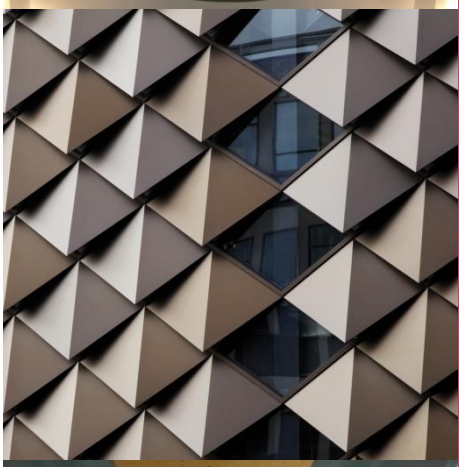


Carrow Works, Norwich

Flood Risk Assessment

Curtins Ref: 081440-CUR-XX-XX-T-C-92030

Revision: P02

Issue Date: 07 July 2022

Client Name: Fuel Properties (Norwich) Limited

Client Address: Fuel Properties (Norwich) Limited
9 South Molten Street
London
W1K 5QH

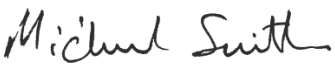
Site Address: Carrow Works, Bracondale, Norwich NR1 2DD

Curtins Consulting Limited
17-19 Whitworth Street West
Manchester
M1 5WG
Tel: 0161 236 2394
Email: manchester@curtins.com
www.curtins.com

Rev	Description	Issued by	Checked	Date
P01	Preliminary Issue	DR-W	MS	17/06/2022
P02	Final Issue for Planning	DR-W	MS	07/07/2022

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins Consulting Limited with respect to the information contained in the report will not extend to any third party.

Author	Signature	Date
Damon Reid-Williams BSc (Hons) Infrastructure Engineer		07/07/2022

Reviewed	Signature	Date
Michael Smith **MEng(Hons)** Principal Civil Engineer		07/07/2022

Curtins has prepared this report on the basis of information provided by Fuel Properties Ltd and others including Private Companies and Government authorities, which Curtins Consulting Ltd has not independently verified or checked beyond the agreed scope of work. Curtins does not accept liability in connection to such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Curtins Consulting Ltd has prepared this report based on the provided and available information. Investigations are required to confirm scope, assumptions and conclusions. The opinions, conclusions and any recommendations in this report are based on assumptions made by Curtins Consulting Ltd described in this report.

Table of Contents

Figures

Tables

1.0 Introduction

1.1 Project Background

Curtins have been appointed by Fuel Properties Ltd ("the Applicant") to carry out a Flood Risk Assessment (FRA) in support of the application for the proposed Carrow Works development located in Norwich, Norfolk.

The hybrid planning application (part full, part outline), alongside Listed Building Consent and Demolition within a Conservation Area seeks to obtain approval for the following:

- **Detailed (Full) Component:**

  "*Full application comprising the construction of the principal means of access, the primary internal road and associated public spaces and public realm, including restoration and change of use of Carrow Abbey to former use as residential (Use Class C3), alteration and extension and conversion to residential use (Use Class C3) of the Lodge, Garage and Gardener's Cottage and the Stable Cottages, development of the former Abbey Dining Room for residential use (Use Class C3), adaptation and conversion for flexible uses (Class E and/or and/or C2 and/or and/C1 and/or C3 and/or F1 and/or F2 and/or B2 and/or B8 and/or Sui Generis) for buildings 207, 92, 206, 7 (7a, 8 and 8a), 209, 35, the Chimney and Class E and/or B2 and/or B8 for the retained Workshop (Block 258), enhanced access to Carrow Abbey and Scheduled Ancient Monument and associated ancillary works*".

  The full component of the application covers a site area of 5.02 ha.

- **Outline Component:**

  "*Demolition of existing buildings and replacement with phased residential-led (Use Class C3 and/or Class E and/or F1 and/or F2 and/or C1 and/or C2 and/or B2 and/or B8 and/or Sui Generis), landscaping, open space, new and modified access, car parking and ancillary works.*"

  The outline component of the application covers a site area of 11.9 ha.

The existing Abbey grounds, Mustard Seed Driers listed building, and gateway areas are proposed to be retained, with the proposed development constructed around these retained features. Due to the industrial nature of the site, the majority of the sites is impermeable. The Abbey's Grounds make up the majority if the permeable area on site (around 2.5ha). existing impermeable areas make up the reminder of the site area (approximately 14.4 ha).

In recent years, the Government and local Councils have placed increased priority on the need for developers to take full account for the risks of their development at all stages of the planning process. The National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) identifies how

the issue of flooding is dealt with through the planning process and with the creation of a site-specific Flood Risk Assessment (FRA) for sites over 1ha in area or in Flood Zones 2 & 3.

The purpose of this report is to assist our client and the Local Planning Authority to make an informed decision on the flood risks associated with the site development. Local Planning Authorities have the powers to control developments, in line with recent legislation, and are expected to apply a risk-based approach to development.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works, to which this report refers, are undertaken more than twelve months following the issue of this report, Curtins Consulting Ltd shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins Consulting Ltd.

Allowance for the effects of climate change will be made in accordance with government recommendations in place and statistical data available at the time of writing this report. These recommendations may become more onerous and the statistical data may be revised in the future; we will not make any estimate of what changes may result from this. Please be aware that this, and other issues over which Curtins Consulting Ltd has no control, may affect future flood risk at the development and require further work to be undertaken for which we accept no liability.

1.2 Scope of Flood Risk Assessment

The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency for Flood Risk Assessments as outlined in the Communities and Local Governments Technical Guidance to the National Planning Policy Framework (NPPF).

The assessment will:

- Investigate all potential risks of current or future flooding to the site;
- Consider the impact the development may have elsewhere with regards to flooding; and
- Consider design proposals to mitigate any potential risk of flooding determined to be present.

2.0 National and Local Policy Considerations

2.1 National Planning Policy Framework

The Ministry of Housing, Communities and Local Governments initially published the National Planning Policy Framework (NPPF) in 2012 to identify how the issue of flooding is dealt with through the planning process and to introduce the requirement for a site-specific Flood Risk Assessment (FRA) for sites over 1ha in area or in Flood Zones 2 & 3. The NPPF was updated in 2021, placing a greater emphasis on plans taking into account all sources of flood risk. The NPPF consolidates the previously used Planning Policy Statements.

2.2 Planning Practice Guidance

The Government's Planning Practice Guidance (PPG) provides additional information to be read alongside the NPPF. The online guidance sets out the definitions for the flood zone's and defines the permitted uses of development that can be proposed in them.

Table 2-1 - PPG Tables 1 & 2 Summary

Flood Zone	Appropriate Users
Flood Zone 1 - Low Probability This zone comprises land having less than 1 in 1000 annual probability of river or sea flooding (<0.1%)	All uses of land are appropriate in this zone
Flood Zone 2 - Medium Probability This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%- 0.1%) in any year	The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table D.2 are appropriate in this Zone Subject to the Sequential Test being applied, the highly vulnerable uses in Table D.2 are only appropriate in this zone if the Exception Test is passed
Flood Zone 3a - High Probability This zone comprises 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	The water-compatible and less vulnerable uses of land in Table D.2 area appropriate in this zone. The highly vulnerable uses in Table D.2 should not be permitted in this zone. The more vulnerable and essential infrastructure uses in Table D.2 should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this should be designed and constructed to remain operational and safe for users in time of flood.
Flood Zone 3b - Functional Floodplain This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes)	Only the water-compatible uses and the essential infrastructure listed in Table D.2 that has to be there should be permitted in this zone. It should be designed and constructed to: Remain operational and safe for users in times of flood; Result in no net loss of floodplain storage; Not impede water flows; and Not increase flood risk elsewhere. Essential infrastructure in this zone should pass the Exception Test.

2.3 Local Planning and Guidance Documents

2.3.1 North-Norfolk District Council Local Plan

The North Norfolk District Council Local Plan was formally adopted in Autumn 2008 and was updated in 2012 following the publication of the NPPF. The current Local Plan is due to be replaced shortly. The Local Plan sets out a vision for the area and, from this, a number of aims and objectives have been identified. Aims include:

- *To provide for sustainable development and mitigate and adapt to climate change*
- *To mitigate and adapt to impacts of coastal erosion and flooding*

Strategic and development control policies have been designed in order to achieve the objectives.

Notable policies regarding flood risk are the following:

- Policy SS 1 – Spatial Strategy for North Norfolk

  Development in these Coastal Service Villages will support local coastal communities in the face of coastal erosion and flood risk. Land may be identified in or adjacent to these settlements to provide for new development or relocation from areas at risk.
- Policy SS 2 – Development in the Countryside

  In areas designated as Countryside development will be limited to that which requires a rural location and is for one or more of the following:
  - *coastal and flood protection.*
  - *new build community, commercial, business and residential development where it replaces that which is at risk from coastal erosion, in accordance with Policy EN 12 'Relocation and Replacement of Development Affected by Coastal Erosion Risk'*

  Proposals which do not accord with the above will not be permitted.
- Policy SS 4 – Environment

  All development proposals will contribute to the delivery of sustainable development, ensure protection and enhancement of natural and built environmental assets and geodiversity and be located and designed so as to reduce carbon emissions and mitigate and adapt to future climate change.

  The Council will minimise exposure of people and property to the risks of coastal erosion and flooding and will plan for a sustainable shoreline in the long-term, that balances the natural coastal processes with the environmental, social and economic needs of the area. Sustainable

Drainage Systems will be encouraged, to reduce flood risk, promote groundwater recharge and improve water quality, enhance biodiversity and provide amenity benefit.)

- Policy EN 10 – Development and Flood Risk

  The sequential test will be applied rigorously across North Norfolk and most new development should be located in Flood Risk Zone 1. New development in Flood Risk Zones 2 and 3a will be restricted to the following categories:

  - *water compatible uses*
  - *minor development*
  - *changes of use (to an equal or lower risk category in the flood risk vulnerability classification) where there is no operational development (xl); and*
  - *'Less vulnerable' uses where the sequential test has been passed.*

  New development in Flood Zone 3b will be restricted to water compatible uses only.

  The Strategic Flood Risk Assessment defines zones 2, 3a and 3b in parts of North Norfolk and this will be used to inform the application of the sequential test. Where this information is not available, the Environment Agency Flood Risk Zones and a site specific Flood Risk Assessment will be used to apply the sequential test.

  A site-specific Flood Risk Assessment which takes account of future climate change must be submitted with appropriate planning applications (xli) in Flood Zones 2, 3a and 3b and for development proposals of 1 hectare or greater in Flood Zone 1.

  Land in Flood Zone 1 that is surrounded by areas of Flood Zones 2 or 3 will be treated as if it is in the higher risk zone and a Flood Risk Assessment will be required to prove that safe access / egress exists for the development or that the land will be sustainable for the duration of the flood period.

  Appropriate surface water drainage arrangements for dealing with surface water run off from new development will be required. The use of Sustainable Drainage Systems will be the preference unless, following an adequate assessment, soil conditions and / or engineering feasibility dictate otherwise.

2.3.2 Norwich City Council Local Plan

The Norwich City Council Local Plan was formally adopted in December 2014. The Local Plan is comprised of three documents which together set out the strategic priorities for the greater Norwich area that allow the Council to manage development. The **Joint Core Strategy** sets out the strategy for regeneration and growth in the greater Norwich area up to 2026. The **Site Allocations Plan and Development Management Plan** provide detailed polices to guide and implement this strategy. The

Development Management Plan has a number of spatial planning objectives, including Objective 1 – To minimise the contributors to climate change and address its impact. The objective states "*Where new development in such areas is desirable for reasons of sustainability (e.g. in the city centre), flood mitigation will be required and flood protection will be maintained and enhanced*."

Notable policies regarding flood risk are the following:

- Policy DM3 – Design Principles
- *Significant weight will be given to the following design principles in assessing development proposals [including]:*
    - *Energy Efficiency and Climate Change*
        - *d) promote and facilitate sustainable drainage and mitigate against flood risk from surface water runoff as required by policy DM5.*
- Policy DM5 – Planning effectively for flood resilience

  Flooding

  All development proposals will be assessed and determined having regard to the need to manage and mitigate against flood risk from all sources. Development proposals must be supported by the relevant flood risk assessments and show that (where necessary) alternative sites of lower flood risk have been assessed, adopting a sequential approach to site selection according to the requirements of national policy and standing technical advice which supports it.

  The sequential site assessment as set out in the NPPF will be expected to consider reasonable alternatives for locating the development in a zone of lower flood risk on any site elsewhere in Norwich, except in the case of:
    - *Proposals within the city centre regeneration areas identified on the Policies map, in which case the assessment need only take account of reasonable alternative sites within the boundary of the relevant regeneration area concerned or (where no such alternative sites exist) alternative regeneration areas elsewhere in the city centre;*
    - *Any other proposal which is consistent with and forms part of a specific allocation for development within the Site allocations plan and other adopted development plan documents, in which case the requirement for the sequential test will not apply.*

  In the case of proposals in areas of higher flood risk which are within the city centre but which fall outside the regeneration areas identified on the Policies map, the search area for reasonable alternative sites should take account of:
    - *a) the scale and function of the proposal;*

- *b) the potential contribution of the use or uses proposed to overall regeneration of the city centre, including through the provision of new housing;*
- *c) where the proposal is for retail, leisure or other main town centre uses, the suitability of any alternative locations in relation to policy DM18 of this plan;*
- *d) any objectively identified need for the use proposed which justifies a location in the city centre in order to support the objectives and policies of the development plan.*

- *For the purposes of this policy "city centre" means the area defined on the city centre Policies map insets, including both the City Centre inset and Northern City Centre Area Action Plan inset.*

  Sustainable drainage and surface water flooding

  Mitigation measures to deal with surface water arising from development proposals should be incorporated to minimise the risk of flooding on the development site and where possible reduce the risk, otherwise at least minimise the risk, within the surrounding area.

  Sustainable drainage measures appropriate to the scale and nature of the development shall be incorporated in all development proposals involving the erection of new buildings or the extension of existing buildings until such time as thresholds are established by nationally applicable standards for sustainable drainage. Such measures will be required except where this is not technically feasible or where it can be demonstrated that other factors preclude their use.

  Within the critical drainage catchments as identified on the Policies map and in other areas where the best available evidence indicates that a serious and exceptional risk of surface water flooding exists, all development proposals involving new buildings, extensions and additional areas of hard surfacing should ensure that adequate and appropriate consideration has been given to mitigating surface water flood risk. Developers will be required to show that the proposed development:

  - *a) would not increase the vulnerability of the site, or the wider catchment, to flooding from surface water run-off from existing or predicted water flows; and*
  - *b) would, wherever practicable, have a positive impact on the risk of surface water flooding in the wider area.*

  Development must, as appropriate, incorporate mitigation measures to reduce surface water runoff, manage surface water flood risk to the development itself and to others, maximise the use of permeable materials to increase infiltration capacity, incorporate on-site water storage and make use of green roofs and walls wherever reasonably practicable.

The use of permeable materials, on-site rainwater storage, green roofs and walls will be required unless the developer can provide justification to demonstrate that this would not be practicable or feasible within the constraints or configuration of the site, or would compromise wider regeneration objectives.

Surface Treatment

Development proposals will be required to maximise the use of soft landscaping and permeable surfacing materials unless the developer can provide justification to demonstrate that this is not feasible.

Where permission is required, proposals involving the provision of new or replacement paved and other impermeable surfaced areas will only be permitted:

- *a) in areas of impermeable soils as identified in Appendix 1;*
- *b) in other areas where it can be demonstrated that permeable surfaces are not practicable due to poor soil infiltration capacity, high groundwater levels or risk of subsidence; and*
- *c) in areas with soils with average or good infiltration capacity, where it can be demonstrated that there is an exceptional and overriding justification for such surfaces.*

In cases where poor soil infiltration capacity or other factors preclude the use of permeable surfacing materials, development proposals should seek to manage and minimise the impact of surface water run-off by suitable measures for water storage on-site.

2.3.3 Greater Norwich Area Strategic Flood Risk Assessment (SFRA) (2017 & 2021)

The Level 1 SFRA (2017) aims to provide up to date information and guidance on all sources of flood risk throughout the Greater Norwich area, taking into account the latest flood risk information and national planning policy. The SFRA aims to ensure all sources of flood risk are understood so they can be managed effectively throughout the planning process, taking into account the potential impacts of climate change. The SFRA provides a broad yet detailed assessment of flood risk, providing the evidence base for policies, recommendations, and guidance to help ensure the effective management of flood risk.

The Level 1 SFRA also provides guidance regarding the application of the Exception Test, aiding Norwich City Council in identifying when the Exception Test is required. It provides information on when a more detailed Level 2 SFRA will be required with regards to strategic site allocations.

The Level 2 SFRA (2021) provides a detailed assessment of all sources of flooding for sites identified by the Greater Norwich Planning Policy team as being potential allocation sites. It builds upon the Level 1 SFRA, providing site-specific assessments to provide the necessary information required to support

the application of the Exception Test. All 26 sites proposed by the Greater Norwich Planning Policy team required a Level 2 assessment of flood risk.

2.3.4 Local Flood Risk Management Strategy (2015)

The aim of the Local Flood Risk Management Strategy (LFRMS) is to serve as a tool to better understand and manage flood risk within the area. For the city of Norwich, Norfolk County Council are the Lead Local Flood Authority, covering planning applications with regards to surface water drainage for the entire county of Norfolk. The aim of the document is:

"*To work with organisations, businesses and communities to manage flood risk and, where it is practicable, affordable and sustainable to do so, to reduce risk to life, property and livelihoods that may arise from local surface runoff, ordinary watercourse and groundwater flooding.*"

The document outlines the challenges and the objectives Norfolk have identified to coordinate flood risk management on a day-to-day basis. Additional information is provided regarding flood risk sources and the Risk Management Authorities who are responsible different flood risk management activities.

Norfolk conducted a Local Flood Risk Management Strategy Policy Review in 2021. Since the adoption of the 2015 LFRMS, Norfolk has experienced widespread flooding, experienced significant growth and development, and has seen a change in the legislative landscape. As a result, the 2015 Strategy's policies were reviewed against new and emerging national strategies and policies. This resulted in 3 new policies and minor updates to the existing policies.

2.3.5 Surface Water Management Plan (2011)

The Surface Water Management Plan (SWMP) provides an assessment of surface water flood risk and outlines a long-term action plan for managing surface water. Norfolk produced five SWMPs, including a Plan for the Norwich Urban Area. Both historic and predicted flooding from different flood risk sources are assessed, including sources which have been identified as surface water, sewer and groundwater flooding. This assessment has been used to identify 3 Critical Drainage Areas (CDA) across the Norwich Urban Area. The proposed development does not fall within a CDA.

2.3.6 Preliminary Flood Risk Assessment (2011)

The Preliminary Flood Risk Assessment (PFRA) serves as high level screening exercise to help Norfolk County Council identify areas of flood risk across the borough. Historic and predicted flood risk data has been assessed to identify areas at risk of flooding from surface water runoff, groundwater, and ordinary watercourse. The PFRA was used to inform the LFRMS by identifying areas potentially at flood risk that may require more detailed studies. Norwich ranked first on the PFRA Settlement Priority Ranking in Norfolk, with a number of people, critical infrastructure, and non-residential properties above the flood risk threshold.

3.0 Existing Site Details

3.1 Site Location

The Site is located approximately 1.8km southeast of Norwich City Centre at the existing Carrow Works site (nearest postcode, NR1 2BF). The site is bound by the River Wensum to the north, the Great Eastern Main Line to the east and the A147 so south and west. The national grid reference for the site is TG 24260 07387.

Figure 3-1: Site Aerial View

3.2 Site Description

The existing Carrow Works site currently houses the Grade I listed Carrow Abbey and Cottages located within the centre of the site. The areas surrounding the Abbey and Cottages parcel are existing industrial buildings previously occupied by the Colemans family and more recently Unilever UK Ltd. The hybrid planning boundary has an approximate area of 16.9 ha.

A topographical survey has been carried out by CD Surveys Ltd and is included in **Appendix A**. The survey shows that the Site generally falls from the southwest to the northeast. An existing underpass beneath the Great Eastern Railway Line between the Site and the adjacent Deal Ground site is located in the northeast corner. The lowest point on site is 1.16mAOD which is the level of one of the gullies by the underpass entrance towards the northeast of the site. The level of the underpass itself reaches a

level of 0.94mAOD between Carrow Works and the Deal Ground site. The site has a topographical high point of 16.20mAOD in the south-eastern corner of the site.

The northern boundary of the site adjacent to the River Wensum varies in levels from 4.14mAOD in the west to 1.39mAOD in the east. Generally, the northern areas of the site that are occupied by the historic Colemans buildings have a level of between 3.0 – 4.0mAOD. The Carrow Abbey area's levels range from 11.5-13.5mAOD.

3.3 Historic Uses

For 155 years the Site was home to Coleman's, manufacturer of condiments and sauces. The factory at the Site opened in 1865, employing 2,300 people by 1909. The factory closed in 2020, with production for Coleman's goods relocated to Burton-on-Trent and Germany.

There are also significant historic structures present on site. This includes the Grade I listed Carrow Abbey, a former Benedictine priory, and the Scheduled Monument Carrow Priory ruins, a former Benedictine nunnery founded in the mid-12th century.

Historical mapping from Old Maps Online confirms that the site was previously used as a mixed-use site. Mapping from 1886 (surveyed from 1880 to 1883) confirms that the site was used for a range of purposes, including cattle farming, timber and saw milling operations, and residential settlements. Mapping from 1908 through to 1951 show that the land remained largely unchanged, though it is fully clear if the operations in the Carrow Works development bordering the River Wensum was unchanged throughout this time. The site currently contains the ruins of a 12th Century priory.

3.4 Existing Site Drainage

3.4.1 Public Drainage

Anglian Water are responsible for the public sewerage in Norwich. The sewer records indicate that the site benefits from an existing 600mm diameter foul water sewer. The sewer is located west of the retained Carrow Abbey building and flows from north to south. Mapping indicates that sewers outfalls to the 1050mm Diameter public sewer in A147. An extract of the mapping can be found below in Figure 3-2 and the mapping can be found in **Appendix B**.

A ground penetrating radar (GPR) survey of the site was carried out in November 2018 by WYG, this survey identified manholes and pipework that appears to align with the Anglian Water sewer mapping presented in Figure 3-2 below, however due to covers being unable to be lifted the route and diameter was unable to be confirmed. The GPR survey can be found in **Appendix C**.

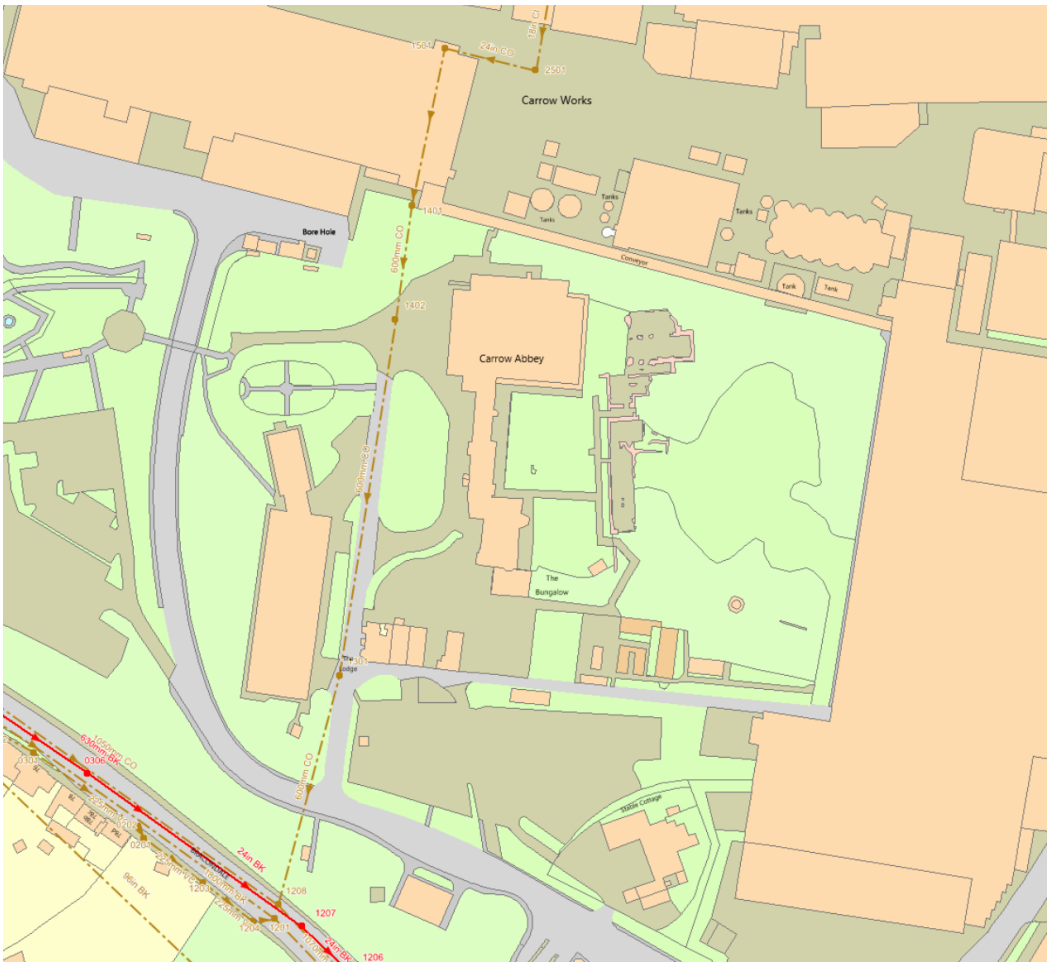


Figure 3-2: Anglian Water Mapping Extract

As this existing foul water sewer serves the Carrow Works site exclusively, it is anticipated to be removed as part of the development. A new foul water drainage network is proposed to be developed following development of the outline portion of the scheme.

3.4.2 Private Drainage

The existing private drainage system contains two outfall methods: discharging surface water into the River Wensum and disposing of surface water via infiltration through soakaways. The GPR survey demonstrates that the northern area of the site discharges to the River Wensum, whereas the southern area (including the Abbey) discharges to the ground via infiltration.

The drainage system which serves the northern region of the Site has multiple outfalls to the River Wensum. As part of the proposed drainage system for the Site, it is proposed to retain and reuse three outfalls to the river in the northwest corner of the site. The surface water drainage network which serves the north of the existing site can be seen in Figure 3-3, Figure 3-4, and Figure 3-5 (in blue). For further

information, see the Drainage & SuDS Strategy (081440-CUR-XX-XX-T-C-92031). The retained outfalls have been identified in Figure 3-3 below.

Figure 3-3: GPR Survey for Existing Surface Water Drainage (Blue) for Northern Area of Site (1 of 3)

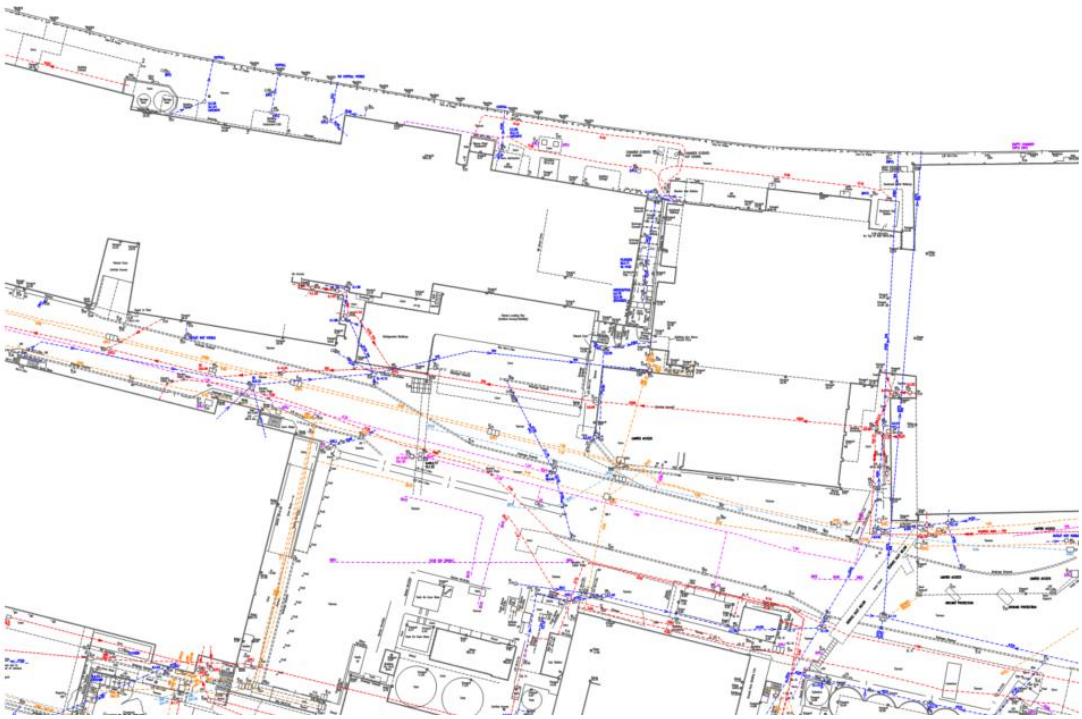


Figure 3-4: GPR Survey for Existing Surface Water Drainage (Blue) for Northern Area of Site (2 of 3)

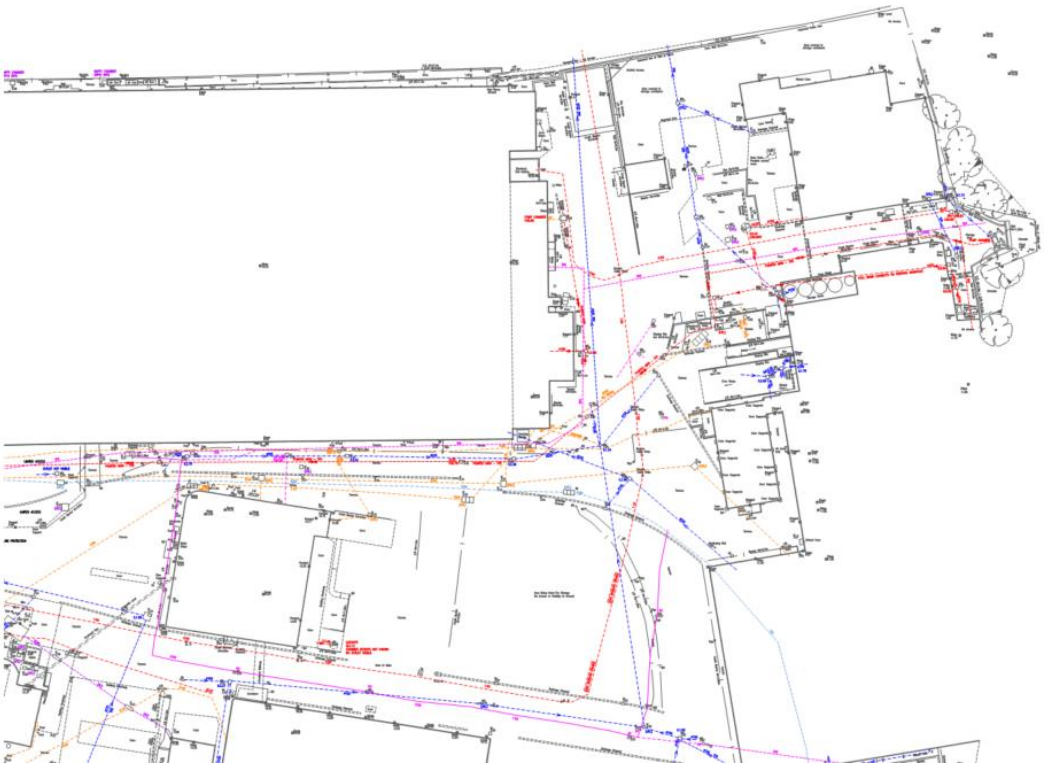


Figure 3-5: GPR Survey for Existing Surface Water Drainage (Blue) for Northern Area of Site (3 of 3)

Carrow Abbey and the surrounding vegetated landscape is indicated to outfall via multiple soakaways, these soakaways have been identified in Figure 3-6. The vegetated area and highway south of the Abbey is also indicated to outfall via soakaways, see Figure 3-7. It is proposed that these existing systems are to be retained and left in situ as part of the scheme.

Figure 3-6: GPR Survey for Existing Surface Water Drainage (Blue) for Soakaways in Carrow Abbey

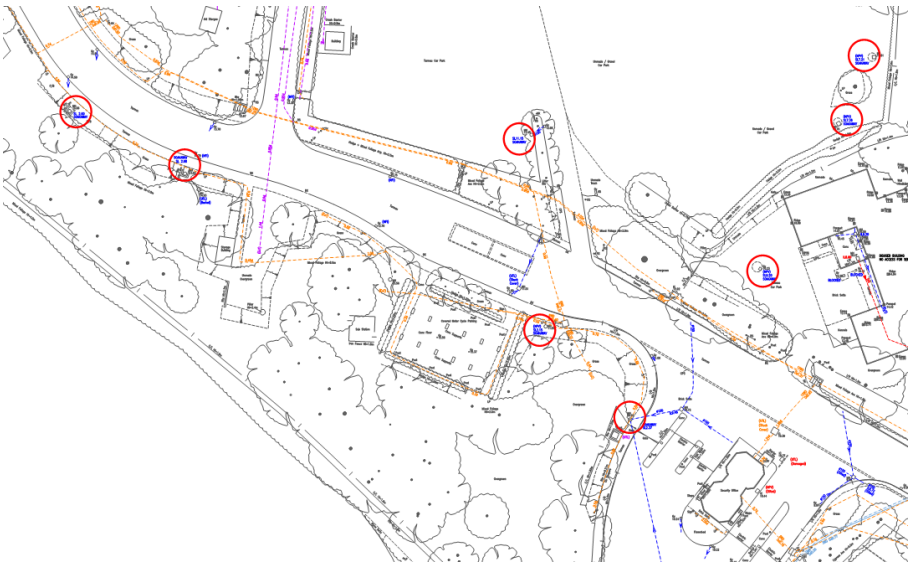


Figure 3-7: GPR Survey for Existing Surface Water Drainage (Blue) for Soakaways in the Area South of the Abbey

The topographical and utility surveys have identified that there a number of drainage channels which serve the site. These drainage channels regularly intersect with below ground surface water drainage pipes to form the surface water drainage for the site. See **Appendix A** and **Appendix C** for the topographical and utilities surveys respectively.

The utilities survey also highlighted the existing foul water drainage which serves the site. However, the survey did not include a definitive outfall for foul water on site. At the time of writing a CCTV survey had not been carried out therefore the existing foul water on site requires further investigation.

An existing pump can be seen to be located in the underpass in the northeast corner of the site (see Figure 3-5). It is proposed to remove the existing foul water pump and install a surface water pump to convey run off in the underpass to the proposed surface water system.

3.5 Existing Land Drainage

There is not known to be any land drainage present on site.

3.6 Existing Watercourse

The site borders the River Wensum, a tidal influenced major river which serves as a tributary to the River Yare. The River Wensum is located directly north of the Site. The is also within 350m of the River Yare, which is located east of the Site.

3.7 Site Geology

As presented in the Leap Environmental Phase 1 Desk Study Site Reconnaissance and the Phase 2 Site Investigation reports, the site is underlain with chalk. This Sedimentary Bedrock formed approximately 72 to 94 million years ago. The Chalk is classified as a principal aquifer. The site is located within a ground water source protection zone I (inner zone).

The site is also underlain with superficial deposits, with River Terrace Deposits underlaying a majority of the site. River Terrace Deposits is comprised of sand and gravel and was formed up to 3 million years ago. Alluvium underlays the north-eastern area of the site. Alluvium is comprised of clay, silt, sand, and gravel and was formed up to 2 million years ago. No superficial geology is present on the western boundary region of the site. The superficial deposits are classified as secondary (A) aquifers.

Historic borehole information was assessed as part of the Phase 1 Desk Study. Of the boreholes assessed, 1 struck groundwater. The borehole was carried out in the south-eastern region of the site and recorded a resting water level of 11 metres below ground level (mbgl). For groundwater information regarding the trial holes carried out on Site as part of the Phase 2 Site Investigation, see Section 4.1.3 below. See The Phase 1 Desk Study (ref: LP01671/DS/DRAFT) and Phase 2 Site Investigation (ref: LP01671/ Phase 2/ DRAFT) for further details.

4.0 Sources and Extents of Flooding

Numerous sources of flood risk need to be assessed to be in line with the requirements for planning under NPPF and EA regulations. This report takes into consideration fluvial flooding (rivers and streams), pluvial flood risk (surface water), tidal flooding (coastal or estuarine), reservoir flooding, canal flooding, groundwater flooding, infrastructure failure flooding and any historical flooding reports.

4.1 Natural Drainage

4.1.1 Fluvial Flooding

With reference to the EA's indicative flood maps, it can be seen that the Site primarily lies in Flood Zone 1. A small proportion of the north-eastern extent of the Site lying in Flood Zone 2 and 3. The portion of the Site that is located in Flood Zone 3 is predicted to have a 1% chance of fluvial flooding.. The areas that fall in Flood Zone 2 are predicted to have between a 0.1% to 1% chance of fluvial flooding. See Figure 4-1 below for further Flood Zone extent information.

Based on the EA Flood Zone Mapping, the extent which falls within Flood Zone 2 & 3 is not in an area benefiting from flood defences. EA Product 4 data contains further information, including defended and undefended fluvial model data for the River Wensum, with and without climate change. The flood extent mapping and sample point data also suggest that the site is not in an area that benefits from flood defences. Further information regarding the EA Product 4 Data can be found in **Appendix D**.

The flood risk map contained within the Phase 1 Desk Study Site Reconnaissance Report also indicates that the majority of the site is not at risk from flooding (Flood Zone 1) from fluvial flooding. The report also indicates that a small area within the north-eastern region of the site lies within Flood Zone 2 and 3. Further details can be found in the Phase 1 Desk Study Site Reconnaissance Report (ref: LP01671/DS/DRAFT).

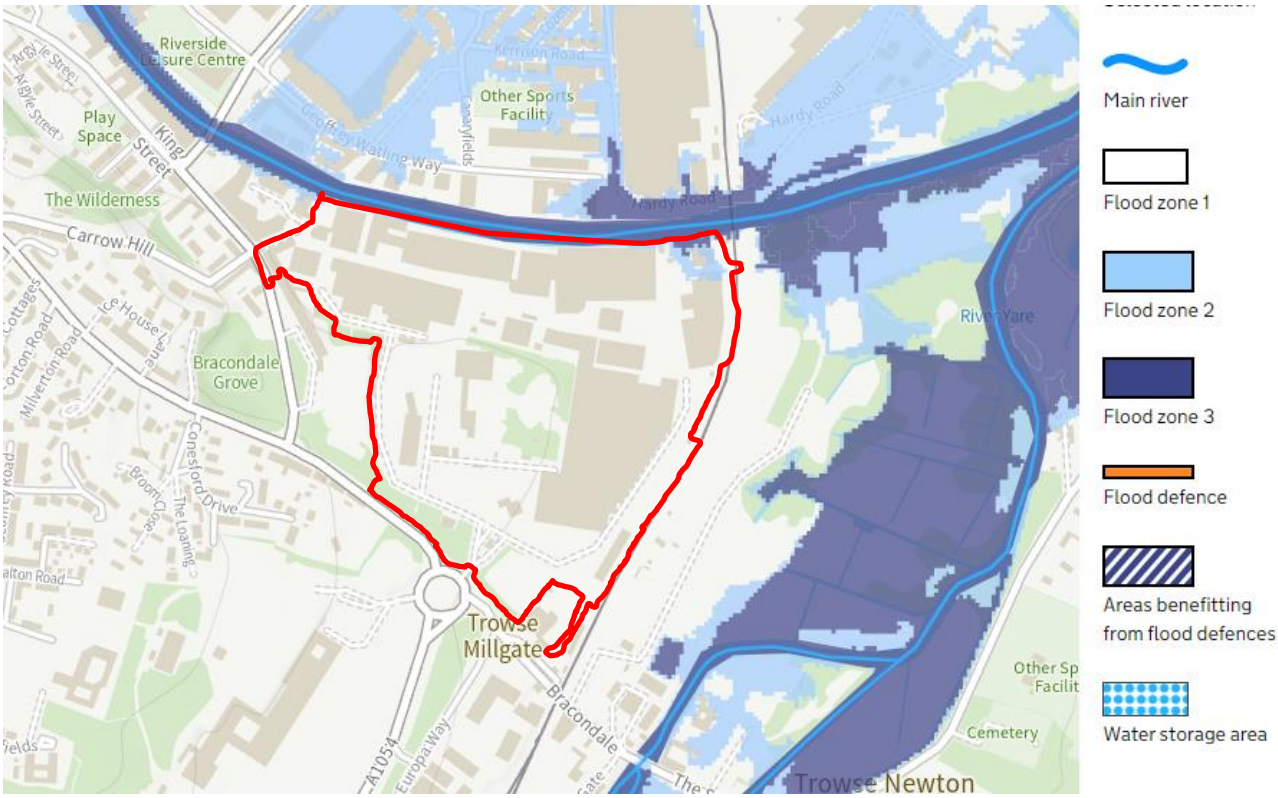


Figure 4-1: Fluvial and Tidal Flood Risk

Though the River Wensum is a fluvial and tidal influenced main river, the main flood risk source is fluvial flooding based on the fluvial and tidal modelling conducted by the EA.

The Flood Warning Information service mapping provided by gov.uk identifies that most of the north-eastern region that is within the flood extent is has a very low risk of flooding. A small portion by the border with the River Wensum in this region is considered to have a high and medium risk of flooding. The service considers any flood defences to provided information on the predicted extent of flooding for different return periods.

A high risk means that each year this area has a chance of flooding of greater than 3.3%. A medium risk of flooding means that each year this area has a chance of flooding of between 1% and 3.3%. A very low risk means that each year this area has chance of flooding that is less than 0.1%. See Figure 4-2 below for further predicted fluvial and tidal flood extent information.

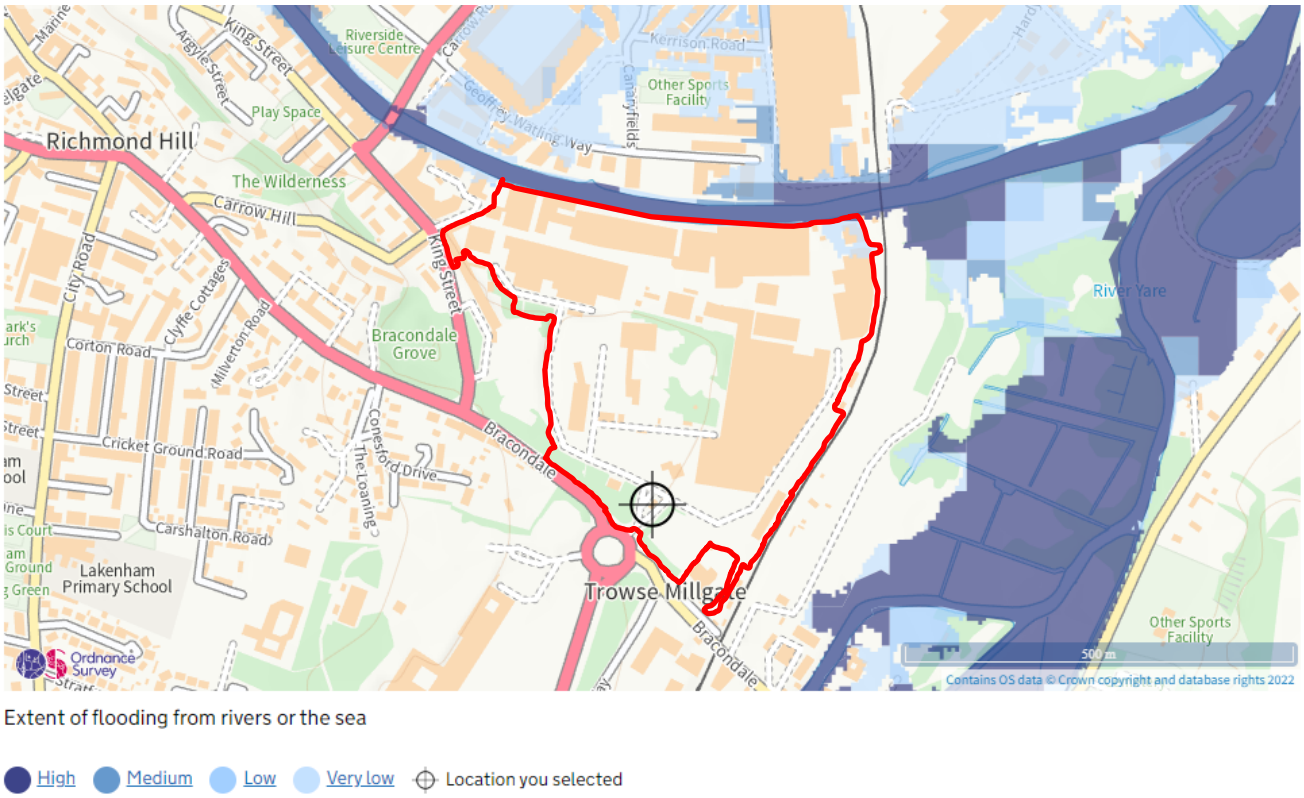


Figure 4-2: Fluvial and Tidal Flood Risk Map

The EA's Detailed Flood Risk Assessment Map (Product 4) is contained in **Appendix D**.

The Product 4 fluvial model mapping provides fluvial flood extent, depth and height information for different return events based on four different scenarios:

- Defended
- Defences Removed
- Defended Climate Change
- Defences Removed Climate Change

The 5%, 2%, 1.33%, 1%, 0.5%, and 0.1% Annual Exceedance Probability (AEP) events were run for the 'Defended' and 'Defences Removed' models. The 1%, 0.5%, and 0.1% AEP events were run for the 'Defended Climate Change' and 'Defences Removed Climate Change' models. The 20%, 25%, 35%, and 65% climate change factors were included with the 1% and 0.5% AEP event model runs, whilst the 20% and 25% climate change factors were included with the 0.1% AEP event model runs.

The Fluvial Node Location Modelling information provides flood level information for locations along the River Wensum and River Yare bordering or near the site. For the section of the River Wensum that borders the site, the modelled levels varies for the 1 in 100 year (0.1% AEP) for the four different modelled scenarios as follows:

- Defended – Water Level is 1.65mAOD to 1.73mAOD
- Defences Removed – Water Level is 1.67mAOD to 1.73mAOD
- Defended Climate Change (25% CC) – Water Level is 2.10mAOD to 2.17mAOD
- Defences Removed Climate Change (25% CC) – Water Level is 2.10mAOD to 2.18mAOD

Further analysis was carried out based on the design river flooding event (1 in 100 year +11%CC). Based on interpolation of the flood levels for the 1 in 100 year + CC events, a flood level of 1.95mAOD was calculated. This was assessed in line with the site topography to determine what proportion of the site is at risk of flooding. The predicted flood extent for the 1 in 100 year +11%CC can be seen in Figure 4-3 (in blue). Figure 4-4 provides topographical information used to predict the flood extent.

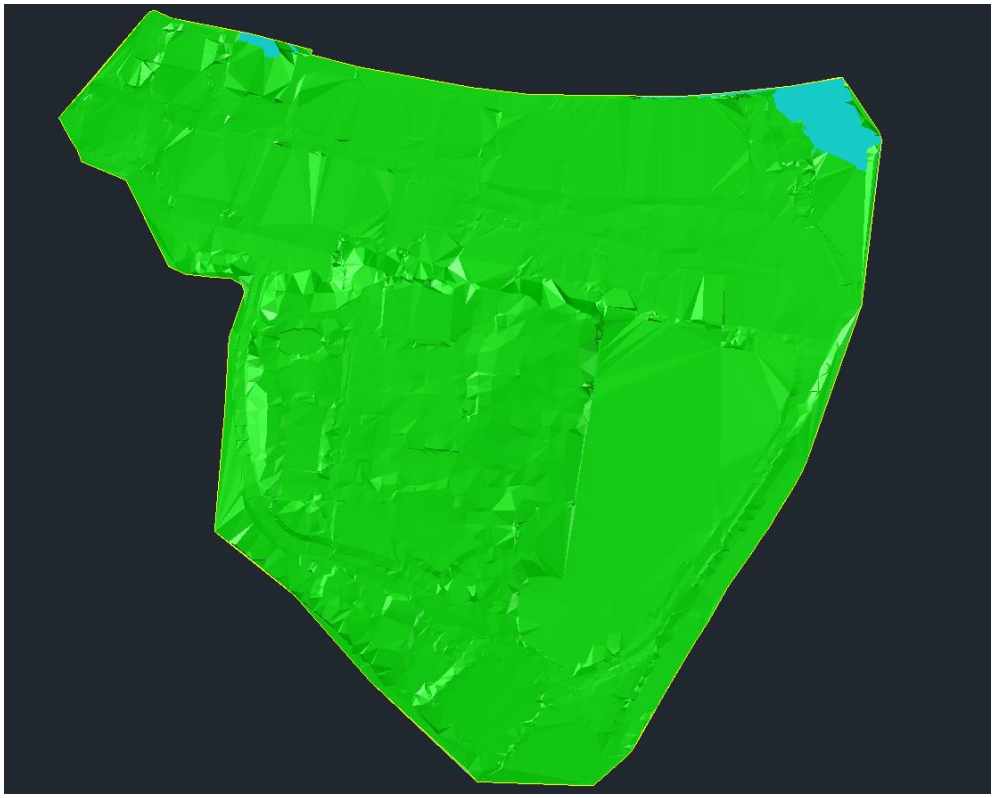


Figure 4-3: Predicted Site Flood Extent for the 1 in 100 Year +11%CC

Figure 4-4: Modelled Topography for the 1 in 100 Year +11% CC Design Flood

The predicted flood extent for the design river flooding extent is similar to the flood extent presented as part of the EA Fluvial and Tidal Flood Risk Map. A small area by the border in the northwest of the site is at risk during this flood event. For further information regarding the design flood, see Section 4.1.4.

The Site has been assessed as being at **low** risk of flooding from fluvial and tidal sources, however mitigation measures are required for the areas of elevated risk. Though there is only a small portion in the north-eastern region of the Site that is at risk of flooding, this area falls within Flood Zone 3 and Flood Zone 3.

4.1.2 Surface Water Flooding and Overland Flow

The EA's online mapping identifies that the Site is largely at very low risk of surface water flooding. There are areas throughout the site which are at high, medium, and low risk of flooding. These areas are towards the north and are within topographical low spots between existing buildings where surface water will flow and pool. There is also a region in the north-eastern region of the Site by the underpass entrance on route to the Deal Ground site which is at a high predicted risk of surface water flooding. See Figure 4-5 below for further predicted surface water extent information.

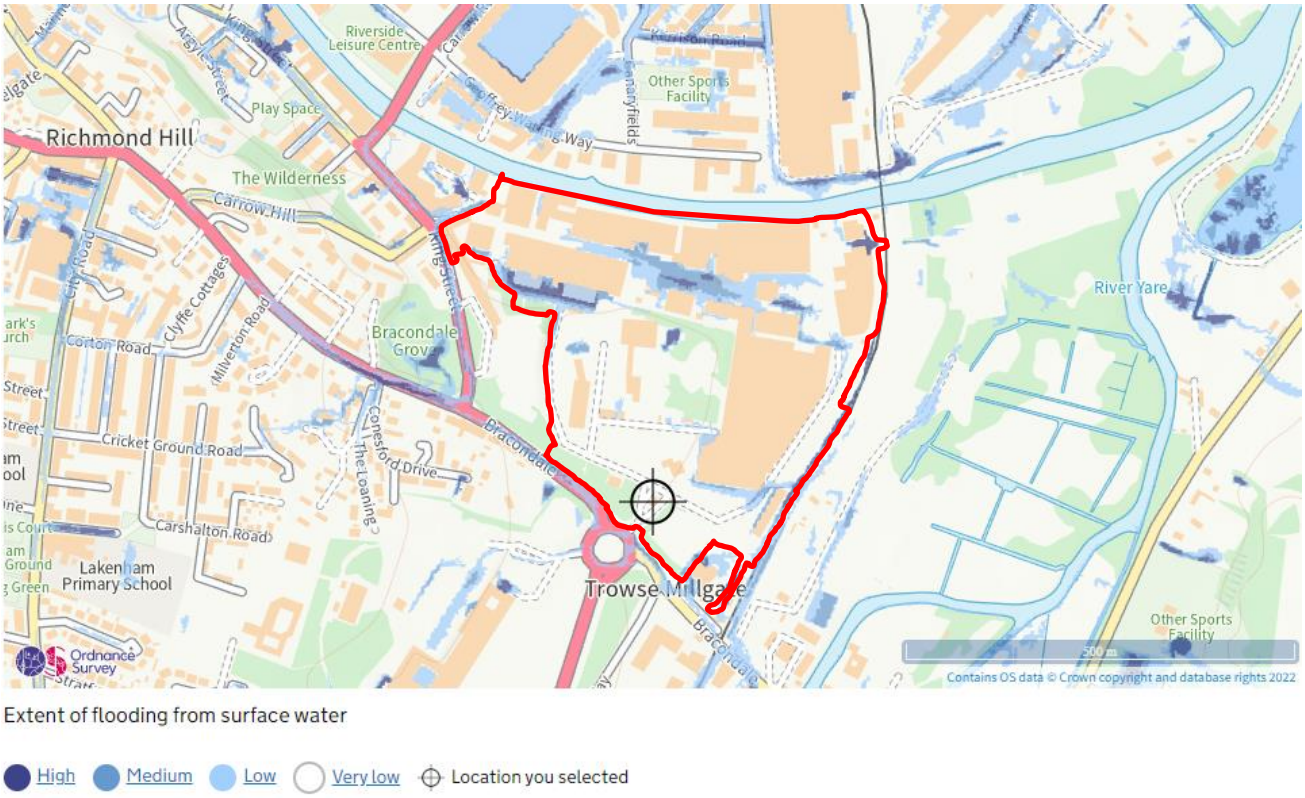


Figure 4-5: Surface Water Flood Risk Map

Bordering the site, the existing Great Eastern Main Line railway line is located east of the site, and the highways located to the west and south of the site are at predicted risk of surface water flooding. King Street, which borders the site to the west, is topographically higher that the Site. This suggests that runoff at King Street and Carrow Hill junction is predicted to flow towards the Site.

The Site has been assessed as being at **medium** risk of flooding from surface water. The site is largely at very low risk of surface water flooding. However, there are areas throughout the site which are at high, medium, and low risk of flooding. These areas are predominantly between or by the existing buildings on Site. The site proposals, detailed below, are anticipated to mitigate this risk.

4.1.3 Ground Water Flooding

The Greater Norwich Area SFRA identifies that the Site is potentially at risk from groundwater flooding. Based on the 'Areas Susceptible to Groundwater Flooding, it falls within an area that is >=75% susceptible.

The Phase 1 Desk Study Site Reconnaissance Report indicates that the north-eastern region of the site has potential for groundwater flooding to occur at surface. In addition, significant parts of the north, north-western and eastern regions of the site have potential for groundwater flooding of property situated below ground level to occur. Due to the Site's proximity to the River Wensum and River Yare,

local and regional ground water is expected to flow to the north and to the east respectively. See the Phase 1 Desk Study Report (ref: LP01671/DS/DRAFT) for further details.

The 'Phase 2 Site Investigation Report' recorded groundwater being struck between 0.5 and 4.5 metres below ground level (mbgl) at 17 different trial holes throughout the Site. See Phase 2 Site Investigation (ref: LP01671/ Phase 2/ DRAFT) for further details.

Based on available information, the site is assessed as having a **medium** risk of flooding due to ground water. As highlighted in the Phase 1 Desk Study Site Reconnaissance Report, below ground structures (basements) are vulnerable to groundwater flooding across wider regions of the site. This risk is highlighted via the 17 trial holes across site that struck ground water, with two striking groundwater less than 1mbgl.

4.1.4 Climate Change

The Environment Agency requires, in accordance with the Government's PPG document, that there should be no increase in the rate of surface water emanating from a newly developed site above that of any previous development. Furthermore, it is the joint aim of the Environment Agency and Local Planning Authorities, to actively encourage a reduction in the discharge of storm water as a condition of Approval for new developments. In addition, all drainage systems should be sized to accommodate the runoff arising from a 1 in 100-year rainfall event and should include a further allowance to account for the further effects of climate change.

Table 4-1 and Table 4-2 below show the climate change peak river flow allowances and peak rainfall allowances respectively for the Broadland Rivers Management Catchment. The data presented in these tables is from the climate change allowances maps provided by the EA.

Table 4-1 - Climate Change Summary (Broadland Rivers Management Catchment) – Peak River Flow Allowances

Type	Applies across all of England	2020s	2050s	2080s
River	Upper	27%	27%	44%
	Higher	14%	10%	20%
	Central	8%	3%	11%

Source: Climate change allowances for peak river flow in England (data.gov.uk)

Table 4-2 - Climate Change Summary (Broadland Rivers Management Catchment) – Peak Rainfall Allowances

Exceedance Rainfall Event	Applies across all of England	2050s	2070s
3.3%	Central	20%	20%
	Upper End	40%	40%
1%	Central	20%	20%
	Upper End	45%	40%

Source: Climate change allowances for peak river flow in England (data.gov.uk)

The development has a proposed design life of 100 years, which if constructed next year will be until 2123. Therefore, a climate change value for river flows of 11% will be used for the purpose of design. For rainfall, 45% climate change will be used for design. This is inline with the guidance provided by the EA.

4.2 Artificial Drainage

4.2.1 Adopted Drainage

Sewer records obtained from Anglian Water are included in **Appendix B** for reference.

These records show that the wider area is drained via a number of different ways. A combined sewer runs under the Bracondale highway which takes drainage south of the site. There is also a surface water sewer that runs under King Street. This sewer run takes flows north before discharging into the River Wensum.

A Google Street View image shows that should flooding occur from the surface water sewer on King Street, near the junction with Carrow Hill, surface water may flow downhill toward the Site. See below for the Google Street View image from King Street towards the site.

Source: google.co.uk

Figure 4-6: View from the King Street and Carrow Hill Junction, Towards the Site

Based on the Anglian Water DG5 information presented in the Greater Norwich Area SFRA, the Site falls in a sub-postcode district (NR1 2) where 1 internal flood incident has been reported to Anglian Water. This information is based on incidents reported up to June 2017.

The Site is therefore as assessed as being at a **low** risk of flooding from adopted drainage.

4.2.2 Private Drainage System

A utilities survey was carried out by Tetra Tech (formerly WYG) and is in included in the **Appendix C.** The topographical survey was carried out by CD Surveys Limited and is in included in the **Appendix A.**

Separate surface water and foul water drainage are found to serve the Site. A majority of the Site's private surface water drainage flows north towards the River Wensum. A few drainage runs flow towards soakaways located towards the middle and south of the Site (see Figure 3-6 and Figure 3-7). A majority of the Site's private foul water drainage flows south towards Bracondale, with the remainder of the Site's foul water drainage flowing to the east towards King Street.

Topographical Levels for the Site demonstrate that the levels generally fall to the northeast of the Site (see 3.2). However, there are topographical low points across the site, most notably in the north between buildings or bordering buildings. It is around this area where there is a low, medium, and/or

high risk of surface water flooding. In these areas there are drainage channels to catch surface water runoff and convey flows to the below ground drainage.

An assessment on the capacity of the current network for surface water and sewer flooding has not been carried out, however, it has been assessed that the network could fail during higher rainfall events. The Site's drainage network appears to be extensive. Surface water is discharged via outfalls to the River Wensum and via soakaways located in the area's chalk geology. Drainage channels are located throughout the Site, connecting with the below ground drainage network to help form the Site's drainage network.

The risk of flooding from failure of the private drainage system to the existing building is therefore seen as **low** to **medium**.

The proposed development will include a new surface water drainage system that will be designed to accommodate rainfall events up to and including the 1 in 100 year +45%CC. Falls will also be designed away from the proposed building. See Section 5 of this report for proposed mitigation measures.

4.2.3 Highway Drainage

As discussed in Section 4.2.1, flooding from the surface water sewer on King Street by the Carrow Hill junction could flow downhill towards the Site. Google Street View shows that the King Street highway is topographically higher than the Site (see Figure 4-6).

The Site is therefore assessed as being at a **low** to **medium** risk of flooding from existing highway drainage.

4.2.4 Reservoir Flooding

The EA's online mapping identifies that the Site is at risk of reservoir flooding when there is also flooding from rivers. The maximum flood extent places the northern extent of the Site at predicted risk of flooding. See Figure 4-7 below for further predicted reservoir flood extent information.

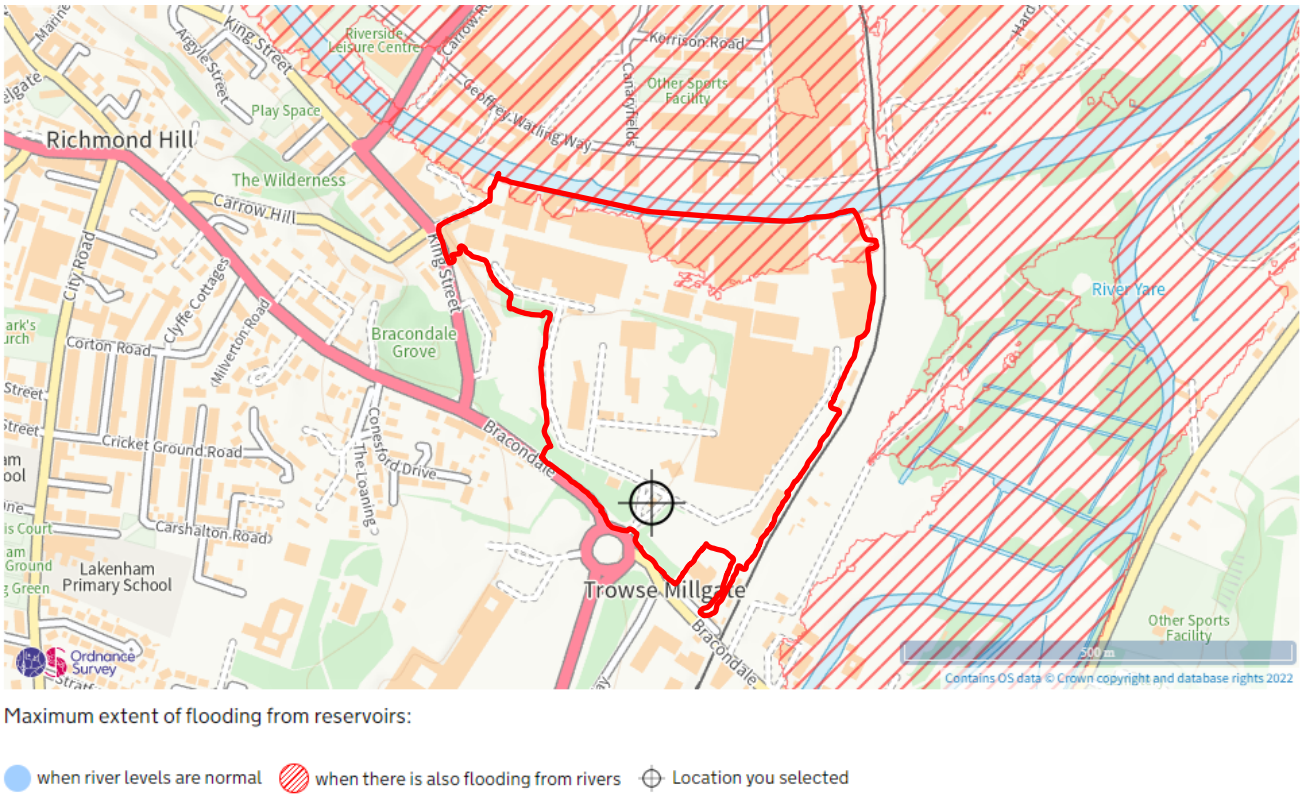


Figure 4-7: Reservoir Flood Risk Map

There are several reservoirs upstream of the site by the River Wensum. These reservoirs, the closest of which are located approximately 3.4km away by Waterworks Road, would flow into the River Wensum and downstream towards the Site if failure were to occur. The Site is also located approximately 500m upstream of Whitlingham Little Broad and 700m upstream of Whitlingham Great Broad, two lagoons located near the River Yare.

Though the site is at risk of reservoir flooding, it is only at risk when there is also flooding from rivers. It is also a residual risk in the unlikely event that there is structural failure to the reservoirs.

High safety measures and routine inspections reduce the risk of reservoir failures. Although there is no official grading of severity, we have used engineering judgement to assess the risk. The Site is therefore assessed as being at **low** risk of flooding as a result of reservoir failure.

5.0 Flood Risk Mitigation

This section responds to the major risks outlined to the undeveloped site in Section 4 and offers mitigating measures that will aim to reduce the risk of flooding to the site, as well as sites both up and down stream.

5.1 Natural Drainage

5.1.1 Fluvial Flooding

With reference to the EA's published flood maps (see Figure 4 1 and Figure 4 2 in Section 4.1.1) the site can be shown to lie predominantly in Flood Zones 1. A small extent in the north-eastern are of the Site falling in Flood Zone 3 and 2.

The site borders the tidal influenced River Wensum, though tidal and fluvial modelling carried out by the EA demonstrate that the Site is at risk of fluvial flooding from the River Wensum. The flood modelling with climate change demonstrates that the predicted flood extent is slightly greater with climate change. As small portion of the Site falls within Flood Zone 3, it is required to include mitigation measures for the proposed planning application. These are outlined below in this section.

5.1.1.1 Site Levels

A Technical Design Note was produced by Hydrock to assess a number of different flood risk mitigation options. As the modelling carried out by the EA for the area was conducted in 2017, it does not make reference to the latest climate change allowances. Hydrock therefore carried out further modelling based on the latest fluvial climate change allowances, utilising the Central 2080s climate change uplift (11%), and the Higher 2080s climate change uplift (20%). Hydrock agreed with the EA that flood depths predicted during a modelled scenario where both the river inflows and tide levels were updated for climate change would be an overestimation of flood levels at the site. The results generated from the EA 2017 modelling indicate that the modelled peak tidal flood levels are lower than the equivalent fluvial flood levels for all return periods. Therefore, it was agreed that the design event for assessing mitigation measures should be the 1 in 100 year + 20% CC event with existing tidal levels.

To assess the existing level of flood risk, the following simulated events were analysed:

- 1 in 20yr, 5% AEP (Flood Zone 3b)
- 1 in 100yr, 1 % AEP (Flood Zone 3a)
- 1 in 100yr + 20% climate change uplift
- 1 in 1000yr, 0.1% AEP (Flood Zone 2)

Following an assessment of the predicted flood risk outputs, two different flood risk mitigation options were assessed. The first was ground lowering only, which was designed to redistribute the 1 in 20-year

flood extent away from areas earmarked for development. This involves lowering all river frontage parcels and river corridor areas to 1.4mAOD with the marinas, being a maximum of 100mm below these levels and at a level of 1.3m AOD.

The second assessed mitigation option was ground raising with compensation storage, which was designed to ensure all development is set above and outside the 1 in 100-year and 1 in 100-year + climate change events. This involves raising proposed development parcels to a level of 2mAOD based on the outputs from Hydrock modelling. This would ensure that finished floor levels (FFL) are raised a minimum of 300mm above the 100-year + climate change flood level of 1.65mAOD. As this is part of a wider generation scheme, compensation storage would be provided on the Deal Ground site, located east of the Site.

Included in the proposed areas to be raised is the north-eastern region of the site. This includes the section which borders the River Wensum and the entrance/exit to the underpass. This means these areas will be above the design flood level. See Figure 5-1 for further information.

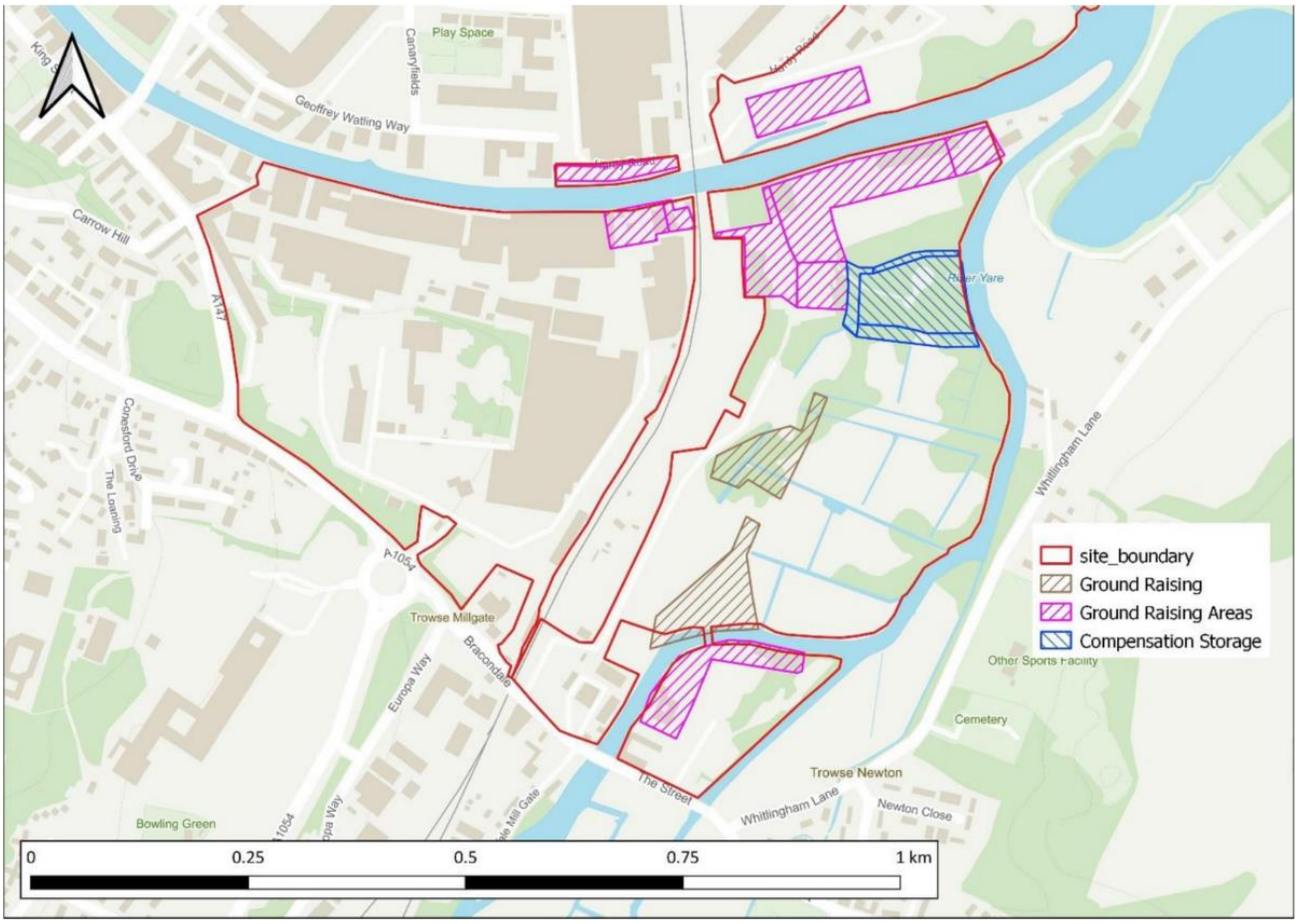


Figure 5-1: Ground Raising Compensatory Storage Areas

As presented in the Flood Risk Mitigation Technical Design Note, it is recommended that the ground raising and compensatory storage option is selected. This would mean that the area at risk of fluvial

flooding will be filled in and raised to mitigate the flood risk. For further information on the Flood Risk Mitigation Technical Design Note, see **Appendix E.**

5.1.1.2 Finished Floor Levels

The Greater Norwich Area SFRA requires that minimum FFLs should be set to whichever is the higher of the following:

- a minimum of 300mm above the 1% AEP fluvial event + an allowance for climate change
- a minimum of 300mm above the 0.5% AEP tidal event + an allowance for climate change
- a minimum of 300mm above surrounding ground levels

As highlighted in the Hydrock Flood Risk Mitigation Technical Design Note, the modelled flood height for the 1 in 100 year + 20% CC event is 1.65mAOD. If the recommendations of 2mAOD ground raising is applied, the ground level will be above the minimum required FFL with regards to fluvial and tidal flood events. Therefore, it is proposed that FFLs are a minimum of 2.3mAOD to ensure it is 300mm above the surrounding ground levels in that part of the site. The minimum FFL will vary across the site.

5.1.2 Surface Water Flooding and Overland Flow

With reference to the EA's published flood maps (see Figure 4-5 in Section 4.1.2) the site can be shown to predominantly be at a very low risk of flooding from surface water sources. There are areas throughout the site which are at high, medium, and low risk of flooding. These areas are towards the north and are within topographical low spots between existing buildings where surface water will flow and pool. There is also a region in the north-eastern region of the Site by the underpass entrance on route to the Deal Ground site which is at a high predicted risk of surface water flooding.

The proposed drainage system will be designed to ensure that no flooding occurs for events up to, and including, the 1 in 100 year + 45%CC rainfall events. The proposed system will be assessed and designed in line with Policy Box 2 (Drainage Hierarchy) as presented in the Greater Norwich Area SFRA and Norfolk County Council guidance document (LLFA role as Statutory Consultee to Planning):

- Into the ground (infiltration)
- To a surface water body
- To a surface water sewer
- To a combined sewer

The SFRA also states that all new development should aim to minimise areas of impermeable ground to reduce surface water runoff. The document also states that SuDS should be used on all new development.

The drainage strategy proposes to follow the existing site arrangement by disposing of surface water via infiltration and via outfalls to the River Wensum. Where surface water runoff is proposed to outfall

to the River Wensum, it is intended to do so at a controlled 1 in 100 greenfield run-off rate (Q100) for all new build areas and for all storms. Where existing outfalls are proposed to be reused the existing catchment entering the system is proposed to remain uncontrolled. Where surface water is proposed to discharge via infiltration, water will be disposed of via new or existing soakaways. Full details are provided are provided as part of the drainage strategy.

As a result of the implementation of this strategy the risk of surface water flooding is to be reduced to **very low** across the Site.

5.1.3 Groundwater Flooding

As discussed in Section 4.1.3, the Site is assessed as having a **medium** risk of flooding due to ground water. This is due to the Site falling in an area classified as >=75% susceptible to groundwater flooding, and 17 different trial holes throughout the Site striking groundwater between 0.5 and 4.5 mbgl. As highlighted in the Phase 1 Desk Study Site Reconnaissance Report, below ground structures (basements) are vulnerable to groundwater flooding across wider regions of the site

To manage the risk posed by groundwater flooding, it is recommended that groundwater is measured and monitored as part of any future intrusive ground investigation. It is also recommended that any basements included in the development across the site are designed in accordance with the recorded flood levels. Furthermore, as the minimum FFLs across the site are recommended to be 300mm above the surrounding ground level, the risk of internal flooding from groundwater is considered to be low.

5.1.4 Climate Change

As discussed in Section 4.1.4, all designs will be based on an allowance of 45% increase in rainfall intensity for future climate change. For fluvial, a 11% allowance will be used for the purpose of design.

5.2 Artificial Systems

5.2.1 Adopted Drainage

The risk of flooding from the adopted drainage is not expected to be altered as a result of the proposed development. The proposed drainage regime will see surface water managed on site, with the northern area of the site discharging to the River Wensum, and the southern area infiltrating to the ground via soakaways.

The Site remains as being at a **low** risk of flooding from adopted drainage.

5.2.2 Private Drainage

The proposed development will include a surface water drainage network designed to accommodate a 1 in 100 year +45% CC allowance rainfall event. It is proposed that some of the existing drainage

infrastructure is retained, including three outfalls to the River Wensum in the northwest corner of the site, and some existing soakaways located towards the south of the site. In addition, below ground cellular storage is proposed to provide attenuation, along with permeable paving, bioretention and petrol interceptors as part of the improved drainage scheme. New outfalls to the River Wensum will be installed above the typical high tide level. Falls will also be designed away from the proposed building to ensure that water will not drain towards or pool by the building if failure of the proposed system were to occur.

The risk of flooding from private drainage is assessed as being **low**.

5.2.3 Highway Drainage

As highlighted in Section 4.2.3, the Site is assessed as being at a **low** to **medium** risk of flooding from existing highway drainage. This is because if a surface water sewer failure were to occur around the King Street and Carrow Hill junction, it would most likely flow towards the site as King Street is topographically higher. As the proposed development is required to raise FFLs a minimum of 300mm above the surrounding ground level, the flood risk to property is assessed as being **low**.

5.2.4 Development Drainage

It will be necessary to provide a suitably designed storm water drainage system to collect, convey and attenuate the additional runoff generated by the development of this site. The site proposes to outfall the area in the north of the Site to the River Wensum at a control rate of Q100 (10.2 l/s/ha) for all storms up to, and including, the 1 in 100 year + 45% CC. For the southern area of the Site, it is proposed that water is discharged by infiltration via soakaways. In addition to geocellular storage for attenuation, it is proposed that permeable paving, bioretention, and petrol interceptors are introduced as part of the drainage scheme. This would ensure the strategy improves run-off quality whilst maximising biodiversity and amenity to provide a sustainable drainage system as noted in PPG. For further information, see the Drainage & SuDS Strategy (081440-CUR-XX-XX-T-C-92031).

Foul flows from the development should be drained through an entirely separate system designed to adoptable standards to minimise the risk of foul flooding occurring as a result of the development.

5.3 Summary

As detailed throughout this FRA, there a few flood risk sources which have been assessed as risks to the Site.

The risk associated with fluvial flooding is from the River Wensum, a major river which serves as a tributary to the River Yare. According to the EA mapping, a small extent located in the north-western corner site is in Flood Zone 3 and 2. Based on the Product 4 information provided by the EA, this area is only at predicted risk of fluvial flooding, not tidal. Through the topographic survey carried out for the

site, it has been identified that this area is the topographic low point for the entire site. The proposed development has been designed to include mitigation measures to reduce the risk of flooding from fluvial flooding, including ground raising (see Section 5.1.1).

The risk associated with surface water flooding is due to topographical low spots throughout the northern half of the site. These areas are predominantly between or by the existing buildings on Site. However, the EA surface water modelling does not take into account the channel drains located throughout the site to drain surface water runoff at these topographical low points. In addition, the new drainage scheme proposed for the Site will be designed to ensure that no flooding occurs for events up to, and including, the 1 in 100 year + 45%CC rainfall events. In addition, falls will be designed away from the proposed building. The new proposed drainage scheme will also address the risk associated with the private drainage.

The risk associated with groundwater flooding is predominantly due to the Site falling in an area classified as >=75% susceptible to groundwater flooding, and 17 different trial holes throughout the Site striking groundwater between 0.5 and 4.5 mbgl. To manage the risk posed by groundwater flooding, it is recommended that groundwater is measured and monitored as part of any future intrusive ground investigation. It should also be noted that below ground structures (basements) are vulnerable to groundwater flooding across wider regions of the site. In line with The Greater Norwich Area SFRA, FFLs should be raised 300mm above the surrounding ground level, therefore dwelling and development at ground level are unlikely to be affected by groundwater flooding.

The risk associated with highway drainage is linked to runoff from King Street by the Carrow Hill junction. This area is topographically higher than the Site. The site has been assessed as being at low risk of flooding from adopted drainage and reservoirs.

Table 5-1 - Flood Risk Summary

Potential Source of Flooding	Is there a flood risk to the development?	Does the proposed development increase the flood risk upstream?	Does the proposed development increase the flood risk downstream?
Fluvial Flooding	No	No	No
Surface Water Flooding	No	No	No
Ground Water Flooding	No	No	No
Adopted Drainage	No	No	No
Private Drainage	No	No	No
Highway Drainage	No	No	No
Reservoir Flooding	No	No	No
Development Drainage	No	No	No

6.0 Sequential Test

As a small portion falls within Flood Zone 3, the site is currently classed as being in Flood Zone 3 and is predicted to have a 1% chance of fluvial flooding or a 0.5% chance of tidal flooding. In accordance with PPG, the site will therefore need to pass a suitable Sequential Test to determine if the site can be brought forward for development.

The Sequential Test is designed to direct development towards areas of lower flood risk, however, where suitable sites do not exist in Flood Zone 1 sites in Flood Zone 2 and then 3 may be considered.

It is therefore necessary to establish a hierarchy of sites ranking the most suitable. From this hierarchy sites may be selected that will be required for housing needs in this location.

6.1 Application

The site is currently classed as being in Flood Zone 3 and is predicted to have a 1% chance of fluvial flooding or a 0.5% chance of tidal flooding. In accordance with PPG, the site will therefore need to pass a suitable Sequential Test to determine if the site can be brought forward for development.

The Sequential Test is designed to direct development towards areas of lower flood risk, however, where suitable sites do not exist in Flood Zone 1 sites in Flood Zone 2 and then 3 may be considered.

It is therefore necessary to establish a hierarchy of sites ranking the most suitable. From this hierarchy sites may be selected that will be required for housing needs in this location.

6.2 Sequential Test

In line with the NPPF, the Greater Norwich Area SFRA, and the Norwich Local Plan, the sequential test was applied as follows:

1. Identify the geographical area of search over which the test is to be applied; this could be the Borough area, or a specific catchment if this is appropriate and justification is provided (e.g. school catchment area or the need for affordable housing within a specific area).
    - The entire Greater Norwich Area was the search area for the site. A site of the appropriate size was a key consideration for the search.
2. Identify the source of ‘reasonably available’ alternative sites; usually drawn from evidence base / background documents produced to inform the Local Plan.
    - This site falls within the ‘East Norwich Masterplan’ area. The ‘Norwich Site Allocations and Site Specific Policies Local Plan’ was assessed to determine potential alternative sites. Though no site that was deemed a comparable alternative was found, the following sites were found:

- The Deal Ground (Policy R9) – This site is in the wider regeneration scheme that the proposed Carrow Works site is part of.
- Land adjoining Norwich City Football Club, Kerrison Road (Policy CC16) – This site is located on the opposite side of the River Wensum, opposite the Site.
- Utilities Site (Policy R10) – This site is located on the opposite side of the River Wensum, northwest of the Site. It is part of wider regeneration scheme that the proposed Carrow Works site is part of.
- Kerrison Road/Hardy Road, Gothic Work (Policy R11) – This site is also located on the opposite side of the River Wensum. It includes Land in front of ATB Laurense Scott which is also part of wider regeneration scheme that the proposed Carrow Works site is part of.

3. State the method used for comparing flood risk between sites; for example the Environment Agency Flood Map for Planning, the SFRA mapping, site-specific FRAs if appropriate, other mapping of flood sources.
    - The sources listed throughout the FRA were used, including EA flood risk maps and flood risk data presented as part of the Norwich SFRA.
4. Apply the Sequential Test; systematically consider each of the available sites, indicate whether the flood risk is higher or lower than the application site, state whether the alternative option being considered is allocated in the Local Plan, identify the capacity of each alternative site, and detail any constraints to the delivery of the alternative site(s).
    - No site that was deemed a comparable alternative was found, therefore a flood risk comparison between sites was not carried out.
    - Three of the four allocated sites highlighted in step 2 are part of the wider regeneration scheme that the proposed Carrow Works site is part of.
5. Conclude whether there are any reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed.
    - There are no reasonably available sites in areas with a lower probability.
6. Where necessary, as indicated by Table 4-3, apply the Exception Test.
    - The proposed use for the site is a mixed development. It will include new homes and employment spaces. Under the PPG Vulnerability Classification (Table 2), the highest development classification that the development wall fall under is ‘More Vulnerable’ (based on residential homes), or ‘Highly Vulnerable’ (if basement dwellings are proposed).

- It is proposed that the development is steered towards Flood Zone 1, which is the majority of the site. Under the PPG Flood Risk Vulnerability and Flood Zone Compatibility (Table 3), all development types are appropriate in Flood Zone 1 and would not need to pass the Exception Test.

7.0 Conclusions and Recommendations

7.1 Overview

This Flood Risk Assessment has been prepared for the proposed redevelopment of the Carrow Works site in Norwich. The FRA has been prepared in accordance with the requirements of the NPPF.

- The Site is primarily located in Flood Zone 1, with a small part of the site located in the north-eastern region falling in Flood Zones 3 and 2. The Site has been identified as having a medium risk of flooding. As part of the Site falls within Flood Zone 3, mitigation measures should be adopted to ensure the development is safe for its lifetime.
- The existing site has also been assessed as being at medium risk of flooding from surface water and ground water flooding. It has also been assessed as having a low to medium risk of flooding from private drainage and highway drainage.
- The Site is to be delivered with a new separate foul and surface water drainage system, though the existing drainage infrastructure will be retained in some instances. It is proposed that the northern area outfalls to the River Wensum at a Controlled rate of Q100, and the southern area discharges by infiltration via new and existing soakaways.
- As part of the new drainage scheme, below ground geocellular storage will be provided for attenuation. In addition, permeable paving, bioretention and petrol interceptors are proposed to treat run off before surface water is discharged into the River Wensum.
- As part of the proposed mitigation measures, it is recommended that the north-eastern area of the site is raised to 2mAOD as per the Hydrock Technical Design Note.
- In line with The Greater Norwich Area SFRA, FFLs should be raised 300mm above the surrounding ground level across the site.
- Following the implementation of the proposed drainage scheme and flood mitigation measures, the proposed development has been identified as a low risk of flooding from fluvial, tidal, surface water, private drainage and adoptable drainage sources.
- A predicted risk of flooding from groundwater and highway drainage will remain, however when the requirement outlined above from the Greater Norwich Area SFRA is applied to the site, the impact of these events is greatly reduced.

8.0 Appendices

Appendix A – Topographic Survey

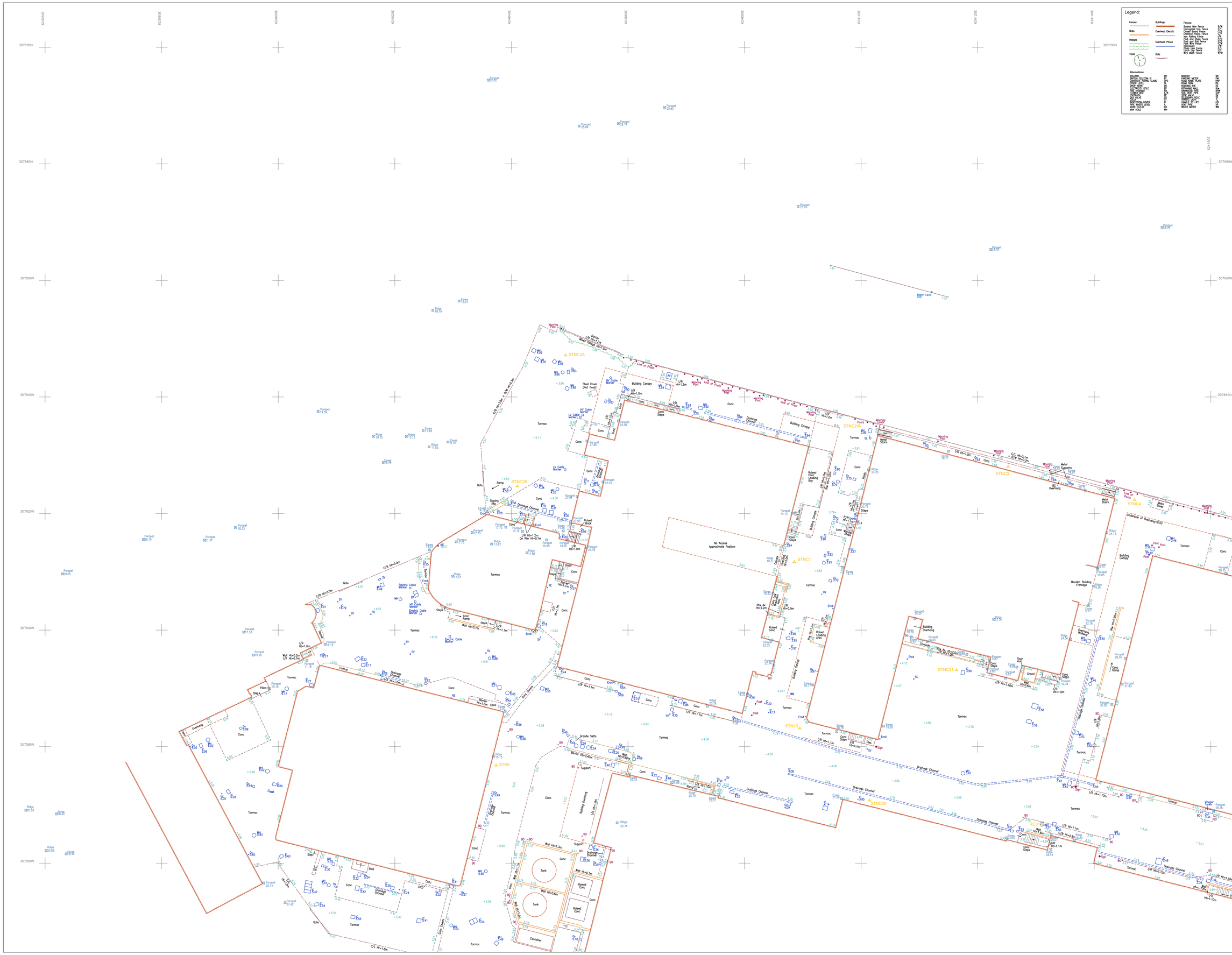
Appendix B – Anglian Water Asset Map

Appendix C – Utilities Survey

Appendix D – EA Product 4 Data

Appendix E – Flood Risk Mitigation Technical Design Note

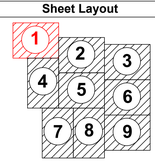
Appendix A – Topographic Survey



Coordinate Table

Stn	Easting	Northing	Level
RC1	624190.337	307611.342	4.832
RC10	624450.249	307577.504	4.601
RC11	624485.811	307557.457	3.619
RC12	624472.992	307505.592	5.235
RC13	624431.089	307516.490	5.089
RC15	624362.846	307523.290	5.021
RC16	624338.487	307468.131	5.256
RC17	624325.864	307471.037	5.093
RC18	624309.030	307474.774	5.063
RC19	624300.886	307488.617	4.992
RC2	624243.598	307601.733	4.801
RC21	624219.933	307553.964	4.794
RC25	624173.654	307554.226	5.021
RC3	624324.448	307593.554	4.784
RC31	624131.053	307566.721	5.225
RC35	624238.767	307506.239	5.153
STN1	624408.946	307268.178	6.934
STN10	624089.489	307583.140	4.067
STN11	624204.934	307546.594	3.302
STN12	624260.866	307526.574	3.226
STN13	624345.517	307498.227	3.231
STN13A	624314.815	307526.408	3.167
STN13B	624320.373	307550.213	3.311
STN14	624393.167	307527.487	3.408
STN15	624470.483	307527.726	3.653
STN16	624478.361	307430.885	3.706
STN17	624466.896	307357.893	6.775
STN1R	624438.720	307310.810	8.710
STN2	624327.608	307198.860	7.392
STN3	624245.087	307257.967	10.932
STN3A	624212.223	307195.780	10.000
STN32	624260.562	307256.565	10.165
STN4	624158.281	307285.589	13.569
STN4A	624138.728	307293.833	14.147
STN4A1	624132.076	307279.935	15.588
STN4B	624163.933	307256.096	14.232
STN5	624112.684	307322.867	15.230
STN6	624104.385	307433.428	8.517
STN7	624126.108	307475.591	6.006
STN7A	624097.573	307485.526	6.178
STN7B	624147.259	307493.761	4.793
STN7C	624163.885	307506.359	4.984
STN8	624042.883	307522.770	5.308
STN8A	624077.341	307502.116	5.105
STN8A1	624075.158	307484.405	6.582
STN8B	624116.044	307502.915	4.794
STN9	624037.369	307576.782	5.554
STN9A	624046.336	307591.864	5.463
STN9B	624012.632	307600.059	6.576
STN9C	623994.743	307585.870	6.047
STN9D	623997.720	307563.436	5.835
STN9E	624031.039	307555.217	5.424
STNB1	624191.286	307243.035	11.384
STNBR1	624205.110	307263.539	11.901
STNC1	624088.529	307611.694	3.887
STNC10	624518.683	307571.198	1.476
STNC10A	624528.065	307565.700	1.167
STNC10B	624520.898	307554.534	1.643
STNC11	624470.275	307564.288	2.317
STNC11A	624473.400	307585.466	1.756
STNC12	624479.8261	307595.4946	1.5447
STNC13	624507.4054	307597.2299	1.6217
STNC14	624472.2326	307512.9358	3.6401
STNC14A	624489.3552	307517.4921	3.5595
STNC19	624450.8611	307553.4420	3.3378
STNC2	624099.6354	307635.0375	3.9449
STNC20	624340.4121	307489.8376	3.3313
STNC21	624356.3641	307486.2783	3.4183
STNC22	624347.5215	307466.6815	3.7155
STNC22A	624345.2797	307455.1947	4.7870
STNC23	624297.3791	307477.6708	3.6695
STNC24	624302.0432	307498.4798	3.3561
STNC24A	624292.1747	307504.4669	3.3343
STNC2A	624049.2924	307647.1517	3.9085
STNC2B	624041.0212	307624.6973	4.4369
STNC3	624125.2265	307628.0419	1.6708
STNC3D	624101.4878	307570.7955	3.8321
STNC31	624116.3712	307593.1521	3.9503
STNC4	624146.9360	307622.3406	3.5638
STNC40	624270.5552	307289.7571	10.3060
STNC41	624286.3119	307275.7697	9.4804
STNC41A	624282.8017	307286.3612	9.8426
STNC42	624280.6199	307259.8963	9.4843
STNC43	624275.7233	307253.9066	9.7601
STNC44	624265.2724	307252.9808	9.5885
STNC45	624239.1039	307269.7593	10.6611
STNC5	624279.6126	307595.4977	3.2085
STNC5A	624273.0914	307555.5582	3.2730
STNC6	624371.5767	307593.2387	3.0596
STNC7	624430.0166	307594.4400	3.1651

Sheet Layout



Rev. Suffix	Date	Initial	Revision Details

Surveyor	PDMS	Verified By	ALS/LW	CAD Operator	TJH	Approved By	ARL	Date	23.08.18

Levelling GNSS Datum OSGB36

To an OS GNSS Datum

Client

Cushman & Wakefield LLP

Location

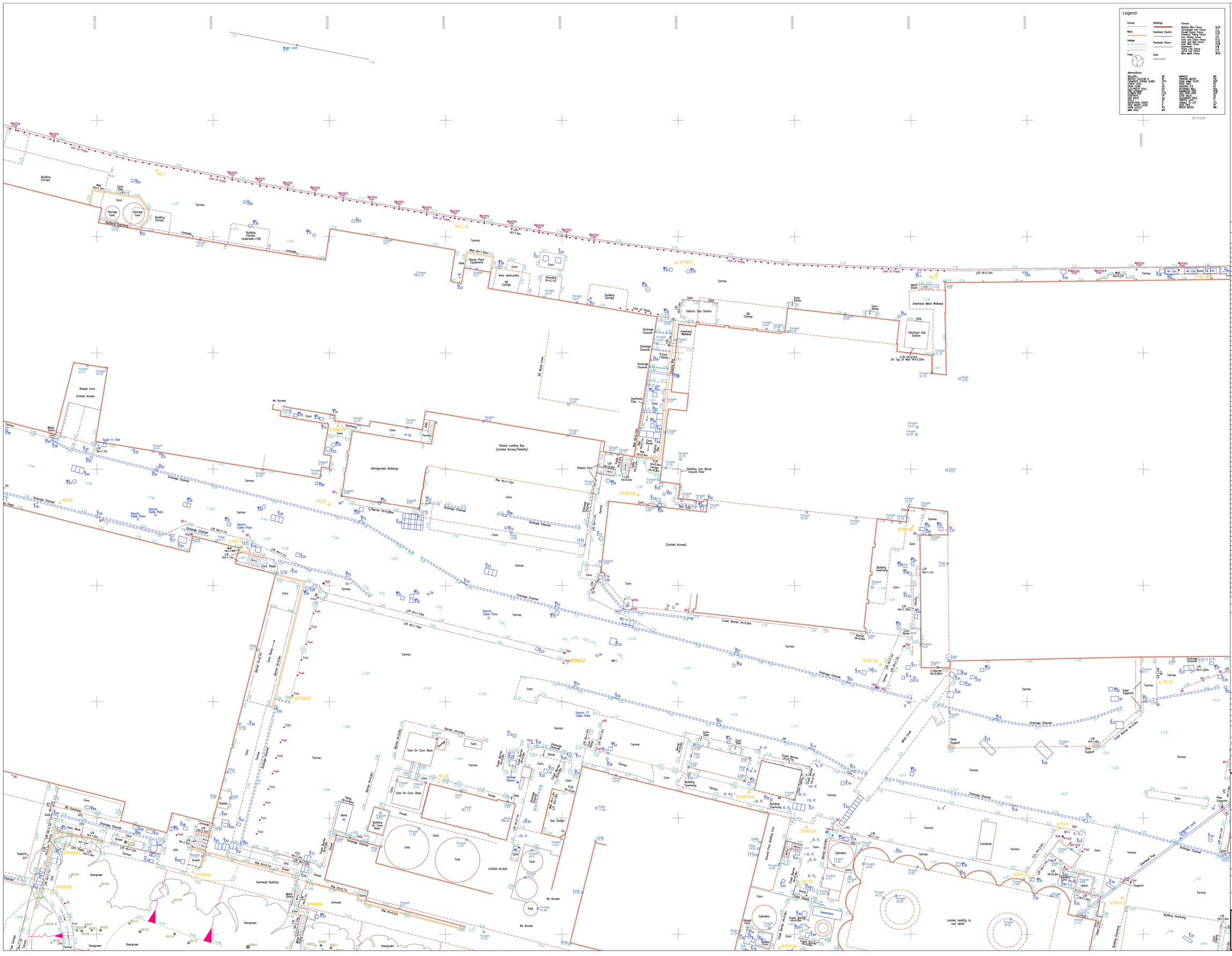
Carrow Works
Norwich, NR1 2DD

Drawing Title

Topographical Survey
Sheet 1 of 9

Job No. 1805022	Old Job No.
Drawing Number CW/1805022/1	Revision Suffix
Scale 1:200m (A0)	Date August 2018

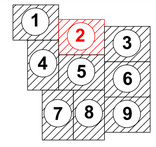
CD SURVEYS LTD
LAND, BUILDING & SITE ENGINEERING
PENTIRE - STABLE 1
FORDBRIDGE ROAD,
SUNBURY-ON-THAMES
MIDDLESEX, TW16 6AX
Tel (01932) 761196
Fax (01932) 786419
Email: mail@cdsurveys.com
Visit us at: www.cdsurveys.com



Coordinate Table

Stn	Easting	Northing	Level
STNC8	624446.199	307592.689	3.014
STNC9	624450.858	307553.439	3.337
STNE1	624368.534	307190.167	6.075
STNE10	624349.429	307450.284	6.775
STNE11	624341.315	307398.212	7.615
STNE12	624328.937	307321.187	7.614
STNE13	624320.134	307320.712	9.313
STNE14	624295.313	307323.707	10.250
STNE15	624296.494	307298.329	9.605
STNE2	624454.801	307321.008	5.854
STNE3	624452.484	307438.506	3.583
STNE4	624426.744	307440.654	4.543
STNE4A	624380.752	307448.559	4.322
STNE4B	624426.995	307427.969	4.405
STNE4R	624435.738	307438.976	5.370
STNE4R2	624433.997	307426.813	6.047
STNE5	624371.083	307450.506	4.036
STNE6	624372.228	307470.070	3.591
STNE7	624375.744	307492.229	3.389
STNE8	624416.667	307485.855	3.411
STNE9	624431.023	307516.037	3.399
STNEA1A	624347.531	307151.398	6.339
STNEA1B	624362.306	307160.385	6.030
STNEB1	624380.992	307184.408	6.065
STNEB2	624416.528	307244.897	5.919
STNER1	624343.842	307193.323	9.061
STNUB1	624381.043	307226.776	6.956
STNUB2	624295.140	307250.796	6.935
STNUP1	624312.786	307195.802	7.642
STNUP2	624281.113	307150.038	8.410
STNUP3	624242.923	307188.094	10.617
STNUP4	624256.249	307210.806	10.284
STNUPR1	624284.575	307215.994	10.711
STNM1	624177.442	307395.019	12.767
STNM2	624203.543	307469.980	11.940
STNM2A	624178.991	307459.549	12.117
STNM2B	624230.579	307471.684	12.138
STNM3	624213.473	307520.800	3.548
STNM3A	624221.464	307567.446	3.207
STNM3B	624214.992	307483.974	5.518
STNM3C	624196.541	307490.763	5.004
STNM3C1	624213.943	307474.499	8.394
STNM3D	624173.916	307496.884	6.577
STNM3E	624172.242	307487.103	7.429
STNM3F	624175.515	307470.120	10.251
STNM3G	624183.493	307459.651	11.980
STNMR1	624055.055	307557.320	5.470
STNMR2	624075.681	307495.508	5.457
STNMR4	624110.666	307384.090	11.902
STNMR5	624256.219	307223.687	10.150
STNMR6	624235.186	307227.123	10.421
STNP1	624162.409	307324.378	13.406
STNP10	624209.939	307312.024	12.488
STNP11	624248.975	307354.130	11.643
STNP12	624269.666	307377.951	12.092
STNP12A	624310.365	307384.996	10.781
STNP13	624228.107	307381.662	12.396
STNP14	624229.713	307420.328	11.929
STNP15	624260.753	307443.206	11.118
STNP15A	624242.378	307467.373	11.130
STNP16	624294.825	307462.105	11.752
STNP17	624338.627	307449.362	11.583
STNP1A	624207.797	307334.880	12.615
STNP2	624131.564	307326.766	13.867
STNP3	624140.772	307391.602	13.832
STNP4	624120.321	307421.815	14.249
STNP5	624116.849	307440.240	13.594
STNP6	624146.236	307436.427	12.609
STNP6A	624131.182	307447.582	13.409
STNP6B	624134.899	307462.372	13.223
STNP7	624172.637	307447.137	12.242
STNP8	624210.186	307379.891	12.190
STNP8A	624196.784	307351.355	11.988
STNP9	624228.720	307358.971	11.944
STNTP1	624152.598	307324.993	13.877
T1	624514.713	307591.823	5.202

Sheet Layout



Rev. Suffix	Date	Initial	Revision Details

Surveyor	PD/MB	Verified By	AL/LW	CAD Operator	TJH	Approved By	ARL	Date	23.08.18

Levelling: GNSS | Datum: OSGB36

To an OS GNSS Datum

Client

Cushman & Wakefield LLP

Location

Carrow Works
Norwich, NR1 2DD

Drawing Title

Topographical Survey
Sheet 2 of 9

Job No. 1805022	Old Job No.
Drawing Number CW/1805022/2	Revision Suffix
Scale 1:200m (A0)	Date August 2018

CD SURVEYS LTD
LAND, BUILDING & SITE ENGINEERING
PENTIRE - STABLE 1
FORDBRIDGE ROAD,
SUNBURY-ON-THAMES
MIDDLESEX, TW16 6AX
Tel (01932) 761196
Fax (01932) 786419
Email: mail@cdsurveys.com
Visit us at: www.cdsurveys.com

Notes:

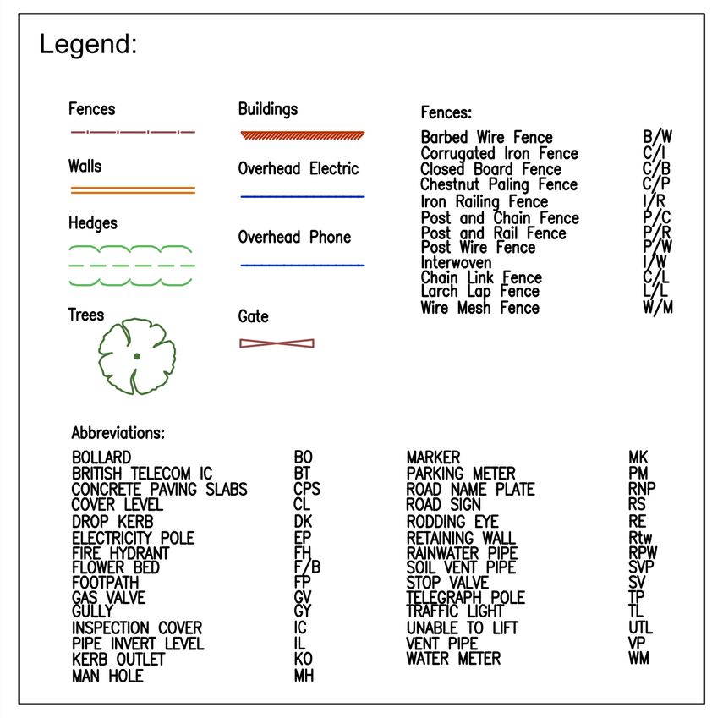
Whilst every effort has been made to correctly identify species of trees on the site, we advise that an arborologist be consulted before any final decisions are made.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

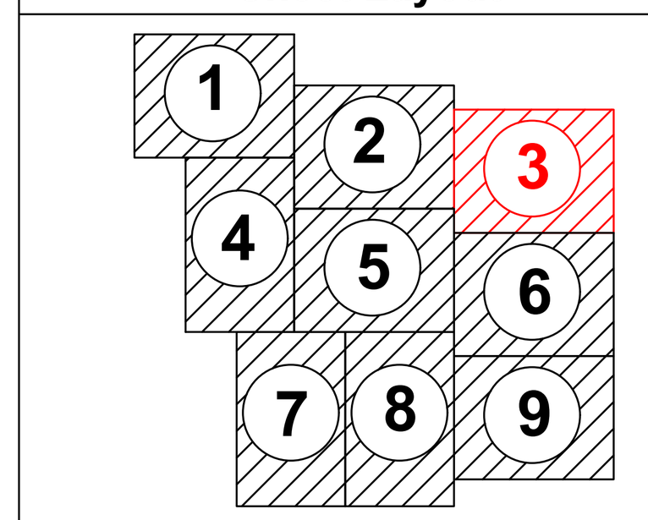
Grid coordinates are based on an OS GNSS system on a plane grid with a scale factor of 1.0000.

INDICATIVE

Legend:



Sheet Layout



Rev. Suffix	Date	Initial	Revision Details

Surveyor	PD/MB	Verified By	AL/LW	CAD Operator	TJH	Approved By	ARL	Date	23.08.18

Levelling GNSS Datum OSGB36

To an OS GNSS Datum

Client

Cushman & Wakefield LLP

Location

Carrow Works
Norwich, NR1 2DD

Drawing Title

Topographical Survey
Sheet 3 of 9

Job No. 1805022 | Old Job No.

Drawing Number CW/1805022/3 | Revision Suffix

Scale 1:200m (A0) | Date August 2018

CD SURVEYS LTD
LAND, BUILDING & SITE ENGINEERING
PENTIRE - STABLE 1
FORDBRIDGE ROAD,
SUNBURY-ON-THAMES
MIDDLESEX, TW16 6AX
Tel (01932) 761196
Fax (01932) 786419
Email: mail@cdsurveys.com
Visit us at: www.cdsurveys.com

Notes:

Whilst every effort has been made to correctly identify species of trees on the site, we advise that an arborologist be consulted before any final decisions are made.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Grid coordinates are based on an OS GNSS system on a plane grid with a scale factor of 1.0000.

INDICATIVE

Tree Schedule

Pt No	Spread	Bole	Height	Species

Legend:

Fences, Walls, Hedges, Trees, Buildings, Overhead Electric, Overhead Phone, Gate

Fences:

Barbed Wire Fence	B/W
Corrugated Iron Fence	C/I
Closed Board Fence	C/B
Chestnut Paling Fence	C/P
Iron Rail Fence	I/R
Post and Chain Fence	P/C
Post and Rail Fence	P/R
Post Wire Fence	P/W
Interwoven	I/W
Chain Link Fence	C/L
Larch Lap Fence	L/L
Wire Mesh Fence	W/M

Abbreviations:

BOLLARD	BO	MARKER	MK
BRITISH TELECOM IC.	BT	PARKING METER	PM
CONCRETE PAVING SLABS	CPS	ROAD NAME PLATE	RNP
COVER LEVEL	CL	ROAD SIGN	RS
DROP KERB	DK	RODDING EYE	RE
ELECTRICITY POLE	EP	RETAINING WALL	Rtw
FIRE HYDRANT	FH	RAINWATER PIPE	RWP
FLOWER BED	F/B	SOIL VENT PIPE	SVP
FOOTPATH	FP	STOP VALVE	SV
GAS VALVE	GV	TELEGRAPH POLE	TP
GULLY	GY	TRAFFIC LIGHT	TL
INSPECTION COVER	IC	UNABLE TO LIFT	UTL
PIPE INVERT LEVEL	IL	VENT PIPE	VP
KERB OUTLET	KO	WATER METER	WM
MAN HOLE	MH		

Sheet Layout

Rev. Suffix	Date	Initial	Revision Details

Surveyor	PD/MB	Verified By	AL/LW	CAD Operator	TJH	Approved By	ARL	Date	23.08.18

Levelling GNSS Datum OSGB36

To an OS GNSS Datum

Client

Cushman & Wakefield LLP

Location

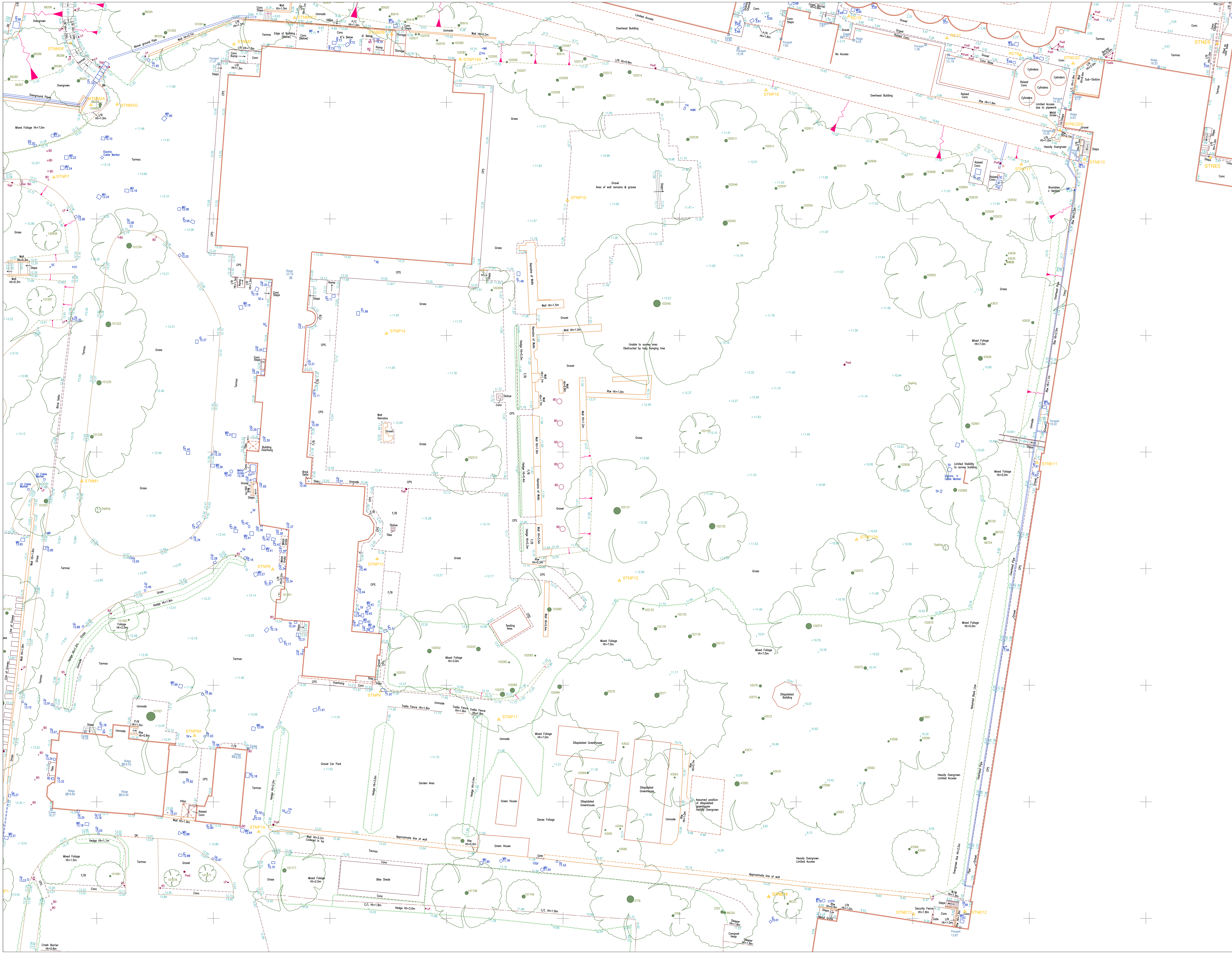
Carrow Works
Norwich, NR1 2DD

Drawing Title

Topographical Survey
Sheet 4 of 9

Job No. 1805022	Old Job No.
Drawing Number CW/1805022/4	Revision Suffix
Scale 1:200m (A0)	Date August 2018

CD SURVEYS LTD
LAND, BUILDING & SITE ENGINEERING
PENTIRE - STABLE 1
FORDBRIDGE ROAD,
SUNBURY-ON-THAMES
MIDDLESEX, TW16 6AX
Tel (01932) 761196
Fax (01932) 786419
Email: mail@cdsurveys.com
Visit us at: www.cdsurveys.com



Notes:

Whilst every effort has been made to correctly identify species of trees on the site, we advise that an arborologist be consulted before any final decisions are made.

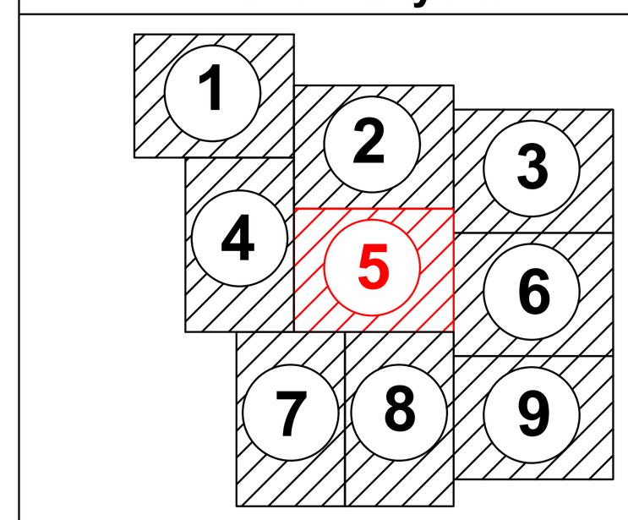
All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Grid coordinates are based on an OS GNSS system on a plane grid with a scale factor of 1.0000.

INDICATIVE

Legend:

Sheet Layout



Rev. Suffix	Date	Initial	Revision Details

Surveyor	PD/MB	Verified By	AL/LW	CAD Operator	TJH	Approved By	ARL	Date	23.08.18

Levelling GNSS Datum OSGB36

To an OS GNSS Datum

Client

Cushman & Wakefield LLP

Location

Carrow Works
Norwich, NR1 2DD

Drawing Title

Topographical Survey
Sheet 5 of 9

Job No. 1805022	Old Job No.
Drawing Number CW/1805022/5	Revision Suffix
Scale 1:200m (A0)	Date August 2018

CD SURVEYS LTD
LAND, BUILDING & SITE ENGINEERING
PENTIRE - STABLE 1
FORDBRIDGE ROAD,
SUNBURY-ON-THAMES
MIDDLESEX, TW16 6AX
Tel (01932) 761196
Fax (01932) 786419
Email: mail@cdsurveys.com
Visit us at: www.cdsurveys.com

Notes:

Whilst every effort has been made to correctly identify species of trees on the site, we advise that an arborologist be consulted before any final decisions are made.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Grid coordinates are based on an OS GNSS system on a plane grid with a scale factor of 1.0000.

INDICATIVE

Legend:

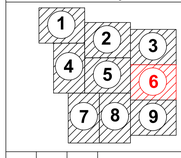
Fences
Walls
Hedges
Trees
Buildings
Overhead Electric
Overhead Phone
Gate

Fences: Barbed Wire Fence; Barbed Wire Iron Fence; Closed Board Fence; Concrete Post Fence; Iron Railing Fence; Post and Chain Fence; Post and Rail Fence; Post Wire Fence; Shuttering Fence; Split Log Fence; Wire Mesh Fence

Abbreviations:

BOLLARD, BOUNDARY STONE, CONCRETE BOUNDARY SLABS, COVER LEVEL, CROSS SECTION, ELECTRICITY POLE, FENCE, FINISHED FLOOR LEVEL, GATE, GAS VALVE, INSPECTION COVER, INVERT LEVEL, KERB OUTLET, MAN HOLE, MARKER, METER, MANHOLE, POST, NAME PLATE, ROAD SIGN, SOIL PIPE, RETAINING WALL, SUBMERGED END, TELEGRAPH POLE, TOTAL VOLUME, TRAFFIC LIGHT, UNABLE TO LIFT, WATER, WATER METER

Sheet Layout



Rev. Suffix	Date	Initial	Revision Details

Surveyor	PD/MB	Verified By	AL/LW	CAD Operator	TJH	Approved By	ARL	Date	23.08.18

Levelling: GNSS — Datum: OSGB36

To an OS GNSS Datum

Client

Cushman & Wakefield LLP

Location

Carrow Works
Norwich, NR1 2DD

Drawing Title

Topographical Survey
Sheet 6 of 9

Job No. 1805022	Old Job No.
Drawing Number CW/1805022/6	Revision Suffix
Scale 1:200m (A0)	Date August 2018

CD SURVEYS LTD
LAND, BUILDING & SITE ENGINEERING
PENTIRE - STABLE 1
FORDBRIDGE ROAD,
SUNBURY-ON-THAMES
MIDDLESEX, TW16 6AX
Tel (01932) 761196
Fax (01932) 786419
Email: mail@cdsurveys.com
Visit us at: www.cdsurveys.com

Notes:

Whilst every effort has been made to correctly identify species of trees on the site, we advise that an arborologist be consulted before any final decisions are made.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Grid coordinates are based on an OS GNSS system on a plane grid with a scale factor of 1.0000.

INDICATIVE

Legend:

Fences
Walls
Hedges
Trees
Buildings
Overhead Electric
Overhead Phone
Gate

Fences:

Barbed Wire Fence	B/W
Corrugated Iron Fence	C/I
Closed Board Fence	C/B
Chestnut Paling Fence	C/P
Iron Railing Fence	I/R
Post and Chain Fence	P/C
Post and Rail Fence	P/R
Post Wire Fence	P/W
Trellis	T/W
Chain Link Fence	C/L
Larch Lap Fence	L/L
Wire Mesh Fence	W/M

Abbreviations:

BOLLARD	BD	MARKER	MK
BRITISH TELECOM IC	BT	PARKING METER	PM
CONCRETE PAVING SLABS	CPS	POST NAME PLATE	PNP
COVER LEVEL	CL	ROAD SIGN	RS
DROP KERB	DK	RODDING EYE	RE
ELECTRICITY POLE	EP	RETAINING WALL	Rtw
FIRE HYDRANT	FH	RAINWATER PIPE	RPW
FLOWER BED	F/B	SOIL VENT PIPE	SVP
FOOTPATH	FP	STOP VALVE	SV
GAS VALVE	GV	TELEGRAPH POLE	TP
GRID	GD	TRAFFIC LIGHT	TL
INSPECTION COVER	IC	UNABLE TO LIFT	UTL
PIPE INVERT LEVEL	IL	VENT PIPE	VP
KERB OUTLET	KO	WATER METER	WM
MAN HOLE	MH		

Sheet Layout

Rev. Suffix	Date	Initial	Revision Details

Surveyor	PD/MB	Verified By	AL/LW	CAD Operator	TJH	Approved By	ARL	Date	23.08.18

Levelling GNSS Datum OSGB36

To an OS GNSS Datum

Client

Cushman & Wakefield LLP

Location

Carrow Works
Norwich, NR1 2DD

Drawing Title

Topographical Survey
Sheet 7 of 9

Job No. 1805022	Old Job No.
Drawing Number CW/1805022/7	Revision Suffix
Scale 1:200m (A0)	Date August 2018

CD SURVEYS LTD
LAND, BUILDING & SITE ENGINEERING
PENTIRE - STABLE 1
FORDBRIDGE ROAD,
SUNBURY-ON-THAMES
MIDDLESEX, TW16 6AX
Tel (01932) 761196
Fax (01932) 786419
Email: mail@cdsurveys.com
Visit us at: www.cdsurveys.com

Notes:

Whilst every effort has been made to correctly identify species of trees on the site, we advise that an arborologist be consulted before any final decisions are made.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Grid coordinates are based on an OS GNSS system on a plane grid with a scale factor of 1.0000.

INDICATIVE

Legend:

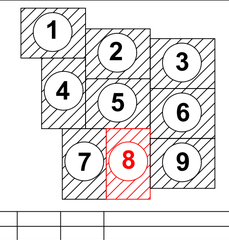
Fences
Walls
Hedges
Trees
Buildings
Overhead Electric
Overhead Phone
Gate

Fences:
Barbed Wire Fence B/W
Corrugated Iron Fence C/I
Closed Board Fence C/B
Chestnut Paling Fence C/P
Iron Railing Fence I/R
Post and Chain Fence P/CHE
Post and Rail Fence P/R
Post Wire Fence P/W
Interwoven C/W
Chain Link Fence C/L
Larch Lap Fence L/L
Wire Mesh Fence W/M

Abbreviations:

BOLLARD	BO	MARKER	MK
BRITISH TELECOM IC	BT	PARKING METER	PM
CONCRETE PAVING SLABS	CPS	ROAD NAME PLATE	RNP
COVER LEVEL	CL	ROAD SIGN	RS
DROP KERB	DK	ROODING EYE	RE
ELECTRICITY POLE	EP	RETAINING WALL	RW
FIRE HYDRANT	FH	RAINWATER PIPE	RPW
FLOWER BED	F/B	SOIL VENT PIPE	SVP
FOOTPATH	FP	STOP VALVE	SV
GAS VALVE	GV	TELEGRAPH POLE	TP
KERB	K	TRAFFIC LIGHT	TL
INSPECTION COVER	IC	UNABLE TO LIFT	U/L
PIPE INVERT LEVEL	IL	VENT PIPE	VP
KERB OUTLET	KO	WATER METER	WM
MAN HOLE	MH		

Sheet Layout



Rev. Suffix	Date	Initial	Revision Details

Surveyor	PD/MB	Verified By	AL/LW	CAD Operator	TJH	Approved By	ARL	Date	23.08.18

Levelling GNSS Datum OSGB36

To an OS GNSS Datum

Client
Cushman & Wakefield LLP

Location
Carrow Works
Norwich, NR1 2DD

Drawing Title
Topographical Survey
Sheet 8 of 9

Job No. 1805022	Old Job No.
Drawing Number CW/1805022/8	Revision Suffix
Scale 1:200m (A0)	Date August 2018

CD SURVEYS LTD
LAND, BUILDING & SITE ENGINEERING
PENTIRE - STABLE 1
FORDBRIDGE ROAD,
SUNBURY-ON-THAMES
MIDDLESEX, TW16 6AX
Tel (01932) 761196
Fax (01932) 786419
Email: mail@cdsurveys.com
Visit us at: www.cdsurveys.com

307120N
307100N
624240E
624260E
624280E
624300E
624320E
624340E
624360E

Pt No	Spread	Bole	Height	Species
142	8.0	0.35	10.0	TREE UNKOWN
166	4.0	0.25	8.0	SILVER BIRCH
167	4.0	0.30	8.0	SILVER BIRCH
168	6.0	0.30	8.0	SILVER BIRCH
385	9.0	0.40	10.0	MAPLE
539	7.0	0.50	15.0	PINE
540	6.5	0.40	15.0	PINE
542	10.0	0.50	15.0	PINE
543	7.0	0.60	16.0	PINE
544	5.0	0.30	11.0	BEECH
545	7.0	0.30	11.0	BIRCH
546	7.0	0.30	11.0	BIRCH
752	5.0	0.35	7.0	FIELD MAPLE
753	4.0	0.30	9.0	CYPRESS
770	9.0	0.35	14.0	TREE UNKOWN
771	7.0	0.30	10.0	TREE UNKOWN
772	10.0	0.45	14.0	TREE UNKOWN
800	9.0	0.40	13.0	MAPLE
801	9.0	0.40	13.0	MAPLE
803	8.0	0.35	12.0	MAPLE
848	6.0	0.45	12.0	CYPRESS
849	6.0	0.45	12.0	CYPRESS
850	4.0	0.35	10.0	CYPRESS
851	4.0	0.35	10.0	CYPRESS
852	4.0	0.30	9.0	CYPRESS
853	7.0	0.40	11.0	TREE UNKOWN
858	5.0	0.40	10.0	CYPRESS
920	9.0	0.45	13.0	TREE UNKOWN
1052	7.0	0.30	8.0	TREE UNKOWN
1053	5.0	0.40	10.0	CYPRESS
1054	8.0	0.40	10.0	TREE UNKOWN
1118	8.0	0.45	12.0	BEECH
1136	10.0	0.50	13.0	BEECH
1142	7.0	0.30	11.0	BEECH
1143	7.0	0.30	4.0	BEECH
1151	9.0	0.50	11.0	BEECH
1528	9.0	0.45	14.0	TREE UNKOWN
1529	7.0	0.35	12.0	FIELD MAPLE
1530	7.0	0.35	12.0	MAPLE
1531	10.0	0.50	15.0	MAPLE
1532	10.0	0.45	15.0	MAPLE
1533	9.0	0.45	13.0	MAPLE
1535	4.0	0.40	14.0	MAPLE
1539	10.0	0.60	14.0	BEECH
1540	10.0	0.50	14.0	BEECH
1541	10.0	0.45	14.0	BEECH
1542	9.0	0.40	14.0	BEECH
1543	7.0	0.30	12.0	BEECH
1544	7.0	0.45	13.0	BEECH
1545	8.0	0.50	13.0	BEECH
1547	9.0	0.60	14.0	BEECH
1548	9.0	0.40	14.0	BEECH
1549	9.0	0.65	14.0	BEECH
1550	8.0	0.35	14.0	BEECH
1551	6.0	0.40	12.0	BEECH
1552	10.0	0.55	14.0	BEECH
1553	9.0	0.45	13.0	BEECH
1554	9.0	0.45	13.0	BEECH
1555	12.0	0.75	16.0	FIELD MAPLE
1556	10.0	0.45	14.0	BEECH
1557	10.0	0.50	14.0	BEECH
1558	12.0	0.55	16.0	BEECH
1559	10.0	0.45	15.0	BEECH
1560	10.0	0.45	15.0	BEECH
1561	12.0	0.75	16.0	BEECH
1562	9.0	0.30	13.0	BEECH
1845	9.0	0.35	13.0	BEECH
1846	7.0	0.35	13.0	SILVER BIRCH
1847	7.0	0.35	13.0	SILVER BIRCH
2210	11.0	1.30	15.0	BEECH
2211	11.0	0.55	14.0	BEECH
2212	10.0	0.55	14.0	SYCAMORE
2216	11.0	1.30	14.0	SYCAMORE
2221	8.0	0.40	13.0	TREE UNKOWN
2404	8.0	0.60	13.0	BEECH
2405	4.0	0.30	13.0	PINE
2407	13.0	0.70	15.0	BEECH
2418	8.0	0.50	10.0	BEECH
3767	8.0	0.50	10.0	CYPRESS
3768	7.0	0.40	14.0	TREE UNKOWN
3779	14.0	1.20	17.0	TREE UNKOWN
40834	7.0	0.20	8.0	TREE UNKOWN
41103	8.0	0.40	13.0	SILVER BIRCH
41104	9.0	0.30	11.0	MAPLE
41107	9.0	0.40	15.0	PINE
41522	18.0	1.20	19.0	BEECH
41523	18.0	1.20	19.0	BEECH
41524	11.0	0.40	14.0	YEW
41541	8.0	0.30	8.0	HOLLY
41965	8.0	0.40	11.0	MAPLE
41981	10.0	0.50	12.0	WILLOW
41990	8.0	0.40	8.0	CHERRY
41991	8.0	0.20	6.0	TREE UNKOWN
41992	8.0	0.30	9.0	HORSE CHESTNUT
41993	12.0	0.20	10.0	PLANE
41994	9.0	0.30	7.0	CHERRY
41995	7.0	0.20	9.0	OAK
41996	9.0	0.20	10.0	PLANE
42137	7.0	0.20	8.0	MAPLE
42138	11.0	0.40	9.0	PLANE
42240	5.0	0.30	12.0	PINE
42360	8.0	0.30	9.0	BEECH
42370	9.0	0.30	11.0	OAK
42392	11.0	0.50	15.0	MAPLE
42393	16.0	0.80	18.0	BEECH
42501	6.0	0.20	7.0	BEECH
42502	7.0	0.30	9.0	BEECH
42529	6.0	0.60	17.0	PINE
42547	9.0	0.40	12.0	PINE
42550	9.0	0.50	12.0	YEW
42551	9.0	0.50	12.0	YEW
42552	9.0	0.50	12.0	YEW
42554	6.0	0.30	9.0	HOLLY
42555	8.0	0.20	12.0	SILVER BIRCH
42559	10.0	0.30	12.0	SYCAMORE
42560	7.0	0.30	10.0	BEECH
42561	15.0	0.70	18.0	BEECH
42562	5.0	0.40	15.0	PINE
42563	9.0	0.40	8.0	TREE UNKOWN
42564	10.0	0.60	16.0	PINE
42565	5.0	0.20	6.0	YEW
42569	10.0	0.30	15.0	SYCAMORE
42570	7.0	0.20	14.0	SYCAMORE
42571	6.0	0.50	17.0	PINE
42573	6.0	0.30	11.0	YEW
42579	9.0	0.50	16.0	BEECH
42580	6.0	0.40	10.0	YEW
42583	9.0	0.30	14.0	SYCAMORE
42585	9.0	0.30	15.0	SYCAMORE
42599	11.0	0.30	15.0	SYCAMORE
42600	11.0	0.30	15.0	SYCAMORE
42601	11.0	0.30	15.0	SYCAMORE
42602	11.0	0.30	15.0	SYCAMORE

Tree Schedule

Pt No	Spread	Bole	Height	Species
42603	6.0	0.30	9.0	YEW
42604	7.0	0.20	10.0	SYCAMORE
42613	11.0	0.40	16.0	OAK
42615	12.0	0.40	16.0	TREE UNKOWN
42616	7.0	0.60	14.0	SYCAMORE
42618	10.0	0.40	15.0	SYCAMORE
42620	8.0	0.30	15.0	SYCAMORE
42621	6.0	0.30	9.0	HOLLY
42622	6.0	0.30	9.0	HOLLY
42623	6.0	0.30	9.0	HOLLY
42657	9.0	0.30	13.0	BEECH
42658	14.0	0.60	16.0	BEECH
42659	14.0	0.60	16.0	BEECH
42743	5.0	0.30	8.0	BEECH
42744	7.0	0.30	8.0	HORSE CHESTNUT
42745	9.0	0.30	8.0	SWEET CHESTNUT
43194	12.0	0.30	14.0	MAPLE
43222	8.0	0.20	11.0	MAPLE
43223	12.0	0.40	14.0	MAPLE
43224	14.0	0.50	15.0	MAPLE
43225	7.0	0.20	9.0	MAPLE
43281	15.0	0.50	15.0	TREE UNKOWN
43282	12.0	0.30	14.0	SYCAMORE
43283	12.0	0.30	14.0	SYCAMORE
43284	12.0	0.30	14.0	SYCAMORE
43285	15.0	0.40	16.0	SYCAMORE
43286	12.0	0.30	13.0	SYCAMORE
43346	5.0	0.30	6.0	PINE
43347	4.0	0.30	7.0	PINE
43348	9.0	0.30	7.0	ASPEN
43350	8.0	0.30	8.0	PALM
43378	8.0	0.30	8.0	MAPLE
43379	9.0	0.30	8.0	MULBERRY
43383	5.0	0.30	5.0	PINE
43384	7.0	0.30	8.0	MAPLE
43385	5.0	0.30	5.0	PINE
43386	7.0	0.30	9.0	BEECH
43387	13.0	0.30	15.0	MAPLE
43388	9.0	0.30	13.0	MAPLE
43389	11.0	0.30	14.0	MAPLE
43464	5.0	0.10	4.0	CHERRY
43465	7.0	0.20	6.0	CHERRY
43489	12.0	0.60	15.0	CEDAR
82582	5.0	0.30	12.0	SYCAMORE
82583	5.0	0.30	12.0	SYCAMORE
82584	5.0	0.20	12.0	SYCAMORE
82585	5.0	0.20	12.0	SYCAMORE
82586	5.0	0.20	12.0	SYCAMORE
82587	5.0	0.20	12.0	SYCAMORE
82588	5.0	0.20	12.0	SYCAMORE
82589	5.0	0.20	12.0	SYCAMORE
82590	5.0	0.20	12.0	SYCAMORE
82591	5.0	0.20	12.0	SYCAMORE
82592	5.0	0.20	12.0	SYCAMORE
82621	8.0	0.40	12.0	SYCAMORE
82674	6.0	0.30	12.0	SYCAMORE
85904	18.0	0.60	24.0	OAK
85914	12.0	0.40	18.0	PINE
85916	8.0	0.40	16.0	SYCAMORE
85917	8.0	0.40	16.0	SYCAMORE
85918	8.0	0.30	16.0	SYCAMORE
85919	8.0	0.30	16.0	SYCAMORE
85920	8.0	0.40	16.0	SYCAMORE
85921	8.0	0.40	16.0	SYCAMORE
85922	8.0	0.40	16.0	SYCAMORE
85923	6.0	0.20	16.0	SYCAMORE
85924	6.0	0.20	16.0	SYCAMORE
85925	6.0	0.20	16.0	SYCAMORE
86123	12.0	0.40	18.0	YEW
86124	12.0	0.40	18.0	YEW
86125	8.0	0.40	16.0	YEW
86127	6.0	0.30	12.0	YEW
86128	8.0	0.40	26.0	LIME
86182	6.0	0.30	12.0	YEW
86183	14.0	0.50	26.0	SYCAMORE
86246	10.0	0.30	26.0	SYCAMORE
86247	10.0	0.30	26.0	SYCAMORE
86248	10.0	0.40	26.0	SYCAMORE
86249	4.0	0.20	7.0	LAUREL
86283	5.0	0.40	12.0	YEW
86284	8.0	0.40	12.0	YEW
86285	8.0	0.40	12.0	YEW
86286	6.0	0.40	12.0	YEW
86287	10.0	0.60	24.0	PINE
86288	10.0	0.50	15.0	PINE
86289	5.0	0.20	9.0	HOLLY
86292	10.0	0.40	26.0	SYCAMORE
86293	10.0	0.30	26.0	SYCAMORE
86294	12.0	0.40	26.0	SYCAMORE
86299	7.0	0.20	8.0	LAUREL
86300	7.0	0.20	8.0	LAUREL
86301	9.0	0.50	14.0	YEW
86319	7.0	0.50	14.0	YEW
86320	10.0	0.30	16.0	SYCAMORE
86330	12.0	0.40	9.0	YEW
86331	5.0	0.30	7.0	HAWTHORN
86351	8.0	0.30	9.0	YEW
86352	14.0	1.20	28.0	OAK
86367	8.0	0.30	16.0	BEECH
86368	8.0	0.30	16.0	BEECH
86369	8.0	0.30	16.0	BEECH
86370	8.0	0.30	16.0	BEECH
86371	8.0	0.30	16.0	BEECH
86378	14.0	0.40	18.0	BEECH
86390	9.0	0.40	16.0	ASH
86394	6.0	0.30	10.0	FRUIT
86395	9.0	0.30	12.0	YEW
86396	5.0	0.40	12.0	CYPRESS
86442	14.0	0.30	24.0	BEECH
86443	14.0	0.30	24.0	BEECH
86444	14.0	0.30	24.0	BEECH
86445	14.0	0.30	24.0	BEECH
86479	8.0	0.30	7.0	CYPRESS
86484	8.0	0.40	12.0	POPLAR
86485	12.0	0.40	12.0	SYCAMORE
86504	14.0	0.50	18.0	BEECH
86510	10.0	0.40	22.0	BEECH
86511	10.0	0.40	22.0	BEECH
86512	10.0	0.40	22.0	BEECH
86513	10.0	0.40	22.0	BEECH
86567	8.0	0.20	5.0	YEW
86568	14.0	0.60	20.0	PINE
86588	10.0	0.40	22.0	BEECH
86589	10.0	0.40	22.0	BEECH
86590	10.0	0.40	22.0	BEECH
86591	10.0	0.50	22.0	BEECH
86689	6.0	0.40	14.0	BEECH
86724	10.0	0.50	12.0	CYPRESS
86725	9.0	0.40	12.0	CYPRESS
86726	9.0	0.40	12.0	CYPRESS
100016	13.0	0.40	11.0	OAK
100155	13.0	0.80	15.0	LIME
100156	10.0	0.30	10.0	OAK

Tree Schedule

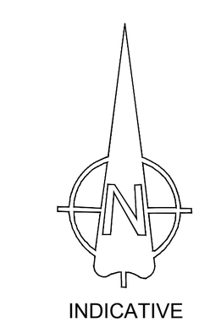
Pt No	Spread	Bole	Height	Species
100196	14.0	0.70	16.0	SYCAMORE
100197	7.0	0.30	8.0	HOLLY
100198	7.0	0.30	8.0	YEW
100199	14.0	1.00	18.0	PINE
100289	7.0	0.40	8.0	CYPRESS
100290	5.0	0.30	6.0	CYPRESS
100291	8.0	0.40	7.0	CHERRY
100292	5.0	0.30	6.0	CYPRESS
100294	8.0	0.30	7.0	TREE UNKOWN
100295	10.0	0.50	7.0	CHERRY
100296	12.0	0.60	10.0	WILLOW
100297	14.0	0.60	12.0	PLANE
100298	5.0	0.40	8.0	CYPRESS
100299	14.0	0.50	12.0	SYCAMORE
100346	8.0	0.30	4.0	CHERRY
100347	7.0	0.50	9.0	CYPRESS
100348	8.0	0.30	4.0	CHERRY
100396	8.0	0.30	5.0	CHERRY
100397	5.0	0.60	10.0	CYPRESS
100398	7.0	0.30	7.0	TREE UNKOWN
100414	16.0	0.70	16.0	BEECH
100443	17.0	0.80	17.0	OAK
100594	16.0	0.50	17.0	MAPLE
100595	7.0	0.30	14.0	SILVER BIRCH
100686	8.0	0.30	7.0	YEW
100687	20.0	1.20	18.0	BEECH
100741	18.0	1.10	18.0	BEECH
100742	8.0	0.30	7.0	YEW
100749	16.0	0.80	16.0	BEECH
100759	16.0	0.70	14.0	MAPLE
100760	8.0	0.30	7.0	YEW
100770	13.0	0.30	14.0	PLANE
100839	5.0	0.10	6.0	BEECH
100909	7.0	0.30	10.0	YEW
101001	7.0	0.30	9.0	YEW
101002	13.0	0.50	16.0	MAPLE
101051	12.0	0.70	15.0	LIME
101097	5.0	0.10	7.0	MAPLE
101163	13.0	0.50	16.0	BEECH
101171	13.0	0.40	16.0	BEECH
101233	13.0	0.90	16.0	LIME
101234	13.0	0.90	16.0	LIME
101235	20.0	0.80	18.0	OAK
101236	14.0	0.60	13.0	OAK
101451	3.0	0.10	4.0	LAUREL
101482	7.0	0.30	6.0	MAGNOLIA
101521	20.0	1.50	20.0	BEECH
101677	3.0	0.10	5.0	EUCALYPTUS
101678	3.0	0.10	5.0	EUCALYPTUS
101681	5.0	0.30	6.0	HOLLY
101717	14.0	0.70	14.0	OAK
101748	12.0	0.60	10.0	HORSE CHESTNUT
101749	6.0	0.60	10.0	CYPRESS
101851	7.0	0.30	8.0	SILVER BIRCH
101854	6.0	0.30	5.0	WHITEBEAM
101855	6.0	0.30	5.0	WHITEBEAM
101856	6.0	0.30	5.0	WHITEBEAM
101863	6.0	0.30	6.0	BEECH
101940	6.0	0.60	15.0	SPRUCE
101973	8.0	0.50	10.0	CEDAR
101988	12.0	1.00	12.0	CEDAR
102010	6.0	0.40	7.0	HOLLY
102042	14.0	0.70	15.0	BEECH
102050	6.0	0.60	13.0	CYPRESS
102069	13.0	0.80	17.0	LIME
102070	13.0	0.80	17.0	LIME
102082	8.0	0.30	14.0	SWEET CHESTNUT
102083	8.0	0.30	14.0	LIME
102084	10.0	0.70	14.0	LIME
102085	15.0	0.70	18.0	BEECH
102131	18.0	1.20	22.0	BEECH
102132	12.0	1.00	9.0	LIME
102133	5.0	0.30	8.0	HOLLY
102134	6.0	0.50	7.0	CYPRESS
102135	13.0	0.30	13.0	SYCAMORE
102136	15.0	0.60	17.0	BEECH
102137	13.0	0.70	18.0	PINE
102150	7.0	0.30	7.0	ASH
102210	12.0	0.50	12.0	TULIP
102225	18.0	0.70	17.0	MAPLE
102405	8.0	0.30	7.0	MULBERY
102505	6.0	0.30	8.0	YEW
102506	6.0	0.30	8.0	HOLLY
102507	7.0	0.30	12.0	BEECH
102508	8.0	0.50	8.0	HOLLY
102509	10.0	0.50	16.0	PINE
102510	12.0	0.50	8.0	YEW
102511	14.0	0.50	8.0	OAK
102512	12.0	0.60	15.0	PINE
102513	10.0	0.50	15.0	BEECH
102514	12.0	0.60	15.0	PINE
102538	12.0	0.50	15.0	SYCAMORE
102539	10.0	0.50	9.0	CYPRESS
102540	28.0	1.20	18.0	BEECH
102544	13.0	0.30	8.0	YEW
102545	18.0	0.80	20.0	OAK
102546	14.0	0.50	16.0	OAK
102547	6.0	0.40	15.0	CYPRESS
102549	12.0	0.40	16.0	SYCAMORE
102550	7.0	0.40	11.0	CYPRESS
102567	10.0	0.50	14.0	PINE
102568	8.0	0.30	14.0	PINE
102577	7.0	0.30	15.0	SILVER BIRCH
102578	8.0	0.30	15.0	SYCAMORE
102579	8.0	0.30	15.0	SYCAMORE
102580	8.0	0.30	15.0	SYCAMORE
102581	8.0	0.30	15.0	SYCAMORE
102604	7.0	0.40	10.0	CYPRESS
102605	8.0	0.30	12.0	ASH
102606	10.0	0.50	12.0	CYPRESS
102607	12.0	0.50	14.0	POPLAR
102608	10.0	0.40	16.0	LIME
102609	7.0	0.40	12.0	CYPRESS
102610	14.0	0.50	13.0	SYCAMORE
102611	8.0	0.30	11.0	SYCAMORE
102612	6.0	0.30	9.0	HOLLY
102613	14.0	0.50	16.0	OAK
102618	13.0	0.50	16.0	SYCAMORE
102631	13.0	0.50	14.0	SYCAMORE
102632	7.0	0.30	9.0	CYPRESS
102633	8.0	0.50	11.0	CYPRESS
102634	8.0	0.50	11.0	CYPRESS
102635	8.0	0.50	11.0	CYPRESS
102655	14.0	0.60	14.0	BEECH
102656	8.0	0.40	14.0	BEECH
102661	13.0	0.80	14.0	HORSE CHESTNUT
102665	12.0	0.60	13.0	HORSE CHESTNUT
102670	8.0	0.40	12.0	HORSE CHESTNUT
102671	8.0	0.40	9.0	HOLLY
102672	16.0	0.50	17.0	OAK
102673	14.0	0.50	8.0	CHERRY
102674	14.0	1.00	17.0	HORSE CHESTNUT

Notes:

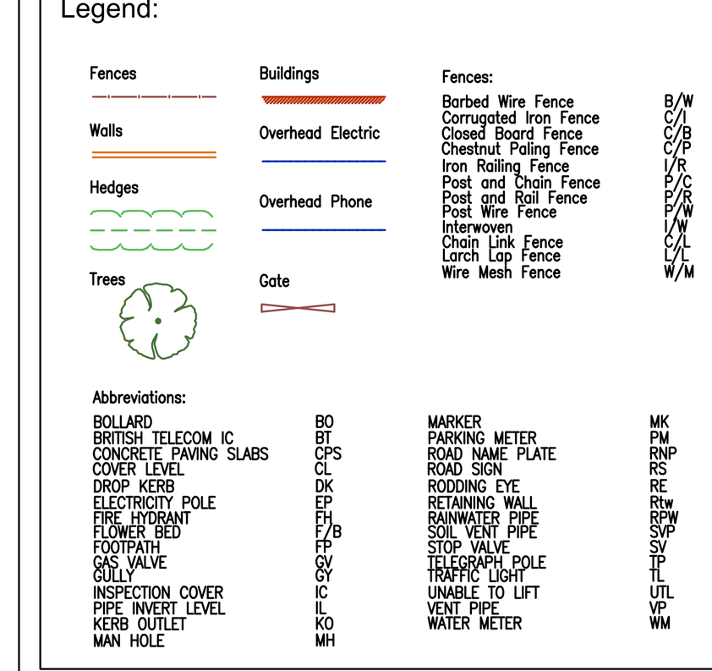
Whilst every effort has been made to correctly identify species of trees on the site, we advise that an arborologist be consulted before any final decisions are made.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

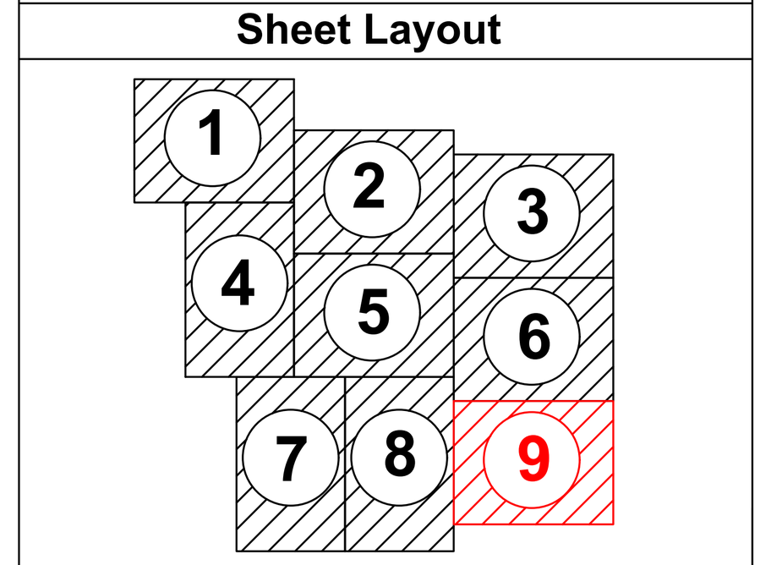
Grid coordinates are based on an OS GNSS system on a plane grid with a scale factor of 1.0000.



Legend:



Sheet Layout



Rev. Suffix	Date	Initial	Revision Details

Surveyor	PD/MB	Verified By	AL/LW	CAD Operator	TJH	Approved By	ARL	Date	23.08.18

Levelling GNSS Datum OSGB36

To an OS GNSS Datum

Client

Cushman & Wakefield LLP

Location

Carrow Works
Norwich, NR1 2DD

Drawing Title

Topographical Survey Sheet 9 of 9

Job No. 1805022 | Old Job No.

Drawing Number CW/1805022/9 | Revision Suffix

Scale 1:200m (A0) | Date August 2018

CD SURVEYS LTD
LAND, BUILDING & SITE ENGINEERING
PENTIRE - STABLE 1
FORDBRIDGE ROAD,
SUNBURY-ON-THAMES
MIDDLESEX, TW16 6AX
Tel (01932) 761196
Fax (01932) 786419
Email: mail@cdsurveys.com
Visit us at: www.cdsurveys.com