



**Rhodes Business Park
Silburn Way
Middleton
Manchester
M24 4NE**

**Flood Risk Assessment
& Drainage Strategy Report**

for

OXENWOOD REAL ESTATE

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1.0 EXECUTIVE SUMMARY

Development comprising the demolition of existing buildings and structures and the erection of a new building for Class B2/B8 (storage / distribution), including ancillary offices, landscaping, yards, alterations to existing access from Silburn Way, car parking, cycle parking and associated engineering works.

The site is located at along Silburn Way within an existing industrial development, Middleton, Manchester, M24 4NE.

A review of the site topographical & GPR survey indicates that the surface water drainage from the existing industrial site currently outfalls unrestricted to the River Irke, with an existing foul water spur serving the site along the northern boundary.

In accordance with the National Planning Policy Framework and the Greater Manchester City Strategic Flood Risk Assessment (SFRA), this report has studied and assessed the flood risk to the site by all sources. A review of the EA Flood Maps shows that the site is located within Flood Zone 3. It is to be noted that the EA flood maps show flood defences along the north bank of the River Irk close to the western boundary of the development site.

A review of the planning portal has shown that the recent application for the residential development, located to the west of the proposed development site, has identified flood defences along the River Irk as part of their strategy. A review of the topographical levels of the defences and the development site suggests the defences continue along the northern bank of the River Irk to the east of the development site. A flood map challenge has been commissioned and undertaken by JBA Consultants, on behalf of the client, and the results will be submitted as an addendum to this report when complete.

The Finish Floor Levels of the proposed development building have been set at 70.900 AOD which is above the EA 1:100 year flood event levels of 70.42 AOD.

The site use is defined as 'less vulnerable' such that the development can be considered 'appropriate' in accordance with NPPF guidelines. As the site is located within Flood Zone 3, the sequential and exception tests may be required by the local authority. Further to this, the site is considered to be at 'low-medium risk' from all other sources of flooding; tidal, fluvial, pluvial, sewer, groundwater and artificial sources.

The surface water drainage strategy, as outlined below, is to restrict the proposed outflow rate to satisfy both Greater Manchester Area & the Rochdale SFRA and to ensure that the flood risk to the site and surrounding catchment is not increased by the proposed development. The Sustainable Drainage Systems (SuDS) hierarchy has been considered in the drainage strategy discussed in Section 5. The surface water runoff will be collected from the impermeable areas and directed via the underground network to a geocellular attenuation tank located beneath the main service yard area before connecting to the existing surface water sewer via an existing connection, within the development site, at a restricted rate of 4.5l/s (Q_{BAR}). This overall approach aligns with the Sustainable Drainage Systems (SuDS) policy and provides a significant reduction in the pre-development unrestricted discharge rates. A detailed Drainage layout with hydraulic calculations incorporating a

climate change allowance of 40% have been prepared to support this approach and can be found in the Appendices.

There is no residual flood risk from the development site to the surrounding district due to the reduction in storm water flow rates. The development does not therefore increase the risk of flooding to other adjacent neighbourhoods. Out of chamber or gully flooding for the extreme 100 year plus climate change event may occur within the development site and is classed as exceedance flows. Flood water from this event will be contained within the development site and directed away from the building to the service yard and parking areas.

Foul flows will be collected by a new gravity network to the existing spur serving the development plot. The private network discharges into the public sewer, located north of the industrial development along the A576, via a rising main.

2.0 DEVELOPMENT DETAILS

2.1 CONTEXT

This Flood Risk Assessment & Drainage Strategy report has been prepared by Burrows Graham Ltd. on behalf of Oxenwood Real Estate to support the planning application and the erection of a new building for Class B2/B8 (storage / distribution), including ancillary offices, landscaping, yards, alterations to existing access from Silburn Way, car parking, cycle parking and associated engineering works.

2.2 LOCATION

Site Name: Silburn Way, Middleton, Greater Manchester, M24 4NE.

Grid Reference: SD 853052

Site Area: 0.537 Ha

Site Description: The irregular plan shape of the site currently serves as a parking area for business located to the north. The main access to the site is from north of the plot off Silburn Way. A copy of the proposed site plan is shown in Appendix A.

There is woodland located to the east of the property. There are several industrial units located to the north and west of the property, with the River Irk located along the southern boundary.

The site is located within the Rochdale Metropolitan Council.

A review of the topographical information indicates the site to have a fall from circa 70.1m AOD at the eastern boundary, down to circa 69.5m AOD at the western boundary. A copy of the existing topographical plan is shown in Appendix A.



Figure 1: Site Location

3.0 PLANNING POLICY

3.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

Local planning authorities are advised by the National Planning Policy Framework (NPPF 2021) to consult the Environment Agency (EA) and the Lead Local Flood Authority (LLFA) on all developments of an area greater than 1Ha and those that are at an increased risk of flooding.

This report has been prepared to assess the requirements of the NPPF in accordance with the current EA and LLFA policies and will primarily assess the following.

- Determining whether the site is likely to be affected by flooding and whether it would increase flood risk elsewhere.
- Assessing whether the proposed development is appropriate in the suggested location.
- Detailing any measures necessary to mitigate any flood risk identified, to ensure that the proposed development and occupants would be safe, and that flood risk would not be increased elsewhere.
- Determine the current surface water drainage regime and assess any potential increase in surface water runoff as a result of the proposed development.
- Discuss Sustainable Drainage Systems (SuDS) as an option for reducing surface water flood risk.
- Devise an appropriate surface water drainage strategy (including calculation where appropriate) to deal with any potential increase in surface water runoff and include for climate change.
- Include the appropriate climate change allowances for both fluvial and surface water runoff.
- Consider the recommendations of Test Valley Borough Council Flood Risk Assessment (SFRA) and other local policies.

A review of the EA Flood Maps shows that the site is located within Flood Zone 1 (land defined as having less than a 1 in 1000 annual probability of flooding from of river or sea water in any year). The site is defined as 'less vulnerable' such that the development can be considered 'appropriate' in accordance with NPPF guidelines. As the site is within Flood Zone 1, the sequential and exception tests are not required by the local authority.

3.2 STRATEGIC FLOOD RISK ASSESSMENT

The aim of a Strategic Flood Risk Assessment (SFRA) is to assess the risks in a particular area regarding all types of flooding and to determine how much development is permitted in that area. It can assess this by looking at how drainage systems in the area should function and how risks in vulnerable areas can be reduced and/or mitigated. The NPPF states that regional planning bodies (RPB's) or local planning authorities should prepare SFRA's in consultation with the EA.

The SFRA provides a detailed understanding of flood risk across all areas and from all sources. It states that the sequential and exception tests must be provided where applicable and climate change must be taken into consideration over the lifespan of the development.

The City of Manchester has produced a Strategic Flood Risk Assessment to demonstrate and define its understanding and role in managing flood risk across the Greater Manchester Area. A fundamental aim of the strategy is that the Council embraces and supports its role as Lead Local Flood Authority for the area, and this means taking the lead in helping with infrastructure development and re-development and working with other bodies in Manchester with flood risk. The Council wants to encourage and wherever possible enforce current thinking and guidance and be able to provide improvements through working better together. The Strategy is aimed at providing an overview and assessment of local flood risk in the area, setting out objectives and measures for how they will manage and reduce local flood risk. This Strategy builds on existing and developing approaches to flood risk management and promotes the use of a wide range of measures to manage flood risk. Risk should be managed in a co-ordinated way within catchments and balance the needs of communities, the economy and the environment.

The full reports can be obtained from the relevant council's website:

[Microsoft Word - GM_SFRA_Appendix B_District_Narratives_27-06-2008.doc \(bolton.gov.uk\)](#)

The main objectives of the SFRA:

- To better understand local flood risk and make best use of available information in order to better manage flood risk to people, businesses, property, infrastructure and the natural environment;
- To reduce the potential impact and costs of flooding in the city;
- To ensure resilience of local water bodies and drainage assets;
- To ensure appropriate development in areas of flood risk;
- To develop a collaborative partnership approach to flood risk management, and cooperate with other Risk Management Authorities (RMAs) and key stakeholders working across catchments;
- To assist communities in understanding information on flood risk and supporting themselves;
- To encourage, support and provide flood risk management which seeks to enhance and protect the environment.
- Determine the variations in risk from all sources of flooding across the city;
- Prepare broad policies for the management of flood risk;
- Steer development towards areas of lowest flood risk, through application of the Sequential Test and, where necessary, the Exception Test;
- Consider opportunities to reduce flood risk to existing communities through better management of surface water, provision for conveyance and storage for flood water; and
- Identify the level of detail required for site-specific Flood Risk Assessments.

3.3 LOCAL FLOOD RISK MANAGEMENT STRATEGY

The aim of this document is to set out the council's approach to managing flood risk in the short and long term. The primary aim of the document is to improve the understanding of flood risks within the Borough and provide a source of information which can be utilised to identify ways of managing flood risk. The second objective is to reduce the risk of flooding for people and businesses and put forward key actions to ensure this can be achieved.

3.4 SUSTAINABLE DRAINAGE

The main principles of SuDS integration into the proposed development have been taken from CIRIA C753 and are summarised below:

- That SuDS are used in major developments.
- That SuDS provide wider benefits which include biodiversity, water quality, amenity and attenuation.
- That developments aim to achieve greenfield run-off rates.
- That the minimum standards of operation proposed by the applicant are appropriate.
- Using planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance of the SuDS scheme over the lifetime of the development (see Appendix E).

The drainage strategy for this development will look to integrate these policies within the design.

4.0 FLOOD RISK

The NPPF guidelines require the developer to assess the impact of the proposed development runoff on the downstream catchment in conjunction with assessing the risk of runoff from the surrounding area on the proposed development layout.

In the following sections the flood risk to the site from all sources will be assessed. As the site will restrict the surface water runoff there is no increased flood risk to the downstream network.

4.1 FLUVIAL & TIDAL FLOODING

The closest identified watercourse is the River Irk, located along the southern boundary of the site.

The National Planning Policy Framework (NPPF) categorises fluvial and tidal 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 EA. (Not separately distinguished from Zone 3a on the Flood Map).

Figure 2 below locates the site on the Environment Agency's (EA) indicative flood map for planning. This identifies the site as located within low-risk Flood Zone 3, i.e. 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.

The EA Flood Map does identify flood defences along the River Irk northern banks to the west of the development site.

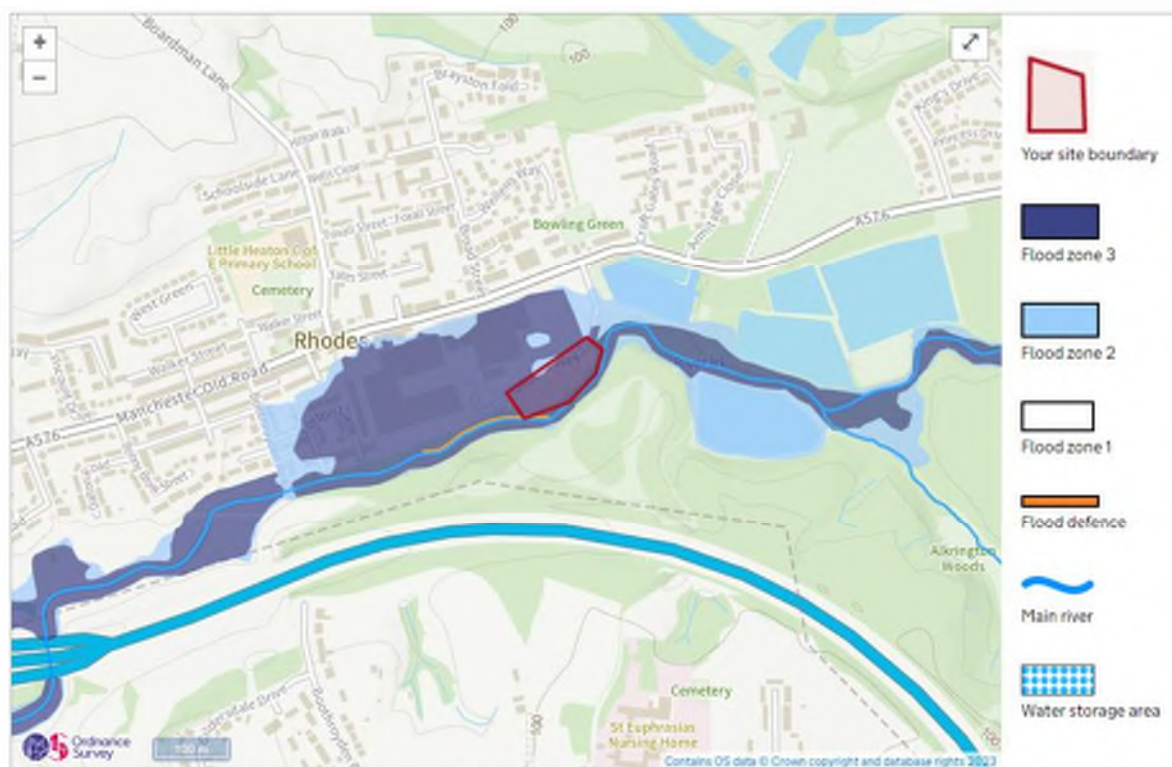


Figure 2: Extract from EA Fluvial Flood Risk Maps

These defences are highlighted in the Campbell Reith FRA document 9940 dated April 2015 (c/o Dolphon Land & Development Consultancy attached in the Appendix), which was submitted for the residential development planning application. This residential development site is located to the west of the proposed development site. An excerpt from drawing SK007 of the Campbell Reith report shows levels of the defences and are reproduced in Figure 2b.

The CBRE Report - 50BCD0443600 - also refers to the defences in the Campbell Reith report and supplement the topographical information along the development site northern banks of the River Irk, see Figure 2a below.

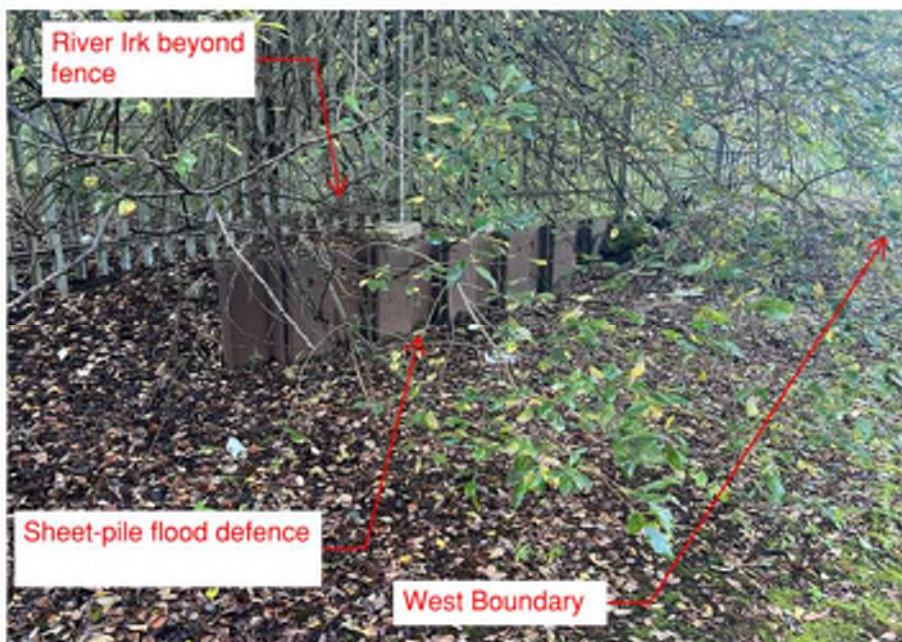
The building FFL has been proposed at 70.900 AOD which at minimum 300mm above the Environment Agency 1:100 flood levels (~70.420 AOD) predicted in the area.

Figure 2a: Extract from CBRE Report 50BCD0443600 Flood Risk Review

[illegible]

Figure 2b: Extract from CBRE Report 50BCD0443600 Flood Risk Review

Site visits have identified the sheet pile wall defence terminating within the proposed development boundary - see images below:



The developer has appointed JBA Consulting to undertake a flood modelling study of the area with updated topographical data to produce a flood challenge report to be submitted to the EA for review.

4.2 SURFACE WATER FLOODING

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%.

A review of the EA surface water flood maps (Figure 3 below) indicates that the site is classified as 'Low Risk'. Beyond the site boundary, the overall industrial development is at a low risk of surface water flooding.

The development will mitigate against any surface water flood risk within the site boundary by amending the levels locally with new building and service yards to suit the development intent. All new impermeable areas will be directed into a new underground drainage network designed in line with local and national guidance. Considering these changes surface water will not pose a flood risk to the development.

There are existing surface water sewer routes through the site that would need to be maintained. Therefore, based on this assessment, the site can be considered at low risk from surface water flooding.

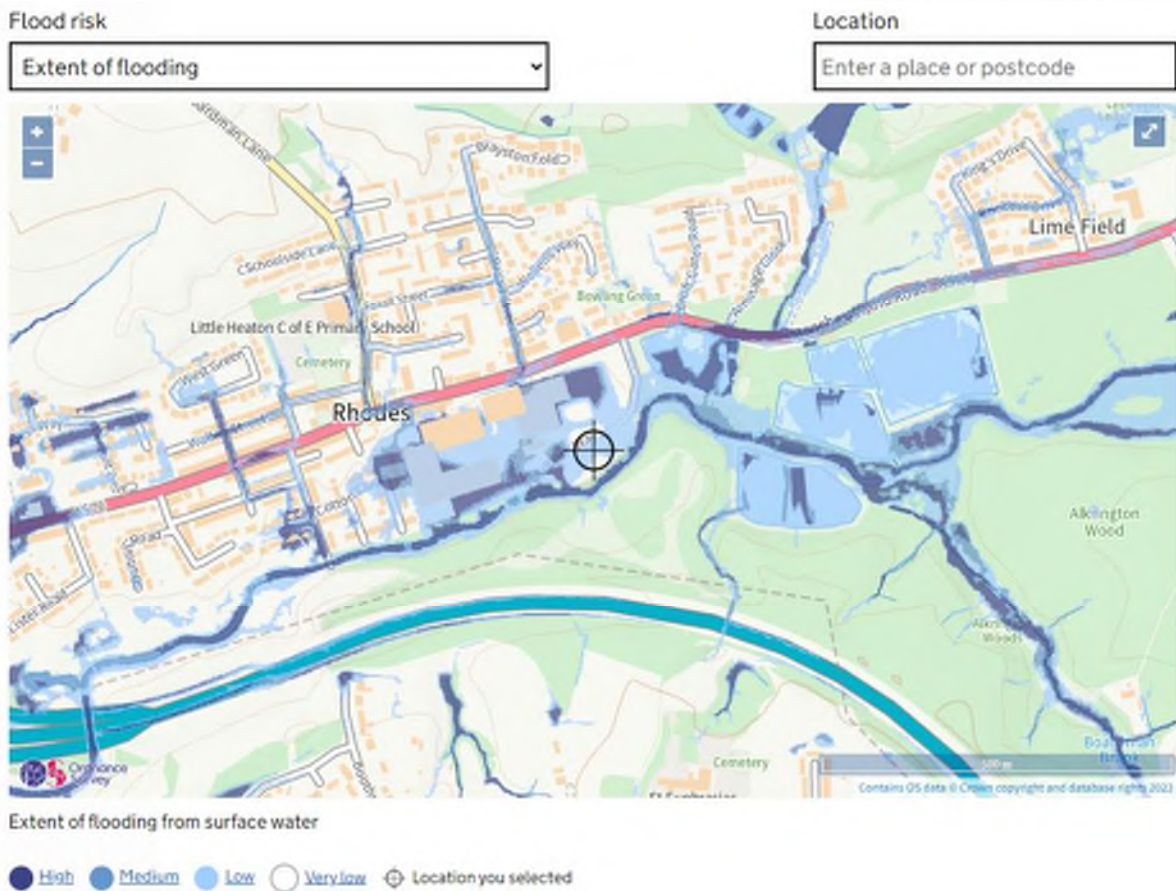


Figure 3: Extract from EA Surface Water Flood Risk Maps

4.3 GROUNDWATER FLOODING

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.

The BGS groundwater dataset suggests that there is a low to medium potential for groundwater flooding to occur at the surface of the land in the area.

The proposed development does not include any below ground basement areas and floor levels are at or above existing ground levels. Intrusive site investigations undertaken at the site have not identified any elevated ground water levels. Based on this, the risk of groundwater flooding to the site is considered low.

4.4 SEWER FLOODING

The United Utilities sewer records have been reviewed and confirm that the closest public sewers are a 900mm diameter foul water sewer located in Manchester Road and a 1100mm diameter foul water

sewer along the River Irk. No surface water assets are recorded in the vicinity of the proposed development site. A copy of the United Utilities Asset plan is shown in Appendix C.

All these adopted SW sewers are located outside the site boundary and set down from the proposed finished floor levels of the proposed building. Furthermore, the existing drainage network serving the surrounding urban district ensures that the development footprint is protected from the impact of both upstream and downstream runoff. It is speculated that complete protection may well exist beyond a storm event equivalent to the 30-year statistical event. Beyond this projection, there may be a small degree of peripheral 'Exceedance' flooding within the areas above the sewers. However, this is expected to be localised and restricted to the location of specific manhole covers located outside the development footprint.

A CCTV and GPR survey of the existing site has identified a number of separate private foul and surface water drainage networks that outfall unrestricted to the public sewers and the River Irk respectively. All these private drains will be inspected and jetted. A copy of the GPR survey is shown in Appendix A.

Considering these findings, flood risk to the site from sewers is diminished to acceptable levels and considered to be low.

4.5 ARTIFICIAL FLOODING

A review of the EA online mapping tool shows that the site is located in an area with risk of flooding from reservoirs and other artificial features.

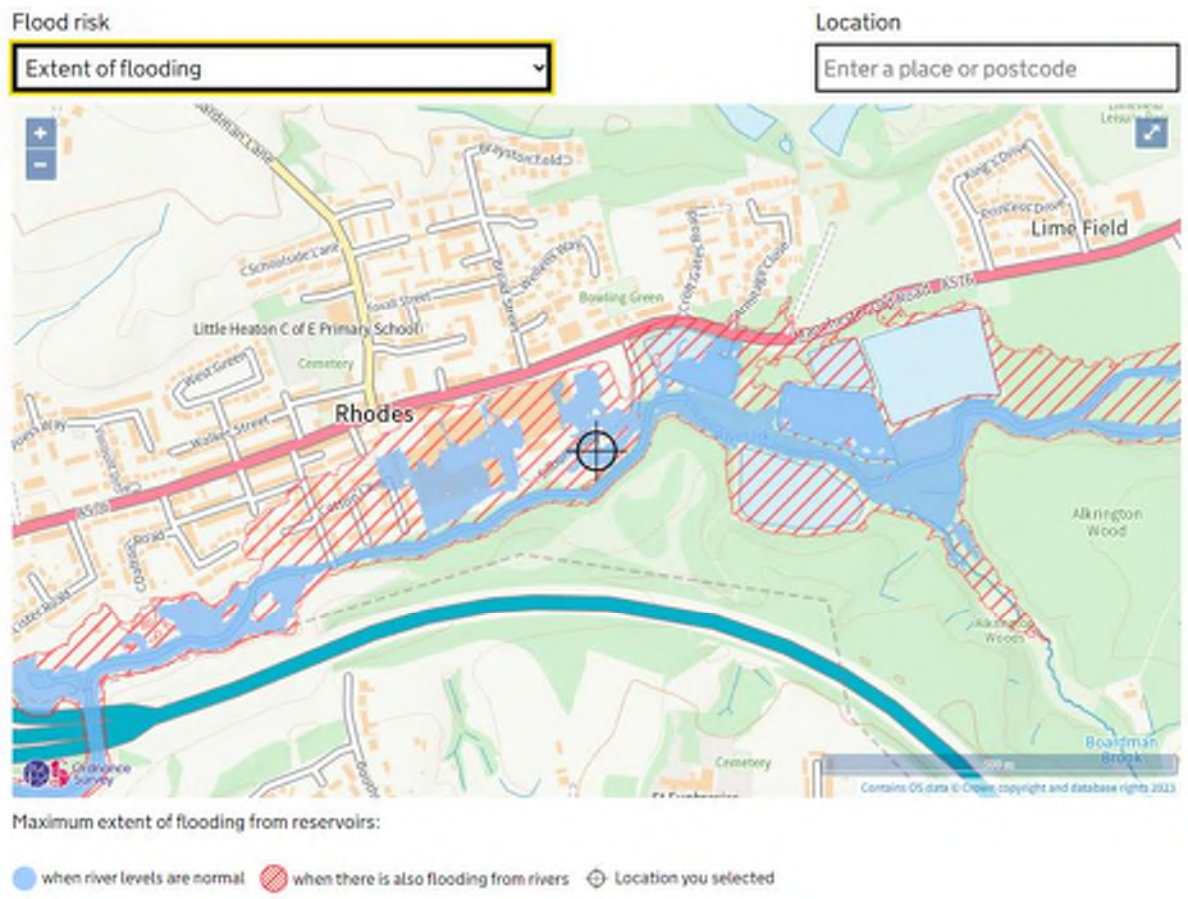


Figure 4: Extract from EA Surface Water Flood Risk Maps

4.6 SUMMARY

Below is a table summary of the flood risks associated with the development site.

Source	Probability of Flood Risk	Impacts	Remarks
Tidal	Low	Low	The development is not located in low tidal zone.
Fluvial (Watercourse)	High	Low	The development is located in high fluvial flood zone 3.
Surface Water (Overland Flood Flow)	Low	Low	The development is located within a very Low Risk Zone. Future Drainage works to remove risk.
Sewers & New Drainage	Low	Low	No adopted sewers within development boundary. New private drainage will serve the units and external areas, all designed to current guidance with any exceedance flooding located away from the units.
Groundwater	Low - Medium	Low	Development does not include basements, no identified elevated ground water levels, and thus risk of considered to be low.
Artificial Sources	Low	Low	Artificial sources in close proximity.

Table 1: Flood Risk Summary

Essential Infrastructure	Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood Wind Turbines
Highly Vulnerable	Police stations, Ambulance stations, Fire stations, Command Centres and telecommunications installations required to be operational during flooding Emergency dispersal points Basement dwellings Caravans, mobile homes and park homes intended for permanent residential use Installations requiring hazardous substances consent
More Vulnerable	Hospitals Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels

	Buildings used for dwelling houses; student halls of residence, drinking establishments, nightclubs and hotels. Non-residential uses for health services, nurseries and educational establishments Landfill and sites used for waste management facilities for hazardous waste. Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	Police, ambulance and fire stations which are not required to be operational during flooding. Buildings used for shops; financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in "more vulnerable", and assembly and leisure. Land and buildings used for agriculture and forestry. Waste treatment (except landfill and hazardous waste facilities). Minerals working and processing (except for sand and gravel working). Water treatment plants and sewage treatment plants (if adequate pollution control measures are in place). Sewage treatment works (if adequate measures to control pollution and manage sewage during flood events are in place).
Water-compatible Development	Flood control infrastructure. Water transmission infrastructure, pumping stations. Sewage transmission infrastructure and pumping stations. Sand and gravel workings. Docks, marinas, wharves Navigation facilities. MOD defence installations. Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. Water-based recreation (excluding sleeping accommodation). Lifeguard and coastguard stations. Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.
Notes 1 - This classification is based partly on Defra/Environment Agency research on Flood Risks to People (FD2321/TR2)21 and also on the need of some uses to keep functioning during flooding. 2 - Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity. 3 - The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.	

Vulnerability Classification		Essential Infrastructure	Water-compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test	✓	✓
	Zone 3a	Exception Test	✓	✗	Exception Test	✓
	Zone 3b	Exception Test	✓	✗	✗	✗
Key ✓ Development is appropriate ✗ Development should not be permitted						

5.0 DRAINAGE STRATEGY

5.1 CONSULTATION

A pre-development enquiry has been submitted to Anglian Water to inform on the design for draining the foul and surface water from the site, plus the agreed peak discharge rates. Their formal response has not yet been received.

5.2 EXISTING DRAINAGE AND FLOW RATES

The site area currently encompasses existing transport and storage operations with hard paved areas which all positively drain unrestricted to the existing Anglian Water surface water sewers bounding the site to the south. As such the site is considered to be partially brownfield for drainage purposes.

The existing surface water flow from the site has been calculated as approximately 46l/s, with flooding on the surface of 29m³ for the impermeable areas currently draining direct to the existing sewer. A drawing of impermeable area is shown in Appendix A.

Greenfield rates have been defined in Table 2 below.

	Area (ha)	1 year (l/s)	Qbar (l/s)	30 year (l/s)	100 year (l/s)
Greenfield Runoff Rates	0.537	4.1	4.5	8.0	9.8

Table 2: Greenfield Runoff Rates

5.3 GEOLOGY

A detailed Phase 2 Site Investigation has been commissioned at the site. This identified made ground comprising a sandy gravelly clay to a maximum depth of up to 3.5m. The made ground was underlain by superficial deposits comprising gravelly clays, silts and horizons of medium dense sands and gravels. Groundwater monitoring recorded standing water at depths of between 1.73m and 4.07m within the eastern area of the site and between 1.15m and 1.77m within the western area of the site. Considering the shallow made ground and elevated groundwater levels, infiltration as a means of draining the site has been discounted.

5.4 SUSTAINABLE DRAINAGE

Sustainable Drainage Systems (SuDS) are utilised in line with the CIRIA 753 guidance and LBB Policy with the aim to minimise the development's impact on the runoff quantity and quality and maximise amenity and biodiversity opportunities.

The CIRIA 753 Management train approach is a fundamental principle of SuDS systems, it aims to primarily reduce pollution, flow rates and volume of runoff from the site. The main objective is to treat the runoff as close to the source as possible and it is imperative that at least two of the following should be included within the drainage strategy.

- **Prevention** – The use of good site design and rainwater re-use measures to prevent runoff.
- **Source Control** – Controlling the runoff as close to source as possible by using green roofs, porous pavements and soakaways.
- **Site Control** – Use of water management techniques within local area, i.e. detention basins and geocellular storage.
- **Regional Control** – Management of water from a number of sites in a specific location, ie. balancing ponds and wetlands.

The drainage strategy for this development will incorporate source control in the form of permeable surfacing to the staff parking area and site control methods in the form of a geocellular attenuation tank to retain the peak flows and allow the water to drain out slowly to the surface water sewer at restricted rates.

Whilst it would be beneficial to include more of these techniques, the space on site means it is not viable to include any additional above ground 'Green' SuDS measures.

5.5 SUDS HIERARCHAL APPROACH

- Based on the SuDS review, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail in Table 3 below.
- The site has an existing discharge to the watercourse, we are reducing the release rate to 4.5 L/S to alleviate flow rates to the sewer.

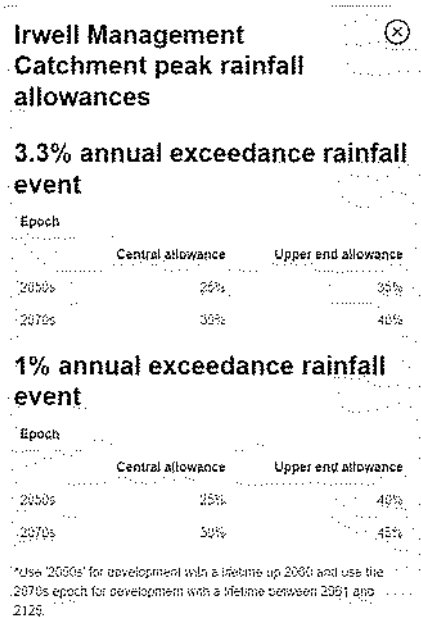
Method	Suitability	Proposed	Suitability for Development
Store rainwater for later use	No	No	Not suitable due to type of development
Use infiltration techniques, such as porous surface in non-clay areas	No	Yes	Based on the BGS data the underlying ground strata may be suitable for infiltration, permeable paving parking area will be used. Water table depth and permeability index to be confirmed by ongoing Soil Investigation works.

Attenuate rainwater in ponds or open water features for gradual release	No	No	Not feasible due to lack of space and site constraints
Attenuate by storing tanks or sealed water features for gradual release	Yes	Yes	Attenuation via underground storage is proposed
Discharge rainwater direct to a water course	Yes	Yes	The site has an existing discharge location to a water course which we are proposing to reuse
Discharge rainwater to a surface water sewer/drain	No	No	The site has an existing discharge location to a water course
Discharge rainwater to the combined sewer	No	No	Separate Surface & Foul Water connections proposed to their respective sewers

Table 3: Drainage Proforma Drainage Hierarchy

5.6 CLIMATE CHANGE

In May 2022, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Rather than nation-wide allowances, each area will have its own peak rainfall allowances.



Based on the nature of the development, a lifespan of 50 years is anticipated (BS EN 1990). Therefore, the potential climate change allowance for the 2070's ranges between 25% and 45% for the central and upper end allowance respectively. In line with the EA Guidance for this design life, a central end allowance of 25% for climate change on peak rainfall intensity would be applicable. However, to satisfy local policy guidance, the 40% climate change allowance has been simulated in the hydraulic model to confirm that any exceedance volumes can be retained within the site boundary and appropriately managed such that they won't impact on the proposed buildings or flow off site.

5.7 THE NON-STATUTORY TECHNICAL STANDARDS FOR SUDS

It is best practice to develop drainage strategies to the DEFRA document 'The Non-Statutory Technical Standards for SuDS'.

The DEFRA document advises the following with respect to 'Peak Flow Control' (S3) and 'Volume Control' (S5) for Brownfield sites such as this:

- **S3** For developments which were previously developed, the peak runoff 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 runoff 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.
- **S5** Where reasonably practicable, for developments which have been previously developed, the runoff 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 runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.
- **S6** Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with **S5** above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

As noted above, and in line with policy, it is intended that surface water discharge rates will be restricted as close as possible to the Q_{Bar} Greenfield Rate (adopted 2l/s/ha) for all rainfall events in accordance with standard **S3** and to also comply with the peak volume requirements as per **S5** and **S6**.

It should be noted that these rates are indicative only and based on the anticipated measured impermeable areas from the development masterplan. The final discharge rate will be confirmed at detailed design stage and agreed with the LLFA through a reserved matters or condition discharge application.

5.8 SURFACE WATER DRAINAGE STRATEGY

The development plot is currently serviced by an existing private surface water sewer which collects the existing wider developed business park and discharges to the River Irk to the south of the proposed development plot with an existing outfall.

Surface water generated from the roof of the new building will pass into a below ground drainage network that will merge with the runoff from the new service yard & car parking area. The car park area will be made up of permeable pavers allowing for filtration with an overflow pipe leading to attenuation tanks for all storm events. The proposed surface water sewer release rate will be 4.5l/s (Q_{BAR}). As the release rate from the site is restricted by a control device (orifice or similar), the surface water will be attenuated in a geocellular attenuation tank located beneath the external yard areas. Refer to Appendix A for the proposed drainage strategy plan.

This overall approach aligns with the Sustainable Drainage Systems (SuDS) policy and Policy E7 covering Flood Risk Management and covering Sustainable Drainage. Table 5 below defines both the existing and post development flow rates based on the SW restricted flow rate and local policy. As shown in the table, these rates incorporate a reduction in the existing predevelopment discharge rates.

	Q_{BAR}	30 year	100 year
Greenfield Runoff Rates	4.7 l/s	8.0 l/s	9.8 l/s
Post Development Peak Flow Rates	4.5 l/s	4.5 l/s	4.5 l/s (Inc 40% CC)

Table 4: Post Development Runoff Rates

Full details of this strategy can be found on the BGL Drainage, Impermeable Areas & Exceedance drawings in Appendix A and the hydraulic calculations in Appendix B.

The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations part H guidance, i.e. to show no flooding for the 30-year storm return period criterion. Events exceeding this up to and including the 100-year plus climate change allowance have been assessed. Flooding from these events is classed as exceedance flooding and will be directed away from buildings, where it will be stored in the low-lying yard and hard paved areas and drain back into the surface water network as the levels recede.

5.8 WATER QUALITY

Water quality has been considered and the following measures have been included within the surface water drainage proposals:

- Runoff from roofs is considered to be clean and will be discharged directly into the surface water network – CIRIA C753 Table 26.2.
- All drainage from the car parking areas have a low-medium risk and will pass through the permeable paving surface.

- All drainage from the loading dock area, having a medium risk, will pass through a Class 1 full retention petrol separator.
- Silt will be prevented from entering the system by the use of channels with silt traps and catch pits where required prior to surface water entering the attenuation crates and the outlet control manhole.
- The measures proposed for the development are considered appropriate as per guidance, SuDS water quality treatment indices are shown below:

Land Use (As Defined in the CIRIA SuDS Manual)	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Roof	Low	0.2	0.2	0.05
Car Park	Low	0.5	0.4	0.4
Loading Yard	Medium	0.7	0.6	0.7
SuDS Type	Treatment			
Permeable Paving	-	0.7	0.6	0.7
Class 1 Separator	-	0.8	0.6	0.9
Suitable Level of Treatment?	-	Yes	Yes	Yes

Table – Simple Index Approach Summary for the Proposed Development

5.9 FOUL WATER STRATEGY

Foul flows will discharge to the existing private foul water sewer network located to the north of the site via the existing connection. The site will drain by a private gravity network to this sewer and be designed in line with Building Regulations Guidance.

Refer to the drainage strategy plan in Appendix A for details.

6.0 CONCLUSION

In conclusion, this report has studied and assessed the flood risk to the site by all sources with the proposals complying with national, regional and local planning policy & guidance. A review of the EA Flood Maps shows that the site is located within Flood Zone 3, i.e. land defined as having high probability of flooding from river water. Further to this, the report has found the site to be at 'low risk' from all sources of flooding; tidal, fluvial, pluvial, sewer, with medium risk from ground water and reservoir/ artificial sources.

The surface water drainage strategy is to connect to the existing surface water sewer running north south on the site at restricted rates, to ensure that the flood risk to the site and surrounding catchment is reduced post development. The Sustainable Drainage Systems (SuDS) hierarchy has been considered in the drainage strategy with reduced release rates, permeable pavers, additional proprietary Class 1 separator and a geocellular attenuation tank located beneath the service yard areas.

There is no residual flood risk from the development site to the surrounding district due to the reduction in storm water flow rates. The development does not therefore increase the risk of flooding to other adjacent neighbourhoods.

APPENDIX A – DRAWINGS

BUILDING GROSS INTERNAL AREA SCHEDULE

UNIT

Warehouse Area	-	1,752 sqm / 18,858 ft ²
Office Ground Floor	-	56 m ² / 602 ft ²
Office First Floor	-	167 m ² / 1,797 ft ²

Total GIA - 1,975 m² / 21,258 ft²

Internal Haunch Height - 9m

VEHICLE PARKING SUMMARY

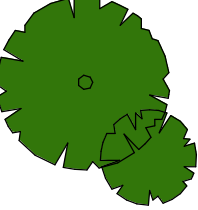
Car Parking = 27 Bays (Including 3 Disabled)
Motorcycle Parking (PTW) = 2 Bays
Cycle Shelters = 10 Cycles Spaces

Level Access = 2 Doors

Site Application Boundary = 0.537 Ha / 1.327 Acres

External Finishes Legend

- Concrete Service Yard**
Concrete slab on sub-base/capping designed to suit ground conditions to Structural Engineer's specification.
- Landscape Areas**
Refer to Landscape Architect's drawings and Arboricultural Survey to details on proposed landscape design.
- Tarmac Finish Access Roads & Car Park Bays**
Tarmac road - construction to Structural Engineer's Specification.
- Block Paving Footpaths**
Permeable block paving footpaths - construction to Structural Engineer's specification.
- Gravel**
To align pedestrian footpaths around perimeter of building. Gravel margins around perimeter of site.
- Standing Fencing**
2.4m High Paladin Security Fence to enclose external service yard area and tie into existing fence line boundary along riverbank. Colour: Dark Green RAL 6005.
- EV Ductwork**
Electric vehicle charging ductwork installed to car parking bays, for future provision for bays to become EV bays.
- WT**
Water Tap
External manual water tap for landscape watering.



Trees and Hedges
All proposed trees are shown indicatively for illustrative purposes. For detailed information on new, retained and removed planting refer to Landscape Architects drawing and specification.



PO6:	Updated indicative position of condensers. Amended red line boundary and updated new proposed and removed trees. Amended tree sizes and add in border fence supported by condensers. Added extent of adjacent footpaths.	06.10.23 DM
PO5:	Updated red line boundary and amended trees to be removed. Update red line area.	05.10.23 DM
PO4:	Updated positions of EV and future EV ducting. Updated area & notes to warehouse. Updated with additional planting & legend. Updated ground level to broom, updated ground margin.	02.10.23 JB
PO3:	Updated building position and size, added M&E equipment and tree locations and RPA details. Issued for Comment. Reissued sheet to 101.	26.09.23 DM
PO2:	Updated building position in line with river assessment.	12.09.23 JB
PO1:	First Issue.	04.09.23 JB

Rev	Date/Checked
The Old Rectory Rectory Lane Milton Masbor NORTHAMPTON N 7 3 A Q t: +44 (0)1604 859916 f: +44 (0)1604 859123 www.peter-haddon.com	pHp architects

Oxenwood Real Estate
Rhodes Business Park, Middleton
Manchester

Proposed Site Plan

Status **PLANNING**

Drawn JB Checked JL

Date **AUGUST 2023**

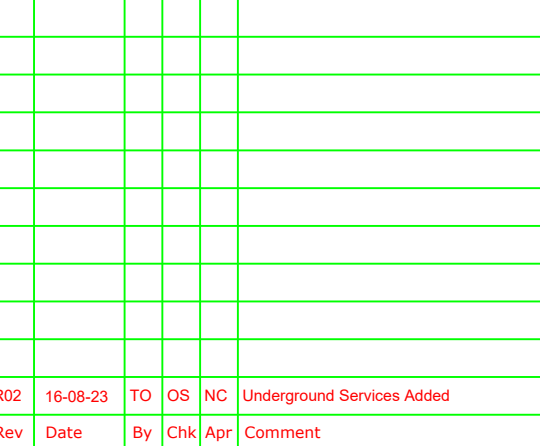
Project Number: 4694

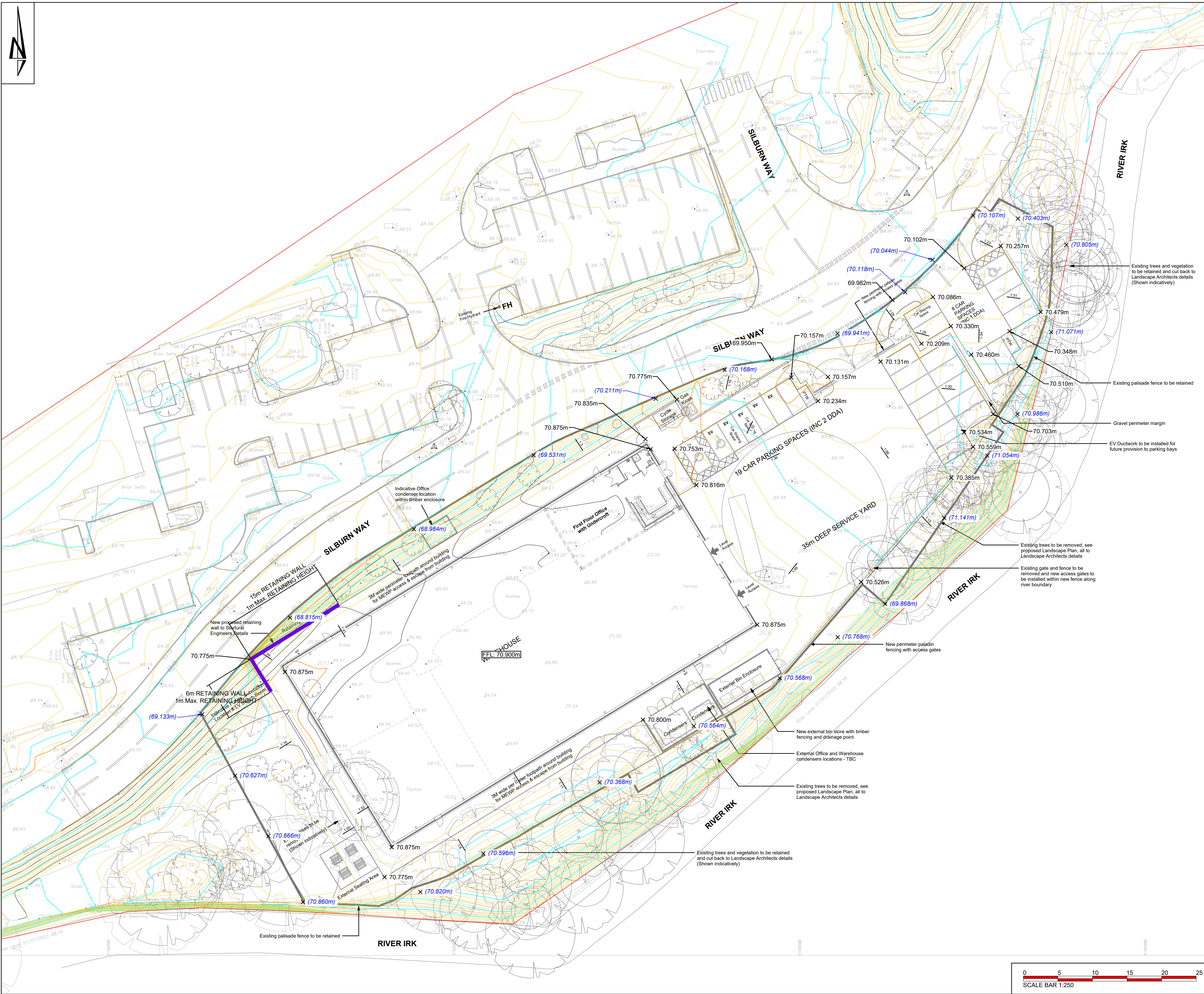
Project Code Originator Zone Level Info Type Rule Obj No Revision

RBP- pHp-XX-00- DR-A- 101- P06

Scale @ A0 1:1000 As indicated

Copyright reserved. Dimensions to be checked on site. Discrepancies to be reported before proceeding.





Key:

- Site Boundary
- Existing Level (00.00m)
- Proposed Level (00.00m)
- Top of Wall Level (TOW: 00.00m)
- Proposed Slope (1:40)
- Precast Retaining Wall
- Existing Retaining Wall
- Proposed Contour Minor 0.1m
- Proposed Contour Major 0.5m

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DRAWING TITLE			
PROPOSED LEVELS			
OUR PROJECT NUMBER 40055	DRAWING STATUS PRELIMINARY	OFFICE SOUTH	
SCALE @ A1 1:250	DATE 15/09/2023	DRAWN BY DRD	CHECKED BY DV
DRAWING NO 40055-BGL-XX-XX-DR-C-00200			REV P02

