

Kimberly Clark, Northfleet – Hydrogen Boiler Facility

Flood Risk Assessment & Drainage Strategy

682039-R1(1)-FRA
April 2026

DNV ISO 9001 · ISO 14001 ISO 45001
INVESTORS IN PEOPLE We invest in people Standard
LDE CIVILS | STRUCTURES | HYDROLOGY an RSK company

RSK GENERAL NOTES

Project No.: 682039-R1(1)-FRA

Site: Kimberly Clark, Northfleet – Hydrogen Boiler Facility

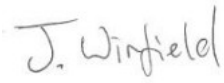
Title: Flood Risk Assessment & Drainage Strategy

Client: Kimberly Clark

Date: April 2026

Office: Hemel Hempstead

Status: Final

FRA Author	S Henshaw	**Drainage Author**	M Foster
Signature		Signature	
Date:	01.04.2026	Date:	01.04.2026
Technical Reviewer	C Whittingham	**Quality Reviewer**	J Winfield
Signature		Signature	
Date:	01.04.2026	Date:	01.04.2026

Issue No	Version/Details	Date issued	Author	Reviewed by	Approved by
R1(0)	Draft	31.03.26	SH / MF	JW	CW
R1(1)	Final	01.04.26	SH / MF	JW	CW

RSK LDE Ltd (RSK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and RSK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK LDE Ltd.

CONTENTS

1 INTRODUCTION 1
2 SITE DESCRIPTION & PROPOSALS 2
2.1 Existing site 2
2.2 Development proposals 4
3 ENVIRONMENTAL SETTING 5
3.1 Hydrology 5
3.2 Geology 5
3.3 Hydrogeology 5
4 SOURCES OF FLOOD RISK 6
4.1 Criteria 6
4.2 Definitions of risk 6
4.3 Flood risk from River Thames (Fluvial and Tidal flood risk) 8
4.4 Flood risk from the land (surface water flood risk) 18
4.5 Flood risk from groundwater 19
4.6 Flood risk from sewers 20
4.7 Flood risk from reservoirs 21
4.8 Other sources of flood risk 22
5 MITIGATION MEASURES AND RESIDUAL RISK 24
5.1 Sequential approach within application boundary 24
5.2 Overland flood flow 24
5.3 Finished floor levels 25
5.4 Easements and consents 26
5.5 Flood compensation 26
5.6 Safe access/egress 26
5.7 Flood management plan 27
6 PLANNING POLICY CONTEXT 28
6.1 National planning policy 28
7 SURFACE AND FOUL WATER DRAINAGE ASSESSMENT 30
7.1 Scope 30
7.2 Pre-development situation 30
7.3 Post-development situation 31
7.4 Surface Water Drainage 32
7.5 Foul drainage provision 33
8 CONCLUSIONS AND RECOMMENDATIONS 34

TABLES

Table 4.1: Flood map for planning risk zoning 6
Table 4.2: Flood risk from rivers or the sea and flood risk from surface water 7
Table 4.3: Flood risk category matrix from reservoirs, groundwater, sewers and other artificial sources 7
Table 4.4: North Kent Coast (2018) 1D Defended Levels - Node 3.24 11
Table 6.1: Flood risk vulnerability and flood zone 'compatibility' 29
Table 8.1: Flood risk summary 35

FIGURES

Figure 2.1: Site location plan 2
Figure 2.2: QGIS mapping of LiDAR 3
Figure 4.1: Environment Agency 'Flood map for planning' 8
Figure 4.2: Environment Agency 'Flood map for planning' (1:10,000 scale) 9
Figure 4.3: Defra's AIMS Spatial Flood Defences 10
Figure 4.4: EA North Kent Coast (2018) Modelled Node Locations 11
Figure 4.5: EA North Kent Coast (2018) Defended Extents 12
Figure 4.6: EA North Kent Coast (2018) Undefended Extents 12
Figure 4.7: EA North Kent Coast (2018) Modelled Breach Locations 13
Figure 4.8: EA North Kent Coast (2018) Modelled Breach Extents 14
Figure 4.9: EA Thames Tidal Downriver Breach Inundation (2018) Breach Locations 14
Figure 4.10: EA Thames Tidal Downriver Breach Inundation (2018) 2005 Epoch Breach Extents 15
Figure 4.11: EA North Kent Coast (2018) Modelled 1 in 200yr Climate Change Extents 16
Figure 4.12: EA Thames Tidal Downriver Breach Inundation (2018) 2115 Epoch Breach Extents 17
Figure 4.13: Environment Agency 'Flood risk from surface water' extents map. 18
Figure 4.14: Environment Agency Risk of Surface Water Depths up to 200mm 19
Figure 4.15: Environment Agency 'Flood risk from reservoirs' map 22

APPENDICES

APPENDIX A RSK GROUP SERVICE CONSTRAINTS
APPENDIX B TOPOGRAPHIC SURVEY AND PRIVATE DRAINAGE SURVEY
APPENDIX C SOUTHERN WATER SEWER RECORDS
APPENDIX D PROPOSED DEVELOPMENT PLANS
APPENDIX E ENVIRONMENT AGENCY CORRESPONDENCE
APPENDIX F LLFA CORRESPONDENCE
APPENDIX G EXISITNG DRAINAGE NETWORK MODEL
APPENDIX H SURFACE WATER DRAINAGE CALCULATIONS
APPENDIX I PRELIMINARY DRAINAGE STRATEGY DRAWINGS
APPENDIX J INDICATIVE MAINTANENCE PLAN

1 INTRODUCTION

RSK Land and Development Engineering Ltd were commissioned by RSK Acoustics (the client) to provide a Flood Risk Assessment (FRA) to support the full planning application at Kimberly Clark Industrial Estate, Northfleet (the site). Development proposals include the development of a Hydrogen Boiler facility as part of the wider Northfleet Green Hydrogen Facility works for which RSK provided a Flood Risk Assessment for (RSK ref: **681688-R1(02)-FRA**).

The purpose of the FRA is to establish the risk associated with the proposed development and to propose suitable mitigation, if required, to reduce the flood risk to a more acceptable level. The FRA must demonstrate that the development will be safe for its lifetime 75 years for non-residential developments taking account of the vulnerability of its users, without increasing flood risk elsewhere.

This document has been produced to assess the flood risk from tidal, fluvial, surface water, groundwater, sewers, reservoirs and artificial sources in line with the National Planning Policy Framework (NPPF)[1] and its corresponding Planning Practice Guidance (PPG)[2]. It includes a summary of the proposed surface water drainage strategy, showing how Sustainable Drainage Systems (SuDS) have been used to demonstrate surface water is appropriately managed on-site, with the aim that there is no increased risk of flooding on-site or elsewhere as a result of the development.

This assessment has been undertaken in consultation with the relevant authorities, and with reference to data, documents and guidance published by the Environment Agency (EA), the Lead Local Flood Authority (LLFA) (Kent County Council), the Local Planning Authority (LPA) (Gravesham Borough Council), and the Water Authority (Southern Water).

The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

[1] Communities and Local Government, 'National Planning Policy Framework', published March 2012 and last updated February 2025.

[2] Communities and Local Government, 'Planning Practice Guidance - Flood Risk and Coastal Change, ID 7', published March 2014 and last updated September 2025

2 SITE DESCRIPTION & PROPOSALS

2.1 Existing site

2.1.1 Site description

The site is located to the south of Crete Hall Road, Northfleet, Kent, within the Kimberly Clark industrial area. The site can be located at National Grid Reference 562600 E, 174375 N and postcode DA11 9AD. A site location plan is included as **Figure 2.1**.

The site covers an area of approximately 0.41Ha and currently comprises land associated with the wider industrial estate. The north of the site is occupied by an abandoned hard standing car park, whilst the southeastern extents of the site are in use as part of an assumed waste disposal yard and grassed areas. The southern most extents of the site are currently in use as land associated with an unspecified mill. The narrower sections of the red line boundary extending southwards and eastward represent the proposed pathways of the pipelines.

The surrounding area consists of the wider waste yard and mill along with a number of industrial and light industrial structures including logistic units, water treatment facilities and scrap yards.



Figure 2.1: Site location plan

2.1.2 Topography

A site-specific topographic survey has been carried out by RES. The survey shows the existing site levels vary from approximately 3.8 metres above ordnance datum (mAOD) in the southernmost part of the site, to approximately 5.3mAOD in the northwest area. The survey indicates the northern extents of the site are relatively flat hardstanding parking area with a ground level ranging from approximately 5.05mAOD to 5.44mAOD. Levels in the southern area of the site which the proposed pipeline is routed drop significantly from approximately 5.3mAOD to 3.8mAOD. The topographic survey is included in **Appendix B**.

In order to better visualise the topography of the surrounding area the Defra's LiDAR data has been processed in QGIS and has been reproduced as **Figure 2.2.** Areas of higher elevation are shown in red, while low lying areas are shown in blue.

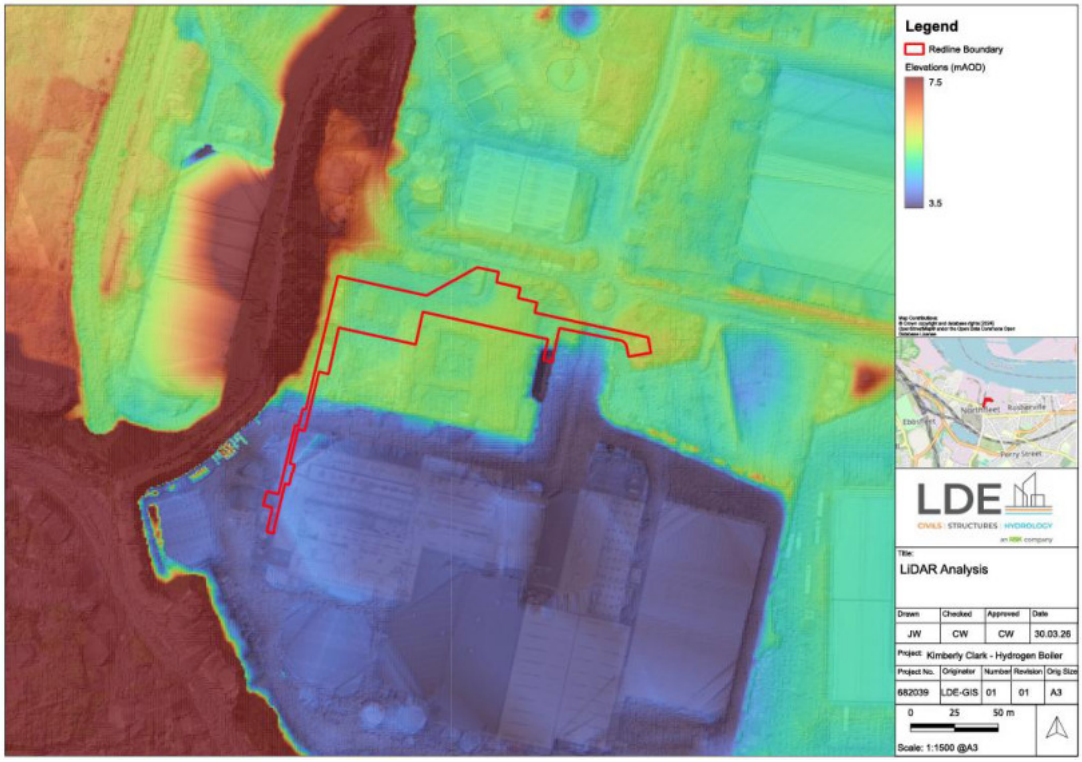


Figure 2.2: QGIS mapping of LiDAR

2.1.3 Existing drainage

2.1.3.1 Public

Southern Water sewer plans have been obtained for the site and are included in **Appendix C**. These plans indicate the following network of sewers in the vicinity of the site:

- A 300mm diameter surface water sewer that runs east to west along Crete Hall Road to the north of the site. This surface water sewer is upsized to a 900mm diameter pipe after Manhole 5450 where the sewer turns to run northward before discharging to the River Thames.
- A foul pumping station is present to the north of the junction between Crete Hall Road and a roundabout 20m northwest of the site. This pumping station receives inflows to the north from a 300mm foul gravity sewer and pumps flows eastward along Crete Hall Road via a 150mm foul rising main sewer.
- A potable water main pipe is located to the north of the site on Crete Hall Road.

2.1.3.2 Private

The existing drainage of the site has been surveyed and has been included in **Appendix B.** These plans indicate the majority of the site drains via a private surface water drainage network of 100mm diameter pipes and gulleys, which ultimately convey flows to the Southern Water 300mm diameter surface water sewer on Crete Hall Road to the north of the site.

2.2 Development proposals

The development proposals for the site include the construction of infrastructure associated with the construction of a hydrogen boiler room and pressure reduction skid with incoming Hydrogen, natural gas and water pipes from the east and electrical cables steam supply and condensate return connections running southward to the offsite heavy industrial unit.

The relevant proposed site plans are included as **Appendix D**.

3 ENVIRONMENTAL SETTING

3.1 Hydrology

Reference to Ordnance Survey (OS) mapping and the EA's web-based mapping indicates that the nearest EA Main River is River Thames, which is located approximately 280m north from the site. The River Thames flows west to east and is tidally influenced at this location. Other notable surface water features in the vicinity of the site include a small pond 110m north of the site.

3.2 Geology

Based on published geological records for the area (British Geological Survey online mapping), the site exhibits the following geology:

- Superficial Geology: The site is not underlain by a superficial geology.
- Bedrock Geology: Seaford Chalk Formation – Chalk.

BGS Borehole data shows several borehole records in the vicinity of the site. The closest record borehole log is located approximately 100m west of the site, Northfleet Works 5, TQ67SW335. The borehole encountered:

- Made Ground to 2.31 meters Below Ground Level (mBGL).
- Chalk with Flints to end of the borehole at 17.06mBGL.
- This borehole struck groundwater at 7.19mBGL.

An intrusive Site Investigation has been undertaken as part of the proposed Northfleet Green Hydrogen Facility application. The Site Investigation report is included within the documents submitted for this planning application.

3.3 Hydrogeology

Hydrogeological information was obtained from the online Magic Maps service. These maps indicate that:

- The site is not underlain by a superficial aquifer.
- The site is underlain by a Principal bedrock aquifer.
- The site is located within a Zone II – Outer Protection Zone groundwater Source Protection Zone (SPZs).

The close proximity of the site to a major watercourse and underlying geology suggest that shallow groundwater may be present beneath the site, however a nearby borehole log suggests groundwater levels to be around 7.19mBGL. The River Thames to the north of the site is a major tidal waterbody and hence groundwater levels are likely to vary with tide levels.

4 SOURCES OF FLOOD RISK

4.1 Criteria

In accordance with the NPPF and advice from the EA, an assessment of the risk associated with various flooding sources is required along with consideration of the effects of climate change over the design life of the development (in this case assumed to be 75 years).

The EA's most recent climate change guidance, published in May 2022[3], should be referenced in order to identify the appropriate peak river flow and rainfall intensity allowances for the scheme. The appropriate allowance for peak river flow is based on the location of the site in the country, the lifetime of development, the relevant flood zone and the vulnerability of the proposed end use.

The flood risk elements that need to be considered for any site are defined in BS 8533 'Assessing and managing flood risk in development Code of practice'[4] as the "Forms of Flooding" and are listed as:

- Flooding from rivers (fluvial flood risk);
- Flooding from the sea (tidal flood risk);
- Flooding from the land;
- Flooding from groundwater;
- Flooding from sewers (sewer and drain exceedance, pumping station failure etc); and
- Flooding from reservoirs, canals and other artificial structures.

The following section reviews each of these in respect of the subject site.

4.2 Definitions of risk

Table 4.1: Flood map for planning risk zoning

Flood Zone	Description
Flood Zone 1	Land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%)
Flood Zone 2	Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year

[3] Environment Agency, 'Guidance: Flood Risk Assessments: Climate Change Allowances'. https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances, last updated May 2022

[4] BSI, 'BS 8533-2017 Assessing and managing flood risk in development Code of practice', December 2017.

Flood Zone	Description
Flood Zone 3	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.
Flood Zone 3b	Land having the potential to flood for storm events up to the 1 in 30 year return period (>3.3% annual probability of flooding occurring). It is classified as 'functional floodplain'

Table 4.2: Flood risk from rivers or the sea and flood risk from surface water

Flood Risk	Description
High	High risk means that each year this area has a chance of flooding of greater than 3.3%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.
Medium	Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.
Low	Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.
Very Low	Means that each year this area has a chance of flooding of less than 0.1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Table 4.3: Flood risk category matrix from reservoirs, groundwater, sewers and other artificial sources

Threat Probability	Low Impact	Medium Impact	High Impact
High	Medium	Medium	High
Medium	Low	Medium	Medium
Low	Low	Low	Medium
Very Low	Very Low		

4.3 Flood risk from River Thames (Fluvial and Tidal flood risk)

The EA Flood Zone mapping study for England is available on their website at: https://flood-map-for-planning.service.gov.uk.

The latest EA published flood zone map **(Figure 4.1)** shows that the majority of the site lies within Flood Zone 2, representing a between 1 in 100 year and 1 in 1000 annual probability of flooding from fluvial sources or between 1 in 200 year and 1 in 1000 annual probability of flooding from tidal sources. The flooding shown on site is likely a result of the tidal River Thames to the north of the site.

The northwestern most extents of the site are in Flood Zone 1. Areas in Flood Zone 1 are estimated to have less than a 1 in 1000 year annual probability of river or sea flooding.

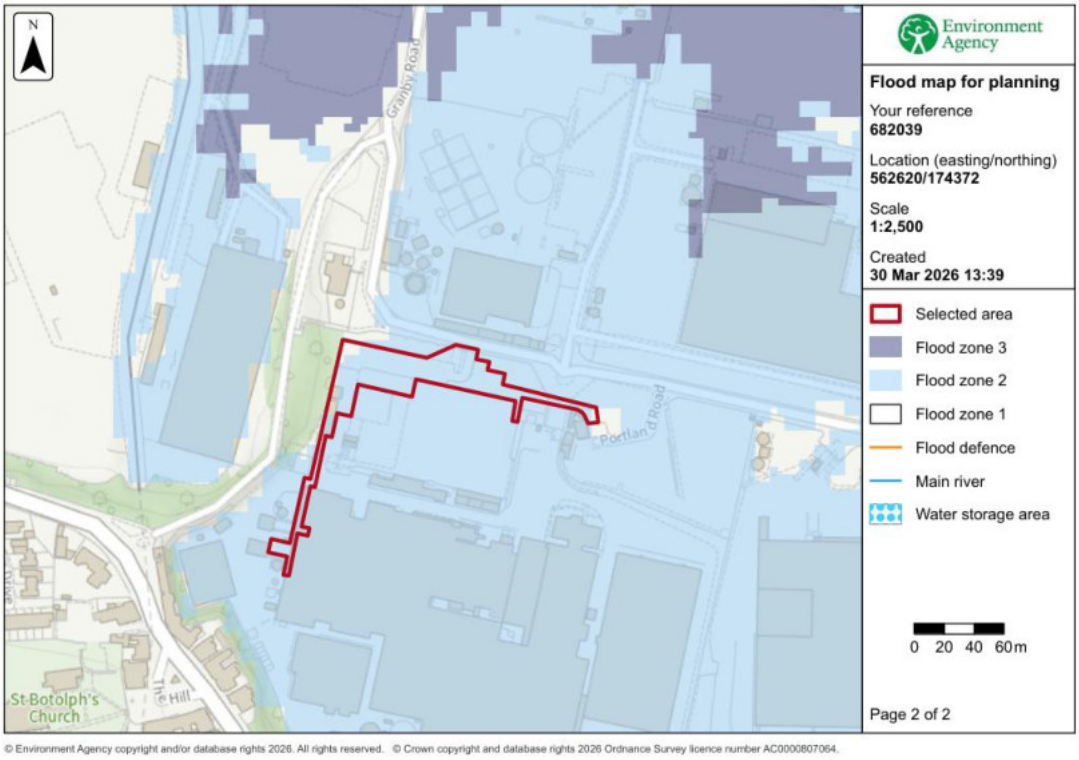


Figure 4.1: Environment Agency 'Flood map for planning'

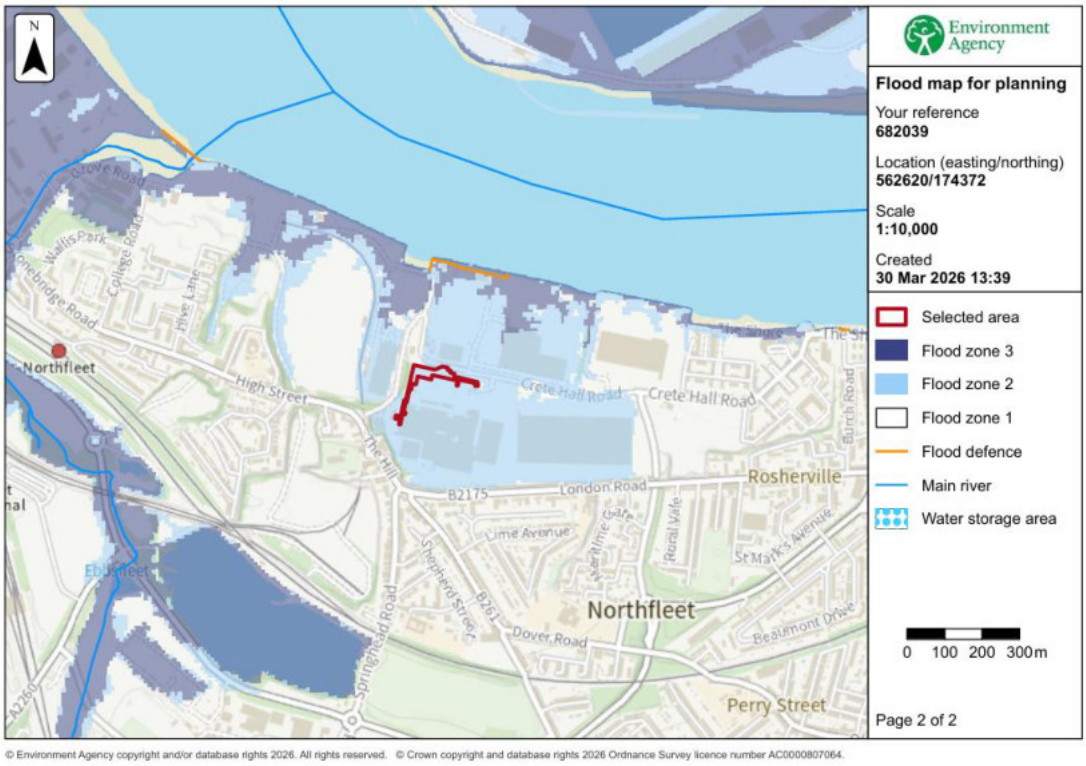


Figure 4.2: Environment Agency 'Flood map for planning' (1:10,000 scale)

Given that the site is located within Flood Zone 2, the EA was formally consulted as part of this assessment, with request for flood related information (including flood levels) included in the consultation. Their full response to the flood data request can be found in **Appendix E**.

Within their formal response the EA provided model extents, depths and levels from the both the North Kent Coast 2108 model, Thames Tidal Downriver Breach Inundation 2018 model and TE2100 report. These results were then imported and analysed within QGIS.

4.3.1 Flood Defences

The EA's Flood Map for Planning **(Figure 4.2)** and Defra's AIMS Spatial defence data **(Figure 4.3)** indicate several formal flood defences present along the bank of the River Thames to the north of the site. These defences consist of flood walls and are indicated to have a 1 in 1000 year standard of protection, with design crest levels ranging between 6.23mAOD to 6.84mAOD within the vicinity of the site.

It is required by 2040 that these defences are increased to a crest level of 6.90mAOD, and by 2070 are increased to 7.40mAOD in line with the TE2100's plan. The future statutory defence level is 7.40mAOD and will ensure the site is protected from extreme flood levels. However, the onus of delivering these flood defence improvements will be on the private landowner in which the flood defences lie. If flood defences are not maintained to their current condition and standard of protection then the flood risk to the site will increase due to the increase in potential risk of a breach of the defences..



Figure 4.3: Defra's AIMS Spatial Flood Defences

4.3.2 North Kent Coast 2018 Model

The EA have provided both defended and undefended extents from their North Kent Coast 2018 model. Mapping of these extents has been reproduced below as **Figure 4.5** and **Figure 4.6** respectively. This mapping indicates that during a 'present day' scenario, the protection offered by the existing flood defences would ensure that the site is protected from tidal flood risk from the 1 in 2 year to the 1 in 1000 year annual exceedance probability (AEP) events. Whilst during the undefended scenario, only the 1 in 1000 year AEP event would result in tidal flood waters inundating the site.

The EA have also provided data outputs from there 1D nodes. The closest of these nodes was Node 3.24. The node locations are visible in **Figure 4.4**, with the extracted data for different return periods included in **Table 4.4**. In all the modelled scenarios the in channel levels do not exceed the crest levels of the flood defences.

Table 4.4: North Kent Coast (2018) 1D Defended Levels - Node 3.24

Return Period	Modelled Levels (m AOD)
20% AEP (1 in 5 year)	4.58
5% AEP (1 in 20 year)	4.83
3.3% AEP (1 in 30 year)	4.91
2% AEP (1 in 50 year)	5.08
1.25% AEP (1 in 75 year)	5.18
0.5% AEP (1 in 200 year)	5.44
0.1% AEP (1 in 1000 year)	5.82

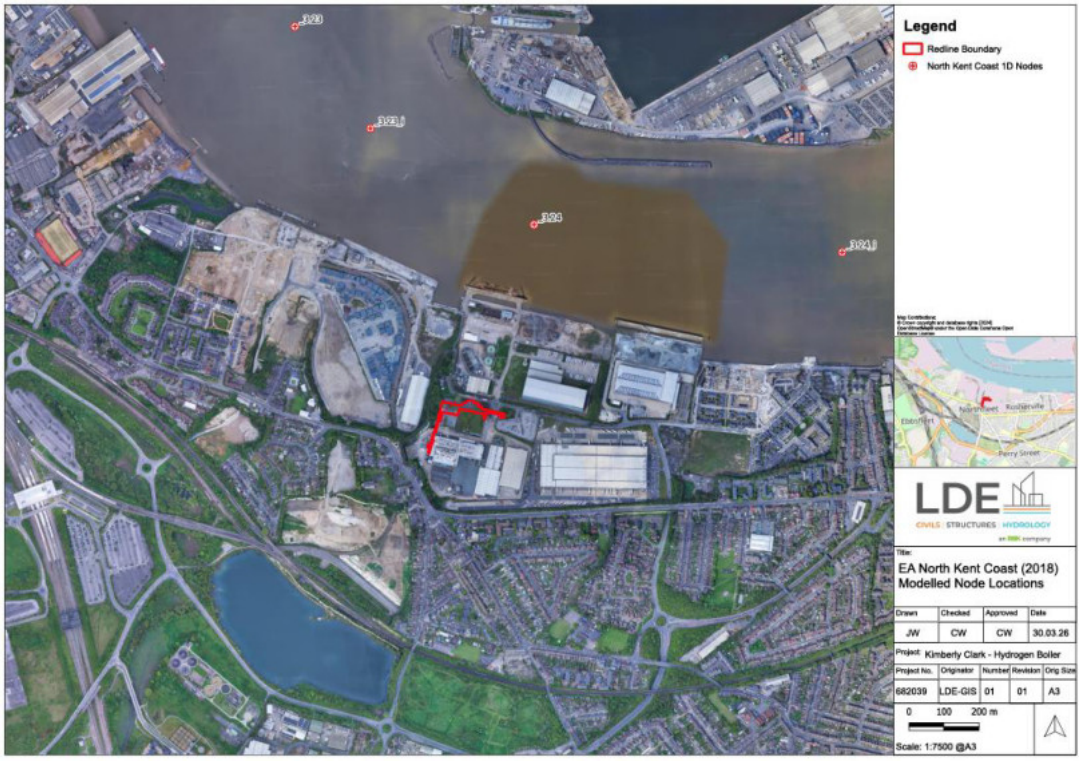


Figure 4.4: EA North Kent Coast (2018) Modelled Node Locations



Figure 4.5: EA North Kent Coast (2018) Defended Extents

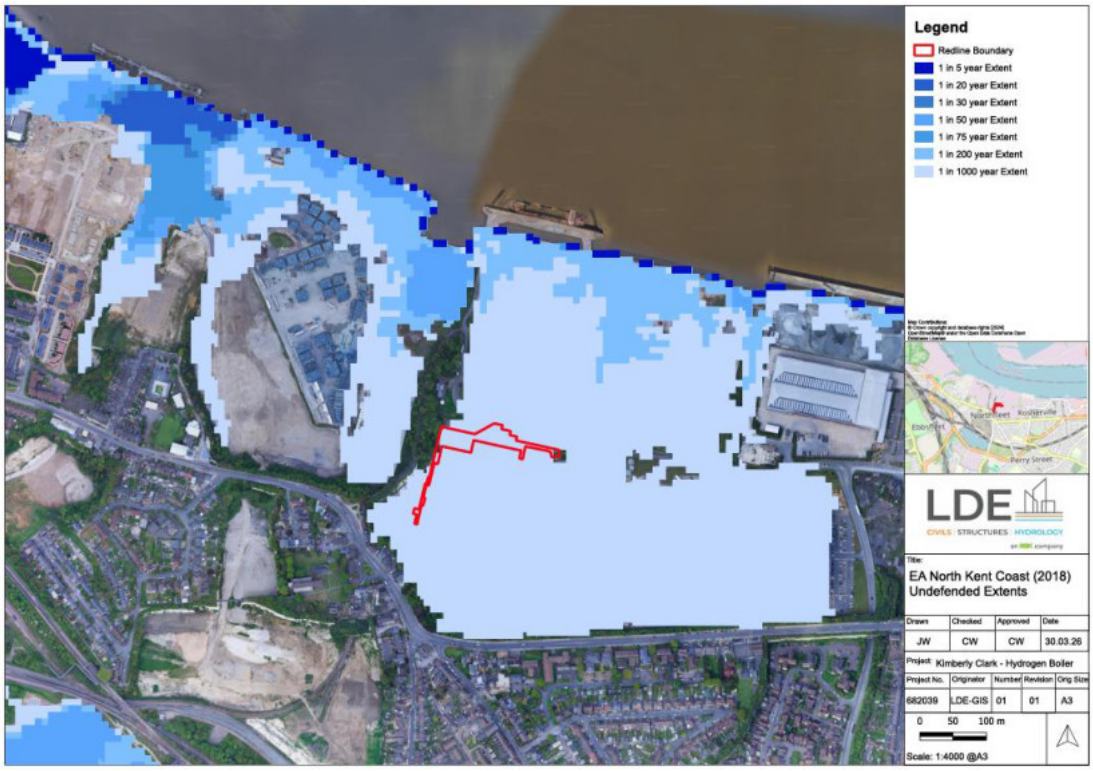


Figure 4.6: EA North Kent Coast (2018) Undefended Extents

4.3.3 Breach analysis

As noted above, the site is afforded protection from tidal inundation by the presence of the Thames Barrier and formal raised linear flood defences. Whilst the failure of the defences during an extreme tidal event is considered unlikely, the consequence of a breach or overtopping failure in terms of the rate, depth and extent of inundation will be dictated largely by the landward ground levels within the embayment area behind the defences. The residual risk, in the event of defence failure, should therefore be assessed for the site.

The EA have provided extents, depths and water levels for the modelled breach scenarios for both their North Kent Coast 2018 model and the Thames Tidal Downriver Breach Inundation 2018 model. The modelled breach locations and extents for the North Kent Coast model have been reproduced below as **Figure 4.7** and **Figure 4.8** respectively and indicate that the site would not be at risk from this tidal breach scenario. The Thames Tidal Downriver Breach Inundation breach locations and extents have been reproduced as **Figure 4.9** and **Figure 4.10** respectively. This mapping indicates that during the 2005 epoch, both the 1 in 200 year and 1 in 1000 year AEP breach events would cause flood waters to inundate the site.



Figure 4.7: EA North Kent Coast (2018) Modelled Breach Locations

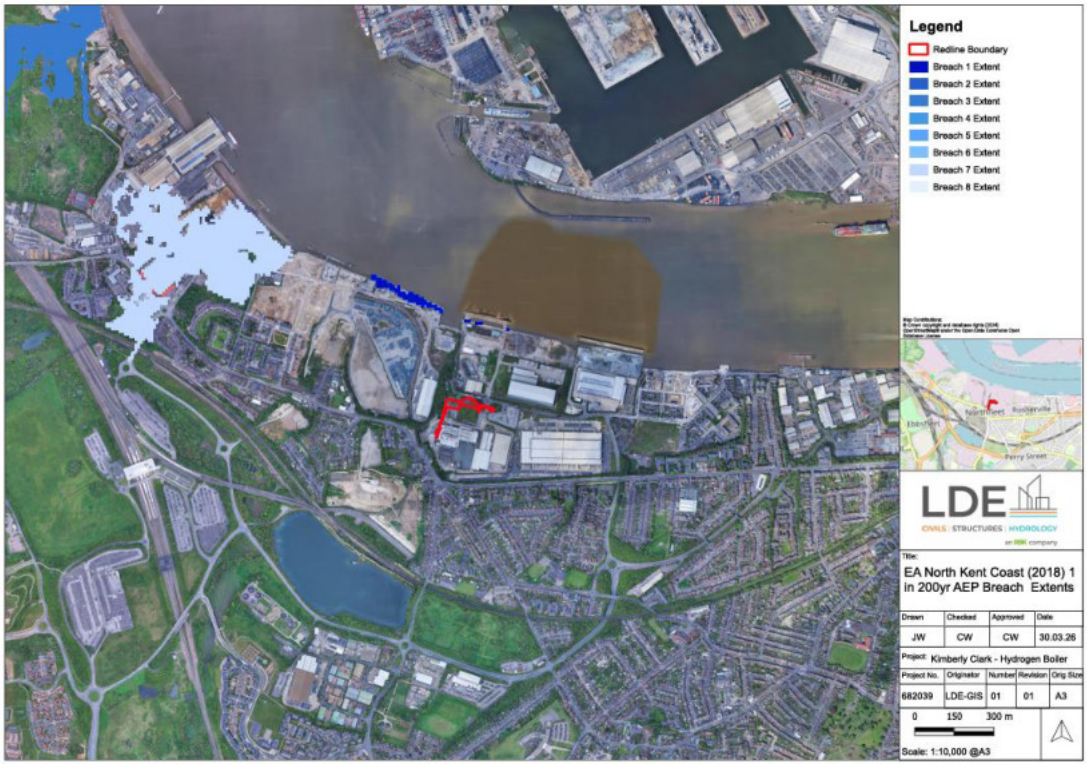


Figure 4.8: EA North Kent Coast (2018) Modelled Breach Extents



Figure 4.9: EA Thames Tidal Downriver Breach Inundation (2018) Breach Locations

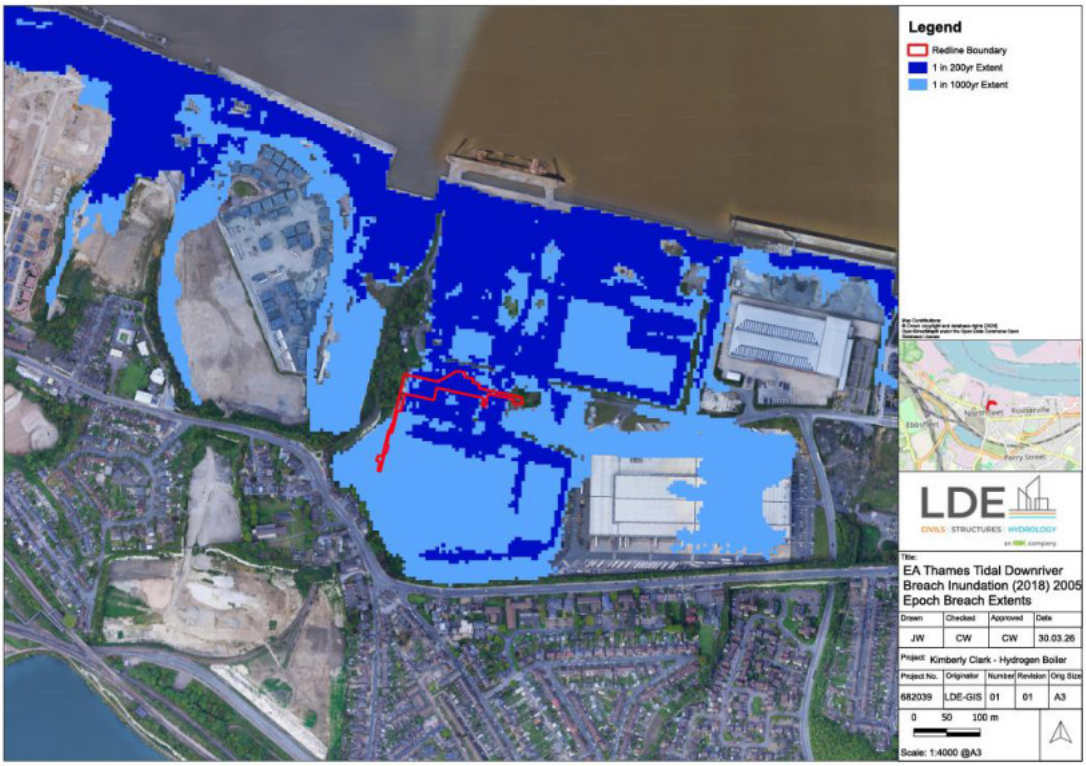


Figure 4.10: EA Thames Tidal Downriver Breach Inundation (2018) 2005 Epoch Breach Extents

The EA's modelled outputs indicate that during the 2005 epoch 1 in 200 year breach scenario, the peak flood level across the site would be 5.203mAOD, whilst during the 1 in 1000 year breach event peak water levels would be 5.35mAOD. The existing ground levels from the topographic survey **(Appendix B)** in the northern area of the site range from approximately 5.05mAOD to 5.44mAOD. Hence, as a worst case scenario, when comparing the ground levels and anticipated flood levels, there is potential for depths across the site to be around 150mm during the 1 in 200 year breach scenario and around 300mm during the 1 in 1000 year breach scenario.

4.3.4 Climate Change

It is anticipated that climate change will result in the accelerating of mean sea levels and possible changes in tides and storminess associated with climate change, which in turn are likely to influence tidal flood risk. The EA have provided modelled data for both the North Kent Coast (2018) model and the Thames Tidal Downriver Breach Inundation (2018) model.

The extents from the North Kent Coast (2018) model have been reproduced below as **Figure 4.11** and indicate that the site would not be at risk of flooding during the 1 in 200 year defended scenario when both the 2070's and 2115's climate change allowances applied.



Figure 4.11: EA North Kent Coast (2018) Modelled 1 in 200yr Climate Change Extents

The extents from the Thames Tidal Downriver Breach Inundation (2018) model with the 2115's epoch climate change allowance have been reproduced below as **Figure 4.12.** This mapping indicates that during both the 1 in 200 year and 1 in 1000 year breach scenarios, the site would be inundated with flood waters. The anticipated on site peak flood level during the 1 in 200 year scenario is 5.986mAOD and 6.40mAOD during the 1 in 1000 year scenario. When compared to the ground levels in the northern area of the site from the topographic survey, flood water could potentially be around 900mm deep during the 1 in 200 year scenario and 1350mm during the 1 in 1000 year scenario.

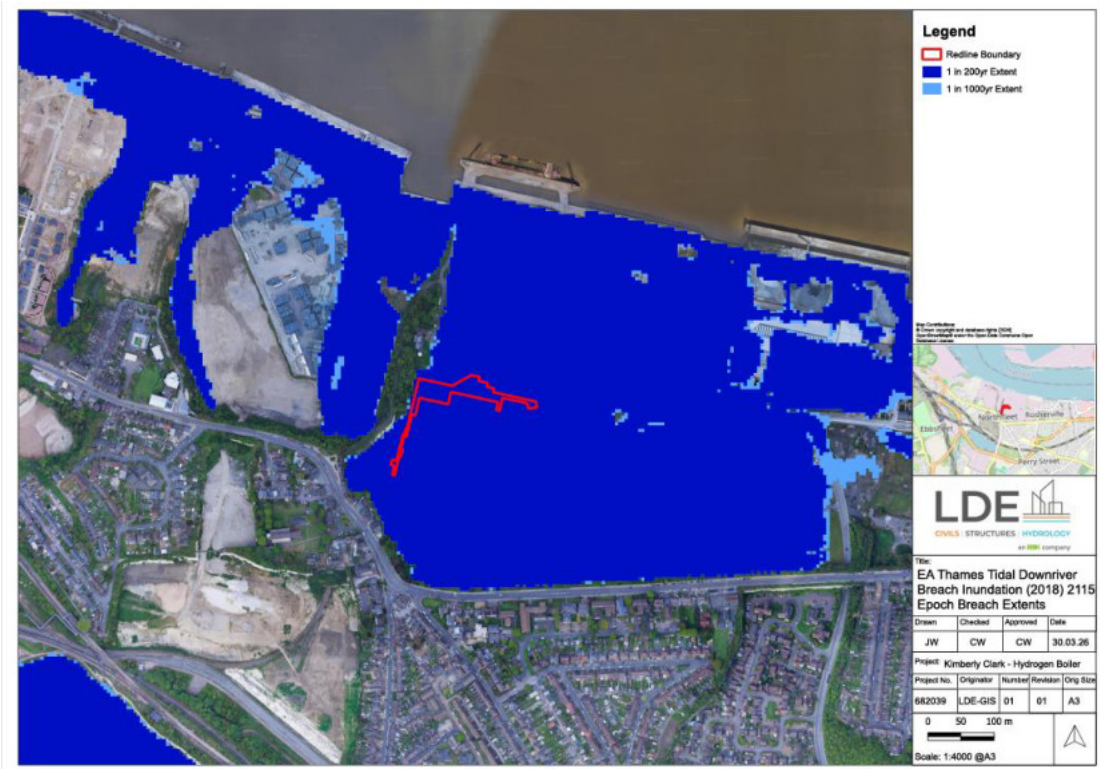


Figure 4.12: EA Thames Tidal Downriver Breach Inundation (2018) 2115 Epoch Breach Extents

4.3.5 Flood Risk

Overall, the site is currently defended against a 1 in 1000 year fluvial / tidal flood event and will continue to be afforded this standard of protection on the basis that the relevant riparian owners continue to maintain and raise the existing flood defences in line with their responsibilities as riparian landowners. There is a residual risk of tidal flooding to the site in the event of a defence failure. Flooding could lead to the damage of equipment given the potential maximum flood height of 6.40mAOD (0.1% AEP 2115 scenario) across the site.

The EA's Historical Flood mapping indicates that no flood events have occurred on site. It should be noted that this is not a complete dataset with the majority of records only dating back to 1946. It is assumed that the Thames Barrier will be closed more frequently due to increased sea levels anticipated during climate change scenarios, fewer high tides will be allowed to flow upstream into central London each year. The site is afforded a high standard of protection under normal circumstances over its lifetime, but potential for significant flood depths in the event of a flood defence failure, the overall flood risk from the River Thames is **medium.**

4.4 Flood risk from the land (surface water flood risk)

If intense rain is unable to soak into the ground or be carried through manmade drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or other watercourse.

Generally, where there is impermeable surfacing or where the ground infiltration capacity is exceeded, surface water runoff can occur. Excess surface water runoff from the site drain to existing drainage infrastructure, evidenced by the several gullies and strip drains across the site, shown in the private drainage survey **(Appendix B),** which ultimately discharge to the River Thames via the 900mm Southern Water sewer to the north of the site.

The EA's surface water flood extents map **(Figure 4.13)** shows that the majority of the site is at 'very low' (less than 1 in 100 year annual probability) to 'low' (between 1 in 100 and 1 in 1000 year annual probability) risk. There is an area of 'medium' risk (between 1 in 30 year and 1 in 100 year annual probability) in the hard standing northern extent of the site where ground levels are approximately 200mm lower than the surrounding ground levels.

According to the EA's surface water flood depth mapping **(Figure 4.14)**, the majority of the site is at a 'very low' risk of flooding to a depth of 200mm. Only a small area in the southern extent of the site is modelled at a 'low' risk of flooding up to 200mm.

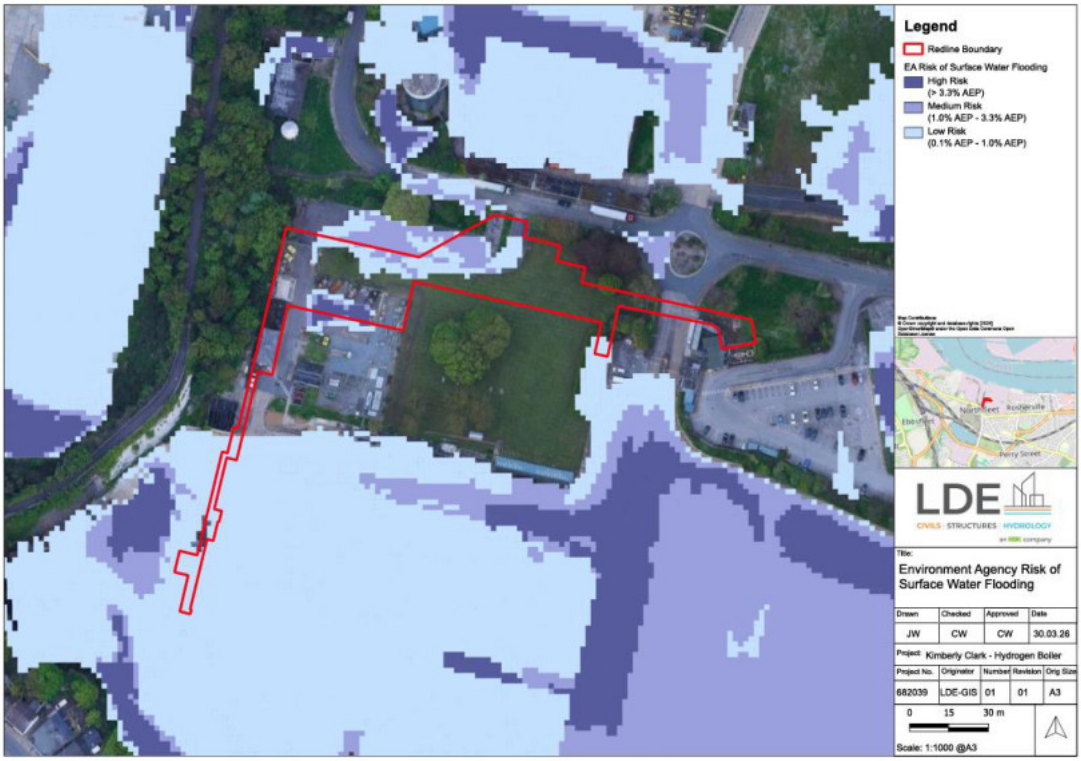


Figure 4.13: Environment Agency 'Flood risk from surface water' extents map.



Figure 4.14: Environment Agency Risk of Surface Water Depths up to 200mm

Surface water flooding is likely to increase as a result of climate change. Increased intensity and frequency of precipitation is likely to lead to increased overland flows. Climate change guidance was updated by the EA in May 2022. Revised allowances for climate change have been included in the indicative drainage strategy below.

Given that the depths indicated during the 1 in 100 year storm are unlikely to exceed 200mm the risk of surface water flooding is **low.**

4.5 Flood risk from groundwater

Groundwater flooding tends to occur after long periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. In low-lying areas, the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Available geological mapping indicates that the site is underlain by a Chalk bedrock which is a designated a principal aquifer. The site is located next to a major tidal waterbody and hence groundwater levels are likely to vary with tide levels, a nearby borehole log suggests groundwater levels to be approximately 7.19mBGL.

The Kent County Council Preliminary Flood Risk Assessment (2011)[5] Groundwater Flood Risk Areas Mapping[6] places the site within an area of negligible to low groundwater flood risk.

Climate change could increase the risk of groundwater flooding as a result of increased precipitation leading to significant groundwater recharge. This is less likely to cause a significant change to flood risk than from other sources, since groundwater flow is not as confined. It is probable that any locally perched aquifers may be more affected, but these are likely to be isolated. The change in flood risk as a result of climate change is likely to be low.

The overall groundwater flood risk is **very low.**

4.6 Flood risk from sewers

Flooding from artificial drainage systems occurs when flow enters a system, such as an urban storm water drainage system, exceeds its conveyance capacity, the system becomes blocked or it cannot discharge due to a high water level in the receiving watercourse. When exceeded, the surcharged pipe work could lead to flooding from backed up manholes and gully connections.

Sewer details have been referenced from sewer record plans obtained from Southern Water. The plans indicate there is a 300mm diameter surface water sewer on Crete Hall Road which is upsized to a 900mm diameter pipe further north of the site, as well as a foul sewer and rising main to the northeast of the site. The private drainage survey **(Appendix B)** also indicates a network of surface water drainage pipes and gulleys within the site boundary. The sewer plans indicate that the invert level of the outfall of the 900mm pipe to the River Thames is thought to be -3.05mAOD, and there is no evidence of tidal flaps to prevent backflow.

Based on the manhole levels obtained during the drainage survey **(Appendix B),** the nearest manhole to the site is MH1004, which has a cover level of 5.20mAOD. Based on the modelled node data from the North Kent Coast (2018) Model, the river levels are anticipated to be 5.44mAOD during a defended 1 in 200 year flood event **(Table 4.4)**. As such, if there is no tidal flap on the sewer, any surcharged water would most likely back up the pipe with a possibility of exceedance from manhole MH1004. Since the MH1004 has a cover level of 5.20mAOD which is elevated above the northern area of the site, any surcharged flood water from MH1004 has the potential to cause flood waters to inundate the site. It is worth noting that the site and wider area would eventually be able to drain once the tide levels recede, reducing the head above the outfall.

[5] Kent County Council Preliminary Flood Risk Assessment (2011), accessible at: https://www.kent.gov.uk/__data/assets/pdf_file/0013/12091/Preliminary-flood-risk-assessment.pdf

[6] Kent County Council PFRA Groundwater Flood Risk Areas Mapping, accessible at: https://www.kent.gov.uk/__data/assets/pdf_file/0018/12087/fig6-groundwater.pdf

No information on historic flooding has been provided by Thames Water and the SFRA[7] does not make mention of site specific sewer flooding. There is uncertainty on the design of the 900mm diameter pipe based on incomplete sewer records and survey information which does not note the outfall structure.

Climate change is likely to result in an increase in flooding from sewers. Increased rainfall and more frequent flooding put existing sewer and drainage systems under additional pressure resulting in the potential for more frequent surcharging and potential flooding. This would increase the frequency of local sewer flooding but would not be significant in terms of the proposed development.

Based on the uncertainty of the pipe design, and possible connection to the tidal flood waters which could be a cause of exceedance onto the site, the overall sewer flood risk to the site is **medium**.

4.7 Flood risk from reservoirs

Flood events can occur from a sudden release of large volumes of water from reservoirs.

The EA reservoir flood map (reproduced as **Figure 4.15**) shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. Since this is a prediction of a worst-case scenario, it is unlikely that any actual flood would be this large.

The EA mapping was updated in 2021 to demonstrate the potential maximum extent of flooding for two scenarios - a "dry day scenario" in which river levels are "normal", and a "wet day scenario" where the flooding from the reservoir coincides with flooding from rivers.

[7] Strategic Flood Risk Assessment of Kent Thameside, Kent Thameside Delivery board, December 2005



Figure 4.15: Environment Agency 'Flood risk from reservoirs' map

The map shows that the site is not in a location at risk of reservoir flooding. The reality is a reservoir failure is more likely to occur sometime after the peak of the event. Reservoir flooding is extremely unlikely and there has been no loss of life in the UK from reservoir flooding since 1925. Since then, reservoir safety legislation has been introduced to ensure reservoirs are maintained.

Reservoirs can be managed over time, controlling inflow/outflow of water and therefore there is the capacity to control the effects of climate change. Increased rainfall has the potential to increase base flow, but this should be minimal. It is unlikely that there will be a substantial change to the risk of flooding for this site as a result of climate change.

The resultant flood risk is **very low**.

4.8 Other sources of flood risk

4.8.1 Canals

There are no Canal & River Trust owned canals within the vicinity of the site.

The resultant flood risk from canals is **very low.**

4.8.2 Other artificial features

No other artificial features with the potential to result in a flood risk to the site have been identified.

The resultant flood risk from 'other' sources is **very low.**

4.8.3 Tide locking

Tide locking occurs when a high rainfall event coincides with a high tide rather than a fluvial flood. Tide locking can be a regular occurrence. However, the period of tide lock is confined to the peak of the tide and therefore its duration is generally limited.

There has been no evidence to suggest that the site floods frequently as a result of rainfall coinciding with high tide, though water levels at Tilbury monitoring station[8] does suggest frequent surcharging of the 900mm diameter public sewer outfall which may impede drainage. The site is shown to discharge from via a private surface water drainage network directly into the public sewer network at Manhole MH1004 **(Appendix B).**

The risk from tide locking causing flooding to the site is greatest when a high intensity rainfall event would coincide with hightide. Tide locking would temporality impede drainage and will result in backlogging of the drainage into the site, therefore resulting in a heightened risk of ponding on site until tidal levels recede. The effect of tide locking could be exacerbated by climate change as a result of more frequent higher tides and increased surface runoff.

The resultant flood risk from tide locking is **medium.**

[8] Tilbury Monitoring Station, accessible at: https://check-for-flooding.service.gov.uk/station/7394

5 MITIGATION MEASURES AND RESIDUAL RISK

5.1 Sequential approach within application boundary

The NPPF requires that development proposals apply a risk-based sequential approach to site layout. This is intended to ensure that, within a development site, the most vulnerable elements are located in areas with the lowest flood risk wherever it is reasonably practicable to do so.

For this application, the sequential approach has been applied to the land within the red-line boundary. Flood Zone mapping and detailed topographic data indicate that flood risk across the site is largely uniform, with the majority of the land falling within Flood Zone 2 and a smaller portion within Flood Zone 1. The Environment Agency's breach modelling similarly shows that residual risk depths across the site are relatively consistent due to the generally level topography. Consequently, there is no materially lower-risk area within the boundary where the proposed facility could realistically be relocated to achieve a demonstrable reduction in flood risk.

In addition to flood risk considerations, the proposed hydrogen boiler facility has operational and safety requirements that constrain where key infrastructure may be positioned. The equipment must be located adjacent to existing industrial utilities, including hydrogen, natural gas, electrical and steam connections, and must be sited away from areas accessible to the general public for safety and security reasons. These requirements significantly limit the feasible area in which the development can be placed.

Taking these factors together, the proposed siting represents the lowest-risk practicable location within the development boundary when both flood risk and operational constraints are considered. The Sequential Approach is therefore satisfied at the site level, and no alternative location within the boundary would provide a meaningful reduction in flood risk while still enabling the development to function safely and effectively.

5.2 Overland flood flow

Tidal flooding caused by a breach of the flood defences could impact the proposed development. It is not proposed to bund the site, and flooding will be permitted to occur in the unlikely event of a breach, ensuring no disruption to existing flow routes.

There is uncertainty regarding the likelihood of exceedance flows from the surface water manholes during a tidal event. The topography of the site would suggest exceedance flows from surcharged manholes within the wider industrial estate will flow southwards towards areas of lower ground.

No surface water overland flow routes have been identified across the site.

5.3 Finished floor levels

A pre-application enquiry response provided by the EA as part of a previous FRA for the wider Kimberly Clark – Northfleet Green site (report ref: **681688-R1(02)-FRA**), which has been included in **Appendix E,** details what is expected of the proposed development to address the flood risk posed to the site. The response noted that*: "The proposal should consider how the site will be protected from tidal flood risk. This will likely require flood defence raising and/or land raising. Raising options should be considered in line with the Thames Estuary 2100 (TE2100) plan. Land raising may be required to protect the site from inundation during a tidal flood defence breach event. This may be of particular importance if the site is considered to be essential infrastructure."*

Whilst it is acknowledged the site is at risk from flooding during the unlikely scenario of a breach of the defences, it is not proposed to raise equipment above the flood levels to maintain operation through a flooding scenario. The design of the proposed development will place emphasis on an automatic safe system shut down in the event of a flood.

The primary process safety risk posed by site flooding is the loss of electrical supply and loss of process cooling. Both are considered to be Global Design Scenarios and have been considered in the project HAZID (Hazard Identification) and HAZOP (Hazard and Operability) studies. These scenarios will also be considered in the specification of equipment design pressure and temperatures, pressure relief facilities, and emergency shutdown systems.

Throughout development, the concepts of both inherent safety and ALARP (As Low As Reasonably Practicable) will be applied, ensuring that the mitigations applied against the risks associated with site flooding follow the hierarchy of controls. These mitigations have been developed as part of project design and will be reviewed at detailed design.

Finished floor levels / slab levels are to be specified in the detailed design of the proposed development dependent on the sensitivity of the equipment.

In the event of a breach of the tidal flood defences, the paper mill, which this proposed hydrogen boiler facility will serve, will be inundated. During such an event, there will be no requirement for the facility to continue to operate. Therefore, the benefits of raising equipment are considered to be limited and outweighed by the commercial difficulties associated with raising the equipment, particularly given the low likelihood of a breach event occurring. The ability to safely shut down the equipment in the event of flooding, and the unmanned nature of the facility, means the facility will remain safe should a flood event occur. The operator acknowledges the residual risk of flooding and accepts that any damage to equipment would need to be repaired prior to the facility being brought back into use following a flood.

In terms of the construction of the development, reference should be made to “Preparing for Floods” a DEFRA publication[9], CIRIA guidance C624 “Development and flood risk”[10] and the CLG document “Improving the flood performance of new buildings”[11].

5.4 Easements and consents

The proposed developed is approximately 250m south from the flood defences. The distance between the flood defences and proposed development is not considered to impede flood defence works in the future including the potential for new defences to be built 16m inland from the existing defences. The current layout is greater than 16m south from the flood defences, as shown in **Appendix D.**

Any consent works usually take place post planning, prior to construction, however, the principals of any development within the appropriate easements should be agreed at the planning stage.

5.5 Flood compensation

The site is shown to be at risk from tidal flooding, rather than fluvial flooding, so fluvial floodplain compensatory measures are not deemed necessary.

5.6 Safe access/egress

The site is shown to be within flood extents, especially in a tidal breach scenario during which inundation mapping shows flooding across the site. The most direct access to Flood Zone 1 and outside of the breach extents is west via Crete Hall Road towards its junction with Granby Road to the northwest of the site. Granby Road slopes steeply upgradient as you travel southward away from the River Thames. Granby Road provides safe refuge more than 600mm above the expected flood depth.

It is noted that the proposed facility will not need to be manned and requires maintenance visits roughly once each month. These visits will take account of any flood warnings in operation for the site and will not take place should conditions mean an increased risk of a breach of the existing defences.

[9] DTLR, ‘Preparing for Floods Interim guidance for improving the flood resistance of domestic and small business properties’, October 2003.

[10] CIRIA, ‘Development and Flood Risk guidance for the construction industry’ C624, 2004.

[11] Communities and Local Government, ‘Improving the flood performance of new buildings – flood resilient construction', May 2007.

5.7 Flood management plan

Given the site's location within Flood Zone 2, a formal Flood Management Plan is not considered necessary. However, a proportionate flood warning and evacuation strategy will be incorporated to ensure the development can be safely managed during a flood event.

The site is located within the EA Flood warning area classified as 'Gravesend and Northfleet'. The EA charter is to provide a minimum 2 hour advance warning, which would provide sufficient time for site users to be evacuated to an area of safe refuge (such as exiting the site to Granby Road). Generally, the site will be unmanned besides monthly scheduled maintenance visits, thereby decreasing risk to life further.

It is recommended that future users of the site ensure they are registered with the EA's Flood Warning system (Floodline Warning Direct) to provide adequate forewarning in the event of a predicted flood in the neighbourhood in order to decrease the overall risk to a 'safe' level.

6 PLANNING POLICY CONTEXT

6.1 National planning policy

Section 14 of the NPPF details the overarching requirements relating to flood risk for any development. The key message is that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

In areas at risk of flooding, the NPPF requires that the following criteria are met:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

The PPG supports the NPPF and provides further advice regarding the assessment of flood risk and the application of the Sequential and Exception Tests.

6.1.1 Land use vulnerability

Table 2 of the PPG indicates the compatibility of various land uses in each flood zone, dependent on their vulnerability to flooding. **Table 6.1** below is reproduced from Table 2 of PPG.

Table 6.1: Flood risk vulnerability and flood zone 'compatibility'

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Zone 2	Appropriate	Appropriate	Exception Test Required	Appropriate	Appropriate
	Zone 3a	Exception Test Required	Appropriate	Should not be permitted	Exception Test Required	Appropriate
	Zone 3b functional floodplain	Exception Test Required	Appropriate	Should not be permitted	Should not be permitted	Should not be permitted

With reference to Annex 3 of the NPPF, the proposed development, based on its utilities use, is classed as 'less vulnerable'. This classification of development is appropriate for areas within Flood Zone 2 and therefore appropriate for the subject site.

6.1.2 Sequential Test

The Sequential Test aims to direct new development to areas with the lowest probability of flooding. A full analysis of the availability of alternative sites is beyond the scope of this assessment. However, it is noted that the proposed facility needs to be located within close proximity to the paper mill. The specific location of the facility within the existing mill site has been dictated by the requirement to direct the infrastructure to an area away from the general public for safety reasons. It is therefore not practicable to locate the facility in another location.

6.1.3 Exception Test

In accordance with **Table 6.1**, there is no requirement to apply the Exception Test for a 'less vulnerable' development within Flood Zone 2.

7 SURFACE AND FOUL WATER DRAINAGE ASSESSMENT

7.1 Scope

This section discusses the potential quantitative effects of the development on both the risk of surface water flooding on-site and elsewhere within the catchment, as well as the type of potential SuDS features that could be incorporated as part of the masterplan.

The NPPF states that SuDS should be considered wherever practical. The use of SuDS is also encouraged by regional and local policy. In accordance with the Defra Non-Statutory Technical Standards[12], the surface water drainage strategy should seek to implement a SuDS hierarchy that aspires to achieve reductions in surface water runoff rates to greenfield rates. Where a reduction to the greenfield rate is not practicable, the proposed surface water drainage strategy should not exceed the existing runoff rate, unless the proposed drainage system will discharge to a tidally influenced waterbody.

In addition, Building Regulations Part H[13] requires that the first choice of surface water disposal should be to discharge to an adequate soakaway or infiltration system, where practicable. If this is not reasonably practicable then discharge should be to a watercourse, the least favourable option being to a sewer (surface water before combined). Infiltration techniques should therefore be applied wherever they are appropriate.

7.2 Pre-development situation

The existing site area is 0.41ha and approximately 85% impermeable.

The existing drainage network has been modelled using an approximation of the hardstanding catchment draining into the private drainage system, and pipe sizes and lengths recorded from the utility survey in **Appendix B.**

In line with the requirements outlined by Kent County Council (KCC) in their predevelopment response and subsequent guidance provided for the RSK Flood Risk Assessment (ref: **681688-R1(02)-FRA**) completed for the Northfleet Green Hydrogen facility **(Appendix F)**, the system was modelled for a 1 in 30 year storm event, plus climate change with the outfall surcharged for the 1 in 200 year event tidal event. The surcharged outfall levels for the tidal event were calculated using the 'rule of twelfths' method to simulate the tidal curve between 6.080mAOD (Extreme Sea Level) and -2.340mAOD (the estimated low tide level). The model simulation shows the existing site

[12] DEFRA, 'Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems', March 2015.

[13] HM Government (2010 with 2013 amendments), 'The Building Regulations 2010: Approved Document H - Drainage and Waste Disposal (2002 Edition incorporating 2010 amendments)'.

would flood in the 30 year + 35% climate change scenario with a surcharged outfall due to tidal storm event.

7.3 Post-development situation

The proposed development is for an industrial end use. This will result in a minor increase in impermeable area and surface water runoff across the site. It will therefore be necessary to manage surface water on-site through conveyance towards the proposed point of discharge, whilst providing sufficient attenuation for all events up to the 1 in 100 year event inclusive of climate change.

Based on latest climate change guidance, for developments with anticipated lifetimes beyond the 2100 epoch, the 'upper end' climate change allowance should be used. Fr sites located within the Medway management catchment, the 'upper end' peak rainfall allowance for the 2070s epoch (between 2061 and 2125) is 40%.

7.3.1 Point of discharge

Discharge options from the site have been considered in line with the SuDS hierarchy, as follows.

Infiltration

Infiltration should be considered as the primary option to discharge surface water from the developed study area. The effectiveness of infiltration is completely dependent on the physical conditions at the study area. Potential obstacles include:

- Local variations in permeability preventing infiltration - It is understood that the site is underlain by Chalk bedrock. This is typically considered suitable for the use of soakaways due to its high permeability.
- Shallow groundwater table - For infiltration drainage devices, Building Regulation approved document H2 states that these *"should not be built in ground where the water table reaches the bottom of the device at any time of the year"*. Groundwater was observed at a nearby borehole at approximately 7.19mbgl and is likely to fluctuate with the tide.
- Source Protection Zones - The study area is located within a Zone II Groundwater Source Protection Zone. Therefore, extra precautions to the ensure the quality of water discharged to the ground must be provided.

From the information available infiltration based SuDS are not considered feasible due to potential variable underlying groundwater levels and potential contamination of an SPZ.

Discharge to watercourse

The site will be able to discharge to the River Thames via the existing drainage system located along Crete Hall Road which connects to a 900mm diameter public surface water sewer which subsequently outfalls into the tidal River Thames.

Previous correspondence from KCC has confirmed that as the River Thames is a tidal body at this location, the proposed development will be able to discharge at an unlimited rate with no restriction on the rate of discharge.

Discharge to surface water sewer

A 900mm diameter public surface water sewer is present to the north of the site on Crete Hall Road and discharges into the River Thames. The proposed development may utilise this public sewer system and subsequently drain into the River Thames as described above.

7.4 Surface Water Drainage

Previous correspondence with KCC has confirmed that discharge from the site may be at unlimited rates to the River Thames but surface water attenuation is subject to the requirements to attenuate for the 30 year storm event plus 35% climate change with a surcharged outfall at the 1 in 200 year tidal storm event level.

Whilst there is no requirement from the LLFA to restrict flows to a greenfield rate, previous applications in the area have had a restriction on the flows requested from Southern Water due to capacity within their network. As such the proposed development will include a vortex flow control in order to restrict flows down to a practicable minimum of 2l/s.

In order to model the effects of the submerged outfall and surcharged downstream network a number of the nearby adopted surface water network, and connecting private areas have been modelled, including runoff from the roads and the adjacent property. The areas included with the detailed modelling equate to 6.26ha of existing impermeable surfaces, and 0.039ha of proposed impermeable surfaces.

When the outfall is submerged to the 1 in 200 year plus climate change tidal storm level there is no outfall from the network due to the head above the outfall, and as such there is significant flooding onsite from the existing surface water networks. However, the proposed on site drainage has been designed to not flood in both the 1 in 30 year plus 35% climate change event, as well as the 1 in 100 year plus 40% climate change event by utilising a small geocellular attenuation tank. In order to prevent backflow from the existing surface water network into the proposed network and causing flooding, it is proposed to utilise a flap valve after the vortex flow control.

The LLFA have confirmed that due to the nature of the site and hydrological constraints, they would not expected to see open SuDS features on site in order to improve water quality and would accept the usage of a proprietary treatment system. As such a Downstream Defender vortex separator or similar has been proposed on site to remove pollutants from the roof runoff.

The proposed drainage layout for the development can be found in **Appendix I,** as well as the catchment plan for the development and flood exceedance flow plan. The attenuation model calculation are included in **Appendix H.**

7.4.1 Adoption and maintenance

The Design and Construction Guidance for Foul and Surface Water Sewers (DCG)[14] states that as of April 1st 2020, sewerage authorities are required to adopt some SuDS features, including basins and swales. However, SuDS features that are classified as forming part of a building or yard (i.e. permeable paving and green roofs) will not be adoptable under the DCG and will require a second adopting authority or maintenance company. Therefore, if an attenuation tank is used at this site, the long-term maintenance will most likely be undertaken by a management company.

Maintenance of SuDS features should be undertaken in line with maintenance schedules outlined in the SuDS Manual and if adopted, any Southern Water maintenance guidance. An example of a typical maintenance regime for a storage tank can be found in **Appendix J.** Similar regimes would be applicable for all other SuDS features on site. Full maintenance schedules should be confirmed at the detailed design stage in consultation with appropriate product suppliers.

7.5 Foul drainage provision

There is no requirement for foul drainage at this site.

[14] Water UK, 'Sewerage Sector Guidance Appendix C – Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England', March 2020.

8 CONCLUSIONS AND RECOMMENDATIONS

This Flood Risk Assessment (FRA) has been prepared in accordance with the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG). It also reflects requirements and guidance from the Environment Agency (EA), Kent County Council as Lead Local Flood Authority (LLFA), and Southern Water.

The assessment demonstrates that all relevant sources of flooding have been considered including tidal, fluvial, surface water, groundwater, sewers, reservoirs and artificial sources as required by policy. The proposed development comprises a hydrogen boiler facility and associated pipework and utilities, located predominantly within Flood Zone 2, with a small portion in Flood Zone 1. The site benefits from the presence of tidal flood defences along the River Thames, which currently provide a 1 in 1000 year standard of protection to the surrounding area. Under present-day defended conditions, the site is therefore considered to be at very low risk of fluvial and tidal flooding.

Residual tidal flood risk arises only in the event of a breach or failure of the defences. The EA's breach modelling indicates that parts of the site could experience flood depths of approximately 150–300 mm under the 2005 epoch and up to 900–1350 mm under climate-change scenarios for the 2115 epoch. Although these residual depths are significant, they would only occur under extreme and highly unlikely breach conditions. Safe egress to Flood Zone 1 is achievable via Crete Hall Road and Granby Road, which provide refuge above predicted breach depths.

A risk-appropriate package of mitigation measures has been incorporated into the proposals. The facility will operate largely unmanned and is capable of automatic safe shutdown during a flood event, removing the need for operational continuity during extreme conditions. Sensitive equipment can be raised where appropriate, and residual risks will be managed through flood warnings and operational procedures.

The proposed development slightly increases impermeable area, therefore requiring a suitable surface water management strategy. Infiltration is not feasible due to chalk geology, groundwater variability and the site's SPZ II designation. As agreed with Kent County Council, runoff may discharge to the tidal River Thames via the existing public surface water sewer along Crete Hall Road. To align with Southern Water preferences, discharge will be controlled using a vortex flow control to a minimum practicable rate of 2.0l/s. Attenuation will be provided using a geocellular storage tank designed for the 1 in 30 year event plus 35% climate change and the 1 in 100 year event plus 40% climate change, with allowance for tidal surcharge when the outfall is submerged.

To ensure system protection during high tides, a non-return flap valve will be installed downstream of the flow control to prevent backflow from the existing network. Water quality treatment will be provided by a proprietary vortex separator, acceptable to the LLFA given the constrained industrial setting. All SuDS components will be privately

maintained, as they are not adoptable under the Design and Construction Guidance for sewers.

Table 8.1: Flood risk summary

Source	Level of risk	Mitigation
River Thames (Tidal)	**Medium** (Flood Zone 2)	-The site is protected by a flood defence wall to the north of the site, with a 1 in 1000-year standard of protection. -During a flood event, it is proposed to safely shut down the site. -The site will mainly be unmanned and operated remotely. -Safe egress away from the breach flood extents is achievable at the intersection of Crete Hall Road and Granby Road to the northwest of the site. -Any sensitive equipment should be raised to limit the impact of any flood waters.
Surface water	**Low**	-Where possible, any sensitive equipment should be raised to limit the impact of any surface water.
Groundwater	**Very Low**	-Where possible, raising of sensitive equipment will mitigate limited flood risk from groundwater.
Sewers	**Medium**	-The design of a 900mm diameter sewer to the north of the site is unknown and based on tidal flood levels, exceedance flows may be possible. -Non return valves should be considered.
Reservoir	**Very Low**	-No Mitigation Required.
Other sources	**Very Low**	-No Mitigation Required.
Tide Locking	**Medium**	-Any associated flooding is likely to be short duration given the influence of the tides. -No such flooding has been reported from the current outfall.

Overall, the FRA concludes that:

- The development is classified as Less Vulnerable and is therefore appropriate within Flood Zone 2 without requiring the Exception Test.

- The development will be safe for its lifetime, taking climate change into account.
- The development will not increase flood risk elsewhere, due to a controlled and well-designed surface water management strategy.
- Subject to implementation of the proposed mitigation measures, flood risk does not preclude the development.

Taking into account the above points, the development of the site should not be precluded on flood risk grounds.

APPENDIX A
RSK GROUP SERVICE CONSTRAINTS

1. This report and the drainage design carried out in connection with the report (together the "Services") were compiled and carried out by RSK LDE Ltd (RSK) for Hyro Energy Ltd. (the "client") in accordance with the terms of a contract between RSK and the "client" dated January 2026. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable civil engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the appropriate location. Such features should not be used for setting out and should be considered indicative only.

APPENDIX B
TOPOGRAPHIC SURVEY AND PRIVATE DRAINAGE SURVEY



PREMIERsurveys
designed to measure

UNIT 3
9-11 LOWATER ST
IVORY WHARF
CARLTON
ELEPHANT LANE
NOTTINGHAM
LONDON
NG4 1JJ
SE16 4JD
Tel: 0115 962 2876
Tel: 0207 231 3404
www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT

RES

JOB TITLE

KIMBERLY CLARK
NORTHFLEET
GRAVESEND DA11 9AD

DRAWING TITLE

SITE SURVEY

SURVEYOR: YI & IA	DRAWN: YI	CHECKED: OH
SCALE 1/200	SHEET No: SHEET 1 OF 5	
DATE MAY 23	SHEET SIZE A0	DRAWING No: 8856_SITE_2D_R0

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum – levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parametes.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722;174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY

LEGEND

- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slabs Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline-with type:
  - BWF=BARBED WIRE FENCE
  - CLF=CHAIN LINK FENCE
  - CBF=CLOSED BOARDED FENCE
  - HDG=HEDGE/TREE FENCE
  - IRF=IRON RAILING FENCE
  - OBF=OPEN BOARDED FENCE
  - PRF=POST & RAIL FENCE
  - PWF=POST & WIRE FENCE

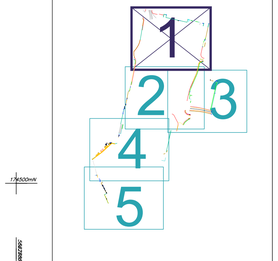
- Survey Station
- +10.00 Level Position
- +THL 10.00 Threshold Level
- +EVE 10.45 Eaves Level
- +RDG 10.45 Ridge Level
- +RFL 10.45 Roof Level
- ETV Service Cover
- DIR 12.34
- Building
- Building Canopy
- Sapling
- Bush
- Tree (Name, Diameter(D),Spread(S) and Height(H) Measurements)
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

Note: Linetypes are visible on 2D drawings only

ABBREVIATIONS

A/C	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
BB	BELISHA BEACON	MH	MANHOLE
BBL	BELL BOLLARD	MKR	MARKER
BC	BOLLARD LIGHTS	MP	MARKER BOARD
BOL	BOLLARD	NP	STREET NAME PLATE
BR	BIKE RAIL	OBF	OPEN BOARD FENCE
BS	BUS STOP POST	OH	OVERHEAD
BSH	BUS STOP SHELTER	P	POST
BT	BT MANHOLE	PB	POST BOX
BWF	BARBED WIRE FENCE	PM	PARKING METER
CAM	CAMERA	PRF	PIPE RAIL
CBF	CLOSED BOARDED FENCE	PRF	POST & RAIL FENCE
CBR	CRASH BARRIER	PWF	POST & WIRE FENCE
CE	CLEANING EYE	RFL	ROOF LEVEL
CL	COVER LEVEL	RG	ROAD GULLY
CLH	CELLAR HATCH	RL	ROAD LEVEL
CLF	CHAIN LINK FENCE	RS	ROAD SIGN
CMP	CAMPER	RSI	ROAD SIGN ILLUMINATED
CPF	CONCRETE PANEL FENCE	RW	RETAINING WALL
CPS	CONCRETE PAVING SLABS	SAP	SACRIFICIAL ANTI POINT
CR	CABLE RISER	SC	STOP COCK
CTV	CABLE TELEVISION	SL	SUMP LEVEL
CW	CONCRETE WALL	SV	SLUICE VALVE
DC	DRAIN COVER	SW	STORM WATER PIPE
EC	ELECTRICITY IC	SW	STONE WALL
EJB	ELECTRICITY JUNCTION BOX	TCB	TELEPHONE CALL BOX
EP	ELECTRICITY POLE	TH	THRESHOLD LEVEL
EV	ELECTRIC VEHICLE	TIC	TELECOMMUNICATIONS IC
EVL	EAVES LEVEL	TP	TELEPHONE POLE
FH	FIRE HYDRANT	TS	TRAFFIC SIGNAL
FLD	FLOODLIGHT	TSCU	TS CONTROL UNIT
FP	FENCE POST	UTC	UNKNOWN UTILITY IC
GRB	GRIT BOX	UTL	UNABLE TO LOCATE
GDR	GUARD RAIL	UTS	UNABLE TO SURVEY
GV	GAS VALVE	VP	VENT PIPE
H	HEIGHT	WL	WATER LEVEL
IB	ILLUMINATED BOLLARD	WM	WATER METER
IC	INSPECTION COVER	WO	WASHOUT
IL	INVERT LEVEL	WT	WALL TOP LEVEL
LP	LAMP POST		

Sheet Layout
Not to scale



© Copyright Premier Surveys 2022

Survey Stations

Name	Easting	Northing	Height
A24	562552.773	174618.239	5.754
Y12	562618.765	174640.839	5.528
Y16	562614.482	174494.424	5.064
Y24	562668.693	174512.288	5.283
Y32	562668.693	174512.288	5.283
Y33	562565.396	174361.880	5.171
Y35	562658.185	174290.107	5.199
Y5	562753.949	174504.080	5.380
Y8	562762.346	174593.823	5.146
A1	562571.360	174138.284	3.645
A2	562571.360	174138.284	3.645
A3	562585.054	174188.723	3.723
A4	562674.258	174200.415	3.994
A5	562674.258	174200.415	3.994
A6	562641.798	174305.929	4.744
A7	562611.259	174277.204	3.704
Y1	562721.111	174404.938	5.145
Y2	562730.364	174438.324	5.224
Y3	562730.364	174438.324	5.224
Y4	562697.270	174441.548	4.979
Y7	562718.601	174506.457	5.495
Y9	562749.902	174603.592	5.241
Y10	562644.401	174622.346	5.365
Y11	562644.401	174622.346	5.365
Y13	562607.068	174545.508	5.263
Y14	562601.407	174550.318	9.184
Y15	562653.839	174538.598	5.350
Y20	562627.475	174430.779	5.095
Y21	562627.475	174430.779	5.095
Y22	562603.303	174438.079	5.113
Y23	562686.709	174365.653	5.260
Y24	562686.709	174365.653	5.260
Y25	562670.297	174475.610	5.251
Y27	562593.730	174533.196	10.021
Y28	562593.283	174488.750	8.785
Y29	562593.283	174488.750	8.785
Y31	562637.051	174388.037	5.193
Y32	562691.273	174319.114	3.687
Y34	562664.628	174264.364	3.370
Y36	562685.345	174334.401	4.281
Y38	562685.345	174334.401	4.281
Y39	562586.233	174307.555	5.173
Y6	562750.066	174410.931	5.368
Y17	562596.912	174474.245	5.085
Y18	562596.912	174474.245	5.085
Y26	562618.082	174627.082	5.759
Y38	562670.192	174355.424	5.331
Y40	562591.846	174373.002	5.090
Y41	562602.817	174425.270	5.346

PREMIERsurveys
designed to measure

UNIT 3
IVORY WHARF
ELEPHANT LANE
LONDON
SE16 4JD
Tel: 0207 231 3404

9-11 LOWATER ST
CARLTON
NOTTINGHAM
NG4 1JJ
Tel: 0115 962 2876

www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT

RES

JOB TITLE

KIMBERLY CLARK
NORTHFLEET
GRAVESEND DA11 9AD

DRAWING TITLE

SITE SURVEY

SURVEYOR: YI & IA	DRAWN: YI	CHECKED: OH
SCALE 1/200	SHEET No: SHEET 2 OF 5	
DATE MAY 23	SHEET SIZE A0	DRAWING No: 8856_SITE_2D_R0

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum – levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parameters.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722;174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY

LEGEND

- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slate Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline–with type:
  - BWF–BARBED WIRE FENCE
  - CLF–CHAIN LINK FENCE
  - CBF–CLOSED BOARDED FENCE
  - CPF–CONCRETE PANEL FENCE
  - IRF–IRON RAILING FENCE
  - OBF–OPEN BOARD FENCE
  - PRF–POST & RAIL FENCE
  - PWF–POST & WIRE FENCE

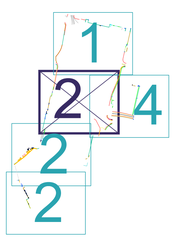
- Survey Station
- +10.00 Level Position
- +THL 15.00 Threshold Level
- +EAL 95.45 Eaves Level
- +RGL 95.45 Ridge Level
- +RFL 95.45 Roof Level
- STV Service Cover
- 12.34
- Building
- Building Canopy
- Sapling
- Bush
- Tree (RPA Trunk_Diameter(D)/Spread(S) and Height(H) Measurements)
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

Note: Linetypes are visible on 2D drawings only

ABBREVIATIONS

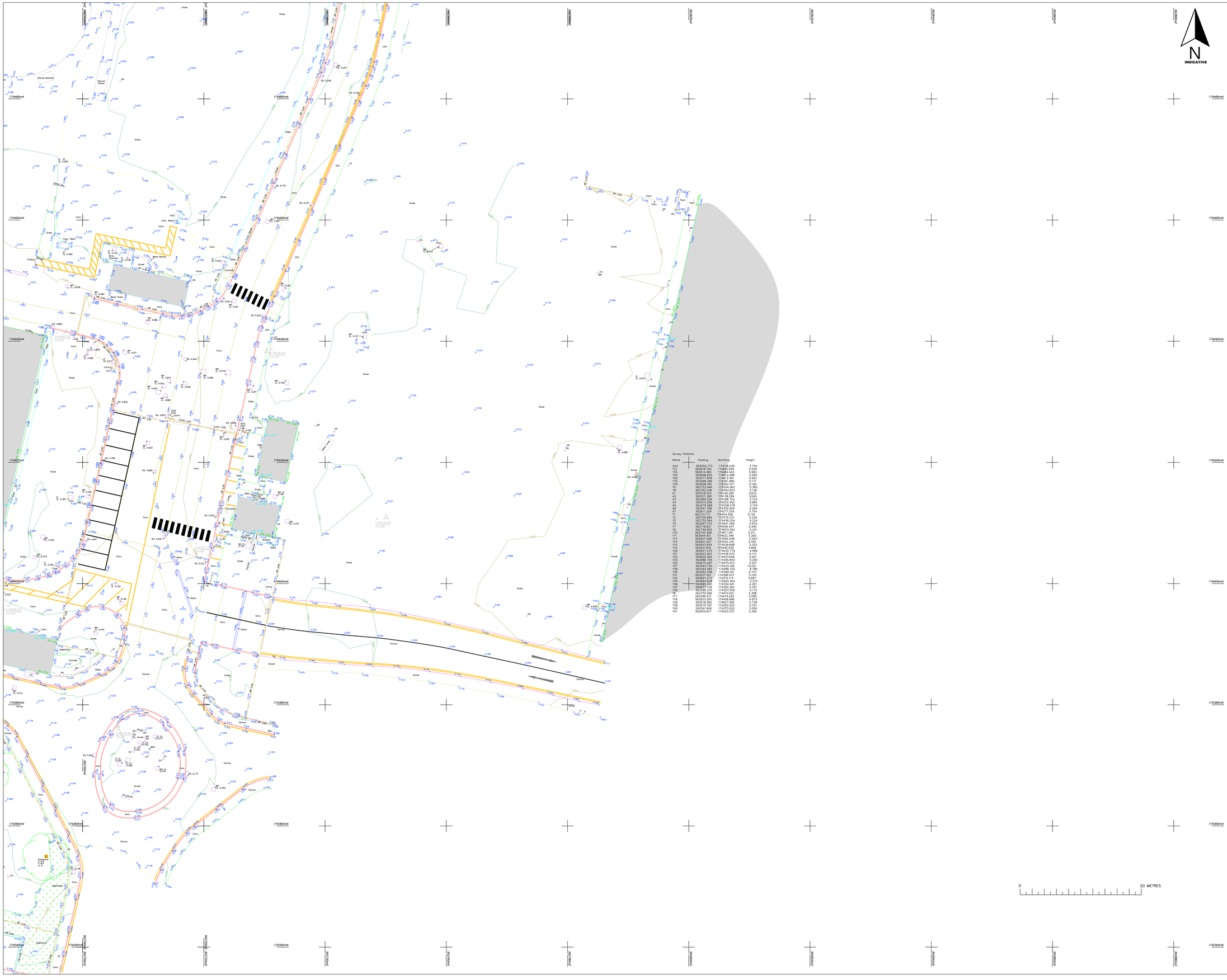
A/C	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
BB	BELISHA BEACON	MH	MANHOLE
BBL	BELL BOLLARD	MKR	MARKER
BL	BASEMENT LIGHTS	NB	NOTICE BOARD
BM	BENCH MARK	NP	NAME PLATE
BR	BRICK PIER	OBF	OPEN BOARD FENCE
BS	BUS STOP POST	O/H	OVERHEAD
BSH	BUS STOP SHELTER	PB	POST BOX
BW	BRICK WALL	PE	POST END
CBF	CLOSED BOARDED FENCE	PM	PARKING METER
CAM	CAMERA	PR	PIPE RISER
CBF	CLOSED BOARDED FENCE	PRF	POST & RAIL FENCE
CBR	CRASH BARRIER	PWF	POST & WIRE FENCE
CE	CLEANING EYE	RF	ROOF LEVEL
CG	CATCH GRATE	RG	ROAD GULLY
CLH	CELLAR HATCH	RGL	RIDGE LEVEL
CLF	CHAIN LINK FENCE	RS	ROAD SIGN
CON	CONCRETE	RSI	ROAD SIGN ILLUMINATED
CPF	CONCRETE PANEL FENCE	RW	RETAINING WALL
CPS	CONCRETE PAVING SLABS	RWP	RAIN WATER PIPE
CR	CABLE RISER	SP	SIGN POST
CTV	CABLE TELEVISION	SPOT	SPOT LEVEL
CW	CONCRETE WALL	SL	SUMP LEVEL
DP	DOWN PIPE	SV	SLUICE VALVE
EB	ELECTRIC BOX	SVP	SOIL VENT PIPE
EJB	ELECTRICITY JUNCTION BOX	TCB	TRAFFIC CALL BOX
EP	ELECTRICITY POLE	TEB	TELEPHONE CALL BOX
ER	EARTHING ROD	THL	THRESHOLD LEVEL
EVL	EAVES LEVEL	TC	TELECOMMUNICATIONS IC
FB	FLOWER BOX	TP	TELEPHONE POLE
FLD	FLOODLIGHT	TRP	TRAFFIC LIGHTS
G	GULLY	TSCU	TS CONTROL UNIT
GB	GRID BOX	TSIC	TRAFFIC SIGNAL IC
GRP	GUARD RAIL	UTL	UNABLE TO LIFT
GV	GAS VALVE	UTS	UNABLE TO SURVEY
H	HEIGHT	VP	VENT PIPE
IBOL	ILLUMINATED BOLLARD	WL	WATER LEVEL
IC	INSPECTION CHAMBER	WM	WATER METER
IL	INVERT LEVEL	WO	WASHOUT
LP	LAMP POST	WT	WALL TOP LEVEL

Sheet Layout
Not to scale



20 METRES

© Copyright Premier Surveys 2022



PREMIERsurveys
designed to measure

UNIT 3
9-11 LOWATER ST
IVORY WHARF
CARLTON
ELEPHANT LANE
NOTTINGHAM
LONDON
NG4 1JJ
SE16 4JD
Tel: 0115 962 2876
Tel: 0207 231 3404
www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT
RES

JOB TITLE
KIMBERLY CLARK
NORTHFLEET
GRAVESEND DA11 9AD

DRAWING TITLE
SITE SURVEY

SURVEYOR: YI & IA	DRAWN: YI	CHECKED: OH
SCALE 1/200	SHEET No: SHEET 3 OF 5	
DATE MAY 23	SHEET SIZE A0	DRAWING No: 8856_SITE_2D_R0

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum – levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parametes.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722,174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY

LEGEND

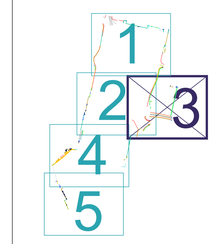
- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slabs Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline–with type:
  - BWF=BARBED WIRE FENCE
  - CLF=CHAIN LINK FENCE
  - CBF=CLOSED BOARDED FENCE
  - CPF=CONCRETE PANEL FENCE
  - IRF=IRON RAILING FENCE
  - OBF=OPEN BOARD FENCE
  - PRF=POST & RAIL FENCE
  - PWF=POST & WIRE FENCE
- Survey Station
- +10.00 Level Position
- +THL 15.00 Threshold Level
- +EVL 95.45 Eaves Level
- +RGL 95.45 Ridge Level
- +RFL 95.45 Roof Level
- ETV Service Cover
- 12.34 Building
- Building Canopy
- Sapling
- Bush
- Tree (RPA Trunk_Diameter(D)/Spread(S) with Height(H) Measurements)
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

Note: Linetypes are visible on 2D drawings only

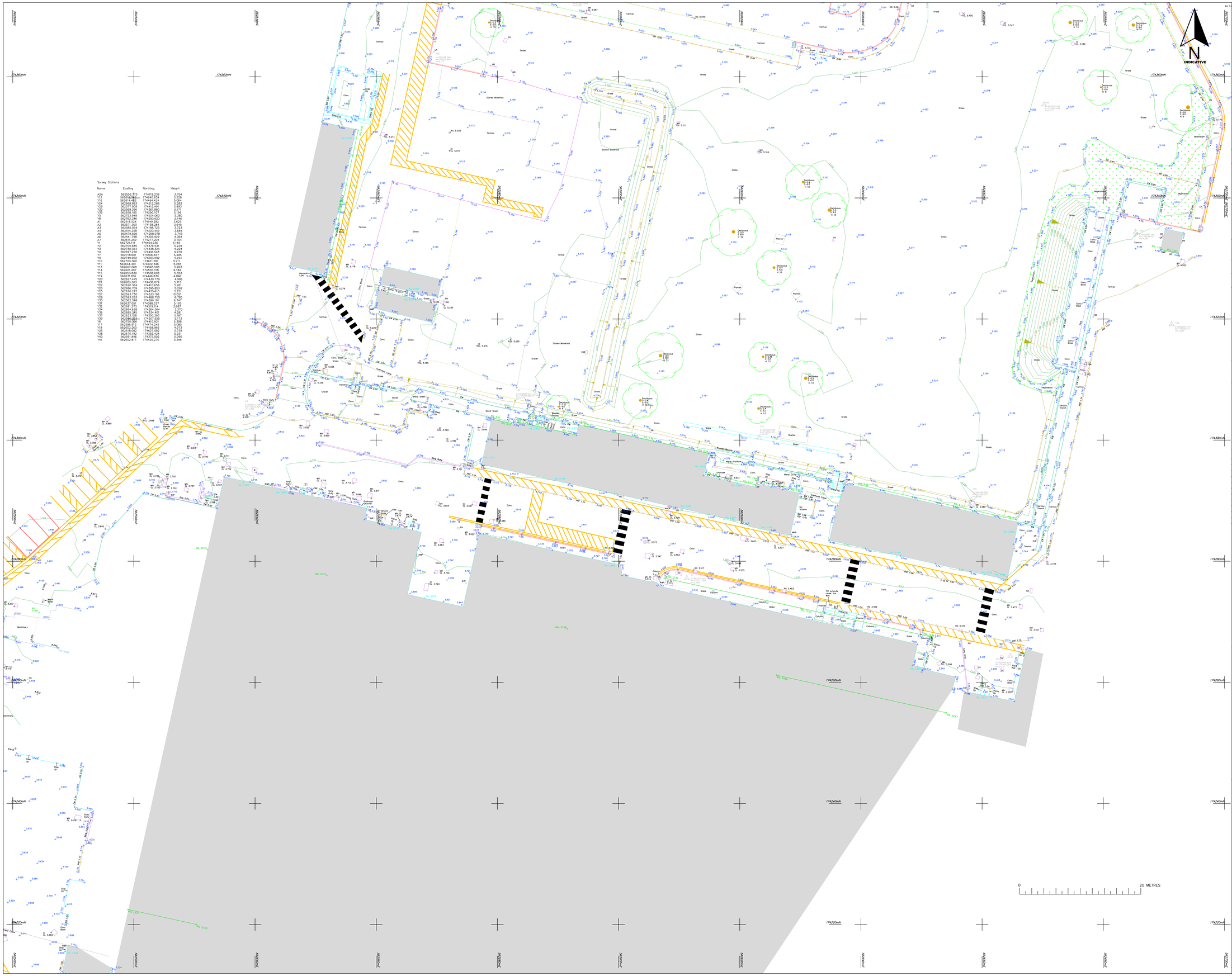
ABBREVIATIONS

A/C	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
BB	BELISHA BEACON	MH	MANHOLE
BBL	BELL BOLLARD	MKR	MARKER
BL	BASEMENT LIGHTS	NB	NOTICE BOARD
BO	BOLLARD	NP	NETWORK PLATE
BR	BMC RAIL	OBF	OPEN BOARD FENCE
BS	BUS STOP POST	O/H	OVERHEAD
BSH	BUS STOP SHELTER	PB	PUSH BUTTON
BW	BRICK WALL	PB	POST BOX
CBW	CONCRETE WALL	PM	PARKING METER
CAM	CAMERA	PR	PIPE RISER
CBF	CLOSED BOARDED FENCE	PRF	POST & RAIL FENCE
CBR	CRASH BARRIER	PWF	POST & WIRE FENCE
CE	CLEANING EYE	RFL	ROOF LEVEL
CG	CATTLE GRID	RG	ROAD GULLY
CLH	CELLAR HATCH	RGL	RIDGE LEVEL
CLF	CHAIN LINK FENCE	RS	ROAD SIGN
CONC	CONCRETE	RSI	ROAD SIGN ILLUMINATED
CPF	CONCRETE PANEL FENCE	RW	RETAINING WALL
CPS	CONCRETE PAVING SLABS	RWP	RAIN WATER PIPE
CR	CABLE RISER	SP	SIGN POST
CTV	CABLE TELEVISION	SV	STOP VALVE
CW	CONCRETE WALL	SL	SUMP LEVEL
DP	DOWN PIPE	SV	SLUICE VALVE
EB	ELECTRIC BOX	SVP	SOIL VENT PIPE
EJB	ELECTRICITY JUNCTION BOX	TC	TOP OF CURB
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
ER	EARTHING ROD	THL	THRESHOLD LEVEL
EVL	EAVES LEVEL	TC	TELECOMMUNICATIONS IC
FB	FLOWER BED	TP	TELEPHONE POLE
FLD	FLOODLIGHT	TR	TELEPHONE RISER
G	GULLY	TSCI	TS CONTROL UNIT
GB	GRID BOX	TSIC	TRAFFIC SIGNAL IC
GRR	GUARD RAIL	UTL	UNABLE TO LIFT
GV	GAS VALVE	UTS	UNABLE TO SURVEY
H	HEIGHT	VP	VENT PIPE
IBOL	ILLUMINATED BOLLARD	WL	WATER LEVEL
IC	INSPECTION CHAMBER	WM	WATER METER
IL	INVERT LEVEL	WO	WASHOUT
LP	LAMP POST	WT	WALL TOP LEVEL

Sheet Layout
Not to scale



© Copyright Premier Surveys 2022



PREMIERsurveys
designed to measure

RICS Regulated by RICS · CHAS Accredited Contractor · Constructionline · The Survey Association · BSI ISO 9001 Quality Management System FS 32271

UNIT 3
IVORY WHARF
ELEPHANT LANE
LONDON
SE16 4JD
Tel: 0207 231 3404

9-11 LOWATER ST
CARLTON
NOTTINGHAM
NG4 1JJ
Tel: 0115 962 2876

www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT

RES

JOB TITLE

KIMBERLY CLARK
NORTHFLEET
GRAVESEND DA11 9AD

DRAWING TITLE

SITE SURVEY

SURVEYOR: YI & IA	DRAWN: YI	CHECKED: OH
SCALE 1/200	SHEET No: SHEET 4 OF 5	
DATE MAY 23	SHEET SIZE A0	DRAWING No: 8856_SITE_2D_R0

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum – levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parameters.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722,174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY

LEGEND

- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slabs Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline–with type:
  - BWF–BARBED WIRE FENCE
  - CLF–CHAIN LINK FENCE
  - CBF–CLOSED BOARDED FENCE
  - CRF–CRASH BARRIER FENCE
  - IRF–IRON RAILING FENCE
  - OBF–OPEN BOARDED FENCE
  - PWF–POST & RAIL FENCE
  - PWF–POST & WIRE FENCE

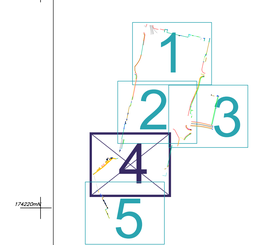
- Survey Station
- +10.00 Level Position
- +TH: 15.00 Threshold Level
- +EVE: 95.45 Eaves Level
- +RDG: 95.45 Ridge Level
- +RFL: 95.45 Roof Level
- ETV Service Cover
- pos. 12.34 Building
- Building Canopy
- Sapling
- Bush
- Tree (Name, Diameter(DI),Spread(S), and Height(H) Measurements)
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

Note: Linetypes are visible on 2D drawings only

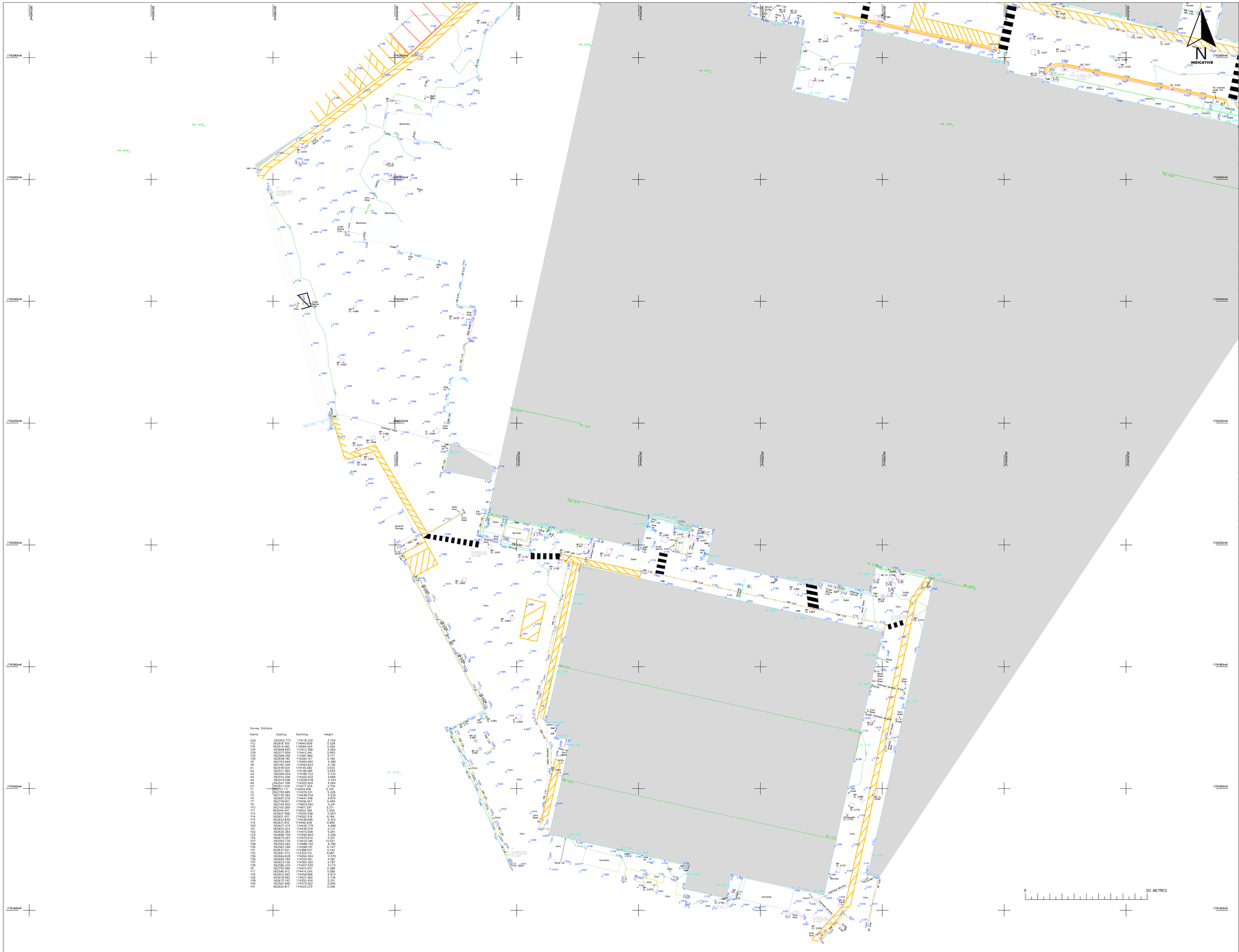
ABBREVIATIONS

A/C	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
BB	BELISHA BEACON	MH	MANHOLE
BBL	BELL BOLLARD	MKR	MARKER
BL	BOLLARD LIGHTS	NBP	NOTICE BOARD
BOL	BOLLARD	NP	STREET NAME PLATE
BR	BIKE RAIL	OBF	OPEN BOARD FENCE
BS	BUS STOP POST	O/H	OVERHEAD
BSH	BUS STOP SHELTER	PC	PEDESTAL
BT	BT MANHOLE	PB	POST BOX
BWF	BARBED WIRE FENCE	PM	PARKING METER
CAM	CAMERA	PRF	PIPE RAIL
CBF	CLOSED BOARDED FENCE	PWF	POST & RAIL FENCE
CBR	CRASH BARRIER	PWF	POST & WIRE FENCE
CH	CHIMNEY	RFL	ROOF LEVEL
CL	COVER LEVEL	RG	ROAD GULLY
CLH	CELLAR HATCH	RGL	RIDGE LEVEL
CLF	CHAIN LINK FENCE	RM	REFLECTOR
CONC	CONCRETE	RS	ROAD SIGN ILLUMINATED
CPF	CONCRETE PANEL FENCE	RW	RETAINING WALL
CPS	CONCRETE PAVING SLABS	RWP	RAIN WATER PIPE
CR	CABLE RISER	SAP	SAPLING
CTV	CABLE TELEVISION	SC	STOP COCK
CW	CONCRETE WALL	SL	SUMP LEVEL
DC	DRAIN COVER	SV	SLUICE VALVE
EC	ELECTRICITY C	SW	SURFACE WATER PIPE
EJB	ELECTRICITY JUNCTION BOX	SW	STONE WALL
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
EX	EARTHING ROD	THL	THRESHOLD LEVEL
FB	FLOWER BED	TIC	TELECOMMUNICATIONS IC
FH	FIRE HYDRANT	TL	TRAFFIC LIGHTS
FLD	FLOODLIGHT	TS	TRAFFIC SIGNAL
G	GULLY	TSCU	TS CONTROL UNIT
GRB	GREY BOX	TSIC	TRAFFIC SIGNAL IC
GV	GAS VALVE	UTL	UNABLE TO LIFT
H	HEIGHT	VP	VENT PIPE SURVEY
IBOL	ILLUMINATED BOLLARD	VP	VENT PIPE
IC	IGNITION CHER	WL	WATER LEVEL
IL	INVERT LEVEL	WM	WATER METER
LP	LAMP POST	WO	WASHOUT
		WT	WALL TOP LEVEL

Sheet Layout
Not to scale



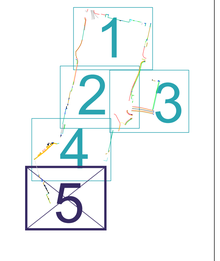
© Copyright Premier Surveys 2022



Survey Stations

Name	Easting	Northing	Height
A2A	562552.773	174118.239	3.754
Y12	562618.765	174163.833	5.528
Y16	562614.482	174494.424	5.064
Y24	562668.870	174512.288	5.283
Y29	562577.909	174412.491	5.993
Y34	562577.909	174412.491	5.993
Y35	562658.585	174290.107	5.199
Y5	562753.949	174504.060	5.380
Y8	562766.758	174393.623	5.146
A1	562558.524	174149.282	3.625
A2	562581.154	174188.723	3.723
A3	562580.004	174188.723	3.723
A4	562514.258	174200.453	3.684
A5	562541.798	174200.453	4.364
A6	562541.798	174329.929	4.364
A7	562611.259	174277.204	5.704
Y1	562721.111	174404.936	5.145
Y2	562705.685	174376.531	5.229
Y3	562697.270	174441.348	4.979
Y4	562697.270	174441.348	4.979
Y7	562718.601	174506.457	5.495
Y9	562749.902	174603.592	5.241
Y10	562700.369	174611.591	5.211
Y11	562700.369	174611.591	5.211
Y13	562807.066	174545.508	5.263
Y14	562801.407	174550.318	9.184
Y15	562813.839	174448.839	5.283
Y17	562813.839	174448.839	5.283
Y20	562921.475	174430.779	4.998
Y21	562903.303	174438.079	5.113
Y22	562820.364	174410.658	5.261
Y23	562820.364	174410.658	5.261
Y25	562870.297	174475.810	5.291
Y27	562593.730	174533.196	10.021
Y28	562593.283	174488.750	8.785
Y30	562562.348	174399.191	6.747
Y31	562562.348	174399.191	6.747
Y32	562691.213	174319.114	3.687
Y34	562664.628	174264.364	3.370
Y36	562685.340	174334.401	4.281
Y37	562623.158	174300.393	5.187
Y38	562623.158	174300.393	5.187
Y6	562750.066	174410.931	5.398
Y17	562596.912	174474.245	5.085
Y27	562593.730	174533.196	10.021
Y28	562618.082	174527.082	5.739
Y38	562670.192	174355.424	5.331
Y40	562591.846	174373.002	5.090
Y41	562602.817	174425.270	5.346

Sheet Layout
Not to scale



PREMIERsurveys
designed to measure

9-11 LOWATER ST
CARLTON
NOTTINGHAM
NG4 1JJ
Tel: 0115 962 2876

UNIT 3
IVORY WHARF
ELEPHANT LANE
LONDON
SE16 4JD
Tel: 0207 231 3404

www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT
RES

JOB TITLE
KIMBERLY CLARK
NORTHFLEET
GRAVESEND DA11 9AD

DRAWING TITLE
SITE SURVEY

SURVEYOR: YI & IA	DRAWN: YI	CHECKED: OH

SCALE	SHEET No:
1/200	SHEET 5 OF 5

DATE	SHEET SIZE	DRAWING No:
MAY 23	A0	8856_SITE_2D_R0

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum – levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parametes.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722,174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY

LEGEND

- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slabs Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline-with type:
  - BWF=BARBED WIRE FENCE
  - CLF=CHAIN LINK FENCE
  - COF=CLOSED BOARDED FENCE
  - CPF=CONCRETE PANEL FENCE
  - IRF=IRON RAILING FENCE
  - OBF=OPEN BOARDED FENCE
  - PRF=POST & RAIL FENCE
  - PWF=POST & WIRE FENCE

- Survey Station
- +10.00 Level Position
- +Thr. 14.00 Threshold Level
- +EVL 95.40 Eaves Level
- +RDL 95.45 Ridge Level
- +RFL 95.45 Roof Level
- ETV Service Cover
- 12.34
- Building
- Building Canopy
- Sapling
- Bush
- Tree (Spread(E/W),Spread(N/S) and Height)
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

Note: Linetypes are visible on 2D drawings only

ABBREVIATIONS

A/C	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
BB	BELISHA BEACON	MH	MANHOLE
BBL	BELL BOLLARD	MKR	MARKER
BOL	BOLLARD LIGHTS	NB	NOTICE BOARD
BR	BIKE RAIL	NP	STREET NAME PLATE
BS	BUS STOP POST	OBF	OPEN BOARD FENCE
BSH	BUS STOP SHELTER	OH	OVERHEAD
BW	BRICK WALL	P	POST
BWF	BARBED WIRE FENCE	PB	POST BOX
CAM	CAMERA	PH	PARKING METER
CBF	CLOSED BOARDED FENCE	PIL	PYLON
CBR	CRASH BARRIER	PRF	POST & RAIL FENCE
CE	CLEANING EYE	PWF	POST & WIRE FENCE
CL	COVER LEVEL	RFL	ROOF LEVEL
CLH	CELLAR HATCH	RGL	RAIL GUARD
CLF	CHAIN LINK FENCE	RGL	RIDGE LEVEL
CON	CONCRETE	RS	ROAD SIGN
CPF	CONCRETE PANEL FENCE	RSI	ROAD SIGN ILLUMINATED
CPS	CONCRETE PAVING SLABS	RW	RETAINING WALL
CR	CABLE RISER	SAP	SAMPLING POINT
CTV	CABLE TELEVISION	SC	STOP COCK
CW	CONCRETE WALL	SL	STREET LIGHT
DP	DOWN PIPE	SLP	SLOPE LEVEL
EC	ELECTRICITY C	SVP	SOIL VENT PIPE
EJB	ELECTRICITY JUNCTION BOX	SW	STONE WALL
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
ER	EARTHING ROD	TCV	TELECOMMUNICATIONS V
EVL	EAVES LEVEL	TIC	TELECOMMUNICATIONS IC
FH	FIRE HYDRANT	TP	TELEPHONE POLE
FLD	FLOODLIGHT	TS	TRAFFIC SIGNAL
G	GULLY	TSCU	TS CONTROL UNIT
GRB	GRIT BIN	TV	TELEVISION POLE
GDR	GUARD RAIL	UTL	UNABLE TO LIFT
GV	GAS VALVE	UTS	UNABLE TO SURVEY
H	HEIGHT	VP	VENT PIPE
HB	HARDENED BOLLARD	WL	WATER LEVEL
IC	INSPECTION COVER	WP	WATER POLE
IL	INVERT LEVEL	WV	WASHOUT
LP	LAMP POST	WT	WALL TOP LEVEL

© Copyright Premier Surveys 2022

** Note **
A range of detection methods are used to obtain the underground information produced in this drawing. Variations in the ground conditions can affect the quality of the data and therefore an absolute affirmation cannot be guaranteed.

The identification of any located service should not be treated as infallible. The originating source may not have been traced.

The location and/or identification of a service will not necessarily indicate whether it is live or dead or identify whether it is a single or multiple service where one or more services may be situated above, below or in close proximity of the indicated line. Where possible, this will be annotated as 'multiple'.

All depths of metallic features are to centre of the service, depths on drainage runs are to the pipe invert at the manhole and should be treated as an approximate indication.

Underground drainage has been proven for position using traceable sonde methods, unless otherwise stated. No allowance has been made for sub surface entry into manholes or other chambers or voids below ground level, therefore any details relating to depths, sizes etc, are taken from above ground and as such will be approximate only.

Features not traceable by electromagnetic or sonde techniques, such as polyethylene water/gas pipes have been located using Ground Probing Radar (GPR). Successful GPR detection is based on a number of factors, clear access, ground/geophysical conditions and size/type of physical target. All GPR work, unless verified (QL-A) is interpretive. Trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

Premier Surveys use skilled professional surveyors and modern, calibrated location equipment. However, the completeness of any underground utility survey should not be 100% guaranteed. We cannot be held liable for inaccuracies beyond those that could be reasonably expected of a professionally skilled company. Any information taken from these drawings, pipe sizes/positions etc cannot be 100% guaranteed.

These results are not infallible and trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

This drawing must be read in conjunction with all available statutory undertakers record information. Record information is often incomplete and should be used for reference only and combined with detailed survey works/verification.

- Power Carrying Feature
- Water Main
- Sea Water
- Sewer Foul Water
- Sewer Combined
- Sewer Rising Main
- Sewer Surface Water
- Sewer Surface Water 300Ø and above
- Sewer Foul Water 300Ø and above
- Sewer Grey Water
- Telecom
- Telecom (Fibre Optic Cable)
- Multiuser Ducts
- Communications
- Cable Television
- Closed Circuit Television
- Undefined EML
- Unidentified GPR

- Heating Pipe
- Road Traffic Sensor
- Traffic Signals
- Pipe (use unknown)
- Extents of Chamber
- Earthing Strap
- Survey Boundary
- End of Trench scar
- End of Trace
- Characteristic Change
- Depth to service (applicable to all types)
- Extent of survey (service continues)
- Assumed Route
- Taken from Records

Manhole Text
UG Text
UG Text remark, text box layer indicates relevant service

Inaccessible areas, (obstructions)
Inaccessible areas due to vegetation
Service Duct extents

WHILST PREMIER SURVEYS APPROACH ALL PROJECTS WITH THE INTENTION OF PROVIDING FULL UNDERGROUND UTILITY MAPPING INFORMATION, 100% SUCCESSFUL DETECTION IS NOT/CANNOT BE GUARANTEED. ITEMS MAY BE OMITTED DESPITE THE BEST ENDEAVOURS OF THE SURVEYOR(S).

UNDERGROUND ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFO
BL	BASE LEVEL	PE	POLYETHYLENE
CL	COVER LEVEL	OH	OVERHEAD
CR	CABLE RISER	PR	PIPE RISER
DI	DUCTILE IRON (SEWER)	PT	PETROLEUM
DI	DUCTILE IRON	ST	STEEL
FW	FOUL WATER (SEWER)	SW	STORM WATER (SEWER)
GLY	GULLY	TFR	TAKEN FROM RECORDS
HV	HIGH VOLTAGE	UG	UNDERGROUND
IC	INSPECTION CHAMBER	UNK	UNKNOWN
IL	INVERT LEVEL	UTS	UNABLE TO SURVEY
LV	LOW VOLTAGE	UTT	UNABLE TO TRACE
MH	MANHOLE		

PREMIERsurveys
designed to measure

UNIT 3
IVORY WHARF
ELEPHANT LANE
LONDON
SE16 4JD
Tel: 0207 231 3404

9-11 LOWATER ST
CARLTON
NOTTINGHAM
NG4 1JJ
Tel: 0115 962 2876

www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT
RES GROUP
BEAUFORT COURT
EGG FARM LANE
KINGS LANGLEY
HERTFORDSHIRE,
WD4 8LR

JOB TITLE
KIMBERLY CLARK
NORTHFLEET
GRAVESEND
DA11 9AD

DRAWING TITLE
UNDERGROUND UTILITY SURVEY

SURVEYOR:	WT/VD	DRAWN:	WT/VD	CHECKED:	DS

SCALE	SHEET No:
1/200	SHEET 1 OF 5

DATE:	SHEET SIZE:	DRAWING No:
MAY 23	A0	8856_UNDERGROUND_R1

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum - levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parameters.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722,174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY
1	UPDATED DRAWING	26.05.23	DS

LEGEND

- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slabs Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline–with type:
  - BWF–BARBED WIRE FENCE
  - CLF–CHAIN LINK FENCE
  - CBF–CLOSED BOARDED FENCE
  - CPF–CONCRETE PANEL FENCE
  - IRF–IRON RAILING FENCE
  - OBF–OPEN BOARDED FENCE
  - PRF–POST & RAIL FENCE
  - PWF–POST & WIRE FENCE

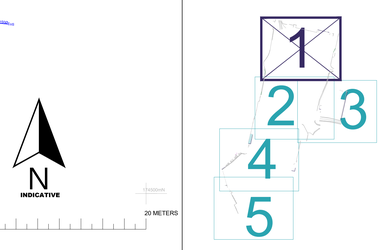
- Survey Station
- Level Position
- Threshold Level
- Eaves Level
- Ridge Level
- Roof Level
- Service Cover
- Building
- Building Canopy
- Sapling
- Bush
- Tree (With Trunk Diameter(DL)Spread(S) and Height(H) Measurements)
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

Note: Linetypes are visible on 2D drawings only

ABBREVIATIONS

A/C	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
ASH	ASH TREE	LP	LAMP POST
BBL	BELL BOLLARD	MAR	MARKER
BL	BASEMENT LIGHTS	NB	NOTICE BOARD
BP	BOLLARD	OBP	OPEN BOARD PLATE
BR	BRICK PIER	OBF	OPEN BOARD FENCE
BS	BUS STOP POST	OH	OVERHEAD
BSH	BUS STOP SHELTER	P	POST
BW	BRICK WALL	PB	POST BOX
BWF	BARBED WIRE FENCE	PM	PARKING METER
CAM	CAMERA	PR	PIPE RISER
CBF	CLOSED BOARDED FENCE	PRF	POST & RAIL FENCE
CBR	CRASH BARRIER	PWF	POST & WIRE FENCE
CE	CLEANING EYE	RFL	ROOF LEVEL
CG	CATCH GRID	RG	ROAD GULLY
CLH	COLLAR HATCH	RGL	RIDGE LEVEL
CLF	CHAIN LINK FENCE	RS	ROAD SIGN
CONC	CONCRETE	RSI	ROAD SIGN ILLUMINATED
CPF	CONCRETE PANEL FENCE	RW	RETAINING WALL
CR	CABLE RISER/ RAILWAYS	RWP	RAIN WATER PIPE
CS	CABLE RISER	SAP	SAPLING
CTV	CABLE TELEVISION	SC	STOP COCK
CW	CONCRETE WALL	SG	SIGNAL GANTRY
DP	DOWN PIPE	SV	SLUICE VALVE
EB	ELECTRIC BOX	SVP	SOIL VENT PIPE
EJB	ELECTRICITY JUNCTION BOX	TC	TELEPHONE BOX
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
ER	EARTHING ROD	THL	THRESHOLD LEVEL
EVL	EAVES LEVEL	TJC	TELECOMMUNICATIONS JC
FB	FLOWER BASKET	TP	TELEPHONE POLE
FLG	FLOOR LIGHT	TRE	TREE (DECIDUOUS)
G	GULLY	TSC	TS CONTROL UNIT
GRB	GRIT BOX	TSC	TRAFFIC SIGNAL IC
GDR	GUARD RAIL	UTL	UNABLE TO LIFT
H	HEDGE	UTS	UNABLE TO SURVEY
H	HEIGHT	UTT	UNABLE TO TRACE
IBOL	ILLUMINATED BOLLARD	WL	WATER LEVEL
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASHOUT
LP	LAMP POST	WT	WALL TOP LEVEL

Sheet Layout
Not to scale



N
INDICATIVE

0 20 METERS

© Copyright Premier Surveys 2022

** Note **
A range of detection methods are used to obtain the underground information produced in this drawing. Variations in the ground conditions can affect the quality of the data and therefore an absolute affirmation cannot be guaranteed.

The identification of any located service should not be treated as infallible. The originating source may not have been traced.

The location and/or identification of a service will not necessarily indicate whether it is live or dead or identify whether it is a single or multiple service where one or more services may be situated above, below or in close proximity of the indicated line. Where possible, this will be annotated as 'multiple'.

All depths of metallic features are to centre of the service, depths on drainage runs are to the pipe invert at the manhole and should be treated as an approximate indication.

Underground drainage has been proven for position using traceable sonde methods, unless otherwise stated. No allowance has been made for sub surface entry into manholes or other chambers or voids below ground level, therefore any details relating to depths, sizes etc, are taken from above ground and as such will be approximate only.

Features not traceable by electromagnetic or sonde techniques, such as polyethylene water/gas pipes have been located using Ground Probing Radar (GPR). Successful GPR detection is based on a number of factors, clear access, ground/geophysical conditions and size/type of physical target. All GPR work, unless verified (QL-A) is interpretive. Trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

Premier Surveys use skilled professional surveyors and modern, calibrated location equipment. However, the completeness of any underground utility survey should not be 100% guaranteed. We cannot be held liable for inaccuracies beyond those that could be reasonably expected of a professionally skilled company. Any information taken from these drawings, pipe sizes/positions etc cannot be 100% guaranteed.

These results are not infallible and trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

This drawing must be read in conjunction with all available statutory undertakers record information. Record information is often incomplete and should be used for reference only and combined with detailed survey works/verification.

- Power Carrying Feature
- Water Main
- Gas Main
- Sewer Foul Water
- Sewer Combined
- Sewer Rising Main
- Sewer Surface Water
- Sewer Surface Water 300Ø and above
- Sewer Foul Water 300Ø and above
- Sewer Grey Water
- Telecom
- Telecom (Fibre Optic Cable)
- Multi-user Ducts
- Communications
- Cable Television
- Closed Circuit Television
- Street Furniture
- Unidentified EML
- Unidentified GPR
- Heating Pipe
- Road Traffic Sensor
- Traffic Signals
- Pipe (use unknown)
- Extents of Chamber
- Earthing Strap
- Survey Boundary
- End of Trench scar
- End of Trace
- Characteristic Change
- Depth to service (applicable to all types)
- Extent of survey (service continues)
- Assumed Route
- Taken from Records
- Manhole Text
- UG Text
- UG Text remark, text box layer indicates relevant service
- Inaccessible areas, construction
- Inaccessible areas due to vegetation
- Service Duct extents

WHILST PREMIER SURVEYS APPROACH ALL PROJECTS WITH THE INTENTION OF PROVIDING FULL UNDERGROUND UTILITY MAPPING INFORMATION, 100% SUCCESSFUL DETECTION IS NOT/CANNOT BE GUARANTEED. ITEMS MAY BE OMITTED DESPITE THE BEST ENDEAVOURS OF THE SURVEYOR(S).

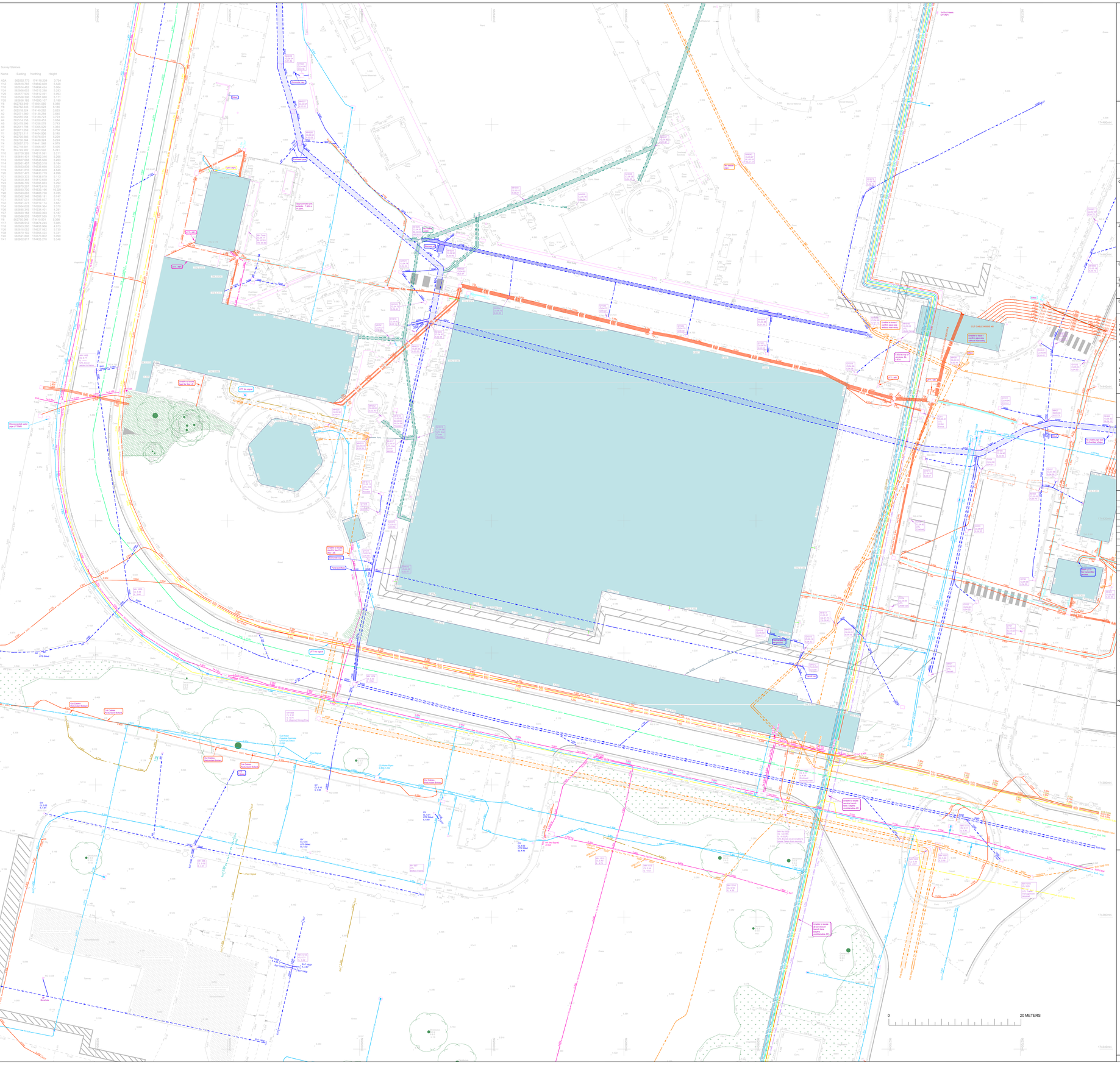
UNDERGROUND ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFO
BL	BASE LEVEL	PE	POLYETHYLENE
CL	COVER LEVEL	OH	OVERHEAD
CB	CABLE RISER	PR	PIPE RISER
CW	COMBINED WATER (SEWER)	PC	PRECAST CONCRETE
DI	DUCTILE IRON	ST	STEEL
FW	FOUL WATER (SEWER)	SW	STORM WATER (SEWER)
GLY	GULLY	TER	TERRACOTTA (SEWER)
HV	HIGH VOLTAGE	UG	UNDERGROUND
IC	INSPECTION CHAMBER	UTL	UNABLE TO LIFT
IL	INVERT LEVEL	UTS	UNABLE TO SURVEY
LV	LOW VOLTAGE	UTT	UNABLE TO TRACE
MH	MANHOLE		

N
INDICATIVE

Survey Stations

Name	Easting	Northing	Height
A2A	562552.773	174118.239	3.754
Y15	562414.482	174494.424	5.054
Y16	562414.482	174494.424	5.054
Y24	562668.693	174512.286	5.263
Y29	562577.069	174412.401	5.993
Y30	562586.384	174361.880	6.171
Y4	562703.945	174504.090	5.380
Y5	562703.945	174504.090	5.380
Y8	562762.348	174693.623	5.146
A1	562518.324	174146.252	3.825
A2	562571.360	174139.264	3.845
A3	562571.360	174139.264	3.845
A4	562479.596	174200.453	3.564
A5	562479.596	174200.079	3.743
A6	562479.596	174200.079	3.743
A7	562411.256	174277.264	3.704
Y1	562721.511	174404.936	5.145
Y2	562795.885	174478.631	5.229
Y3	562735.364	174439.324	5.234
Y6	562749.903	174493.592	5.241
Y7	562749.903	174493.592	5.241
Y9	562749.903	174493.592	5.241
Y10	562749.903	174491.591	5.217
Y11	562644.467	174622.346	5.265
Y12	562644.467	174622.346	5.265
Y14	562491.407	174450.318	5.164
Y15	562653.839	174538.696	5.353
Y16	562653.839	174538.696	5.353
Y20	562837.675	174482.529	5.446
Y21	562825.543	174439.079	5.715
Y22	562825.364	174439.079	5.291
Y23	562686.759	174356.853	5.292
Y26	562686.759	174356.853	5.292
Y27	562693.182	174468.196	5.121
Y28	562693.293	174468.750	5.795
Y30	562682.344	174398.157	6.747
Y31	562637.251	174398.037	5.193
Y32	562637.251	174398.037	5.193
Y34	562664.638	174354.364	5.370
Y36	562685.345	174334.401	4.281
Y37	562652.158	174360.355	5.187
Y39	562696.232	174357.500	5.173
Y40	562696.232	174357.500	5.173
Y17	562696.815	174474.245	5.085
Y18	562603.263	174458.966	4.973
Y19	562603.263	174458.966	4.973
Y38	562591.940	174373.002	5.139
Y39	562591.940	174373.002	5.090
Y41	562692.817	174429.270	5.346



PREMIERsurveys
designed to measure

UNIT 3
9-11 LOWATER ST
IVORY WHARF
CARLTON
ELEPHANT LANE
NOTTINGHAM
LONDON
NG4 1JJ
SE16 4JD
Tel: 0115 962 2876
Tel: 0207 231 3404
www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT
RES GROUP
BEAUFORT COURT
EGG FARM LANE
KINGS LANGLEY
HERTFORDSHIRE,
WD4 8LR

JOB TITLE
KIMBERLY CLARK
NORTHFLEET
GRAVESEND
DA11 9AD

DRAWING TITLE
UNDERGROUND UTILITY SURVEY

SURVEYOR: WT/VD	DRAWN: WT/VD	CHECKED: DS
SCALE: 1/200	SHEET No: SHEET 2 OF 5	
DATE: MAY 23	SHEET SIZE: A0	DRAWING No: 8856_UNDERGROUND_R1

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum - levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parameters.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722,174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY
1	UPDATED DRAWING	26.05.23	DS

LEGEND

- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slabs Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline–with type:
  - BWF–BARBED WIRE FENCE
  - CLF–CHAIN LINK FENCE
  - CWF–CLOSE BOARDED FENCE
  - CPF–CONCRETE PANEL FENCE
  - IRF–IRON RAILING FENCE
  - OBF–OPEN BOARDED FENCE
  - PRF–POST & RAIL FENCE
  - PWF–POST & WIRE FENCE

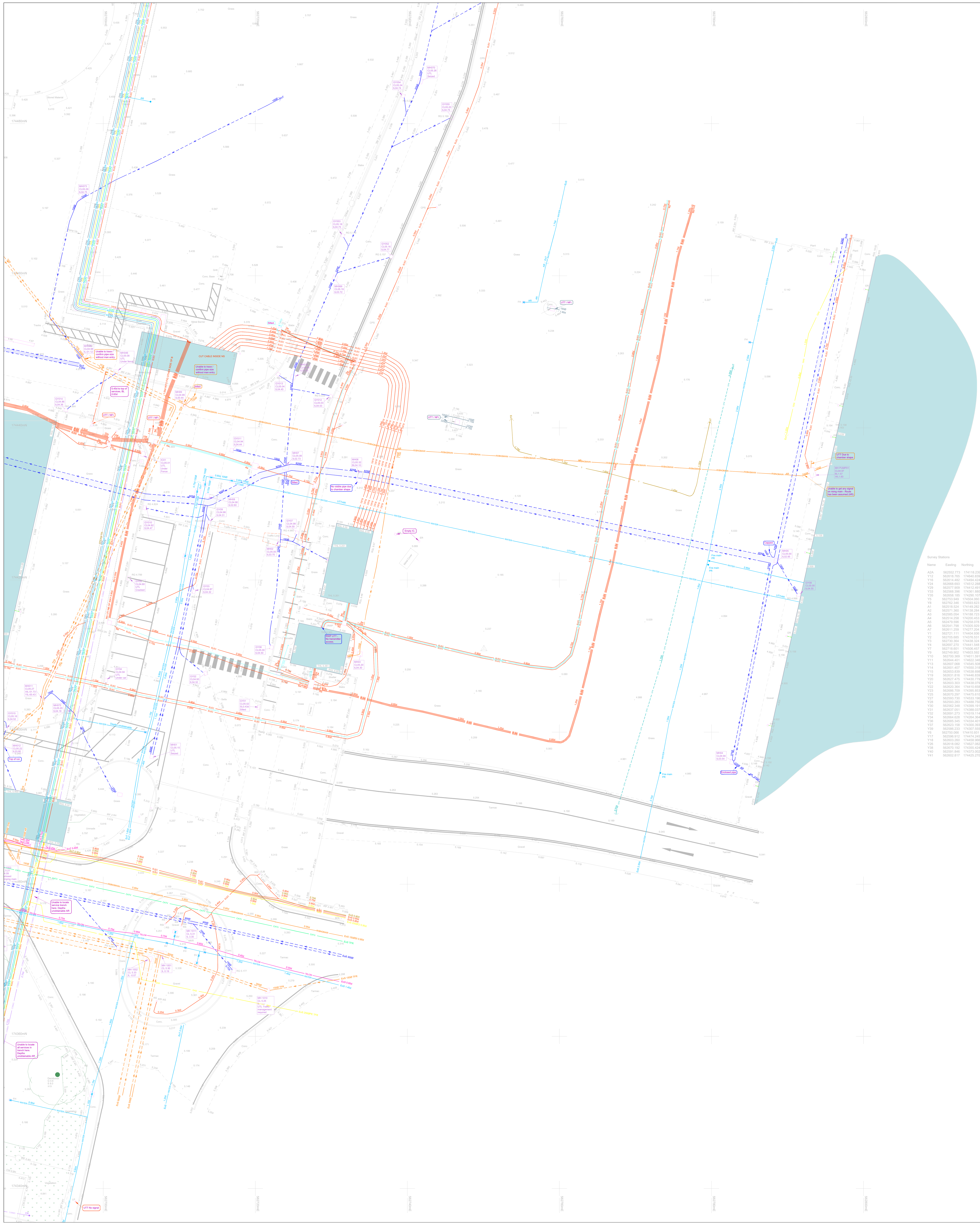
Note: Linetypes are visible on 2D drawings only

- Survey Station
- 10.00 Level Position
- THR 10.00 Threshold Level
- EVL 90.45 Eaves Level
- RDG 90.45 Ridge Level
- RFL 90.45 Roof Level
- CTV 12.34 Service Cover
- Building
- Building Canopy
- Sapling
- Bush
- Tree (Height, Trunk Diameter@1.5(breast)& and Height to Viewscreen/Canopy)
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

ABBREVIATIONS

A/C	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
BB	BELISHA BEACON	MH	MANHOLE
BBL	BELL BOLLARD	MKR	MARKER
BC	BOLLARD LIGHTS	NB	NOTICE BOARD
BOL	BOLLARD	NP	STREET NAME PLATE
BR	BIKE RAIL	OBF	OPEN BOARD FENCE
BS	BUS STOP POST	PAD	PADSTAND
BSH	BUS STOP SHELTER	P	POST
BW	BRICK WALL	PB	POST BOX
BWF	BARBED WIRE FENCE	PM	PARKING METER
CAM	CAMERA	PPF	POST & PANEL FENCE
CBF	CLOSE BOARDED FENCE	PRF	POST & RAIL FENCE
CR	CRASH BARRIER	PWF	POST & WIRE FENCE
CE	CLEANING EYE	RFL	ROOF LEVEL
CL	COVER LEVEL	RGL	RIDGE LEVEL
CLH	CELLAR HATCH	RDL	ROAD LEVEL
CF	CLOSE BOARD FENCE	RS	ROAD SIGN
CON	CONCRETE	RSI	ROAD SIGN ILLUMINATED
CPF	CONCRETE PANEL FENCE	RWF	RETAINING WALL
CPS	CONCRETE PAVING SLABS	SHR	SHRUB/TREE PATCH
CR	CABLE RISER	SAF	SAFELINE
CTV	CLOSED TELEVISION	SC	STOP COCK
CW	CONCRETE WALL	SL	SUMP LEVEL
DP	DOWN PIPE	SV	SLUICE VALVE
EC	ELECTRICITY	TF	TRAFFIC LIGHTS
EJB	ELECTRICITY JUNCTION BOX	SW	STONE WALL
EM	ELECTRIC MAST	TCB	TELEPHONE CALL BOX
ER	EARTHING ROD	TCI	TELECOMMUNICATIONS IC
EVL	EAVES LEVEL	TIC	TELECOMMUNICATIONS IC
FH	FIRE HYDRANT	TP	TELEPHONE POLE
FLD	FLOODLIGHT	TS	TRAFFIC SIGNAL
FP	FENCE POST	TSCU	TS CONTROL UNIT
GRB	GRIT BOX	UTC	UNABLE TO CLIMB IC
GDR	GUARD RAIL	UTL	UNABLE TO LIFT
GV	GAS VALVE	UTS	UNABLE TO SURVEY
H	HEIGHT	VP	VENT PIPE
IB	INSTALLATION BOLLARD	WL	WATER LEVEL
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASHOUT
LP	LAMP POST	WT	WALL TOP LEVEL

© Copyright Premier Surveys 2022



Survey Stations

Name	Easting	Northing	Height
A2A	562552.773	174118.239	3.754
Y12	562618.765	174640.839	5.528
Y16	562614.482	174494.424	5.064
Y24	562668.693	174512.288	5.283
Y29	562577.909	174412.491	5.993
Y33	562568.396	174361.880	5.171
Y35	562658.185	174290.107	5.199
Y5	562753.949	174504.060	5.380
Y8	562762.346	174593.623	5.146
A1	562518.524	174149.282	3.625
A2	562571.360	174138.284	3.645
A3	562585.054	174188.723	3.723
A4	562514.258	174200.453	3.684
A5	562479.596	174258.078	3.743
A6	562541.798	174305.929	4.364
A7	562611.259	174277.204	3.704
Y1	562721.111	174404.936	5.145
Y2	562705.685	174376.531	5.229
Y3	562730.364	174438.324	5.224
Y4	562697.270	174441.548	4.979
Y7	562718.601	174506.457	5.495
Y9	562749.902	174603.592	5.241
Y10	562700.369	174611.591	5.211
Y11	562644.401	174622.346	5.265
Y13	562607.068	174545.508	5.263
Y14	562601.407	174550.318	9.184
Y15	562653.839	174538.698	5.353
Y19	562631.816	174446.839	4.846
Y20	562627.475	174430.779	4.996
Y21	562603.303	174438.079	5.113
Y22	562620.364	174410.658	5.261
Y23	562686.709	174395.853	5.292
Y25	562670.297	174475.610	5.251
Y27	562593.730	174533.196	10.021
Y28	562593.283	174488.750	8.785
Y30	562562.348	174399.191	6.747
Y31	562637.051	174388.037	5.193
Y32	562691.273	174319.114	3.687
Y34	562664.628	174264.364	3.370
Y36	562685.345	174334.401	4.281
Y37	562623.158	174300.393	5.187
Y39	562586.233	174307.555	5.173
Y6	562750.066	174410.931	5.398
Y17	562596.912	174474.245	5.085
Y18	562603.260	174458.966	4.973
Y26	562618.082	174627.082	5.739
Y38	562670.192	174355.424	5.331
Y40	562591.846	174373.002	5.090
Y41	562602.817	174425.270	5.346

N
INDICATIVE

** Note **

A range of detection methods are used to obtain the underground information produced in this drawing. Variations in the ground conditions can affect the quality of the data and therefore an absolute affirmation cannot be guaranteed.

The identification of any located service should not be treated as infallible. The originating source may not have been traced.

The location and/or identification of a service will not necessarily indicate whether it is live or dead or identify whether it is a single or multiple service where one or more services may be situated above, below or in close proximity of the indicated line. Where possible, this will be annotated as 'multiple'.

All depths of metallic features are to centre of the service, depths on drainage runs are to the pipe invert at the manhole and should be treated as an approximate indication.

Underground drainage has been proven for position using traceable sonde methods, unless otherwise stated. No allowance has been made for sub surface entry into manholes or other chambers or voids below ground level, therefore any details relating to depths, sizes etc, are taken from above ground and as such will be approximate only.

Features not traceable by electromagnetic or sonde techniques, such as polyethylene water/gas pipes have been located using Ground Probing Radar (GPR). Successful GPR detection is based on a number of factors, clear access, ground/geophysical conditions and size/type of physical target. All GPR work, unless verified (QL-A) is interpretive. Trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

Premier Surveys use skilled professional surveyors and modern, calibrated location equipment. However, the completeness of any underground utility survey should not be 100% guaranteed. We cannot be held liable for inaccuracies beyond those that could be reasonably expected of a professionally skilled company. Any information taken from these drawings, pipe sizes/positions etc cannot be 100% guaranteed.

These results are not infallible and trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

This drawing must be read in conjunction with all available statutory undertakers record information. Record information is often incomplete and should be used for reference only and combined with detailed survey works/verification.

- ELEC — Power Carrying Feature
- WATER — Water Main
- GAS — Gas Main
- Sewer Foul Water
- Sewer Combined
- RISINGMAIN — Sewer Rising Main
- Sewer Surface Water
- Sewer Surface Water 300Ø and above
- Sewer Foul Water 300Ø and above
- Sewer Grey Water
- TELCM — Telecom
- TEL FO — Telecom (Fibre Optic Cable)
- MU — Multi-user Ducts
- COMMS — Communications
- CATV — Cable Television
- CCTV — Closed Circuit Television
- DUCT EMPTY — Duct (Empty)
- ? — Unidentified EML
- GPR — Unidentified GPR
- H — Heating Pipe
- Road Traffic Sensor
- TLIGHT — Traffic Signals
- PIPE — Pipe (use unknown)
- Extents of Chamber
- E — Earthing Strap
- Survey Boundary
- EoSc — End of Trench scar
- EoT — End of Trace
- Characteristic Change
- 1.20d — Depth to service (applicable to all types)
- EoS — Extent of survey (service continues)
- AR — Assumed Route
- TFR — Taken from Records
- MH FW** CL**.** — Manhole Text
- UG Text — UG Text remark, text box layer indicates relevant service
- Inaccessible areas, obstruction(s)
- Inaccessible areas due to vegetation
- Service Duct extents

WHILST PREMIER SURVEYS APPROACH ALL PROJECTS WITH THE INTENTION OF PROVIDING FULL UNDERGROUND UTILITY MAPPING INFORMATION. 100% SUCCESSFUL DETECTION IS NOT/CANNOT BE GUARANTEED. ITEMS MAY BE OMITTED DESPITE THE BEST ENDEAVOURS OF THE SURVEYOR(S).

UNDERGROUND ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFO
BL	BASE LEVEL	PE	POLYETHYLENE
CL	COVER LEVEL	O/H	OVERHEAD
CR	CABLE RISER	PR	PIPE RISER
CW	COMBINED WATER (SEWER)	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
FW	FOUL WATER (SEWER)	SW	STORM WATER (SEWER)
GLY	GULLY	TFR	TAKEN FROM RECORDS
HV	HIGH VOLTAGE	UG	UNDERGROUND
IC	INSPECTION CHAMBER	UTL	UNABLE TO LIFT
IL	INVERT LEVEL	UTS	UNABLE TO SURVEY
LV	LOW VOLTAGE	UTT	UNABLE TO TRACE
MH	MANHOLE		

0 — 20 METERS

PREMIERsurveys
designed to measure

9-11 LOWATER ST
CARLTON
NOTTINGHAM
NG4 1JJ
Tel: 0115 962 2876

UNIT 3
IVORY WHARF
ELEPHANT LANE
LONDON
SE16 4JD
Tel: 0207 231 3404

www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT
RES GROUP
BEAUFORT COURT
EGG FARM LANE
KINGS LANGLEY
HERTFORDSHIRE,
WD4 8LR

JOB TITLE
KIMBERLY CLARK
NORTHFLEET
GRAVESEND
DA11 9AD

DRAWING TITLE
UNDERGROUND UTILITY SURVEY

SURVEYOR: WT/VD	DRAWN: WT/VD	CHECKED: DS
SCALE 1/200	SHEET No: SHEET 3 OF 5	
DATE MAY 23	SHEET SIZE A0	DRAWING No: 8856_UNDERGROUND_R1

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum - levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parameters.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722;174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY
1	UPDATED DRAWING	26.05.23	DS

LEGEND

- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slabs Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline-with type: BWF-BARBED WIRE FENCE, CLF-CHAIN LINK FENCE, CBF-CLOSED BOARDED FENCE, CPF-CONCRETE PANEL FENCE, IRF-IRON RAILING FENCE, OBF-OPEN BOARDED FENCE, PRF-POST & RAIL FENCE, PWF-POST & WIRE FENCE

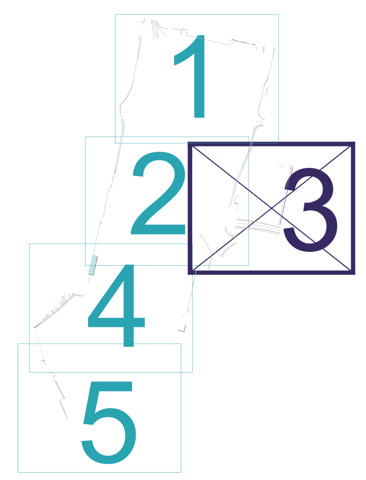
- Survey Station
- 10.00 Level Position
- THL 15.00 Threshold Level
- EVL 95.45 Eaves Level
- RGL 95.45 Ridge Level
- RFL 95.45 Roof Level
- IC CL 12.34 CTV Service Cover
- Building
- Building Canopy
- Sapling
- Bush
- Tree With Trunk Diameter(D),Spread(S) and Height(H) Measurements
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

Note: Linetypes are visible on 2D drawings only

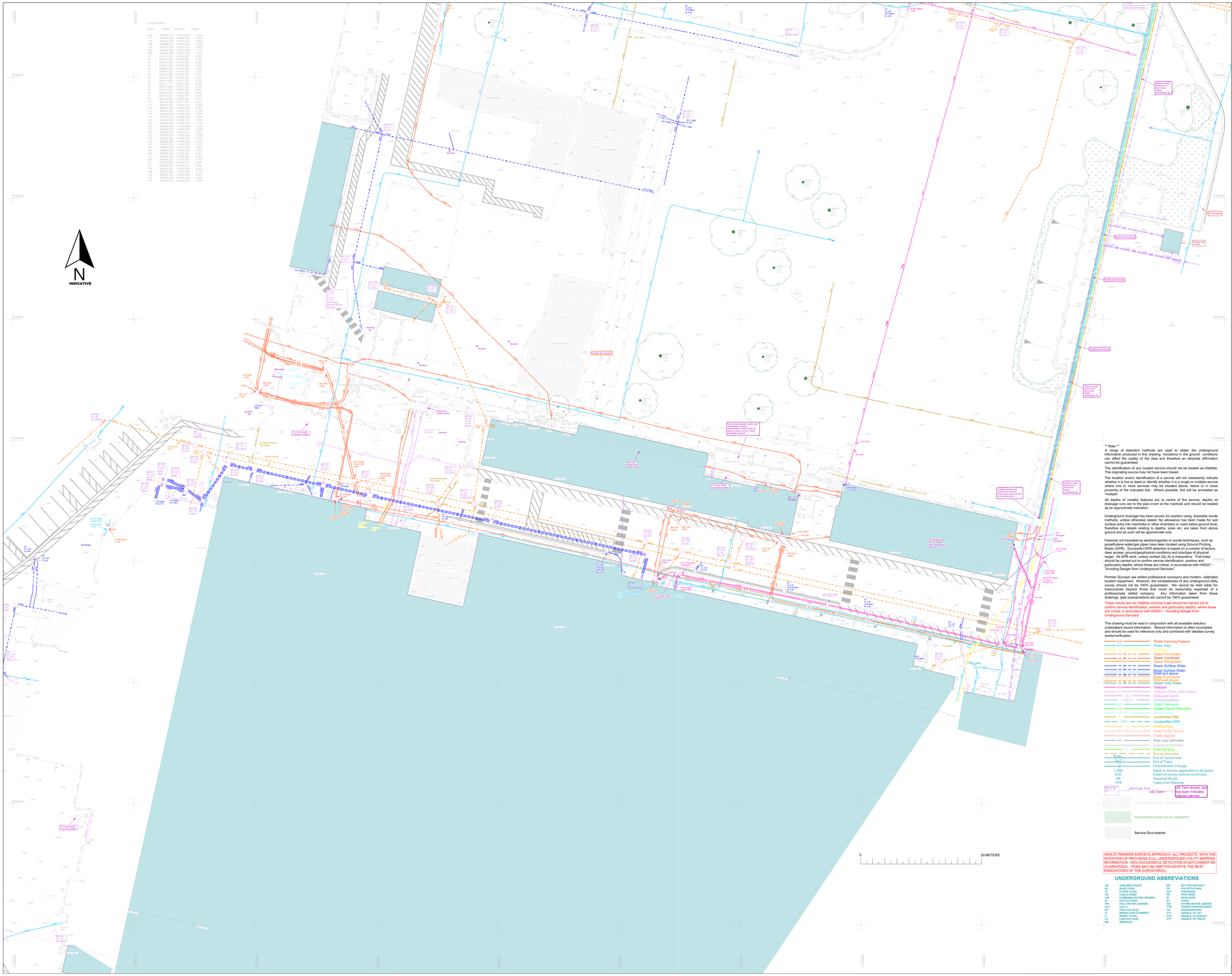
ABBREVIATIONS

A/C	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
BB	BELISHA BEACON	MH	MANHOLE
BBL	BELL BOLLARD	MKR	MARKER
BL	BASEMENT LIGHTS	NB	NOTICE BOARD
BOL	BOLLARD	NP	STREET NAME PLATE
BR	BIKE RAIL	OBF	OPEN BOARD FENCE
BS	BUS STOP POST	O/H	OVERHEAD
BSH	BUS STOP SHELTER	P	POST
BW	BRICK WALL	PB	POST BOX
BWF	BARBED WIRE FENCE	PM	PARKING METER
CAM	CAMERA	PR	PIPE RISER
CBF	CLOSED BOARDED FENCE	PRF	POST & RAIL FENCE
CBR	CRASH BARRIER	PWF	POST & WIRE FENCE
CE	CLEANING EYE	RFL	ROOF LEVEL
CL	COVER LEVEL	RG	ROAD GULLY
CLH	CELLAR HATCH	RGL	RIDGE LEVEL
CLF	CHAIN LINK FENCE	RS	ROAD SIGN
CONC.	CONCRETE	RSI	ROAD SIGN ILLUMINATED
CPF	CONCRETE PANEL FENCE	RW	RETAINING WALL
CPS	CONCRETE PAVING SLABS	RWP	RAIN WATER PIPE
CR	CABLE RISER	SAP	SAPLING
CTV	CABLE TELEVISION	SC	STOP COCK
CW	CONCRETE WALL	SL	SUMP LEVEL
DP	DOWN PIPE	SV	SLUICE VALVE
EIC	ELECTRICITY IC	SVP	SOIL VENT PIPE
EJB	ELECTRICITY JUNCTION BOX	SW	STONE WALL
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
ER	EARTHING ROD	THL	THRESHOLD LEVEL
EVL	EAVES LEVEL	TIC	TELECOMMUNICATIONS IC
FH	FIRE HYDRANT	TP	TELEPHONE POLE
FLD	FLOODLIGHT	TS	TRAFFIC SIGNAL
G	GULLY	TSCU	TS CONTROL UNIT
GRB	GRIT BOX	TSIC	TRAFFIC SIGNAL IC
GDR	GUARD RAIL	UTL	UNABLE TO LIFT
GV	GAS VALVE	UTS	UNABLE TO SURVEY
H	HEIGHT	VP	VENT PIPE
IBOL	ILLUMINATED BOLLARD	WL	WATER LEVEL
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASHOUT
LP	LAMP POST	WT	WALL TOP LEVEL

Sheet Layout
Not to scale



© Copyright Premier Surveys 2022



** Note **
A range of detection methods are used to obtain the underground information produced in this drawing. Variations in the ground conditions can affect the quality of the data and therefore an absolute affirmation cannot be guaranteed.

The identification of any located service should not be treated as infallible. The originating source may not have been traced.

The location and/or identification of a service will not necessarily indicate whether it is live or dead or identify whether it is a single or multiple service where one or more services may be situated above, below or in close proximity of the indicated line. Where possible, this will be annotated as "multiple".

All depths of metallic features are to centre of the service, depths on drainage runs are to the pipe invert at the manhole and should be treated as an approximate indication.

Underground drainage has been proven for position using traceable sonde methods, unless otherwise stated. No allowance has been made for sub surface entry into manholes or other chambers or voids below ground level, therefore any details relating to depths, sizes etc. are taken from above ground and as such will be approximate only.

Features not traceable by electromagnetic or sonde techniques, such as polyethylene water/gas pipes have been located using Ground Probing Radar (GPR). Successful GPR detection is based on a number of factors, clear access, ground/geophysical conditions and size/type of physical target. All GPR work, unless verified (QL-A) is interpretive. Trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

Premier Surveys use skilled professional surveyors and modern, calibrated location equipment. However, the completeness of any underground utility survey should not be 100% guaranteed. We cannot be held liable for inaccuracies beyond those that could be reasonably expected of a professionally skilled company. Any information taken from these drawings, pipe sizes/positions etc cannot be 100% guaranteed.

These results are not infallible and trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

This drawing must be read in conjunction with all available statutory undertakers record information. Record information is often incomplete and should be used for reference only and combined with detailed survey works/verification.

- Power Carrying Feature
- Water Main
- Gas Main
- Sewer Foul Water
- Sewer Combined
- Sewer Rising Main
- Sewer Surface Water
- Sewer Surface Water 300Ø and above
- Sewer Foul Water 300Ø and above
- Sewer/ Grey Water
- Telecom
- Telecom (Fibre Optic Cable)
- Multi-user Ducts
- Communications
- Cable Television
- Closed Circuit Television
- Unidentified EML
- Unidentified GPR
- Heating Pipe
- Road Traffic Sensor
- Traffic Signals
- Pipe (use unknown)
- Extents of Chamber
- Earthing Strap
- Survey Boundary
- End of Trench scar
- End of Trace
- Characteristic Change
- Depth to service (applicable to all types)
- Extent of survey (service continues)
- Assumed Route
- Taken from Records
- Manhole Text
- UG Text
- Inaccessible areas: obstruction
- Inaccessible areas due to vegetation
- Service Duct extents

WHILST PREMIER SURVEYS APPROACH ALL PROJECTS WITH THE INTENTION OF PROVIDING FULL UNDERGROUND UTILITY MAPPING INFORMATION, 100% SUCCESSFUL DETECTION IS NOT/CANNOT BE GUARANTEED. ITEMS MAY BE OMITTED DESPITE THE BEST ENDEAVOURS OF THE SURVEYOR(S).

UNDERGROUND ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFO
BL	BASE LEVEL	PE	POLYETHYLENE
CL	COVER LEVEL	OH	OVERHEAD
CI	CAST IRON	SI	SEWER INVERT
CW	COMBINED WATER (SEWER)	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
FW	FOUL WATER (SEWER)	SW	SURFACE WATER (SEWER)
GLY	GULLY	TFR	TAKEN FROM RECORDS
HC	HIGH VOLTAGE	UG	UNDERGROUND
IC	INSPECTION CHAMBER	UTL	UNABLE TO LIFT
IL	INVERT LEVEL	UTS	UNABLE TO SURVEY
LV	LOW VOLTAGE	UTT	UNABLE TO TRACE
MH	MANHOLE		

PREMIERsurveys
designed to measure

UNIT 3
IVORY WHARF
ELEPHANT LANE
LONDON
SE16 4JD
Tel: 0207 231 3404

9-11 LOWATER ST
CARLTON
NOTTINGHAM
NG4 1JJ
Tel: 0115 962 2876

www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT
RES GROUP
BEAUFORT COURT
EGG FARM LANE
KINGS LANGLEY
HERTFORDSHIRE,
WD4 8LR

JOB TITLE
KIMBERLY CLARK
NORTHFLEET
GRAVESEND
DA11 9AD

DRAWING TITLE
UNDERGROUND UTILITY SURVEY

SURVEYOR:	WT/VD	DRAWN:	WT/VD	CHECKED:	DS

SCALE	SHEET No:
1/200	SHEET 4 OF 5

DATE:	SHEET SIZE:	DRAWING No:
MAY 23	A0	8856_UNDERGROUND_R1

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum - levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parameters.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722,174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY
1	UPDATED DRAWING	26.05.23	DS

LEGEND

- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slabs Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline-with type:
  - BWF-BARBED WIRE FENCE
  - CLF-CHAIN LINK FENCE
  - CBF-CLOSED BOARDED FENCE
  - CPF-CONCRETE PANEL FENCE
  - HF-HEDGE FENCE
  - OBF-OPEN BOARDED FENCE
  - PRF-POST & RAIL FENCE
  - PWF-POST & WIRE FENCE

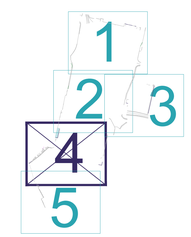
- Survey Station
- + 10.00 Level Position
- + THL 10.00 Threshold Level
- + EDL 95.45 Eaves Level
- + RGL 95.45 Ridge Level
- + RFL 95.45 Roof Level
- CTV Service Cover
- ID 12.34
- Building
- Building Canopy
- Sapling
- Bush
- H30 Tree With Trunk Diameter(D) Spread(S) and Height(H) Measurements
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

Note: Linetypes are visible on 2D drawings only

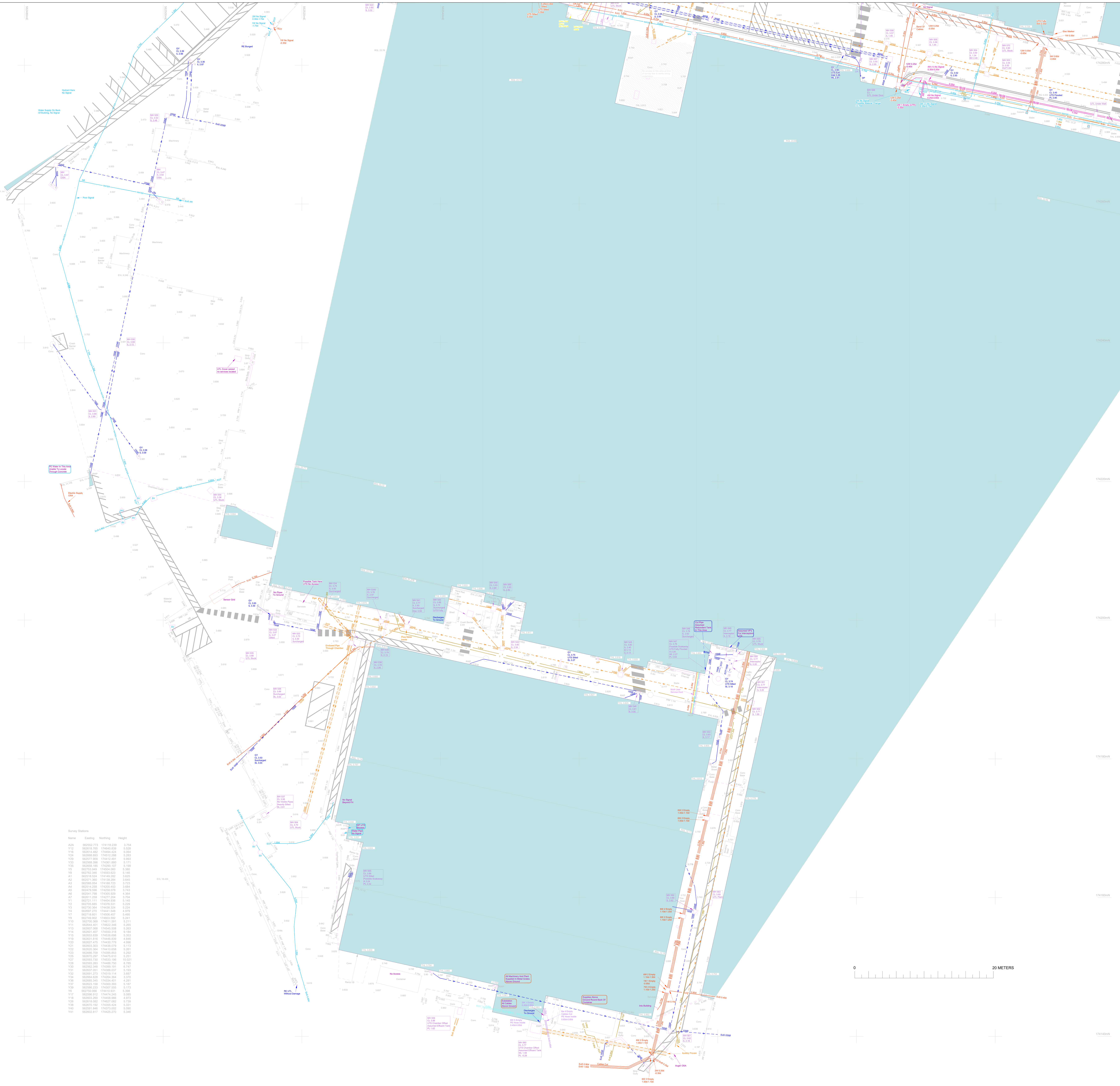
ABBREVIATIONS

AC	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
BB	BELISHA BEACON	MH	MANHOLE
BBL	BELL BOLLARD	MP	MARKER POST
BL	BASEMENT LIGHTS	NB	NOTICE BOARD
BO	BOLLARD	NP	STREET NAME PLATE
BR	BIKE RAIL	OBF	OPEN BOARD FENCE
BS	BUS STOP POST	OH	OVERHEAD
BSH	BUS STOP SHELTER	PB	PUSH BOX
BW	BRICK WALL	PB	POST BOX
CAF	CHAIN LINK WIRE FENCE	PM	PARKING METER
CAM	CAMERA	PR	PIPE RISER
CBF	CLOSED BOARDED FENCE	PRF	POST & RAIL FENCE
CBR	CRASH BARRIER	PWF	POST & WIRE FENCE
CE	CLEARING EYE	RFL	ROOF LEVEL
CH	CHIMNEY	RG	ROAD GULLY
CVH	CELLAR HATCH	RL	ROAD LEVEL
CLF	CHAIN LINK FENCE	RS	ROAD SIGN
CP	CONCRETE POST	RSI	ROAD SIGN ILLUMINATED
CPF	CONCRETE PANEL FENCE	RW	RETAINING WALL
CPS	CONCRETE PAVING SLABS	RWP	RAIN WATER PIPE
CR	CABLE RISER	SC	SAMPLE CORE
CTV	CABLE TELEVISION	SO	STOP COCK
CW	CONCRETE WALL	SL	SUMP LEVEL
DP	DOWN PIPE	SV	SLUICE VALVE
EB	ELECTRIC BOX	SVP	SOIL VENT PIPE
EJB	ELECTRICITY JUNCTION BOX	TB	TELEPHONE BOX
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
ER	EARTHING ROD	THL	THRESHOLD LEVEL
EVL	EAVES LEVEL	TP	TELECOMMUNICATIONS IC
FB	FLOWER BOX	TV	TELEPHONE POLE
FLD	FLOODLIGHT	TW	TRAFFIC WARDEN
G	GULLY	TSCU	TS CONTROL UNIT
GB	GRASS BANK	TSIC	TRAFFIC SIGNAL IC
GDR	GUARD RAIL	UP	UNKNOWN POST
GV	GAS VALVE	UTS	UNABLE TO SURVEY
H	HEIGHT	VP	VENT PIPE
IBOL	ILLUMINATED BOLLARD	WL	WATER LEVEL
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASHOUT
LP	LAMP POST	WT	WALL TOP LEVEL

Sheet Layout
Not to scale



© Copyright Premier Surveys 2022



N
INDICATIVE

** Note **

A range of detection methods are used to obtain the underground information produced in this drawing. Variations in the ground conditions can affect the quality of the data and therefore an absolute affirmation cannot be guaranteed.

The identification of any located service should not be treated as infallible. The originating source may not have been traced.

The location and/or identification of a service will not necessarily indicate whether it is live or dead or identify whether it is a single or multiple service where one or more services may be situated above, below or in close proximity of the indicated line. Where possible, this will be annotated as 'multiple'.

All depths of metallic features are to centre of the service, depths on drainage runs are to the pipe invert at the manhole and should be treated as an approximate indication.

Underground drainage has been proven for position using traceable sonde methods, unless otherwise stated. No allowance has been made for sub surface entry into manholes or other chambers or voids below ground level, therefore any details relating to depths, sizes etc, are taken from above ground and as such will be approximate only.

Features not traceable by electromagnetic or sonde techniques, such as polyethylene water/gas pipes have been located using Ground Probing Radar (GPR). Successful GPR detection is based on a number of factors, clear access, ground/geophysical conditions and size/type of physical target. All GPR work, unless verified (QL-A) is interpretive. Trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

Premier Surveys use skilled professional surveyors and modern, calibrated location equipment. However, the completeness of any underground utility survey should not be 100% guaranteed. We cannot be held liable for inaccuracies beyond those that could be reasonably expected of a professionally skilled company. Any information taken from these drawings, pipe sizes/positions etc cannot be 100% guaranteed.

These results are not infallible and trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

This drawing must be read in conjunction with all available statutory undertakers record information. Record information is often incomplete and should be used for reference only and combined with detailed survey works/verification.

- ELEC — Power Carrying Feature
- WATER — Water Main
- GAS — Gas Main
- Sewer Foul Water
- Sewer Combined
- RISINGMAIN — Sewer Rising Main
- Sewer Surface Water
- Sewer Surface Water 300Ø and above
- Sewer Foul Water 300Ø and above
- Sewer Grey Water
- TELCM — Telecom
- TEL FO — Telecom (Fibre Optic Cable)
- MU — Multi-user Ducts
- COMMS — Communications
- CATV — Cable Television
- CCTV — Closed Circuit Television
- DUCT EMPTY — Duct (Empty)
- ? — Unidentified EML
- GPR — Unidentified GPR
- H — Heating Pipe
- Road Traffic Sensor
- TLIGHT — Traffic Signals
- PIPE — Pipe (use unknown)
- Extents of Chamber
- E — Earthing Strap
- Survey Boundary
- EoSc — End of Trench scar
- EoT — End of Trace
- Characteristic Change
- 1.20d — Depth to service (applicable to all types)
- EoS — Extent of survey (service continues)
- AR — Assumed Route
- TFR — Taken from Records
- MH FW** CL**.** — Manhole Text
- UG Text — UG Text remark, text box layer indicates relevant service
- Inaccessible areas, obstruction(s)
- Inaccessible areas due to vegetation
- Service Duct extents

WHILST PREMIER SURVEYS APPROACH ALL PROJECTS WITH THE INTENTION OF PROVIDING FULL UNDERGROUND UTILITY MAPPING INFORMATION. 100% SUCCESSFUL DETECTION IS NOT/CANNOT BE GUARANTEED. ITEMS MAY BE OMITTED DESPITE THE BEST ENDEAVOURS OF THE SURVEYOR(S).

UNDERGROUND ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFO
BL	BASE LEVEL	PE	POLYETHYLENE
CL	COVER LEVEL	O/H	OVERHEAD
CR	CABLE RISER	PR	PIPE RISER
CW	COMBINED WATER (SEWER)	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
FW	FOUL WATER (SEWER)	SW	STORM WATER (SEWER)
GLY	GULLY	TFR	TAKEN FROM RECORDS
HV	HIGH VOLTAGE	UG	UNDERGROUND
IC	INSPECTION CHAMBER	UTL	UNABLE TO LIFT
IL	INVERT LEVEL	UTS	UNABLE TO SURVEY
LV	LOW VOLTAGE	UTT	UNABLE TO TRACE
MH	MANHOLE		

Survey Stations

Name	Easting	Northing	Height
A2A	562552.773	174118.239	3.754
Y12	562618.765	174640.839	5.528
Y16	562614.482	174494.424	5.064
Y24	562668.693	174512.288	5.283
Y29	562577.909	174412.491	5.993
Y33	562568.396	174361.880	5.171
Y35	562658.185	174290.107	5.199
Y5	562753.949	174504.060	5.380
Y8	562762.346	174593.623	5.146
A1	562518.524	174149.282	3.625
A2	562571.360	174138.284	3.645
A3	562585.054	174188.723	3.723
A4	562514.258	174200.453	3.684
A5	562479.596	174258.078	3.743
A6	562541.798	174305.929	4.364
A7	562611.259	174277.204	3.704
Y1	562721.111	174404.936	5.145
Y2	562705.685	174376.531	5.229
Y3	562730.364	174438.324	5.224
Y4	562697.270	174441.548	4.979
Y7	562718.601	174506.457	5.495
Y9	562749.902	174603.592	5.241
Y10	562700.369	174611.591	5.211
Y11	562644.401	174622.346	5.265
Y13	562607.068	174545.508	5.263
Y14	562601.407	174550.318	9.184
Y15	562653.839	174538.698	5.353
Y19	562631.816	174446.839	4.846
Y20	562627.475	174430.779	4.996
Y21	562603.303	174438.079	5.113
Y22	562620.364	174410.658	5.261
Y23	562686.709	174395.853	5.292
Y25	562670.297	174475.610	5.251
Y27	562593.730	174533.196	10.021
Y28	562593.283	174488.750	8.785
Y30	562562.348	174399.191	6.747
Y31	562637.051	174388.037	5.193
Y32	562691.273	174319.114	3.687
Y34	562664.628	174264.364	3.370
Y36	562685.345	174334.401	4.281
Y37	562623.158	174300.393	5.187
Y39	562586.233	174307.555	5.173
Y6	562750.066	174410.931	5.398
Y17	562596.912	174474.245	5.085
Y18	562603.260	174458.966	4.973
Y26	562618.082	174627.082	5.739
Y38	562670.192	174355.424	5.331
Y40	562591.846	174373.002	5.090
Y41	562602.817	174425.270	5.346

0 — 20 METERS

PREMIERsurveys
designed to measure

9-11 LOWATER ST
CARLTON
NOTTINGHAM
NG4 1JJ
Tel: 0115 962 2876

UNIT 3
IVORY WHARF
ELEPHANT LANE
LONDON
SE16 4JD
Tel: 0207 231 3404

www.premiersurveys.co.uk
mail@premiersurveys.co.uk

PSL REF 8856

CLIENT
RES GROUP
BEAUFORT COURT
EGG FARM LANE
KINGS LANGLEY
HERTFORDSHIRE,
WD4 8LR

JOB TITLE
KIMBERLY CLARK
NORTHFLEET
GRAVESEND
DA11 9AD

DRAWING TITLE
UNDERGROUND UTILITY SURVEY

SURVEYOR: WT/VD	DRAWN: WT/VD	CHECKED: DS
SCALE 1/200	SHEET No: SHEET 5 OF 5	
DATE MAY 23	SHEET SIZE A0	DRAWING No: 8856_UNDERGROUND_R1

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.

Vertical datum - levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parameters.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.

A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

SCALE FACTOR: 0.99992612
CENTRE POINT: 562641.722;174436.439

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY
1	UPDATED DRAWING	26.05.23	DS

LEGEND

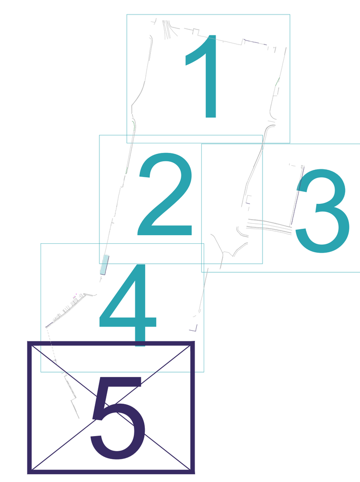
- Building Line
- Overhead Building
- Drainage Channel
- Kerb (Bottom)
- Kerb (Top)
- Drop Kerb
- Embankment
- Vegetation Line
- Concrete Line
- Slabs Line
- Tarmac Line
- Tactile Paving
- Setts Line
- Wall Line
- Fenceline-with type: BWF-BARBED WIRE FENCE, CLF-CHAIN LINK FENCE, CBF-CLOSED BOARDED FENCE, CPF-CONCRETE PANEL FENCE, IRF-IRON RAILING FENCE, OBF-OPEN BOARDED FENCE, PRF-POST & RAIL FENCE, PWF-POST & WIRE FENCE
- Survey Station
- 10.00 — Level Position
- THL 15.00 — Threshold Level
- EVL 95.45 — Eaves Level
- RGL 95.45 — Ridge Level
- RFL 95.45 — Roof Level
- IC CL 12.34 / CTV — Service Cover
- Building
- Building Canopy
- Sapling
- Bush
- Tree — With Trunk Diameter(D),Spread(S) and Height(H) Measurements
- Vegetated Area
- Bank Fall
- Gate
- Registration Mark

Note: Linetypes are visible on 2D drawings only

ABBREVIATIONS

A/C	AIR CONDITIONING UNIT	IRF	IRON RAILING FENCE
BB	BELISHA BEACON	MH	MANHOLE
BBL	BELL BOLLARD	MKR	MARKER
BL	BASEMENT LIGHTS	NB	NOTICE BOARD
BOL	BOLLARD	NP	STREET NAME PLATE
BR	BIKE RAIL	OBF	OPEN BOARD FENCE
BS	BUS STOP POST	O/H	OVERHEAD
BSH	BUS STOP SHELTER	P	POST
BW	BRICK WALL	PB	POST BOX
BWF	BARBED WIRE FENCE	PM	PARKING METER
CAM	CAMERA	PR	PIPE RISER
CBF	CLOSED BOARDED FENCE	PRF	POST & RAIL FENCE
CBR	CRASH BARRIER	PWF	POST & WIRE FENCE
CE	CLEANING EYE	RFL	ROOF LEVEL
CL	COVER LEVEL	RG	ROAD GULLY
CLH	CELLAR HATCH	RGL	RIDGE LEVEL
CLF	CHAIN LINK FENCE	RS	ROAD SIGN
CONC.	CONCRETE	RSI	ROAD SIGN ILLUMINATED
CPF	CONCRETE PANEL FENCE	RW	RETAINING WALL
CPS	CONCRETE PAVING SLABS	RWP	RAIN WATER PIPE
CR	CABLE RISER	SAP	SAPLING
CTV	CABLE TELEVISION	SC	STOP COCK
CW	CONCRETE WALL	SL	SUMP LEVEL
DP	DOWN PIPE	SV	SLUICE VALVE
EIC	ELECTRICITY IC	SVP	SOIL VENT PIPE
EJB	ELECTRICITY JUNCTION BOX	SW	STONE WALL
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
ER	EARTHING ROD	THL	THRESHOLD LEVEL
EVL	EAVES LEVEL	TIC	TELECOMMUNICATIONS IC
FH	FIRE HYDRANT	TP	TELEPHONE POLE
FLD	FLOODLIGHT	TS	TRAFFIC SIGNAL
G	GULLY	TSCU	TS CONTROL UNIT
GRB	GRIT BOX	TSIC	TRAFFIC SIGNAL IC
GDR	GUARD RAIL	UTL	UNABLE TO LIFT
GV	GAS VALVE	UTS	UNABLE TO SURVEY
H	HEIGHT	VP	VENT PIPE
IBOL	ILLUMINATED BOLLARD	WL	WATER LEVEL
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASHOUT
LP	LAMP POST	WT	WALL TOP LEVEL

Sheet Layout
Not to scale



© Copyright Premier Surveys 2022

APPENDIX C
SOUTHERN WATER SEWER RECORDS



(c) Crown copyright and database rights 2022 Ordnance Survey 100031673

Date: 10/11/22

Scale: 1:1250

Map Centre: 562803,174518

Data updated: 27/10/22

Our Ref: 1000564 - 3

Wastewater Plan A1

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2022 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Foul Outfall
Surface Water Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decantation Chamber, Dummy Manhole or Surface Water Soakaway

daniel.cole@res-group.com

Northfleet

WATER for LIFE from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0301	F	5.33	3.22	
0302	F	5.06	3.36	
1201	F	5.34	4.88	
1301	F	6.27	2.82	
1302	F	6.53	2.78	
1303	F	5.23	3.02	
1304	F	6.02	3.27	
2201	F	0.00	0.00	
2301	F	4.58	1.68	
2302	F	6.29	2.24	
2303	F	7.54	2.74	
2304	F	5.61	2.10	
2401	F	5.76	1.26	
3201	F	29.20	26.79	
3202	F	29.43	26.96	
3203	F	29.71	27.46	
3204	F	29.79	27.67	
3205	F	28.84	27.16	
3206	F	27.17	10.17	
3207	F	26.85	10.00	
3208	F	28.67	27.16	
3209	F	28.54	27.39	
3210	F	28.08	27.44	
3211	F	28.12	27.64	
3212	F	28.06	27.72	
3213	F	28.57	26.53	
3214	F	28.86	26.66	
3215	F	28.86	28.56	
3216	F	28.86	28.28	
3217	F	28.32	28.00	
3218	F	0.00	0.00	
3219	F	29.46	27.11	
3601	F	0.00	0.00	
3701	F	5.19	3.23	
3703	F	5.51	2.13	
3704	F	5.25	3.25	
4104	F	28.87	28.21	
4105	F	28.76	27.82	
4106	F	28.35	24.60	
4107	F	28.46	24.37	
4201	F	27.20	26.05	
4202	F	27.30	25.63	
4204	F	29.44	26.64	
4602	F	5.39	0.00	
4700	F	5.30	1.46	
5601	F	4.82	0.22	
5602	F	4.92	0.32	
6302	F	5.47	-0.03	
6402	F	5.26	-0.42	
6403	F	4.95	-1.25	
6404	F	5.24	0.00	
6501	F	3.97	-0.55	
6502	F	7.39	-0.13	
6601	F	5.54	-0.13	
7301	F	5.22	1.02	
7303	F	5.30	0.15	
7304	F	5.26	0.00	
7401	F	5.07	-0.93	
7402	F	5.07	-1.33	
8301	F	5.32	3.55	
9301	F	5.00	3.55	
9302	F	5.03	3.55	
9303	F	0.00	0.00	
0351	S	5.28	4.34	
0352	S	5.03	4.33	
1250	S	6.68	4.80	
1251	S	5.99	3.83	
1351	S	5.22	4.57	
1352	S	6.38	3.50	
2350	S	6.92	3.19	
2351	S	5.39	2.88	
2352	S	5.27	2.38	
2450	S	5.28	2.29	
2451	S	5.40	2.15	
5350	S	0.00	0.00	
5450	S	0.00	0.00	
7250	S	0.00	0.00	
7351	S	5.12	0.00	
8351	S	5.28	3.65	
9351	S	5.05	4.12	
9352	S	5.29	3.87	

Northfleet Lower Lighthouse
(flashing red and white)

3" CI

4" CI

THE SHORE

Path

3" CI

GRANBY ROAD

4" SI

Tanks

Tanks

Tank

Warehouse

Tank

Warehouse

6" SI

6" SI

6" SI

CRETE HALL ROAD

6" SI

PORTLAND ROAD

El Sub Sta

Tank

Tank

6" SI

6" SI

3" CI

6" CI

6" CI

180 PE

6" CI

4" CI

7" CI

SOUTH PIER

VILLAGE DRIVE

Surgery

Granby Place

Mill

Tanks

Tk

Mill

0m 100m 200m 300m

(c) Crown copyright and database rights 2022 Ordnance Survey 100031673 | Date: 10/11/22 | Scale: 1:1250 | Map Centre: 562803,174518 | Data updated: 27/10/22 | Our Ref: 1000564 - 2 | Clean Water Plan A1

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2022 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Water Main | Proposed Main | Trunk Main | Non-potable Main | Abandoned Main

Water Hydrant | Water Meter | Water Valve

daniel.cole@res-group.com

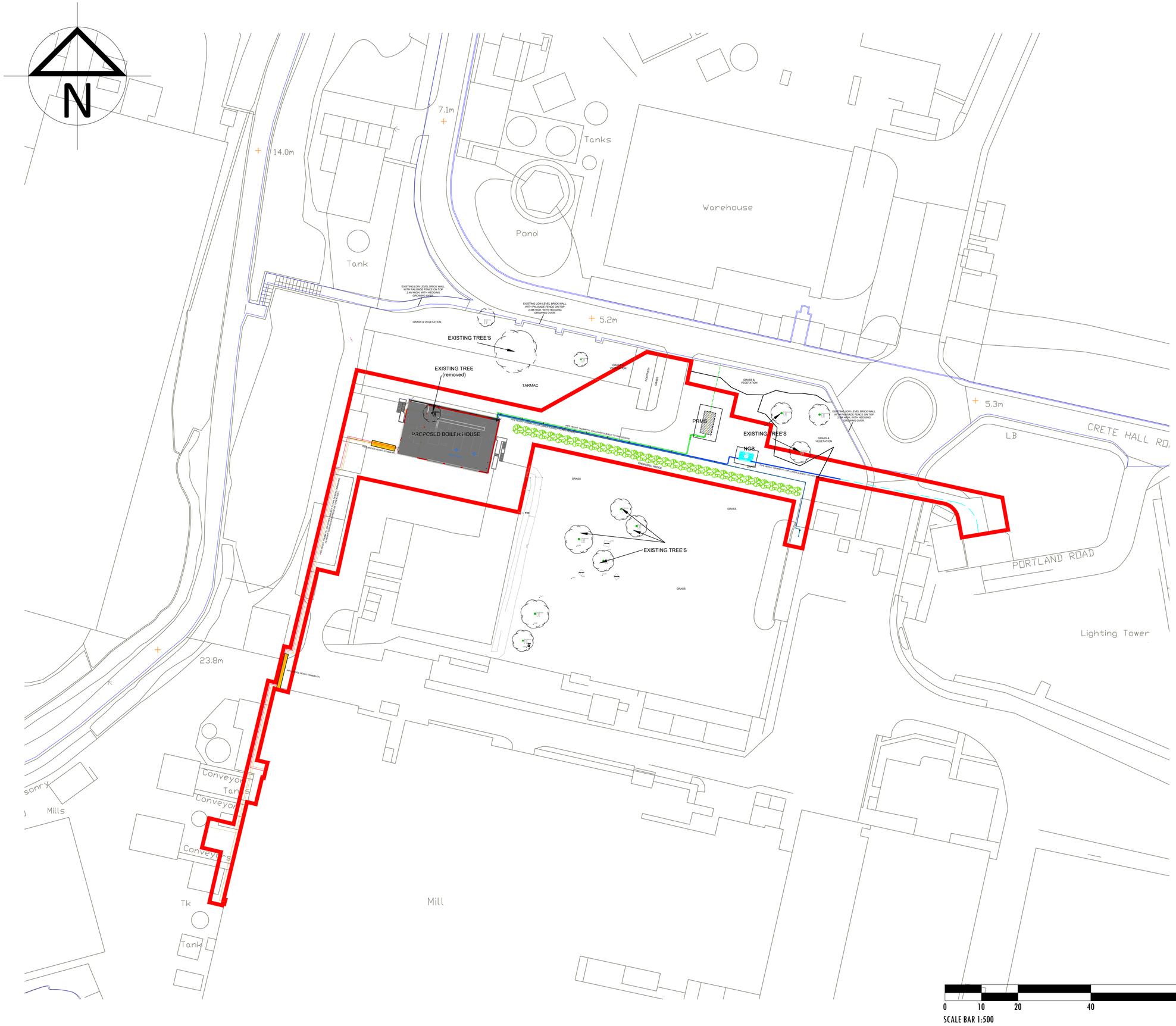
Northfleet

WATER for LIFE from Southern Water.

APPENDIX D
PROPOSED DEVELOPMENT PLANS

© COPYRIGHT - No part of this drawing is to be reproduced without permission.

ORIGINAL DRAWING SIZE - A1



SCALE BAR 1:500

0 10 20 40 80

Notes:
Site Area(in red) equates to 0.41 hectares

KEY: BELOW GROUND SERVICES

- HYDROGEN PIPELINE
- NATURAL GAS PIPELINE

KEY: ABOVE GROUND SERVICES

- HYDROGEN PIPELINE
- NATURAL GAS PIPELINE
- WATER SUPPLY
- ELECTRICAL CABLES
- STEAM SUPPLY
- CONDENSATE RETURN
- PIPE BRIDGE OVER ROAD
- PRMS — HYDROGEN PRESSURE REDUCTION & METERING SKID
- NGB — NATURAL GAS BOOSTER

KEY

- Indicates all other land within the ownership/control of the applicant
- Proposed Development Boundary

Signed for Revision:

Author:				
Checker:				
Approver:				
P2				
	JD	FN	KGP	26/03/2026
REVISION	DRAWN BY	CHECKED BY	APPROVED BY	DATE

DRAWING STATUS

AMERESCO
Green • Clean • Sustainable

GUILDFORD:
Ranger House, Walnut Tree Close,
Guildford, GU1 4UL
Tel: 020 3542 8300
LONDON:
14-16 Dowgate Hill, London, EC4R 2SU
Fax: 020 3542 8301
ameresco.com

beamconsulting

Beam Consulting
14 Bond Street
Wakefield
WF1 2QP
Tel: 01924 361653
Fax: 01924 364631

CLIENT	CLIENT PROJECT REF.
KIMBERLY-CLARK	3001954

SITE ADDRESS
NORTHFLEET MILL
CRETE HALL ROAD, NORTHFLEET
GRAVESEND, DA11 9AD

DRAWING TITLE
NORTHFLEET MILL STEAM GENERATION
BOILERS REPLACEMENT
SITE PLAN AS PROPOSED

SCALE	DNO	DRAWN BY
1:500 Original Size A1		CEPH

DRAWING NUMBER	REVISION
3001954-AME-NF-ZZ-DR-PL-6053	P2

APPENDIX D
PROPOSED DEVELOPMENT PLANS

Jacob Winfield

From: KSL Enquiries <kslenquiries@environment-agency.gov.uk>
Sent: 29 January 2026 08:07
To: Jacob Winfield
Subject: Request for information - Ref: EIR2026/04074
Attachments: EIR202604074.pdf

You don't often get email from kslenquiries@environment-agency.gov.uk. Learn why this is important

Our ref: EIR2026/04074

Your ref:

Dear Jacob Winfield,

I am writing in response to your request for information, received 23 January 2026 regarding Request for Flood risk assessment data (product 4). Customer request reference FDX4EEK9W1RD.

Our response is attached.

Yours sincerely,

Robyn Latter

KSL Area Customers and Engagement Team

Environment Agency

Please tell us how we did

To help improve your experience as a customer we are currently gathering feedback. If you would like to take part in a short customer satisfaction survey, please click the link below:

Environment Agency FOI Customer Satisfaction Survey

Dear Jacob,

Re: EIR2026/04074 - Customer request reference FDX4EEK9W1RD

Thank you for your enquiry which was received on 23 January 2026.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

You have requested a Product 4, please see Appendix 1 below detailing each product.

Your request for a Product 4 falls under the exemption in provision 6(1)(a) and (b) of the Environmental Information Regulations 2004 (EIR), and on this occasion we are not providing the information in the requested format, but in an alternative format. Further detail of the provisions under the EIR can be found in Appendix 2.

Please find below the link containing the Product 5 and 6

Thames Tidal Downriver Breach Inundation Modelling 2018
https://fcrm.quatrix.it/download/363ce4b0-18ae-4c8e-9298-6723b5efc9fb

North Kent Coast - Domain 1 2018 https://fcrm.quatrix.it/download/4cfbcf86-faf6-44b7-8ee0-9fd0780dcdb3

We have also enclosed Thames Estuary 2100 information.

We are licensing the supplied data to you under the Environment Agency Conditional Licence, details of which are included in the Quatrix link. You must first check this supporting information, to determine if the conditions of use are suitable for your purposes. If the conditions for use are not suitable for your purposes, this information is not provided with a licence for use, and the data is provided for the right to read only.

The information provided in the Quatrix link is based on the best data available as of the date of this letter. You may feel it is appropriate to contact us at regular intervals, to check whether any amendments/ improvements have been made to the data for this location. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

Requests for flood products in Kent, South London and East Sussex

Please note that we changed our process in December 2019 for responding to flood product data requests. Where appropriate, we supply the data in its raw form (Product 6), as opposed to in the Product 4 and/or 8 PDF format. This is to improve efficiency within our area of the Environment Agency, and to provide customers with a more rapid and flexible response. Where customers are unable to use the Model Output Data (Product 6), or if the data is particularly complex, we will continue to produce Product 4 and 8 formats.

The Product 4 itself is not a direct requirement in the planning process, but the data that goes into the Product 4 is required to inform your Flood Risk Assessment. This data can be extracted from the Product 6 data provided in the Quatrix link and in open data sources listed below. Instructions on how to use the appropriate data are provided on the Quatrix link.

Other flood data sources

The Flood Map for Planning is available to view and export maps for your site at: https://flood-map-for-planning.service.gov.uk/

Flood Zones 2 and 3 https://environment.data.gov.uk/dataset/04532375-a198-476e-985e-0579a0a11b47

Historic Flood Map https://data.gov.uk/dataset/historic-flood-map1

Please note that our historic flood event maps may not be comprehensive. We would therefore advise that you make further enquiries locally with specific reference to

flooding at your location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

Please be aware that flooding can come from different sources. Examples of these are:

- from rivers or the sea
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system)
- overflowing or backing up of sewer or drainage systems which have been overwhelmed
- groundwater rising up from underground aquifers

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea. The Lead Local Flood Authority is responsible for surface water flooding issues. Please contact them for further information or for details on groundwater flood risk.

Environment Agency planning guidance and pre application service.

1. Planning practice guidance - provides information about planning considerations in areas at risk of flooding https://www.gov.uk/guidance/flood-risk-and-coastal-change
2. Planning applications: assessing flood risk - information about completing flood risk assessments https://www.gov.uk/planning-applications-assessing-flood-risk
3. Site specific flood risk assessment checklist - a checklist to help ensure you have considered all the relevant factors in your flood risk assessment http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment-checklist/
4. Climate change allowance guidance - https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

We recommend that you discuss your proposals with the Local Planning Authority at the earliest opportunity. They will be able to advise you on a wide range of planning matters in addition to flood risk.

Please see our website for details on how to get planning advice from the Environment Agency, including charged-for discretionary advice https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals#when-to-consult. Our planning team can be contacted at kslplanning@environment-agency.gov.uk

If you have a new enquiry or would like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months by email at KSLE@environment-agency.gov.uk

Kind regards,

Aidan Anderson

Flood & Coastal Risk Management Officer

Partnership & Strategic Overview - South East London & North Kent

Kent, South London and East Sussex

Environment Agency |□Orchard House, London Road, Addington, West Malling, ME19 5SH

PSO.SELondonandNKent@environment-agency.gov.uk



Appendix 1

Product 4	Detailed Flood Risk Assessment Map, including flood zones, defences and storage areas, areas benefiting from defences, statutory main river designations, historic flood event outlines and more detailed information from hydraulic models (including model extents and 2D flood level data for specific points)
Product 5	Reports, including flood modelling reports, model user logs and guides, hydrology reports, etc
Product 6	Model Output Data, including product 5. • flood outlines usually provided in shapefile format • 2D grids (level (h), depth (d) velocity (v) and hazard ZKU0) usually provided in ASCII or GeoTIFF format • 1D flow and level data Requires GIS software such as ArcGIS, MapInfo, QGIS or similar.
Product 7	Calibrated and Verified Model Input Data (CaVMID), including product 5. Enables customer to re-run and/or make changes to a hydraulic model. Requires specific hydraulic modelling software such as Flood Modeller, TUFLOW, or ICM InfoWorks.
Product 8	Breach Hazard Map Provides a hazard map of breaches in PDF format including, maximum flood depth, maximum flood velocity and maximum flood hazard. Please note product 8 is not available for fluvial models.

Appendix 2

The exemption in provision 6(1)(a) and (b) of the Environmental Information Regulations 2004 (EIR) states that

'……6.—(1) Where an applicant requests that the information be made available in a particular form or format, a public authority shall make it so available, unless—

(a) it is reasonable for it to make the information available in another form or format; or

(b) the information is already publicly available and easily accessible to the applicant in another form or format……’

On this occasion we are not providing the information in the requested format, for the following reasons:

- Complying with the preference would incur a significant cost, which the public authority [The Environment Agency] cannot pass on to the requester;
- Using a Product 5/6/7 allows us to make the information available at a lower cost; and
- The impact on the available resources of the public authority [The Environment Agency], of supplying a Product 5/6/7, is therefore much less.

Jacob Winfield

From: Alison Cadge
Sent: 16 January 2025 16:51
To: Jacob Winfield
Subject: FW: KSL 305544 RL: Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

Alison Cadge
Principal Hydrologist

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company

www.rsklde.com
18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT, UK
Switchboard: +44 (0)1442 437500
Direct Dial: +44 (0)1442 437523

RSK Land & Development Engineering Ltd is registered in England at Spring Lodge, 172 Chester Road, Helsby, Cheshire WA6 0AR.
Company Number: 4723837
This e-mail is intended only for the addressee named above. As this e-mail may contain confidential or privileged information, if you are not the named addressee, or the person responsible for delivering the message to the named addressee, please notify us immediately and delete the e-mail. The content must not be disclosed to any other person, nor copies taken. Although this e-mail and any attachment are believed to be free from viruses, it is the responsibility of the recipient to ensure that they are virus free. No responsibility is accepted by LDE for any loss or damage arising in any way from their receipt. LDE reserve the right to monitor e-mails sent or received. All works/services agreed are carried out under the LDE terms and conditions that can be found at https://rsklde.com/terms-of-use/
Before printing think about your responsibility and commitment to the **ENVIRONMENT!**

From: KSL PSO SE London & North Kent <PSO.SELondonandNKent@environment-agency.gov.uk>
Sent: 14 November 2024 15:29
To: Alison Cadge <ACadge@rsk.co.uk>
Cc: KSL Enquiries <KSLE@environment-agency.gov.uk>
Subject: RE: KSL 305544 RL: Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

CAUTION: This email originated from outside the Organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon Alison,

The model data provided within the Product 4 and 8 in May 2023 is still the most up-to-date modelling we have for the Thames Tidal Downriver extents. Therefore, the Product 4 and 8 should still be suitable for input into a Flood Risk Assessment.

Kind regards,

Aidan Anderson
Flood & Coastal Risk Management Officer
Partnership & Strategic Overview | South East London & North Kent
Environment Agency | Orchard House, London Road, Addington, West Malling, ME19 5SH
E: PSO.SELondonandNKent@environment-agency.gov.uk

Creating a better place for people and wildlife

From: Alison Cadge <ACadge@rsk.co.uk>
Sent: 12 November 2024 15:20
To: KSL Enquiries <KSLE@environment-agency.gov.uk>
Subject: FW: KSL 305544 RL: Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

Dear Sir / Madam,

You provided the attached Product 4 and Product 8 datasets in May 2023, please can you advise whether these are still valid or whether you have updated the flood modelling in this location since provision of this data?

Many thanks,

Alison

Alison Cadge
Principal Hydrologist

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company

www.rsklde.com
18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT, UK
Switchboard: +44 (0)1442 437500
Direct Dial: +44 (0)1442 437523

RSK Land & Development Engineering Ltd is registered in England at Spring Lodge, 172 Chester Road, Helsby, Cheshire WA6 0AR.
Company Number: 4723837
This e-mail is intended only for the addressee named above. As this e-mail may contain confidential or privileged information, if you are not the named addressee, or the person responsible for delivering the message to the named addressee, please notify us immediately and delete the e-mail. The content must not be disclosed to any other person, nor copies taken. Although this e-mail and any attachment are believed to be free from viruses, it is the responsibility of the recipient to ensure that they are virus free. No responsibility is accepted by LDE for any loss or damage arising in any way from their receipt. LDE reserve the right to monitor e-mails sent or received. All works/services agreed are carried out under the LDE terms and conditions that can be found at https://rsklde.com/terms-of-use/
Before printing think about your responsibility and commitment to the **ENVIRONMENT!**

From: KSL Enquiries <KSLE@environment-agency.gov.uk>
Sent: 15 May 2023 08:50
To: Alison Cadge <ACadge@rsk.co.uk>
Subject: KSL 305544 RL: Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

Dear Alison,

RE: KSL 305544 RL - Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

Thank you for your enquiry which was received on 31 March 2023.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Please note that we have changed our process for responding to flood product data requests, in that where appropriate we supply the data in its raw form as opposed to in the Product 4 and 8 PDF formats. This is to improve efficiency within our area of the Environment Agency and to provide customers with a more rapid and flexible response. Where customers are unable to use the Model Output Data (Product 6), or if the

data is particularly complex, we will continue to produce Product 4 and 8 formats, until an alternative process is confirmed.

Please find attached the Product 4 and 8.

Please refer to the Open Government Licence which explains the permitted use of this information.

Please be aware that the Environment Agency supply data, but we do not interpret it for use in a Flood Risk Assessment. Flood Risk Assessment's should be completed by a suitably competent and qualified person.

Surface water flooding maps can be downloaded from our Partner Data Catalogue (http://environment.data.gov.uk/ds/partners/#/partners/login). The Lead Local Flood Authority is responsible for surface water flooding issues. Please contact them for further information or for details on groundwater flood risk.

You may be interested in the following guidance / information publically available:

- **'Planning Practice Guidance'** - provides information about planning considerations in areas at risk of flooding. http://planningguidance.planningportal.gov.uk/
- **'Planning applications: assessing flood risk'** - information about completing Flood Risk Assessments. https://www.gov.uk/planning-applications-assessing-flood-risk
- **'Site specific flood risk assessment: Checklist'** – a checklist to help ensure you have considered all the relevant factors in your flood risk assessment. http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment-checklist/

Please refer to https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances for Climate Change allowance guidance.

We recommend that you discuss your proposals with the Local Planning Council at the earliest opportunity. They will be able to advise you on a wide range of planning matters in addition to flood risk.

Environment Agency pre application service

We are able to supply a preliminary opinion outlining the key environmental issues and opportunities which is free. For more detailed advice, guidance, review of draft report, meetings etc we can organise a cost recovery agreement which is chargeable.

We encourage early discussions to ensure environmental issues and opportunities are considered early in the planning process. If you would like a free preliminary opinion or our cost recovery service please complete the form and email back to kslplanning@environment-agency.gov.uk.

If you have any further queries or if you'd like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months.

Kind regards,

Robyn

Robyn Latter
Customer & Engagement Officer
Customer and Engagement Team – Kent, South London and East Sussex Area
Environment Agency | Orchard House, London Road, Addington, West Malling, ME19 5SH | KSLE@environment-agency.gov.uk | 0208 474 6848

From: Alison Cadge <ACadge@rsk.co.uk>
Sent: 25 April 2023 11:21
To: KSL PSO SE London & North Kent <PSO.SELondonandNKent@environment-agency.gov.uk>
Cc: KSL Enquiries <KSLE@environment-agency.gov.uk>
Subject: RE: KSL 305544 RL: Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

Dear Layo,

Thank you for providing the Product 5 and 6 data. Unfortunately we don't have the capability or resource to extract the required information ourselves. Would it be possible to provide the information in a Product 4/8 format please?

Many thanks,

Alison

Alison Cadge
Principal Hydrologist

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company
www.rsklde.com

From: KSL PSO SE London & North Kent <PSO.SELondonandNKent@environment-agency.gov.uk>
Sent: 06 April 2023 13:59
To: Alison Cadge <ACadge@rsk.co.uk>
Cc: KSL Enquiries <KSLE@environment-agency.gov.uk>
Subject: RE: KSL 305544 RL: Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

Dear Alison,

Re: KSL 305544 RL: Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

Thank you for your enquiry which was received on 31 March 2023.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

You have requested a Product 4, please see Appendix 1 below detailing each product.

Your request for a Product 4 falls under the exemption in provision 6(1)(a) and (b) of the Environmental Information Regulations 2004 (EIR), and on this occasion we are not providing the information in the requested format, but in an alternative format. Further detail of the provisions under the EIR can be found in Appendix 2.

Please find below the link containing the Product 5 and 6

Thames Tidal Downriver Breach Inundation Modelling 2018 https://defra.sharefile.com/d-s7fa7e1d01734d5a9

We have also enclosed Thames Estuary 2100 information.

We are licensing the supplied data to you under the Environment Agency Conditional Licence, details of which are included in the ShareFile link. You must first check this supporting information, to determine if the conditions of use are suitable for your purposes. If the conditions for use are not suitable for your purposes, this information is not provided with a licence for use, and the data is provided for the right to read only.

The information provided in the ShareFile link is based on the best data available as of the date of this letter. You may feel it is appropriate to contact us at regular intervals, to check whether any amendments/ improvements have been made to the data for this location. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

Requests for flood products in Kent, South London and East Sussex

Please note that we changed our process in December 2019 for responding to flood product data requests. Where appropriate, we supply the data in its raw form (Product 6), as opposed to in the Product 4 and/or 8 PDF format. This is to improve efficiency within our area of the Environment Agency, and to provide customers with a more rapid and flexible response. Where customers are unable to use the Model Output Data (Product 6), or if the data is particularly complex, we will continue to produce Product 4 and 8 formats.

The Product 4 itself is not a direct requirement in the planning process, but the data that goes into the Product 4 is required to inform your Flood Risk Assessment. This data can be extracted from the Product 6 data provided in the ShareFile link and in open data sources listed below. Instructions on how to use the appropriate data are provided on the ShareFile link.

Other flood data sources

The Flood Map for Planning is available to view and export maps for your site at: https://flood-map-for-planning.service.gov.uk/

Flood Zone 3 https://data.gov.uk/dataset/flood-map-for-planning-rivers-and-sea-flood-zone-3
Flood Zone 2 https://data.gov.uk/dataset/flood-map-for-planning-rivers-and-sea-flood-zone-2
Historic Flood Map https://data.gov.uk/dataset/historic-flood-map1

Please note that our historic flood event maps may not be comprehensive. We would therefore advise that you make further enquiries locally with specific reference to flooding at your location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

Please be aware that flooding can come from different sources. Examples of these are:
- from rivers or the sea
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system)
- overflowing or backing up of sewer or drainage systems which have been overwhelmed
- groundwater rising up from underground aquifers

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea. The Lead Local Flood Authority is responsible for surface water flooding issues. Please contact them for further information or for details on groundwater flood risk.

Defence Information

Asset type / Description – Wall

Location – Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet,

Maintainer – Environment Agency

Standard of protection – 1000

Asset protection type – Tidal

Condition – 3

Build date – 11/10/2012

Date of next inspection – 20/07/2023

Plans for improvement / future schemes – Unknown

Environment Agency planning guidance and pre application service.

- Planning practice guidance - provides information about planning considerations in areas at risk of flooding https://www.gov.uk/guidance/flood-risk-and-coastal-change
- Planning applications: assessing flood risk - information about completing flood risk assessments https://www.gov.uk/planning-applications-assessing-flood-risk
- Site specific flood risk assessment checklist - a checklist to help ensure you have considered all the relevant factors in your flood risk assessment http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment-checklist/
- Climate change allowance guidance - https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

We recommend that you discuss your proposals with the Local Planning Authority at the earliest opportunity. They will be able to advise you on a wide range of planning matters in addition to flood risk.

Please see our website for details on how to get planning advice from the Environment Agency, including charged-for discretionary advice https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals#when-to-consult. Our planning team can be contacted at kslplanning@environment-agency.gov.uk

If you have a new enquiry or would like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months by email at KSLE@environment-agency.gov.uk

Regards,

Layo Oluwole
Flood & Coastal Risk Management Officer
Partnership & Strategic Overview - South East London & North Kent
Kent, South London and East Sussex Area
Environment Agency | Orchard House, London Road, Addington, West Malling, ME19 5SH

PSO.SELondonandNKent@environment-agency.gov.uk





Appendix 1

Product 4	Detailed Flood Risk Assessment Map, including flood zones, defences and storage areas, areas benefiting from defences, statutory main river designations, historic flood event outlines and more detailed information from hydraulic models (including model extents and 2D flood level data for specific points)
Product 5	Reports, including flood modelling reports, model user logs and guides, hydrology reports, etc
Product 6	Model Output Data, including product 5. • flood outlines usually provided in shapefile format • 2D grids (level (h), depth (d) velocity (v) and hazard ZKU0) usually provided in ASCII or GeoTIFF format • 1D flow and level data Requires GIS software such as ArcGIS, MapInfo, QGIS or similar.
Product 7	Calibrated and Verified Model Input Data (CaVMID), including product 5. Enables customer to re-run and/or make changes to a hydraulic model. Requires specific hydraulic modelling software such as Flood Modeller, TUFLOW, or ICM InfoWorks.
Product 8	Breach Hazard Map Provides a hazard map of breaches in PDF format including, maximum flood depth, maximum flood velocity and maximum flood hazard. Please note product 8 is not available for fluvial models.

Appendix 2

The exemption in provision 6(1)(a) and (b) of the Environmental Information Regulations 2004 (EIR) states that

'……6.—(1) Where an applicant requests that the information be made available in a particular form or format, a public authority shall make it so available, unless—
(a) it is reasonable for it to make the information available in another form or format; or
(b) the information is already publicly available and easily accessible to the applicant in another form or format……'

On this occasion we are not providing the information in the requested format, for the following reasons:

- Complying with the preference would incur a significant cost, which the public authority [The Environment Agency] cannot pass on to the requester;
- Using a Product 5/6/7 allows us to make the information available at a lower cost; and
- The impact on the available resources of the public authority [The Environment Agency], of supplying a Product 5/6/7, is therefore much less.

From: Alison Cadge <ACadge@rsk.co.uk>
Sent: 31 March 2023 16:36
To: KSL Enquiries <KSLE@environment-agency.gov.uk>
Subject: Product 4 flood data request - Kimberley-Clark Industrial Estate, Gravesend

Dear Sir / Madam,

Please could I request a Product 4 flood risk dataset for the site shown on the attached plan? The address is Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend DA11 9AD, NGR TQ 62643 74342.

Specifically we would like to request:

- Floodplain modelled flood levels and extents for a range of return period events including a climate change allowance
- Modelled in-channel flood levels and flows for a range of return period events
- Details of any flood defences benefitting the site
- Any breach modelled flood levels / extents where applicable
- Details of any historical flooding affecting the site

Many thanks,

Alison

Alison Cadge
Principal Hydrologist

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company

www.rsklde.com
18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT, UK
Switchboard: +44 (0)1442 437500
Direct Dial: +44 (0)1442 437523

RSK Land & Development Engineering Ltd is registered in England at Spring Lodge, 172 Chester Road, Helsby, Cheshire WA6 0AR.
Company Number: 4723837
This e-mail is intended only for the addressee named above. As this e-mail may contain confidential or privileged information, if you are not the named addressee, or the person responsible for delivering the message to the named addressee, please notify us immediately and delete the e-mail. The content must not be disclosed to any other person, nor copies taken. Although this e-mail and any attachment are believed to be free from viruses, it is the responsibility of the recipient to ensure that they are virus free. No responsibility is accepted by LDE for any loss or damage arising in any way from their receipt. LDE reserve the right to monitor e-mails sent or received. All works/services agreed are carried out under the LDE terms and conditions that can be found at https://rsklde.com/terms-of-use/
Before printing think about your responsibility and commitment to the **ENVIRONMENT!**

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes. [WARNING: This email originated outside of RSK. DO NOT CLICK links, attachments or respond unless you recognise the sender and are certain that the content is safe]
Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes. [WARNING: This email originated outside of RSK. DO NOT CLICK links, attachments or respond unless you recognise the sender and are certain that the content is safe]
Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

Product 4 (Detailed Flood Risk) for: Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD
Requested by: Alison Cadge
Reference: KSL 305544 RL
Date: 12th May 2023

Contents

- Flood Map for Planning (Rivers and Sea)
- Flood Map Extract
- Thames Estuary 2100 (TE2100)
- Thames Tidal Downriver Breach Inundation Modelling 2018
- Thames Tidal Downriver Breach Inundation Modelling Map
- Site Node Locations Map
- Defence Details
- Recorded Flood Events Data
- Recorded Flood Events Outlines Map
- Additional Information

The information provided is based on the best data available as of the date of this letter.

You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements to the data for this location have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

Please refer to the Open Government Licence which explains the permitted use of this information.

Environment Agency, Orchard House, Endeavour Park, London Road, West Malling, ME19 5SH
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Flood Map for Planning (Rivers and Sea)

The Flood Map:

Our Flood Map shows the natural floodplain for areas at risk from river and tidal flooding. The floodplain is specifically mapped ignoring the presence and effect of defences (including any tidal barriers). Although flood defences reduce the risk of flooding they cannot completely remove that risk as they may be over topped or breached during a flood event.

The Flood Map indicates areas with a 1% (0.5% in tidal areas), Annual Exceedance Probability (AEP) - the probability of a flood of a particular magnitude, or greater, occurring in any given year, and a 0.1% AEP of flooding from rivers and/or the sea in any given year. In addition, the map also shows the location of some flood defences.

The Flood Map is intended to act as a guide to indicate the potential risk of flooding. When producing it we use the best data available to us at the time and also take into account historic flooding and local knowledge. The Flood Map is updated on a quarterly basis to account for any amendments required. These amendments are then displayed on the internet at https://www.gov.uk/check-flood-risk

At this Site:

The Flood Map shows that this site lies within the outline of Flood Zone 3. This zone comprises land assessed as having a 0.5% (1 in 200) or greater annual probability of tidal flooding.

Enclosed is an extract of our Flood Map which shows this information for your area.

Method of production

The Flood Map at this location has been derived using detailed modelling of the tidal River Thames through the North Kent Coastal Modelling study completed in 2018 by JBA Consulting.

Environment Agency, Orchard House, Endeavour Park, London Road, West Malling, ME19 5SH
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Flood Map for Planning centred on DA11 9AD created 12th May 2023 [Ref: KSL 305544 RL]



Environment Agency

Scale 1: 10,000

Legend

- Site Location
- TE2100 Model Nodes
- Main Rivers
- Flood Zone 3
- Flood Zone 2
- Flood Defences

Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of occurring each year
- or from a river with a 1% or greater chance of occurring each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

© Environment Agency copyright and / or database rights 2023. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2023.
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Thames Estuary 2100 (TE2100)

You have requested in-channel flood levels for the tidal river Thames. These have been taken from the Thames Estuary 2100 study completed by HR Wallingford in 2008. The modelled node closest to your site is **3.24**; the locations of nearby nodes are also shown on the enclosed map.

Details about the TE2100 plan

The Plan sets out how the Environment Agency and our partners can work together to manage tidal flood risk, from now until the end of the century. The Plan covers the Thames Estuary from Teddington in the west to the mouth of the estuary at Shoeburyness (north bank) and Sheerness (south bank) in the east. It is an adaptive plan for managing the estuary, including the tidal defence system, until 2100 so that current standards of flood protection are maintained or improved taking into account climate change effects e.g. sea level rise. The Plan has 3 phases of activity:

- Until 2035 – maintain and improve current defences, safeguard areas required for future improvements, and monitor climate change indicators.
- 2035-2050 – raise existing walls, defences & smaller barriers whilst reshaping the riverside environment.
- 2050-2100 – determine and implement an option for the future of the Thames Barrier, and adapt other defences as required to work alongside this to protect the estuary.

The Thames Estuary 2100 Plan can be found at: https://www.gov.uk/government/publications/thamesestuary-2100-te2100

Details about the TE2100 in-channel levels

The TE2100 in-channel levels take into account operation of the Thames Barrier when considering future levels. The Thames Barrier requires regular maintenance and with additional closures the opportunity for maintenance will be reduced. When this happens, river levels – for which the Barrier would normally shut for the 2008 epoch – will have to be allowed through to ensure that the barrier is not shut too often. For this reason, levels upriver of the barrier will increase and the tidal walls will need to be raised to match.

Where to find the in-channel levels and defence crest level data from the 2008 TE2100 study

The TE2100 in-channel levels and defence crest levels documents can be downloaded from ShareFile at the following link:
https://ea.sharefile.com/d-s5e56401472448219331e780c91c4ac2

- Downriver of the Thames Barrier is detailed within Table 7.1 (page 56) of the document titled '*Thames Estuary 2100, Improvements to Flood Risk Management System, Design Water Levels and Future Defence Crest Levels, May 2015*'. Defence raising for other barrier options can also ben found the document titled '*Thames Estuary 2100, Phase 3 Studies, Topic 1.5, Phase 3 Set 2 Estuary Wide Options Hydraulic modelling, December 2008'*

Environment Agency, Orchard House, Endeavour Park, London Road, West Malling, ME19 5SH
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Thames Tidal Downriver Breach Inundation Modelling - 2018

The table below displays site-specific modelled flood levels at your site. These have been taken from the Downriver Breach Inundation Modelling Study 2018 completed by Atkins Ltd. in May 2018.

We have developed a modelling approach where all downriver breach locations along the Thames are equitably modelled, to ensure a consistent approach across London. This modelling simulates continuous tidal breaches along the entire extent of the Thames between the Thames Barrier and east of Gravesend on the south bank and east of Tilbury on the north bank. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width.

Based on the 2008 TE2100 in-channel levels, the 0.5% (1 in 200 year) and 0.1% (1 in 1000 year) annual probability of exceedance tidal events were modelled for all breach locations downriver of the Thames Barrier. These were modelled for the 2014 year epoch (current year), as well as 2115 epoch which include allowances for climate change.

This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within London.

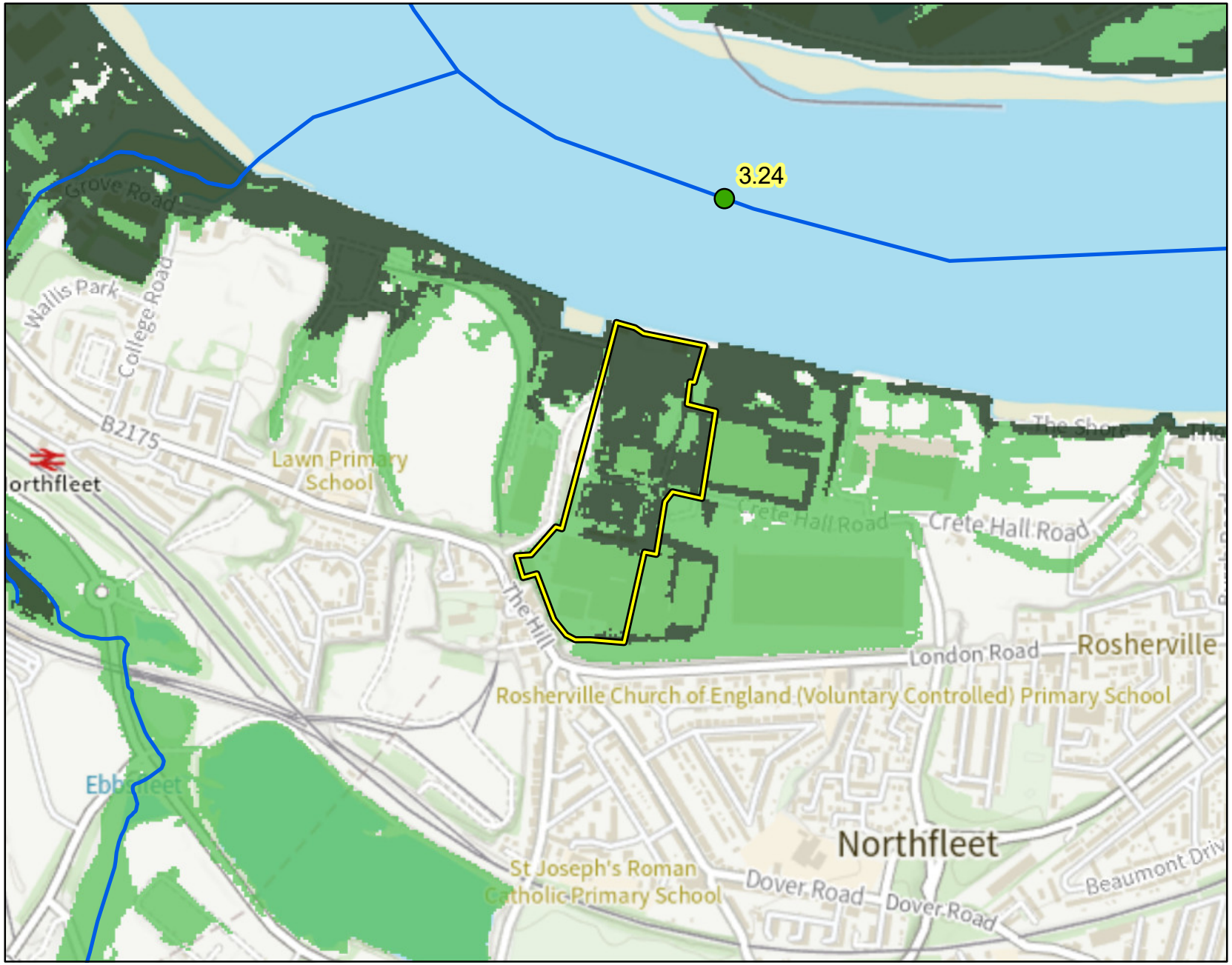
	National Grid Reference		Modelled levels in mAODN for 0.5% AEP		Modelled levels in mAODN for 0.1% AEP	
Node	Easting	Northing	2014	2115	2014	2115
1	562638	174658	5.71	6.08	5.78	6.37
2	562773	174622	5.40	5.99	5.58	6.40
3	562748	174516	5.24	5.99	5.53	6.40
4	562792	174503	5.21	5.99	5.53	6.40
5	562771	174375	5.21	5.99	5.46	6.40
6	562715	174381	5.28	5.99	5.48	6.40
7	562688	174273	3.59	5.99	4.32	6.40
8	562635	174113	Nil return	5.98	4.32	6.40
9	562550	174119	Nil return	5.99	4.32	6.40
10	562494	174248	Nil return	5.99	4.32	6.40
11	562547	174302	Nil return	5.99	4.32	6.40

Environment Agency, Orchard House, Endeavour Park, London Road, West Malling, ME19 5SH
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

12	562593	174476	Nil return	Nil return	Nil return	Nil return
13	562674	174549	5.47	6.02	5.65	6.40
14	562631	174345	Nil return	5.99	5.30	6.40

Environment Agency, Orchard House, Endeavour Park, London Road, West Malling, ME19 5SH
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Downriver Breach Modelling Map centred on DA11 9AD created 12th May 2023 [Ref: KSL 305544 RL]



Environment Agency

Scale 1: 10,000

Legend

- Site Location
- TE2100 Model Nodes
- Main Rivers

Downriver 0.5% AEP Outlines

Epoch

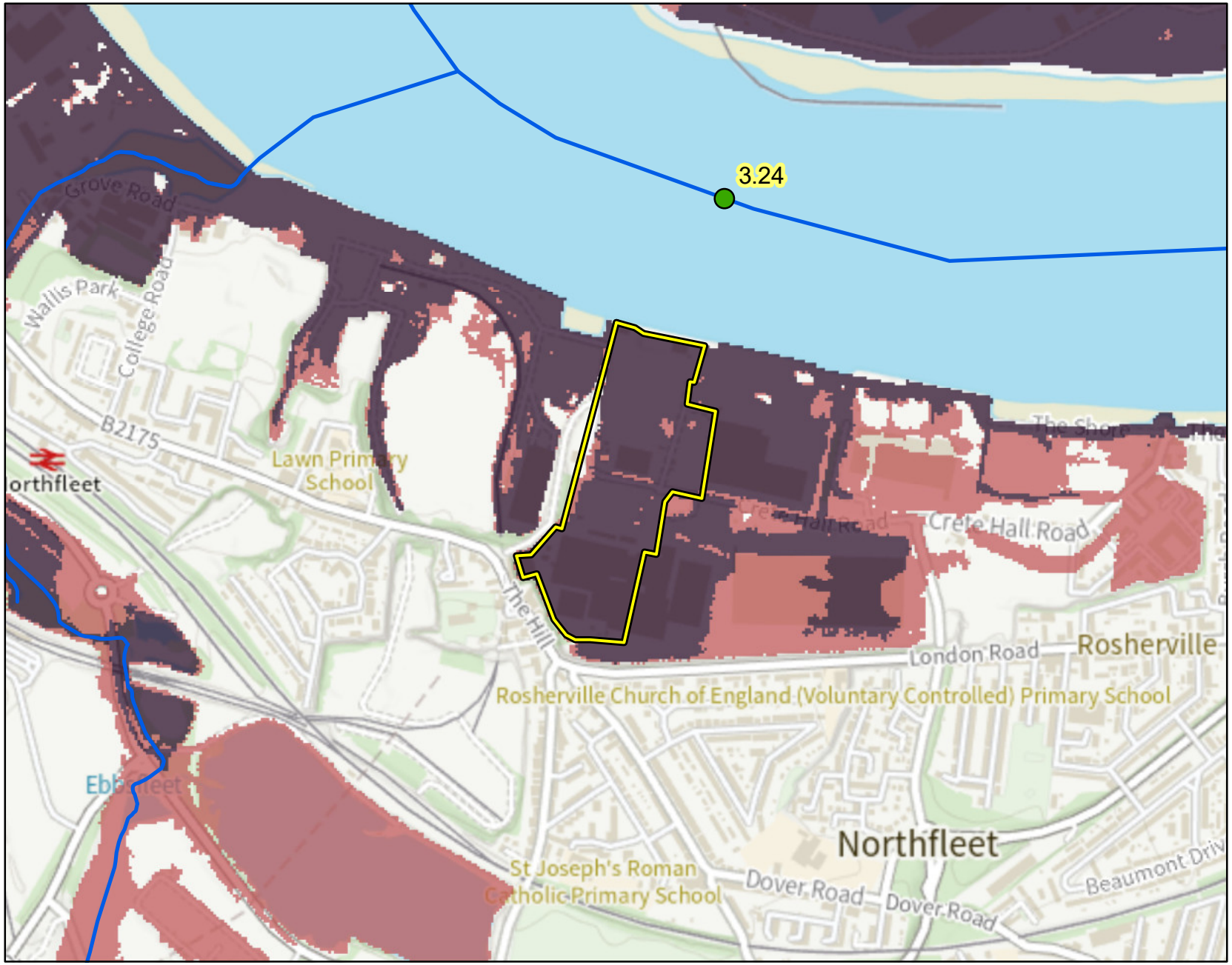
- 2014 (Current year)
- 2115

Thames Tidal Downriver Breach Inundation Modelling 2018

A modelled representation of all tidal breach locations along the Thames from the Thames Barrier to Gravesend, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width.
The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epoch 2115.

© Environment Agency copyright and / or database rights 2023. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2023.
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Downriver Breach Modelling Map centred on DA11 9AD created 12th May 2023 [Ref: KSL 305544 RL]



Environment Agency

Scale 1: 10,000

N
W
E
S

Legend

- Site Location
- TE2100 Model Nodes
- Main Rivers

Downriver 0.1% AEP Outlines

Epoch

- 2014 (Current year)
- 2115

Thames Tidal Downriver Breach Inundation Modelling 2018

A modelled representation of all tidal breach locations along the Thames from the Thames Barrier to Gravesend, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width.
The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epoch 2115.

© Environment Agency copyright and / or database rights 2023. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2023.
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Node Location Map centred on DA11 9AD created 12th May 2023 [Ref: KSL 305544 RL]



Environment Agency

Scale 1: 5,000

N
W
E
S

Legend

- Node Point Locations
- Site Location
- Main Rivers

© Environment Agency copyright and / or database rights 2023. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2023.
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Defence Details

Asset type / Description – Wall

Location – Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet,

Maintainer – Environment Agency

Standard of protection – 1000

Asset protection type – Tidal

Condition – 3

Build date – 11/10/2012

Date of next inspection – 20/07/2023

Plans for improvement / future schemes – Unknown

For more information on your rights and responsibilities as a riparian owner, please see our document 'Living on the edge' found on our website at:

https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities

Areas Benefiting from Flood Defences

The Environment Agency has taken the decision to retire this dataset and remove it from the Flood Map for Planning portal. This is because we have determined that it no longer meets the customer needs and creates a false sense of security for users.

To understand the long-term risk of flooding to an area, you can use the Check Your Long Term Flood Risk portal: this will provide an understanding of flood risk from rivers and sea, taking into account the presence and condition of defences, and other sources of flood risk such as from surface water and reservoirs.

Environment Agency, Orchard House, Endeavour Park, London Road, West Malling, ME19 5SH
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Recorded Flood Events Data

We hold records of historic flood events from rivers and the sea. Information on the floods that may have affected the area local to your site is provided below and in the enclosed map (if relevant).

Flood Event Data

1953 – The site was within approximately 700m of the tidal flooding, due to a storm surge in the North Sea, on the night of the 31st January into the morning of 1st February. An approximate level in the Thames at the time was 4.90 m AODN.

Due to the fact that our records are not comprehensive, we would advise that you make further enquiries locally with specific reference to flooding at this location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

We map flooding to land, not individual properties. Our historic flood event record outlines are an indication of the geographical extent of an observed flood event. Our historic flood event outlines do not give any indication of flood levels for individual properties. They also do not imply that any property within the outline has flooded internally.

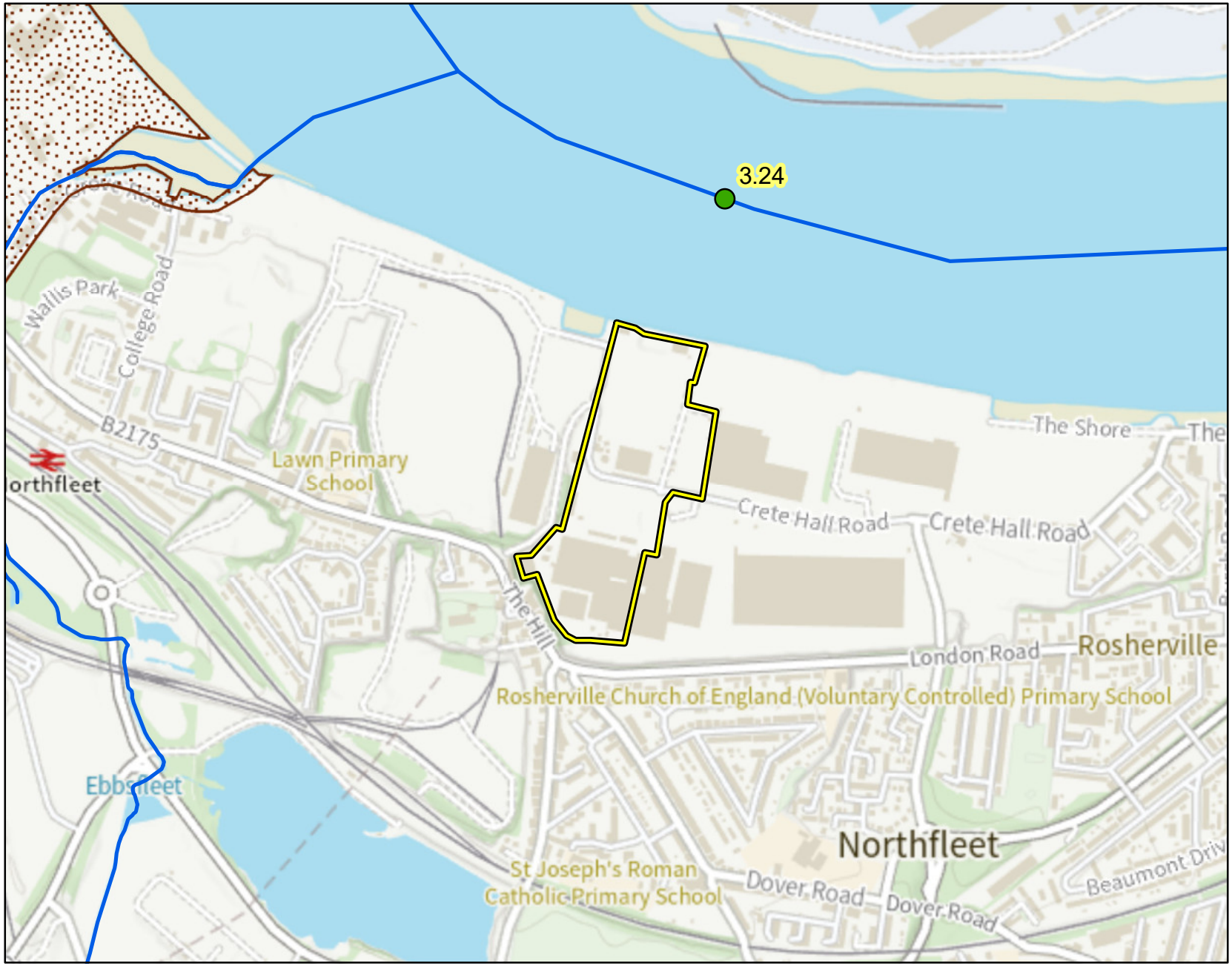
Please be aware that flooding can come from different sources. Examples of these are:

- from rivers or the sea;
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system);
- overflowing or backing up of sewer or drainage systems which have been overwhelmed,
- groundwater rising up from underground aquifers

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea. However you should be aware that in recent years, there has been an increase in flood damage caused by surface water flooding and drainage systems that have been overwhelmed.

Environment Agency, Orchard House, Endeavour Park, London Road, West Malling, ME19 5SH
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Historic Flood Map centred on DA11 9AD created 12th May 2023 [Ref: KSL 305544 RL]



Environment Agency

Scale 1: 10,000

N
W
E
S

Legend

- Site Location
- TE2100 Model Nodes
- Main Rivers
- Jan 1953 Flood Outline

© Environment Agency copyright and / or database rights 2023. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2023.
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Additional Information

Information Warning - OS background mapping

The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.

Environment Agency planning guidance and pre application service

- Planning Practice Guidance - provides information about planning considerations in areas at risk of flooding. https://www.gov.uk/guidance/flood-risk-and-coastal-change
- Planning applications: assessing flood risk - information about completing Flood Risk Assessments. https://www.gov.uk/planning-applications-assessing-flood-risk
- Site specific flood risk assessment: Checklist – a checklist to help ensure you have considered all the relevant factors in your flood risk assessment. http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment-checklist/
- Climate change allowance guidance https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

We recommend that you discuss your proposals with the Local Planning Authority at the earliest opportunity. They will be able to advise you on a wide range of planning matters in addition to flood risk.

Please see our website for details on how to get planning advice, including charged-for discretionary advice, from the Environment Agency https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals#when-to-consult. Our planning team can be contacted at kslplanning@environment-agency.gov.uk

You should also consult the Strategic Flood Risk Assessment and flood risk local plan policies produced by your local planning authority.

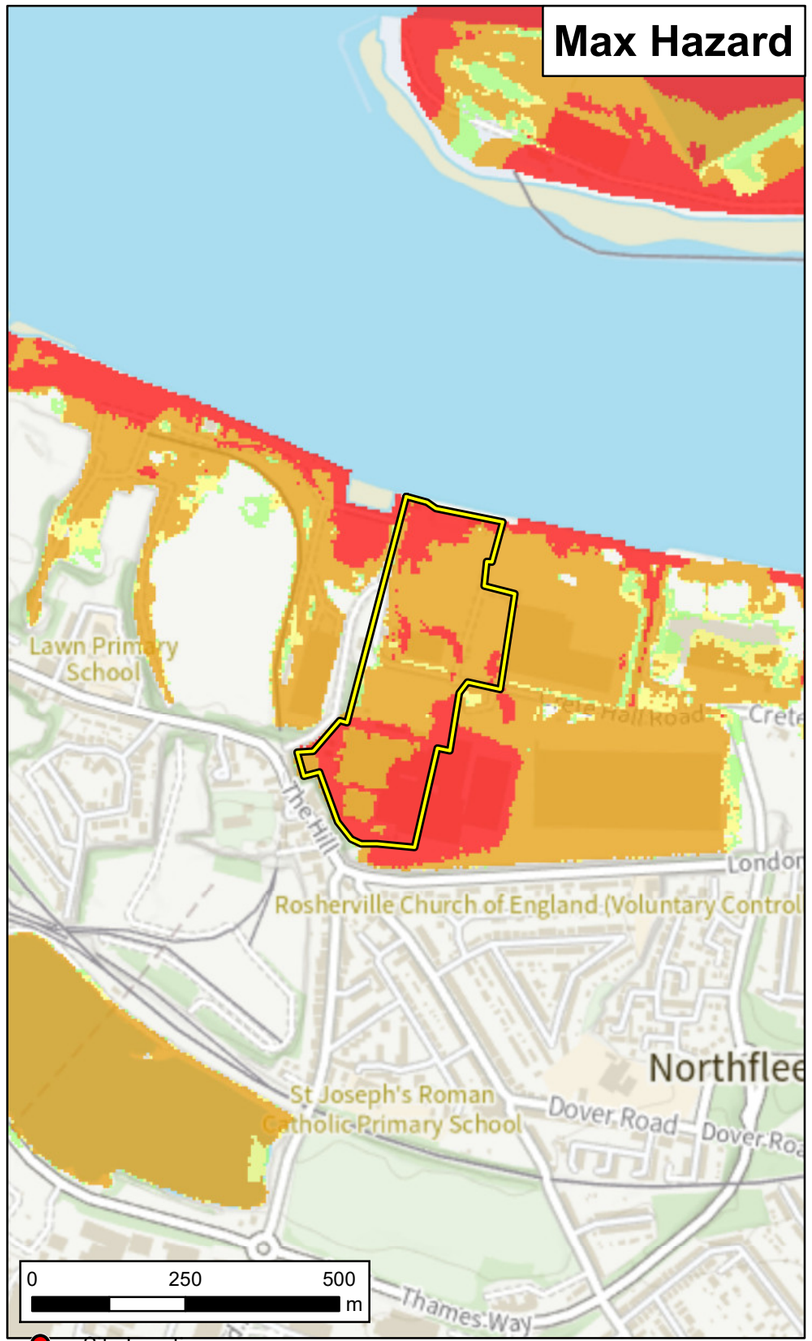
You should note that:

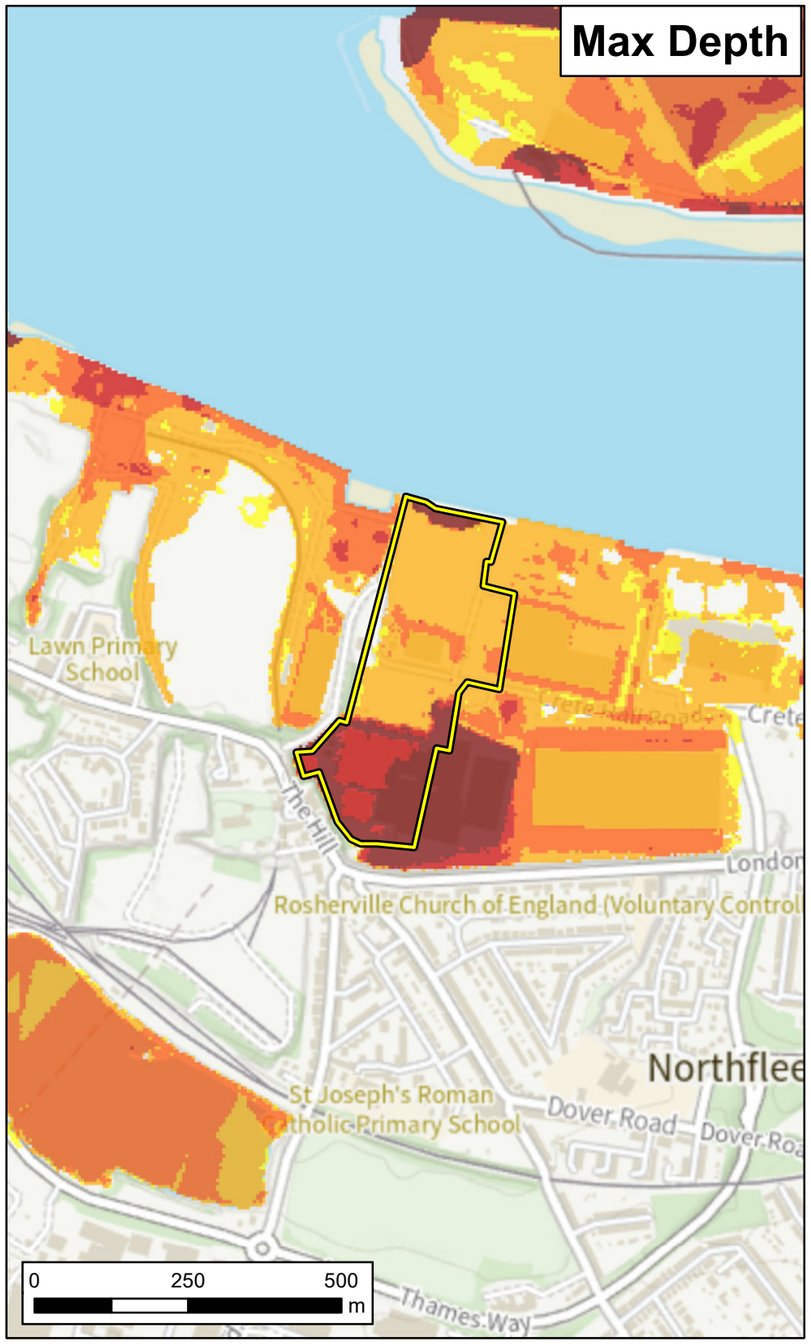
1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment where one is required, but does not constitute such an assessment on its own.

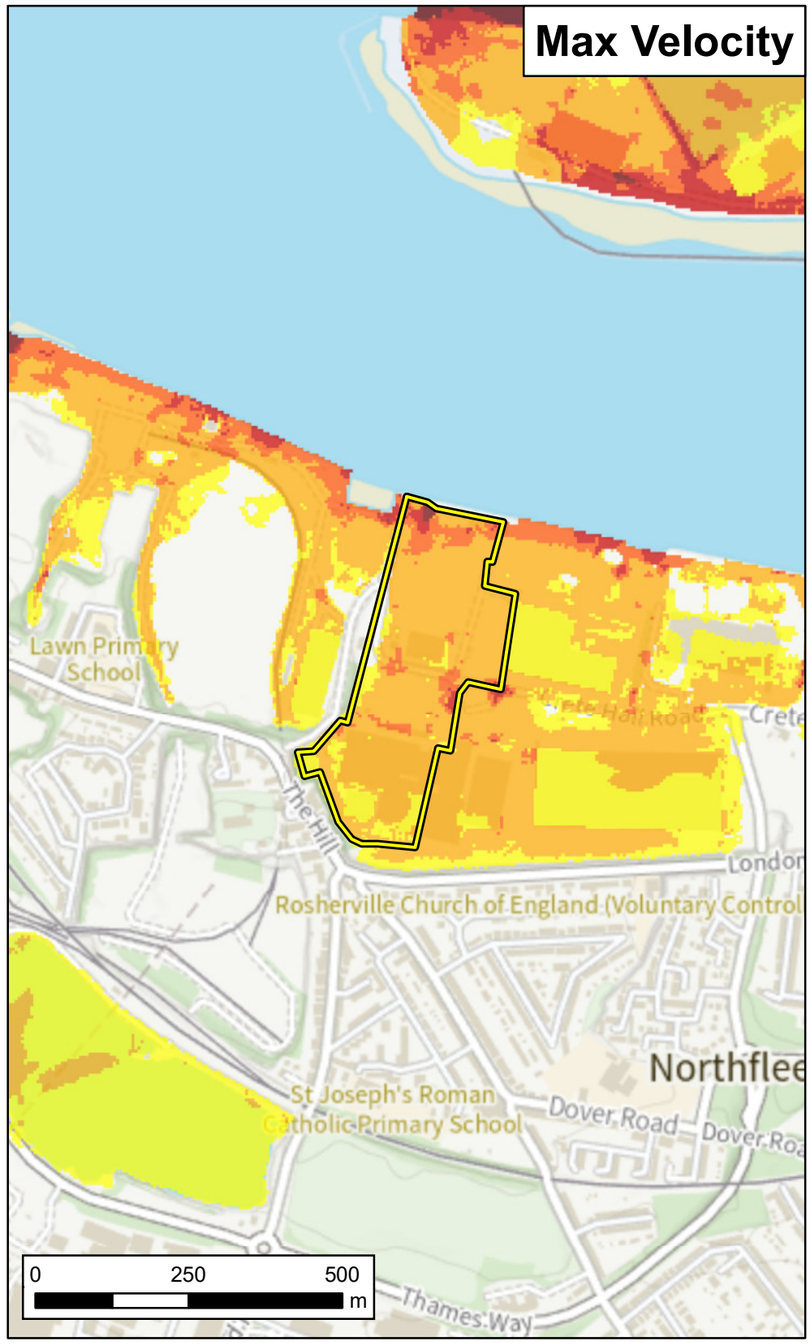
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or overland runoff. You should discuss surface water management with your Lead Local Flood Authority.

3. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection due to insufficient information

Environment Agency, Orchard House, Endeavour Park, London Road, West Malling, ME19 5SH
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency







Site Location

Site Location

Max Hazard

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.00 (Danger for Most)
- Greater than 2.00 (Danger for All)

Max Depth (m)

- 0 - 0.25
- 0.25 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00

Max Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- > 2.5

Date Printed	12/05/2023	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)

This map shows the combined flood hazard to people (called a hazard rating) if our flood defences are breached at any given single location, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches covering the entire extent between the Thames Barrier and Gravesend. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

Please contact the Environment Agency for further information on emergency planning associated with flood risk in this area.

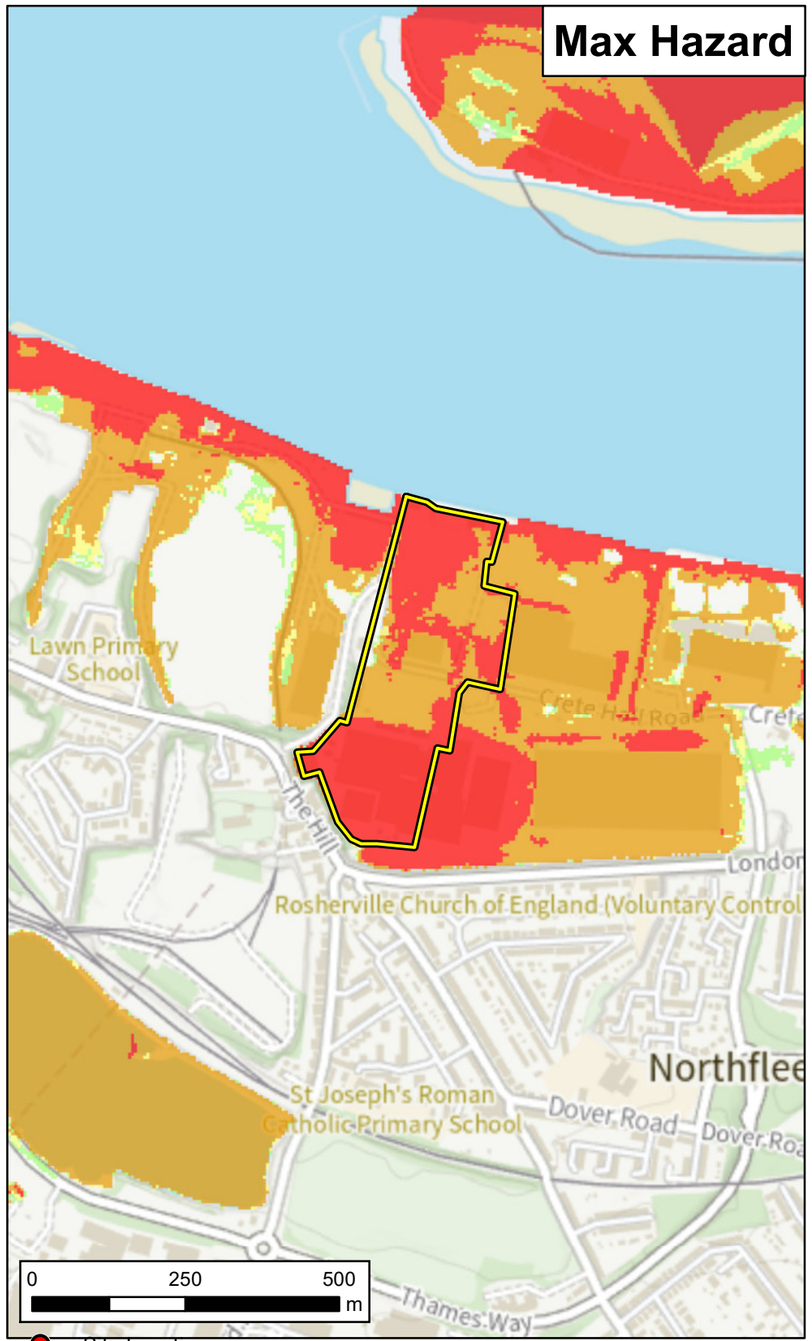
General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

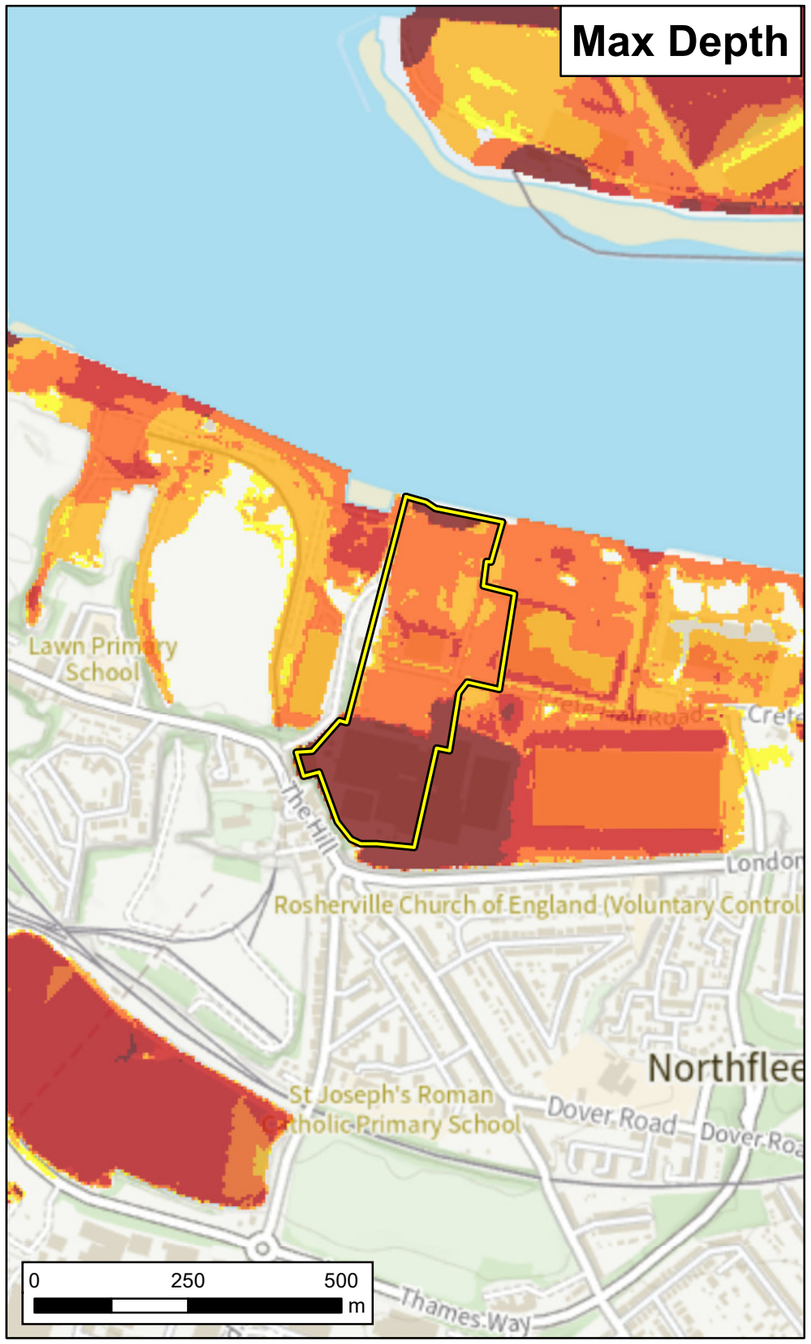
Environment Agency

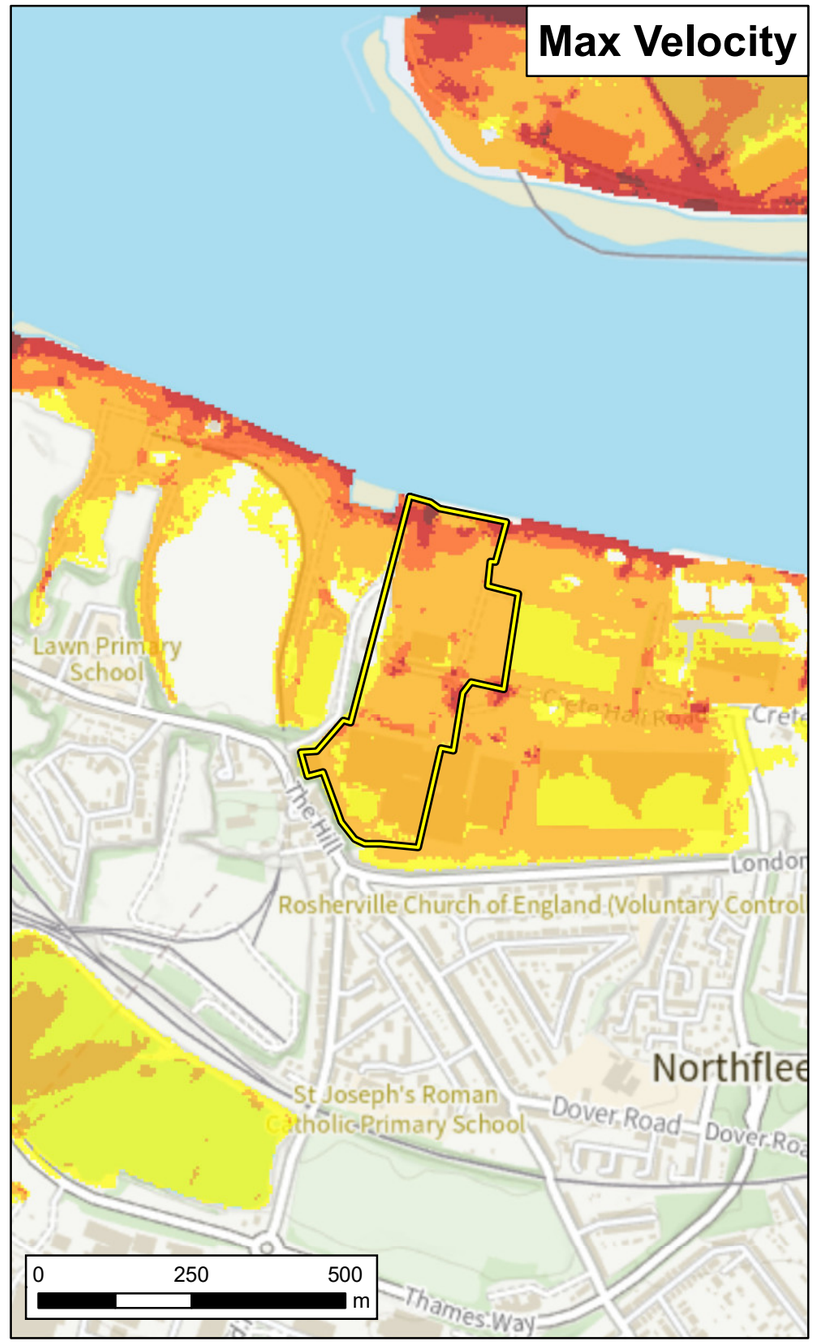
Thames Tidal Downriver Breach Hazard Mapping

Map Centred on DA11 9AD
KSL 305544 RL

This map is reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationary Office. Crown copyright. All rights reserved. Environment Agency 100026380, 2023. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings.







Site Location

Site Location

Max Hazard

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.00 (Danger for Most)
- Greater than 2.00 (Danger for All)

Max Depth (m)

- 0 - 0.25
- 0.25 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00

Max Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- > 2.5

Date Printed	12/05/2023	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)

This map shows the combined flood hazard to people (called a hazard rating) if our flood defences are breached at any given single location, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches covering the entire extent between the Thames Barrier and Gravesend. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

Please contact the Environment Agency for further information on emergency planning associated with flood risk in this area.

General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

Environment Agency

Thames Tidal Downriver Breach Hazard Mapping

Map Centred on DA11 9AD
KSL 305544 RL

This map is reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationary Office. Crown copyright. All rights reserved. Environment Agency 100026380, 2023. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings.

Table 7.1 Defence levels downriver of the Thames Barrier

DEFENCE LEVELS downriver of Barrier		Existing defence levels (2009)		OPTIONS 1.4 & 3.2 Defence levels required in 2040 (for period 2040 to 2070)		OPTION 1.4 Defence levels required in 2070 (for period 2070 to 2120)		OPTION 1.4 Defence levels required in 2120 (for period 2120 to 2170)		OPTION 3.2 Defence levels required in 2070 (for period 2070 to 2170)	
Location	Node	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB
Barrier	a3.1	7.20	7.20	7.20	7.20	8.30	8.30	8.80	8.80	6.20	6.20
	3.2	7.20	7.20	7.20	7.20	8.30	8.30	8.80	8.80	6.20	6.20
	3.3	7.20	7.20	7.20	7.20	8.30	8.30	8.80	8.80	6.20	6.20
	3.4	7.20	7.20	7.20	7.20	8.30	7.70	8.80	8.20	6.20	6.20
Roding	a3.5u	7.20	7.10	7.20	7.20	8.30	7.70	8.80	8.20	6.20	6.20
	a3.5d	7.20	7.10	7.20	7.20	7.70	7.70	8.20	8.20	6.20	6.20
	River Roding	R5.80	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3.6	7.30	7.10	7.20	7.20	7.70	7.70	8.20	8.20	6.10	6.10
	3.7	7.30	7.10	7.20	7.20	7.70	7.70	8.20	8.20	6.10	6.10
	3.8	7.30	7.10	7.20	7.20	7.70	7.70	8.20	8.20	6.10	6.10
Beam	3.9	7.20	7.10	7.10	7.10	7.70	7.70	8.20	8.20	6.10	6.10
	3.10	7.10	7.10	7.10	7.10	7.60	7.60	8.10	8.10	6.10	6.10
	3.11	7.05	7.10	7.10	7.10	7.60	7.60	8.10	8.10	6.10	6.10
	3.12	6.90	7.00	7.10	7.10	7.60	7.60	8.10	8.10	6.10	6.10
	3.13	7.00	7.00	7.10	7.10	7.60	7.60	8.10	8.10	6.10	6.10
	3.14	7.00	6.90	7.10	7.10	7.60	7.60	8.10	8.10	6.10	6.10
Darent	3.15u	7.05	6.90	7.10	7.10	7.60	7.60	8.10	8.10	6.10	6.10
	3.15d	7.05	6.90	7.10	7.10	7.60	7.60	8.10	8.10	6.10	6.10
	River Darent	N/A	R5.30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3.16	7.15	6.70	7.10	7.10	7.60	7.60	8.10	8.10	6.10	6.10
	3.17	6.85	6.74	7.00	7.00	7.60	7.60	8.00	8.00	8.50	8.50
	3.18	6.90	6.35	7.00	7.00	7.50	7.50	8.00	8.00	8.50	8.50
	3.19	6.85	6.75	7.00	7.00	7.50	7.50	8.00	8.00	8.50	8.50
	3.20	6.85	6.28	7.00	7.00	7.50	7.50	8.00	8.00	8.50	8.00
	3.21	6.90	7.05	7.00	7.00	7.50	7.50	8.00	8.00	8.50	8.00
	3.22	6.85	7.05	7.00	7.00	7.50	7.50	7.90	7.90	8.00	8.00
	3.23	6.85	6.75	7.00	7.00	7.50	7.50	7.90	7.90	8.00	8.00
	3.24	6.50	6.73	6.90	6.90	7.40	7.40	7.90	7.90	8.00	8.00
Tilbury	3.25	6.95	6.87	6.90	6.90	7.40	7.40	7.90	7.90	8.00	8.00
	3.26	6.65	6.75	6.90	6.90	7.40	7.40	7.90	7.90	8.00	8.00
	3.27	7.00	6.35	6.90	6.35	7.40	6.35	7.90	6.35	8.00	6.35
	3.28	7.00	6.57	7.00	6.57	7.00	6.57	7.00	6.57	7.00	6.57
	3.29	6.48	6.12	6.48	6.12	6.48	6.12	6.48	6.12	6.48	6.12
	3.30	6.75	5.91	6.75	5.91	6.75	5.91	6.75	5.91	6.75	5.91
Mucking	3.31	6.90	6.10	6.90	6.10	7.50	6.10	8.10	6.10	8.10	6.10
	3.32	6.50	5.90	6.90	5.90	7.50	5.90	8.10	5.90	8.10	5.90
	3.33	6.60	5.80	6.80	5.80	7.50	5.80	8.10	5.80	8.10	5.80
	Vange Creek	R4.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3.34	6.80	5.75	6.70	5.75	7.40	5.75	8.10	5.75	8.10	5.75
Canvey	3.35	6.75	5.82	6.70	5.82	7.40	5.82	8.10	5.82	8.10	5.82
	3.36	6.65	Cliff	6.70		7.40		8.10		8.10	
	EH Creek	R4.20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hadleigh Marsh	R6.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3.37	4.75	5.30	6.00	5.30	6.70	5.30	7.40	5.30	7.40	5.30
Southend	3.38	5.70	5.50	6.00	5.50	6.70	5.50	7.40	5.50	7.40	5.50
	Grain east	N/A	5.70	N/A	6.30	N/A	7.00	N/A	7.70	N/A	7.70

Key		Notes
	P5 (1:10,000)	Defence levels are shown at ISIS model nodes. Policy Units are not indicated.
	P4 (1:1,000)	Representative levels are shown using the prefix 'R' for defences
	P4 (1:200)	not represented by ISIS nodes.
	P3	

If staff are requested to provide data to developers in P3 areas downriver of the Barrier, including at Hadleigh Marshes, North Kent Marshes and Isle of Grain, they must contact the TE2100 implementation team as early as possible, to ensure they use the best available data on design levels. The TE2100 Plan assumed that the existing defence crest levels would be maintained in P3 areas downriver of the Barrier but did not calculate the specific design levels required for such sites. These may need to be calculated to support such a data request.

Source: Reference 29 (*Phase 3 Set 2 Estuary Wide Options – Hydraulic Modelling*). Some minor adjustments were subsequently made to simplify the level information.

Table 7.2 Defence levels for Policy Units downriver of the Thames Barrier

Recommendations are given in the right hand column for the allowances for future raising that should be included in new defence designs when defences are replaced.

Policy Unit	Bank	Defence levels (m AOD)				Comment and Recommendations
		Existing (2009 data)	2070 Implement in 2040	2170 See Table 7.1 for implementation dates	2170	
				Option 1.4	Option 3.2	
Greenwich, Royal Docks	R L	7.2	7.2	8.8	6.2	Downriver Thames Barrier. Allow future raising to 8.8m AOD
Barking & Dagenham	L	7.2	7.2	8.2	6.1	Allow future raising to 8.2m AOD
Rainham	L	6.9 – 7.1	7.1	8.1	6.1	Allow future raising to 8.1m AOD
Thamesmead	R	7.0 – 7.1	7.1 – 7.2	8.1 – 8.2	6.1	Allow future raising to 8.2m AOD
Dartford & Erith:						
- U/R new barrier	R	6.7 – 7.0	7.1	8.1	6.1	Allow future raising to 8.1m AOD
- D/R new barrier	R	6.7	7.0	8.0	8.5	Allow future raising to 8.5m AOD
Swanscombe & Northfleet	R	6.3 – 7.1	6.9 – 7.0	7.9 – 8.0	8.0	Allow future raising to 8.0m AOD
Purfleet, Grays & Tilbury:						
- U/R new barrier	L	7.1	7.0 - 7.1	8.0 - 8.1	6.1	Allow future raising to 8.1m AOD
- D/R new barrier to Grays	L	6.8 – 6.9	7.0	8.0	8.5	Allow future raising to 8.5m AOD
- D/R Grays	L	6.5 – 6.9	6.9 – 7.0	7.9	8.0	Allow future raising to 8.0m AOD
East Tilbury	L	6.4 – 6.9	6.4 – 6.9	6.4 – 6.9	6.4 – 6.9	APF will be 5% by 2100. Consider secondary defence for East Tilbury.
Shellhaven & Fobbing	L	6.5	6.8 – 6.9	8.1	8.1	Allow for future raising of existing tidal defences to 8.1m AOD in the southern half of the policy unit (i.e. from Mucking Sluice to Fobbing Barrier) to protect critical infrastructure, including London Gateway Port.
Bowers	L	6.5	6.7	8.1	8.1	Allow future raising to 8.1m AOD for primary defence on Holehaven Creek.
Canvey	L	6.6 – 6.8	6.7	8.1	8.1	Allow future raising to 8.1m AOD
Hadleigh	L	6.0	6.0	6.0	6.0	
Southend	L	4.7 – 5.7	6.0	7.4	7.4	Allow future raising to 7.4m AOD
North Kent west	R	6.1 - 6.5	6.1 - 6.5	6.1 - 6.5	6.1 - 6.5	
North Kent east	R	5.8 – 6.1	5.8 – 6.1	5.8 – 6.1	5.8 – 6.1	
Grain west	R	5.5	5.5	5.5	5.5	No defence raising proposed for Allhallows and Grain Marshes. Protection needed for access routes to Grain east.
Grain east	R	5.7	6.0 – 6.3	7.4 – 7.7	7.4 – 7.7	Industrial areas. Allow future raising to 7.4m or 7.7m AOD depending on location.

Notes:
Green shading: Policy P3 - No change in levels
Orange shading: Increase in defence levels
D/R: Downriver U/R: Upriver

If staff are requested to provide data to developers in P3 areas downriver of the Barrier, including at Hadleigh Marshes, North Kent Marshes and Isle of Grain, they must contact the TE2100 implementation team as early as possible, to ensure they use the best available data on design levels. The TE2100 Plan assumed that the existing defence crest levels would be maintained in P3 areas downriver of the Barrier but did not calculate the specific design levels required for such sites. These may need to be calculated to support such a data request.

creating a better place

Environment Agency

Daniel Cole
HYRO Energy Ltd
Beaufort Court Egg Farm Lane
Kings Langley
Hertfordshire
WD4 8LR

Our ref: KT/2023/130807/01-L01
Your ref: 680775

Date: 19 July 2023

Dear Daniel,

Development of hydrogen electrolysis facility within the grounds of the existing Kimberly-Clark Industrial Estate.

Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

Thank you for consulting us on the above planning application.

Flood Risk:
We have reviewed the submitted information and, we would be unlikely to object to the proposal in principle. However, we are not able to determine if the development would meet the requirements of the National Planning Policy Framework (NPPF, 2021). In particular, it is not clear if the proposal would be made safe for its lifetime without increasing flood risk elsewhere.

As noted, the site is mostly within Flood Zone 2 with a small section in Flood Zone 3. However, the site would be flooded were the neighbouring tidal Thames flood defence to breach. This would result in significant site flooding in the 0.5% Annual Exceedance Probability (AEP) current day breach scenario. The resulting flood depths would worsen with the impacts of climate change.

The client has stated that the proposal's design life would be 25 years. It should be noted that the Planning Practice Guidance (PPG), paragraph 006, states that non-residential development should be considered to have a design life of at least 75 years. We understand elements of the hydrogen electrolysis facility may have a lesser design life, but we would consider 75 years as the baseline for the proposal in its entirety. The tidal Thames downstream model does not include 2050 flood outputs which would rarely be appropriate for development when considering the PPG.

The site benefits from the Tidal Thames flood defences, which should provide a

minimum protection up to the 1 in 1000 year event. However, the condition of the neighbouring flood defences varies and it is likely that significant works would need to be undertaken to maintain this standard of protection and enable such development.

From the submitted documents, it is not clear what the blue line boundary is for the development. Please can this be provided.

The PPG also states that, where flood risk management infrastructure such as flood defences form part of the strategy for addressing flood risk, Flood Risk Assessments (FRAs) should identify how this infrastructure will be operated, funded and maintained in addition to ensuring that there is space for future maintenance or new flood risk management infrastructure.

The proposal should consider how the site will be protected from tidal flood risk. This will likely require flood defence raising and/or land raising. Raising options should be considered in line with the Thames Estuary 2100 (TE2100) plan.

Land raising may be required to protect the site from inundation during a tidal flood defence breach event. This may be of particular importance if the site is considered to be essential infrastructure.

Groundwater and Contaminated Land:
We note that no new buildings are proposed and that the equipment would be housed within portacabin style containers on existing or new hardstanding.

A preliminary risk assessment would be required for any breaking of ground and this may necessitate further investigations should suspected or identified contamination be discovered.

Environmental permits may be required for any effluent with detailed designs submitted for associated infrastructure relating to drainage.

Any facilities for the storage of oils, fuels or chemicals shall be provided with secondary containment that is impermeable to both the oil, fuel or chemical and water, for example a bund, details of which shall be submitted to the local planning authority for approval. The minimum volume of the secondary containment should be at least equivalent to the capacity of the tank plus 10%. If there is more than one tank in the secondary containment the capacity of the containment should be at least the capacity of the largest tank plus 10% or 25% of the total tank capacity, whichever is greatest.

Environmental Permitting Regulations Installations
The papermill is a permitted activity and a change to the boiler arrangement will require a permit variation, however this will depend on specifics of the changes/additions etc, a stand-alone permit could be required in some circumstances, without further information it’s difficult to say.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact us via the email below.

Yours sincerely,

pp. Kimberley Wadsworth

George Goodby
Planning Specialist

KSLPLANNING@environment-agency.gov.uk

creating a better place
for people and wildlife

Environment Agency

Alison Cadge
RSK Land and Development Engineering

Our ref: KT/2023/130807/02-L01
Charged Agreement ref: ENVPAC/1/KSL/00653
Your ref: 680775

Date: 16 August 2023

Dear Alison,

02- Review of further flood risk queries

Kimberly-Clark Industrial Estate, Crete Hall Road, Northfleet, Gravesend, DA11 9AD

Following our initial response dated 19 July 2023 (KT/2023/130807/01-L01), we received further flood risk queries from yourself via email on 25 July 2023. Please see our response to these queries below.

Flood risk vulnerability classification
Thank you for confirming the purpose of the proposed hydrogen facility and that this will not be 'essential infrastructure' but form a part of the wider, less vulnerable site.

Defence raising and setback
Assuming the red line boundary does not include any tidal flood defence, then we accept that defence raising could not be delivered as part of this development. We would require any submitted site specific Flood Risk Assessment (FRA) to consider the spatial requirements for a future tidal flood defence were it to be retreated inland e.g. away from the river wall. It should be clearly demonstrated that the proposed development would not restrict options for future defence raising in line with the Thames Estuary 2100 (TE2100) Plan.

It may be that the current river wall would not form the raised tidal flood defence due to space limitations along the quayside. The revised FRA should show minimum offsets between the riverward boundary of the site and the sunken tanks which border the river frontage. It should be demonstrated that there would be sufficient space to construct a retreated tidal flood defence. Ideally this would be at least 16 metres.

Lifetime of development
As previously stated, the development should be assumed to have a minimum design life of 75 years in line with the Paragraph 6 of the "Flood Risk and Coastal Change" section of the Planning Practice Guidance (PPG).

At the formal planning consultation stage, we would assume a design life of 75 years, unless the Local Planning Authority advised us to consider a different value

design life.

Safe refuge
Where people are expected to work from the proposed development, we would expect the facility to include safe refuge which must be raised to at least the site breach level for the 0.5% Annual Exceedance Probability (AEP) breech event plus 0.6 metres freeboard.

Closing comments
Please note that the view expressed in this letter is a response to a pre application enquiry and does not represent our final view in relation to any future planning application made in relation to this site. We reserve the right to change our position in relation to any such application. You should seek your own expert advice in relation to technical matters relevant to any planning application before submission.

Should you have any queries regarding this response, please contact me.

Yours sincerely,

George Goodby
Sustainable Places Planning Specialist

Mobile +447879802840
E-mail kslplanning@environment-agency.gov.uk

APPENDIX D
PROPOSED DEVELOPMENT PLANS

RYAN WHITFIELD

Flood and Water Management
Invicta House
Maidstone
Kent
ME14 1XX
Website: www.kent.gov.uk/flooding
Email: suds@kent.gov.uk
Tel: 03000 41 41 41
Our Ref: NON/2023/095761
Date: 22 June 2023

Application No: pre app

Location: Kimberley Clark Industrial Estate, Gravesham, DA11 9AA

Proposal: Hydrogen electrolysis facility

Thank you for your enquiry in relation to the above site.

I will address your queries as presented in your original email:

- *Whether we would have any requirements in relation to the restriction of runoff from the area of the proposed works or in relation to the use of SuDS?*

- *Or whether it would be acceptable to allow surface water discharge as per the existing scenario.*

It is understood from the information provided that the existing scenario discharges to the existing private surface water network that serves the industrial estate. This is thought to discharge to mains sewer and then the tidal Thames.

The LLFA applies the Non-Statutory Technical Standards guidance, of which Paragraph S1 states:

"Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (S2 and S3 below) and volume control technical standards (S4 and S6 below) need not apply"

In this instance, the LLFA would view that applying discharge rates and volume do not apply to this development due to the nature of the receiving watercourse (River Thames).

Consideration would however need to be given to the tide locking scenario. Appropriate storage would need to be provided to accommodate for tide locking against varying rainfall events (30- 100 year).

We note from BGS data available to us that groundwater in this area may be high, coupled with the proximity to an Source Protection zone 1 making infiltration not feasible. Therefore we would accept for the reuse of the existing connection.

Existing connection to mains sewer and river Thames:

- A CCTV survey should ideally be undertaken to confirm the condition of this existing network for reuse.
- With the River Thames being a Main River, and parts of the site being within Flood Zones 2 and 3 and we would expect for the Environment Agency to be consulted with regards to the appropriateness for development.
- Further to this, any work in, under, over or within 8 metres of the banks of a designated main river or the toe of a flood defence requires a Flood Risk Activity Permit (FRAP). As of 6th April 2016, the Water Resources Act 1991 and associated land drainage byelaws have been amended and flood defence consents will now fall under the Environmental Permitting (England and Wales) Regulations 2010. Further details and guidance are available on the GOV.UK website: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

Further items for consideration:

Pollution Controls:

Prior to offsite discharge to the Thames, the LLFA requests for all developments to adhere to the guidance stipulated within the CIRIA SuDS Manual (2015) Part E Section 26. This section within the manual contains details of treatment levels and anticipated pollution from different land uses.

Given the sites existing and proposed use, the incorporation of above ground SuDS features is not considered feasible. We would therefore accept for proprietary treatment devices such as vortex separators, downstream defenders or interceptors .These must still demonstrate they meet the required total SuDS mitigation index within the Ciria SuDs manual.

Supporting Drainage Modelling:

As part of a future drainage strategy report for all major planning applications, we would seek for the proposed scheme to be modelled, using appropriate software. The following items should be considered when undertaking the modelling:

- Simulations against the varying storm events that include the 1/2, 30 and the 100 year events.
- Appropriate application of climate change percentages for both the 30 and 100 year events. The climate change rates to be applied can be found at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

- The utilisation of the FEH 2013 rainfall dataset where possible. Should FEH not be used, the LLFA would request the M5-60 value is uplifted from the default 20.00mm value to 26.25mm.
- If full network analysis is provided for outline or full, the outputs as presented should also contain the pipe/ manhole schedule to illustrate the design modelled through the simulations (the identification of pipes and manholes in the calculations should be reflected on the accompanying drainage layout drawings).
- Inclusion of the critical summary events within the outputs.
- No surcharging of the network should be experienced for the 1/2 year events, unless where unavoidable at features such as flow controls.

Climate Change Guidance:

As of the 10th of May 2022, the Environment Agency's climate change allowances have been updated. As part of this update, revisions have been made to the 'Peak Rainfall Intensity Allowances' that are used in applying climate change percentages to new drainage schemes. The LLFA would now seek the 'upper end' allowance is designed for both the 30 (3.3%) and 100 (1%) year storm scenarios. The latest information on the allowances and map can be found at the following link:
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

I trust this information assists with your enquiries.

Yours faithfully,

Emily Neale
Graduate Flood Risk Officer
Flood and Water Management

Ryan Whitfield

From: Emily.Neale@kent.gov.uk
Sent: 18 July 2023 13:23
To: Ryan Whitfield
Subject: RE: Response To pre app at Kimberley Clark Industrial Estate, Gravesham, DA11 9AA

Follow Up Flag: Follow up
Flag Status: Flagged

CAUTION: This email originated from outside the Organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon Ryan,

Thank you for your email.

As noted in your email the 200-year (tidal) climate change event coinciding with a 30 year (including climate change 35%) rainfall event is viewed as an acceptable joint probability.

Where there is any exceedance of the drainage network, an exceedance plan should be provided illustrating where exceedance occurs and the extent and depth of flooding.

Kind regards,

Emily Neale | **Graduate Flood Risk Officer** | **Flood & Water Management**
Kent County Council | Invicta House, County Hall, Maidstone ME14 1XX |
As Lead Local Flood Authority (LLFA) for the County, we have become a statutory consultee in planning to promote the provision of Sustainable Drainage Systems. You can find out more by visiting: http://www.kent.gov.uk/waste-planning-and-land/flooding-and-drainage/sustainable-drainage-systems

Please don't take offence if I don't reply to say 'thank you'. If every UK adult sent 1 less courtesy email a day, we'd save over 16,400 tonnes of carbon a year – so please, think before you thank.

From: Ryan Whitfield <rwhitfield@rsk.co.uk>
Sent: Tuesday, July 11, 2023 10:38 AM
To: SUDS - GT <SUDS@kent.gov.uk>
Cc: Alison Cadge <ACadge@rsk.co.uk>
Subject: RE: Response To pre app at Kimberley Clark Industrial Estate, Gravesham, DA11 9AA

Good morning,

Thank you for your response.

Would you be able to advise which coinciding events I should be using to provide the maximum attenuation volumes for the tidal locking scenario?

For example, a Q200 tidal height coinciding with a Q30 rainfall event?

Kind regards,

Ryan Whitfield
Hydrologist BSc(Hons) MSc MCIWEM

CIVILS | STRUCTURES | HYDROLOGY
an RSK company
www.rsklde.com
14 Beecham Court, Pemberton Business Park, Wigan, WN3 6PR, UK
Switchboard: +44 (0)1942 493255

From: SUDS@kent.gov.uk <SUDS@kent.gov.uk>
Sent: Thursday, June 22, 2023 2:13 PM
To: Ryan Whitfield <rwhitfield@rsk.co.uk>
Subject: Response To pre app at Kimberley Clark Industrial Estate, Gravesham, DA11 9AA

Good afternoon,

Please find attached my representation in relation to the above pre app.

Kind regards,

Emily Neale

Kent County Council

[WARNING: This email originated outside of RSK. DO NOT CLICK links, attachments or respond unless you recognise the sender and are certain that the content is safe]

APPENDIX D
PROPOSED DEVELOPMENT PLANS

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	77.666	0.640	121.4	0.155	5.00	0.0	0.600	o	225
1.001	38.639	0.330	117.1	0.084	0.00	0.0	0.600	o	225
1.002	9.200	0.090	102.2	0.310	0.00	0.0	0.600	o	300
1.003	20.396	0.200	102.0	0.000	0.00	0.0	0.600	o	300
1.004	5.099	0.010	509.9	0.208	0.00	0.0	0.600	o	300
1.005	9.055	0.240	37.7	0.000	0.00	0.0	0.600	o	375
1.006	2.236	0.100	22.4	0.000	0.00	0.0	0.600	o	375
1.007	3.000	1.110	2.7	0.000	0.00	0.0	0.600	o	375
1.008	103.078	4.740	21.7	0.000	0.00	0.0	0.600	o	900

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Vel (m/s)	Cap (l/s)
1.000	4.410	0.155	0.0	1.19	47.1
1.001	3.770	0.239	0.0	1.21	48.0
1.002	3.440	0.549	0.0	1.55	109.9
1.003	3.350	0.549	0.0	1.56	110.0
1.004	3.000	0.757	0.0	0.69	48.7
1.005	2.990	0.757	0.0	2.96	326.7
1.006	2.750	0.757	0.0	3.85	424.8
1.007	2.650	0.757	0.0	11.09	1224.6
1.008	1.015	0.757	0.0	6.73	4284.4

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		5.320	-3.725	-2.340	0	0

Datum (m) 0.000 Offset (mins) 60

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
60	6.080	420	-2.340	780	6.080	1140	-2.340	1500	6.080
120	5.380	480	-1.640	840	5.380	1200	-1.640	1560	5.380
180	3.980	540	-0.230	900	3.980	1260	-0.230	1620	3.980
240	1.870	600	1.870	960	1.870	1320	1.870		
300	-0.230	660	3.980	1020	-0.230	1380	3.980		
360	-1.640	720	5.380	1080	-1.640	1440	5.380		

©1982-2010 Micro Drainage Ltd

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30
Climate Change (%) 0, 35

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	240 Winter	30	+35%	1/180 Summer	1/240 Winter			22
1.001	240 Winter	30	+35%	1/180 Summer	1/180 Summer			31
1.002	15 Winter	30	+35%	1/120 Winter	1/1440 Summer			9
1.003	1440 Summer	30	+35%	1/120 Winter	1/1440 Summer			1
1.004	240 Summer	30	+35%	1/15 Summer	1/1440 Summer			3
1.005	240 Summer	30	+35%	1/120 Summer	1/1440 Summer			
1.006	240 Summer	30	+35%	1/120 Summer	1/1440 Summer			17
1.007	240 Summer	30	+35%	1/120 Summer	1/1440 Summer			19
1.008	1440 Summer	1	0%	1/120 Summer	1/1440 Summer			19

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	MH061	5.285	0.650	45.265	1.04	0.0	47.7	FLOOD
1.001	MH064	5.298	1.303	88.120	1.36	0.0	62.1	FLOOD
1.002	MH065	5.342	1.602	22.215	2.23	0.0	167.8	FLOOD
1.003	MH066	5.360	1.710	1.761	0.45	0.0	42.8	FLOOD
1.004	MH034	5.333	2.033	3.313	1.54	0.0	71.2	FLOOD
1.005	MH033	5.332	1.967	0.000	0.37	0.0	71.9	FLOOD RISK
1.006	MH032	5.331	2.206	30.609	0.64	0.0	79.1	FLOOD
1.007	MH031	5.330	2.305	30.744	0.30	0.0	123.1	FLOOD
1.008	MH030	5.348	3.433	32.800	0.02	0.0	59.2	FLOOD

©1982-2010 Micro Drainage Ltd

APPENDIX D
PROPOSED DEVELOPMENT PLANS

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
EX1	0.027	5.00	9.060	1200	562591.368	174503.160	2.350
EX2	0.044	5.00	6.770	1200	562580.177	174442.709	1.500
EX3	0.029	5.00	5.540	1200	562585.201	174408.137	2.100
EX4	0.098	5.00	5.310	1200	562711.909	174374.787	2.010
5	0.020	5.00	5.100	1200	562594.557	174352.393	1.500
5a	0.020	5.00	5.100	1200	562598.202	174368.093	1.660
5b			5.100	1200	562604.977	174366.648	1.689
6			5.110	1200	562640.977	174367.988	1.852
7	0.000		5.200	1200	562645.376	174388.657	2.104
EX8	0.221	5.00	5.200	1200	562619.205	174395.313	2.260
EX9	0.332	5.00	5.020	1200	562621.994	174412.473	2.250
EX10	2.854	5.00	5.320	1200	562733.827	174433.865	1.220
EX11	0.000		5.080	1200	562724.005	174434.697	2.350
EX12	0.000		4.900	1200	562713.878	174430.235	2.300
EX13	0.332	5.00	4.830	1200	562630.932	174450.684	2.450
EX14	0.332	5.00	4.820	1200	562632.237	174458.073	2.620
EX15	0.332	5.00	4.930	1200	562610.864	174477.226	2.900
EX16	0.332	5.00	4.970	1200	562609.874	174482.000	2.950
EX17	0.332	5.00	5.040	1200	562607.882	174488.947	3.200
EX18	0.332	5.00	5.100	1200	562607.280	174526.400	3.300
EX19	0.332	5.00	5.340	1200	562622.213	174540.151	3.650
EX20	0.332	5.00	5.330	1200	562644.223	174627.440	3.820
EX20_OUT	0.000		5.300	1800	562655.426	174673.064	3.884

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	EX1	EX2	61.478	0.600	6.710	5.270	1.440	42.7	150	5.66	50.0
1.001	EX2	EX3	34.935	0.600	5.270	3.515	1.755	19.9	150	5.92	50.0
1.002	EX3	EX8	36.342	0.600	3.440	3.090	0.350	103.8	225	6.39	50.0
2.000	EX4	7	94.949	0.600	3.300	3.096	0.204	465.4	300	7.19	50.0
3.000	5	5a	16.118	0.600	3.600	3.440	0.160	100.7	300	5.17	50.0
3.001	5a	5b	6.927	0.600	3.440	3.411	0.029	238.9	300	5.29	50.0
3.002	5b	6	36.025	0.600	3.411	3.258	0.153	235.0	300	5.87	50.0
3.003	6	7	21.132	0.600	3.258	3.096	0.162	130.4	300	6.13	50.0
2.001	7	EX8	27.004	0.600	3.096	3.015	0.081	333.4	300	7.72	50.0
1.003	EX8	EX9	17.385	0.600	2.940	2.770	0.170	102.3	375	7.88	50.0
1.004	EX9	EX13	39.242	0.600	2.770	2.380	0.390	100.6	375	8.24	50.0
4.000	EX10	EX11	9.857	0.600	4.100	2.730	1.370	7.2	825	5.01	50.0
4.001	EX11	EX12	11.066	0.600	2.730	2.600	0.130	85.1	825	5.07	50.0
4.002	EX12	EX13	85.430	0.600	2.600	2.380	0.220	388.3	825	6.02	50.0
1.005	EX13	EX14	7.503	0.600	2.380	2.200	0.180	41.7	825	8.27	50.0
1.006	EX14	EX15	28.699	0.600	2.200	2.105	0.095	302.1	825	8.55	50.0
1.007	EX15	EX16	4.876	0.600	2.030	2.020	0.010	487.6	900	8.61	50.0
1.008	EX16	EX17	7.227	0.600	2.020	1.840	0.180	40.2	900	8.63	50.0
1.009	EX17	EX18	37.458	0.600	1.840	1.800	0.040	936.5	900	9.25	1.0
1.010	EX18	EX19	20.300	0.600	1.800	1.690	0.110	184.5	900	9.39	1.0
1.011	EX19	EX20	90.021	0.600	1.690	1.510	0.180	500.1	900	10.47	1.0
1.012	EX20	EX20_OUT	46.979	0.600	1.510	1.416	0.094	499.8	900	11.03	1.0

Flow v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	35	0	0
100	40	0	0

Node 6 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	3.258	Product Number	CTL-SHE-0070-2000-0800-2000
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node 5b Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	3.525
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	25.0	25.0	0.800	25.0	39.2	0.801	0.0	39.2

Flow v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 2 year Critical Storm Duration. Lowest mass balance: 95.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EX1	10	6.752	0.042	4.7	0.0471	0.0000	OK
30 minute summer	EX2	19	5.330	0.060	10.8	0.0675	0.0000	OK
30 minute winter	EX3	18	5.209	1.769	44.6	2.0010	0.0000	SURCHARGED
30 minute summer	EX4	18	5.310	2.010	38.9	2.2733	2.3553	FLOOD
7200 minute summer	5	6780	3.818	0.218	0.1	0.2464	0.0000	OK
4320 minute winter	5a	4320	3.818	0.378	0.2	0.4271	0.0000	SURCHARGED
4320 minute winter	5b	4020	3.818	0.407	0.2	7.4206	0.0000	SURCHARGED
10080 minute summer	6	10020	3.818	0.560	0.2	0.6332	0.0000	SURCHARGED
30 minute summer	7	18	5.200	2.104	156.8	2.3796	1.0604	FLOOD
30 minute summer	EX8	18	5.110	2.170	219.4	2.4546	0.0000	FLOOD RISK
30 minute summer	EX9	18	5.020	2.250	189.2	2.5448	0.5490	FLOOD
30 minute winter	EX10	17	5.015	0.915	352.1	1.0344	0.0000	SURCHARGED
30 minute winter	EX11	17	4.967	2.237	490.8	2.5302	0.0000	FLOOD RISK
15 minute summer	EX12	11	4.900	2.300	463.8	2.6013	15.1625	FLOOD
30 minute summer	EX13	17	4.830	2.450	571.8	2.7710	42.7493	FLOOD
10080 minute summer	EX14	2160	4.820	2.620	24.2	2.9632	3375.4150	FLOOD
30 minute summer	EX15	17	4.930	2.900	408.5	3.2799	15.4500	FLOOD
30 minute summer	EX16	17	4.958	2.938	357.4	3.3224	0.0000	FLOOD RISK
30 minute summer	EX17	17	4.989	3.149	303.9	3.5613	0.0000	FLOOD RISK
30 minute summer	EX18	17	5.076	3.276	215.5	3.7056	0.0000	FLOOD RISK
30 minute summer	EX19	17	5.036	3.346	172.8	3.7846	0.0000	SURCHARGED
30 minute summer	EX20	17	4.952	3.442	121.0	3.8925	0.0000	SURCHARGED
15 minute summer	EX20_OUT	1	6.270	4.854	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EX1	1.000	EX2	4.6	0.916	0.168	0.3105	
15 minute summer	EX2	1.001	EX3	12.0	1.950	0.300	0.4132	
30 minute summer	EX3	1.002	EX8	-48.7	-1.224	-0.954	1.4454	
60 minute summer	EX4	2.000	7	-79.8	-1.177	-1.564	6.6862	
15 minute summer	5	3.000	5a	3.4	0.438	0.031	0.1544	
15 minute summer	5a	3.001	5b	6.8	0.637	0.094	0.1542	
15 minute summer	5b	3.002	6	6.8	0.440	0.094	1.6891	
15 minute winter	6	Hydro-Brake®	7	1.9				
30 minute summer	7	2.001	EX8	-156.8	-2.227	-2.594	1.9016	
15 minute summer	EX8	1.003	EX9	-224.0	-2.031	-1.132	1.9175	
60 minute winter	EX9	1.004	EX13	-164.7	-1.493	-0.826	4.3283	
15 minute summer	EX10	4.000	EX11	495.1	2.773	0.083	5.2542	
15 minute summer	EX11	4.001	EX12	463.8	1.591	0.270	5.8997	
15 minute summer	EX12	4.002	EX13	426.8	1.471	0.532	45.5456	
15 minute summer	EX13	1.005	EX14	516.4	1.618	0.210	4.0001	
15 minute summer	EX14	1.006	EX15	538.2	1.571	0.591	15.3004	
15 minute summer	EX15	1.007	EX16	551.3	1.451	0.614	3.0903	
15 minute summer	EX16	1.008	EX17	581.4	1.367	0.185	4.5803	
15 minute summer	EX17	1.009	EX18	510.7	1.252	0.791	23.7399	
15 minute winter	EX18	1.010	EX19	417.5	1.323	0.285	12.8656	
15 minute winter	EX19	1.011	EX20	253.7	0.952	0.286	57.0530	
15 minute summer	EX20	1.012	EX20_OUT	0.0	0.000	0.000	29.7741	0.0

Flow v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 98.11%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EX1	12	7.037	0.327	16.8	0.3698	0.0000	SURCHARGED
15 minute summer	EX2	12	6.770	1.500	42.4	1.6965	0.0480	FLOOD
15 minute summer	EX3	11	5.530	2.090	46.2	2.3639	0.0000	FLOOD RISK
15 minute winter	EX4	8	5.310	2.010	94.0	2.2733	10.8762	FLOOD
2880 minute summer	5	1680	4.861	1.261	0.5	1.4266	0.0000	FLOOD RISK
2880 minute summer	5a	1680	4.861	1.421	1.0	1.6076	0.0000	FLOOD RISK
2880 minute summer	5b	1680	4.861	1.450	0.9	20.6641	0.0000	FLOOD RISK
2880 minute summer	6	1680	4.861	1.603	0.6	1.8134	0.0000	FLOOD RISK
30 minute summer	7	12	5.200	2.104	146.7	2.3796	7.3157	FLOOD
15 minute summer	EX8	10	5.200	2.260	358.8	2.5561	1.1086	FLOOD
30 minute summer	EX9	12	5.020	2.250	348.7	2.5448	89.7038	FLOOD
15 minute summer	EX10	8	5.320	1.220	1773.3	1.3798	65.1286	FLOOD
15 minute summer	EX11	8	5.080	2.350	1372.9	2.6579	60.5998	FLOOD
30 minute winter	EX12	11	4.900	2.300	1167.9	2.6013	400.9738	FLOOD
120 minute winter	EX13	42	4.830	2.450	594.8	2.7710	551.3673	FLOOD
10080 minute winter	EX14	1020	4.820	2.620	39.7	2.9632	9274.5520	FLOOD
15 minute summer	EX15	8	4.930	2.900	935.7	3.2799	55.1258	FLOOD
15 minute summer	EX16	8	4.970	2.950	1030.4	3.3365	58.0190	FLOOD
15 minute summer	EX17	10	5.026	3.186	824.3	3.6036	0.0000	FLOOD RISK
15 minute winter	EX18	8	5.100	3.300	820.4	3.7323	2.8424	FLOOD
15 minute winter	EX19	7	5.169	3.479	828.5	3.9348	0.0000	FLOOD RISK
15 minute winter	EX20	7	5.330	3.820	434.6	4.3204	8.2016	FLOOD
15 minute summer	EX20_OUT	1	6.270	4.854	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EX1	1.000	EX2	15.1	1.034	0.555	1.0823	
15 minute summer	EX2	1.001	EX3	31.3	2.121	0.781	0.6150	
30 minute summer	EX3	1.002	EX8	-52.5	-1.321	-1.030	1.4454	
60 minute winter	EX4	2.000	7	-83.0	-1.178	-1.626	6.6862	
15 minute summer	5	3.000	5a	12.3	0.585	0.111	0.8297	
15 minute summer	5a	3.001	5b	23.6	0.855	0.329	0.4876	
15 minute summer	5b	3.002	6	13.9	0.565	0.193	2.5369	
15 minute summer	6	Hydro-Brake®	7	1.9				
15 minute winter	7	2.001	EX8	-169.7	-2.609	-2.806	1.9016	
15 minute summer	EX8	1.003	EX9	-271.4	-2.461	-1.372	1.9175	
15 minute summer	EX9	1.004	EX13	-174.1	-1.579	-0.873	4.3283	
15 minute summer	EX10	4.000	EX11	1372.9	2.819	0.231	5.2551	
15 minute summer	EX11	4.001	EX12	1167.9	2.191	0.679	5.8997	
15 minute winter	EX12	4.002	EX13	541.8	1.510	0.676	45.5456	
15 minute winter	EX13	1.005	EX14	625.0	1.615	0.254	4.0001	
30 minute summer	EX14	1.006	EX15	-742.7	1.495	-0.816	15.3004	
15 minute summer	EX15	1.007	EX16	-729.4	1.463	-0.812	3.0903	
15 minute summer	EX16	1.008	EX17	-824.1	1.447	-0.262	4.5803	
15 minute winter	EX17	1.009	EX18	743.6	1.441	1.151	23.7399	
15 minute winter	EX18	1.010	EX19	713.8	1.426	0.487	12.8656	
15 minute summer	EX19	1.011	EX20	383.0	1.139	0.432	57.0530	
15 minute summer	EX20	1.012	EX20_OUT	0.0	0.000	0.000	29.7741	0.0

Flow v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

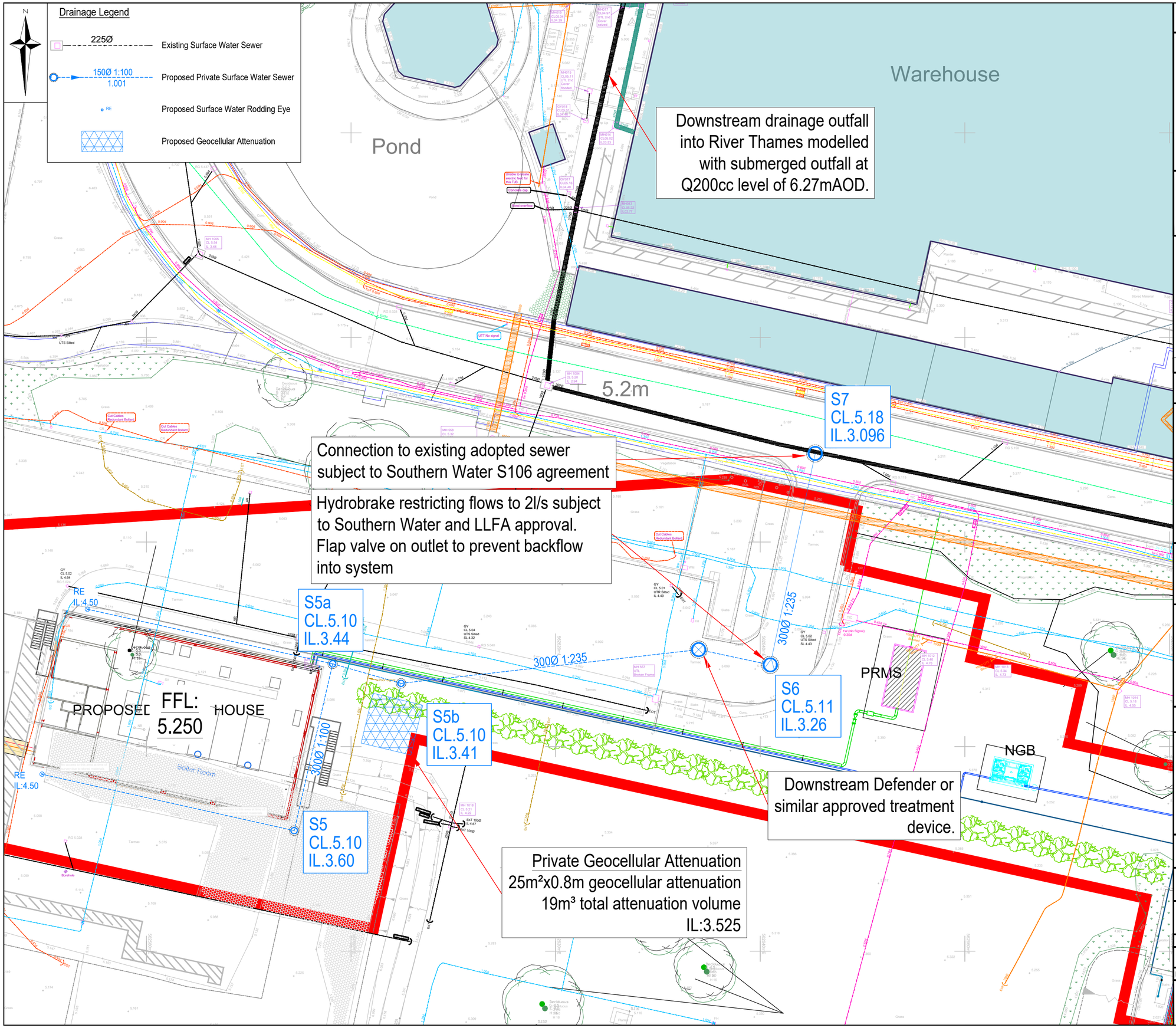
Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EX1	12	7.546	0.836	22.4	0.9459	0.0000	SURCHARGED
15 minute summer	EX2	10	6.770	1.500	53.2	1.6965	3.6245	FLOOD
15 minute summer	EX3	10	5.540	2.100	78.4	2.3751	1.1679	FLOOD
15 minute summer	EX4	8	5.310	2.010	81.1	2.2733	14.9480	FLOOD
960 minute summer	5	555	5.016	1.416	1.6	1.6019	0.0000	FLOOD RISK
960 minute summer	5a	555	5.017	1.577	3.1	1.7830	0.0000	FLOOD RISK
960 minute summer	5b	555	5.017	1.606	2.9	20.8396	0.0000	FLOOD RISK
960 minute summer	6	555	5.016	1.758	2.0	1.9886	0.0000	FLOOD RISK
30 minute winter	7	14	5.200	2.104	161.5	2.3796	11.5322	FLOOD
30 minute summer	EX8	15	5.200	2.260	217.1	2.5561	10.6689	FLOOD
30 minute winter	EX9	11	5.020	2.250	364.5	2.5448	136.7745	FLOOD
15 minute summer	EX10	8	5.320	1.220	2362.5	1.3798	222.2983	FLOOD
30 minute winter	EX11	14	5.080	2.350	1372.9	2.6579	81.5191	FLOOD
60 minute winter	EX12	14	4.900	2.300	1129.7	2.6013	598.9291	FLOOD
180 minute winter	EX13	64	4.830	2.450	594.2	2.7710	817.2051	FLOOD
10080 minute summer	EX14	720	4.820	2.620	79.6	2.9632	11926.4800	FLOOD
15 minute summer	EX15	7	4.930	2.900	1004.2	3.2799	90.4756	FLOOD
15 minute summer	EX16	7	4.970	2.950	1188.8	3.3365	121.5035	FLOOD
15 minute summer	EX17	10	5.038	3.198	914.0	3.6166	0.0000	FLOOD RISK
15 minute summer	EX18	8	5.100	3.300	827.9	3.7323	32.6514	FLOOD
15 minute summer	EX19	9	5.149	3.459	660.4	3.9118	0.0000	FLOOD RISK
15 minute summer	EX20	8	5.190	3.680	600.0	4.1623	0.0000	FLOOD RISK
15 minute summer	EX20_OUT	1	6.270	4.854	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EX1	1.000	EX2	18.9	1.089	0.694	1.0823	
30 minute summer	EX2	1.001	EX3	31.8	1.807	0.794	0.6150	
15 minute summer	EX3	1.002	EX8	-47.2	-1.186	-0.925	1.4454	
30 minute summer	EX4	2.000	7	-83.7	-1.188	-1.639	6.6862	
15 minute summer	5	3.000	5a	16.5	0.610	0.149	1.0838	
15 minute summer	5a	3.001	5b	28.4	0.808	0.397	0.4878	
15 minute winter	5b	3.002	6	13.7	0.588	0.190	2.5369	
960 minute summer	6	Hydro-Brake®	7	2.0				
15 minute summer	7	2.001	EX8	-185.5	-2.635	-3.069	1.9016	
30 minute winter	EX8	1.003	EX9	-187.2	-1.698	-0.946	1.9175	
30 minute winter	EX9	1.004	EX13	-154.9	-1.405	-0.777	4.3283	
15 minute summer	EX10	4.000	EX11	1372.9	2.847	0.231	5.2551	
15 minute summer	EX11	4.001	EX12	1167.9	2.191	0.679	5.8997	
15 minute summer	EX12	4.002	EX13	710.4	1.461	0.886	45.5456	
15 minute summer	EX13	1.005	EX14	-605.1	1.609	-0.246	4.0001	
15 minute summer	EX14	1.006	EX15	-751.1	1.560	-0.825	15.3004	
15 minute summer	EX15	1.007	EX16	-729.4	1.467	-0.812	3.0903	
15 minute summer	EX16	1.008	EX17	-914.0	1.447	-0.290	4.5803	
30 minute summer	EX17	1.009	EX18	-657.7	1.281	-1.018	23.7399	
15 minute winter	EX18	1.010	EX19	624.1	1.516	0.426	12.8656	
15 minute winter	EX19	1.011	EX20	550.1	1.170	0.620	57.0530	
15 minute summer	EX20	1.012	EX20_OUT	0.0	0.000	0.000	29.7741	0.0

Flow v15.0 Copyright © 1988-2026 Causeway Technologies Ltd

APPENDIX D
PROPOSED DEVELOPMENT PLANS



CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

- Proposed Site Layout taken from Beam Consulting Drawing - 3001954-AME-NF-ZZ-DR-PL-6053 - SITE PLAN AS PROPOSED P2 - DRAFT
- Subject to planning, LLFA and water authority approval, building control, and technical approval.

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P01	31.03.2026	PRELIMINARY ISSUE	MDF	NC	CW

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company

Abbey Park
Humber Road
Coventry
CV3 4AQ
United Kingdom

Tel: +44 (0) 24 7650 5600
Fax: +44 (0) 24 7650 1417
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client
Hyro Energy Ltd.

Project Title
Crete Hall Road
Northfleet

Status
PRELIMINARY

Drawing Title
Proposed Drainage Strategy

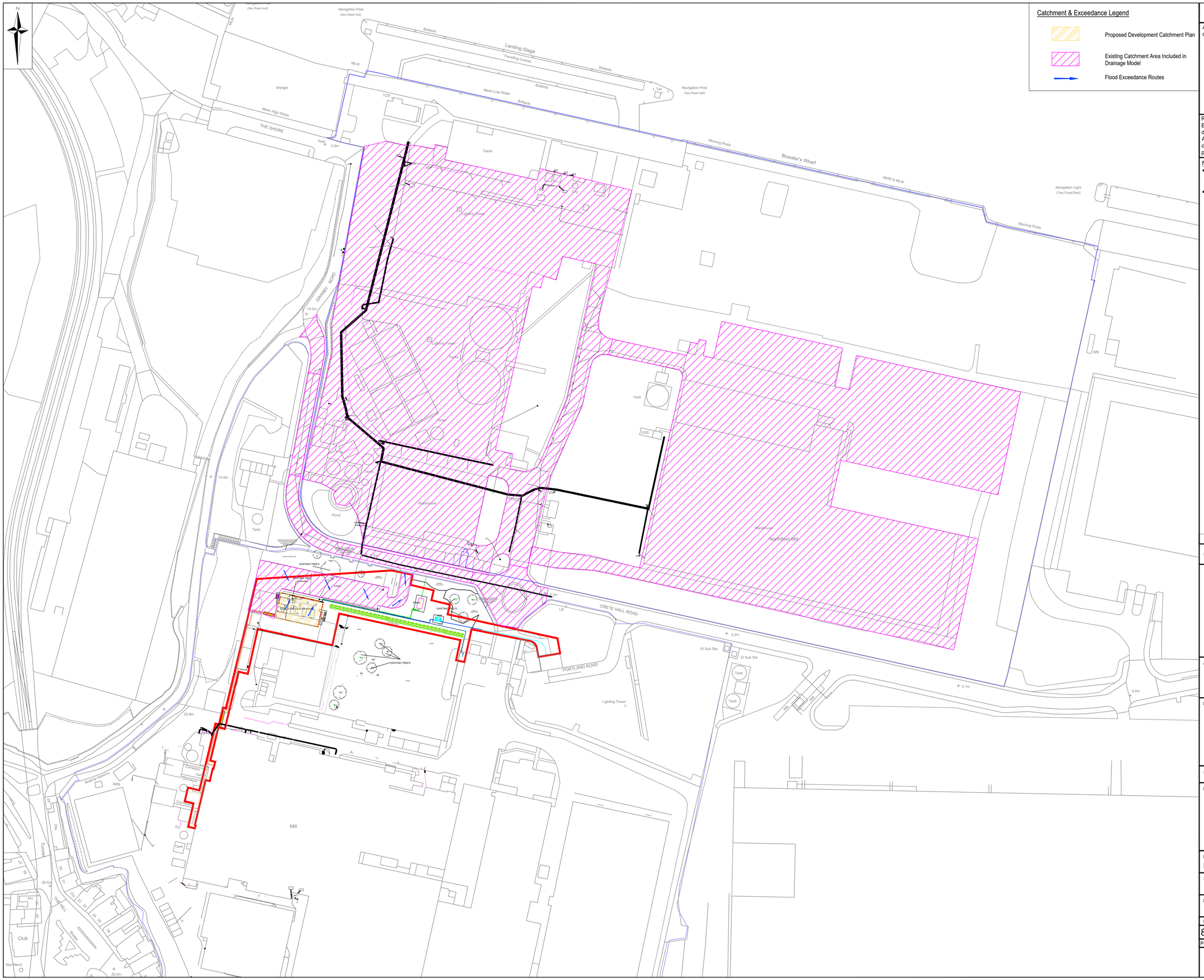
Drawn	Date	Checked	Date	Approved	Date
MDF	31.03.26	NC	31.03.26	CW	31.03.26

Scale	Orig Size	Dimensions
1:250	A2	m

Project No.: 891151
Drawing File: 891151-RSK-ZZ-ZZ-DR-C-0001-WIP-Proposed Drainage Strategy.dwg

Drawing No.							Rev.
891151	RSK	ZZ	ZZ	DR	C	0001	P01
Project	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Draw. No.	

Scale 1:250
0 2.5 5 7.5 10 12.5m



Catchment & Exceedance Legend

- Proposed Development Catchment Plan
- Existing Catchment Area Included in Drainage Model
- Flood Exceedance Routes

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

- Proposed Site Layout taken from Beam Consulting Drawing - 3001954-AME-NF-ZZ-DR-PL-6053 - SITE PLAN AS PROPOSED P2 - DRAFT
- Subject to planning, LLFA and water authority approval, building control, and technical approval.

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P01	31.03.2026	PRELIMINARY ISSUE	MDF	NC	CW

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company
Abbey Park
Humber Road
Coventry
CV3 4AQ
United Kingdom
Tel: +44 (0) 24 7650 5600
Fax: +44 (0) 24 7650 1417
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client
Hyro Energy Ltd.

Project Title
Crete Hall Road
Northfleet

Status
PRELIMINARY

Drawing Title
Catchment Plan and
Flood Exceedance Routes

Drawn	Date	Checked	Date	Approved	Date
MDF	27.03.26	NC	27.03.26	CW	27.03.26

Scale	Orig Size	Dimensions
1:1000	A1	m

Project No.	Drawing File
891151	891151-RSK-ZZ-ZZ-DR-C-0002-WIP-Drainage Catchment & Exceedance Flow Plan.dwg

Drawing No. Rev.

Project	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Draw. No.	
891151	RSK	ZZ	ZZ	DR	C	0002	P01

Scale 1:1000
0 0 50 100 150 200mm 200m

APPENDIX D
PROPOSED DEVELOPMENT PLANS



Hyro Energy Ltd.

Kimberly Clark, Northfleet – Hydrogen Boiler Facility

Sustainable Drainage System (SuDS) Management Strategy

682039-R2(1)
April 2026

DNV ISO 9001 · ISO 14001 · ISO 45001
INVESTORS IN PEOPLE We invest in people Standard
LDE CIVILS | STRUCTURES | HYDROLOGY
an RSK company

RSK GENERAL NOTES

Project No.: 682039-R2(1)

Site: Kimberly Clark, Northfleet – Hydrogen Boiler Facility

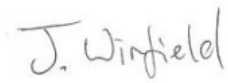
Title: Sustainable Drainage System (SuDS) Management Strategy

Client: Hyro Energy Ltd.

Date: April 2026

Office: Hemel Hempstead

Status: Final

Author	J Winfield	**Technical reviewer**	M Foster
Signature		Signature	
Date:	01.04.2026	Date:	01.04.2026

Project Manager	C Whittingham
Signature	
Date:	01.04.2026

Issue No	Version/Details	Date issued	Author	Reviewed by	Approved by
R2(0)	Draft	31.03.26	JW	MF	CW
R2(1)	Final	01.04.26	JW	MF	CW

RSK LDE Ltd (RSK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and RSK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK LDE Ltd.

CONTENTS

1 INTRODUCTION 2
2 MAINTENANCE RESPONSIBILITIES 3
3 MAINTENANCE REGIME 4
3.1 Attenuation Tanks 5
3.2 Operation and Maintenance Requirements for Proprietary Treatment Systems 5
3.3 Catchpit Manholes 6
3.4 Sewer Mains 6
3.5 Gullies and Drainage Channels 6
3.6 HydroBrake Manholes 7

APPENDICES
APPENDIX A INSPECTION CHECKLIST

1 INTRODUCTION

This management strategy has been prepared by RSK Land and Development Engineering Ltd on behalf of Hyro Energy Ltd., to satisfy planning conditions related to Kimberly Clark, Northfleet – Hydrogen Boiler Facility (The Development).

The SuDS considered for the purposes of this statement, include drainage features that will be employed to reduce and manage surface water runoff from the development to a design return period of 100 years plus climate change. This is required so that The Development will not increase the risk of flooding to the site and its environs. All drainage on site is taken to the River Thames. Such features include the following:

- Geocellular Storage Tank.

This document outlines the long-term maintenance of the proposed surface water system and will refer to the following documents, some of which provide further detail on the maintenance operations required:

- CIRIA Report C753, 'The SUDS Manual', 2015
- CIRIA Report C625, 'Model Agreements for Sustainable Water Management Systems', 2004; and
- Interpave, 'Permeable pavements: Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements', ed. 4, 2006.

2 MAINTENANCE RESPONSIBILITIES

Responsibility for drainage within England and Wales rests with various bodies. For the Development, the drainage responsibilities will be divided between the following:

- **Private Landowner** – each Householder will be responsible for the maintenance of drainage features within individual property curtilages.
- **Communal Areas** - A Management company will be set up for the Development to maintain all stormwater attenuation tanks, outfalls and any associated flow controls within communal areas. However, it should be noted that if, the Flood and Water Management Act 2010 is ever fully implemented this allows a surface water drainage system to be vested to the SUDS approving body (SAB) in this case Kent County Council. This would be reviewed at the time of any implementation of the act.
- **Adoptable Drainage** – All drainage within the adoptable areas will be offered for Section 104 Agreement adoption with Southern Water. All drainage will be designed and constructed to adoptable standards in accordance with Design and Construction Guidance (App C Sewerage Sector Guidance) requirements.
- **During Construction** – Until the drainage is approved and adopted by the adopting authorities, it is the responsibility of the groundworks contractor to protect the drainage system from construction run-off and effluent during the construction process. It will also be their responsibility to ensure that the drainage network is maintained, and functions as intended.

3 MAINTENANCE REGIME

As the maintenance of the communal SUDS features will be carried out via a Management Company, the form of agreement should include the required maintenance listed below. Should the maintenance be transferred at a later date to a public body, then the model agreement SUDS MA1 should be used, details of which can be found in the CIRIA guidance C625.

The following section describes the required maintenance for each feature in turn. The SUDS maintenance requirements listed below should be reviewed after the first 5 years, with a view to agreeing a new regime for the ongoing maintenance.

Notwithstanding the routine inspections and maintenance requirements, after severe storm events all features shall be inspected to clear debris and repair damaged structures or features. Records of the maintenance carried out shall be prepared by the Management Company.

3.1 Attenuation Tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, the annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

3.2 Operation and Maintenance Requirements for Proprietary Treatment Systems

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

3.3 Catchpit Manholes

Maintenance schedule	Required action	Typical frequency
Occasional maintenance	Remove litter, debris, and detritus that enters the drainage system	Annually, or as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Annually, or as required
	Inspection inlets and sump for silt accumulation, establish appropriate silt removal frequencies	Annually, or as required
Remedial actions	Remove and dispose of silt	Annually, or as required
	Remove and dispose of oils or petrol residues using safe standard practices	Annually, or as required

3.4 Sewer Mains

Maintenance schedule	Required action	Typical frequency
Monitoring & Occasional maintenance	CCTV Survey pipe network to check system is functioning correctly and that there are no cracks in the pipework.	Every 5 years
	Removal of blockages reported in the pipe network will also require a full CCTV Survey of the pipe network afterwards to confirm there are not any other blockages.	As required

3.5 Gullies and Drainage Channels

Maintenance schedule	Required action	Typical frequency
Regular inspections	Remove litter, debris, and detritus that enters the gullies or linear drainage channels	Six monthly, or as required
	Inspect inlets and outlets for blockages, and clear if required	Six monthly, or as required
	Inspection of sump for silt accumulation, establish appropriate silt removal frequencies	Six monthly, or as required
Remedial actions	Remove and dispose of silt	Six monthly or as required
	Remove and dispose of oils or petrol residues using safe standard practices	Six monthly or as required

3.6 HydroBrake Manholes

Maintenance schedule	Required action	Typical frequency
Occasional maintenance	Remove litter, debris, and detritus that enters the drainage system	Six monthly, or as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Six monthly, or as required
	Inspection HydroBrake bypass door, open and close door, greasing of door to prevent mechanism from seizing	Six monthly, or as required
Remedial actions	Replace components of HydroBrake if faulty in line with manufacturers guidance.	As required
	Replace entire HydroBrake if components cannot be replaced in accordance with manufacturers guidance.	As required

APPENDIX A
INSPECTION CHECKLIST

General information			
Site ID			
Site location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved drawing reference	
Inspection frequency		Approved specification reference	
Type of development		Specific purpose of any parts of the scheme (e.g. biodiversity, wildlife and visual aspects)	

Inspection Date	Details	Y/N	Action required	Date completed	Details	Y/N	Action required	Date completed
General inspection items								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours or nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Silt/Sediment accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent. Is removal required? If yes, state waste disposal requirements and confirm that all waste management requirements have been complied with (consult environmental regulator)								
Is surface clogging visible potentially problematic where water has to soak into the underlying								

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
construction or ground (e.g. underdrained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging or blockage of outlets or drainage paths?								
Is the vegetation condition satisfactory (density, weed growth, coverage etc)? (check against approved planting regime)								
Does any part of the system require weeding, pruning or mowing? (check against maintenance frequency state in approved design).								
Is there any evidence of invasive species becoming established? If yes, state action required								
Are any check dams or weirs in good condition?								
Is there any evidence of any accidental damage to the system (e.g. wheel ruts?)								

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow control?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects?								
Other observations								
Information appended (e.g. photos)								
Continue as current Increase maintenance Decrease maintenance								
Proposed date for next inspection								