

For Eia Power Ltd

Flood Risk Assessment

NEWARK

HELLOS

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1. Introduction

This report has been prepared by Hydrock Consultants Limited (Hydrock) on behalf of our client Fig Power Ltd, in support of a planning application for a Battery Energy Storage System (BESS) scheme located at Stewart Court, Lemington, Newburn, Newcastle upon Tyne.

Local Planning Authorities are advised by the Government's National Planning Policy Framework (NPPF) to consult the Environment Agency (EA) on development proposals in areas at risk of flooding and / or for sites greater than 1 hectare in area. The EA requires a Flood Risk Assessment (FRA) to be submitted in support of the planning application for the proposed development.

The report has been prepared to consider the requirements of NPPF through:

- » Assessing whether the proposed development is likely to be affected by flooding;
- » Assessing whether the proposed development is appropriate in the suggested location; and
- » Detailing measures necessary to mitigate any flood risk identified, to ensure that the proposed development and occupants would be safe, and that flood risk would not be increased elsewhere.

The report considers the requirements for undertaking an FRA as stipulated in NPPF Technical Guidance. Only those requirements that are appropriate to a development of this nature have been considered in the compilation of this report.

This report has been prepared in accordance with current EA policy.

2. Site Information

2.1 Location

The site is located within the Newburn area of Newcastle Upon Tyne, England. The site is approximately 8 km east of the city centre of Newcastle Upon Tyne.

The site is bound:

- » To the north by residential development;
- » To the east by Walbottle Road, beyond which lies greenfield (undeveloped) land;
- » To the south east by a commercial enterprise park;
- » To the south by the A6085; and
- » To the west by commercial properties.

Access to the site is via an access road in the south that provides access onto the A6085.

The site address and Ordnance Survey Grid Reference is provided in Table 1 below, with site boundaries and locations shown in Figure 1.

Table 1: Site Referencing Information

Site Referencing Information	
Site Address	Stewart Court, Lemington, Newburn, Newcastle upon Tyne, North of Tyne, England, NE15 8HH, United Kingdom
Grid Reference	NZ 17032 65310 417032 565310

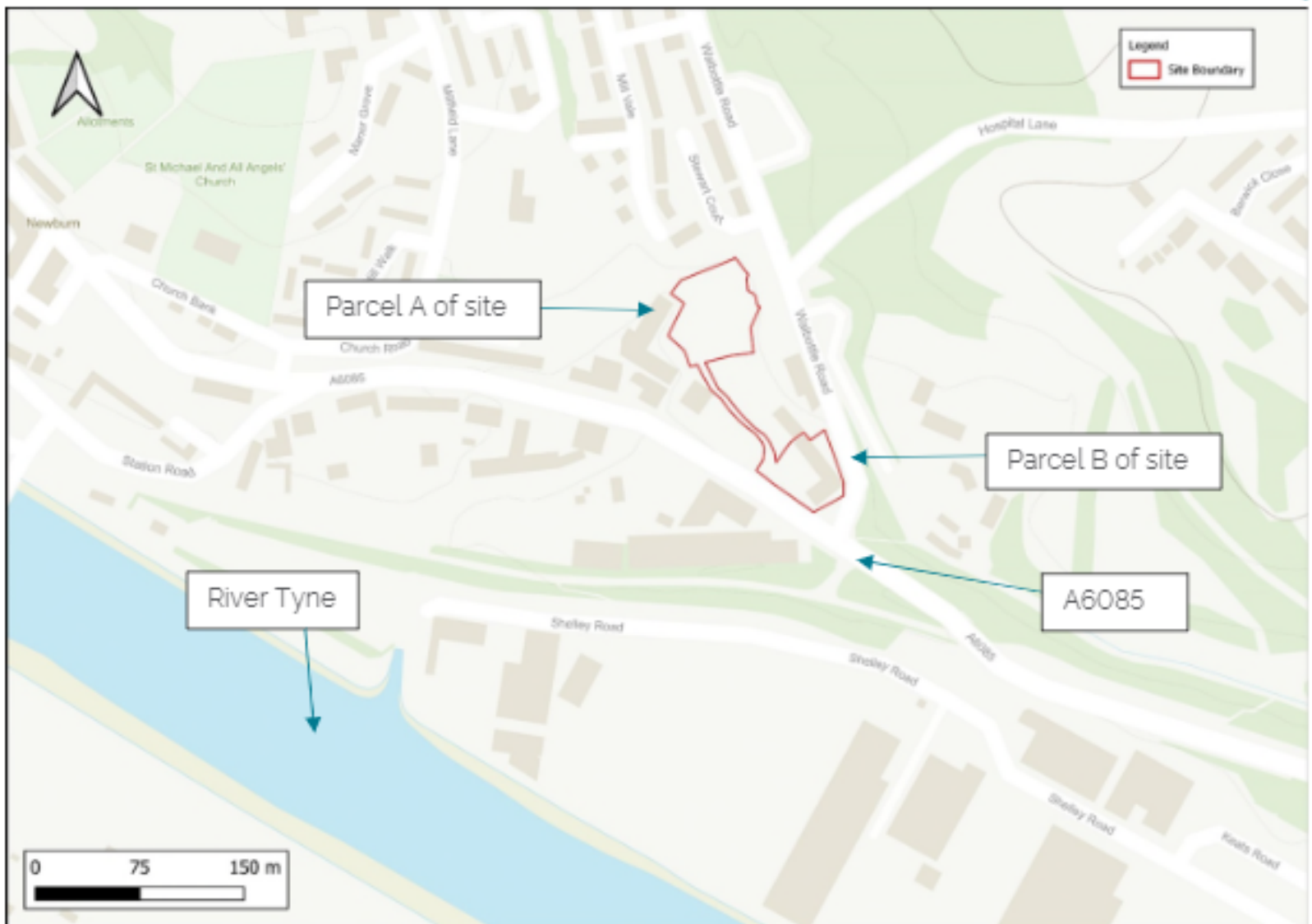


Figure 1 - Site Location

2.2 Topography

Topographic levels to metres Above ordnance Datum (m AOD) have been derived from a 1 m resolution EA composite Light Detecting and Ranging (LiDAR) DTM (Figure 2). Parcel A of the site is shown to slope from approximately 25 m AOD in the east to approximately 15 m AOD in the south west of the site. Parcel B of the site is shown to slope from approximately 20 m AOD in the north to approximately 14 m AOD in the south. The general topography of the surrounding areas follows this general slope down to the River Tyne which is at approximately 4 m AOD.

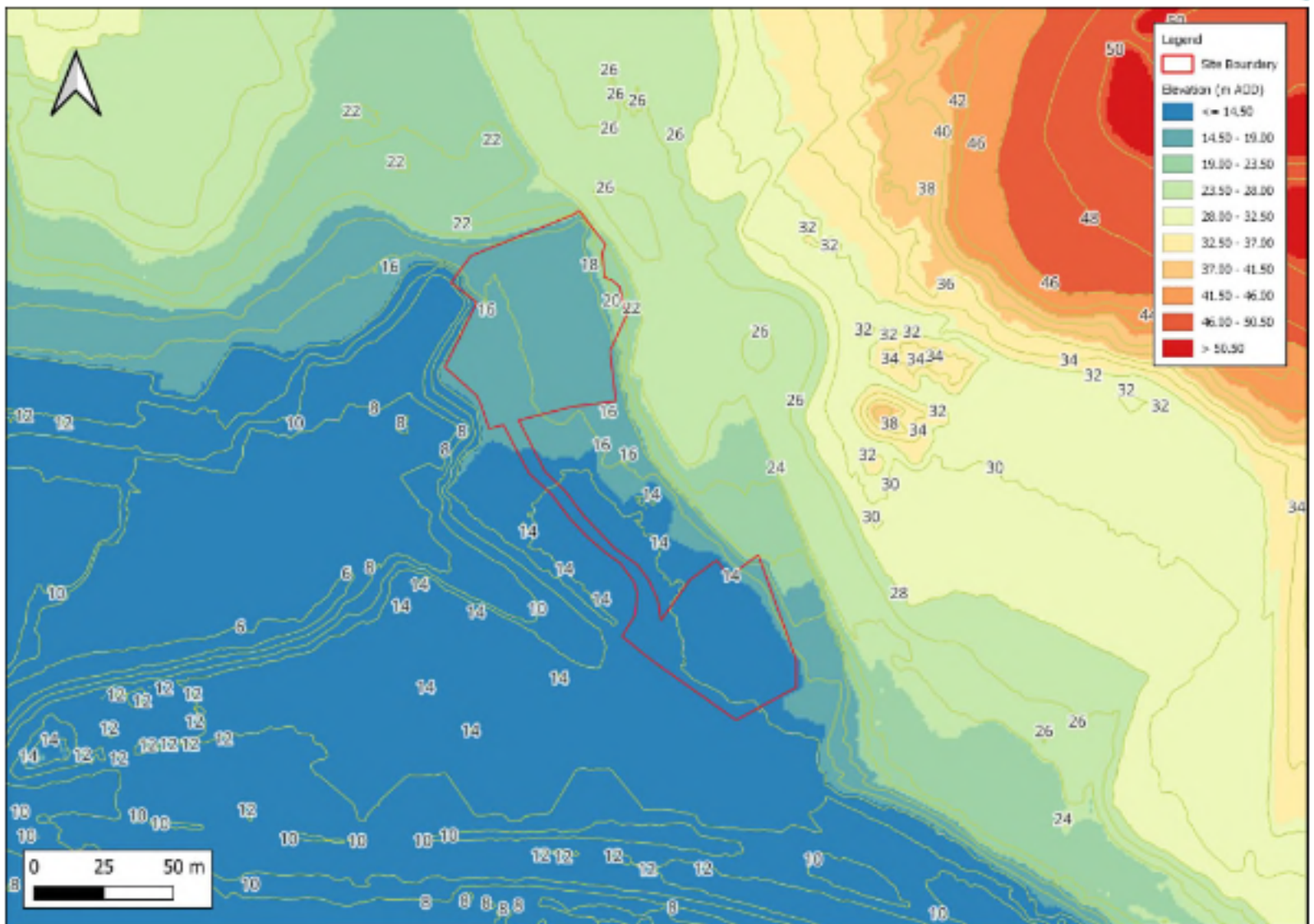


Figure 2 - LiDAR Plan

2.3 Current Site Use

According to Google Aerial imagery (accessed 30/11/2023), Parcel A of the site is partially used for car and tyre storage and Parcel B an enterprise park with existing building.

2.4 Proposed Site Use

The proposed site development is for a BESS with associated access. A proposed site plan is included in Appendix A.

3. Sources of Flood Risk

3.1 Fluvial and Tidal Flood Risk

The nearest watercourse to the site is the New Burn, an ordinary watercourse under LLFA jurisdiction. The New Burn is culverted north of the site beneath a residential development, flowing in a southerly direction immediately west of the site before emerging approximately 70 m south-west of the site at the River Tyne. The New Burn is a tributary of the River Tyne (a main river under EA jurisdiction) which is a tidally influenced watercourse located approximately 320 m south west of the site at its closest point, and flows in an easterly direction through Newcastle Upon Tyne.

The site is located approximately 20 km from the nearest coastline, where the mouth of the River Tyne (Tynemouth) is located. The site is not believed to be directly impacted by tidal flood risk, however, the River Tyne is known to interact with the tide at this location.



Figure 3 - EA Flood Map for Planning (Rivers and Seas)

According to the current EA Flood Map for Planning (Figure 3), the site and immediate surrounding area is located wholly within Flood Zone 1 (Low Risk). Flood Zone 2 (Moderate Risk) and Flood Zone 3 (High Risk) extents are in close proximity to the western site boundary of Parcel A.

For reference, the EA Flood Zones are defined as follows:

- » Flood Zone 1 (Low Risk) comprises land assessed as having a $\leq 0.1\%$ AEP of fluvial flooding in any given year, equivalent to the ≥ 1 in 1,000-year return period flood event.
- » Flood Zone 2 (Moderate Risk) comprises land assessed as having a 0.1-1% AEP of fluvial flooding in any given year, equivalent to the 1 in 1,000 - 1 in 100-year return period flood event.

- » Flood Zone 3 (High Risk) comprises land assessed as having a $\geq 1\%$ AEP of fluvial flooding in any given year, equivalent to the ≤ 1 in 100-year return period flood event.
- » Flood Zone 3a (High Risk) comprises land assessed as having a 1-3.33% AEP of fluvial flooding in any given year, equivalent to the 1 in 100 - 1 in 30-year return period flood event.
- » Flood Zone 3b (Functional Floodplain) comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the EA. Flood Zone 3b is defined as land that has a 3.33% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events.

According to the EA's 'Spatial Flood Defences with Standardised Attributes' dataset, there are 'Natural High Ground Defences' along the River Tyne to the south west, maintained by a 'private individual, company or charity' designed with a Standard of Protection (SoP) of up to 1 in 100 years.

According to the EA's 'Recorded Flood Outlines' Dataset, the site is shown to be outside of the extents of historical fluvial flooding events.

There is no evidence within the 2011 Preliminary Flood Risk Assessment¹ (PFRA) to indicate that the site is at risk of fluvial or tidal flooding. Within the 'Newcastle City Council Level 2 2011 Strategic Flood Risk Assessment²' (2011 SFRA) a map (Appendix B) is shown to indicate that the site could be at risk of fluvial flooding in the 1 in 100-year scenario. However, it is assumed that this mapping has not taken into account the culverting of the New Burn and is likely to be overestimating the risk. New and updated surface water mapping that has since been produced supersedes this data as there is evidence of exceedance routing of the culverted New Burn.

As such, the site is concluded to be at 'low' risk of fluvial water flooding and 'negligible' risk of tidal flooding.

¹ [\[ARCHIVED CONTENT\] \(nationalarchives.gov.uk\)](#)

² [Microsoft Word - 2010s4294_Newcastle_SFRA_Level_2_Final.doc](#)

3.2 Surface Water Flood Risk

Surface water flooding occurs as the result of an inability of intense rainfall to infiltrate the ground. This often happens when the maximum soil infiltration rate or storage capacity is reached. Flows generated by such events either enter existing land drainage features or follow the general topography which can concentrate flows and lead to localised ponding/flooding.

The EA Long Term Flood Risk Map (Surface Water) in Figure 4 shows surface water risk levels in Parcel A and Parcel B of the site to range from Very Low to Low.

Flood depths are expected to remain below 300 mm across both Parcel A and Parcel B of the site in the High, Medium and Low risk scenarios, which is considered to be passable to people and vehicles. In Parcel A, flood depths are shown to cover a section of the site from the west to the east and a section in the north. In Parcel B, flood depths are shown to be contained to the northern extent of the current building footprint.

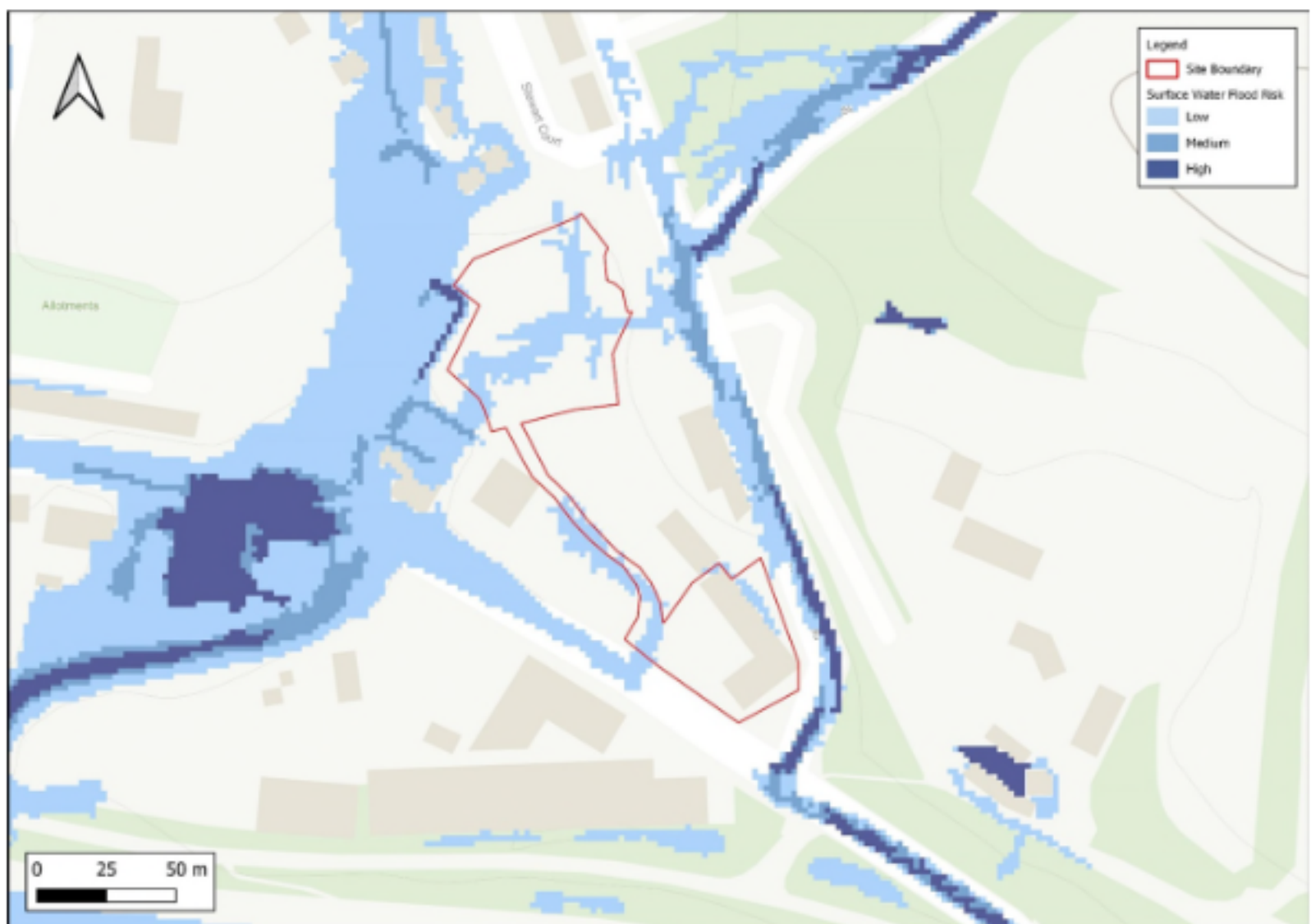


Figure 4 - EA Long Term Flood Risk Map (Surface Water)



Surface water flood risk: water velocity in a low risk scenario
Flood velocity (metres/second)

● Over 0.25 m/s ● Less than 0.25 m/s ➔ Direction of water flow 📍 Location you selected

Figure 5 - EA Long Term Flood Risk Map (Surface Water) - Velocity (Low Risk)

During the Low-risk scenario, there appears to be a flow route through Parcel A with a velocity of >0.25 m/s which directs water through the site in a south westerly direction as shown in Figure 5 above. This flow route is representative of the New Burn River culverted north of Parcel A of the site and emerging in the south-west of Parcel A of the site.

The EA Flood Depth mapping does not take into account the existence of local drainage, sewer networks or the culverted New Burn River. Due to the brownfield nature of the site and its general surroundings, it is assumed that there is an existing sewer network serving the site; therefore, the depths and flows generated throughout the Low-risk scenario are considered to be a 'worst case' assessment of the potential surface water flood risk.

There is no evidence contained within the 2011 SFRA or 2011 PFRA to indicate that the site is at risk of surface water flooding.

As such, the site is concluded to be at 'low' risk of surface water flooding. Mitigation measures are referenced in section 4.2 of this report.

3.3 Groundwater Flood Risk

British Geological Survey (BGS) Mapping shows the site to be underlain by superficial geology described as Till, Devensian (diamicton), underlain by bedrock geology described as Pennine Lower Coal Measures Formation (sandstone). The underlying bedrock deposits are classified as a Secondary A Aquifer. Secondary A Aquifers are defined as 'permeable layers capable of supporting

water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. There are generally aquifers formerly classified as minor aquifers'. According to Soilscales⁴ mapping, the site is located within freely draining floodplain loamy soils.

According to British Geological Survey (BGS) Borehole records, there are several publicly available records registered within 10 m of the north of Parcel A of the site (BGS refs NZ16NE620 and NZ16NE619). The records suggest that all boreholes within a 200 m radius of the site did not encounter groundwater (BGS refs NZ16NE621 - NZ16NE627).

According to the 'Areas Susceptible to Groundwater Flooding' map provided in the 2011 PFRA, the site has 25 - 50 % susceptibility to groundwater flooding (Appendix C).

As such, the site is concluded to be at 'low' risk of groundwater flooding.

3.4 Infrastructure Flood Risk

According to the 2011 SFRA there are no recorded canals within close proximity of the site. Therefore, flood risk from canals is considered to be 'negligible'.

Given the surrounding industrial nature of the site, it is likely there will be a public drainage system serving the area. LiDAR data suggests that any potential flooding arising from a surrounding sewer system will be directed south west. Flow routes on-site and in the surrounding area indicate that any flows would likely be directed in a general southerly direction towards the River Tyne.

Given that the risk of sewer flooding is likely only in the event of failure or blockage, this is considered to be a 'residual' risk, and as such the risk of potential flooding from sewers is concluded to be 'low'.

⁴ [LandIS - Land Information System - Soilscales soil types viewer](#)

The EA Reservoir Failure Extent mapping shows both Parcel A and B of the site to lie wholly within the extents of potential reservoir flooding when there is also flooding from rivers as shown in Figure 6. The EA state that reservoir flooding is extremely unlikely to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the EA ensure that reservoirs are inspected regularly, and essential safety work is carried out.



Maximum extent of flooding from reservoirs:

● when river levels are normal ■ when there is also flooding from rivers ⊕ Location you selected

Figure 6 - EA Reservoir Failure Extent Mapping

3.4.1 Third Party Reports

An addendum by Newcastle city council (2017) updated the 2011 PFRA⁵, stating that in 2012 a section of the New Burn culvert collapsed approximately 400 m north of Parcel A of the site due to flooding. The council have since conducted a city-wide investigation of major culverts to understand their condition and impact should they collapse. Since this, 'A Review of Extreme Events in Newcastle 2012'⁶ was published by Newcastle City Council where it is noted that the group is 'satisfied that the issue of Flood Risk has been properly considered' and mitigated since the events.

As such, the site is concluded to be at 'low' risk of infrastructure flood risk.

⁵ [PFRA_Newcastle_City_Council_2017.pdf \(publishing.service.gov.uk\)](#)

⁶ [Overview and Scrutiny Committee - Review of Extreme Events in Newcastle 2012 - Final.pdf](#)

4. National Planning Policy Framework

4.1 Sequential & Exception Tests

This assessment has demonstrated that the site and surrounding areas are on land designated by the EA's Flood Zone Mapping as Flood Zone 1 (Low Risk). The site is at low / negligible risk from all assessed sources.

Paragraph 023 of the Flood Risk and Coastal Change National Planning Practice Guidance (NPPG) states that the Sequential Test 'is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding.' Given the site's location as wholly within Flood Zone 1 and the 'negligible' and 'low' risk ratings of all other sources of flooding, the Sequential Test is not considered to be required.

The NPPG Flood Risk Vulnerability and Flood Zone Compatibility matrix (Table 2) also indicates that 'less vulnerable' developments are "appropriate" in Flood Zone 1 without application of the Exception Test.

Table 2: Flood Risk Vulnerability and Flood Zone Compatibility Matrix

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3 a	Exception Test required	X	Exception Test required	✓	✓
Zone 3 b	Exception Test required	X	X	X	✓

Accordingly, the application of the Exception Test is concluded to not be required in this instance.

4.2 Mitigation Measures

Whilst an Exception Test is not explicitly required under the NPPG, the following section details any measures recommended to mitigate any 'residual' flood risks and to ensure that the proposed development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, akin to the requirements of section 'b' of the Exception Test as outlined in the NPPG.

4.2.1 Finished Floor Levels

It is recommended that finished floor levels (FFLs) of the on-site substation and site admin enclosure be set at 150 mm above surrounding ground levels in line with building standards. It is also recommended that any electrical equipment / battery storage areas are raised as high as practicably possible, in line with good practice.

An example battery storage unit is shown in Figure 7 below. As shown, surface flows will be able to pass freely beneath the structure.



Figure 7 - Battery Storage Unit - Example

4.2.2 Flow Route Mitigation

Comparing the proposed layout plan with the EA Long Term Flood Risk Map (Surface Water) it can be viewed that the surface water flow route on-site does not directly impact the majority of areas proposed for development. Furthermore, the surface water flow route is only present during the Low risk scenario and is shown to have shallow depths of up to 300 mm. Therefore, it is not considered that the proposed development will have a significant impact on obstructing the surface water flow route.

It is recommended that ground levels are retained as existing to minimise any potential disruption or obstruction of surface water flow routes.

4.2.3 Safe Access and Egress

It is proposed that the site is accessed via the A6085 (High Street) to the south, turning either left or right.

This route is located both in Flood Zone 1 and at Very Low to Low risk of surface water flooding and therefore deemed to be passable by both people and vehicles.

4.2.4 Floodplain Storage

Paragraph 49 of the NPPG states that where development may result in an increase in flood risk elsewhere as a result of 'loss of floodplain storage, the deflection or constriction of flood flow routes or through inadequate management of surface water.' Therefore, where flood storage from any source of flooding is lost, as a result of development, on-site level-for-level compensatory storage should be provided.

On the basis that the site is located in Flood Zone 1, the provision of floodplain compensation is not considered to be required.

5. Summary

This report has been prepared by Hydrock on behalf of our client Fig Power Ltd, in support of a proposed development for a BESS scheme located at Stewart Court, Lemington, Newburn, Newcastle upon Tyne.

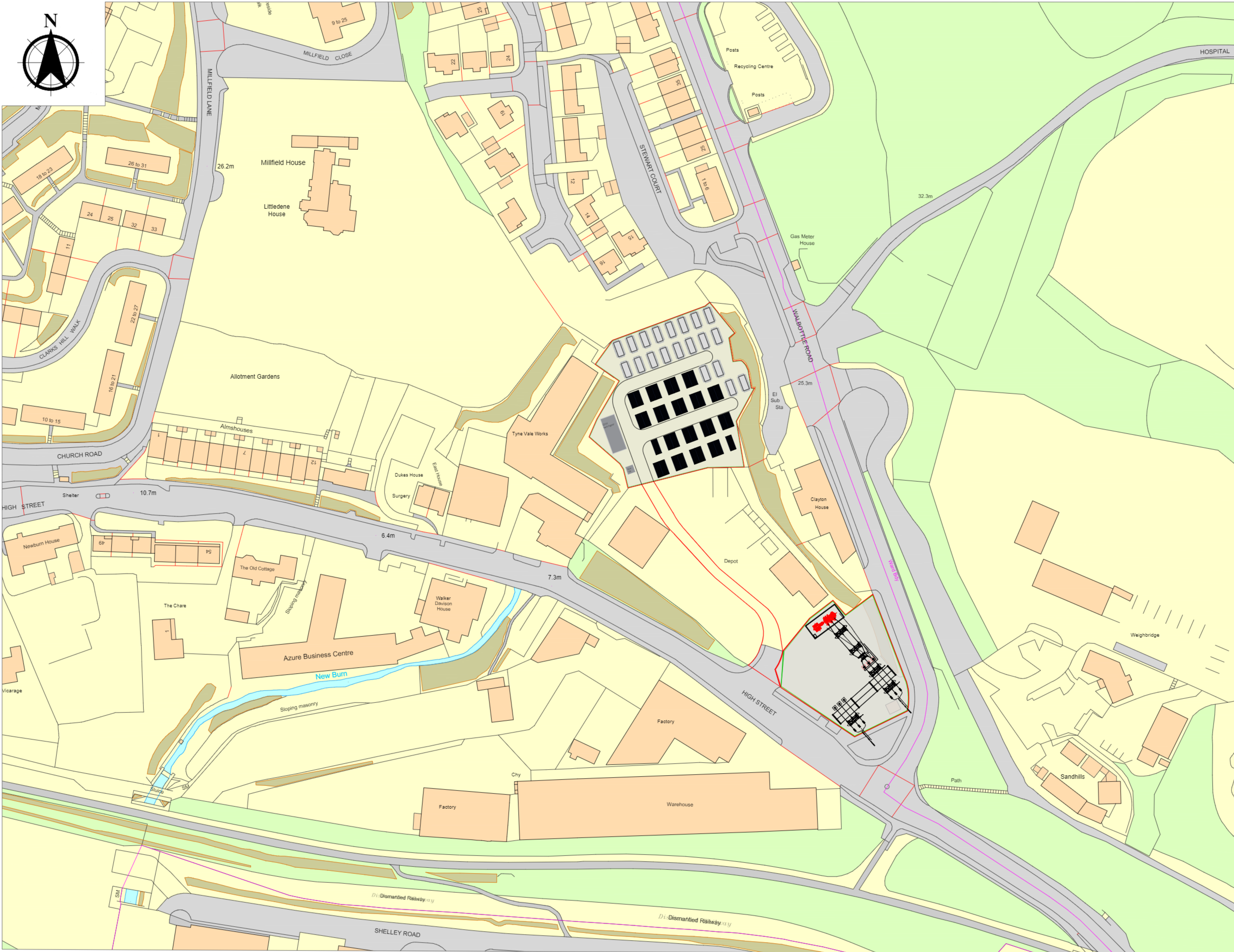
A detailed assessment of flood risk has identified that the site is located wholly within Flood Zone 1 (Low risk). The site is also at low / negligible risk from all assessed sources of flooding.

This report therefore demonstrates that, in the respect to flood risk, the proposed development:

- » Is suitable in location proposed if mitigation measures are considered;
- » Will be adequately flood resistant and resilient;
- » Will not place additional persons at risk of flooding, and will offer a safe means of access and egress;
- » Will not increase flood risk elsewhere as a result of the proposed development through the loss of floodplain storage or impedance of flood flows; and
- » Will put in place measures to ensure surface water is appropriately managed.

As such, the application is concluded to meet flood risk requirements of the NPPF.








Appendix A - Proposed Development Plan



NOTES

Any equipment shown is indicative of dimensions and general appearance and may be subject to minor amendments by the manufacturer or supplier

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- | | |
|---|---------------------|
|  | BATTERY |
|  | PCS AND TRANSFORMER |
|  | CONCRETE PLINTHS |
|  | HARDSTANDING AREA |
|  | FENCE |
|  | GATE |
|  | ON SITE SUBSTATION |

REVISIONS

P01	INITIAL VERSION					
	CL	22/01/24	XX	XX	XX	XX

REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

fig power
firm, flexible energy

CLIENT
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PROJECT NEWBURN BATTERY ENERGY STORAGE SYSTEM

TITLE
SITE LAYOUT
FOR OPERATION

HYDROCK PROJECT NO. 29911	SCALE @ A1 1:500	PAGE NO. X:XXX
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STATUS DESCRIPTION	STATUS
FOR INFORMATION	S2

DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
2991-FIG-DR-0006	P01

Appendix B - Fluvial Flood Risk Map



Appendix C - Areas Susceptible to Groundwater Flooding Map

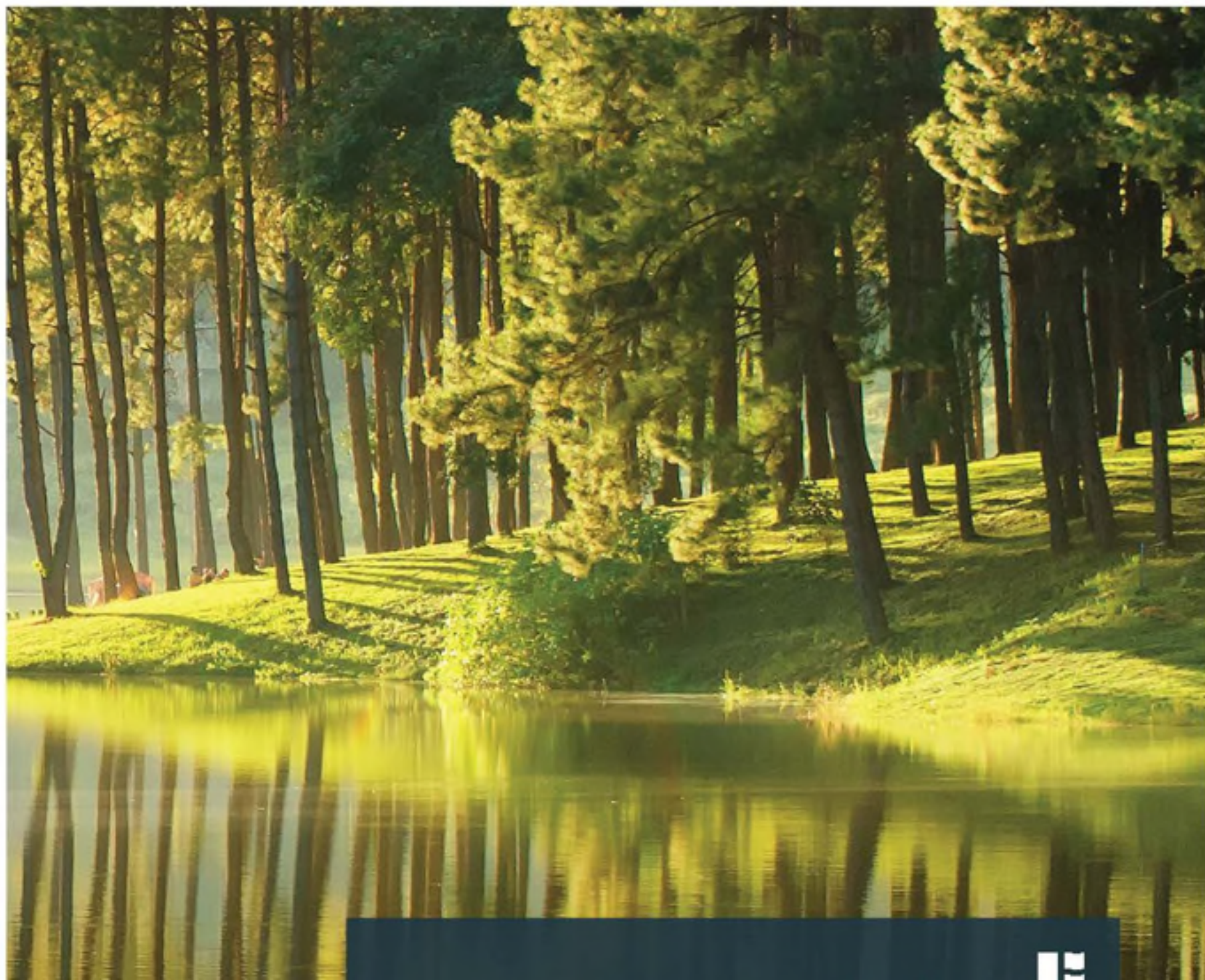
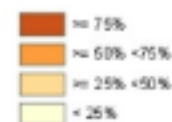


Figure 5-2 Areas Susceptible to Groundwater Flooding

Areas Susceptible to
Groundwater Flooding



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