FLOOD RISK ASSESSMENT
FOR COMMERCIAL DEVELOPMENT AT
CRESSWELL CLOSE, PINCHBECK

FINAL REPORT

ECL0803a/ROBERT BOOR

DATE AUGUST 2023

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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 Industro Tech Ltd in respect of a development that consists of two industrial buildings at Cresswell Close, Pinchbeck.

A full planning application for the proposed development is to be submitted by Robert Boor.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located at 5 Cresswell Close, Pinchbeck, Spalding, PE11 3TY. The National Grid Reference of the site is 52530/32488.

The location of the site is shown in Figure 1.



Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is an industrial premises located to the northern side of Creswell Close. The site consists of one industrial unit and the surrounding hardstanding. This site is within an industrial estate to the south of Pinchbeck. The area of development is approximately 0.20 hectares.

Environment Agency LiDAR data shows that the site is flat with ground levels typically between +3.0m OD and +3.2m OD.

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. The Pennygate Pup Drain, an IDB Main Drain, is located 450m west 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 two industrial units. The existing unit at the site will be dismantled and the steel frame used for one of the new units. Details of the proposed warehouse are provided in Attachment 1.

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.

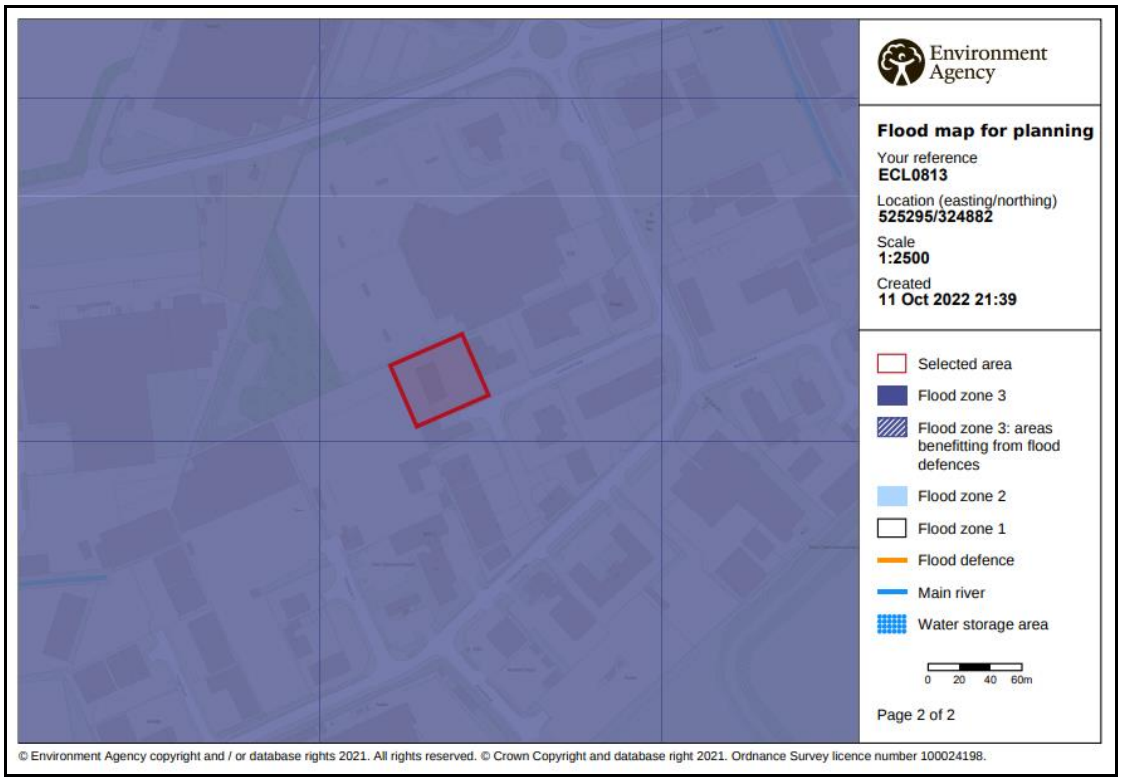


Figure 2 – Environment Agency Flood Map for Planning

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	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 between 0.5m and 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 SFRA states that it is necessary to use the refined flood risk information (hazard and depth maps) to assist with the application of the sequential test. The refined flood risk information contained within the SFRA demonstrates the site is not at risk during the 1% fluvial event and 0.5% tidal event. The site therefore has a low probability of flooding and is considered to pass the Sequential Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is approximately 800mm 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 watercourses, the Pennygate Pup Drain, 450m to the west 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

The potential sources of flooding that have been identified during this assessment are:

- local blockages to the Welland and Deepings IDB main drain system;
- an event in the local drainage network greater that exceeds the standard of protection;
- failure of Pinchbeck Marsh Pumping Station; and
- overtopping and / or breaching of the River Welland tidal defences.

Based upon the Environment Agency Long Term Flood Risk Maps the area of the site where the warehouse will be located is not at risk of surface water flooding. As such surface water flooding has not been considered further in this assessment.

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 between 0.5m and 1.0m. An extract from the SFRA map is shown in Figure 3 below.

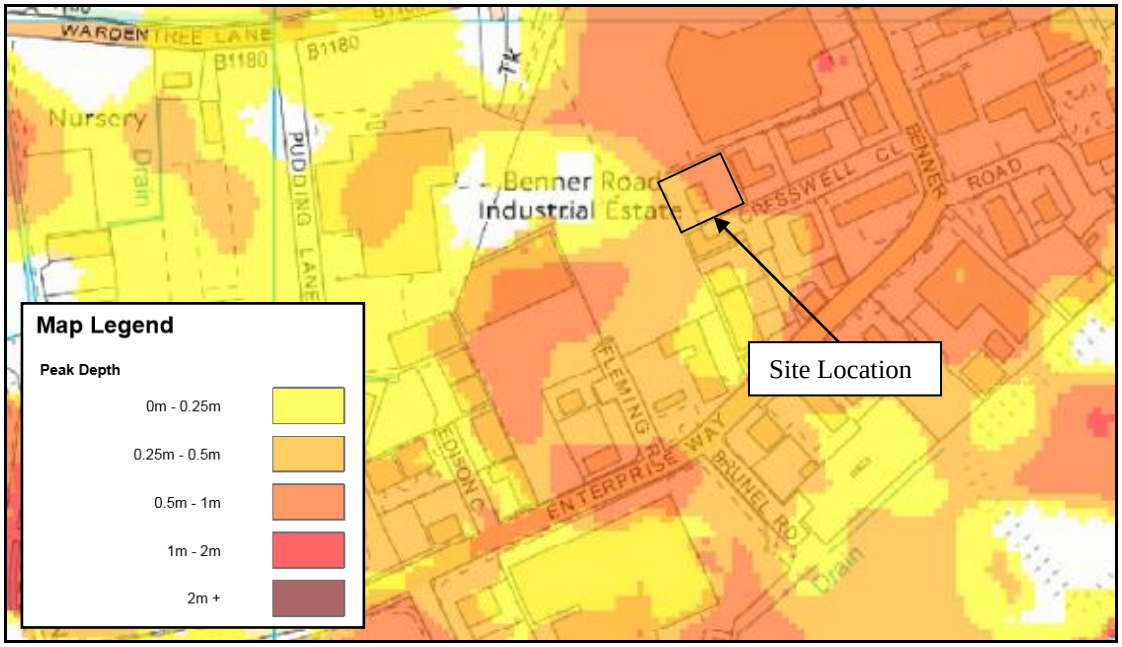


Figure 3 – SFRA 2116 Residual Peak Depth Map during the 1% fluvial and 0.5% tidal Annual Probability Event

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 is between 0.5m and 1.0m.

There will be no increase in impermeable area associated with the development so there is no potential that flood risk will be increased elsewhere due to surface water.

5.2 Mitigation Measures

The NPPF Planning Practice Guidance (PPG) on Flood Risk and Coastal Change provides direction regarding Making Development Safe from Flood Risk. Paragraphs 059 and 060 advise on flood resistance and flood resilience. It states that the first preference should be to avoid flood risk by raising it above the flood level. For this development this is not practical.

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 finished floor levels of the warehouse is a minimum of 0.15m above surrounding ground levels and the following resilience measures are considered:

- there is a water entry strategy allowing flood water to enter the warehouse and drain freely from it;
- the main electrical supply and switchboard are elevated above the flood level;
- the user of the site should register to receive flood warnings from the Environment Agency to reduce the vulnerability of people at the site; and
- the user of the site should identify the actions to be undertaken in the event of receiving a flood warning.

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.

The existing site is 100% impermeable. The proposed development introduces some minor areas of landscaping that will reduce the total impermeable area. It is recommended that surface water run-off is managed so that stormwater from the site will not affect any adjoining properties or increase the flood risk elsewhere.

6.0 CONCLUSIONS

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

- The proposed development consists of two industrial units at 5 Cresswell Close, Pinchbeck.

- 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.

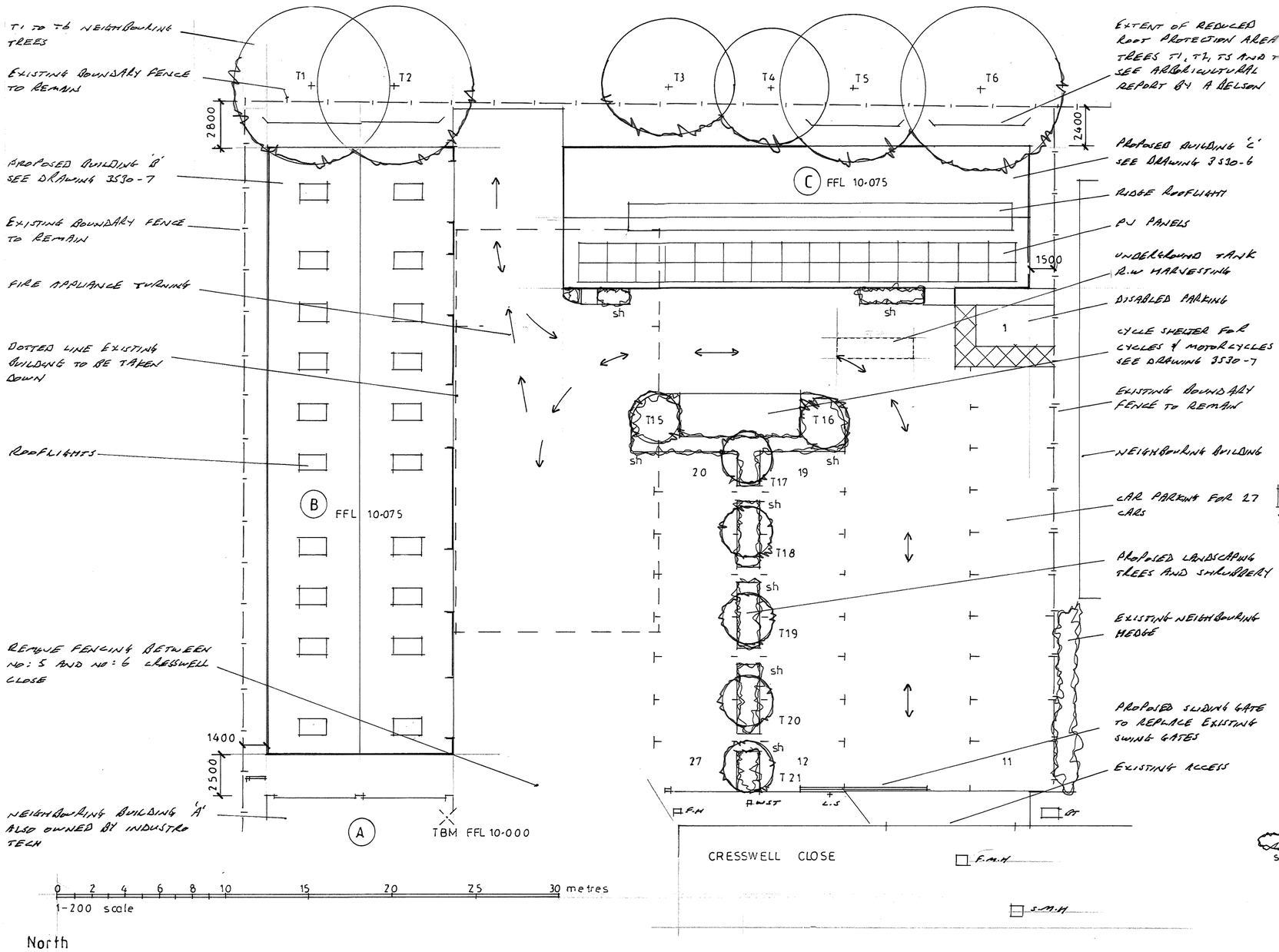
- The proposed development is in Flood Zone 3. The proposed development benefits from tidal defences on the River Welland that provide protection the 1% annual probability (1 in 100 chance each year) fluvial event and 0.5% annual probability (1 in 200 chance each year) tidal event including climate change.

- There is a residual risk associated with a breach of the defences. Based upon the information available during the preparation of this Flood Risk Assesessment, it is recommended that the finished floor level is a minimum of 0.15m above surrounding ground levels and flood resilience measures are adopted to manage the risk of a breach. These include a water entry strategy, reducing the vulnerability of people and safe access and egress.

- The development passes the Sequential Test and is therefore suitable for the proposed location.

ATTACHMENT 1

SITE PLAN PROPOSED
(Dwg 3530-8)



SITE MATERIALS
- CAR PARKING TO BE IN RED BRICK PAVERS
- YARD AREAS FOR VEHICLE MANOEUVRING TO BE IN CONCRETE
- SPACE BETWEEN BUILDINGS AND BOUNDARIES TO BE GRAVEL ON HARDCORE

BIRD BOXES
TO NORTH SIDE OF BUILDING 'C' UNDER GUTTER INSTALL 5 NO SWIFT NEST BOXES

Contractor To Check All Dimensions On Site Before Work Commences.

Rev.	Date.	Init.	Revision Details.

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Project.
INDUSTROTECH LTD.
5 CRESSWELL CLOSE,
PINCHBECK.

Drawing.
SITE PLAN PROPOSED

Scale.	Drawing. No.
1-200	3530-8
Drawn. RMB	
Date. JUNE 2023	Rev.

LANDSCAPING

T16 DENOTES TREES
- TREES T1 TO T6 ON SUPERMARKET SITE TO THE NORTH TO BE RETAINED WITH TRIMMING/PRUNING TO FACILITATE PROPOSED WORKS
- TREES T7 TO T13 ON NEIGHBOURING SITE TO EAST ARE GRADE C AND SELF SET. THESE TREES REMOVED BY OWNER OF ADJOINING SITE AS THEY WERE DAMAGING CLADDING TO BUILDING
- TREES T15 TO T21 ARE PROPOSED AND THESE TO BE SORBUS AUCUPARIA (ROWAN) FROM THE HILLIER STREETWISE RANGE
- NEW TREES TO BE HEAVY STANDARDS 12-14 cm
- TREES TO BE SECURED USING 2 NO 75x75 TREATED TIMBER STAKES TO SUPPORT BOTTOM 1/3 OF TREE. SINK STAKES MIN 1500 mm INTO GROUND. 75 x 40 CROSSBAR NAILED TO STAKES. SECURE TREE TO CROSSBAR WITH FLEXIBLE TIE AND SPACER
- LATE SUMMER/EARLY AUTUMN PREPARE GROUND CLEARING UNWANTED VEGETATION. BREAK UP COMPACTED SOIL. TREAT TO ERADICATE WEEDS.
- PLANTS TO BE SET IN SUITABLE CONDITIONS IN FIRST WINTER SEASON AFTER BUILDING WORKS COMPLETE
- TREES TO BE SET IN PITS WITH MIN 75mm CLEARANCE AROUND ROOTS AND BACK FILL WITH A MIXTURE OF TOPSOIL AND COMPOST/MANURE 3:1 RATIO
- PROVIDE BARK MULCHING AROUND TREE
- THOROUGHLY WATER TREES PRIOR TO APPLYING MULCH

sh DENOTES SHRUBBERY
- TO BE FROM THE BERBERIS EVERGREEN RANGE EG FRIGARTII OR TELSTAR, ULTIMATE HEIGHT NOT TO EXCEED 1200 mm
- PLANTS TO BE SET AT 900 CTRS (MATRIX
- PLANTS TO BE 20-30 CM IN 2 LITRE POTS
- PLANTS TO BE SET IN PITS WITH MIN 75mm CLEARANCE AROUND SOIL BALL
- BED AND SURROUND SOIL BALL WITH PLANTING MIXTURE, 1 PART TOPSOIL TO 1 PART PEAT SUBSITUTE
- LAY MULCHING TO ALL OF GROUND
- THOROUGHLY WATER PLANTS PRIOR TO APPLYING MULCH

GENERAL MAINTENANCE
- FOR FIRST 5 YEARS MAINTAIN ALL PLANTS
- ENSURE MULCH IS MAINTAINED AND REMOVE ANY WEEDS MANUALLY
- REPLACE ANY DEAD STOCK
- IN PERIODS OF DRY WEATHER USUALLY MARCH-AUGUST ENSURE PLANTS ARE WATERED AND THIS TO BE CARRIED OUT BEFORE LEAVES SHOW SIGN OF WILTING

BOUNDARY TREATMENT
- EXISTING BOUNDARY FENCING TO NORT, EAST AND WEST TO REMAIN.
- EXISTING FENCE TO SOUTH REMOVE SECTION BETWEEN NO: 5 & NO: 6 CRESSWELL CLOSE
- EXISTING SWING GATES IN ACCESS TO BE REMOVED WITH SLIDING GATE APPROX 7.5 METRE CLEAR OPENING.

LEVELS
- GROUND FLOOR LEVEL TO BUILDING B AND C TO BE SET ABOVE SURROUNDING GROUND LEVELS SO ANY FLOOD WATERS DRAIN AWAY FROM BUILDINGS
- LEVELS ON THE BOUNDARY LINE TO REMAIN AS EXISTING
- LEVELS WITHIN SITE TO FALLS FOR DRAINAGE PURPOSES