Highfields Centre, New North Road, Huddersfield, HD1 5LS

NPPF: Flood Risk Assessment

For San Pedro Properties Ltd

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Highfields Centre, New North Road, Huddersfield, HD1 5LS	
Project	NPPF: Flood Risk Assessment
Client	San Pedro Properties Ltd
Status	Final
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EXECUTIVE SUMMARY

Residential apartments 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.

1.0 INTRODUCTION

1.1 Background

This Flood Risk Assessment (FRA) has been prepared by KRS Environmental Limited at the request of San Pedro Properties Ltd to support a planning application for the proposed development at the Highfields Centre, New North Road, Huddersfield, HD1 5LS. This FRA includes an assessment of the existing and proposed surface water drainage of the site.

This FRA has been carried out in accordance with guidance contained in the National Planning Policy Framework (NPPF)[1] and associated Planning Practice Guidance[2]. 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 source;
- 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.

1.3 Report Structure

This FRA has the following report structure:

- Section 2 describes the location area and the existing and proposed development;

[1] Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework..
[2] Communities and Local Government (2014) Planning Practice Guidance - Flood Risk and Coastal Change.

- Section 3 outlines the flood risk to the existing and proposed development;
- Section 4 details the foul water discharge destination;
- Section 5 details the proposed surface water drainage for the site and assesses the potential impacts of the proposed development on surface water drainage;
- Section 6 outlines mitigation measures used to reduce the overall level of flood risk;
- Section 7 details the sequential and exception tests; and
- Section 8 presents a summary and conclusions.

2.0 LOCATION & DEVELOPMENT DESCRIPTION

2.1 Site Location

The site is located on New North Road, Huddersfield, HD1 5LS (see Figure 1). The National Grid Reference (NGR) of the site is 413891, 417165.

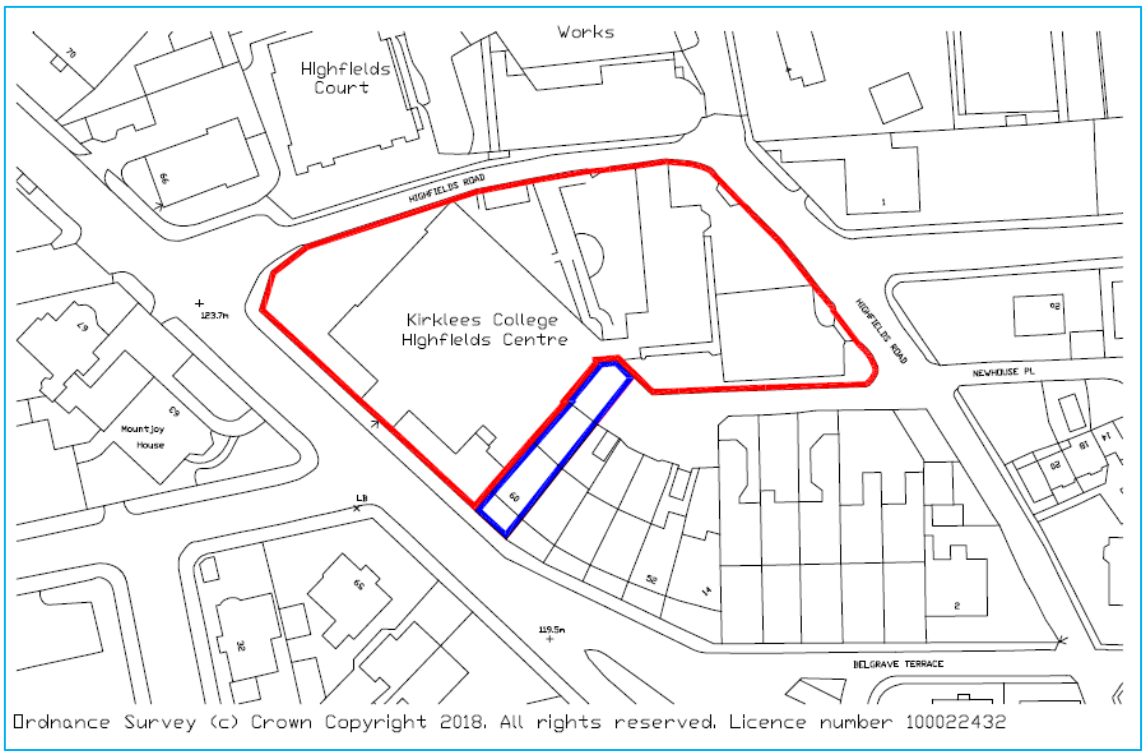

Figure 1 - Site Location

2.2 Existing Development

The site currently consists of former college buildings.

2.3 Proposed Development

It is understood that the development proposals comprise the conversion of the former college buildings into 33 residential apartments (see Appendix 1). The existing use of the cellar will not change. The proposed development will include enhanced landscaping of the grounds to include improved planting, reduced impermeable areas and a bog garden-rainwater pond. Further details with regard to the proposed development can be found in the accompanying information submitted with the planning application.

2.4 Catchment Hydrology

The River Colne is located approximately 1km to the east of the site. The Huddersfield Broad Canal is located approximately 900m to the east of the site and a pond is located approximately 60m to the north east of the site.

2.5 Ground Levels

The site ground level is approximately 120 metres Above Ordnance Datum (mAOD).

2.6 Ground Conditions

Due to the historic use of the site, it is likely that the site is underlain by Made Ground. The British Geological Survey (BGS) map shows that the site is not underlain by superficial deposits. The bedrock deposits consist of Middle Band Rock – Sandstone. Sedimentary bedrock formed approximately 318 to 319 million years ago in the Carboniferous Period in a local environment previously dominated by swamps, estuaries and deltas. Information from the National Soil Resources Institute[3] details the site area as being situated on freely draining slightly acid loamy soils.

2.7 Groundwater

The Environment Agency has designated the bedrock deposits as designated as secondary A. Geology that exhibit 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. These are generally aquifers formerly classified as minor aquifers.

2.8 Source Protection Zone

The site is not located within an Environment Agency Source Protection Zone.

2.9 Permeability/Infiltration Rate

In determining the future surface runoff from the site, the potential of using infiltration devices has been considered. An overview of the general ground conditions may be used to gauge if there is potential for their application. The general ground conditions suggest that the permeability and infiltration rate of the site will be low and infiltration devices such as soakaways may not work at the site.

If an infiltration system is proposed, it is recommended that a series of infiltration/soakaway tests are carried out on site to BRE Digest 365 Guidelines to confirm the assumptions made in the calculations. Such work is beyond the scope of this report but should be undertaken to inform the detailed drainage strategy for the site.

[3] https://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 Environment Agency Data

Information regarding the current flood risk at the application site and local flood defences has been obtained from the Environment Agency.

3.3 Kirklees Council

Kirklees Council is the Local Panning Authority (LPA) and the Lead Local Flood Authority (LLFA) and has responsibilities for 'local flood risk', which includes surface runoff, groundwater and ordinary watercourses. Planning guidance written by Kirklees Council regarding flood risk was consulted to assess the mitigation policies in place. In particular, the Calder Strategic Flood Risk Assessment (SFRA), the Kirklees Council Preliminary Flood Risk Assessment (PFRA), and the Kirklees Council Local Flood Risk Management Strategy which cover the site have been reviewed.

3.4 Historic Flooding

Environment Agency records show that the site and surrounding area has not historically flooded. The British Hydrological Society "Chronology of British Hydrological Events" does not list any records of flooding at the site. There are no other records of anecdotal information of flooding at the site. No other historical records of flooding for the site have been recorded. Therefore, it has been concluded that the site has not flooded in the recent past.

3.5 Environment Agency Flood Zones

A review of the Environment Agency's Flood Zones indicates that the site is located within Flood Zone 1 and therefore has a 'low probability' of flooding with a 1 in 1000 annual probability of river flooding (<0.1%) in any year, as shown in Figure 2.

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. The Environment Agency Flood Zones and acceptable development types are explained in Table 1. Tables 1 and 2 show that all development types are acceptable in Flood Zone 1.

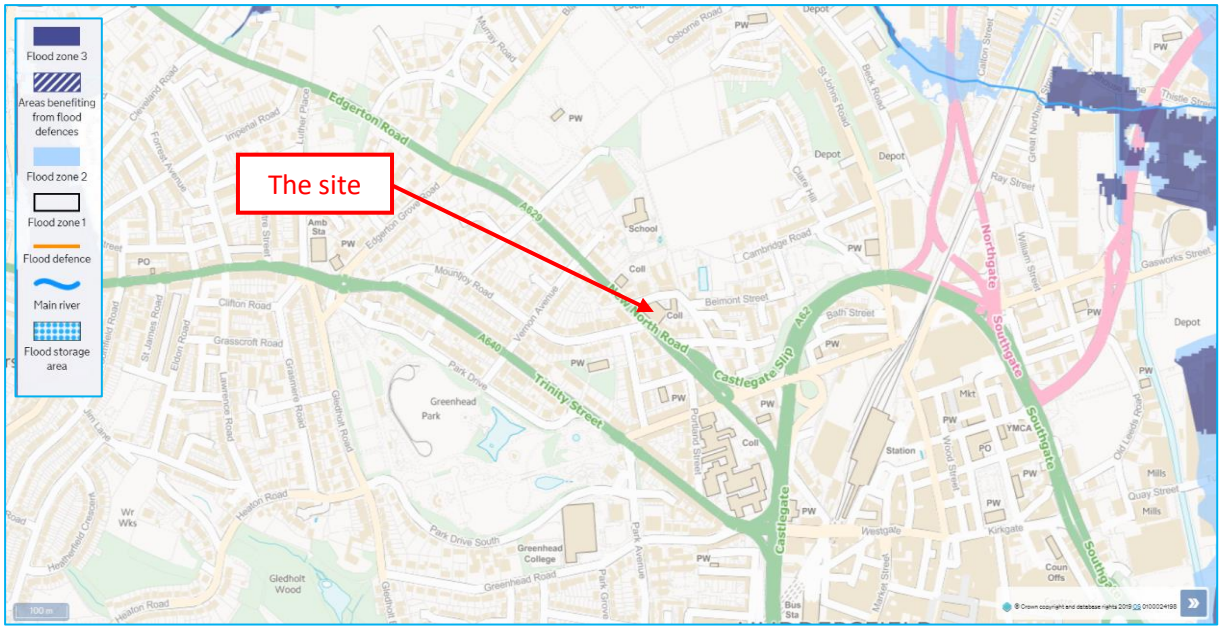

Figure 2 - Environment Agency Flood Zones

Table 1 - Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land Use
Zone 1	Low	Less than 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'	Land where water has to be flow or be stored in times of flood. SFRAs should identify this zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1% flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes)	Some development types not acceptable

3.6 Flood Risk Vulnerability

In the Planning Practice Guidance to the NPPF, appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in the Planning Practice Guidance to the NPPF, the proposed development is classified as 'more vulnerable', 'more vulnerable' uses are appropriate within Flood Zone 1.

Table 2 - Flood Risk Vulnerability and Flood Zone 'Compatibility' as identified in Table 3 of the Planning Practice Guidance to the NPPF

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.*

3.7 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 FRAs. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the Flood risk assessments: climate change allowances guidance[4].

Table 3 shows the peak river flow climate change allowances by river basin district. There is reasonable level of certainty that the future impacts of climate change will lie somewhere between the central and upper allowances. The flood risk assessments: climate change allowances guidance recommends that for 'more vulnerable' uses in Flood Zone 1 that the central allowance be used. Therefore, the design flood level for the site is the 1 in 100 year (+20%) event.

Table 3 - Peak River Flow Allowances by River Basin District (use 1961 to 1990 baseline)

River basin district	Allowance category	2015 to 2039	2040 to 2059	2060 to 2119
Humber	Upper end	+20%	+30%	+50%
	High central	+15%	+20%	+30%
	Central	+10%	+15%	+20%

3.8 Fluvial (river) Flooding

The Environment Agency's Flood Zones (see Figure 2) show that the site will not be inundated with floodwater for all events up to and including the 1 in 1000 year event. The site will be flood free during the 1 in 1000 year event. The site is not located within the vicinity of fluvial flooding sources and the risk of fluvial flooding is considered to be **not significant**.

3.9 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**.

[4] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances.

3.10 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).

The risk from groundwater flooding is negligible. Therefore, the risk of flooding from groundwater flooding is considered to be **not significant**.

3.11 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 development.

Surface water flood maps are generated by routing rainfall over a Digital Terrain Model (DTM). DTM data is gathered using aerial survey techniques and then filtered to remove buildings and trees to generate ground levels.

3.11.1 Extents

The Environment Agency Surface Water flood map shows that the majority of the site has a very low risk of surface water flooding with a chance of flooding less than 1 in 1000 (0.1%) years (see Figure 3). No surface water flooding of the building is shown to occur.

Only a very small proportion of the site, to the north at the location of the car park, is shown to be at risk of surface water flooding. This area is shown to have a low to a high risk of surface water flooding with a chance of flooding of between 1 in 1000 (0.1%) years to greater than 1 in 30 (3.3%) years.

The surface water flooding is shown as overland flow following the local topography down New North Road from the north west, the local topography then falls to the east at the junction with Highfield Road. The surface water is shown flowing over the pavement on the junction of New North Road and Highfield Road, then flowing over the small upstand on the boundary of the site before ponding on the car park to the north of the site. The car park is approximately 2.00m below the ground level of New North Road.

The proposed development will include enhanced landscaping of the grounds of the site to include improved planting, reduced impermeable areas and a bog garden-rainwater pond. These measures will manage and reduce the overall flood risk at the site. Furthermore, there is an existing dished drainage channel runs which runs along the north and west boundary of the building within the car park. This intercepts surface water runoff before it reaches the building.

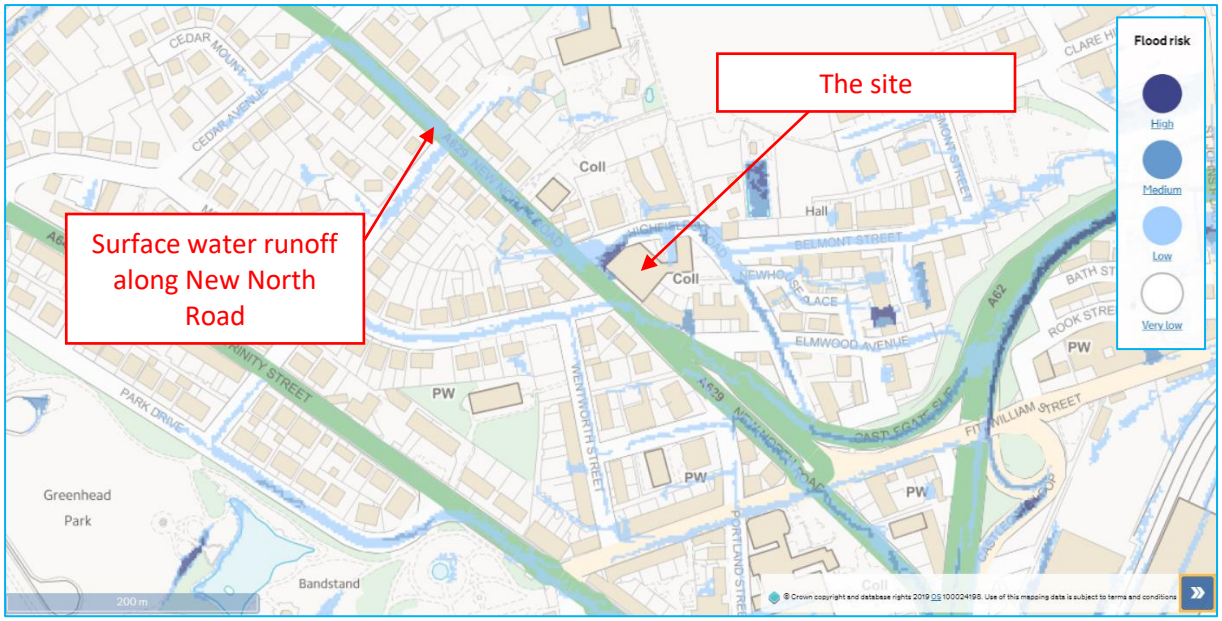

Figure 3 - Environment Agency Surface Water Flood Map

3.11.2 Depths

The Environment Agency Surface Water flood map shows that the majority of the site would not experience flooding however, a very small proportion of northern part of the site being the car park area may experience depths of less than 300mm during the high risk event which has a chance of flooding of 1 in 30 (3.3%) years (see Figure 4) and between 300mm and 900mm during the medium and low risk events which has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) years (see Figure 5) and between 1 in 1000 (0.1%) and 1 in 100 (10%) years (see Figure 6).

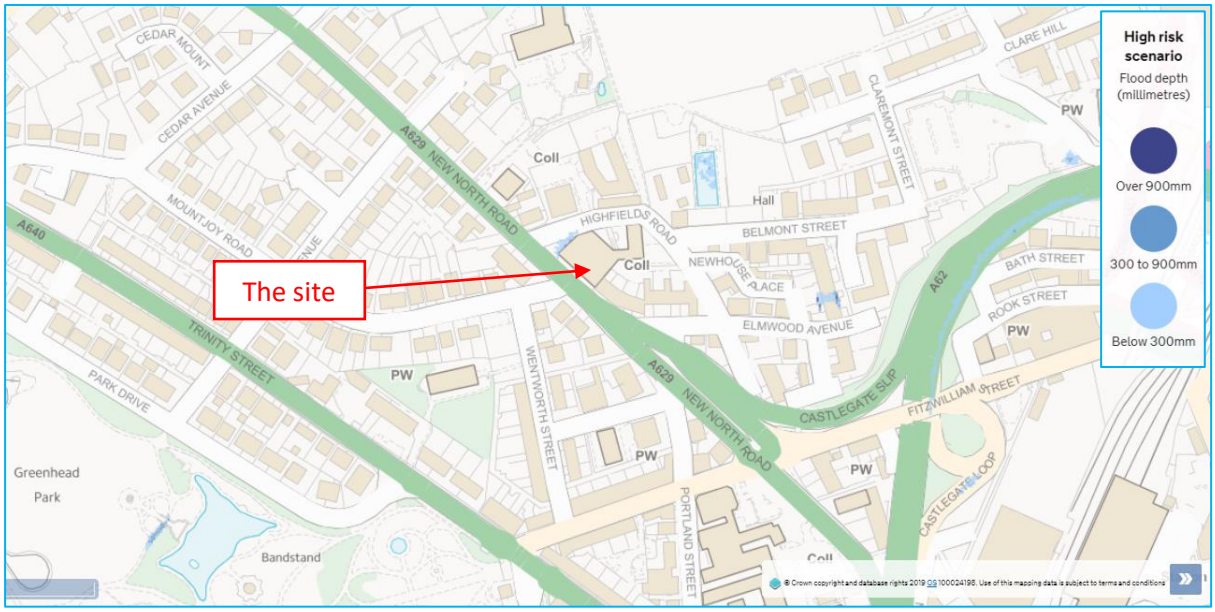

Figure 4 - High Risk: Environment Agency Surface Water Flood Depth Map

Figure 5 - Medium Risk: Environment Agency Surface Water Flood Depth Map

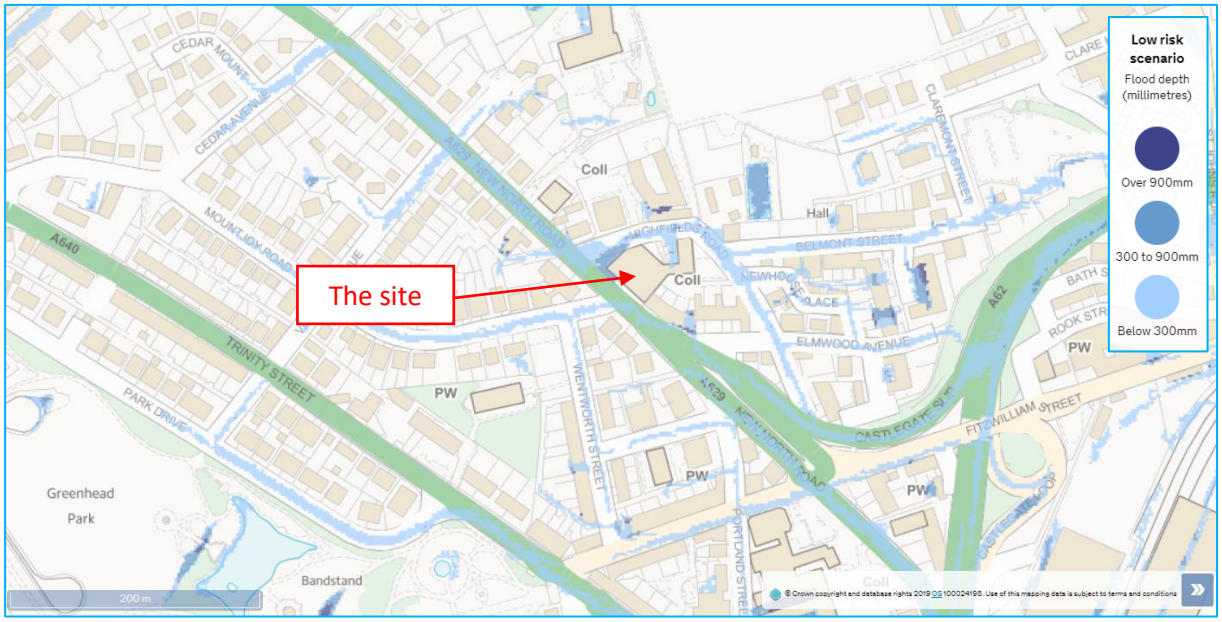

Figure 6 - Low Risk: Environment Agency Surface Water Flood Depth Map

3.11.3 Velocities

The Environment Agency Surface Water flood map shows that the area of the site may experience velocities of less than 0.25m/s.

3.11.4 Hazard

Using a conservative estimate of water velocity of 0.25m/s and a maximum water depth of between 300mm and 900mm any flooding would result in a '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 this 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.

3.11.5 Conclusions

Aerial photography shows that the areas shown to be at risk of surface water flooding, to the north of the site i.e. the carpark, coincides with the presence of a lower ground level to the adjacent roads of New North Road and Highfields Road. The difference in level of the car park to the adjacent roads is approximately 2.00m. The surface water flooding is shown as overland flow along New North Road. The proposed development will include enhanced landscaping of the grounds of the site to include improved planting, reduced impermeable areas and a bog garden-rainwater pond. These measures will manage and reduce the overall flood risk at the site. Furthermore, there is an existing dished drainage channel runs which runs along the north and west boundary of the building within the car park. This intercepts surface water runoff before it reaches the building.

Any resulting flooding would be expected to be very infrequent or have a very low predicted depth and affect the car park area of the site only and not the building. Therefore, the risk of flooding from surface water flooding is considered to be of **low significance**. 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 5.0).

3.12 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.

Sewers 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 30 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**.

3.13 Flooding from Artificial Drainage Systems/Infrastructure Failure

There are no nearby artificial water bodies, reservoirs, water channels and artificial drainage systems that could be considered a flood risk to the site. Figure 6 shows that the site is not at risk of flooding from reservoir failure. The risk of flooding from artificial drainage systems/infrastructure failure is considered to be **not significant**.

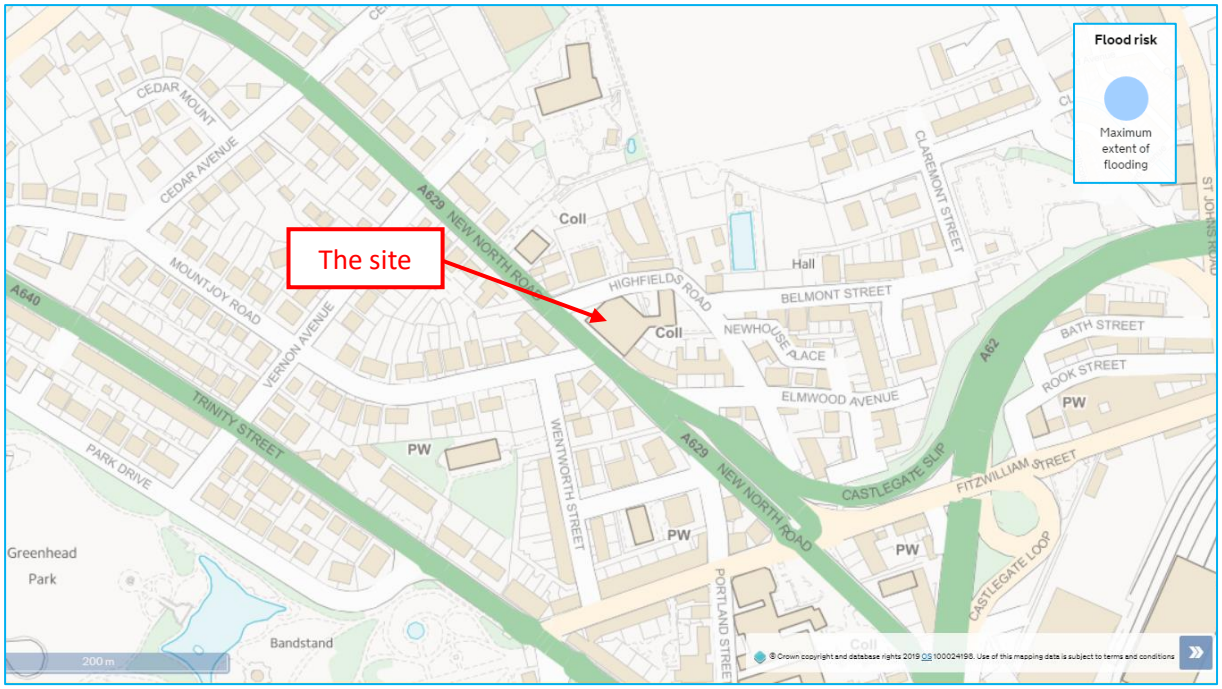

Figure 7 - Environment Agency Reservoir Flood Map

3.14 Site Specific Flood Risk Assessment

A summary of the sources of flooding and a review of the risk posed by each source at the site is shown in Table 4.

Table 4 - Risk Posed by Flooding Sources

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

The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal). The majority of the site has a very low risk of surface water flooding with a chance of flooding less than 1 in 1000 (0.1%) years. No surface water flooding of the building is shown to occur. Only a very small proportion of the site, to the north at the location of the car park, is shown to be at risk of surface water flooding. This area is shown to have a low to a high risk of surface water flooding with a chance of flooding of between 1 in 1000 (0.1%) years to greater than 1 in 30 (3.3%) years.

This may result in water depths of less than 300mm during the high risk event which has a chance of flooding of 1 in 30 (3.3%) years and between 300mm and 900mm during the medium and low risk

events which has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) years and between 1 in 1000 (0.1%) and 1 in 100 (10%) years. Water velocities would be less than 0.25m/s and any flooding would result in a 'low' flood hazard with a 'flood zone with shallow flowing water or deep standing water'

The surface water flooding is shown as overland flow following the local topography down New North Road from the north west, the local topography then falls to the east at the junction with Highfield Road. The surface water is shown flowing over the pavement on the junction of New North Road and Highfield Road, then flowing over the small upstand on the boundary of the site before ponding on the car park to the north of the site. The car park is approximately 2.00m below the ground level of New North Road.

Furthermore, there is an existing dished drainage channel runs which runs along the north and west boundary of the building within the car park. This intercepts surface water runoff before it reaches the building.

Any resulting flooding would be expected to be very infrequent or have a very low predicted depth and affect the car park area of the site only and not the building. Therefore, the risk of flooding from surface water flooding is considered to be of **low significance**.

The flooding sources will only inundate the site to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development site. 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 5.0).

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. The topography of the site will not be altered therefore; the overland flow routes will not be altered. The proposed development proposes minimal new structures and will therefore allow floodwater to pass through the site with no effect on the conveyance routes.

The proposed development will improve the sites resilience, resistance to flooding and by using property level protection measures to protect the site from flooding the vulnerability of the site will be improved. 'More vulnerable' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA.

In conclusion, the flood risk to the site can be considered to be limited; the site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources. The site is unlikely to flood except in very extreme conditions.

4.0 SURFACE WATER DRAINAGE

4.1 Surface Water Management Overview

It is recognised that consideration of flood issues should not be confined to the floodplain. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. For example, replacing vegetated areas with roofs, roads and other paved areas can increase both the total and the peak flow of surface water runoff from the development site. Changes of land use on previously developed land can also have significant downstream impacts where the existing drainage system may not have sufficient capacity for the additional drainage.

An assessment of the surface water runoff rates has been undertaken, in order to determine the surface water options and attenuation requirements for the site. The assessment considers the impact of the development compared to current conditions. Therefore, the surface water attenuation requirement for the developed site can be determined and reviewed against existing arrangements.

The requirement for managing surface water runoff from developments depends on the pre-developed nature of the site. If it is an undeveloped greenfield site, then the impact of the development will need to be mitigated so that the runoff from the site replicates the natural drainage characteristics of the pre-developed site. In the case of brownfield sites, drainage proposals will be measured against the existing performance of the site, although it is preferable for solutions to provide runoff characteristics that are similar to greenfield behaviour.

The surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development, unless specific off-site arrangements are made and result in the same net effect.

It should be acknowledged that the satisfactory collection, control and discharge of surface water runoff are now a principle planning and design consideration. This is reflected in recently implemented guidance and recently released National Sustainable Drainage Systems (SuDS) Standards.

4.2 Surface Water Runoff Rates

It is understood that the existing surface water discharges to the public sewers and the drainage infrastructure at the site efficiently and effectively manages surface water runoff generated at the site. As there is no history of surface water flooding at the site it is likely that the current drainage system is sufficient for the current and proposed site use.

The site is currently occupied by former college buildings, the ground surface at the location of the site hardstanding. The proposed development will include enhanced landscaping of the grounds of the site to include improved planting, reduced impermeable areas and a bog garden-rainwater pond. These measures will manage and reduce the surface water runoff and reduce off-site risk.

The amount of impermeable surfaces will reduce post-application compared to pre-application by way of improved landscaping and planting around the site and the addition of a bog-garden-rainwater pond.

The surface water runoff from the developed site will be reduced post-application. There will be a reduction in surface water runoff and reduced off-site risk as a result of the development. The risk

of flooding from surface water is considered to be low and it is likely that the current drainage system is sufficient for the proposed use.

5.0 RISK MANAGEMENT

5.1 Introduction

The flood risk at this location is considered suitable for 'more 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.

A number of techniques and mitigation strategies to manage and reduce the overall flood risk in the area will be used. 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.

5.2 Finished/Threshold Floor Levels

The finished floor levels will be no lower than the existing ground levels. The existing finished floor levels and threshold levels are raised above the external ground level by a minimum of 100mm. It is recognised however that owing to limited headroom constraints, massing, planning policy and Building Regulations it is considered impractical to raise the finished floor levels further. Therefore, in order to mitigate against this, it is recommended that the occupants of the proposed dwelling sign up to receive flood warnings from the Environment Agency and implement a flood evacuation plan to a safe area away from the building during times of flood. It is also proposed that flood protection measures are employed within the building design to reduce the overall risk to the occupants. This is discussed below.

A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

5.3 First Floor Accommodation

Accommodation will be located on the first floor as well as the ground floor. This will allow residents to retreat to higher floor levels if needed. The level of the first floor is to be located well above any floodwater levels. This will provide a 'safe haven' above the any flood water levels. The upper floors will be accessed via internal stairs and are sufficient in size to safely house all occupants of the dwelling. The 'safe haven' will only be required in very extreme events or if a flood warning has not been received.

5.4 Flood Resistance

Flood risk can be mitigated through the design of the building. Flood resistance measures are measures that help resist floodwaters entering a property (airbrick covers are an example of a flood resistance measure). Flood resistant measures will be used, including:

- The walls of the building are thick.
- Sealant will be used around external doors and windows.

- All external doors and windows will be constructed from hard wearing materials.
- The existing dished drainage channel runs which runs along the north and west boundary of the building within the car park will be retained. This intercepts surface water runoff before it reaches the building.

These factors will prevent water entering the property and make the property more resistant to seepage.

5.5 Flood Resilience

Flood resilience measures are designed in such a way as to reduce the cost and time required to reinstate the property should it be flooded (tiled floors are an example of a flood resilience measure).

The building will be constructed in such a way that although floodwater may enter the building, elements that are damaged by floodwater can be easily repaired or replaced. This is a form of flood resilience. They are suitable as no other measure is practicable. Robust materials and finishes will be used, including:

- all electrics wiring, switches, sockets, socket outlets etc. will be located a minimum of 450mm above the finished floor level.

5.6 Flooding Consequences

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.

6.0 SEQUENTIAL APPROACH

6.1 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). The proposed development site complies with the sequential approach, as the site is located within Flood Zone 1, which should be applied at all stages of planning. Therefore, the Sequential Test will not need to be undertaken as part of this planning application.

6.2 Exception Test

Applications located within Flood Zone 1 are not subject to the Exception Test as confirmed within Table 2 of the Planning Practice Guidance to the NPPF.

7.0 SUMMARY AND CONCLUSIONS

7.1 Introduction

This report presents an FRA in accordance with the NPPF for the proposed development at Highfields Centre, New North Road, Huddersfield, HD1 5LS.

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.

7.2 Flood Risk

The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal). The majority of the site has a very low risk of surface water flooding with a chance of flooding less than 1 in 1000 (0.1%) years. No surface water flooding of the building is shown to occur. Only a very small proportion of the site, to the north at the location of the car park, is shown to be at risk of surface water flooding. This area is shown to have a low to a high risk of surface water flooding with a chance of flooding of between 1 in 1000 (0.1%) years to greater than 1 in 30 (3.3%) years.

This may result in water depths of less than 300mm during the high risk event which has a chance of flooding of 1 in 30 (3.3%) years and between 300mm and 900mm during the medium and low risk events which has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) years and between 1 in 1000 (0.1%) and 1 in 100 (10%) years. Water velocities would be less than 0.25m/s and any flooding would result in a 'low' flood hazard with a 'flood zone with shallow flowing water or deep standing water'

The surface water flooding is shown as overland flow following the local topography down New North Road from the north west, the local topography then falls to the east at the junction with Highfield Road. The surface water is shown flowing over the pavement on the junction of New North Road and Highfield Road, then flowing over the small upstand on the boundary of the site before ponding on the car park to the north of the site. The car park is approximately 2.00m below the ground level of New North Road.

The proposed development will include enhanced landscaping of the grounds of the site to include improved planting, reduced impermeable areas and a bog garden-rainwater pond. These measures will manage and reduce the overall flood risk at the site. Furthermore, there is an existing dished drainage channel runs which runs along the north and west boundary of the building within the car park. This intercepts surface water runoff before it reaches the building.

Any resulting flooding would be expected to be very infrequent or have a very low predicted depth and affect the car park area of the site only and not the building. Therefore, the risk of flooding from surface water flooding is considered to be of **low significance**.

The flooding sources will only inundate the site to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development site. 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.

The overall direction of the movement of water will be maintained within the developed site and surrounding area. The proposed development proposes minimal new structures and will therefore allow floodwater to pass through the site with no effect on the conveyance routes.

The proposed development will improve the sites resilience, resistance to flooding and by using property level protection measures to protect the site from flooding the vulnerability of the site will be improved. 'More vulnerable' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA.

In conclusion, the flood risk to the site can be considered to be limited; the site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources. The site is unlikely to flood except in very extreme conditions.

7.3 Surface Water Drainage

It is understood that the existing surface water discharges to the public sewers and the drainage infrastructure at the site efficiently and effectively manages surface water runoff generated at the site. As there is no history of surface water flooding at the site it is likely that the current drainage system is sufficient for the current and proposed site use.

The site is currently occupied by former college buildings, the ground surface at the location of the site hardstanding. The proposed development will include enhanced landscaping of the grounds of the site to include improved planting, reduced impermeable areas and a bog garden-rainwater pond. These measures will manage and reduce the surface water runoff and reduce off-site risk.

The amount of impermeable surfaces will reduce post-application compared to pre-application by way of improved landscaping and planting around the site and the addition of a bog-garden-rainwater pond.

The surface water runoff from the developed site will be reduced post-application. There will be a reduction in surface water runoff and reduced off-site risk as a result of the development. The risk of flooding from surface water is considered to be low and it is likely that the current drainage system is sufficient for the proposed use.

7.4 Risk Management

The flooding sources will be managed on the site by using a number of mitigation strategies to manage and reduce the overall flood risk at the site and will ensure the development will be safe. Measures used:

Finished/Threshold Floor Levels: The finished floor levels will be no lower than the existing ground levels. The existing finished floor levels and threshold levels are raised above the external ground level by a minimum of 100mm. It is recognised however that owing to limited headroom constraints, massing, planning policy and Building Regulations it is considered impractical to raise the finished floor levels further. Therefore, in order to mitigate against this, it is recommended that the occupants of the proposed dwelling sign up to receive flood warnings from the Environment Agency and implement a flood evacuation plan to a safe area away from the building during times of flood. It is also proposed that flood protection measures are employed within the building design to reduce the overall risk to the occupants. This is discussed below.

A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

First Floor Accommodation: Accommodation will be located on the first floor as well as the ground floor. This will allow residents to retreat to higher floor levels if needed. The level of the first floor is to be located well above any floodwater levels. This will provide a 'safe haven' above the any flood water levels. The upper floors will be accessed via internal stairs and are sufficient in size to safely

house all occupants of the dwelling. The 'safe haven' will only be required in very extreme events or if a flood warning has not been received.

Flood Resistance: Flood risk can be mitigated through the design of the building. Flood resistance measures are measures that help resist floodwaters entering a property (airbrick covers are an example of a flood resistance measure). Flood resistant measures will be used, including:

- The walls of the building are thick.
- Sealant will be used around external doors and windows.
- All external doors and windows will be constructed from hard wearing materials.
- The existing dished drainage channel runs which runs along the north and west boundary of the building within the car park will be retained. This intercepts surface water runoff before it reaches the building.

These factors will prevent water entering the property and make the property more resistant to seepage.

Flood Resilience: Flood resilience measures are designed in such a way as to reduce the cost and time required to reinstate the property should it be flooded (tiled floors are an example of a flood resilience measure).

The building will be constructed in such a way that although floodwater may enter the building, elements that are damaged by flood water can be easily repaired or replaced. This is a form of flood resilience. They are suitable as no other measure is practicable. Robust materials and finishes will be used, including:

- all electrics wiring, switches, sockets, socket outlets etc. will be located a minimum of 450mm above the finished floor level.

7.5 Sequential Approach

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

7.6 Conclusion

In conclusion, residential apartments 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 – Proposed Site Layout

This drawing is based on survey information provided by other another party
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Drawing Status

PRELIMINARY

all existing ground surfaces, walls, ramps and steps etc to courtyard to be retained as existing unless stated otherwise

garden to G.1
garden to G.2
garden to G.3

G.1 G.2 G.3 G.4 G.5 G.6 G.7 G.8

existing gates replaced with electric sliding gate - design to replicate existing

enclosed and covered refuse bin store

1 2 3 4 5 6 7 8 9 10

existing drainage channel
existing drainage channel

entrance from car park
entrance from 'Town'
main entrance

circulation walkway

planted buffer zone

sculpture niche

GROUND FLOOR PLAN

FFL (as existing): 120.570

(Note: at this level, exact position of partitions in 'outer rooms' adjusted slightly as required and to avoid clashes with existing timber beams)

GROUND FLOOR PLAN:
FORMER BUILDING B
(see drawing no.(2-)005)

LOWER GROUND FLOOR PLAN:
FORMER 'LINK TOWER'

UPPER GROUND FLOOR PLAN:
FORMER 'LINK TOWER'

FIRST FLOOR PLAN:
FORMER 'LINK TOWER'

GROUND FLOOR PLAN:
FORMER 'LINK' BUILDING

FIRST FLOOR PLAN:
FORMER 'LINK' BUILDING

no. 60

no. 60

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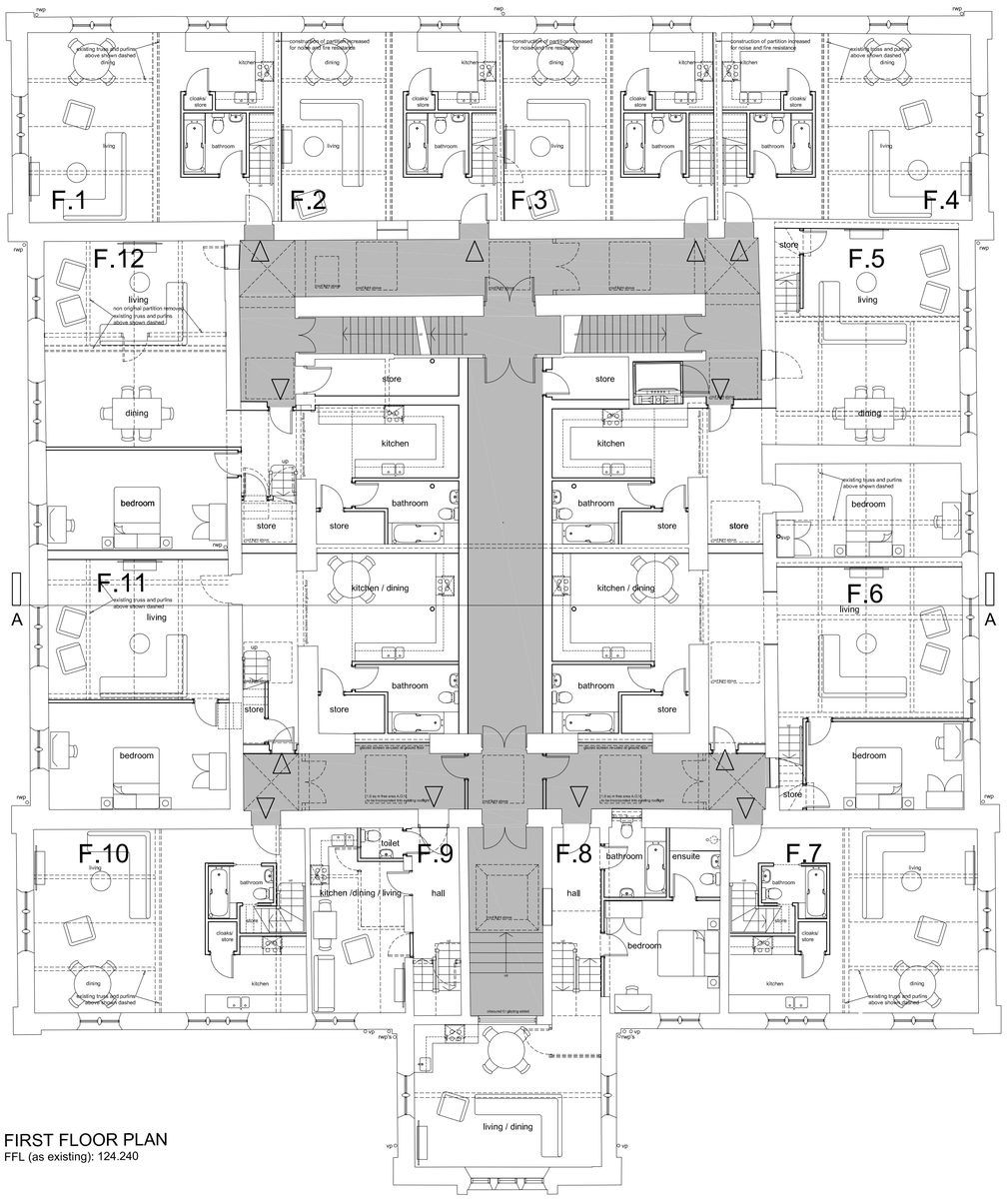
Client
San Pedro Properties Ltd

Project
Conversion of Former College Buildings to Residential Apartments
Highfields, New North Road,
Huddersfield, HD1 5LS

Drawing Title
Proposed Ground Floor Plan: Building A and toilet block and all floors: Link and Tower Buildings

Scale @ A1	Scale @ A3	Date	Drawn	Checked	Drawing Number	Revision
1:100	1:200	08.03.18	MJD	mjd	18.007(2-)001	



FIRST FLOOR PLAN
FFL (as existing): 124.240

MEZZANINE ABOVE FIRST FLOOR
FFL: 126.780

rev	description	date	by	checked
A	apts. F.1 to f.6 incl. amended & misc other minor changes	17.09.18	MJD	mjd

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Drawing Status
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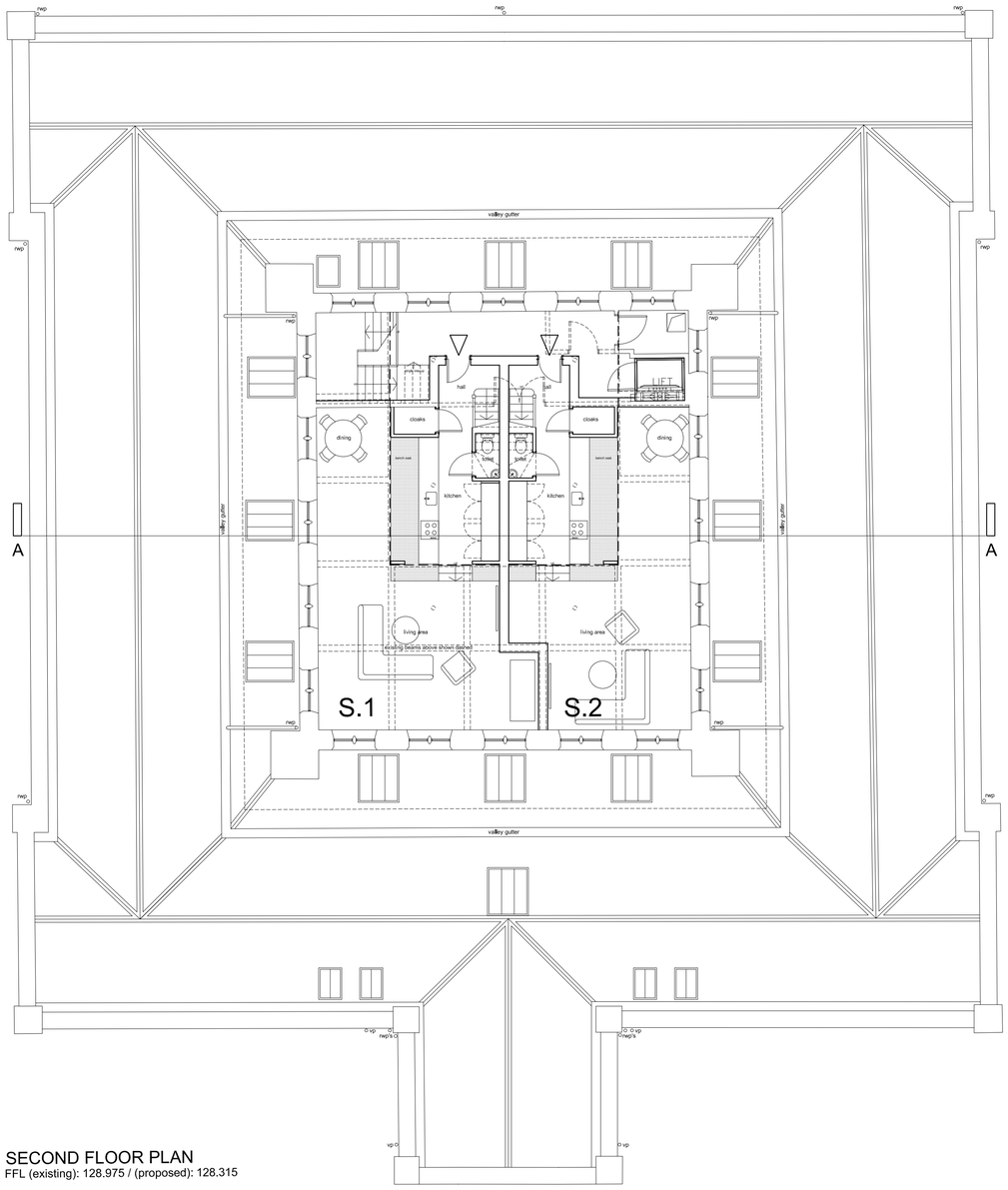
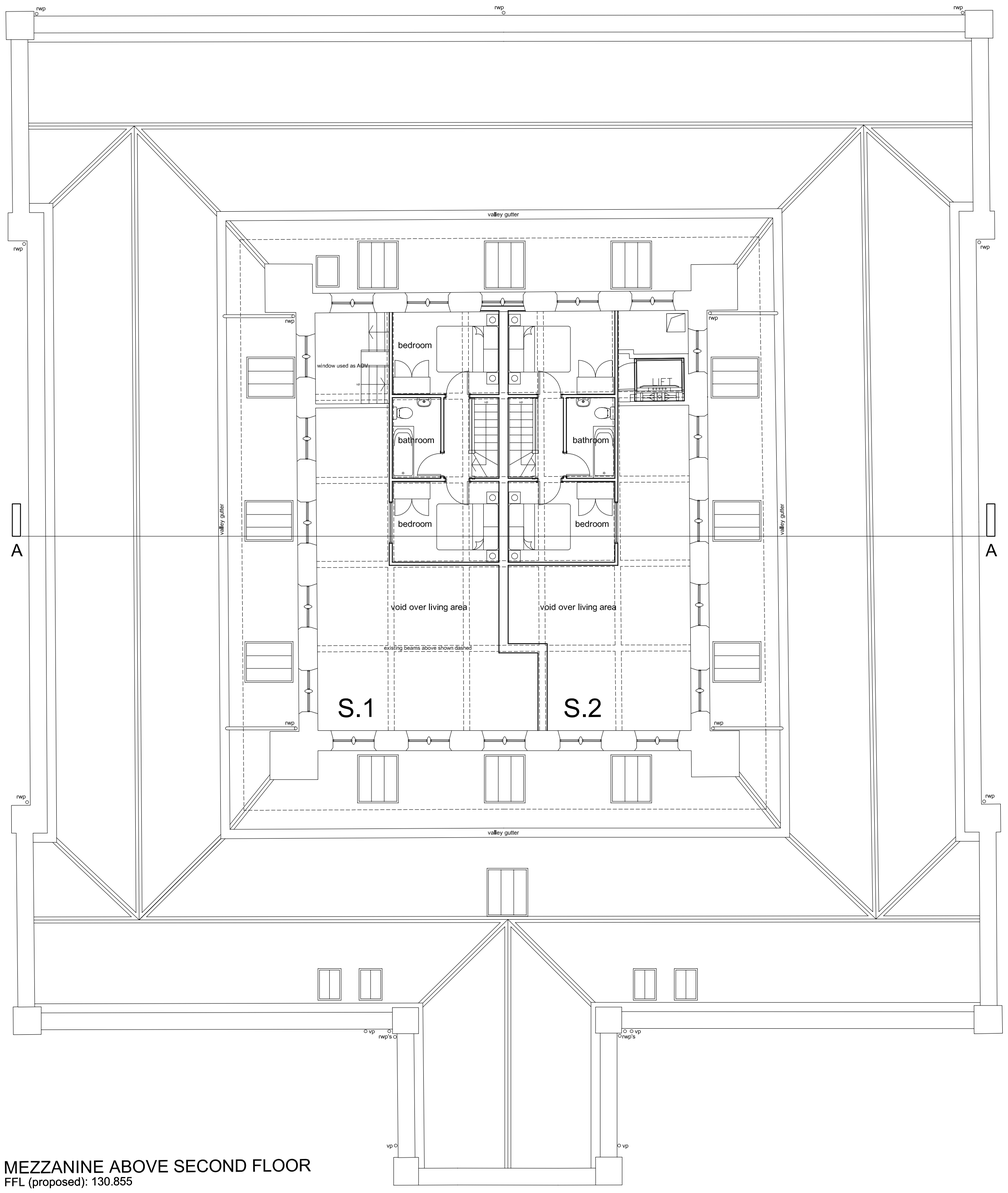
Drawing Title
Proposed First Floor and
Mezzanine above First Floor Plans: Building A

Scale @ A1	Scale @ A3	Date	Drawn	Checked	Drawing Number	Revision
1:100	1:200	08.03.18	MJD	mjd	18.007(2–)002	A



SECOND FLOOR PLAN
FFL (existing): 128.975 / (proposed): 128.315



MEZZANINE ABOVE SECOND FLOOR
FFL (proposed): 130.855

no	description	date	by	checked
A	apt. layouts changed to suit existing floor structure	24.05.18	MJD	mjd

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Drawing Status
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Conversion of Former College Buildings to Residential Apartments
Highfields, New North Road,
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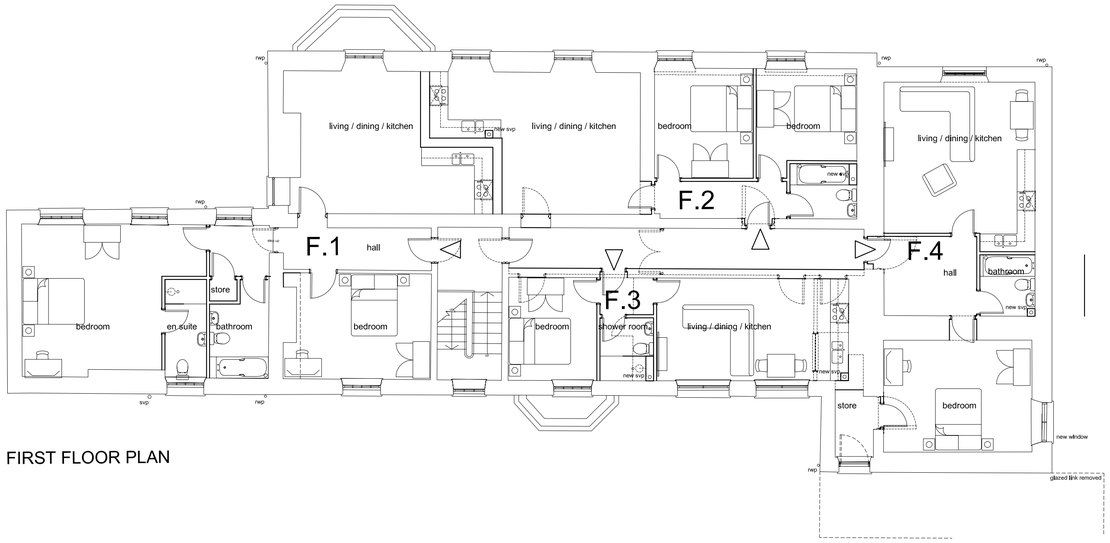
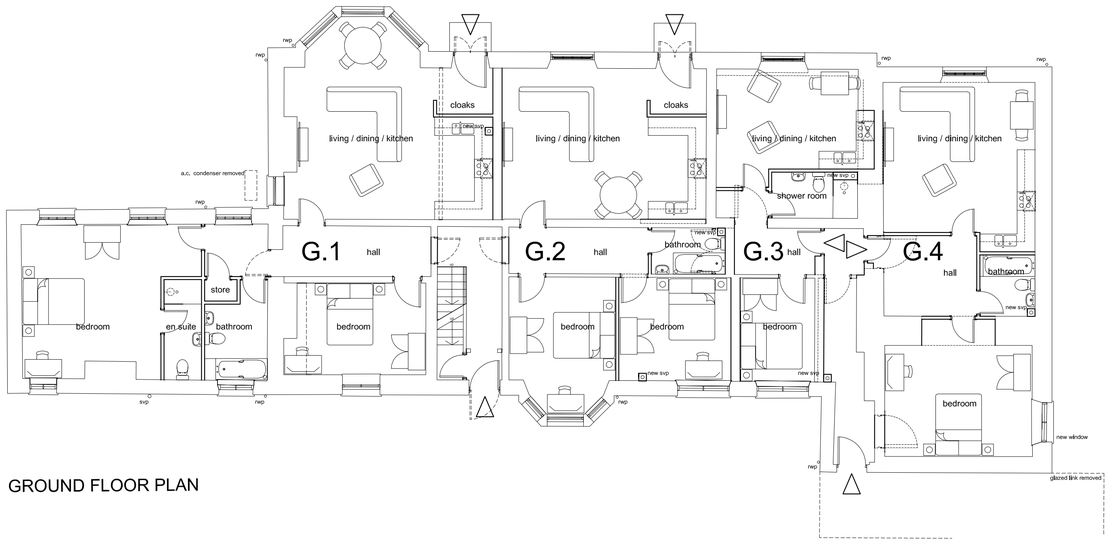
Drawing Title
Proposed Second Floor and Mezzanine above Second Floor Plans: Building A

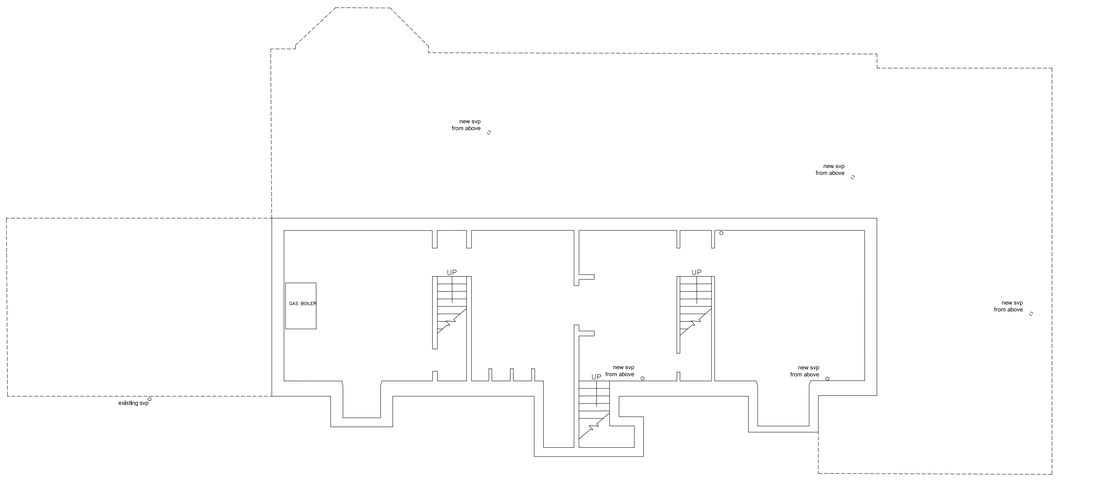
Scale @ A1	Scale @ A3	Date	Drawn	Checked	Drawing Number	Revision
1:100	1:200	08.03.18	MJD	mjd	18.007(2-)003	A



FIRST FLOOR PLAN



GROUND FLOOR PLAN



CELLAR PLAN

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Drawing Status

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Conversion of Former College Buildings to Residential Apartments
Highfields, New North Road,
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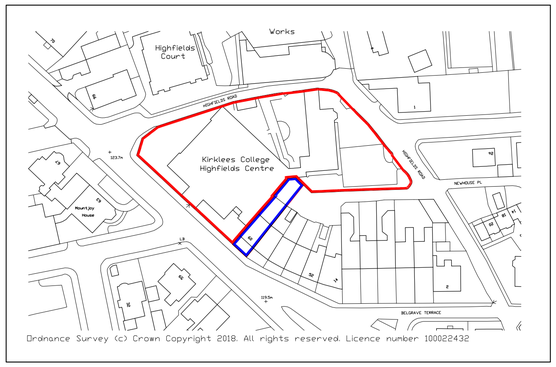
Drawing Title
Floor Plans – all levels
Building B

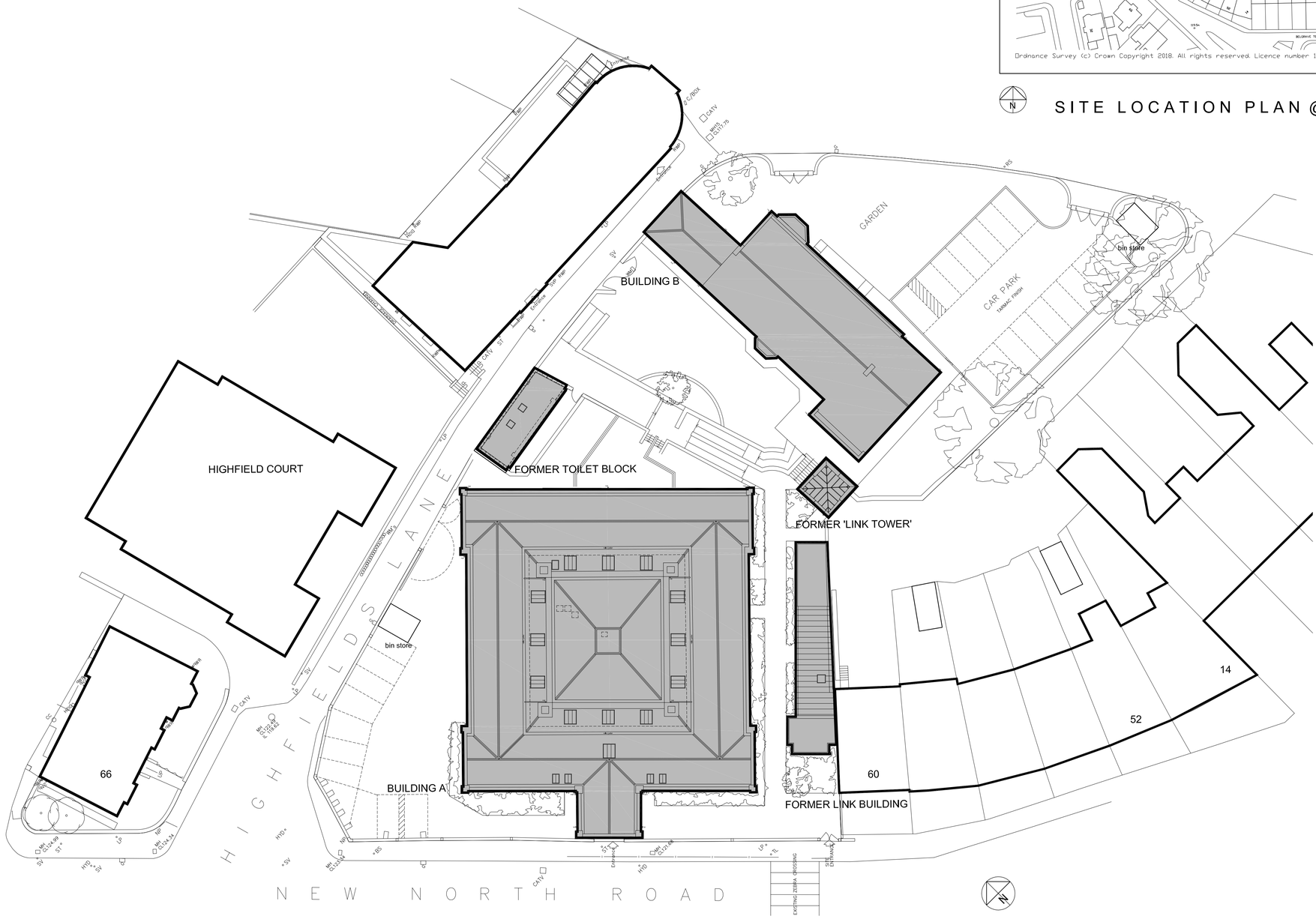
Scale @ A1	Scale @ A3	Date	Drawn	Checked	Drawing Number	Revision
1:100	1:200	08.03.18	MJD	mjd	18.007(2–)005	

no	revision	date	by	checked
A	blue outline added to site location plan	07.06.18	MJD	mjd



N

SITE LOCATION PLAN @ 1:1250



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Drawing Status

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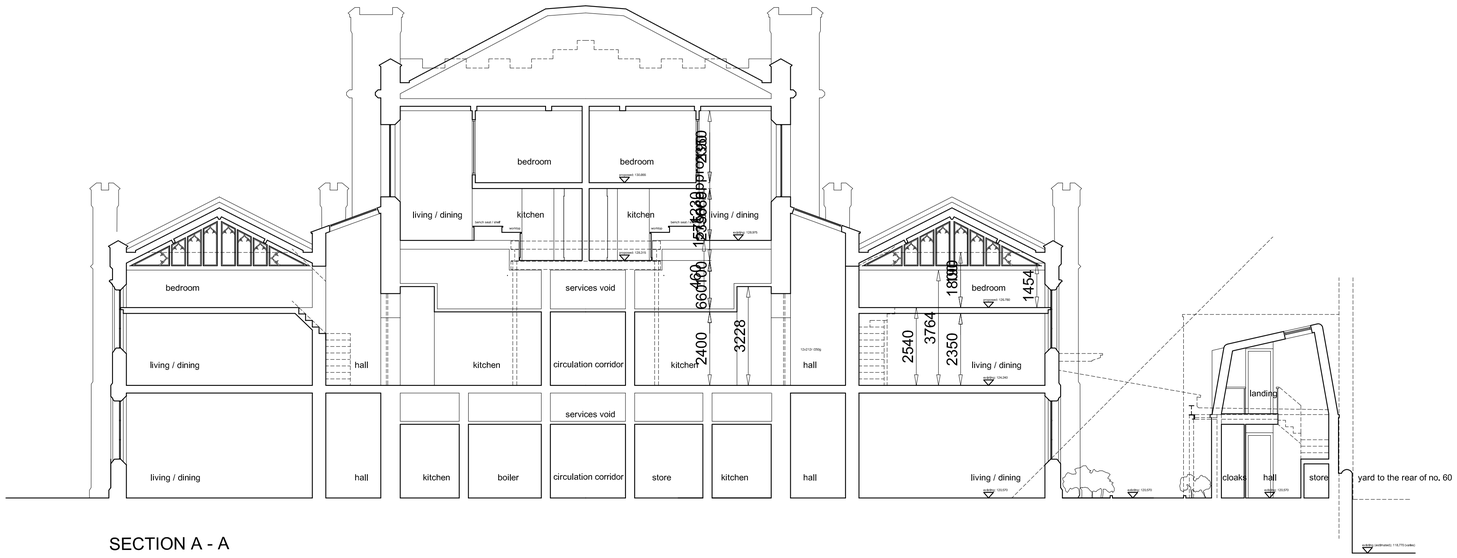
Drawing Title
Proposed Site Layout Plan

Scale @ A1	Scale @ A3	Date	Drawn	Checked	Drawing Number	Revision
1:250	1:500	08.03.18	MJD	mjd	18.007(9--)008	A



SECTION A - A

nr	description	date	by	checked
A	apt. layouts on 2nd floor changed to suit existing floor structure	24.05.18	MJD	mjd

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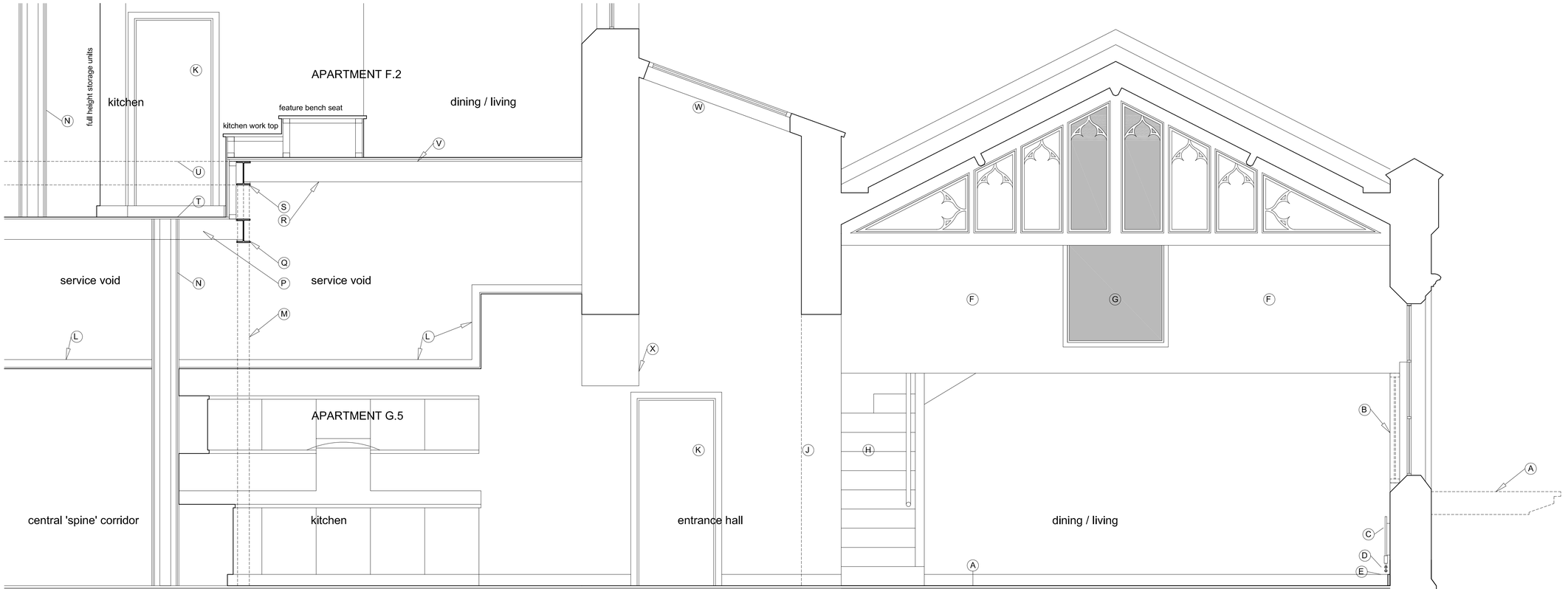
Project
Conversion of Former College Buildings to Residential Apartments
Highfields, New North Road,
Huddersfield, HD1 5LS

Drawing Title
Proposed Sections
Building A – former Highfields Building

Scale @ A1	Scale @ A3	Date	Drawn	Checked	Drawing Number	Revision
1:100	1:200	08.03.18	MJD	mjd	18.007(2–)009	A

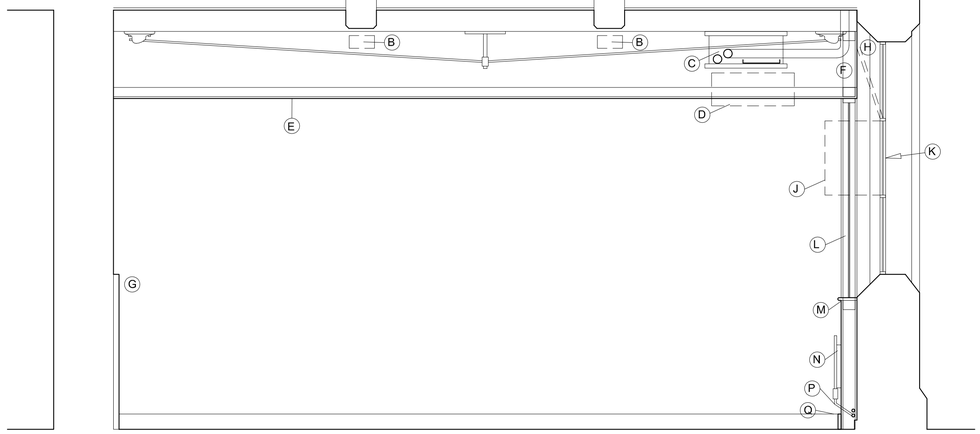


PROPOSED TYPICAL FIRST FLOOR APARTMENT

based on F.5 / S.2

KEY:

A window cleaning gantry (installed by former college) to be removed
B secondary glazing (in locations deemed necessary by Acoustics Consultant)
C existing / new radiators
D existing heating pipework retained and re-used where possible
E new timber skirting, size and profile to match existing
F new plasterboard partitionto enclose mezannine level bedroom and set 50 mm behind existing truss(nb, no connection between truss and partition)
G internal window between bedroom and living / dining space - note relationship with vertical members to truss)
H timber stair leading to bedroom
J new opening formed in existing wall
K apartment entrance door
L new timber and plasterboard ceiling / bulkhead to Acoustic Consultant's specification
M dashed lines indicate existing steel column (installed by former college)
N new timber and plasterboard dividing wall to Acoustic Consultant's specification
P new timber joists to Structural Engineer's specification
Q new steel beam to Structural Engineer's specification
R existing timber floor joists
S existing steel beam
T new chipboard floor to Acoustic Consultant's specification
U position of steel beam to be removed
V existing chipboard floor (2 x 22mm thick layers)
W existing rooflight
X existing arched opening - existing timber glazed screen removed and re-used at ground floor level



PROPOSED TYPICAL GROUND FLOOR ROOM

eg. living / dining room to G.5

KEY:

A first floor (construction in area investigated: 25 plywood on 10 thick parquet on 25 floorboards)
B existing modern flourescent lights removed
C most existing services at perimeter remain and are re-used
D misc A/C units etc., where below new ceiling, to be removed
E new plasterboard ceiling on timber framing
F new plasterboard on timber framing bulkhead inside original wall line
G where present, timber wainscotting to remain
H existing bottom hung inward opening window to remain with new operating cords etc
J existing side hung inward opening casement to remain
K existing steel frame windows to be overhauled, refurbished and repainted by specialist sub contractor
L new secondary glazing system (with glass as Acoustic Consultant's specification)
M plasterboard lining on timber framing below window cill with insulation behind lining
N new / re-used radiators
P existing radiator pipework remains and is re-used
Q new timber skirting, size and profile to match existing

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Drawing Title
Detailed Part Sections

Scale @ A1	Scale @ A3	Date	Drawn	Checked	Drawing Number	Revision
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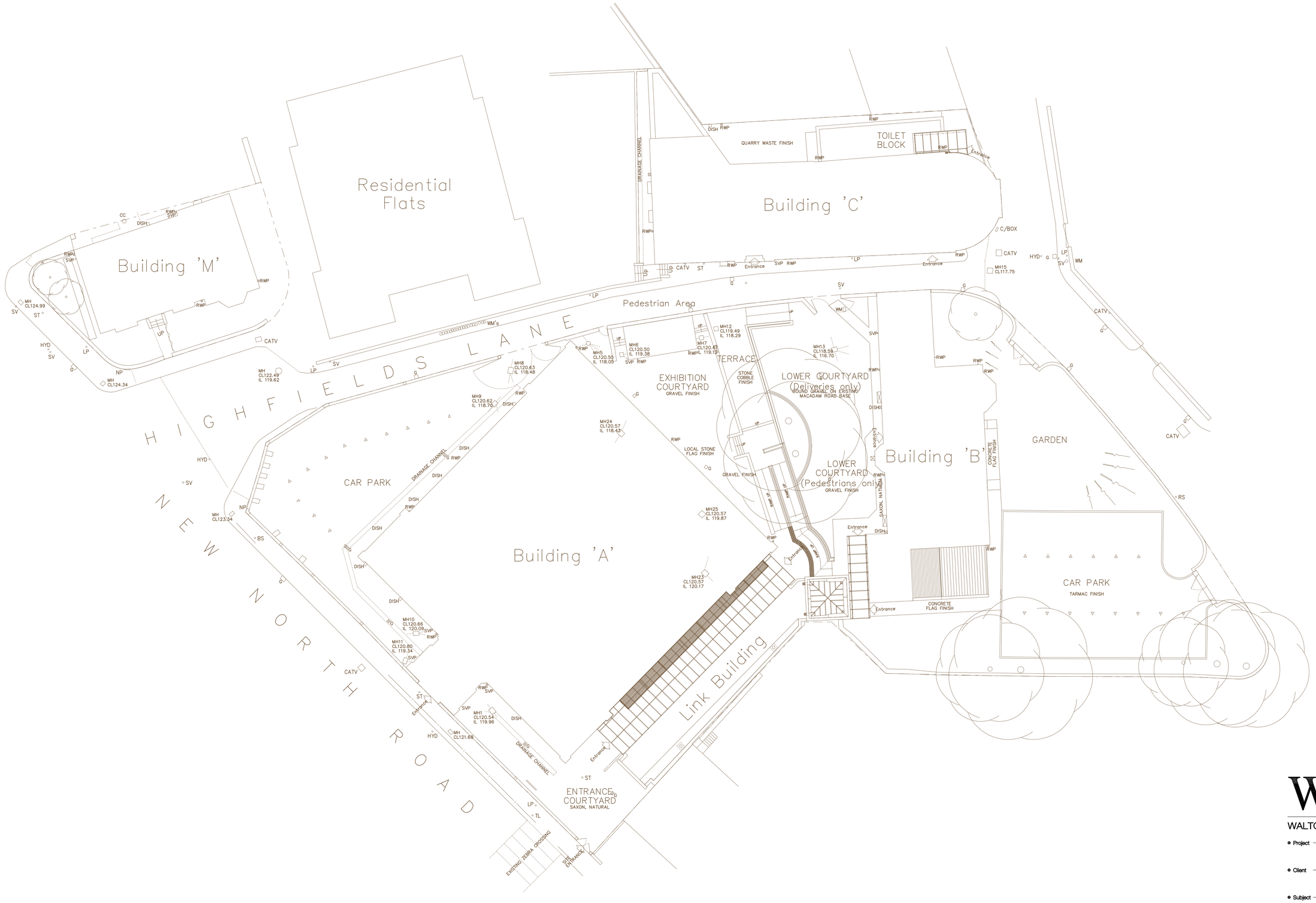
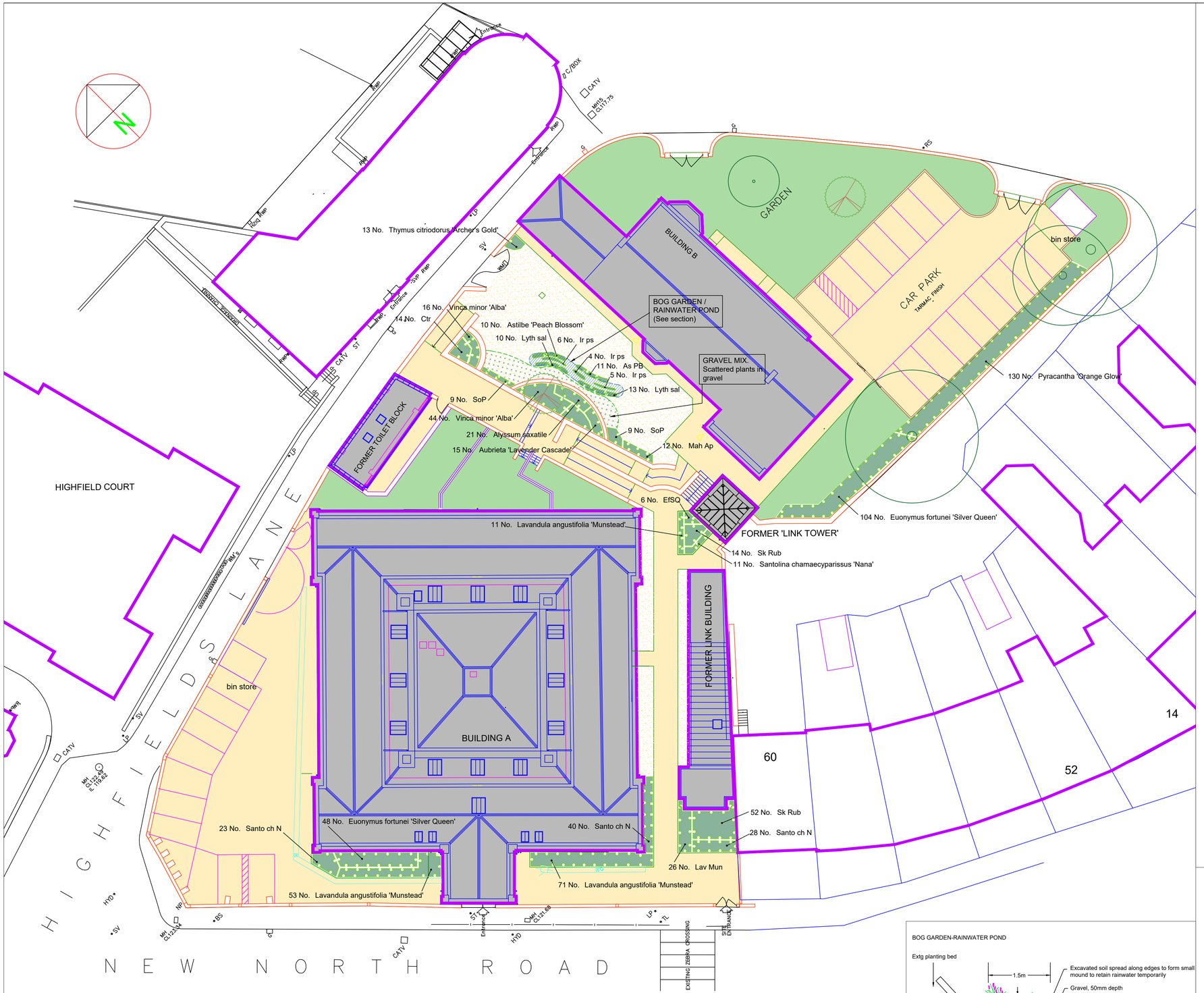


W·H·p

WALTON HORSFALL PARTNERSHIP

- **Project** —SCHOOL OF ARTS, DESIGN & PERFORMING A
- **Client** —HUDDERSFIELD TECHNICAL COLLEGE
- **Subject** —SITE PLAN AS BUILT
- **Scale** —1: 200 **Drg. No.**—2953/100
- **Date** —DEC 01 **Revision** —
- **Drawn** —JDW



Shrubs					
Number	Abbreviation	Species	Height	Specification	Density
14 No.	Ctr	Ceanothus thyrsiflorus repens	30-40cm	3L pot	4/m²
158 No.	EfSQ	Euonymus fortunei 'Silver Queen'	30-40cm	3L pot	4/m²
161 No.	Lav Mun	Lavandula angustifolia 'Munstead'	30-40cm	3L pot	4/m²
12 No.	Mah Ap	Mahonia aquifolium 'Apollo'	30-40cm	3L pot	4/m²
130 No.	POG	Pyracantha 'Orange Glow'	40-60cm	3L pot	3/m²
18 No.	SoP	Salvia officinalis 'Purpurascens'	30-40cm	3L pot	4/m²
102 No.	Santo ch N	Santolina chamaecyparissus 'Nana'	20-30cm	3L pot	5/m²
66 No.	Sk Rub	Skimmia japonica 'Rubella'	30-40cm	3L pot	4/m²
60 No.	V min Al	Vinca minor 'Alba'	20-30cm	2L pot	5/m²

Herbaceous				
Number	Abbreviation	Species	Specification	Density
21 No.	Alys sax	Alyssum saxatile	9cm pot	5/m²
21 No.	As PB	Astilbe 'Peach Blossom'	9cm pot	5/m²
15 No.	Aub LC	Aubrieta 'Lavender Cascade'	9cm pot	5/m²
13 No.	Th cit AG	Thymus citriodorus 'Archer's Gold'	9cm pot	6/m²

Marginal / Aquatics				
Number	Abbreviation	Species	Specification	Density
15 No.	Ir ps	Iris pseudacorus	9cm pot	5/m²
23 No.	Lyth sal	Lythrum salicaria	9cm pot	5/m²

Gravel plants mix					
Number	Abbreviation	Species	Specification	Density	Weight
6 No.	ArBG	Ajuga reptans 'Burgundy Glow'	9cm pot	2/m²	
6 No.	Aq RP	Aquilegia vulgaris 'Ruby Port'	9cm pot	2/m²	
6 No.	Ger sA	Geranium sanguineum 'Album'	9cm pot	2/m²	
8 No.	Luz niv	Luzula nivea	9cm pot	2/m²	
8 No.	PaS	Persicaria affinis 'Superba'	9cm pot	2/m²	
6 No.	SEDACA	Sedum acre aureum	9cm pot	2/m²	
Total :40 No.					

PREPARATION AND PLANTING

All plant material shall conform to BS3936 Parts 1and 4 and BS 4428.
Topsoil to comply with BS3882, 2015.
Organic matter to be proprietary shrub planting compost, or approved compost derived from recycled organic matter.
Slow release fertiliser to be 'Enmag' or similar.

Shrub planting.

1 Shrubs to be planted into 400mm depth of high quality topsoil complying with BS3882, 1994.
2 Organic matter to be spread over planting area and cultivated into soil to a min 400mm depth.
3 Shrubs to be planted into prepared soil in pits large enough to accomodate full rootball.
4 Finished beds to be lightly forked over and dressed with 50mm depth of coarse forest bark mulch, or 50mm gravel.

Herbaceous planting into gravel

1. Existing gravel to be removed and saved for re-use.
2. Excavate to 300mm depth, then spread 300mm depth topsoil.
3. Lay weed suppressant membrane over cultivated soil.
4. Plants to be notch planted into soil through membrane. Plant @ 250mm centres in small groups of 3-6, each group approx 300-750mm apart.
5. Finished area to be dressed with 50mm depth gravel.

PHASING

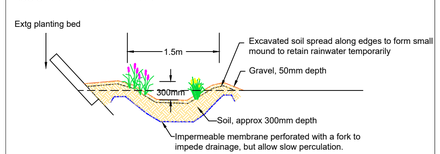
All container grown shrubs, herbaceous and emergent/aquatic plants to be planted in the first March/April after completion of construction.

AFTERCARE - 5 YEARS

Shrubs, herbaceous, emergent/aquatic plants
1 Keep all shrub and gravel areas free from weeds by hand pulling or spot
2 treatment with a translocated herbicide.
3 Replace plants that die or fail to thrive, annually.
4 Top up mulch annually.
5 Trim all shrubs along the edges of footpaths after flowering, to encourage bushiness and keep paths clear.
6 Cut back herbaceous species in March.

Watering
In years 1-3, water plants in periods of prolonged dry weather, approx 10 litres per plant.
Watering to be undertaken in early morning or evening, avoiding periods of bright sunshine or windy conditions.

BOG GARDEN-RAINWATER POND



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project: Development at Highfields
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Huddersfield

drawing title: Landscape proposals

scale	date	drwn by	drawing no
As shown @ A1	Nov 18	CTF	SPP/H/541/1

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