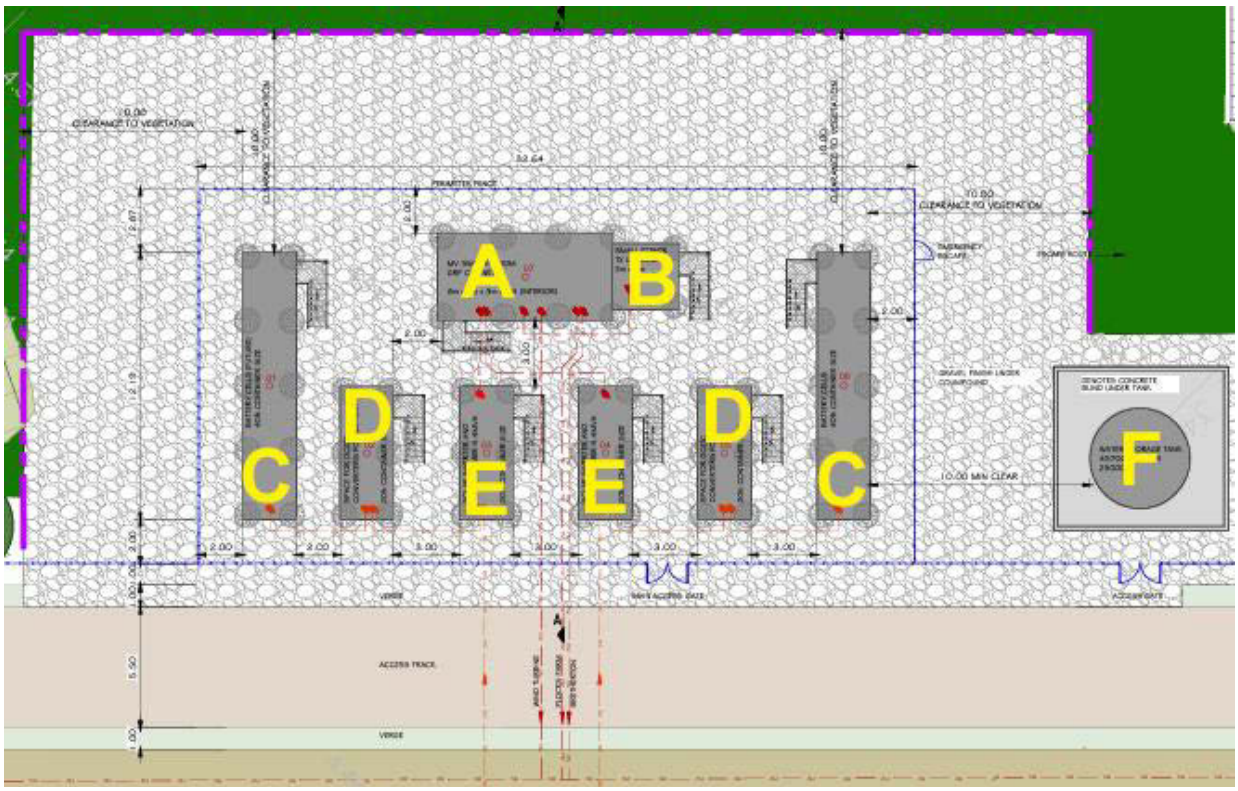
   B. A 3m x 3m Power Transformer facility is attached to the Switch Room

   C. 2 no units for Battery Cells, housed in 12.2m long x 2.4m wide x 2.4m high containers, aligned on a NW-SE 'grain'

   D. 2 no separate units for the solar DC/OC Converters, housed in 6.1m long x 2.4m wide x 2.4m high containers, aligned on a NW-SE 'grain'

   E. 2 no separate units for the solar centralised inverters and transformer (4.4MVA), also housed in 6.1m long x 2.4m wide x 2.4m high containers, aligned on a NW-SE 'grain'

Fig 1 – BESS General Arrangement : Reference Plan (extract from Dwg No 2022-143-013D)

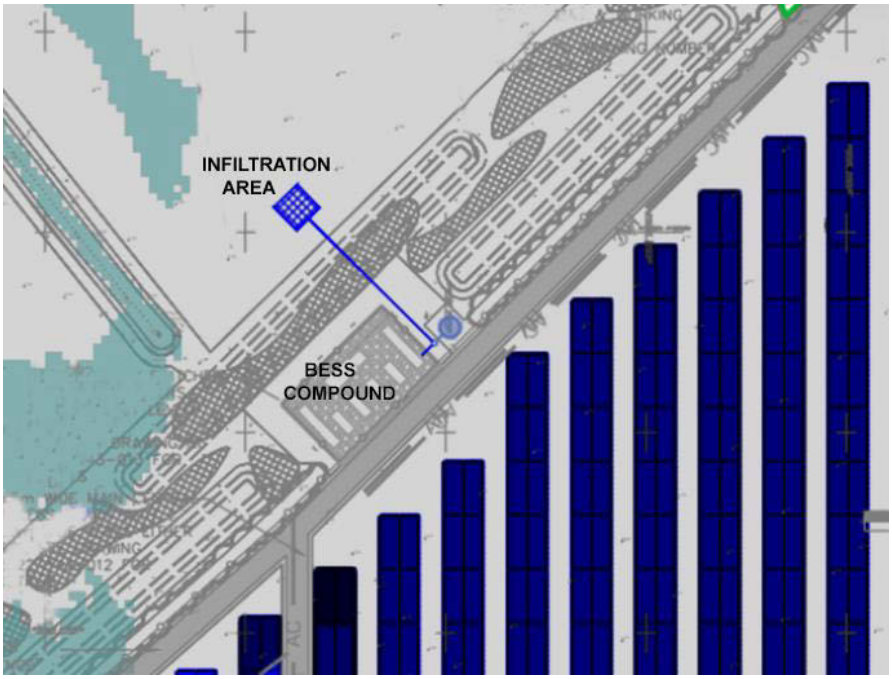


4. 'F' denotes the location of a tank at the north end of the compound providing water for use in the event of battery fire. This is located close to the potential source of fire, as per the NFCC (National Fire Chiefs Council) Guidance *'Grid Scale Battery Energy Storage System planning – Guidance for FRS (v1.0 November 2022)*' Further detail is provided in the *'Fire Management Strategy'* statement (GA December 2025), noting –

    - The tank is a standard galvanised steel item 4.57m diameter x 1.52m high / 228 m^3 capacity), providing 25,000 litres of water in a dedicated supply capable of ≥1,900 L/min for 2 hours.
    - Outlets and couplings aligned with Lancashire FRS requirements
    - Access will be maintained for High Volume Pump units if required

5. Drainage of surplus water after a fire event is directed to an infiltration area to the north. Due to the risk of contaminants from dispensed firewater contaminating ground- or surface water, the drainage system will require a diversion and containment system to ensure that firewater is directed and contained to mitigate the risk of a pollution event. The proposals are noted in the *'Flood Risk Assessment'* Report (Tetra Tech November 2025) at 5.4.

Fig 2 – Location of Infiltration Area



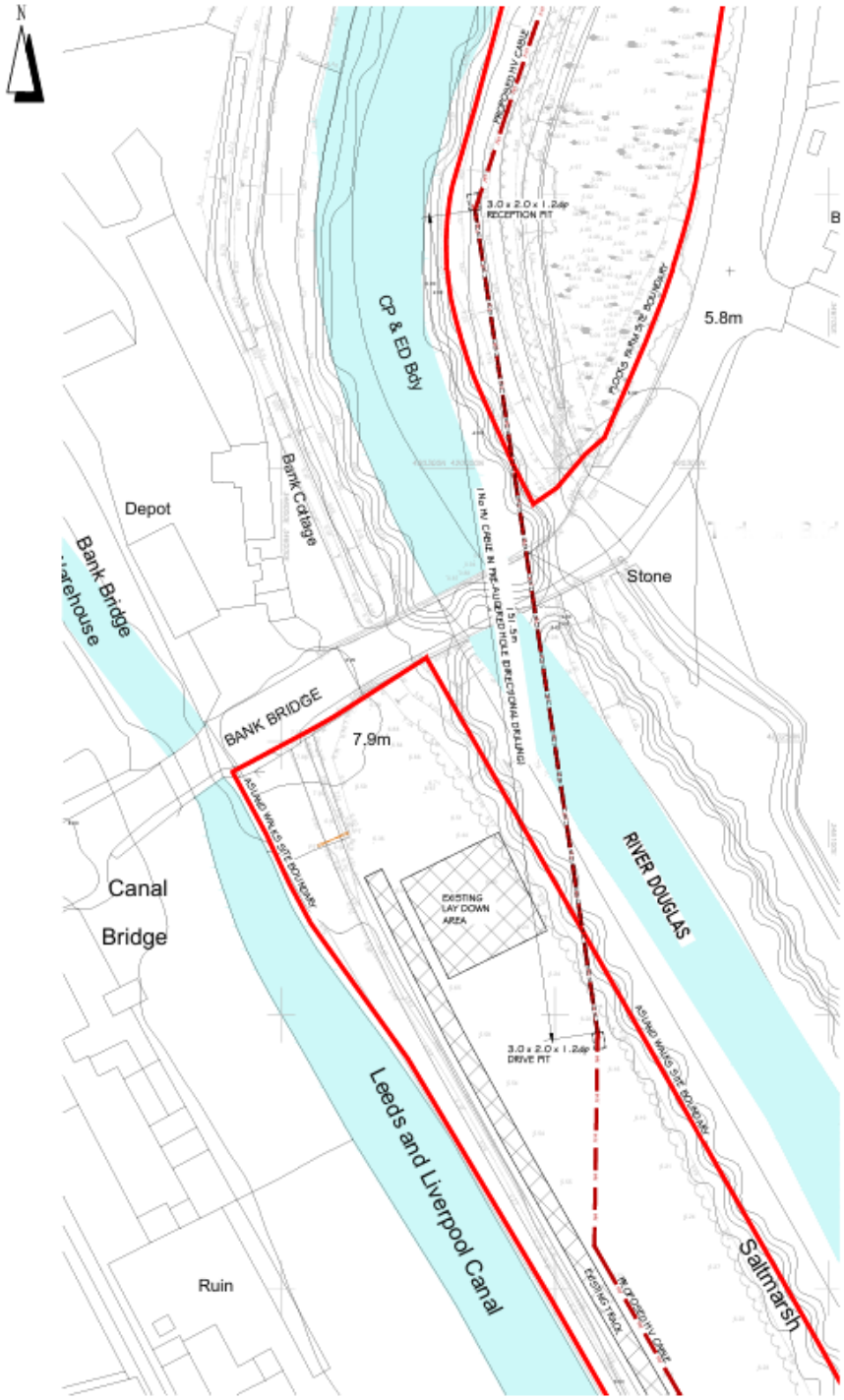
C. Cable Routes

6. The cable routes to Plocks Farm and Bretherton are identified on the plan 2022-143-020D - *HV Cable Route to Bretherton.* The supply as far as the Bretherton Battery Building is HV and the cable is thick and not flexible, and needs to be accessible in case of a fault : it will be laid in a narrow trench at a depth of 1m. The section between he Bretheron Battery Building and the North Substaion is LV

7. The routes involve access to third party land and arrangements for approvals and wayleaves will be undertaken : section 5.52 of the DAS notes the landowners involved.Streetworks permits will be negotiated with the Highways Authority for the sections along Eyes Lane and South Road in Bretherton, in accordance with the statutory guidance published by the Department of Transport

8. The River Douglas will be crossed by thrust-boring the cables under the river bed : for the Bretherton route this will be at 90° ; the route to Plocks Farm needs to cross both the river and the A59, achieved by the bore at an oblique angle as shown Fig 2 below. Once past this point the route is straightforward, running on the east side of the flood bund to reach the centre of Plocks Farm

Fig 2 – Alignment of Thrust Bore at Tarleton (Bank) Bridge (extract Dwg 2022-143-021 - General Arrangement and Details of HV Cable Route Under River and Road



9. The cables on both routes will be laid in trenches, approximately 500mm wide and 900mm deep. As a principle the pre-existing surface will be reinstated following completion and testing. This includes the reinstatement of 'soft' areas (field edges, riverbanks, grass verges etc) and 'hard' areas (private driveways, pavement crossings, pavements).

10. The Bretherton route involves a variety of conditions : east of the Douglas the route follows an existing farm access track, located on the south side and thus within the arable field. The Arboricultural Survey, Appendix 2 Plans (Ascerta November 2025) identifies sections of this route where specifc survey and assessments will need to be made to mitigate any potential effects to trees : this will involve route alignment, protective fencing and clear working arrangements, all of which will be the subject of an Arboricultural Method Statement (AMS).

11. Typical views are shown along the route to Bretherton –

Fig 03A – Cable Route to Bretherton
Typical View R Douglas to Eyes Lane

Cable on right (south) side of track.

View due east at the start of access track to Eyes Lane : turning point for vehicles to the foreground right (south) side of the view.

Arable cropping of field to the right (south) side of the track, narrow verge maintained : verge on right (north) side falls towards the ditch, marginal vegetation, incl bramble, nettle, coarse grasses.

Boundary to the left (north) side includes a ditch : mature trees are at the south end of River Wood and include ash, lime, oak in hawthorn hedgerow

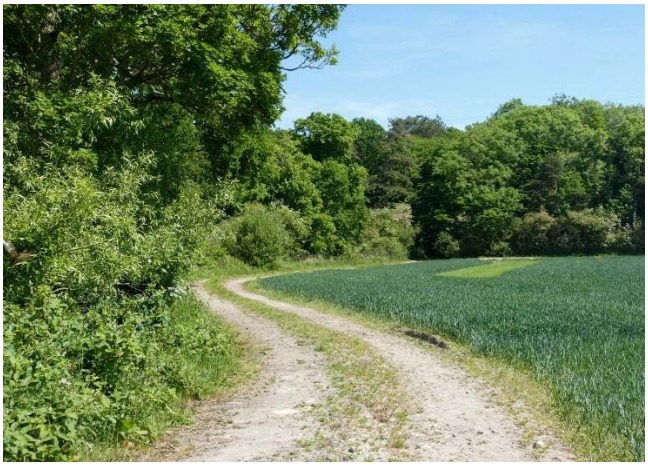


Fig 03B – Cable Route to Bretherton
Typical View R Douglas to Eyes Lane

Cable on right (south) side of track. Woodland in the background is Bull Pits Wood.

Arable cropping of field to the right (south) side of the track, narrow verge maintained : verge on left (north) side falls towards a ditch, with marginal vegetation, incl bramble, nettle, coarse grasses along the edge of the granular surface.

Boundary to the left (north) side includes mature trees and provides a total screen to the open fields on the edge of Bank Hall to the north

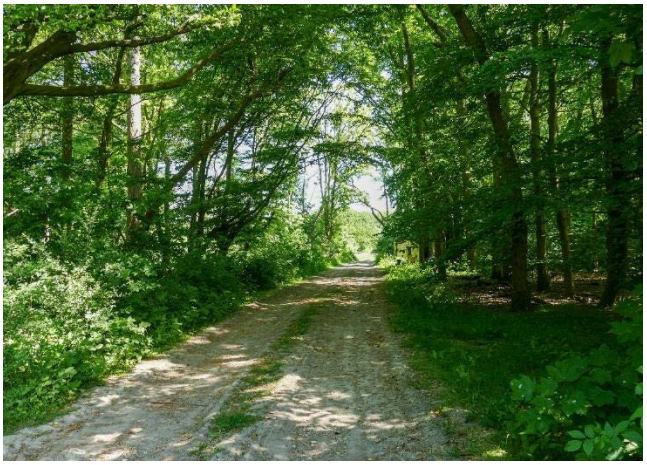


Fig 03C – Cable Route to Bretherton
Typical View R Douglas to Eyes Lane

View due east at the point where the track crosses a prominent woodland block (Bull Pits Wood) planted on a north-south grain.

Cable route to be agreed (to minimise impact of tree rooting zone)

Trees are open to the track (no boundary hedgerow).

Fig 03D – Cable Route to Bretherton
Junction of Field Track and Eyes Lane

View from the gate, set back on the west side of the Eyes Lane Wood. The edge of Eyes Lane is marked by the sunlit patch, with low hedge and copse on the far (east) side.

Granular track, well compacted.

Narrow verges : trees close to track surface - root plates likely to be under track surface – addressed in AMS

Fig 03E – Cable Route to Bretherton
Typical View Eyes Lane - Bretherton

Viewpoint – level with northwest corner of Glynwood House curtilage.

Character of Lane - hawthorn hedgerows on both sides, edging the linear woodland (Eyes Lane Wood) : narrow verges, particularly on the left (east) side of the view.

Shallow, dry ditch on left (west) side of view

Fig 03F – Cable Route to Bretherton
Typical View Eyes Lane - Bretherton

Pear Tree Cottage in the foreground - boundary set back from the Lane to provide a wide verge of mown grass.

Two entrances to Pear Tree Cottage – both vehicular (identified by wooden gate in the view) – stone setts, including a circular pattern as a central feature : separate footpath access to the north – slab paving.

Smithy Cottage to north aligned with gable end facing Eyes Lane (ie frontage is to the north). Single driveway entrance, paved with stone setts.

Fig 03G – Cable Route to Bretherton
Typical View Eyes Lane - Bretherton

Approx location – centre of the Eyes Lane west-east route, at the point where the Lane is crossed by LV service (pole to right (south) of view).

Cable on left (north) side of Lane

Mown grass verge and clipped hawthorn hedging on both sides of Lane : fewer trees on right (south) side of the view (hedgerow trees). Greater number of trees on south boundary of Ashcrofts Farm, include some ornamental species.

Fig 03H – Cable Route to Bretherton
Typical View Eyes Lane - Bretherton

Approx location – centre of road at junction of Back Lane, where Eyes Lane turns 90° to run north towards South Road Bretherton.

Cable on right (east) side of Lane

Boundary hedgerows mainly clipped hawthorn

Two driveway entrances are paved with stone setts, one on each side of the Lane.

Mown grass verges on both sides of the Lane.

Fig 03J – Cable Route to Bretherton
Typical View Bretherton South Road

Approx location – just to west of the junction with Pompian Brow.

Cable on right (south) side of the Road

Pavements on both sides of the road : clipped (mainly) hawthorn hedgerows : houses closer to the road.

Railings and prominent (birch) trees on left (north) side of view mark the location of the Congregational Church.

Fig 03K – Cable Route to Bretherton
Typical View Bretherton South Road

Approx location – at junction with Pompian Brow ; South Road straightens eastwards through Bretherton Village.

Pavements on both sides of the road : clipped (mainly) hawthorn hedgerows : houses closer to the road. Block on right (south) side of the view at one time included a shop.

Cable on right (south) side of the Road

Fig 03L – Cable Route to Bretherton
Typical View Bretherton South Road

Approx location – approaching St John the Baptiste Church just east of the speed camera.

Cable on right (south) side of the Road

Pavements on both sides of the road : clipped (mainly) hawthorn hedgerows : houses set on the right (south) side are set back from the roadside and tend to be individual large dwellings associated with the historic pattern of settlement

Fig 03M – Cable Route to Bretherton
Typical View Bretherton South Road

Approx location – approaching the Bretherton Endowed CofE Voluntary Aided School (marked by the blue-painted railings).

Parking restrictions and portable signs regarding waiting – to be accommodated in Construction Method Statement

Cable on right (south) side of the Road

Prominent copse of beech in background to the right (south) side – to be addressed in AMS.

Fig 03N – Cable Route to Bretherton
Access to Battery Building off Bretherton South Road

View along proposed access track (camera turned 90° north from viewpoint).

Trees to left (west) side – closely planted, mainly alder ; will require crown lifting to accommodate building construction traffic – to be addressed in AMS.

Fig 03P – Cable Route to Bretherton
Site of Battery Building off Bretherton South Road

Trees on left (south) side of view mark the boundary of the School – to be addressed in AMS.

Shadow area is approx. location of proposed building.

Fig 03Q – Cable Route to Bretherton North
Route from Battery Building to North Road

LV Cable runs along the left (west) side of the hedgerow to serve existing Sub Station by North Road.

D. Bretherton Battery Building

12. The proposed Battery Building occupes the southeast corner of the arable field to the rear of the Bretherton Endowed Primary School : it is accessed via the existing field track leading north off South Road – the track will be surfeaced in granular (DoT Type 3) material to take the construction traffic, and be 4m wide. Construction vehicles – and future maintenace vehicles – will be able to turn within the curtilage of the building : onward access into the adjacent field will be protected by a standard farm gate.

13. The adjacent boundary at this point is fenced, with screening of the boundary provided by a copse of silver birch and alder trees (mainly) within the School grounds – these are unaffected by the proposal. The proposed site area is approximately 31m long x 10.5m wide, orientated to run parallel with the adjacent boundary.

14. The Battery Building is 12.6m long x 2.92m wide x 3.43m high to ridge (2.60m to eaves level) : it has a traditional appearance. On account of its proximity to the Bretherton Conservation Area it will be finished in a red rustic facing brick (specified as York Handmade ' Thirkleby Blend' following consultation with the project's Heritage Consultant).

15. To address the provisions in the event of fire a dedicated fire hydrant will be installed at the Bretherton Battery Building.

16. This mitigation is further enhanced by the planting of a hedgerow with trees around the north and west sides of the enclosure, so that the building will be enclosed within a natural screen will merge into the backdrop of Bretherton Village when view across the open field from North Road. The planting detail is included in the DAS Appendix One, TN4 Fig 08 and comprises –

1,040	**sq.m**	**Total Area of Plantation**	
83	**no**	**Understorey Planting (25% of Area) - at 2m centres**	
112	no.	Crataegus monogyna (Hawthorn)	)
31	no.	Corylus avellana (Hazel)	)
25	no.	Ilex aquifolium (Holly)	)
25	no.	Prunus spinosa (Blackthorn)	) bare root 1+1
31	no.	Rosa canina (Dog Rose)	)
25	no.	Sambucus nigra (Elder)	)
248	**no**	**Tree Planting (75% of Area) - at 2m centres**	
49	no.	Alnus glutinosa (Alder)	)
26	no.	Betula pubescens (Downy Birch)	)
10	no.	Prunus avium (wild cherry)	) bare root 1+2
26	no.	Quercus petraea (Sessile Oak)	)
13	no.	Quercus robur (Pedunculate Oak)	)
7	no.	Sorbus aucuparia (Mountain Ash)	)

E. Plocks Farm Infrastructure (not within this Application)

17. At Plocks Farm a 'GridGate' facility will be constructed and will be the subject of a separate Planning Application – it is required now, to ensure that the power input to Plocks Farm from the National Grid is stabilised against the micro-fluctuations and surges currently experienced (these are causing loss and expensive delays through disruption of production and consequent recovery costs). The system is to be supplied by a British owned company, (Pillar) : it includes two 4.5 tonne fly wheels which balance out the fluctuations, giving an uninterrupted power supply capable of providing 40 seconds of electrical power at 11,000 volts. The capacity of the installation will be sufficient to accommodate the incoming power from the wind and solar generation at Asland Walks and prevent any impact to the grid, in the event of a fault occurring on the grid network.

CONTENTS :

REFERENCES

1. Asland Walks – Preliminary Landscape Appraisal & Recreation Strategy (v2) BCA Landscape (February 2022)
2. Proposed Green Energy Park at Asland Walks : Pre-Application Submission : (LPA Ref 2024/00025/PREAPP) Bretherton Energy Partnership & GA Pet Food Partners (November 2024)
3. 2022-143-018A - Existing Contour Plan Survey Operations (September 2022)
4. Information Note – Scrapes RSPB (extract Appendix Fig 05)
5. Biodiversity Net Gain Pre-Application Advice (Pre-Application Submission Response Ref 2024/00025/PREAPP) Chorley Council (December 2024)

ILLUSTRATIONS (Fig)

A. Preliminary Site Appraisal

1. A preliminary appraisal of the Asland Walks Green Energy site was undertaken in 2021-22 with a landscape strategy proposal for the potential development issued in February 2022[1]. The report (included in part as Appendix One of the Pre-App Submission November 2024 (2024/00025/PREAPP)[2] included a summary appraisal of the site and its context and identified areas which could be planted in advance to contribute to the screening and setting of the development.

2. The strategy of 'advance structure planting' was successfully employed at GA's premises at Plocks Farm. Here a similar study was carried out at the start of the phased production and infrastructure expansions identified in the business plan and presented to Chorley Council in the 2003 Masterplan. This preliminary landscape and visual appraisal (LVA) identified boundary areas which could be planted, and these were completed in the season 2003-24, using 'forestry' techniques (mass planting) of canopy trees, understorey trees, and shrub layer as a coarse matrix to form linear woodland, copse and shelterbelts around the site : the species mix follows the composition of local woodlands, with the overall character thus being 'natural' as opposed to ornamental.

3. These plantations are then managed under the guidance of a 'Habitat and Ecological Management Plan' (HEMP) reviewed at two-year intervals to steer the evolution of the woodland through coppicing and removal of 'nurse' species to encourage a balanced structure of woodland layers. Occasionally adjustments are made by minimal clearance of some marginal areas (to accommodate the detail of buildings and infrastructure), and the addition of further infill planting where space is available after such development is fully designed and/or built.

4. The perimeter planting then matures in advance of development, providing effective screening of the buildings as they are completed.

5. The preliminary LVA of the Asland Walks site considered similar opportunities to screen the sustainable energy infrastructure envisaged. The approach recognised that the focus should be on the solar arrays and 'low level' infrastructure of ancillary buildings, rather than the turbine itself.

B. Advance Planting – Strategy and Implementation

Advance Planting Plan Fig 01
Advance Planting – Plant Schedules Fig 02

6. The following areas were identified by the preliminary LVA and have been planted in the season 2022-23 (unless otherwise noted). The woodland / hedgerow planting mixes are noted in Appendix Fig 02 of this section.

7. The locations are identified on the Advance Planting Plan Appendix Fig 01 : the references include the prefix 'AP' to differentiate this activity from the further analysis and detail produce for the Green Energy Park Application. The notes start in the southwest corner adjacent to Strand Bridge on Lock Lane, Sollom –

   AP-A : Linear woodland (11m wide) – extending the copse within the curtilage of Barrowford House northwards along the Canal boundary : the planting detail includes a hedgerow on the east (AW Site) side of the plantation, thus allowing the wood to add to the experience of walking along the canal (birdwtaching, berrying). The woodland will screen views of the solar arrays in the foreground, and also help screen the turbine base.

   AP-B : approximately 450m from Strand Bridge this boundary is defined by hedgerow planting only : this is mixed hedgerow and includes occasional randomly spaced trees, intended to maintain a barrier to predestrian access on to the agricultural fields of the Site, whilst maintaining the open, long distance views of the mature woodland and shelterbelts established on the rising ground towards Tarleton when viewed from the footpath along the River Douglas on the east boundary.

   AP-C : at this point the canal turns at approximately 90° and a copse of alder has been planted in the corner ; this adds to the willow/alder copse on the west bank of the canal thus creating a dominant group of trees at this point. Future recreation opprtunities include fishing points and / or bird hide within the alder carr.

AP-D : continuation of the hedgeow with occasional trees (as AP-C) as far as the north end of the main site.

AP-E : at this strategy stage the intention was to plant woodland on the narrow land area up to Bank Bridge, creating a character similar to that surrounding Bank Hall on the east bank of the river (including pine as well as oak and lime). However, the area needed to accommodate the easements for the Site access road and service route to Plocks Farm, thus leaving little space for this treatment : consequently the area was not planted under the advance planting programme. The proposal has since been amended to be a mix of wet scrub (dominant) with wetland grasses and wildflowers (designated Area 'F', para 24 below) to promote a richer variety of habitat type.

AP-F : east boundary planting along the river Douglas. The location accommodates the EA easement for the maintenance of the flood banks along the River Douglas. A hedgerow is planted along the Site boundary with an 8m wide linear woodland to screen the solar arrays.

AP-G : south boundary (east) planting along the bank of the Strine River, thus turning southwards along the boundary of Red Bridge Farm towards Eyes Lane. The planting is 8m wide with hedgerow planted on the north (Site) side, leaving sufficient room for the proposed Eyes Lane – River Douglas footpath link along the riverbank (as para 28 below).

AP-H : south boundary planting west of the site access off Eyes Lane, reinstating the former hedgerow along the edge of the landholding. The hedgerow element is again located on the north side of the plantation.

AP-J : the requirement for an additional hedgerow / screen along the west side of the existing access track from Eyes Lane was identified by the glint / glare analysis, which identified the benefit of planting trees along this boundary to mitigate the effect of flicker (under certain conditions) on Red Bridge Farm. The planting was delayed due to the need to refurbish the existing land drain at this point ; the planting is scheduled for the 2025-26 season.

8. The planting matrices included in Appendix One includes full details of the plant schedules, specifications and density. The planting excluded tree guards / supports so that the area could easily be returned to agriculture if the green energy planning consent was not forthcoming.

9. Chorley Council's advice at the Pre-Application Stage [5] included agreement that these works may be recorded as habitat created (or enhanced, where applicable) in the statutory biodiversity metric using the *'habitat created in advance'* function, subject to the date and details of the habitat creation work being provided and evidenced in the BNG report (Pre-App Advice[5] note, para 16 page 5).

C. Landform Interventions

Landscape Strategy Plan (Extract) Fig 03
RSPB Wet Scrapes Advice

10. A full topographical survey of Asland Walks has been undertaken[3]. The Site forms part of the lower flood plain of the Douglas and appears flat and level ; however, there is a fall of approximately 1.5m from the north end (at approximately 6mAOD) to 4.5m AOD at the south end by Eyes Lane. The main field has been regularly ploughed for arable crops, and within this area there are occasional low spots (hollows) which collect water.

11. The existing flood banks along the River Douglas are unaffected by the proposals.

12. The following summary of the landform interventions reverts to the Application Masterplan for the references (reproduced here as Appendix Fig 03) -

13. There will be no adjustment of this situation for the construction of the solar arrays (**Area C**) and the wind turbine : these will be at the pre-existing ground level. Arisings from the solar panel footings are relatively minimal and used as noted in para 21 below : the turbine foundation will produce more material of varying quality from excavations at depth, and these will be used to create the formation of the three linear earth bunds noted within area 'G'.

14. The construction of the access trackways will involve the removal of vegetable soil and the replacement with load-bearing granular material (for example DoT Type 1) – this will generally be topsoil which will be re-used within the

habitat bank areas 'A' and 'B' to make up levels in the 'hollow' areas mentioned in para 9 above, and retained for use as final cover on the proposed earth bunds in area 'G'.

15. In the general area of the habitat bank (**areas 'A' and 'B'**) there will be no changes in level (other than the localised filling of low spots mentioned above) : ground preparation for the creation of the pasture will involve standard agricultural practice of cultivation and seeding of the ground layer to a depth of (say) 150mm depth

16. There are localised areas within '**A' and 'B'** which will be developed as 'wet scrapes' to encourage ground-nesting birds. The formation of these will follow the RSPB advice[4] – reduced level in random areas typically to 250mm but up to a maximum of 500mm to create small areas of standing water. Any surplus soils will be used in the manner noted in the RSPB advice note, or added to the stock of material for the final cover of the proposed earth bunds.

17. **Area 'D'** in the southwest part is proposed as wetland (amphibians) and will involve a gradation of excavation depths to create a variety of marginal edge conditions from saturated ground, through marsh / reedbeds to standing water up to 1m in depth. The detail will require liaison with the Ecologist and will create a variety of conditions from marsh to open water. Soil materials will be reclaimed and added to the stock for the final cover of the proposed earth bunds.

18. **Areas 'E1' and 'E2'** on the Masterplan are the existing ditches which are to be retained.

19. There will be no adjustment of levels with the **area 'F'** : reinstatement of the ground following the trenching for the supply cables will be worked back to the pre-existing ground level.

20. **Area 'G'** contains the three separate (but overlapping) screen mounds, designed to follow the 'engineered' profile seen in local flood bunds. The side slopes are a regular gradient of 1 in 3, to achieve a crest level of 6.5-7m AOD. The design here is intended to screen the Battery Compound on the north edge of the solar arrays, which (for flood protection Reasons) have to be located at a level of 6m AOD.

21. The bunds are formed of material gained from excavation of the turbine foundation and the finished levels are thus raised above existing ground level. The standard practice for the construction will be followed - blade back the ground surface under the proposed mound area to remove the topsoil and then build the mound up on the subsoil base. The topsoil is then replaced (using an excavator, not a bulldozer) as the surface layer of the mounds. Any shortfall can be made up using topsoil gained from the from the wet scrapes. The Agricultural Land Classification (ALC) Report indicates a soil depth of around 300mm in this area (BH26 and BH29 for example).

22. The sequence of works will be considered relative to the Construction Management Plan to minimise soil movements and the need for storage of topsoils.

D. Landscape & Habitats

Landscape Strategy Plan (Extract) Fig 02 (Appendix One)
Landscape Structure Plan 22.522-BCAL-102-3

23. The Landscape Strategy proposal has been developed jointly by the Landscape Architects (BCA Landscape /Lanpro) and the Ecologist (Avian). As well as creating a suitable landscape setting for the proposed development the strategy seeks to achieve the criteria set out in the Pre-Application advice[5] (para 12) –

    The proposals at the site do not meet any of the Biodiversity Net Gain exemptions and will be subject to statutory Biodiversity Net Gain (BNG), and the general pre commencement biodiversity gain condition if granted consent. The development must demonstrate a 10% net gain in biodiversity across each area habitat, linear (hedgerow) habitat and watercourse habitats, and meet the Trading Rules of the statutory metric.

24. The following table summarises the proposed landscape of the completed Energy Park are illustrated by the submitted Landscape Structure Plan 22.522-BCAL-102-3 (reproduced in the Appendix Fig 03).

Area Ref	Proposal	UK Habitat Classification Code (General) / Notes
Advance Planting	Pre-planted woodland belts as noted - mixed broadleaved woodland Pre- planted hedgerows along boundary to canal species rich hedgerows	w1g.29 – other broadleaf woodland. Locations as noted above (paras 6-9 above) : additional areas to be planted 2025-26 h2a5 – species-rich native hedgerow : locations as noted above (paras 6-9 above) (native hedgerows with (over 4 species per 30m stretch)
A, B	General pasture in residual land (habitat bank) - species diverse grassland (using Emorsgate EM10 tussocky meadow mixture, or similar) Wet scrapes (for waders) – approx. location as shown on Masterplan : located at least 300m from turbine	g3c – low input pasture Mix EM10 attached as Appendix Three r1f6 – other temporary ponds and scrapes (water bodies containing water normally for < 6 months/ year
C	Pasture - neutral grassland (using Emorsgate EM3 general purpose meadow mixture, or similar)	g3c – low input pasture Mix EM3 attached as Appendix Three
D	Ponds in SW corner of site : variety of marginal edge conditions from saturated ground, through marsh / reedbeds to standing water up to 1m in depth Marginal veg around ponds : management plan to allow natural colonisation : potential for translocation from local donor ponds. Wet/ marshy grassland around pond areas (using Emorsgate EM8 meadow mixture for wetlands, or similar)	r1g.41 – primary code is r1g, secondary code of 41 denotes a non-priority pond. f2d / g3c – aquatic marginal vegetation (vegetation fringing open water developed as a narrow part of the hydrosere (<0.5m wide or <0.25ha in total) g3c – low input pasture Mix EM8 attached as Appendix Three
E	Existing ditches E1 and E2 – retained as existing	r1g.50 – other standing water, in ditches
F	Predominantly wet scrub with wetland grasses and wildflowers	Area includes F1 and F2 as copse at north and south ends, to assist screening of solar arrays from Bank Bridge
G	General pasture as sward layer on mounds, as A/B above - species diverse grassland (Emorsgate EM10 tussocky meadow mixture, or similar) Mixed scrub - along earth bund north of solar site (to be min 3 species) Hedgerows along fence line - species rich hedgerows (over 4 species per 30m stretch)	g3c – low input pasture Mix EM10 attached as Appendix Three h3h – mixed scrub (dense scrub comprising a mixture of species without a single species dominant) h2a5 – species-rich native hedgerow (native hedgerows with >4 native or archaeophyte woody species)
H	Linear copse / hedgerow (additional area of advance planting)	w1g.29 – other broadleaf woodland : planted on west side of site access road from Eyes Lane to mitigate potential flicker effect on Red Bridge Farm.
J	Additional planting along access road from Eyes Lane	h2a5 – species-rich native hedgerow (native hedgerows with >4 native or archaeophyte woody species)
Other	Grassland along southern edge between site fence and boundary - modified grassland	g4.528 – species poor vegetation (<9 species/ m^2) dominated by a few fast-growing grasses on fertile neutral soils

E. Access & Circulation

Landscape Strategy Plan (Extract) Fig 03 (Appendix One)
Landscape Structure Plan 22.522-BCAL-102-3

25. The existing track from Bank Bridge will be extended along the east side of Area 'B' to provide access to the turbine area and to continue the agricultural husbandry of the Site. The track is 3.5m wide, proposed as a granular surface (DoT Type 1 250mm deep) to match the existing surface. Localised reinforcement using a 'cellblock' system may be required., dependent on local ground conditions. It will not be open for public use.

26. The location of maintenace access tracks within the solar area 'C' is shown on the Masterplan. These will also be granular material, and also not available for public use.

27. The existing footpath routes along the Leeds-Liverpool Canal (canal path) and the River Douglas (river path) are retained. These will remain as unsurfaced paths to maintain the rural character : there is one stile and one gateway on the river path which will be refurbished as part of the proposals.

28. Additional paths will be created to increase the walking routes around the Site : these will be grassed, as per the category 'Other' in the table above –

    FP1 : route along the south boundary from the canal (by Barrowford House) to the Site access track off Eyes Lane.

    FP2 : route from the access track off Eyes Lane, along the Strine River to meet the river path at the southeast corner of the Site.

F. Recreation

29. The retention of the footpaths and the additional routes FP1 and FP2 will be the main features for informal recreation. Opportunities for enhancement through the addition of occasional benches and interpretation (celebrating the history of the river diversion and the Leeds-Liverpool Canal) will be added.

30. The educational potential of the project is to be explored. An information point will be included to display the energy output from the turbine and the solar : a CCTV camera on the turbine tower has the potential to provide 360° view of the Site and the surrounding area. Public access to such features is likely to be on-line via log-in or QR Coding.

G. Landscape Management

31. Management of the planting / habitats will be guided by the Landscape and Habitat Management Plan (LHMP).

32. The LHMP will incorporate the prescriptions to maintain scrub free / clear zones around facilities where noted in the Application – for example, the clear zone for fire purposes around the Battery Compound (BESS) and the Turbine Compound (to remove potential food sources for bats in the vicinity of the turbine). The LHMP will also be co-ordinated with the agricultural management prescriptions for the grazed areas.

H. Cable Routes

33. The cable routes to Plocks Farm and Bretherton are laid in trenches, approximately 500mm wide and 900mm deep. The pre-existing surface will be reinstated following completion and testing. This includes the reinstatement of 'soft' reas (field edges, riverbanks, grass verges etc) and 'hard' areas (private driveways, pavement crossings, pavements).

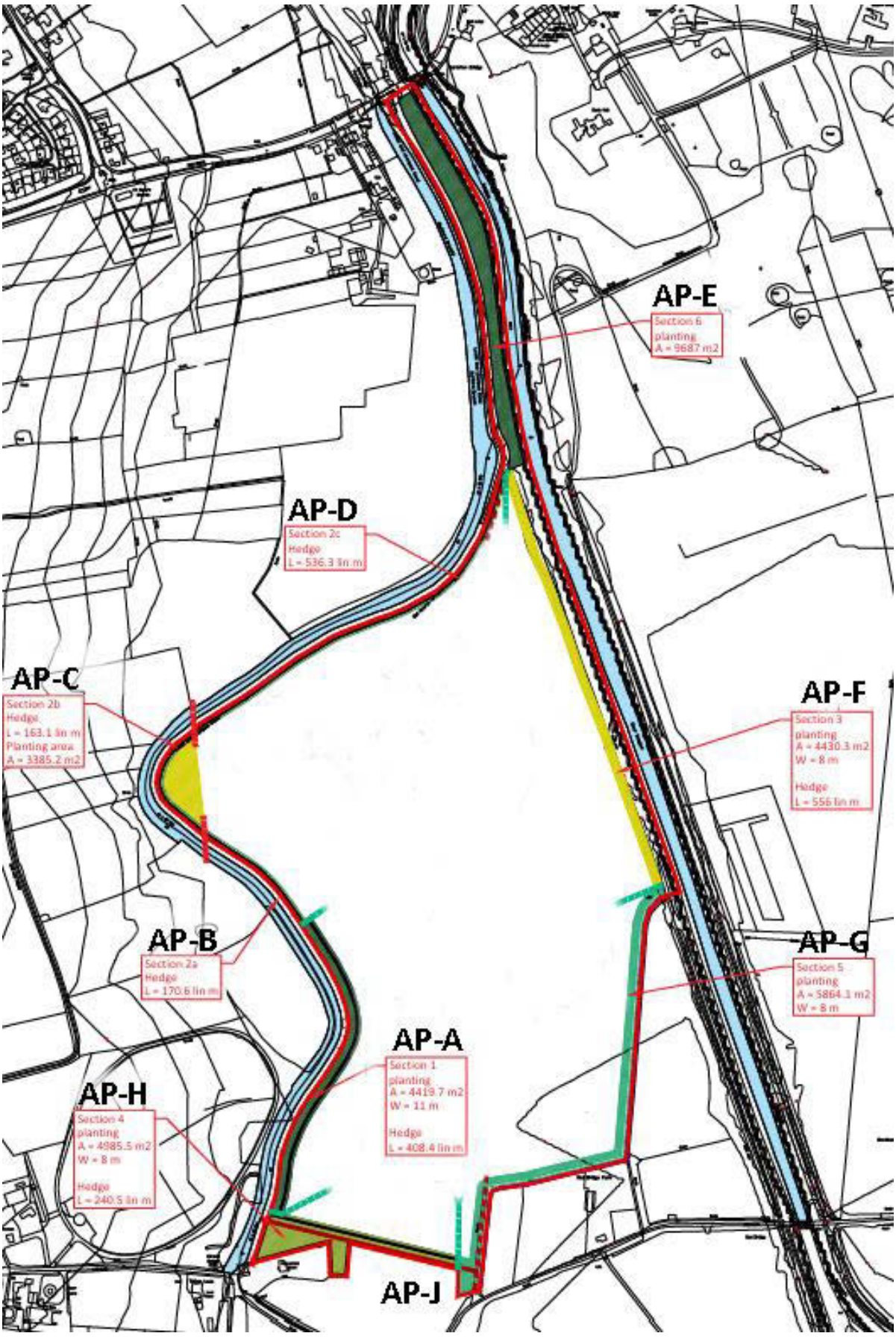
I. Bretherton Battery Building

34. The proposed Battery Building occupes the southeast corner of the arable field to the rear of the Bretherton Endowed Primary School : the adjacent boundary at this point is fenced, with screening of the boundary provided by a copse of silver birch and alder trees (mainly) within the School grounds – these are unaffected by the proposal. The proposed site area is approximately 31m long x 10.5m wide, orientated to run parallel with the adjacent boundary.

35. The Battery Building is 12.6m long x 2.92m wide x 3.43m high to ridge (2.60m to eaves level) : it has a traditional appearance. On account of its proximity to the Bretherton Conservation Area it will be finished in a red rustic facing brick (specified as York Handmade ' Thirkleby Blend' following consultation with the project's Heritage Consultant).

36. This mitigation is further enhanced by the planting of a hedgerow with trees around the north and west sides of the enclosure, so that the building will be enclosed within a natural screen will merge into the backdrop of Bretherton Village when view across the open field from North Road. The planting detail is included in the Appendix (Fig 07).

FIG 01 – Advance Planting Areas Reference Plan



KEY - Red font/ boxes – reference to setting out drawing 2022-23 planting works

FIG 02 - Advance Planting Areas – Planting Schedules

Area Ref AP-A (Section 1 of 2022-23 works) :
Canal boundary – linear woodland extending around the western bend : detail includes hedge planting on east side

Total		Species	Specification :	%	
4,420	**sq.m**	**Total Area of Plantation**			
352	**no**	**Understorey Planting (25% of Area) - at 2m centres**			
158	no.	Crataegus monogyna (Hawthorn)	)	45%	
44	no.	Corylus avellana (Hazel)	)	12.5%	
35	no.	Ilex aquifolium (Holly)	)	10%	
82	no.	Prunus spinosa (Blackthorn)	) bare root 1+1	10%	
44	no.	Rosa canina (Dog Rose)	)	12.5%	
35	no.	Sambucus nigra (Elder)	)	10%	100%
1,056	**no**	**Tree Planting (75% of Area) - at 2m centres**			
396	no.	Alnus glutinosa (Alder)	)	37.5%	
211	no.	Betula pubescens (Downy Birch)	)	20%	
79	no.	Prunus avium (wild cherry)	) bare root 1+2	7.5%	
211	no.	Quercus petraea (Sessile Oak)	)	20%	
106	no.	Quercus robur (Pedunculate Oak)	)	10%	
53	no.	Sorbus aucuparia (Mountain Ash)	)	5%	100%
408	**m**	**Hedgerow Length**			
816	**no**	**Hedgerow Plants (at 0.5m centres)**			
449	no.	Crataegus monogyna (Hawthorn)	)	55%	
82	no.	Corylus avellana (Hazel)	)	10%	
122	no.	Prunus spinosa (Blackthorn)	)	15%	
82	no.	Rosa canina (Dog Rose)	) bare root 1+1	10%	
41	no.	Sambucus nigra (Elder)	)	5%	
41	no.	Viburnum opulus (Guelder Rose)	)	5%	100%

Area Ref AP-B (Section 2A of 2022-23 works) :
Canal boundary – hedgerow with trees , aligned on the east side of the alder copse noted in 2B below

Total		Species	Specification :	%	
334	**m**	**Hedgerow Length**			
668	**no**	**Hedgerow Plants (at 0.5m centres)**			
401	no.	Crataegus monogyna (Hawthorn)	)	60%	
33	no.	Corylus avellana (Hazel)	)	5%	
100	no.	Prunus spinosa (Blackthorn)	)	15%	
82	no.	Rosa canina (Dog Rose)	) bare root 1+1	10%	
33	no.	Sambucus nigra (Elder)	)	5%	
33	no.	Viburnum opulus (Guelder Rose)	)	5%	100%
Add		**Hedgerow Trees**			
12	no.	Alnus glutinosa (Alder)	1.2 – 1.5m feathered whip		
3	no.	Populus alba (Aspen)	1.2 – 1.5m feathered whip		
5	no.	Quercus robur (Pedunculate Oak)	1.2 – 1.5m feathered whip		

Area Ref AP-C (Section 2B of 2022-23 works) :
Canal boundary – alder copse at turn of the western bend : hedge on east side as AP-B (2A)

Total		Species	Specification :	%	
3,385	**sq.m**	**Total Area of Plantation**			
216	**no**	**Understorey Planting (20% of Area) - at 2m centres**			
43	no.	Crataegus monogyna (Hawthorn)	)	20%	
32	no.	Corylus avellana (Hazel)	)	15%	
43	no.	Salix caprea (Goat Willow)	) bare root 1+1	20%	
75	no.	Salix cinerea (Grey Willow)	)	35%	
22	no.	Sambucus nigra (Elder)	)	10%	100%
862	**no**	**Tree Planting (80% of Area) - at 2m centres**			
431	no.	Alnus glutinosa (Alder)	)	50%	
172	no.	Betula pubescens (Downy Birch)	) bare root 1+2	20%	
259	no.	Populus tremula (Aspen)	)	30%	100%

Area Ref AP-D (Section 2C of 2022-23 works) :
Canal boundary – hedgerow with trees , continuation from alder copse to the north end of the Site

Total		Species	Specification :	%	
536	**m**	**Hedgerow Length**			
1,072	**no**	**Hedgerow Plants (at 0.5m centres)**			
536	no.	Crataegus monogyna (Hawthorn)		50%	
107	no.	Corylus avellana (Hazel)	)	10%	
80	no.	Prunus spinosa (Blackthorn)	)	7.5%	
107	no.	Rosa canina (Dog Rose)	)	10%	
134	no.	Salix caprea (Goat Willow)	) bare root 1+1	12.5%	
54	no.	Sambucus nigra (Elder)	)	5%	
54	no.	Viburnum opulus (Guelder Rose)	)	5%	100.0%
Add		**Hedgerow Trees**			
15	no.	Alnus glutinosa (Alder)	1.2 – 1.5m feathered whip		
25	no.	Populus tremula (Aspen)	1.2 – 1.5m feathered whip		
15	no.	Quercus robur (Pedunculate Oak)	1.2 – 1.5m feathered whip		

Note –

AP-E (Area 6 of the 2022-23 Works) – to be planted as part of Green Energy project

Area Ref AP-F (Section 3 of 2022-23 works) :
East boundary along the River Douglas

Total		Species	Specification :	%	
4,430	**sq.m**	**Total Area of Plantation**			
564	**no**	**Understorey Planting (40% of Area) - at 2m centres**			
226	no.	Crataegus monogyna (Hawthorn)	)	40%	
85	no.	Corylus avellana (Hazel)	)	15%	
18	no.	Rosa canina (Dog Rose)	)	5%	
122	no.	Salix caprea (Goat Willow)	) bare root 1+1	15%	
56	no.	Salix cinerea (Grey Willow)	)	10%	
56	no.	Sambucus nigra (Elder)	)	10%	
28	no.	Viburnum opulus (Guelder Rose)	)	5%	100%
846	**no**	**Tree Planting (60% of Area) - at 2m centres**			
296	no.	Alnus glutinosa (Alder)	)	35%	
169	no.	Betula pubescens (Downy Birch)	)	20%	
212	no.	Populus tremula (Aspen)	) bare root 1+2	25%	
169	no.	Quercus petraea (Sessile Oak)	)	20%	100%
556	**m**	**Hedgerow Length**			
1,112	**no**	**Hedgerow Plants (at 0.5m centres)**			
667	no.	Crataegus monogyna (Hawthorn)	)	60%	
56	no.	Corylus avellana (Hazel)	)	5%	
167	no.	Prunus spinosa (Blackthorn)	) bare root 1+1	15%	
167	no.	Salix caprea (Goat Willow)	)	15%	
56	no.	Sambucus nigra (Elder)	)	5%	100%
Add		**Hedgerow Trees**			
50	no.	Alnus glutinosa	1.2 – 1.5m feathered whip		

Area Ref AP-G (Section 5 of 2022-23 works) :
South boundary planting – linear woodland along Strine River : hedgerow to north side.

Total		Species	Specification :	%	
4,985	**sq.m**	**Total Area of Plantation**			
318	**no**	**Understorey Planting (20% of Area) - at 2m centres**			
127	no.	Crataegus monogyna (Hawthorn)	)	40%	
32	no.	Corylus avellana (Hazel)	)	10%	
16	no.	Prunus spinosa (Blackthorn)	)	5%	
64	no.	Rosa canina (Dog Rose)	) bare root 1+1	20%	
16	no.	Salix cinerea (Grey Willow)	)	5%	
32	no.	Sambucus nigra (Elder)	)	10%	
32	no.	Viburnum opulus (Guelder Rose)	)	10%	100%
1,270	**no**	**Tree Planting (80% of Area) - at 2m centres**			
508	no.	Alnus glutinosa (Alder)	)	40%	
127	no.	Betula pubescens (Downy Birch)	)	10%	
222	no.	Populus tremula (Aspen)	) bare root 1+2	17.5%	
95	no.	Quercus petraea (Sessile Oak)	)	7.5%	
64	no.	Quercus robur (Pedunculate Oak)	)	5%	
210	no.	Salix cinerea (Grey Willow)	)	15%	
64	no.	Sorbus aucuparia (Mountain Ash)	)	5%	100%
240	**m**	**Hedgerow Length**			
480	**no**	**Hedgerow Plants (at 0.5m centres)**			
264	no.	Crataegus monogyna (Hawthorn)	)	55%	
48	no.	Corylus avellana (Hazel)	)	10%	
72	no.	Prunus spinosa (Blackthorn)	) bare root 1+1	15%	
48	no.	Rosa canina (Dog Rose)	)	10%	
24	no.	Sambucus nigra (Elder)	)	5%	
24	no.	Viburnum opulus (Guelder Rose)	)	5%	100%

Area Ref AP-H (Section 4 of 2022-23 works) :
South boundary planting – west of site access of Eyes Lane : hedgerow to north side.

Total		Species	Specification :	%	
5,864	**sq.m**	**Total Area of Plantation**			
467	**no**	**Understorey Planting (25% of Area) - at 2m centres**			
187	no.	Crataegus monogyna (Hawthorn)	)	40%	
23	no.	Corylus avellana (Hazel)	)	5%	
111	no.	Prunus spinosa (Blackthorn)	) bare root 1+1	10%	
93	no.	Salix caprea (Goat Willow)	) bare root 1+1	20%	
47	no.	Sambucus nigra (Elder)	)	10%	
70	no.	Viburnum opulus (Guelder Rose)	)	15%	100%
1,401	**no**	**Tree Planting (75% of Area) - at 2m centres**			
560	no.	Alnus glutinosa (Alder)	)	40%	
140	no.	Betula pubescens (Downy Birch)	)	10%	
420	no.	Populus tremula (Aspen)	) bare root 1+2	30%	
280	no.	Salix cinerea (Grey Willow)	)	20%	100%

Area Ref AP-J (Section 1A : not part of 2022-23 works) :
Linear woodland along west side of access road from Eyes Lane : hedgerow to west side (to be detailed)

Total		Species	Specification :	%
1,040	**sq.m**	**Total Area of Plantation**		
83	**no**	**Understorey Planting (25% of Area) - at 2m centres**		
112	no.	Crataegus monogyna (Hawthorn)	)	45%
31	no.	Corylus avellana (Hazel)	)	12.5%
25	no.	Ilex aquifolium (Holly)	)	10%
25	no.	Prunus spinosa (Blackthorn)	) bare root 1+1	10%
31	no.	Rosa canina (Dog Rose)	)	12.5%
25	no.	Sambucus nigra (Elder)	)	10%
248	**no**	**Tree Planting (75% of Area) - at 2m centres**		
49	no.	Alnus glutinosa (Alder)	)	37.5%
26	no.	Betula pubescens (Downy Birch)	)	20%
10	no.	Prunus avium (wild cherry)	) bare root 1+2	7.5%
26	no.	Quercus petraea (Sessile Oak)	)	20%
13	no.	Quercus robur (Pedunculate Oak)	)	10%
7	no.	Sorbus aucuparia (Mountain Ash)	)	5%
130	**m**	**Hedgerow Length**		
		To be added on completion of project		

FIG 03 – Landscape Strategy Masterplan

KEY :

Principal features……

A & B –
Pasture, low intensity sheep grazing, incl wet scrape areas for wading birds (located min 300m from turbine)

C –
Solar arrays -also pasture, grazed

D –
Marginal area in southwest – dedicate to wet grasses/wet scrapes/standing water for amphibians

E1 & E2 –
Existing ditches retained

F –
Wet scrub (dominant) plus wildflower/species-rich grasses. F1 and F2 copse to assist with screening of solar in views from Bank Bridge.

G –
Replication of 'flood bund' landform to assist screening of Battery Compound, Solar Arrays, and Security Fencing. Pasture grasses on mounds, plus wet scrub.

H –
Linear woodland on west side of access from Eyes Lane, to mitigate potential flicker effect on Red Bridge Farm.

New Footpaths –

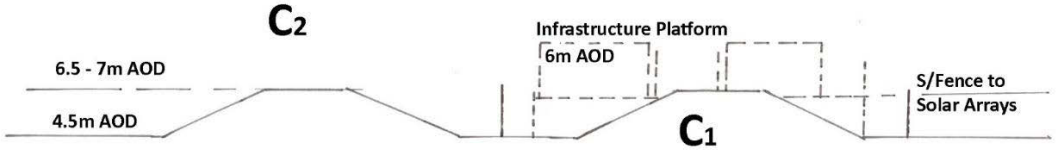
FP1 – canal to Eyes Lane access track

FP2 – Eyes Lane access track to river path

Drawing Ref – BCAL-ZZ-00-DR-L-102-3

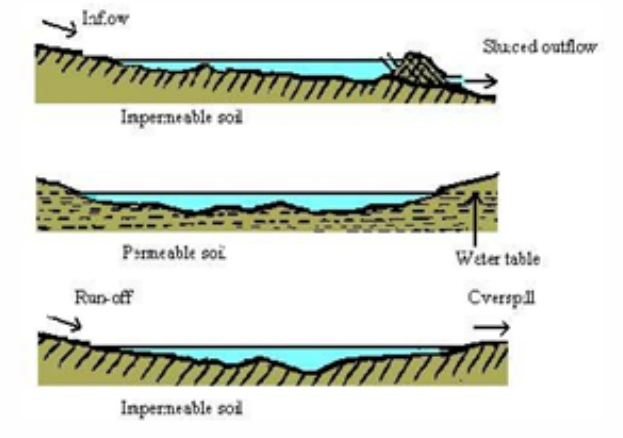
FIG 04 – Landform Intervention (Solar Boundary)

Extract – GSA Dwg 2022-143-011H - General Arrangement to Solar Farm



Schematic Section and Notes	○
Location of Transformers / BESS Infrastructure	○ *Ground Level 4.5m AOD* ○ *Platform Level to be 6.0m AOD* ○ *Building Height 2.4m*
'Flood Bund' landform – three separate regular engineered bunds, profile as per those along River Douglas : *C1 – south /inner* *C2 – central / outer* *C3 – north / inner (not shown, aligns with C1 (on north side of Compound)*	○ *Bund height 2m (height as R Douglas flood bank)* ○ *Side slopes at 1 in 2.5* ○ *Crest width 2m* ○ *Overall width thus 18m includes transition to security fence*

FIG 05– Landform Intervention (Wet Scrapes) – Type C



Type A: Dry area with impermeable soil. Water is retained by bunds and a control structure

Type B: Permeable soil with high groundwater. Surface flooding occurs in a depression as a result of a high water table.

Type C: Wet area with impermeable soil. Water retained in low-lying wet areas.

Managing water levels

Water levels can be left to fluctuate naturally, but where possible, it is advantageous to be able to control water levels. Without the ability to control the inflow or outflow of water, the scrape may dry out too soon in early dry weather, while a wet spring may result in levels remaining too high. It also allows levels to be lowered gradually through the spring to expose fresh mud for foraging birds, and dried out in the summer. Simple water control devices such as sluices or sandbag can be used to help manage levels.

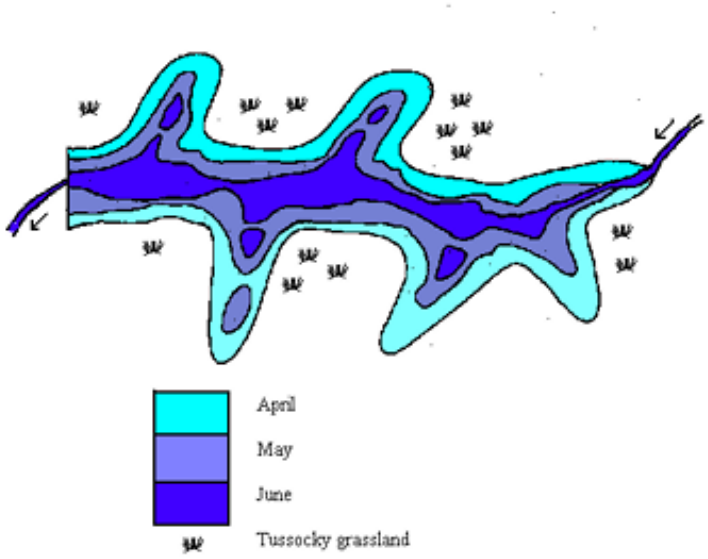


Figure: Hypothetical scrape, showing receding area of water through spring and early summer.

The outer line represents the extent of the open water in early April. The middle line represents the shrinking area of water by the end of May and the inner by the end of June. Annual weeds will have grown on the mud and set seed. By August, the scrape should be all but dry, allowing for any required management.

Contact us

For further information e-mail farm-advice@rspb.org.uk

FIG 06 – Proposed Seed Mixes (Emorsgate https://wildseed.co.uk/) & Management Notes

EMORSGATE EM3 SPECIAL GENERAL PURPOSE MEADOW MIX

Composition

EM3 is a complete mix composed of 20% native wild flowers and 80% slow growing grasses (by weight).

Wild flowers 20%

0.40% ***Achillea millefolium*** **– Yarrow**
0.20% ***Agrimonia eupatoria*** **– Agrimony**
1.20% ***Betonica officinalis*** **– Betony**
2.00% ***Centaurea nigra*** **– Common Knapweed**
1.00% ***Daucus carota*** **– Wild Carrot**
0.60% ***Echium vulgare*** **– Viper's-bugloss**
0.20% ***Filipendula ulmaria*** **– Meadowsweet**
0.80% ***Galium album*** **– Hedge Bedstraw**
0.40% ***Galium verum*** **– Lady's Bedstraw**
0.40% ***Geranium pratense*** **– Meadow Crane's-bill**
1.00% ***Leucanthemum vulgare*** **– Oxeye Daisy**
1.00% ***Malva moschata*** **– Musk Mallow**
0.40% ***Medicago lupulina*** **– Black Medick**
0.20% ***Onobrychis viciifolia*** **– Sainfoin**
0.20% ***Pastinaca sativa*** **– Wild Parsnip**
1.40% ***Plantago lanceolata*** **– Ribwort Plantain**
0.60% ***Poterium sanguisorba ssp sanguisorba*** **– Salad Burnet**
1.00% ***Primula veris*** **– Cowslip**
1.60% ***Prunella vulgaris*** **– Selfheal**
1.60% **Ranunculus** ***acris*** **– Meadow Buttercup**
0.60% ***Ranunculus bulbosus*** **– Bulbous Buttercup**
0.40% ***Rhinanthus minor*** **– Yellow Rattle**
0.40% ***Rumex acetosa*** **– Common Sorrel**
0.20% ***Scabiosa columbaria*** **– Small Scabious**
0.80% ***Silene dioica*** **– Red Campion**
1.00% ***Silene vulgaris*** **– Bladder Campion**
0.20% ***Taraxacum officinale*** **– Dandelion**
0.20% ***Vicia cracca*** **– Tufted Vetch**

Grasses 80%

8.00% ***Agrostis capillaris*** **– Common Bent**
28.00% ***Cynosurus cristatus*** **– Crested Dogstail**
24.00% ***Festuca rubra*** **– Red Fescue**
4.00% ***Phleum bertolonii*** **– Smaller Cat's-tail**
16.00% ***Poa pratensis*** **– Smooth-stalked Meadow-grass**

Suggested Sowing Rates

40kg/ha 16kg/acre 4g/m^2

EM3 - Description

This meadow mixture contains a very wide range of species. It may be used to create a very diverse sward where conditions vary across a site. It is also useful in situations where precise soil and site characteristics have not been established before sowing.

Ground Preparation

Endeavour to select ground that is not highly fertile and does not have a problem with perennial weeds. Good preparation is essential to success so aim to control weeds and produce a good quality seed bed before sowing.

To prepare a seed bed first remove weeds using repeated cultivation. Then plough or dig to bury the surface vegetation, harrow or rake to produce a medium tilth, and roll, or tread, to produce a firm surface.

Sowing

Seed is best sown in the autumn or spring but can be sown at other times of the year if there is sufficient warmth and moisture. The seed must be surface sown and can be applied by machine or broadcast by hand. To get an even distribution and avoid running out divide the seed into two or more parts and sow in overlapping sections. Do not incorporate or cover the seed, but firm in with a roll, or by treading, to give good soil/seed contact.

First Year Management

Most of the sown meadow species are perennial and are slow to establish. Soon after sowing there will be a flush of annual weeds, arising from the soil seed bank. These weeds can look unsightly, but they will offer shelter to the sown seedlings, are great for bugs, and they will die before the year is out. So resist cutting the annual weeds until mid to late summer, especially if the mixture contains Yellow Rattle, or has been sown with a nurse of cornfield annuals. Then cut, remove and compost. Early August is a good time. This will reveal the young meadow, which can then be kept short by grazing or mowing through to the end of March of the following year. Dig out any residual perennial weeds such as docks.

Management Once Established

In the second and subsequent years EM3 sowings can be managed in a number of ways which, in association with soil fertility, will determine the character of the grassland. The best results are usually obtained by traditional meadow management based around a main summer hay cut in combination with autumn and possibly spring mowing or grazing.

Meadow grassland is not cut or grazed from spring through to late July/August to give the sown species an opportunity to flower. After flowering in July or August take a 'hay cut': cut back with a scythe, petrol strimmer or tractor mower to c 50mm. Leave the 'hay' to dry and shed seed for 1-7 days then remove from site.

Mow or graze the re-growth through to late autumn/winter to c 50mm and again in spring if needed.

Emorsgate EM8 Meadow Mix for Wetlands

Composition

EM8 is a complete mix composed of 20% native wild flowers and 80% slow growing grasses (by weight).

Wild Flowers 20%

0.70% *Achillea Millefolium* – Yarrow
0.60% *Agrimonia eupatoria* – Agrimony
0.10% *Angelica sylvestris* – Wild Angelica
0.20% *Betonica officinalis* – Betony
3.20% *Centaurea nigra* – Common Knapweed
1.40% *Filipendula ularia* – Meadowsweet
0.40% *Galium album* – Hedge Bedstraw
2.00% *Galium verum* – Lady's Bedstraw
0.80% *Lathyrus pratensis* – Meadow Vetchling
0.60% *Leontodon hispidus* – Rough Hawkbit
1.20% *Leucanthemum vulgare* – Oxeye Daisy (Moon Daisy)
0.60% *Lotus corniculatus* – Birdsfoot Trefoil
0.10% *Lotus pedunculatus* – Greater Birdsfoot Trefoil
1.00% *Medicago lupulina* – Black Medick
2.00% *Plantago lancelata* – Ribwort Plantain
0.40% *Primula veris* – Cowslip
0.80% *Prunella vulgaris* – Selfheal
1.20% *Ranunculus acris* – Meadow Buttercup
0.80% *Rhinanthus minor* – Yellow Rattle
0.60% *Rumex acetosa* – Common Sorrel
0.30% *Sanguisorba officinalis* – Great Burnet
0.50% *Silene flos-cuculi* – Ragged Robin
0.20% *Taraxacum officinale* – Dandelion
0.30% *Vicia cracca* – Tufted Vetch

Grasses 80%

8.00% *Agrostis capillaris* – Common Bent

8.00% *Carex echinata* – Star Sedge (w)
30.00% *Cynosurus cristatus* – Crested Dogstail
18.00% *Festuca rubra* – Red Fescue
1.60% *Hordeum secalinum* – Meadow Barley (w)
8.00% *Phleum bertolonii* – Smaller Cat's-tail (w)
6.40% *Poa pratensis* – Smooth-stalked Meadow-grass

Suggested Sowing Rates

40kg/ha 16kg/acre 4g/m²

EM 8 - Description

EM8 contains species suitable for seasonally wet soils and is based on the vegetation of traditional floodplain and water meadows. Soils in wet meadows may flood for short periods in winter, but are usually well drained in summer.

Ground Preparation

Endeavour to select ground that is not highly fertile and does not have a problem with perennial weeds. Good preparation is essential to success so aim to control weeds and produce a good quality seed bed before sowing.

To prepare a seed bed first remove weeds using repeated cultivation. Then plough or dig to bury the surface vegetation, harrow or rake to produce a medium tilth, and roll, or tread, to produce a firm surface.

Sowing

Sowings on ground prone to winter flooding are safest either in the early autumn or in spring once the land has drained. Most plants need time to grow mature enough to withstand flooding.

The seed must be surface sown and can be applied by machine or broadcast by hand. To get an even distribution and avoid running out, divide the seed into two or more parts and sow in overlapping sections. Do not incorporate or cover the seed but firm in with a roll, or by treading, to give good soil/seed contact.

First Year Management

Most of the sown meadow species are perennial and are slow to establish. Soon after sowing there will be a flush of annual weeds, arising from the soil seed bank. These weeds can look unsightly, but they will offer shelter to the sown seedlings, are great for bugs, and they will die before the year is out. So resist cutting the annual weeds until mid to late summer, especially if the mixture contains Yellow Rattle, or has been sown with a nurse of cornfield annuals. Then cut, remove and compost the cuttings. This will reveal the young meadow, which can then be kept short by grazing or mowing through to the end of March of the following year. Dig out any residual perennial weeds such as docks.

Management Once Established

In the second and subsequent years EM8 sowings can be managed in a number of ways which, in association with soil fertility, will determine the character of the grassland. The best results are usually obtained by traditional meadow management based around a main summer hay cut in combination with autumn and possibly spring mowing or grazing.

Meadow grassland is not cut or grazed from spring through to July/August to give the sown species an opportunity to flower. After flowering in July or August take a 'hay cut' : cut back with a scythe, strimmer or tractor mower to c 50mm. Leave the 'hay' to dry and shed seed for 1-7 days then remove from site. Mow or graze the re-growth through to late autumn/winter to c 50mm and again in spring if needed.

Wetland habitats are characteristically quite variable in composition, reflecting local drainage and management. Conditions can vary, for instance, between the highs and lows in ridge and furrow grassland. Localized differences may require a targeted approach. For example, boggy areas which remain waterlogged for much of the year may be best sown with pond edge mixture EP1.

Emorsgate EM10 Tussock Meadow Mix

Composition

EM10 is a complete mix composed of 20% native wild flowers and 80% grasses (by weight).

Wild Flowers 20%

0.80% *Achillea millefolium* – Yarrow
0.60% *Agrimonia eupatoria* – Agrimony
0.20% *Arctium minus* – Lesser Burdock
2.00% *Centaurea nigra* – Common Knapweed
1.00% *Centaurea scabiosa* – Greater Knapweed
2.00% *Daucus carota* – Wild Carrot
1.60% *Dipsacus fullonum* – Wild Teasel
0.60% *Filipendula ulmaria* – Meadowsweet
1.80% *Galium album* – Hedge Bedstraw
0.40% *Geranium pratense* – Meadow Crane's-bill
0.80% *Knautia arvensis* – Field Scabious
0.40% *Lathyrus pratensis* – Meadow Vetchling
1.60% *Leucanthemum vulgare* – Oxeye Daisy
0.40% *Malva moschata* – Musk Mallow
1.80% *Plantago lanceolata* – Ribwort Plantain
0.80% *Poterium sanguisorba* – Salad Burnet
1.20% *Silene dioica* – Red Campion
0.40% *Vicia Cracca* – Tufted Vetch
1.60% *Silene vulgaris* – Bladder Campion

Grasses 80%

4.00% Agrostis capillaris – Common Bent
8.00% *Alopecurus pratensis* – Meadow Foxtail (w)
4.00% Carex divulsa ssp divulsa – Grey Sedge (w)
24.00% *Cynosurus cristatus* – Crested Dogstail
4.00% *Dactylis glomerata* – Cocksfoot (w)
4.00% Festuca ovina – Sheep's-fescue
16.00% *Festuca rubra ssp rubra* – Slender-creeping Red Fescue
8.00% Phleum bertolonii – Smaller Cat's-tail (w)
8.00% *Schedonorus arundinaceus (Festuca arundinacea)* – Tall Fescue (w)

Suggested Sowing Rates

40kg/ha 16kg/acre 4g/m^2

EM10 - Description

The varied forms of the grasses in EM10 provide the main focus of interest of this mixture. The tussock forming grasses are combined with wild flowers like knapweeds and vetches which can cope with competition from taller vegetation. This mixture has been devised to create areas of tussocky grassland that, once established, require little or no maintenance. This grassland type can form a good habitat for insects, small mammals, birds, amphibians and reptiles, providing nesting sites during spring, food during summer and autumn, and shelter during winter.

Ground Preparation

Endeavour to select ground that is not highly fertile and does not have a problem with perennial weeds. Good preparation is essential to success so aim to control weeds and produce a good quality seed bed before sowing.

To prepare a seed bed first remove weeds using repeated cultivation. Then plough or dig to bury the surface vegetation, harrow or rake to produce a medium tilth, and roll, or tread, to produce a firm surface.

Sowing

Seed is best sown in the autumn or spring but can be sown at other times of the year if there is sufficient warmth and moisture. The seed must be surface sown and can be applied by machine or broadcast by hand. To get an even distribution and avoid running out divide the seed into two or more parts and sow in overlapping sections. Do not incorporate or cover the seed, but firm in with a roll, or by treading, to give good soil/seed contact.

First Year Management

Most of the sown meadow species are perennial and are slow to establish. Soon after sowing there will be a flush of annual weeds, arising from the soil seed bank. These weeds can look unsightly, but they will offer shelter to the sown seedlings, are great for bugs, and they will die before the year is out. So resist cutting the annual weeds until mid to late summer, especially if the mixture contains Yellow Rattle, or has been sown with a nurse of cornfield annuals. Then cut, remove and compost. Early August is a good time. This will reveal the young meadow, which can then be kept short by grazing or mowing through to the end of March of the following year. Carefully dig out any residual perennial weeds such as docks.

Management Once Established

Once established tussocky grassland requires minimal maintenance. Unwanted perennial weeds (docks, thistles) may need control by selective scything before seeding. To control scrub and bramble development, tussocky areas may need cutting every 2-3 years between October and February. For wildlife this cutting is best done on a rotational basis so that no more than half the area is cut in any one year leaving part as an undisturbed refuge.

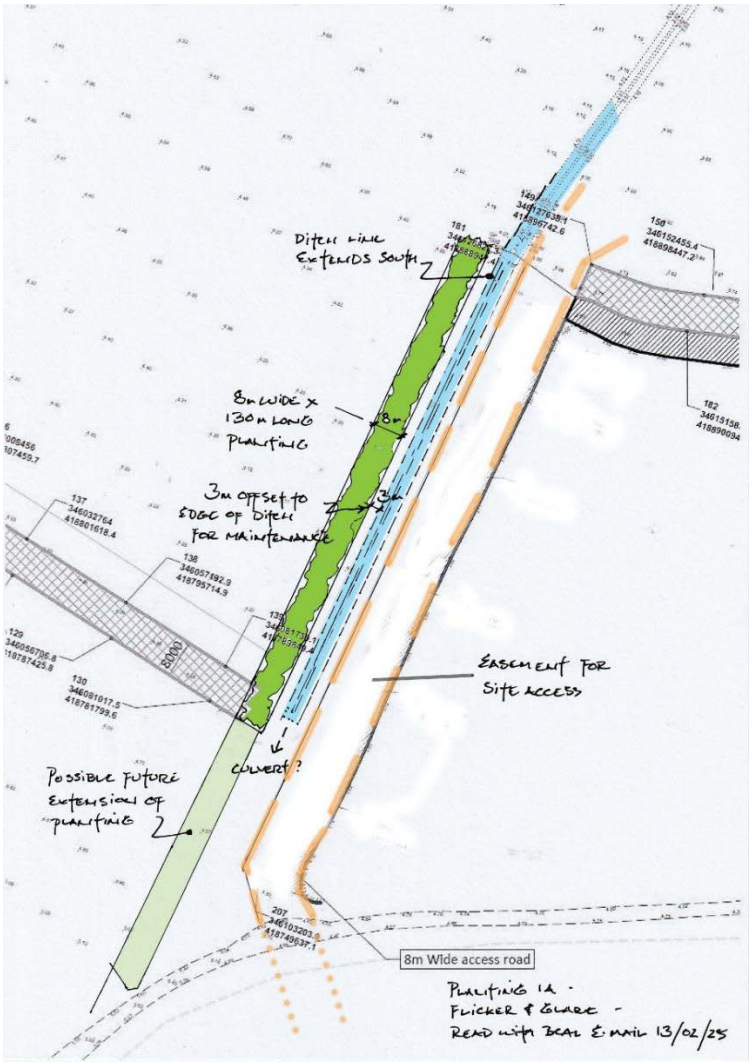
FIG 07 – Bretherton Battery Building – Planting

Dwg Ref 1255-Sk0-02

Bretherton Battery Building : Hedgerow Planting

70	**no**	**Hedgerow Plants (at 0.5m centres)**		
2	no.	Alnus glutinosa (Alder)	1.2-1.5m Feathered Whip	
4	no.	Betula pubescens (Downy Birch)	1.2-1.5m Feathered Whip	
39	no.	Crataegus monogyna (Hawthorn)	)	55%
7	no.	Corylus avellana (Hazel)	)	10%
11	no.	Prunus spinosa (Blackthorn)	) bare root 1+1	15%
7	no.	Rosa canina (Dog Rose)	)	10%
7	no.	Viburnum opulus (Guelder Rose)	)	10%

FIG 08 – Additional Planting to Access Track off Eyes Lane



Access Track off Eyes Lane : Tree / Hedgerow Planting (Location as Sketch Plan

1,040	**sq.m**	**Total Area of Plantation**	
83	**no**	**Understorey Planting (25% of Area) - at 2m centres**	
112	no.	Crataegus monogyna (Hawthorn)	)
31	no.	Corylus avellana (Hazel)	)
25	no.	Ilex aquifolium (Holly)	)
25	no.	Prunus spinosa (Blackthorn)	) bare root 1+1
31	no.	Rosa canina (Dog Rose)	)
25	no.	Sambucus nigra (Elder)	)
248	**no**	**Tree Planting (75% of Area) - at 2m centres**	
49	no.	Alnus glutinosa (Alder)	)
26	no.	Betula pubescens (Downy Birch)	)
10	no.	Prunus avium (wild cherry)	) bare root 1+2
26	no.	Quercus petraea (Sessile Oak)	)
13	no.	Quercus robur (Pedunculate Oak)	)
7	no.	Sorbus aucuparia (Mountain Ash)	)

TECHNICAL NOTE FIVE – AGRICULTURAL MANAGEMENT

CONTENTS :

ILLUSTRATIONS (Fig)

A. Introduction

1. The Landscape Strategy objectives are set out in TN3, noting that on completion of the green energy infrastructure the site will return to agriculture ; this will be as pasture, as opposed to the current arable farming practice. Thus, once the grassland on the managed habitat and under the solar panels has become established it will be managed by sheep grazing. There is to be no public access to the pasture areas, and measures are included to deter access (the tree/hedgerows planted in advance of the works, plus fencing).

B. Grazing Regime

2. The annotated copy of the Landscape Strategy (Fig 1) identifies the main features of this -

Fig 1 – Management Notes – Landscape Strategy Areas

AREA	NOTES :
A/B	*Main pasture area – low intensity grazing regime, managed for ground-nesting birds : wet scrape areas identified in northwest part of field adjacent to the Canal and 300m distant from the turbine.* *Wet scrape areas can be protected from grazing by temporary use of stock-proof fencing (post/wire/sheep netting) to suit nesting period* *The north and west areas (boundary to the Canal) are enclosed by the advance planting of hedgerow and trees (see TN4 para 7) : the hedgerow is to be managed as a stock-proof barrier, but will be reinforced with post & wire / netting fence before the sheep are delivered.*
C	*Area under solar panels – grazing : panel height set to 0.9m min to allow sheep to pass underneath.*
D	*Wet grass / marsh area – available for grazing*
E1	*Existing ditch – retained*
F/G	*Areas managed for species-rich grasses and scrub habitat – narrow areas, controlled grazing as per wet scrape areas.*

3. The grazing of Areas A and B will follow a low intensity grazing regime to maintain grass cover. Moderate trampling will be used to expose ground for colonisation by annuals the following spring; however, heavy trampling will be avoided as it can lead to ground poaching and allow the infestations by weed species detrimental to the site's management.

4. During the spring and summer (February to August), sheep stocking densities will be reduced to allow summer flowering plants to set seed. This will be achieved by rotational grazing in conjunction with Area C (Solar Panels). Likewise, during the winter period grazing will be closely monitored to prevent excessive compaction of water-logged soils. The day-to-day management of the sheep grazing will be managed in accordance with the agreed management plan by shepherd engaged by the Bretherton Energy Partnership.

5. The objective is to achieve a stocking density sufficient to maintain a varied structure. The grazing density proposal (Fig 2) is based on medium sized sheep (e.g. 60kg). It will be important to constantly monitor the Site to ensure the grassland is not under or over grazed and stock density and duration altered accordingly. The stocking density will be reduced during wet periods or in conditions when poaching would lead to a break-up of the sward and colonisation by aggressive weed species.

6. The table (Fig 2) is an indicative guide to stocking levels for lowland grassland (number of sheep per hectare) : it is adapted from the Lowland Grassland Management Handbook produced by Natural England.

Fig 2 - Provisional Stocking Numbers, Lowland Grazing -

Number of grazing (weeks per year)	Neutral Grassland (sheep per ha)
16	12.5
20	10
24	8
36	5.5
52	4

7. The following indicators will be used to review and amend stocking densities:

   - An increase in the amount of uneaten grass, the accumulation of litter, an increase in vigorous rank and unpalatable grasses, and a reduction in low growing herbs : this indicates stocking density is too low (and a need to increase density) ; and –
   - A reduction in density/diversity of plants, excessive poaching, weed invasion and the development of bare patches : this indicates stocking density is too high (need to reduce density).

8. The growth of the five injurious (harmful) weeds listed within the Weeds Act 1959: common ragwort, spear thistle, creeping thistle, curled dock, and broad-leaved dock, will be managed on Site in order to protect grazing animals and to enhance the species richness of the enhanced grassland habitats. The management of such species will follow published guidance documents.

C. Monitoring – Landscape & Habitat Management Plan (LHMP)

9. The objectives of the grazing regime are summarised at para 5 above. These will be monitored and the effects fed into periodic reviews of the development of the habitat noted in the Landscape Strategy (as TN4, Section D). The agricultural practice will thus be a component part of the LHMP.

10. Monitoring will also occur as part of the daily / weekly visits to the flock : any issues arising from (for example) over-grazing or surface erosion, or observed variations in the ground-nesting timings can be addressed by temporary stock proof fencing (post & wire, plus sheep netting) to prevent access to affected areas and allow the grassland to recover.

D. Livestock Handling

11. Use will be made of mobile handling equipment placed on the permeable gravel areas, (within the turbine compound area and thus enclosed) to undertake daily tasks of worming, shearing, and dipping of the sheep flock. This will enable good sheep husbandry techniques to be followed, to maintain the health of the flock.

12. Import / export of animals will be via the same point.

E. Restoration On Completion

13. At the end of the operational period the land occupied by the solar arrays, turbine, and associated infrastructure would be regraded and cultivated to return the Asland Walks site to agricultural use, restoring the land to the same quality as the pre-development state.

14. The final use – whether as pasture or arable land – will of necessity be determined at the time, consistent with prevailing farming practice and climate suitability : however, the habitat creation objectives will be retained and incorporated into the agricultural land management.