



DETRAFFORD - PHOENIX WORKS

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY REPORT

5977-WSP-FRA1





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EXECUTIVE SUMMARY

This Flood Risk Assessment and Drainage Strategy Report has been prepared by WSP Ltd in support of a full planning application for a proposed residential-led development at Phoenix Works, Ellesmere Street, Manchester.

The report has been written in due cognisance of the National Planning Policy Framework (NPPF) and the Manchester, Salford and Trafford Strategic Flood Risk Assessment.

The Environment Agency's Flood Map for Planning indicates that the site wholly located in EA Flood Zone 1 and therefore has a Low Risk of flooding from rivers or the sea.

The Environment Agency Map of long-term flood risk from surface water indicates that there is a Medium risk of surface water flooding in Cawdor Street and the western boundary of the site. Cawdor Street and the associated low-lying areas within it are being removed as part of the development proposals and replaced by a building which will be drained by conventional means. This will in turn remove the current risk of localised surface water flooding.

The provision of Sustainable Drainage Systems (SuDS) has been considered and, where appropriate, have been included within the surface water drainage proposals.

It is not feasible to dispose of surface water drainage from this development to soakaways, a watercourse or surface water sewer / highway drain. Therefore, it is proposed to discharge surface water from the site via a new 225mm combined lateral connection to the existing 525mm / 550mm x 620mm combined sewer in Ellesmere Street at a maximum rate of 5 litres per second.

The attenuation volumes to be provided have been designed to ensure that surface water runoff for storm events up to and including the 100 year storm plus a 40% allowance for climate change, can be contained within the site safely without causing a risk of flooding to property.

It is proposed to discharge foul drainage from the site via a new combined lateral connection to the existing 525mm / 550mm x 620mm combined sewer in Ellesmere Street.

This Flood Risk Assessment and Drainage Strategy has concluded that the development is appropriate and can be occupied safely subject to implementation of the flood risk mitigation being carried out.

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1. PROJECT BACKGROUND

1.1. APPOINTMENT

- 1.1.1. WSP UK Ltd have been commissioned by DeTrafford (hereafter referred to as “the Client”), to undertake a Flood Risk Assessment (FRA) and Drainage Strategy Report for a proposed residential-led development at Phoenix Works, Ellesmere Street, Manchester.

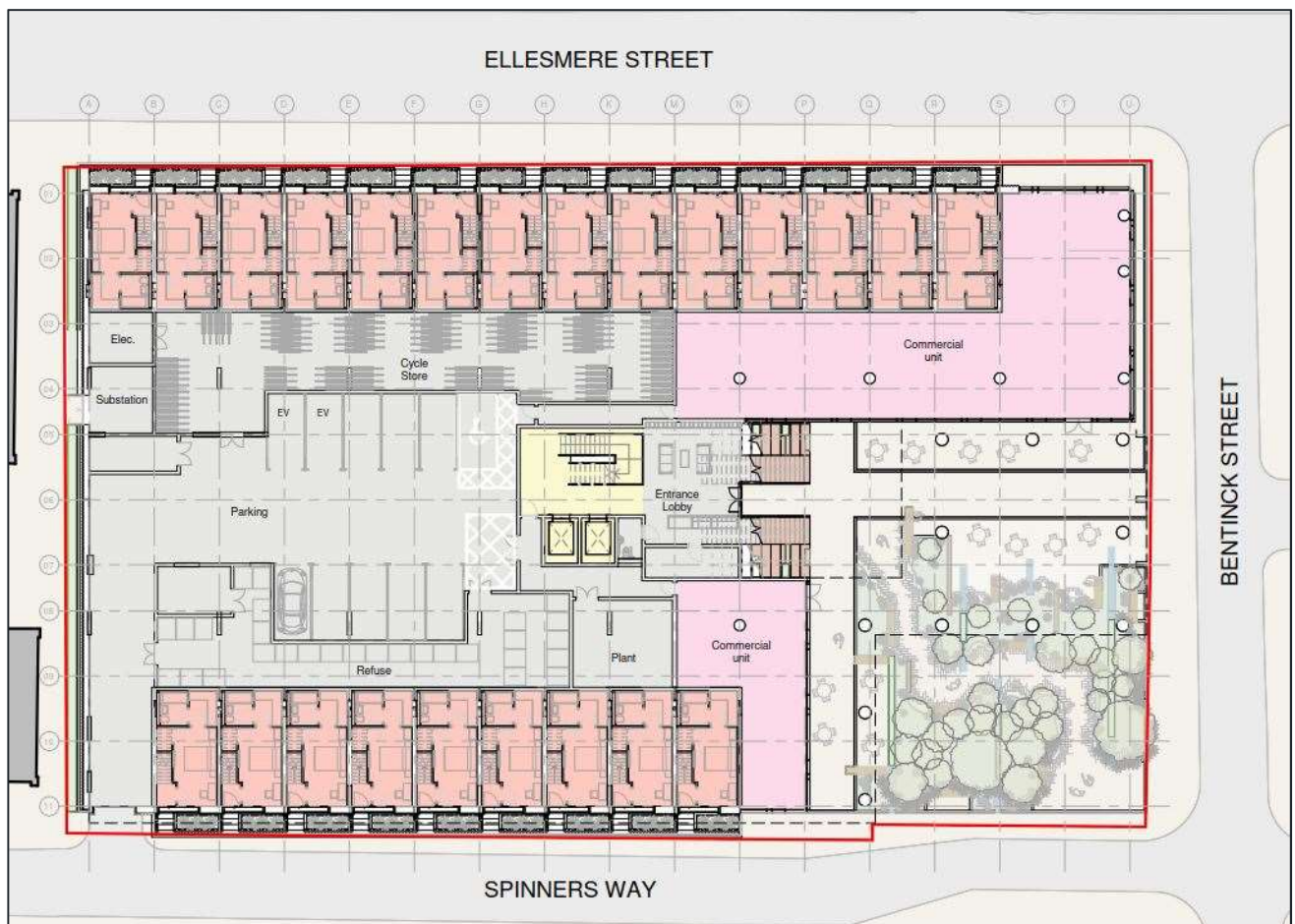
1.2. AIM OF STUDY

- 1.2.1. The aim of this study is to carry out a Flood Risk Assessment and Drainage Strategy of suitable scope and detail to support a full planning application for the site.

1.3. PROPOSED DEVELOPMENT

- 1.3.1. Reference should be made to the extract of the proposed development masterplan shown below, which is included as Appendix A of this report.

Figure 1-1 - Development Masterplan



- 1.3.2. The proposals comprise a part 11, part 13 storey residential-led development scheme on a prominent site on Ellesmere Street.

- 1.3.3. The building footprint is rectangular in shape with stepped storey heights. The ground floor within the building contains townhouses and commercial floorspace along with cycle storage, plant and parking areas.

1.4. CONSULTATION

- 1.4.1. The following statutory consultees were contacted whilst preparing this report:
- Manchester City Council (MCC), Lead Local Flood Authority (LLFA) and Local Highways Authority;
 - The Environment Agency (EA); and
 - United Utilities (UU).

1.5. REFERENCE

- 1.5.1. This FRA and Drainage Strategy has been developed in due cognisance of all relevant local and national planning policy information as outlined in section 2 of this report, along with requirements outlined in consultation responses.

1.6. LIMITATIONS

- 1.6.1. This report has been written using data provided by third parties. Whilst every care has been taken to ensure this information is accurate and up to date, WSP cannot guarantee the accuracy of third party data, and the findings of this report are subject to change if the data is amended or updated after consultation. The recommendations made within this report are subject to review on receipt of further consultation responses.

2. PLANNING POLICY AND CONSULTATION

2.1. RELEVANT NATIONAL AND LOCAL PLANNING POLICY AND STRATEGY DOCUMENTS

2.1.1. The following documents were reviewed as part of this Flood Risk Assessment:

- National Planning Policy Framework (Updated February 2019) and Planning Practice Guidance (March 2014)
- Defra Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015)
- Sustainable Drainage Systems Written Statement HCWS161 (December 2014)
- Environment Agency Climate Change Guidance (February 2016)
- Manchester, Salford and Trafford Hybrid Strategic Flood Risk Assessment (March 2011)
- Manchester, Salford and Trafford Hybrid Strategic Flood Risk Assessment User Guide (March 2011)
- North West SuDS Pro-forma (April 2020)
- Flood and Water Management Act (April 2010)

2.2. NATIONAL PLANNING POLICY

NATIONAL PLANNING POLICY FRAMEWORK

- 2.2.1. The National Planning Policy Framework (NPPF) ensures that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest flood risk.
- 2.2.2. Where new development is exceptionally necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and, where possible, reducing flood risk overall.
- 2.2.3. On 6 March 2014 the Department for Communities and Local Government launched the Planning Practice Guidance web resource to supplement the framework. On this date, PPS 25 (Development and Flood Risk) Practice Guide was cancelled and replaced by the Flood Risk and Coastal Change Planning Practice Guidance.

DEFRA NON-STATUTORY TECHNICAL STANDARDS FOR SUSTAINABLE DRAINAGE SYSTEMS (MARCH 2015)

- 2.2.4. This document sets out non-statutory technical standards for sustainable drainage systems. It should be used in conjunction with the National Planning Policy Framework and Planning Practice Guidance.
- 2.2.5. For developments which were previously developed, the peak run-off rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield run-off rate from the development for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event.

- 2.2.6. Where reasonably practicable, for developments which have been previously developed, the run-off volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield run-off volume for the same event but should never exceed the run-off volume from the development site prior to redevelopment for that event.
- 2.2.7. The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.
- 2.2.8. The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water, (eg Pumping Station or Electricity Substation) within the development.
- 2.2.9. The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event is managed in exceedance routes that minimise the risks to people and property.

SUSTAINABLE DRAINAGE SYSTEMS WRITTEN STATEMENT HCWS161 (DECEMBER 2014)

- 2.2.10. The Secretary of State for Communities and Local Government laid a Written Ministerial Statement in the House of Commons on 18th December 2014 setting out changes to planning that will apply for major development from 6th April 2015. This confirms that in considering planning applications, local planning authorities should consult the relevant Lead Local Flood Authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.
- 2.2.11. Therefore, from 6 April 2015 local planning policies and decisions on planning applications relating to major development are required to ensure that sustainable drainage systems (SuDS) are used for the management of surface water.
- 2.2.12. Major development is development involving any one or more of the following:
 - The winning and working of minerals or the use of land for mineral-working deposits;
 - Waste development;
 - The provision of 10 dwellings or more;
 - The provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
 - Development carried out on a site having an area of 1 hectare or more.

2.3. CONSIDERATION OF CLIMATE CHANGE

- 2.3.1. As explained in the Climate Change Adaptation Sub-Committee Progress Report 2014, increased flood risk is the greatest threat to the UK from climate change. Models of the climate system suggest floods of the type experienced in England and Wales in autumn 2000, and between December 2013 and February 2014, have become more likely as a consequence of increased concentrations of greenhouse gases in the atmosphere.

- 2.3.2. More frequent short-duration, high intensity rainfall and more frequent periods of long-duration rainfall could be expected. Sea levels are also expected to continue to rise.
- 2.3.3. New Environment Agency guidance “Flood risk assessments: climate change allowances” issued on the 19th February 2016 provides up to date information on expected changes in rainfall, river flows and sea level rise as a consequence of climate change.
- 2.3.4. A key change from the previous guidance is that the climate change allowances for peak river flows now are shown as variables on a regional basis; allowance are also now based on percentiles, whereby a percentile is a measure used in statistics to describe the proportion of possible scenarios that fall below an allowance level (e.g. a 50% percentile means that the allowance has 50% chances of not being exceeded).
- 2.3.5. On this basis key allowances for Peak River Flows based on percentiles are:
 - central allowance - based on the 50th percentile
 - higher central - based on the 70th percentile
 - upper end - based on the 90th percentile
- 2.3.6. These allowances are detailed in Table 1 (Peak River Flow allowances by river basin district) of the EA guidance.
- 2.3.7. As discussed in the EA Guidance the choice of the appropriate allowance for peak river flow (e.g. central or higher central) should reflect the risk for the proposed development and therefore is linked to the expected hazard, vulnerability and resilience of the scheme; recommendations on the appropriate allowances to be considered are provided in the EA Guidance.
- 2.3.8. For peak rainfall the EA Guidance provides an upper end and central allowance depending on epoch; the guidance recommends assessment of both the central and upper end allowances to understand the range of impact. These allowances are detailed in Table 2 (Peak Rainfall Intensity Allowance in Small and Urban Catchments) of the EA guidance.
- 2.3.9. Sea levels allowances reflect the previous guidance and vary on a regional basis and for each epoch as shown in Table 3 of the EA guidance.

DEVELOPMENT LIFESPAN AND APPLICABLE ALLOWANCES

- 2.3.10. The contingency allowances for climate change that are potentially applicable to this site are:

Peak River Flows (Northwest);

- Upper End – 70% for 2070 to 2115
- Higher Central – 35% for 2070 to 2115
- Central – 30% for 2070 to 2115

Peak Rainfall;

- Upper End – 40% for 2070 to 2115
- Central – 20% for 2070 to 2115

Sea Level Rise;

- 0.99 m by 2115

2.4. LOCAL PLANNING POLICY

MANCHESTER, SALFORD AND TRAFFORD STRATEGIC FLOOD RISK ASSESSMENT

- 2.4.1. The combined Manchester, Salford & Trafford Strategic Flood Risk Assessment (SFRA) and accompanying User Guide was prepared by JBA Consulting in March 2011, in accordance with PPS 25.
- 2.4.2. *“The SFRA was prepared to inform the preparation of the Local Development Framework and assist the Local Planning Authority in the allocation of sites for future development and general decision making. In addition, the SFRA provides detailed development control recommendations in order to achieve a positive reduction in flood risk within these council areas”.*
- 2.4.3. The site is shown to be located within the Conurbation Core Critical Drainage Area, *“an area within Flood Zone 1 which has critical drainage problems, and which has been notified... [to].... The local planning authority by the Environment Agency”.*
- 2.4.4. The SFRA gives the following guidance in relation to surface water runoff from development sites in the area:

“Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and a consequent potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure. It should be borne in mind that the sewer network in places across the Greater Manchester area was designed to drain less development than exists today. Development (both planned for and urban creep such as windfall development and paving over gardens) has increased the coverage of impermeable surfaces and added flow over time and the network is known to be at capacity in many places.

Managing surface water discharges from new development is therefore crucial in managing and reducing flood risk to new and existing development downstream. Carefully planned development can also play a role in reducing the amount of properties that are directly at risk from surface water flooding. The Planning System has a key role to play in settings standards for sustainable drainage from new developments and ensuring that developments are designed to take account of the risk from surface water flooding.

All development should seek to reduce existing local flooding problems and not add to them. The AGMA authorities are currently developing drainage standards for developments within Critical Drainage Areas and for all other areas. Over time, it is envisaged that local authorities will commission drainage strategies (see below) to determine in more detail, and establish the evidence base for, set reductions in surface water runoff from development sites. These will be used to inform the incorporation of targets and standards in Development Plan Documents, supported by Supplementary Planning Documents, as appropriate. With regard to this, the developer should liaise closely with the Environment Agency, United Utilities and the LPA as soon as possible to determine an appropriate reduction in runoff rate and volume with reference to discharge limits as laid down by any completed SWMP, drainage strategy or local development document for that area. Minimising surface water run off rates within catchments should be the starting point for negotiations with Developers. In the interim, and based on the technical work undertaken for the SFRA, the following guidance is provided:

- *Development should aim for a minimum reduction in surface water runoff rates of 50% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, considering climate change*

- *Development should be designed so that there is no flooding to the development in a 1 in 30 year event and so that there is no property flooding in a 1 in 100 year plus climate change event*

Wherever possible, this should be achieved through the implementation of SUDS. Source control should be considered first. There may be opportunities to deliver SUDS through integrated solutions for collections of strategic sites. The future ownership and maintenance of SUDS systems should be discussed at the planning application stage with the relevant sections of the LPA (including Highways and Drainage), United Utilities and the Environment Agency. This approach should be taken unless the developer can demonstrate that this is not feasible and that there will be no adverse impact caused by the development elsewhere.”³. Any exceedance flows within the site should be retained within the site boundaries for all events up to a 1 in 100 year event”.

3. EXISTING SITE

3.1. SITE LOCATION

- 3.1.1. Reference should be made to
- 3.1.2. Figure 3-1 - Site Location Plan, which is also included as Appendix B.

Figure 3-1 - Site Location Plan



3.2. SITE DESCRIPTION

- 3.2.1. Table 3-1 summarises the general characteristics of the site as it currently exists.

Table 3-1 – General Site Characteristics

Characteristic	Description
Site address	Ellesmere Street, Hulme, Manchester, M15 4JY
Grid reference	382,690 (Easting), 397,212 (Northing)
Area (Ha)	0.288 Hectares

Characteristic	Description
Existing / previous site usage	Cawdor Street splits the site into two distinct areas. A building that is temporarily being used as the Manchester DeTrafford office, occupies land to the north of Cawdor Street, with land to the south being used for the construction of adjacent developments - City and Sky Gardens.
Surroundings	The site is part of DeTrafford's masterplan residential community and is encompassed by Ellesmere Street (North), Bentinck Street (East), Sky Gardens (South) and Gallery Gardens (West).
Topography	The site generally falls towards the western end of Cawdor Street with levels ranging from approximately 30.340 m AOD to 29.060 m AOD. Levels fall from around 29.600 m AOD along the northern boundary and around 30.100 m AOD along the southern boundary at an approximated gradient of 1 in 40. A copy of the topographical survey has been included in Appendix C.

3.3. EXISTING DRAINAGE

PUBLIC SEWERS

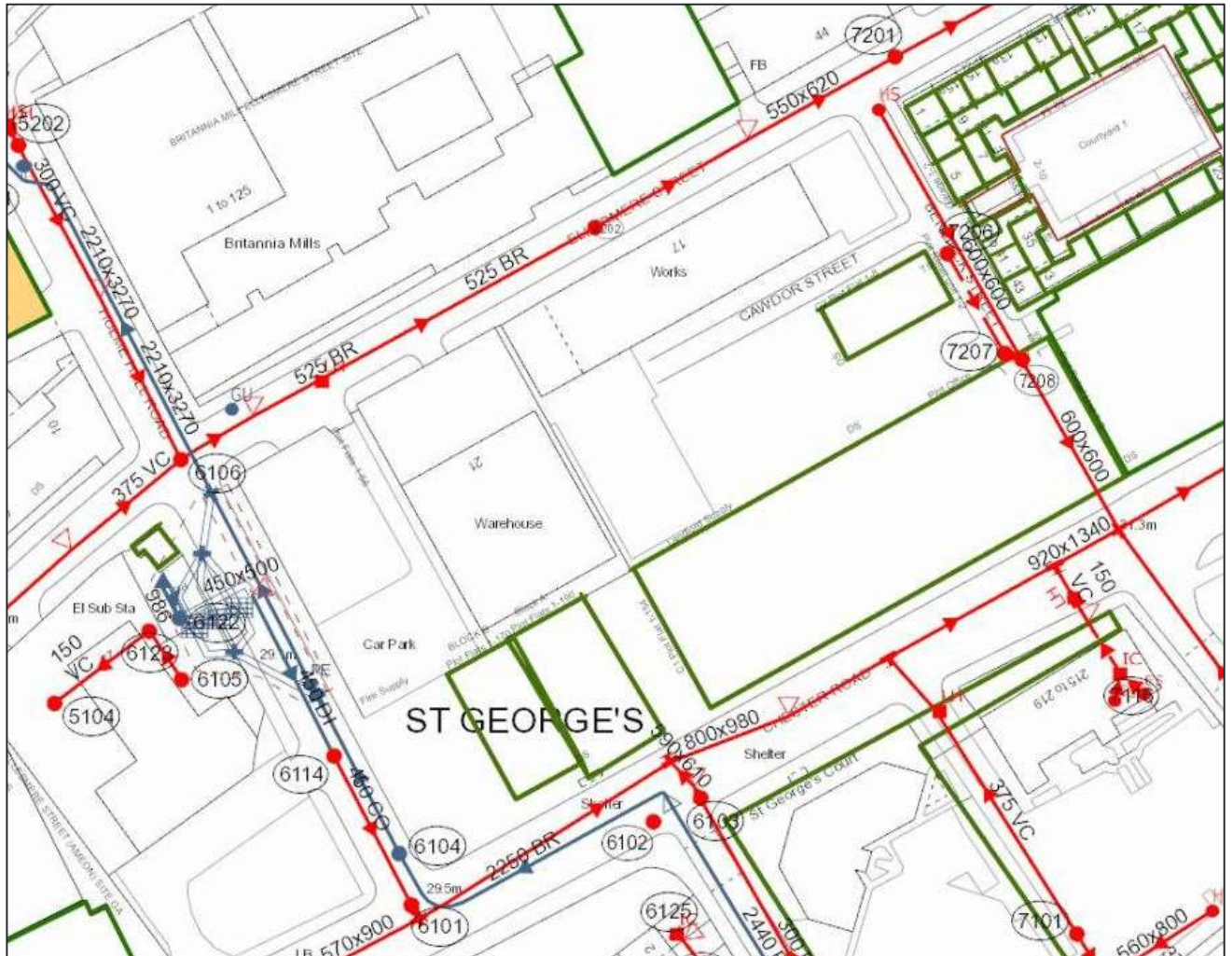
- 3.3.1. The United Utilities Public Sewer Records, a full copy of which is included in Appendix D, indicate that there are several public sewers in the vicinity of the site.
- 3.3.2. The records show a 525mm / 550mm x 620mm combined public sewer heading in an easterly direction in Ellesmere Street.
- 3.3.3. A separate 600mm x 600mm combined public sewer starts in Bentinck Street and traverses in a southerly direction to Chester Road.
- 3.3.4. Circa 60 metres west of the site boundary, a 2250mm brick surface water sewer is shown to traverse Hulme Hall Road in a northerly direction, discharging to the River Irwell.

PRIVATE DRAINAGE

- 3.3.5. The public sewer records show an existing 300mm private combined sewer in Bentinck Street which flows in a southerly direction away from the site, connecting into the 600mm x 600mm combined public sewer in Bentinck Street at UU MH Ref: 7208.
- 3.3.6. The site generally falls towards Cawdor Street, in which there are 7 no. existing gullies.
- 3.3.7. The topographical survey shows a 100mm diameter surface water connection and 5 no. down pipes from the existing building on site.
- 3.3.8. The topographical survey identifies 3 no. existing surface water manholes within the site - one of which is in the western end of Cawdor Street, another immediately north of the aforementioned manhole and the third within the southern footway of Cawdor Street at the eastern end.

- 3.3.9. The topographical survey also identifies an existing below ground tank approximately 2 metres deep situated south east of the site.
- 3.3.10. A CCTV drainage survey is to be undertaken to confirm the location, connectivity and condition of all existing private drainage on site to its connection to the existing public sewer or other outfall, any off site connections coming into the site from surrounding sites and the status / function of the existing tank identified on the topographical survey.

Figure 3-2 - Public Sewer Records Extract



3.4. EXISTING WATERCOURSES

- 3.4.1. The closest identified watercourses to the site are as follows:
- The Bridgewater Canal (100 metres north)
 - River Irwell (230 metres north).

3.5. EXISTING FLOOD DEFENCE INFRASTRUCTURE

- 3.5.1. The EA confirmed that the site is not within an area which benefits from the protection of nearby formal flood defences.

3.6. GEOLOGY AND HYDROGEOLOGY

- 3.6.1. The following information has been extracted from the WSP Phase 1 Preliminary Risk Assessment Ground Investigation Report (Ref: 70075977-11690, October 2020).
- 3.6.2. Reference to the BGS GeoIndex indicates the site geology comprises Glaciofluvial sheet deposits of sand and gravel, underlain by bedrock of the Chester Sandstone Formation.
- 3.6.3. To gain insight into the likely nature and thickness of the superficial deposits and bedrock, a review of nearby BGS logs Geo Index Logs and available third-party ground investigation logs for adjacent developments has been completed.
- There are no BGS logs on site, however, there were three boreholes drilled in Hulme Hall Road to the south / north west, all within 100m of the site. The nearest, (50m south west reference SJ89NW124) recorded 0.91m of 'Made Ground' underlain by approximately 5m of superficial deposits comprising 1.83m of 'sandy loam', 0.91m of 'dirty sand and ballast', 2.13m of 'clay'. 'Red sandstone' was recorded from 5.79m bgl.
 - Exploratory holes advanced in the adjacent Gallery Gardens Development by LK Consult encountered superficial deposits to a maximum depth of 4.20m bgl comprising either gravelly sandy and silty clay or locally, gravelly very silty sand. This was underlain by weathered bedrock comprising clayey sand, with competent bedrock inferred from 5.80 – 6.00m bgl and described as weak red micaceous sandstone with occasional rounded quartz gravel inclusions.
- 3.6.4. Based on the site history, Made Ground is anticipated to overlie natural strata. Infilled basements are likely, as the site was historically occupied by terraced housing and also a public house in the south eastern corner. Site investigation undertaken by LK Consult at the adjacent Gallery Gardens Development identified Made Ground at thicknesses of 0.90 – 5.05m bgl, with the deeper thicknesses of Made Ground interpreted as infilled former basements. A brick wall was also identified in one trial pit to a depth of 2.5m bgl, indicating that below ground structures are likely.
- 3.6.5. The Groundsure Report indicates the following aquifer designations:
- The superficial deposits are classed as a Secondary A Aquifer
 - Bedrock is classed as a Principal Aquifer
- 3.6.6. There are no groundwater abstractions within 1km of the site.
- 3.6.7. Groundwater depths are not recorded on the nearest BGS logs (within 100m of the site). Ground Investigation undertaken by LK Consult on the adjacent Gallery Gardens Development recorded resting groundwater at depths between 5.40m and 5.80m bgl.

4. CONSULTATION

4.1. THE ENVIRONMENT AGENCY (EA)

- 4.1.1. The EA were contacted and asked to provide their detailed flood maps for the surrounding area of the site, details of any recorded flooding incidents at or in close proximity to the site and to confirm whether the site has a known risk of flooding from any source.
- 4.1.2. The EA confirmed that they have no record of flooding affecting the site and that there are no flood defences within the vicinity of the site.
- 4.1.3. The EA confirmed that the nearest culvert is over 700m from the site and does not pose a flood risk to the site.
- 4.1.4. A copy of all correspondence and information provided by the EA to date is included in Appendix E of this report.

4.2. MANCHESTER CITY COUNCIL (MCC)

- 4.2.1. Manchester City Council were contacted and asked to advise whether surface water should be discharged at brownfield or greenfield runoff rates and whether they have any record of historical flooding incidents at or in close proximity to the site.
- 4.2.2. MCC indicated that for Brownfield sites they expect the following in line with LFRM Policy 6:
 - A 50% runoff rate reduction for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, including consideration of climate change.
- 4.2.3. MCC confirmed that within a 100m buffer of the provided site outline they hold one recorded flood incident ('blocked gully or drain' reported 2012, at the junction of Hulme Hall Road and Ellesmere Street).
- 4.2.4. MCC also confirmed that within a 100m buffer of the provided site outline they hold no records of culverted watercourses and that this should be verified by a competent site investigation.
- 4.2.5. A copy of all correspondence with MCC is included in Appendix E of this report.

4.3. UNITED UTILITIES (UU)

- 4.3.1. United Utilities were contacted and asked to advise on points of discharge, maximum discharge rates and whether they hold and records of any flooding incidents at or in close proximity to the site as a result of hydraulic sewer flooding from their sewers.
- 4.3.2. United Utilities advised the following:
 - They have no current record of sewer flooding on their DG5 register.
 - Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.
 - There are no waterbodies within the vicinity of the site for surface water runoff to discharge to.
 - If an evidence-based assessment has been carried out and confirms that infiltration is not feasible, UU recommend that the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse should be investigated by contacting the relevant Highway Authority.

- Once evidence is provided as outlined above, United Utilities will consider a connection to the 525mm diameter public combined sewer within Ellesmere Street located North of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.
- Foul flow from this site will be allowed to drain into the public foul water/combined sewer system. UU's preferred point of discharge would be to the 520mm diameter public combined sewer within Ellesmere Street located to the North of your proposed development at an unrestricted rate.

4.3.3. A copy of the correspondence with UU to date is included in Appendix E of this report.

5. DEFINITION OF FLOOD RISK

- 5.1.1. The potential risk of flooding to the site from all current and future sources of flooding has been assessed in accordance with the National Planning Policy Framework. A detailed explanation of the flood risk issues on the site and determination of flood risk ratings are presented in Sections 5.2 to 5.6.
- 5.1.2. Table 5-1 below summarises the findings of the assessment. It should be noted that the designation of risk outlined in Table 5-1 is prior to the inclusion of any mitigation measures, which may subsequently act to reduce the risk.

Table 5-1 – Degree of Risk from Each Source of Flooding

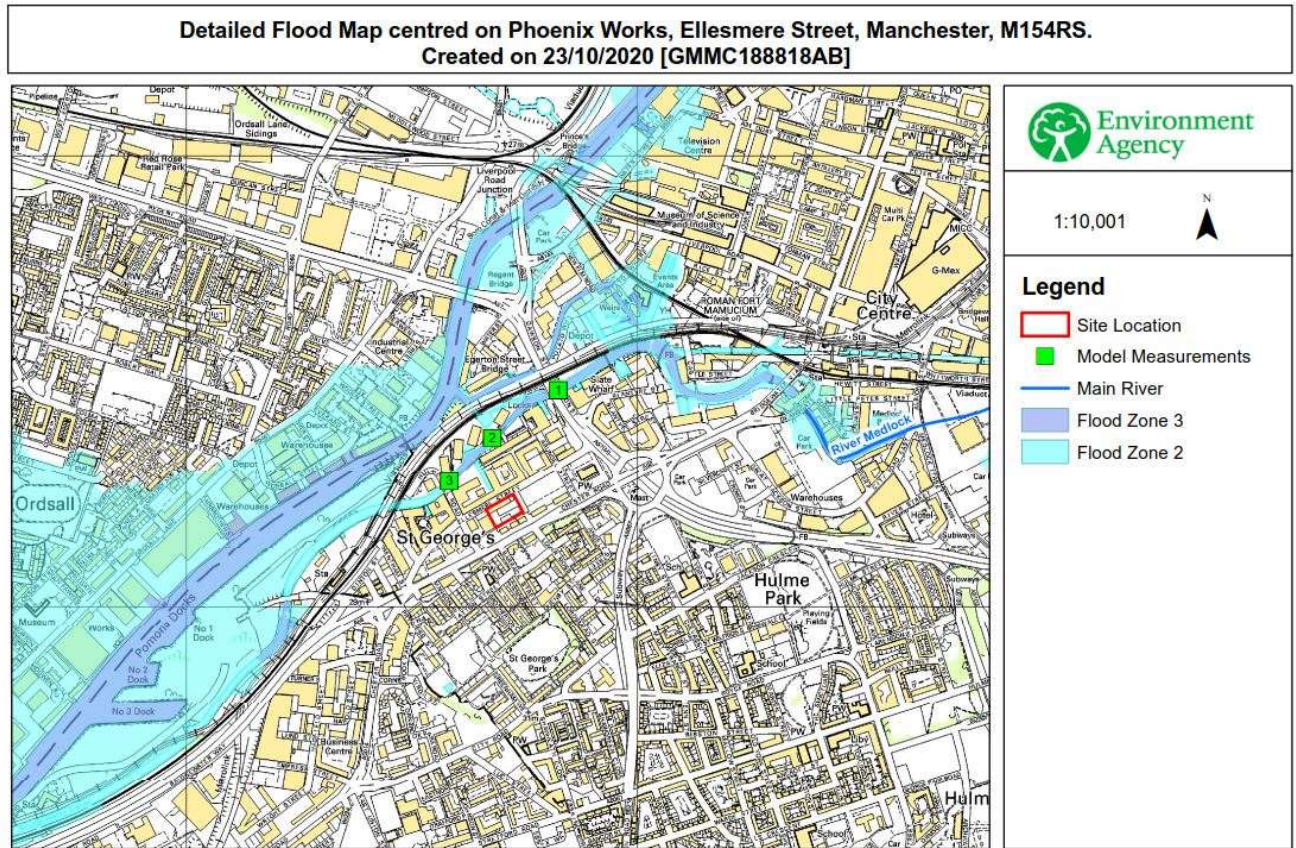
Source		Risk
Fluvial		Low
Surface Water		Medium
Sewer		Low
Groundwater		Low
Tidal		Not at risk
Artificial Sources	Reservoir	Not at risk
	Canal	Not at risk

5.2. FLUVIAL FLOOD RISK

FLOOD MAPS

- 5.2.1. The National Planning Policy Framework (NPPF) categorises flood risk as follows:
- **Zone 1 (low probability)** – Land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%);
 - **Zone 2 (medium probability)** – Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year; and
 - **Zone 3a (high probability)** - Land assessed as having 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.
 - **Zone 3b The Functional Floodplain** - This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map).

Figure 5-1 - EA Flood Maps for Planning



- 5.2.2. The Environment Agency's Flood Map for Planning indicates that the site is wholly located in EA Flood Zone 1 and therefore has a Low risk of flooding from rivers or the sea.
- 5.2.3. An assessment of the residual risk of fluvial flooding from the 1000 year event has been carried out.
- 5.2.4. The EA provided modelled flood level and river flow information at four node points along the Bridgewater Canal. The worst case with respect to flood levels is Node 1.

Table 5-2 – EA Modelled Flood Levels (Medlock SFRA 2011 Study)

Node Ref	Easting	Northing	1 in 100 year	1 in 100 year plus climate change (m AOD)	1 in 1000 year (m AOD)
1	382824	397478	25.57	25.68	25.86

- 5.2.5. The ground floor finished floor level of the proposed townhouses will be 30.100 m AOD and the finished floor level for all other areas will be 29.50m AOD, both of which are significantly above the critical 1 in 1000 year water level. The development proposals do not include any basement levels and so it is anticipated that there is no residual risk of flooding to the site from the Bridgewater Canal.

5.3. SURFACE WATER FLOODING

- 5.3.1. The EA descriptions for the High, Medium and Low risk scenarios for surface water flooding are as follows:

- **High risk** means that each year this area has a chance of flooding of greater than 3.3%.
- **Medium risk** means that each year this area has a chance of flooding of between 1% and 3.3%.
- **Low risk** means that each year this area has a chance of flooding of between 0.1% and 1%.
- **Very Low risk** means that each year this area has a chance of flooding of less than 0.1%.

5.3.2. The Environment Agency Map of long-term flood risk from surface water indicates that there is a Medium risk of surface water flooding in Cawdor Street and the western boundary of the site.

Figure 5-2 - EA Surface Water Flood Map



5.4. SEWER FLOODING

- 5.4.1. United Utilities were contacted and confirmed that they have no current record of sewer flooding within the vicinity of the proposed development.
- 5.4.2. Manchester City Council were also contacted and confirmed that within a 100m buffer of the provided site outline they hold one recorded flood incident ('blocked gully or drain' reported in 2012, at the junction of Hulme Hall Road and Ellesmere Street).
- 5.4.3. Based on the above, the risk of sewer flooding is considered to be Low.

5.5. GROUNDWATER FLOODING

- 5.5.1. Groundwater flooding occurs when the water table, the level of water below the ground, rises above the ground surface or into cellars and basements. Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks.
- 5.5.2. The Manchester City, Salford City and Trafford Councils Level 2 SFRA Groundwater Flood Map (2011) indicates that the site is not at risk of groundwater flooding.
- 5.5.3. At this stage, there is no site specific data regarding the groundwater level, but based on site investigations in surrounding developments, it is anticipated to be between 5 and 6 m bgl.
- 5.5.4. Based on the above, it is considered that the risk of groundwater flooding to the site is Low.

5.6. TIDAL / COASTAL FLOOD RISK

- 5.6.1. The site is remote from tidal influences and is therefore Not at risk of tidal or coastal flooding.

5.7. ARTIFICIAL SOURCES FLOODING

- 5.7.1. Non-natural or artificial sources of flooding can include canals, reservoirs, lakes, etc. The potential effects of flood risk management infrastructure and other structures need to be considered.

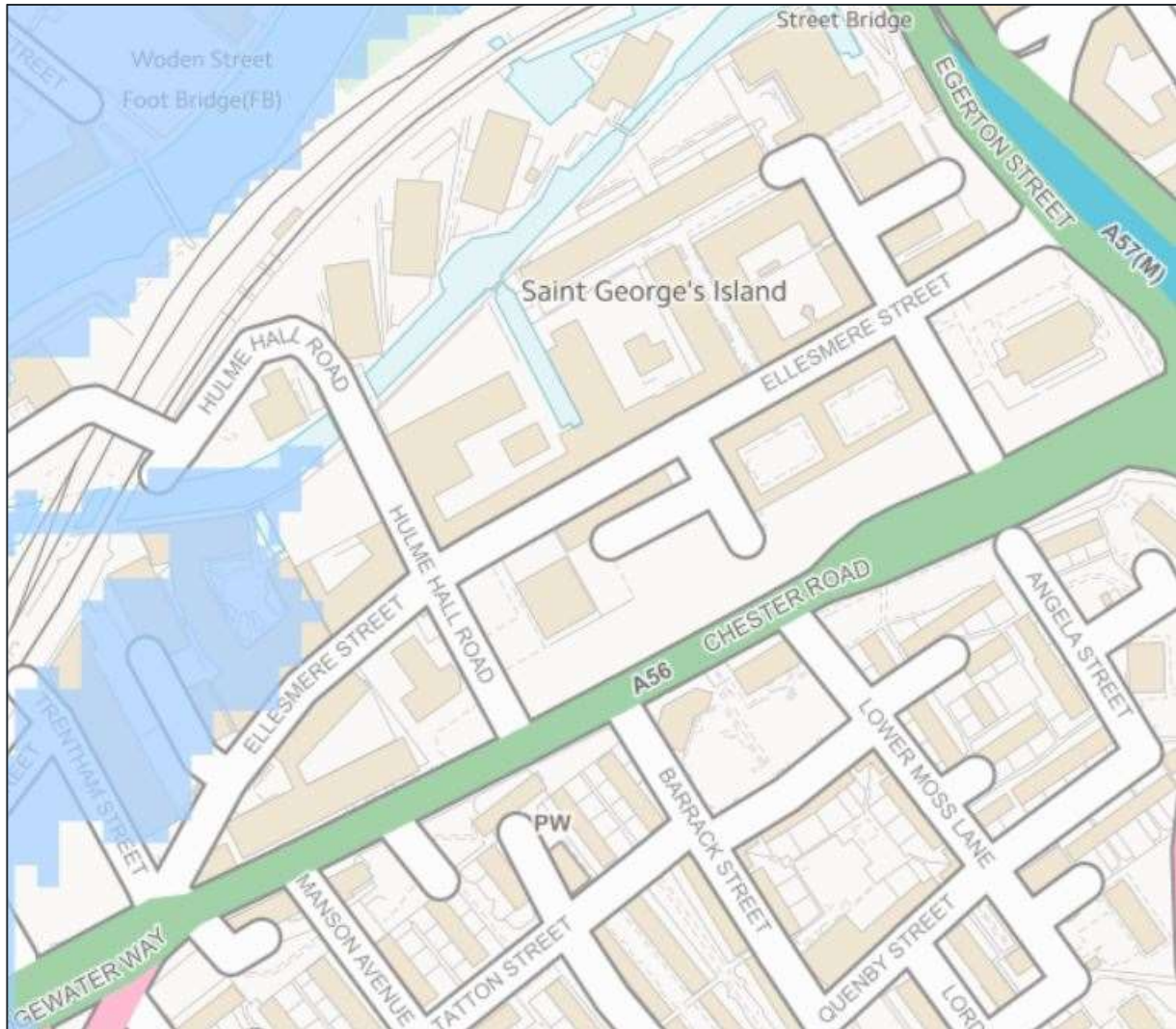
CANAL / RIVER INTERACTION

- 5.7.2. The closest Canal to the site is the Bridgewater Canal which lies approximately 100 metres to the north of the site. The Manchester City, Salford City and Trafford Councils Level 2 SFRA Hydraulic Interactions map indicates that the site will not be affected by flooding from this canal.
- 5.7.3. Therefore, it is considered that the site is Not at risk of flooding from canals or canal and river interaction.

RESERVOIRS

- 5.7.4. The Environment Agency provided a copy of their Reservoir Flood Map which indicates that the site is not within an area that could be affected by flooding from reservoirs in the event of a reservoir failure.

Figure 5-3 - EA Reservoir Flood Map Extract



5.7.5. Based on the above, it is considered that the site is Not at risk of flooding from reservoir failure.

6. NPPF SEQUENTIAL AND EXCEPTION TEST

6.1. THE SEQUENTIAL TEST

- 6.1.1. The Sequential Test, within the National Planning Policy Framework, aims to steer all new developments to areas at the lowest risk of flooding and to ensure that the development type proposed is appropriate by reference to the flood risk.
- 6.1.2. As the site is within Flood Zone 1, a sequential test is not required for this development.

6.2. THE EXCEPTION TEST

- 6.2.1. Table 3 of the Flood Risk and Coastal Change Chapter of the Planning Practice Guidance (2014) shows that all land uses are appropriate in Flood Zone 1 areas and therefore an Exception Test is not required for this site.

7. SURFACE WATER DRAINAGE STRATEGY

- 7.1.1. For details of the outline surface water drainage proposals for the site, reference should be made to the WSP Drainage Strategy drawing (5977-WSP-DR-D001), which is included in Appendix F of this report.

7.2. DISPOSAL OF SURFACE WATER

- 7.2.1. The method for removal of surface water from the site has been selected in accordance with the hierarchy outlined in Building Regulations Part H as summarised below:

- Infiltration to the ground
- Discharge to a watercourse
- Connection to a surface water sewer
- Connection to a combined sewer

SOAKAWAYS

- 7.2.2. A detailed assessment of the feasibility of soakaways has been undertaken. The only practicable location to situate a soakaway is within the pedestrian access in the eastern corner of the site. There is currently no site investigation information available that is specific to the Phoenix Works site. However, the WSP Environment Consultant has advised that based on the site's brownfield history, published data and nearby BGS / third party logs it is reasonable to anticipate up to 5 metres of Made Ground in this area. Previously, there was what appears to be a row of terraced houses, potentially with basements, associated with Cawdor Street. The houses ran along the southern boundary of the site. The site investigation for the adjacent Gallery Gardens plot (which also covered Cawdor Street, but the south western end) inferred infilled basements based on Made Ground observations and a groundwater level between 5.40m and 5.80m bgl. Such ground conditions are prohibitive to infiltration, particularly in an area classified as having a Medium Groundwater Vulnerability risk based on the DEFRA MAGIC map.
- 7.2.3. Based on the above, it is anticipated soakaways and other means of infiltration will not be feasible as a means of disposing surface water runoff. This will be reviewed and confirmed upon completion of the site-specific site investigation.

WATERCOURSE

- 7.2.4. A new connection directly to the nearest watercourse, the Bridgewater Canal, is not considered to be feasible due to the distance associated with any viable route to the watercourse, the busy residential location of the development and the disruption that would be caused to local highway networks if a new drain was laid from the site directly to the canal.
- 7.2.5. UU have confirmed that *'there are no waterbodies within the vicinity of the site for surface water runoff to discharge to'*.

SURFACE WATER SEWER / HIGHWAY DRAIN

- 7.2.6. The public sewer records show that the closest surface water sewer to the site is an existing 2250mm brick sewer in Hulme Hall Road. However, a connection to this sewer would require a significant length of new pipework being installed in the public highway (Ellesmere Street) outside the site in order to make a connection to this sewer. Therefore, it is deemed to be not feasible to connect to a surface water sewer.
- 7.2.7. Based on the information currently available, there are no existing highway drains in the vicinity of the site which can be connected into.

COMBINED SEWER

- 7.2.8. Therefore, based on the above, it is proposed to discharge surface water from the site via a new 225mm combined lateral connection to the existing 525mm / 550mm x 620mm combined sewer in Ellesmere Street.
- 7.2.9. The type of connection and details will be agreed with United Utilities at detailed design stage and a section 106 sewer connection application will be submitted to UU for approval of the connection.

7.3. SUDS

- 7.3.1. The provision of Sustainable Urban Drainage Systems (SUDS) has been considered and will, where appropriate, be included within the surface water drainage proposals.
- 7.3.2. There is no scope to incorporate swales or a detention basin within the site due to the spatial constraints and rainwater harvesting has been discounted due to potential future maintenance issues.
- 7.3.3. It is currently anticipated that SuDS will be provided in the form of filter drains to capture and treat runoff from external areas and an attenuation storage tank to temporarily store surface water from the site before controlled release to the public sewer.
- 7.3.4. It is worth adding that the development proposals maximise areas of soft landscaping and tree planting which will help to reduce the overall volume of water that discharges to the public sewer.

7.4. IMPERMEABLE AREAS

- 7.4.1. The total impermeable area within the existing site boundary has been measured to be 0.288 hectares. This includes the impermeable area associated with Cawdor Street which is to be stopped up.
- 7.4.2. The total drained impermeable area of the proposed site has been measured to be 0.258 hectares.

7.5. DISCHARGE RATES

- 7.5.1. The site has been previously developed and is therefore considered to be a brownfield site for the drainage design purposes.
- 7.5.2. At present there is no drainage survey information available to carry out a detailed assessment of the hydraulic characteristics of the existing drainage system.
- 7.5.3. However, based on a total impermeable area of 0.288 Hectares, the existing surface water runoff rate from the site has been calculated to be 40 litres per second (l/s) using the Rational Method with a rainfall intensity of 50 mm / hour.

- 7.5.4. MCC indicated that for Brownfield sites they expect the following in line with LFRM Policy 6:
- A 50% runoff rate reduction for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, including consideration of climate change.
- 7.5.5. When accounting the 50% reduction, the peak discharge from the developed site should be no more than 20 l/s.
- 7.5.6. The existing greenfield runoff rate (QBAR) from the site has also been calculated to be 1.6 litres per second using the ICP SUDS method in Micro-Drainage WinDes design software.
- Reference should be made to the MicroDrainage calculations, included as Appendix G of this report.
- 7.5.7. However, it should be noted that United Utilities have indicated they would consider a connection to the public combined sewer within Ellesmere Street at a maximum pass forward flow rate of 5 l/s.
- 7.5.8. Therefore, in line with UU's request, it is proposed that the maximum surface water runoff rate from the developed site will be restricted 5 litres per second.

7.6. ATTENUATION STORAGE

- 7.6.1. In order to achieve the restriction in surface water runoff rates from the developed site as described above, on site surface water attenuation storage will be required in order to temporarily store the residual volume of surface water for rainfall events resulting in a peak runoff rate over and above 5 litres per second.
- 7.6.2. The attenuation storage will be designed to ensure that surface water runoff for storm events up to and including the 100 year storm plus a 40% allowance for climate change, can be contained within the site safely without causing a risk of flooding to property or a risk of flooding elsewhere in the catchment.
- 7.6.3. Based on a 'source control' assessment using MicroDrainage software, it is anticipated that approximately 110 cubic metres of storage will be required. This is subject to the detailed design of the proposed surface water drainage system.

7.7. WATER QUALITY

- 7.7.1. Water Quality has been considered and the following measures have been included within the surface water drainage proposals:
- The proposed filter drain, serving the external areas, will treat the runoff by facilitating filtration of sediment and heavy metals.

7.8. MAINTENANCE

- 7.8.1. Reference should be made to the Drainage Inspection and Maintenance Schedule, included as Appendix J of this report.

8. FOUL DRAINAGE

8.1. GENERAL STRATEGY

- 8.1.1. For details of the outline foul drainage proposals for the site, reference should be made to the WSP Drainage Strategy drawing (5977-WSP-DR-D001), which is included in Appendix F of this report.
- 8.1.2. It is proposed to discharge foul drainage from the site via a new combined lateral connection to the existing 525mm / 550mm x 620mm combined sewer in Ellesmere Street.
- 8.1.3. The type and details of the proposed connection will be agreed with United Utilities at detailed design stage and a section 106 sewer connection application will be submitted to UU for approval.

8.2. DISCHARGE RATES

- 8.2.1. United Utilities have confirmed that foul drainage from the proposed development can be discharged to the public sewer at an unrestricted discharge rate.
- 8.2.2. An assessment of the anticipated peak foul flow from residential dwellings has been calculated based on the probability / discharge unit method outlined in BS EN 16933:2-2017 and using the maximum typical values associated with each appliance and a typical frequency factor of 0.5 (for dwellings).
- 8.2.3. The number and type of appliances associated with 1 and 2 bedroom dwellings has been assessed and is presented in Table 8-1 below.

Table 8-1 – Foul flows from building

Type of Appliance	1 bedroom – 80 no.		2 bedroom – 157 no.	
	Number	Typical value (max)	Number	Typical value (max)
W/C	1 no.	2.5	1 no.	2.5
Bath	0	1.3	1 no.	1.3
Shower	1 no.	0.6	0	0.6
Sink	2 no.	1.3	2 no.	1.3
Dishwasher	1 no.	0.8	1 no.	0.8
Washing machine	1 no.	1.5	1 no.	1.5
	Sum	8	Sum	8.7
Foul design flow rate = $0.5 * (8*80 + 8.7*157)^{1/2} = 22.4 \text{ l/s}$				

- 8.2.4. As the number and type of appliances associated with the ground floor restaurant and bar is unknown at this stage, peak foul flows have been calculated to be 0.14 l/s based on a figure of 0.5 l/s/ha for normal industry as stipulated in the Design and Construction Guidance for foul and surface water sewers (2020).

- 8.2.5. A total peak foul flow of 22.54 l/s is anticipated to discharge from the development to the combined public sewer.

9. MITIGATION / MANAGEMENT OF FLOOD RISK

9.1. FINISHED FLOOR LEVELS / ACCESS AND EGRESS

- 9.1.1. The site is located in Environment Agency Flood Zone 1 and all access points will be set above the critical 1000 year event level. Therefore, a safe means of access / egress is always available to the site.
- 9.1.2. The Environment Agency Map of long-term flood risk from surface water indicates that there is a Medium risk of surface water flooding in Cawdor Street and the western boundary of the site. Cawdor Street and the associated low-lying areas within it are being removed as part of the development proposals and replaced by a building which will be drained by conventional means. This will in turn remove the current risk of localised surface water flooding.
- 9.1.3. The finished floor levels of the townhouses will be set at 30.100 m AOD, approximately 600mm above street level, and the rest of the site set at 29.500 m AOD.

9.2. DRAINAGE AND EXCEEDANCE FLOW ROUTES

- 9.2.1. The proposed surface water drainage system will be designed in accordance with the drainage strategy set out in section 7 of this report. This will ensure that there is no increase in flood risk to the site or elsewhere in the local catchment for all storm events up to and including the 100 year storm plus 40% climate change.
- 9.2.2. It should be noted that if storm events in excess of the 100 year storm plus 40% climate change or blockages occur, this will result in flood water arising from the site drainage system.
- 9.2.3. Reference should be made to the WSP Exceedance - Overland Flow Routes drawing that is appended to this report and which identifies that overland flows would be safely routed away from buildings and towards Spinners Way in the event of failure or design exceedance of the proposed site drainage system

9.3. FLOOD RISK POST MITIGATION

- 9.3.1. Table 9-1 below, summarises the risk of all sources of flooding post mitigation.

Table 9-1 - Degree of Risk from Each Source of Flooding Post Mitigation

Source		Risk
Fluvial		Low
Surface Water		Low
Groundwater		Low
Sewer		Low
Tidal		Not at risk
Artificial Sources	Reservoir	Not at risk

Source		Risk
	Canal	Not at risk

- 9.3.2. This Flood Risk Assessment and Drainage Strategy has concluded that the development is appropriate and can be occupied safely subject to implementation of the flood risk mitigation being carried out.

Appendix A

PROPOSED SITE MASTERPLAN

wsp

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Figured dimensions only to be taken from this drawing. DO NOT SCALE. All contractors must visit the site and be responsible for checking all setting out dimensions and notifying the architect of any discrepancies prior to any manufacture or construction work.

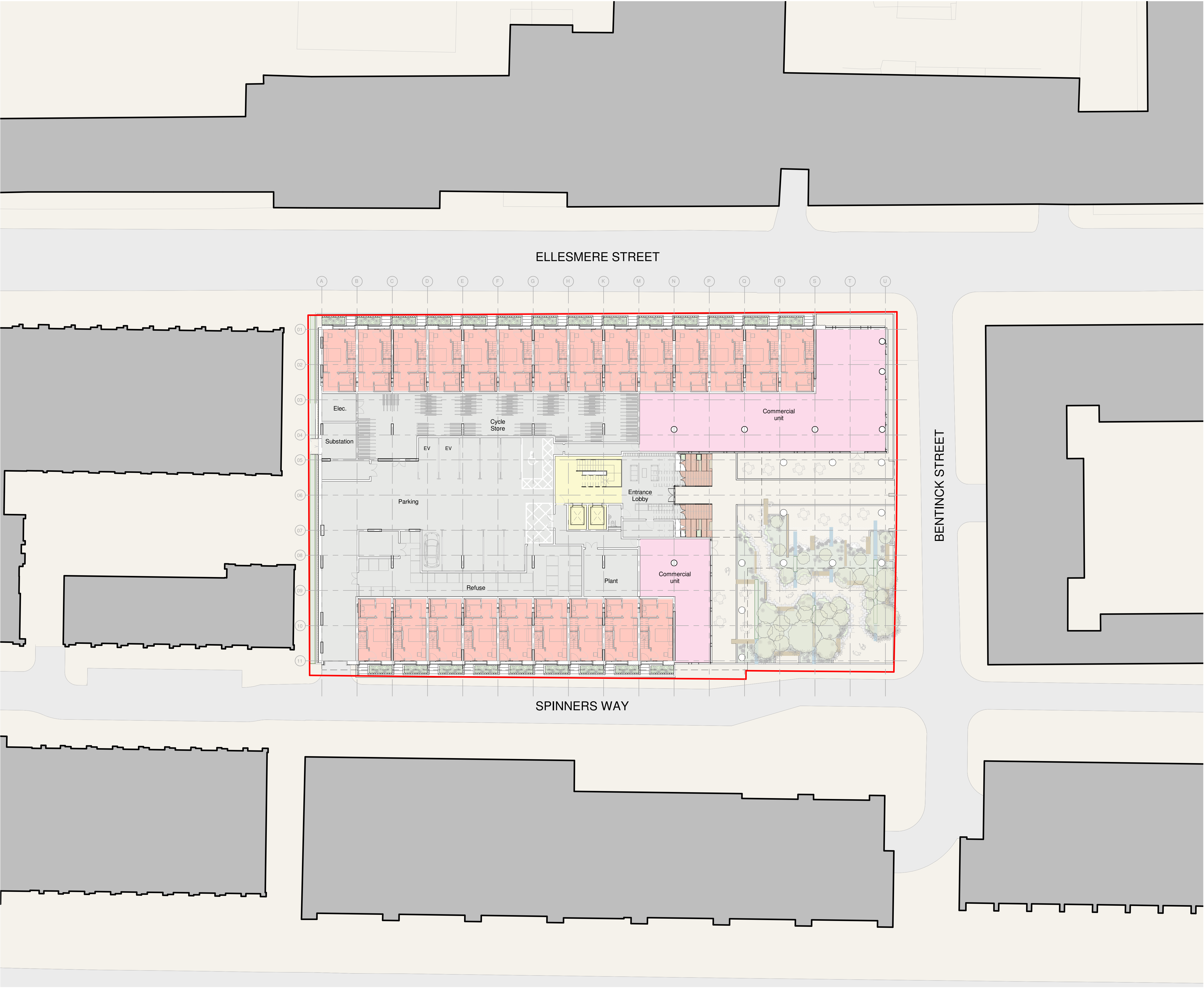
NOTES:

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NIA

- Commercial Unit
- Core
- Lobby
- Refuse
- Townhouse



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00	Issued for information	23.08.20	DM	MD
Rev	Description	Date	Dr by	App by

Project Stage

PLANNING

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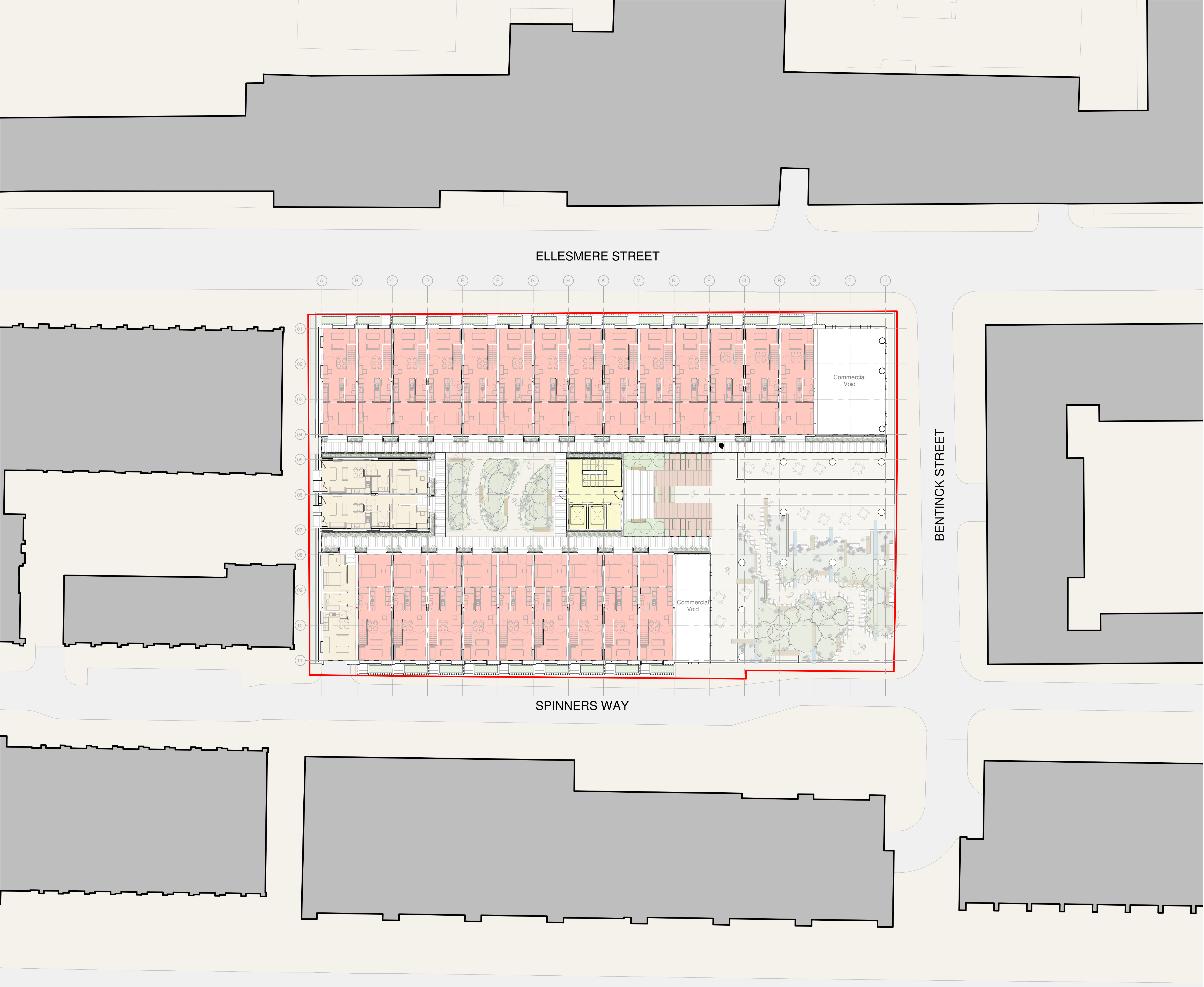
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PHOENIX WORKS

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CDE Area:		Suitability Code:	BIM Revision: P01.01	

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NIA

- 1Bed
- Core
- Townhouse

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Project Stage

PLANNING

Client:
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Drawing Title:
First Floor GA

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CDE Area:		Suitability Code:	BIM Revision: P01.01	

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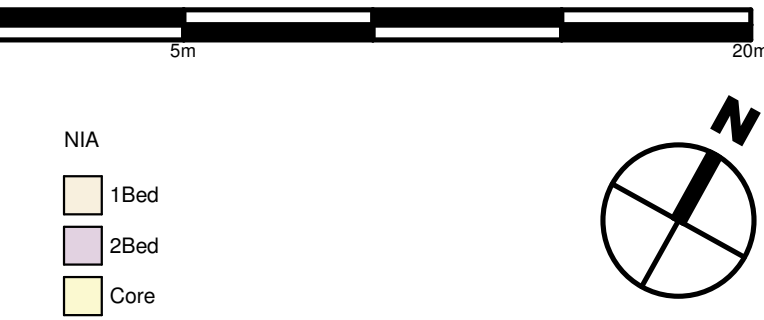
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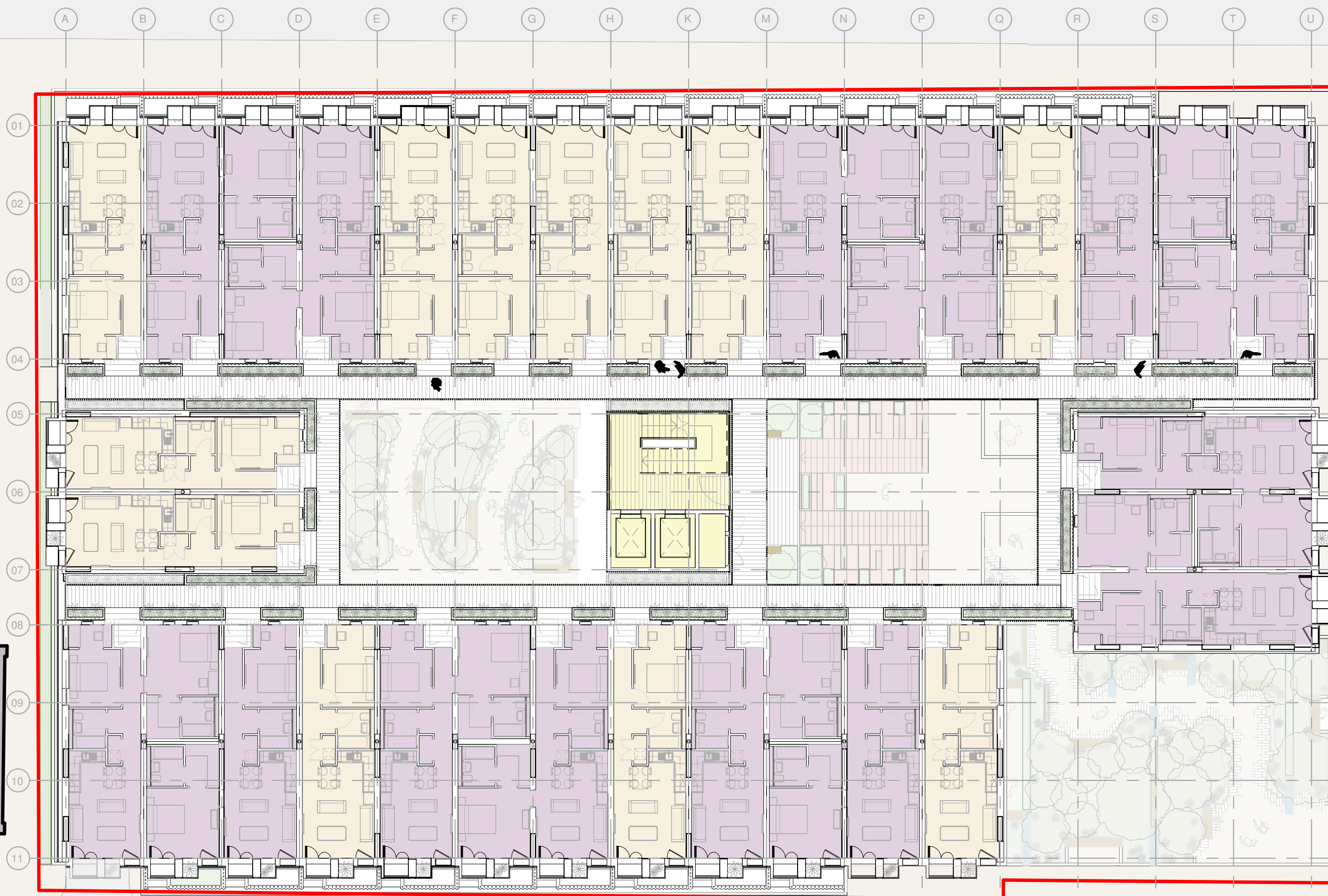
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- NIA
- 1Bed
 - 2Bed
 - Core



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Drawing Title:
Second Floor GA

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Drawing BIM Name:
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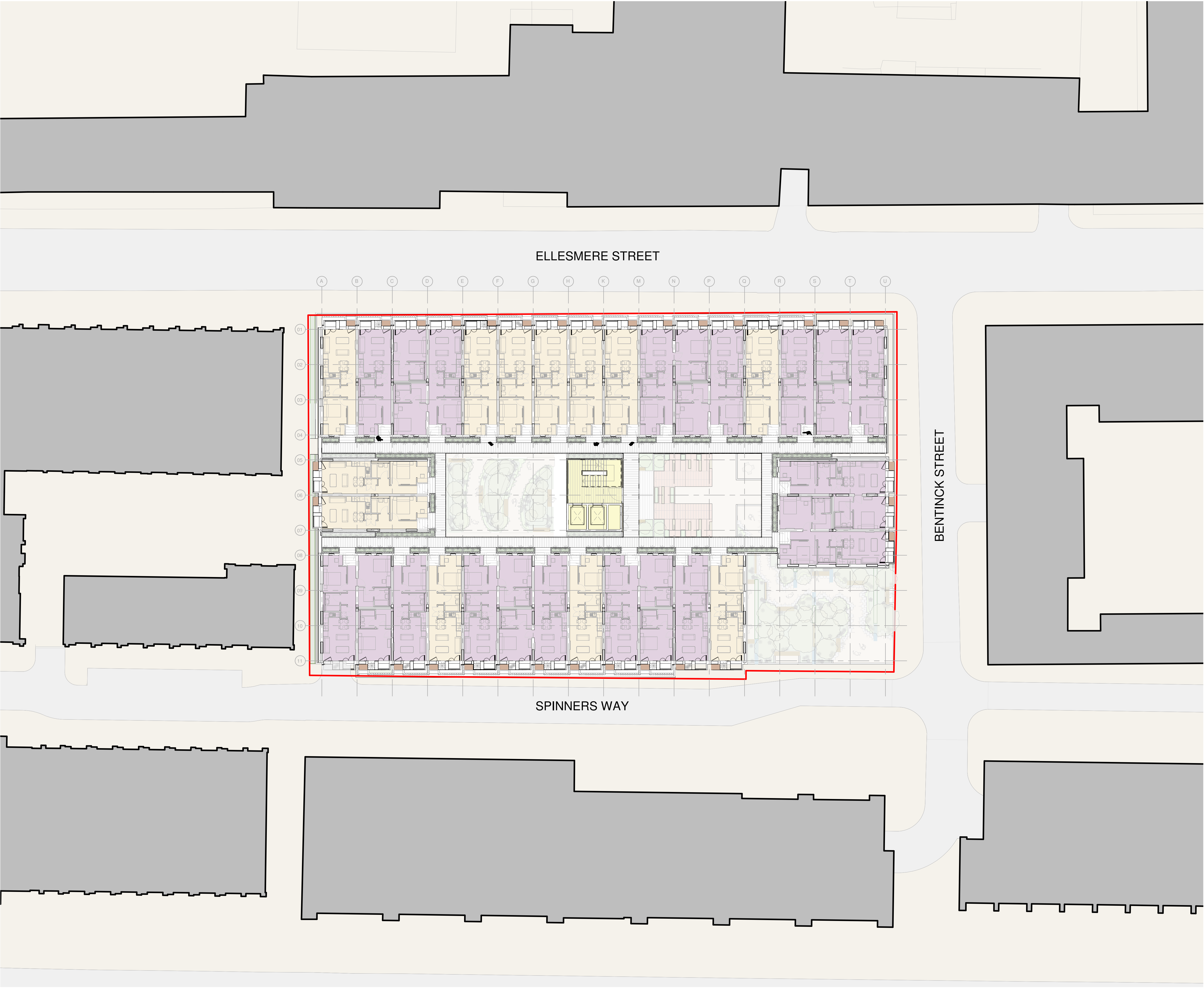
NIA

1Bed

2Bed

Core

N



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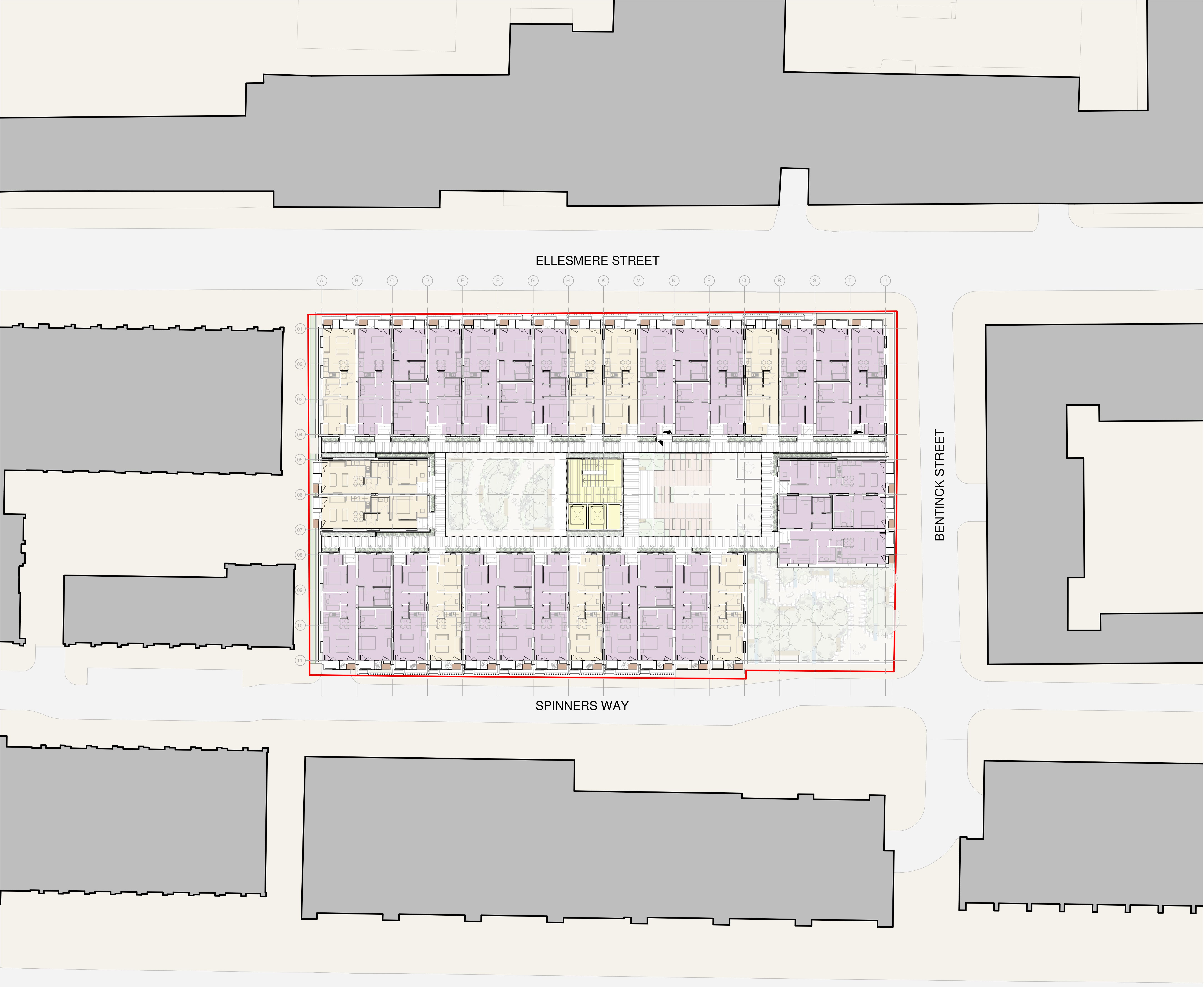
Project:
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Drawing Title:
Third Floor GA

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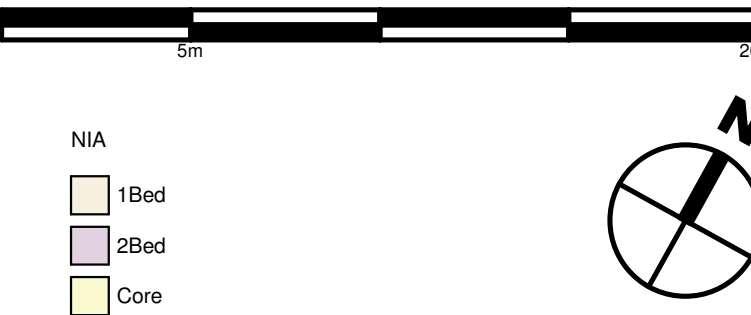


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NOTES:

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- NIA
- 1Bed
 - 2Bed
 - Core

P01	Issued for Planning	20.11.20	DM	MB
00	Issued for information	23.08.20	DM	MD
Rev	Description	Date	Dr by	App by

Project Stage

PLANNING

Client:
DE TRAFFORD

Project:
PHOENIX WORKS

Drawing Title:
Fourth, Sixth, Eighth GA Plan

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Drawing BIM Name:
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		P01.01

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