Intended for
Oxford University Development Ltd

Project No.
1620011508

Date
August 2021

Report Reference
BBSP-RAMB-CP-XX-RP-C-000001

BEGBROKE SCIENCE PARK
SURFACE CAR PARK DRAINAGE STATEMENT

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SURFACE CAR PARK DRAINAGE STATEMENT

Project name	**Begbroke Science Park**
Project no.	**1620011508**
Recipient	**Oxford University Development Ltd**
Document no.	**BBSP-RAMB-CP-XX-RP-C-000001**
Version	**P02**
Date	**09/09/2021**
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Revision	Date	Prepared by	Checked by	Approved by	Description
P01	25/08/2021	L February	L Sawyer	M Sokal	1st Issue (for Planning)
P02	09/09/2021	A Taleb	L February	L Sawyer	2nd issue (for planning)

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APPENDICES

1. INTRODUCTION

1.1 Objective

Begbroke Science park is located north of Oxford, off the A44 and situated between Begbroke and Kidlington. The site consists of several commercial laboratory developments, along with greenfield areas and listed farm buildings. The boundary of the science park is defined by a wooded area surrounding the perimeter. The grid location for the development is SP 47821 13596, and the postcode OX5 1PF.

This Drainage Statement accompanies a full planning application for a new surface car park and service building located on the existing greenfield area to the northwest of the Science Park. A site Location Plan is included in Appendix 1.

This Drainage Statement has been produced to provide the surface and foul water drainage strategy for the proposed surface car park and ancillary buildings in support of a planning application for the development. The drainage strategy indicated in this document is to be reviewed and taken forward during the next stages of the design by all relevant stakeholders.

1.2 Constraints and Limitations

This drainage statement has been prepared for the exclusive use of Oxford University Development Ltd for the purpose of detailing the surface water and foul water below ground drainage strategy with associated constraints and opportunities that have been identified at this development.

Ramboll UK has endeavoured to assess all information provided to them during this appraisal. The report summarises information from a number of external sources and Ramboll cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon. Ramboll UK has not verified information from third parties unless otherwise stated in this report.

This report should not be relied upon exclusively for decision making purposes and should be read in conjunction with all other Engineers', Architects', Consultants' reports, specifications and drawings in addition to all other relevant documentation.

2. SITE INFORMATION

2.1 Records Review

The key reports and drawings reviewed as part of this study are listed in the table below.

TITLE	AUTHOR	DATE
Phase 2 Site Investigation Report Zones B & C (Ref. C15387)	Ground Engineering	August 2021
Topographical Survey (Ref. 46515T-01-4)	Plowman Craven	April 2021
LP2264-FIRA-MP-ST-P-LA-WS 0001	Fira Landscape Architect	18 August 2021
BBSP-NBBJ-ZZ-XX-DR-A-511010 & 511011	NBBJ	24 August 2021

Table 2.1. Key Documents and Reports

2.2 Existing Site Description

The development site is on a greenfield area bounded by woodlands to the north and west and an access road to the south. An existing farm access track traverses north/south along the western edge of the proposed surface car park. This is a greenfield site.

Figure 2.2. Site Location and Extents

Extract from Google Maps, website accessed 19.08.2021

The extent of the planning application boundary is 0.59ha.

2.3 Existing Site Conditions

2.3.1 Topography

The site topography is generally flat at approximately 68.80m AoD to the southwest and 68.30m AoD to the northeast.

The topographical survey is included in Appendix 3.

2.3.2 Geology

The ground conditions comprise of made ground circa 0.25m to 2.30m thick underlain by superficial river terrace deposit of Summertown-Radley Sand and Gravel Member. This is underlain by the solid geology of Kellaways Clay Member at depths between 4.30m and 4.40m. The Kellaways Clay Member was underlain by a layer of Cornbrash Formation (2.70m to 2.8m thick) which in turn was underlain by Forest Marble Formation.

2.3.2.1 Ground Water

The nearest watercourse is Rowel Brook approximately 250m to the north of the proposed development.

From the ground investigation report, the site is recorded as being underlain by the Secondary (A) Aquiver Summertown-Radley Sand and Gravel Member of the Unproductive Oxford Clay Formation.

Ground water was encountered during excavation at depths of 3.9m below ground level and 3.60m below ground level in TP5 and TP6, respectively.

The Ground Investigation report is included in Appendix 2.

2.4 Flood Risk Considerations

From the Environment Agency (EA) flood mapping, suitable for planning, the development site is located within Flood Zone 1. The EA classes land within Flood Zone 1 as:

- Land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (<0.1%)

The figure below is an extract from the Environment Agency flood map and confirms that the proposed development site is located within Flood Zone 1.

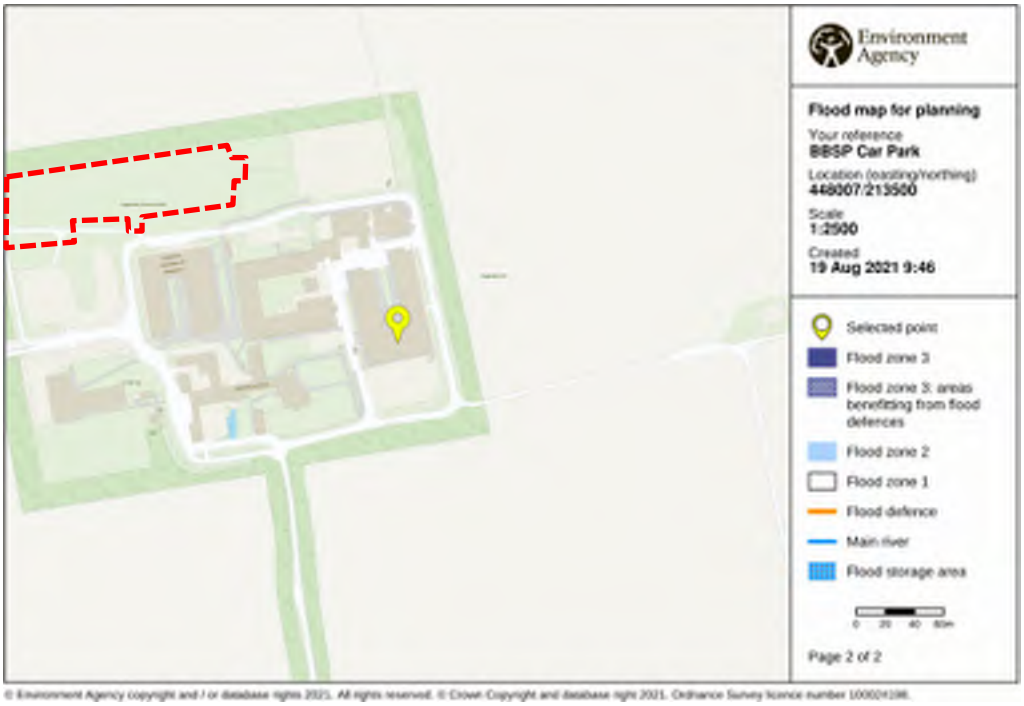


Figure 2.2. Environment Agency Flood Map (suitable for Planning)

Extract from Environment Agency website, August 2021

On further assessment of the Environment Agency Flood Map, the development is at low risk of flooding from surface waters – see map extract below.

Figure 2.3. Environment Agency Flood Map – Extent of Flooding from Surface Water

Extract from Environment Agency website, August 2021

The Flood Risk from Surface Water is 'very low' within the development site. The Environment Agency defines the flood risk as follows;

- 'Very low risk' means that each year this area has a chance of flooding of less than 0.1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

In order to ensure the flood risk status of the development site is unaffected, a robust drainage strategy has been devised. The drainage strategy along with sustainable urban drainage features (SuDS) will manage surface water flows on site such that the development does not increase flood risk either to itself or neighbouring locations. There is no identified flood risk to the proposed development from artificial sources.

2.5 Existing Drainage Consideration

2.5.1 Foul Water Drainage

The existing local public foul and surface water sewer network currently serving the Begbroke Science Park and the wider Oxfordshire area is owned and maintained by Thames Water. The existing foul network serving the Science Park drain via gravity into a private sewerage pumping station located to the northwest of the site and discharges into the existing Thames Water sewer network.

Existing below ground services records indicate the two foul pumping chambers serving the wider science park located to the south west corner of the proposed development.

2.5.2 Surface Water Drainage

The proposed development is located on an existing greenfield site, and the nearest existing surface water drainage network is to the south of the propose development beneath the existing access road.

An analysis has been made of the existing greenfield run-off rate based on a total site area of 5,902m^2. The greenfield run-off rate was determined using industry standard software MicroDrainage ICP SuDS model, summarised as follows:

QBAR (l/s)	Q (100 yrs) (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
2.3	7.2	1.9	5.1	7.2

2.6 Infiltration Testing

Soakaway testing in accordance with BRE Digest 365 was carried out in August 2021. The soakaway testing was undertaken in trial pits TP3, TP4 and TP7 at 2.0m depth within the coarse-grained Summertown-Radley Sand and Gravel Member. A summary of the infiltration test results at each location is included in the table below.

INFILTRATION TEST LOCATION	INFILTRATION TEST RESULT (CARRIED OUT IN ACCORDANCE WITH BRE DIGEST 365)
TP3	$3.46x10^{-5}$ m/s $2.60x10^{-5}$ m/s $1.62x10^{-5}$ m/s

INFILTRATION TEST LOCATION	INFILTRATION TEST RESULT (CARRIED OUT IN ACCORDANCE WITH BRE DIGEST 365)
TP4	5.61x10-5m/s 3.97x10-5m/s **3.47x10-5 m/s**
TP7	1.16x10-4 m/s 7.15x10-5 m/s 6.80x10-5 m/s

The nearest infiltration test taken to the proposed development site is at trial pit location TP4. Of the three test fillings undertaken at this location $3.47x10^{-5}$ m/s was used in the proposed drainage strategy.

The trial pit locations are indicated on the Infiltration Test Location Plan below, and the Ground Investigation report appended to this report.

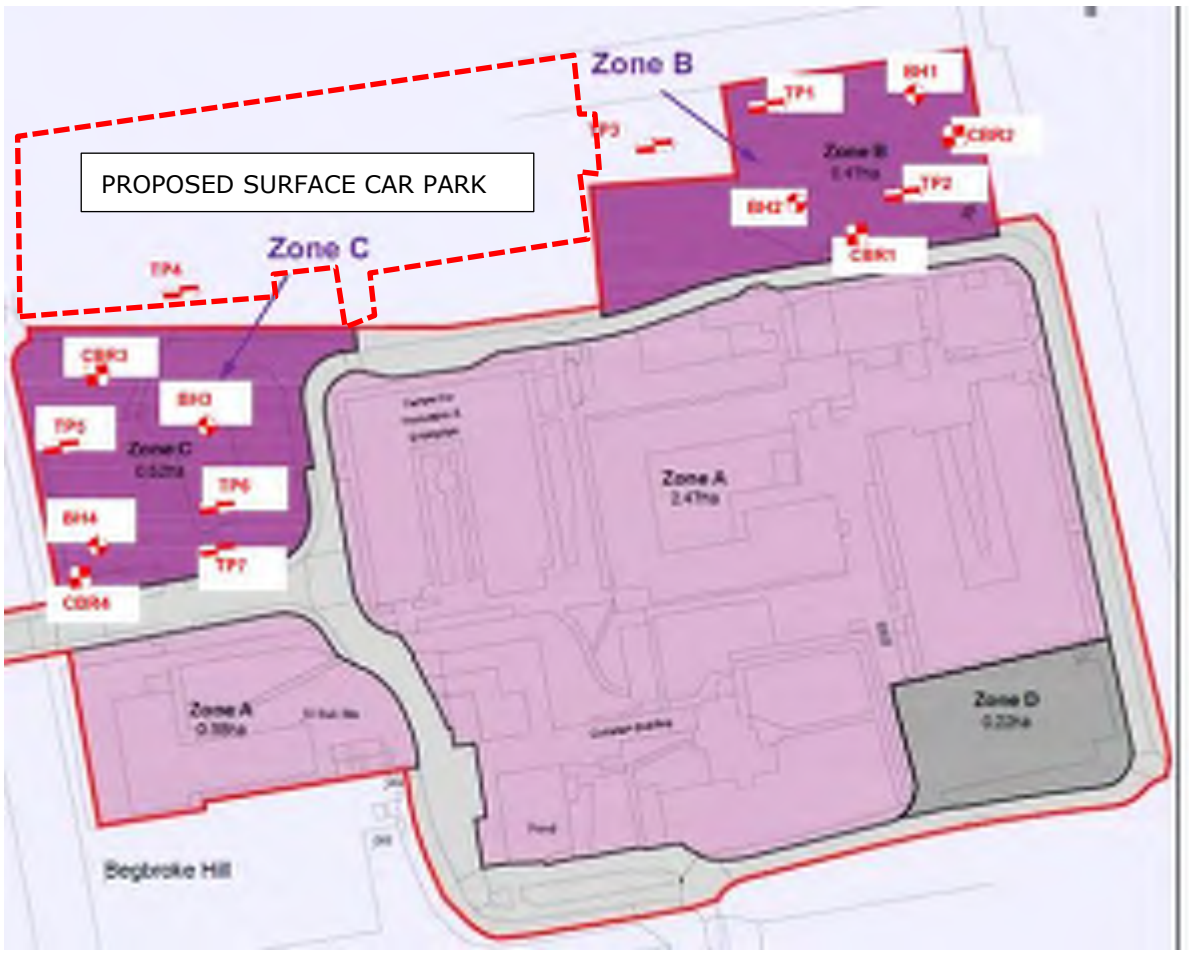


Figure 2.3. Infiltration Test Location Plan

Extracted from Ground Engineering report C15387, dated August 2021

The ground investigation report prepared by Ground Engineering, Phase 2 Site Investigation Report Zones B & C (report ref. C15387, dated August 2021), is included Appendix 2.

3. PROPOSED DRAINAGE STRATEGY

3.1 Proposed Development

The proposed development is located on an existing greenfield site, bounded by woodland area to the north and west.

3.2 Design Standards

The proposed drainage strategy comprises an infiltration surface water drainage scheme utilising sustainable drainage systems (SuDS) co-ordinated with the landscape, and unattenuated foul flows for foul water discharge.

The proposed drainage strategy includes a comprehensive SuDS scheme to provide water quality betterment and satisfy Local Policy.

The proposed foul and surface water drainage strategy was designed in accordance with, and follows procedures, set out in the following documents noted below.

The proposed surface water and foul water drainage networks will be designed and installed to achieve self-cleaning velocity. Flows will generally be kept close to 1 m/s and less than 3 m/s to avoid erosion of the internal pipe surface and to ensure that self-cleaning velocities are achieved. This is subject to the condition, location and level of the existing off-site below ground drainage and sewerage network. Proposed foul water drainage pipes are to be minimum 150mm in diameter, and laid to gradients sufficient to allow for self-cleansing as per "**the Code**".

The development will be drained by dedicated and fully segregated surface and foul water systems designed in accordance with the following documents (where appropriate):

- Building Regulations - Approved Document Part H;
- BS EN 12056: Parts 1-5: Gravity Drainage Systems Inside Buildings
- BS EN 752: Drain and Sewer Systems outside buildings
- BS EN 1610: Construction and testing of drains and sewers;
- BS EN 1295-1: Structural design of buried pipelines under various conditions of loading;
- Sustainable Drainage Systems - Design manual for England and Wales (CIRIA);
- Appendix C of the Design and Construction Guidance for foul and surface water sewers offered for adoption under the code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("**the Code**");
- BS 8000-14: Workmanship on Building Sites: Code of Practice for Below Ground Drainage
- Oxfordshire County Council Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire (V1. November 2018)
- Non-statutory Technical Standards for Sustainable Drainage Systems, S5 and S6
- CIRIA C753 The SuDS Manual

Local planning guidance has indicated that SuDS should be used on-site where appropriate, as this will;

- Reduce the impact of the urbanisation on the frequency and size of floods;
- Protect and enhance water quality;
- Provide habitats for wildlife;
- Provide amenity for users of the facility;
- Encourage natural water recharge.

The drainage strategy will be designed to current guidance for adoptable sewers (the Code), however, it is anticipated that the drainage network will be private.

As per the National Planning Policy Framework (NPPF) guidance and the guidance provided in the Code, surface water design storm criteria for the development should be as follows;

- No surcharging for the 1 in 1 year return period
- No flooding for the 1 in 30 year return period, unless where noted to allow overflow in above ground SuDS features
- No flooding permitted to residential or commercial properties for the 1 in 100 year return period storm event with an additional 40% allowance for climate change. If overland flooding occurs in this event, the location of overland flow paths and the extent and depth of ponding will be considered.

The actual below ground foul water drainage sizes will be determined once the flow rates are available from building services engineers, during the design development stages.

3.3 Proposed Surface Water Drainage

The development site is located on an existing greenfield area as noted in Section 2.2, above. This together with the existing ground conditions, infiltration test results and ground water level below ground indicated that an infiltration drainage strategy utilising SuDS features is suitable for this location.

A porous pavement build-up is proposed for the parking bays in the car park, and impermeable paving in the access road and aisle to provide a more robust pavement build-up. Car parking bays located within 5.0m of proposed (and existing) buildings are laid to porous pavement with an impermeable geotextile surround to provide attenuation and conveyed to the nearby below ground soakaway geocellular tank located beneath the surface car park. A perforated pipe is included in the impermeable line porous pavement.

Surface water run-off from the ancillary buildings is collected via a gravity below ground drainage network to a below ground soakaway tank located in the soft landscaped area to the west.

The pre- and post-development rates based on a greenfield run-off rate (QBAR) is as follows:

Pre-development run-off rate	2.3 l/s
Post-development run-off rate	2.1 l/s

Table 3.4. Greenfield Run-off Rates

As noted above, the surface water run-off from the proposed development is managed on site through infiltration.

The proposed surface water management strategy has been developed in parallel with the Architectural and Landscaping Architects proposals. In producing this strategy, a feasibility assessment of viable SuDS measures was undertaken to ensure that surface water is appropriately managed given the existing site constraints.

The principles of the strategy are as follows:

- **Porous pavement** (2167m^2) construction to the majority of parking bays within the surface car park with a 400mm thick coarse graded drainage layer to **infiltrate** surface water run-off to ground. Where infiltration is allowed, the pavement build-up to include a permeable permafilter geomembrane to provide pollution treatment. This system will provide the required treatment for the small flows entering the positive drainage system. Treatment measures to be confirmed sufficient in accordance with Ciria SuDS Manual (Chapter 26) at detailed design stage.
- Where located within 5.0m of proposed and existing buildings, a **porous pavement** (346m^2) build-up with an impermeable geomembrane surround is proposed to **attenuate** surface water run-off. A perforated pipe within the filter material conveys surface water run-off to a nearby below ground geocellular soakaway tank for **infiltration** to ground. This system will provide the required treatment for the small flows entering the positive drainage system. Treatment measures to be confirmed sufficient in accordance with Ciria SuDS Manual (Chapter 26) at detailed design stage.
- **Filter drains** (29m^2) are proposed to accept roof run-off from the ancillary buildings and conveyed via a series of perforated and solid pipes to the soakaway tank located to the east of the buildings. This system will provide the required treatment for the small flows entering the positive drainage system. Treatment measures to be confirmed sufficient in accordance with Ciria SuDS Manual (Chapter 26) at detailed design stage.
- Linear drainage channels are proposed in strategic locations within the surface car park and ancillary buildings to intercept excess run-off during intense storm events for conveyance to the nearby below ground geocellular soakaway tank for **infiltration** to ground.
- The proposed surface water run-off from the development site is conveyed to the geocellular structures via the SuDS features noted above to provide **infiltration** to ground.
- A petrol/oil **full retention separator** is proposed upstream of the below ground geocellular soakaway tank to provide an added level of **pollution treatment** in addition to the inherent pollution treatment from the SuDS features.

The proposed surface water drainage strategy drawings are included in Appendix 4.

The total impermeable area for the proposed development site is 0.54 ha. Further hydraulic modelling in the following design stages is required to determine the precise network capacity and surface water attenuation volumes. The hydraulic analysis and modelling criteria for the surface water drainage design to be undertaken at detailed design stage is;

- FSR Rainfall Data
- M5-60(mm) – 20.0
- Ratio (R) – 0.40
- Climate Change (CC) – 40% for 1 in 100-year return period
- Area (ha) – 0.54 ha (for impermeable areas refer to the MicroDrainage results included in Appendix 5)
- Maximum Allowable Discharge – Infiltration only

The above criteria have been input into the industry standard MicroDrainage hydraulic modelling software.

The proposed surface water drainage strategy was modelled in MicroDrainage and the output results included in Appendix 5. In accordance with the Code and latest EA guidelines, the surface water drainage network has been modelled to not flood in the 1 in 30 year and 1 in 100 year plus 40% climate change storm events.

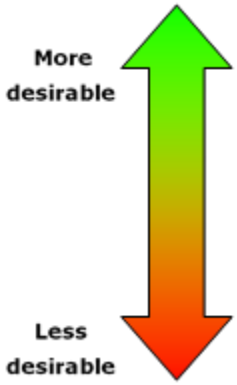
3.3.1 SuDS Analysis

Good practice emphasises the need to ensure surface water run-off is managed close to its source. It highlights that developers should aim to achieve greenfield run-off from their site through the use of sustainable drainage techniques. This can also be aided by encouraging the retention of soft landscaping as opposed to hard, less permeable surfaces.

In line with the Lead Local Flood Authority guidance, SuDS features are used to achieve a minimum of 40% betterment on brownfield rates for the development site.

The following hierarchy for managing surface water applies:

- Water Reuse
- Living Roofs
- Basins and Ponds
- Infiltration Devices
- Permeable Surfaces
- Tank Systems



The surface water drainage strategy considers the SuDS hierarchy in developing the water management proposals. The surface water management features, infiltration devices, permeable surfaces and tank systems are incorporated within the development proposals.

Basins and ponds were discounted due to the limitations on space for future development proposals not included as part of this Planning Application.

The type of development; ancillary buildings comprising plant rooms and bin store, and surface car park, is not considered suitable for water re-use.

3.3.2 SuDS Treatment Train

Water pollution has been taken into account and methods of treatment chosen against criteria outlined in the Ciria SuDS Manual. Treatment measures are to be confirmed sufficient in accordance with Ciria SuDS Manual (Chapter 26) at detailed design stage. An outline using extracts from the document to allocate suitable pollution indices for the proposed land use is provided below:

1. Define pollution hazard indices, presented in Table 26.2 of the Ciria SuDS Manual:

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Notes

1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Table 3.2. Pollution Hazard Indices

Extract from the Ciria SuDS Manual, Chapter 26

2. Determine SuDS Pollution Mitigation Indices

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates[1]	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.6[4]	0.5	0.6
A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[5, 6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Notes

1 All designs must include a minimum of 1m unsaturated depth of aquifer material between the infiltration surface and the maximum likely groundwater level (as required in infiltration design – Chapter 25).

2 For example as recommended in Sniffer (2008a and 2008b), Scott Wilson (2010) or other appropriate guidance.

3 Alternative depths may be considered where it can be demonstrated that the combination of the proposed depth and soil characteristics will provide equivalent protection to the underlying groundwater – see note 1.

4 If significant volumes of sediment are allowed to enter an infiltration system, there will be a high risk of rapid clogging and subsequent system failure.

5 See Chapter 14 for approaches to demonstrate product performance. Note: a British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: **www.britishwater.co.uk/Publications/codes-of-practise.aspx**

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution, where there is a requirement to retrofit treatment. WAT-RM-08 (SEPA, 2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

Table 3.3. Pollution Mitigation Indices for Discharges to Ground Waters

Extract from the Ciria SuDS Manual, Chapter 26

The applicable indices following the methodology set out in the Ciria SuDS Manual is highlighted with a red box.

The proposed development is subject to design development, and a risk assessment of the SuDS features are to be undertaken in the following design stage.

3.4 Proposed Foul Water Drainage

The indicative foul water drainage strategy assumes sufficient capacity in the existing foul water pumping station to accommodate foul flows from the proposed development, this is to be confirmed by the Client.

Although the ancillary buildings are not anticipated to require foul water drainage, floor gullies are proposed. The foul flows from the ancillary buildings are expected to be minimal from wash-down activities only. Foul water drains are proposed to connect via gravity to the existing private site network to the southeast of the ancillary buildings.

The proposed foul water drainage strategy drawings are included in Appendix 4.

4. MAINTENANCE REQUIREMENTS OF DRAINAGE COMPONENTS

The tables below, taken from the Ciria SuDS Manual, provides guidance on the type of operational and maintenance requirements that may be appropriate for the drainage features proposed in this Drainage Strategy report.

TABLE 13.1 Operation and maintenance requirements for soakaways

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Table 4.5. Maintenance Requirements of Drainage Components (Soakaways)

Extract from the Ciria SuDS Manual, Chapter 13

TABLE 16.1 Operation and maintenance requirements for filter drains

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Table 4.2. Maintenance Requirements of Drainage Components (Filter Drains)

Extract from the Ciria SuDS Manual, Chapter 16

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 4.3. Maintenance Requirements of Drainage Components (Pervious Pavements)

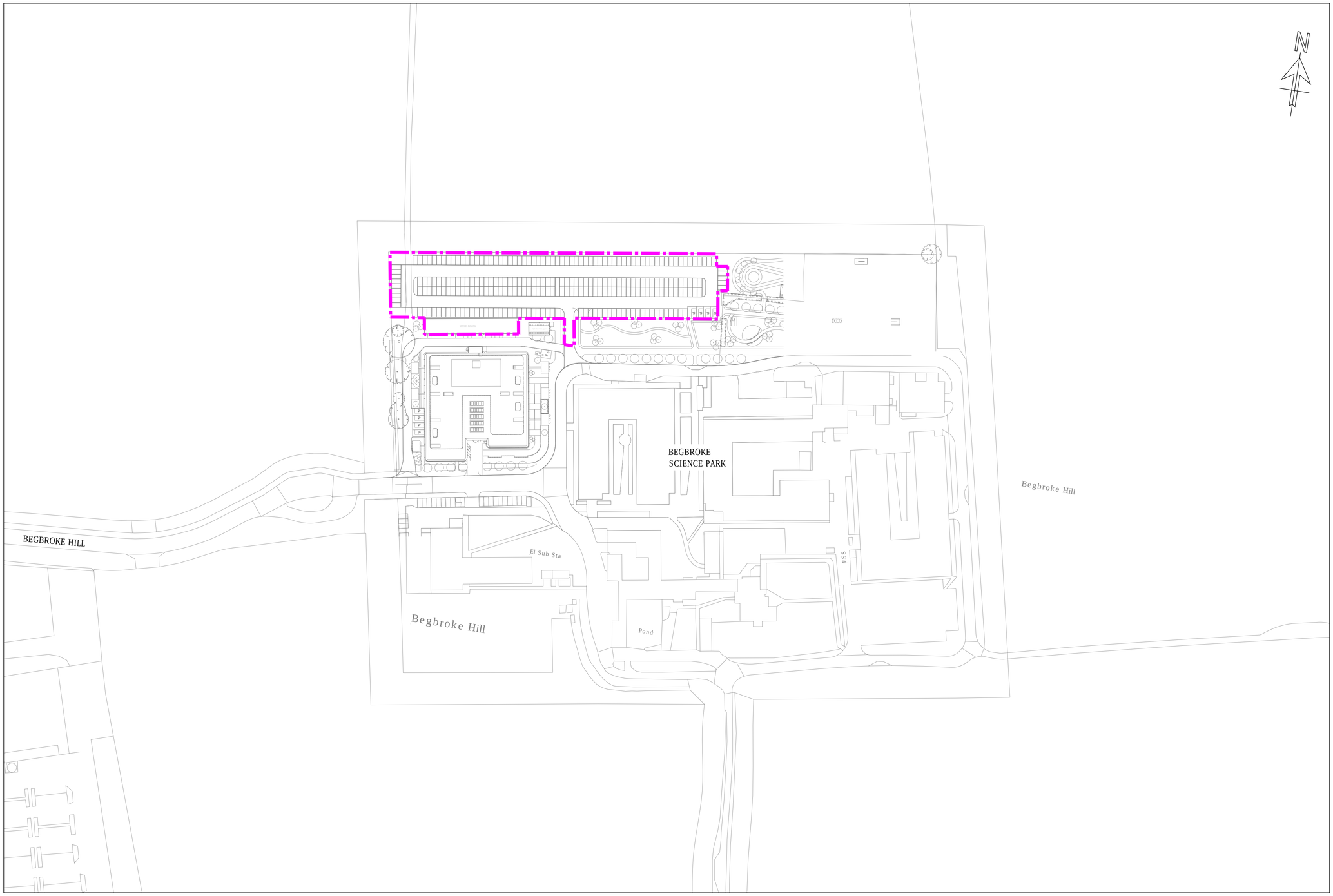
Extract from the Ciria SuDS Manual, Chapter 16

In addition to the items listed above, the table below provides further guidance on type of operational and maintenance requirements that may be appropriate for the drainage features not included in the tables provided above.

Drainage Feature	Regular Maintenance	Occasional/Remedial Maintenance	Monitoring
Drainage channels/Gullies	Inspections will include gratings; covers including their locking bolts; sumps and sump buckets; exposed concrete surround and adjacent surfacing. Check for accumulation of debris and silt and cleaned as necessary Gratings, frames and all associated locking parts to be checked for damage. Exposed concrete and adjacent surfacing to be checked for cracking and general damage.	Channel cleaning will be by flushing with water or high pressure jetting (no boiling water or cleaning agent will be used). All silt buckets and sumps will be cleaned out replaced back into the units ensuring they are correctly fitted. All channel surfaces and joints will be checked and repaired as necessary. Repair/rehabilitation of inlets, outlet, overflows and vents, as required.	Inspect every 4 months or after large storm.
Catchpit Manholes/Inspection Chambers	Check condition of inlet and outlet pipes, flow controls, baffles and isolation structures Check for accumulation of debris and silt and cleaned as necessary. Covers and frames to be checked for damage. Exposed concrete and adjacent surfacing to be checked for cracking and general damage. Check condition of inlet and outlet pipes, flow controls, baffles and isolation structures	Clean as necessary. All manhole and inspection chamber covers and frames to be replaced as necessary. Repair exposed concrete and surfacing as necessary Repair/rehabilitation of inlets, outlet, overflows and vents, as required.	Inspect every 6 months or after large storm.
Proprietary treatment system	Remove litter and debris and inspect for sediment, oil and grease accumulation; six monthly Change the filter media; as recommended by manufacturer Remove sediment, oil, grease and floatables; as necessary – indicated by system inspections or immediately following significant spill	Replace malfunctioning parts or structures; as required	Inspect for evidence of poor operation; six monthly Inspect filter media and establish appropriate replacement frequencies; six monthly Inspect sediment accumulation rates and establish appropriate removal frequencies; monthly during the first half year of operation, then every six months

Table 4.4. Drainage Maintenance Strategy

APPENDIX 1
SITE LOCATION PLAN



Notes

1. THIS DRAWING IS NOT TO BE SCALED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL, STRUCTURAL AND M&E DRAWINGS.
3. THIS IS NOT AN INSTALLATION DRAWING NOR A CO-ORDINATION DRAWING.
4. INDICATIVE BELOW GROUND DRAINAGE STRATEGY SUBJECT TO FURTHER DESIGN DEVELOPMENT AND COORDINATION.
5. THIS DRAWING IS BASED
   - NBBJ DRAWING LBBSP-NBBJ-ZZ-XX-DR-A-511010, REVISION P1, DATED 19.08.2021.
   - NBBJ SITE PLAN RECEIVED ON MAY 2021.

KEY:

SITE BOUNDARY

Rev	Description	Date	By	Chk	App
P02	ISSUED FOR PLANNING	09.09 2021	AT	LF	LS
P01	ISSUED FOR PLANNING	25.08 2021	MES	LF	LS

PLANNING

BEGBROOKE SCIENCE PARK SURFACE CAR PARK

RAMBOLL

tel 020 7631 5291 london@ramboll.co.uk
www.ramboll.co.uk

CAR PARK LOCATION PLAN

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	1:1000	MES	AUG 2021

Drawing No: BBSP-RAMB-CP-XX-DR-C-000010

Rev: P02

09/09/2021 14:35:27

APPENDIX 2
GROUND INVESTIGATION REPORT

GROUND ENGINEERING LIMITED

Newark Road
Peterborough
PE1 5UA
Tel: 01733 566566
admin@groundengineering.co.uk

PHASE 2 SITE INVESTIGATION REPORT

ZONES B & C

BEGBROKE SCIENCE PARK

BEGBROKE HILL

WOODSTOCK ROAD

KIDLINGTON

Report Reference No. C15387

On behalf of:-

Oxford University Development
University Offices
Wellington Square
Oxford
OX1 2JD

August 2021

conditions. Based on this, a CBR design value of 2.5% is therefore considered appropriate for this localised clay within Zone C.

Proof rolling of the formation layer should be carried out prior to construction and any topsoil, soft or loosely compacted material should be removed and replaced with a well graded hardcore or lean mix concrete.

Drainage

The soil infiltration rates determined from the three sets of three BRE 365 soakaway tests undertaken in TP3, TP4 and TP7 at 2.00m depth within the coarse-grained Summertown-Radley Sand and Gravel Member were between $1.16x10^{-4}$m/s and $1.62x10^{-5}$m/s. The quickest infiltration rate was determined from the first filling in TP7 (Zone C) and the slowest rate was determined from the third test filling in TP3 (Zone B). The infiltration rates are considered to be representative of the coarse-grained Summertown-Radley Sand and Gravel Member and consistent with the sieve test results obtained, and indicate a good drainage potential based on Figure 6 of BS8004:1986.

Based on these findings it is considered that traditional soakaways may be installed. For any proposed soakaway drainage, chambers should be designed with sufficient storage capacity and surface area to cope with storm events. The groundwater level, measured at approximately 3.30m depth during the return visits, would limit the depth of soakaways. The underlying Kellaways Clay Member, met at its shallowest at 4.30m depth, is typically practically impervious.

Any proposed soakaway chambers should incorporate silt and leaf traps to ensure the infiltration rates do not deteriorate with time. Soakaways should be positioned at least 5m distance from buildings due to the potential for removal of fines and undermining foundations within the coarse-grained soils, particularly within the deep, rubbly made ground (met in the infilled former reservoir in Zone B). Drainage design should be undertaken by a specialist.

It is recommended that unless already completed, a CCTV survey of the existing drainage system, including any sewers, should be undertaken to determine their locations, depths, state of repair and as to whether they can be used or augmented for the proposed redevelopment.

Buried Concrete

Sulphate analysis of the soil and water samples tested (undertaken as part of both geotechnical and chemical laboratory testing) gave results in Design Sulphate Classes DS-1 and DS-2 of the BRE Special Digest 1, Table C2 (2005) presented in Appendix 5. The DS-2 results were obtained from samples of Kellaways Clay and Forest Marble Formation clay. The pH results were between 6.8 and 10.2, and so acidic to alkaline.

The Kellaways Clay contained rare gravel size pyrite nodules/pyritised fossil wood. It should be noted that the use of piled foundations would minimise disturbance of the ground and consequently reduce the potential for the oxidation of any pyritic clay, but re-use of pile arisings could enhance the potential for oxidation of any disturbed pyritic clay. Pile arisings should therefore not be re-used for fill in contact with buried concrete.

Using the sulphate and pH results obtained within the made ground and Summertown-Radley Sand and Gravel Member, an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1 would be considered appropriate for buried concrete/mass footings in contact with these soils**.**

An ACEC class of AC-2 would be required for concrete in deepened/piled foundations, where in contact with the underlying solid geology clays.

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Begbroke Science Park, Kidlington
Project No:C15387
Date of Test :16/06/2021
Sheet No: 1/3

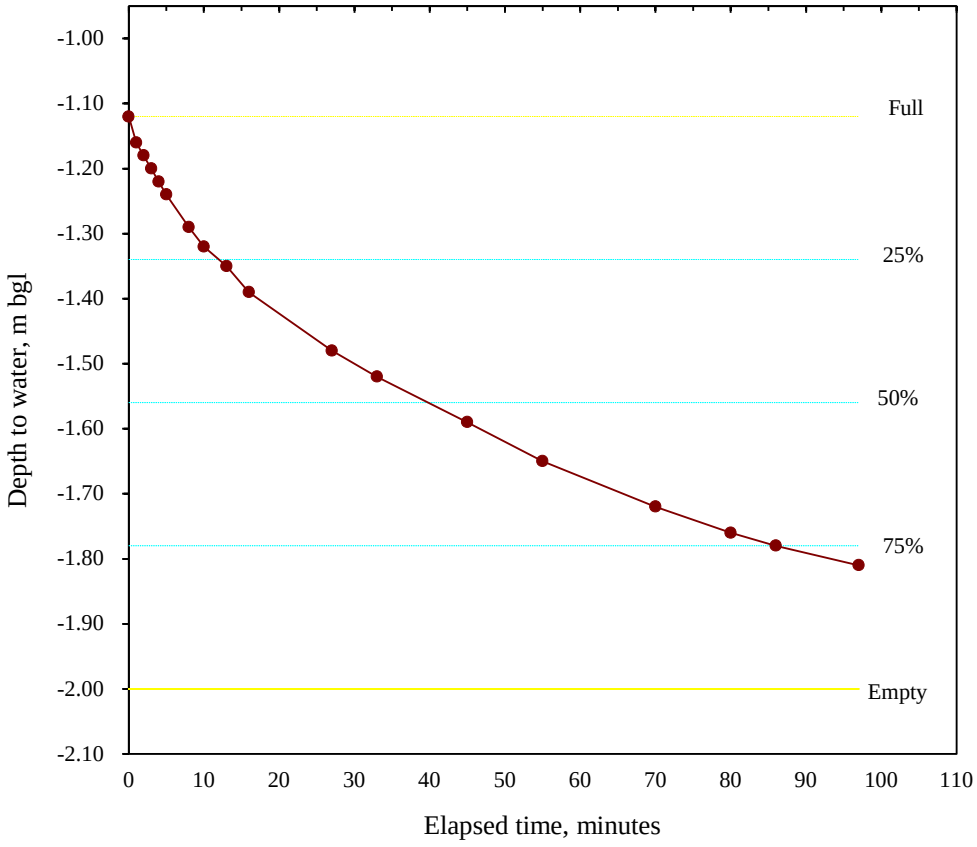
Trial Pit: TP3 (FIRST FILLING)
Depth: 2.00
Length: 2.20
Width: 0.60

Description of Stratum under test: Brown and yellow brown, slightly silty, gravelly SAND

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0.00	1.12
1.00	1.16
2.00	1.18
3.00	1.20
4.00	1.22
5.00	1.24
8.00	1.29
10.00	1.32
13.00	1.35
16.00	1.39
27.00	1.48
33.00	1.52
45.00	1.59
55.00	1.65
70.00	1.72
80.00	1.76
86.00	1.78
97.00	1.81

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.58
A50 = 3.78
T75-T25 = 74

Soil Infiltration Rate **f = 3.46E-05 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Begbroke Science Park, Kidlington
Project No:C15387
Date of Test :16/06/2021
Sheet No: 2/3

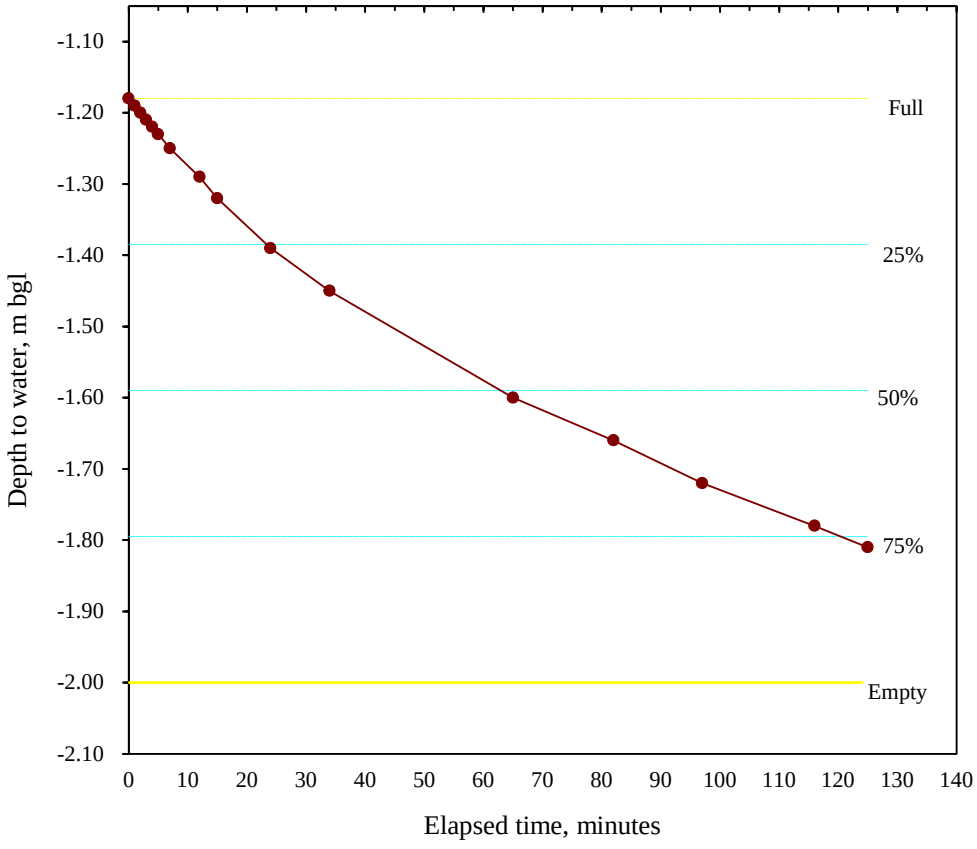
Trial Pit: TP3 (SECOND FILLING)
Depth: 2.00
Length: 2.20
Width: 0.60

Description of Stratum under test: Brown and yellow brown, slightly silty, gravelly SAND

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0.00	1.18
1.00	1.19
2.00	1.20
3.00	1.21
4.00	1.22
5.00	1.23
7.00	1.25
12.00	1.29
15.00	1.32
24.00	1.39
34.00	1.45
65.00	1.60
82.00	1.66
97.00	1.72
116.00	1.78
125.00	1.81

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.54
A50 = 3.62
T75-T25 = 96

Soil Infiltration Rate **f = 2.60E-05 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

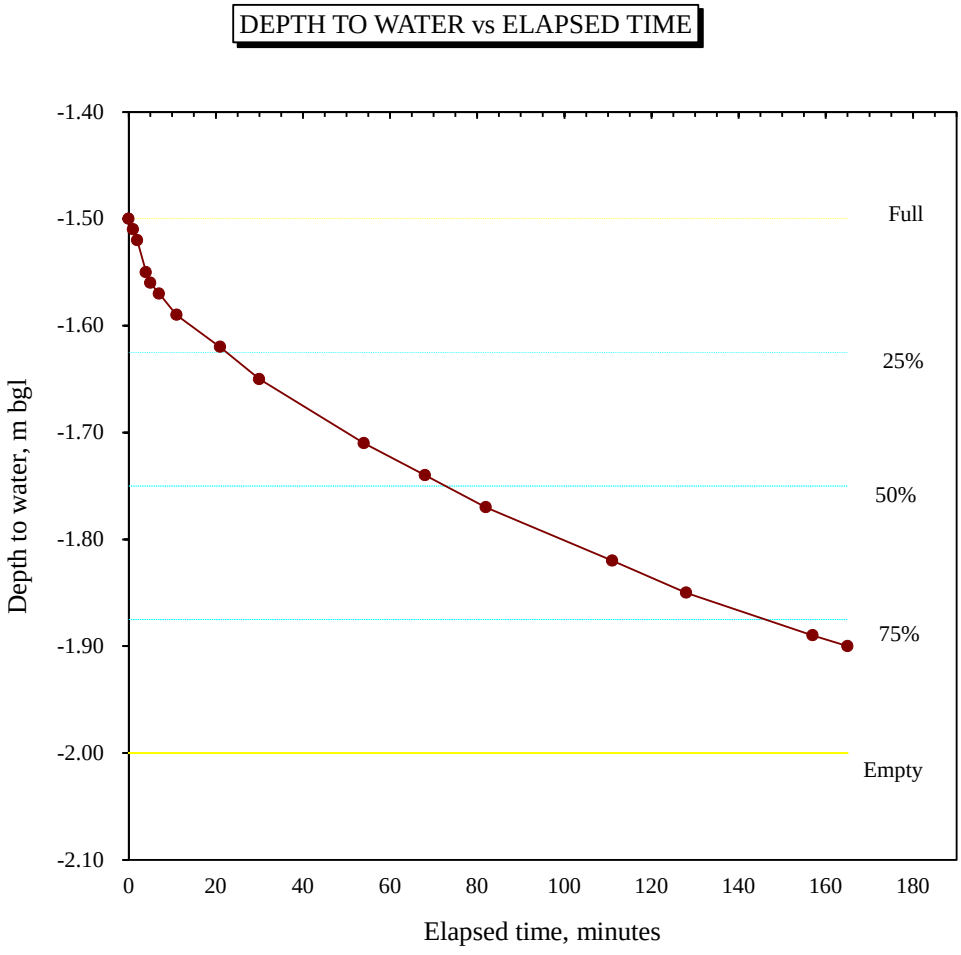
Project: Begbroke Science Park, Kidlington
Project No:C15387
Date of Test :16/06/2021
Sheet No: 3/3

Trial Pit: TP3 (THIRD FILLING)
Depth: 2.00
Length: 2.20
Width: 0.60

Description of Stratum under test: Brown and yellow brown, slightly silty, gravelly SAND

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0.00	1.50
1.00	1.51
2.00	1.52
4.00	1.55
5.00	1.56
7.00	1.57
11.00	1.59
21.00	1.62
30.00	1.65
54.00	1.71
68.00	1.74
82.00	1.77
111.00	1.82
128.00	1.85
157.00	1.89
165.00	1.90



All dimensions given in metres

f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.33
A50 = 2.72
T75-T25 = 125

Soil Infiltration Rate **f = 1.62E-05 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

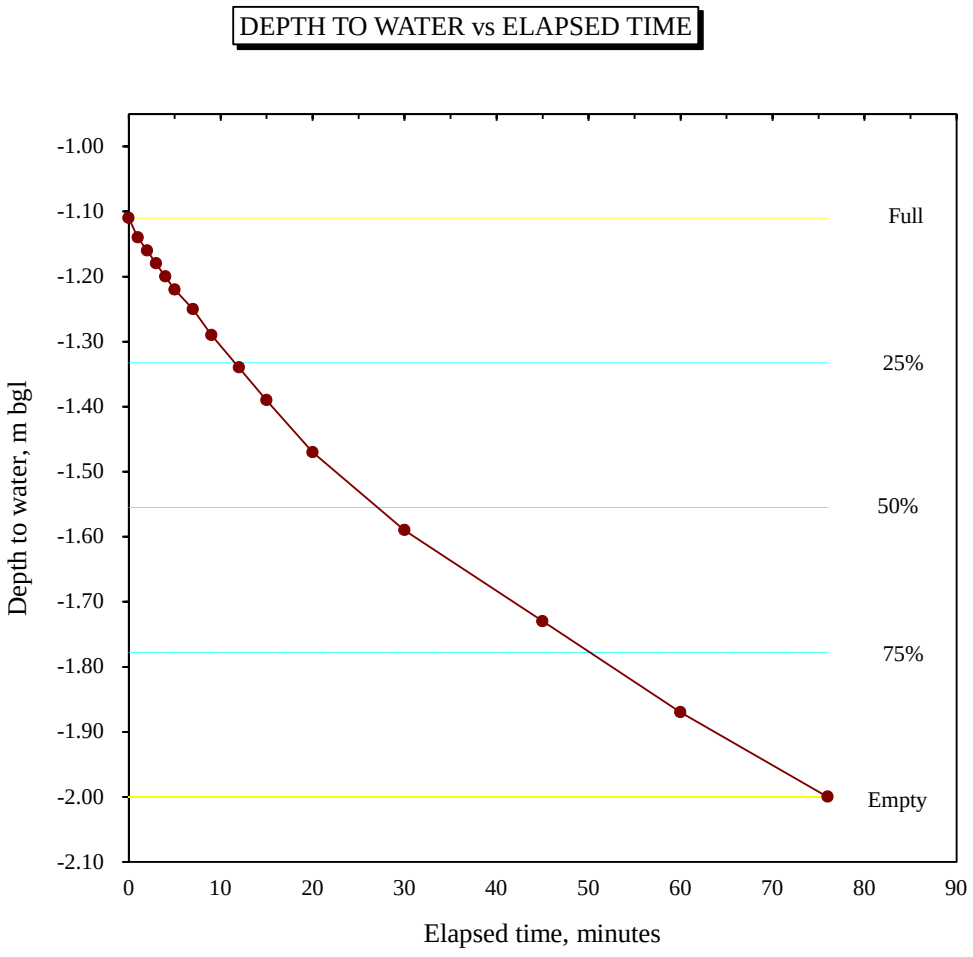
Project: Begbroke Science Park, Kidlington — Project No:C15387
Date of Test :16/06/2021 — Sheet No: 1/3

Trial Pit: TP4 (FIRST FILLING)
Depth: 2.00
Length: 1.70
Width: 0.60

Description of Stratum under test: Light brown, slightly silty SAND AND GRAVEL.

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0.00	1.11
1.00	1.14
2.00	1.16
3.00	1.18
4.00	1.20
5.00	1.22
7.00	1.25
9.00	1.29
12.00	1.34
15.00	1.39
20.00	1.47
30.00	1.59
45.00	1.73
60.00	1.87
76.00	2.00



All dimensions given in metres

f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.45
A50 = 3.07
T75-T25 = 44

Soil Infiltration Rate **f = 5.61E-05 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Begbroke Science Park, Kidlington
Project No:C15387
Date of Test :16/06/2021
Sheet No: 2/3

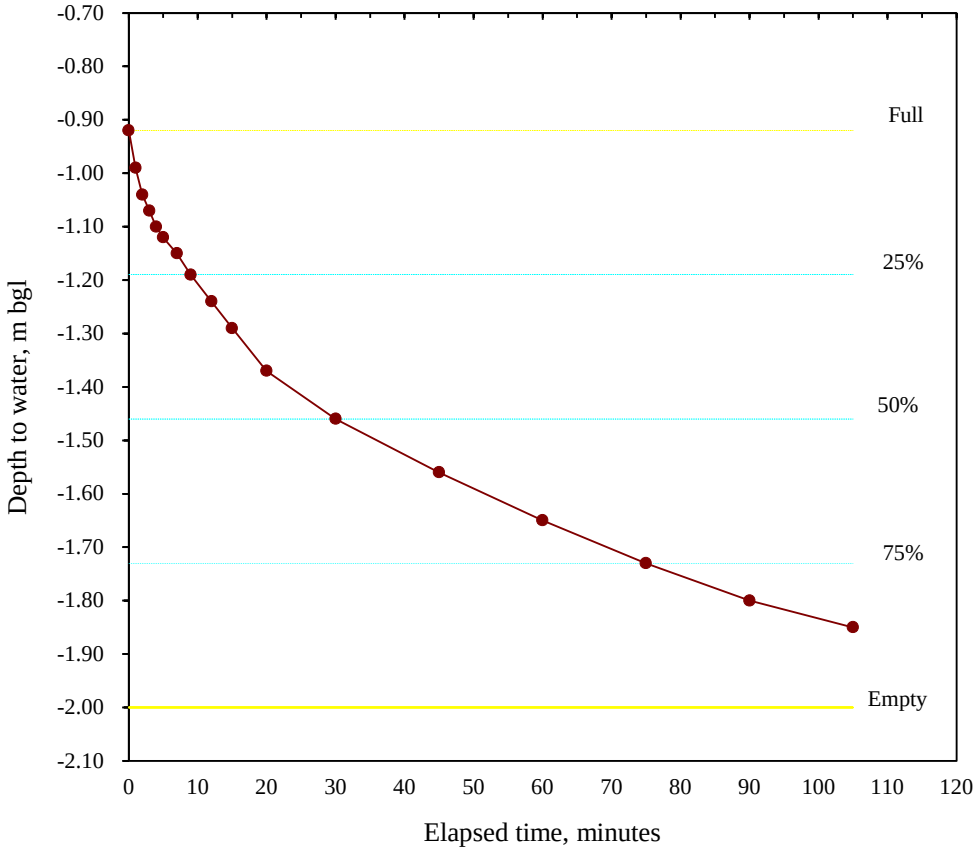
Trial Pit: TP4 (SECOND FILLING)
Depth: 2.00
Length: 1.70
Width: 0.60

Description of Stratum under test: Light brown, slightly silty SAND AND GRAVEL.

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0.00	0.92
1.00	0.99
2.00	1.04
3.00	1.07
4.00	1.10
5.00	1.12
7.00	1.15
9.00	1.19
12.00	1.24
15.00	1.29
20.00	1.37
30.00	1.46
45.00	1.56
60.00	1.65
75.00	1.73
90.00	1.80
105.00	1.85

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.55
A50 = 3.50
T75-T25 = 66

Soil Infiltration Rate **f = 3.97E-05 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Begbroke Science Park, Kidlington
Project No:C15387
Date of Test :16/06/2021
Sheet No: 3/3

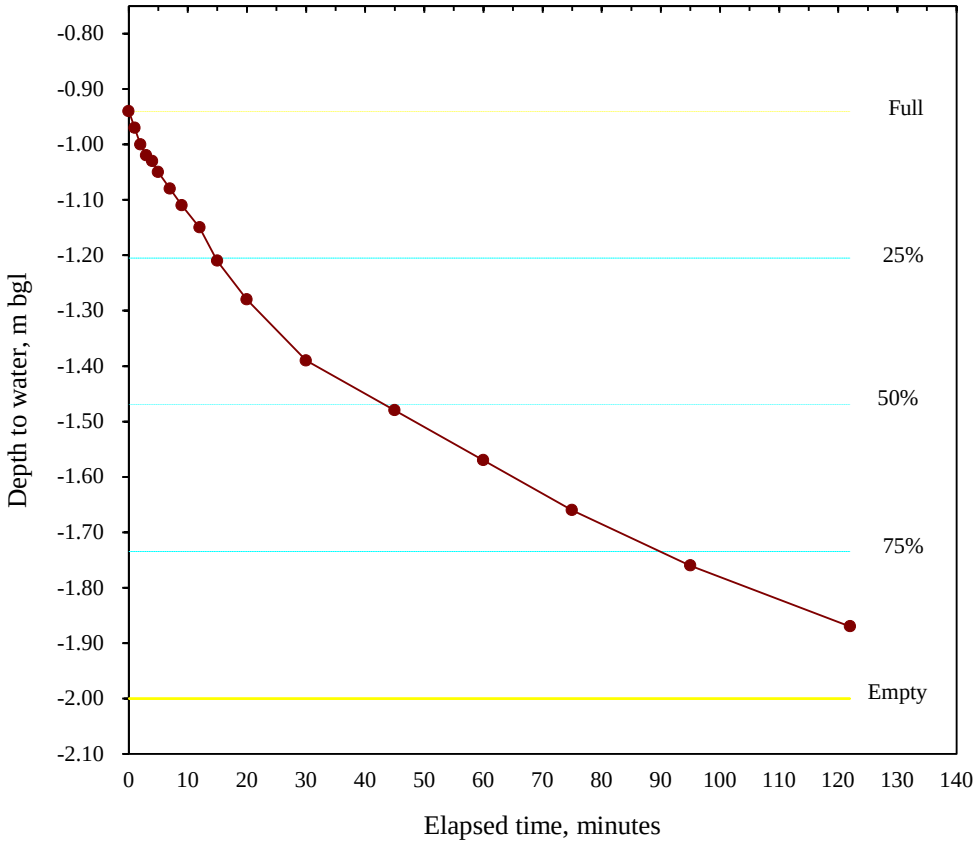
Trial Pit: TP4 (THIRD FILLING)
Depth: 2.00
Length: 1.70
Width: 0.60

Description of Stratum under test: Light brown, slightly silty SAND AND GRAVEL.

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0.00	0.94
1.00	0.97
2.00	1.00
3.00	1.02
4.00	1.03
5.00	1.05
7.00	1.08
9.00	1.11
12.00	1.15
15.00	1.21
20.00	1.28
30.00	1.39
45.00	1.48
60.00	1.57
75.00	1.66
95.00	1.76
122.00	1.87

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.54
A50 = 3.46
T75-T25 = 75

Soil Infiltration Rate **f = 3.47E-05 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Begbroke Science Park, Kidlington
Project No:C15387
Date of Test :16/06/2021
Sheet No: 1/3

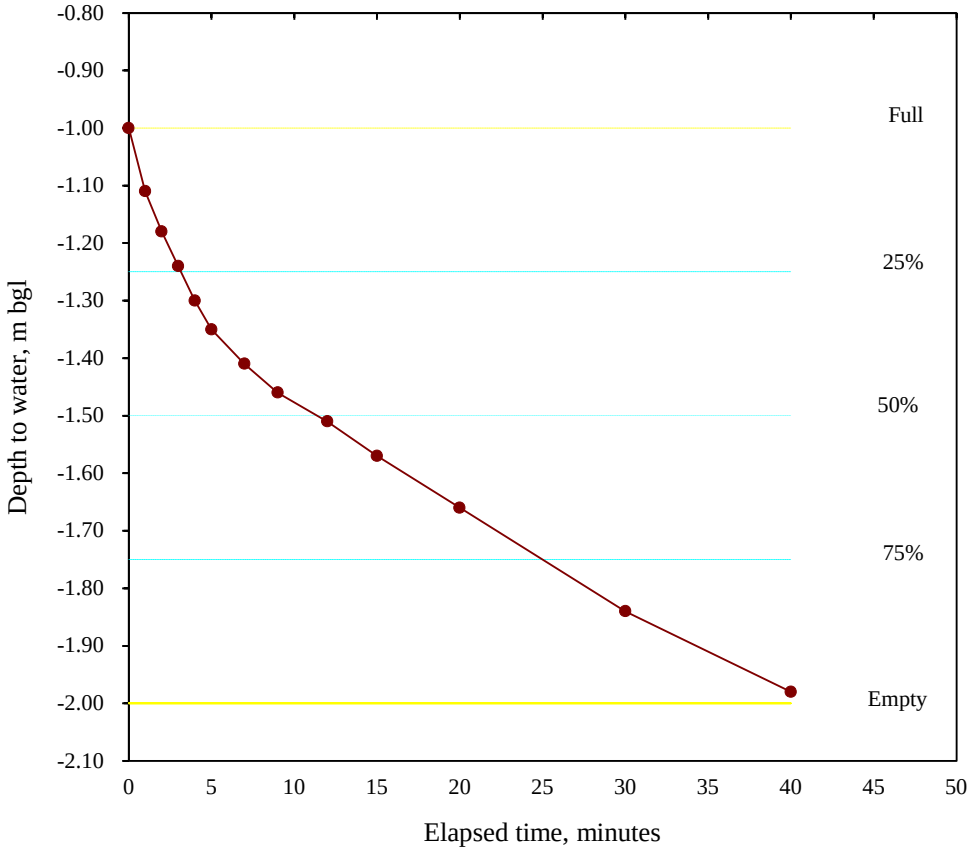
Trial Pit: TP7 (FIRST FILLING)
Depth: 2.00
Length: 1.70
Width: 0.60

Description of Stratum under test: Brown and Yellow Brown, slightly silty SAND AND GRAVEL

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0.00	1.00
1.00	1.11
2.00	1.18
3.00	1.24
4.00	1.30
5.00	1.35
7.00	1.41
9.00	1.46
12.00	1.51
15.00	1.57
20.00	1.66
30.00	1.84
40.00	1.98

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.51
A50 = 3.32
T75-T25 = 22

Soil Infiltration Rate **f = 1.16E-04 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

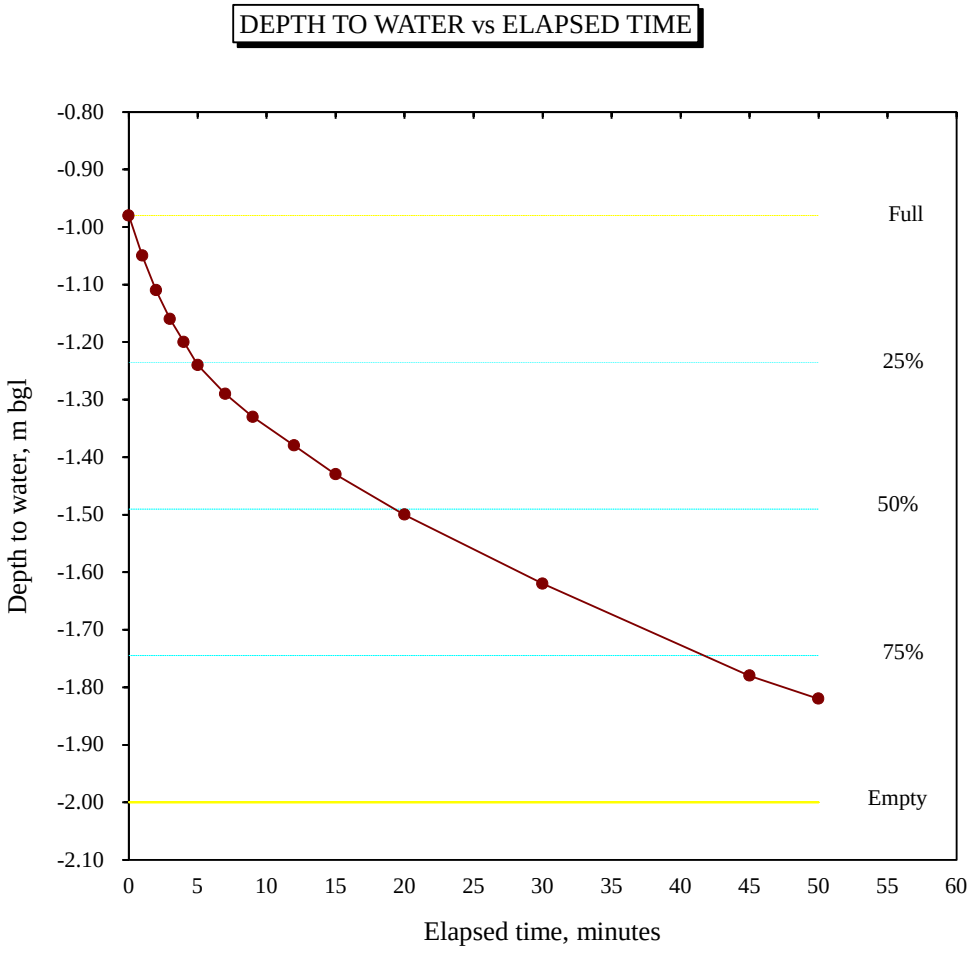
Project: Begbroke Science Park, Kidlington — Project No:C15387
Date of Test :16/06/2021 — Sheet No: 2/3

Trial Pit: TP7 (SECOND FILLING)
Depth: 2.00
Length: 1.70
Width: 0.60

Description of Stratum under test: Brown and Yellow Brown, slightly silty SAND AND GRAVEL

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0.00	0.98
1.00	1.05
2.00	1.11
3.00	1.16
4.00	1.20
5.00	1.24
7.00	1.29
9.00	1.33
12.00	1.38
15.00	1.43
20.00	1.50
30.00	1.62
45.00	1.78
50.00	1.82



All dimensions given in metres

f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.52
A50 = 3.37
T75-T25 = 36

Soil Infiltration Rate **f = 7.15E-05 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Begbroke Science Park, Kidlington
Project No:C15387
Date of Test :16/06/2021
Sheet No: 3/3

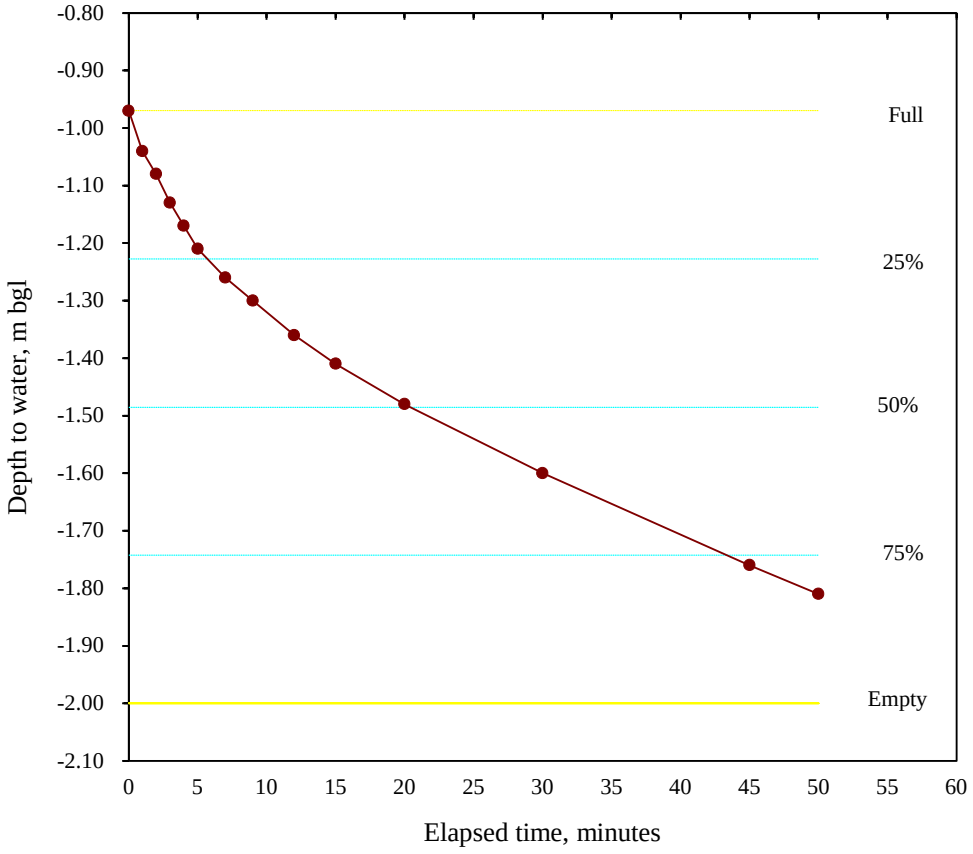
Trial Pit: TP7 (THIRD FILLING)
Depth: 2.00
Length: 1.70
Width: 0.60

Description of Stratum under test: Brown and Yellow Brown, slightly silty SAND AND GRAVEL

Depth to water prior to test: Dry
(below ground level)

Elapsed Time min	Depth to Water m
0.00	0.97
1.00	1.04
2.00	1.08
3.00	1.13
4.00	1.17
5.00	1.21
7.00	1.26
9.00	1.30
12.00	1.36
15.00	1.41
20.00	1.48
30.00	1.60
45.00	1.76
50.00	1.81

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

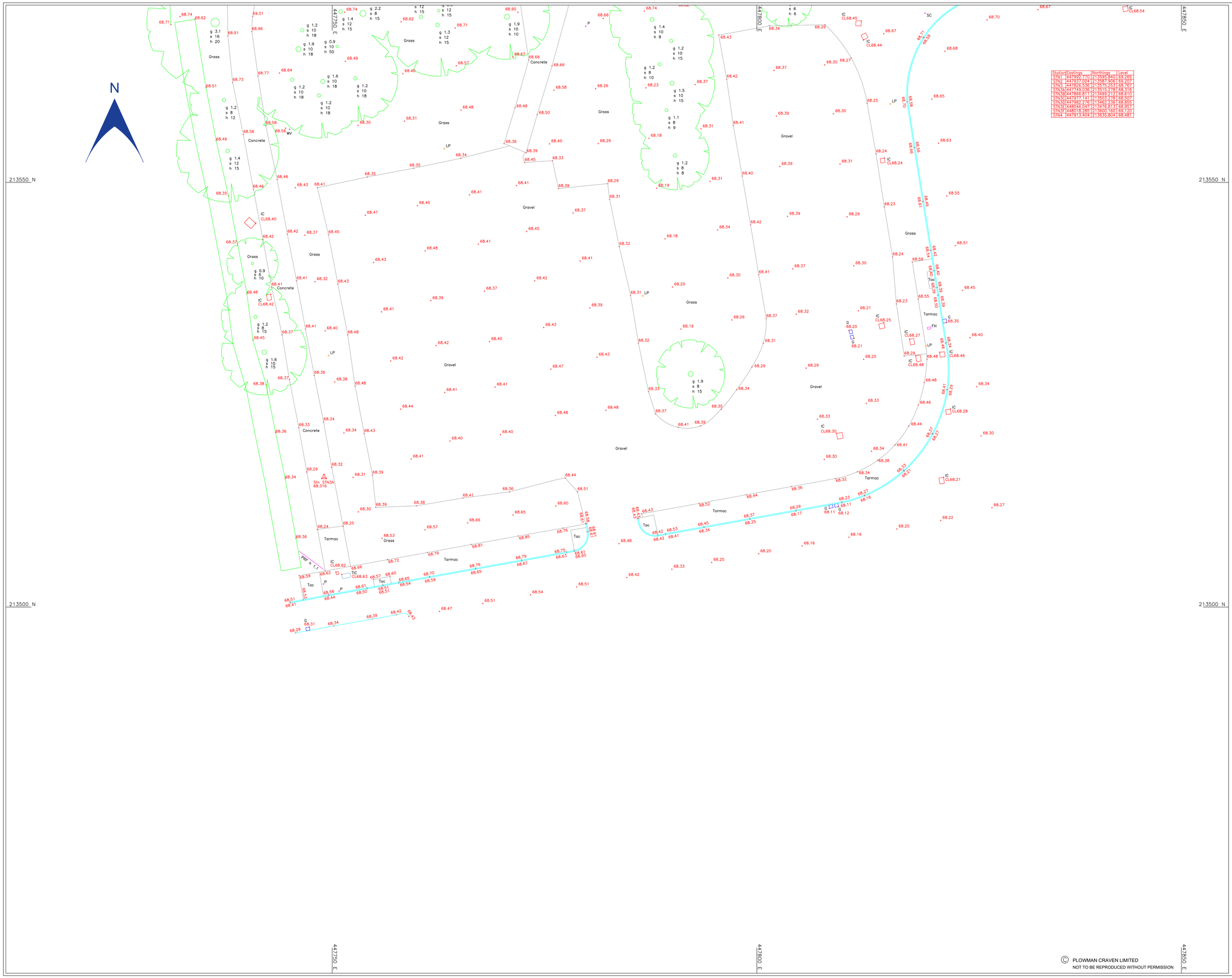
f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.53
A50 = 3.39
T75-T25 = 38

Soil Infiltration Rate **f = 6.80E-05 m/s**

Ground Engineering, Peterborough

APPENDIX 3
TOPOGRAPHICAL SURVEY



STANDARD ABBREVIATIONS

A/C	Air Conditioner	LB	Litter Bin
ATM	Automated Telling Machine	LP	Lamp Post
B	Bollard	Max	Maximum
BB	Bellaha Beacon	Mb	Multibole
Bh	Borehole	MH	Manhole
Br	Brick	Min	Minimum
BrS	Brick Setts	Mkr	Marker
BRW	Brick Retaining Wall	NB	Notice Board
BS	Bus Stop	NP	Name Plate
BT	British Telecom	OBF	Open Boarded Fence
BW	Brick Wall	OH	Overhead
BWF	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
CBF	Close Boarded Fence	P	Post
CCTV	Closed Circuit Television	PB	Pillar Box
CIF	Corrugated Iron Fence	PGM	Permanent Ground Marker
CL	Cover Level	PL1	Pavement Light
CLF	Chain Link Fence	PM	Parking Meter
Col	Column	PRF	Post and Rail Fence
Conc	Concrete	PS	Paving Stones
CoW	Cable on Wall	PWF	Post and Wire Fence
CPS	Concrete Paving Slabs	RE	Rodding Eye
CTV	Cable Television IC	RG	Road Gully
d	depth	RS	Road Sign
DC	Duct Cover	RSJ	Rolled Steel Joist
DH	Duct Height	RWP	Rain Water Pipe
DP	Down Pipe	s	spread
DrC	Drainage Channel	SB	Sign Board
EIC	Electrical Inspection Cover	SBM	Site Bench Mark
EJB	Electrical Junction Box	SC	Stop Cock
EP	Electricity Pole	SF	Security Fence
ER	Earthing Rod	SNB	Shrub Bed
ESG	Electrical Switchgear	SL	Sump Level
FB	Flower Bed	SO	Smoke Outlet
FH	Fire Hydrant	SP	Sign Post
FL	Floor Level	SV	Stop Valve
Flt	Floodlight	T	Telephone
g	girth	Tac	Tactile Paving
G	Gully	TBM	Temporary Bench Mark
GC	Gas Cock	TCB	Telephone Call Box
GM	Gas Meter	TCP	Traffic Control Post
GP	Gate Post	TIC	Telephone Inspection Cover
GV	Gas Valve	TJB	Telephone Junction Box
h	height	TL	Traffic Light
HR	Handrail	TLCB	Traffic Light Control Box
IB	Illuminated Bollard	TLIC	Traffic Light Inspection Cover
IC	Inspection Cover	TP	Telephone Pole
IL	Invert Level	Typ	Typical
IRF	Iron Railing Fence	V	Vent
IRS	Illuminated Road Sign	VP	Vent Pipe
JB	Junction Box	W	Window
KO	Kerb Outlet	WM	Water Meter
L	Light	WV	Water Valve

LEGEND

Stair/Step arrows point up

Bank

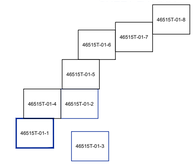
Assumed detail

Due to the inherent instability of paper materials, drawings plotted on paper may be stretched and distorted - dimensions scaled from paper plots should therefore be treated with caution

This drawing has been produced for the purpose of the original commissioning agent. Plowman Craven Limited will accept no responsibility for details that are subsequently found to be the consequence of undisclosed facts or that were obscured from view at the time of survey or that have been altered since the survey.

See www.plowmancraven.co.uk for full terms and conditions of contract.

SHEET LAYOUT



ISSUES & REVISIONS

Issue	Details	By	Date
A	Original Issue	PCL	29/04/21
B	Area 3 added	PCL	03/06/21
C	Area 4 and Footpath added	PCL	11/08/21

This survey is commensurate with band F accuracy, as outlined in the RICS survey detail accuracy banding table

All levels are in metres and are above Ordnance Survey Newlyn Datum derived by multiple network RTK GPS observations

The survey grid shown on this drawing is positioned on Ordnance Survey (OS) National Grid, obtained by multiple network RTK GPS observations

Unless otherwise stated, levels have been taken to finished floor surface

All quoted dimensions are in metres

Drawing units are metres

CLIENT

Buro Four

1 Naoroji Street
London
WC1X 0GB

PROJECT TITLE

Begbroke Campus

Yarnton OX5 1PF

3D Topographical Survey

PRESENTATION SCALE 1:200 @ A1

DATE OF ORIGINAL SURVEY April 2021

PC PROJECT No. 46515 CHECKED GH

DRAWING No. 46515T-01-1 ISSUE C

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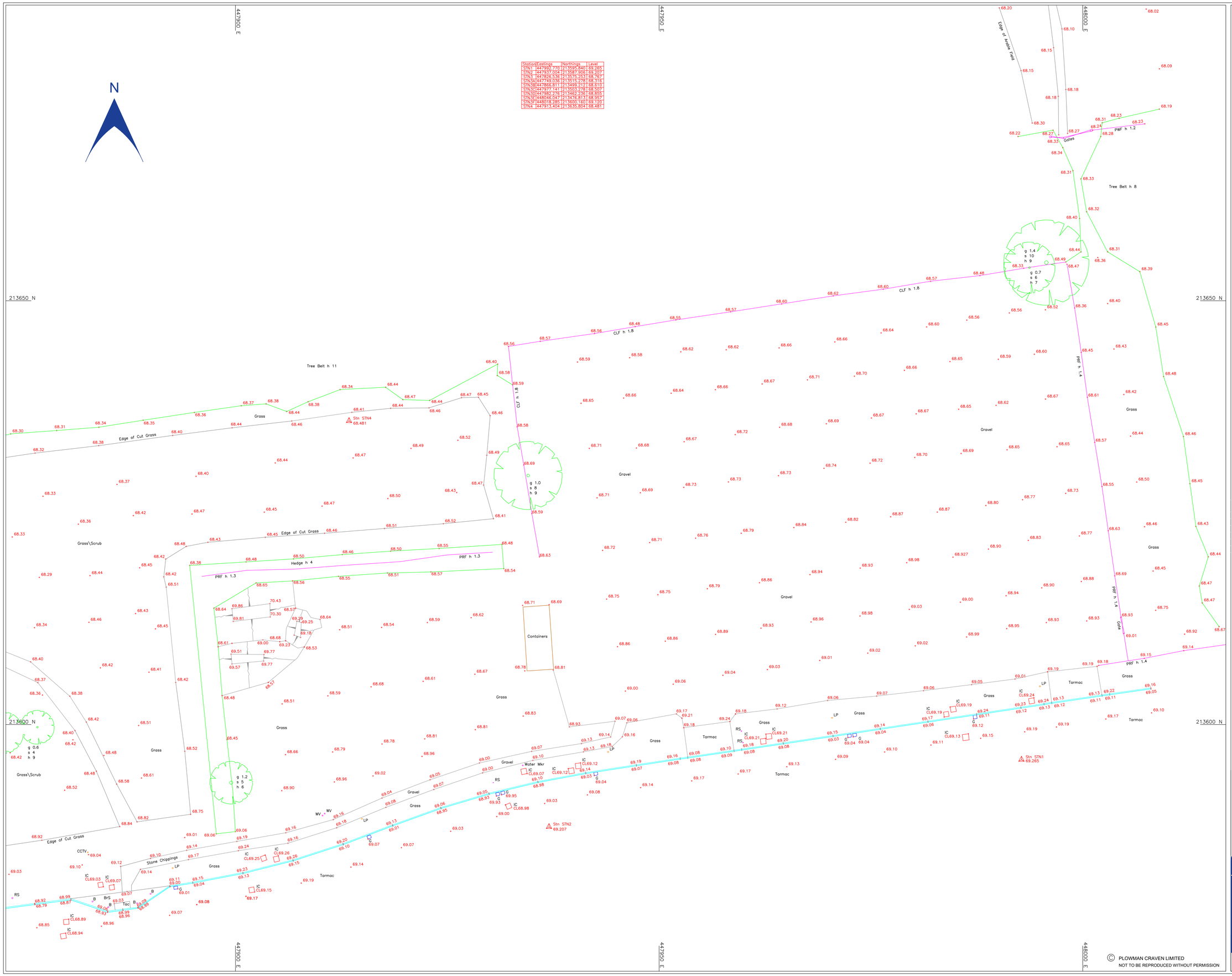

Station	Eastings	Northings	Level
STN1	447902.770	213650.940	69.265
STN2	447837.004	213587.905	69.207
STN3	447826.536	213575.253	68.767
STN3B	447749.036	213515.276	68.316
STN3B	447866.811	213499.212	68.610
STN3C	447977.141	213503.278	68.507
STN3D	447982.276	213462.236	68.855
STN3E	448048.047	213476.813	68.957
STN3F	448018.285	213600.160	69.120
STN4	447915.404	213635.804	68.481

STANDARD ABBREVIATIONS

A/C	Air Conditioner	LB	Litter Bin
ATM	Automated Telling Machine	LP	Lamp Post
B	Bollard	Max	Maximum
BB	Bellaha Beacon	Mb	Multibole
Bh	Borehole	MH	Manhole
Br	Brick	Min	Minimum
BrS	Brick Setts	Mkr	Marker
BRW	Brick Retaining Wall	NB	Notice Board
BS	Bus Stop	NP	Name Plate
BT	British Telecom	OBF	Open Boarded Fence
BW	Brick Wall	OH	Overhead
BWF	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
CBF	Close Boarded Fence	P	Post
CCTV	Closed Circuit Television	PB	Pillar Box
CIF	Corrugated Iron Fence	PGM	Permanent Ground Marker
CL	Cover Level	PLI	Pavement Light
CLF	Chain Link Fence	PM	Parking Meter
Col	Column	PRF	Post and Rail Fence
Conc	Concrete	PS	Paving Stones
CoW	Cable on Wall	PWF	Post and Wire Fence
CPS	Concrete Paving Slabs	RE	Rodding Eye
CTV	Cable Television IC	RG	Road Gully
d	depth	RS	Road Sign
DC	Duct Cover	RSJ	Rolled Steel Joist
DH	Duct Height	RWP	Rain Water Pipe
DP	Down Pipe	s	spread
DrC	Drainage Channel	SB	Sign Board
EIC	Electrical Inspection Cover	SBM	Site Bench Mark
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EP	Electricity Pole	SF	Security Fence
ER	Earthing Rod	ShB	Shrub Bed
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FB	Flower Bed	SO	Smoke Outlet
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h	height	TL	Traffic Light
HR	Handrail	TLCB	Traffic Light Control Box
IB	Illuminated Bollard	TLIC	Traffic Light Inspection Cover
IC	Inspection Cover	TP	Telephone Pole
IL	Invert Level	Typ	Typical
IRF	Iron Railing Fence	V	Vent
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LEGEND

- Stair/Step arrows point up
- Bank
- Assumed detail

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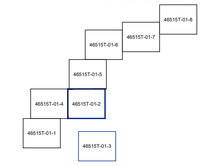

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CLIENT

Buro Four

1 Naoroji Street
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WC1X 0GB

PROJECT TITLE

Begbroke Campus

Yarnton OX5 1PF

3D Topographical Survey

PRESENTATION SCALE	1:200 @ A1
DATE OF ORIGINAL SURVEY	April 2021
PC PROJECT No. 46515	CHECKED GH
DRAWING No.	ISSUE
46515T-01-2	C

Plowman Craven

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447950 E

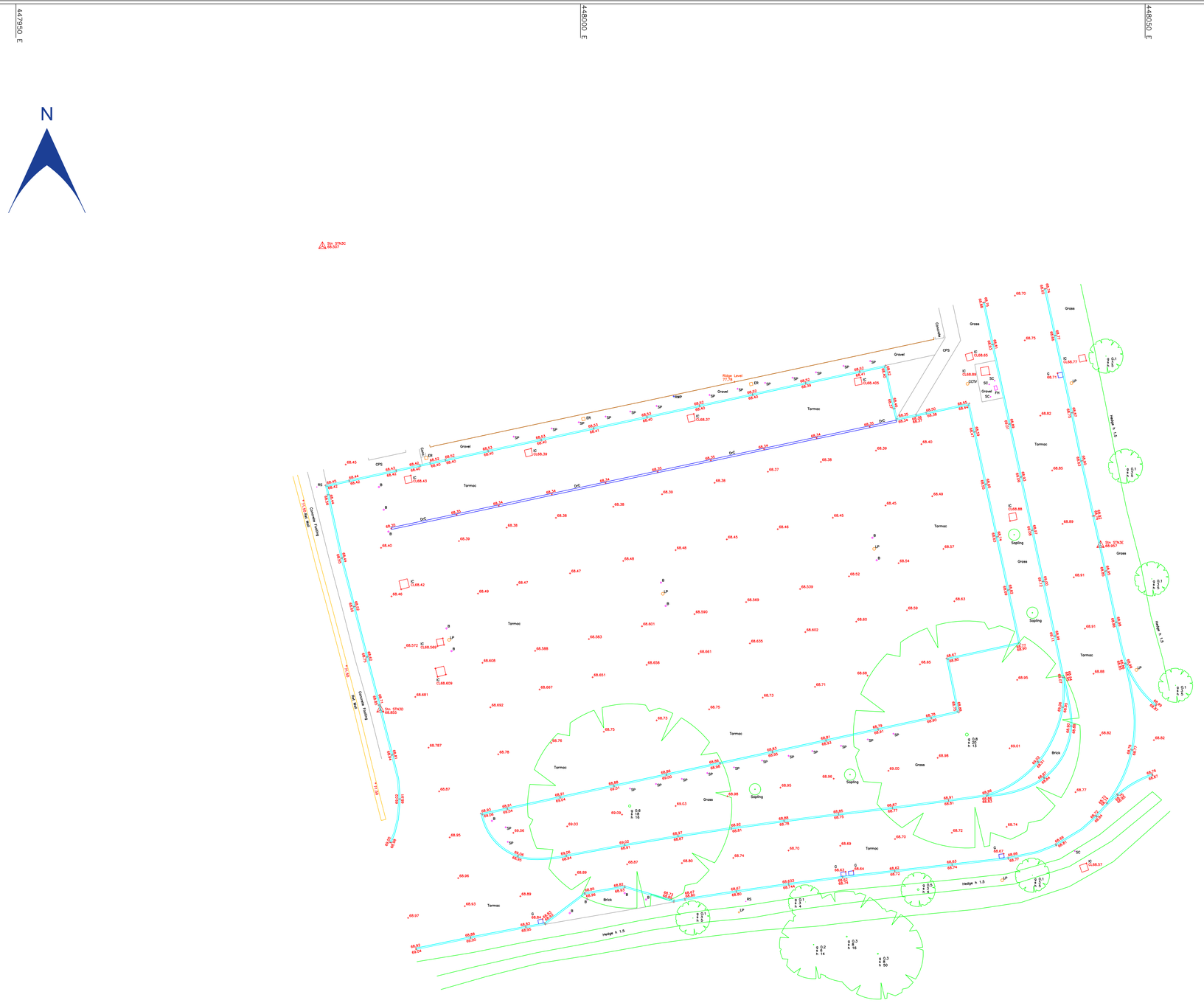
448000 E

448050 E

213500 N

213450 N

Station	Eastings	Northings	Level
STN1	447992.770	213595.640	69.265
STN2	447937.004	213587.956	69.207
STN3	447826.536	213575.253	68.767
STN3A	447749.036	213515.278	68.316
STN3B	447866.811	213499.212	68.610
STN3C	447977.141	213563.278	68.507
STN3D	447982.276	213462.236	68.855
STN3E	448048.047	213476.813	68.957
STN3F	448018.285	213600.160	69.120
STN4	447913.404	213535.804	68.481



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BWF	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
CBF	Close Boarded Fence	P	Post
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CIF	Corrugated Iron Fence	PGM	Permanent Ground Marker
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Bank

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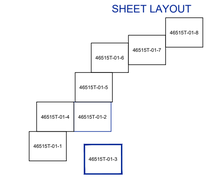

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PROJECT TITLE

Begbroke Campus

Yarnton OX5 1PF

3D Topographical Survey

PRESENTATION SCALE: 1:200 @ A1

DATE OF ORIGINAL SURVEY: April 2021

PC PROJECT No.: 46515 CHECKED: GH

DRAWING No.: 46515T-01-3 ISSUE: C

Plowman Craven

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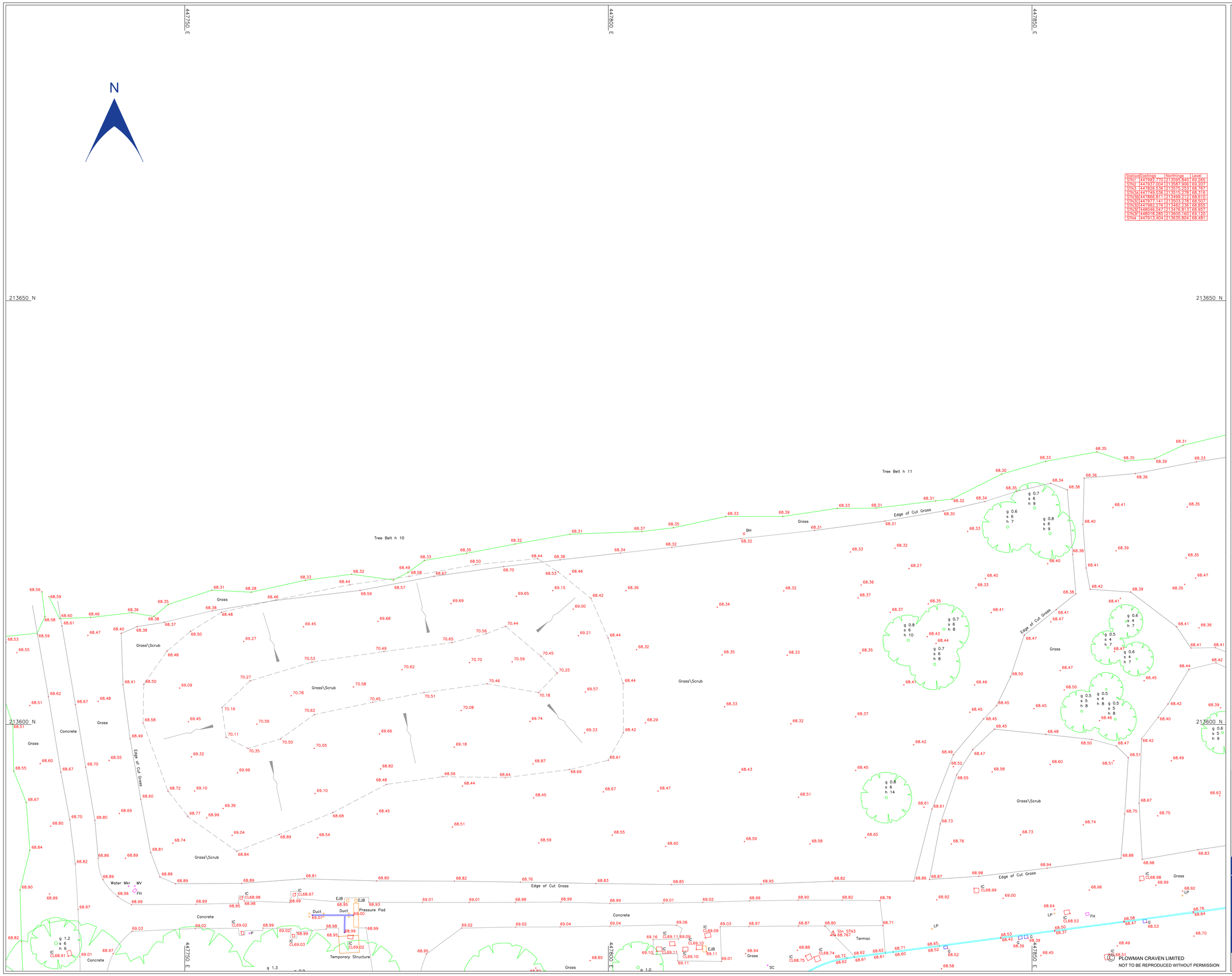

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LEGEND

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Bank

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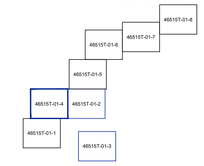

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PROJECT TITLE

Begbroke Campus

Yarnton OX5 1PF

3D Topographical Survey

PRESENTATION SCALE 1:200 @ A1

DATE OF ORIGINAL SURVEY April 2021

PC PROJECT No. 46515 CHECKED GH

DRAWING No. ISSUE

46515T-01-4 C

Plowman Craven

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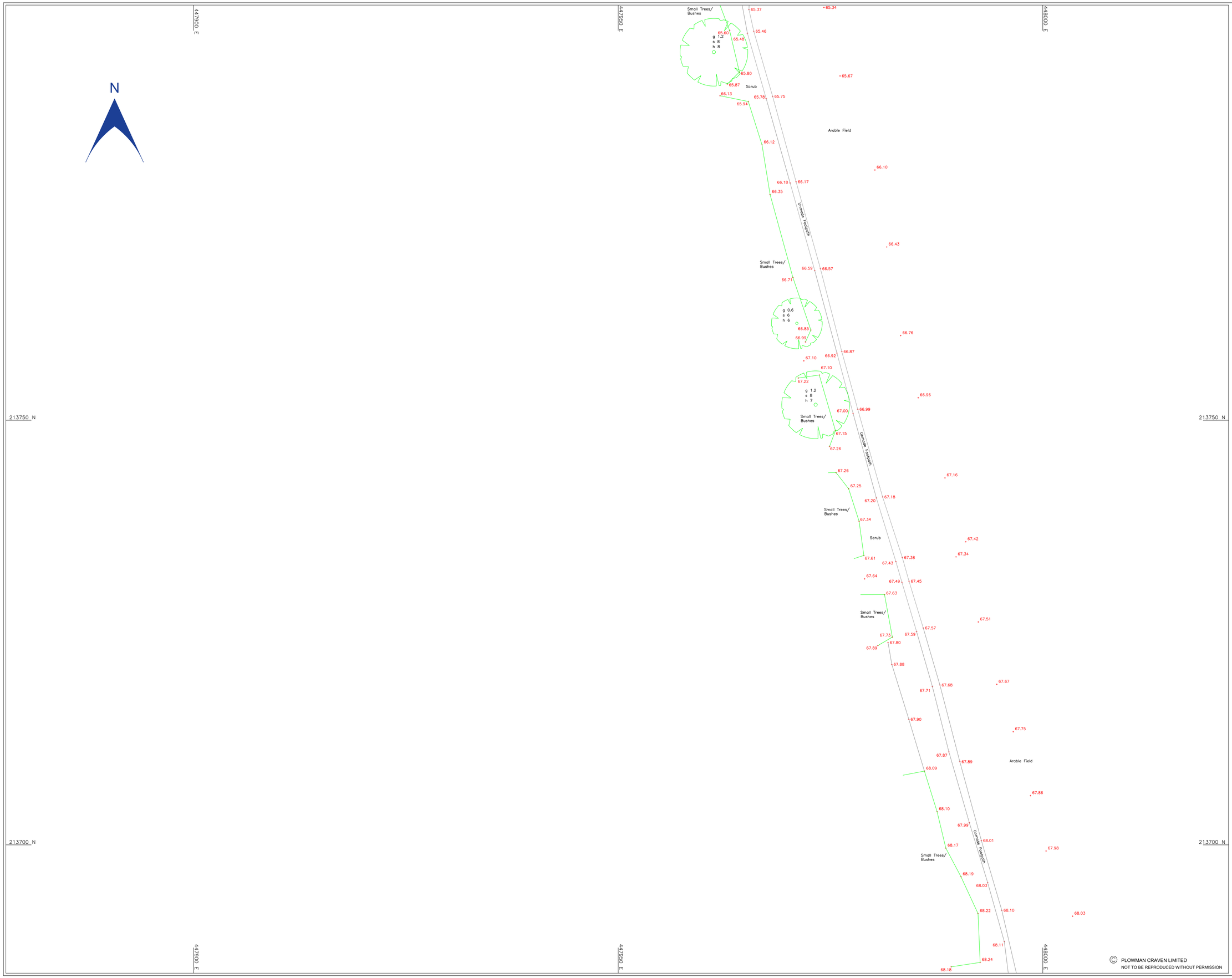

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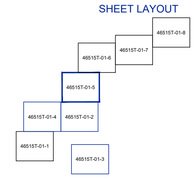

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Yarnton OX5 1PF

3D Topographical Survey

PRESENTATION SCALE 1:200 @ A1

DATE OF ORIGINAL SURVEY April 2021

PC PROJECT No. 46515 CHECKED GH

DRAWING No. 46515T-01-5 ISSUE C

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447950_E

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N

63.87

Arable Field

Arable Field

Unmade Footpath

Unmade Footpath

Small Trees/ Bushes

Post

64.00 63.98 64.15 64.14 64.17 64.21 64.26 64.18 64.33 64.23 64.36 64.33 64.39 64.35 64.39 64.39 64.41 64.55 64.48 64.51 64.58 64.51 64.59 64.56 64.65 64.59 64.64 64.73 64.68 64.74 64.75 64.74 64.75 64.88 64.79 64.80 64.91 64.97 65.02 65.05 65.07 65.13 65.27 65.25 65.24 65.33 65.30 65.45 65.39 65.33 65.31 65.36 65.39 64.95 64.97

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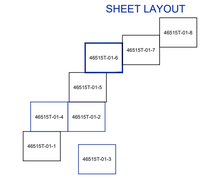

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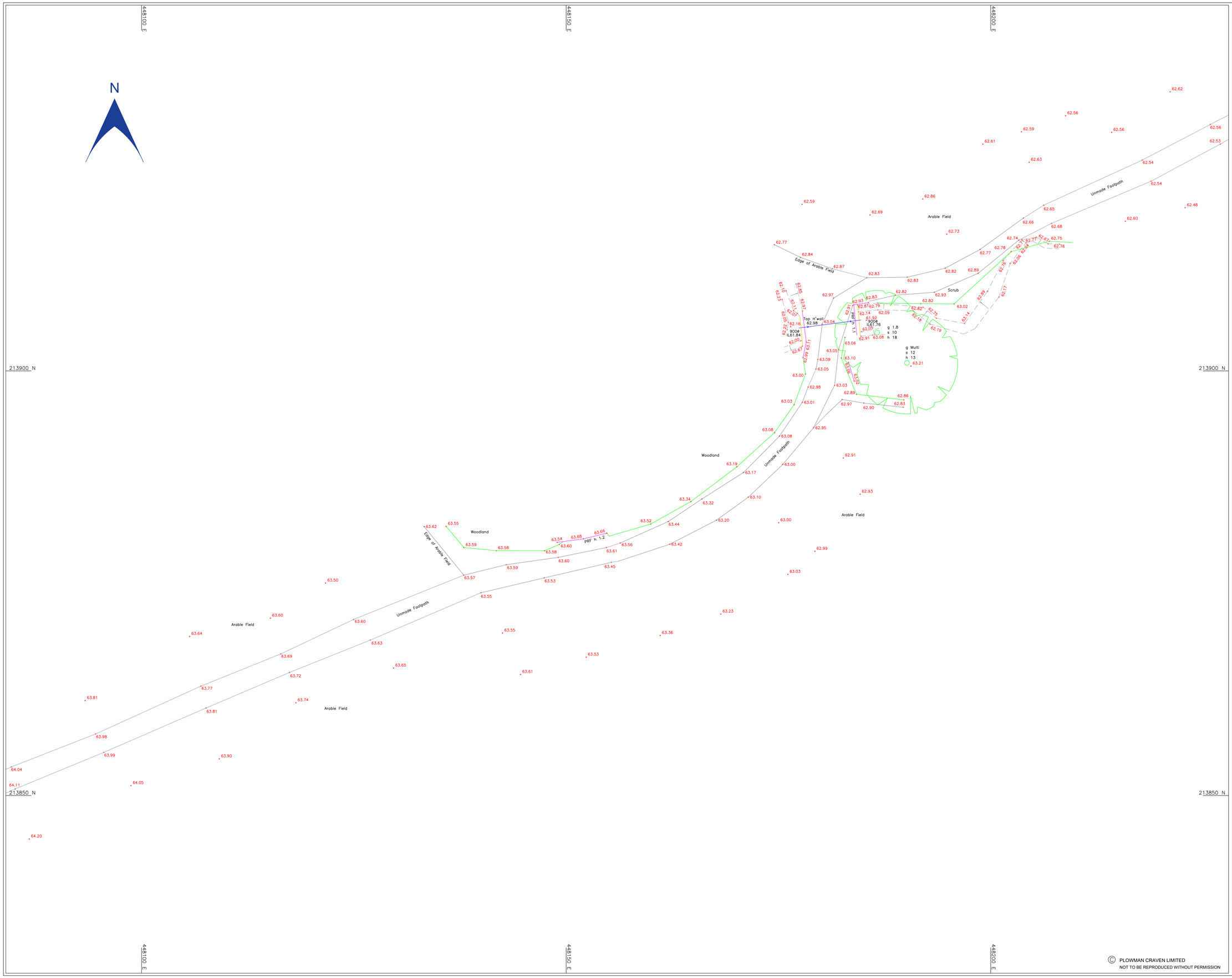

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Bh	Borehole	MH	Manhole
Br	Brick	Min	Minimum
BrS	Brick Setts	Mkr	Marker
BRW	Brick Retaining Wall	NB	Notice Board
BS	Bus Stop	NP	Name Plate
BT	British Telecom	OBF	Open Boarded Fence
BW	Brick Wall	OH	Overhead
BWF	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
CBF	Close Boarded Fence	P	Post
CCTV	Closed Circuit Television	PB	Pillar Box
CIF	Corrugated Iron Fence	PGM	Permanent Ground Marker
CL	Cover Level	PLI	Pavement Light
CLF	Chain Link Fence	PM	Parking Meter
Col	Column	PRF	Post and Rail Fence
Conc	Concrete	PS	Paving Stones
CoW	Cable on Wall	PWF	Post and Wire Fence
CPS	Concrete Paving Slabs	RE	Rodding Eye
CTV	Cable Television IC	RG	Road Gully
d	depth	RS	Road Sign
DC	Duct Cover	RSJ	Rolled Steel Joist
DH	Duct Height	RWP	Rain Water Pipe
DP	Down Pipe	s	spread
DrC	Drainage Channel	SB	Sign Board
EIC	Electrical Inspection Cover	SBM	Site Bench Mark
EJB	Electrical Junction Box	SC	Stop Cock
EP	Electricity Pole	SF	Security Fence
ER	Earthing Rod	ShB	Shrub Bed
ESG	Electrical Switchgear	SL	Sump Level
FB	Flower Bed	SO	Smoke Outlet
FH	Fire Hydrant	SP	Sign Post
FL	Floor Level	SV	Stop Valve
Flt	Floodlight	T	Telephone
g	girth	Tac	Tactile Paving
G	Gully	TBM	Temporary Bench Mark
GC	Gas Cock	TCB	Telephone Call Box
GM	Gas Meter	TCP	Traffic Control Post
GP	Gate Post	TIC	Telephone Inspection Cover
GV	Gas Valve	TJB	Telephone Junction Box
h	height	TL	Traffic Light
HR	Handrail	TLCB	Traffic Light Control Box
IB	Illuminated Bollard	TLIC	Traffic Light Inspection Cover
IC	Inspection Cover	TP	Telephone Pole
IL	Invert Level	Typ	Typical
IRF	Iron Railing Fence	V	Vent
IRS	Illuminated Road Sign	VP	Vent Pipe
JB	Junction Box	W	Window
KO	Kerb Outlet	WM	Water Meter
L	Light	WV	Water Valve

LEGEND

- Stair/Step arrows point up
- Bank
- Assumed detail

Due to the inherent instability of paper materials, drawings plotted on paper may be stretched and distorted - dimensions scaled from paper plots should therefore be treated with caution

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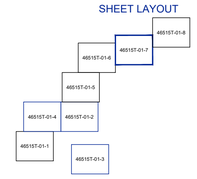
See www.plowmancraven.co.uk for full terms and conditions of contract.

SHEET LAYOUT



ISSUES & REVISIONS

Issue	Details	By	Date
A	Original Issue	PCL	29/04/21
B	Area 3 added	PCL	03/06/21
C	Area 4 and Footpath added	PCL	11/08/21

This survey is commensurate with band F accuracy, as outlined in the RICS survey detail accuracy banding table

All levels are in metres and are above Ordnance Survey Newlyn Datum derived by multiple network RTK GPS observations

The survey grid shown on this drawing is positioned on Ordnance Survey (OS) National Grid, obtained by multiple network RTK GPS observations

Unless otherwise stated, levels have been taken to finished floor surface

All quoted dimensions are in metres

Drawing units are metres

CLIENT

Buro Four

1 Naoroji Street
London
WC1X 0GB

PROJECT TITLE

Begbroke Campus

Yarnton OX5 1PF

3D Topographical Survey

PRESENTATION SCALE 1:200 @ A1

DATE OF ORIGINAL SURVEY April 2021

PC PROJECT No. 46515 CHECKED GH

DRAWING No. 46515T-01-7 ISSUE C

Plowman Craven

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Web: www.plowmancraven.co.uk

448100 E

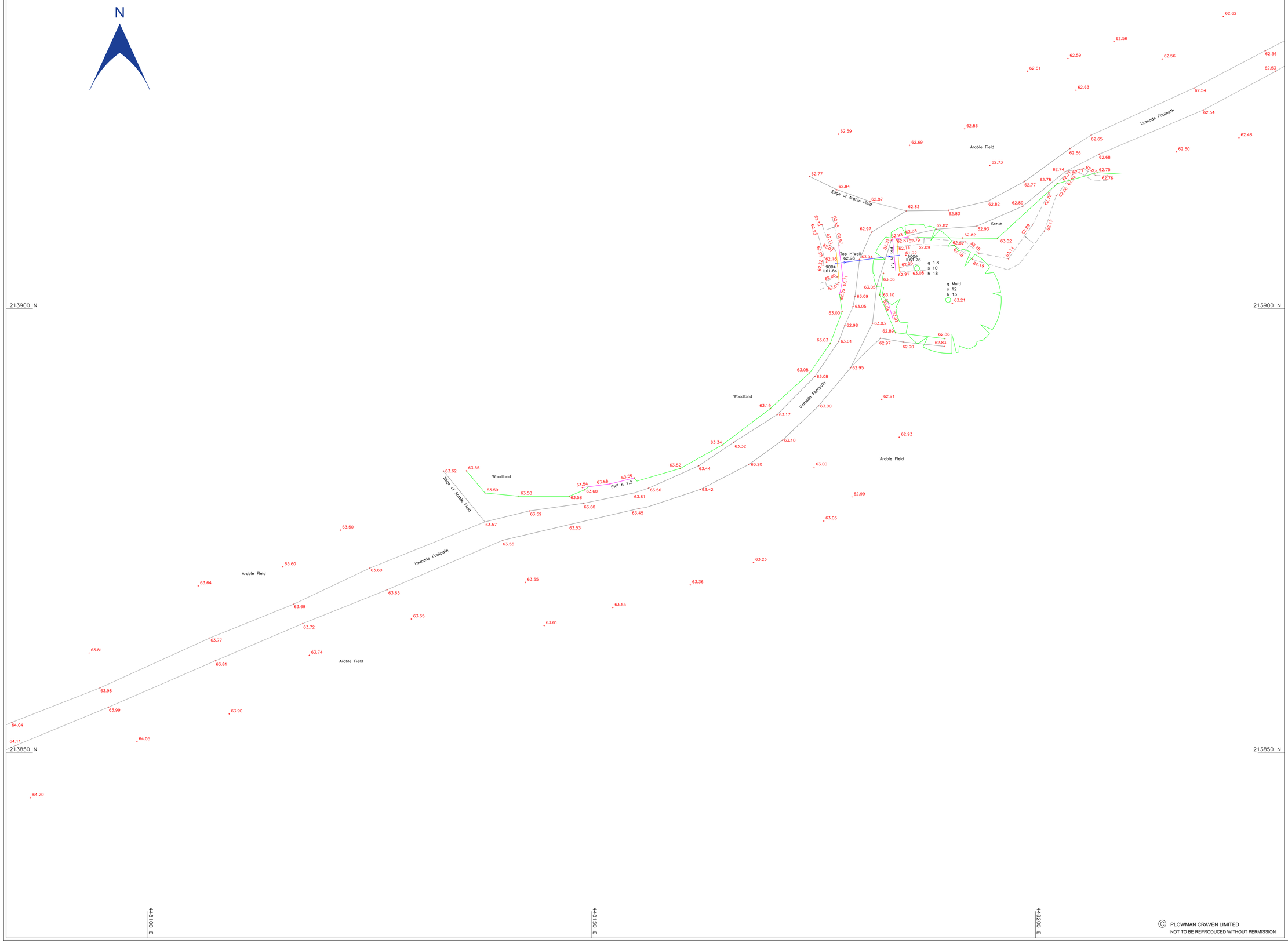
448150 E

448200 E

213900 N

213850 N

N



STANDARD ABBREVIATIONS

A/C	Air Conditioner	LB	Litter Bin
ATM	Automated Telling Machine	LP	Lamp Post
B	Bollard	Max	Maximum
BB	Bellaha Beacon	Mb	Multibole
Bh	Borehole	MH	Manhole
Br	Brick	Min	Minimum
BrS	Brick Setts	Mkr	Marker
BRW	Brick Retaining Wall	NB	Notice Board
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CoW	Cable on Wall	PWF	Post and Wire Fence
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DrC	Drainage Channel	SB	Sign Board
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ESG	Electrical Switchgear	SL	Sump Level
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FH	Fire Hydrant	SP	Sign Post
FL	Floor Level	SV	Stop Valve
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h	height	TL	Traffic Light
HR	Handrail	TLCB	Traffic Light Control Box
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IL	Invert Level	Typ	Typical
IRF	Iron Railing Fence	V	Vent
IRS	Illuminated Road Sign	VP	Vent Pipe
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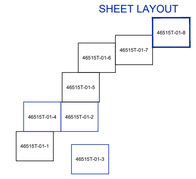
SHEET LAYOUT



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PROJECT TITLE

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3D Topographical Survey

PRESENTATION SCALE 1:200 @ A1

DATE OF ORIGINAL SURVEY April 2021

PC PROJECT No. 46515 CHECKED GH

DRAWING No. ISSUE

46515T-01-8 C

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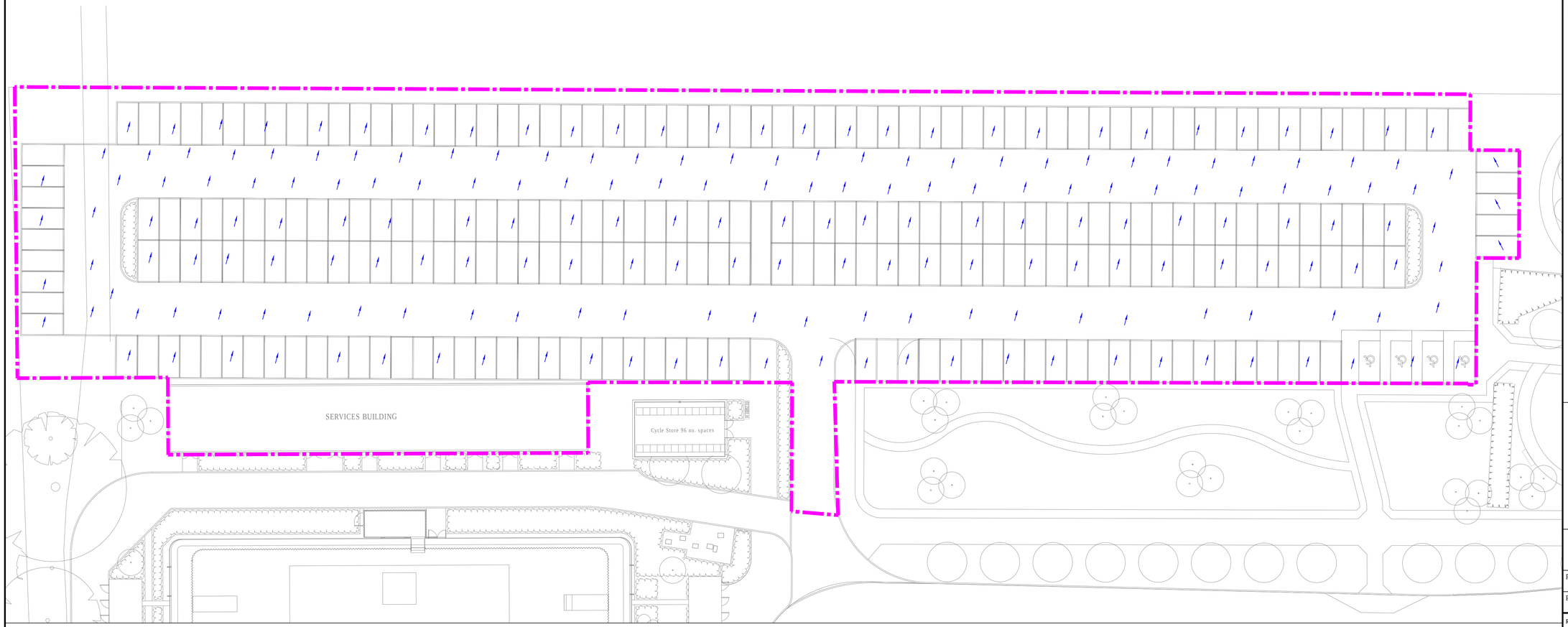
APPENDIX 4
PROPOSED DRAINAGE DRAWINGS



Notes

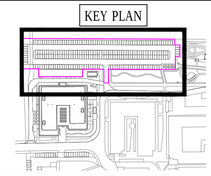
1. THIS DRAWING IS NOT TO BE SCALED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL, STRUCTURAL AND M&E DRAWINGS.
3. THIS IS NOT AN INSTALLATION DRAWING NOR A CO-ORDINATION DRAWING.
4. INDICATIVE BELOW GROUND DRAINAGE STRATEGY SUBJECT TO FURTHER DESIGN DEVELOPMENT AND COORDINATION.
5. THIS DRAWING IS BASED
   - NBBJ DRAWING LBBSP-NBBJ-ZZ-XX-DR-A-511010, REVISION P1, DATED 19.08.2021.

KEY:

SITE BOUNDARY

DIRECTION OF OVERLAND FLOWS

KEY PLAN



Rev	Description	Date	By Chk	App
P02	ISSUED FOR PLANNING	09.09 2021	AT LF	LS
P01	ISSUED FOR PLANNING	25.08 2021	AT LF	LS

PLANNING

BEGBROOKE SCIENCE PARK SURFACE CAR PARK

RAMBOLL

tel 020 7631 5291 london@ramboll.co.uk
www.ramboll.co.uk

CAR PARK OVERLAND FLOWS

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	1:250	MES	AUG 2021

Drawing No: BBSP-RAMB-CP-XX-DR-C-000105

Rev: P02

09/09/2021 14:34:57

Notes

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2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL, STRUCTURAL AND M&E DRAWINGS.
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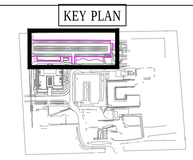
4. INDICATIVE BELOW GROUND DRAINAGE STRATEGY SUBJECT TO FURTHER DESIGN DEVELOPMENT AND COORDINATION.
5. THIS DRAWING IS BASED ON
   - FIRA LP2264-FIRA-MP-ST-P-LA-WS 0001 'WIP' LANDSCAPE DRAWING RECEIVED ON 18.08.2021.
   - BBSP-NBBJ-ZZ-XX-DR-A-511010-511011 ARCHITECT DRAWINGS RECEIVED ON 24-08-2021.
   - HISTORIC SITE INFO RECEIVED ON 22.03.2021.
6. FOR DRAINAGE DETAILS REFER TO DRAWINGS "BSP-RAMB-CP-XX-DR-C-000410-413 FOR PAVEMENT DETAILS REFER TO DRAWINGS BSP-RAMB-CP-XX-DR-C-000510 AND 551 .

KEY:

- SITE BOUNDARY
- SURFACE WATER DRAIN
- DRAINAGE CHANNEL
- FOUL WATER DRAIN
- EXISTING FOUL WATER DRAIN
- PERFORATED PIPE
- SURFACE WATER MANHOLE/PPIC
- FOUL WATER MANHOLE/PPIC
- EXISTING FOUL WATER MANHOLE
- THRESHOLD CHANNEL DRAIN
- ROAD GULLY
- RODDING EYE
- FLOOR GULLY
- RWP
- OUTFALL/SUMP
- OIL SEPARATOR
- GEO-CELLULAR SOAKAWAY TANK
- PERMEABLE UNLINED PAVING
- ASPHALT
- PERMEABLE LINED PAVING
- FILTER DRAIN

KEY PLAN



Rev	Description	Date	By / Chk	App
P02	ISSUED FOR PLANNING	09.09 2021	AT LF	LS
P01	ISSUED FOR PLANNING	26.08 2021	AT LF	LS

PLANNING

BEGBROOKE SCIENCE PARK
SURFACE CAR PARK

RAMBOLL
tel 020 7631 5291 london@ramboll.co.uk
www.ramboll.co.uk

CAR PARK
FOUL AND SURFACE WATER
DRAINAGE LAYOUT

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	1:250	MES	AUG 2021

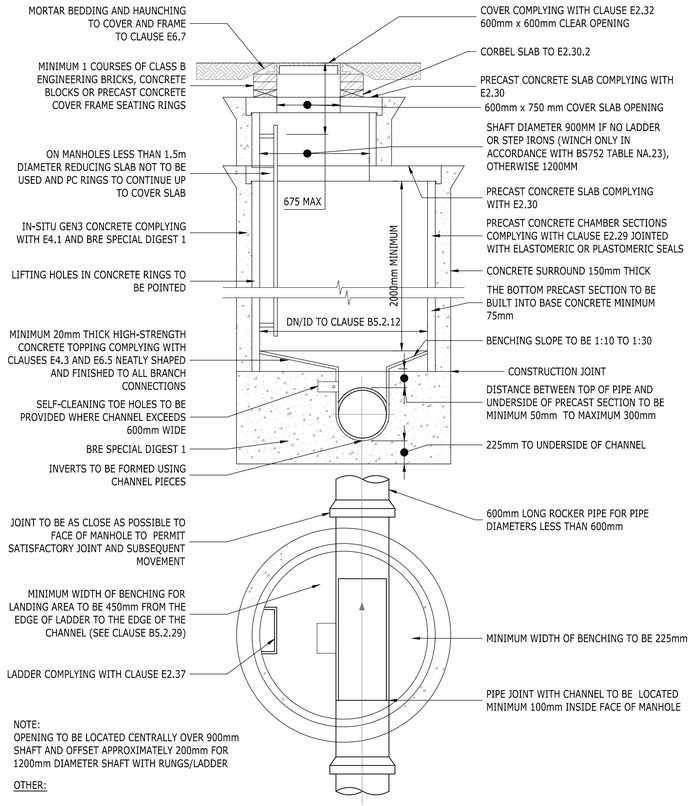
Drawing No: BBSP-RAMB-CP-XX-DR-C-000110 Rev: P02

RISKS:
- MEP DRAIN POINT AND RWP LOCATIONS (AND FLOWS) TO BE CONFIRMED.
- THE LOCATION AND EXTENT OF EXISTING BELOW GROUND SERVICES TO BE CONFIRMED WITH BELOW GROUND SERVICES SURVEYS. THE INDICATIVE DRAINAGE STRATEGY MAY CHANGE FOLLOWING CONFIRMATION OF EXISTING BELOW GROUND SERVICES.
- THIS INDICATIVE INFILTRATION DRAINAGE STRATEGY IS BASED ON SITE SPECIFIC INFILTRATION RESULTS DONE BY GROUND ENGINEERING ON AUGUST 2021 . ADDITIONAL INFILTRATION TESTING TO BE UNDERTAKEN IN PROPOSED CAR PARK AT THE DEPTH OF THE POROUS PAVEMENT BUILD-UP.
- THE INDICATIVE DRAINAGE STRATEGY TO BE CO-ORDINATED WITH ARCHITECTURAL LAYOUT, LANDSCAPE ARCHITECTURAL SITE PLAN, STRUCTURAL FOUNDATIONS AND MEP DRAIN POINT LOCATIONS IN THE FOLLOWING DESIGN STAGE.

09/09/2021 14:34:28

TYPICAL MANHOLE - TYPE A1 - SSG FIG.B5

(DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m TO 6m)



NOTE:
OPENING TO BE LOCATED CENTRALLY OVER 900mm SHAFT AND OFFSET APPROXIMATELY 200mm FOR 1200mm DIAMETER SHAFT WITH RUNGS/LADDER

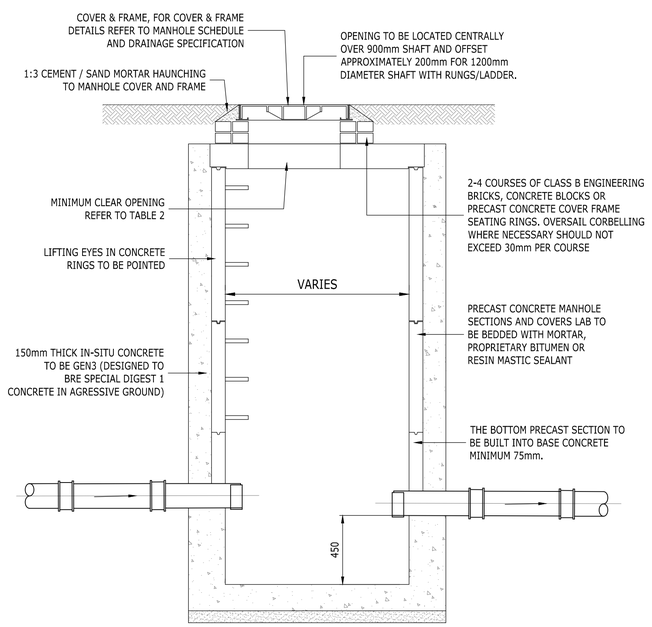
OTHER:

THE DESIGN AND CONSTRUCTION OF MANHOLES WILL NEED TO COMPLY WITH THE RELEVANT UNDERTAKER'S SAFETY POLICY.

DRAWN IN ACCORDANCE WITH SSG "THE CODE"

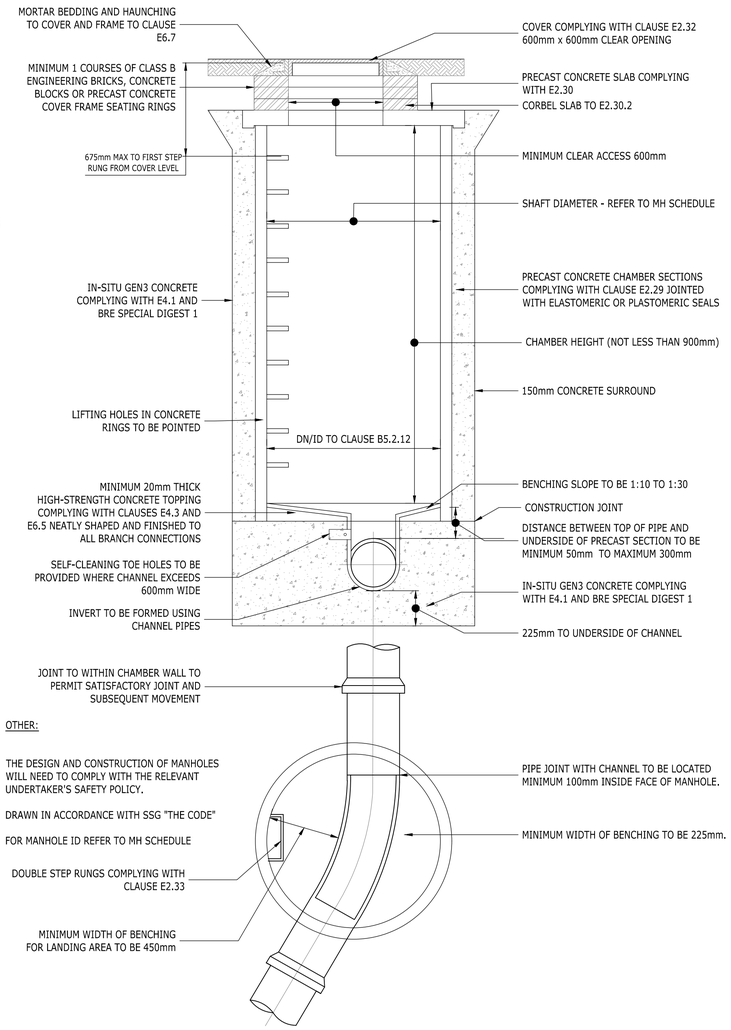
FOR MANHOLE ID REFER TO MH SCHEDULE

CATCHPIT



TYPICAL MANHOLE - TYPE B SSG FIG.B10

(MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3.0m)



OTHER:

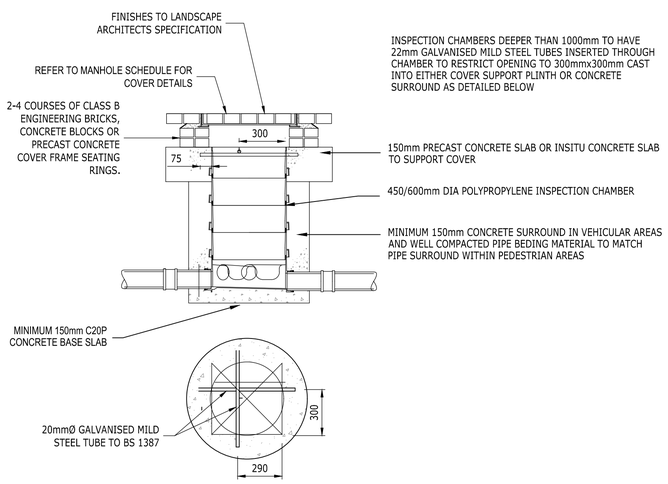
THE DESIGN AND CONSTRUCTION OF MANHOLES WILL NEED TO COMPLY WITH THE RELEVANT UNDERTAKER'S SAFETY POLICY.

DRAWN IN ACCORDANCE WITH SSG "THE CODE"

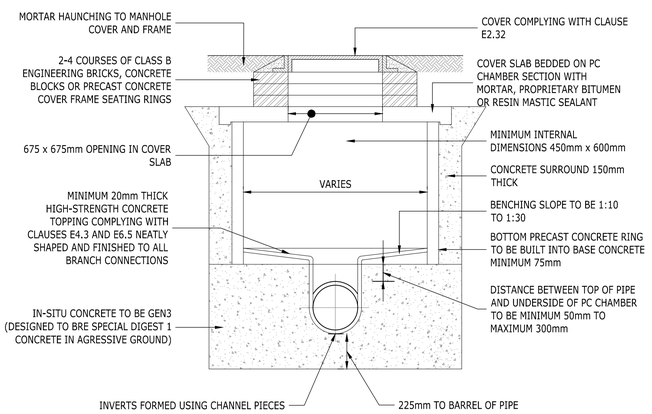
FOR MANHOLE ID REFER TO MH SCHEDULE

EXTERNAL RESTRICTED ACCESS POLYPROPYLENE INSPECTION CHAMBER

(DEPTH GREATER THAN 1000mm TO INVERT REQUIRES RESTRICTED ACCESS)



PRE-CAST CONCRETE RING MANHOLE - TYPE E SSG FIG.B24



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4. INDICATIVE BELOW GROUND DRAINAGE STRATEGY SUBJECT TO FURTHER DESIGN DEVELOPMENT AND COORDINATION.
5. REFER TO DRAWING BBSP-RAMB-CP-XX-DR-C-000110 FOR DRAINAGE LAYOUT.

Rev	Description	Date	By / Chk	App
P01	ISSUED FOR PLANNING	20.08 2021	MES LF	LS

PLANNING

BEGBROOKE SCIENCE PARK
SURFACE CAR PARK

RAMBOLL
tel 020 7631 5291 london@ramboll.co.uk
www.ramboll.co.uk

CAR PARK
DRAINAGE DETAILS
SHEET 1

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	1:1000	MES	AUG 2021

Drawing No: BBSP-RAMB-CP-XX-DR-C-00410
Rev: P01

17/08/2021 20:27:42

CLASS Z CONCRETE BED AND SURROUND

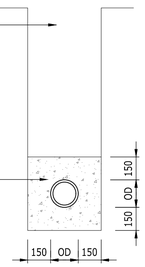
TRENCH BACKFILL:

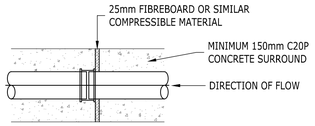
1. UNDER ROADS AND FOOTPATHS USE TYPE 1 GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO THE UNDERSIDE OF SURFACING CONSTRUCTION.

2. ELSEWHERE USE SELECTED EXCAVATED MATERIALS COMPACTED IN 150mm LAYERS

CONCRETE BED AND SURROUND SHALL BE INTERUPTED AT EACH PIPE JOINT USING 25mm THICK FIBRE BOARD TO THE FULL AREA OF THE CONCRETE - SEE DETAIL BELOW

USE CLASS Z CONCRETE BED AND SURROUND UNDER ALL FOUNDATIONS AND FLOOR SLABS, WHERE COVER TO CROWN OF PIPE IS LESS THAN 0.75m IN VEHICULAR ACCESS AREAS, AND WHERE PIPES ARE LAID WITHIN 1.0m OF FOUNDATIONS





CLASS S GRANULAR BED AND SURROUND

TRENCH BACKFILL:

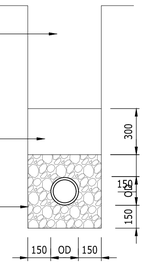
1. UNDER ROADS AND FOOTPATHS USE TYPE 1 GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO THE UNDERSIDE OF SURFACING CONSTRUCTION.

2. ELSEWHERE USE SELECTED EXCAVATED MATERIALS COMPACTED IN 150mm LAYERS

FIRST 300mm OF BACKFILL ABOVE CROWN OF PIPE TO BE FREE FROM STONES EXCEEDING 40mm

MINIMUM 150mm BED AND SURROUND AS DETAILED IN TABLE BELOW

USE CLASS S BED AND SURROUND WHERE COVER TO PIPE IS BETWEEN 0.75m AND 1.2m IN VEHICULAR ACCESS AREAS AND LESS THAN 0.45m UNDER FOOTPATHS/PAVED AREAS



PIPE DIAMETER:	BEDDING MATERIAL:
100Ø	10mm SINGLE SIZE AGGREGATE
101Ø -150Ø	10mm OR 14mm SINGLE SIZE AGGREGATE
151Ø - 500Ø	10mm, 14mm OR 20mm SINGLE SIZE AGGREGATE

NOTE:
THE ABOVE MATERIALS ARE FOR GUIDANCE OTHER BEDDING MATERIALS CAN BE USED IN ACCORDANCE WITH THE PIPE MANUFACTURES RECOMMENDATIONS I.E. SINTERED PULVERISED FUEL ASH AND AIR COOLED BLAST FURNACE SLAGS

CLASS B GRANULAR BED AND SURROUND

TRENCH BACKFILL:

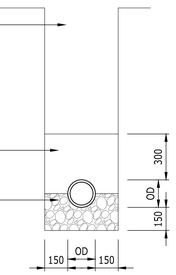
1.UNDER ROADS AND FOOTPATHS USE TYPE 1 GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO THE UNDERSIDE OF SURFACING CONSTRUCTION.

2.ELSEWHERE USE SELECTED EXCAVATED MATERIALS COMPACTED IN 150mm LAYERS.

FIRST 300mm OF BACKFILL ABOVE CROWN OF PIPE TO BE FREE FROM STONES EXCEEDING 40mm

MINIMUM 150mm BED AND SURROUND AS DETAILED IN TABLE BELOW

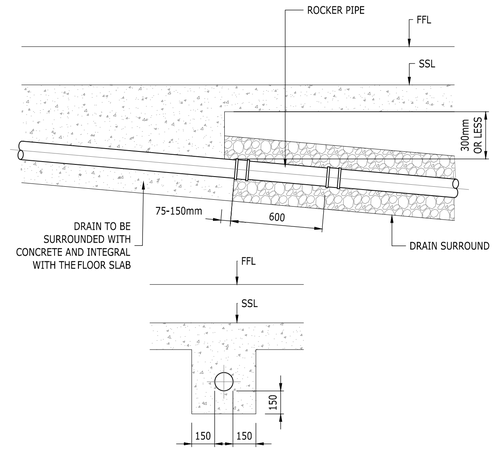
CLASS B BED TO BE USED WHERE COVER TO CROWN OF PIPE IS GREATER THAN 1.2m IN VEHICULAR ACCESS AREAS AND 0.45m IN FOOTPATHS/PAVED AREAS



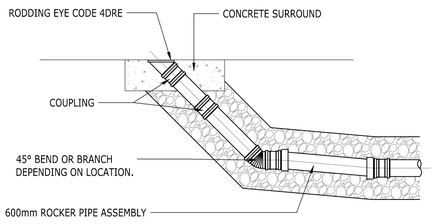
PIPE DIAMETER:	BEDDING MATERIAL:
100Ø	10mm SINGLE SIZE AGGREGATE
101Ø -150Ø	10mm OR 14mm SINGLE SIZE AGGREGATE
151Ø - 500Ø	10mm, 14mm OR 20mm SINGLE SIZE AGGREGATE
501Ø AND ABOVE	10mm, 14mm, 20mm OR 40mm SINGLE SIZE CRUSHED ROCK

NOTE:
THE ABOVE MATERIALS ARE FOR GUIDANCE OTHER BEDDING MATERIALS CAN BE USED IN ACCORDANCE WITH THE PIPE MANUFACTURES RECOMMENDATIONS I.E. SINTERED PULVERISED FUEL ASH AND AIR COOLED BLAST FURNACE SLAGS

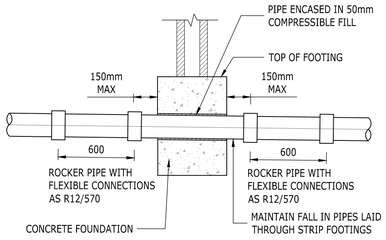
CLASS Y CONCRETE SURROUND WITHIN 300mm OF FLOOR SLAB



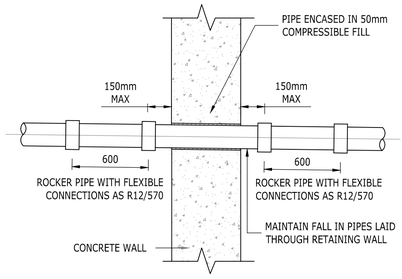
TYPICAL EXTERNAL RODDING EYE DETAIL



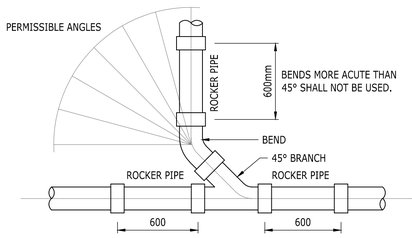
TYPICAL DRAIN/STRIP FOOTING PENETRATION DETAIL



TYPICAL PIPE PENETRATION THROUGH A CONCRETE WALL DETAIL

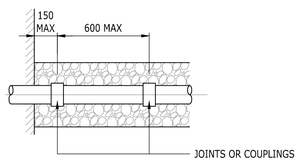


OBLIQUE JUNCTION ARRANGEMENT

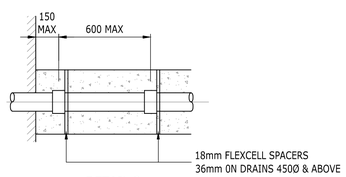


TYPICAL ROCKER PIPE ASSEMBLY DETAIL

THESE DETAILS APPLY TO ALL DRAINS AT FIXED POINTS I.E. AT FACE OF STRUCTURE, CHAMBERS ETC.

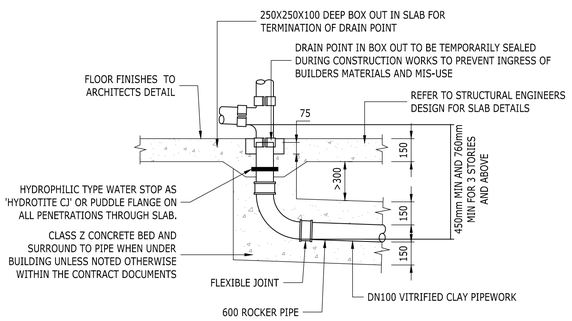


DETAIL 1
DRAIN WITH GRANULAR SURROUND

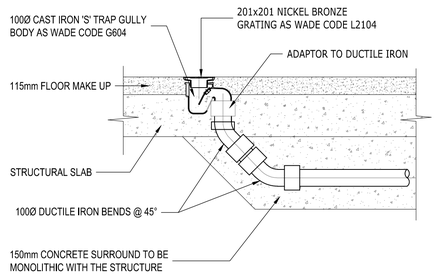


DETAIL 2
DRAIN WITH CONCRETE SURROUND

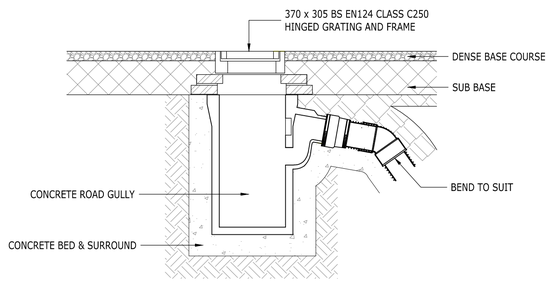
TYPICAL DRAIN POINT

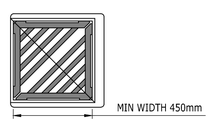


TYPICAL PLANT/SERVICE AREA TRAPPED FLOOR GULLY DETAIL



CONCRETE ROAD GULLY





ROAD GULLY GRATING DETAIL WITH FRAME.
GRATING TYPE AND FRAME TO BE IN ACCORDANCE WITH CYS EN 124

Notes

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3. THIS IS NOT AN INSTALLATION DRAWING NOR A CO-ORDINATION DRAWING.
4. INDICATIVE BELOW GROUND DRAINAGE STRATEGY SUBJECT TO FURTHER DESIGN DEVELOPMENT AND COORDINATION.
5. REFER TO DRAWING BBSP-RAMB-CP-XX-DR-C-000110 FOR DRAINAGE LAYOUT.

Rev	Description	Date	By Chk	App
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PLANNING

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SURFACE CAR PARK

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CAR PARK
DRAINAGE DETAILS
SHEET 2

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	1:1000	MES	AUG 2021

Drawing No: BBSP-RAMB-CP-XX-DR-C-00411
Rev: P01

17/08/2021 20:34:04

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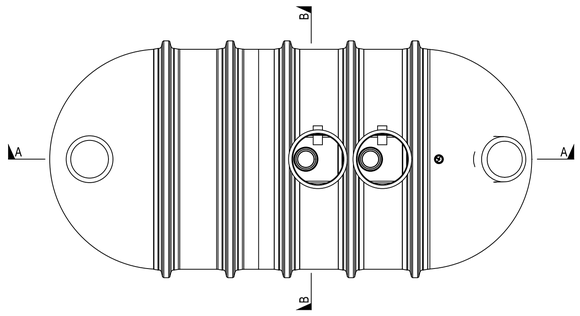
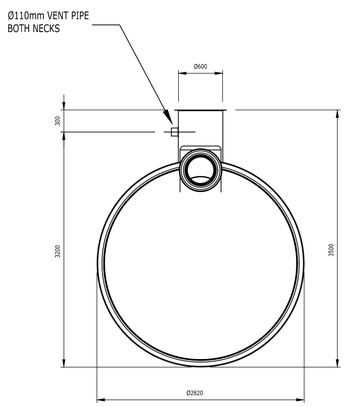
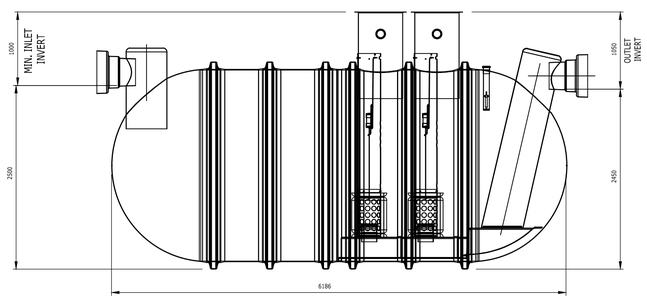
TYPICAL FULL RETENTION PETROL INTERCEPTOR BY KLARGESTER OR SIMILAR APPROVED



PLAN

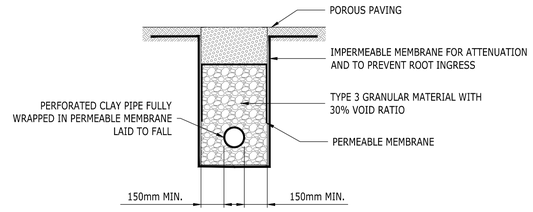


(CROSS SECTION B-B)

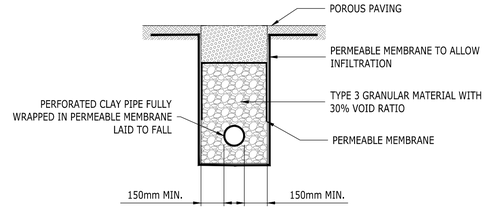


(LONG SECTION A-A)

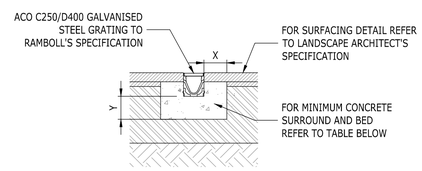
FILTER DRAIN DETAIL (WITH IMPERMEABLE MEMBRANE)



FILTER DRAIN DETAIL (WITH PERMEABLE MEMBRANE)



TYPICAL DRAINAGE CHANNEL DETAIL
(ACO M100 0.0, OR SIMILAR APPROVED)



CONCRETE SURROUND: MINIMUM DIMENSIONS

LOADING CLASS		C250	D400
MINIMUM	X	150	200
MINIMUM	Y	150	200

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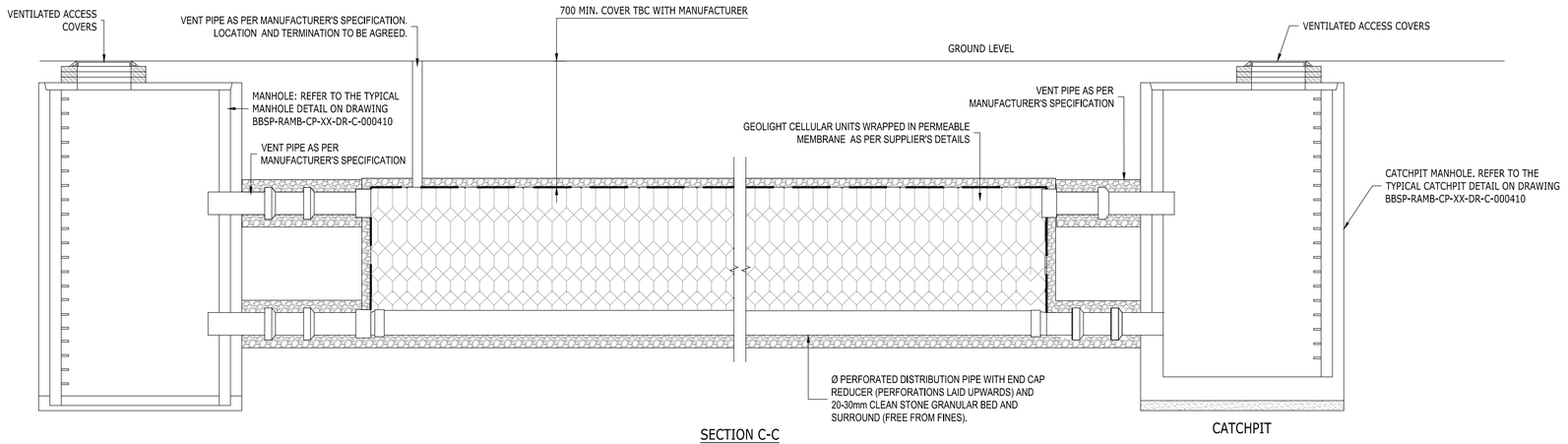
CAR PARK
DRAINAGE DETAILS
SHEET 3

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	1:1000	MES	AUG 2021

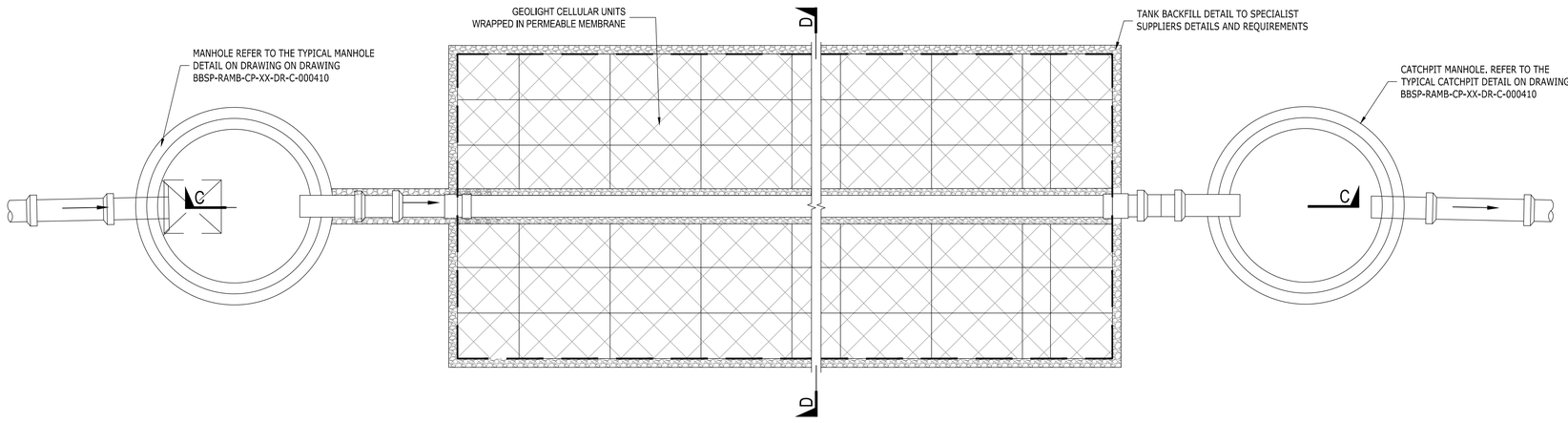
Drawing No:	Rev:
BBSP-RAMB-CP-XX-DR-C-00412	P01

26/08/2021 12:40:24

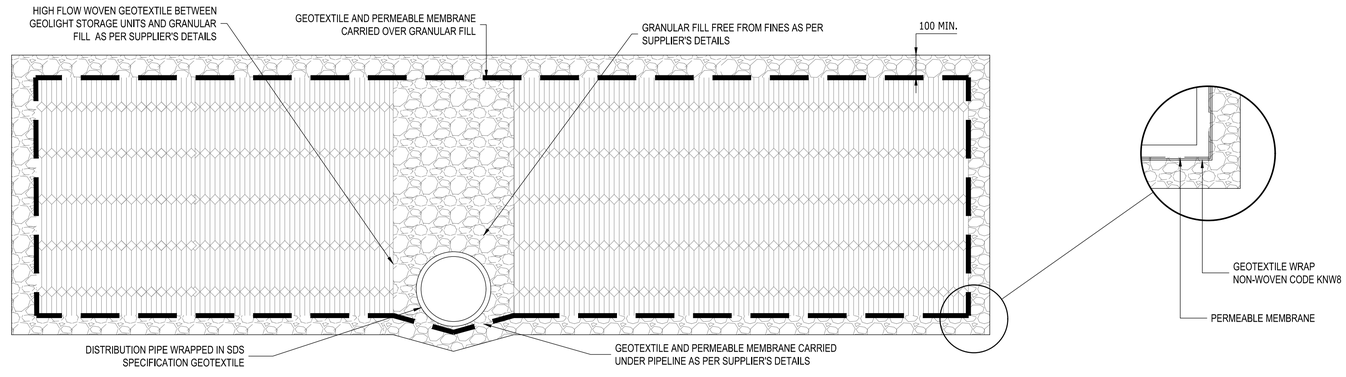
TYPICAL SOAKAWAY MODULAR TANK DETAIL (SDS GEOLIGHT TANK, OR SIMILAR APPROVED)



SECTION C-C



PLAN VIEW



SECTION D-D

Notes

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4. INDICATIVE BELOW GROUND DRAINAGE STRATEGY SUBJECT TO FURTHER DESIGN DEVELOPMENT AND COORDINATION.
5. REFER TO DRAWING BBSP-RAMB-CP-XX-DR-C-000110 FOR DRAINAGE LAYOUT.

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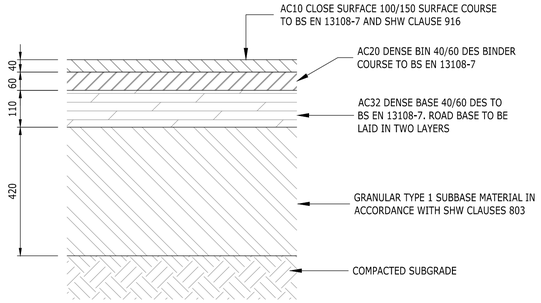
CAR PARK
DRAINAGE DETAILS
SHEET 4

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	1:1000	MES	AUG 2021

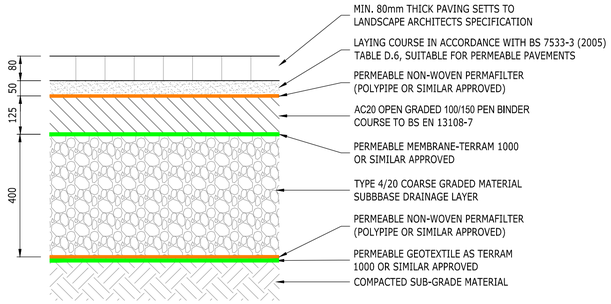
Drawing No:	Rev:
BBSP-RAMB-CP-XX-DR-C-00413	P01

26/08/2021 12:29:06



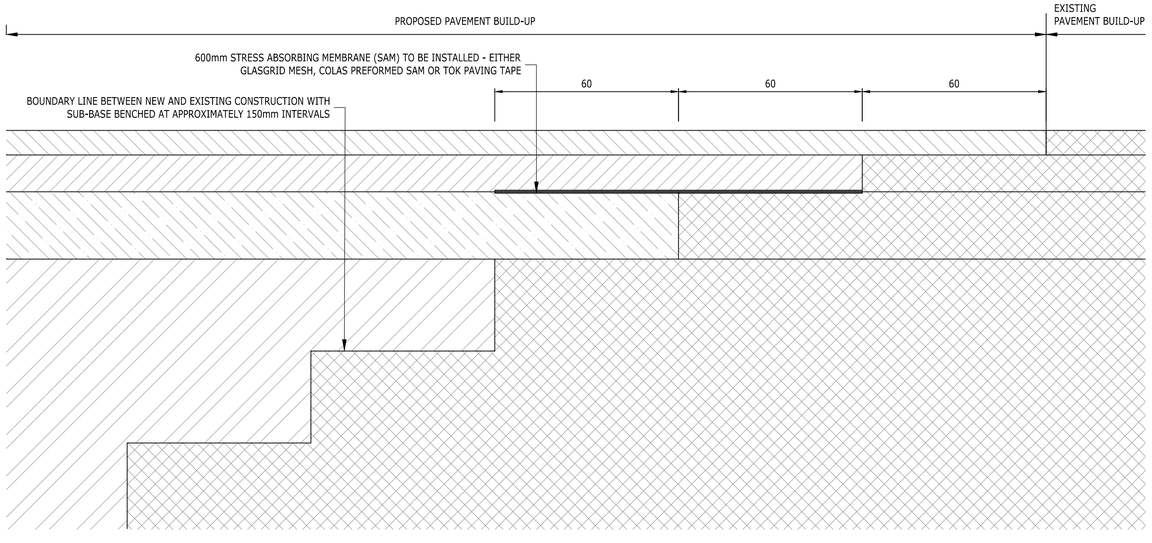
- DESIGN IN ACCORDANCE WITH DMRB VOLUME 7 CD, 225 AND 226
- BS594987:2007
- DESIGNED TO ACCOMMODATE MIN. 1.0 msa
- ASSUMED 2.5% CBR VALUE. SUB BASE THICKNESS MAY CHANGE UPON CONFIRMATION OF CBR VALUE.

TYPICAL ASPHALT CONCRETE (IMPERMEABLE) PAVEMENT BUILD-UP SUITABLE FOR VEHICULAR LOADING

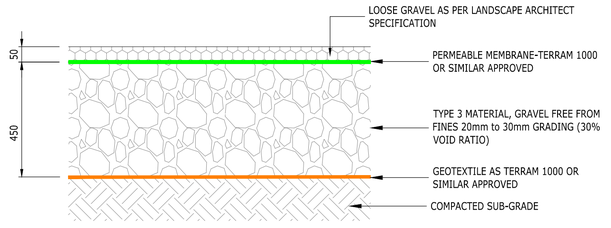


- DESIGNED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS, BS 7533-13 (2009) AND BS 7533-3 (2005)
- DESIGNED IN ACCORDANCE WITH BS EN 13108-7:2016 AND SHW VOLUME 1 SERIES 900
- BASED ON PEDESTRIAN AND LIGHT VEHICLE LOADING ONLY (BS 7533-13 (2009) TABLE 7
- ASSUMED CBR OF 2.5 %. SUB-BASE THICKNESS MAY CHANGE UPON CONFIRMATION OF CBR VALUE.
- PAVEMENT BUILD-UP SUITABLE FOR SURFACE WATER INFILTRATION TO GROUND

TYPICAL POROUS (PERMEABLE) PAVEMENT BUILD-UP PAVEMENT SUITABLE FOR (LIGHT) VEHICULAR LOADING

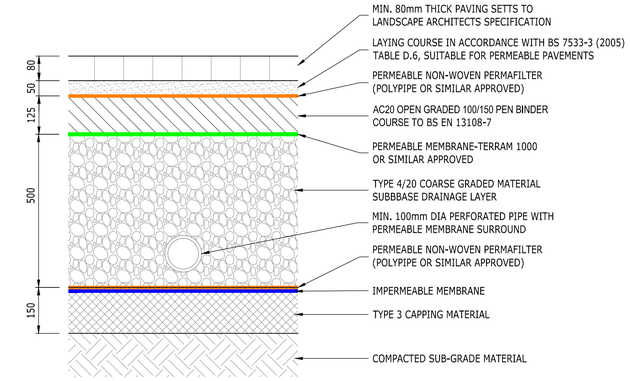


STEPPED CONSTRUCTION DETAIL FOR TYING IN NEW ROAD CONSTRUCTION TO EXISTING CARRIAGEWAY



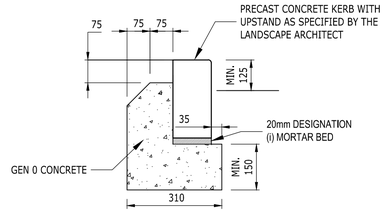
- DESIGNED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND BS 7533-13
- BASED ON PEDESTRIAN LOADING ONLY
- ASSUMED CBR OF 2.5 %. SUB-BASE THICKNESS MAY CHANGE UPON CONFIRMATION OF CBR VALUE.

TYPICAL PAVEMENT DETAIL LOOSE GRAVEL (PERMEABLE) SUITABLE FOR PEDESTRIAN LOADING

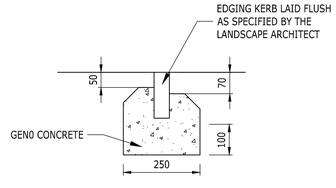


- DESIGNED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS, BS 7533-13 (2009) AND BS 7533-3 (2005)
- DESIGNED IN ACCORDANCE WITH BS EN 13108-7:2016 AND SHW VOLUME 1 SERIES 900
- BASED ON PEDESTRIAN AND LIGHT VEHICLE LOADING ONLY (BS 7533-13 (2009) TABLE 7
- ASSUMED CBR OF 2.5 %. SUB-BASE THICKNESS MAY CHANGE UPON CONFIRMATION OF CBR VALUE.
- PAVEMENT BUILD-UP SUITABLE FOR SURFACE WATER ATTENUATION AND CONVEYANCE TO A NEARBY BELOW GROUND GEOCELLULAR SOAKAWAY TANK

TYPICAL POROUS (IMPERMEABLE) PAVEMENT BUILD-UP PAVEMENT SUITABLE FOR (LIGHT) VEHICULAR LOADING



PRECAST CONCRETE BULLNOSE KERB (KERB TYPE BN)



PRECAST CONCRETE EDGING KERB (KERB TYPE EF)

Notes

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4. REFER TO DRAWING
   - BBSP-RAMB-CP-XX-DR-C-000110 FOR CONSTRUCTION AREAS
   - BBSP-RAMB-CP-XX-DR-C-000410 TO 000413 FOR TYPICAL DRAINAGE DETAILS
5. THE PAVEMENT DETAILS PROVIDED ARE TYPICAL, AND SUBJECT TO DETAIL DESIGN AND ASSESSMENT IN THE FOLLOWING DESIGN STAGE.

Rev	Description	Date	By	Chk	App
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CONSTRUCTION DETAILS

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	NTS	MES	AUG 2021

Drawing No:	Rev:
BBSP-RAMB-CP-XX-DR-C-000510	P01

APPENDIX 5
MICRODRAINAGE (SURFACE WATER) RESULTS

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	20.000	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.400	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

Time Area Diagram for Storm at outfall S (pipe S1.007)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.152	4-8	0.334	8-12	0.021

Total Area Contributing (ha) = 0.508

Total Pipe Volume (m^3) = 33.471

Time Area Diagram at outfall S (pipe S27.004)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.023	4-8	0.010

Total Area Contributing (ha) = 0.033

Total Pipe Volume (m³) = 2.298

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	52.344	0.349	150.0	0.000	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S1.001	3.147	0.021	149.2	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S2.000	47.231	0.236	200.1	0.023	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.85	68.050	0.000	0.0	0.0	0.0	1.03	32.9	0.0
S1.001	50.00	5.90	67.701	0.000	0.0	0.0	0.0	1.03	33.0	0.0
S2.000	49.92	6.11	67.550	0.023	0.0	0.0	0.0	0.71	12.5	3.1

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S2.001	7.208	0.048	149.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	30.927	0.189	164.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	66.079	0.330	200.0	0.043	5.00	0.0	0.600	o	150	Pipe/Conduit	
S3.001	11.558	0.152	75.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.000	43.200	0.288	150.0	0.000	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S4.001	9.840	0.066	150.0	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S2.001	49.36	6.26	67.314	0.023	0.0	0.0	0.0	0.82	14.5	3.1
S1.002	47.01	6.92	67.266	0.023	0.0	0.0	0.0	0.78	13.8	3.1
S3.000	48.27	6.56	67.560	0.043	0.0	0.0	0.0	0.71	12.5	5.7
S3.001	47.68	6.72	67.230	0.043	0.0	0.0	0.0	1.16	20.4	5.7
S4.000	50.00	5.70	68.060	0.000	0.0	0.0	0.0	1.03	32.9	0.0
S4.001	50.00	5.86	67.772	0.000	0.0	0.0	0.0	1.03	32.9	0.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.003	26.065	0.189	138.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.000	55.265	0.366	151.0	0.000	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S5.001	3.358	0.022	150.0	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S6.000	55.416	0.277	200.0	0.029	5.00	0.0	0.600	o	100	Pipe/Conduit	
S6.001	6.623	0.044	150.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S7.000	11.669	0.077	151.0	0.013	5.00	0.0	0.600	o	100	Pipe/Conduit	
S7.001	17.315	0.115	151.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.003	45.35	7.43	67.077	0.066	0.0	0.0	0.0	0.85	15.1	8.2
S5.000	50.00	5.90	67.990	0.000	0.0	0.0	0.0	1.02	32.8	0.0
S5.001	50.00	5.95	67.624	0.000	0.0	0.0	0.0	1.03	32.9	0.0
S6.000	47.73	6.71	67.510	0.029	0.0	0.0	0.0	0.54	4.2	3.7
S6.001	47.12	6.89	67.233	0.029	0.0	0.0	0.0	0.63	4.9	3.7
S7.000	50.00	5.31	67.520	0.013	0.0	0.0	0.0	0.62	4.9	1.7
S7.001	50.00	5.77	67.443	0.013	0.0	0.0	0.0	0.62	4.9	1.7

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.004	45.021	0.298	151.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.000	44.870	0.297	151.0	0.024	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S8.001	3.667	0.024	150.0	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S9.000	43.537	0.218	200.0	0.022	5.00	0.0	0.600	o	100	Pipe/Conduit	
S9.001	7.249	0.048	151.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.005	7.737	0.208	37.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.004	43.27	8.14	66.814	0.108	0.0	0.0	0.0	1.06	42.2	12.6
S8.000	50.00	5.73	68.010	0.024	0.0	0.0	0.0	1.02	32.8	3.2
S8.001	50.00	5.79	67.713	0.024	0.0	0.0	0.0	1.03	32.9	3.2
S9.000	49.05	6.34	67.530	0.022	0.0	0.0	0.0	0.54	4.2	2.9
S9.001	48.34	6.54	67.312	0.022	0.0	0.0	0.0	0.62	4.9	2.9
S1.005	43.10	8.20	66.516	0.154	0.0	0.0	0.0	2.15	85.6	17.9

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S10.000	11.499	0.076	151.0	0.006	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S10.001	6.829	0.045	151.0	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S11.000	9.767	0.049	200.0	0.006	5.00	0.0	0.600	o	100	Pipe/Conduit	
S11.001	8.956	0.059	151.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S10.002	35.528	0.235	151.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S12.000	27.459	0.183	150.0	0.033	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S10.000	50.00	5.19	68.070	0.006	0.0	0.0	0.0	1.02	32.8	0.8
S10.001	50.00	5.30	67.994	0.006	0.0	0.0	0.0	1.02	32.8	0.8
S11.000	50.00	5.30	67.600	0.006	0.0	0.0	0.0	0.54	4.2	0.8
S11.001	50.00	5.54	67.551	0.006	0.0	0.0	0.0	0.62	4.9	0.8
S10.002	48.51	6.49	67.492	0.012	0.0	0.0	0.0	0.62	4.9	1.6
S12.000	50.00	5.45	68.100	0.033	0.0	0.0	0.0	1.03	32.9	4.5

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S12.001	7.739	0.051	151.0	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S13.000	23.705	0.119	200.0	0.013	5.00	0.0	0.600	o	100	Pipe/Conduit	
S13.001	6.898	0.046	151.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S10.003	36.746	0.243	151.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S14.000	20.269	0.134	151.0	0.000	5.00	0.0	0.600	o	100	Pipe/Conduit	
S15.000	69.596	0.461	151.0	0.040	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S12.001	50.00	5.57	67.917	0.033	0.0	0.0	0.0	1.02	32.8	4.5
S13.000	50.00	5.73	67.640	0.013	0.0	0.0	0.0	0.54	4.2	1.7
S13.001	50.00	5.92	67.521	0.013	0.0	0.0	0.0	0.62	4.9	1.7
S10.003	45.95	7.24	67.207	0.058	0.0	0.0	0.0	0.81	14.4	7.2
S14.000	50.00	5.54	68.000	0.000	0.0	0.0	0.0	0.62	4.9	0.0
S15.000	49.85	6.13	68.130	0.040	0.0	0.0	0.0	1.02	32.8	5.3

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S15.001	6.576	0.044	151.0	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S16.000	34.948	0.175	199.7	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	
S16.001	4.829	0.032	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S17.000	52.805	0.264	200.0	0.037	5.00	0.0	0.600	o	150	Pipe/Conduit	
S17.001	8.992	0.060	151.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S10.004	25.946	0.052	499.0	0.008	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S15.001	49.44	6.24	67.669	0.040	0.0	0.0	0.0	1.02	32.8	5.3
S16.000	50.00	5.82	67.610	0.021	0.0	0.0	0.0	0.71	12.5	2.8
S16.001	50.00	5.92	67.435	0.021	0.0	0.0	0.0	0.82	14.5	2.8
S17.000	49.42	6.24	67.570	0.037	0.0	0.0	0.0	0.71	12.5	5.0
S17.001	48.73	6.43	67.306	0.037	0.0	0.0	0.0	0.82	14.4	5.0
S10.004	43.69	7.99	66.889	0.163	0.0	0.0	0.0	0.58	23.0	19.3

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S18.000	15.521	0.103	150.0	0.009	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S18.001	7.856	0.052	151.0	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S19.000	11.928	0.204	58.5	0.009	5.00	0.0	0.600	o	100	Pipe/Conduit	
S19.001	7.508	0.050	151.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S10.005	55.107	0.365	151.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S20.000	72.060	0.360	200.0	0.047	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S20.001	4.281	0.028	152.9	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S18.000	50.00	5.25	68.000	0.009	0.0	0.0	0.0	1.03	32.9	1.2
S18.001	50.00	5.38	67.897	0.009	0.0	0.0	0.0	1.02	32.8	1.2
S19.000	50.00	5.20	67.520	0.009	0.0	0.0	0.0	1.01	7.9	1.2
S19.001	50.00	5.40	67.316	0.009	0.0	0.0	0.0	0.62	4.9	1.2
S10.005	41.37	8.85	66.837	0.182	0.0	0.0	0.0	1.06	42.2	20.3
S20.000	49.01	6.35	68.150	0.047	0.0	0.0	0.0	0.89	28.4	6.2
S20.001	48.75	6.42	67.790	0.047	0.0	0.0	0.0	1.02	32.5	6.2

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S21.000	67.429	0.337	200.1	0.034	5.00	0.0	0.600	o	100	Pipe/Conduit	
S21.001	8.119	0.054	151.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S10.006	6.720	0.164	40.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S22.000	9.600	0.064	151.0	0.012	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S22.001	3.774	0.025	151.0	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S23.000	10.744	0.071	151.0	0.014	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S21.000	46.47	7.08	67.630	0.034	0.0	0.0	0.0	0.54	4.2	4.2
S21.001	45.77	7.30	67.293	0.034	0.0	0.0	0.0	0.62	4.9	4.2
S10.006	41.24	8.91	66.472	0.262	0.0	0.0	0.0	2.05	81.5	29.3
S22.000	50.00	5.16	68.480	0.012	0.0	0.0	0.0	1.02	32.8	1.6
S22.001	50.00	5.22	68.416	0.012	0.0	0.0	0.0	1.02	32.8	1.6
S23.000	50.00	5.17	68.210	0.014	0.0	0.0	0.0	1.02	32.8	2.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S23.001	4.117	0.027	151.0	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S24.000	11.253	0.075	151.0	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit	
S25.000	8.688	0.058	151.0	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit	
S24.001	6.498	0.043	151.1	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.006	8.392	0.176	47.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S23.001	50.00	5.24	68.139	0.014	0.0	0.0	0.0	1.02	32.8	2.0
S24.000	50.00	5.30	67.710	0.005	0.0	0.0	0.0	0.62	4.9	0.7
S25.000	50.00	5.23	67.900	0.005	0.0	0.0	0.0	0.62	4.9	0.7
S24.001	50.00	5.47	67.635	0.010	0.0	0.0	0.0	0.62	4.9	1.4
S1.006	41.06	8.98	66.308	0.452	0.0	0.0	0.0	1.90	75.5	50.3

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S26.000	42.701	0.283	151.0	0.056	5.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S26.001	2.656	1.696	1.6	0.000	0.00	0.0	0.600	MD7	-16	Pipe/Conduit	
S1.007	32.155	0.291	110.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S27.000	26.371	0.293	90.0	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
S27.001	21.649	0.241	90.0	0.013	0.00	0.0	0.600	o	150	Pipe/Conduit	
S27.002	21.881	0.243	90.0	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
S27.003	12.863	0.143	90.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S27.004	13.872	0.154	90.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S26.000	50.00	5.70	68.050	0.056	0.0	0.0	0.0	1.02	32.8	7.6
S26.001	50.00	5.70	67.767	0.056	0.0	0.0	0.0	10.16	325.2	7.6
S1.007	40.25	9.34	66.056	0.508	0.0	0.0	0.0	1.50	105.7	55.3
S27.000	50.00	5.41	67.800	0.010	0.0	0.0	0.0	1.06	18.7	1.4
S27.001	50.00	5.76	67.507	0.023	0.0	0.0	0.0	1.06	18.7	3.1
S27.002	49.98	6.10	67.266	0.033	0.0	0.0	0.0	1.06	18.7	4.4
S27.003	49.38	6.25	67.023	0.033	0.0	0.0	0.0	1.38	54.8	4.4
S27.004	48.76	6.42	66.805	0.033	0.0	0.0	0.0	1.38	54.8	4.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	68.370	0.320	Junction		S1.000	68.050	-16				
S2	68.320	0.619	Junction		S1.001	67.701	-16	S1.000	67.701	-16	
S3	68.350	0.800	Junction		S2.000	67.550	150				
S4	68.320	1.006	Junction		S2.001	67.314	150	S2.000	67.314	150	
SSWMH01	68.320	1.054	Open Manhole	1200	S1.002	67.266	150	S1.001	67.680	-16	549
								S2.001	67.266	150	
S26	68.360	0.800	Junction		S3.000	67.560	150				
S28	68.350	1.120	Open Manhole	1200	S3.001	67.230	150	S3.000	67.230	150	
S16	68.380	0.320	Junction		S4.000	68.060	-16				
S17	68.330	0.558	Junction		S4.001	67.772	-16	S4.000	67.772	-16	
SSWMH06	68.390	1.313	Open Manhole	1200	S1.003	67.077	150	S1.002	67.077	150	
								S3.001	67.077	150	
								S4.001	67.706	-16	764
S4	68.310	0.320	Junction		S5.000	67.990	-16				
S5	68.330	0.706	Junction		S5.001	67.624	-16	S5.000	67.624	-16	
S8	68.310	0.800	Junction		S6.000	67.510	100				
S9	68.330	1.097	Junction		S6.001	67.233	100	S6.000	67.233	100	
S10	68.320	0.800	Junction		S7.000	67.520	100				
S11	68.320	0.877	Junction		S7.001	67.443	100	S7.000	67.443	100	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SSWMH02	68.460	1.646	Open Manhole	1200	S1.004	66.814	225	S1.003	66.889	150	
								S5.001	67.602	-16	848
								S6.001	67.189	100	250
								S7.001	67.328	100	389
S7	68.330	0.320	Junction		S8.000	68.010	-16				
S8	68.470	0.757	Junction		S8.001	67.713	-16	S8.000	67.713	-16	
S15	68.330	0.800	Junction		S9.000	67.530	100				
S16	68.470	1.158	Junction		S9.001	67.312	100	S9.000	67.312	100	
SSWMH03	68.620	2.104	Open Manhole	1200	S1.005	66.516	225	S1.004	66.516	225	
								S8.001	67.688	-16	1233
								S9.001	67.264	100	624
S6	68.390	0.320	Junction		S10.000	68.070	-16				
S7	68.420	0.426	Junction		S10.001	67.994	-16	S10.000	67.994	-16	
S20	68.400	0.800	Junction		S11.000	67.600	100				
S21	68.480	0.929	Junction		S11.001	67.551	100	S11.000	67.551	100	
SSWMH11	68.430	0.938	Open Manhole	1200	S10.002	67.492	100	S10.001	67.949	-16	642
								S11.001	67.492	100	
S13	68.420	0.320	Junction		S12.000	68.100	-16				
S14	68.420	0.503	Junction		S12.001	67.917	-16	S12.000	67.917	-16	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S19	68.440	0.800	Junction		S13.000	67.640	100				
S20	68.410	0.889	Junction		S13.001	67.521	100	S13.000	67.521	100	
SSWMH10	68.470	1.263	Open Manhole	1200	S10.003	67.207	150	S10.002	67.257	100	
								S12.001	67.866	-16	794
								S13.001	67.476	100	219
SSWMH09	68.900	0.900	Open Manhole	1200	S14.000	68.000	100				
S18	68.450	0.320	Junction		S15.000	68.130	-16				
S19	68.320	0.651	Junction		S15.001	67.669	-16	S15.000	67.669	-16	
S25	68.410	0.800	Junction		S16.000	67.610	150				
S26	68.320	0.885	Junction		S16.001	67.435	150	S16.000	67.435	150	
S29	68.370	0.800	Junction		S17.000	67.570	150				
S30	68.320	1.014	Junction		S17.001	67.306	150	S17.000	67.306	150	
SSWMH08	68.330	1.441	Open Manhole	1200	S10.004	66.889	225	S10.003	66.964	150	
								S14.000	67.866	100	852
								S15.001	67.626	-16	797
								S16.001	67.403	150	439
								S17.001	67.246	150	283
S19	68.320	0.320	Junction		S18.000	68.000	-16				
S20	68.330	0.433	Junction		S18.001	67.897	-16	S18.000	67.897	-16	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S36	68.320	0.800	Junction		S19.000	67.520	100				
S37	68.350	1.034	Junction		S19.001	67.316	100	S19.000	67.316	100	
Sdummy	68.300	1.463	Junction		S10.005	66.837	225	S10.004	66.837	225	
								S18.001	67.845	-16	1068
								S19.001	67.266	100	305
S24	68.470	0.320	Junction		S20.000	68.150	-16				
S25	68.860	1.070	Junction		S20.001	67.790	-16	S20.000	67.790	-16	
S45	68.430	0.800	Junction		S21.000	67.630	100				
S46	68.890	1.597	Junction		S21.001	67.293	100	S21.000	67.293	100	
SSWMH05	68.700	2.228	Open Manhole	1200	S10.006	66.472	225	S10.005	66.472	225	
								S20.001	67.762	-16	1350
								S21.001	67.239	100	643
S47	68.800	0.320	Junction		S22.000	68.480	-16				
S48	68.600	0.184	Junction		S22.001	68.416	-16	S22.000	68.416	-16	
S49	68.530	0.320	Junction		S23.000	68.210	-16				
S50	68.600	0.461	Junction		S23.001	68.139	-16	S23.000	68.139	-16	
S53	68.510	0.800	Junction		S24.000	67.710	100				
S54	68.700	0.800	Junction		S25.000	67.900	100				
S54	68.550	0.915	Open Manhole	1200	S24.001	67.635	100	S24.000	67.635	100	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
								S25.000	67.842	100	207
SSWMH04	68.670	2.362	Open Manhole	1200	S1.006	66.308	225	S1.005	66.308	225	
								S10.006	66.308	225	
								S22.001	68.391	-16	2143
								S23.001	68.112	-16	1864
								S24.001	67.592	100	1160
S57	68.370	0.320	Junction		S26.000	68.050	-16				
S58	68.440	0.673	Junction		S26.001	67.767	-16	S26.000	67.767	-16	
S7	68.320	2.264	Open Manhole	450	S1.007	66.056	300	S1.006	66.131	225	
								S26.001	66.071	-16	
S	68.320	2.555	Open Manhole	0		OUTFALL		S1.007	65.765	300	
SSWMH12	68.740	0.940	Open Manhole	1200	S27.000	67.800	150				
SSWMH13	69.020	1.513	Open Manhole	1200	S27.001	67.507	150	S27.000	67.507	150	
SSWMH14	69.000	1.734	Open Manhole	1200	S27.002	67.266	150	S27.001	67.266	150	
SSWMH15	69.000	1.977	Open Manhole	1200	S27.003	67.023	225	S27.002	67.023	150	
S66	68.650	1.845	Open Manhole	1200	S27.004	66.805	225	S27.003	66.880	225	
S	68.600	1.949	Open Manhole	0		OUTFALL		S27.004	66.651	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	MD7	-16	S1	68.370	68.050	0.035	Junction	
S1.001	MD7	-16	S2	68.320	67.701	0.334	Junction	
S2.000	o	150	S3	68.350	67.550	0.650	Junction	
S2.001	o	150	S4	68.320	67.314	0.856	Junction	
S1.002	o	150	SSWMH01	68.320	67.266	0.904	Open Manhole	1200
S3.000	o	150	S26	68.360	67.560	0.650	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	52.344	150.0	S2	68.320	67.701	0.334	Junction	
S1.001	3.147	149.2	SSWMH01	68.320	67.680	0.355	Open Manhole	1200
S2.000	47.231	200.1	S4	68.320	67.314	0.856	Junction	
S2.001	7.208	149.4	SSWMH01	68.320	67.266	0.904	Open Manhole	1200
S1.002	30.927	164.1	SSWMH06	68.390	67.077	1.163	Open Manhole	1200
S3.000	66.079	200.0	S28	68.350	67.230	0.970	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S3.001	o	150	S28	68.350	67.230	0.970	Open Manhole	1200
S4.000	MD7	-16	S16	68.380	68.060	0.035	Junction	
S4.001	MD7	-16	S17	68.330	67.772	0.273	Junction	
S1.003	o	150	SSWMH06	68.390	67.077	1.163	Open Manhole	1200
S5.000	MD7	-16	S4	68.310	67.990	0.035	Junction	
S5.001	MD7	-16	S5	68.330	67.624	0.421	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S3.001	11.558	75.9	SSWMH06	68.390	67.077	1.163	Open Manhole	1200
S4.000	43.200	150.0	S17	68.330	67.772	0.273	Junction	
S4.001	9.840	150.0	SSWMH06	68.390	67.706	0.399	Open Manhole	1200
S1.003	26.065	138.3	SSWMH02	68.460	66.889	1.421	Open Manhole	1200
S5.000	55.265	151.0	S5	68.330	67.624	0.421	Junction	
S5.001	3.358	150.0	SSWMH02	68.460	67.602	0.573	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S6.000	o	100	S8	68.310	67.510	0.700	Junction	
S6.001	o	100	S9	68.330	67.233	0.997	Junction	
S7.000	o	100	S10	68.320	67.520	0.700	Junction	
S7.001	o	100	S11	68.320	67.443	0.777	Junction	
S1.004	o	225	SSWMH02	68.460	66.814	1.421	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S6.000	55.416	200.0	S9	68.330	67.233	0.997	Junction	
S6.001	6.623	150.0	SSWMH02	68.460	67.189	1.171	Open Manhole	1200
S7.000	11.669	151.0	S11	68.320	67.443	0.777	Junction	
S7.001	17.315	151.0	SSWMH02	68.460	67.328	1.032	Open Manhole	1200
S1.004	45.021	151.0	SSWMH03	68.620	66.516	1.879	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S8.000	MD7	-16	S7	68.330	68.010	0.035	Junction	
S8.001	MD7	-16	S8	68.470	67.713	0.472	Junction	
S9.000	o	100	S15	68.330	67.530	0.700	Junction	
S9.001	o	100	S16	68.470	67.312	1.058	Junction	
S1.005	o	225	SSWMH03	68.620	66.516	1.879	Open Manhole	1200
S10.000	MD7	-16	S6	68.390	68.070	0.035	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S8.000	44.870	151.0	S8	68.470	67.713	0.472	Junction	
S8.001	3.667	150.0	SSWMH03	68.620	67.688	0.647	Open Manhole	1200
S9.000	43.537	200.0	S16	68.470	67.312	1.058	Junction	
S9.001	7.249	151.0	SSWMH03	68.620	67.264	1.256	Open Manhole	1200
S1.005	7.737	37.2	SSWMH04	68.670	66.308	2.137	Open Manhole	1200
S10.000	11.499	151.0	S7	68.420	67.994	0.141	Junction	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S10.001	MD7	-16	S7	68.420	67.994	0.141	Junction	
S11.000	o	100	S20	68.400	67.600	0.700	Junction	
S11.001	o	100	S21	68.480	67.551	0.829	Junction	
S10.002	o	100	SSWMH11	68.430	67.492	0.838	Open Manhole	1200
S12.000	MD7	-16	S13	68.420	68.100	0.035	Junction	
S12.001	MD7	-16	S14	68.420	67.917	0.218	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S10.001	6.829	151.0	SSWMH11	68.430	67.949	0.196	Open Manhole	1200
S11.000	9.767	200.0	S21	68.480	67.551	0.829	Junction	
S11.001	8.956	151.0	SSWMH11	68.430	67.492	0.838	Open Manhole	1200
S10.002	35.528	151.0	SSWMH10	68.470	67.257	1.113	Open Manhole	1200
S12.000	27.459	150.0	S14	68.420	67.917	0.218	Junction	
S12.001	7.739	151.0	SSWMH10	68.470	67.866	0.319	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S13.000	o	100	S19	68.440	67.640	0.700	Junction	
S13.001	o	100	S20	68.410	67.521	0.789	Junction	
S10.003	o	150	SSWMH10	68.470	67.207	1.113	Open Manhole	1200
S14.000	o	100	SSWMH09	68.900	68.000	0.800	Open Manhole	1200
S15.000	MD7	-16	S18	68.450	68.130	0.035	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S13.000	23.705	200.0	S20	68.410	67.521	0.789	Junction	
S13.001	6.898	151.0	SSWMH10	68.470	67.476	0.894	Open Manhole	1200
S10.003	36.746	151.2	SSWMH08	68.330	66.964	1.216	Open Manhole	1200
S14.000	20.269	151.0	SSWMH08	68.330	67.866	0.364	Open Manhole	1200
S15.000	69.596	151.0	S19	68.320	67.669	0.366	Junction	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S15.001	MD7	-16	S19	68.320	67.669	0.366	Junction	
S16.000	o	150	S25	68.410	67.610	0.650	Junction	
S16.001	o	150	S26	68.320	67.435	0.735	Junction	
S17.000	o	150	S29	68.370	67.570	0.650	Junction	
S17.001	o	150	S30	68.320	67.306	0.864	Junction	
S10.004	o	225	SSWMH08	68.330	66.889	1.216	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S15.001	6.576	151.0	SSWMH08	68.330	67.626	0.419	Open Manhole	1200
S16.000	34.948	199.7	S26	68.320	67.435	0.735	Junction	
S16.001	4.829	150.0	SSWMH08	68.330	67.403	0.777	Open Manhole	1200
S17.000	52.805	200.0	S30	68.320	67.306	0.864	Junction	
S17.001	8.992	151.0	SSWMH08	68.330	67.246	0.934	Open Manhole	1200
S10.004	25.946	499.0	Sdummy	68.300	66.837	1.238	Junction	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S18.000	MD7	-16	S19	68.320	68.000	0.035	Junction	
S18.001	MD7	-16	S20	68.330	67.897	0.148	Junction	
S19.000	o	100	S36	68.320	67.520	0.700	Junction	
S19.001	o	100	S37	68.350	67.316	0.934	Junction	
S10.005	o	225	Sdummy	68.300	66.837	1.238	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S18.000	15.521	150.0	S20	68.330	67.897	0.148	Junction	
S18.001	7.856	151.0	Sdummy	68.300	67.845	0.170	Junction	
S19.000	11.928	58.5	S37	68.350	67.316	0.934	Junction	
S19.001	7.508	151.0	Sdummy	68.300	67.266	0.934	Junction	
S10.005	55.107	151.0	SSWMH05	68.700	66.472	2.003	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S20.000	MD7	-16	S24	68.470	68.150	0.035	Junction	
S20.001	MD7	-16	S25	68.860	67.790	0.785	Junction	
S21.000	o	100	S45	68.430	67.630	0.700	Junction	
S21.001	o	100	S46	68.890	67.293	1.497	Junction	
S10.006	o	225	SSWMH05	68.700	66.472	2.003	Open Manhole	1200
S22.000	MD7	-16	S47	68.800	68.480	0.035	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S20.000	72.060	200.0	S25	68.860	67.790	0.785	Junction	
S20.001	4.281	152.9	SSWMH05	68.700	67.762	0.653	Open Manhole	1200
S21.000	67.429	200.1	S46	68.890	67.293	1.497	Junction	
S21.001	8.119	151.0	SSWMH05	68.700	67.239	1.361	Open Manhole	1200
S10.006	6.720	40.9	SSWMH04	68.670	66.308	2.137	Open Manhole	1200
S22.000	9.600	151.0	S48	68.600	68.416	-0.101	Junction	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S22.001	MD7	-16	S48	68.600	68.416	-0.101	Junction	
S23.000	MD7	-16	S49	68.530	68.210	0.035	Junction	
S23.001	MD7	-16	S50	68.600	68.139	0.176	Junction	
S24.000	o	100	S53	68.510	67.710	0.700	Junction	
S25.000	o	100	S54	68.700	67.900	0.700	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S22.001	3.774	151.0	SSWMH04	68.670	68.391	-0.006	Open Manhole	1200
S23.000	10.744	151.0	S50	68.600	68.139	0.176	Junction	
S23.001	4.117	151.0	SSWMH04	68.670	68.112	0.273	Open Manhole	1200
S24.000	11.253	151.0	S54	68.550	67.635	0.815	Open Manhole	1200
S25.000	8.688	151.0	S54	68.550	67.842	0.608	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S24.001	o	100	S54	68.550	67.635	0.815	Open Manhole	1200
S1.006	o	225	SSWMH04	68.670	66.308	2.137	Open Manhole	1200
S26.000	MD7	-16	S57	68.370	68.050	0.035	Junction	
S26.001	MD7	-16	S58	68.440	67.767	0.388	Junction	
S1.007	o	300	S7	68.320	66.056	1.964	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S24.001	6.498	151.1	SSWMH04	68.670	67.592	0.978	Open Manhole	1200
S1.006	8.392	47.7	S7	68.320	66.131	1.964	Open Manhole	450
S26.000	42.701	151.0	S58	68.440	67.767	0.388	Junction	
S26.001	2.656	1.6	S7	68.320	66.071	1.964	Open Manhole	450
S1.007	32.155	110.4	S	68.320	65.765	2.255	Open Manhole	0

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S27.000	o	150	SSWMH12	68.740	67.800	0.790	Open Manhole	1200
S27.001	o	150	SSWMH13	69.020	67.507	1.363	Open Manhole	1200
S27.002	o	150	SSWMH14	69.000	67.266	1.584	Open Manhole	1200
S27.003	o	225	SSWMH15	69.000	67.023	1.827	Open Manhole	1200
S27.004	o	225	S66	68.650	66.805	1.620	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S27.000	26.371	90.0	SSWMH13	69.020	67.507	1.363	Open Manhole	1200
S27.001	21.649	90.0	SSWMH14	69.000	67.266	1.584	Open Manhole	1200
S27.002	21.881	90.0	SSWMH15	69.000	67.023	1.827	Open Manhole	1200
S27.003	12.863	90.0	S66	68.650	66.880	1.620	Open Manhole	1200
S27.004	13.872	90.0	S	68.600	66.651	1.724	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.023	0.023	0.023
2.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
3.000	User	-	97	0.045	0.043	0.043
3.001	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.000	0.000	0.000
4.001	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.000	0.000	0.000
5.001	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.029	0.029	0.029
6.001	-	-	100	0.000	0.000	0.000
7.000	User	-	97	0.013	0.013	0.013
7.001	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
8.000	User	-	97	0.025	0.024	0.024
8.001	-	-	100	0.000	0.000	0.000
9.000	User	-	100	0.022	0.022	0.022
9.001	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
10.000	User	-	100	0.006	0.006	0.006
10.001	-	-	100	0.000	0.000	0.000
11.000	User	-	100	0.006	0.006	0.006
11.001	-	-	100	0.000	0.000	0.000
10.002	-	-	100	0.000	0.000	0.000

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
12.000	User	-	97	0.034	0.033	0.033
12.001	-	-	100	0.000	0.000	0.000
13.000	User	-	100	0.013	0.013	0.013
13.001	-	-	100	0.000	0.000	0.000
10.003	-	-	100	0.000	0.000	0.000
14.000	-	-	100	0.000	0.000	0.000
15.000	User	-	100	0.040	0.040	0.040
15.001	-	-	100	0.000	0.000	0.000
16.000	User	-	97	0.021	0.021	0.021
16.001	-	-	100	0.000	0.000	0.000
17.000	User	-	100	0.037	0.037	0.037
17.001	-	-	100	0.000	0.000	0.000
10.004	User	-	100	0.008	0.008	0.008
18.000	User	-	100	0.009	0.009	0.009
18.001	-	-	100	0.000	0.000	0.000
19.000	User	-	100	0.009	0.009	0.009
19.001	-	-	100	0.000	0.000	0.000
10.005	-	-	100	0.000	0.000	0.000
20.000	User	-	100	0.047	0.047	0.047
20.001	-	-	100	0.000	0.000	0.000
21.000	User	-	100	0.034	0.034	0.034
21.001	-	-	100	0.000	0.000	0.000
10.006	-	-	100	0.000	0.000	0.000
22.000	User	-	100	0.006	0.006	0.006
	User	-	100	0.005	0.005	0.012
22.001	-	-	100	0.000	0.000	0.000
23.000	User	-	100	0.009	0.009	0.009

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	100	0.006	0.006	0.014
23.001	-	-	100	0.000	0.000	0.000
24.000	User	-	100	0.005	0.005	0.005
25.000	User	-	100	0.005	0.005	0.005
24.001	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
26.000	User	-	95	0.059	0.056	0.056
26.001	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
27.000	User	-	97	0.010	0.010	0.010
27.001	User	-	97	0.013	0.013	0.013
27.002	User	-	97	0.010	0.010	0.010
27.003	-	-	100	0.000	0.000	0.000
27.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.548	0.540	0.540

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.007	S	68.320	65.765	0.000	0	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S27.004	S	68.600	66.651	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	2	Number of Storage Structures	11	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	20.000	Cv (Summer)	0.750
Return Period (years)	1	Ratio R	0.400	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: S7, DS/PN: S1.007, Volume (m³): 0.7

Invert Level (m) 66.056

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.000	0.0000	2.000	0.0000	3.000	0.0000

Pump Manhole: S66, DS/PN: S27.004, Volume (m³): 2.6

Invert Level (m) 66.805

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.000	0.0000	2.000	0.0000	3.000	0.0000

Storage Structures for Storm

Porous Car Park Manhole: S4, DS/PN: S2.001

Infiltration Coefficient Base (m/hr)	0.12492	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	67.314	Depression Storage (mm)	5
Max Percolation (l/s)	62.7	Width (m)	4.7	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	48.0	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: S9, DS/PN: S6.001

Infiltration Coefficient Base (m/hr)	0.12492	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	67.233	Depression Storage (mm)	5
Max Percolation (l/s)	76.7	Width (m)	4.6	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	60.0	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: S11, DS/PN: S7.001

Infiltration Coefficient Base (m/hr)	0.12492	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	67.443	Depression Storage (mm)	5
Max Percolation (l/s)	18.4	Width (m)	4.6	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	14.4	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: S16, DS/PN: S9.001

Infiltration Coefficient Base (m/hr)	0.12492	Safety Factor	2.0	Width (m)	4.6
Membrane Percolation (mm/hr)	1000	Porosity	0.30	Length (m)	45.5
Max Percolation (l/s)	58.1	Invert Level (m)	67.312	Slope (1:X)	200.0

Porous Car Park Manhole: S16, DS/PN: S9.001

Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.400

Porous Car Park Manhole: S20, DS/PN: S13.001

Infiltration Coefficient Base (m/hr)	0.12492	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	67.521	Depression Storage (mm)	5
Max Percolation (l/s)	33.7	Width (m)	4.6	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	26.4	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: S26, DS/PN: S16.001

Infiltration Coefficient Base (m/hr)	0.12492	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	67.435	Depression Storage (mm)	5
Max Percolation (l/s)	58.4	Width (m)	4.6	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	45.7	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: S30, DS/PN: S17.001

Infiltration Coefficient Base (m/hr)	0.12492	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	67.306	Depression Storage (mm)	5
Max Percolation (l/s)	90.0	Width (m)	4.6	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	70.4	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: S37, DS/PN: S19.001

Infiltration Coefficient Base (m/hr)	0.12492	Max Percolation (l/s)	18.4	Porosity	0.30
Membrane Percolation (mm/hr)	1000	Safety Factor	2.0	Invert Level (m)	67.316

Porous Car Park Manhole: S37, DS/PN: S19.001

Width (m)	4.6	Slope (1:X)	200.0	Evaporation (mm/day)	3
Length (m)	14.4	Depression Storage (mm)	5	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: S46, DS/PN: S21.001

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	67.293	Depression Storage (mm)	5
Max Percolation (l/s)	92.0	Width (m)	4.6	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	72.0	Cap Volume Depth (m)	0.400

Cellular Storage Manhole: S7, DS/PN: S1.007

Invert Level (m)	65.900	Infiltration Coefficient Side (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Base (m/hr)	0.12492	Safety Factor	2.0		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	195.0	190.0	0.800	195.0	234.1	1.201	0.0	256.2
0.400	195.0	212.1	1.200	195.0	256.2			

Cellular Storage Manhole: S66, DS/PN: S27.004

Invert Level (m)	66.650	Infiltration Coefficient Side (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Base (m/hr)	0.12492	Safety Factor	2.0		

Cellular Storage Manhole: S66, DS/PN: S27.004

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	0.0	0.800	40.0	0.0	1.201	0.0	0.0
0.400	40.0	0.0	1.200	40.0	0.0			

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

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 11 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	60 Winter	1	+0%					68.050	-0.285	0.000	0.00		0.0	OK
S1.001	S2	60 Winter	1	+0%					67.701	-0.285	0.000	0.00		0.0	OK

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

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S2.000	S3	15 Winter	1	+0%					67.602	-0.098	0.000	0.24		3.0
S2.001	S4	15 Winter	1	+0%					67.354	-0.110	0.000	0.16		2.2
S1.002	SSWMH01	15 Winter	1	+0%	100/15 Summer				67.307	-0.109	0.000	0.16		2.2
S3.000	S26	15 Winter	1	+0%					67.634	-0.076	0.000	0.44		5.5
S3.001	S28	15 Winter	1	+0%	100/15 Summer				67.286	-0.094	0.000	0.30		5.5
S4.000	S16	60 Winter	1	+0%					68.060	-0.285	0.000	0.00		0.0
S4.001	S17	60 Winter	1	+0%					67.772	-0.285	0.000	0.00		0.0
S1.003	SSWMH06	15 Winter	1	+0%	30/15 Summer				67.154	-0.073	0.000	0.52		7.5
S5.000	S4	60 Winter	1	+0%					67.990	-0.285	0.000	0.00		0.0
S5.001	S5	60 Winter	1	+0%					67.624	-0.285	0.000	0.00		0.0
S6.000	S8	15 Winter	1	+0%					67.587	-0.023	0.000	0.87		3.7
S6.001	S9	15 Winter	1	+0%	100/15 Summer				67.283	-0.050	0.000	0.49		2.4
S7.000	S10	15 Winter	1	+0%					67.562	-0.058	0.000	0.35		1.7
S7.001	S11	15 Winter	1	+0%					67.476	-0.067	0.000	0.24		1.2
S1.004	SSWMH02	15 Winter	1	+0%	100/15 Summer				66.893	-0.145	0.000	0.27		10.8
S8.000	S7	15 Winter	1	+0%					68.066	-0.229	0.000	0.10		3.2
S8.001	S8	15 Winter	1	+0%					67.767	-0.230	0.000	0.14		3.2
S9.000	S15	15 Winter	1	+0%					67.593	-0.037	0.000	0.68		2.9
S9.001	S16	15 Winter	1	+0%	100/15 Winter				67.356	-0.057	0.000	0.39		1.9
S1.005	SSWMH03	15 Winter	1	+0%	30/15 Summer				66.590	-0.151	0.000	0.24		15.2
S10.000	S6	15 Winter	1	+0%					68.096	-0.259	0.000	0.03		0.8
S10.001	S7	15 Winter	1	+0%					68.019	-0.260	0.000	0.03		0.8
S11.000	S20	15 Winter	1	+0%					67.629	-0.071	0.000	0.18		0.8
S11.001	S21	15 Winter	1	+0%					67.578	-0.074	0.000	0.16		0.8
S10.002	SSWMH11	15 Winter	1	+0%	30/15 Winter				67.531	-0.061	0.000	0.32		1.5

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

PN	US/MH Name	Status	Level Exceeded
S2.000	S3	OK*	
S2.001	S4	OK*	
S1.002	SSWMH01	OK	
S3.000	S26	OK*	
S3.001	S28	OK	
S4.000	S16	OK	
S4.001	S17	OK	
S1.003	SSWMH06	OK	
S5.000	S4	OK	
S5.001	S5	OK	
S6.000	S8	OK*	
S6.001	S9	OK*	
S7.000	S10	OK*	
S7.001	S11	OK*	
S1.004	SSWMH02	OK	
S8.000	S7	FLOOD RISK*	
S8.001	S8	OK	
S9.000	S15	OK*	
S9.001	S16	OK*	
S1.005	SSWMH03	OK	
S10.000	S6	FLOOD RISK*	
S10.001	S7	OK	
S11.000	S20	OK*	
S11.001	S21	OK*	

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

PN	US/MH Name	Status	Level Exceeded
S10.002	SSWMH11	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S12.000	S13	15 Winter	1	+0%					68.168	-0.217	0.000	0.14		4.5
S12.001	S14	15 Winter	1	+0%					67.985	-0.217	0.000	0.17		4.4
S13.000	S19	15 Winter	1	+0%					67.685	-0.055	0.000	0.41		1.7
S13.001	S20	15 Winter	1	+0%	100/15 Summer				67.554	-0.067	0.000	0.23		1.1
S10.003	SSWMH10	15 Winter	1	+0%	30/15 Summer				67.282	-0.075	0.000	0.49		6.8
S14.000	SSWMH09	60 Winter	1	+0%					68.000	-0.100	0.000	0.00		0.0
S15.000	S18	15 Winter	1	+0%					68.207	-0.208	0.000	0.16		5.1
S15.001	S19	15 Winter	1	+0%					67.743	-0.211	0.000	0.22		5.1
S16.000	S25	15 Winter	1	+0%					67.659	-0.101	0.000	0.22		2.8
S16.001	S26	15 Winter	1	+0%					67.476	-0.109	0.000	0.17		1.9
S17.000	S29	15 Winter	1	+0%					67.637	-0.083	0.000	0.39		4.8
S17.001	S30	15 Winter	1	+0%	100/15 Summer				67.357	-0.099	0.000	0.25		3.6
S10.004	SSWMH08	15 Winter	1	+0%	30/15 Summer				67.049	-0.065	0.000	0.84		17.8
S18.000	S19	15 Winter	1	+0%					68.033	-0.252	0.000	0.04		1.3
S18.001	S20	15 Winter	1	+0%					67.930	-0.252	0.000	0.05		1.3
S19.000	S36	15 Winter	1	+0%					67.547	-0.073	0.000	0.16		1.3
S19.001	S37	15 Winter	1	+0%	100/15 Winter				67.344	-0.072	0.000	0.18		0.9
S10.005	Sdummy	15 Winter	1	+0%	30/15 Summer				66.944	-0.117	0.000	0.45		19.1
S20.000	S24	15 Winter	1	+0%					68.244	-0.191	0.000	0.21		5.9
S20.001	S25	15 Winter	1	+0%					67.871	-0.203	0.000	0.25		5.8
S21.000	S45	15 Winter	1	+0%					67.730	0.000	0.000	0.96		4.1
S21.001	S46	15 Winter	1	+0%	30/15 Winter				67.354	-0.039	0.000	0.68		3.3
S10.006	SSWMH05	15 Winter	1	+0%	30/15 Summer				66.582	-0.115	0.000	0.48		27.6
S22.000	S47	15 Winter	1	+0%					68.517	-0.248	0.000	0.06		1.6
S22.001	S48	15 Winter	1	+0%					68.453	-0.248	0.000	0.07		1.6

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

PN	US/MH Name	Status	Level Exceeded
S12.000	S13	FLOOD RISK*	
S12.001	S14	OK	
S13.000	S19	OK*	
S13.001	S20	OK*	
S10.003	SSWMH10	OK	
S14.000	SSWMH09	OK	
S15.000	S18	FLOOD RISK*	
S15.001	S19	OK	
S16.000	S25	OK*	
S16.001	S26	OK*	
S17.000	S29	OK*	
S17.001	S30	OK*	
S10.004	SSWMH08	OK	
S18.000	S19	FLOOD RISK*	
S18.001	S20	OK	
S19.000	S36	OK*	
S19.001	S37	OK*	
S10.005	Sdummy	OK*	
S20.000	S24	FLOOD RISK*	
S20.001	S25	OK	
S21.000	S45	SURCHARGED*	
S21.001	S46	OK*	
S10.006	SSWMH05	OK	
S22.000	S47	FLOOD RISK*	

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

PN	US/MH Name	Status	Level Exceeded
S22.001	S48	FLOOD RISK*	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S23.000	S49	15 Winter	1	+0%					68.252	-0.243	0.000	0.07		2.0
S23.001	S50	15 Winter	1	+0%					68.181	-0.243	0.000	0.09		2.0
S24.000	S53	15 Winter	1	+0%					67.736	-0.074	0.000	0.15		0.7
S25.000	S54	15 Winter	1	+0%					67.925	-0.075	0.000	0.14		0.7
S24.001	S54	15 Winter	1	+0%	100/15 Summer				67.674	-0.061	0.000	0.32		1.4
S1.006	SSWMH04	15 Winter	1	+0%	30/15 Summer				66.458	-0.075	0.000	0.78		46.0
S26.000	S57	15 Winter	1	+0%	100/15 Winter				68.145	-0.190	0.000	0.23		7.5
S26.001	S58	15 Winter	1	+0%					67.790	-0.262	0.000	0.05		7.5
S1.007	S7	120 Winter	1	+0%	30/30 Winter				66.143	-0.213	0.000	0.00		0.0
S27.000	SSWMH12	15 Winter	1	+0%					67.828	-0.122	0.000	0.08		1.4
S27.001	SSWMH13	15 Winter	1	+0%					67.547	-0.110	0.000	0.16		2.8
S27.002	SSWMH14	15 Winter	1	+0%	100/15 Summer				67.314	-0.102	0.000	0.22		4.0
S27.003	SSWMH15	15 Winter	1	+0%	100/480 Winter				67.067	-0.181	0.000	0.08		4.0
S27.004	S66	1440 Winter	1	+0%	30/960 Winter				66.872	-0.158	0.000	0.00		0.0

PN	US/MH Name	Status	Level Exceeded
S23.000	S49	FLOOD RISK*	
S23.001	S50	OK	
S24.000	S53	OK*	
S25.000	S54	OK*	
S24.001	S54	OK	

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

PN	US/MH Name	Status	Level Exceeded
S1.006	SSWMH04	OK	
S26.000	S57	FLOOD RISK*	
S26.001	S58	OK	
S1.007	S7	OK	
S27.000	SSWMH12	OK	
S27.001	SSWMH13	OK	
S27.002	SSWMH14	OK	
S27.003	SSWMH15	OK	
S27.004	S66	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 11 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	60 Winter	30	+0%					68.050	-0.285	0.000	0.00		0.0	OK
S1.001	S2	60 Winter	30	+0%					67.701	-0.285	0.000	0.00		0.0	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S2.000	S3	15 Winter	30	+0%					67.637	-0.063	0.000	0.60		7.5
S2.001	S4	15 Winter	30	+0%					67.380	-0.084	0.000	0.40		5.6
S1.002	SSWMH01	15 Winter	30	+0%	100/15 Summer				67.333	-0.083	0.000	0.41		5.4
S3.000	S26	15 Winter	30	+0%					67.710	0.000	0.000	1.04		13.0
S3.001	S28	15 Winter	30	+0%	100/15 Summer				67.335	-0.045	0.000	0.70		12.9
S4.000	S16	60 Winter	30	+0%					68.060	-0.285	0.000	0.00		0.0
S4.001	S17	60 Winter	30	+0%					67.772	-0.285	0.000	0.00		0.0
S1.003	SSWMH06	15 Winter	30	+0%	30/15 Summer				67.281	0.054	0.000	1.14		16.4
S5.000	S4	60 Winter	30	+0%					67.990	-0.285	0.000	0.00		0.0
S5.001	S5	60 Winter	30	+0%					67.624	-0.285	0.000	0.00		0.0
S6.000	S8	60 Winter	30	+0%					67.610	0.000	0.000	1.11		4.7
S6.001	S9	15 Winter	30	+0%	100/15 Summer				67.311	-0.022	0.000	0.96		4.7
S7.000	S10	15 Winter	30	+0%					67.593	-0.027	0.000	0.87		4.2
S7.001	S11	15 Winter	30	+0%					67.496	-0.046	0.000	0.56		2.7
S1.004	SSWMH02	15 Winter	30	+0%	100/15 Summer				66.936	-0.102	0.000	0.57		23.0
S8.000	S7	15 Winter	30	+0%					68.110	-0.185	0.000	0.24		7.9
S8.001	S8	15 Winter	30	+0%					67.810	-0.188	0.000	0.33		7.8
S9.000	S15	30 Winter	30	+0%					67.630	0.000	0.000	1.22		5.2
S9.001	S16	15 Winter	30	+0%	100/15 Winter				67.382	-0.030	0.000	0.83		4.1
S1.005	SSWMH03	15 Winter	30	+0%	30/15 Summer				66.831	0.091	0.000	0.50		32.2
S10.000	S6	15 Winter	30	+0%					68.113	-0.242	0.000	0.07		2.1
S10.001	S7	15 Winter	30	+0%					68.037	-0.242	0.000	0.09		2.1
S11.000	S20	15 Winter	30	+0%					67.648	-0.052	0.000	0.45		1.9
S11.001	S21	15 Winter	30	+0%					67.621	-0.031	0.000	0.39		1.9
S10.002	SSWMH11	15 Winter	30	+0%	30/15 Winter				67.615	0.023	0.000	0.74		3.6

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S2.000	S3	OK*	
S2.001	S4	OK*	
S1.002	SSWMH01	OK	
S3.000	S26	SURCHARGED*	
S3.001	S28	OK	
S4.000	S16	OK	
S4.001	S17	OK	
S1.003	SSWMH06	SURCHARGED	
S5.000	S4	OK	
S5.001	S5	OK	
S6.000	S8	SURCHARGED*	
S6.001	S9	OK*	
S7.000	S10	OK*	
S7.001	S11	OK*	
S1.004	SSWMH02	OK	
S8.000	S7	FLOOD RISK*	
S8.001	S8	OK	
S9.000	S15	SURCHARGED*	
S9.001	S16	OK*	
S1.005	SSWMH03	SURCHARGED	
S10.000	S6	FLOOD RISK*	
S10.001	S7	OK	
S11.000	S20	OK*	
S11.001	S21	OK*	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S10.002	SSWMH11	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S12.000	S13	15 Winter	30	+0%					68.222	-0.163	0.000	0.34		11.1
S12.001	S14	15 Winter	30	+0%					68.037	-0.165	0.000	0.43		11.0
S13.000	S19	15 Winter	30	+0%					67.725	-0.015	0.000	0.99		4.2
S13.001	S20	15 Winter	30	+0%	100/15 Summer				67.575	-0.046	0.000	0.54		2.7
S10.003	SSWMH10	15 Winter	30	+0%	30/15 Summer				67.566	0.209	0.000	1.03		14.3
S14.000	SSWMH09	60 Winter	30	+0%					68.000	-0.100	0.000	0.00		0.0
S15.000	S18	15 Winter	30	+0%					68.268	-0.147	0.000	0.38		12.5
S15.001	S19	15 Winter	30	+0%					67.800	-0.154	0.000	0.53		12.6
S16.000	S25	15 Winter	30	+0%					67.691	-0.069	0.000	0.55		6.9
S16.001	S26	15 Winter	30	+0%					67.503	-0.082	0.000	0.42		4.8
S17.000	S29	15 Winter	30	+0%					67.696	-0.024	0.000	0.95		11.8
S17.001	S30	15 Winter	30	+0%	100/15 Summer				67.392	-0.064	0.000	0.63		9.0
S10.004	SSWMH08	15 Winter	30	+0%	30/15 Summer				67.364	0.251	0.000	1.78		37.8
S18.000	S19	15 Winter	30	+0%					68.054	-0.231	0.000	0.09		3.1
S18.001	S20	15 Winter	30	+0%					67.951	-0.231	0.000	0.12		3.1
S19.000	S36	15 Winter	30	+0%					67.564	-0.056	0.000	0.40		3.1
S19.001	S37	15 Winter	30	+0%	100/15 Winter				67.361	-0.055	0.000	0.43		2.1
S10.005	Sdummy	15 Winter	30	+0%	30/15 Summer				67.220	0.159	0.000	0.94		39.6
S20.000	S24	15 Winter	30	+0%					68.320	-0.115	0.000	0.51		14.6
S20.001	S25	15 Winter	30	+0%					67.935	-0.140	0.000	0.62		14.4
S21.000	S45	60 Winter	30	+0%					67.730	0.000	0.000	1.23		5.2
S21.001	S46	15 Winter	30	+0%	30/15 Winter				67.394	0.001	0.000	1.05		5.1
S10.006	SSWMH05	15 Winter	30	+0%	30/15 Summer				66.899	0.202	0.000	0.96		54.7
S22.000	S47	15 Winter	30	+0%					68.543	-0.222	0.000	0.14		3.9
S22.001	S48	15 Winter	30	+0%					68.479	-0.222	0.000	0.17		3.9

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S12.000	S13	FLOOD RISK*	
S12.001	S14	OK	
S13.000	S19	OK*	
S13.001	S20	OK*	
S10.003	SSWMH10	SURCHARGED	
S14.000	SSWMH09	OK	
S15.000	S18	FLOOD RISK*	
S15.001	S19	OK	
S16.000	S25	OK*	
S16.001	S26	OK*	
S17.000	S29	OK*	
S17.001	S30	OK*	
S10.004	SSWMH08	SURCHARGED	
S18.000	S19	FLOOD RISK*	
S18.001	S20	OK	
S19.000	S36	OK*	
S19.001	S37	OK*	
S10.005	Sdummy	SURCHARGED*	
S20.000	S24	FLOOD RISK*	
S20.001	S25	OK	
S21.000	S45	SURCHARGED*	
S21.001	S46	SURCHARGED*	
S10.006	SSWMH05	SURCHARGED	
S22.000	S47	FLOOD RISK*	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S22.001	S48	FLOOD RISK*	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S23.000	S49	15 Winter	30	+0%					68.283	-0.212	0.000	0.16		4.9
S23.001	S50	15 Winter	30	+0%					68.211	-0.213	0.000	0.21		4.9
S24.000	S53	15 Winter	30	+0%					67.752	-0.058	0.000	0.36		1.8
S25.000	S54	15 Winter	30	+0%					67.941	-0.059	0.000	0.35		1.7
S24.001	S54	15 Winter	30	+0%	100/15 Summer				67.704	-0.032	0.000	0.80		3.5
S1.006	SSWMH04	15 Winter	30	+0%	30/15 Summer				66.749	0.217	0.000	1.51		89.1
S26.000	S57	15 Winter	30	+0%	100/15 Winter				68.224	-0.111	0.000	0.56		18.2
S26.001	S58	15 Winter	30	+0%					67.807	-0.245	0.000	0.12		18.1
S1.007	S7	240 Winter	30	+0%	30/30 Winter				66.610	0.254	0.000	0.00		0.0
S27.000	SSWMH12	15 Winter	30	+0%					67.845	-0.105	0.000	0.19		3.4
S27.001	SSWMH13	15 Winter	30	+0%					67.578	-0.079	0.000	0.44		7.7
S27.002	SSWMH14	15 Winter	30	+0%	100/15 Summer				67.355	-0.062	0.000	0.63		11.1
S27.003	SSWMH15	15 Winter	30	+0%	100/480 Winter				67.098	-0.151	0.000	0.24		11.2
S27.004	S66	1440 Winter	30	+0%	30/960 Winter				67.097	0.066	0.000	0.00		0.0

PN	US/MH Name	Status	Level Exceeded
S23.000	S49	FLOOD RISK*	
S23.001	S50	OK	
S24.000	S53	OK*	
S25.000	S54	OK*	
S24.001	S54	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S1.006	SSWMH04	SURCHARGED	
S26.000	S57	FLOOD RISK*	
S26.001	S58	OK	
S1.007	S7	SURCHARGED	
S27.000	SSWMH12	OK	
S27.001	SSWMH13	OK	
S27.002	SSWMH14	OK	
S27.003	SSWMH15	OK	
S27.004	S66	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 11 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	60 Winter	100	+40%					68.050	-0.285	0.000	0.00		0.0	OK
S1.001	S2	60 Winter	100	+40%					67.701	-0.285	0.000	0.00		0.0	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S2.000	S3	15 Winter	100	+40%					67.700	0.000	0.000	1.06		13.3
S2.001	S4	15 Winter	100	+40%					67.462	-0.002	0.000	0.68		9.4
S1.002	SSWMH01	15 Winter	100	+40%	100/15 Summer				67.466	0.050	0.000	0.75		10.0
S3.000	S26	15 Winter	100	+40%					67.710	0.000	0.000	1.62		20.2
S3.001	S28	15 Winter	100	+40%	100/15 Summer				67.643	0.264	0.000	0.99		18.2
S4.000	S16	60 Winter	100	+40%					68.060	-0.285	0.000	0.00		0.0
S4.001	S17	60 Winter	100	+40%					67.772	-0.285	0.000	0.00		0.0
S1.003	SSWMH06	15 Winter	100	+40%	30/15 Summer				67.492	0.265	0.000	1.30		18.6
S5.000	S4	60 Winter	100	+40%					67.990	-0.285	0.000	0.00		0.0
S5.001	S5	60 Winter	100	+40%					67.624	-0.285	0.000	0.00		0.0
S6.000	S8	15 Winter	100	+40%					67.610	0.000	0.000	2.41		10.2
S6.001	S9	360 Winter	100	+40%	100/15 Summer				67.390	0.057	0.000	0.38		1.9
S7.000	S10	15 Winter	100	+40%					67.620	0.000	0.000	1.54		7.5
S7.001	S11	15 Winter	100	+40%					67.522	-0.021	0.000	0.98		4.8
S1.004	SSWMH02	360 Winter	100	+40%	100/15 Summer				67.421	0.382	0.000	0.20		8.1
S8.000	S7	15 Winter	100	+40%					68.157	-0.138	0.000	0.44		14.4
S8.001	S8	15 Winter	100	+40%					67.856	-0.142	0.000	0.61		14.2
S9.000	S15	15 Winter	100	+40%					67.630	0.000	0.000	2.19		9.3
S9.001	S16	15 Winter	100	+40%	100/15 Winter				67.417	0.005	0.000	1.09		5.4
S1.005	SSWMH03	360 Winter	100	+40%	30/15 Summer				67.430	0.689	0.000	0.16		10.5
S10.000	S6	15 Winter	100	+40%					68.132	-0.223	0.000	0.12		3.8
S10.001	S7	15 Winter	100	+40%					68.055	-0.224	0.000	0.16		3.8
S11.000	S20	15 Winter	100	+40%					67.700	0.000	0.000	0.73		3.1
S11.001	S21	15 Winter	100	+40%					67.651	0.000	0.000	0.45		2.2
S10.002	SSWMH11	15 Winter	100	+40%	30/15 Winter				67.916	0.325	0.000	0.85		4.1

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S2.000	S3	SURCHARGED*	
S2.001	S4	OK*	
S1.002	SSWMH01	SURCHARGED	
S3.000	S26	SURCHARGED*	
S3.001	S28	SURCHARGED	
S4.000	S16	OK	
S4.001	S17	OK	
S1.003	SSWMH06	SURCHARGED	
S5.000	S4	OK	
S5.001	S5	OK	
S6.000	S8	SURCHARGED*	
S6.001	S9	SURCHARGED*	
S7.000	S10	SURCHARGED*	
S7.001	S11	OK*	
S1.004	SSWMH02	SURCHARGED	
S8.000	S7	FLOOD RISK*	
S8.001	S8	OK	
S9.000	S15	SURCHARGED*	
S9.001	S16	SURCHARGED*	
S1.005	SSWMH03	SURCHARGED	
S10.000	S6	FLOOD RISK*	
S10.001	S7	OK	
S11.000	S20	SURCHARGED*	
S11.001	S21	SURCHARGED*	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S10.002	SSWMH11	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S12.000	S13	15 Winter	100	+40%					68.286	-0.099	0.000	0.61		20.2
S12.001	S14	15 Winter	100	+40%					68.099	-0.103	0.000	0.78		20.0
S13.000	S19	15 Winter	100	+40%					67.740	0.000	0.000	1.62		6.9
S13.001	S20	15 Winter	100	+40%	100/15 Summer				67.691	0.070	0.000	1.33		6.5
S10.003	SSWMH10	15 Winter	100	+40%	30/15 Summer				67.779	0.423	0.000	1.05		14.7
S14.000	SSWMH09	60 Winter	100	+40%					68.000	-0.100	0.000	0.00		0.0
S15.000	S18	15 Winter	100	+40%					68.342	-0.073	0.000	0.70		22.8
S15.001	S19	15 Winter	100	+40%					67.870	-0.084	0.000	0.97		23.0
S16.000	S25	15 Winter	100	+40%					67.747	-0.013	0.000	0.98		12.3
S16.001	S26	15 Winter	100	+40%					67.564	-0.021	0.000	0.84		9.4
S17.000	S29	15 Winter	100	+40%					67.720	0.000	0.000	1.54		19.3
S17.001	S30	15 Winter	100	+40%	100/15 Summer				67.547	0.091	0.000	1.30		18.7
S10.004	SSWMH08	15 Winter	100	+40%	30/15 Summer				67.557	0.443	0.000	1.94		41.4
S18.000	S19	15 Winter	100	+40%					68.080	-0.205	0.000	0.17		5.7
S18.001	S20	15 Winter	100	+40%					67.977	-0.205	0.000	0.22		5.7
S19.000	S36	15 Winter	100	+40%					67.584	-0.036	0.000	0.72		5.7
S19.001	S37	15 Winter	100	+40%	100/15 Winter				67.429	0.013	0.000	0.98		4.8
S10.005	Sdummy	15 Winter	100	+40%	30/15 Summer				67.459	0.397	0.000	0.99		41.6
S20.000	S24	15 Winter	100	+40%					68.427	-0.008	0.000	0.93		26.6
S20.001	S25	15 Winter	100	+40%					68.058	-0.016	0.000	1.00		23.4
S21.000	S45	15 Winter	100	+40%					67.730	0.000	0.000	2.46		10.4
S21.001	S46	30 Winter	100	+40%	30/15 Winter				67.446	0.053	0.000	1.44		7.1
S10.006	SSWMH05	360 Winter	100	+40%	30/15 Summer				67.438	0.742	0.000	0.35		19.8
S22.000	S47	15 Winter	100	+40%					68.573	-0.192	0.000	0.25		7.1
S22.001	S48	15 Winter	100	+40%					68.509	-0.192	0.000	0.31		7.2

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S12.000	S13	FLOOD RISK*	
S12.001	S14	OK	
S13.000	S19	SURCHARGED*	
S13.001	S20	SURCHARGED*	
S10.003	SSWMH10	SURCHARGED	
S14.000	SSWMH09	OK	
S15.000	S18	FLOOD RISK*	
S15.001	S19	OK	
S16.000	S25	OK*	
S16.001	S26	OK*	
S17.000	S29	SURCHARGED*	
S17.001	S30	SURCHARGED*	
S10.004	SSWMH08	SURCHARGED	
S18.000	S19	FLOOD RISK*	
S18.001	S20	OK	
S19.000	S36	OK*	
S19.001	S37	SURCHARGED*	
S10.005	Sdummy	SURCHARGED*	
S20.000	S24	FLOOD RISK*	
S20.001	S25	OK	
S21.000	S45	SURCHARGED*	
S21.001	S46	SURCHARGED*	
S10.006	SSWMH05	SURCHARGED	
S22.000	S47	FLOOD RISK*	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S22.001	S48	FLOOD RISK*	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S23.000	S49	15 Winter	100	+40%					68.316	-0.179	0.000	0.29		8.9
S23.001	S50	15 Winter	100	+40%					68.245	-0.179	0.000	0.38		8.9
S24.000	S53	15 Winter	100	+40%					67.801	-0.009	0.000	0.62		3.1
S25.000	S54	15 Winter	100	+40%					67.959	-0.041	0.000	0.64		3.1
S24.001	S54	15 Winter	100	+40%	100/15 Summer				67.771	0.035	0.000	1.37		6.0
S1.006	SSWMH04	360 Winter	100	+40%	30/15 Summer				67.435	0.903	0.000	0.56		32.9
S26.000	S57	15 Winter	100	+40%	100/15 Winter				68.338	0.003	0.000	0.99		32.5
S26.001	S58	15 Winter	100	+40%					67.823	-0.230	0.000	0.22		32.6
S1.007	S7	360 Winter	100	+40%	30/30 Winter				67.433	1.077	0.000	0.00		0.0
S27.000	SSWMH12	15 Winter	100	+40%					67.861	-0.089	0.000	0.34		6.1
S27.001	SSWMH13	15 Winter	100	+40%					67.613	-0.044	0.000	0.80		14.1
S27.002	SSWMH14	15 Winter	100	+40%	100/15 Summer				67.460	0.044	0.000	1.09		19.4
S27.003	SSWMH15	1440 Winter	100	+40%	100/480 Winter				67.421	0.173	0.000	0.02		0.9
S27.004	S66	1440 Winter	100	+40%	30/960 Winter				67.421	0.391	0.000	0.00		0.0

PN	US/MH Name	Status	Level Exceeded
S23.000	S49	FLOOD RISK*	
S23.001	S50	OK	
S24.000	S53	OK*	
S25.000	S54	OK*	
S24.001	S54	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
S1.006	SSWMH04	SURCHARGED	
S26.000	S57	FLOOD RISK*	
S26.001	S58	OK	
S1.007	S7	SURCHARGED	
S27.000	SSWMH12	OK	
S27.001	SSWMH13	OK	
S27.002	SSWMH14	SURCHARGED	
S27.003	SSWMH15	SURCHARGED	
S27.004	S66	SURCHARGED	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 347 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	66.476	0.576	4.1	0.0	4.1	128.7	O K
30 min Summer	66.664	0.764	4.1	0.0	4.1	170.5	O K
60 min Summer	66.846	0.946	4.1	0.0	4.1	211.2	O K
120 min Summer	67.006	1.106	4.1	0.0	4.1	246.9	O K
180 min Summer	67.076	1.176	4.1	0.0	4.1	262.6	O K
240 min Summer	67.189	1.289	5.5	0.0	5.5	269.1	O K
360 min Summer	67.202	1.302	5.7	0.0	5.7	269.4	O K
480 min Summer	67.149	1.249	4.9	0.0	4.9	268.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.153	0.0	133.1	26
30 min Summer	90.705	0.0	177.7	41
60 min Summer	56.713	0.0	224.4	70
120 min Summer	34.246	0.0	272.9	128
180 min Summer	25.149	0.0	301.4	186
240 min Summer	20.078	0.0	321.2	244
360 min Summer	14.585	0.0	350.4	348
480 min Summer	11.622	0.0	372.6	438

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
600 min Summer	67.080	1.180	4.1	0.0	4.1	263.5	O K
720 min Summer	67.052	1.152	4.1	0.0	4.1	257.1	O K
960 min Summer	66.997	1.097	4.1	0.0	4.1	244.8	O K
1440 min Summer	66.900	1.000	4.1	0.0	4.1	223.2	O K
2160 min Summer	66.766	0.866	4.1	0.0	4.1	193.3	O K
2880 min Summer	66.640	0.740	4.1	0.0	4.1	165.2	O K
4320 min Summer	66.418	0.518	4.1	0.0	4.1	115.7	O K
5760 min Summer	66.240	0.340	4.1	0.0	4.1	75.9	O K
7200 min Summer	66.108	0.208	4.1	0.0	4.1	46.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Summer	9.738	0.0	390.2	544
720 min Summer	8.424	0.0	405.1	600
960 min Summer	6.697	0.0	429.2	722
1440 min Summer	4.839	0.0	464.3	986
2160 min Summer	3.490	0.0	500.9	1388
2880 min Summer	2.766	0.0	527.4	1792
4320 min Summer	1.989	0.0	565.2	2552
5760 min Summer	1.573	0.0	591.8	3240
7200 min Summer	1.311	0.0	612.1	3904

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	66.018	0.118	4.1	0.0	4.1	26.4	O K
10080 min Summer	65.966	0.066	4.1	0.0	4.1	14.8	O K
15 min Winter	66.553	0.653	4.1	0.0	4.1	145.7	O K
30 min Winter	66.764	0.864	4.1	0.0	4.1	192.9	O K
60 min Winter	66.971	1.071	4.1	0.0	4.1	239.2	O K
120 min Winter	67.362	1.462	8.3	0.0	8.3	277.5	O K
180 min Winter	67.471	1.571	10.0	0.0	10.0	287.0	O K
240 min Winter	67.483	1.583	10.2	0.0	10.2	288.2	O K
360 min Winter	67.477	1.577	10.1	0.0	10.1	287.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.129	0.0	628.2	4584
10080 min Summer	0.994	0.0	641.4	5152
15 min Winter	138.153	0.0	150.2	26
30 min Winter	90.705	0.0	200.1	40
60 min Winter	56.713	0.0	252.5	68
120 min Winter	34.246	0.0	306.8	124
180 min Winter	25.149	0.0	338.7	178
240 min Winter	20.078	0.0	361.0	228
360 min Winter	14.585	0.0	393.8	284

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
480 min Winter	67.462	1.562	9.9	0.0	9.9	286.0	O K
600 min Winter	67.432	1.532	9.4	0.0	9.4	283.2	O K
720 min Winter	67.394	1.494	8.8	0.0	8.8	279.9	O K
960 min Winter	67.306	1.406	7.4	0.0	7.4	273.8	O K
1440 min Winter	67.057	1.157	4.1	0.0	4.1	258.4	O K
2160 min Winter	66.856	0.956	4.1	0.0	4.1	213.5	O K
2880 min Winter	66.664	0.764	4.1	0.0	4.1	170.6	O K
4320 min Winter	66.332	0.432	4.1	0.0	4.1	96.5	O K
5760 min Winter	66.088	0.188	4.1	0.0	4.1	42.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
480 min Winter	11.622	0.0	418.6	362
600 min Winter	9.738	0.0	438.5	440
720 min Winter	8.424	0.0	455.1	520
960 min Winter	6.697	0.0	482.2	684
1440 min Winter	4.839	0.0	521.9	1074
2160 min Winter	3.490	0.0	563.1	1516
2880 min Winter	2.766	0.0	593.1	1936
4320 min Winter	1.989	0.0	636.1	2684
5760 min Winter	1.573	0.0	666.6	3344

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
7200 min Winter	65.956	0.056	4.1	0.0	4.1	12.5	O K
8640 min Winter	65.944	0.044	3.6	0.0	3.6	9.8	O K
10080 min Winter	65.939	0.039	3.2	0.0	3.2	8.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Winter	1.311	0.0	690.0	3752
8640 min Winter	1.129	0.0	708.9	4400
10080 min Winter	0.994	0.0	724.3	5136

Rainfall Details

Rainfall Model	FSR	Ratio R	0.400	Cv (Winter)	0.840
Return Period (years)	100	Summer Storms	Yes	Shortest Storm (mins)	15
Region	England and Wales	Winter Storms	Yes	Longest Storm (mins)	10080
M5-60 (mm)	20.000	Cv (Summer)	0.750	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.550

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.183	4	8	0.183	8	12	0.183

Model Details

Storage is Online Cover Level (m) 68.350

Complex Structure

Cellular Storage

Invert Level (m) 65.900 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.12500 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	235.0	235.0	0.800	235.0	284.1	1.201	0.0	308.6
0.400	235.0	259.5	1.200	235.0	308.6			

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.12500	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	67.100	Depression Storage (mm)	5
Max Percolation (l/s)	507.3	Width (m)	4.6	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	397.0	Cap Volume Depth (m)	0.400

Pump Outflow Control

Invert Level (m) 66.056

Pump Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.000	0.0000	2.000	0.0000	3.000	0.0000	4.000	0.0000