



Flood Risk Assessment

For JPS Civil & Structural Engineers

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Hyde Road Bus Depot, Hyde Road, Manchester, M12 6JS

Project	Flood Risk Assessment
Client	JPS Civil & Structural Engineers
Status	Final
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EXECUTIVE SUMMARY

The Site would be expected to remain dry in all but the most extreme conditions. The consequences of flooding are acceptable, and the development would be in accordance with the requirements of the National Planning Policy Framework (NPPF).

This Flood Risk Assessment (FRA) demonstrates that the Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of NPPF. The Proposed Development should not therefore be precluded on the grounds of flood risk.

1.0 INTRODUCTION

1.1 Background

This Flood Risk Assessment (FRA) has been prepared by KRS Enviro at the request of JPS Civil & Structural Engineers to support a planning application for the retrofitting of an existing bus depot for the purposes of housing ‘electric’ buses with charging points and infrastructure as necessary (“the Proposed Development”) at Hyde Road Bus Depot, Hyde Road, Manchester, M12 6JS (“the Site”).

This FRA has been carried out in accordance with guidance contained in the National Planning Policy Framework (NPPF)¹, associated Planning Practice Guidance on flood risk and coastal change² (PPG) and the PPG ‘Site-specific flood risk assessment checklist. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

1.2 National Planning Policy Framework (NPPF)

One of the key aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall. A risk-based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FRA is required and should include:

- whether a Proposed Development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- if necessary, provide the evidence to the Local Planning Authority (LPA) that the Sequential Test can be applied; and
- whether the development will be safe and pass part c) of the Exception Test if this is appropriate.

The report findings are based upon professional judgement and are summarised below with detailed recommendations provided at the end of the report. The report includes rainfall data from the Flood Estimation Handbook (FEH) and hydrogeological information from the British

¹ Ministry for Housing, Communities and Local Government (2021) National Planning Policy Framework: https://assets.publishing.service.gov.uk/media/669a25e9a3c2a28abb50d2b4/NPPF_December_2023.pdf

² Communities and Local Government (2022) Planning Practice Guidance - Flood Risk and Coastal Change: <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

Geological Survey (BGS). The assessment will summarise and refer to these datasets in the text.

1.3 Report Structure

This FRA has the following report structure:

- Section 2 describes the location and the existing and Proposed Development;
- Section 3 outlines the flood risk to the existing and Proposed Development;
- Section 4 describes the risk management methods used to mitigate all sources of flood risk;
- Section 5 details the Sequential and Exception Tests; and
- Section 6 presents a summary and conclusions.

2.0 LOCATION & DEVELOPMENT DESCRIPTION

2.1 Site Location

The Site is located at Hyde Road Bus Depot, Hyde Road, Manchester, M12 6JS (see Figure 1). The National Grid Reference (NGR) of the Site is 351045, 430411.

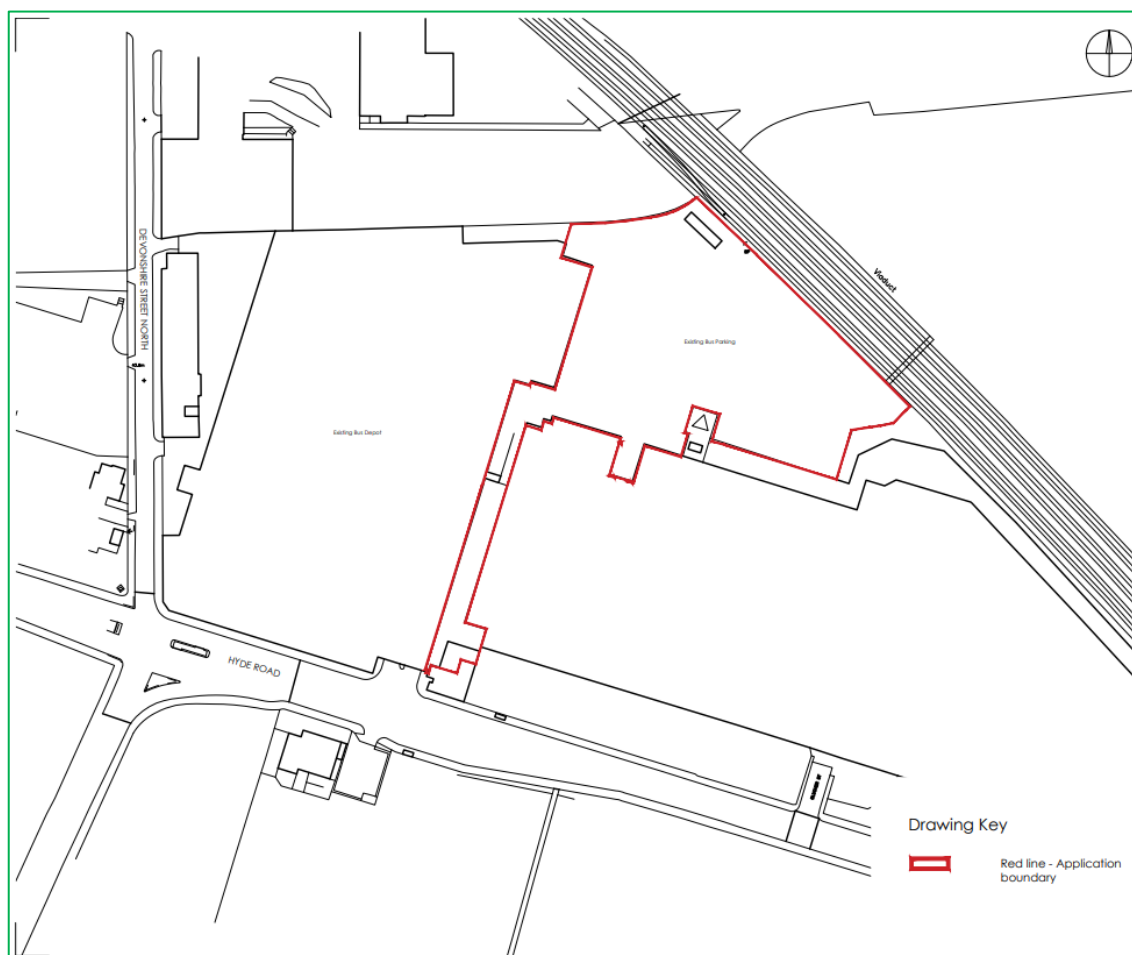


Figure 1 - Site Location

2.2 Existing Development

The Site is currently an operational bus depot (see Appendix 1).

2.3 Proposed Development

The Proposed Development is for the retrofitting of the existing bus depot for the purpose of housing 'electric' buses with charging points and infrastructure as necessary (see Appendix 1). Further details with regard to the Proposed Development can be found in the accompanying information submitted with the planning application.

2.4 Ground Levels

A topographical survey of the Site has recently been completed (see Appendix 2). The Site is relatively flat with maximum ground levels of 45.69 metres Above Ordnance Datum (mAOD) to the north east and minimum ground levels of 44.21 to the south.

2.5 Catchment Hydrology / Drainage

The River Medlock is located approximately 825m to the north west of the Site. The Corn Brook is located to the south of the Site within a culvert, the nearest open section of the Corn Brook is located approximately 1.16km to the north east of the Site. The Corn Brook is largely culverted and flows from Openshaw in a westerly direction, discharging into the Manchester Ship Canal at Pomona Docks.

2.6 Ground Conditions

The British Geological Survey (BGS) map³ shows that the bedrock deposits underneath the Site consist of the Manchester Marls Formation - mudstone. The superficial deposits consist of Till, Devensian - diamicton.

Information from the National Soil Resources Institute⁴ details the Site area as being situated on slowly permeable seasonally wet acid loamy and clayey soils.

³ <https://mapapps2.bgs.ac.uk/geoindex/home.html>

⁴ <http://www.landis.org.uk/soilscapes/>

3.0 FLOOD RISK

3.1 Sources of Flooding

All sources of flooding have been considered, these are; fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

3.2 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF recommends that the effects of climate change are incorporated into FRA's. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the flood risk assessments: climate change allowances guidance⁵. Table 1 shows peak river flow allowances by river catchment.

As per Environment Agency guidance, the anticipated lifetime of the development is deemed to be 75 years. The flood risk assessments: climate change allowances guidance recommends that the central allowances are used. Therefore, the design flood level for the Site is the 1 in 100 year (+35%) event.

Table 1 - Peak River Flow Allowances by River Catchment

Catchment	Allowance Category	2020s	2050s	2080s
Irwell Management Catchment	Upper	+24%	+43%	+75%
	Higher	+15%	+26%	+46%
	Central	+12%	+19%	+35%

3.3 Environment Agency Flood Zones

A review of the Environment Agency's Flood Zones indicates that the majority of the Site is located within Flood Zone 1, with a 'low probability' of flooding, with less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%), as shown in Figure 2. However, a small proportion of the Site is located within Flood Zone 2, and therefore has a 'medium probability' of flooding. Flood Zone 2 has a between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year. The areas of Flood Zone 2 are situated on the very north eastern corner of the Site and to the south east of the Site.

The Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. They show the worst-case scenario.

The Environment Agency Flood Zones and acceptable development types are explained in Table 2. Table 2 shows that most development types are generally acceptable in Flood Zones 1 and 2.

⁵ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances>

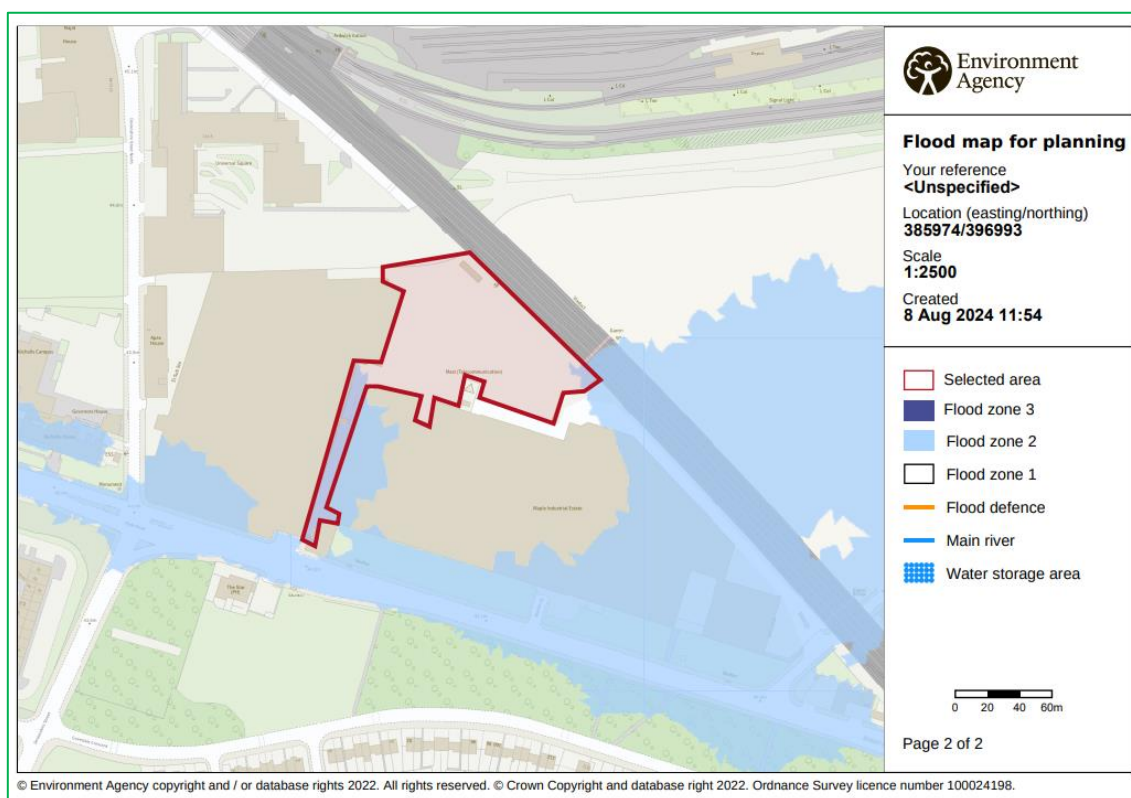


Figure 2 - Environment Agency Flood Zones

Table 2 - Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land Use
Zone 1	Low	Less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)	All development types generally acceptable
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year	Most development type are generally acceptable
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year	Some development types not acceptable
Zone 3b	'Functional Floodplain'	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or	Some development types not acceptable

		land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)	
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3.4 Flood Vulnerability

In the PPG, appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in the PPG, the existing and proposed use is classified as 'less vulnerable'. The Proposed Development will not change the vulnerability of the Site and will not introduce a new 'less vulnerable' developments into the floodplain. Table 3 of this report and the PPG state that 'less vulnerable' uses are appropriate within Flood Zones 1 and 2 after the completion of a satisfactory FRA.

Table 3 - Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	✗	Exception test required	✓
Zone 3b 'Functional Floodplain'	Exception test required	✓	✗	✗	✗

Key: ✓: Development is appropriate, ✗: Development should not be permitted.

3.5 Historic Flooding

Environment Agency data shows that the Site has not historically flooded. There are no records of anecdotal information of flooding at the Site including within the British Hydrological Society "Chronology of British Hydrological Events". No other historical records of flooding for the Site have been recorded. Therefore, it has been concluded that the Site has not flooded within the recent past.

3.6 Existing and Planned Flood Defence Measures

Environment Agency data confirms that the Site is not protected against flooding by existing flood defence measures.

3.7 Fluvial (River) Flooding

The primary, but unlikely, flood risk posed to the Site is from fluvial flooding from the Corn Brook. The Environment Agency has provided modelled flood data for the Corn Brook at the Site.

Table 4 shows the undefended Environment Agency floodplain water levels for the Site, Table 5 shows the undefended Environment Agency floodplain water depths for the Site and Figure 3 shows the model node locations. The modelled water levels have been compared to the ground level of the Site and areas within the vicinity of the Site to assess the flood risk at the Site in detail. Figures 4 and 5 show the Environment Agency undefended modelled flood outlines.

The Environment Agency data shows that the Site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+70%) event. The Site will be flood free during the undefended 1 in 100 year (+35%) event, which the design flood event for the Site.

Water levels have been modelled at 42.62mAOD during the undefended 1 in 1000 year event and 44.95mAOD during the undefended 1 in 1000 year (+30%) event. Therefore, the Site may be inundated with floodwater to a maximum depth of 0.26m during the undefended 1 in 1000 year event and to a maximum depth of 0.47m during the undefended 1 in 1000 year (+30%) event.

Table 4 - Environment Agency Undefended Modelled Water Levels (mAOD)

Node Label	Easting	Northing	Return Period (years)				
			100	100 (+35%)	100 (+70%)	1000	1000 (+30%)
11	385910	396935	No Data	No Data	No Data	44.62	44.95
18	385910	396996	No Data	No Data	No Data	44.48	44.34
19	385971	396996	No Data	No Data	No Data	No Data	45.29
20	386032	396996	No Data	No Data	No Data	No Data	45.74
25	385971	397057	No Data	No Data	No Data	No Data	No Data

*Cells which contain text 'No Data' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.

Table 5 - Environment Agency Undefended Modelled Water Depths (m)

Node Label	Easting	Northing	Return Period (years)				
			100	100 (+35%)	100 (+70%)	1000	1000 (+30%)
11	385910	396935	No Data	No Data	No Data	0.14	0.47
18	385910	396996	No Data	No Data	No Data	0.26	0.12
19	385971	396996	No Data	No Data	No Data	No Data	0.22
20	386032	396996	No Data	No Data	No Data	No Data	0.12
25	385971	397057	No Data	No Data	No Data	No Data	No Data

*Cells which contain text 'No Data' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.

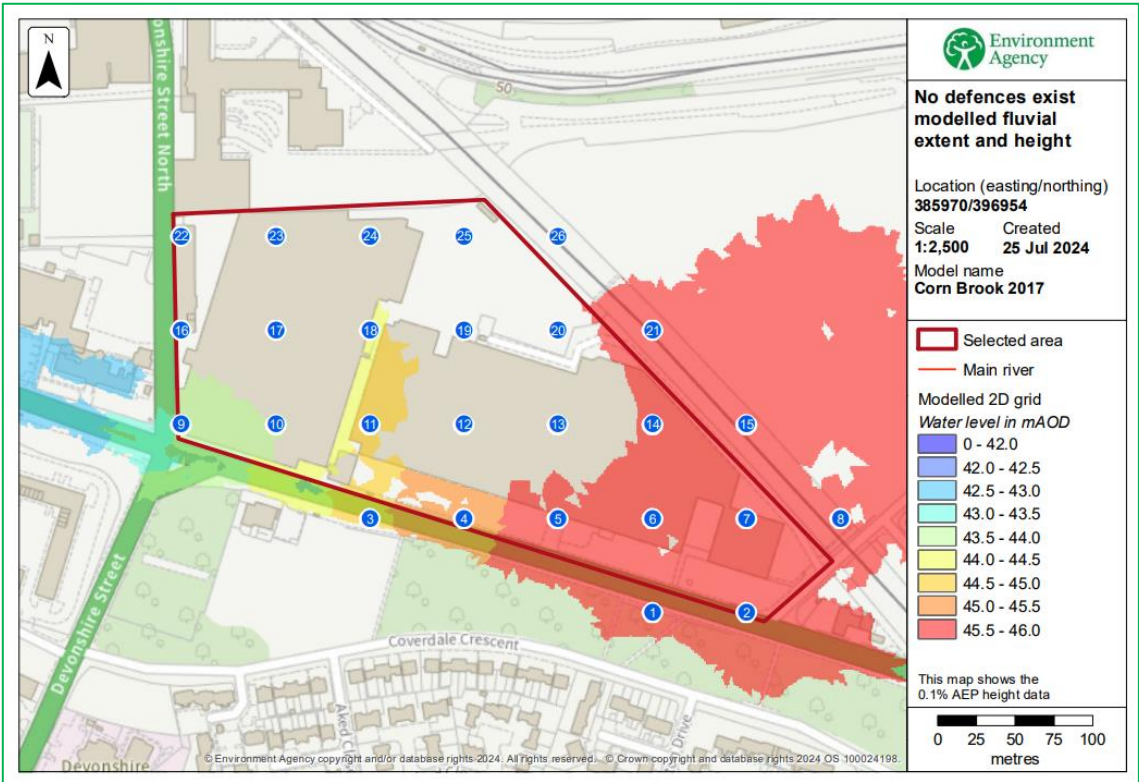


Figure 3 - Environment Agency Undefended Modelled Nodes Location Map

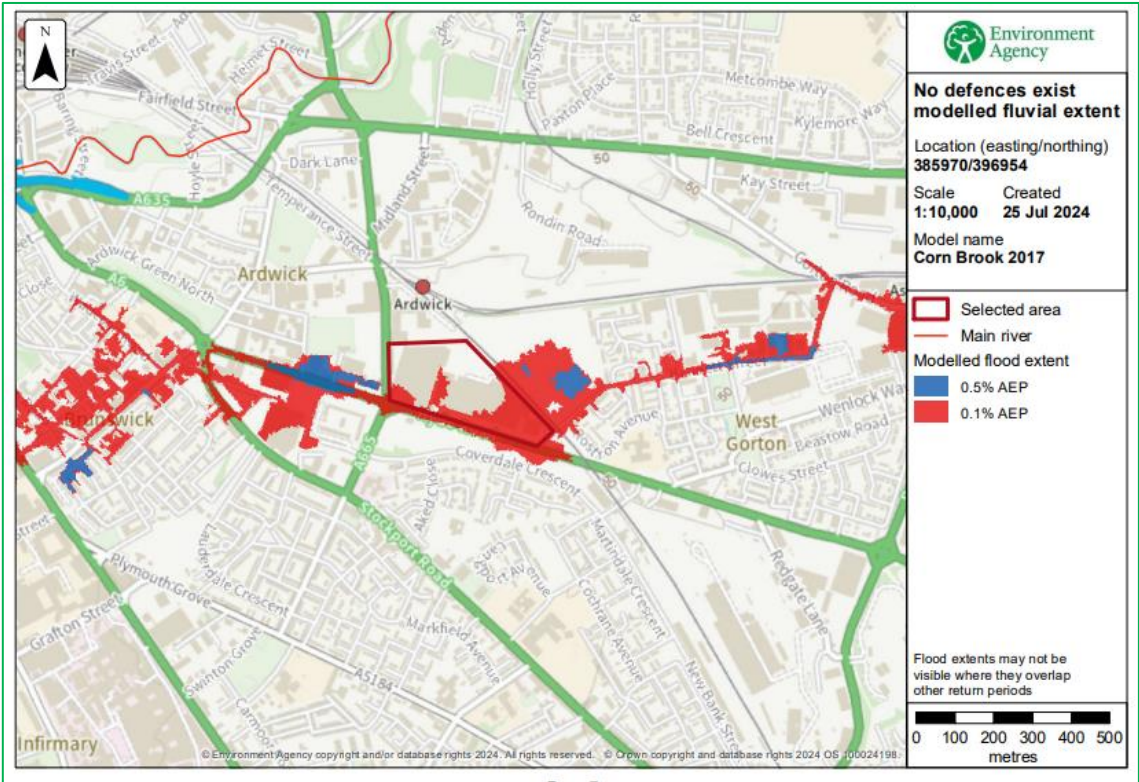


Figure 4 - Environment Agency Undefended Modelled Flood Outlines

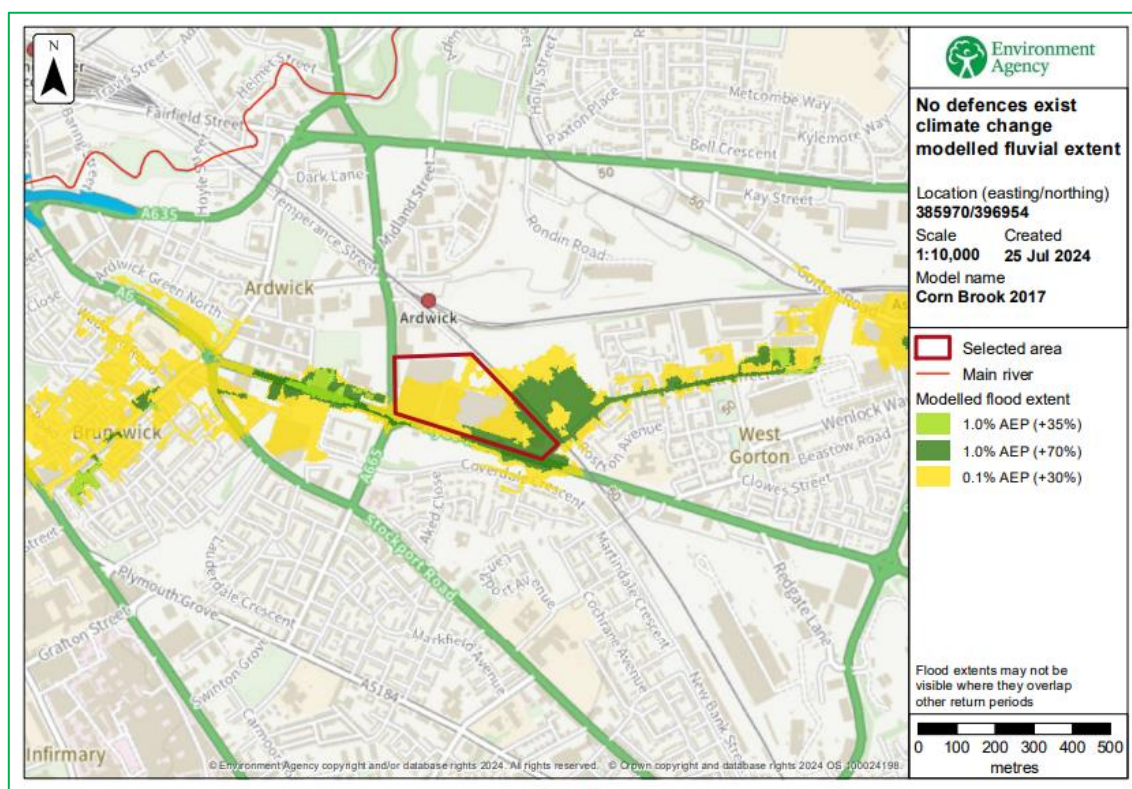


Figure 5 - Environment Agency Undefended Climate Change Modelled Flood Outlines

Fluvial flood risk to the Site can be considered to be limited. Any overbank flow would follow the contours of the surrounding area and would flow away from the Site rather than flowing towards the Site.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the Site. Therefore, the risk of fluvial flooding is considered to be of **low significance**. The risk of fluvial flooding will be further managed and mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 4.0).

3.8 Tidal (Coastal) Flooding

The Site is not located within the vicinity of tidal flooding sources and the risk of tidal flooding is considered to be **not significant**.

3.9 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers). Site ground conditions suggest a low potential for groundwater flooding. Environment Agency data confirms flooding from groundwater is unlikely. Therefore, the risk of flooding from groundwater flooding is considered to be **not significant**.

3.10 Surface Water (Pluvial) Flooding

The Site is not situated near to large areas of poor permeability or areas with the geology and/or topography which may result in surface water flooding. The Site surroundings are relatively flat and there are no large catchments that would tend to generate surface water runoff towards the Site. Surface water flow flooding tends to occur sporadically in both location and time such surface water flows would tend to be confined to the streets around the Proposed Development.

The Environment Agency Surface Water flood map shows that the majority of the Site has a very low risk of surface water flooding (see Figure 7) with less than 1 in 1000 (0.1%) annual probability of flooding. However, a small proportion of the Site has a low to high risk of surface water flooding with a chance of 1 in 1000 (0.1%) to greater than 1 in 30 years (3.3%). The areas shown to be at risk of surface water flooding are associated with low spots on the Site

During the 1 in 30 year (high risk) and 1 in 100 year (medium risk) events the water depths are shown to be 0.30 to 0.90m (see Figure 8) with velocities of less than 0.25m/s. During the 1 in 30 year (high risk) and 1 in 100 year (medium risk) events the hazard rating is shown to be less than 0.75 with a 'very low' flood hazard with a 'flood zone with shallow flowing water or deep standing water' as per Table 4 of the Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose - Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD/2321/TR1.

It should be noted that the above is the most conservative estimate of surface water flood risk. The flood risk from surface water is of a minor nature with low water depths and velocities being experienced. Therefore, the risk of flooding from surface water flooding is considered to be of **low significance**.

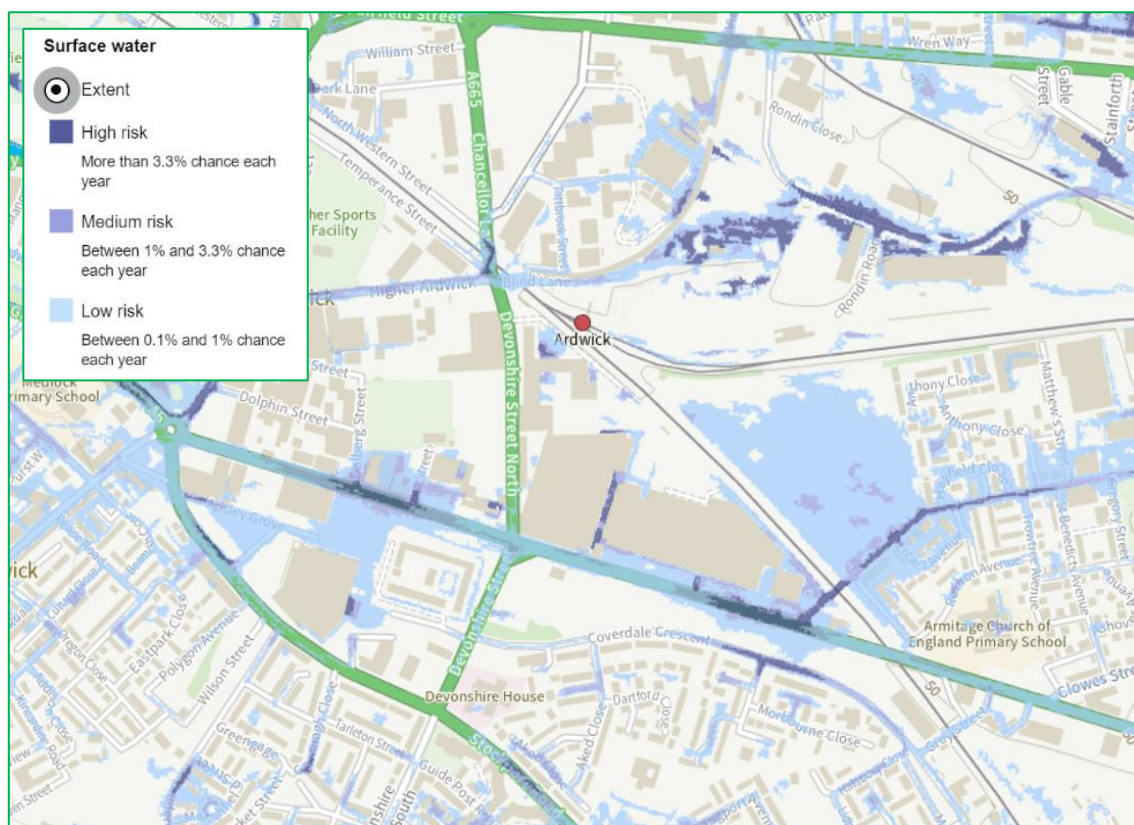


Figure 7 - Environment Agency Surface Water Flood Map

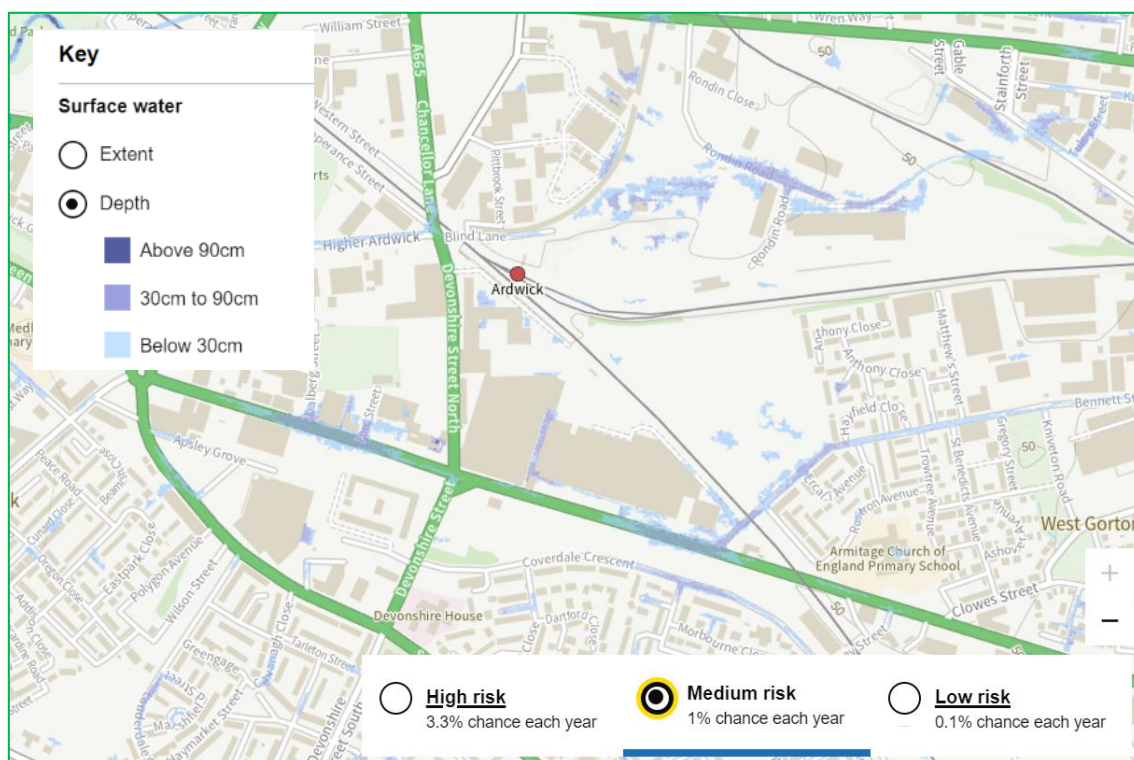


Figure 8 - Environment Agency Surface Water Flood Map: Medium Risk Event Water Depths

3.11 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows would tend to be confined to the streets around the development.

There are existing sewers located within the vicinity of the Site and these will inevitably have a limited capacity so in extreme conditions there would be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains, but these would tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment.

Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 20 years. The provision of adequate level difference between the ground floors and adjacent ground level would reduce the annual probability of damage to property from this source to 1 in 100 years or less. Therefore, the risk of flooding from sewer flooding is considered to be **not significant**.

3.12 Flooding from Artificial Drainage Systems/Infrastructure Failure

Reservoirs are located within the vicinity of the Site. The Environment Agency Reservoir flood map shows that the Site is at risk of reservoir flooding (see Figure 9). Reservoir flooding is extremely unlikely; reservoirs in the UK have a very good safety record. There has been no loss of life in the UK from reservoir flooding since 1925.

Since then, reservoir safety legislation has been introduced to make sure reservoirs are well maintained. The hazard is well managed through effective legislation and it is unlikely that the impact zone downstream of the reservoirs should preclude the Proposed Development.

There are no other nearby artificial water bodies, water channels and artificial drainage systems that could be considered a flood risk to the Site. The risk of flooding from these sources is considered to be not significant. There are no other nearby artificial water bodies, reservoirs, water channels and artificial drainage systems that could be considered a flood risk to the Site. The risk of flooding from artificial drainage systems/infrastructure failure is considered to be **not significant**.

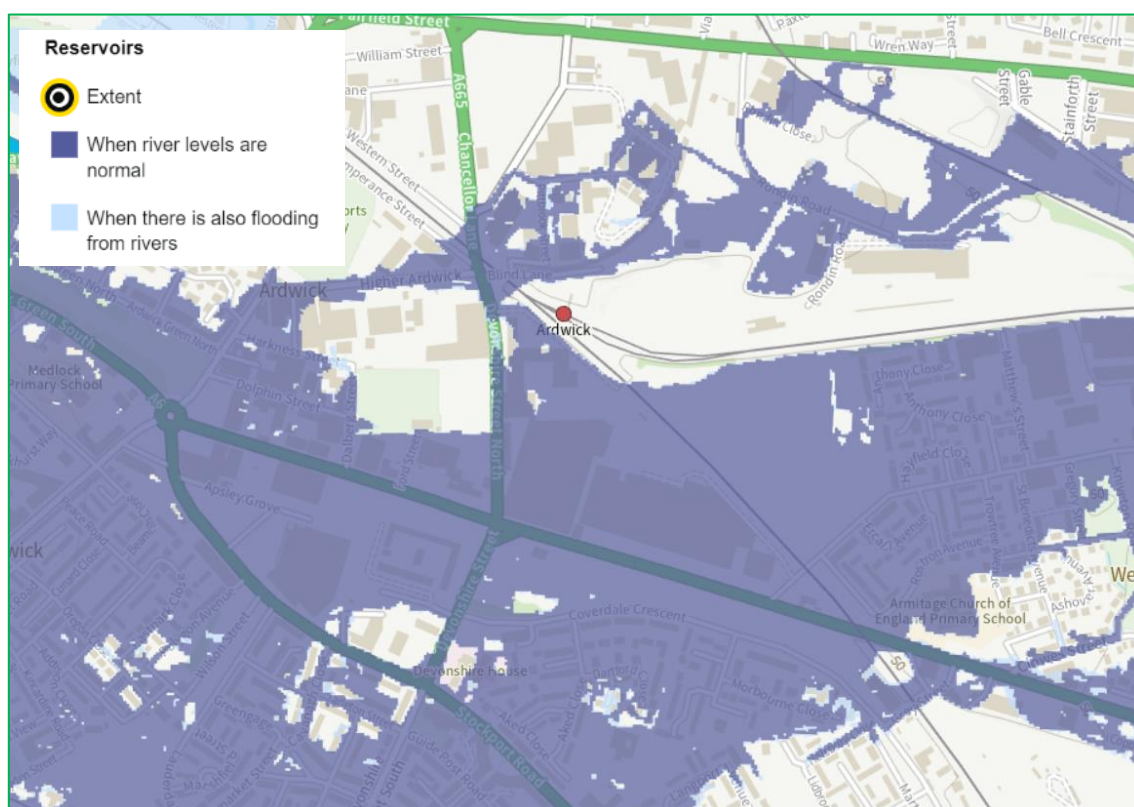


Figure 9 - Environment Agency Reservoir Flood Map

3.13 The Effect of the Development on Flood Risk

The Proposed Development will not impede the movement of floodwater across the Site. The topography of the Site will not be altered; therefore, the overland flow routes will not be altered. The overall direction of the movement of water will be maintained within the developed Site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed.

In summary, there will no net loss in flood storage capacity or impact on movement of floodwater across the Site as a result of the Proposed Development.

3.14 Summary of Site Specific Flood Risk

A summary of the sources of flooding and a review of the risk posed by each source at the Site is shown in Table 6.

The Site is unlikely to flood except in extreme conditions, the primary, but unlikely, flood risk posed to the Site is from fluvial flooding from the Corn Brook. The Environment Agency's Flood

Zones indicates that the majority of the Site is located within Flood Zone 1, with a 'low probability' of flooding, with less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). However, a small proportion of the Site is located within Flood Zone 2, and therefore has a 'medium probability' of flooding. Flood Zone 2 has a between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year. The areas of Flood Zone 2 are situated on the very north eastern corner of the Site and to the south east of the Site.

The existing and proposed use is classified as 'less vulnerable'. The Proposed Development will not change the vulnerability of the Site and will not introduce a new 'less vulnerable' developments into the floodplain, 'less vulnerable' uses are appropriate within Flood Zones 1 and 2 after the completion of a satisfactory FRA.

The Environment Agency data shows that the Site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+70%) event. The Site will be flood free during the undefended 1 in 100 year (+35%) event, which the design flood event for the Site.

Water levels have been modelled at 42.62mAOD during the undefended 1 in 1000 year event and 44.95mAOD during the undefended 1 in 1000 year (+30%) event. Therefore, the Site may be inundated with floodwater to a maximum depth of 0.26m during the undefended 1 in 1000 year event and to a maximum depth of 0.47m during the undefended 1 in 1000 year (+30%) event.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the Site. Therefore, the risk of fluvial flooding is considered to be of **low significance**. A secondary flooding source has been identified which may pose a **low significant** risk to the Site. This is:

- Surface Water Flooding

There will no net loss in flood storage capacity or impact on movement of floodwater across the Site as a result of the Proposed Development. The risk from this source will be further mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 4.0).

In conclusion, the flood risk posed to the Site can be considered to be limited; the Site is located within Flood Zones 1 and 2 and has a low or very low annual probability of flooding from all sources. The Site is unlikely to flood except in very extreme conditions.

Table 6 - Risk Posed by Flooding Sources

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial Flooding	Yes	Corn Brook	Low
Tidal Flooding	No	None Reported	None
Groundwater Flooding	No	None Reported	None
Surface Water Flooding	Yes	Low Spots / Poor Permeability	Low
Sewer Flooding	No	None Reported	None
Flooding from Artificial Drainage Systems/Infrastructure Failure	Yes	Reservoirs	None

4.0 RISK MANAGEMENT

4.1 Introduction

The flood risk at this location is considered suitable for ‘less vulnerable’ developments within the NPPF. In this flood zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the use of flood mitigation measures.

The flooding sources will be mitigated on the Site by using a number of techniques, and mitigation strategies to manage and reduce the overall flood risk at the Site. This will ensure the development will be safe and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;
- Minimal impact of the Proposed Development on flood risk generally; and;
- Minimal disruption to natural heritage.

The flood risk at the Site will be reduced by mitigation measures; these are discussed in more detail below.

4.2 Finished Floor Level

The finished floor level of the structures will be as a minimum at the existing ground levels. It is considered impractical to raise these further. Therefore, in order to mitigate against this, it is recommended that flood resilience and resistance methods are used and Site signs up to receive flood warnings from the Environment Agency. This is discussed below.

4.3 Flood Resistance and Resilience

The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed.

The floors of the structures will be constructed from concrete which will be resilient to floodwater. The structures will be sealed against flooding and will be constructed from hard wearing materials. Further to this, there are safety features built into the system which mean they would shut down in the event of a flood to protect the equipment.

4.4 Flood Warning and Evacuation

The Site is located in a flood risk area therefore; the Site will participate in the Environment Agency flood warning telephone service. The Site will register contact details with the Environment Agency’ Flood Warnings Service (Floodline 0345 988 1188) in order to receive Flood Alerts for the Lower River Irwell catchment including areas in Greater Manchester.

The Environment Agency operate a free flood warning service providing alerts by phone, text or email when flooding is anticipated providing an opportunity for owners to take necessary precautions, giving enough time for the building to be safely evacuated and mitigation measures to be put in place.

All occupants of the Site will be made aware of the Environment Agency Floodline telephone number and the Flood Warning Codes and their meaning. The owner of the property will carry out the role of Flood Warden for the Site and ensure they have an understanding of the flood mechanisms of the Site and will ensure that the safety of the occupants and visitors will not be compromised.

The Environment Agency uses Flood Warnings Codes. They can be issued in any order, usually ending with an 'all clear'. They are issued by the Environment Agency through their website and Floodline. The flood warning will be passed onto the occupiers and visitors of the Site verbally, by telephone and/or in person. It will be ensured that everyone receives flood warnings when required.

4.5 Flood Plan

A Flood Plan outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause will be developed. Sensible precautions would include raising electrical items, irreplaceable items and sentimental items off the ground or where possible moving them to a higher floor, rolling up carpets and rugs and turning off utilities. In addition, consider what actions you would take should the property need to be evacuated including access and egress routes and preparing a flood kit in advance containing warm clothing, medication, a torch, food and wellingtons.

The Flood Plan is a 'living' document and therefore should be periodically reviewed and updated to provide advice and guidance to occupants in the event of an extreme flood. The Flood Plan will therefore reduce the vulnerability of the occupants to flooding and makes them aware of the mechanisms of flooding at the Site.

Residual Risk

If flooding starts to affect the Site without any pre-warning i.e. in real time (e.g. through a failure of the flood warning delivery) the following actions will be taken:

- Occupants and visitors should consider evacuating the Site.
- If flood levels continue to rise, occupants and visitors are advised to evacuate before safe access is lost. Occupants and visitors should monitor the flood progression and evacuate.

4.6 Safe Access and Egress Route

The NPPF requires that, where required, safe access and escape is available to/from new developments in flood risk areas. Access routes should be such that occupants can safely access and exit their buildings in design flood conditions. These routes must also provide the emergency services with access to the development during a flood event and enable flood defence authorities to carry out any necessary duties during the period of flood.

The Environment Agency data shows that the Site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+70%) event. The Site will be flood free during the undefended 1 in 100 year (+35%) event, which is the design flood event for the Site.

A safe access and egress route, including emergency access can be maintained for vehicles and/or by foot via the access road to the south east along Hyde Road. The Site is at such a ground level that it would only flood in the most extreme flood event. A safe access and egress

route with minimum water depths would be possible for many hours if not days. This would provide more than an adequate amount of time for the Site to be evacuated, if required.

The actual risk of flooding caused by overtopping during a flood event will be reduced compared to the extent of flooding shown on the Environment Agency's Flood Zones. The Site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

Facilities such as community centres, shops etc. are located to the south east of the Site. There may also be large areas than those shown in Figure 2 that are flood free located nearer and within the vicinity of the Site. In the event of a Flood Warning, vital belongings, including waterproof clothing, necessary medication and essentials will be collected. It should be ensured that all occupants and visitors to the Site are accounted for, and then exit the Site using the routes shown in Figure 10.

The Safe Access and Egress Route shown in Figure 10 indicates the exit routes that all people (i.e. occupants and visitors) on Site should follow once a flood warning has been received. People should make their way to areas outside of the flood zone. Therefore, safe access and egress can be maintained in accordance with the NPPF and Environment Agency guidance.

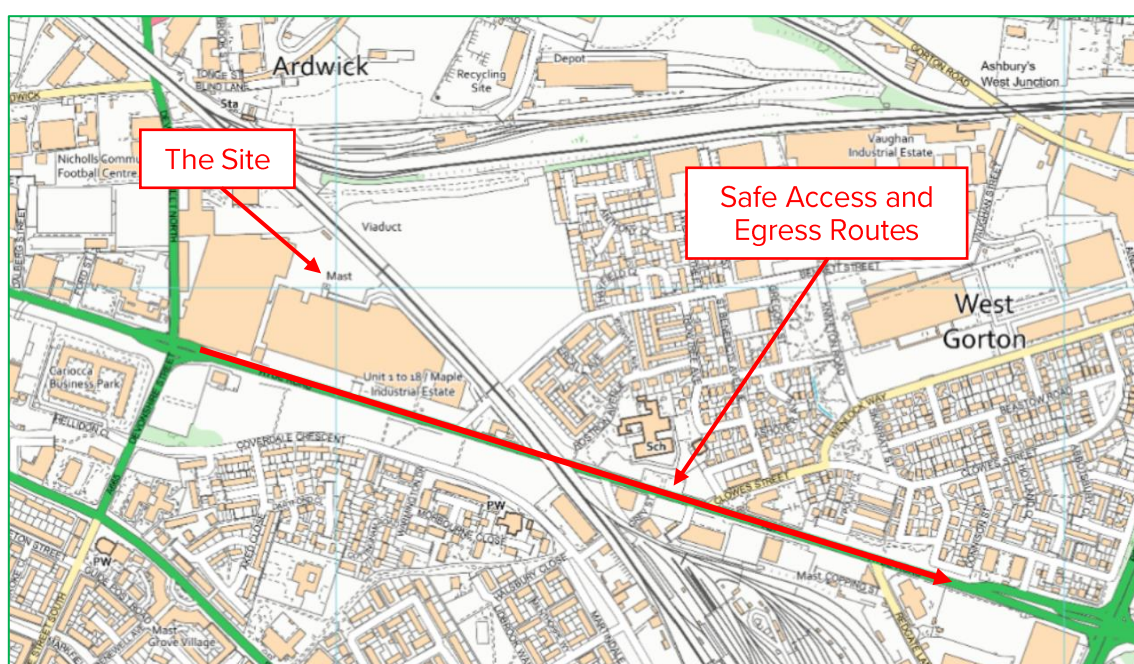


Figure 10 - Safe Access and Egress Route

4.7 Residual Risk

The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. The Site is unlikely to flood except in extreme conditions. This takes into account the property level protection measures.

5.0 SEQUENTIAL APPROACH

5.1 Sequential Test

The risk-based Sequential Test in accordance with the NPPF aims to steer new development to areas at the lowest probability of flooding (i.e. Flood Zone 1). However, paragraph 174 of the NPPF confirms that: *'Applications for minor development and changes of use should not be subject to the Sequential or Exception Tests⁶ but should still meet the requirements for Site-specific flood risk assessments'*.

The Council's objectives are to sustain and enhance the vitality and viability of the region, and to ensure a wide range of jobs to which people have easy access by a range of transport therefore, improving the overall quality of life. This is underpinned by the quality of the physical environment, social well-being and economic and environmental improvements. The Council seeks to grant permission for developments that add to the vitality and viability of the region.

This Site will help to regenerate the region and will help to deliver these objectives. This Site will help encourage economic impetus that will in turn help deliver a stronger service function and mix of employment uses.

It is impractical to suggest that there are more suitable locations for this development elsewhere. This is the only Site in the ownership of the client and therefore the only Site available to them to develop. The Site proposals cannot be located in another Site elsewhere. There are no alternative Sites available to develop. The Proposed Development is ancillary infrastructure to the existing bus depot adjacent to the Proposed Development. Therefore, the location of the Proposed Development adjacent to the existing bus depot is a necessary function of this ancillary infrastructure. The Site proposals cannot be located in another Site elsewhere they have to be located at this Site adjacent to the existing facilities.

The existing and proposed use is classified as 'less vulnerable'. The Proposed Development will not change the nature or times of occupation or introduce a new 'more vulnerable' use into the floodplain. Therefore, the vulnerability of the Site will not change as part of the planning application. The Proposed Development will not therefore increase the vulnerability of the development or introduce new development in the Flood Zones.

The Site proposals remain consistent with the relevant planning policies and are not at odds with the current use of the Site and can only enhance and preserve the employment base which currently exists. The wider area surrounding the Proposed Development Site is affected by a very similar, and in many cases, higher risk of flooding.

Similar developments on any Site outside a Flood Zone will not offer any advantage vis-a-vis flooding. Consequently, application of the Sequential Test demonstrates that there is no measurable advantage to constructing the Proposed Development elsewhere.

Application of the Sequential Test requires that there are other suitable Sites available that offer less risk in terms of flooding. Hence this proposal provides greater protection to occupants than might be afforded by another notional Site. Consequently, the Sequential Test would suggest that this Site is one to which development should be moved, rather than one from which it should be directed. Indeed, using a pragmatic approach it is doubtful that the Sequential Test should be applied at all.

⁶ Except for any proposal involving a change of use to a caravan, camping or chalet Site, or to a mobile home or park home Site, where the Sequential and Exception Tests should be applied as appropriate.

In summary, the development proposals should therefore be considered by the LPA to satisfy the Sequential Test as set out in the NPPF.

5.2 Exception Test

Applications for 'less vulnerable' uses located within Flood Zones 1 and 2 are not subject to the Exception Test as confirmed within Table 2 of this report and Table 3 of the PPG. Therefore, the Exception Test will not need to be undertaken as part of this planning application.

6.0 SUMMARY AND CONCLUSIONS

6.1 Introduction

This report presents a FRA in accordance with the NPPF for the Proposed Development at Hyde Road Bus Depot, Hyde Road, Manchester, M12 6JS.

This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

6.2 Flood Risk

The Site is unlikely to flood except in extreme conditions, the primary, but unlikely, flood risk posed to the Site is from fluvial flooding from the Corn Brook. The Environment Agency's Flood Zones indicates that the majority of the Site is located within Flood Zone 1, with a 'low probability' of flooding, with less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). However, a small proportion of the Site is located within Flood Zone 2, and therefore has a 'medium probability' of flooding. Flood Zone 2 has a between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year. The areas of Flood Zone 2 are situated on the very north eastern corner of the Site and to the south east of the Site.

The existing and proposed use is classified as 'less vulnerable'. The Proposed Development will not change the vulnerability of the Site and will not introduce a new 'less vulnerable' developments into the floodplain, 'less vulnerable' uses are appropriate within Flood Zones 1 and 2 after the completion of a satisfactory FRA.

The Environment Agency data shows that the Site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+70%) event. The Site will be flood free during the undefended 1 in 100 year (+35%) event, which the design flood event for the Site.

Water levels have been modelled at 42.62mAOD during the undefended 1 in 1000 year event and 44.95mAOD during the undefended 1 in 1000 year (+30%) event. Therefore, the Site may be inundated with floodwater to a maximum depth of 0.26m during the undefended 1 in 1000 year event and to a maximum depth of 0.47m during the undefended 1 in 1000 year (+30%) event.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the Site. Therefore, the risk of fluvial flooding is considered to be of **low significance**. A secondary flooding source has been identified which may pose a **low significant** risk to the Site. This is:

- Surface Water Flooding

There will no net loss in flood storage capacity or impact on movement of floodwater across the Site as a result of the Proposed Development. The risk from this source will be further mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site.

In conclusion, the flood risk posed to the Site can be considered to be limited; the Site is located within Flood Zones 1 and 2 and has a low or very low annual probability of flooding from all sources. The Site is unlikely to flood except in very extreme conditions.

6.3 Risk Management

The flood risk at the Site will be reduced by property level protection measures. Measured used:

Finished Floor Levels: The finished floor level of the structures will be as a minimum at the existing ground levels. It is considered impractical to raise these further. Therefore, in order to mitigate against this, it is recommended that flood resilience and resistance methods are used and Site signs up to receive flood warnings from the Environment Agency. This is discussed below.

Flood Resilience Resistance: The floors of the structures will be constructed from concrete which will be resilient to floodwater. The structures will be sealed against flooding and will be constructed from hard wearing materials. Further to this, there are safety features built into the system which mean they would shut down in the event of a flood to protect the equipment.

Flood Warning and Evacuation: The Site is located in a flood risk area therefore; the building will participate in the Environment Agency flood warning telephone service. The Site will register contact details with the Environment Agency's Flood Warnings Service.

Flood Plan: A Flood Plan outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause will be developed.

Safe Access and Egress Route: The Environment Agency data shows that the Site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+70%) event. The Site will be flood free during the undefended 1 in 100 year (+35%) event, which the design flood event for the Site.

A safe access and egress route, including emergency access can be maintained for vehicles and/or by foot via the access road to the south east along Hyde Road. The Site is at such a ground level that it would only flood in the most extreme flood event. A safe access and egress route with minimum water depths would be possible for many hours if not days. This would provide more than an adequate amount of time for the Site to be evacuated, if required.

The actual risk of flooding caused by overtopping during a flood event will be reduced compared to the extent of flooding shown on the Environment Agency's Flood Zones. The Site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

Facilities such as community centres, shops etc. are located to the south east of the Site. In the event of a Flood Warning, vital belongings, including waterproof clothing, necessary medication and essentials will be collected. It should be ensured that all occupiers and visitors to the Site are accounted for, and then exit the Site. The Safe Access and Egress Route indicates the exit routes that all people (i.e. occupants and visitors) on Site should follow once a flood warning has been received. People should make their way to areas outside of the flood zone. Therefore, safe access and egress can be maintained in accordance with the NPPF and Environment Agency guidance.

6.4 Sequential Approach

The development proposals should therefore be considered by the LPA to satisfy the Sequential and Exception Tests as set out in the NPPF.

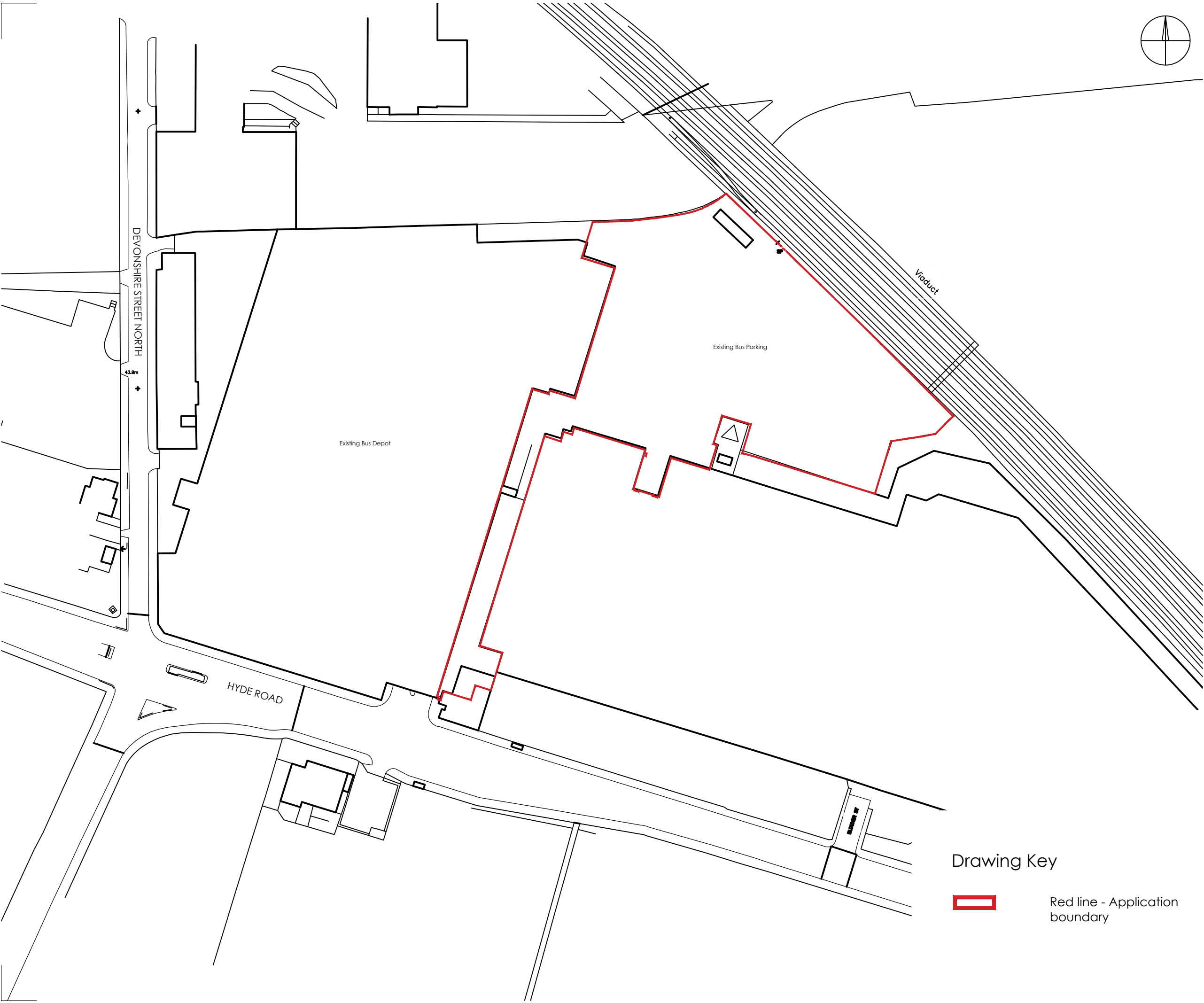
6.5 Conclusion

In conclusion, the Proposed Development, would be expected to remain dry in all but the most extreme conditions. Providing the recommendations made in this FRA are instigated, flood risk from all sources would be minimised, the consequences of flooding are acceptable and the development would be in accordance with the requirements of the NPPF.

This FRA demonstrates that the Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

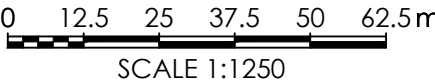
APPENDICES

APPENDIX 1 – Existing and Proposed Site Layout



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Rev	Date	Description	Drawn	Chk'd
P01	06.06.24	First issue.	TM	PS
P02	20.06.24	Updated boundary to suit TIGM requirements	CC	PS





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**Transport for
Greater Manchester**

Project Title

Hyde Rd Bus Depot

Hyde Rd
Manchester
M12 6JS

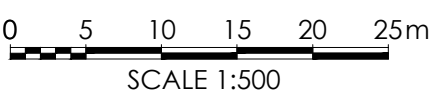
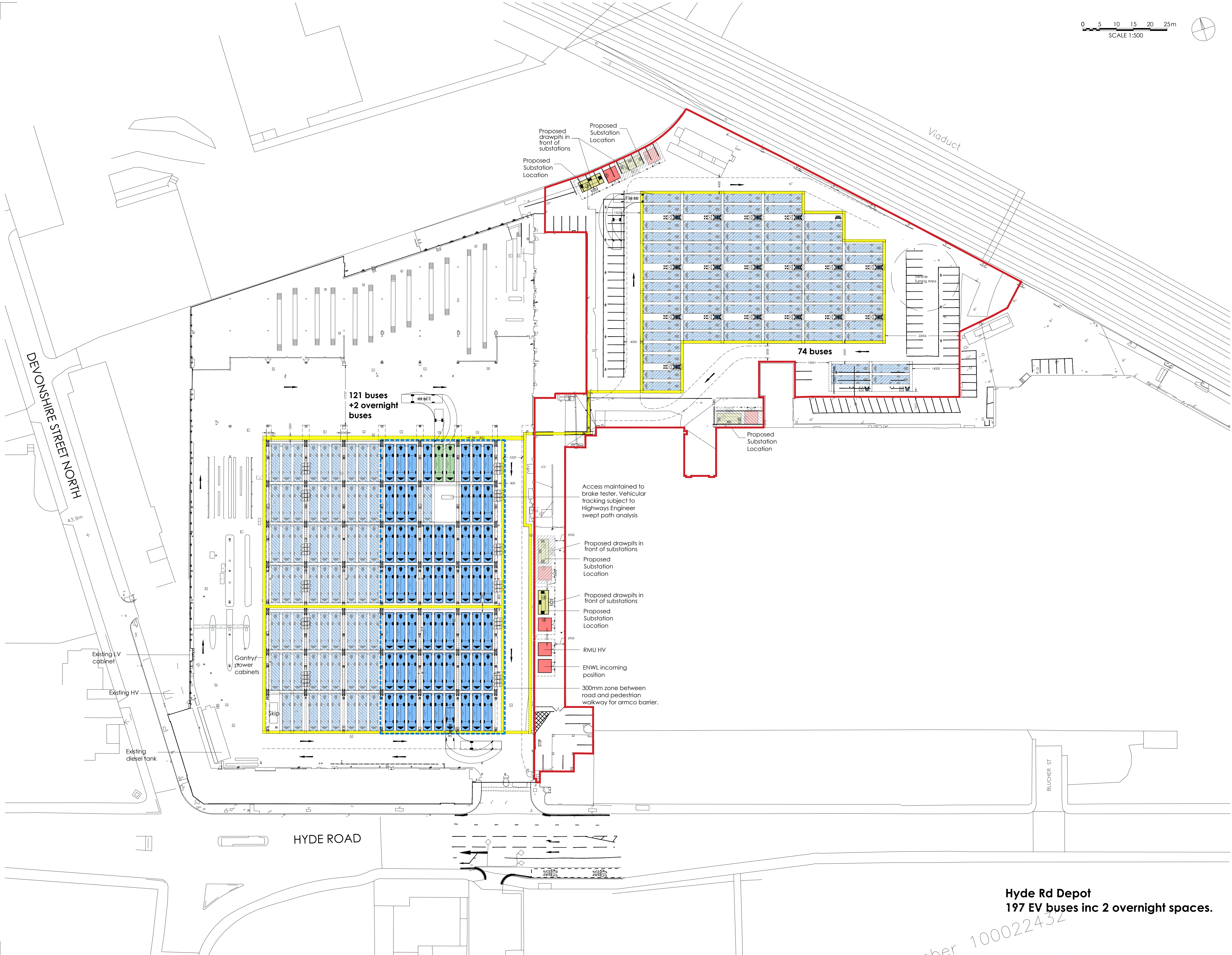
Drawing Title

Location Plan

Drawn	Checked	Scale @A3	BIM Status	Date
TM	PS	1:1250	NA	06.24

Drawing Status	Rev.	THP Project No
Stage 3	P02	20514-1

Project No.	Originator	Volume	Level	Type	Role	Number
BFDEFP-HY	THP	XXX	XXX	DR	AR	0201



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Rev	Date	Description	Drawn	Chkd
P01	04.06.24	Drawing renamed from 20514-1-THPW-00-XX-DR-A-0002_P04-Hyde Rd Proposed Site Layout - First Issue	TM	PS
P02	18.06.24	Updated in line with client comments	CC	PS
P03	20.06.24	Updated boundary to suit HRAA requirements	CC	PS

Notes

All vehicle tracking shown on this drawing are illustrative and for internal use only. All vehicle tracking manoeuvres and swept path analysis should be checked and confirmed by the project Highways Engineer.

All charging units and cable management setting out on this drawing is subject to a separate options appraisal. Refer to specific EVC layout drawings for spatial/ setting out information.

Please refer to the Utility Overlay for site constraints. THP have used their best endeavours to highlight constraints which could impact on each development site. Please note this list is not exhaustive and all design team to review, highlight and mitigate against clashes with existing utilities.

Please refer to latest MEP engineers' drawings for - draw pit details and final locations, lighting layouts and sub-station requirements.

Drawing Key

- Phase 1 Site Boundary
- 195no. Double Decker Bus (11,200mm x 2550 mm)
- 2no. Double Decker Bus (Night Bus Parking only) (11,200mm x 2550 mm)
- Substation/ Switchroom
- Compound Line (61 bays)
- Safe Pedestrian Walkway
- Hatch depicts items excluded from this phase (137no. bays)

Ownership of red line boundary to be confirmed

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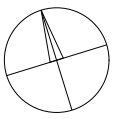
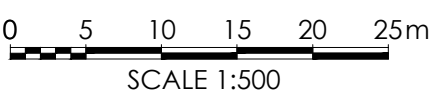
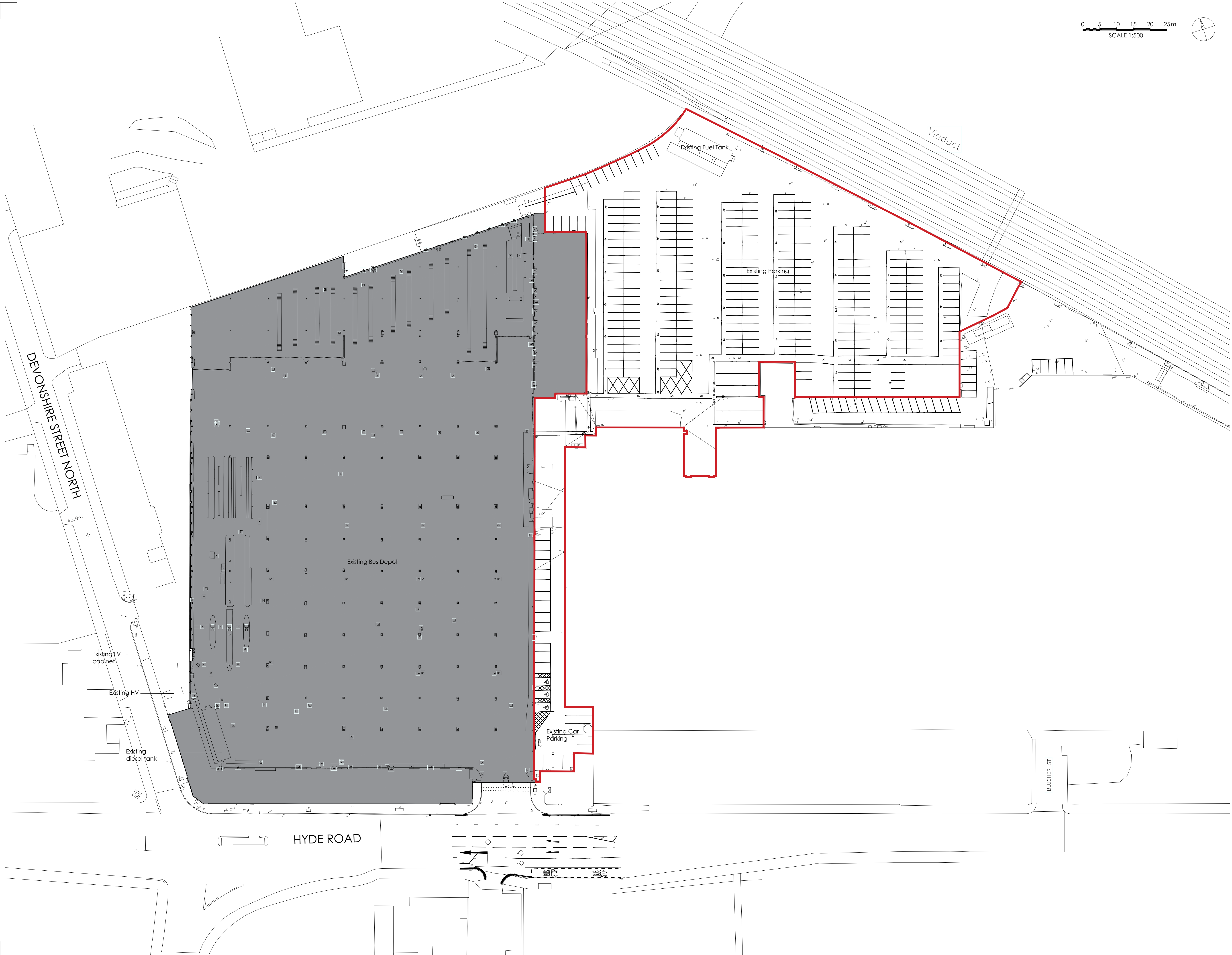
WILLMOTT DIXON

Transport for Greater Manchester

Project Title					
Hyde Rd Bus Depot					
Hyde Rd Manchester M12 6JS					
Drawing Title					
Proposed Detailed Site Plan					
Drawn	Checked	Scale	BIM Status	Date	
TM	PS	1:500	NA	06.24	
Drawing Status		Rev.	THP Project No		
Stage 3		P03	20514-1		
Project No.	Originator	Volume	Level	Type	Number
BDFEFP-HY	THP	XXX	XXX	DR AR	0203

Hyde Rd Depot
197 EV buses inc 2 overnight spaces.

100022432



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Rev	Date	Description	Drawn	Ch'd
P01	14.06.24	First Issue	CC	PS
P02	20.06.24	Updated boundary to suit HGM requirements	CC	PS

Drawing Key

 Red line - Application boundary



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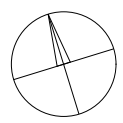
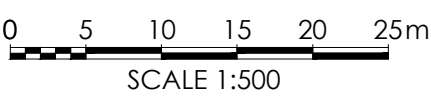
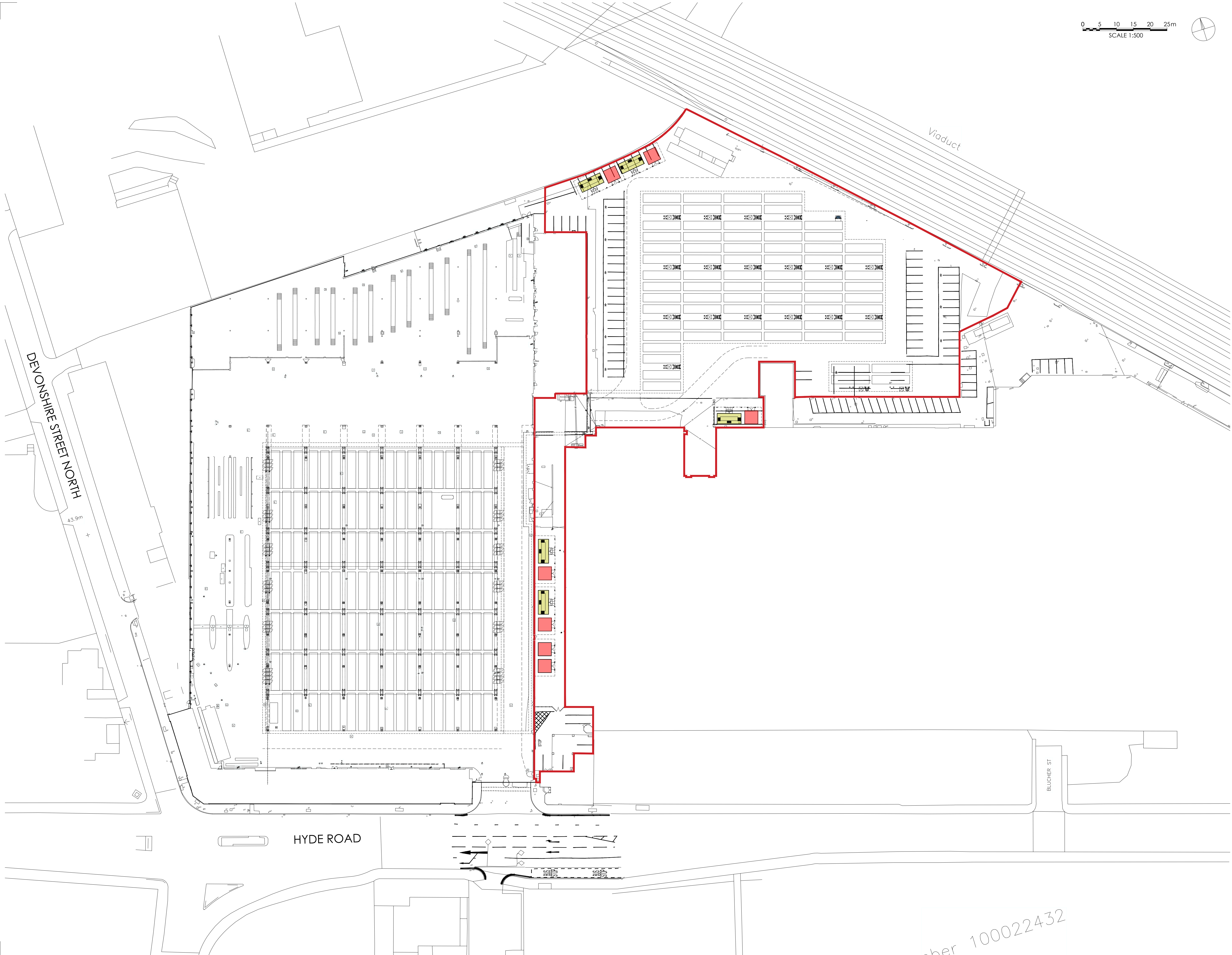
Client
 WILLMOTT DIXON
 Transport for Greater Manchester

Project Title
Hyde Rd Bus Depot

Hyde Rd
Manchester
M12 6JS

Drawing Title
Existing Site Plan

Drawn	Checked	Scale	BA1	BIM Status	Date
CC	PS	1:500	NA		06.24
Drawing Status		Rev.	THP Project No		
Stage 3		P02	20514-1		
Project No.	Originator	Volume	Level	Type	Role
BFDEFP-HY	THP	XXX	XXX	DR	AR
					0202



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Rev	Date	Description	Drawn	Chk'd
P01	14.06.24	First issue	CC	PS
P02	19.06.24	Updated boundary	CC	PS

Note:

Please refer to THP drawings:
'BDEFP-XX-THP-XXX-XXX-DR-AR-0201 (P01) - Proposed Typical Substation' and
'BDEFP-XX-THP-XXX-XXX-DR-AR-0202 (P01) - Proposed Typical LV Switch Room' for substation and switchroom details in conjunction with this drawing.

Drawing Key

 Red line - Application boundary



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Client



Project Title

Hyde Rd Bus Depot

Hyde Rd
Manchester
M12 6JS

Drawing Title

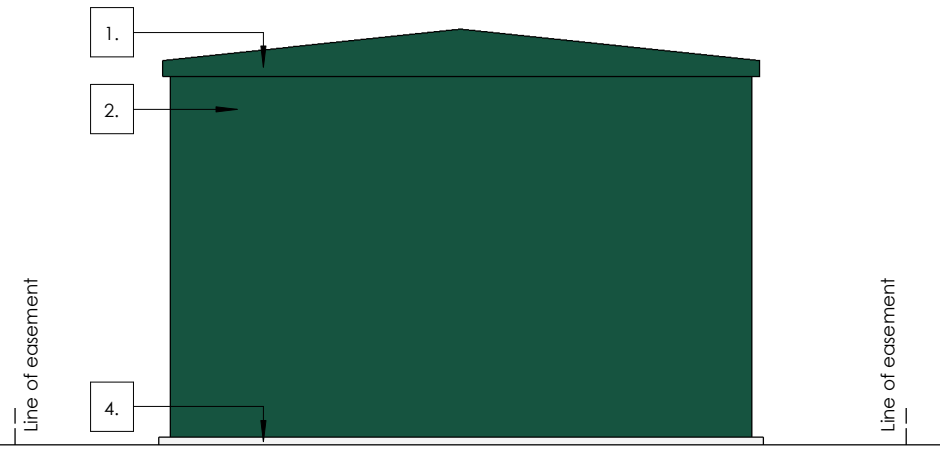
Proposed Detailed Site Plan

Drawn	Checked	Scale	BA1	BIM Status	Date
CC	PS	1:500	NA		06.24

Drawing Status	Rev.	THP Project No
Stage 3	P02	20514-1

Project No.	Originator	Volume	Level	Type	Role	Number
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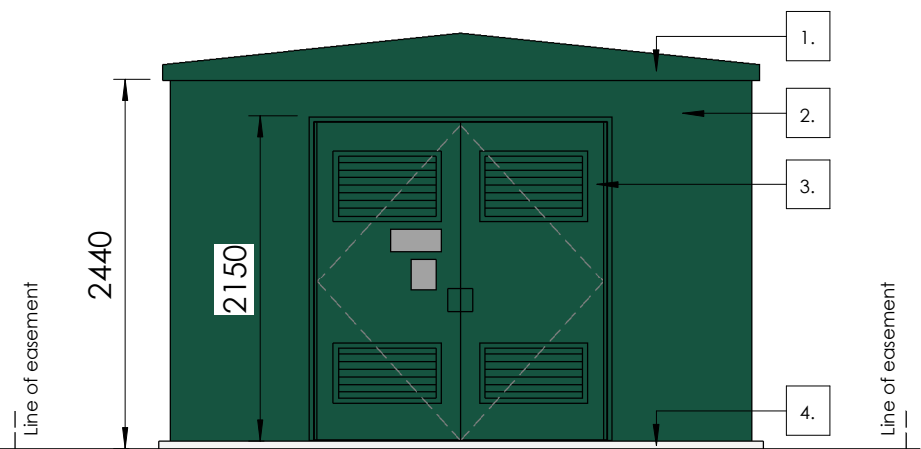
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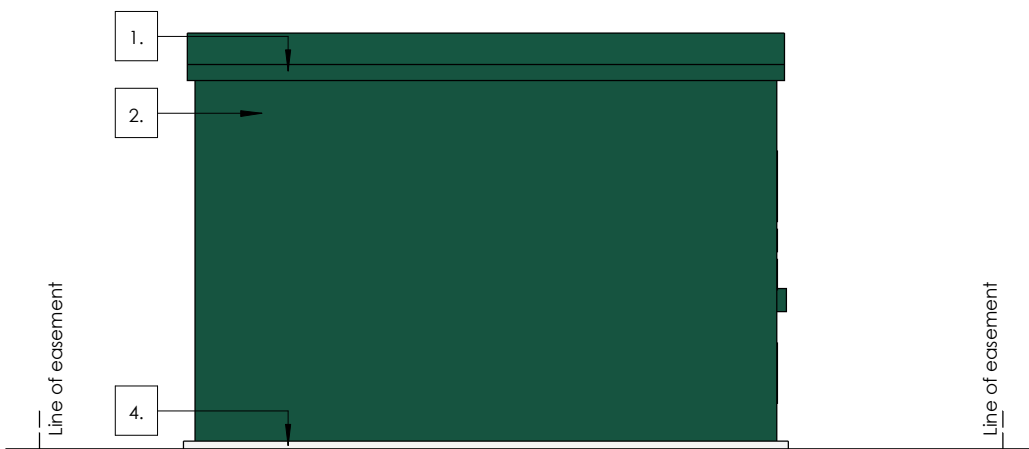
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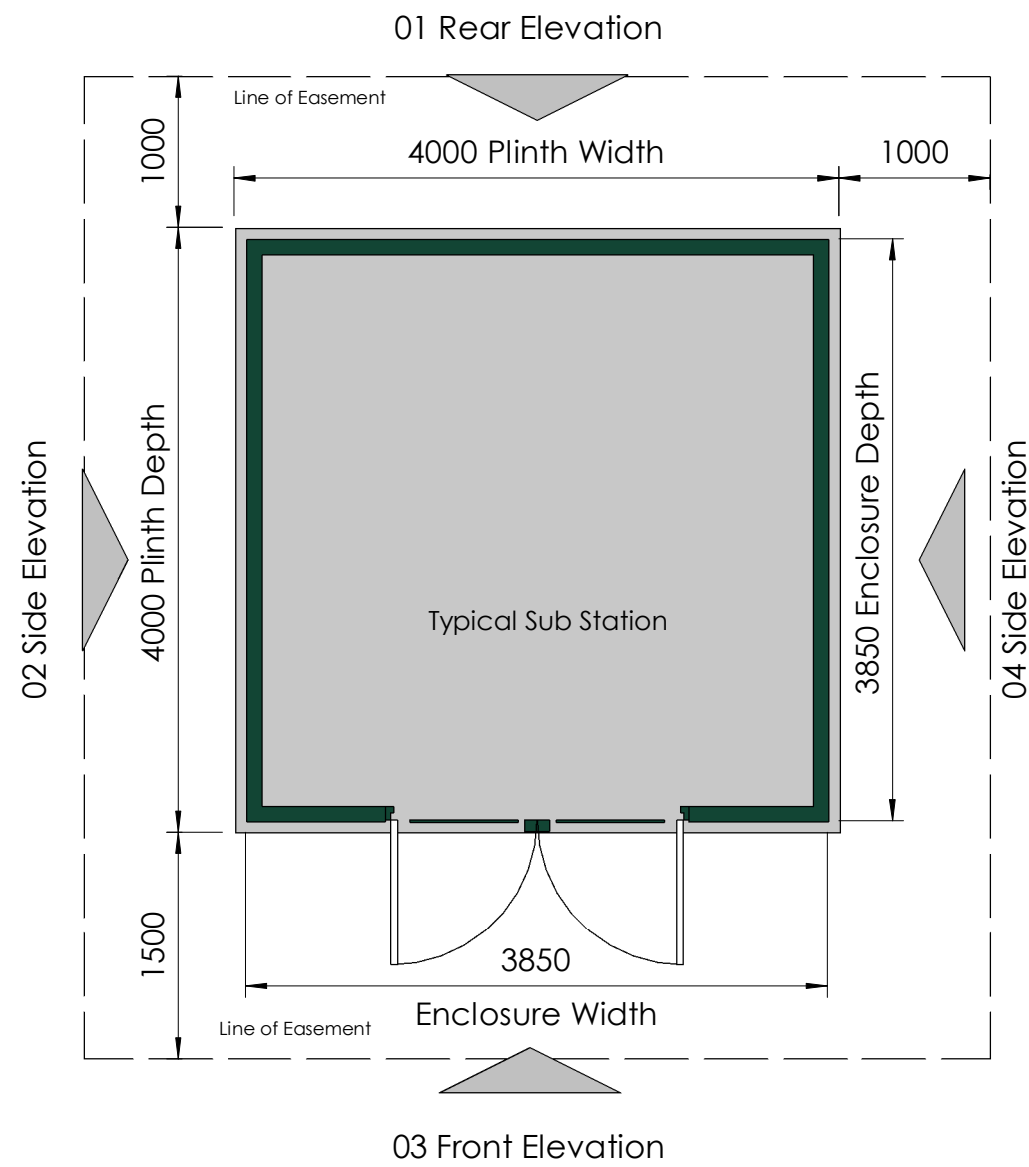
02 Side Elevation
1 : 50



03 Front Elevation
1 : 50



04 Side Elevation
1 : 50



GA Plan
1 : 50



Sketch Perspective View

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CONSTRUCTION DRAWING

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For Structural details refer to the Structural & Civil Engineers detailed design drawings & specifications.

For M&E information, refer to the M&E Engineers and sub contractor's design drawings & specifications.

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Drawing Revisions

Rev	Date	Description	Drawn	Chk'd By
P01	04.06.24	First Issue	KB	PS

Materials Key

- Roof to be glass reinforced plastic (GRP)
Colour: Moss Green (RAL 6005)
- Walls to be glass reinforced plastic (GRP)
Colour: Moss Green (RAL 6005)
- Doors to be glass reinforced plastic (GRP)
Colour: Moss Green (RAL 6005)
- Concrete base/ foundation subject to Engineers design

Notes

This drawing is to be read in conjunction with Electricity North West specifications and all associated works must comply with their requirements, recommendations and standard details.

Extent of louvres to be confirmed by M&E engineers

GRP housing to be supplied by an ENWL approved supplier. Doors to have Hasp and Staple to accept ENWL padlocks. Left hand to be first opening leaf.

For Sub Station locations please refer to Site plan

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READING - T. 0118 950 7700
101 London Road, Reading, RG1 5BY

LONDON - T. 020 7409 1215
10 Green Court, 39 Christopher's Place, London, W1U 1JJ

Client



Project Title
Depot Electrification Future Provision
Ashton Bus Depot
Clarence Street
Stalybridge
SK15 1QP

Drawing Title

Proposed Typical Substation

Drawn	Checked	Scale @A2	Status	Date
PS	CB	As indicated	S3	03.24

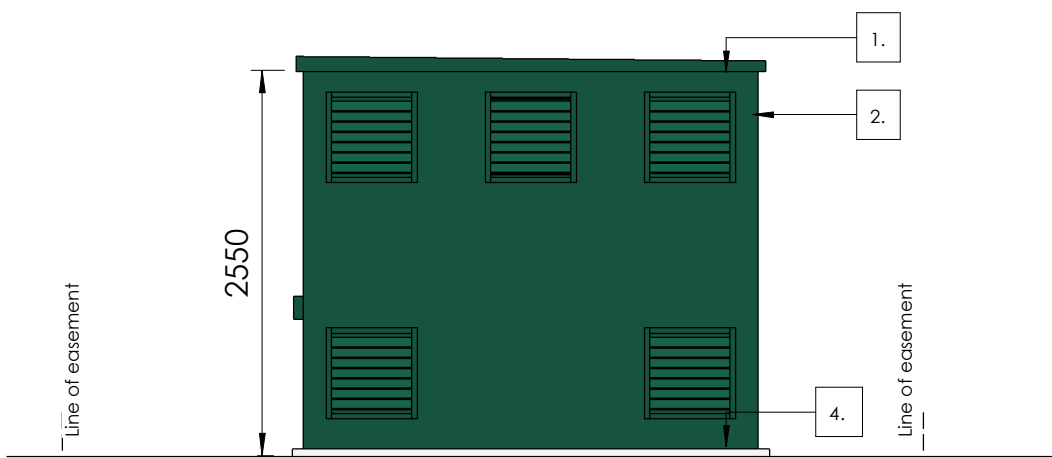
Drawing Status	Rev.	THP Project No
Stage 3	P01	20514

Project No.	Originator	Volume	Level	Type	Role	Number
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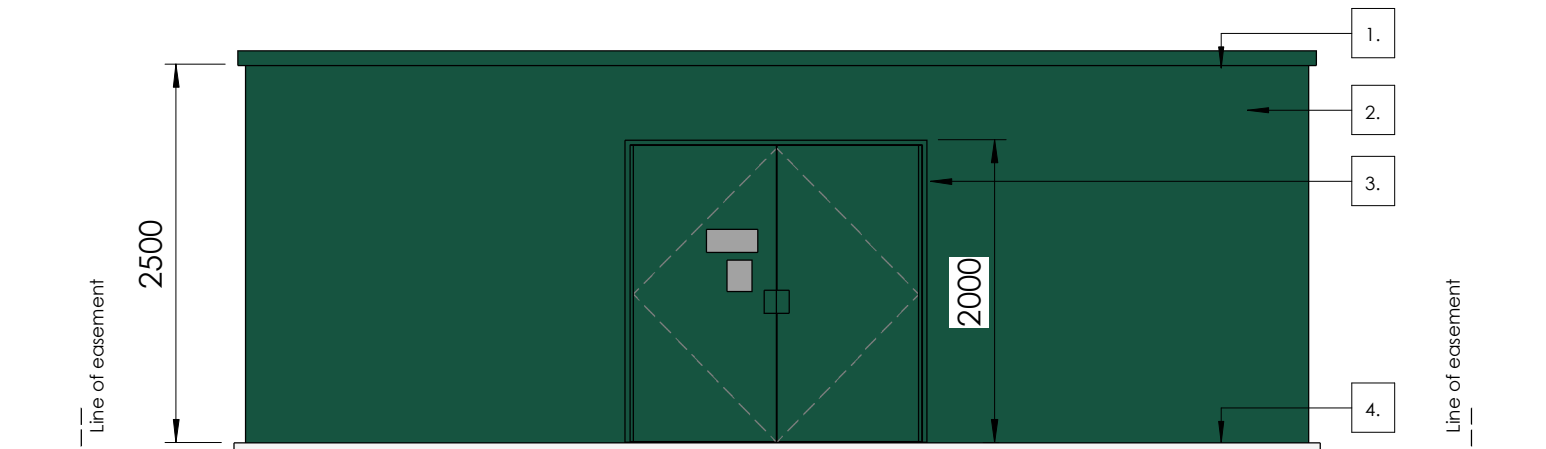
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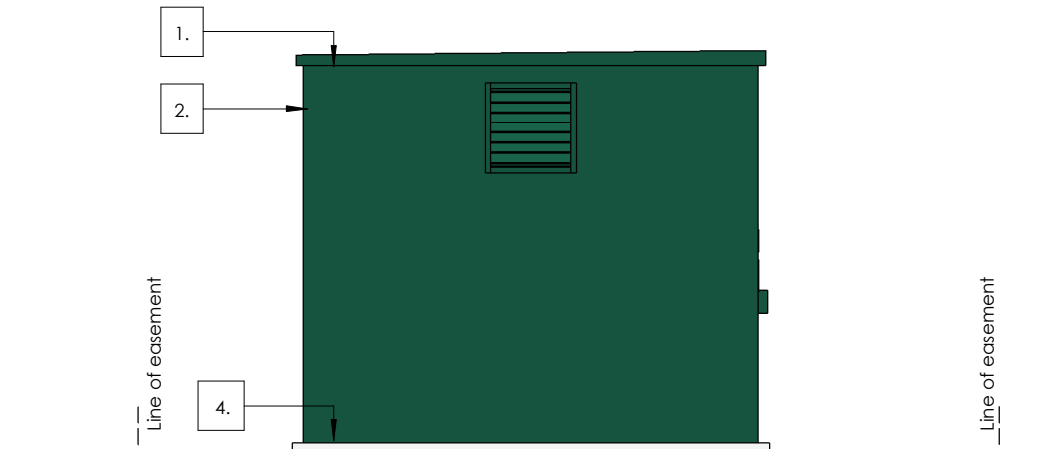
02 Side Elevation

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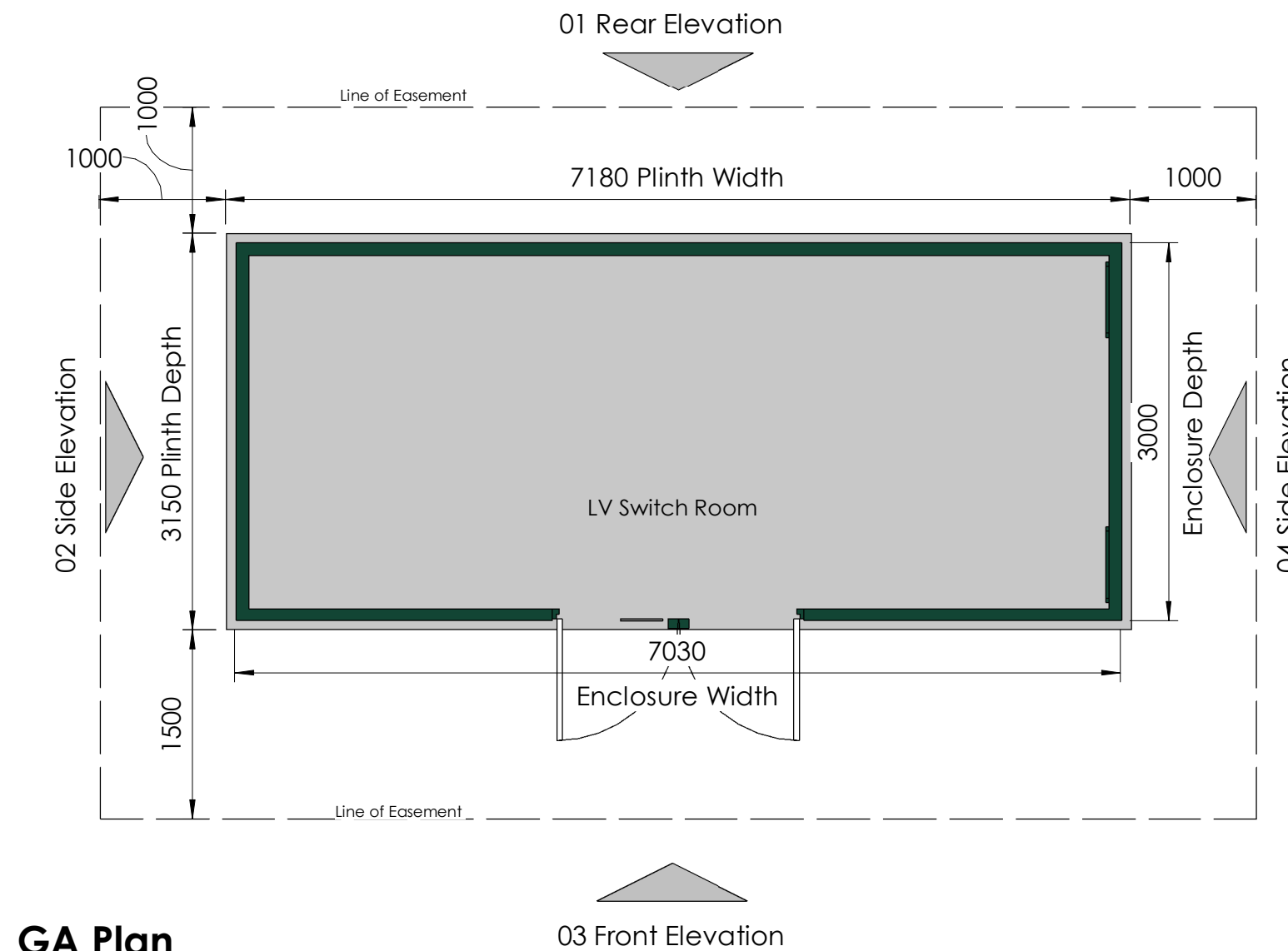
03 Front Elevation

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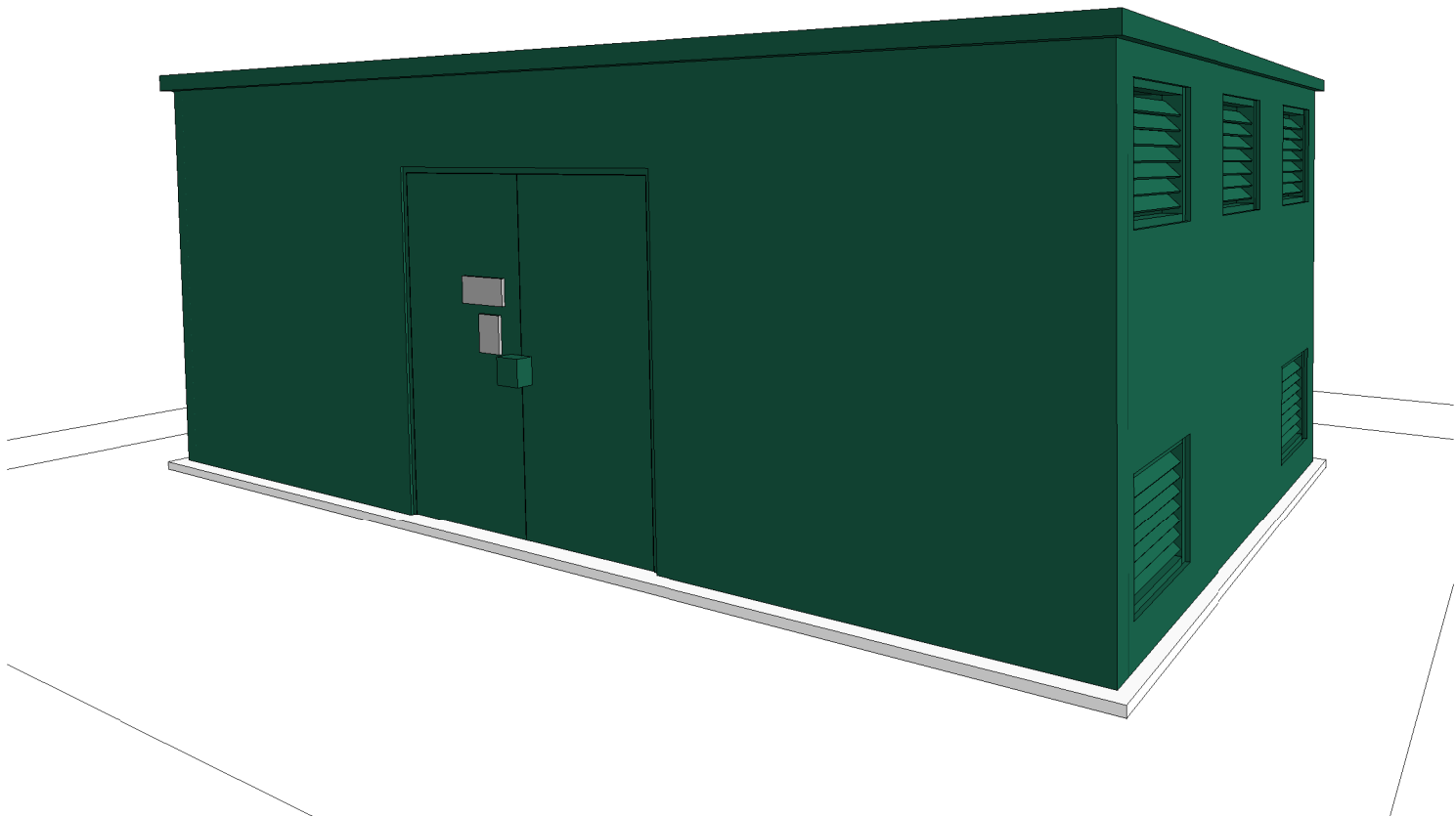
04 Side Elevation

1 : 50



GA Plan

1 : 50



Sketch Perspective View

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PLANNING DRAWING

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For Structural details refer to the Structural & Civil Engineers detailed design drawings & specifications.

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Drawing Revisions				Drawn	Chk'd By
Rev	Date	Description			
P01	04.06.24	First Issue		KB	PS
P02	17.06.24	Doors updated		KB	PS

Materials Key

- Roof to be glass reinforced plastic (GRP)
Colour: Moss Green (RAL 6005)
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Colour: Moss Green (RAL 6005)
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For Switch Room locations please refer to Site Plan.

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WAKEFIELD - T. 01924 291800
2 St John's North, Wakefield, WF1 3GA

MANCHESTER - T. 0161 2388555
Convers Warehouse, 77 Dale Street, Manchester, M1 2HG

MILTON KEYNES - T. 01908 211 577
The Old Rectory, 79 High Street, Newport Pagnell, MK16 8AB

READING - T. 0118 950 7700
101 London Road, Reading, RG1 5BY

LONDON - T. 020 7409 1215
10 Green Court, 39 Christopher's Place, London, W1U 1JJ

Client

WILLMOTT DIXON

Project Title
Depot Electrification Future Provision
Ashton Bus Depot
Clarence Street
Stalybridge
SK15 1QP

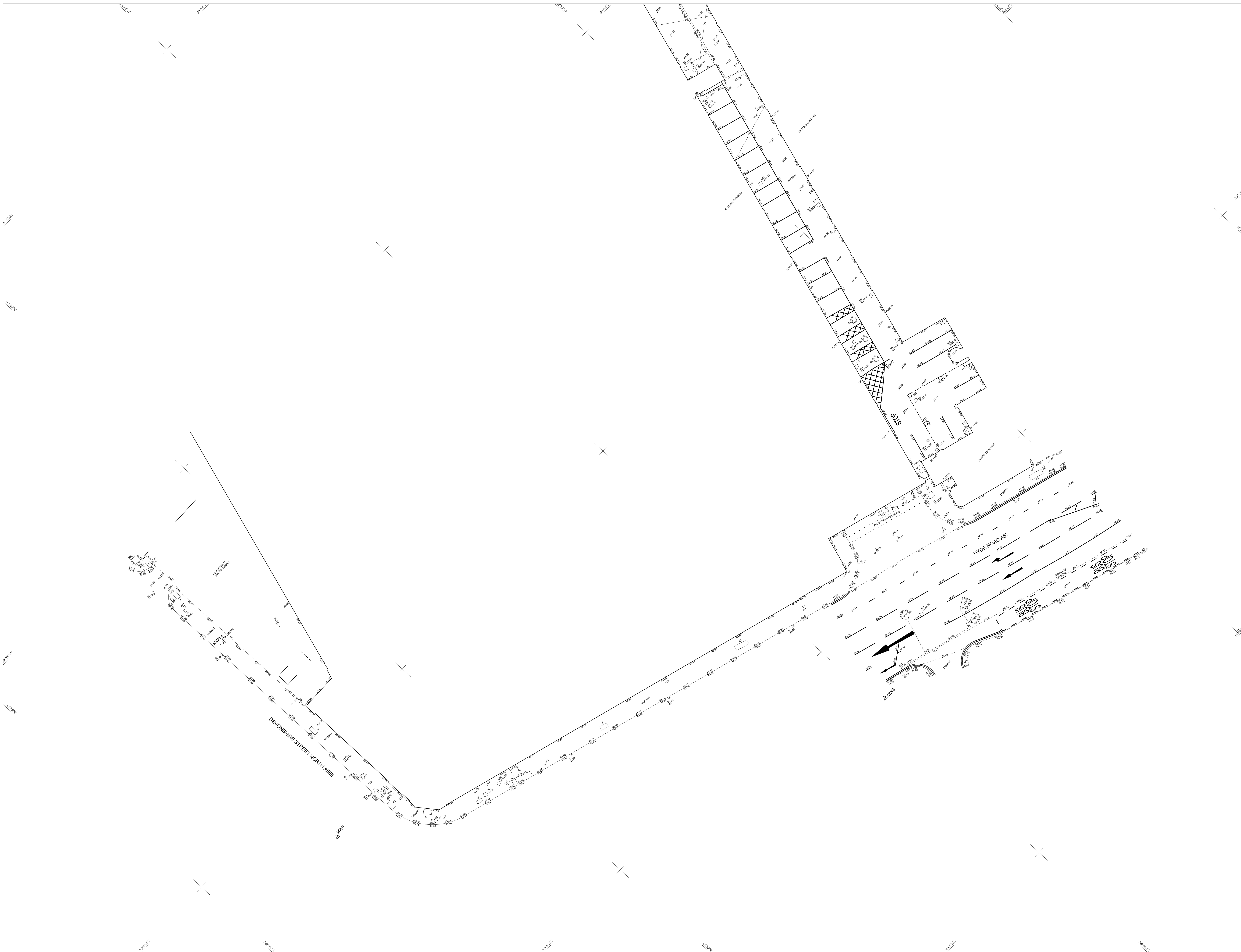
Drawing Title
Proposed Typical LV Switch Room

Drawn	Checked	Scale @A2	Status	Date
PS	CB	As indicated	S3	06.2024

Drawing Status	Rev.	THP Project No
Stage 3	P02	20514-4

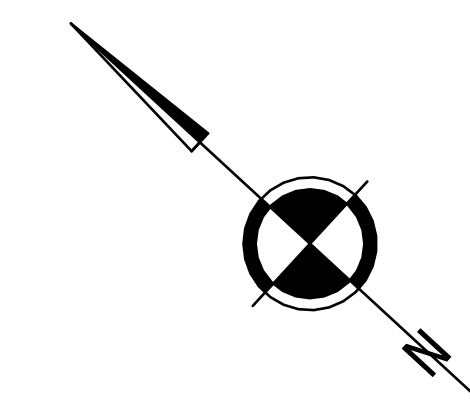
Project No.	Originator	Volume	Level	Type	Role	Number
BFDEFP-XX-	THP-	XXX-	XXX-	DR-	AR-	0202

APPENDIX 2 – Topographical Survey



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Note:

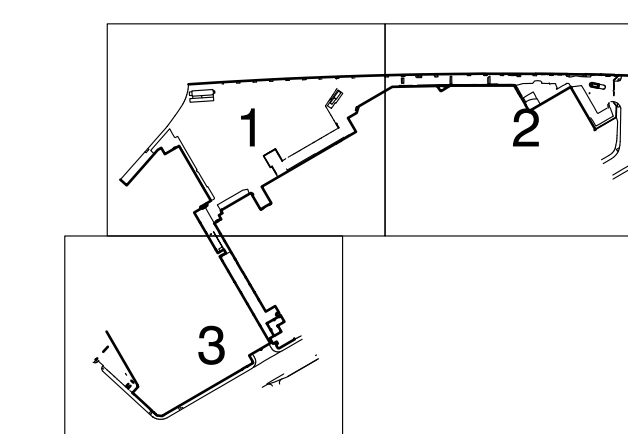
The survey is plotted on a plane local Grid. Orientation to National Grid. All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

Levels in parenthesis indicate top of wall/fence heights.

SURVEY STATIONS			
Name	East/ing	North/ing	Height
MF1	386065.30	386989.55	45.45
MF2	386121.46	386945.06	45.45
MF3	386135.46	386901.55	45.00
MF4	386179.57	386848.91	45.15
MF5	386207.17	386835.44	45.00
ML1	386075.33	387012.12	45.45
ML2	386076.18	387044.30	45.45
ML3	386087.46	387061.17	45.45
ML4	386096.61	387071.62	45.00
MF2	386091.62	387011.45	45.00
MF3	386093.51	387005.74	45.00
MF4	386092.53	387012.12	44.95
MM1	386091.78	386998.15	44.42
MM2	386092.77	386999.23	44.42
MM3	386095.12	386998.77	44.42
MM4	386091.82	386985.03	45.25
MM5	386077.18	386958.87	45.35
MM6	386078.48	386958.87	45.35

STANDARD REFERENCE & ABBREVIATIONS

[illegible]

Survey

Smith Street, Skelmersdale, Lancs. WN8 8LN
Tel: 01695 725662 Fax: 01695 51816
Email: mail@survops.co.uk - www.survops.co.uk

Client	
WSP UK Ltd	

Drawing Title
Topographical Survey of Land at:
Stagecoach Hyde Road Bus Depot
Ardwick
Sheet 3 of 3

Scale(s)	1:200	Surveyor	ML ME
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Date	Nov 23	Drawn	A
Job Number	23I223	Checked	T

Sheet Size & Drg Number & Revision
A0 23I223/003

