

**FLOOD RISK ASSESSMENT
FOR INDUSTRIAL DEVELOPMENT AT
WARDENTREE PARK, PINCHBECK**

FINAL REPORT

ECL1266b/VINCENT STUART ARCHITECTURE

DATE JULY 2024

ELLINGHAM CONSULTING LTD

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1.0 INTRODUCTION

This Flood Risk Assessment has been prepared in accordance with National Planning Policy Framework (NPPF) and supporting planning practice guidance (PPG) on Flood Risk and Coastal Change.

In areas at risk of flooding or for sites of 1 hectare or more, developers are required to undertake a site-specific Flood Risk Assessment to accompany an application for planning permission. This Flood Risk Assessment has been produced on behalf of Vincent Stuart Architecture in respect of a development that consists of a bus depot including a cabin to be used as an office, refuelling facility, and washdown at Wardentree Park, Pinchbeck.

A planning application for the proposed development is to be submitted by Vincent Stuart Architecture.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located at Wardentree Park, Pinchbeck, Spalding, PE11 3UG. The National Grid Reference of the site is 52595/32565.

The location of the site is shown in Figure 1.

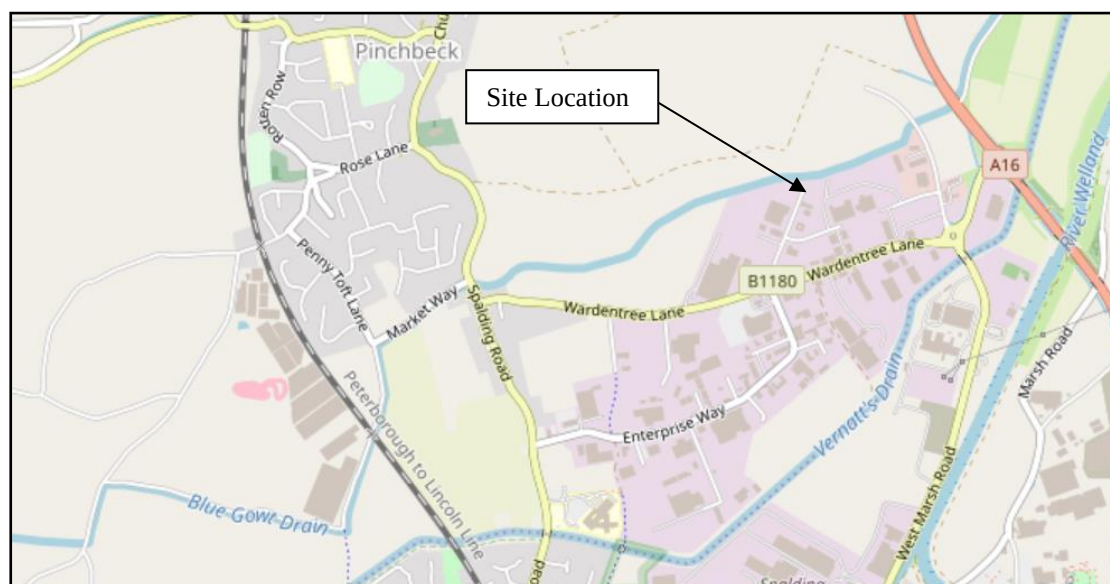


Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the eastern side of Wardentree Park. The site is an industrial area that has been used for parking and storage. The area of development is approximately 0.4 hectares.

A topographic survey of the site has been undertaken and is provided in Attachment 1. Ground levels within the site are between +3.2m OD and +3.7m OD. The carriageway level of Wardentree Park adjacent to the site is typically +3.5m.

The site is in the Welland and Deepings Internal Drainage Board (IDB) District. Surface water at the site would discharge to the local drainage network and hence to the IDB drain system. Scraggs Dyke, an IDB pipeline, is on eastern boundary of the site and Blue Gowt Drain, and IDB Main Drain, forms the northern boundary of the site.

The online British Geological Survey maps indicate that the site is likely to be underlain by Oxford Clay Formation mudstone. The bedrock is shown to be overlain with superficial deposits of clay and silt.

2.3 Proposed Development

The proposed development consists of a bus depot including a cabin to be used as an office, refuelling facility, and washdown. The refuelling facility and washdown will be on a new hardstanding. Details of the proposed development are provided in Attachment 2.

2.4 Local Development Documents

The South East Lincolnshire Local Plan 2011 – 2036, adopted in March 2019, is the Local Plan for the district. Policy 4: Approach to Flood Risk states the requirements for flood risk reduction.

The South East Lincolnshire Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA) was prepared in June 2017.

The Joint Lincolnshire Flood Risk and Drainage Management Strategy has been prepared by Lincolnshire County Council as the Lead Local Flood Authority. The purpose of the Strategy is to increase the safety of people across Lincolnshire by reducing the number of people at risk of flooding, increasing the resilience of local communities, and reducing the impact of flooding

2.5 Available Flood Risk Information

An extract from the Environment Agency Flood Map for Planning is shown in Figure 2. The site is located within Flood Zone 3, an area with a high probability of flooding.

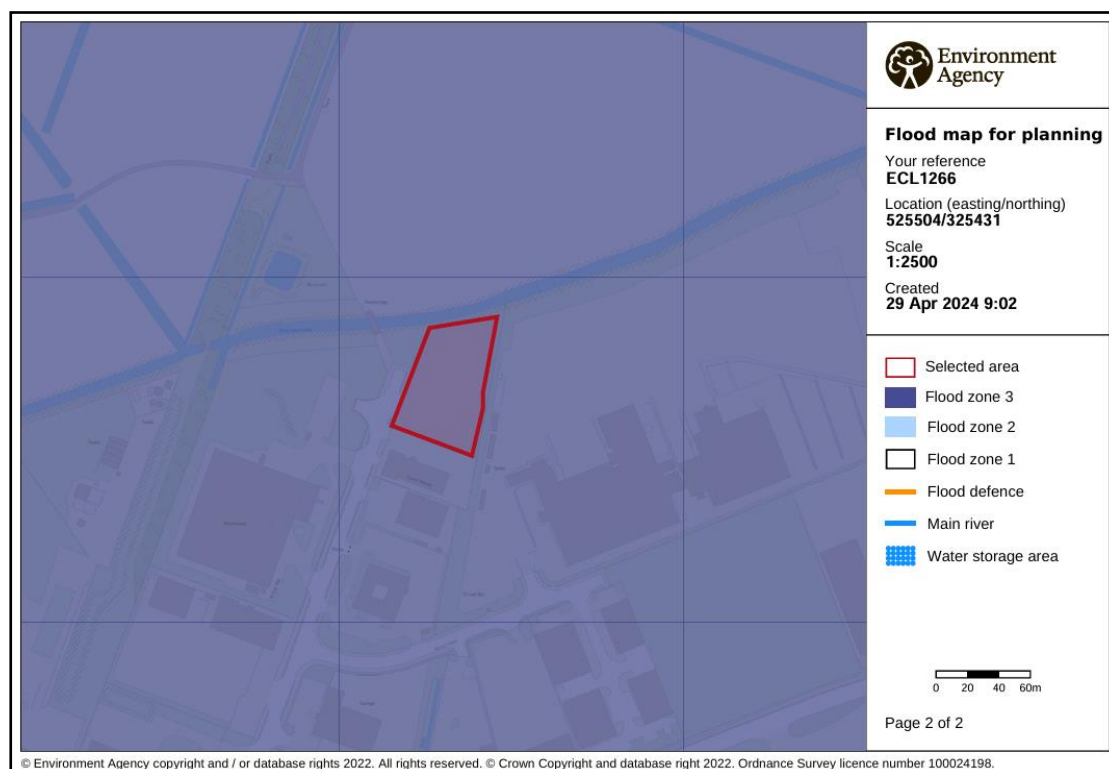


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a low risk of flooding from rivers or the sea (annual probability between 0.1% and 1%);
- the site has a very low risk of surface water flooding (annual probability less than 0.1%); and
- the site is not within an area at risk of reservoir flooding.

Table 1 shows the level of risk at the site within the South East Lincolnshire SFRA.

SFRA Map	Present Day	2116
Residual Flood Hazard Map for the 1% fluvial and 0.5% tidal event	The site is outside the 'Low Hazard' area	Part of the site is in the 'Danger for Most' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal	The site is outside the area at risk	The peak flood depth is 1.0m.

Table 1 – Flood Risk within SFRA Maps

3.0 FLOOD RISK VULNERABILITY

3.1 The Sequential and Exception Test

The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding.

The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

3.2 Vulnerability Classification

Table 2 of the PPG Flood Risk and Coastal Change categorises different types of uses and development according to their vulnerability to flood risk. The proposed development is covered by the description of general industry and is classified as 'Less Vulnerable'.

Table 3 of the PPG Flood Risk and Coastal Change sets out Flood Risk Vulnerability and flood zone 'compatibility'. The site is in Flood Zone 3 and the development is 'Less Vulnerable' therefore it is not necessary to complete the Exception Test.

PPG Flood Risk and Coastal Change defines that the lifetime of the development in terms of flood risk and coastal change is 100 years.

3.3 Application of the Sequential Test

It is for the Local Planning Authority, using the evidence provided and taking advice from the Environment Agency as appropriate, to consider whether an application passes the Sequential Test.

Large parts of the South Holland district close to the River Welland lie within Flood Zone 3. As such opportunities to undertake the development at an alternative site with a lower flood risk are limited. At this location it is not possible to position the development on higher ground within the proposed site.

The River Welland has defences that provide protection during the 0.5% annual probability (1 in 200 chance each year) event. Considering that the use of the site is similar to previous uses together with the standard of protection provided by the Environment Agency defences the site is considered to pass the Sequential Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is approximately 850m west of the River Welland downstream of Spalding. The River Welland tidal defences, which are downstream of the confluence of the Coronation Channel and River Welland, provide protection to Pinchbeck. The tidal defences are the responsibility of the Environment Agency.

There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated periodically.

There is an extensive local drainage network managed by Welland and Deepings IDB. There is an IDB maintained watercourse, the Blue Gowt Drain, on the northern boundary of the site and an IDB pipeline, Scraggs Dyke, on the eastern boundary of the site. The site and the surrounding land are within the Pinchbeck catchment and drain in a north westerly direction to Pinchbeck Marsh Pumping Station. Pinchbeck Marsh Pumping Station discharges to Vernatts Drain which flows into the River Welland at Surfleet.

During the operation and maintenance of its pumping stations, associated structures, and channel systems, the IDB seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought.

Current maintenance standards of the Welland and Deepings IDB and the Environment Agency are generally good.

4.2 Sources of Flooding

A summary of the sources of flooding is provided in Table 2.

Source of Flooding	Level of Risk
Drainage Network Flooding	The risk is assessed in Section 4.3.
Surface Water Flooding	Based upon the EA maps the risk is very low.
Fluvial Flooding	The risk is assessed in Section 4.3.
Tidal Flooding	The risk is assessed in Section 4.3.
Reservoir Flooding	Based upon the EA maps the site is not at risk of reservoir flooding.
Groundwater Flooding	There is no evidence to suggest the site is at risk of groundwater flooding.

Table 2 – Sources of Flooding

4.3 Probability of Flooding

The probability of flooding associated with blockages in the Welland and Deepings IDB drainage system is low due to the maintenance standards achieved and managed by the IDB.

Through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 years and 1 in 100 years, respectively. The risk associated with flood events that exceed the standard of protection provided is lowered due to the Welland & Deeping IDB main drains incorporating freeboard. This freeboard provides storage during the exceedance events.

The River Welland tidal defences provide protection during the 0.5% annual probability (1 in 200 chance each year) tidal event including climate change.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded.

4.5 Climate Change

Climate change is likely to impact the site through increased rainfall intensity and duration affecting the local drainage network and increased flood levels.

The River Welland tidal defences have been designed to include an allowance for climate change.

In summary the existing systems and defences are appropriate for the design life of the development (i.e., 100 years).

4.6 Residual Risk

There is a residual risk of flooding at the site should a tidal breach occur. The South East Lincolnshire SFRA includes maps demonstrating the residual peak depth in 2115. When climate change allowances are applied to the 1% annual probability (1 in 100 chance each year) fluvial event and 0.5% annual probability (1 in 200 chance each year) tidal event the peak depth at the site is 1.0m. An extract from the SFRA map is shown in Figure 3 below.

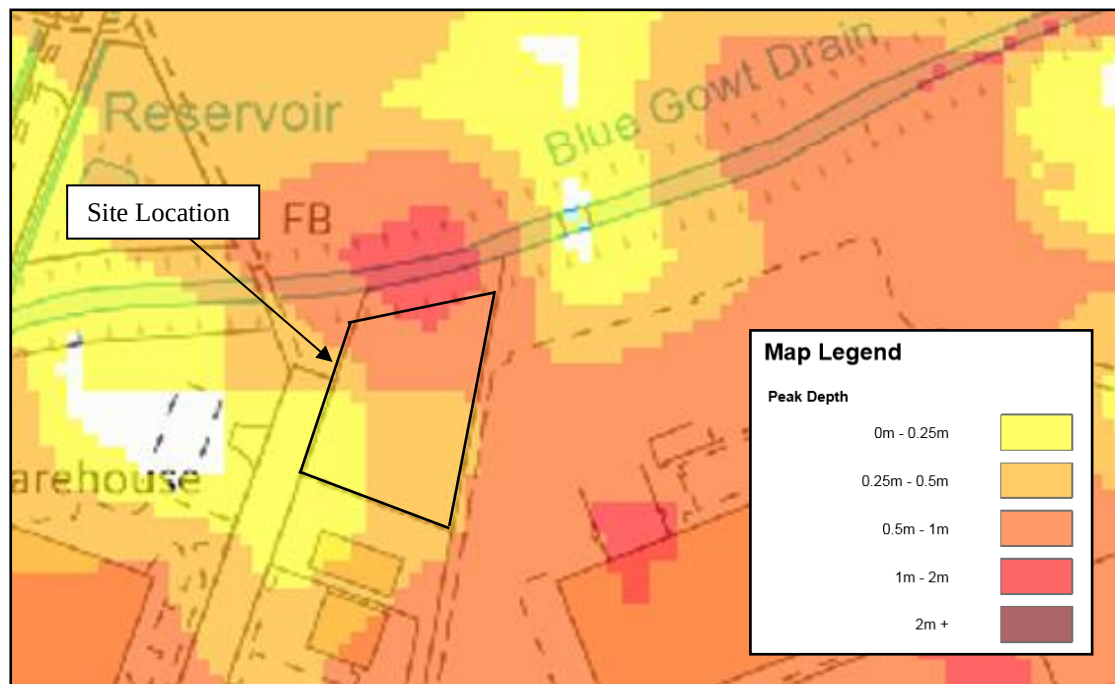


Figure 3 – SFRA 2116 Residual Peak Depth Map during the 1% fluvial and 0.5% tidal Annual Probability Event

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Pinchbeck Marsh Pumping Station could lead to an increased level of risk at the site.

The probability of the site flooding from any Environment Agency system is less than 0.5% annual probability (1 in 200 chance each year) because of the standards of the existing flood defence systems. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development it is not anticipated that the site would flood.

The SFRA considers the residual risk associated with overtopping and a breach in the defences in 2116. During the 0.5% annual probability (1 in 200 chance each year) plus climate change event the maximum flood depth at the site is 1.0m. The proposed fuel tank is located in an area with a peak flood depth of 0.25m.

The proposed arrangement increases the impermeable area and therefore there will be an increased volume of surface water that has the potential to increase flood risk.

5.2 Flood Risk Mitigation Measures

The proposed site layout has considered the IDB byelaw that there should be no obstruction within 9m of a Board's Watercourse. The cabin, refuelling facility and washdown are located on the western side of the site and are therefore not within the byelaw area.

The PPG states that resistance and resilience measures may be suitable in some circumstances. One example given when it is suitable is as a measure to manage residual flood risk. The mitigation measures required at this site are to manage the residual risk from a breach in the defences therefore flood resilience is appropriate.

Considering the nature and scale of the risk it is recommended that:

- the user of the site should register to receive flood warnings from the Environment Agency to reduce the vulnerability of people at the site;
- the user of the site should identify the actions to be undertaken in the event of receiving a flood warning;
- the electrical supply and switchboard are elevated above the flood level;
- the fuel tank is secured to the hardstanding by an anchor.

Should there be a failure of Pinchbeck Marsh Pumping Station and conditions were such to put properties and land at risk of flooding, the IDB would take emergency action to maintain the drainage level of service by using temporary pumping equipment.

5.3 Water Management

There is no formal drainage system within the existing site. Surface water infiltrates through the surface into the ground below. Within the areas of the site to be used for parking there will be no change to the management and disposal of surface water.

There is an existing hardstanding on the western boundary of the site. The cabin, which will be used as an office, will be sited on this existing hardstanding. At present surface water from the hardstanding discharges as sheet runoff to the surrounding ground and infiltrates. There are no proposals to change this arrangement.

Welland and Deepings Internal Drainage Board advised that runoff from the washdown facility would need to be discharged to the Anglian Water foul system. The Anglian Water wastewater plan covering the site is provided in Attachment 2. It is proposed that runoff from the new hardstanding is discharged into a channel drain with a grated or slotted inlet on the southern side of the hardstanding. It is recommended that the runoff is passed through an interceptor prior to discharge to the Anglian Water foul sewer within the carriageway of Wardentree Park.

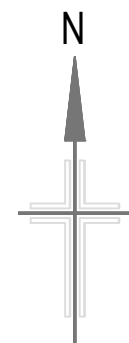
6.0 CONCLUSIONS

As a result of the assessment, the following conclusions have been reached.

- The proposed development consists bus depot including a cabin to be used as an office, refuelling facility, and washdown at Wardentree Park, Pinchbeck, Spalding.
- The site is located within an Internal Drainage Board catchment and through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 and 1 in 100 years, respectively.
- The proposed development is in Flood Zone 3. The proposed development benefits from tidal defences on the River Welland that provide protection the 1% annual probability (1 in 100 chance each year) fluvial event and 0.5% annual probability (1 in 200 chance each year) tidal event including climate change.
- There is a residual risk associated with a breach of the defences with flood depths at the site up to 1.0m.
- It is recommended that flood resilience measures are adopted to manage the risk of a breach including the use of flood warnings, elevated electrical services, and the anchoring of the fuel tank.
- The development passes the Sequential Test and is therefore suitable for the proposed location.

ATTACHMENT 1

**TOPOGRAPHICAL SURVEY
(Dwg P24-00384 01)**



Notes

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Grid : OS National Grid.
Using the OS GPS Network and applying OSTN15 transformation and then removing the scale factor for true distances with a one-step transformation centred on S2

Datum : OS Level Datum.
Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections.

Station Listing			
Station	Easting	Northing	Level
S1	525471.517	325414.982	3.530
S2	525513.695	325403.894	3.231
S3	525497.988	325463.806	3.399
S2A	525471.628	325444.875	3.908

KEY				
AIR VALVE	AV	○	JUNCTION BOX	JB
BENCH MARK	BM	■	KERB OUTLET	KO
BIN	○	○	LAMP POST	LP
BOLLARD	BOL	○	MANHOLE (CIRCULAR)	MH
BORE HOLE	BH	○	MANHOLE (RECTANGULAR)	MH
BUSINESS TELECOM COVER	BT	□	MANHOLE (TRIANGULAR)	MH
BUS STOP	BUS	□	MARKER POST	MKP
CABLE TV COVER	CATV	○	GULLY	GU
CABLE TV SUPPLY	CATV	+	ROOFTOP EYE	RE
COLUMN	COL	+	SIGN POST	SIGN
DROPPED KERB	DK	—	TELECOM COVER	TC
EARTHING POINT	EP	○	TELEGRAPH POLE	TP
ELECTRICITY COVER	ELEC	○	THRESHOLD LEVEL	TL
ELECTRICITY POLE	EP	○	TRAFFIC LIGHT	TL
FIRE HYDRANT	FH	○	TRIAL PIT	TP
GAS VALVE	GV	○	WASH OUT	WO
GATE		—	WATER METER	WM
INSPECTION COVER (CIRCULAR)	IC	○	WATER STOP COOK	SC
INSPECTION COVER (RECTANGULAR)	IR	□	WATER STOP VALVE	SV
COVER LEVEL	CL		CHAMBER BASE LEVEL	Ch.L
INVERT LEVEL	IL		WATER SURFACE LEVEL	WL
UNABLE TO RAISE	UTR		UNABLE TO MEASURE	UTM
GIRTH OF TREE TRUNK	G		DIAMETER OF TREE TRUNK	D
HIGHEST TOP OF TREE CANOPY	H		MULTI BOLT TREE	MB

Rev	Date	Drawn	Description	Check



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Client
VINCENT STUART ARCHITECTURE
ILKLEY

Site STAGECOACH, SPALDING DEPOT
BERVOR CLOSE, SPALDING

Title

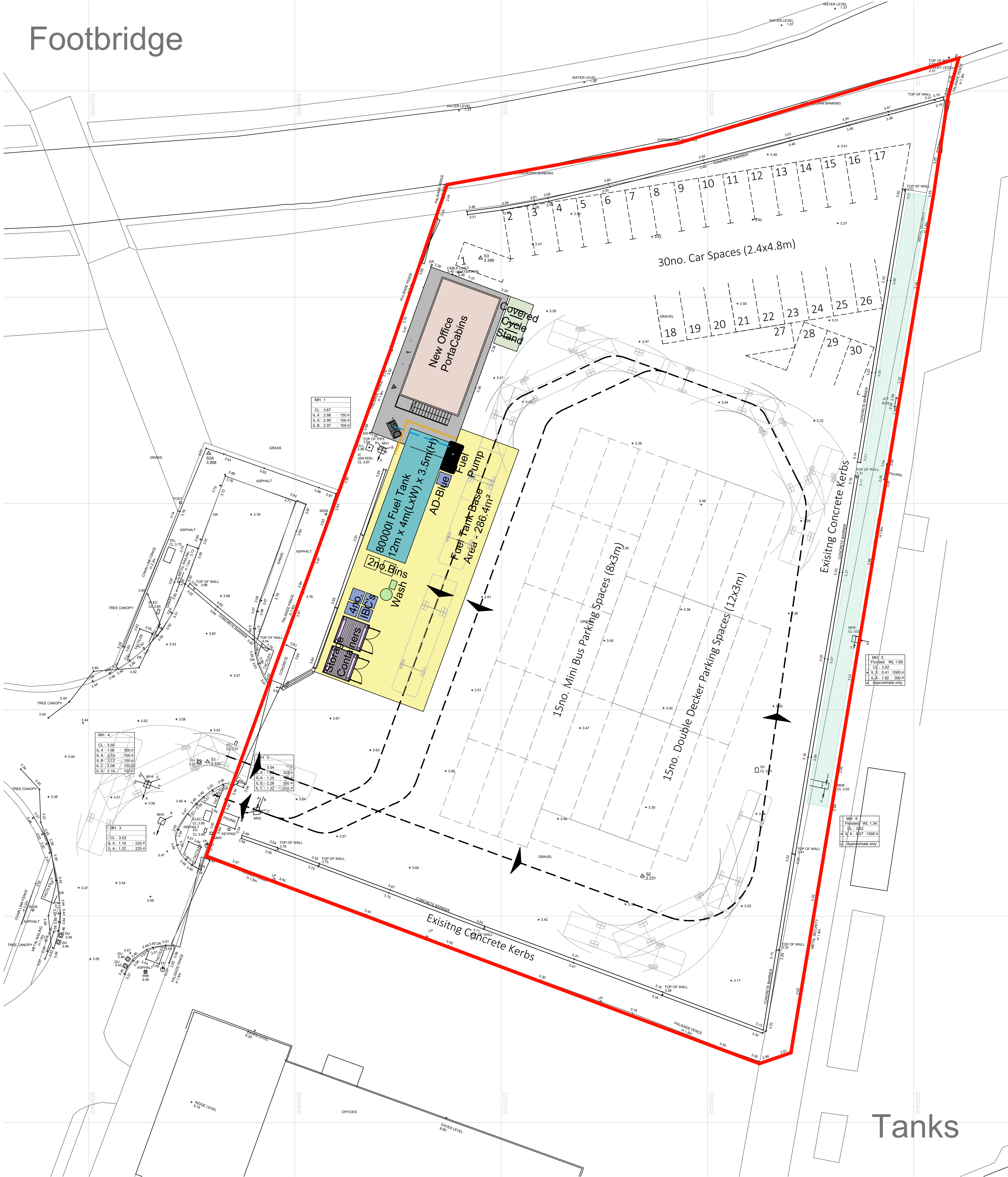
TOPOGRAPHICAL
SURVEY

Surveyed	SB, HB		Drawn	SB			
Check	DA		Date	02/05/2024			
Scale	Job No		Sheet	Rev			
1:200	P24-00384		A1	01			
OWG Ref							
Project Number	Origin	Zone	Level	Desc	Type	Role	Sheet
P24-00384	MET	EXT	XX	TOP	M2	G	001

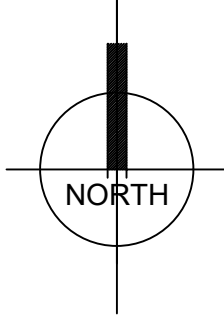
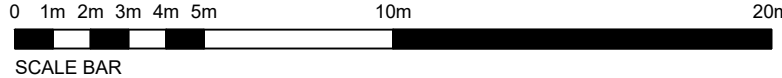
ATTACHMENT 2

PROPOSED SITE LAYOUT (Dwg 220001-I)

Footbridge



PROPOSED SITE LAYOUT PLAN - 1:200



SITE KEY :

- Ownership Boundary
- Ad-Blue + 4no. IBC's
- Fuel Tank (12m x 4m x 3.5m high)
- Office - Cabin (40ft x 20ft)
- Storage Containers (2no. 9ft x 9ft)
- Bus Walkaround Wash
- New Hardstanding (Approx. 368m²) to S.E. Information - Nominal: 250mm thick C35 concrete slab with 2 x layers of A393 mesh. Min. cement content of 340
- Existing Hardstanding (17m x 7.95m)
- Covered Cycle Stand
- Potential Drainage Route dependent on permissions.
- New Electrical Connections Required from existing Distribution box to New Cabins and Fuel Tank and Bus Wash.
- New 60min Fire Separation Wall, approx. height 300mm higher than fuel tank.
- Mixed species native shrub belt along 60m long and 2m wide includes hawthorn, blackthorn, dog rose, hazel and wild privet.

Revision	Description	Date	Drawn	Checked
i	Minor amendment. to cycle stand location.	17-07-2024	RVF	RVF
H	Minor Amends. of Fuel and Bus Wash and Circulation route.	05-07-2024	RVF	RVF
G	Topographical Survey Overlayd on Proposed Layout.	17-05-2024	RVF	RVF

Project:	
Spalding Depot, Wardentree Park, PE11 3UG	
Sheet Title:	
Proposed Site Layout	
Client:	Scale:
Stagecoach Services Ltd	1:200 @ A1
Drawn:	Suitability:
RVF	S02
Checked:	
RVF	
Date:	
07-03-2024	
UPRN - Originator - Zone - Level - Type - Role - Dwg No. - Rev.	
024009 - VSA - XX - XX - DR - A - 22001 - i	

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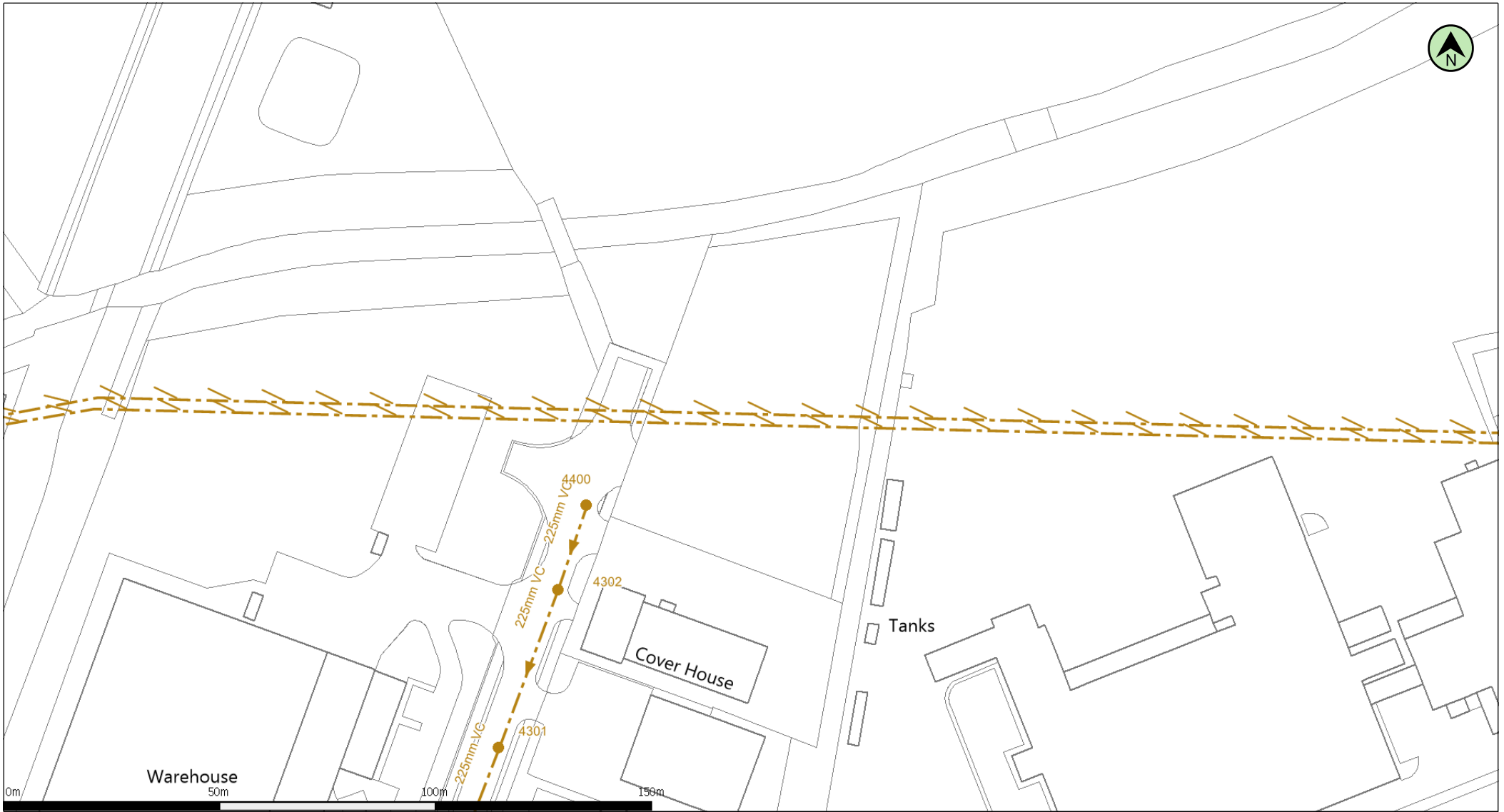
NOTES:

- All work to be carried out in accordance with the building regulations and the requirements of the local authority.
- Do not scale from this drawing - use figured dimensions only.
- The contractor shall check and verify all levels and dimensions on site before work commences.
- Drawing to be read in conjunction with all other consultants/specialists drawings. report any discrepancies before affected work commences.
- On site alterations to the construction or finishes shown or implied on this drawing must be drawn to the attention of the architect before such work is implemented.

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ATTACHMENT 3

ANGLIAN WATER WASTEWATER PLAN



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Date: 25/04/24

Scale: 1:1250

Map Centre: 525504,325431

Data updated: 31/03/24

Our Ref: 1454489 - 2

Wastewater Plan A4

This plan is provided by Anglian Water pursuant to its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2024 Ordnance Survey 100022432. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer	--- --	Outfall*
Surface Sewer	----	
Combined Sewer	----	
Final Effluent	----	Inlet*
Rising Main*	----	
Private Sewer*	----	
Decommissioned Sewer*	----	Manhole*

⊕	Sewage Treatment Works	□
⊕	Public Pumping Station	●
●	Decommissioned Pumping Station	●

*(Colour denotes effluent type)

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Wardentree Park

love every drop

anglianwater

