Abbott Risk Consulting Limited

ARC-1283-002-R1

National Fire Chiefs Council Planning Guidance for Battery Energy Storage System (BESS) Compliance Report –

Old Wood Energy Park

Issue 1 – August 2025

Prepared for:

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Issue No.	Date	Prepared	Reviewed	Approved	Revision Notes
Issue 1	August 2025	J Tough	C Clarke-Brown	R Davies	Client comments incorporated

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Executive Summary

This National Fire Chief Council (NFCC) Planning Guidance for Battery Energy Storage Systems (BESS) [Ref. 1] was published by the NFCC in November 2022 in response to the growing number of BESS installations being proposed across the United Kingdom, with the aim of providing Regional Fire and Rescue Services (FRS) a set of fire safety recommendations to be considered for BESS installations. In July 2024 the NFCC issued a draft consultation report, with the intent to update the extant NFCC Planning Guidance. This updated version has yet to materialise and consultation with various regional FRS has indicated it is unlikely to occur prior to 2026.

The NFCC Compliance Report has been prepared for Exagen Development Limited (the Applicant and Developer), in relation to the updated layout plan for the Old Wood Energy Park, a ground mounted solar farm with associated BESS, substation and point of connection, on land near Wysall, Nottinghamshire (the Site). The Development was refused planning consent by Rushcliffe Borough Council's planning committee in June 2025 under planning application reference: 24/00161/FUL and is now the subject of a section 78 appeal. The focus of this report is primarily on the BESS element of the Old Wood Energy Park, hereafter referred to as the "Development". The Development will use Lithium Ferrous Phosphate (LFP) chemistry, although at this juncture the exact make and model of BESS is yet to be determined.

This NFCC Compliance Report reviews the proposed site layout and construction against the recommendations detailed in the NFCC Planning Guidance for BESS (2022) [Ref. 1], drawing on the 14 key recommendations in the report. It provides the claimed compliance status with supporting evidence.

Consultation with the FRS at similar BESS installations has concluded that "the developer should produce a risk reduction strategy" incorporating safety measures and risk mitigation in collaboration with the associated Regional FRS and covering the construction, operational and decommissioning phases of the project. This report provides the fundamental building block for such consultation with the FRS. The developer will ensure that the risk of fire is minimised, this is by the implementation of the following measures:

a) The procuring of components and using construction techniques that comply with all relevant and prevailing legislation.

b) Including automatic fire detection and suppression systems as part of the design requirement.

c) Designing the development to contain and restrict the spread of fire using fire-resistant materials and separation between elements of the BESS, conversant with the NFCC Guidance [Ref. 1].

d) Developing an Emergency Response Plan (ERP) with FRS to minimize the impact of an incident during construction, operation, and decommissioning of the facility.

e) Ensuring the BESS is located away from residential areas. Prevailing wind directions have been factored into the location of the BESS to minimize the impact of a fire on the local populace.

Abbreviations

ALARP	As Low As Reasonably Practicable
ARC	Abbott Risk Consulting Ltd
BESS	Battery Energy Storage System
ERP	Emergency Response Plan
FRS	Fire and Rescue Service
HSAWA	Health and Safety at Work Act
HSE	Health and Safety Executive
LFP	Lithium Ferrous Phosphate
NFCC	National Fire Chiefs Council
R2P2	Reducing Risk, Protecting People

Contents

1.0 Introduction

This NFCC Compliance Report has been developed by Abbott Risk Consulting Ltd (ARC) in the role of the Safety Subject Matter Expert. The NFCC Compliance Report has been prepared for Exagen Development Limited (the Applicant and Developer), in relation to the updated layout plan for the Old Wood Energy Park, a ground mounted solar farm with associated BESS, substation and point of connection, on land to the west of Wysall, Nottinghamshire (the Site). The focus of this report is solely the BESS element of Old Wood Energy Park, hereafter referred to as the Development. The Development was refused planning consent by Rushcliffe Borough Council's planning committee in June 2025 under planning application reference: 24/00161/FUL and is now the subject of a section 78 appeal.

The Old Wood Energy Park BESS solution, in terms of BESS manufacturer and model, has yet to be determined, however it is currently proposed that Lithium Ferrous Phosphate (LFP) chemistry cells will be used. This is subject to change and will be driven by the availability of technology at the time of construction of the site. This approach is common to this type of development given the rapid changes and technological advances being made in the field of lithium-Ion storage systems. Reference to LFP is solely to illustrate the capability that is possible for developments of this type and the safety measures that are generically available.

This NFCC Compliance Report has been developed to provide an overview to how the proposed layout and construction complies with the NFCC Guidance for BESS [Ref. 1]. This NFCC Compliance Report provides the starting point to support a robust safety strategy. The final design and equipment details is based on the site layout plan and associated details provided by Exagen Development Limited.

2.0 Background

The NFCC Planning Guidance for BESS (2022) [Ref. 1] has been used for this assessment. In July 2024 the NFCC issued a draft consultation report, with the intent to update the extant NFCC Planning Guidance. This updated version has yet to materialise and consultation with various regional FRS has indicated it is unlikely to occur prior to 2026.

3.0 Aim

The overall safety aim is that the levels of risk of accident, death or injury to personnel or other parties, and to the environment due to the construction, operation and decommissioning of the Development are broadly acceptable or tolerable and 'As Low As Reasonably Practicable' (ALARP) in accordance with the Health and Safety Executive (HSE) Reducing Risk, Protecting People (R2P2) [Ref. 2].

4.0 Scope

The scope of the NFCC Compliance Report for the Development covers the physical and functional aspects of the equipment. The site is flat and is outlined by the red line boundary on the Site Location and Site Layout Plans, submitted as part of the planning application. The BESS facility and associated ancillary infrastructure is illustrated at Figure 4-1. The primary access route is illustrated by the orange arrow route with the secondary accesses shown by the black arrow route.

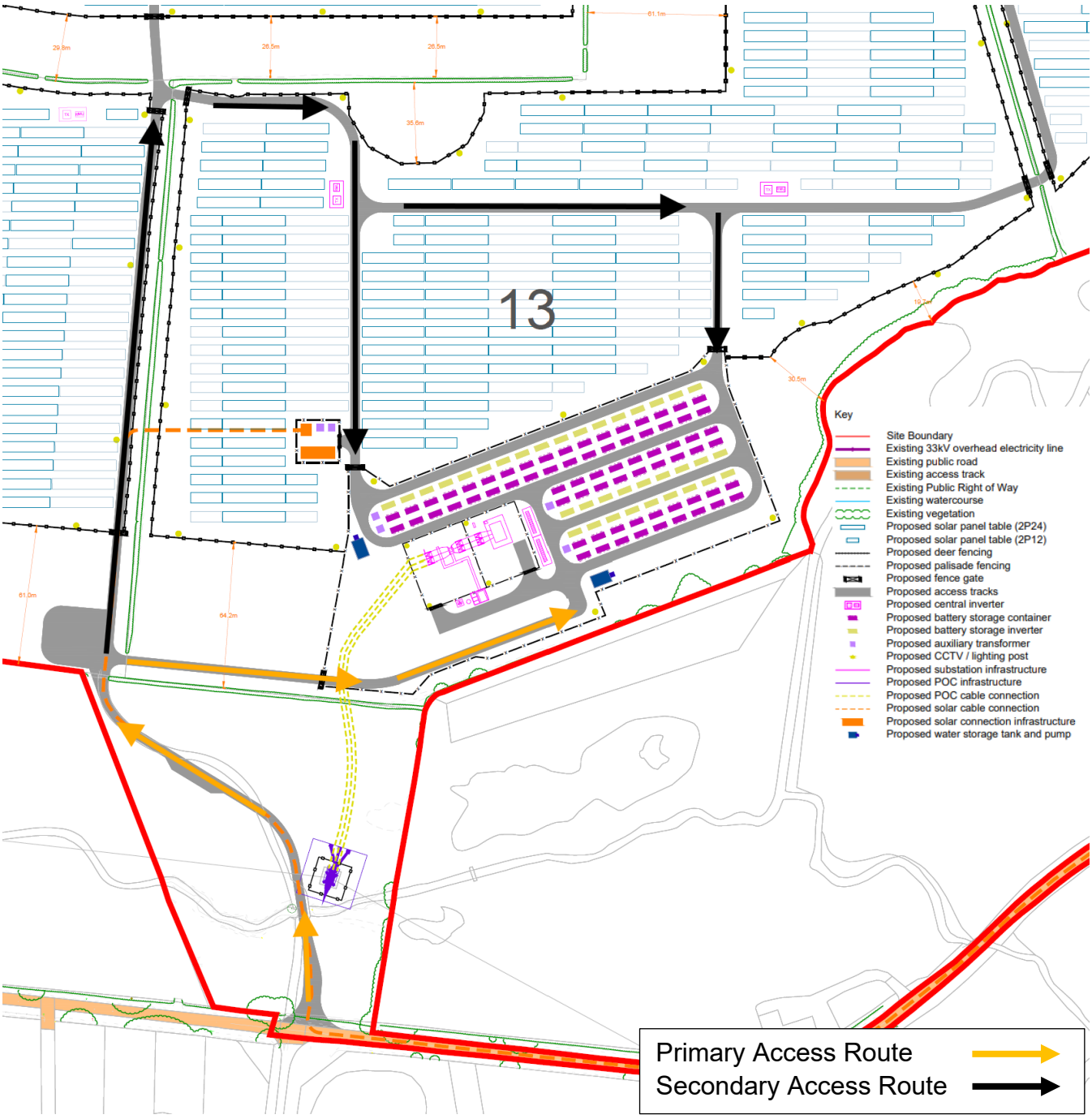


Figure 4-1 Old Wood Energy Park - BESS Layout

The historical wind rose for Nottingham[1] is at Figure 4-2 which illustrates a predominant wind direction from the southwest.

[1] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/nottingham_united-kingdom_2641170

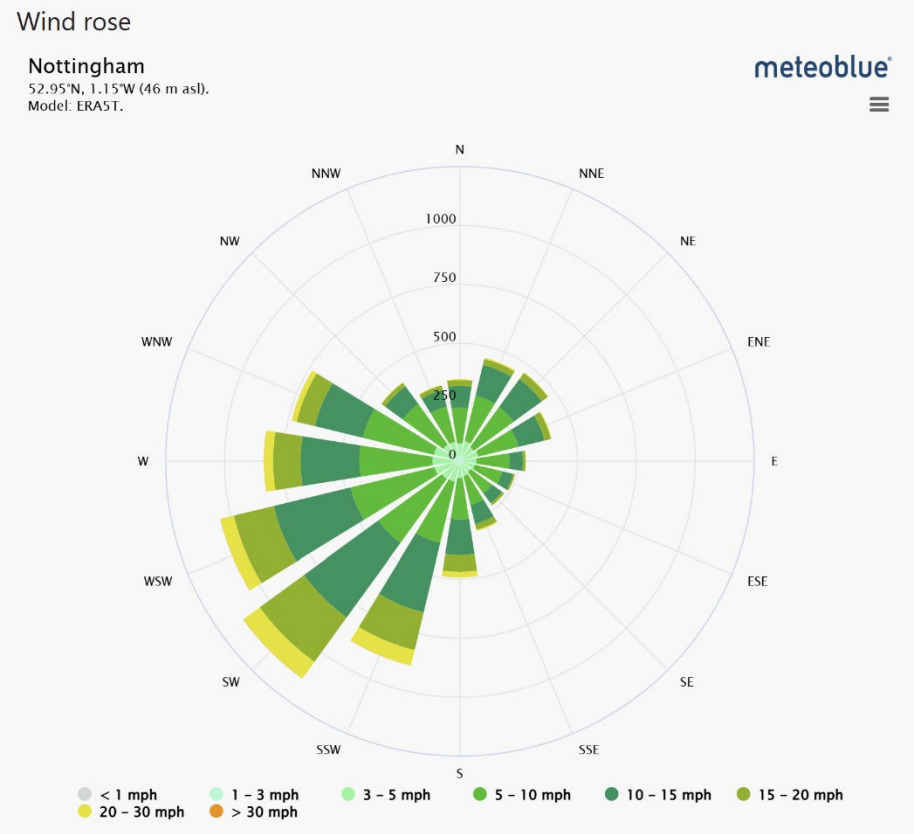


Figure 4-2 Wind Rose, Nottingham

4.1 BESS - Overview

The exact BESS unit type has yet to be determined for the Development, however the option currently available and under consideration is based on LFP chemistry. This type has been considered as being used for this development, although this is subject to change.

4.2 Frequently Asked Questions

Appendix A of this NFCC Compliance Report contains frequently asked questions regarding battery safety and is provided for assurance and a greater awareness of BESS and Lithium-Ion technologies in general.

4.3 NFCC Recommendations

The NFCC Report Grid Scale Battery Energy Storage System Planning – Guidance for FRS [Ref. 1], details the FRS recommendations for BESS installations. These have been distilled at Table 4-1 cognisant of the site layout at Figure 4-1.

4.4 FRS Consultation

The Site location falls within the jurisdiction of the Nottingham FRS. The Planning Application as originally submitted received response from the FRS, this directed the Applicant to consider how the development and site layout aligned with the prevailing NFCC Guidance for BESS [Ref. 1], hence the submission of this report.

Further to this addition fire safety concerns have been raised through consultation or at planning committee meetings.

*32. **Fire Service** – No objection raised, a pre-commencement condition is recommended to ensure appropriate risks are known and mitigated for once the final detail/technology of the battery storage equipment is known and that this information is to be submitted through a Risk Management Plan and Emergency Response Plan. The plan is required to include confirmation that Fire Service vehicles can easily access all the site, final safety systems of the containers, final internal suppression system to be used, method of dealing with a fire, container heat output (energy density), contamination levels of gases and vapour and how will it be controlled.*

And under the Fire Safety section of the committee report:

145. Accordingly, the comments from the Fire Safety Officer have been sought on this matter. A number of consultation responses have been received by the Fire Safety Officer which required further information to be supplied.

146. In response to this, a suggested condition which requires the submission of a Risk Management Plan and Emergency Response Plan has been put forward to the fire safety officer. The suggested condition requires the plan to be developed in conjunction with the Nottinghamshire Rescue service using the best practice guidance as detailed and required in the published Grid Scale Battery Storage Energy Storage planning - Guidance for Fire and Rescue Services (FRS) published by National Fire Chiefs Council (NFCC).

147. The plan is required to include confirmation that Fire Service vehicles can easily access all of the site, final safety systems of the containers, final internal suppression system to be used, method of dealing with a fire, container heat output (energy density), contamination levels of gases and vapour and how will it be controlled. Given that the finalised detail of the development in relation to the above matters is to be provided once known, it is considered that the detail can be satisfactorily and appropriately secured by condition.

148. The Fire Safety Officer has confirmed that the suggested condition is appropriate and would invite a further consultation once precise details are available in order to work with the applicant on the production of an emergency response plan.

The proposed condition was condition 16 in the committee report, copied below:

16. Prior to the construction of the Battery Energy Storage System (BESS), a Risk Management Plan and Emergency Response Plan shall be submitted to and approved in writing by the Local Planning Authority. These plans shall be developed in conjunction with Nottinghamshire Rescue Service using the best practice guidance as detailed and required in the published Grid Scale Battery Energy Storage System planning - Guidance for FRS published by NFCC National Fire Chiefs Council and as set out within the consultation response from Nottinghamshire Fire & Rescue Service dated 8 March 2024. Once approved, these plans shall be implemented thereafter and for the duration of the lifetime of the development.

Applicant Response: A Detailed Battery Safety Management Plan (DBSMP) forms an element of the progressive safety assurance process adopted for this site. The DBSMP will detail the infrastructure to be used at the site and the associated fire safety certification / systems. In addition, the Applicant will develop, in conjunction with the FRS the site ERP.

4.5 Building Regulations

The building work will be subject to control under the restrictions of the Building Regulations 2010 (as amended). The Building Regulations are concerned with the safety of individuals in and around a building. The development will be designed and constructed to satisfy the functional requirements of Part B (Fire Safety) to Schedule 1 of the Building Regulations 2010 (as amended), which includes the following:

- B1 – Means of warning and escape.
- B2 – Internal fire spread (linings).
- B3 – Internal fire spread (structure).
- B4 – External fire spread.
- B5 – Access and facilities for the Fire Service.

As majority of the facilities located on Site are external and would be considered as enclosures, as opposed to buildings or structures. Enclosures are not obliged to satisfy Requirement B2 of the Building Regulations; however, the requirements have been applied where reasonably practicable to demonstrate a good level of fire safety (please refer to Table 4-1 below).

Ser	NFCC Recommendations	Site Status	Options / Comments
1	Access - Minimum of 2 separate access points to the site	**Compliant**	There are 3 points of access into the BESS compound using the site internal roads. Access to the BESS compound is possible from differing points of the compass allowing access whatever the wind direction. All access emanates from a single point on the public highway, recourse to historic wind data indicates that the prevailing wind direction in the location is southwest veering westerly, see Figure 4.2. <u>Primary Access</u> The primary operational access to the BESS compound is off Wysall Road, heading north over Kingston Brook, turning right towards the BESS compound and turning left (north) into the compound from the south. <u>Emergency Secondary Accesses</u> The secondary emergency accesses to the BESS compound utilise the solar farm tracks. The routes commence as per the primary route but instead of turning east they continue north into the solar farm before turning east and using one of two tracks running south to enter the BESS compound in the northwest or northeast corner. Vehicle tracking has been completed for fire tenders and these drawings are included at Appendix B of this report. For the avoidance of doubt fire tenders can make all turns and corners safely.
2	Roads/hard standing capable of accommodating fire service vehicles in all weather conditions. As such, there should be no extremes of grade.	**Compliant**	The site service roads, which allow access around the site and BESS compound, will be a hard compacted surface and a minimum of 4.0m wide. There is no extreme of gradient at the site. The site access road is suitable for HGV traffic during construction and retained to be suitable for fire tenders during the operational period. All internal services roads have been designed with a 10m radii and are compatible for a DB32 Fire Appliance. Refer to fore tender vehicle tracking to all BESS access points in Appendix B.
3	A perimeter road or roads with passing places suitable for fire service vehicles	**Compliant**	The BESS compound service roads are 4.0m wide hard surface access running around the site allowing access to all BESS units, Figure 4-1 refers, given the circular nature and compactness of the site the ability to drive-in and drive-out without the need for passing points or the need to reverse is provided. Section 13.4 of Approved Document B5 states that FRS vehicles should not have to reverse more that 20m from the end of an access road – given the provision of a circular perimeter service road the requirement for FRS vehicles to reverse is minimised to situations in which use of the perimeter service road is not possible, and in these circumstances, reversing more than 20m is not a requirement. Section 13.4 references Table 13.1 of the Approved Document B5 which contains typical FRS vehicle access route specifications – the site will meet these specifications.

Ser	NFCC Recommendations	Site Status	Options / Comments
4	Road networks on sites must enable unobstructed access to all areas of the facility	**Compliant**	Access to all BESS units is afforded from the network of services roads in the BESS compound road. The site is designed such that all routes have the capacity to allow for a Fire Tender (based on DB32 Fire Appliance), refer to Appendix B.
5	Turning circles, passing places etc. size to be advised by FRS depending on fleet	**Compliant**	The BESS compound access service roads allow access to all BESS units (Figure 4-1 refers) in two differing directions and allow for FRS vehicles to drive in and drive out without the need to reverse. From consultation with the FRS to date it is established that these arrangements are satisfactory. Swept Path Analysis has been carried out for the site to establish that all routes have the capacity to allow Fire Tender (based on 8.68m Fire Tender with a 4.0m wheelbase and 2.18m width). Refer to Appendix B.
6	Distance from BESS units to occupied buildings & site boundaries. Initial min distance of 25m	**Compliant**	There are no occupied buildings within 25m of the BESS compound, the nearest residential dwellings are approximately 400 m east/southeast and 450m south of the BESS compound.
7	Access between BESS unit – minimum of 6 metres suggested. If reducing distances, a clear, evidence based, case for the reduction should be shown.	**Compliant**	The suggested 6.0m separation is based on a 2017 Issue of the FM Global Loss and Prevention Datasheet 5-33 (footnote 9 in the NFCC Guidance refers). This Datasheet was revised in July 2023 and again in Jan 2024, it now details the following: 1. For containerized LIB-ESS comprised of Lithium iron phosphate (LFP) cells, provide aisle separation of at least 5 ft (1.5 m) on sides that contain access panels, doors, or deflagration vents. 2. For containerized LIB-ESS comprised of Lithium nickel manganese cobalt (NMC) cells where wall construction is unknown or has an ASTM E119 rating less than 1 hour, provide aisle separation of at least 13 ft (4.0 m) on sides that contain access panels, doors, or deflagration vents. For containerized NMC LIB-ESS where wall construction is documented as having at least a 1-hour rating in accordance with ASTM E119, aisle separation of at least 8 ft (2.4 m) is acceptable. Additionally, the Department for Energy Security and Net Zero published in March 2024 their Health and Safety Guidance for BESS in which it is stated that the separation distance, for sides with access panel, doors or deflagration panels should be a minimum of 1.5m for LFP. It has been noted that the current NFCC guidance is in the process of being revised and a consultation document has been promulgated, a revised version has yet to be published. The draft consultation version removes the 6.0m separation distance and refers out to NFPA 855 for guidance on separation.

Ser	NFCC Recommendations	Site Status	Options / Comments
			Following this revision to the Datasheet, the BESS containers on-site will be compliant with the minimum distances and conformance to ASTM E119 1-hour fire rating will be confirmed on the down select of the BESS units to be procured. The BESS units for the Development will be LFP and the smallest separation distances between BESS units is 3 m providing compliance with FM Global Specifications.
8	Site Conditions – areas within 10m of BESS Units should be cleared of combustible vegetation	**Compliant**	The BESS units will sit on concrete slabs or supporting feet. Internal access tracks will comprise crushed stone and the access road for the abnormal load will be asphalt. Within fence line and between BESS containers units the surface is laid over to gravel. All areas within 10m of the BESS are cleared of vegetation.
9	Water Supplies	**Compliant**	The current recommendation is for 1900l/min for 2 hours (228,000 litre capacity). Original proposals were for any water applied to be collected in a below ground water storage pipe that will be closed off in the event of a fire, via a penstock. This will allow for the FRS to recirculate any runoff and use it for boundary cooling. The water storage pipe has a greater than 228,000 litre capacity. In addition, and through changes made to the design during the appeal, two above ground water tanks are provided in the BESS compound as shown on the site layout plan extract included in Figure 4.1. The tanks each have the following dimensions – 8 m x 5 m x 3 m (h) with a small adjoining housing for a pump of 2 m x 2 m x 2 m. Each tank would have a capacity of circa 120,000 litres so together water capacity of 240,000 litres. The NFCC guidance requires a minimum of 1,900 litres per minute for 2 hours, totalling 228,000 litres. The pump houses allow for water to be pumped into and out of the tanks.
10	Signage	**Compliant**	Signage to be positioned at both entrances to the site. Signage to be confirmed through design process and will be detailed in the ERP.
11	Emergency Plans	**Compliant**	Future iteration of the Outline Battery Safety Management Plan (OBSMP) to DBSMP will roll up the ERP outlining who and how FRS will be alerted, facility description, number of operatives, detailed site plan etc.

Ser	NFCC Recommendations	Site Status	Options / Comments
12	Environmental Impacts	**Compliant**	There have been no environmental impact concerns raised for the Site, the EA have responded to the Planning Application and have no objections. A Drainage Report has been prepared for the site as part of the planning application and forms part of the planning application document set. The premise of the drainage strategy is retention of firefighting water runoff is made via the below ground water storage pipe, which can be used by the FRS to recirculate the runoff for boundary cooling. Post the incident the runoff will not be released to the wider environment prior to being tested for any contamination. A Flood Risk Assessment has been conducted and whilst the access to the site from the public highway falls within Flood Zones 2 and 3 the depth of the water is such that it is unlikely to prevent access to the site. The BESS compound is unaffected.
13	System design, construction, testing and decommissioning	**Compliant at this juncture**	Several of the elements under this aspect of the NFCC Guidance will be contained on the OBSMP, the Planning Application Safety Plan, however details of the construction, testing and decommissioning will only be available in later stages of the programme and be contained in the DBSMP, developed post consent.
14	Deflagration Prevention and venting	**Compliant at this juncture**	Elements of this requirement will be contained in the OBSMP, but the actual technique to be adopted will not be apparent up to the point the decision is made as to what BESS is being used. It is acknowledged that deflagration venting is possibly most effective when fitted to the roof of the BESS Units, as such deflecting blast upwards and away from FRS personnel, as such this will form an element of the procurement strategy for the BESS units.

Table 4-1 - NFCC Recommendations Cross-Referenced to the Old Wood Energy Park BESS

5.0 Conclusions and Recommendations

5.1 Conclusions

It is concluded that the proposed site layout and construction is compliant with the recommendations detailed in the NFCC Planning Guidance for BESS [Ref. 1].

This NFCC Compliance Report has been developed using existing knowledge of the BESS capability and leans heavily on the subject matter expertise that ARC have in this technological domain.

Installation of the BESS in accordance with OEM instructions followed by a period of qualification and testing will provide the supporting evidence. This will also allow for the consolidation of control evidence and enhanced development of mitigation to further reduce the level of risk posed.

5.2 Recommendations

It is recommended that the BESS safety management and criteria (for assessment and analysis) as defined in this NFCC Compliance Report, is adhered to throughout the site lifecycle to ensure that safety management is developed as the programme progresses and remains valid through the life of the BESS capability. This NFCC Compliance Report will be revised and updated as the programme progresses.

6.0 References

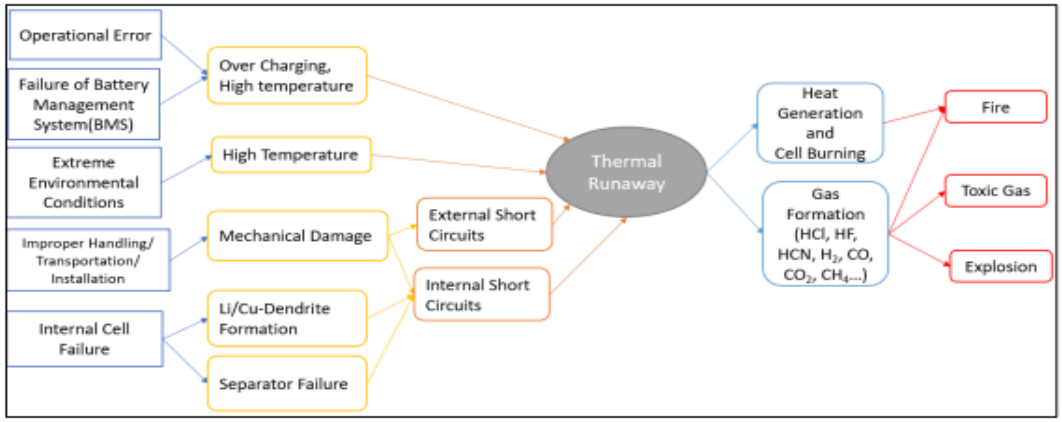
1. NFCC Grid Scale BESS Planning – Guidance for FRS dated Nov 2022
2. Reducing Risk, Protecting People (HSE Publications) - https://www.hse.gov.uk/risk/theory/r2p2.pdf.

Appendix A – Frequently Asked Questions

Ser	Question	Answer
1	How does a BESS work?	A BESS employs technology to temporarily store electrical energy, very much in the same manner as a mobile phone or laptop battery, but on a much bigger scale. The energy can be stored and released when demand on the National Grid is high and assists in balancing out variations in demand. The primary use for BESS is to store electrical energy generated by energy suppliers during period of low demand and releasing in periods of high demand, thus balancing out changes in supply and demand on the National Grid.
2	How safe is a BESS?	The Department for Energy Security and Net Zero promulgates on a regular basis the Renewable Energy Planning Database (REPD). From the quarterly extract (dated Apr 2025) the data has been filtered for BESS installations in the UK and the following salient points are deduced[2]: 1. As of Apr 2025, there are approx. 132 operational BESS sites listed in the REPD[3], 8 having been decommissioned, 96 are under construction and a further 834 have planning consent and are awaiting construction. 2. The current operational BESS provides the UK with an estimated 2.6GWelec storage and those awaiting construction will provide an additional 5.4GWelec of storage. 3. Since 2006 UK BESS installations have accumulated an estimated 700 years of operation, this equates to 240,000 days of operation. 4. There have currently been only two reported BESS fires in the UK that have required FRS attendance, these occurred at Carnegie Road, Liverpool in Sept 2020 and East Tilbury in Feb 2025, the cause of the latter is yet to be declared. Given the estimated 6 million hours of operation, extrapolates out to approx. 3.3E-07 (0.00000014) failures per hour (fph) for BESS in the UK. 5. To date, there have been no recorded fatalities, third-party injuries, or environmental damage resulting from BESS incidents in the UK. Reflecting on the HSE R2P2 guidance, an individual risk of death of 1.0E-05 per year (or 1 in 100,000 annually) is considered broadly acceptable for workers. Based on this framework, the risk associated with BESS operation is assessed to be within the broadly acceptable range and compliant with the HSE ALARP principles.

[2] The REPD tracks the progress of energy projects, including BESSs, through the planning system. Until 2021, the REPD only recorded projects with a capacity over 1 MW). Since 2021, it also includes projects with a capacity over 150 kilowatts (kW). Therefore, BESSs that were going through the planning system before 2021 may not have been captured in the REPD – Source: Commons Library Research Briefing, 19 April 2024 – BESS.

[3] This is a conservative figure as the REPD did not account for project under 1MW until 2021.

Ser	Question	Answer
3	Lithium-Ion is sensitive to temperature variations – how is this controlled?	The batteries are housed in an ISO container which is fitted with an Environmental Control Unit (ECU). The ECU maintains the temperature and humidity within the container, allowing the Lithium-Ion batteries to operate within the optimum temperature range. The temperature of individual cells in each battery is monitored by the battery management system (BMS) and is reported back to the container level BMS which adjusts the internal temperature in response. Should the ECU develop a fault the container will isolate charge and discharge to the batteries until the fault has been rectified. All faults in the BESS are remotely fed to a centralised Control Room.
4	What is Thermal Runaway?	Thermal Runaway (TR) is the term used to describe an internal short-circuit in one of the battery cells that can lead to cell over-pressure and the venting of combustible gases. Should this gas ignite then the cell will increase in over-pressure and the resulting fire will be self-sustaining until all the material in the cell is expended. Short-circuits in cells are generally a result of: 1. Cell penetration by a foreign object (not usually an issue for a BESS as the batteries are housed in sturdy containers). 2. Impurities in the electrolyte (deposited during the manufacturing process), which over time can lead to the formation of dendrites (electrolytic crystals) which puncture the membrane isolating the anode and cathode – this can, but not always, result in a short-circuit and TR. 3. Over-temperature in the cell because of: . Over-charging (which is controlled by 2 separate BMS – battery and rack). . High ambient temperature – controlled by the ECU. The illustration below provides an outline of the possible causes of TR. 

Ser	Question	Answer
5	How can TR be controlled?	TR is not always inevitable, and the nature of the cell design is such that early warning signs of a stressed cell can be detected by the BMS. Initial signs of cell degradation are an increase in the time it takes the cells to reach full charge (maximum voltage) and a decrease in the time it takes to discharge. These indicators are picked up by the BMS and if persistent the BMS will isolate (prevent charge and discharge) to the battery and inform the centralised Control Room. In turn an engineer will be dispatched to remove the battery and replace it with a serviceable item. Since the early inception of BESS safeguards in the design have developed and are now details in UL1973 and BESS are assessed against UL9540A. If these indicators are not present, and the cell enters early stages of short-circuit the over-pressure in the cell will result in the venting of off-gas which is detected by the off-gas detectors built into the container Heating, Ventilation and Air Conditioning unit (the ECU). This will result in the container disabling the charge and discharge (the act of charging and discharging the batteries generates heat, which is what we want to avoid) and setting the ECU to maximum volume setting. This has a twofold effect, it clears the container of combustible gas and cools the internals, taking the energy out of the cells (the cells used in BESS, like other batteries do not perform well in low temperature conditions). It should be noted that most BESS only operate at between 80-90% of capacity provide an engineering margin that mitigates the probability of over-charging the cells.
6	How is a BESS fire controlled and suppressed?	If the TR is not controlled and spreads, known as Thermal Runaway Propagation, the fire detection and suppression system (FDSS) will activate. There are currently two types of FDSS that are used in BESS; gaseous systems and aerosol systems. Each system has advantages and disadvantages: 1. Aerosol systems are better in terms of extinguishing the fire and benefit against gaseous systems, which generally supress the fire by reducing the level of oxygen in the container. 2. Gaseous systems are instantaneous in operation; the gas being kept under pressure in bottles. Aerosol, by the nature of the deployment as a fine mist, take a little longer to reach all areas of the container. 3. Aerosol systems generally require a more complex and intricate delivery system to reach all areas of the container. 4. Gaseous systems require a sealed environment in which to operate. As such if the container is opened and oxygen reintroduced it can lead to the fire reigniting, as such they require the ECU to close prior to activation (to prevent the ECU from pushing out the extinguishing medium). 5. Various FDSS aerosols (also known as aqueous) and gaseous systems are available, and they use a variety of aerosol solutions. Under consideration for this site is the use of an aerosol aqueous solution containing potassium carbonate (K_2CO_3) – this inhibits the fire by isolating at a molecular level with the chemical chain reactions forming the flame front. This aerosol is non-harmful to the environment and presents no health and safety concerns to first responders.

Ser	Question	Answer
7	Can water be used to extinguish a Lithium-Ion fire?	The use of water to extinguish a BESS fire has some drawbacks and disadvantages over bespoke FDSS aerosol mediums, these being: 1. Due to the design of the BESS batteries and racks (in which they are contained), the inability of water to cool the cell interiors may result in re-ignition of a fire once the water application is halted. 2. The high conductivity of water may cause short circuiting of cells presenting collateral damage risk and increase the spread of the fire internal in the BESS. 3. A high volume of water is required to cool the cells below the critical temperature to prevent TR propagation, this results in a high volume of fire water run-off and a potential environmental impact. 4. The application of water on a BESS fire increases the generation of gases such as carbon monoxide (CO), hydrogen (H_2) and hydrogen fluoride (HF). Applying water causes incomplete combustion of organic substances inside the battery resulting in production of CO rather than CO_2; when water is applied, H_2 is released that, without combustion, can react with phosphorus pentafluoride, if present in free form, to produce gaseous HF.
8	What are the environmental consequences of a BESS fire?	In the event of a BESS fire several chemicals in gaseous form can be released and the composition and concentration of the plume (also referred to as the vapour cloud). In the event of a BESS fire amongst the general gases released are CO, HF, oxygen and hydrogen. The BESS fire at Carnegie Road, Liverpool – Sept 2020 was monitored, and the resultant composition of the plume was determined as being negligible in toxic gas concentration. Should the resulting fire be treated with water in the presence of HF the result can be the formation of a HF acid which can be detrimental to the environment, especially the aquatic habitat. To prevent this, it is possible to contain the fire run-off water but often best to let the fire run its course and burn out. It is worth noting that the fire run-off water at Carnegie is considered to have been neutralised by the lime-based gravel covering used at the base of the BESS and on testing was found to be a low alkaline level, as opposed to acidic. Further to this the recent fire at Moss Landing California (Feb 2025), was monitored at 1 second intervals for toxic substances in the smoke plume. It was established that the composition of the plume emanating from the fire was within US Air Pollution limits. California Air Quality limits for HF are stricter than those in the UK.
9	How is the BESS site secured?	The BESS Site is secured through fences / walls and monitored remotely via security cameras. Warning signs along the fence indicates the presence of electrical storage facilities within the site.
10	How is the serviceability of the BESS assured?	The Health and Usage data for each BESS is remoted to a centralised Control Room and the serviceability of each battery determined on an hour-to-hour basis. Given that the batteries have a finite number of cycles over a given period it is envisaged that the batteries will be renewed multiple times in the 40-year life of the site.

Appendix B – Fire Tender Vehicle Tracking Drawings

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11

12

13

14

See Drawing '2303076-TK38B'

See Drawing '2303076-TK39B'

See Drawing '2303076-TK37B'

See Drawing '2303076-TK36B'

See Drawing '2303076-TK35A'

0 50 100 150 200m

SCALE IN METRES
1:2500

C:\Users\droddy\Motion\StaffSite - Exwysa 2303076\Drawings\2303076 - TK34B [Fire Appliance].dwg

Notes

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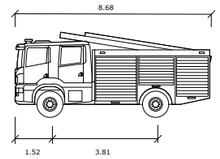
2. Motion accepts no liability for any vehicle specification errors or inaccuracies within the vehicle tracking software used / or it's vehicle libraries. The vehicles speeds used for the analysis are as follows: forward 6kph / reversing 6kph.



DB32 Fire Appliance

meters

Width	:	2.18
Track	:	2.12
Lock to Lock Time	:	6.0
Steering Angle	:	38.7

Rev.	Description	Drn	Chk	App	Date
B	Updated Project Name	DR	MF	MF	13/08/2025
A	Updated Swept Paths	DR	MF	MF	11/08/2025
-	First Issue	DR	MF	MF	06/08/2025

Drawing Status:

FOR PLANNING
NOT FOR CONSTRUCTION

motion
Guildford - Reading - London
www.motion.co.uk

Client:
Exagen Development Limited

Project:
Old Wood Energy Park

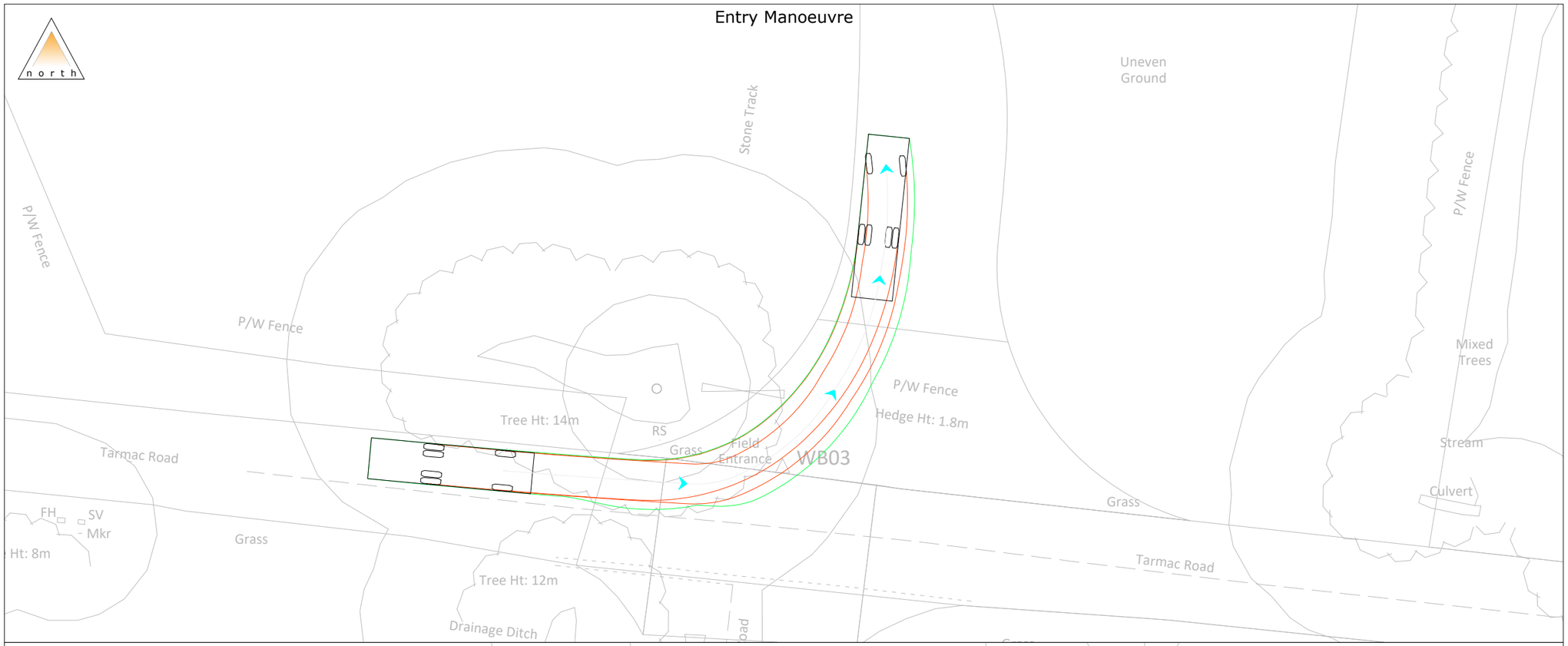
Title:
Swept Path Analysis
Southern Parcel Overview
Fire Appliance

Scale: 1:2,500 (@ A3)

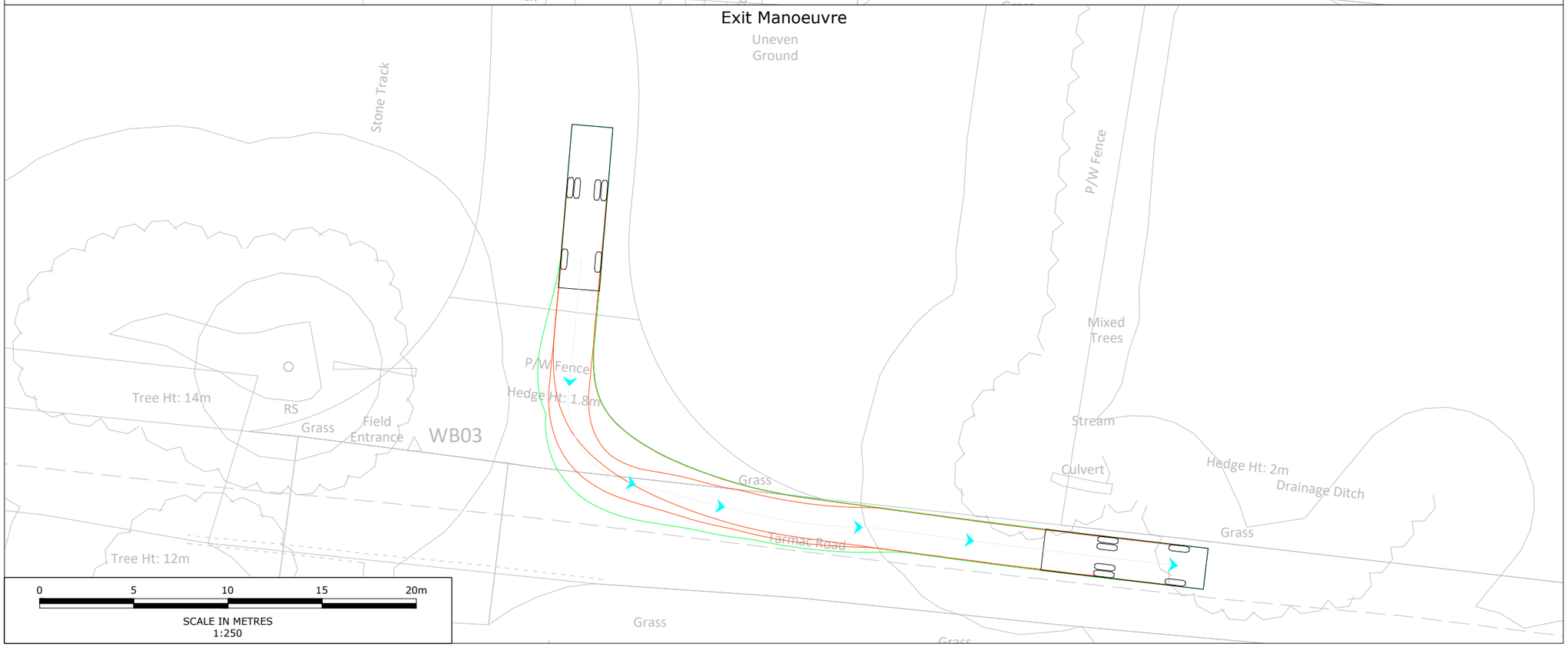
Drawing: 2303076-TK34

Revision: B

Entry Manoeuvre



Exit Manoeuvre



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Notes

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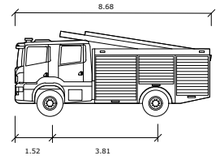

DB32 Fire Appliance

		meters
Width	:	2.18
Track	:	2.12
Lock to Lock Time	:	6.0
Steering Angle	:	38.7

Rev.	Description	Drn	Chk	App	Date
A	Updated Project Name	DR	MF	MF	13/08/2025
-	First Issue	DR	MF	MF	06/08/2025

Drawing Status:

FOR PLANNING
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Client:
Exagen Development Limited

Project:
Old Wood Energy Park

Title:
Swept Path Analysis
Southern Parcel Access
Fire Appliance

Scale: 1:250 (@ A3)

Drawing: 2303076-TK35

Revision: A

n o r t h

Exit Manoeuvre

Hedge Ht: 1.8m
Tree Ht: 7m
Tree Ht: 9m
Tree Ht: 13m
Tree Ht: 14m
P/W Fence
Tree Ht: 3m

0 10 20 30 40m

SCALE IN METRES
1:500

Notes

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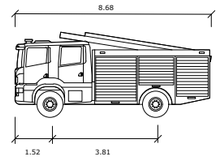

DB32 Fire Appliance

meters

Width	:	2.18
Track	:	2.12
Lock to Lock Time	:	6.0
Steering Angle	:	38.7

Rev.	Description	Drn	Chk	App	Date
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-	First Issue	DR	MF	MF	06/08/2025

Drawing Status:

FOR PLANNING
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Client:
Exagen Development Limited

Project:
Old Wood Energy Park

Title:
Swept Path Analysis
Southern Parcel
Fire Appliance

Scale: 1:500 (@ A3)

Drawing: 2303076-TK36

Revision: B

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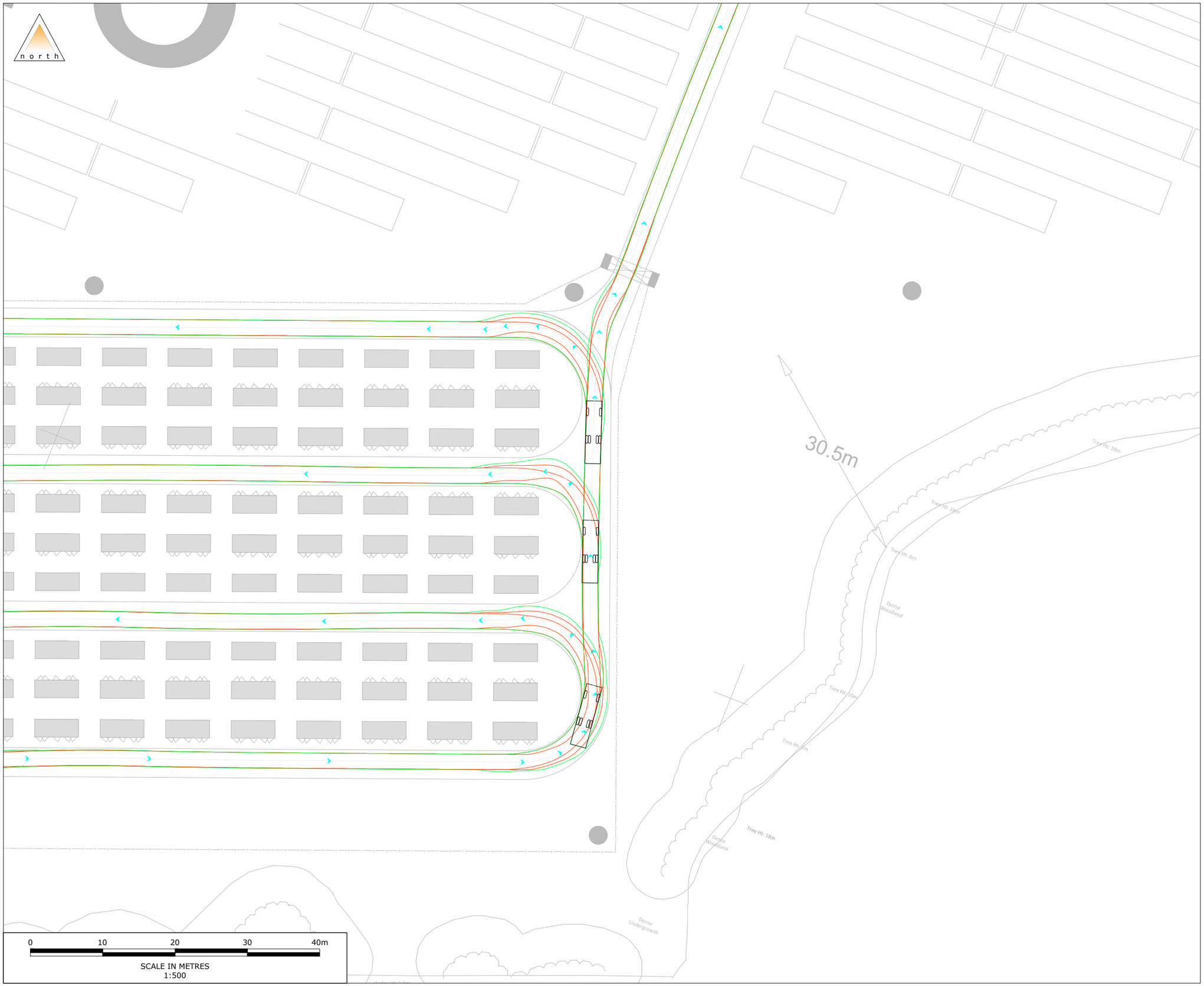

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Notes

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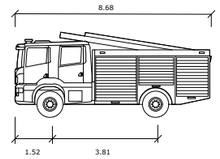

DB32 Fire Appliance

meters

Width	:	2.18
Track	:	2.12
Lock to Lock Time	:	6.0
Steering Angle	:	38.7

Rev.	Description	Drn	Chk	App	Date
B	Updated Project Name	DR	MF	MF	13/08/2025
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-	First Issue	DR	MF	MF	06/08/2025

Drawing Status:

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Client:
Exagen Development Limited

Project:
Old Wood Energy Park

Title:
Swept Path Analysis
Southern Parcel
Fire Appliance

Scale: 1:500 (@ A3)

Drawing: 2303076-TK37

Revision: B

Notes

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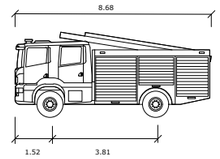

DB32 Fire Appliance

meters

Width	:	2.18
Track	:	2.12
Lock to Lock Time	:	6.0
Steering Angle	:	38.7

Rev.	Description	Drn	Chk	App	Date
B	Updated Project Name	DR	MF	MF	13/08/2025
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-	First Issue	DR	MF	MF	06/08/2025

Drawing Status:

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Client:
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Project:
Old Wood Energy Park

Title:
Swept Path Analysis
Southern Parcel
Fire Appliance

Scale: 1:500 (@ A3)

Drawing: 2303076-TK38

Revision: B

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north

Spring

Burrows

Burrows

Grass Track

Hedge Ht: 2m

35.6m

Hedge Ht: 2m

WB01

RMU

TX

Entry Manoeuvre

Track

Hedge Ht: 2m

P/W Fence

Hedge Ht: 1.8m

P/W Fence

P/W Fence

Uneven Ground

Exit Manoeuvre

Track

Hedge Ht: 2m

P/W Fence

Hedge Ht: 1.8m

P/W Fence

P/W Fence

Uneven Ground

0 10 20 30 40m

SCALE IN METRES
1:500

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Notes

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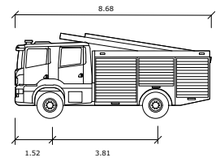

DB32 Fire Appliance

meters

Width	:	2.18
Track	:	2.12
Lock to Lock Time	:	6.0
Steering Angle	:	38.7

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Drawing Status:

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Client:
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Project:
Old Wood Energy Park

Title:
Swept Path Analysis
Southern Parcel
Fire Appliance

Scale: 1:500 (@ A3)

Drawing: 2303076-TK39

Revision: B