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LIDL

ICKENHAM ROAD, RUISLIP

FLOOD RISK ASSESSMENT and WATER CYCLE STUDY

Final Report for:

January 2025

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1.0 INTRODUCTION

1.1 *Overview*

1.1.1 Cora IHT have been instructed by Lidl to prepare a Flood Risk Assessment [FRA] to support proposals for a new store located off Ickenham Road, Ruislip. **Figure 1.1** illustrates the site location.

1.1.2 This report presents the findings of an FRA, which has been carried out in accordance with the National Planning Policy Framework (NPPF), Technical Guidance to the NPPF and Planning Practice Guidance. Environment Agency (EA) FRA Guidance Note 1, West London Strategic Flood Risk Assessment (SFRA) and The London Borough of Hillingdon Surface Water Management Plan.

1.1.3 This FRA aims to identify and assess the risks of all forms of flooding to and from the site and demonstrate how these flood risks will be managed, taking climate change into account. The FRA also considers the management of surface water run-off and outlines the proposed drainage strategy.

1.1.4 As the approximate area of the site inclusive of the access road is under 1 hectare (6,460m2) in line with the guidance contained within the National flood risk standing advice for local planning authorities a full FRA is not required, however In accordance with the NPPF and SFRA, site development should not increase the risk of flooding elsewhere and this FRA has therefore been prepared to demonstrate that this has been achieved. Consideration has also been given to minimising the risk of pollution to controlled waters and the site conditions prior to, during and after development.

1.1.5 It is assumed that ground levels post-development will remain similar to present levels. If this or other key assumptions change, then the conclusions within this report may need to be reassessed to check that they are still applicable.

Figure 1.1: Site Location

2.0 SITE DESCRIPTION AND EXISTING CONDITIONS

2.1 Site Description

2.1.1 The site is currently occupied by The Orchard, Beefeater public house and the Ruislip Hotel Premier Inn, with an identified impermeable area of 6,460m^2 (0.646 hectares).

2.1.2 The site is located approximately 2.25km to the north of RAF Northolt and 1.34km to the North East of Ickenham. National Grid reference 508816 , 187185 is located at the central point of the proposed site area with the nearest postcode is identified as HA4 7DR.

2.1.3 It is understood that the site is being considered for new Food store development.

2.1.4 A proposed site layout plan provided by KLH Architects drawing reference 4478-0105 is presented in **Appendix A**.

2.1.5 Thames Water Asset Records shown in **Appendix B** indicates dedicated surface water networks in both Sharps Lane (225mm dia) and Ickenham Road (150mm dia) flowing in a northerly direction, with a 225mm dia combined network also present within Sharps Lane.

2.1.6 A second combined system is also present commencing at the junction of Church Avenue and Ickenham Road again heading in a northerly direction.

2.1.7 The existing site is currently occupied and is understood to benefit from both existing foul and surface water connections offsite.

2.1.8 It has been identified that the foul water appears to comminute with the combined system at the junction of Church Avenue and Ickenham Road with the surface water appearing to follow the site topography and discharging the direction of Sharps Lane in the south west corner of the site.

2.1.9 Prior to detailed design commencing, the exact location and condition of these outfalls must be surveyed to establish the exact location and suitability for reuse.

2.1.10 There are no noted watercourses in the immediate vicinity of the proposed site with the River Pinn located approximately 665m to the north of the proposed site.

2.1.11 The presence of underground culverts is not anticipated, should the detailed CCTV survey identify their presence the exact routes are to be confirmed.

2.2 Proposed Future Use

2.2.1 It is proposed to develop the site for food retail purposes. The scheme layout is shown on KLH Architects drawing reference 4478-0105.

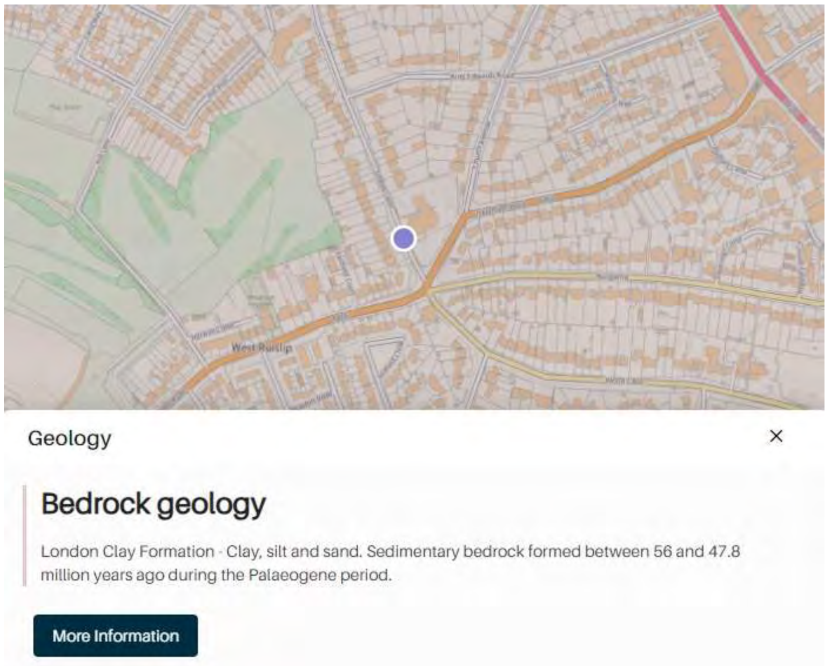
2.3 Site Levels

2.3.1 Following assessment of the topographical survey, shown in **Appendix C** provided by EDI Surveys Ltd the site appears to be fall from its southern boundary with Ickenham Road at a level of approximately 55.30 to its northern boundary adjacent to an existing residential area at a level of approximately 53.28 a fall of 2.02m resulting in an average gradient of approximately 1 in 32.

2.4 Underlying Ground

2.4.1 Review of British Geological Survey (BGS) geology mapping records indicate the site would be underlain by London Clay Formation. Extract of the BGS information is shown in **Figure 2.1**.

Figure 2.1: BGS Information

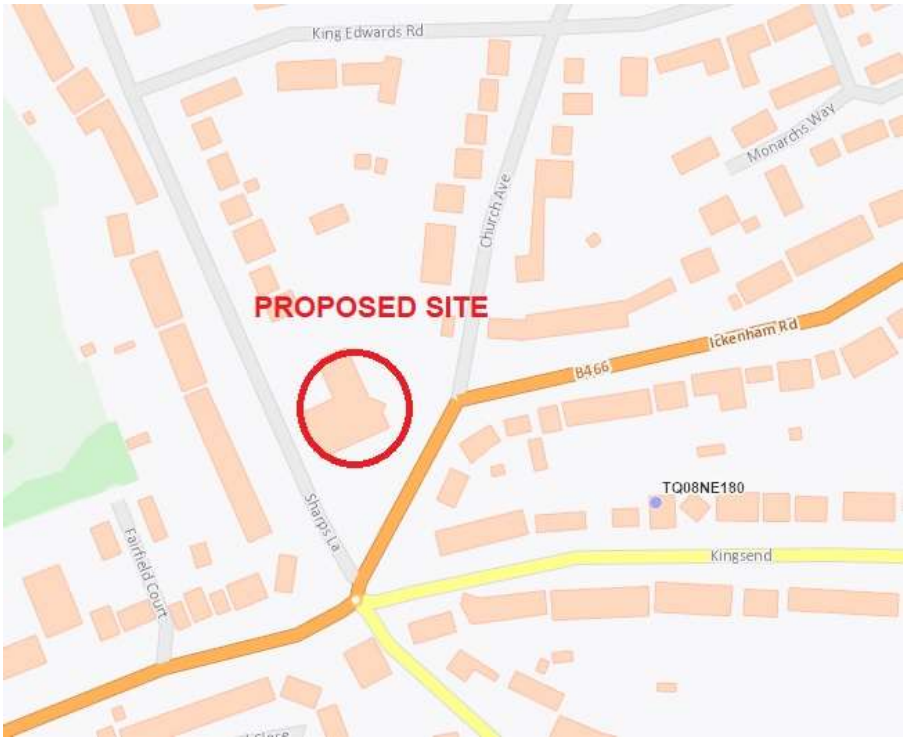


2.4.2 The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

- *Igneous rocks - are derived from molten magma in the Earth's crust. They may, for example, be extruded at the surface by volcanic activity to form lavas and tuffs (ash) or intruded into other rocks to form large masses of granite and gabbro at depth or minor, cross-cutting basalt dykes near the surface.*
- *Metamorphic rocks - such as schist and gneiss are those that have been changed from one rock type to another in the solid state by the recrystallisation of minerals, often at high temperatures and pressures when buried deep in the Earth's crust.*
- *Sedimentary rocks - are formed when grains and fragments of existing rocks are eroded away by ice, water and wind action, transported elsewhere and redeposited as a sediment. These sediments are often laid down in layers or strata of loose particles of gravel, sand, silt and clay. Over time they may be buried by later sediments and consolidated or cemented to form stratified or bedded rocks such as conglomerate, sandstone, siltstone and claystone. Other sedimentary rocks such as ironstone and limestone are created by chemical or biogenic (life) action.*

2.4.3 Although no boreholes are located within the proposed site, the nearest borehole reference TQ08NE180 is located to the south east of the proposed site, location shown in **Figure 2.2** Below which may provide a guide to potential ground conditions to be encountered, the full log are included within **Appendix D**.

Figure 2.2: BGS Borehole Locations



3.0 FLOOD RISK and FLOOD ZONES

3.1 Brief

3.1.1 The vulnerability of the site to flooding from rivers, sea and other sources has been considered, along with the potential to increase flooding elsewhere through the addition of impermeable areas and the effect on surface water run-off. Typical sources of flooding include fluvial, tidal, surface water, groundwater, sewers and anthropogenic sources; these are considered below.

3.2 Fluvial, Tidal

3.2.1 Additional to the information contained within he SFRA Flood maps are also produced by the EA for the whole of the UK to highlight areas at particular risk of flooding by categorising them into different Zones. These maps are based on a broad assessment of areas using digital mapping techniques and extracts from the EA flood maps for the site and its surroundings are included in the figures below.

3.2.2 The EA flood map for planning shows river and sea flooding data only, extract in **Figure 3.1**, below full report provided in **Appendix E**, shows that the development area and its immediate surroundings are wholly located within EA Flood Zone 1 (unshaded areas).

Figure 3.1: Flood Map for Planning Extract

3.2.3 Zone 1 areas are defined in NPPF Table 1 as "land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%)" and all uses of land are considered appropriate in Flood Zone 1 as shown in Table 2 of the NPPF shown in **Figure 3.2.**

Figure 3.2: NPPF Table 2

Table 2: Flood risk vulnerability and flood zone 'incompatibility'

Flood Zones	**Flood Risk Vulnerability Classification**				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✔	✔	✔	✔	✔
Zone 2	✔	Exception Test required	✔	✔	✔
Zone 3a †	Exception Test required †	X	Exception Test required	✔	✔
Zone 3b *	Exception Test required *	X	X	X	✔ *

Key:

✔ Exception test is not required

X Development should not be permitted

3.2.4 Annex 3 within the National Planning Policy Framework Technical Guidance (NPPF) indicates that the proposed development is designated as less Vulnerable see **Figure 3.3**.

Figure 3.3: Annex 3: Flood Risk Vulnerability Classification

Less vulnerable

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
- Car parks.

3.3 Surface Water

3.3.1 The EA's surface water flood map and associated description shown in **Figures 3.4** and **3.5** identifies the surface water flood risk for the proposed site. The surface water flood zone for the site has been identified as being very low with minor instances of flooding being identified along the line of Sharps Lane.

Figure 3.4 Surface Water flood Map

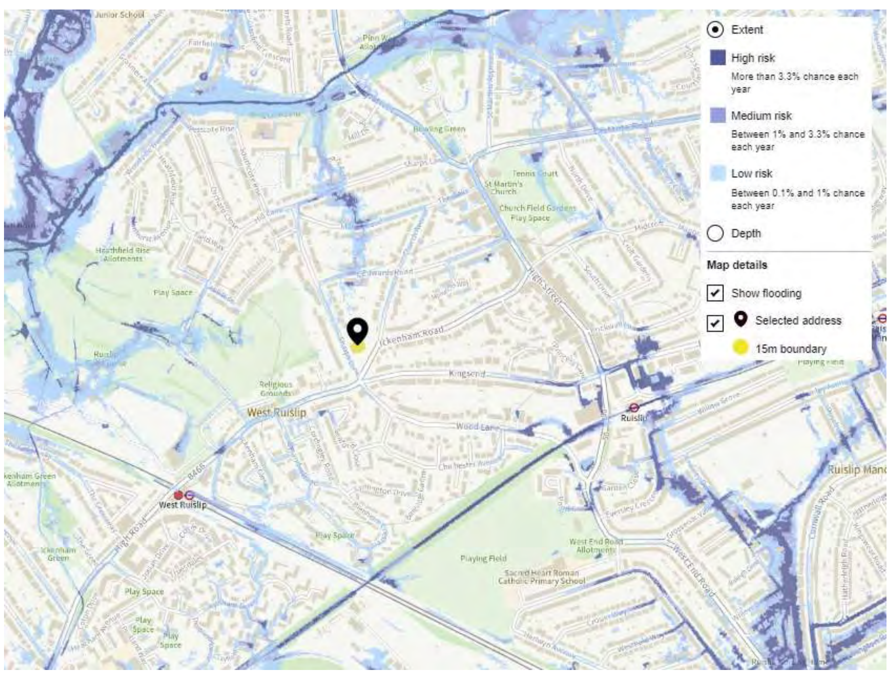


Figure 3.5 Surface Water flood Map – Description

Surface water	Very low risk of flooding
How likely a flood is	Very low risk means that this area has a chance of flooding of less than 0.1% each year. ► What makes an area more likely to flood from surface water
Manage your flood risk from surface water	An area can still be at risk of flooding even if it has not flooded in the past. You should check your long term flood risk regularly because the information may change. Find out how to prepare for flooding. Lead local flood authorities (LLFAs) are responsible for managing the flood risk from surface water. They may hold more detailed information. Your LLFA is Hillingdon council.
What this information covers	This information tells you the highest chance of flooding on the land 15 metres around a property. It is not specific to a property. ► What you can use this information for
See surface water flood risk on a map	View a map of surface water flood risk for information on: • where any flood water might spread to (extent) • how deep any flood water could be (depth) • the speed and direction of any flood water (velocity)

3.3.2 Surface water flooding occurs when rainwater does not drain away through normal drainage systems or soak into the ground but lies on or flows over the ground instead.

3.3.3 Surface water flooding appears to follow a natural topography of the surrounding areas with only very minor instances of flooding shown along Sharps Lane.

3.3.4 Post development the introduction of the proposed development will provide the opportunity for the introduction of more vegetated spaces which can be used to incorporate sustainable technologies that were not a requirement when the previous development was constructed.

3.4 Other Sources

3.4.1 The EA's other flood risks guidance shown in **Figures 3.6** identifies the potential extents of both reservoir and groundwater flooding. The extract below indicates that the site is not at risk from either flood source.

Figure 3.6 Other Sources

Other flood risks

Groundwater	Flooding from groundwater is unlikely in this area. ▼ What groundwater is and how we check an area's risk Groundwater is the water that is usually held in rocks and soil underground. Groundwater flooding happens when this water rises and flows above the surface. We use flood alert data to check the risk of flooding from groundwater.
Reservoirs	Flooding from reservoirs is unlikely in this area. ▼ What a reservoir is and how we check an area's risk A reservoir is a large natural or artificial lake that is designed to collect and store water. We use predicted scenarios to understand the risk of flooding from reservoirs. Flooding from reservoirs is extremely unlikely. An area is considered at risk if people's lives could be threatened in the event of a dam or reservoir failure.

3.5 Historic Flooding

3.5.1 The London Borough of Hillingdon surface water management plan identifies a number of historical flood events attributed to various sources of flooding.

3.5.2 Both the historical records for both ground water and surface water have been included within **Figures 3.7** and **3.8**.

Figure 3.7 Historical Flooding Groundwater

Historical Records

Table 3-4 provides a summary of the previous records of flooding attributed to of groundwater in the LB of Hillingdon. Figure 10 in Appendix D shows the geographical locations on these incidents within the Borough.

Table 3-4: Records of Groundwater Flooding

Date	Location	Recorded Impacts
06/11/2006	Northwood Cricket Ground	Unknown
31/05/2007	Property on Links Way, Northwood	Waterlogged
22/11/2002	Crosier Way, Ruislip Manor	Standing Water
18/11/2004	Winsor Avenue next to recreation ground,North Hillingdon	Standing Water
21/11/2002	Hoppner Road, Hillingdon	Standing Water
08/02/2010	Beacon Close, Willowbank	Slow Flowing Water

The areas with increased potential of elevated groundwater in the LB of Hillingdon are shown in Figure 10 of Appendix D together with historic records of flooding which have been identified as related to groundwater. The figures show that areas along the western Borough boundary and the south around Heathrow Airport have the greatest potential within the Borough.

Figure 3.8 Historical Flooding Surface Water

Historic Records – Surface Water Flooding

Past records of surface water flooding within Hillingdon have been gathered from sources such as the Environment Agency, London Underground as well as the LB of Hillingdon. These incidents have been mapped as part of the SWMP and are identified in Figure 5 (Appendix D). Table 3-2 provides a summary of the previous records of flooding attributed to surface water in the LB of Hillingdon.

Table 3-2: Records of Surface Water Flooding

Date	Location	Recorded Impacts
Unknown	Ruislip Manor Tube Station, Victoria Road	Flooding to station entrance during periods of heavy rainfall
Unknown	Ruislip Tube Station, A4180	Flooding to station entrance during periods of heavy rainfall
Unknown	West Ruislip Station	Heavy rain left standing water in the middle of roads in Eastcote and Ruislip and seeping in through front doors of properties
Unknown	Hillingdon underground station	Flooding throughout flood warning area
Unknown	Civic Centre	Civic centre canteen and underground car park flooded, cars left with water levels up to window sills
July 2006	Heathrow Airport	Heavy rain causing disruption to flights

There are limited records of surface water flooding in the London Borough of Hillingdon that can be used to verify the modelling results, however discussions with Council staff at Hillingdon has provided anecdotal support for several of the locations identified as being susceptible.

3.5.3 One instance of Groundwater flooding has been recorded within Ruislip along Crosier Way however the occurrence of historic groundwater flooding is noted as lying approximately 950m to the south of the proposed site, as such this is not anticipated to present an issue.

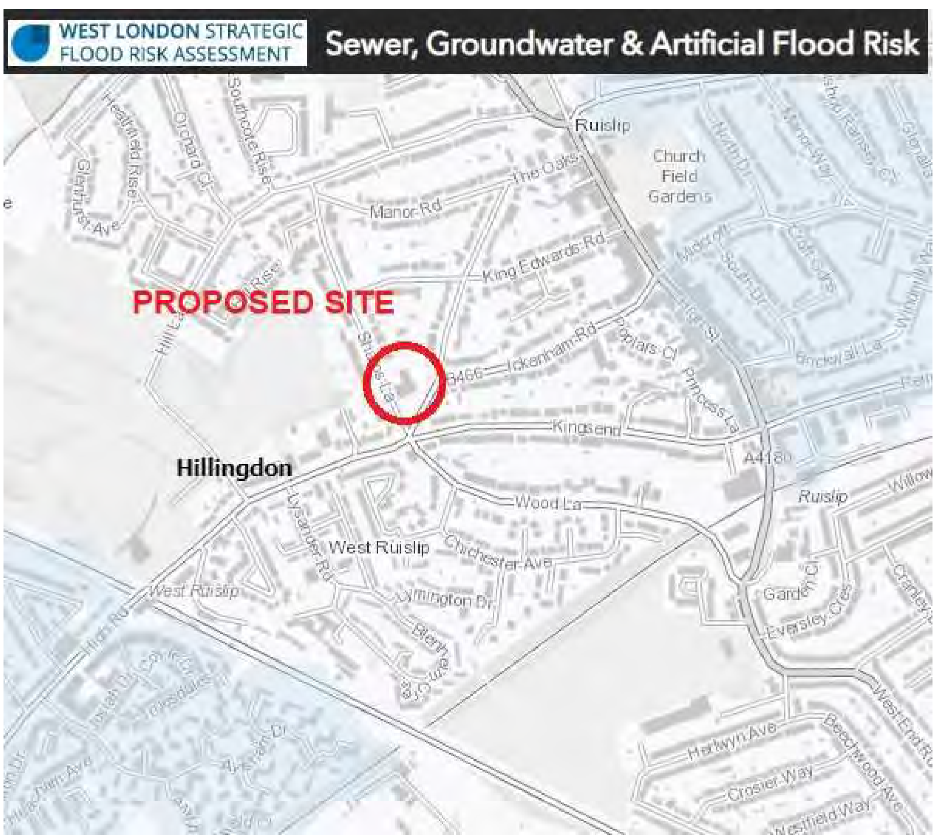
3.5.4 Three separate instances of historic flooding via surface water sources have been recorded within Ruislip, namely:

- Ruislip Manor Tube Station – 1.28 km to the east of the site
- Ruislip Tube Station – 700m to the east of the site
- West Ruislip Station – 585m to the south west of the site

3.5.5 All instances of flooding have been attributed to heavy rainfall events potentially linked to improper maintenance of the surface water network or a lack of capacity, as all 3 instances are located away for the immediate vicinity of the proposed site and with the flow for the development being restricted to predevelopment greenfield discharge rates historical flooding is not considered to be an issue with the reduction in flows being introduced as part of the propose development improving he situation offsite.

3.5.6 **Figure 3.9** below indicates the extent of the of the flood warning area which has been shown to not affect the proposed site.

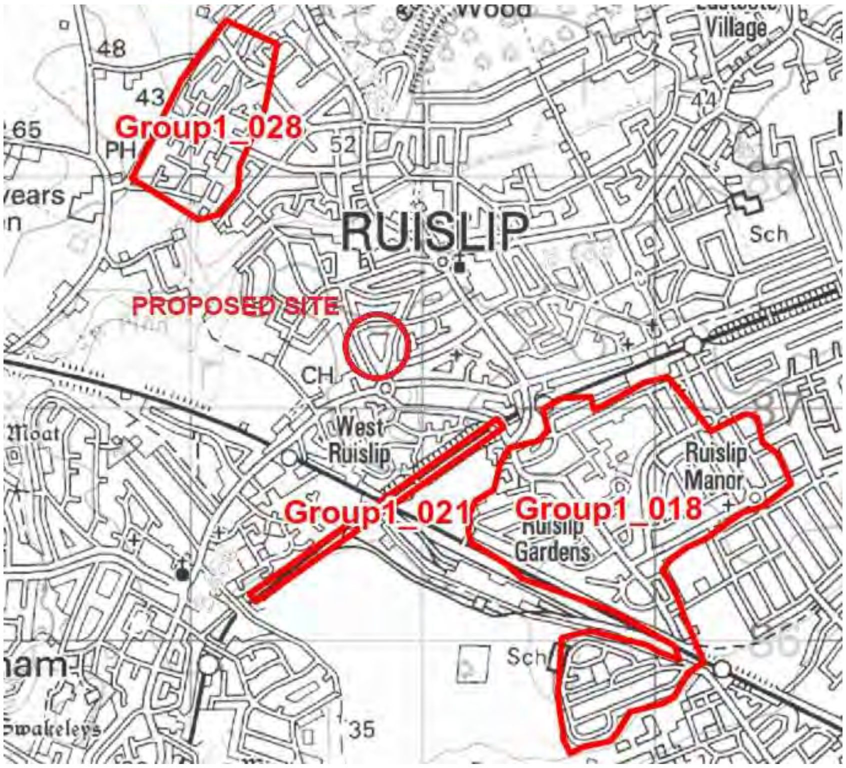
Figure 3.9 West London SFRA Sewer Flooding Records



3.6 Critical drainage Area

3.6.1 The proposed site is located outside of any critical drainage area (CDA) extract shown in **figure 3.10** below with the full page shown in **Appendix F.**

Figure 3.9 Critical Drainage Area Extract



3.6.2 The critical drainage area is not considered to affect the proposed site.

4.0 SUMMARY

4.1.1 The site is considered to be at very low risk of flooding from all sources.

4.1.2 The proposed site is designated as Less vulnerable which is acceptable in areas identified as flood zone 1.

4.1.3 Extremely minor instances of surface water flooding have been noted adjacent to the proposed site, Provided the existing surface water features are considered in the future development layout and the site drainage design, then surface water flooding should not preclude safe site development.

4.1.4 There are no recorded historic flood events within the immediate vicinity of the existing site.

4.1.5 A preliminary drainage strategy is discussed in Section 6 which shows that post-development flood risks will not be increased due to the development plans.

4.1.6 Considering the above, overall flood risks to and from the site are considered to be very low.

5.0 MANAGING SURFACE WATER

5.1 London Plan

5.1.1 In accordance with the NPPF and SFRA, consideration should be given to natural water flows at the site. The development should not adversely affect flow or increase flood risk elsewhere, including increasing run-off rates. The disposal of surface water should be dealt with in a sustainable way and climate change should also be accounted for. The site drainage strategy is discussed in Section 6.

5.1.2 Policy 5.13 of the London Plan **figure 5.1** below, states that all new developments should aim to achieve greenfield run off rates and follow the drainage hierarchy with all flows managed as close to source as possible.

Figure 5.1 Policy 5.13 extract of the London Plan

POLICY 5.13 SUSTAINABLE DRAINAGE

Planning decisions

A Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

1 store rainwater for later use
2 use infiltration techniques, such as porous surfaces in non-clay areas
3 attenuate rainwater in ponds or open water features for gradual release
4 attenuate rainwater by storing in tanks or sealed water features for gradual release
5 discharge rainwater direct to a watercourse
6 discharge rainwater to a surface water sewer/drain
7 discharge rainwater to the combined sewer.

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

5.2 Previous Situation and Development Proposals

5.2.1 The existing site is currently occupied by The Orchard, Beefeater public house and the Ruislip Hotel Premier Inn, which is understood to be 100% impermeable discharging at an unrestricted rate to the offsite network.

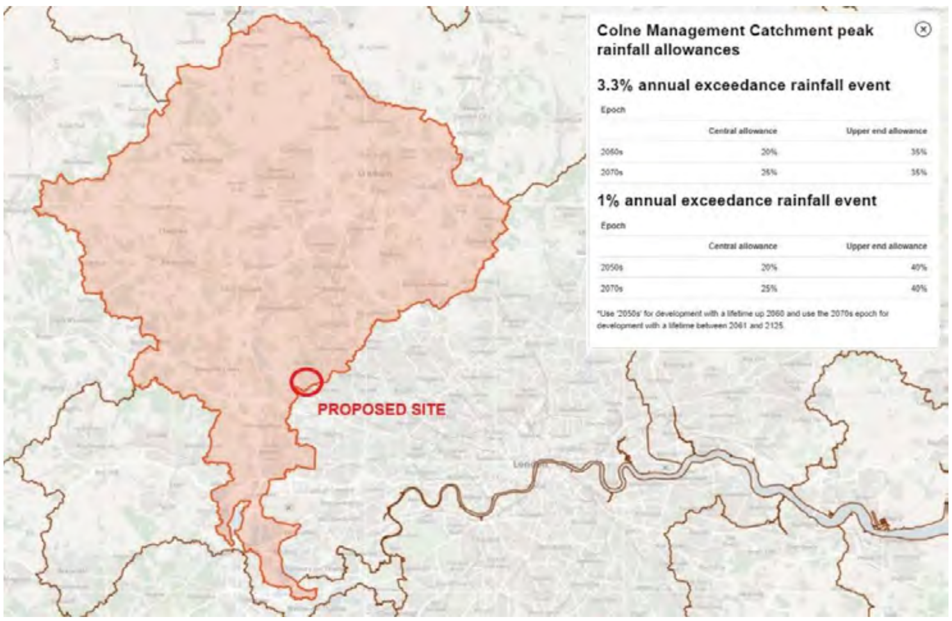
5.2.2 Post-development the site impermeable area will be reduced with the introduction of permeable surfacing through all external areas and the introduction of biodiverse planting areas which will provide surface water flows the opportunity to recharge the underlying ground, something not possible under the current site use. Nevertheless, surface water collected from impermeable areas, such as roofs, will need to be managed and a proposed strategy is included in Section 6.

5.3 Climate Change

5.3.1 There is evidence to suggest that the climate is changing with sea levels predicted to continue to rise along with more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall. The NPPF recommends that the effects of climate change be accounted for in FRA, with consideration of the EA flood maps and local authority SFRA.

5.3.2 Increased rainfall or higher intensity short-duration rainfall may increase as a result of climate change. The .GOV website states that for the **Colne Management Catchment** which includes upper end climate change allowances of 35% for the 1 in 30-year storm (3.3%) and 40% for the 1 in 100-year event (1%), are therefore being allowed for within the new surface water drainage design to take account of climate change as discussed in Section 6.

Figure 5.2 Climate Change Allowance



5.4 Sustainable Drainage Systems (SUDS)

5.4.1 SUDS are a desirable way to manage surface water disposal within new developments and SUDS methods for surface water drainage management are discussed further within the CIRIA SUDS Manual C753 which states that:

SuDS can take many forms, both above and below ground. Some types of SuDS include planting, others include proprietary manufactured products. In general terms, SuDS that are designed to manage and use rainwater close to where it falls, on the surface and incorporating vegetation, tend to provide the greatest benefits. Most SuDS schemes use a combination of SuDS components to achieve the overall design objectives for the site.

5.4.2 When designing surface water drainage strategies priority should be given to disposal of surface water via infiltration drainage systems over (first) discharge to watercourses (second) prior to identifying a possible discharge to sewers.

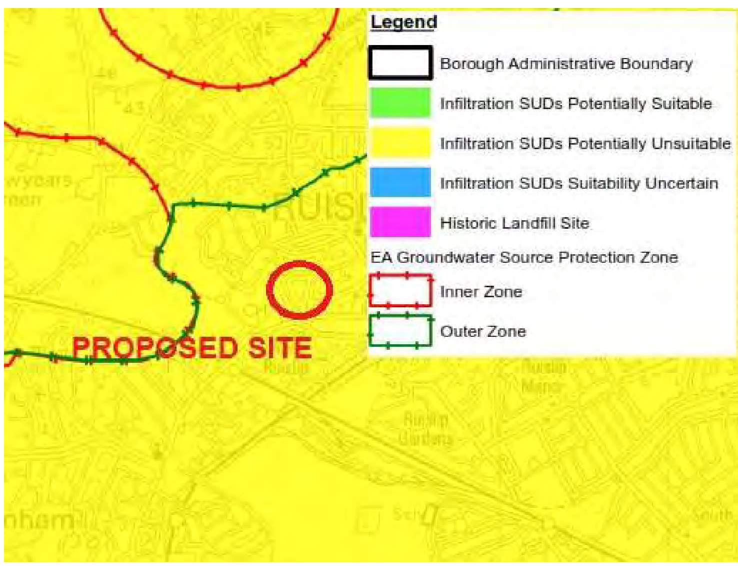
SuDS hierarchy

- *Into the ground (infiltration)*
- *To a surface water body (rivers, watercourses, lakes, ponds, canals etc.)*
- *Into a surface water sewer, highway drain, or another drainage system*
- *Into a combined sewer*

5.4.3 Although the possibility for infiltration has yet to be established, site specific infiltration testing has been deemed unnecessary with the SWMP identifying areas that may benefit from the potential of infiltration.

5.4.4 The site is identified to lie within an area considered unsuitable for infiltration (yellow hatch), which together with the presence of clay within the nearby borehole log infiltration has been unfortunately discounted as single form of discharge, however all flows will be provided with the opportunity to recharge the existing ground where possible.

Figure 5.3 SWMP Infiltration Extract

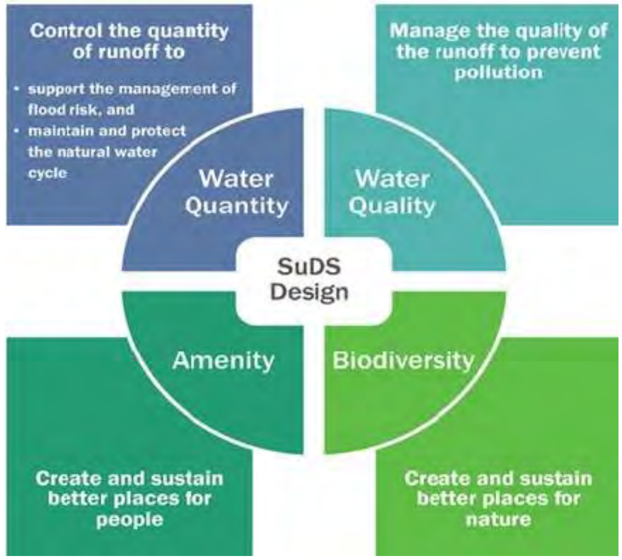


5.4.5 There are no noted watercourses in the immediate vicinity of the proposed site with the River Pinn located approximately 665m to the north of the proposed site.

5.4.6 Given the proximity of both combined and surface water networks in the immediate vicinity of the proposed site, it is proposed to discharge all surface water flows at a reduced rate potentially via an existing connection.

5.4.7 A detailed CCTV survey should be completed of both networks prior to detailed design commencing.

Figure 5.4 Four Pillars of SuDS



5.4.8 Examples of acceptable SuDS proposals are listed with the CIRIA SuDS Manual C753 the guidance provided within this list of examples have been used to inform the proposed strategy.

5.4.9 The examples listed with the SuDS manual that have been applied to the proposed drainage strategy include the following:

- *Pervious pavements provide a hard surface that can be used for pedestrians or vehicles, while allowing rainwater to pass through to the soil or underground storage.*
- *Bioretention systems including rain gardens collect runoff, allowing it to pond temporarily on the surface before filtering through vegetation and underlying soils.*
- *Trees capture rainwater and provide evapotranspiration, biodiversity and shade.*
- *Swales, detention basins, ponds and wetlands slow the ow of water, store and treat runoff while draining it through the site and encouraging biodiversity.*
- *Soakaways and infiltration basins promote infiltration as an effective means of controlling runoff and supporting groundwater recharge.*

5.4.10 The proposed development will address the above 4 pillars of SuDS design criteria with the inclusion of a range of sustainable features through a comprehensive treatment train.

- **Water Quantity** will be strictly controlled to greenfield run off in line with policy 5.13 of the London Plan, the exact flow rate is discussed within Section 6 below. The proposed flow restriction will be achieved through the introduction of a hydrobrake flow control device prior to the outfall, however the flows will be restricted a little closer to source as they pass through the system via a combination of both infiltration and online attenuation provided within the subbase of the vehicular parking bays and bio retention/detention basin areas.

- **Water Quality** will be provided with the inclusion of a significant treatment train including extensive areas of permeable construction within the proposed car parking areas, prior to outfall.

  The simple index approach tool has been used shown in **Appendix G**, for both commercial roofing and external car parking, the spreadsheets have been included to confirm that the proposed treatment train is sufficient to achieve pollution mitigation indices for the selected SuDS components.

  The proposed treatment train has been deemed sufficient to achieve an acceptable level of water quality prior to discharge from the site.

- **Biodiversity** The proposed SuDS drainage strategy has been designed in accordance as much as possible with Table 6.1 of the CIRIA SuDS Manual which requires any biodiverse scheme to adhere to the following criteria:

  - *Support and protect natural local habitat and species.*
  - *Contribute to the delivery of local biodiversity objectives.*
  - *Contribute to habitat connectivity.*
  - *Create diverse, self-sustaining and resilient ecosystems.*

  Although the above criteria presents a challenge to the design team given the nature of the proposed development, the introduction of a number of vegetated spaces and sensitive planting within the new site proposal, together with ongoing maintenance which will combine to achieve a better environment for nature to thrive.

- **Amenity** and biodiversity are often considered together, however each are equally important in their own right, although the proposed development is not intended to become a destination to connect the visitors to water, the opportunity to create visually attractive areas within the proposed site has been maximised which has the ability to connect people to water. With such features have been shown to improve the well-being of people that work in or visit the proposed store.

6.0 DRAINAGE STRATEGY

6.1 Surface Water Drainage Strategy

6.1.1 Although infiltration is not considered to be possible, all flows generated by the proposed development will be provided the opportunity to recharge the existing ground.

6.1.2 With the above in mind and in accordance with the SUDS hierarchy, it is proposed that all surface water flows arising from the proposed development are to discharge at an attenuated rate into the offsite dedicated Thames Water public drainage network within either Sharps Lane or Ickenham Road. Once the existing connection positions have been established.

6.1.3 Following the site-specific CCTV survey, should it be confirmed that an existing connection is available, it is proposed that the new surface water networks will reuse the existing outfall and maintain its current invert level.

6.1.4 The site inclusive of the proposed access extends to an area just less than 1 hectare, however, to establish an approximate discharge rate from the proposed development, the proposed site area within the red line boundary which extends to approximately 0.646 hectares (6,460m^2) has been used to inform the proposed greenfield calculation.

6.1.5 There are two methods for calculating the greenfield run-off rate: the IH124 method and the ICP method. The IH124 method calculates the peak Greenfield run-off flow rates by correlation of the Soil Index Value, the Average Annual Rainfall and the Site Area (SOIL, SAAR and AREA). The IH124 Method should be used for sites in excess of 50 hectares and the resulting discharge is linearly interpolated for the required area. The ICP method uses the IH124 method and automatically interpolates the discharge for sites less than 50 hectares and therefore this is the method that has been used.

6.1.6 The greenfield discharge rate using the HR Wallingford Greenfield Estimation tool shown in **Appendix H** has been used to provide the requisite discharge rates at outfall.

6.1.7 The mean annual greenfield run off rate for the site has been calculated as 9.09 l/s for the 1 in 100-year storm 6.55 l/s for the 1 in 30-year storm and 2.42 l/s for the 1 in 1-year storm event.

6.1.8 Attenuation will be provided on the site to ensure that the calculated greenfield run off rate is not exceeded during a 1 in 100-year critical storm event, inclusive of a 40% allowance for climate change.

6.1.9 It is proposed that the areas of permeable surfacing will act as inline storage structures for the flows generated by the all-external areas, together with the bio retention areas, full Causeway Flow outputs for each critical storm by return period can be found in **Appendix I**.

6.1.10 The site drainage network will be designed in accordance with current best practice to have sufficient capacity not to flood during both the critical 1 in 30-year and 1 in 100-year storms (plus climate change allowances of 35% and 40% respectively). In this way the risk of off-site flooding, which could result in damage to other buildings and essential services, will be minimised and the risk of flooding elsewhere should not be increased as a result of the development proposals.

6.1.11 An indicative drainage strategy is shown in **Appendix J**.

6.1.12 To provide the requisite Water Quality the proposed treatment train has been designed in accordance with CIRIA guidance document C753 to achieve interception.

6.1.13 Interception is described in CIRIA C753 as:

> ***interception****: preventing runoff and the associated pollution load from the majority of small rainfall events, for example through the use of pervious surfaces and vegetated collection systems. Interception helps facilitate the retention of pollutants in surface vegetation, soil or other material layers from where a proportion can often be degraded. 7his can reduce the potential total pollution load discharged to the receiving surface waters over the year noting that risks to groundwater should always be managed effectively. The requirement for Interception is set out as water quality standard 1 in Section 4.3.1. It is also required by water quantity standard 1 in Section 3.3.1, and guidance on designing for Interception is set out in Section 24.8.*

6.1.14 All features proposed within the proposed drainage strategy have been specified to provide interception in the first instance in line with Table 26.7 Below.

Figure 6.2 Suitability of SuDS Components

TABLE 26.7 Indicative suitability of SuDS components within the Management Train

SuDS component	Interception[1]	Close to source/ primary treatment	Secondary treatment	Tertiary treatment
Rainwater harvesting	Y			
Filter strip	Y	Y		
Swale	Y	Y	Y	
Filter drain	Y		Y	
Pervious pavements	Y	Y		
Bioretention	Y	Y	Y	
Green roof	Y	Y		
Detention basin	Y	Y	Y	
Pond	[3]	Y[2]	Y	Y
Wetland	[3]	Y[2]	Y	Y
Infiltration system (soakaways/ trenches/ blankets/basins)	Y	Y	Y	Y
Attenuation storage tanks	Y[4]			
Proprietary treatment systems		Y[5]	Y[5]	Y[5]

6.1.15 The prominent features proposed within the proposed drainage strategy the site include Rainwater harvesting, pervious pavements and bioretention areas which all provide interception as well as controlling sources of pollution close to the source within primary treatment and secondary treatment.

6.1.16 Further discussions with the appropriate approving bodies are required to agree the proposed drainage strategy.

6.2 Foul Flows

6.2.1 Following assessment of the Thames Water apparatus records, a dedicated foul water gravity system is located within the proposed site boundary shown in **Appendix B**.

6.2.2 Given the location of the existing foul water network, the proposed site has the potential to currently benefit from an existing connection to the adopted public system. Following the site-specific CCTV survey should a connection be established; the proposed development will look to reuse the connection in order to avoid a new connection being necessary.

6.2.3 All foul flows from the proposed site will communicate with the existing foul system prior to discharge to the adopted Thames Water network.

7.0 WATER EFFICIENCY

7.1 WATER CONSUMPTION

7.1.1 Water consumption will be monitored in order to enable the following:

7.1.2 Improving water efficiency and reducing cost related to water consumption in use;

- Reducing potable water use in order to help conserve stretched water reserves at times of shortage, and;
- Reducing water industry greenhouse gas emissions, pollution impacts and associated costs on a national level.

7.1.3 This can be monitored by using the BREEAM Wat 01 calculator to assess the efficiency of the Domestic water-consuming components. Reducing the demand for potable water through the provision of efficient sanitary fittings, rainwater collection and water recycling systems. If a greywater or rainwater system is specified, use its yield in l/person/day to offset potable water demand from components.

- 1 credit – 12.5% improvement
- 2 credit – 25% improvement
- 3 credit – 40% improvement
- 4 credit – 50% improvement
- 5 credit – 55% improvement

7.1.4 The proposed development aims to incorporate water saving fixtures and fittings to achieve over 40% reduction over industry baseline. This is equivalent to 3 credits in the BREEAM Wat01 category. Please refer to the Sustainability Statement and accompanying BREEAM pre-assessment tracker for further details.

7.2 WATER MONITORING

7.2.1 Water monitoring is undertaken for the following reasons:

- Increasing awareness of water usage within the building;
- Identifying and monitoring large water uses and changed consumption levels to improve management and maintenance as well as to encourage reductions in unnecessary consumption;
- Reducing costs related to water consumption;
- Managing water demand for different building areas and uses, and;
- Reducing the need for large scale increases in water infrastructure in the future which are likely to increase costs over time as well as impact on our rural and urban landscapes and communities.

7.2.2 A water meter should be provided on the mains water supply to the assessed building area. The meter must have a pulsed or other open protocol communication output to enable connection to an appropriate utility monitoring and management system.

7.2.3 Water Smart Meters helps to identify and eliminate misbilling. Detailed analysis of water usage can be broken down by building, department, tenant, equipment or shift. Automatic Meter Reading determines usage over time, identifies peaks, compares sites and correlates use with the offending equipment or personnel. It provides leak monitoring and helps leak detection and prevention.

7.2.4 The system helps identification of sudden peaks or gradual increases in consumption, which can indicate leaks and reveal inefficient practices or equipment.

7.3 LEAK DETECTION AND PREVENTION

7.3.1 Water leak detection systems are implemented for the various reasons including:

- Reducing potable water wastage associated with leaks;
- Minimising damage, costs and disruption arising from water leaks, and;
- Reducing costs related to water consumption.

7.3.2 A leak detection system is proposed to be installed which is capable of detecting a major water leak on the mains water supply within the building and between the building and the utilities water meter is installed.

7.3.3 The leak detection system is:

- A permanent automated water leak detection system that alerts the building occupants to the leak OR an inbuilt automated diagnostic procedure for detecting leaks;
- Activated when the flow of water passing through the water meter or data logger is at a flow rate above a pre-set maximum for a pre-set period of time;
- Able to identify different flow and therefore leakage rates, e.g., continuous, high or low level, over set time periods;
- Programmable to suit the owner's or occupier's water consumption criteria; and,
- Where applicable, designed to avoid false alarms.

7.4 WATER REUSE

7.4.1 Whist the development aims to reduce water demand in the first instance, consumption will also be offset through the provision of rainwater collection and greywater systems where feasible.

7.4.2 Water butts of 200l capacity will be connected to the rainwater pipes in areas agreed with the architect. The surface water collected will be used for irrigation purposes. This will be maximised through a combination of water reuse and use of both native and drought resistant plant species.

8.0 WATER EFFICIENT CONSIDERATIONS

8.1 EFFICIENT LANDSCAPING:

8.1.1 Potable water consumption reduction from irrigation can be further maximised through a combination of water reuse and use of both native and drought resistant plant species, which will thrive with little to no irrigation and rely only on natural rainfall.

8.2 EFFICIENT EQUIPMENT:

8.2.1 Identify all water demands that could be realistically mitigated or reduced. To achieve this the following is considered:

- Reduce unregulated water demand (e.g. by using harvested rainwater for irrigation).
- identify all water demands from uses of a non-domestic scale, non-sanitary water use or vehicle wash that could be realistically mitigated or reduced.
- Identify systems or processes to reduce the relevant water demand and establish a demonstrable reduction in the total water demand of the building.

8.3 WATER RESILIENCE

8.3.1 All droughts will vary in terms of their duration and impact on the availability of water resources. The return-to-normal conditions are unpredictable and dependent on increasing levels of rainfall/recharge, making the duration and severity of droughts difficult to forecast.

8.3.2 Affinity Water has devised a Drought Management Plan (DMP) which is of relevance for the development. Drought plans are a statutory requirement for all water companies under Section 39B of the Water Industry Act 1991 (WIA 1991). The DMP has been produced in line with the Drought Plan. Regulations 2005 and the Drought Plan (England) Direction 2016. This DMP complies with the drought plan guidelines published by the Environment Agency (the Guidelines).

8.3.3 Affinity Water has 130 groundwater sources, four river intakes on the River Thames, one impounding reservoir and a number of bulk supply imports from neighbouring water companies. Approximately 65% of the water abstracted is from groundwater sources and the remainder is from surface water. Groundwater levels will normally reach their highest point around March/April. With low winter rainfall, they may peak before this, again decreasing the length of the recharge period and therefore limiting the amount of groundwater level rise. Shortened recharge seasons will lower the starting point of the following year’s natural recession, again contributing to lower-than-normal levels.

8.3.4 During a drought, Affinity Water would manage the supply and demand balance using a two-tiered approach, in which they would look to reduce demands on the water resources, as well as increasing the water available for use. Sources are reviewed to determine the feasibility of increasing abstraction within licensed volumes by increasing pumping capacity. Investigation of options for accelerating planned delivery of capital investment projects which will secure additional water for supply.

8.3.5 For more information, please refer to Drought Management Plan Annual Update 2019 by Affinity Water.

8.4 WATER SUPPLY

8.4.1 Early engagement with the local planning authority, the Environment Agency and relevant water and sewerage companies as appropriate can help establish whether particular water and wastewater issues need to be considered.

8.4.2 Planning for the necessary water supply would normally be addressed through authorities' strategic policies, which can be reflected in water companies' water resources management plans Water supply is therefore unlikely to be a consideration for most planning applications.

8.5 WATER QUALITY

8.5.1 Water quality is only likely to be a significant planning concern when a proposal will involve the physical modifications to a water body such as flood storage areas, channel diversions and dredging, removing natural barriers, construction of new locks, new culverts, major bridges, new barrages/dams, new weirs (including for hydropower) and removal of existing weirs; and/or

8.5.2 Moreover water bodies can be indirectly impacted for example, via;

- The result of new development such as the redevelopment of land that may be affected by contamination, mineral workings, water or wastewater treatment, waste management facilities and transport schemes including culverts and bridges;
- The result in runoff into surface water sewers that drain directly, or via combined sewers, into sensitive waterbodies e.g. water bodies with local, national or international habitat designations;
- A lack of adequate infrastructure to deal with wastewater
- A lack of adequate infrastructure to deal with wastewater where development occurs in an area where there is a strategic water quality plan e.g. Nutrient Management Plans, River Basin Management Plans, water cycle studies, diffuse water pollution plans or sewerage undertakers' drainage strategies which set out strategies to manage water quality locally and help deliver new development.

9.0 MAINTENANCE STRATEGY

9.1.1 SuDS components require good maintenance including inspections to identify performance issues and plan appropriate maintenance needs, checks on the operation and maintenance of the drainage system and landscape management. Therefore, it is intended that those responsible for the drainage within a development will be provided with an Operation and Maintenance Manual as part of the documentation provided under the Construction (Design and Management) regulations 2015 at the end of the construction works. Maintenance requirements that would be appropriate for this development, to be included in the document are outlined below.

9.1.2 All maintenance necessary will be undertaken, appointed and/or suitably managed by Lidl Great Britain Limited

9.1.3 The Drainage network and inherent SuDS have been designed with minimal maintenance in mind. The maintenance is generally of a 'common sense' approach and is to comprise:

- Regular day to day care: - litter collection, grass cutting and checking the inlets and outlets where water enters or leaves a drainage feature.
- Occasional tasks: - managing vegetation in wet areas (ponds, swales, etc.) and removing any silt that builds up in the drainage features.
- Remedial work: -repairing damage when, and where, necessary.

Specific recommendations for each feature are provided in the following sections and should be referred to in the first instance if there are any issues.

Permeable Surfacing

9.1.4 The drainage scheme utilises permeable construction for the parking bays as in line storage structures, at the base of the stone build-up is a perforated pipe, which slowly collects the water and conveys it to the attenuation tank and Bioretention area, via a network of catchpit PPIC's and manholes.

Maintenance schedule	Required action	Frequency
Regular maintenance	Litter and debris removal from permeable surface and access.	Monthly (or as required).
	Remove weeds within joints of any permeable paving.	Monthly (at start, then as required).
	Trimming of any roots that may be causing blockages.	Annual (6monthly for the first year).
Occasional maintenance	Removal of sediment from catchpit.	Six monthly (or following significant rainfall event).
Remedial actions	Inspect inlets, outlets and inspection points for blockages,	Monthly.
	Clear perforated pipework of blockages.	As required.
	Replace geotextiles and clean and replace filter media, if clogging occurs.	As required.
Monitoring	Inspect inlets, surfaces and perforated pipework for silt. accumulation. Establish appropriate silt removal frequencies.	6 monthly.

Manholes and PPICs

9.1.5 Manholes are typically sized in accordance with Sewers for Adoption, which relates to the incoming and outgoing pipe diameters. However, as the system is not Adopted, PPICs have been used where manufacturer's limitations permit. Typically, PPICs can be used for depths up to 3m and for pipe diameters up to 150mm.

Personnel access into PPIC chambers is not possible, and therefore rodding/jetting should be carried out from ground level. This is generally accepted as good practice and in accordance with good health and safety procedures. Where larger manholes, which could accommodate man access, have been included maintenance should also take place from ground level. Man, access should be resisted and only used as a last resort.

Maintenance schedule	Required action	Frequency
Occasional Maintenance and Monitoring	Covers should be lifted and inspected for litter and debris to ensure that the runs are free flowing.	3 Monthly (or as required).

Bio Retention Area

9.1.6 A Proposed Bio Retention area is proposed as part of a comprehensive treatment train to remove contaminants prior to discharge.

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Litter and debris removal.	Monthly (or as required).
	Grass cutting – to retain grass height within specified design range (refer to landscape architects recommendations).	Monthly (during growing season), or as required.
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
Occasional maintenance	Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually.
	Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required.	Annually, or if bare soil is exposed over 10% or more of the swale.
Remedial actions	Repair erosion or other damage by re-turfing or reseeding.	As required.
	Re-level uneven surfaces and reinstate design levels.	As required.
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.
	Inspect infiltration surfaces for ponding, compaction, and silt accumulation. Record areas where water is ponding for > 48hours.	Monthly, or when required. Advise BKPL if ponding is occurring as noted.

Flow Control Device

9.1.7 The surface water flow off site is limited to Greenfield run-off rate of no more than 9.09 l/s. The flow is limited by a Hydrobrake Optimum (CTL-SHE-0131-9000-150-9000). This is a proprietary system and will be installed in line with the manufacturers written instructions. Operation and Maintenance guidance is provided within the manufacturers' standard documentation.

Pumping Station

9.1.8 This is a proprietary system and will be installed in line with the manufacturers written instructions. Operation and Maintenance guidance is provided within the manufacturers' standard documentation.

10.0 CONCLUSIONS

10.1.1 The site is Wholly contained within in Environment Agency (EA) Flood Zone 1. Reference to NPPF Table 3 shows that an Exception Test is not required as buildings used for shops are classified as less vulnerable and all uses are acceptable in areas categorised as Zones 1.

10.1.2 The site is considered to be at a very low overall risk of flooding provided that surface water flooding risks are appropriately managed during the development. EA mapping indicates that sections of Sharps Lane may currently experience an element of surface water flooding and this potential risk has been considered as part of the preliminary site surface water drainage strategy. It is recommended that finished floor levels are set at least 150mm above external ground levels to protect against localised pooling of surface water during heavy prolonged rainfall.

10.1.3 The risk of flooding elsewhere should not be increased as a result of the development.

10.1.4 The nearest surface watercourse is the River Pinn, which is located approximately 665m north of the proposed site.

10.1.5 A maximum permissible discharge rate of 9.09 l/s for the 1 in 100-year storm event plus 40% allowance for climate change will be used to inform the proposed design.

10.1.6 Attenuation will be provided on the site to ensure that the calculated greenfield run off rate is not exceeded during a 1 in 100-year storm event, inclusive of a 40% allowance for climate change. Based on the calculated run off rate of 9.09 l/s, the modelled level of storage required to achieve the proposed discharge rates.

10.1.7 The new site drainage will be designed with sufficient capacity not to flood during a 1 in 30-year storm event plus 35% allowance for climate change as well as to contain flood water generated from a 1 in 100 year plus climate change storm event (+40%) within the site. The risk of off-site flooding would not increase as a result of the development and safe access and egress will be maintained.

10.1.8 Foul flows are anticipated to communicate with the offsite system potentially through an existing connection.

10.1.9 Discharge restrictions/charges may apply for connections to the public drainage network and for discharge of surface waters into the adjacent watercourse.

10.1.10 The potential for pollution of controlled waters is considered to be low provided best practice procedures are following during development. Drainage systems should be maintained to ensure that they do not become blocked and unable to discharge.

10.1.11 The proposed development aims to incorporate water saving fixtures and fittings to achieve over 40% reduction over industry baseline. This is equivalent to 3 credits in the BREEAM Wat01 category.

10.1.12 Whist the development aims to reduce water demand in the first instance, consumption will also be offset through the provision of rainwater collection and greywater systems where feasible.

10.1.13 Affinity Water has devised a Drought Management Plan (DMP) which is of relevance for the development. Drought plans are a statutory requirement for all water companies under Section 39B of the Water Industry Act 1991 (WIA 1991). The DMP has been produced in line with the Drought Plan. Regulations 2005 and the Drought Plan (England) Direction 2016. During a drought, Affinity Water would manage the supply and demand balance using a two-tiered approach, in which they would look to reduce demands on the water resources, as well as increasing the water available for use.

10.1.14 A leak detection system is proposed to be installed which is capable of detecting a major water leak on the mains water supply within the building and between the building and the utilities water meter is installed.

10.1.15 Overall, the development aims to use water responsibly, reuse water where possible, incorporate SuDS to maximise the efficiency of the development, take future weather such as droughts and floods into consideration, monitor possible leaks and utilise water efficient landscaping and equipment.

Appendix A

NO DIMENSIONS TO BE SCALED FROM THIS DRAWING

Rev	Date	Reference	Drawn / Chk'd	
P12	2025/01/03	CUSTOMER WC REVISED.	AA	AA

PARKING

Standard		46
Disabled		4
Enlarged Bay	E/B	3
Parent & Child		3
EVCP 22kW & 50kW DC Rapid Charging Spaces		2
Passive Infrastructure for future EVCP Charging Spaces		14
Total Customer Parking		72
Short Stay Cycle		24
Long Stay Cycle		12

SCHEDULE OF ACCOMMODATION - KEY

Site Area	0.646Ha (1.596 Acres)	
GIA	1,825	sq m
GEA	1,902	sq m
Sales Area	1,212	sq m
WAREHOUSE		
Warehouse	217	sq m
Bakery Warehouse	52	sq m
Additional Chillers	44	sq m
DRS Store	40	sq m
Total Warehouse	353	sq m
ANCILLARY AREA		
Bakery Prep	65	sq m
Cash Office	10	sq m
Welfare Area, wcs, etc	87	sq m
Customer WC	9	sq m
Utility	8	sq m
Circulation	32	sq m
Internal Partitions	49	sq m
Total Ancillary	260	sq m

Client
Lidl Great Britain Ltd

Project
Lidl
Ickenham Road, Ruislip

Title
Site Plan as Proposed
Option C

Drawing Ref.			Revision
4478-0105			P12
Scale - unless otherwise stated		Status	Issued For
1:500	@ A3	S0	Preliminary

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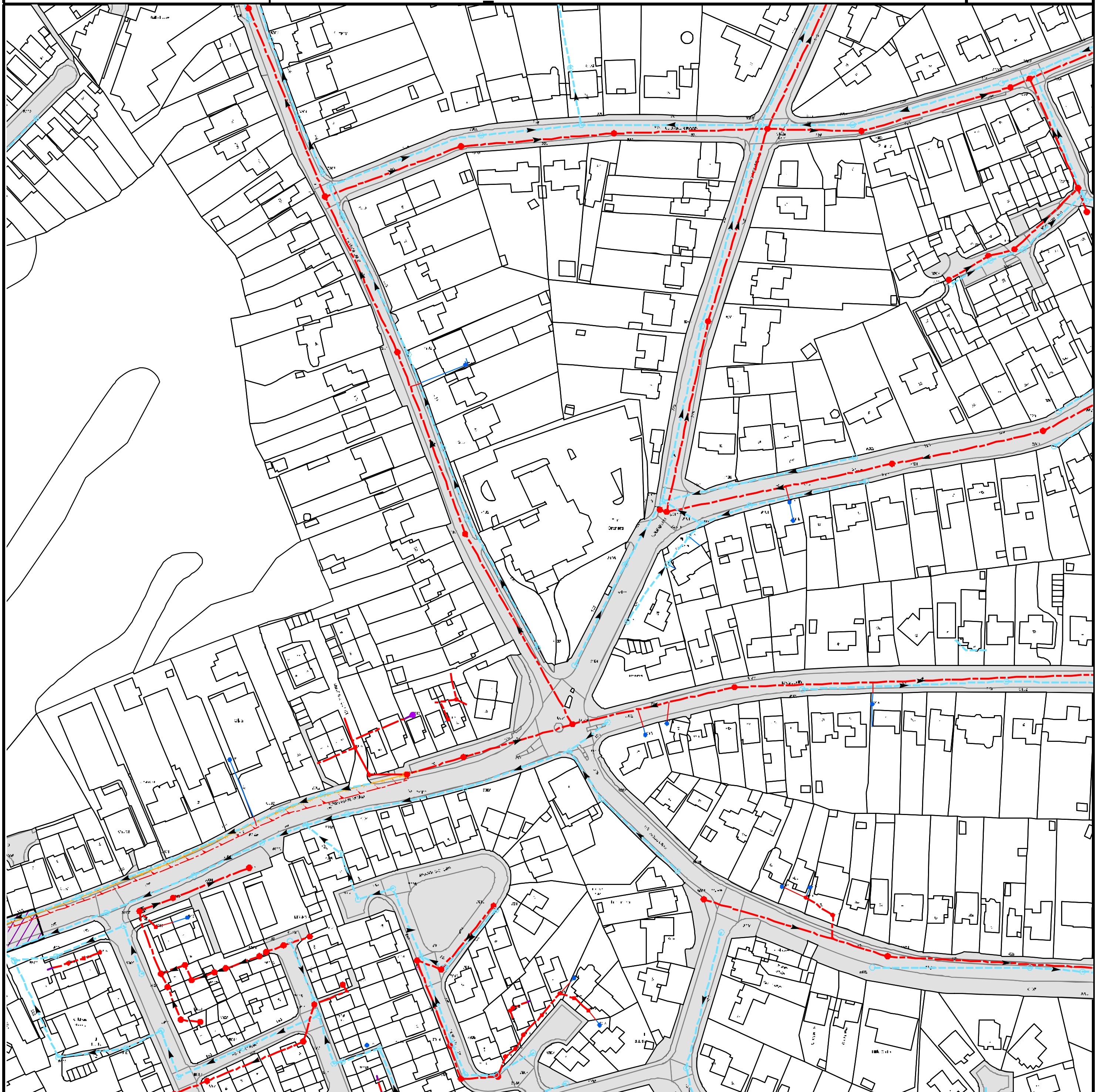
Appendix B

Asset Location Search Sewer Map - ALS/ALS Standard/2023_4855621



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 508813,187166

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

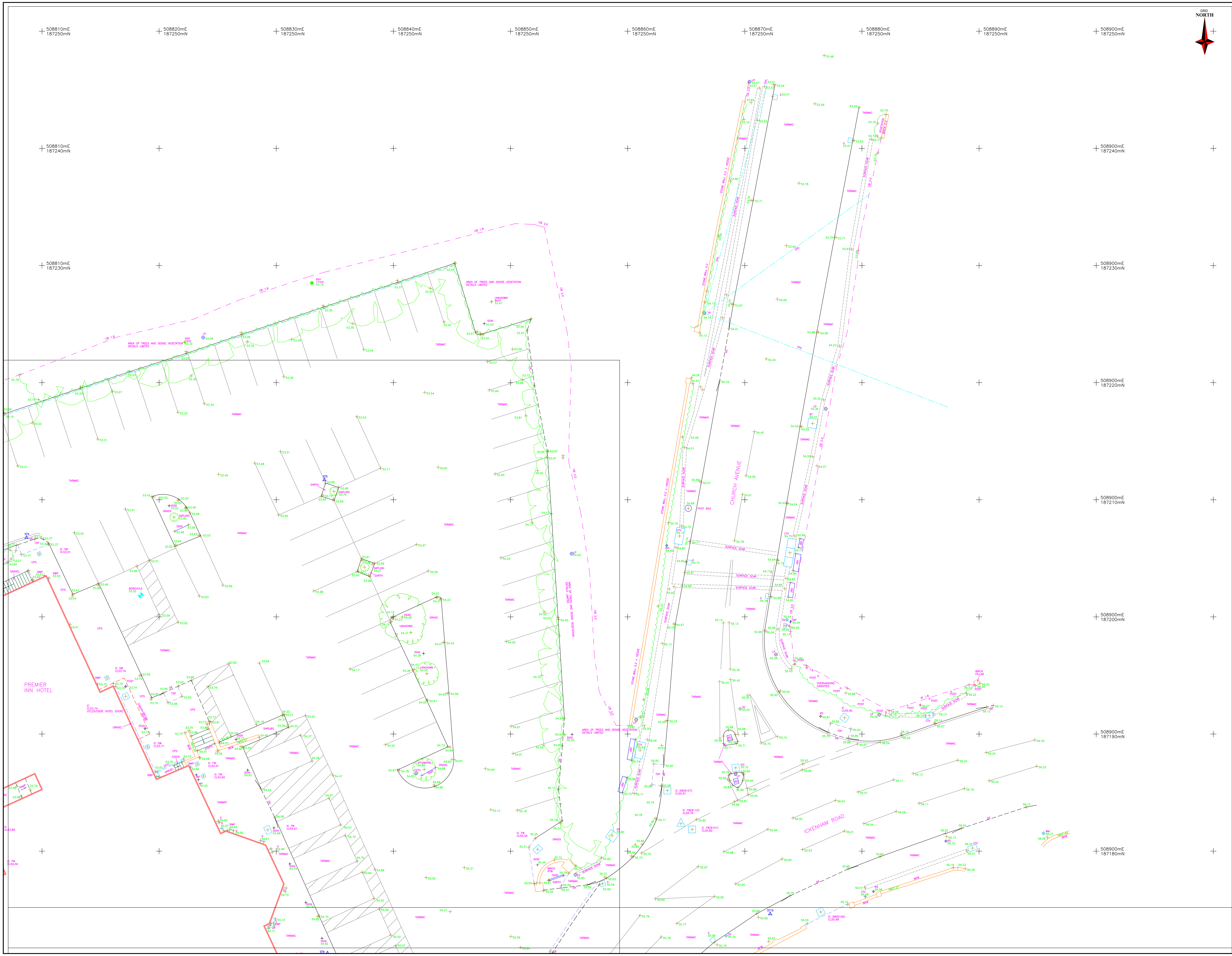
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
891B	n/a	n/a
891A	n/a	n/a
801B	n/a	n/a
791D	n/a	n/a
791C	n/a	n/a
791B	n/a	n/a
891F	n/a	n/a
791F	n/a	n/a
791E	n/a	n/a
891C	n/a	n/a
891D	n/a	n/a
891E	n/a	n/a
691E	n/a	n/a
6918	n/a	n/a
601D	n/a	n/a
601C	n/a	n/a
0903	54.1	52.5
0902	55.45	53.84
0102	58.55	54.79
011C	n/a	n/a
911A	n/a	n/a
8202	52.95	51.2
8201	52.91	50.99
8108	56.12	54.61
9101	56.31	54.97
911C	n/a	n/a
911B	n/a	n/a
9202	57.36	55.93
9102	57.47	56.3
9201	57.63	54.91
0201	56.85	54
0203	56.9	55.89
0202	56.61	55.27
011B	n/a	n/a
8903	n/a	n/a
7916	n/a	n/a
8905	62.1	58.87
8908	n/a	n/a
9902	59.18	57.7
9901	59.67	57.38
8904	59.78	58.52
991A	n/a	n/a
8006	59.23	56.92
901D	n/a	n/a
901C	n/a	n/a
901B	n/a	n/a
8005	58.96	57.83
8004	27.48	26.69
8003	n/a	n/a
801A	n/a	n/a
8001	56.38	52.66
8002	56.75	55.76
901A	n/a	n/a
9103	59.45	55.44
8102	58.61	54.52
8104	56.09	54.94
8103	55.23	54.22
8105	56.12	54.53
7915	55.8	54.1
7908	55.81	53.7
7907	56.56	54.67
7901	n/a	n/a
7902	n/a	n/a
7903	n/a	n/a
7914	55.26	53.8
791A	n/a	n/a
7909	55.27	53.41
7921	n/a	n/a
7913	55.43	54.01
7910	55.02	53.6
7920	54.59	53.57
7911	54.63	53.31
7011	56.13	54.2
7010	56.05	54.65
7007	n/a	n/a
7008	n/a	n/a
7006	n/a	n/a
7004	n/a	n/a
7005	n/a	n/a
701E	n/a	n/a
7012	55.01	53.3
701F	n/a	n/a
701A	n/a	n/a
701C	n/a	n/a
701D	n/a	n/a
701B	n/a	n/a
7305	n/a	n/a
7301	50.63	48.42
7304	50.45	48.74
7303	50.7	49.28
7201	51.41	49.18

Manhole Reference	Manhole Cover Level	Manhole Invert Level
7202	51.54	50.63
7203	52.4	51.66
7302	48.99	47.25
7101	53.42	51.28
721A	n/a	n/a
7102	53.94	52.82
7306	n/a	n/a
8303	48.18	46.43
8302	48.92	46.93
8301	49.23	46.91
8106	55.83	54.3
8110	n/a	n/a
8107	55.47	53.7
8101	55.7	52.99
811B	n/a	n/a
811A	n/a	n/a
8109	55.79	54.18
691C	n/a	n/a
6925	n/a	n/a
6911	50.55	49.29
6924	n/a	n/a
6001	51.47	50.13
6906	n/a	n/a
6916	n/a	n/a
691B	n/a	n/a
6917	n/a	n/a
6004	51.7	50.59
6905	n/a	n/a
601B	n/a	n/a
6914	51.21	49.79
6919	n/a	n/a
6003	52.49	51.23
6901	n/a	n/a
6002	53.11	51.62
6902	n/a	n/a
6915	52.43	50.84
6903	n/a	n/a
7003	n/a	n/a
7912	n/a	n/a
7917	n/a	n/a
7918	52.53	50.69
7919	52.54	50.6
7002	53.8	52.12
5909	49.95	48.04
5901	50.22	48.37
591A	n/a	n/a
5007	50.09	48.55
591B	n/a	n/a
691A	n/a	n/a
6907	50.15	48.95
6908	50.37	48.81
6910	50.34	49.11
601A	n/a	n/a
6909	n/a	n/a
5902	50.17	48.8
6921	n/a	n/a
6912	50.41	49.36
6904	n/a	n/a
9303	51.13	48
9301	51.21	46.7
9304	51.35	48.17
9302	51.47	49.26
9203	n/a	n/a
9204	n/a	n/a
0208	n/a	n/a
0207	n/a	n/a
0302	51.41	48.85
0301	51.36	48.88
0314	55.96	53.86
0313	53.85	52.37
0304	51.25	48.8
0303	51.28	48.88
0305	52.92	50.83
0306	52.92	51.32
0307	53.07	51.38
0308	53.2	51.2
6404	49.06	48.42
6403	49.07	46.93
6302	n/a	n/a
6301	n/a	n/a
5302	51.12	49.77

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Appendix C



Original Drawing Size: A0

NOTES:-

The accuracy and content of the drawing is commensurate with the graphical scale of mapping and the original specification. The drawing should only be used for its original intended purpose.

Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only. Unless indicated otherwise connections between inspection covers are shown as direct.

Tree species (where shown) are indicative, if crucial expert identification by an arborist is advised.

Boundary features may not represent the extent of legal ownership.

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LEGEND

Features:

AB Air Brick
ACU Air Conditioning Unit
AV Air Valve
BD Bollard
BH Borehole
BP Boundary Post
BS Bus Stop
BT British Telecom
CL Cover Level
COL Column
CTV Cable TV Cover
DCH Drainage Channel
DF Drinking Fountain
DIS Disused
DK Drop Kerb
DPC Damp proof Course
EIC Electricity IC
EJ Expansion Joint
ER Earth Rod
FB Flower Bed
FH Fire Hydrant
FHR Fire Hose Reel
FS Flagstaff
GV Gas Valve
G Gully
HR Handrail
IC Inspection Cover
IL Invert Level
JBX Junction Box
KO Kerb Outlet
LB Letter Box
LBN Litter Bin
LLP Low Level LP
LP Lamp Post
MP Marker Post
OHL Overhead Line
OP Overflow Pipe
PM Parking Meter
PP Power Pole
RAD Radiator
RE Rodding Eye
RNP Road Name Plate
RS Road Sign
RSD Roller Shutter Door
RWP Rain Water Pipe
SD Service Duct
SV Stop Valve
TCB Telephone Call Box
THL Threshold Level
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TS Traffic Signal
TW Top of Wall
UB Universal Beam
UNK Unknown
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UTL Unable To Lift
V Vent
VP Vent Pipe
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Building Level Details:

D Door
EL Eave Level
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PI Picket
PR Post & Rail
PW Post & Wire
TKR Timber Knee Rail
RTW Retaining Wall
WMF Wire Mesh Fence

Surfaces & Finishes:

B Brickwork
BB Breeze Block
C Concrete
CLT Ceiling Tiles
CP Carpet
CPS Concrete Paving Slabs
CPT Carpet Tiles
CR Concrete Render
CT Ceramic Tiles
FT Floor Tiles
HBD Hardboard
L Linoleum
P Plaster
PAV Brick Paviors
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Building
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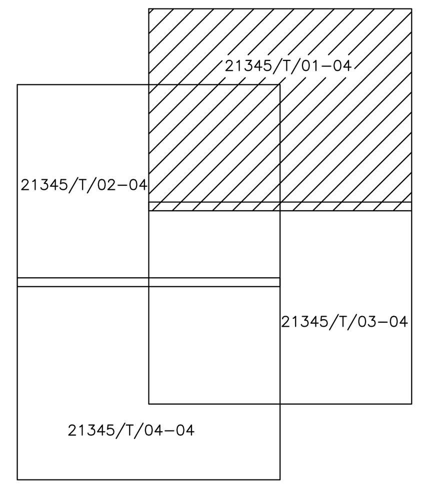

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CLIENT

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1st Floor
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PROJECT

Topographic & Buried Utilities Survey
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Ickenham Road
Ruislip
HA4 7DR

Job No.	Surveyor	Checked	Date	Scale
21345	A Kennell	TA	July 2023	1:100

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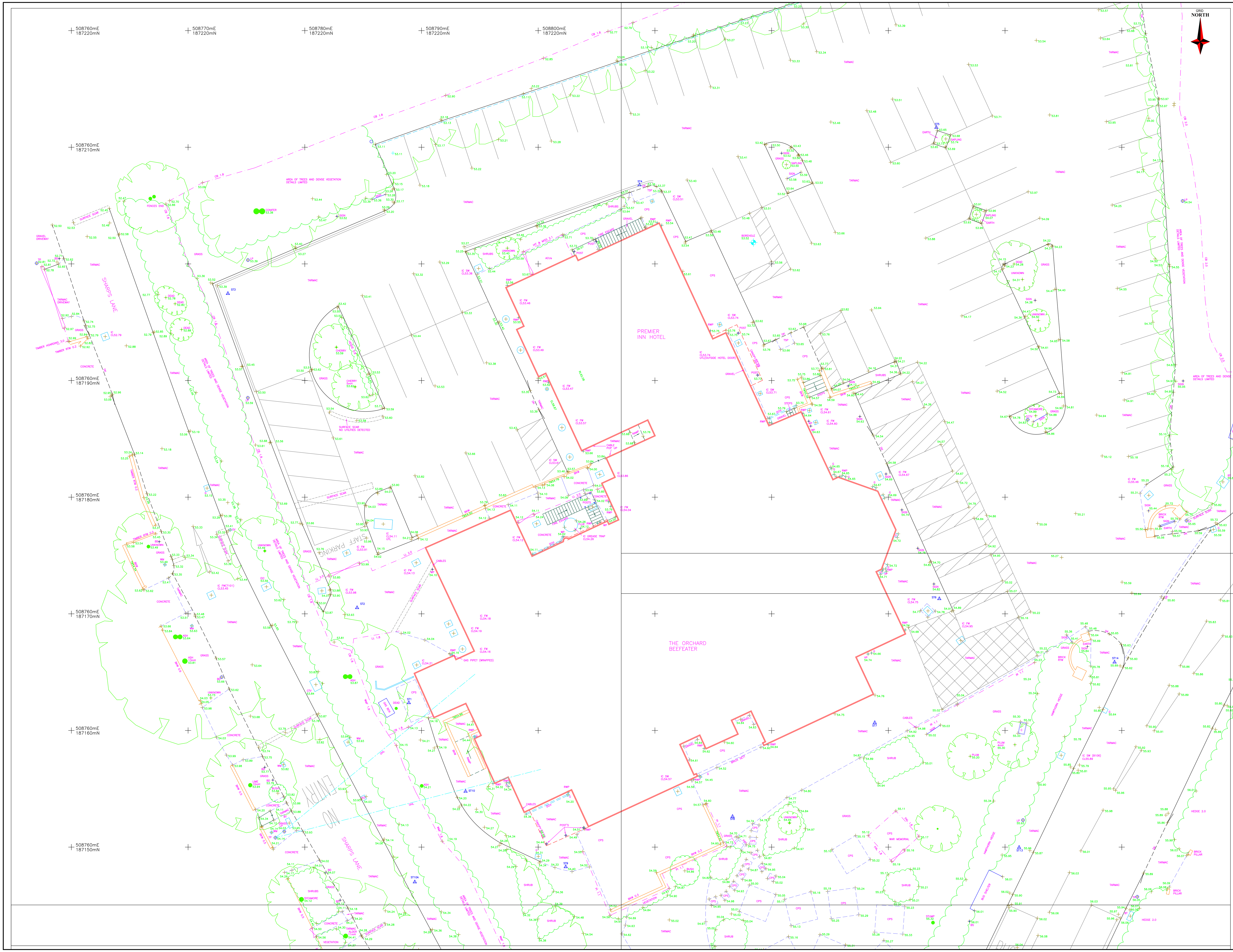
REV. -



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PP Power Pole, RAD Radiator, RE Rodding Eye, RNP Road Name Plate, RS Road Sign, RSD Roller Shutter Door, RWP Rain Water Pipe, SD Service Duct, SV Stop Valve, TCB Telephone Call Box, THL Threshold Level, TP Telegraph Pole, TS Traffic Signal, TW Top of Wall, UB Universal Beam

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CCTV(B*) CCTV Cables; FO(B*) Fibre Optic; FW(B*) Foul Water Drain; HD(B*) Heating duct; SW(B*) Storm water drain; T(B*) Telecom cables; EML(B*) Unidentified EML; UN(B*) Unidentified Trace; EOT End Of Trace; UTT Unable To Trace; NPV No Pipes Visible; 150ø Pipe Diameter/Flow

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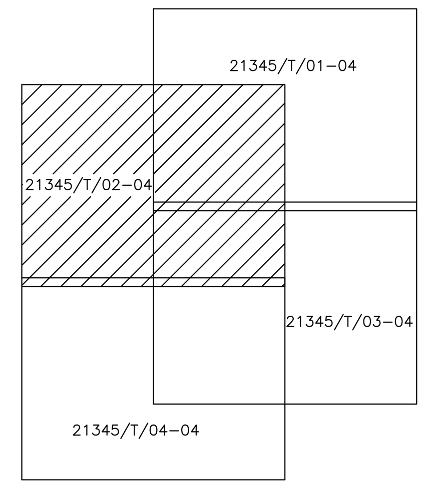

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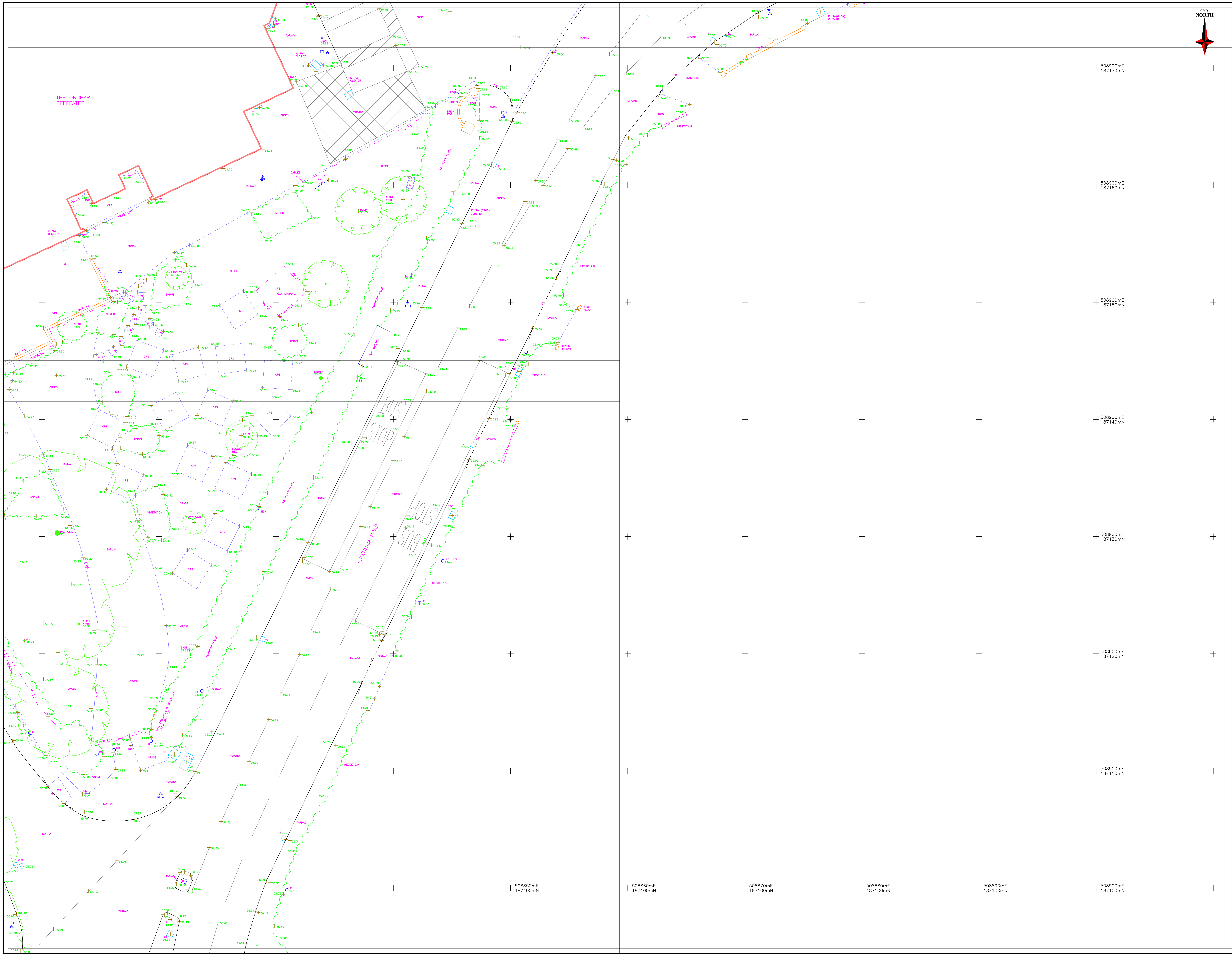
DRAWING No. 21345/T/02–04 REV. –



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PAV Brick Paviors
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Building
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Wall
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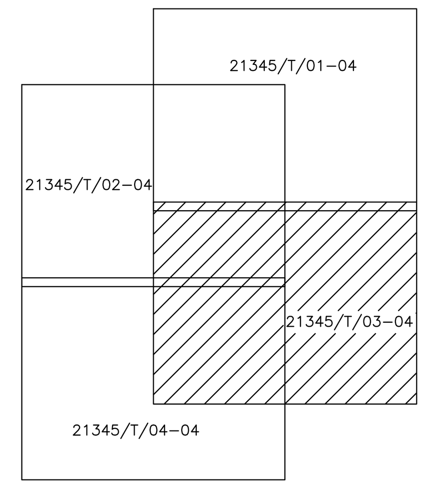

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PROJECT

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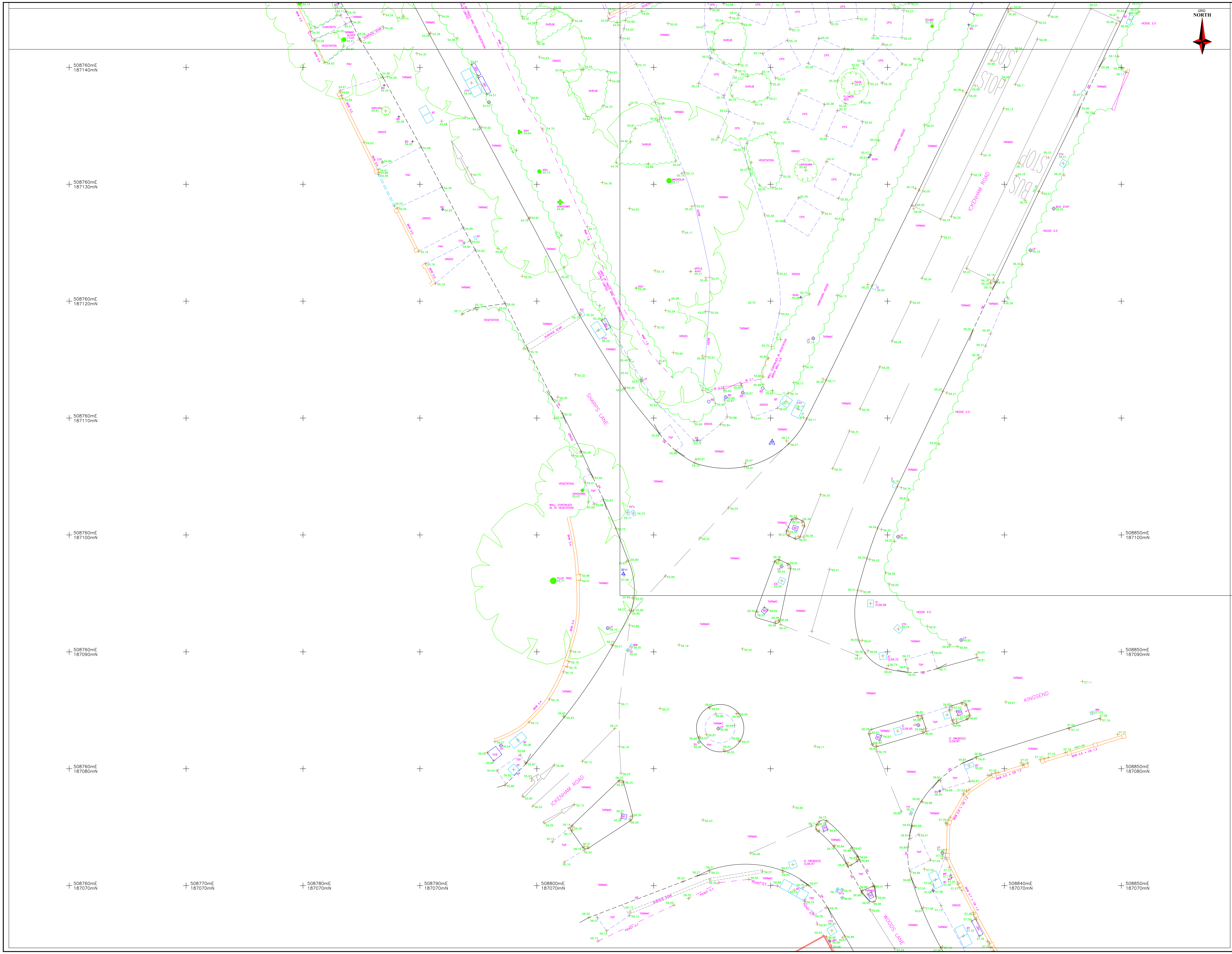
DRAWING No.	REV.
21345/T/03-04	-



GRID NORTH

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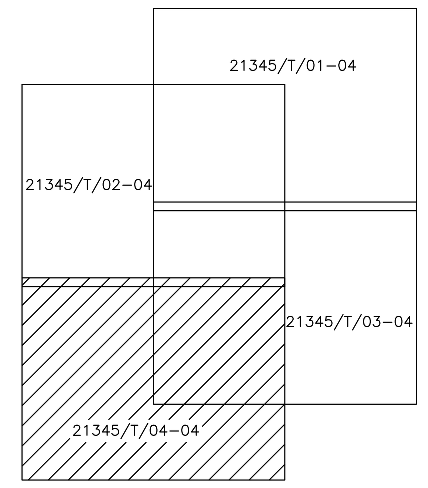

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DRAWING No. 21345/T/04–04

REV. –

Original Drawing Size: A0

NOTES:–

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LEGEND

Features:

AB	Air Brick
ACU	Air Conditioning Unit
AV	Air Valve
BD	Bollard
BH	Borehole
BP	Boundary Post
BS	Bus Stop
BT	British Telecom
CL	Cover Level
COL	Column
CTV	Cable TV Cover
DCH	Drainage Channel
DF	Drinking Fountain
DIS	Disused
DK	Drop Kerb
DPC	Damp proof Course
EIC	Electricity IC
EJ	Expansion Joint
ER	Earth Rod
FB	Flower Bed
FH	Fire Hydrant
FHR	Fire Hose Reel
FS	Flagstaff
GV	Gas Valve
G	Gully
HR	Handrail
IC	Inspection Cover
IL	Invert Level
JBX	Junction Box
KO	Kerb Outlet
LB	Letter Box
LBN	Litter Bin
LLP	Low Level LP
LP	Lamp Post
MP	Marker Post
OHL	Overhead Line
OP	Overflow Pipe
PM	Parking Meter
PP	Power Pole
RAD	Radiator
RE	Rodding Eye
RNP	Road Name Plate
RS	Road Sign
RSD	Roller Shutter Door
RWP	Rain Water Pipe
SD	Service Duct
SV	Stop Valve
TCB	Telephone Call Box
THL	Threshold Level
TP	Telegraph Pole
TS	Traffic Signal
TW	Top of Wall
UB	Universal Beam
UNK	Unknown
UR	Urinal
UTL	Unable To Lift
V	Vent
VP	Vent Pipe
WM	Water Meter
WO	Wash Out
WP	Waste Pipe
VSB	Vehicle Safety Barrier

Building Level Details:

D	Door
EL	Eave Level
FFL	Floor Level
FRL	Flat Roof Level
HL	Head Level
PPL	Parapet Level
RL	Ridge Level
SL	Sill Level
SP	Springer of Arch
TA	Top of Arch
W	Window
12.34	Ceiling/Beam Soffit

Boundary Types:

BW	Barbed Wire
BKW	Brick Wall
CB	Close Boarded
CH	Chainlink
CI	Corrugated Iron
CP	Chestnut Paling
HM	Hit and Miss
IR	Iron Railing
IW	Interwoven
LL	Larch Lap
PAL	Palisade
PI	Picket
PR	Post & Rail
PW	Post & Wire
TKR	Timber Knee Rail
RTW	Retaining Wall
WMF	Wire Mesh Fence

Surfaces & Finishes:

B	Brickwork
BB	Breeze Block
C	Concrete
CLT	Ceiling Tiles
CP	Carpet
CPS	Concrete Paving Slabs
CPT	Carpet Tiles
CR	Concrete Render
CT	Ceramic Tiles
FT	Floor Tiles
HBD	Hardboard
L	Linoleum
P	Plaster
PAV	Brick Paviors
S	Steel work
T	Tarmac
TSP	Textured Safety Paving
VT	Vinyl Tiles

Building
Overhead Building Detail
Wall
Tree
Kerb/Drop Kerb
Survey Station
Fence
Gate
Painted Road Markings
Edge of Vegetation
Banks (Top / Bottom)

Utilities

C(B*)	CATV Cables
E(B*)	Electricity Cables
FL(B*)	Fuel Pipes
G(B*)	Gas Pipes
SD(B*)	Service ducts
TC(B*)	Traffic Control
GPR(B*)	Unidentified GPR
W(B*)	Water pipes
	Overhead Lines
TFR	Taken From Records
	Extent of utility survey
CCTV(B*)	CCTV Cables
FO(B*)	Fibre Optic
FW(B*)	Foul Water Drain
HD(B*)	Heating duct
SW(B*)	Storm water drain
T(B*)	Telecom cables
EML(B*)	Unidentified EML
UN(B*)	Unidentified Trace
EOT	End Of Trace
UTT	Unable To Trace
NPV	No Pipes Visible
150ø	Pipe Diameter/Flow

Control: All levels and co–ordinates are related to the datums described.
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(Accuracy: Horizontal (±25mm) Vertical(±50mm)
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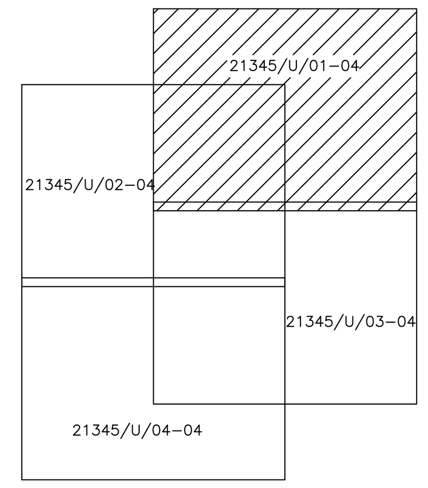

Rev	Job No	Date	Revision Detail	Surveyor	Check
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CLIENT
Lidl Great Britain Ltd
1st Floor
4–14 Blackbird Hill
London
NW9 8SD

PROJECT
Topographic & Buried Utilities Survey
The Orchard Hotel – Premier Inn
Ickenham Road
Ruislip
HA4 7DR

Job No.	Surveyor	Checked	Date	Scale
21345	A Kennell	TA	July 2023	1:100

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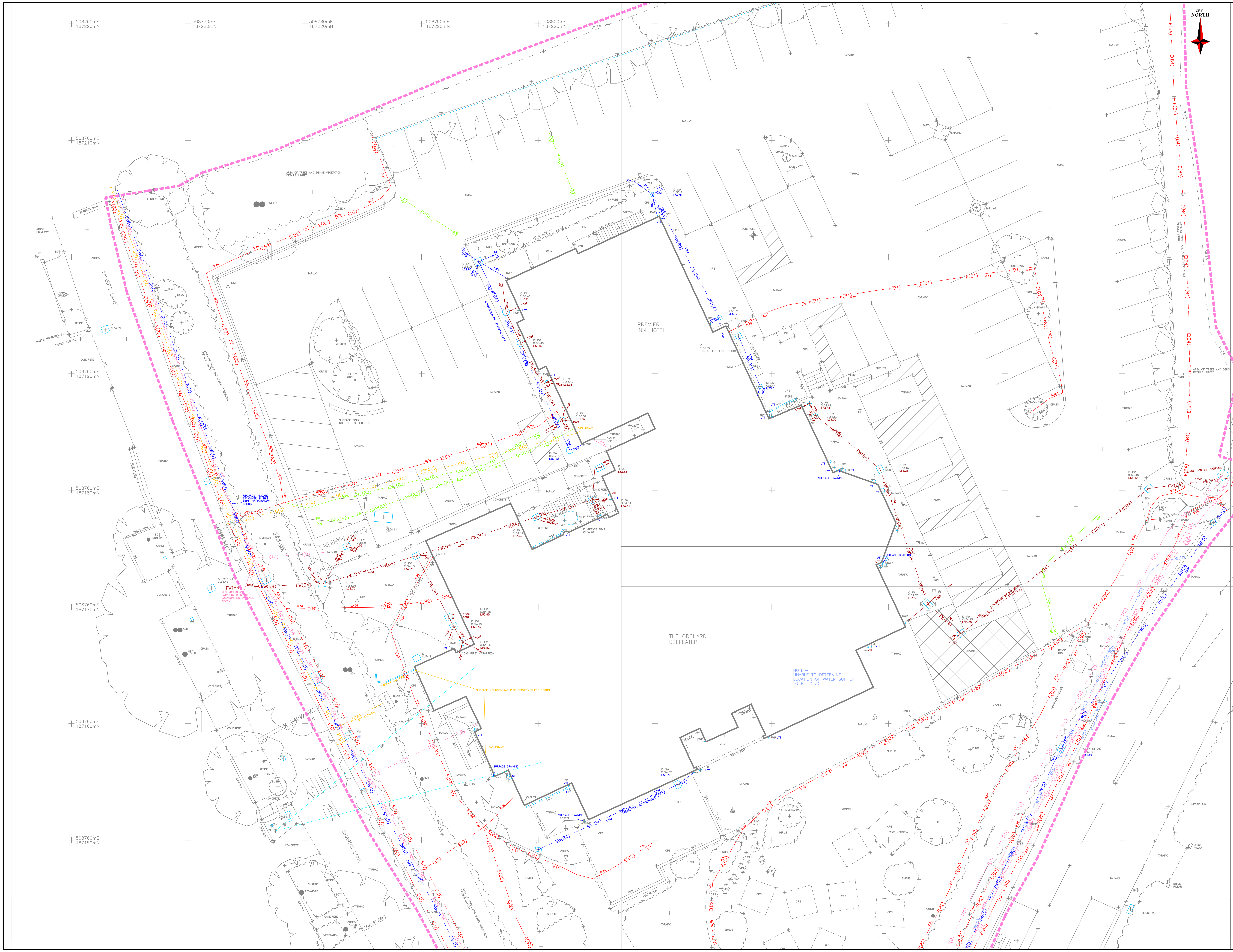

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BT British Telecom
CL Cover Level
COL Column
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KO Kerb Outlet
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LBN Litter Bin
LLP Low Level LP
LP Lamp Post
MP Marker Post
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PM Parking Meter
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RE Rodding Eye
RNP Road Name Plate
RS Road Sign
RSD Roller Shutter Door
RWP Rain Water Pipe
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C(B*) CATV Cables
E(B*) Electricity Cables
FL(B*) Fuel Pipes
G(B*) Gas Pipes
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TC(B*) Traffic Control
GPR(B*) Unidentified GPR
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EOT End Of Trace
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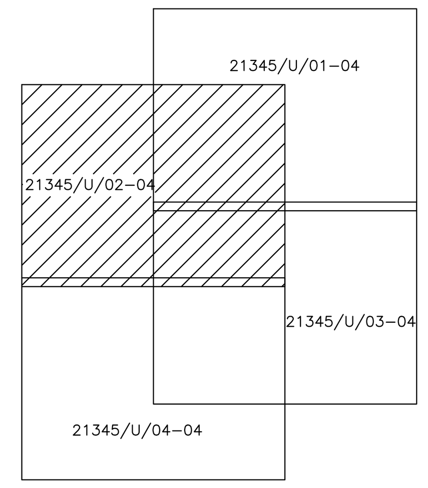

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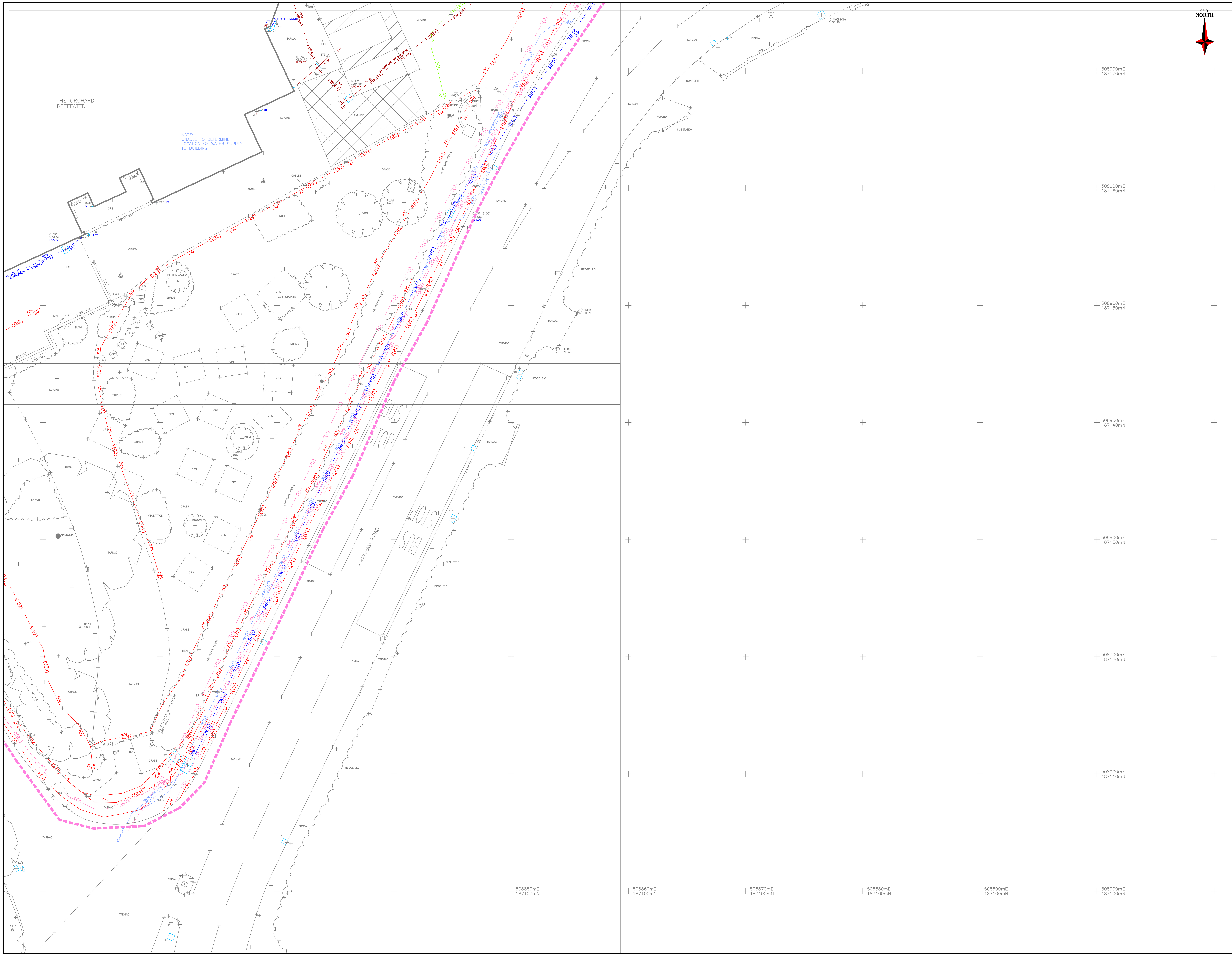
REV. -



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D Door
EL Eave Level
FFL Floor Level
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Overhead Building Detail
Wall
Tree
Kerb/Drop Kerb
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Painted Road Markings
Edge of Vegetation
Top
Bottom
Banks

Utilities

C(B*) CATV Cables
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TC(B*) Traffic Control
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Overhead Lines
TFR Taken From Records
Extent of utility survey
CCTV(B*) CCTV Cables
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FW(B*) Foul Water Drain
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EOT End Of Trace
UTT Unable To Trace
NPV No Pipes Visible
150ø Pipe Diameter/Flow

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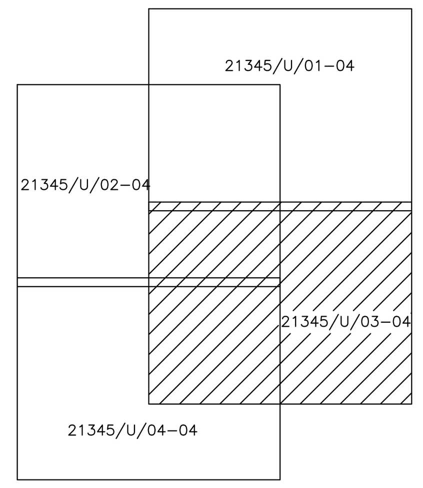

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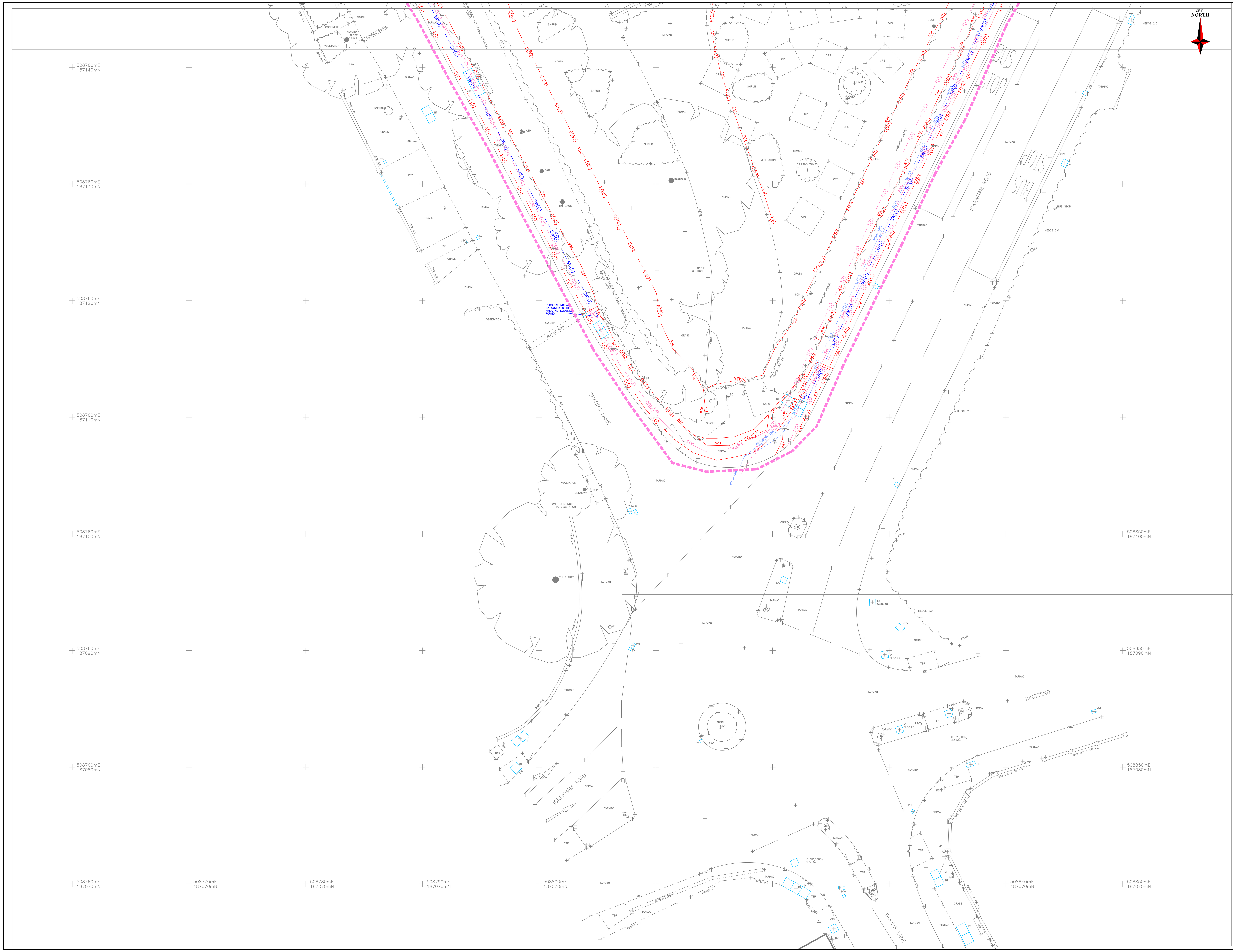

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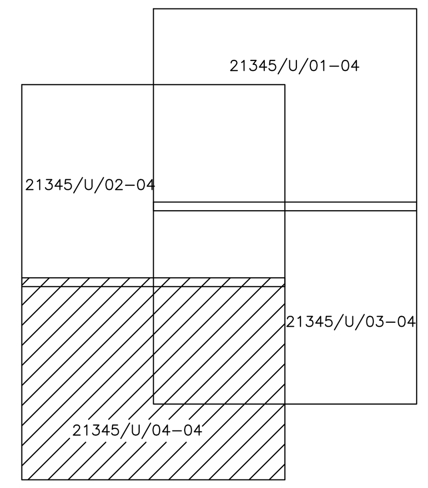

Rev	Job No	Date	Revision Detail	Surveyor	Check
–	---	--/--		--	--

CLIENT
Lidl Great Britain Ltd
1st Floor
4–14 Blackbird Hill
London
NW9 8SD

PROJECT
Topographic & Buried Utilities Survey
The Orchard Hotel – Premier Inn
Ickenham Road
Ruislip
HA4 7DR

Job No.	Surveyor	Checked	Date	Scale
21345	A Kennell	TA	July 2023	1:100

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ISO 9001 REGISTERED FIRM

DRAWING No. 21345/U/04–04
REV. –

Appendix D

LOCATION : Kingsend, Ruislip

BOREHOLE No. One

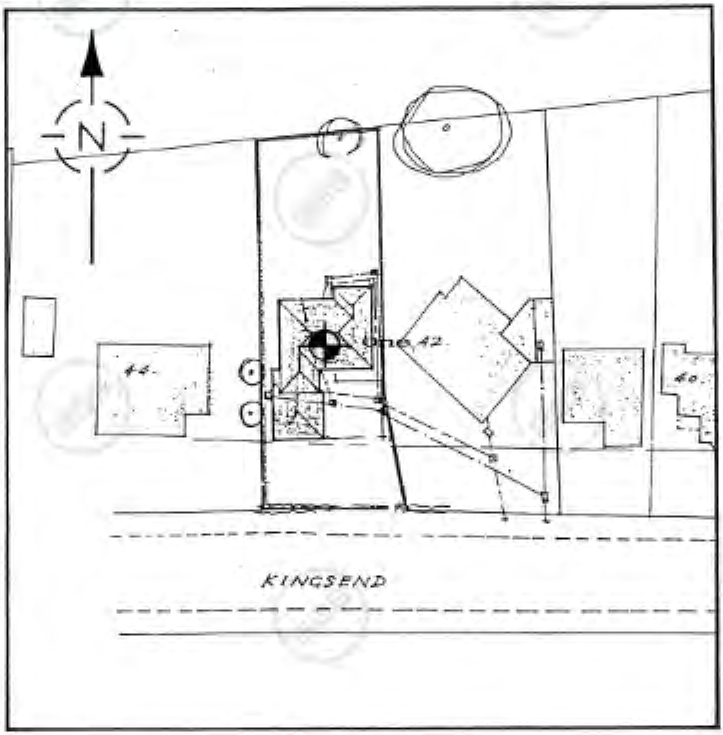
DATE OF BORING : 22.11.1988

Description of Strata	Strata change: Depth m	Strata change: O.D. Level m	Samples: Depth m	Samples: Type	SPT CPT N-Value	Water Level m
MADE GROUND Black brown clayey TOPSOIL with abundant red brick, gravel and rootlets.					(U100 blows)	
WEATHERED LONDON CLAY Firm to stiff light brown, grey CLAY.	1.00		1.00	J	7	
- abundant rootlets.						
- occasional silt lenses.	2.00		2.00	J/U100	(17)	
- weakly fissured.	3.00		3.00	J	14	
	4.00		4.00	J/U100	(20)	
- selenite crystals.	5.00		5.00	J/U100	(25)	
- sandy.	6.00		6.00	J	19	
- medium brown.	7.00					
			7.50	J/U100	(30)	
LONDON CLAY Stiff dark grey fissured CLAY with occasional silty lenses.	8.00					
	9.00					
- selenite crystals.			9.50	J/U100	(30)	
	10.00					DRY

BOREHOLE DIAMETER : 150mm
LINING TUBES : 150mm
GROUND LEVEL : -
REMARKS : Borehole sunk from existing ground level

Ꮖ - Water strike
Ꮖ - Water (standing level)
W - Water Sample
B/J - Bulk/Jar Sample
S.P.T. - Standard Penetration Test
C.P.T. - Cone Penetration Test
(U) - Undisturbed Sample (38mm & 100mm)

Date		Report No.
November 1988	BOREHOLE LOG	S.1012



Borehole Location

Scale 1 : 500

Date	BOREHOLE LOCATION PLAN	Report No.
November 1988		S.1012

TYRONE

Appendix E

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
508812/187173

Your selected location is in flood zone 1, an area with a low probability of flooding.

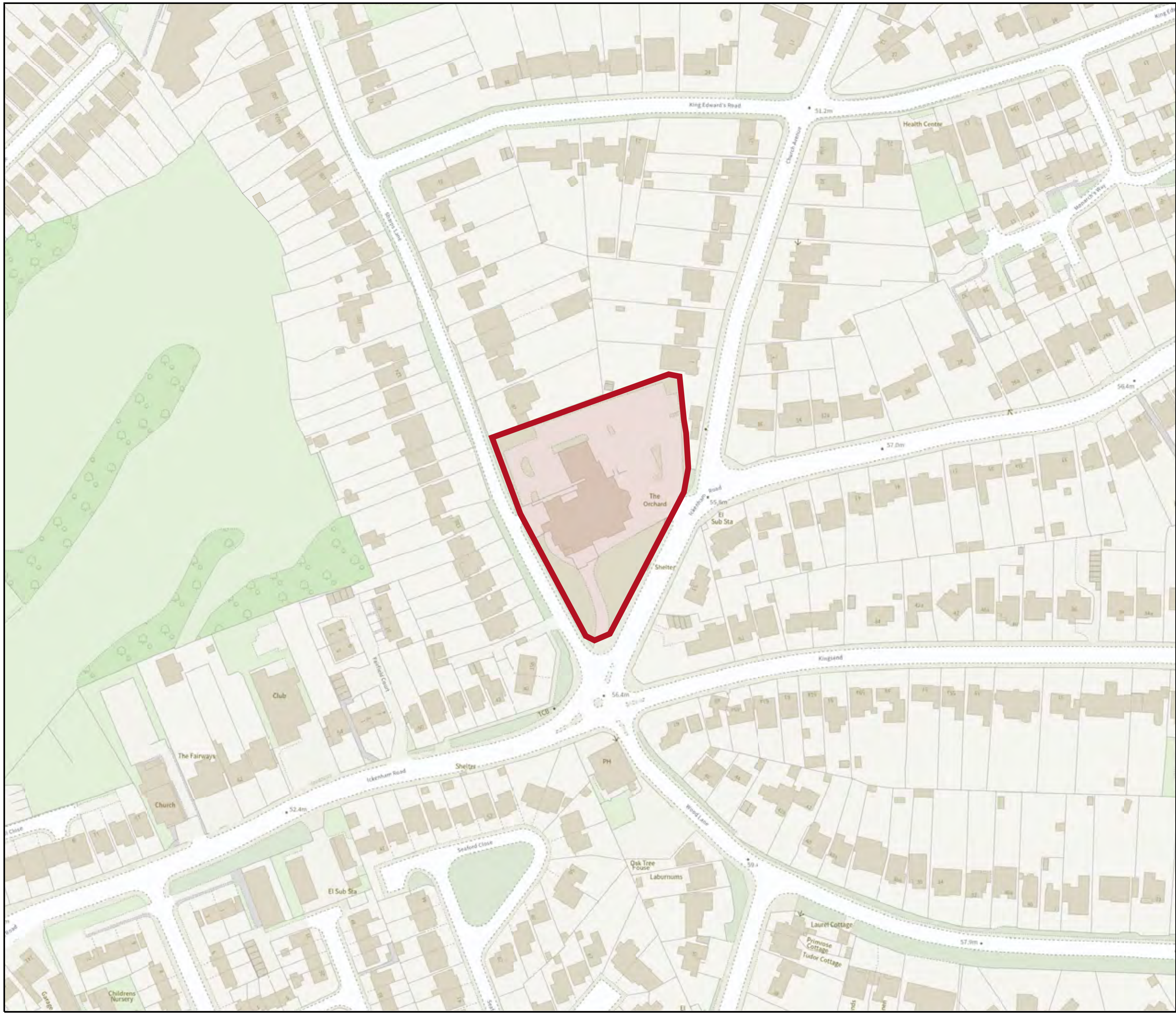
You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
<Unspecified>

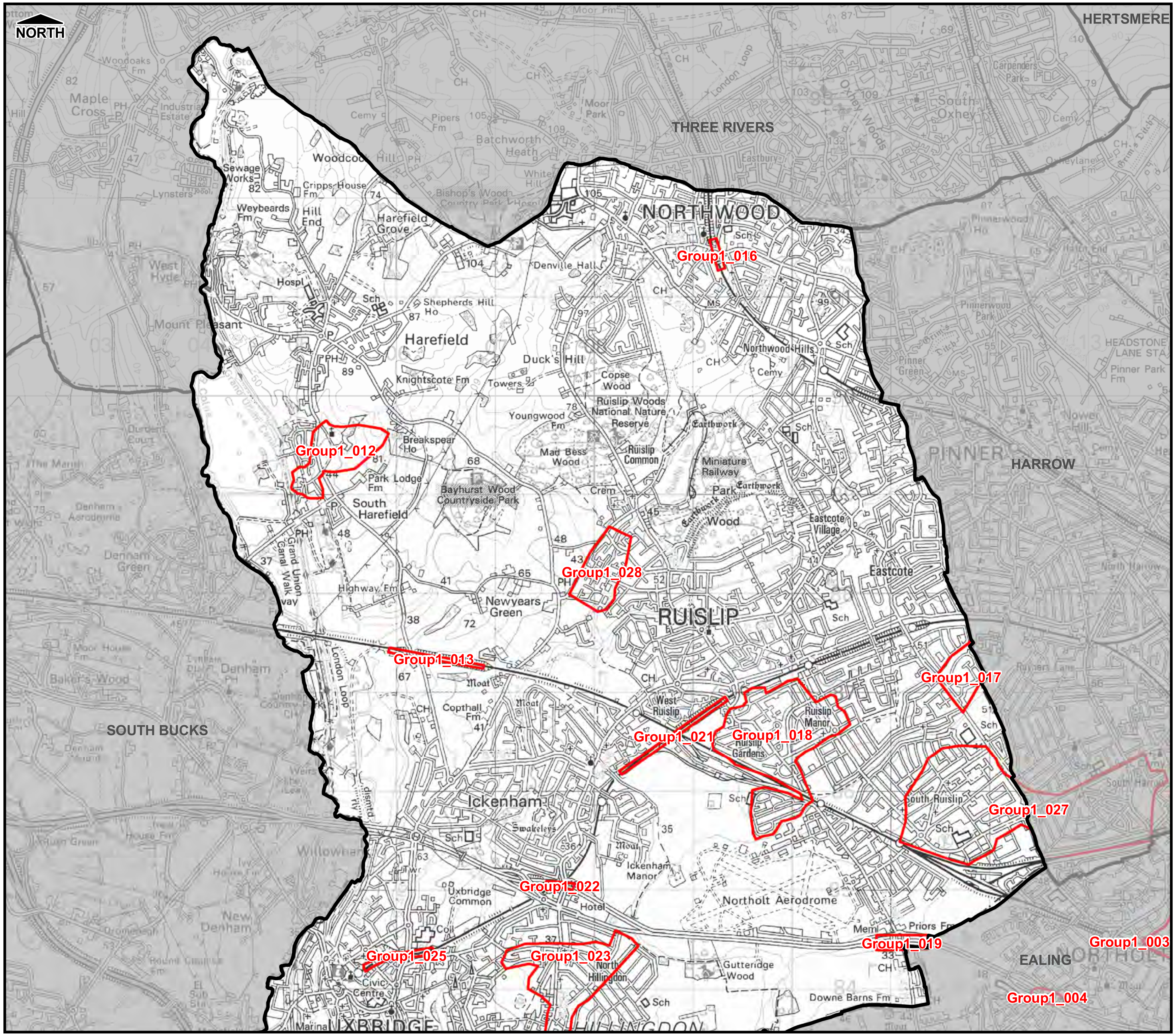
Location (easting/northing)
508812/187173

Scale
1:2500

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

Appendix F



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED

Legend

- Borough Administrative Boundary
- Critical Drainage Area

Notes

London Borough of Hillingdon

HILLINGDON LONDON

Surface Water Management Plan

Scale at A3	Date	Drawn by	Approved by
1:40,000	15/04/2011	R.MOORE	P.HLINOVSKY

Critical Drainage Area Index Map

Consultants

CAPITA SYMONDS Flood Risk Management

Scott Wilson

Capita Symonds
Level Seven,
52 Grosvenor Gardens,
Belgravia,
London
SW1W 0AU

Drain London Programme Board Members

Environment Agency · Thames Water · LONDON COUNCILS · GREATERLONDONAUTHORITY

FIGURE 1.1

Filepath: L:\Environment\zwet\CS046913_DrainLondon_Tier2\Group1\ARC\mxds\GP1_Hillingdon_Fig1.1_CDA_Index.mxd

Appendix G

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Commercial/Industrial roofing: Inert materials				
Pollution Hazard Level	Very low				
Pollution Hazard Indices					
TSS	0.3				
Metals	0.2				
Hydrocarbons	0.05				
SuDS components proposed		SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)				
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
Groundwater protection type	Pervious pavement underlain by 300 mm minimum depth of soils with good contamination attenuation potential	All designs must include a minimum of 1 m unsaturated depth of subsoil or aquifer material between the infiltration surface and the maximum likely groundwater level. Infiltration components should always be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate lined zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events	The permeable pavement must include a suitable filtration layer provides treatment and must include a geotextile at the base separating the foundation from the sub-grade. The underlying soils must provide good contaminant attenuation potential (eg as recommended in Sniffer 2008 (a) and (b) / Scott Wilson (2010) or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater		
Groundwater protection Pollution Mitigation Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
Combined Pollution Mitigation Indices		Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
TSS	>0.95				
Metals	0.9				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Non-residential car parking with frequent change (eg hospitals, retail)				
Pollution Hazard Level	Medium				
Pollution Hazard Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
SuDS components proposed		SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)				
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
Groundwater protection type	Pervious pavement underlain by 300 mm minimum depth of soils with good contamination attenuation potential	All designs must include a minimum of 1 m unsaturated depth of subsoil or aquifer material between the infiltration surface and the maximum likely groundwater level. Infiltration components should always be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate lined zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events	The permeable pavement must include a suitable filtration layer provides treatment and must include a geotextile at the base separating the foundation from the sub-grade. The underlying soils must provide good contaminant attenuation potential (eg as recommended in Sniffer 2008 (a) and (b) / Scott Wilson (2010) or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater		
Groundwater protection Pollution Mitigation Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
Combined Pollution Mitigation Indices		Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
TSS	>0.95				
Metals	0.9				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

Appendix H

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Garry Eyres
Site name:	Lidl Ruislip
Site location:	

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.57286° N
Longitude:	0.43134° W
Reference:	3629872071
Date:	Jun 02 2024 23:19

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): .646

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	648	648
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default Edited

Q_{BAR} (l/s):	2.85	2.85
1 in 1 year (l/s):	2.42	2.42
1 in 30 years (l/s):	6.55	6.55
1 in 100 year (l/s):	9.09	9.09
1 in 200 years (l/s):	10.66	10.66

Appendix I

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.350	Preferred Cover Depth (m)	0.350
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	6.00	Enforce best practice design rules	✓

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SPPIC1	1	54.450	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SPPIC2	11	53.517	0.017	1.2	0.0169	0.0000	OK
15 minute winter	SPPIC3	12	52.877	0.027	1.2	0.1112	0.0000	OK
15 minute winter	RAIN GARDEN	14	52.849	0.024	1.1	0.1853	0.0000	OK
30 minute winter	SPPIC4	22	52.840	0.040	2.8	0.5960	0.0000	OK
15 minute summer	SPPIC6	1	54.350	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SPPIC7	11	54.068	0.018	1.0	0.0090	0.0000	OK
15 minute summer	SPPIC9	1	53.850	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SPPIC10	12	53.188	0.028	1.2	0.1245	0.0000	OK
15 minute winter	SPPIC8	12	53.138	0.038	4.5	0.2121	0.0000	OK
30 minute winter	SPPIC5	24	52.728	0.078	8.5	2.1595	0.0000	OK
60 minute winter	SMH8 HYDROBRAKE	49	52.180	0.207	8.2	0.2341	0.0000	OK
15 minute winter	SMH1	11	53.325	0.045	3.7	0.0664	0.0000	OK
15 minute winter	SMH2	11	53.285	0.065	7.4	0.0958	0.0000	OK
15 minute winter	SMH3	11	53.238	0.088	11.1	0.1279	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SPPIC1	1.000	SPPIC2	0.0	0.000	0.000	0.0145	
15 minute winter	SPPIC2	1.001	SPPIC3	1.2	0.784	0.026	0.0161	
15 minute winter	SPPIC3	1.002	RAIN GARDEN	1.1	0.702	0.064	0.0051	
15 minute winter	RAIN GARDEN	1.003	SPPIC4	1.0	0.349	0.055	0.0073	
30 minute winter	SPPIC4	1.004	SPPIC5	2.2	0.356	0.159	0.1558	
15 minute summer	SPPIC6	2.000	SPPIC7	0.0	0.000	0.000	0.0084	
15 minute winter	SPPIC7	2.001	SPPIC8	1.0	0.453	0.031	0.0677	
15 minute summer	SPPIC9	3.000	SPPIC10	0.0	0.000	0.000	0.0236	
15 minute winter	SPPIC10	3.001	SPPIC8	1.0	0.367	0.076	0.0286	
15 minute winter	SPPIC8	2.002	SPPIC5	4.2	0.867	0.142	0.0931	
30 minute winter	SPPIC5	1.005	SMH8 HYDROBRAKE	6.0	0.689	0.508	0.3372	
60 minute winter	SMH8 HYDROBRAKE	Hydro-Brake®	OUTFALL	8.2				29.5
15 minute winter	SMH1	4.000	SMH2	3.7	0.493	0.088	0.0694	
15 minute winter	SMH2	4.001	SMH3	7.4	0.622	0.171	0.1201	
15 minute winter	SMH3	4.002	SMH4	11.1	0.683	0.278	0.1673	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
15 minute winter	SMH4	11	53.194	0.105	14.8	0.1517	0.0000	OK
15 minute winter	SMH5	11	53.149	0.121	19.6	0.1853	0.0000	OK
15 minute winter	SMH6	11	53.070	0.126	22.0	0.1665	0.0000	OK
15 minute winter	SMH7	12	52.952	0.128	21.7	0.1446	0.0000	OK
60 minute winter	RAIN GARDEN 2	49	52.180	0.180	13.1	12.8239	0.0000	OK
15 minute summer	OUTFALL	1	51.500	0.000	7.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m^3)	Discharge Vol (m^3)
15 minute winter	SMH4	4.003	SMH5	14.7	0.739	0.368	0.2045	
15 minute winter	SMH5	4.004	SMH6	19.5	0.877	0.489	0.3155	
15 minute winter	SMH6	4.005	SMH7	21.7	0.952	0.544	0.4645	
15 minute winter	SMH7	4.006	RAIN GARDEN 2	21.9	0.988	0.548	0.2504	
60 minute winter	RAIN GARDEN 2	4.007	SMH8 HYDROBRAKE	6.3	0.277	0.074	0.2178	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SPPIC1	1	54.450	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SPPIC2	11	53.530	0.030	4.1	0.0358	0.0000	OK
15 minute winter	SPPIC3	13	52.902	0.052	4.1	0.3890	0.0000	OK
15 minute winter	RAIN GARDEN	14	52.881	0.056	3.5	0.4264	0.0000	OK
15 minute winter	SPPIC4	14	52.876	0.076	10.6	2.0508	0.0000	OK
15 minute summer	SPPIC6	1	54.350	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SPPIC7	11	54.082	0.032	3.3	0.0161	0.0000	OK
15 minute summer	SPPIC9	1	53.850	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SPPIC10	12	53.212	0.052	4.1	0.4039	0.0000	OK
15 minute winter	SPPIC8	12	53.172	0.072	14.8	0.6980	0.0000	OK
120 minute winter	SPPIC5	106	52.826	0.176	14.2	10.7795	0.0000	SURCHARGED
120 minute winter	SMH8 HYDROBRAKE	98	52.817	0.844	12.0	0.9544	0.0000	SURCHARGED
15 minute winter	SMH1	13	53.853	0.573	12.2	0.8476	0.0000	SURCHARGED
15 minute winter	SMH2	13	53.848	0.628	21.0	0.9213	0.0000	SURCHARGED
15 minute winter	SMH3	13	53.826	0.676	30.4	0.9835	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SPPIC1	1.000	SPPIC2	0.0	0.000	0.000	0.0346	
15 minute winter	SPPIC2	1.001	SPPIC3	4.1	1.149	0.090	0.0392	
15 minute winter	SPPIC3	1.002	RAIN GARDEN	3.5	0.809	0.200	0.0147	
15 minute winter	RAIN GARDEN	1.003	SPPIC4	3.2	0.433	0.183	0.0194	
15 minute winter	SPPIC4	1.004	SPPIC5	7.2	0.516	0.517	0.3202	
15 minute summer	SPPIC6	2.000	SPPIC7	0.0	0.000	0.000	0.0194	
15 minute winter	SPPIC7	2.001	SPPIC8	3.3	0.637	0.102	0.1602	
15 minute summer	SPPIC9	3.000	SPPIC10	0.0	0.000	0.000	0.0558	
15 minute winter	SPPIC10	3.001	SPPIC8	3.6	0.519	0.258	0.0684	
15 minute winter	SPPIC8	2.002	SPPIC5	14.1	1.218	0.472	0.2020	
120 minute winter	SPPIC5	1.005	SMH8 HYDROBRAKE	12.0	0.802	1.022	0.6845	
120 minute winter	SMH8 HYDROBRAKE	Hydro-Brake®	OUTFALL	9.0				119.5
15 minute winter	SMH1	4.000	SMH2	9.9	0.570	0.236	0.3645	
15 minute winter	SMH2	4.001	SMH3	19.8	0.685	0.458	0.4000	
15 minute winter	SMH3	4.002	SMH4	29.7	0.747	0.745	0.4095	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SMH4	13	53.776	0.687	40.0	0.9933	0.0000	SURCHARGED
15 minute winter	SMH5	13	53.689	0.661	53.5	1.0155	0.0000	SURCHARGED
15 minute winter	SMH6	13	53.492	0.548	59.6	0.7271	0.0000	SURCHARGED
15 minute winter	SMH7	13	53.162	0.338	59.2	0.3819	0.0000	SURCHARGED
120 minute winter	RAIN GARDEN 2	98	52.817	0.817	28.4	60.7013	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	51.500	0.000	9.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SMH4	4.003	SMH5	39.6	0.996	0.991	0.4087	
15 minute winter	SMH5	4.004	SMH6	52.6	1.322	1.320	0.5651	
15 minute winter	SMH6	4.005	SMH7	59.2	1.489	1.484	0.8051	
15 minute winter	SMH7	4.006	RAIN GARDEN 2	59.3	1.493	1.487	0.4354	
120 minute winter	RAIN GARDEN 2	4.007	SMH8 HYDROBRAKE	8.8	0.285	0.103	0.3194	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SPPIC1	1	54.450	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SPPIC2	11	53.535	0.035	5.5	0.0436	0.0000	OK
120 minute winter	SPPIC3	120	52.954	0.104	2.0	1.4875	0.0000	OK
120 minute winter	RAIN GARDEN	120	52.954	0.129	2.0	0.9964	0.0000	OK
120 minute winter	SPPIC4	120	52.954	0.154	6.0	8.2080	0.0000	SURCHARGED
15 minute summer	SPPIC6	1	54.350	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SPPIC7	11	54.087	0.037	4.4	0.0185	0.0000	OK
15 minute summer	SPPIC9	1	53.850	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SPPIC10	12	53.221	0.061	5.5	0.5551	0.0000	OK
15 minute winter	SPPIC8	12	53.186	0.086	19.7	0.9690	0.0000	OK
120 minute winter	SPPIC5	118	52.953	0.303	19.3	31.1235	0.0000	SURCHARGED
120 minute winter	SMH8 HYDROBRAKE	88	52.971	0.998	13.7	1.1284	0.0000	SURCHARGED
15 minute winter	SMH1	13	54.427	1.147	16.4	1.6979	0.0000	SURCHARGED
15 minute winter	SMH2	13	54.419	1.199	27.3	1.7601	0.0000	SURCHARGED
15 minute winter	SMH3	13	54.384	1.234	38.9	1.7957	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SPPIC1	1.000	SPPIC2	0.0	0.000	0.000	0.0426	
15 minute winter	SPPIC2	1.001	SPPIC3	5.5	1.256	0.121	0.0493	
120 minute winter	SPPIC3	1.002	RAIN GARDEN	2.0	0.562	0.114	0.0380	
120 minute winter	RAIN GARDEN	1.003	SPPIC4	2.0	0.344	0.113	0.0440	
120 minute winter	SPPIC4	1.004	SPPIC5	5.7	0.410	0.408	0.4247	
15 minute summer	SPPIC6	2.000	SPPIC7	0.0	0.000	0.000	0.0243	
15 minute winter	SPPIC7	2.001	SPPIC8	4.4	0.686	0.136	0.1982	
15 minute summer	SPPIC9	3.000	SPPIC10	0.0	0.000	0.000	0.0699	
15 minute winter	SPPIC10	3.001	SPPIC8	4.7	0.549	0.339	0.0851	
15 minute winter	SPPIC8	2.002	SPPIC5	18.8	1.326	0.628	0.2244	
120 minute winter	SPPIC5	1.005	SMH8 HYDROBRAKE	12.4	0.805	1.057	0.6845	
120 minute winter	SMH8 HYDROBRAKE	Hydro-Brake®	OUTFALL	9.0				160.0
15 minute winter	SMH1	4.000	SMH2	12.6	0.573	0.300	0.3645	
15 minute winter	SMH2	4.001	SMH3	25.1	0.693	0.580	0.4000	
15 minute winter	SMH3	4.002	SMH4	37.6	0.945	0.942	0.4095	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SMH4	13	54.305	1.216	50.9	1.7566	0.0000	SURCHARGED
15 minute winter	SMH5	13	54.163	1.135	68.3	1.7450	0.0000	SURCHARGED
15 minute winter	SMH6	13	53.844	0.900	75.8	1.1931	0.0000	SURCHARGED
15 minute winter	SMH7	13	53.305	0.481	75.5	0.5440	0.0000	SURCHARGED
120 minute winter	RAIN GARDEN 2	88	52.972	0.972	37.1	72.6939	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	51.500	0.000	9.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SMH4	4.003	SMH5	50.2	1.262	1.257	0.4087	
15 minute winter	SMH5	4.004	SMH6	67.0	1.685	1.681	0.5651	
15 minute winter	SMH6	4.005	SMH7	75.5	1.898	1.892	0.8051	
15 minute winter	SMH7	4.006	RAIN GARDEN 2	75.5	1.898	1.892	0.4446	
120 minute winter	RAIN GARDEN 2	4.007	SMH8 HYDROBRAKE	13.7	0.281	0.160	0.3194	

Node SMH8 HYDROBRAKE Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	51.973	Product Number	CTL-SHE-0131-9000-1500-9000
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	9.0	Min Node Diameter (mm)	1200

Node SPPIC1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.35	Width (m)	4.800	Depth (m)
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	54.450	Length (m)	28.578	Inf Depth (m)
Safety Factor	1.0	Time to half empty (mins)	0	Slope (1:X)	30.1	

Node SPPIC2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.35	Width (m)	4.800	Depth (m)
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	53.500	Length (m)	10.012	Inf Depth (m)
Safety Factor	1.0	Time to half empty (mins)	0	Slope (1:X)	15.4	

Node SPPIC3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.35	Width (m)	4.800	Depth (m)
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.850	Length (m)	24.126	Inf Depth (m)
Safety Factor	1.0	Time to half empty (mins)	0	Slope (1:X)	160.8	

Node SPPIC5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Width (m)	4.800	Depth (m)
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.650	Length (m)	38.884	Inf Depth (m)
Safety Factor	1.0	Time to half empty (mins)	68	Slope (1:X)	150.0	

Node SPPIC6 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.35	Width (m)	4.800	Depth (m)
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	54.350	Length (m)	17.950	Inf Depth (m)
Safety Factor	1.0	Time to half empty (mins)	0	Slope (1:X)	150.0	

Node SPPIC8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Width (m)	4.800	Depth (m)
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	53.100	Length (m)	28.911	Inf Depth (m)
Safety Factor	1.0	Time to half empty (mins)	0	Slope (1:X)	49.7	

Node SPPIC9 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.35	Width (m)	4.800	Depth (m)
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	53.850	Length (m)	21.818	Inf Depth (m)
Safety Factor	1.0	Time to half empty (mins)	0	Slope (1:X)	31.6	

Node SPPIC10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.35	Width (m)	4.800	Depth (m)
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	53.160	Length (m)	9.889	Inf Depth (m)
Safety Factor	1.0	Time to half empty (mins)	0	Slope (1:X)	164.8	

Node RAIN GARDEN Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	52.825
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.35	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	21.0	0.0	0.200	22.0	0.0	0.400	23.0	0.0	0.600	24.0	0.0
0.100	21.5	0.0	0.300	22.5	0.0	0.500	23.5	0.0	0.700	24.5	0.0

Node RAIN GARDEN 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	52.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	184

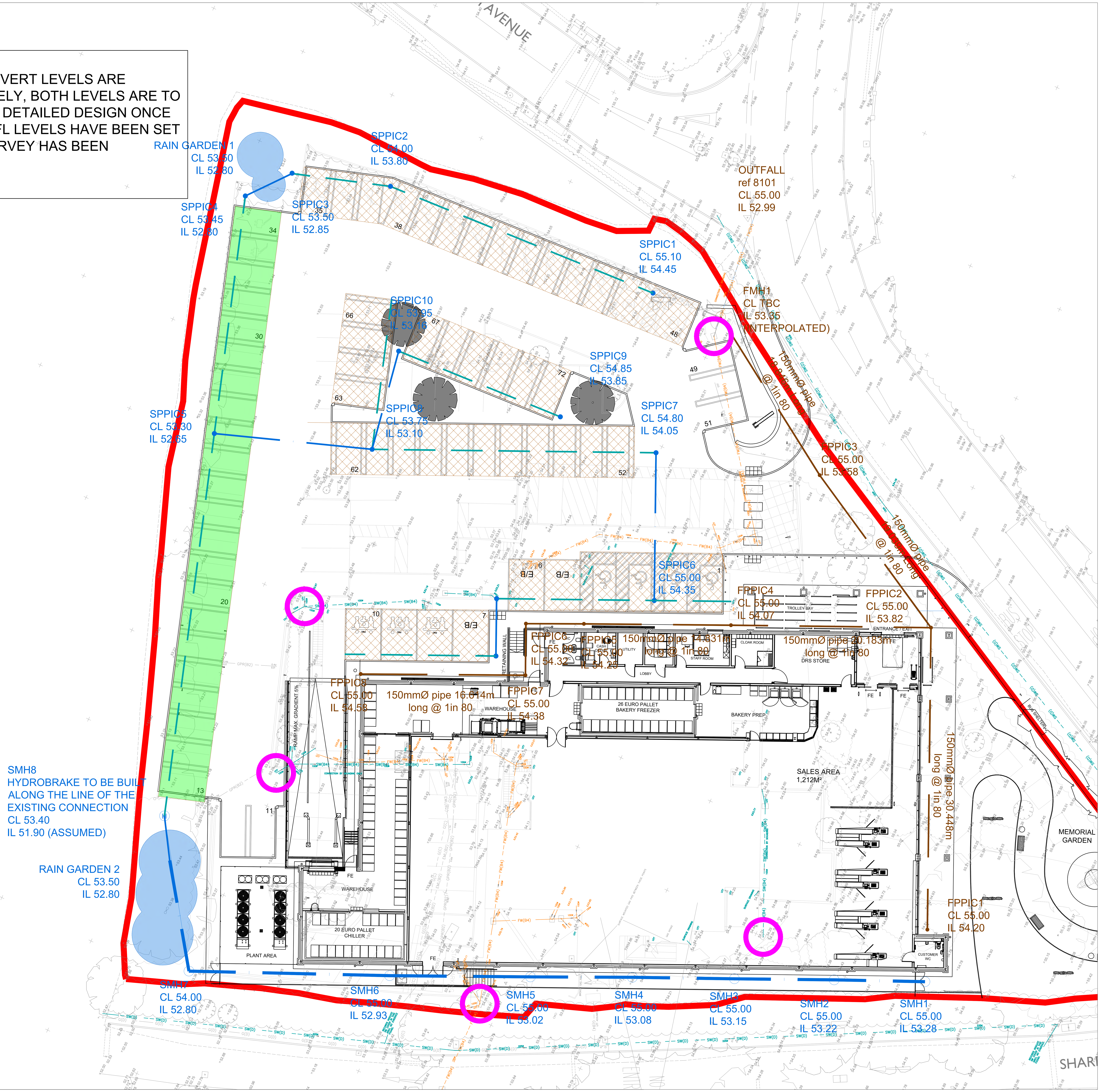
Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	70.0	0.0	0.200	72.0	0.0	0.400	74.0	0.0	0.600	76.0	0.0
0.100	71.0	0.0	0.300	73.0	0.0	0.500	75.0	0.0	0.700	77.0	0.0

Node SPPIC4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Width (m)	4.800	Depth (m)
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.800	Length (m)	24.126	Inf Depth (m)
Safety Factor	1.0	Time to half empty (mins)	0	Slope (1:X)	150.0	

Appendix J

ALL COVER AND INVERT LEVELS ARE SHOWN INDICATIVELY, BOTH LEVELS ARE TO BE CONFIRMED AT DETAILED DESIGN ONCE THE PROPOSED FFL LEVELS HAVE BEEN SET AND THE CCTV SURVEY HAS BEEN COMPLETED



KEY

- PROPOSED SURFACE WATER SEWER
- PROPOSED 150mmØ FOUL WATER SEWER
- PROPOSED PERFORATED PIPE WRAPPED IN PERMEABLE MEMBRANE
- SW(B3) — EXISTING SURFACE WATER SYSTEM WITH EXISTING OUTFALL TO E REUSED
- FW(B3) — EXISTING FOUL SYSTEM WITH EXISTING OUTFALL TO BE REUSED
- PROPOSED BIO-RETENTION AREAS
- PROPOSED PERMEABLE SURFACING ULITISuDS BY TARMAC OR SIMILAR APPROVED
- 40mm PERMEABLE ASPHALT 10 SURFACE COURSE
  80mm PERMEABLE ASPHALT 14 BINDER COURSE BEDDING LAYER
  50mm THICK POLYPIPE PERMAFILTER GEOTEXTILE
  150mm POLYPIPE PERMAVOID ATTENUATION LAYER POLYPIPE HEAVY DUTY PROTECTION FLEECE
  IMPERMEABLE GEOMEMBRANE (or similar)
  50mm BEDDING LAYER PREPARED FORMATION (CAPPING IF REQUIRED TO ENGINEERS SPEC.)
- NEW FOUL WATER INSPECTION CHAMBER 450mm DIAMETER
- NEW FOUL WATER MANHOLE 1200mm DIAMETER
- NEW SURFACE WATER MANHOLE 1200mm DIAMETER
- (H) PROPOSED HYDROBRAKE FLOW CONTROL DEVICE
- NEW SURFACE WATER CATCHPIT 600mm DIAMETER
- NEW RAINWATER HARVESTING TANK FINAL SPECIFICATION TO BE PROVIDED BY M&E CONSULTANT
- EXISTING FOUL AND SURFACE WATER FEATURES TO BE INVESTIGATED TO IDENTIFY POTENTIAL EXISTING OUTFALLS

DRAINAGE NOTES

1. ALL NON ADOPTABLE DRAINS UP TO 150 Dia. TO BE 'POLYPIPE uPVC UNDERGROUND DRAIN' MANUFACTURED IN ACCORDANCE WITH BS EN 1401-1OR EQUAL APPROVED.
2. ALL NON ADOPTABLE DRAINS WITH A PIPE Dia of 225 or 300 TO BE EITHER A PLAIN WALLED PLASTIC PIPE TO BS 1401-1 (POLYSEWER) OR A STRUCTURED WALL PLASTIC PIPE TO WIS-04-35-01 'POLYSEWER'. OR EQUAL APPROVED
3. ALL ADOPTABLE DRAINS UP TO 300 Dia. TO BE 'POLYSEWER' BY 'POLYPIPE' AND MANUFACTURED IN ACCORDANCE WITH THE WATER INDUSTRY SPECIFICATION WIS-4-35-01.
4. DRAINAGE PIPEWORK 400mm to 600mm DIA TO BE 'RIDGIDRAIN' HDPE BY POLYPIPE OR EQUAL APPROVED.
5. ALL PIPE LENGTHS NOT TO EXCEED 3m.
6. DRAINS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
7. NEW INSPECTION CHAMBERS (IC) TO BE A MINIMUM OF 450MM DIA. EXCEPT FOR MINI ACCESS CHAMBERS WHICH MAY BE SMALLER, REFER TO M.H. SCHEDULE FOR ACTUAL SIZES.
8. ALL EXTERNAL RAINWATER PIPES (RWP) TO BE TERMINATED AT RODDABLE GULLIES. INTERNAL RWP's TO ARCHITECTS DETAILS BUT SHOULD ALLOW FOR RODDABLE ACCESS.
9. FOR ALL DRAINAGE ABOVE GROUND FLOOR SLAB INCLUDING SETTING OUT FOR PENETRATIONS THROUGH THE GROUND FLOOR SLAB REFER TO ARCHITECTS DRAWING & SPECIFICATIONS
10. ANY DRAINS PASSING THROUGH SUBSTRUCTURE WALLS TO HAVE A MINIMUM 50mm CLEAR SPACE, RC LINTEL SUPPORT ABOVE & CEMENT FIBRE COLLARS EITHER SIDE TO PREVENT VERMIN ENTRY
11. ANY DRAINS CAST IN & PASSING THROUGH CONCRETE GROUND BEAMS TO HAVE A FLEXIBLE JOINT NOT MORE THAN 150mm FROM THE FACE OF THE GROUND BEAM. (FLEXIBLE JOINT TO MANUFACTURERS DETAILS) AND A MAXIMUM 600mm LONG ROCKER PIPER EITHER SIDE
12. ANY ALTERATIONS TO DRAINAGE PROPOSED BY CONTRACTOR TO BE SUBMITTED TO ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT OF WORK ON SITE. ANY REVISIONS ARE ALSO SUBJECT TO THE APPROVAL OF THE LOCAL BUILDING INSPECTOR.
13. ALL DRAINS RUNNING UNDER BUILDINGS TO HAVE A MINIMUM FALL OF 1:40 TOWARDS THE BUILDING EXTERIOR. PIPE TO BE ENCASED IN 100MM GRANULAR FILL.
14. COVER LEVELS SHOWN ARE APPROXIMATE ONLY AND SHOULD BE ALTERED TO SUIT FINISHED SURFACE LEVELS.
15. THE BEDDING SPECIFICATION FOR ALL DRAINS WHERE COVER IS GREATER THAN 1200mm SHALL BE TYPE 'S'....WHERE COVER IS LESS THAN 1200mm TYPE 'Z' SHALL BE USED
16. THE DEVELOPER/CONTRACTOR MUST SELF VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN 'SEWERS FOR ADOPTION 7TH EDITION'
17. PROPOSED COVER AND INVERT LEVELS TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO ANY WORKS COMMENCING ONSITE
18. ALL PPIC'S LOCATED WITHIN VEHICLE AREAS TO RECEIVE A MINIMUM 150mm CONCRETE BED AND SURROUND

Rev	Date	Revision Details	By	Chkd	Appd
P2	JAN 25	SITE LAYOUT UPDATED	GRE		
P1	MAY 24	FIRST ISSUE	GRE		

Cora iHt

Client: LIDL GREAT BRITAIN Ltd

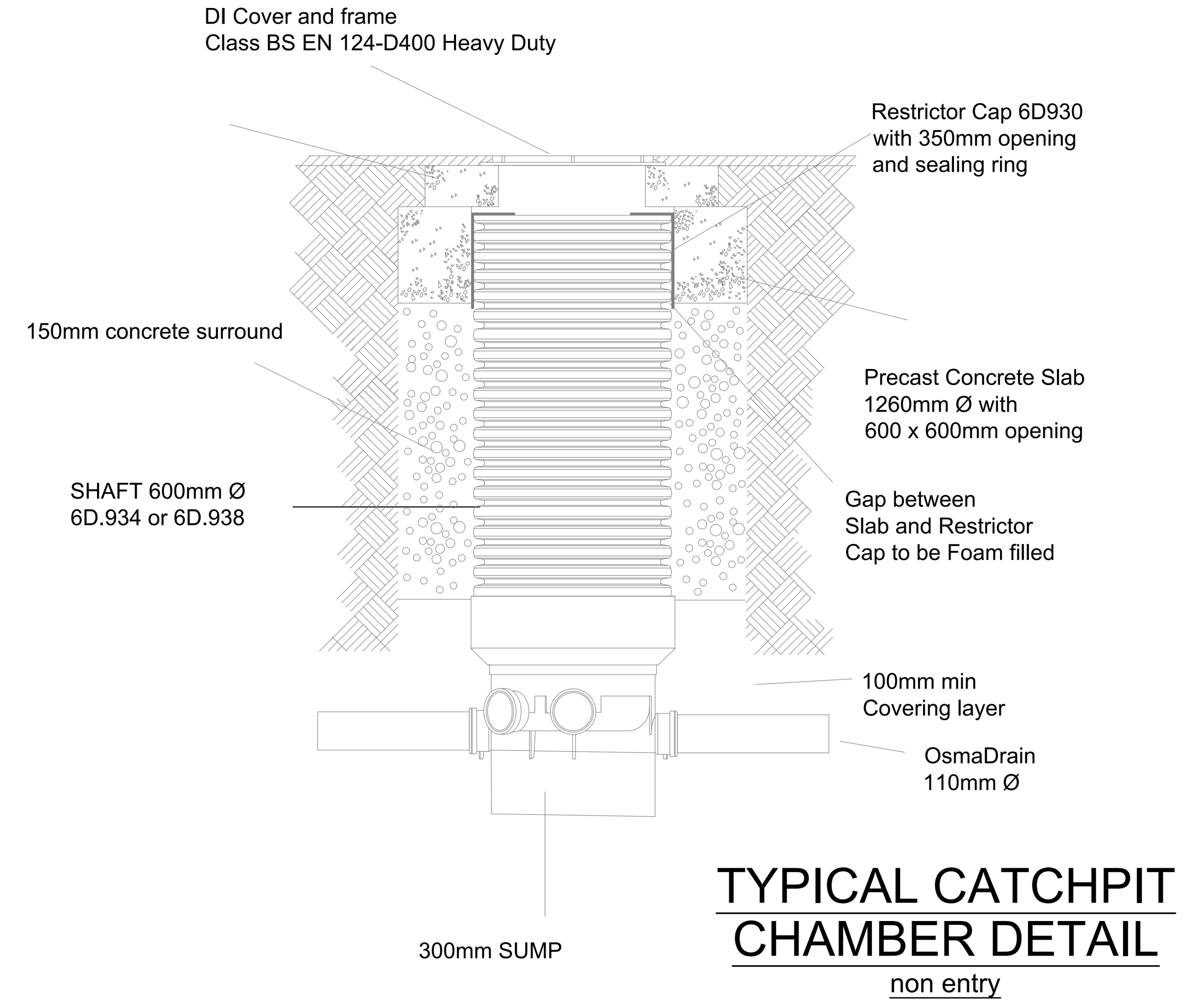
Project: RUISLIP

Title: DRAINAGE ARRANGEMENT SHEET 1 OF 2

Drawing No.	16-2073-001	Revision	P2
Scale	1:200 @ A1	Date	MAY 2024
Drawn	GRE	Chk	App

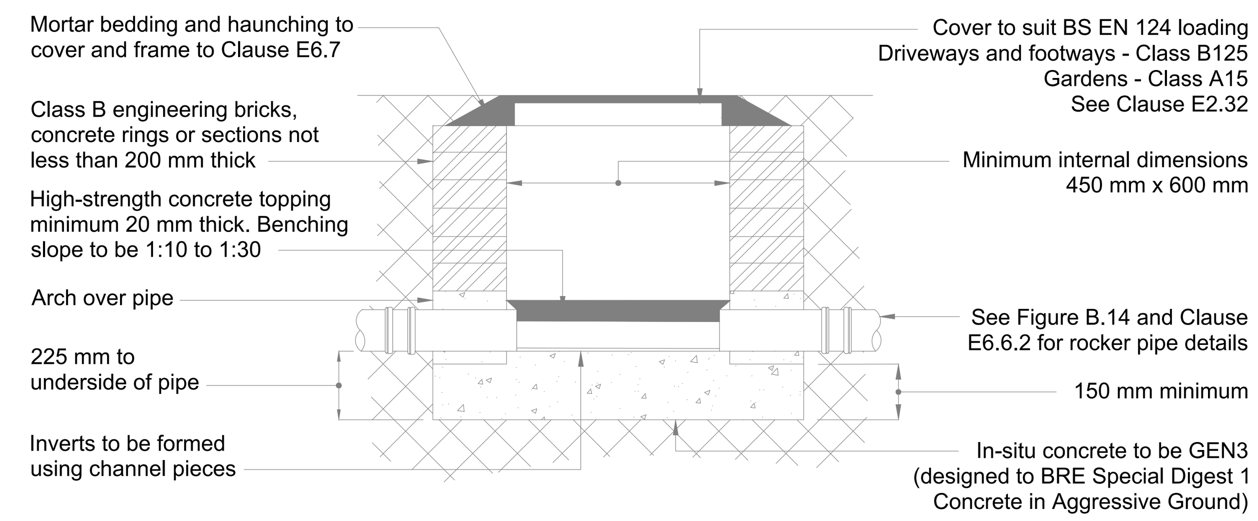
Common name	Scientific name	Habit	Sunlight and Aspect	Origin
Guelder rose	Viburnum opulus	Perennial shrub	Any	Native. Flowers attract insects and berries are eaten by birds.
Dogwood	Cornus sanguinea	Perennial shrub	Any	Native. Leaves are larval food for vase bearer moth and berries eaten by birds. Often planted for attractive winter stems.
Culvers root	Veronicastrum virginicum	Herbaceous perennial	Full sun or partial shade	Non-native. Tall with long terminal blue flower spikes. On the RHS 'plants for pollinators' list.
Aster	Aster spp.	Herbaceous perennial	Full sun or partial shade	Non-native. Often late flowering. Clump forming. Several species on the RHS 'plants for pollinators' list.
Black eyed susan	Rudbeckia birta	Herbaceous annual or biennial	Full sun or partial shade	Non-native. Spectacular yellow and black flowers. On RHS 'plants for pollinators' list.
Stinking hellebore	Helleborus foetidus	Herbaceous perennial	Full sun or partial shade	Native. Winter flowers.
Montbretia	Crocosmia spp.	Deciduous rhizomatous perennial	Partial shade	Naturalised. Red flowers. Thrives in most conditions.
Bugle	Ajuga reptans	Rhizomatous perennial	Partial shade	Native. Low growing and will form a mat.
Columbine	Aquilegia spp.	Herbaceous perennial	Full sun or partial shade	Non-native. Clump forming with tall flower spikes. On RHS 'plants for pollinators' list.
Inula	Inula hookeri	Herbaceous perennial	Partial shade	Tall clump forming with yellow flowers. On RHS 'plants for pollinators' list.
Hemp agrimony	Eupatorium cannabinum	Herbaceous perennial	Full sun or partial shade	Native. Sub-shrubs with pink flowers.
Bellflower	Campanula glomerata	Herbaceous perennial	Full sun or partial shade	Native. Clumps bearing violet-blue bell shaped flowers.
Sneezeweed	Helenium sp.	Herbaceous perennial	Full sun	Non-native. Clump forming with red flowers. On RHS 'plants for pollinators' list.
Lesser periwinkle	Vinca minor	Perennial sub-shrub	Any	Non-native. Ground cover with blue flowers.
Elephants ear	Bergenia sp.	Rhizomatous perennial	Full sun or partial shade	Non-native. Large leaves and pink flowers.
Plantain lilies	Hosta spp.	Herbaceous perennial	Part shade	Non-native. Attractive light coloured flowers.
Yellow flag	Iris pseudocorus	Rhizomatous perennial	Full sun or partial shade	Native. Likely to prefer wetter areas near inlet.
Siberian flag	Iris sibirica	Rhizomatous perennial	Full sun or partial shade	Non-native. Blue flowers. Prefers moist but well drained soil.
Garlic and onions	Allium spp.	Bulbous perennials	Full sun	Non-native. On RHS 'plants for pollinators' list.
Soft rush	Juncus effusus	Evergreen perennial	Full sun or partial shade	Native. Form tussocks – likely to prefer wetter areas.
Pendulous sedge	Carex pendula	Rhizomatous perennial	Full sun or partial shade	Native. Nodding flower spikes. Likely to prefer wetter areas near inlet.
Zebra grass	Miscanthis sinensis	Perennial, deciduous grass	Full sun	Non-native. Tussock forming ornamental grass with silky flowers.
Switch grass	Panicum virgatum	Deciduous perennial grass	Full sun	Non-native. Tussock forming ornamental grass.
Royal fern	Osmunda regalis	Deciduous fern	Any	Native. Large clump-forming plants.
Male fern	Dryopteris felix-mas	Deciduous or evergreen fern	Partial shade or full shade	Native. Large shuttlecock-like form.
Broad buckler fern	Dryopteris dilatata	Deciduous or evergreen fern	Partial shade or full shade	Native. Large shuttlecock-like form.

WATER COMPATIBLE PLANT SPECIES



TYPICAL CATCHPIT CHAMBER DETAIL

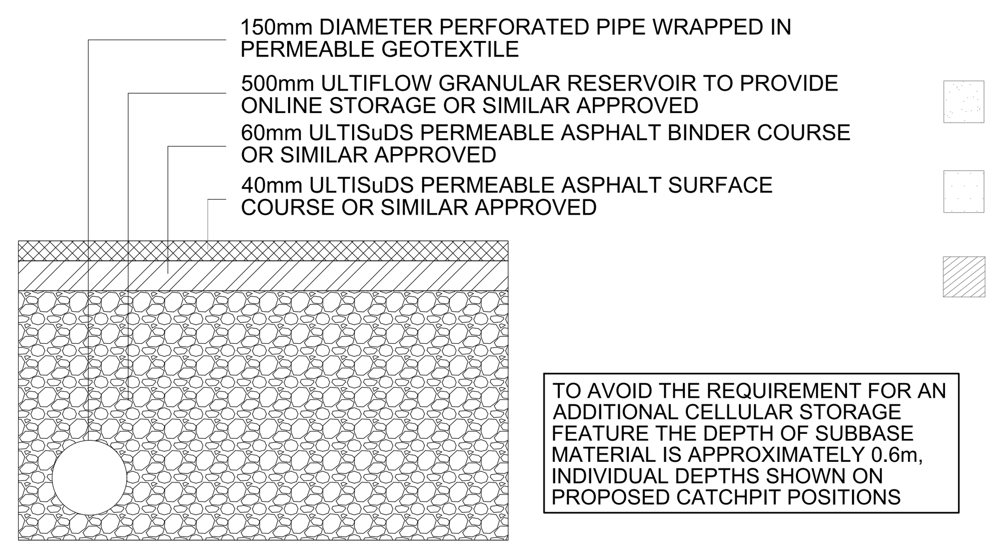
non entry



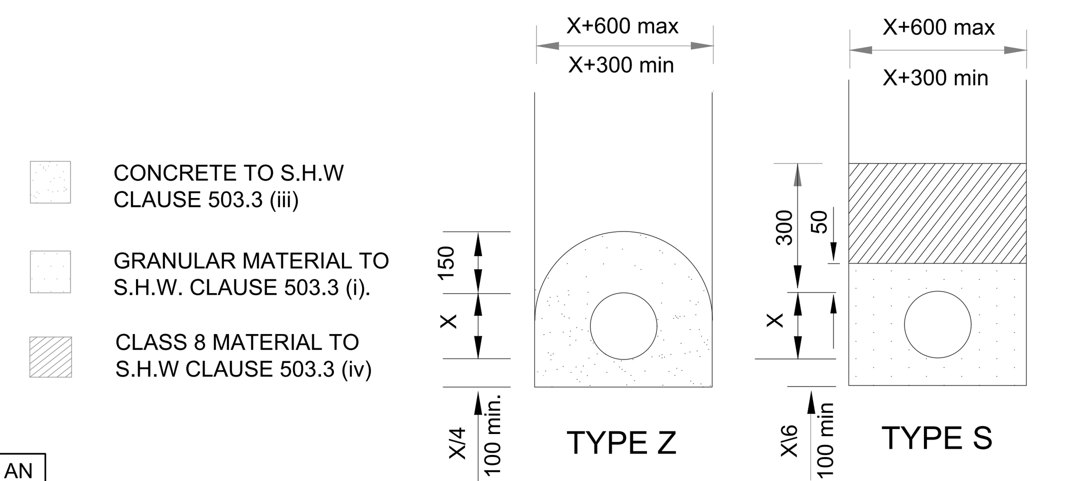
Note: The use of precast rectangular concrete manhole units with 150 mm grade GEN3 concrete surround (designed to BRE Special Digest 1 Concrete in Aggressive Ground) is Permitted

TYPICAL INSPECTION CHAMBER DETAIL - TYPE 4 (Rigid material detail)

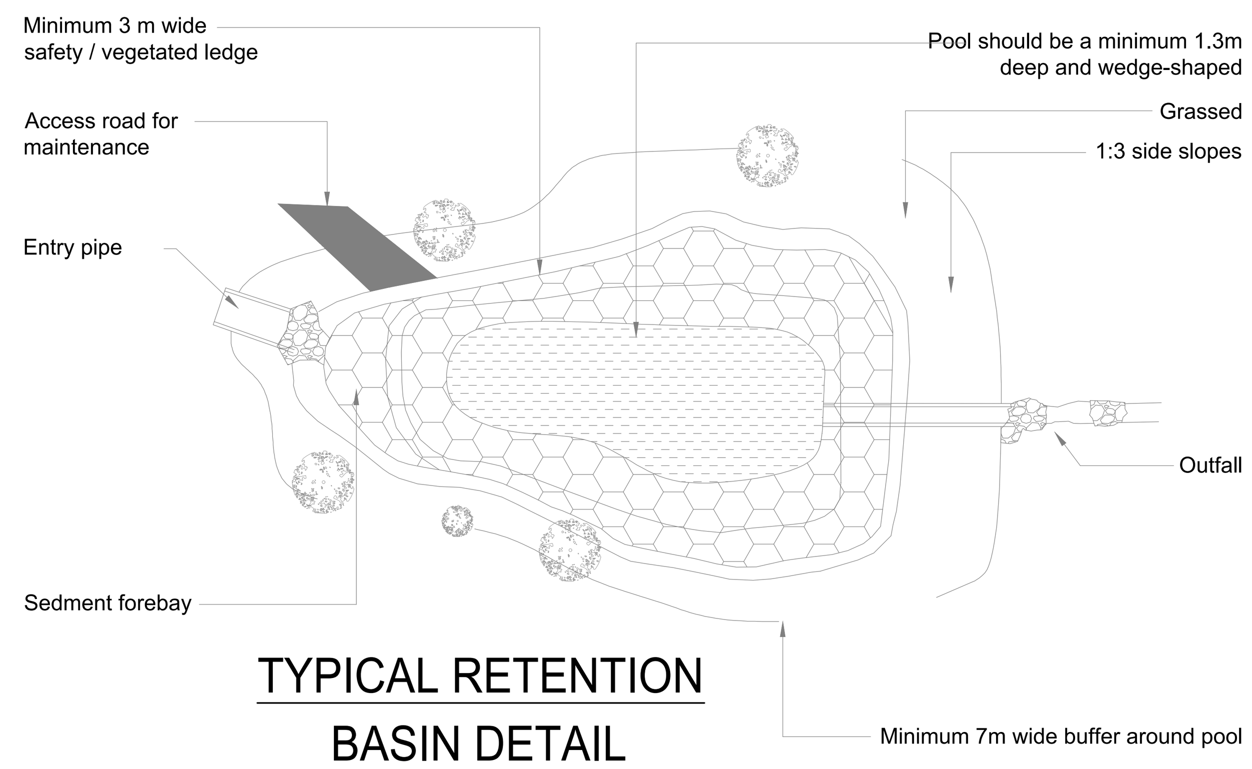
(Maximum depth from cover level to soffit of pipe 1 m, non-entry)



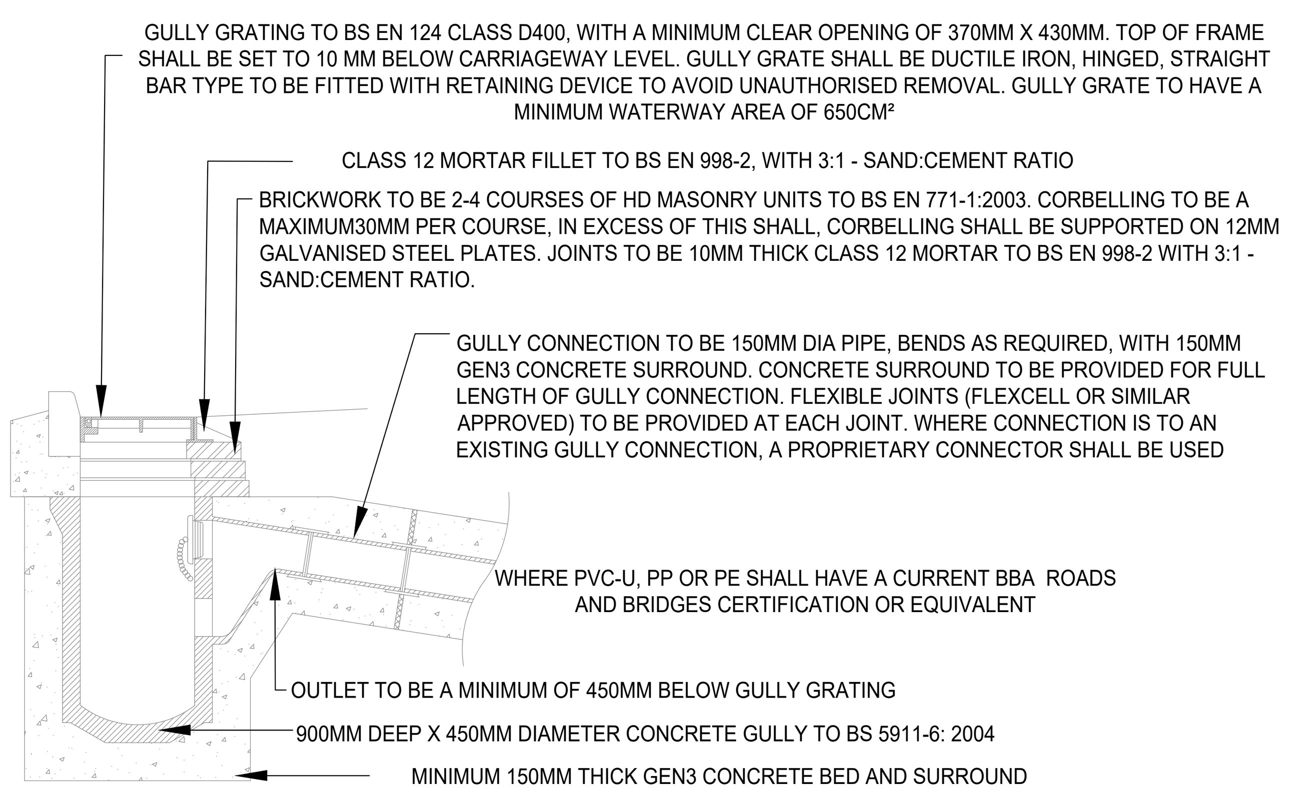
TYPICAL PERMEABLE SURFACING (PARTIAL INFILTRATION) DETAIL INCLUDING ONLINE STORAGE



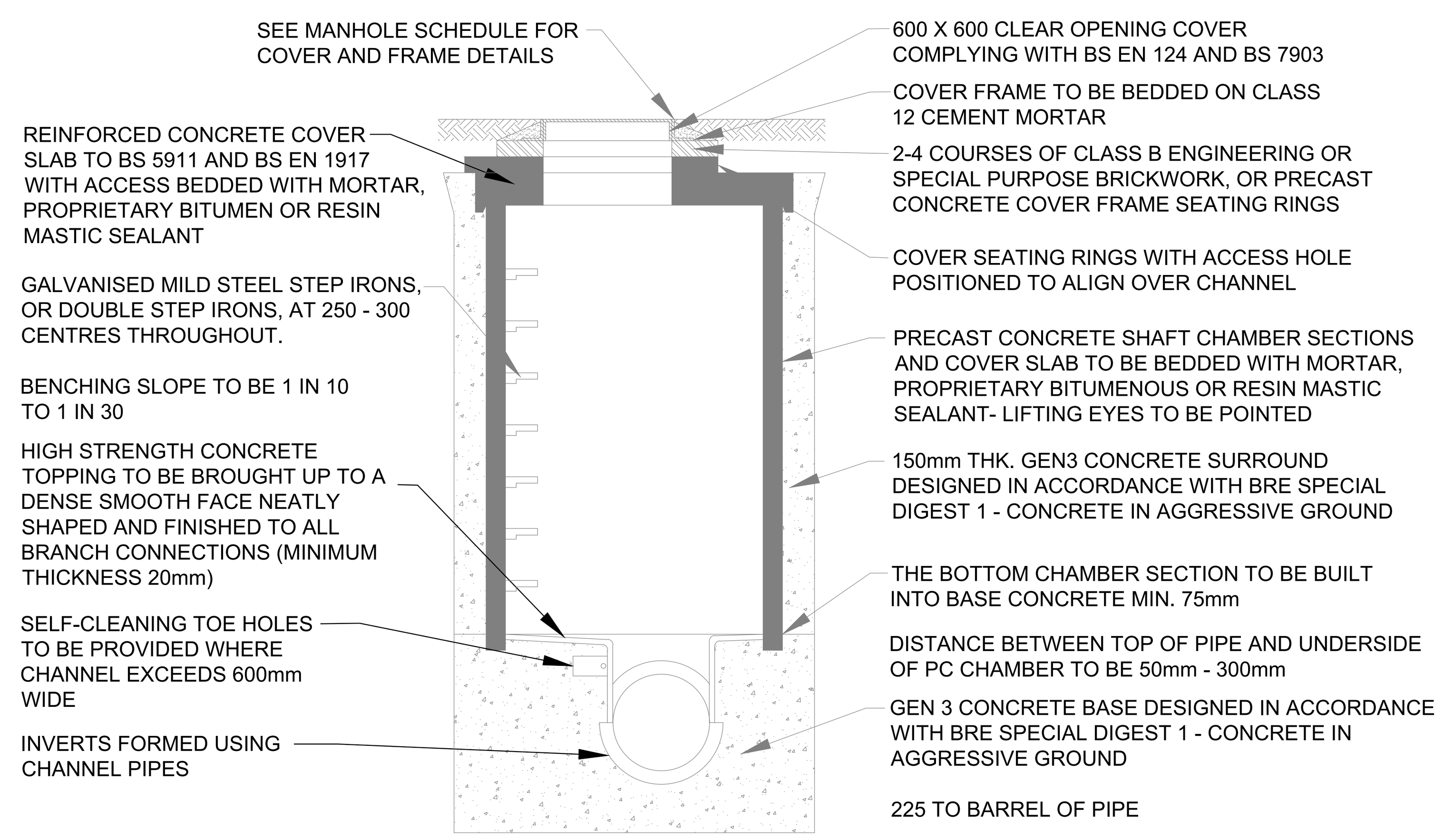
TYPICAL PIPE BED AND SURROUND DETAIL



TYPICAL RETENTION BASIN DETAIL



ROAD GULLY DETAIL



TYPICAL TYPE 2 CONCRETE MANHOLE (PCC) DETAIL

MAX DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 0m - 3m

Rev	Date	Revision Details	By	Chkd	Appd
P2	JAN 25	SITE LAYOUT UPDATED	GRE		
P1	MAY 24	FIRST ISSUE	GRE		

Cora iHt

Client: LIDL GREAT BRITAIN Ltd

Project: RUISLIP

Title: DRAINAGE ARRANGEMENT SHEET 2 OF 2

Drawing No.: 16-2073-001 | Revision: P2

Scale: NTS | Date: MAY 2024

Drawn: GRE | Chk | App