TETRA TECH

Appendices Chapter 9

Environmental Statement: Volume 2

784-B048803

Pell Frischmann

M4 J16 Motorway Rest Area, Swindon

Flood Risk Assessment

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Ref. reference. Rev revision. Suit suitability.

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1 Introduction

1.1 Project Brief

1.1.1 Pell Frischmann has been appointed by Moto Hospitality to undertake a Flood Risk Assessment (FRA) to support a planning application for a commercial motorway rest area on a site located at Junction 16 of the M4, Swindon.

1.1.2 The purpose of this FRA is to review available information and assess the flood risk posed to the site and proposed development from a range of sources, now and in the future. The FRA has been carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG), in respect to flood risk and coastal change.

1.1.3 To complete the Flood Risk Assessment, the following key stages of work have been undertaken:

- Collation of desk-based information and undertake a review of publicly available flood risk information including Environment Agency mapping and local data, policy, and guidance.
- Desktop review of other data that has been made available such as topographical surveys, utility plans and proposed development layout options.
- Consultation with relevant stakeholders to obtain further information on local risks and issues.
- Provision advice on appropriate flood risk mitigation measures for the proposed development.

1.2 Sources of Information

1.2.1 A review of relevant information and guidance from a range of sources has been undertaken and includes the following key documents:

- National Planning Policy Framework (NPPF), September 2023
- Planning Practice Guidance (PPG), August 2022
- Environment Agency Flood Map for Planning and Risk of Flooding from Surface Water datasets from the DEFRA Spatial Data Catalogue
- DEFRA MagicMap, 2023
- British Geological Survey Geology Viewer, 2023
- British Geological Survey GeoIndex, 2023
- Wiltshire Strategic Flood Risk Assessment, May 2019
- Wiltshire Preliminary Flood Risk Assessment, June 2011
- Wiltshire County Council Local Plan, January 2015
- Wiltshire Local Flood Risk Management Strategy, November 2014
- Wiltshire Council Surface Water Management Plan, November 2011
- Thames Catchment Flood Management Plan, December 2009
- Thames River Basin Management Plan, December 2022

1.2.2 A request for information was submitted to the Environment Agency on May 2023 to obtain any site-specific flood risk data they may hold. Information was received on June 2023 and is incorporated within this FRA where appropriate.

2 Background & Site Context

2.1 Site Location & Existing Use

2.1.1 The site is located to the south of Swindon, on the southern side of Junction 16 of the M4. A site location plan is included for reference as **Figure 2.1**. In total, the site covers approximately 7.3 hectares.

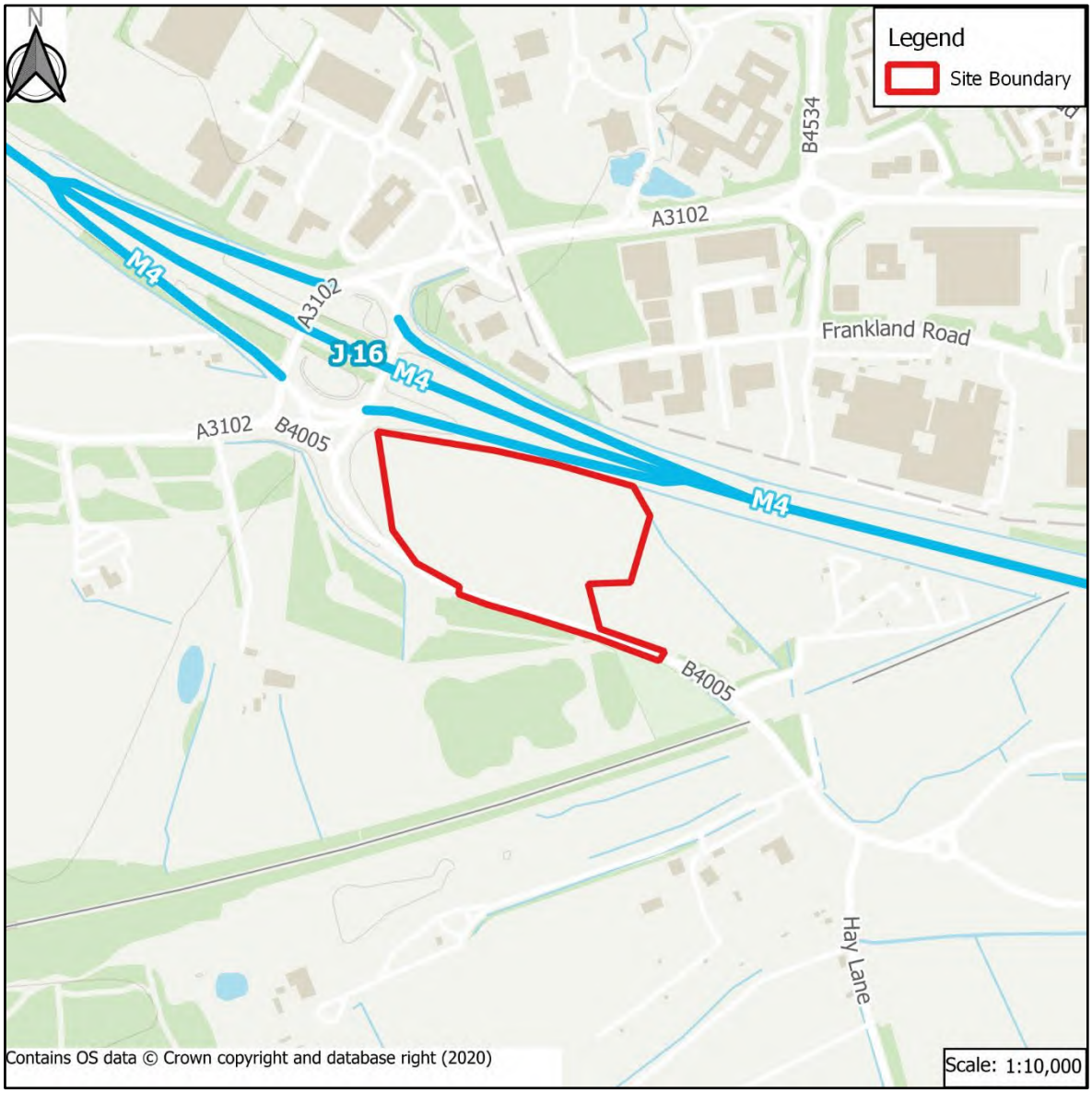


Figure 2.1 Site Location Plan

2.1.2 The northern boundary of the site is formed by J16 of the M4, beyond which is Swindon. To the east is open agricultural land and a small unnamed watercourse. The southern boundary is formed by the B4005, beyond which is further agricultural land, and to the west is the B4005, and J16 of the M4.

2.1.3 Mapping shows the site to be currently undeveloped. Furthermore, the site is shown to be used primarily for agriculture, therefore, it is considered the Site is subject to a natural regime of drainage involving runoff and infiltration where ground conditions permit.

2.2 Local Watercourses

2.2.1 A review of the OS OpenRivers dataset shows a small field drain is found within the site boundary. Found along the eastern boundary of the site, the small watercourse likely served a land drainage function.

Several smaller unnamed watercourses are found immediately surrounding the site boundary and in the wider area. Some of these form part of the highway drainage network, and others provide a land drainage function to the agricultural land, with wider connectivity to watercourses to the east.

2.2.2 **Figure 2.2** shows the locations of local watercourses.

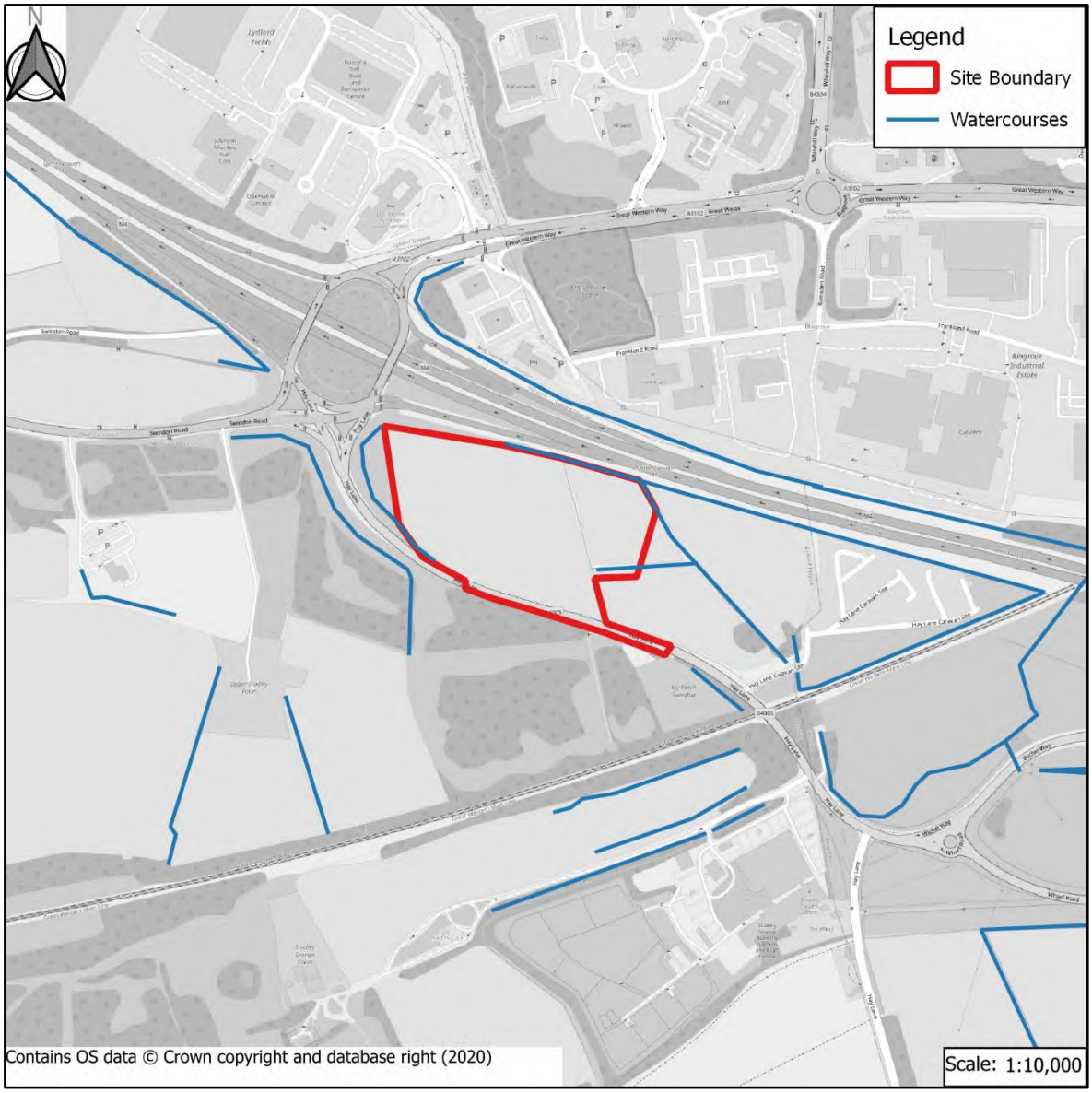


Figure 2.2 Local Watercourses

2.3 Topography

2.3.1 The site generally falls from west to east with maximum elevations of approximately 108.14m AOD in the west, falling to a minimum elevation of approximately 103.41m AOD in the east. Approximate elevations have been taken from LiDAR elevation data provided by DEFRA. An extract of which is provided for reference as **Figure 2.3**. The topographic survey for the site has been attached as **Appendix A.**

2.3.2 The LiDAR data further shows elevations in the wider area remain consistent with the change in levels within the site boundary, with elevations rising to the west and falling to the east.

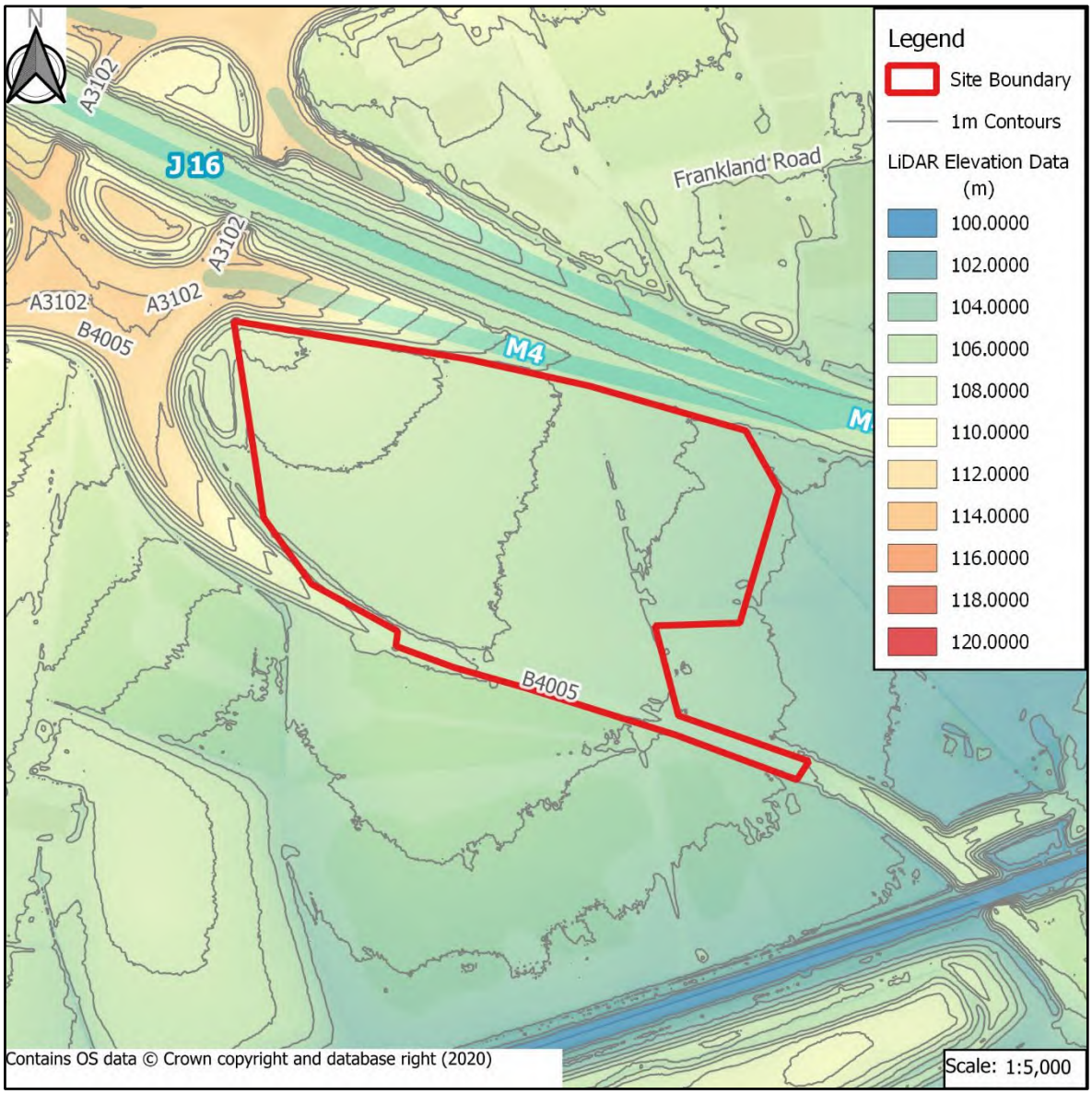


Figure 2.3 LiDAR Elevation Data

2.4 Geology

2.4.1 British Geological Survey (BGS) mapping suggests the site is wholly underlain by a bedrock geology comprising Kimmeridge Clay Formation – Mudstone. This suggests limited potential for infiltration.

2.4.2 BGS mapping also shows there to be no recorded superficial geology within the site or the surrounding area.

2.4.3 There are no freely available borehole records within the site boundary. The nearest can be found immediately to the southwest and northeast of the site (borehole references: SU18SW41 and SU18SW60). Details from the logs made available via the BGS are summarised in **Table 2.1**.

Table 2.1 Borehole Information

Borehole Reference	Date Drilled	Depth (mbgl)	Water Struck (mbgl)
SU18SW41	September 1966	1.2	DRY
SU18SW60	July 1984	5.0	DRY

2.4.4 Aquifer designations by DEFRA show both the superficial drift classification and bedrock classification to be Unproductive. This is defined as rock layers and drift deposits with low permeability that have

negligible significance for water supply or river base flow. This suggests very little to no water within the bedrock or superficial strata.

2.4.5 The site does not fall within a Source Protection Zone (SPZ), with the nearest SPZ (Zone II – Subsurface Activity) being found approximately 1.5km to the west of the site.

2.5 Development Proposals

2.5.1 Development proposals comprise a new amenity building, drive thru, charging areas for electric cars and parking for coaches, caravans & HGV creating a new Motorway Rest Area at J16 of the M4, with associated road infrastructure, landscaping, and SuDS features.

3 Policy Context

3.1 National Planning Policy Framework

3.1.1 The National Planning Policy Framework[1] (NPPF) was first published in 2012, with a subsequent revision by the Ministry of Housing, Communities and Local Government appended in July 2018, February 2019, and July 2021 with the most recent update made in September 2023.

3.1.2 The NPPF is the primary source of national planning guidance in England, setting out the Government's planning policies for England, and how they are expected to be applied by local councils.

3.1.3 'Chapter 14: Meeting the challenge of climate change, flooding and coastal change' outlines the guiding principles for managing flood risk as part of the planning process, notably paragraphs 159-169.

3.1.4 The Planning Practice Guidance[2] (PPG) sets out the vulnerability to flooding of different land uses. It encourages development to be in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment.

3.1.5 The Planning Practice Guidance also states that alternative sources of flooding, other than fluvial (river flooding), should be considered when preparing a Flood Risk Assessment.

3.1.6 The Planning Practice Guidance includes a series of tables that define Flood Zones, the flood risk vulnerability classification of development land uses, and 'compatibility' of development within the defined Flood Zones.

3.1.7 Therefore, this Flood Risk Assessment has been completed in line with the guidance and requirements for the NPPF and Planning Practice Guidance.

3.2 Local Plan Policies

3.2.1 The Wiltshire Local Plan[3] was adopted in January 2015 and sets out how land within the district can be used and developed, providing policies which the council use to determine application and regeneration activities.

3.2.2 The plan aims to oversee how the council will manage future growth, encourage sustainable development, and ensure changes are appropriate to local need now, and in the future.

3.2.3 More generally, the Local Plan lists policies that influence the design and principles of all development within the district. Those relevant to this FRA are as follows:

- Core Policy 19: Spatial Strategy
- Core Policy 52: Green Infrastructure
- Core Policy 67: Flood Risk
- Core Policy 68: Water Resources

3.3 Local SFRA

3.3.1 The Wiltshire Council Strategic Flood Risk Assessment[4] (SFRA) was published in May 2019. The SFRA was prepared to provide an appropriate evidence base for local policymaking, including a summary of

[1] Ministry of Housing, Communities and Local Government (September 2023); *The National Planning Policy Framework*
[2] Ministry of Housing, Communities and Local Government (August 2022); *Planning Practice Guidance on Flood risk and coastal change*
[3] Wiltshire Council (January 2015); *Wiltshire Local Plan Core Strategy*: prepared by WC
[4] Wiltshire Council (May 2019); *Wiltshire Council Level 1 Strategic Flood Risk Assessment*; prepared by JBA

flood risk issues across the area and to support the application of the sequential test for suitability of allocated sites.

3.3.2 The SFRA also includes relevant background flooding data and a summary of flood risk within the district.

3.4 Local PFRA

3.4.1 The Wiltshire Council Preliminary Flood Risk Assessment[5] (PFRA) was published in June 2011. The PFRA was prepared to assist Wiltshire Council meet their duties to manage local flood risk and deliver any legal requirements placed on them as the LLFA under the Flood Risk Regulations 2009.

3.4.2 The PFRA also identifies the past and future flood risk for the County and includes an assessment of where within the County flooding, including overland flow and direct rainfall, will occur along with the number of properties potentially at risk.

3.5 Local Flood Risk Management Strategy

3.5.1 The Wiltshire Local Flood Risk Management Strategy[6] (LFRMS) was produced to comply with Section 9 of the Flood and Water Management Act 2010 and aims to provide a framework for meeting their requirements to develop, maintain, apply, and monitor a local strategy for flood risk management.

3.5.2 The LFRMS provides further information regarding surface water runoff, groundwater and sewer flooding and flood risk around the County and the introduction of flood risk alleviation schemes at various scales, including SuDS.

3.6 Surface Water Management Plan

3.6.1 The Wiltshire Surface Water Management Plan[7] (SWMP) was published in November 2011 by URS and Scott Wilson on behalf of Wiltshire Council. It was produced to understand the flood risks that can arise from local flooding, identifying where flood risk issues are, what impact they have, how they can be managed, as well as providing a full history of the plan area. This will provide a baseline for the Wiltshire Council aim to manage and improve surface water flood risks within the council area.

3.7 Thames Catchment Flood Management Plan

3.7.1 The Thames Catchment Flood Management Plan[8] (CFMP) was published in December 2009 by the Environment Agency. The CFMP aims to help the Environment Agency and local councils to understand the scale and extent of flooding now and in the future, whilst also setting policies for managing flood risk within the catchment.

3.7.2 The CFMP should be used to inform planning and decision making by key stakeholders including; the Environment Agency, local authorities, IDB's, water companies and utility providers, landowners, and the general public. The CFMP also aims to promote more sustainable approaches to managing flood risk.

3.8 Thames River Basin Management Plan

3.8.1 The latest version of the Thames River Basin District Flood Risk Management Plan[9] (RBPM) was prepared by the Environment Agency and published in December 2022. The purpose of this RBMP is to provide a framework for protecting and enhancing the benefits provided by the water environment.

[5] Wiltshire Council (June 2011); *Wiltshire Council Preliminary Flood Risk Assessment*; prepared by WC
[6] Wiltshire Council (November 2014); *Wiltshire Local Flood Risk Management Strategy*; prepared by WC
[7] Wiltshire Council (November 2011); *Wiltshire Surface Water Management Plan*; prepared by URS and Scott Wilson
[8] Environment Agency (December 2009); *Thames Catchment Flood Management Plan*; prepared by EA
[9] Environment Agency (December 2022); *Thames River Basin District Flood Risk Management Plan*; prepared by EA

4 Assessment of Flood Risk

4.1 Desk-Based Information

4.1.1 The NPPF states that all potential sources of flood risk must be identified and appraised. Flooding can occur from a variety of sources individually, or in combination and can result from both natural and artificial processes.

4.1.2 **Table 4.1** provides an initial desk-based review of the level of flood risk from all sources, which are then assessed in further details where the risk is considered significant and merits further investigation.

Table 4.1 Desk-Based Assessment of Flood Risk

Sources of Flood Risk	Degree of Risk			Comments
	Significant	Moderate	Low	
Fluvial			X	The Site is wholly within Flood Zone 1
Coastal & Tidal			X	The site is removed from the extent of tidal flooding, now and in the future
Groundwater			X	Low potential susceptibility to groundwater flooding due to deep groundwater and aquifer designations.
Surface Water			X	Isolated areas of low surface water risk found within and around the site.
Sewers			X	Limited extent of sewers in the immediate vicinity.
Canals			X	Canal found approximately 680m to the south of the site.
Reservoirs & Waterbodies			X	Low risk posed.

4.2 Fluvial Flood Risk

4.2.1 The Environment Agency has produced a resource known as the Flood Map for Planning, which identifies areas at risk of flooding from Main Rivers and the sea. An extract of this mapping is included for reference as **Figure 4.1**.

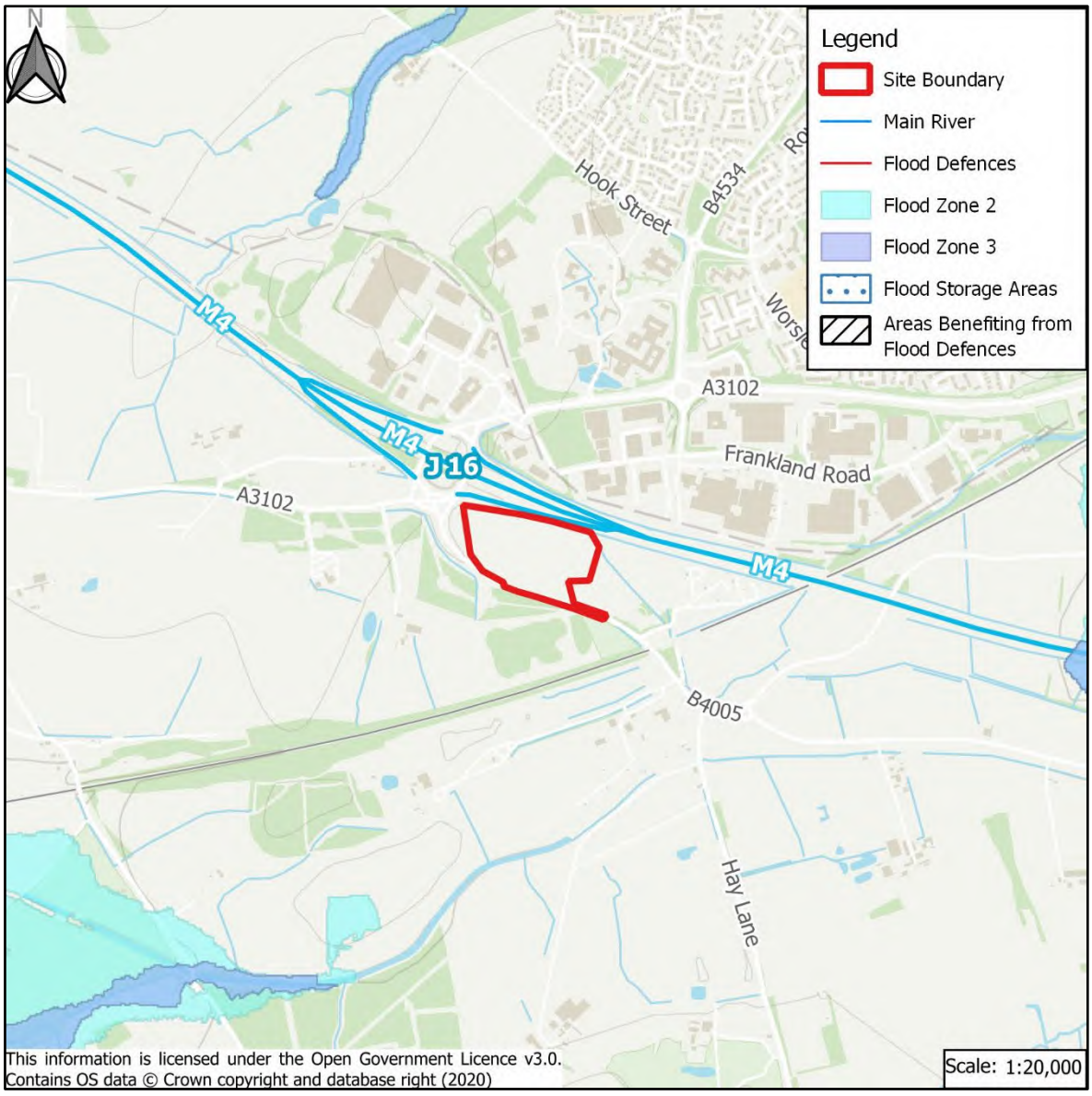


Figure 4.1 Flood Map for Planning

4.2.2 The mapping shows the site to be wholly within Flood Zone 1 (Low Probability) which is defined in the NPPF as land having less than 0.1% annual chance of flooding from rivers or the sea.

4.2.3 The nearest extent of Flood Zones 2 and 3 (Medium and High Probability respectively) is found approximately 1km to the northwest of the site, associated with an unnamed watercourse running north.

4.2.4 Data provided by the EA confirming that the site is not inherently associated with any significant areas of fluvial flooding this is included as **Appendix B**.

4.2.5 Several small watercourses can be found around the site boundary. These show connectivity and generally drain toward the south east as discussed in **Section 2.2.**

4.2.6 Therefore, based on the published information the site is considered to be at low risk of flooding from fluvial sources, including local watercourses.

4.3 Coastal & Tidal

4.3.1 The site is located wholly within Flood Zone 1 and is far removed from the coast and so not affected by tidal influences.

4.3.2 Therefore, the risk of flooding from coastal or tidal related events is negligible.

4.4 Groundwater

4.4.1 Groundwater flooding occurs when the water table rises above ground elevations. It is most likely to happen in low lying areas underlain by permeable geology. This may be regional scale chalk or sandstone aquifers, or localised deposits of sands and gravels underlain by less permeable strata such as that in a river valley.

4.4.2 Previously mentioned boreholes did not report striking groundwater within their investigations at depths of up to 5mbgl. Alongside a superficial and bedrock aquifer designation of Unproductive, this suggests groundwater within the area will have limited potential to move within the strata.

4.4.3 The PFRA provides information on groundwater flooding within the County. It suggests groundwater flooding is more likely to occur within the south of Wiltshire, and that the EA's Areas Susceptible to Groundwater Flooding mapping is not sufficiently detailed to allow firm conclusions to be made regarding this aspect of flood risk within Wiltshire.

4.4.4 The 2019 SFRA includes groundwater flooding mapping produced by JBA, this places the site within an area deemed as having a negligible risk of flooding from groundwater due to the nature of the local geological deposits. The area surrounding the site shares the same classification.

4.4.5 The site does not fall within a Source Protection Zone (SPZ), with the nearest SPZ (Zone II – Subsurface Activity) being found approximately 1.5km to the west of the site.

4.4.6 Overall, considering the aquifer designations, underlying geology and information on groundwater provided within local documentation, the risk of flooding from groundwater is considered to be negligible.

4.5 Surface Water (Pluvial)

4.5.1 The risk of flooding from surface water has been mapped by the EA on a strategic scale to understand areas that may be susceptible to ponding of surface water during periods of extreme rainfall. An extract of the latest mapping is included for reference as **Figure 4.2**.

4.5.2 The mapping indicates the site to generally be at a low overall risk of flooding from surface water. Areas of low risk are found in the west and east of the site, likely associated with localised topographical depressions.

4.5.3 It should be noted, the mapping used by the EA to provide the risk of flooding from surface water does not consider continual losses to the ground through infiltration. Whilst infiltration rates are likely to be low, geology and ground conditions may provide a reduction in flows on site.

4.5.4 Furthermore, it is likely the unnamed watercourses around the boundaries of the site would intercept any surface water flows from surrounding land and convey flows away from the site.

4.5.5 Given the above, the risk posed to the site from surface water flooding is considered to be low.

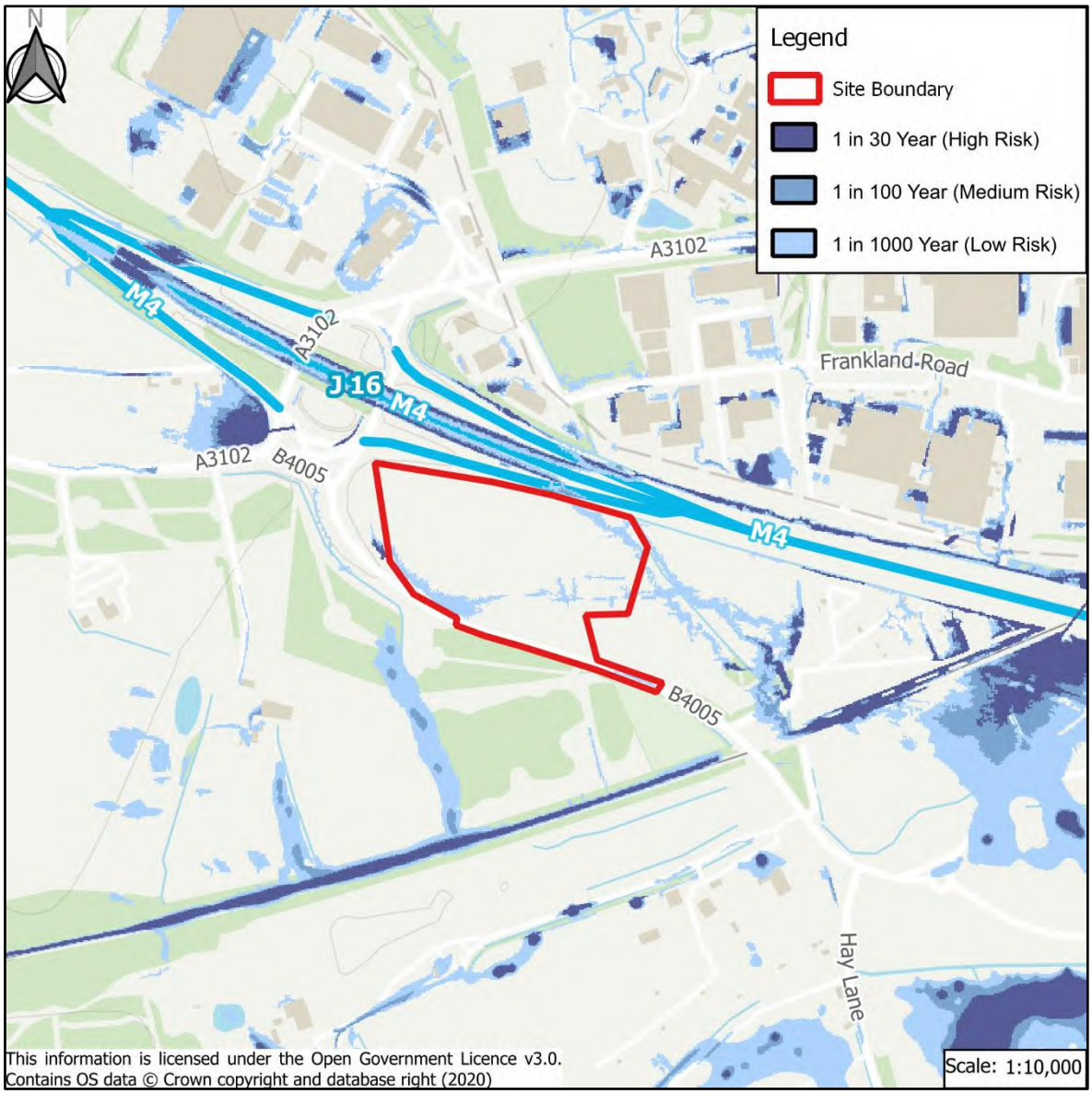


Figure 4.2 Surface Water Flooding

4.6 Sewers

4.6.1 Flooding from sewers typically results from the network capacity being exceeded or because of a blockage to key elements. Flooding usually occurs by way of surcharging manholes, gullies or other features that allow water from sewers to reach the surface, resulting in overland flows that can affect nearby properties.

4.6.2 Due to the undeveloped nature and previous use of the site, it is unlikely for either public or private sewerage networks to be present within the site boundary. Discussions are ongoing with Thames Water to confirm this.

4.6.3 However, due to the topography of the site, it is likely any surcharging would be routed away from the site, or towards areas of lower topography in the vicinity.

4.6.4 Therefore, the site is considered to be low risk from flooding from surcharging of the local network.

4.7 Canals

4.7.1 The Wiltshire and Berkshire Canal is found approximately 680m to the south of the site. However, due to intervening topography and distance between the site and the canal, the risk of flooding posed from canals is considered to be negligible.

4.8 Reservoirs

4.8.1 The EA has produced strategic scale mapping showing the potential risk of flooding from the failure of large waterbodies and reservoirs, if the relevant impounding structure were to fail.

4.8.2 This mapping confirms the site is far removed from the extent of any modelled flooding from such sources. Furthermore, a review of OS mapping does not identify any other reservoirs or waterbodies near to the site that could pose a risk of flooding.

4.8.3 Therefore, the risk of flooding from reservoirs or large waterbodies is considered to be negligible.

5 Flood Risk Mitigation

5.1 Sequential Arrangement

5.1.1 All types of development are considered acceptable uses within Flood Zone 1 in line with the Sequential Test guidance included within the NPPF and PPG. A motorway rest area such as the one proposed (comprising 'car parks' and 'shops') is considered to be 'less vulnerable' to the potential impacts of flooding in line with definitions in Annex 3 of the NPPF.

5.1.2 The site is inherently sequentially preferable due to its location within Flood Zone 1 and concluded to be at low risk from other sources and therefore passes the requirements of the Sequential Test.

5.2 Development Levels

5.2.1 There are no specific requirements for finished floor levels to address any flood risk. However, it is recommended that appropriate design of external levels and their relation to building thresholds considers the residual risk from overland flows from surface runoff and drainage exceedance from the proposed network.

5.2.2 Finished floor levels should be designed so there is a nominal threshold above surrounding ground levels, in accordance with the relevant building regulations and external levels should be designed so any surface flows shed away from buildings and towards positively drained areas.

5.3 Surface Water Drainage Strategy

5.3.1 A surface water drainage strategy has been prepared for the submitted scheme, and details are provided as part of the Sustainable Drainage Report by Pell Frischmann (report ref: 107846-PEF-ZZ-XX-RP-CD-000001).

5.3.2 The strategy is based on discharging surface water runoff from the site at the equivalent greenfield rate, with the additional volume stored within attenuation basins before being discharged to the local watercourses, following the existing watersheds across the site.

5.3.3 Additional SuDS features are recommended to complement the strategic attenuation basins, and could include features such as permeable paving, rainwater butts, tree pits and rain gardens. These will act as source control measures by capturing and managing runoff close to it source, while providing amenity and biodiversity improvements, as well as improving the quality of runoff.

5.3.4 Therefore, the development will not have an adverse impact on the flood risk elsewhere subject to the suitable management of surface water generated by the proposed development.

5.4 Watercourse Standoffs

5.4.1 A suitable standoff will be required from any watercourses in line with Wiltshire Land Drainage byelaws. 8m free of obstruction is required from the top of bank of any watercourse however it is envisaged that this required can be relaxed due to the nature and catchment of the relevant ditches.

6 Conclusions & Recommendations

6.1.1 This Flood Risk Assessment has been written in support of a planning application for the development of a site known as M4 J16 Motorway Rest Area, at J16 of the M4, Swindon. The development is considered a less vulnerable development in flood risk terms and is considered a suitable development for Flood Zone 1.

6.1.2 To summarise the findings of the FRA:

- The site is wholly within Flood Zone 1 (Low Probability) and so considered to be at low risk of flooding from Main Rivers and the sea. With the nearest extents of Flood Zone 2 and 3 found approximately 1.2km south west of the site.
- A number of small unnamed watercourses are found immediately surrounding the site; however, these are relatively small and have limited catchments. It is likely these are used for highway and land drainage and pose a low risk of flooding to the site.
- The Wiltshire SFRA and PFRA, and BGS geology mapping suggests the site is at low risk of flooding from groundwater.
- The site is considered to be at low risk of surface water flooding, with small low-risk surface water ponding found within topographic low points of the site. It is likely these will be resolved as part of the development of the site, with the additional surface water being attenuated within attenuation basins on site.
- It is unlikely public or private sewers will be found within the site boundary. Consultation with Thames Water is ongoing to confirm this. The topography of the site would encourage any surcharging away from the site.
- Mapping provided by the EA suggests the site is considered to be at low risk of flooding from reservoirs or large waterbodies.

6.1.3 Recommendations are made in respect of appropriate consideration of finished floor levels and external level design to manage the residual risk of overland flows by conveying water away from dwellings and towards positively drained areas including suitable watercourse standoff in line with local prevailing guidance.

6.1.4 In accordance with the requirements of the National Planning Policy Framework (NPPF), this FRA has demonstrated that development could proceed without being subject to significant flood risk and complies within relevant local plan policies.

6.1.5 Furthermore, the development will not result in increased flood risk to third parties if there is suitable management of surface water runoff.

Appendix A Topographical Survey

INDICATIVE

A302 / ROYAL MINT

A4361

A302 / SWINDON

B4005

Parking Bay

0 20 METRES

PREMIERsurveys
designed to measure

UNIT 3
9-11 LOWATER ST
CARLTON
NOTTINGHAM
NG4 1JJ
Tel: 0115 962 2876

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

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

PSL REF 8807

CLIENT

MOTO HOSPITALITY LTD

JOB TITLE

PROPOSED MOTORWAY SERVICE AREA
M4 JUNCTION 16
SWINDON SN4 9QT

DRAWING TITLE

TOPOGRAPHICAL SURVEY

SURVEYOR: WM	DRAWN: WM	CHECKED: ML

SCALE	SHEET No:
1/200	SHEET 1 OF 6

DATE	SHEET SIZE	DRAWING No:
APR 23	A0	8807_SITE_2D_R0

DATUM & COORDINATES SYSTEM

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

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

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

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

SCALE FACTOR: 0.99960
CENTRE POINT: 410466.777, 182630.761

LEGEND

SURVEY STATION
LEVEL POSITION
WALL TOP LEVEL
THRESHOLD LEVEL
INVERT LEVEL
CROWN LINE
KERB
KERB TOP
BUILDING
WALL
FENCE
OVERHEAD CABLE
VEGETATION
GATE
SERVICE COVERS
IC CL 12.34
BUILDING
BUILDING CANOPY
REGISTRATION MARK
SAPLING
BUSH
TREE
BANK

ABBREVIATIONS

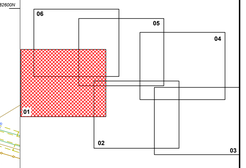
A/C	AIR CONDITIONING UNIT
BB	BELOW BEACON
BC	BELOW CANOPY
BL	BASEMENT LIGHTS
BOL	BOLLARD
BP	BUS PASS
BS	BUS STOP POST
BSH	BUS STOP SHELTER
BW	BRICK WALL
BWF	BARBED WIRE FENCE
C/L	CENTRE LINE
CBF	CLOSED BOARDED FENCE
CBR	CRASH BARRIER
CE	CLEANING EYE
CL	COVER LEVEL
CLF	CLOSE BOARD
CLF	CHAIN LINK FENCE
CONC	CONCRETE
CPF	CONCRETE PANEL FENCE
CR	CABLE RISER
CS	CONCRETE STATION
CW	CONCRETE WALL
EIC	ELECTRICITY IC
EJB	ELECTRICITY JUNCTION BOX
EP	ELECTRICITY POLE
ESK	ELECTRIC SUB
EVL	EAVES LEVEL
FH	FIRE HYDRANT
FLD	FLOODLIGHT
G	GULLY
GC	GAS GOVERNOR
GDR	GUARD RAIL
GV	GAS VALVE
H	HEDGE
IBOL	ILLUMINATED BOLLARD
IC	INSPECTION COVER
IL	INVERT LEVEL
LP	LAMP POST
IRF	IRON RAILING FENCE
MH	MANHOLE
MKR	MARKER
NB	NOTICE BOARD
NP	STREET NAME PLATE
OBF	OPEN BOARD FENCE
OHL	OVERHEAD
P	POST
PB	POST BOX
PBF	POST & BARBED WIRE
PR	PIPE RISER
PRF	POST & RAIL FENCE
PWF	POST & WIRE FENCE
RFL	ROOF LEVEL
RG	RODDING EYE
RGL	RIDGE LEVEL
RS	ROAD SIGN
RSI	ROAD SIGN ILLUMINATED
RW	RETAINING WALL
SVP	SOIL VENT PIPE
SAP	SAPLING
SC	STOP COCK
SL	STREET LIGHT
SV	SCARS VALVE
SVP	SOIL VENT PIPE
SW	STONE WALL
TCB	TELEPHONE CALL BOX
TCP	TRAFFIC CONTROL
TIC	TELECOMUNICATIONS IC
TP	TELEPHONE POLE
TS	TRAFFIC SIGNAL
TSCU	TS CONTROL UNIT
UTC	UNABLE TO LIFT IC
UTI	UNABLE TO LIFT
UTS	UNABLE TO SURVEY
VP	VENT PIPE
WBL	WATER LEVEL
WC	WATER COURSE
WO	WASHOUT
WT	WALL TOP LEVEL

REVISIONS

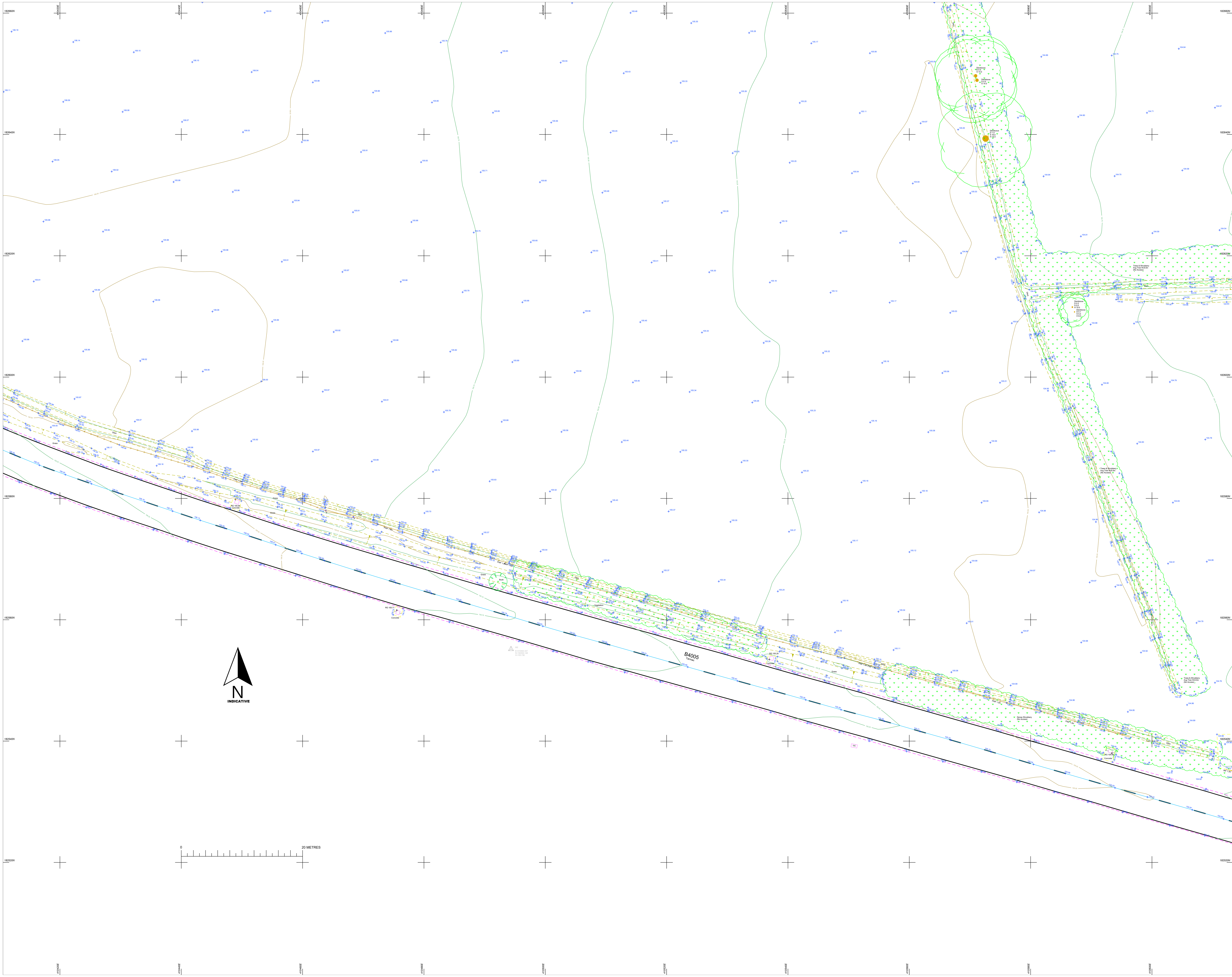
No.	DATE	REVISION

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PSL REF 8807

CLIENT

MOTO HOSPITALITY LTD

JOB TITLE

PROPOSED MOTORWAY SERVICE AREA
M4 JUNCTION 16
SWINDON SN4 9QT

DRAWING TITLE

TOPOGRAPHICAL SURVEY

SURVEYOR: WM	DRAWN: WM	CHECKED: ML
SCALE 1/200		SHEET No: SHEET 2 OF 6
DATE APR 23	SHEET SIZE A0	DRAWING No: 8807_SITE_2D_R0

DATUM & COORDINATES SYSTEM

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

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

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

SCALE FACTOR: 0.99960
CENTRE POINT: 410466.777, 182630.761

LEGEND

SURVEY STATION
+ 10.00 LEVEL POSITION
+ WT94.43 WALL TOP LEVEL
+ THL 94.43 THRESHOLD LEVEL
+ IL 94.43 INVERT LEVEL
CTV SERVICE COVERS (IC CL 12.34)
BUILDING
BUILDING CANOPY
CROWN LINE
KERB
KERB TOP
BUILDING
WALL
FENCE
OVERHEAD CABLE
VEGETATION
GATE
REGISTRATION MARK
SAPLING
BUSH
TREE
BANK

ABBREVIATIONS

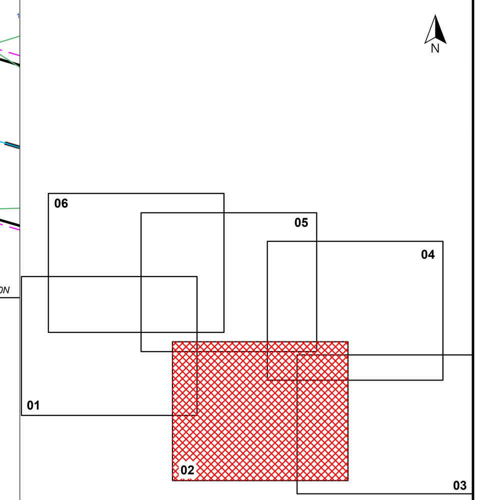
A/C	AIR CONDITIONING UNIT	MH	MANHOLE
BB	BELISHA BEACON	MKR	MARKER
BBL	BELL BOLLARD	NB	NOTICE BOARD
BL	BASEMENT LIGHTS	NP	STREET NAME PLATE
BOL	BOLLARD	OBF	OPEN BOARD FENCE
BR	BIKE RAIL	O/H	OVERHEAD
BS	BUS STOP POST	P	POST
BSH	BUS STOP SHELTER	PB	POST BOX
BW	BRICK WALL	PM	PARKING METER
BWF	BARBED WIRE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

REVISIONS

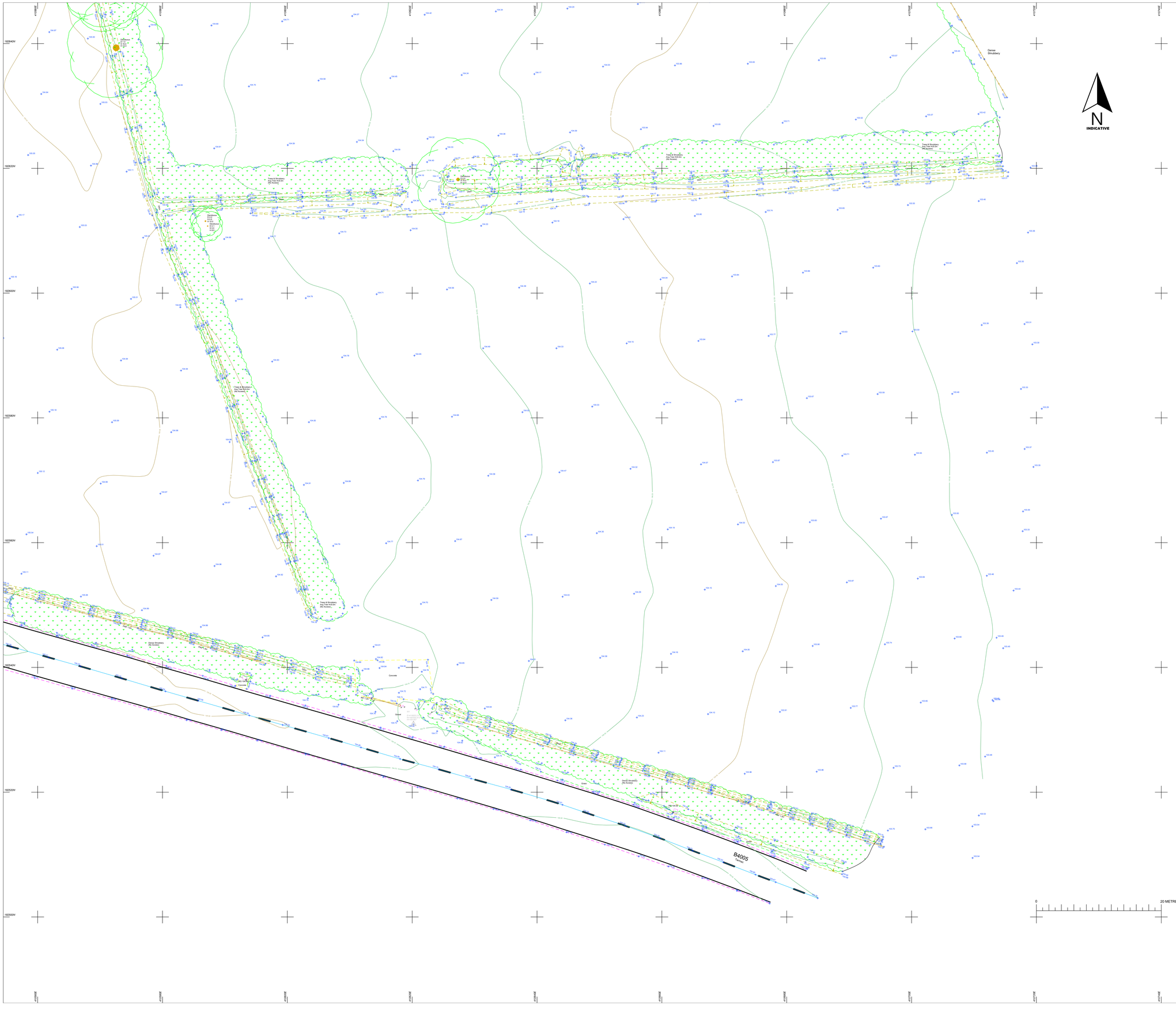
No.	DATE	REVISION

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PSL REF 8807

CLIENT

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JOB TITLE

PROPOSED MOTORWAY SERVICE AREA
M4 JUNCTION 16
SWINDON SN4 9QT

DRAWING TITLE

TOPOGRAPHICAL SURVEY

SURVEYOR: WM	DRAWN: WM	CHECKED: ML
SCALE 1/200		SHEET No: SHEET 3 OF 6
DATE APR 23	SHEET SIZE A0	DRAWING No: 8807_SITE_2D_R0

DATUM & COORDINATES SYSTEM

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SCALE FACTOR: 0.99960
CENTRE POINT: 410466.777, 182630.761

LEGEND

SURVEY STATION
LEVEL POSITION
WALL TOP LEVEL
THRESHOLD LEVEL
INVERT LEVEL
CROWN LINE
KERB
KERB TOP
BUILDING
WALL
FENCE
OVERHEAD CABLE
VEGETATION
GATE
SERVICE COVERS
BUILDING
BUILDING CANOPY
REGISTRATION MARK
SAPLING
BUSH
TREE
BANK

ABBREVIATIONS

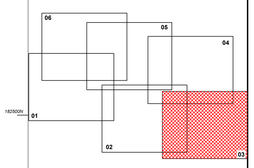
A/C	AIR CONDITIONING UNIT	MH	MANHOLE
BB	BELISHA BEACON	MKR	MARKER
BBL	BELL BOLLARD	NB	NOTICE BOARD
BL	BASEMENT LIGHTS	NP	STREET NAME PLATE
BOL	BOLLARD	OBF	OPEN BOARD FENCE
BR	BIKE RAIL	OH	OVERHEAD
BS	BUS STOP POST	P	POST
BSH	BUS STOP SHELTER	PB	POST BOX
BW	BRICK WALL	PM	PARKING METER
BWF	BARBED WIRE FENCE	PR	PIPE RISER
CAM	CAMERA	PWF	POST & WIRE FENCE
CBF	CLOSED BOARDED FENCE	PWR	POST & RAILS FENCE
CBR	CABLE RISER	RFL	ROOF LEVEL
CE	CLEARING EYE	RG	ROAD GULLY
CL	COVER LEVEL	RGL	RIDGE LEVEL
CLH	CELLAR HATCH	RS	ROAD SIGN
CLF	CHAIN LINK FENCE	RSI	ROAD SIGN ILLUMINATED
CP	CONCRETE POST	RW	RETAINING WALL
CPF	CONCRETE PANEL FENCE	RWP	RAIN WATER PIPE
CR	CABLE RISER	SAP	SAPLING
CTV	CABLE TELEVISION	SH	SHED / KIOSK
CW	CONCRETE WALL	SL	SUMP LEVEL
DM	DRAIN MANHOLE	SV	SLUICE VALVE
EJB	ELECTRICITY JUNCTION BOX	SW	STONE WALL
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
ER	EARTHING ROD	THL	THRESHOLD LEVEL
EVL	EAVES LEVEL	TIC	TELECOMMUNICATIONS IC
FB	FLOOD BARRIER	TP	TRAFFIC BOLLARD
FLD	FLOOD LIGHT	TS	TRAFFIC SIGNAL
G	GULLY	TSCU	TS CONTROL UNIT
GRB	GRIT BOX	TSIC	TRAFFIC SIGNAL IC
GDR	GUARD RAIL	UTL	UNABLE TO LIFT
HDG	HEDGE / HEDGE HEIGHT	US	UNABLE TO SURVEY
H		VP	VENT PIPE
IBOL	ILLUMINATED BOLLARD	WL	WATER LEVEL
IC	INSPECTION COVER	WM	WATER METER
IL	INVERT LEVEL	WO	WASHOUT
IRF	IRON RAILING FENCE	WT	WALL TOP LEVEL

REVISIONS

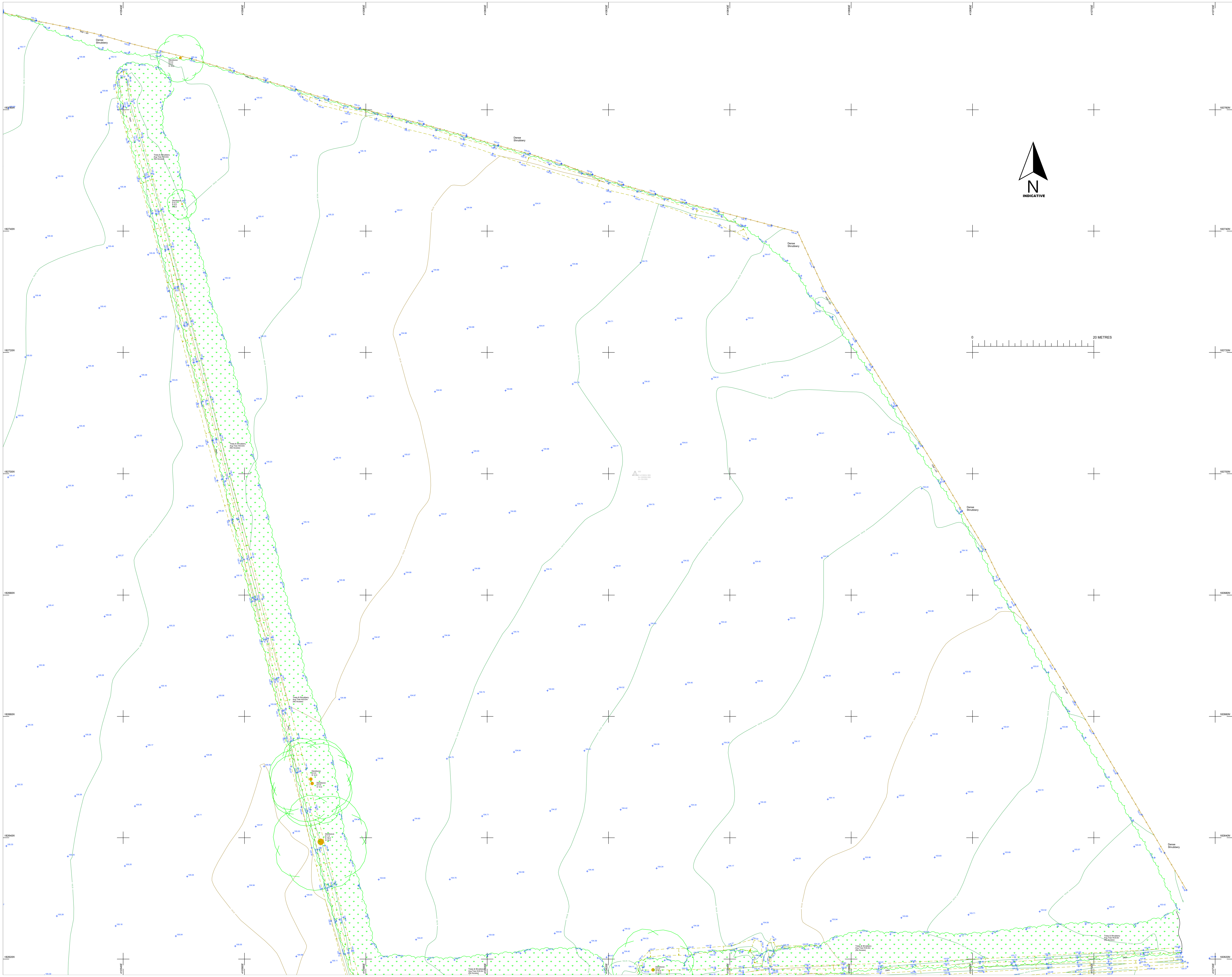
No.	DATE	REVISION

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PSL REF 8807

CLIENT

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JOB TITLE

PROPOSED MOTORWAY SERVICE AREA
M4 JUNCTION 16
SWINDON SN4 9QT

DRAWING TITLE

TOPOGRAPHICAL SURVEY

SURVEYOR: WM	DRAWN: WM	CHECKED: ML
SCALE 1/200		SHEET No: SHEET 4 OF 6
DATE APR 23	SHEET SIZE A0	DRAWING No: 8807_SITE_2D_R0

DATUM & COORDINATES SYSTEM

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SCALE FACTOR: 0.99960
CENTRE POINT: 410466.777, 182630.761

LEGEND

SURVEY STATION
+ 10.00 LEVEL POSITION
+ WT94.43 WALL TOP LEVEL
+ THL 94.43 THRESHOLD LEVEL
+ IL 94.43 INVERT LEVEL
IC CL 12.34 CTV SERVICE COVERS
BUILDING
BUILDING CANOPY
CROWN LINE
KERB
KERB TOP
BUILDING
WALL
FENCE
OVERHEAD CABLE
VEGETATION
GATE
REGISTRATION MARK
SAPLING
BUSH
TREE
BANK

ABBREVIATIONS

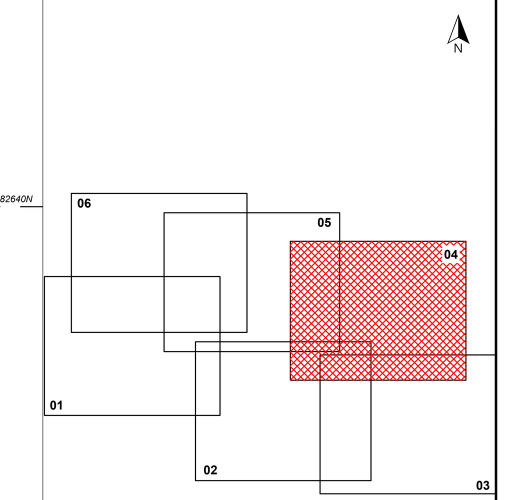
A/C	AIR CONDITIONING UNIT	MH	MANHOLE
BB	BELISHA BEACON	MKR	MARKER
BBL	BELL BOLLARD	NB	NOTICE BOARD
BL	BASEMENT LIGHTS	NP	STREET NAME PLATE
BOL	BOLLARD	OBF	OPEN BOARD FENCE
BR	BIKE RAIL	O/H	OVERHEAD
BS	BUS STOP POST	P	POST
BSH	BUS STOP SHELTER	PB	POST BOX
BW	BRICK WALL	PM	PARKING METER
BWF	BARBED WIRE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

REVISIONS

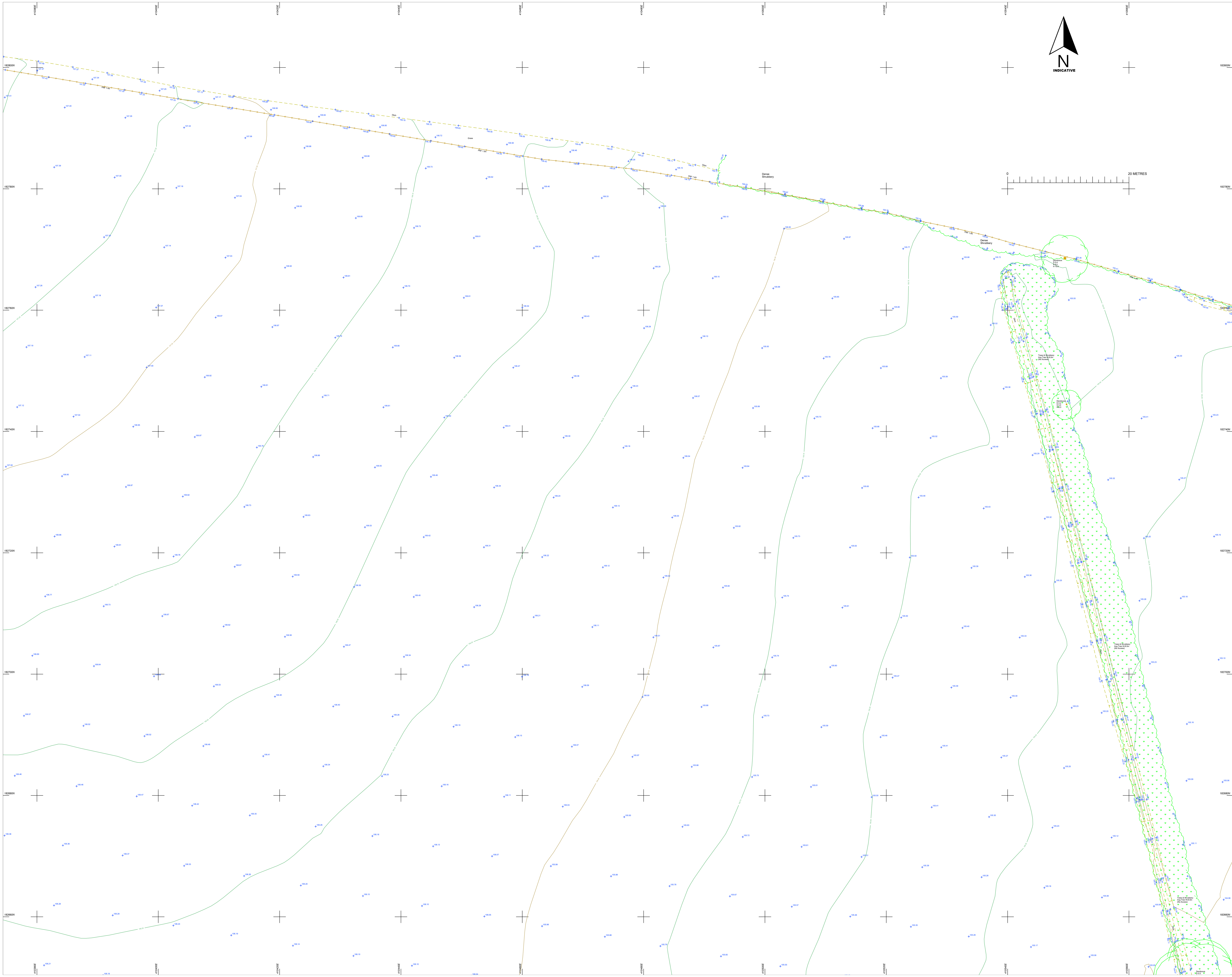
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PSL REF 8807

CLIENT

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JOB TITLE

PROPOSED MOTORWAY SERVICE AREA
M4 JUNCTION 16
SWINDON SN4 9QT

DRAWING TITLE

TOPOGRAPHICAL SURVEY

SURVEYOR: WM	DRAWN: WM	CHECKED: ML
SCALE 1/200		SHEET No: SHEET 5 OF 6
DATE APR 23	SHEET SIZE A0	DRAWING No: 8807_SITE_2D_R0

DATUM & COORDINATES SYSTEM

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CENTRE POINT: 410466.777, 182630.761

LEGEND

SURVEY STATION
+ 10.00 LEVEL POSITION
+ WT94.43 WALL TOP LEVEL
+ THL 94.43 THRESHOLD LEVEL
+ IL 94.43 INVERT LEVEL
CTV IC CL 12.34 SERVICE COVERS
BUILDING
BUILDING CANOPY
CROWN LINE
KERB
KERB TOP
BUILDING
WALL
FENCE
OVERHEAD CABLE
VEGETATION
GATE
REGISTRATION MARK
SAPLING
BUSH
TREE
BANK

ABBREVIATIONS

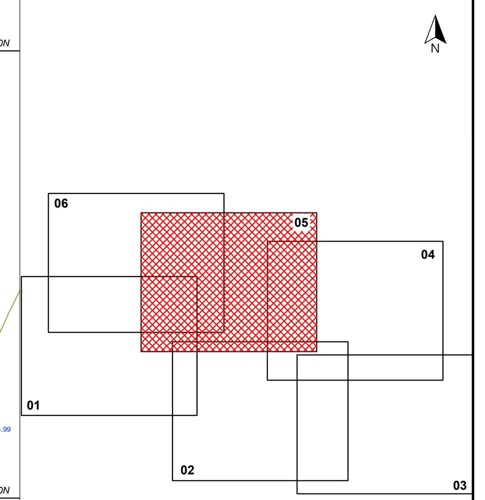
A/C	AIR CONDITIONING UNIT	MH	MANHOLE
BB	BELISHA BEACON	MKR	MARKER
BBL	BELL BOLLARD	NB	NOTICE BOARD
BL	BASEMENT LIGHTS	NP	STREET NAME PLATE
BOL	BOLLARD	OBF	OPEN BOARD FENCE
BR	BIKE RAIL	O/H	OVERHEAD
BS	BUS STOP POST	P	POST
BSH	BUS STOP SHELTER	PB	POST BOX
BW	BRICK WALL	PM	PARKING METER
BWF	BARBED WIRE FENCE	PR	PIPE RISER
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CLH	CELLAR HATCH	RS	ROAD SIGN
CLF	CHAIN LINK FENCE	RSI	ROAD SIGN ILLUMINATED
CONC.	CONCRETE	RW	RETAINING WALL
CPF	CONCRETE PANEL FENCE	RWP	RAIN WATER PIPE
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GDR	GUARD RAIL	TSIC	TRAFFIC SIGNAL IC
GV	GAS VALVE	UTL	UNABLE TO LIFT
H	HEIGHT	UTS	UNABLE TO SURVEY
IBOL	ILLUMINATED BOLLARD	VP	VENT PIPE
IC	INSPECTION COVER	WL	WATER LEVEL
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LP	LAMP POST	WO	WASHOUT
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REVISIONS

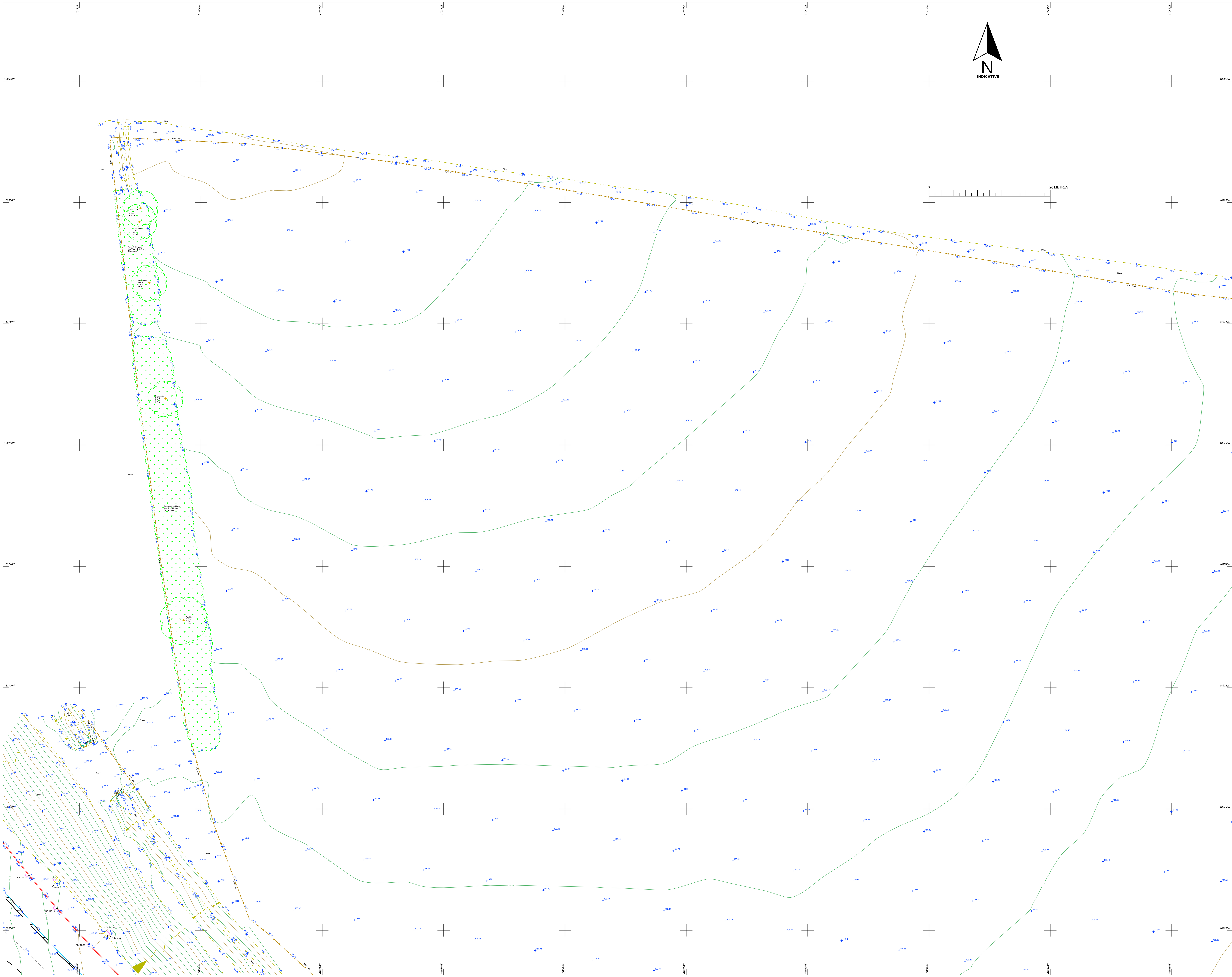
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PSL REF 8807

CLIENT

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JOB TITLE

PROPOSED MOTORWAY SERVICE AREA
M4 JUNCTION 16
SWINDON SN4 9QT

DRAWING TITLE

TOPOGRAPHICAL SURVEY

SURVEYOR: WM	DRAWN: WM	CHECKED: ML
SCALE 1/200		SHEET No: SHEET 6 OF 6
DATE APR 23	SHEET SIZE A0	DRAWING No: 8807_SITE_2D_R0

DATUM & COORDINATES SYSTEM

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LEGEND

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+ WT94.43 WALL TOP LEVEL
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KERB
KERB TOP
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FENCE
OVERHEAD CABLE
VEGETATION
GATE
IC CL 12.34 CTV SERVICE COVERS
BUILDING
BUILDING CANOPY
REGISTRATION MARK
SAPLING
BUSH
TREE
BANK

ABBREVIATIONS

A/C	AIR CONDITIONING UNIT	MH	MANHOLE
BB	BELISHA BEACON	MKR	MARKER
BBL	BELL BOLLARD	NB	NOTICE BOARD
BL	BASEMENT LIGHTS	NP	STREET NAME PLATE
BOL	BOLLARD	OBF	OPEN BOARD FENCE
BR	BIKE RAIL	O/H	OVERHEAD
BS	BUS STOP POST	P	POST
BSH	BUS STOP SHELTER	PB	POST BOX
BW	BRICK WALL	PM	PARKING METER
BWF	BARBED WIRE FENCE	PR	PIPE RISER
CAM	CAMERA	PRF	POST & RAIL FENCE
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CR	CABLE RISER	SAP	SAPLING
CTV	CABLE TELEVISION	SC	STOP COCK
CW	CONCRETE WALL	SL	SUMP LEVEL
EIC	ELECTRICITY IC	SV	SLUICE VALVE
EJB	ELECTRICITY JUNCTION BOX	SVP	SOIL VENT PIPE
EP	ELECTRICITY POLE	SW	STONE WALL
ER	EARTHING ROD	TCB	TELEPHONE CALL BOX
EVL	EAVES LEVEL	THL	THRESHOLD LEVEL
FH	FIRE HYDRANT	TIC	TELECOMMUNICATIONS IC
FLD	FLOODLIGHT	TP	TELEPHONE POLE
G	GULLY	TS	TRAFFIC SIGNAL
GRB	GRIT BOX	TSCU	TS CONTROL UNIT
GDR	GUARD RAIL	TSIC	TRAFFIC SIGNAL IC
GV	GAS VALVE	UTL	UNABLE TO LIFT
H	HEIGHT	UTS	UNABLE TO SURVEY
IBOL	ILLUMINATED BOLLARD	VP	VENT PIPE
IC	INSPECTION COVER	WL	WATER LEVEL
IL	INVERT LEVEL	WM	WATER METER
LP	LAMP POST	WO	WASHOUT
IRF	IRON RAILING FENCE	WT	WALL TOP LEVEL

REVISIONS

No.	DATE	REVISION

Every effort is made to identify all visible features. However, please bear in mind that at the time of the survey, some surface features may have been obscured.

SHEET LAYOUT
(not to scale)

06 05 04 01 02 03

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Appendix B Sewer Records

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2017_3549400



0 40 80 160 240 320
Meters

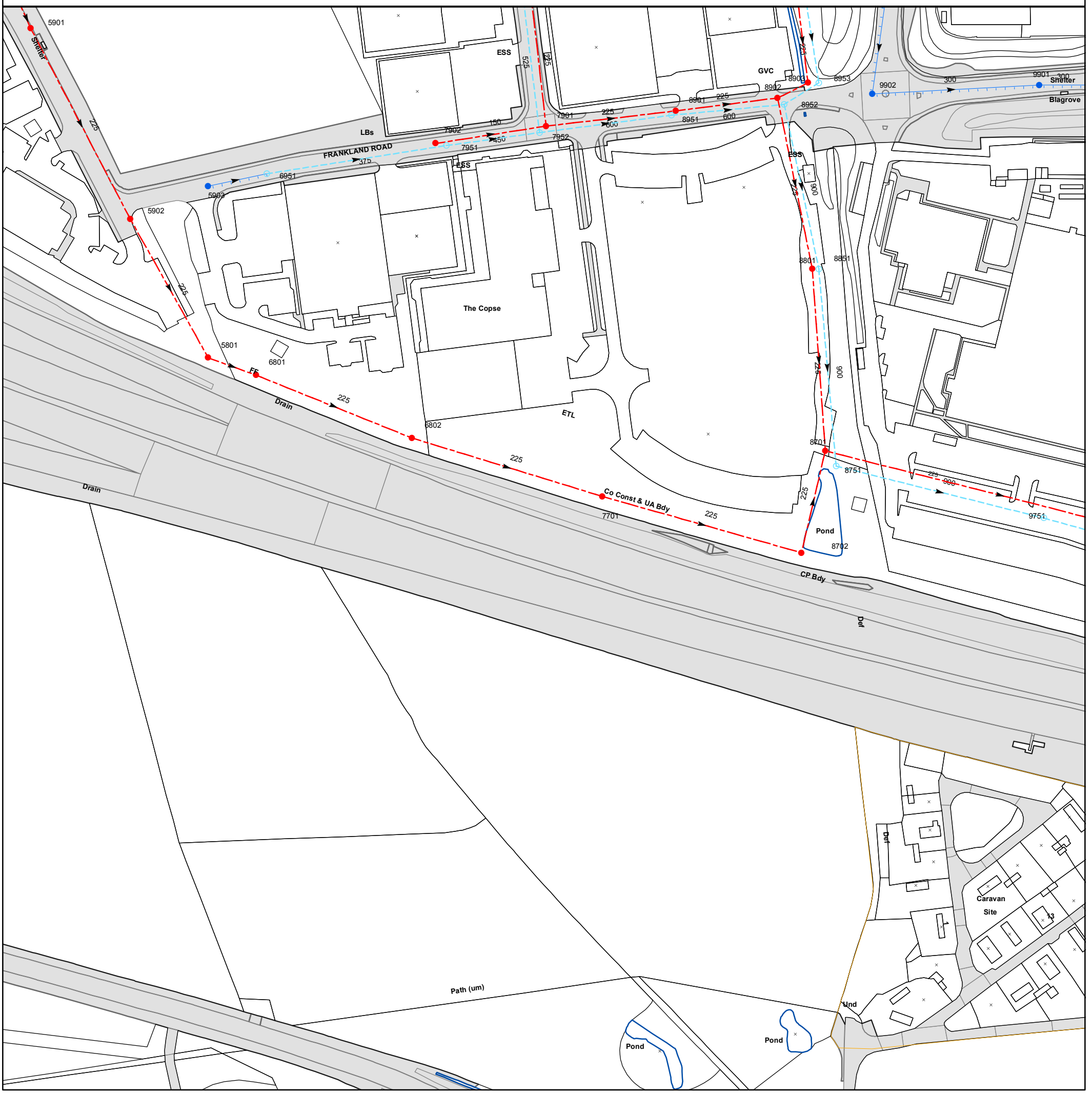
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual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

Scale:	1:6440
Width:	1799m
Printed By:	Vkumar1
Print Date:	13/04/2017
Map Centre:	410114,182757
Grid Reference:	SU1082NW

Comments:

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2017_3549400



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Scale:	1:1790
Width:	500m
Printed By:	Vkumar1
Print Date:	13/04/2017
Map Centre:	410750,182750
Grid Reference:	SU1082NE

Comments:

ALS/ALS Standard/2017_3549400

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL
7901	98.6	95.86
8901	98.2	95.26
8952	97.78	95.63
8953		
9901		
5801		
6801		
6802		
8702		
8851	96.49	94.76
8751	95.83	93.9
5901		
7951	98.96	96.73

REFERENCE	COVER LEVEL	INVERT LEVEL
8951	98.2	96.04
8902	97.7	94.66
8903		
9902		
5902		
5903		
6951		
7701		
8801	96.49	93.76
8701	95.84	92.91
9751		
7902	98.84	96.41
7952	98.6	96.4

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ALS/ALS Standard/2017_3549400



0 40 80 160 240 320
Meters

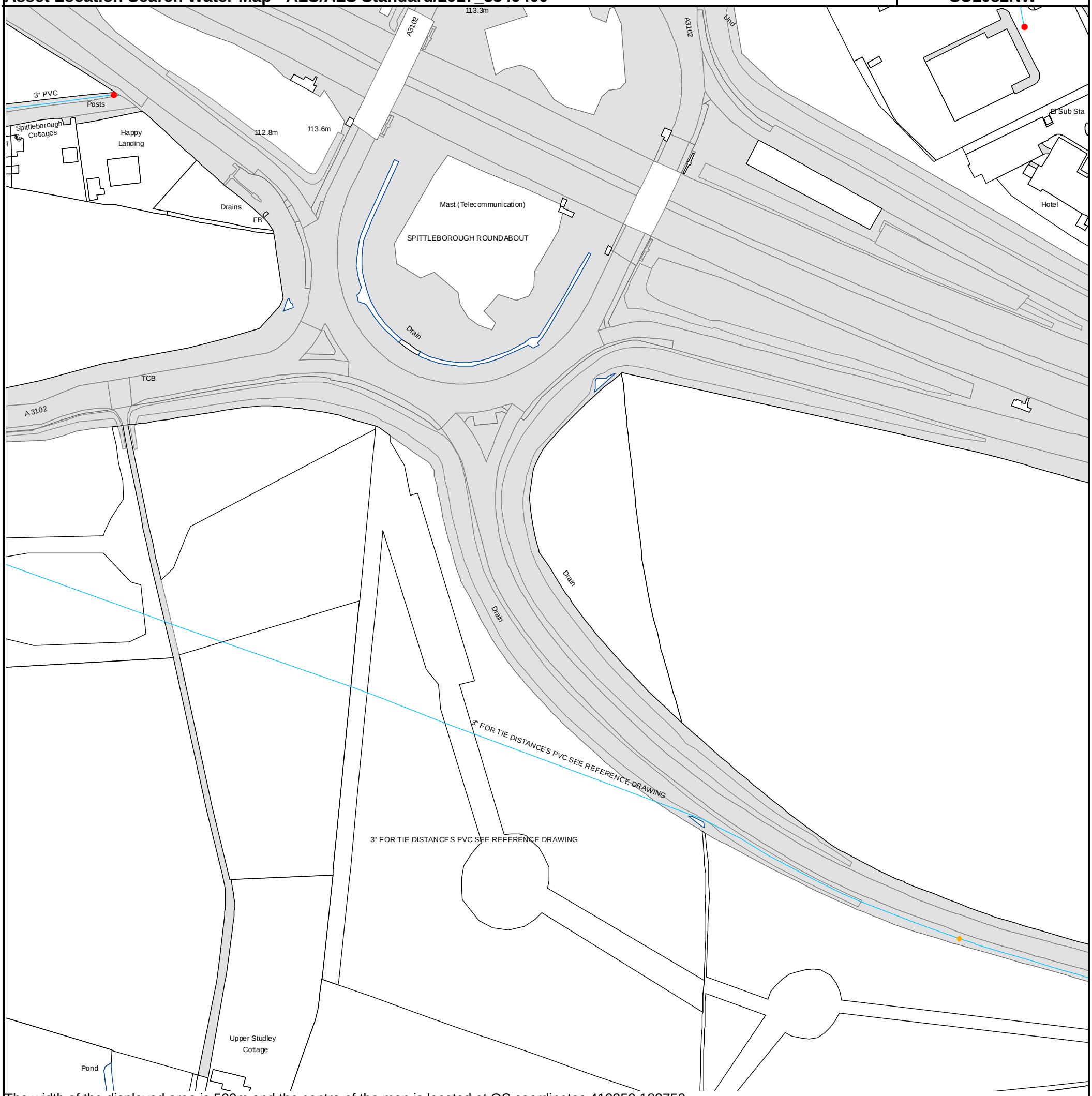
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual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

Scale:	1:6440
Width:	1799m
Printed By:	Vkumar1
Print Date:	13/04/2017
Map Centre:	410114,182757
Grid Reference:	SU1082NW

Comments:

Asset Location Search Water Map - ALS/ALS Standard/2017_3549400

SU1082NW



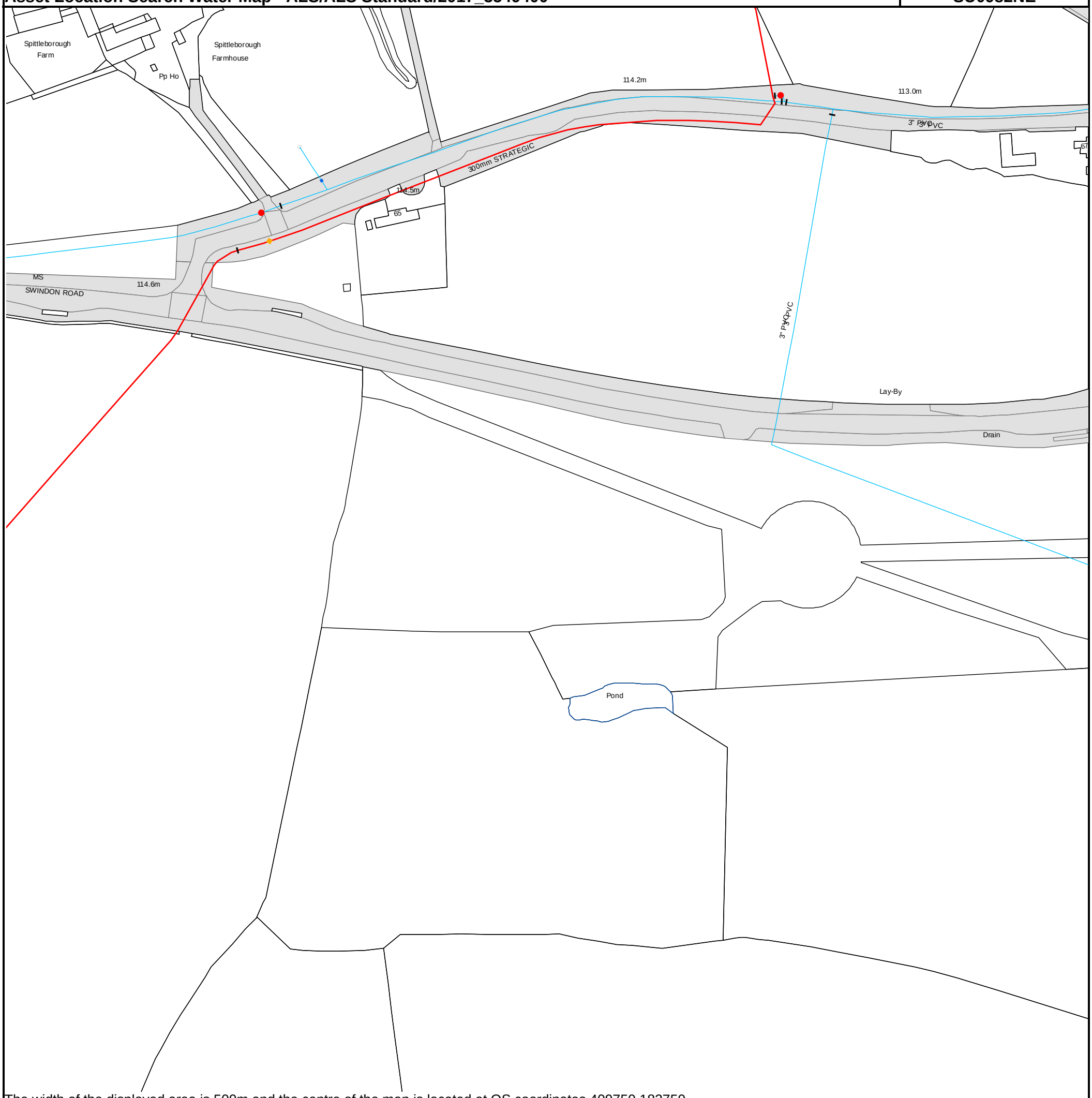
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 410250,182750

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

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Asset Location Search Water Map - ALS/ALS Standard/2017_3549400

SU0982NE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 409750,182750

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Appendix C Environment Agency Product 4 Request for Information Response

Henry McColl

From: Enquiries_THM <enquiries_THM@environment-agency.gov.uk>
Sent: 15 June 2023 16:43
To: Thomas Sturtridge
Subject: THM313753 - PRODUCT - Request for Information - M4 Junction 16, Swindon - Product 4
Attachments: Site Location Plan Swindon - RFI PDF.pdf

Dear Sturtridge,

Thank you for your email requesting Product 4 data.

Please accept my apologies for the delay in responding.

We unfortunately do not have any detailed flood risk modelling in this location. We are sorry that we are therefore unable to provide modelled flood levels and extents for your site.

The Flood Map for Planning in this location is likely to be based on JFLOW data which is not suitable for use in site specific Flood Risk Assessments. Please advise if you would like to request JFLOW data for this location.

You can access our flood map for planning on our website:

https://flood-map-for-planning.service.gov.uk/

You can find more information on the long term risk of flooding for this location on our website:

https://flood-warning-information.service.gov.uk/long-term-flood-risk

You can find recorded flood outlines for this location via the link below:

https://data.gov.uk/dataset/recorded-flood-outlines1

You can find out the risk of flooding from surface water for this location via the link below:

https://data.gov.uk/dataset/d5ca01ec-e535-4d3f-adc0-089b4f03687d/risk-of-flooding-from-surface-water-suitability

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

- 'Planning Practice Guidance' - provides information about planning considerations in areas at risk of flooding. https://www.gov.uk/government/collections/planning-practice-guidance
- 'Planning applications: assessing flood risk' - information about completing Flood Risk Assessments. https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications
- 'Site specific flood risk assessment: Checklist' – a checklist to help ensure you have considered all the relevant factors in your flood risk assessment. https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section

Please be aware that from 20th July 2021 the climate change allowances required in flood risk assessments have been updated. Please see https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#contents for more information.

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I hope that we have correctly interpreted your request. Please refer to our Open Government Licence for the permitted use of the supplied data: http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Please be aware that many of our datasets are now available online. Simply visit environment.data.gov.uk

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely,

Customers & Engagement Team **- Thames**

☎ **External: 0203 0259 804**

enquiries_THM@environment-agency.gov.uk

Environment Agency | Red Kite House, Howbery Park, Wallingford, OX10 8BD

ARE YOU AT RISK FROM FLOODING?
Check your flood risk today

FLOODS DESTROY BE PREPARED

From: Thomas Sturtridge <TSturtridge@pellfrischmann.com>
Sent: 26 May 2023 11:59
To: Enquiries, Unit <enquiries@environment-agency.gov.uk>
Subject: Request for Information - M4 Junction 16, Swindon - Product 4

To whom it may concern,

We have been instructed by our client to advise on flood risk and drainage constraints for a proposed development at a site off Junction 16 of the M4, Swindon. A site location plan is provided centred on 410377 , 182730 (nearest postcode: SN5 8UD).

Mapping shows the site to be wholly within Flood Zone 1. I would be grateful if you could supply a Product 4 as a minimum to verify flood extents, levels, and impact of any climate change events and any modelled flood data you may hold.

I trust you find this in order, but should you have an questions, please do not hesitate to contact me on the details below.

Kind regards,

Thomas Sturtridge
BSc (Hons) MSc PIEMA
Graduate Engineer
Suite 4.2 - 1
4th Floor
The Poynt
Wollaton Street T: 0115784 8960

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ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Pell Frischmann

M4 Junction 16 Motorway Rest Area

Sustainable Drainage Report

This report is to be regarded as confidential to our Client and is intended for their use only and may not be assigned except in accordance with the contract. Consequently, and in accordance with current practice, any liability to any third party in respect of the whole or any part of its contents is hereby expressly excluded, except to the extent that the report has been assigned in accordance with the contract. Before the report or any part of it is reproduced or referred to in any document, circular or statement and before its contents or the contents of any part of it are disclosed orally to any third party, our written approval as to the form and context of such a publication or disclosure must be obtained.

Report Ref.	**107846-PEF-ZZ-XX-RP-CD-000001**
File Path	\\RSBGUKFS01\NOTEngineering\Data\107846 - M4 Junction 16 Motorway Rest Area\01 - WIP\Documents\Drainage\107846-PEF-ZZ-XX-RP-CD-000001-S2-P04_SDR.docx

Suit	Rev	Description	Date	Originator	Checker	Approver
S2	P01	Preliminary Issue	25/08/2023	H. McColl	D. Allum-Rooney	D. Allum-Rooney
S2	P02	Updated based on client comments	13/09/2023	T. Sturtridge	H. McColl	D. Allum-Rooney
S2	P03	Updated to client comments	02/10/2023	H. McColl	D. Allum-Rooney	D. Allum-Rooney
S2	P04	Updated to new layout	05/06/2024	H. McColl	D. Allum-Rooney	D. Allum-Rooney

Ref. reference. Rev revision. Suit suitability.

Prepared for

Moto Hospitality Ltd.

Toddington Service Area
Junction 11/12, M1 (Southbound)
Toddington, Bedfordshire
LU5 6HR

Prepared by

Pell Frischmann

Suite 4.2 – 1, The Poynt
Wollaton Road
Nottingham
NG1 5FW

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Appendix F Surface Water Attenuation Calculations
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Appendix H SuDS Simple Index Approach Calculations
Appendix I Impermeable Area Plan
Appendix J Watercourse Connectivity Plans
Appendix K Thames Water Correspondence

1 Introduction

1.1 Report Context

1.1.1 Pell Frischmann has been commissioned by Moto Hospitality to develop a drainage strategy for a site off Junction 16 of the M4 to support an outline planning application for a proposed new motorway rest area.

1.1.2 This Sustainable Drainage Report (SDR) will set out the principles of the proposed drainage strategy and demonstrate how the local and national guidance has been considered. This will include justification of; specific surface water discharge rates, the volume of attenuation required and sustainable drainage systems to be included.

1.2 Sources of Information

1.2.1 A review of the relevant information from a range of sources has been undertaken and includes the following:

- National Planning Policy Framework (NPPF), September 2023;
- Non-statutory technical standards for sustainable drainage systems, March 2015;
- Water UK, Sewerage Sector Guidance, October 2019;
- CIRIA, C753 The SuDS Manual Version 6, 2015;
- HM Government, The Building Regulations 2010, Drainage and Water Disposal (Part H), 2015;

1.2.2 The NPPF specifies that surface water arising from a developed site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development. Opportunities to reduce the flood risk to the site itself and elsewhere, taking climate change into account, should be investigated. The drainage proposals within this strategy have been prepared to meet planning policy requirements.

1.2.3 In their role as Lead Local Flood Authority, Wiltshire County Council have not produced any explicit guidance surrounding the drainage of new developments (outside of adoptable highway works.) The designs and principles outlined in this report therefore follow industry best practice and the legislation and guidance presented above.

1.3 Site Location

1.3.1 The site is located between the M4 Motorway and the B4005, just to the east of Junction 16. It is bounded by these two roads (along with associated drainage elements) to the north, south, and west and by further open agricultural space to the east.

1.3.2 The site covers a footprint of approximately 7.3 hectares.

1.3.3 The site is currently accessed from the south of the B4005.

1.3.4 The above can be seen in **Figure 1.1**.

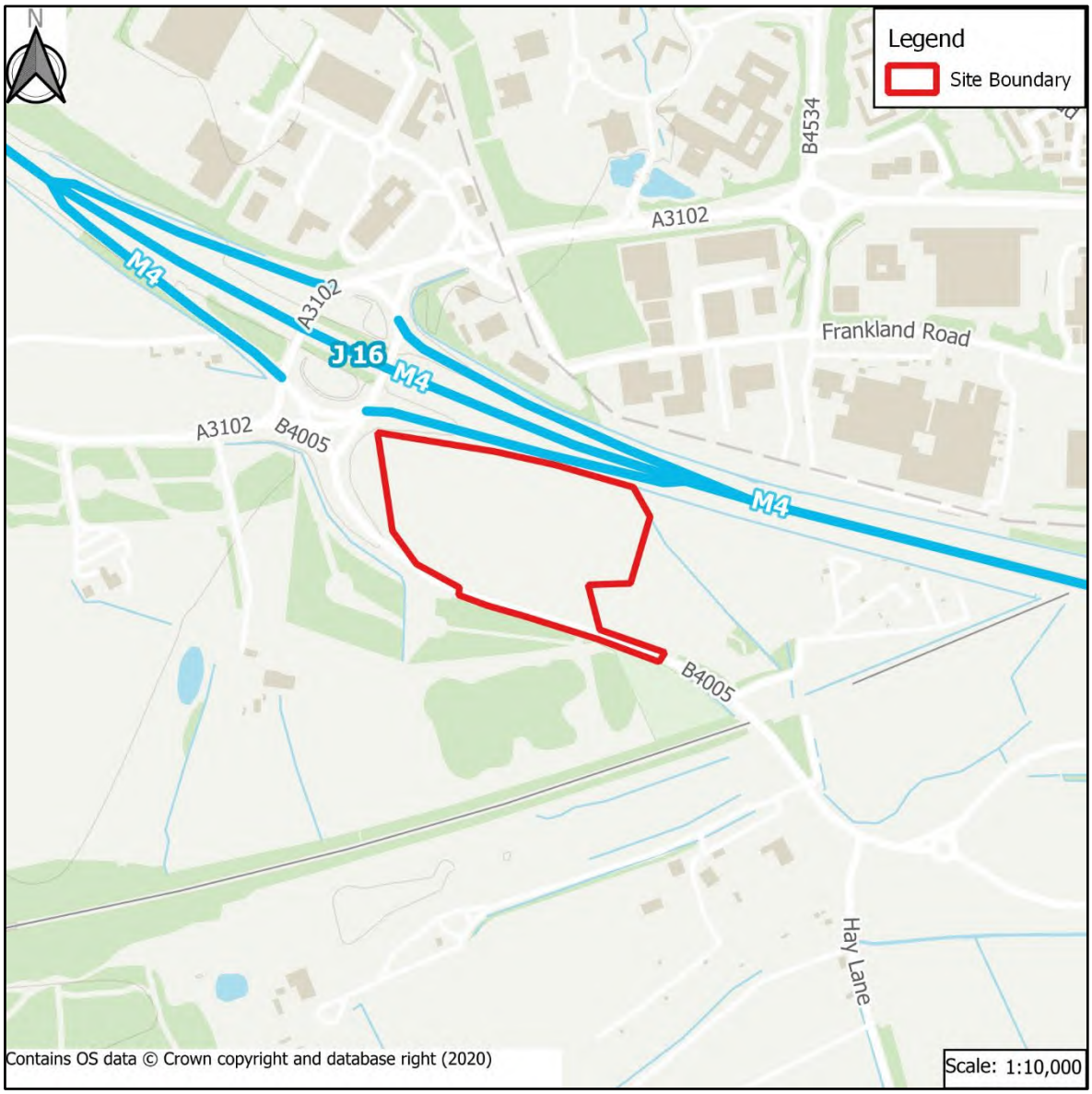


Figure 1.1 Site Location Plan

1.4 Topography

1.4.1 The site generally falls from west to east with a small portion of the western edge to the site falling to the south west.

1.4.2 Levels range from approximately 108mAOD in the north-western corner of the site and fall to approximately 105mAOD in the south-eastern corner.

1.4.3 LiDAR data presented in **Figure 1.2** shows the overall topography of the area and a site-specific topographic survey has been provided in **Appendix A**.

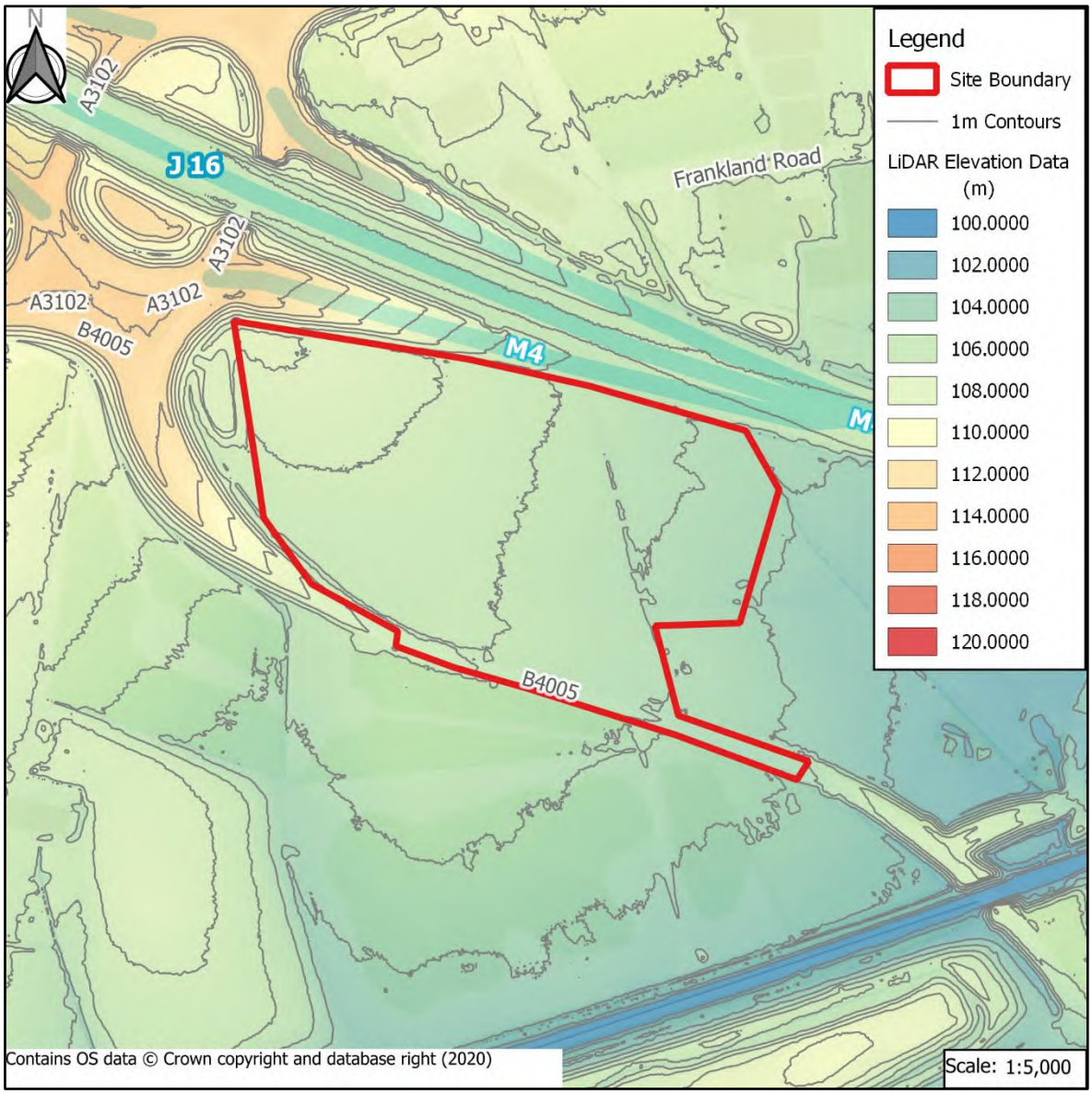


Figure 1.2 LiDAR Elevation Data

1.5 Proposed Development

1.5.1 Development proposals comprise of a new amenity building, charging areas for electric cars and parking for coaches, caravans & HGV creating a new Motorway Rest Area at J16 of the M4, with associated road infrastructure, landscaping, and SuDS features. The latest masterplan for the development, on which the drainage strategy is based, can be found in **Appendix B** of this report.

2 Existing Conditions

2.1 Existing site

2.1.1 There are no areas of hardstanding located within the site in its current state and is assumed to drain via a network of land drainage ditches toward the south and east. This is shown in **Figure 2.1**.

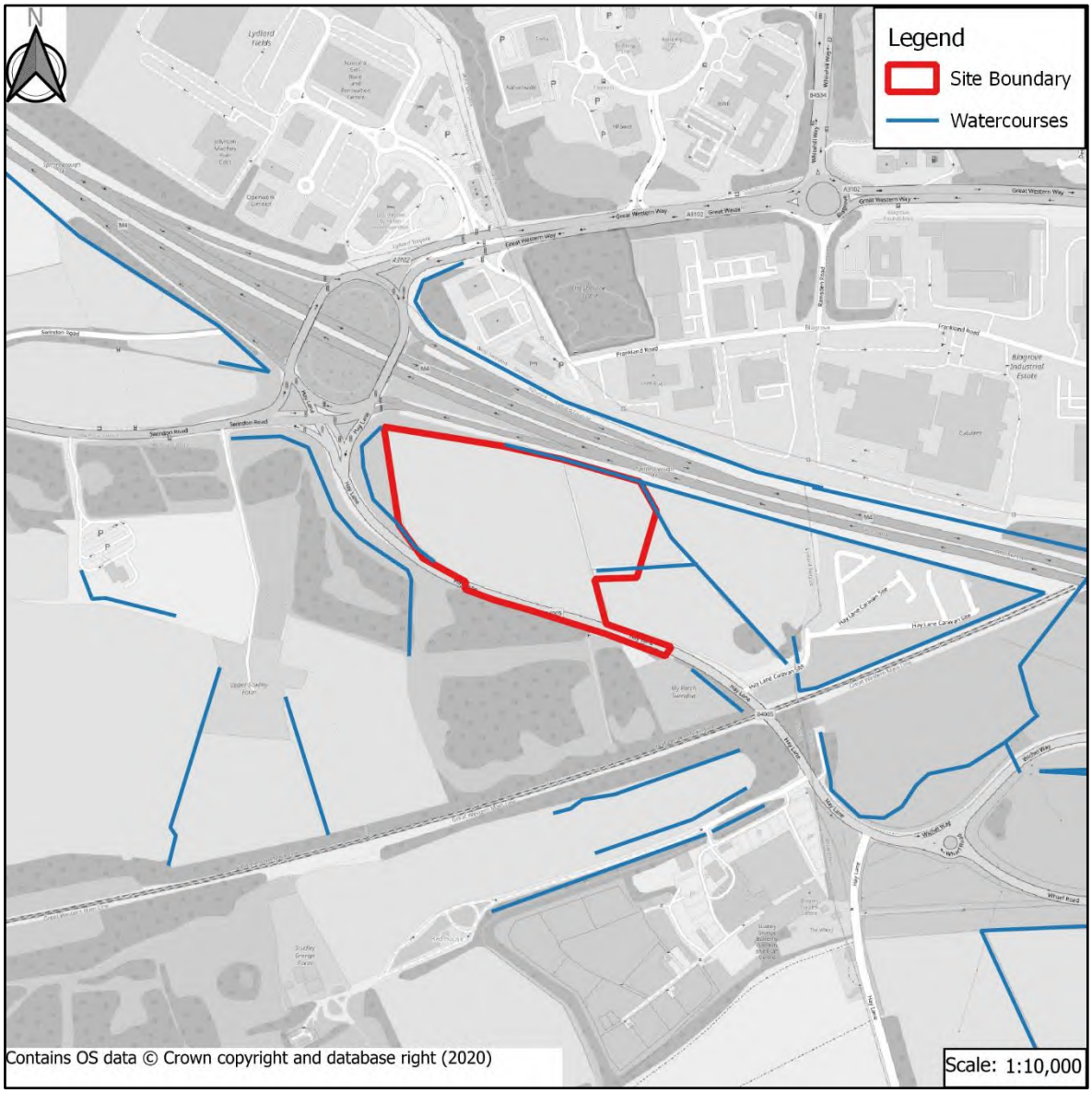


Figure 2.1 Local Watercourses

2.1.2 A recently constructed highway balancing pond and conveyance swale is present on the western and southern boundary, providing a conveyance route for runoff generated by the M4 in the immediate area, Continuity of these elements as a watercourse is provided by a culvert running under the B4005 to the south.

2.2 Site Geology

2.2.1 British Geological Survey (BGS) mapping suggests the site is wholly underlain by a bedrock geology comprising Kimmeridge Clay Formation – Mudstone. This suggests limited potential for infiltration.

2.2.2 BGS mapping also shows there to be no recorded superficial geology within the site or the surrounding area.

2.2.3 There are no freely available borehole records within the site boundary. The nearest can be found immediately to the southwest and northeast of the site (borehole references: SU18SW41 and SU18SW60). Details from the logs made available via the BGS are summarised in **Table 2.1**, which suggest no water was struck during drilling.

Table 2.1 Borehole Information

Borehole Reference	Date Drilled	Depth (mbgl)	Water Struck (mbgl)
SU18SW41	September 1966	1.2	DRY
SU18SW60	July 1984	5.0	DRY

2.3 Existing Runoff Rate

2.3.1 The following runoff rates in **Table 2.2** have been provided for a range of return period for a 'per hectare' rate and a total rate for the developable site area. These have been calculated using Interim Code of Practice/FSR method.

2.3.2 Calculations variables and results are presented in **Appendix C** of this report.

Table 2.2 Summary of Greenfield Runoff Rates

Area	QBAR (l/s)	2 Year Return Period (l/s)	30 Year Return Period (l/s)	100 Year Return Period (l/s)
1ha	3.64	3.2	8.1	11.4
7.05ha	25.1	22.2	57.0	80.2

2.3.3 In accordance with all relevant guidance, it is proposed to limit all surface runoff from the site to a flow rate equivalent to the QBAR rate calculated above.

2.4 Existing Runoff Volume

2.4.1 In accordance with requirement **S4** presented with the '*Non-statutory technical standards for sustainable drainage systems*', the volumetric runoff for the site must not exceed the existing runoff for a 1 in 100-year, 6-hour rainfall event.

2.4.2 As shown in **Appendix D** of this report, the greenfield runoff volume for the aforementioned event is equal to 1,370m^3.

3 Surface Water Strategy

3.1 Drainage Hierarchy

3.1.1 Prevailing local and national guidance suggests that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

- Water reuse, where a need is identified;
- into the ground (infiltration), where ground conditions permit;
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer;

3.1.2 Infiltration should be investigated as a means of surface water disposal as the first priority. Given that investigations are yet to take place, it is proposed that a local watercourse is the most appropriate location of outfall for surface water.

3.1.3 An appropriate receptor is located at the eastern boundary of the site, flowing eastward.

3.2 Surface Water Attenuation

3.2.1 In accordance with national guidance, it is proposed to limit all surface water runoff flow off-site to the equivalent QBAR rate for all events up to the 100-year return period event + 40% climate change. A 40% uplift on the 1% annual probability storm is in line with the allowances for the 'Gloucestershire and the Vale' Management catchment in the latest guidance issued by the Environment Agency[1].

3.2.2 Given this requirement, surface water attenuation is required on site to account for the difference between peak runoff rate and allowable discharge rate, based on the site development area.

3.2.3 Discussion of the calculation of the QBAR greenfield rate can be found in **Section 2.3** of this report.

3.2.4 Given the spatial constraints of the required masterplan for the site and the topographical constraints of outfall location (discussed in **Section 3.3**), various methods of surface water attenuation are currently proposed to be included on-site. These include rain gardens, permeable paving with voided subbase, conveyance swales, green roofs, open basins, and cellular storage. The proposed inclusion of these features can be seen on the conceptual drainage strategy presented in **Appendix E**.

3.2.5 The network calculations presented in **Appendix F** show the following requirements for attenuation on site. An indicative impermeable area plan can be seen in **Appendix I.**

Table 3.1 Summary of Attenuation Required

Impermeable Area (ha)	Allowable Runoff Rate (l/s)	Storage required under 2 year return period (m^3)	Storage required under 30 year return period (m^3)	Storage required under 100 year return period (+40% CC) (m^3)
3.42	25.1	872	1,627	3,272

3.3 Outfall location

3.3.1 In order to satisfy the drainage hierarchy, set out by the CIRIA SuDS Manual C753, it is proposed to outfall surface water runoff generated by the development into an existing drainage ditch running eastward from the eastern boundary of the site.

[1] Environment Agency (2022); *Flood risk assessments: climate change allowances*; available from gov.uk, accessed via https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3038

3.3.2 The downstream connectivity of the receiving watercourse can be seen in **Appendix J**.

3.4 Runoff Volume Control

3.4.1 The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6 states that where reasonably practical the runoff volume from a development for the 1 in 100-year 6-hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Additionally, if practicable on previously developed sites, the runoff volume should not exceed the equivalent greenfield runoff volume. It is proposed that any detailed designs for the surface water management of the site will adhere to this requirement.

3.5 Surface Water Exceedance Flows

3.5.1 In the event of the failure of the surface water network serving the event, e.g. in the event of blockage or a rainfall event that exceeds capacity of conveyance elements.

3.5.2 A surface water exceedance route plan has been included as **Appendix G** of this report, showing flows to be directed toward the eastern boundary of the site, in general accordance with the existing overland flow routes of the site; where topography creates sheet flow to the east.

3.6 SuDS Features

3.6.1 The proposed strategy is based on sustainable drainage principles, employing SuDS features to manage surface water runoff across the site.

3.6.2 Whilst the conveyance swales and attenuation basins are principally designed to address the movement and quantity of water that is to be attenuated, they also have water quality benefits, especially if planted with vegetation. They can also provide additional habitats for wildlife, increasing biodiversity and can increase the amenity value of the service area.

3.6.3 A wide variety of other SuDS features are also proposed to be implemented across the development;

3.6.4 Areas of permeable paving constructed with a voided subbase are proposed to be utilised under large areas of parking. Detailed design will necessitate provision of overflows and baffles to utilise the full area.

3.6.5 Conveyance swales will be used to connect the site where possible to allow flow to progress from west to east.

3.6.6 Rain gardens will be provided at the end of parking areas to provide a visible element of additional surface level storage.

3.6.7 Flood Storage areas will be introduced to hold some of the flooded volume in the most extreme rainfall events.

3.6.8 In order to provide the required attenuation volume on-site, underground features such as cellular storage tanks are required to hold surface water.

3.6.9 Additional measures are likely to be incorporated into the design at the appropriate stage, including oil/petrol interceptors in areas at high risk of pollution.

3.7 Water Quality Assessment

3.7.1 In accordance with the Simple Index Approach presented in CIRIA SuDS Manual C753, it is a requirement to show that there is adequate water treatment within the surface water runoff treatment

train. **Table 3.2** summarises the land hazard use and treatment indices presented within the drainage strategy.

Table 3.2 Summary of Land Use Hazard and Treatment Indices

SuDS Component	Mitigation Indices		
	Total Suspended Solids	***Metals***	***Hydrocarbons***
Permeable Paving	0.7	0.6	0.7
Conveyance Swale	0.5	0.6	0.6
Attenuation Basin	0.7	0.7	0.5
SuDS Mitigation Index	**>0.95**	**>0.95**	**>0.95**
Lorry Park	0.8	0.8	0.9
Highly Frequented Road	0.8	0.8	0.9
Mitigation Requirement Met?	Yes	Yes	Yes

3.7.2 It can be seen above that the treatment provided by the train within the development is adequate for the development uses, even when considering the factored treatment index for secondary and tertiary stages. Details of the calculations using the Simple Index Approach are included as **Appendix H.**

3.7.3 Any requirement for specific petrol/oil interceptors will be confirmed at detailed design. It should also be noted that the petrol filling station will have a separate, discrete drainage system designed with suitable monitoring and shut off valves to separate it from the rest of the drainage system, which can be isolated in the event of spills. Pollution prevention plans should also be prepared in line with prevailing guidance and best practice.

3.8 Maintenance and Adoption

3.8.1 For the proposed surface water drainage system to function correctly, it will need to be appropriately maintained. It is proposed that all drainage elements within the site will be owned and maintained by the body responsible for maintenance of the wider motorway service area.

3.8.2 The maintenance schedule for the network must be comprehensive and detail the specific maintenance requirements for each element of the drainage system. The CIRIA SuDS Manual has extensive information relating to the maintenance of SuDS which should be consulted when specifying the requirements.

3.8.3 For pipes, manholes and gullies, both general best practice and specific manufacturer maintenance protocols should be followed.

3.8.4 Requirements for the ongoing maintenance of the infrastructure should form part of the Operation and Maintenance (O&M) manual for the site, clearly detailing the extent of responsibility and features to be maintained. Any specialist or proprietary products specified should have a manufacturer specific maintenance regime which should be included. It is envisaged that the O&M manual will be developed at the detailed design stage. A summary of general best practice maintenance is given below.

- All drainage features should be situated in open areas which are readily accessible.
- Gullies, pipes, manholes and silt traps should be inspected and de-silted at least once per year, where necessary.
- Wherever permeable paving is incorporated it should be swept a minimum of every 6 months to maintain flow capacity of the joints between blocks.
- For any basins which are designed to be dry, they should be seeded with a wildflower grass seed mix that can tolerate wet ground conditions and should be mowed periodically over the summer months to ensure they do not become overgrown.

- For any basins which are designed to be wet, plants which are suitable for growing in permanent water should be used, such as bull rushes and reeds.
- Regular inspections of all basins should be undertaken to remove litter/debris, invasive/colonising vegetation, and silt build-up as necessary.
- Inlet and outlet structures should be regularly inspected with remedial work as required to ensure clear flow of water and the prevention of silt/vegetation build up.

3.8.5 Flow control chambers should be inspected every 6 months to ensure proper function with any litter or debris removed as necessary.

4 Foul Water Drainage

4.1 Existing Foul water provisions

4.1.1 Given the undeveloped nature of the site, there are currently no foul water provisions within the site.

4.2 Proposed Foul water provisions

4.2.1 In order to convey foul water from the site, it is likely that Thames Water will need to requisition an appropriate route to the existing adopted network. It is anticipated that these discussions will take place subsequent to the approval of planning permission.

4.2.2 The estimation of foul water generated by the development is calculated at 2.94l/s. This has been estimated for the developed area of 4.9ha and an assumed 0.6l/s/ha of developed land as presented in Section B3.1 of Design and Construction Guidance. Thames Water have confirmed that there is capacity within the local sewerage network. Correspondence is shown in **Appendix K**.

4.2.3 Any requirements for an onsite pumping station will be determined at detailed design stage.

5 Summary

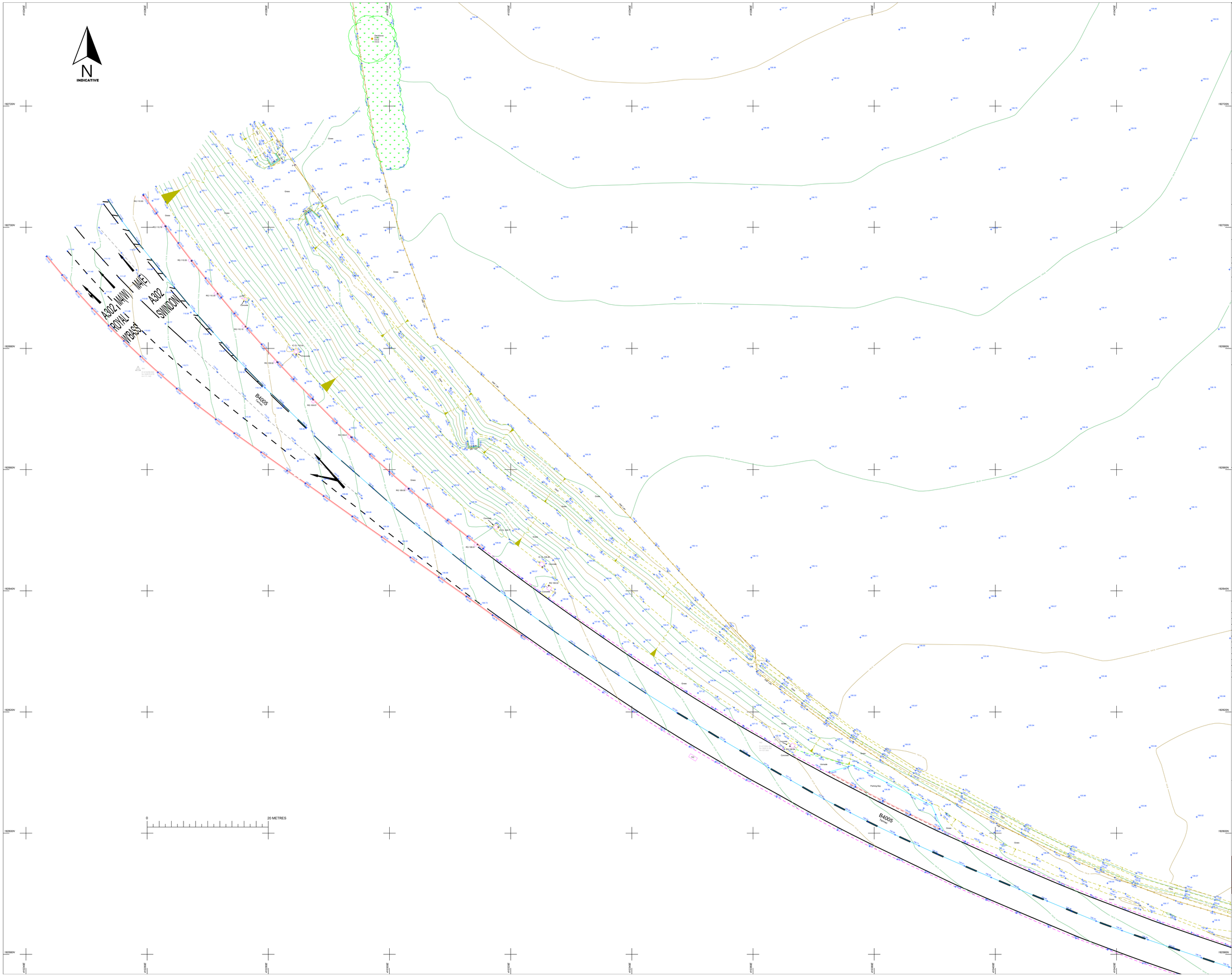
5.1.1 This report and supporting appendices demonstrate that an appropriate surface water drainage strategy has been developed for the site based on sustainable drainage principles in line with the relevant local and national policy and standards.

5.1.2 This Sustainable Drainage Report is intended to support an outline planning application and as such the level of detail included is commensurate with the nature of the proposals. **Table 5.1** provides a summary of key information included within this report.

Table 5.1 Summary of Key Information

Topic	Existing Site		Proposed Development
Site Area (hectares)	7.2		7.2
Impermeable Area (hectares)	0		3.42
Number of Sub-Catchments	-		1
Outfall Location(s)			
Peak Runoff Rate (l/s)	1 in 1-year	21.4	Peak Runoff Rate 25.1 (l/s)
	QBAR	25.1	
	1 in 30-year	57.0	
	1 in 100-year	80.2	
	1 in 100-year + CC	112.3	
Proposed Storage Volume (m^3)	-		3,272
SuDS Features	-		Attenuation basin Permeable paving Swales Rain gardens Rainwater harvesting systems Tree Pits Green Roofs
Maintenance Responsibilities	Landowner		MSA Operator

Appendix A Topographic Survey



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TOPOGRAPHICAL SURVEY

SURVEYOR:	WM	DRAWN:	WM	CHECKED:	ML

SCALE	SHEET No:
1/200	SHEET 1 OF 6

DATE	SHEET SIZE	DRAWING No:
APR 23	A0	8807_SITE_2D_R0

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LEGEND

SURVEY STATION
LEVEL POSITION
WALL TOP LEVEL
THRESHOLD LEVEL
INVERT LEVEL
CROWN LINE
KERB
KERB TOP
BUILDING
WALL
FENCE
OVERHEAD CABLE
VEGETATION
GATE
SERVICE COVERS
IC CL 12.34
BUILDING
BUILDING CANOPY
REGISTRATION MARK
SAPLING
BUSH
TREE
BANK

ABBREVIATIONS

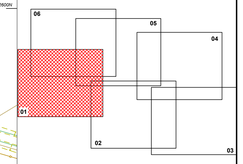
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BB	BELLMAN BEACON	MKR	MARKER
BC	BELOW CANOPY	NB	NOTICE BOARD
BL	BASEMENT LIGHTS	NP	STREET NAME PLATE
BOL	BOLLARD	OBF	OPEN BOARD FENCE
BR	BUS STOP	OH	OVERHEAD
BS	BUS STOP POST	P	POST
BSH	BUS STOP SHELTER	PB	POST BOX
BW	BRICK WALL	PM	PARKING METER
BWF	BARBED WIRE FENCE	PR	PIPE RISER
CAB	CABLE	PRF	POST & RAIL FENCE
CBF	CLOSED BOARDED FENCE	PWF	POST & WIRE FENCE
CBR	CRASH BARRIER	RFL	ROOF LEVEL
CE	CLEANING EYE	RL	RADIUS LEVEL
CL	COVER LEVEL	RGL	RIDGE LEVEL
CLF	CLOSE FENCE	RS	ROAD SIGN
CLF	CHAIN LINK FENCE	RSI	ROAD SIGN ILLUMINATED
CONC	CONCRETE	RW	RETAINING WALL
CPF	CONCRETE PANEL FENCE	SCP	SCAFFOLD POLE
CR	CABLE RISER	SAP	SAPLING
CS	CONCRETE STATION	SC	STOP COCK
CW	CONCRETE WALL	SL	STREET LIGHT
EIC	ELECTRICITY IC	SV	SCARS VALVE
EJB	ELECTRICITY JUNCTION BOX	SVP	SOIL VENT PIPE
EP	ELECTRICITY POLE	SW	STONE WALL
ES	ELECTRIC SIGN	TCB	TELEPHONE CALL BOX
EVL	EAVES LEVEL	TCP	TELEPHONE POLE
FH	FIRE HYDRANT	TIC	TELECOMUNICATIONS IC
FLD	FLOODLIGHT	TP	TELEPHONE POLE
G	GULLY	TS	TRAFFIC SIGNAL
GI	GRATED INLET	TSCU	TS CONTROL UNIT
GSW	GUARD RAIL	UIC	UNABLE TO LIFT IC
GV	GAS VALVE	UTL	UNABLE TO LIFT
H	HEDGE	UTS	UNABLE TO SURVEY
IBOL	ILLUMINATED BOLLARD	VP	VENT PIPE
IC	INSPECTION COVER	WL	WATER LEVEL
IL	INVERT LEVEL	WM	WATER METER
LP	LAMP POST	WO	WASHOUT
IRF	IRON RAILING FENCE	WT	WALL TOP LEVEL

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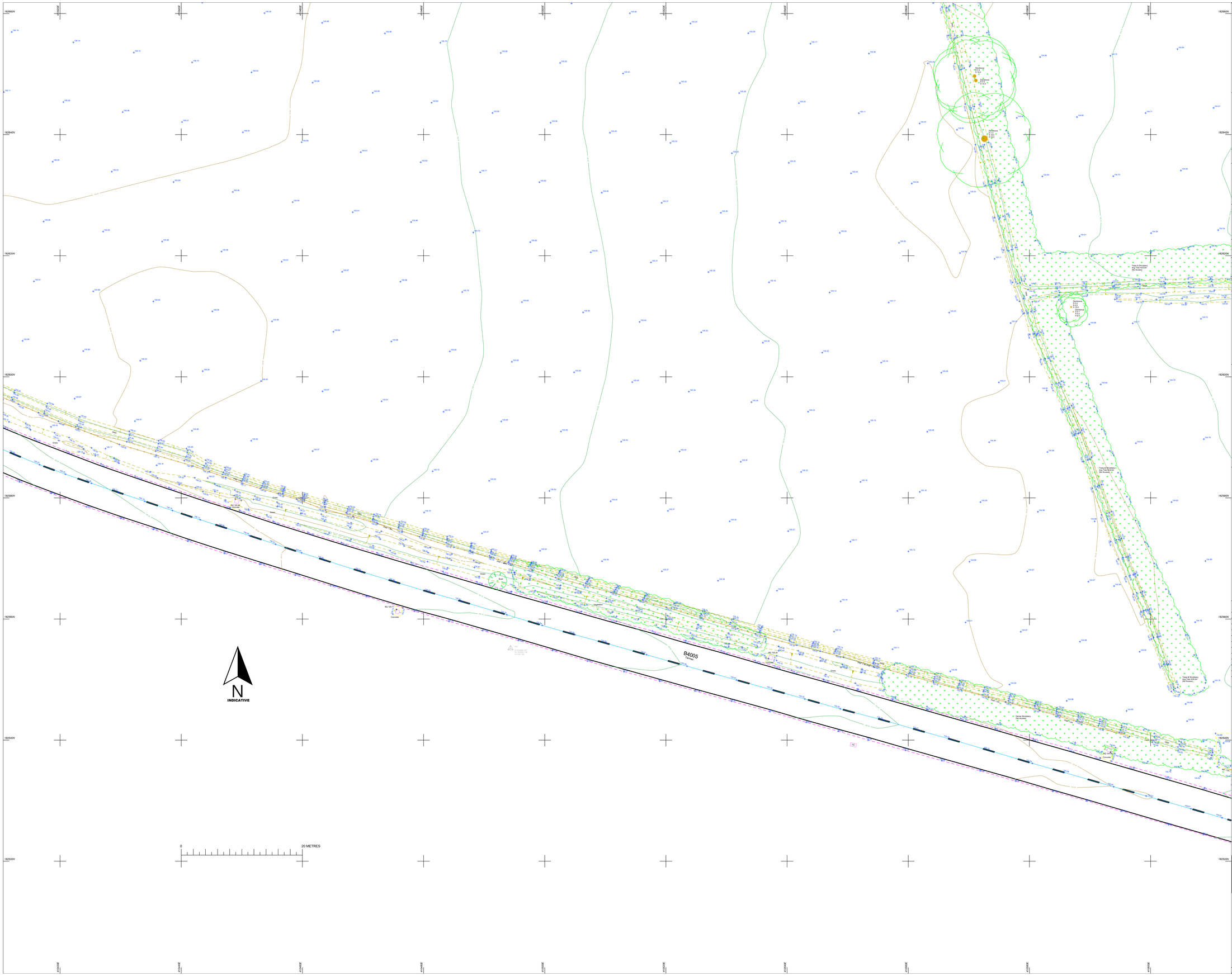
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SCALE: 1/200	SHEET No: SHEET 2 OF 6	
DATE: APR 23	SHEET SIZE: A0	DRAWING No: 8807_SITE_2D_R0

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- WALL TOP LEVEL
- THRESHOLD LEVEL
- INVERT LEVEL
- CROWN LINE
- KERB
- KERB TOP
- BUILDING
- WALL
- FENCE
- OVERHEAD CABLE
- VEGETATION
- GATE
- SERVICE COVERS
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- BUILDING CANOPY
- REGISTRATION MARK
- SAPLING
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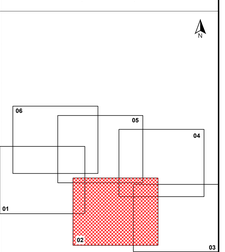
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BBL	BALL BOLLARD	NB	NOTICE BOARD
BCL	BOLLARD / LIGHTS	NP	STREET NAME PLATE
BOL	BOLLARD	OBF	OPEN BOARD FENCE
BR	BIKE RAIL	OHI	OVERHEAD
BS	BUS STOP POST	PB	POST
BSH	BUS STOP SHELTER	PB	POST BOX
BW	BRICK WALL	PM	PARKING METER
BWF	BARBED WIRE FENCE	PP	POWER POLE
CAM	CAMERA	PRF	POST & RAIL FENCE
CBF	CLOSE BOARDED FENCE	PWF	POST & WIRE FENCE
CBR	CRASH BARRIER	RTI	ROOF LEVEL
CE	CLEARING EYE	RG	ROAD GULLY
CL	COVER LEVEL	RI	ROAD INSET
CLH	CELLAR HATCH	RS	ROAD SIGN
CLF	CHAIN LINK FENCE	RSI	ROAD SIGN ILLUMINATED
CONC	CONCRETE	RW	RETAINING WALL
CPF	CONCRETE PANEL FENCE	RWP	RAIN WATER PIPE
CR	CABLE RISER	SA	SAMPLE
CTV	CABLE TELEVISION	SC	STOP COCK
DE	DRAINAGE EYE	SL	SUMP LEVEL
EC	ELECTRICITY IC	SP	SOIL PIPE
EJB	ELECTRICITY JUNCTION BOX	SVP	SOIL VENT PIPE
EP	ELECTRICITY POLE	SW	STONE WALL
ER	EARTHING ROD	TCB	TELEPHONE CALL BOX
EX	EXISTING	THL	THRESHOLD LEVEL
FH	FIRE HYDRANT	TI	TELEPHONE MANHOLE IC
FLD	FLOODLIGHT	TP	TELEPHONE POLE
G	GULLY	TS	TRAFFIC SIGNAL
GRB	GRIT BOX	TSCU	TS CONTROL UNIT
GSI	GAS SIGNAL	TSIC	TRAFFIC SIGNAL IC
GV	GAS VALVE	UP	UNKNOWN PIPE
H	HEIGHT	UTS	UNABLE TO SURVEY
IBOL	ILLUMINATED BOLLARD	VP	VENT PIPE
IC	INSPECTION COVER	WA	WATER AREA
IL	INVERT LEVEL	WM	WATER METER
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IRF	IRON RAILING FENCE	WT	WALL TOP LEVEL

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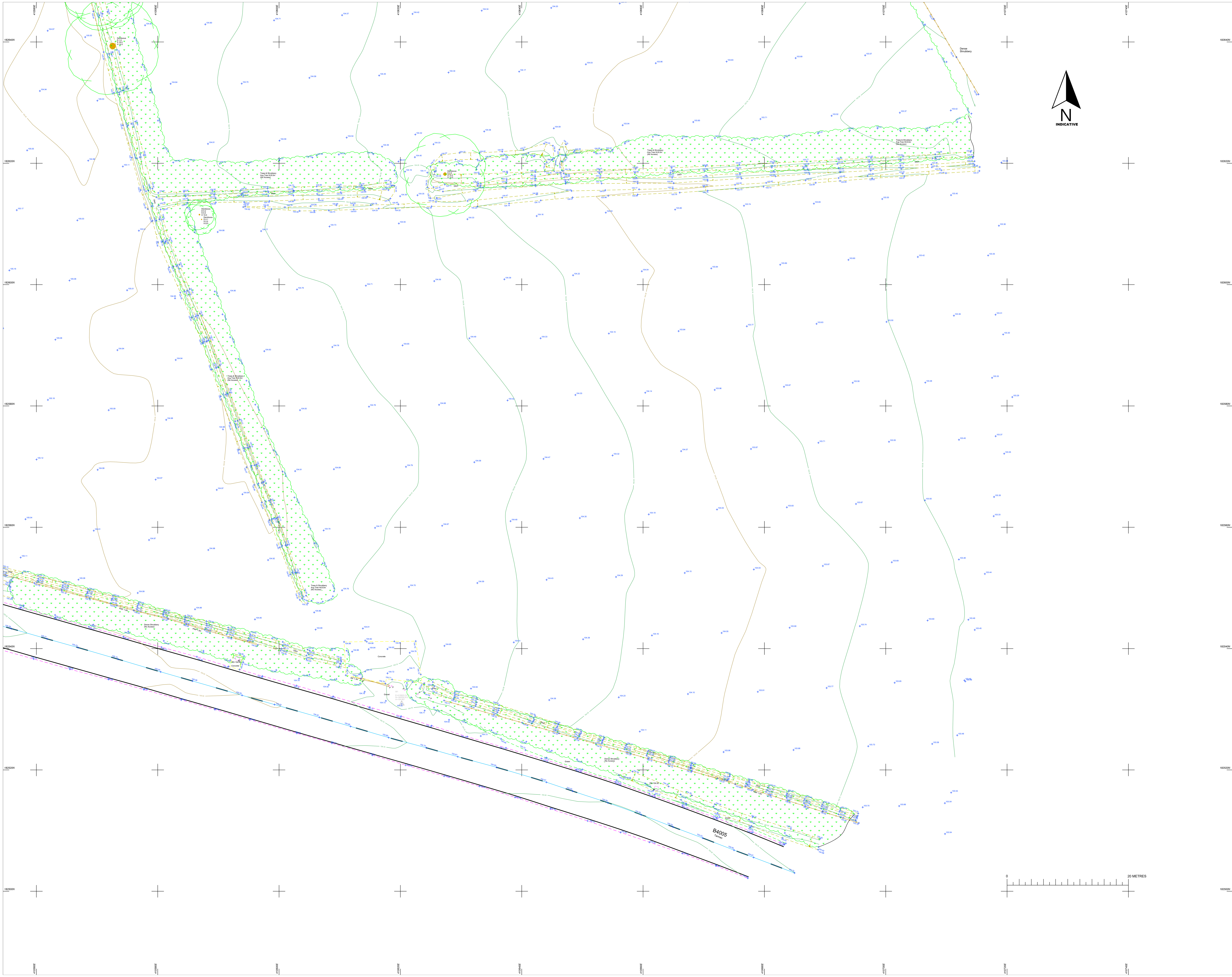
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IC CL 12.34 CTV SERVICE COVERS
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BUILDING CANOPY
CROWN LINE
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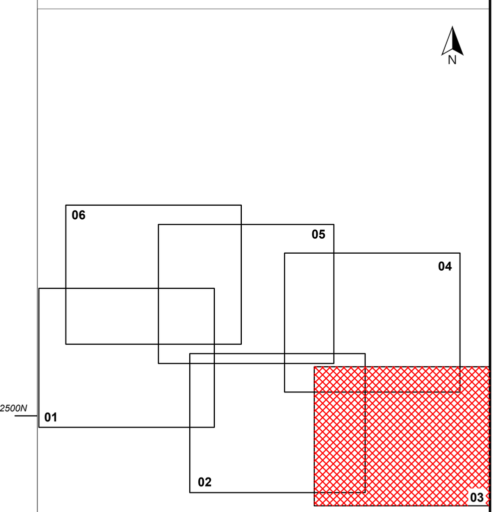
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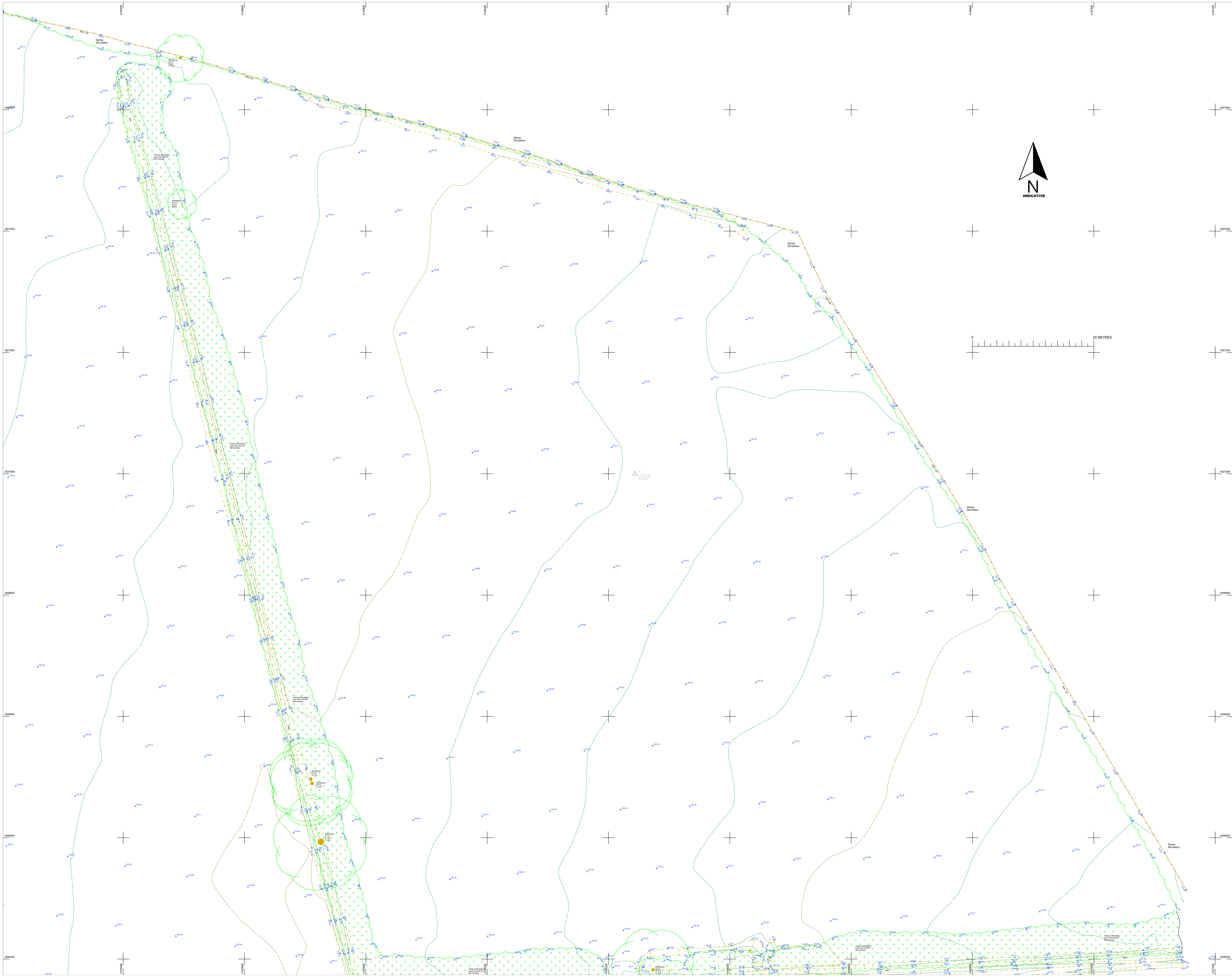
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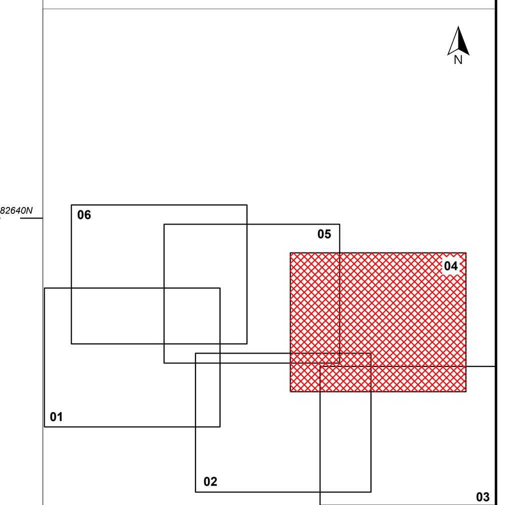
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CTV	CABLE TELEVISION	SC	STOP COCK
CW	CONCRETE WALL	SL	SUMP LEVEL
EIC	ELECTRICITY IC	SV	SLUICE VALVE
EJB	ELECTRICITY JUNCTION BOX	SVP	SOIL VENT PIPE
EP	ELECTRICITY POLE	SW	STONE WALL
ER	EARTHING ROD	TCB	TELEPHONE CALL BOX
EVL	EAVES LEVEL	THL	THRESHOLD LEVEL
FH	FIRE HYDRANT	TIC	TELECOMMUNICATIONS IC
FLD	FLOODLIGHT	TP	TELEPHONE POLE
G	GULLY	TS	TRAFFIC SIGNAL
GRB	GRIT BOX	TSCU	TS CONTROL UNIT
GDR	GUARD RAIL	TSIC	TRAFFIC SIGNAL IC
GV	GAS VALVE	UTL	UNABLE TO LIFT
H	HEIGHT	UTS	UNABLE TO SURVEY
IBOL	ILLUMINATED BOLLARD	VP	VENT PIPE
IC	INSPECTION COVER	WL	WATER LEVEL
IL	INVERT LEVEL	WM	WATER METER
LP	LAMP POST	WO	WASHOUT
IRF	IRON RAILING FENCE	WT	WALL TOP LEVEL

REVISIONS

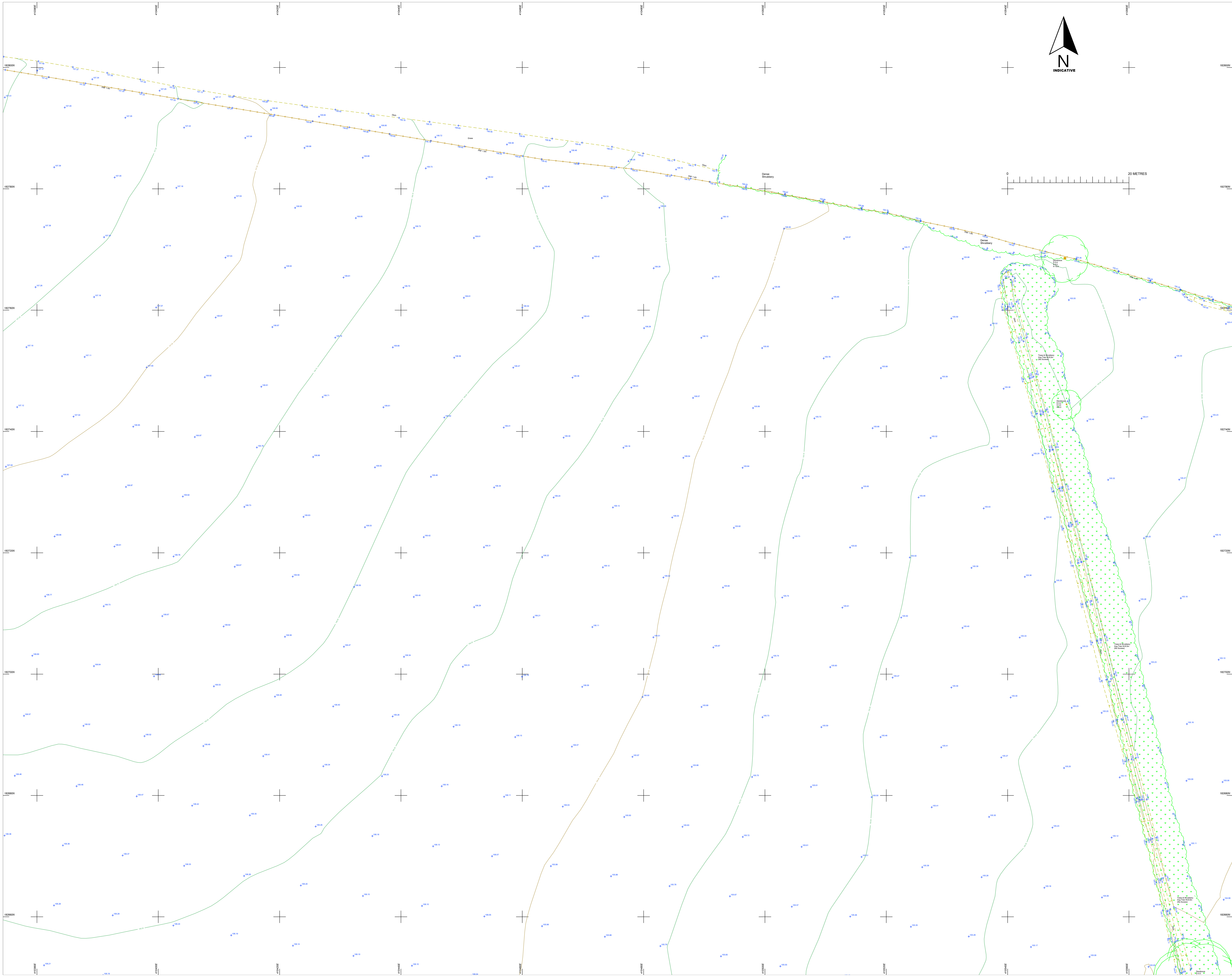
No.	DATE	REVISION

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Tel: 0207 231 3404

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

PSL REF 8807

CLIENT

MOTO HOSPITALITY LTD

JOB TITLE

PROPOSED MOTORWAY SERVICE AREA
M4 JUNCTION 16
SWINDON SN4 9QT

DRAWING TITLE

TOPOGRAPHICAL SURVEY

SURVEYOR: WM	DRAWN: WM	CHECKED: ML
SCALE 1/200		SHEET No: SHEET 5 OF 6
DATE APR 23	SHEET SIZE A0	DRAWING No: 8807_SITE_2D_R0

DATUM & COORDINATES SYSTEM

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SCALE FACTOR: 0.99960
CENTRE POINT: 410466.777, 182630.761

LEGEND

SURVEY STATION
+ 10.00 LEVEL POSITION
+ WT94.43 WALL TOP LEVEL
+ THL 94.43 THRESHOLD LEVEL
+ IL 94.43 INVERT LEVEL
CTV IC CL 12.34 SERVICE COVERS
BUILDING
BUILDING CANOPY
CROWN LINE
KERB
KERB TOP
BUILDING
WALL
FENCE
OVERHEAD CABLE
VEGETATION
GATE
REGISTRATION MARK
SAPLING
BUSH
TREE
BANK

ABBREVIATIONS

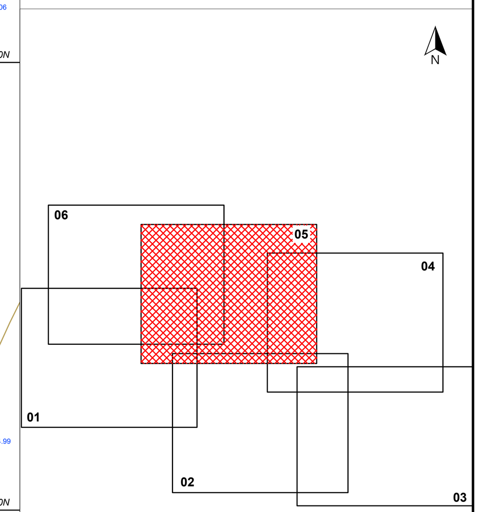
A/C	AIR CONDITIONING UNIT	MH	MANHOLE
BB	BELISHA BEACON	MKR	MARKER
BBL	BELL BOLLARD	NB	NOTICE BOARD
BL	BASEMENT LIGHTS	NP	STREET NAME PLATE
BOL	BOLLARD	OBF	OPEN BOARD FENCE
BR	BIKE RAIL	O/H	OVERHEAD
BS	BUS STOP POST	P	POST
BSH	BUS STOP SHELTER	PB	POST BOX
BW	BRICK WALL	PM	PARKING METER
BWF	BARBED WIRE FENCE	PR	PIPE RISER
CAM	CAMERA	PRF	POST & RAIL FENCE
CBF	CLOSED BOARDED FENCE	PWF	POST & WIRE FENCE
CBR	CRASH BARRIER	RFL	ROOF LEVEL
CE	CLEANING EYE	RG	ROAD GULLY
CL	COVER LEVEL	RGL	RIDGE LEVEL
CLH	CELLAR HATCH	RS	ROAD SIGN
CLF	CHAIN LINK FENCE	RSI	ROAD SIGN ILLUMINATED
CONC.	CONCRETE	RW	RETAINING WALL
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REVISIONS

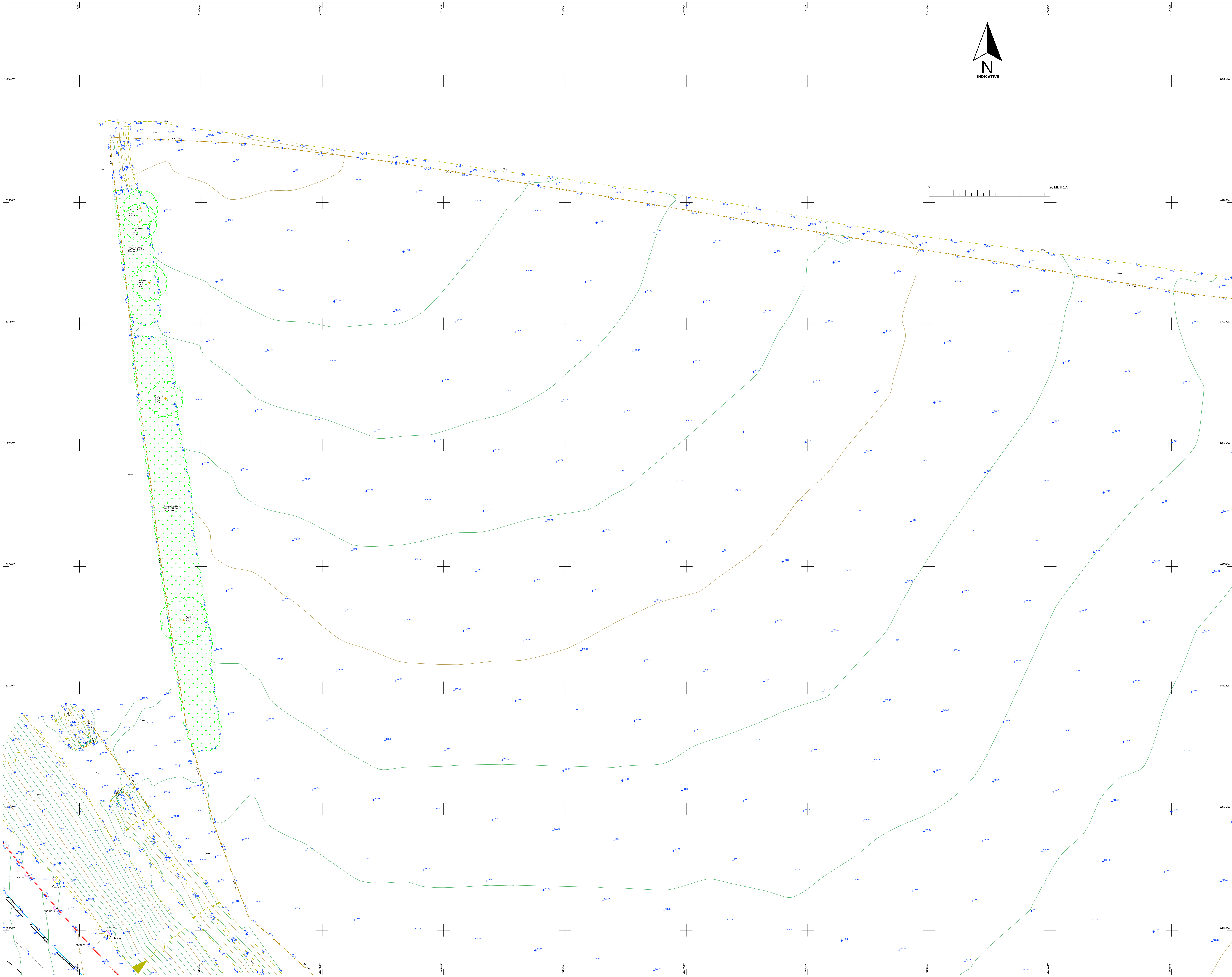
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ABBREVIATIONS

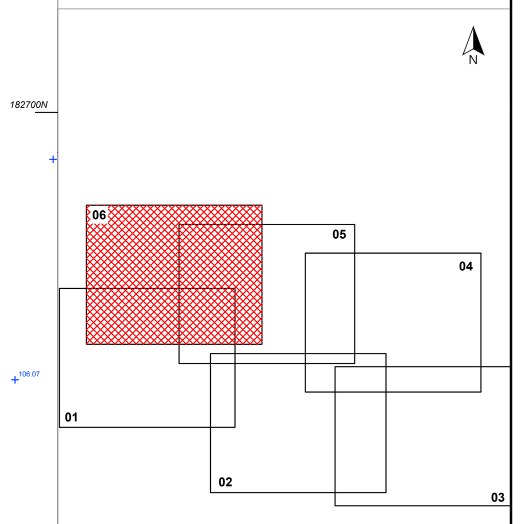
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TP	TELEPHONE POLE
TS	TRAFFIC SIGNAL
TSCU	TS CONTROL UNIT
TSIC	TRAFFIC SIGNAL IC
UTL	UNABLE TO LIFT
UTS	UNABLE TO SURVEY
VP	VENT PIPE
WL	WATER LEVEL
WM	WATER METER
WO	WASHOUT
WT	WALL TOP LEVEL

REVISIONS

No.	DATE	REVISION

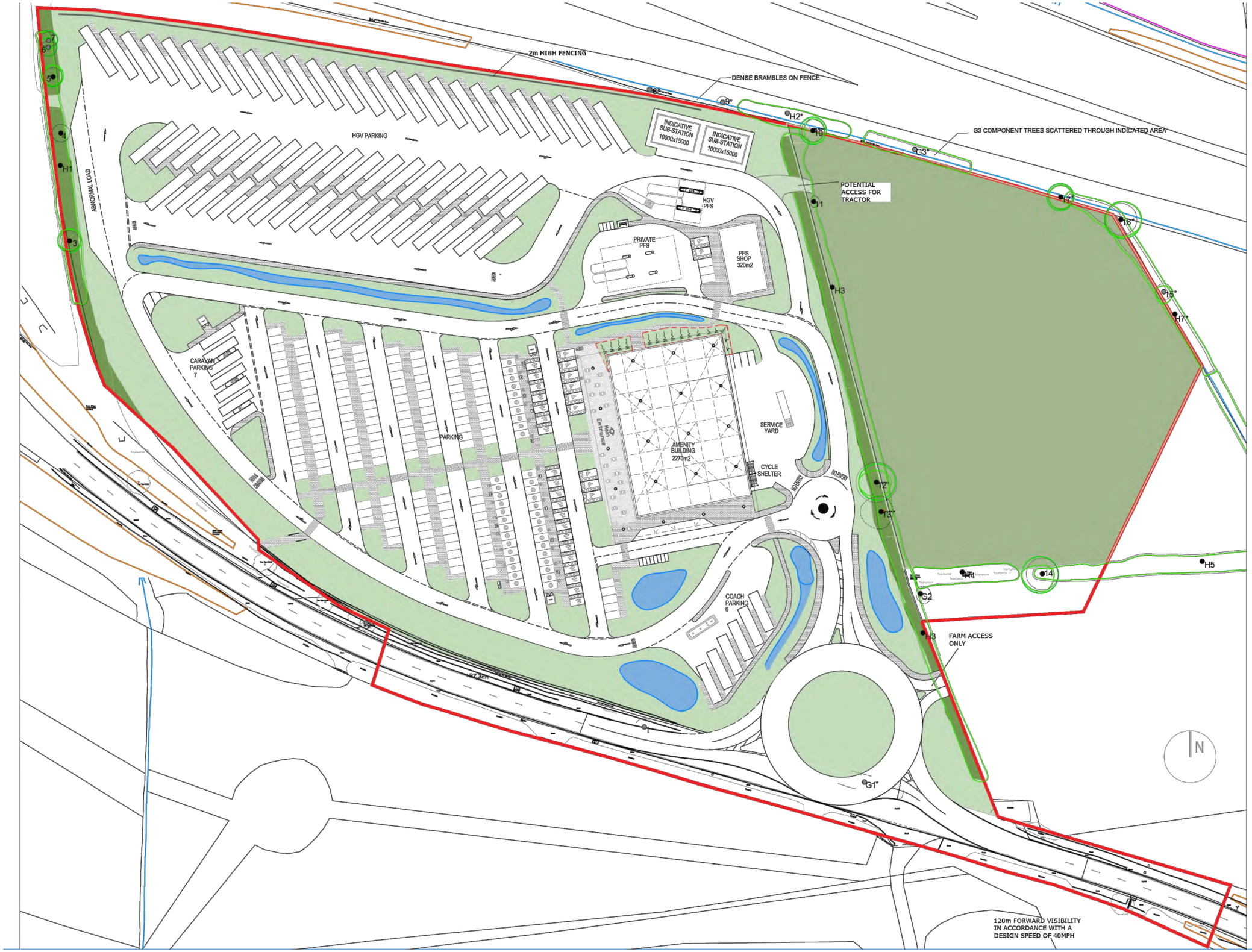
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Appendix B Development Masterplan



Cartwright & Gross Ltd
Chartered Architects
The Golden Lion
Middle Hillgate
Stockport
SK1 3EH
0161 480 1119
www.cartwrightandgross.co.uk

Do not scale. Contractors must check all dimensions on site before preparing production drawings or commencing any work. This drawing and its design is the copyright of Cartwright and Gross Ltd and may not be reproduced in any form whatsoever without their prior express written consent.

Revision	Date	Revision note
D	08.05.2024	Renamed from previous issue (M49_001 rev C)
E	08.05.2024	Revised following consultation comments

Notes

DRAFT
13/05/24

Project : Swindon MRA
Title : Proposed Layout Plan (Illustrative)
Drawing number : 915-201
Issue : E
Client : Moto Hospitality Ltd
Scale : 1:1250 @ A3
Date : May 2024
CAD Ref :
Drawn by : CG

CG ARCHITECTS

Appendix C Greenfield Runoff Rate Calculation

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 750 Urban 0.000
Area (ha) 5.280 Soil 0.450 Region Number Region 6

Results l/s

QBAR Rural 25.1
QBAR Urban 25.1

Q100 years 80.2

Q1 year 21.4
Q30 years 57.0
Q100 years 80.2

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Appendix D Greenfield Runoff Volume Calculation

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.000
Ratio R	0.397
Areal Reduction Factor	1.00
Area (ha)	7.050
SAAR (mm)	783
CWI	45.000
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%)	31.00
Greenfield Runoff Volume (m^3)	1370.226

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Appendix E Drainage Strategy

STORAGE SUMMARY

NETWORK NODE	STORAGE TYPE	DISCHARGE RATE (l/s)	STORAGE REQUIRED (m^3)
12	VOIDED SUBBASE	6	1800
30	VOIDED SUBBASE	6	1700
32	BASIN	50mm ORIFICE	113
34	CELLULAR SUBBASE REPLACEMENT	1.5	64
35	BLUE ROOF	TBC	tbc
38	CELLULAR TANK	1.5	170
39	CELLULAR TANK	1.5	25
40	BASIN	25.1	140

Balancing Pond

FF Drain

Voided Subbase Storage (or similar) - **S12**
Approximate Footprint - 10900m²
Thickness of subbase layer - 550mm
Assumed Porosity - 0.3
Approximate volume provided - 1800m³

Any exceedance flow generated by this area will fall toward the swale to the south

HGV PARKING

ABNORMAL LOAD

INDICATIVE SUB-STATION 10000x15000

INDICATIVE SUB-STATION 10000x15000

Green Roof Should be Implemented on Petrol Filling Station Shop if possible.

Petrol Interceptor required for surface water drainage serving petrol filling station.

TRACTOR

HGV PFS

PRIVATE PFS

PFS SHOP ~320m2

Flow Control Device** - 6l/s

Conveyance Swale - Average Longitudinal Gradient 1:300

Conveyance Swale - Average Longitudinal Gradient 1:350

CARAVAN PARKING

External areas should be directed towards the underground storage under parking areas

Any exceedance flow generated by this area will be directed to localised rain gardens at the end of parking aisles.

Cellular Attenuation Tank (or similar) - **S38**
Bed Level - 104.225
Soffit Level - 104.625
Minimum Cover Level (providing 0.6m Cover) - 105.225
Approximate Storage Provided - 176m³

175mm deep depression to be provided as flood storage area, providing approximately 70m³ storage.

PARKING

Flow Control Device** - 1.5l/s

AMENITY BUILDING 2270m2

Cellular Attenuation - **S36**
Approximate Storage - 285m³

SERVICE YARD

CYCLE SHELTER

Conveyance Swale - Average Longitudinal Gradient 1:250

Above Ground Flood Storage Area
Approximately 75m³ Required in 380m2 footprint

Attenuation Basin - **S40**
Bed Level - 103.600
Top of storage - 105.100
Approximate volume stored under critical 100 year +CC event - 140m³

COACH PARKING 6

Outfall to existing ditch, nature and level of this outfall TBC.
Any works to ensure connectivity/effective conveyance of existing ditch TBC

Flow Control Device** - 25.1/s

Flow Control Device** - 1.5l/s

Provision of terminal petrol interceptor/proprietary treatment system is subject to EA/LLFA approval and assessment of surface water treatment train

Cellular Attenuation Tank (or similar) - **S39**
Bed Level - 103.700
Soffit Level - 104.100
Minimum Cover Level (providing 0.6m Cover) - 104.700
Approximate Storage Provided - 25m³

Voided Subbase Storage (or similar) - **S30**
Approximate Footprint - 10270m²
Thickness of subbase layer - 550mm
Assumed Porosity - 0.3
Approximate volume provided - 1700m³

Flow Control Device** - 6l/s

Attenuation Basin - **S32**
Bed Level - 104.100
Top of storage - 105.400
Approximate volume stored under critical 100 year +CC event - 113m³

50mm Orifice Flow Restriction**

Cellular Subbase Replacement (or similar) - **S34**
Approximate Footprint - 450m²
Bed Level - 104.300
Depth - 150mm
Approximate volume - 64m³

Where possible, drainage serving the roundabout should make use of existing highway drainage assets, subject to capacity and agreement from Highways Authority.

Path (um)

GENERAL NOTES

G1. DO NOT SCALE THIS DRAWING.

G2. ANY DIMENSIONAL DISCREPANCIES SHOULD BE NOTIFIED TO THE ENGINEER IMMEDIATELY.

G3. ALL DIMENSIONS ARE IN MILLIMETRES - (mm) ALL LEVELS ARE IN METRES - (m) AND ARE ABOVE ORDNANCE DATUM AT NEWLYN, CORNWALL UNLESS NOTED OTHERWISE.

G4. NORTH SHOWN INDICATIVE ONLY

G5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT; SPECIFICATIONS; DRAWINGS; DETAILS AND OTHER DESIGN INFORMATION.

G6. ALL DRAWINGS AND WRITTEN MATERIAL CONTAINED WITHIN, CONSTITUTE ORIGINAL AND UNPUBLISHED WORK OF THE ENGINEER AND MAY NOT BE DUPLICATED, USED, REPRODUCED OR DISCLOSED WITHOUT WRITTEN CONSENT OR EXPRESS PERMISSION FROM THE ENGINEER.

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G8. WHERE THE CONTRACTOR UNDERTAKES OR ENGAGES A THIRD PARTY TO UNDERTAKE TEMPORARY WORKS DESIGN, OR VARIES THE PELL FRISCHMANN DESIGN IN ANY WAY, THEN THE CONTRACTOR WILL TAKE FULL RESPONSIBILITY AND LIABILITY FOR ALL DESIGN ASPECTS, INCLUDING A DESIGN RISK ASSESSMENT. THE CONTRACTOR SHALL INFORM PELL FRISCHMANN OF ANY PROPOSED VARIANCES TO THE DESIGN.

DRAINAGE STRATEGY NOTES

THIS STRATEGY HAS BEEN PRODUCED TO SUPPORT AN OUTLINE PLANNING APPLICATION. DETAILS PROVIDED ARE CONSIDERED TO BE COMMENSURATE WITH THIS.

*DETAILED DESIGN OF BAFFLES WITHIN AREAS OF VOIDED SUBBASE WILL BE REQUIRED TO ENSURE UTILITY OF THE STORAGE VOLUME

**APPROPRIATE BLOCKAGE MITIGATION, MAINTENANCE AND OVERFLOW WILL BE REQUIRED.

KEY

SURFACE WATER CONVEYANCE ROUTE

CONVEYANCE SWALE

VOIDED SUBBASE STORAGE AREA

UNDERGROUND CELLULAR ATTENUATION

PERMAVOID SUBBASE REPLACEMENT

CAR PARK RAIN GARDENS

GREEN ROOF

P06	Updated to new site layout	HM	DAR	DAR 05.06.24
P05	Updated outfall	HM	DAR	DAR 08.09.23
P04	Updated outfall routes	HM	DAR	DAR 06.09.23
P03	Updated to updated layout	HM	DAR	DAR 23.08.23
P02	Updated Outfall Route	HM	RH	DAR 17.08.23
P01	Initial Issue	HM	RH	DAR 27.07.23
REV	DESCRIPTION	DRN	CHK	APP DATE

Pell Frischmann
4th FLOOR, THE POYNT, WOLLATON STREET, NOTTINGHAM NG1 5FW
Telephone +44 (0)115 784 8900
Email: pfnottingham@pellfrischmann.com
www.pellfrischmann.com

Architect/Client/Contractor: moto

Project: Swindon Services

Drawing Title: Conceptual Surface Water Drainage Strategy

Drawing Status: PRELIMINARY

	Name	Date	Status Code
Drawn	H. McColl	27.07.23	S2
Designed	H. McColl	27.07.23	Scale 1:500@A0
Eng Chk	R. Holmes	27.07.23	Revision P06
Approved	D. Allum-Rooney	27.07.23	

Drawing No.
107846 - PEF - ZZ - XX - DR - CD - 0504

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Appendix F Surface Water Attenuation Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2	Volumetric Runoff Coeff.	1.000
		PIMP (%)	100
FEH Rainfall Version	2013	Add Flow / Climate Change (%)	0
Site Location	GB 410651 182602 SU 10651 82602	Minimum Backdrop Height (m)	0.200
Data Type	Point	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for SW

« - Indicates pipe capacity < flow

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

Network Results Table

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Network Design Table for SW

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)

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Network Design Table for SW

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
S4.000	24.124	0.090	268.0	0.051	5.00	0.0	0.600	o	600	Pipe/Conduit	
S4.001	37.906	0.100	379.1	0.034	0.00	0.0	0.600	o	600	Pipe/Conduit	
S4.002	41.636	0.140	297.4	0.033	0.00	0.0	0.600	o	600	Pipe/Conduit	
S4.003	36.174	0.070	516.8	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S5.000	9.036	0.010	903.6	1.090	5.00	0.0	0.600	o	675	Pipe/Conduit	
S5.001	30.263	0.800	37.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.004	13.078	0.045	290.6	0.016	0.00	0.0	0.600	o	600	Pipe/Conduit	
S4.005	38.536	0.085	453.4	0.025	0.00	0.0	0.600	o	600	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)
S4.000	50.00	5.27	104.550	0.051	0.0	0.0	0.0	1.48	419.2	9.2
S4.001	50.00	5.78	104.460	0.085	0.0	0.0	0.0	1.24	351.9	15.3
S4.002	50.00	6.27	104.360	0.118	0.0	0.0	0.0	1.41	397.8	21.3
S4.003	50.00	6.84	104.220	0.118	0.0	0.0	0.0	1.06	300.9	21.3
S5.000	50.00	5.17	105.050	1.090	0.0	0.0	0.0	0.86	309.1	196.8
S5.001	50.00	5.41	104.950	1.090	0.0	0.0	0.0	2.13	84.8«	196.8
S4.004	50.00	6.99	104.150	1.224	0.0	0.0	0.0	1.42	402.4	221.0
S4.005	48.88	7.56	104.105	1.249	0.0	0.0	0.0	1.14	321.5	221.0

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Network Design Table for SW

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
S6.000	16.220	0.100	162.2	0.242	5.00	0.0	0.600	o	450	Pipe/Conduit	
S6.001	11.222	0.480	23.4	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S4.006	30.558	0.100	305.6	0.027	0.00	0.0	0.600	o	600	Pipe/Conduit	
S4.007	42.554	0.120	354.6	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S4.008	46.505	0.200	232.5	0.138	0.00	0.0	0.600	o	600	Pipe/Conduit	
S7.000	56.696	0.280	202.5	0.033	5.00	0.0	0.600	o	600	Pipe/Conduit	
S7.001	81.614	0.310	263.3	0.049	0.00	0.0	0.600	o	600	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)
S6.000	50.00	5.17	104.600	0.242	0.0	0.0	0.0	1.59	253.5	43.7
S6.001	50.00	5.21	104.500	0.242	0.0	0.0	0.0	4.22	670.9	43.7
S4.006	47.70	7.92	104.020	1.518	0.0	0.0	0.0	1.39	392.4	261.4
S4.007	46.04	8.47	103.920	1.518	0.0	0.0	0.0	1.29	364.0	261.4
S4.008	44.68	8.96	103.800	1.656	0.0	0.0	0.0	1.59	450.3	267.2
S7.000	50.00	5.55	105.190	0.033	0.0	0.0	0.0	1.71	482.8	6.0
S7.001	50.00	6.46	104.910	0.082	0.0	0.0	0.0	1.50	423.0	14.8

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Network Design Table for SW

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
S7.002	47.021	0.200	235.1	0.040	0.00	0.0	0.600	o	600	Pipe/Conduit	
S7.003	23.072	0.155	148.9	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S8.000	9.314	0.050	186.3	1.070	5.00	0.0	0.600	o	600	Pipe/Conduit	
S8.001	11.135	0.055	202.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.004	45.755	0.265	172.7	0.026	0.00	0.0	0.600	o	600	Pipe/Conduit	
S7.005	44.370	0.210	211.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S9.000	7.948	0.100	79.5	0.102	5.00	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)
S7.002	50.00	6.96	104.600	0.122	0.0	0.0	0.0	1.58	447.8	22.0
S7.003	50.00	7.15	104.400	0.122	0.0	0.0	0.0	1.99	563.7	22.0
S8.000	50.00	5.09	104.350	1.070	0.0	0.0	0.0	1.78	503.6	193.2
S8.001	50.00	5.29	104.300	1.070	0.0	0.0	0.0	0.92	36.4«	193.2
S7.004	48.86	7.56	104.245	1.218	0.0	0.0	0.0	1.85	523.2	214.9
S7.005	47.44	8.00	103.980	1.218	0.0	0.0	0.0	1.67	472.6	214.9
S9.000	50.00	5.09	104.400	0.102	0.0	0.0	0.0	1.47	58.4	18.4

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Network Design Table for SW

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
S9.001	19.618	0.530	37.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.006	21.614	0.070	308.8	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S10.000	8.835	2.000	4.4	0.210	5.00	0.0	0.600	o	300	Pipe/Conduit	
S10.001	22.397	0.275	81.4	0.030	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.002	38.545	0.525	73.4	0.031	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.007	23.273	0.100	232.7	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)
S9.001	50.00	5.24	104.300	0.102	0.0	0.0	0.0	2.16	85.8	18.4
S7.006	46.65	8.27	103.770	1.320	0.0	0.0	0.0	1.38	390.3	222.4
S10.000	50.00	5.02	106.500	0.210	0.0	0.0	0.0	7.53	532.2	37.9
S10.001	50.00	5.28	104.500	0.240	0.0	0.0	0.0	1.45	57.7	43.3
S10.002	50.00	5.70	104.225	0.271	0.0	0.0	0.0	1.53	60.8	48.9
S7.007	45.34	8.72	103.700	1.591	0.0	0.0	0.0	0.85	33.9«	260.5

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Network Design Table for SW

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
S4.009	136.338	0.100	1363.4	0.169	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)
S4.009	32.49	15.53	103.600	3.416	0.0	0.0	0.0	0.35	13.7«	400.7

Free Flowing Outfall Details for SW

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S4.009	S26	105.000	103.500	0.000	1200	0

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Simulation Criteria for SW

Volumetric Runoff Coeff	1.000	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 6	Number of Storage Structures 9	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	2	Winter Storms	Yes
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 410651 182602 SU 10651 82602	Cv (Winter)	0.840
Data Type	Point	Storm Duration (mins)	30

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Online Controls for SW

Hydro-Brake® Optimum Manhole: S12, DS/PN: S5.001, Volume (m³): 4.6

Unit Reference	MD-SHE-0121-6000-0550-6000	Sump Available	Yes
Design Head (m)	0.550	Diameter (mm)	121
Design Flow (l/s)	6.0	Invert Level (m)	104.950
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	150
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.550	6.0	Kick-Flo®	0.405	5.2
Flush-Flo™	0.194	6.0	Mean Flow over Head Range	-	5.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.3	0.600	6.2	1.600	9.9	2.600	12.5	5.000	17.0	7.500	20.7
0.200	6.0	0.800	7.1	1.800	10.5	3.000	13.3	5.500	17.8	8.000	21.4
0.300	5.8	1.000	7.9	2.000	11.0	3.500	14.4	6.000	18.5	8.500	22.1
0.400	5.3	1.200	8.6	2.200	11.5	4.000	15.3	6.500	19.3	9.000	22.7
0.500	5.7	1.400	9.3	2.400	12.0	4.500	16.2	7.000	20.0	9.500	23.4

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Hydro-Brake® Optimum Manhole: S30, DS/PN: S8.001, Volume (m³): 4.0

Unit Reference	MD-SHE-0064-1500-0550-1500	Sump Available	Yes
Design Head (m)	0.550	Diameter (mm)	64
Design Flow (l/s)	1.5	Invert Level (m)	104.300
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	100
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.550	1.5	Kick-Flo®	0.362	1.2
Flush-Flo™	0.162	1.5	Mean Flow over Head Range	-	1.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.4	0.600	1.6	1.600	2.4	2.600	3.0	5.000	4.1	7.500	5.0
0.200	1.5	0.800	1.8	1.800	2.6	3.000	3.3	5.500	4.3	8.000	5.2
0.300	1.4	1.000	2.0	2.000	2.7	3.500	3.5	6.000	4.5	8.500	5.4
0.400	1.3	1.200	2.1	2.200	2.8	4.000	3.7	6.500	4.7	9.000	5.5
0.500	1.4	1.400	2.3	2.400	2.9	4.500	3.9	7.000	4.9	9.500	5.7

Orifice Manhole: S32, DS/PN: S7.005, Volume (m³): 15.0

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 103.980

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Orifice Manhole: S37, DS/PN: S10.001, Volume (m³): 1.6

Diameter (m) 0.033 Discharge Coefficient 0.600 Invert Level (m) 104.500

Hydro-Brake® Optimum Manhole: S38, DS/PN: S10.002, Volume (m³): 2.3

Unit Reference	MD-SHE-0066-1500-0400-1500	Sump Available	Yes
Design Head (m)	0.400	Diameter (mm)	66
Design Flow (l/s)	1.5	Invert Level (m)	104.225
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	100
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	1.5	Kick-Flo®	0.279	1.3
Flush-Flo™	0.118	1.5	Mean Flow over Head Range	-	1.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	0.600	1.8	1.600	2.8	2.600	3.5	5.000	4.8	7.500	5.9
0.200	1.4	0.800	2.0	1.800	3.0	3.000	3.8	5.500	5.0	8.000	6.1
0.300	1.3	1.000	2.3	2.000	3.1	3.500	4.0	6.000	5.3	8.500	6.3
0.400	1.5	1.200	2.5	2.200	3.3	4.000	4.3	6.500	5.5	9.000	6.5
0.500	1.7	1.400	2.6	2.400	3.4	4.500	4.6	7.000	5.7	9.500	6.6

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Hydro-Brake® Optimum Manhole: S40, DS/PN: S4.009, Volume (m³): 16.2

Unit Reference	MD-SHE-0217-2510-1200-2510	Sump Available	Yes
Design Head (m)	1.200	Diameter (mm)	217
Design Flow (l/s)	25.1	Invert Level (m)	103.600
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	300
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1500
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	25.1	Kick-Flo®	0.849	21.3
Flush-Flo™	0.394	25.1	Mean Flow over Head Range	-	21.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.3	0.600	24.4	1.600	28.8	2.600	36.4	5.000	49.9	7.500	60.7
0.200	21.3	0.800	22.5	1.800	30.5	3.000	39.0	5.500	52.2	8.000	62.6
0.300	24.8	1.000	23.0	2.000	32.1	3.500	42.0	6.000	54.5	8.500	64.5
0.400	25.1	1.200	25.1	2.200	33.6	4.000	44.8	6.500	56.6	9.000	66.3
0.500	24.9	1.400	27.0	2.400	35.0	4.500	47.4	7.000	58.7	9.500	68.1

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Storage Structures for SW

Tank or Pond Manhole: S12, DS/PN: S5.001

Invert Level (m) 104.950

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3270.0	0.550	3270.0	0.551	0.0

Tank or Pond Manhole: S30, DS/PN: S8.001

Invert Level (m) 104.300

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3050.0	0.550	3050.0	0.551	0.0

Tank or Pond Manhole: S32, DS/PN: S7.005

Invert Level (m) 104.100

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	132.0	1.300	441.0

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Tank or Pond Manhole: S34, DS/PN: S9.001

Invert Level (m) 104.300

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	430.0	0.150	430.0	0.151	0.0

Tank or Pond Manhole: S35, DS/PN: S7.006

Invert Level (m) 103.770

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	160.0	0.500	160.0	0.501	0.0

Tank or Pond Manhole: S37, DS/PN: S10.001

Invert Level (m) 104.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1500.0	0.200	1500.0	0.201	0.0

Tank or Pond Manhole: S38, DS/PN: S10.002

Invert Level (m) 104.225

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Tank or Pond Manhole: S38, DS/PN: S10.002

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	418.0	0.400	418.0	0.401	0.0

Tank or Pond Manhole: S39, DS/PN: S7.007

Invert Level (m) 103.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	66.0	0.400	66.0	0.401	0.0

Tank or Pond Manhole: S40, DS/PN: S4.009

Invert Level (m) 103.600

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	25.0	1.500	230.0

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

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 6 Number of Storage Structures 9 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
FEH Rainfall Version 2013 Cv (Summer) 1.000
Site Location GB 410651 182602 SU 10651 82602 Cv (Winter) 1.000

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

Profile(s) Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S4.000	S1	15 minute 2 year Winter I+0%	107.200	104.618	-0.532	0.000	0.03		0.111		8.9	OK

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S4.001	S4	15 minute 2 year Winter I+0%	106.900	104.549	-0.511	0.000	0.05		0.348		13.8	OK
S4.002	S7	15 minute 2 year Winter I+0%	106.700	104.452	-0.508	0.000	0.05		0.488		18.2	OK
S4.003	S10	15 minute 2 year Winter I+0%	106.100	104.340	-0.480	0.000	0.07		0.794		17.1	OK
S5.000	S11	15 minute 2 year Winter I+0%	106.000	105.528	-0.197	0.000	0.91		0.835		189.4	OK
S5.001	S12	1440 minute 2 year Winter I+0%	106.000	105.037	-0.138	0.000	0.04		285.530		3.6	OK
S4.004	S13	15 minute 2 year Winter I+0%	105.800	104.271	-0.479	0.000	0.07		0.833		19.2	OK
S4.005	S14	15 minute 2 year Winter I+0%	105.650	104.244	-0.461	0.000	0.08		0.520		21.8	OK
S6.000	S15	15 minute 2 year Winter I+0%	105.700	104.750	-0.300	0.000	0.24		0.208		42.7	OK
S6.001	S15	15 minute 2 year Winter I+0%	105.700	104.600	-0.350	0.000	0.11		0.287		42.5	OK
S4.006	S16	15 minute 2 year Winter I+0%	105.570	104.195	-0.425	0.000	0.19		1.830		59.5	OK
S4.007	S17	15 minute 2 year Winter I+0%	105.940	104.105	-0.415	0.000	0.18		1.559		56.9	OK
S4.008	S18	30 minute 2 year Winter I+0%	105.300	104.046	-0.354	0.000	0.15		3.432		57.6	OK
S7.000	S19	15 minute 2 year Winter I+0%	107.157	105.229	-0.561	0.000	0.01		0.061		5.7	OK
S7.001	S22	15 minute 2 year Winter I+0%	106.800	104.981	-0.529	0.000	0.03		0.282		12.5	OK
S7.002	S25	15 minute 2 year Winter I+0%	106.200	104.683	-0.517	0.000	0.05		0.394		18.1	OK
S7.003	S28	15 minute 2 year Winter I+0%	105.700	104.482	-0.518	0.000	0.05		0.356		17.9	OK
S8.000	S29	15 minute 2 year Winter I+0%	105.300	104.691	-0.259	0.000	0.60		0.593		186.9	OK
S8.001	S30	10080 minute 2 year Winter I+0%	105.300	104.428	-0.097	0.000	0.05		390.953		1.4	OK
S7.004	S31	15 minute 2 year Winter I+0%	105.300	104.328	-0.517	0.000	0.05		0.360		21.1	OK
S7.005	S32	240 minute 2 year Winter I+0%	105.400	104.218	-0.362	0.000	0.01		18.938		2.4	OK
S9.000	S33	15 minute 2 year Winter I+0%	105.000	104.500	-0.125	0.000	0.40		0.108		17.9	OK
S9.001	S34	180 minute 2 year Winter I+0%	105.000	104.327	-0.198	0.000	0.04		11.837		2.8	OK
S7.006	S35	180 minute 2 year Winter I+0%	105.000	103.932	-0.438	0.000	0.03		27.199		8.4	OK
S10.000	S36	15 minute 2 year Winter I+0%	108.000	106.565	-0.235	0.000	0.11		0.068		37.3	OK
S10.001	S37	10080 minute 2 year Winter I+0%	105.400	104.554	-0.171	0.000	0.01		81.239		0.4	OK

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S10.002	S38	10080 minute 2 year Winter I+0%	105.480	104.261	-0.189	0.000	0.01		15.241		0.5	OK
S7.007	S39	120 minute 2 year Winter I+0%	104.700	103.934	0.009	0.000	0.40		17.508		12.3	SURCHARGED
S4.009	S40	30 minute 2 year Winter I+0%	105.100	104.031	0.206	0.000	1.41		26.914		22.3	SURCHARGED

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

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 6 Number of Storage Structures 9 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
FEH Rainfall Version 2013 Cv (Summer) 1.000
Site Location GB 410651 182602 SU 10651 82602 Cv (Winter) 1.000

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

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S4.000	S1	15 minute 30 year Winter I+0%	107.200	104.665	-0.485	0.000	0.07		0.194		21.7	OK

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S4.001	S4	15 minute 30 year Winter I+0%	106.900	104.611	-0.449	0.000	0.12		0.914		35.8	OK
S4.002	S7	15 minute 30 year Winter I+0%	106.700	104.521	-0.439	0.000	0.14		1.475		46.5	OK
S4.003	S10	30 minute 30 year Winter I+0%	106.100	104.461	-0.359	0.000	0.14		3.043		34.4	OK
S5.000	S11	15 minute 30 year Winter I+0%	106.000	105.788	0.063	0.000	2.24		1.296		465.7	FLOOD RISK
S5.001	S12	600 minute 30 year Winter I+0%	106.000	105.111	-0.064	0.000	0.08		528.214		6.0	OK
S4.004	S13	30 minute 30 year Winter I+0%	105.800	104.456	-0.294	0.000	0.12		4.496		32.9	OK
S4.005	S14	30 minute 30 year Winter I+0%	105.650	104.453	-0.252	0.000	0.13		2.123		36.7	OK
S6.000	S15	15 minute 30 year Winter I+0%	105.700	104.850	-0.200	0.000	0.58		0.351		104.2	OK
S6.001	S15	15 minute 30 year Winter I+0%	105.700	104.659	-0.291	0.000	0.27		0.672		103.6	OK
S4.006	S16	30 minute 30 year Winter I+0%	105.570	104.447	-0.173	0.000	0.35		7.956		113.6	OK
S4.007	S17	30 minute 30 year Winter I+0%	105.940	104.435	-0.085	0.000	0.32		7.473		98.9	OK
S4.008	S18	30 minute 30 year Winter I+0%	105.300	104.422	0.022	0.000	0.30		12.137		117.3	SURCHARGED
S7.000	S19	15 minute 30 year Winter I+0%	107.157	105.261	-0.529	0.000	0.03		0.117		14.0	OK
S7.001	S22	15 minute 30 year Winter I+0%	106.800	105.033	-0.477	0.000	0.09		0.657		34.1	OK
S7.002	S25	15 minute 30 year Winter I+0%	106.200	104.743	-0.457	0.000	0.13		1.113		49.2	OK
S7.003	S28	15 minute 30 year Winter I+0%	105.700	104.540	-0.460	0.000	0.12		0.973		49.2	OK
S8.000	S29	15 minute 30 year Winter I+0%	105.300	105.094	0.144	0.000	1.49		1.306		460.6	FLOOD RISK
S8.001	S30	10080 minute 30 year Winter I+0%	105.300	104.518	-0.007	0.000	0.05		666.146		1.5	OK
S7.004	S31	240 minute 30 year Winter I+0%	105.300	104.413	-0.432	0.000	0.03		1.172		13.4	OK
S7.005	S32	240 minute 30 year Winter I+0%	105.400	104.413	-0.167	0.000	0.01		56.942		3.1	OK
S9.000	S33	15 minute 30 year Winter I+0%	105.000	104.582	-0.043	0.000	0.98		0.200		43.6	OK
S9.001	S34	60 minute 30 year Winter I+0%	105.000	104.350	-0.175	0.000	0.11		21.573		8.7	OK
S7.006	S35	120 minute 30 year Winter I+0%	105.000	104.339	-0.031	0.000	0.04		91.570		11.8	OK
S10.000	S36	15 minute 30 year Winter I+0%	108.000	106.603	-0.197	0.000	0.26		0.111		91.0	OK
S10.001	S37	1440 minute 30 year Winter I+0%	105.400	104.589	-0.136	0.000	0.01		134.044		0.6	OK

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S10.002	S38	240 minute 30 year Winter I+0%	105.480	104.275	-0.175	0.000	0.01		20.816		0.8	OK
S7.007	S39	120 minute 30 year Winter I+0%	104.700	104.340	0.415	0.000	0.44		34.831		13.6	SURCHARGED
S4.009	S40	30 minute 30 year Winter I+0%	105.100	104.405	0.580	0.000	1.55		65.048		24.6	SURCHARGED

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

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 6 Number of Storage Structures 9 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
FEH Rainfall Version 2013 Cv (Summer) 1.000
Site Location GB 410651 182602 SU 10651 82602 Cv (Winter) 1.000

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

Profile(s) Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S4.000	S1	60 minute 100 year Winter I+40%	107.200	104.965	-0.185	0.000	0.06		0.724		20.1	OK

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S4.001	S4	60 minute 100 year Winter I+40%	106.900	104.963	-0.097	0.000	0.10		5.870		31.0	OK
S4.002	S7	60 minute 100 year Winter I+40%	106.700	104.960	0.000	0.000	0.11		10.665		37.9	OK
S4.003	S10	60 minute 100 year Winter I+40%	106.100	104.953	0.133	0.000	0.11		12.608		28.0	SURCHARGED
S5.000	S11	15 minute 100 year Winter I+40%	106.000	106.017	0.292	17.237	3.53		18.902		733.6	FLOOD
S5.001	S12	720 minute 100 year Winter I+40%	106.000	105.261	0.086	0.000	0.08		1018.914		6.0	SURCHARGED
S4.004	S13	60 minute 100 year Winter I+40%	105.800	104.949	0.199	0.000	0.09		12.182		25.1	SURCHARGED
S4.005	S14	60 minute 100 year Winter I+40%	105.650	104.945	0.240	0.000	0.11		4.750		30.1	SURCHARGED
S6.000	S15	15 minute 100 year Winter I+40%	105.700	105.056	0.006	0.000	1.02		0.645		181.6	SURCHARGED
S6.001	S15	60 minute 100 year Winter I+40%	105.700	104.950	0.000	0.000	0.25		2.770		96.1	SURCHARGED
S4.006	S16	60 minute 100 year Winter I+40%	105.570	104.939	0.319	0.000	0.31		13.644		99.0	SURCHARGED
S4.007	S17	120 minute 100 year Winter I+40%	105.940	104.928	0.408	0.000	0.21		9.989		66.9	SURCHARGED
S4.008	S18	120 minute 100 year Winter I+40%	105.300	104.918	0.518	0.000	0.25		13.575		96.9	SURCHARGED
S7.000	S19	15 minute 100 year Winter I+40%	107.157	105.285	-0.505	0.000	0.06		0.159		25.0	OK
S7.001	S22	15 minute 100 year Winter I+40%	106.800	105.074	-0.436	0.000	0.16		1.183		61.3	OK
S7.002	S25	15 minute 100 year Winter I+40%	106.200	104.796	-0.404	0.000	0.23		1.974		88.8	OK
S7.003	S28	480 minute 100 year Winter I+40%	105.700	104.713	-0.287	0.000	0.03		4.574		10.8	OK
S8.000	S29	15 minute 100 year Winter I+40%	105.300	105.325	0.375	25.462	2.18		27.013		675.5	FLOOD
S8.001	S30	10080 minute 100 year Winter I+40%	105.300	104.719	0.194	0.000	0.05		1280.527		1.5	SURCHARGED
S7.004	S31	480 minute 100 year Winter I+40%	105.300	104.713	-0.132	0.000	0.03		5.322		13.4	OK
S7.005	S32	480 minute 100 year Winter I+40%	105.400	104.714	0.134	0.000	0.01		130.016		3.8	SURCHARGED
S9.000	S33	15 minute 100 year Winter I+40%	105.000	104.832	0.207	0.000	1.75		0.482		78.0	FLOOD RISK
S9.001	S34	180 minute 100 year Winter I+40%	105.000	104.827	0.302	0.000	0.17		65.926		13.4	FLOOD RISK
S7.006	S35	180 minute 100 year Winter I+40%	105.000	104.822	0.452	0.000	0.04		95.725		11.1	FLOOD RISK
S10.000	S36	15 minute 100 year Winter I+40%	108.000	106.644	-0.156	0.000	0.46		0.157		163.0	OK
S10.001	S37	1440 minute 100 year Winter I+40%	105.400	104.663	-0.062	0.000	0.02		244.871		0.9	OK

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S10.002	S38	720 minute 100 year Winter I+40%	105.480	104.421	-0.029	0.000	0.03		82.284		1.5	OK
S7.007	S39	180 minute 100 year Winter I+40%	104.700	104.822	0.897	72.226	0.45		108.605		14.0	FLOOD
S4.009	S40	120 minute 100 year Winter I+40%	105.100	104.904	1.079	0.000	1.58		140.138		25.1	FLOOD RISK

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Appendix G Exceedance Flow Routes



GENERAL NOTES

G1. DO NOT SCALE THIS DRAWING.

G2. ANY DIMENSIONAL DISCREPANCIES SHOULD BE NOTIFIED TO THE ENGINEER IMMEDIATELY.

G3. ALL DIMENSIONS ARE IN MILLIMETRES - (mm)
ALL LEVELS ARE IN METRES - (m) AND ARE ABOVE ORDNANCE DATUM AT NEWLYN, CORNWALL UNLESS NOTED OTHERWISE.

G4. NORTH SHOWN INDICATIVE ONLY

G5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT; SPECIFICATIONS; DRAWINGS; DETAILS AND OTHER DESIGN INFORMATION.

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KEY:

EXISTING FLOOD ROUTING

POST DEVELOPMENT EXCEEDANCE FLOW ROUTING

REV	DESCRIPTION	DRN	CHK	APP	DATE
P02	UPDATED TO NEW LAYOUT	HM	DAR	DAR	05.06.24
P01	INITIAL ISSUE	HM	DAR	DAR	05.06.24

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Architect/Client/Contractor

moto

Project

M4 Junction 16
Motorway Rest Area

Drawing Title

Exceedance Flow Routes Plan

Drawing Status

PRELIMINARY

	Name	Date	Status Code
Drawn	H. McCOLL	25.08.23	S2
Designed	H. McCOLL	25.08.23	Scale 1:500
Eng Chk	D. ALLUM-ROONEY	25.08.23	Revision P02
Approved	D. ALLUM-ROONEY	25.08.23	

Drawing No.

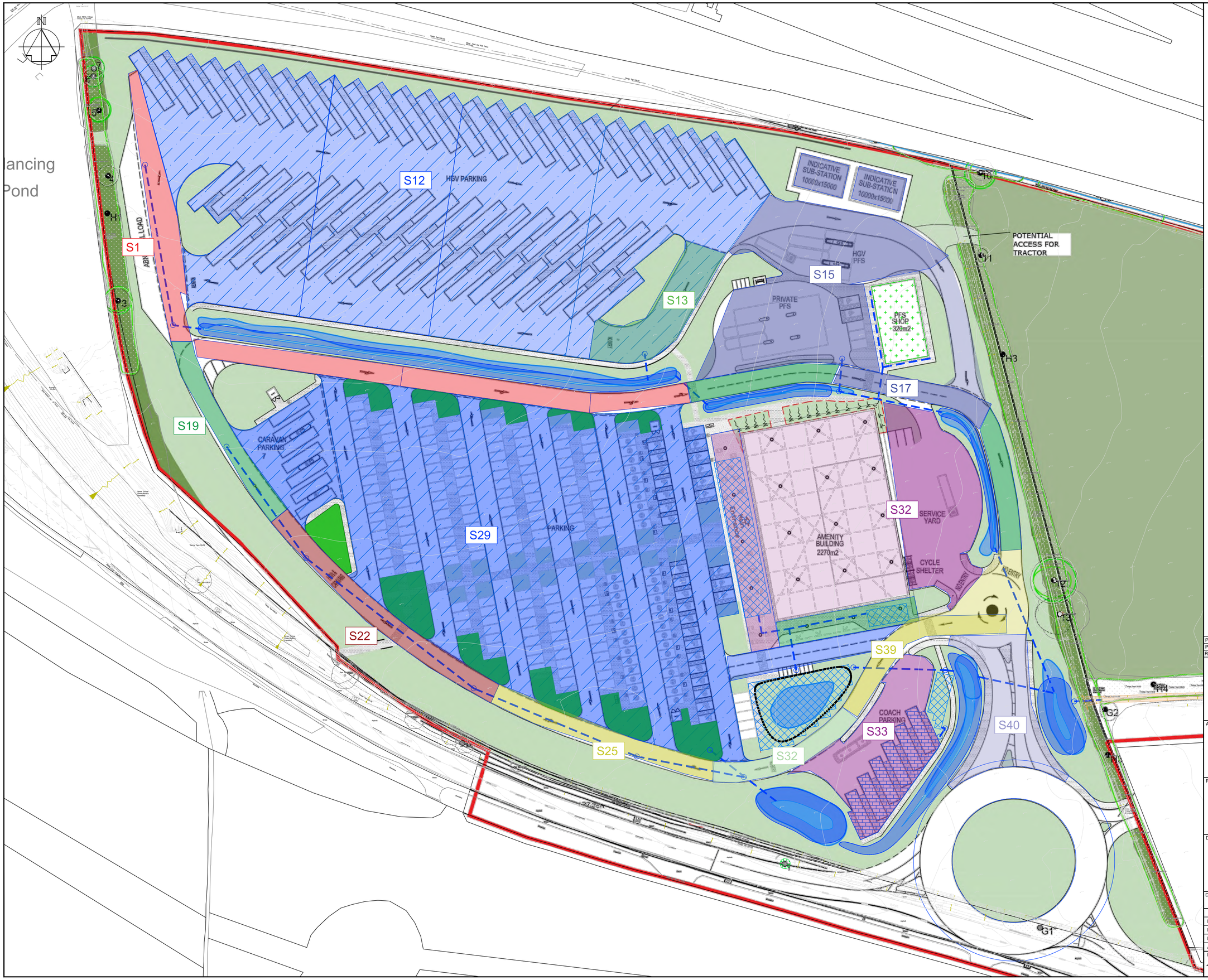
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Appendix H SuDS Simple Index Approach Calculations

SUMMARY TABLE		DESIGN CONDITIONS			
		1	*2*	*3*	*4*
Land Use Type	Lorry park	These indices should only be used if considered appropriate by the required risk assessment and where approved by the regulator. If they are not considered appropriate, the risk assessment should use alternative measures of pollution hazard for the site.	In Scotland and Northern Ireland, the environmental regulator should be consulted as part of the licensing process required for High Risk sites. In England and Wales, the environmental regulator should be consulted prior to design (for pre-permitting advice) to determine the most appropriate design approach and requirements for risk assessment.		
Pollution Hazard Level	High				
Pollution Hazard Indices					
TSS	0.8				
Metals	0.8				
Hydrocarbons	0.9				
SuDS components proposed					
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	Swale	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 3	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
SuDS Pollution Mitigation Indices					
TSS	>0.95				
Metals	>0.95				
Hydrocarbons	>0.95				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	>0.95	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	>0.95				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

Appendix I Impermeable Area Plan



GENERAL NOTES

G1. DO NOT SCALE THIS DRAWING.

G2. ANY DIMENSIONAL DISCREPANCIES SHOULD BE NOTIFIED TO THE ENGINEER IMMEDIATELY.

G3. ALL DIMENSIONS ARE IN MILLIMETRES - (mm)
ALL LEVELS ARE IN METRES - (m) AND ARE ABOVE ORDNANCE DATUM AT NEWLYN, CORNWALL UNLESS NOTED OTHERWISE.

G4. NORTH SHOWN INDICATIVE ONLY

G5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT; SPECIFICATIONS; DRAWINGS; DETAILS AND OTHER DESIGN INFORMATION.

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REV	DESCRIPTION	DRN	CHK	APP	DATE
P02	UPDATED TO NEW LAYOUT	HM	DAR	DAR	05.06.24
P01	INITIAL ISSUE	HM	DAR	DAR	25.08.23

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Architect/Client/Contractor

moto

Project

M4 Junction 16
Motorway Rest Area

Drawing Title

Impermeable Area Plan

Drawing Status

PRELIMINARY

	Name	Date	Status Code
Drawn	H. McCOLL	25.08.23	S2
Designed	H. McCOLL	25.08.23	Scale 1:500
Eng Chk	D. ALLUM-ROONEY	25.08.23	Revision P02
Approved	D. ALLUM-ROONEY	25.08.23	

Drawing No.

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Appendix J Watercourse Connectivity Plans



GENERAL NOTES

G1. DO NOT SCALE THIS DRAWING.

G2. ANY DIMENSIONAL DISCREPANCIES SHOULD BE NOTIFIED TO THE ENGINEER IMMEDIATELY.

G3. ALL DIMENSIONS ARE IN MILLIMETRES - (mm)
ALL LEVELS ARE IN METRES - (m) AND ARE ABOVE ORDNANCE DATUM AT NEWLYN, CORNWALL UNLESS NOTED OTHERWISE.

G4. NORTH SHOWN INDICATIVE ONLY

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KEY:

OPEN WATERCOURSE

CULVERTED WATERCOURSE

APPLICATION SITE BOUNDARY

REV	DESCRIPTION	DRN	CHK	APP	DATE
P03	DIRECTION SHOWN ONLY ON OUTFALL ROUTE	HM	DAR	DAR	22.09.23
P02	ADDITIONAL INFO ADDED	HM	DAR	DAR	21.09.23
P01	INITIAL ISSUE	HM	DAR	DAR	19.09.23

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Architect/Client/Contractor

moto

Project

M4 JUNCTION 16
MOTORWAY REST AREA

Drawing Title

WATERCOURSE CONNECTIVITY PLAN

Drawing Status

PRELIMINARY

	Name	Date	Status Code
Drawn	H. McCOLL	19.09.23	S2
Designed	H. McCOLL	19.09.23	Scale NTS
Eng Chk	D. ALLUM-ROONEY	19.09.23	Revision P03
Approved	D. ALLUM-ROONEY	19.09.23	

Drawing No.

107846 - PEF - ZZ - XX - DR - CD - 0512

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Appendix K Thames Water Correspondence

Mr Thomas Sturtridge – Pell Frischmann
Suite 4.2, 1 The Poynt
Wollaton Street
NOTTINGHAM
NG1 5FW

Wastewater pre-planning
Our ref DS6107143

14 September 2023

Pre-planning enquiry: Confirmation of sufficient capacity (foul water)

Site address: **M4 J16 Motorway Rest Area, Swindon, Wiltshire SN4 9QJ**

Dear Mr Sturtridge,

Thank you for providing information on your development of 2500 m^2 commercial space with proposed foul water discharge pumped @ 2.94 l/s to the 225 mm Ø foul water sewer via manhole ref. SU10825801 and no surface water discharge to sewer.

We have completed the assessment of the foul water flows based on the information submitted in your application with the purpose of identifying sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the nearby foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, up to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number/density of units. Such changes could mean that there is no longer sufficient capacity.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable.

Where disposal of surface water is other than to a public sewer, the developer shall ensure that approval for the discharge has been obtained from the appropriate authorities.

What happens next?

Please make sure to submit your sewer connection application, giving us at least 21 days' notice of the date you wish to make your new connection(s).

Thames Water Utilities Limited – Registered Office: Clearwater Court, Vastern Road, Reading RG1 8DB
Company number 02366661. VAT registration no GB 537-4569-15

If you have any queries, please give me a call on 07747 644 979 (9am to 5pm, Monday to Friday) or email developer.services@thameswater.co.uk.

Yours sincerely,



Nicholas Short BSc (Hons)
Adoption & Pre-planning Engineer
Waste Adoptions Thames Valley & Home Counties
Service Delivery

Thames Water Utilities Limited – Registered Office: Clearwater Court, Vastern Road, Reading RG1 8DB
Company number 02366661. VAT registration no GB 537-4569-15

Asset location search

Thames Water Property Searches

Pell Frischmann
86-88
Mansfield Road
NOTTINGHAM
NG1 3HD

Search address supplied J16 M4 Swindon
Frankland Road
Blagrove
Swindon
SN5 8UD

Your reference 107846

Our reference ALS/ALS Standard/2023_4873056

Search date 24 August 2023

Notification of Price Changes

From 1st April 2023 Thames water Property Searches will be increasing the prices of its CON29DW, CommercialDW Drainage & Water Enquiries and Asset Location Searches. Historically costs would rise in line with RPI but as this currently sits at 14.2%, we are capping it at 10%.

Customers will be emailed with the new prices by January 1st 2023.

Any orders received with a higher payment prior to the 1st April 2023 will be non-refundable. For further details on the price increase please visit our website at www.thameswater-propertysearches.co.uk

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Search address supplied: J16 M4 Swindon, Frankland Road, Blagrove, Swindon, SN5 8UD

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

SU1082NE
SU1083SW

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

The following quartiles have not been printed as they contain no assets:

SU1082NW
SU1082SE

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

The following quartiles have been printed as they fall within Thames' water area:

SU1082NW
SU1082NE
SU1082SE
SU1083SW

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Clean Water queries

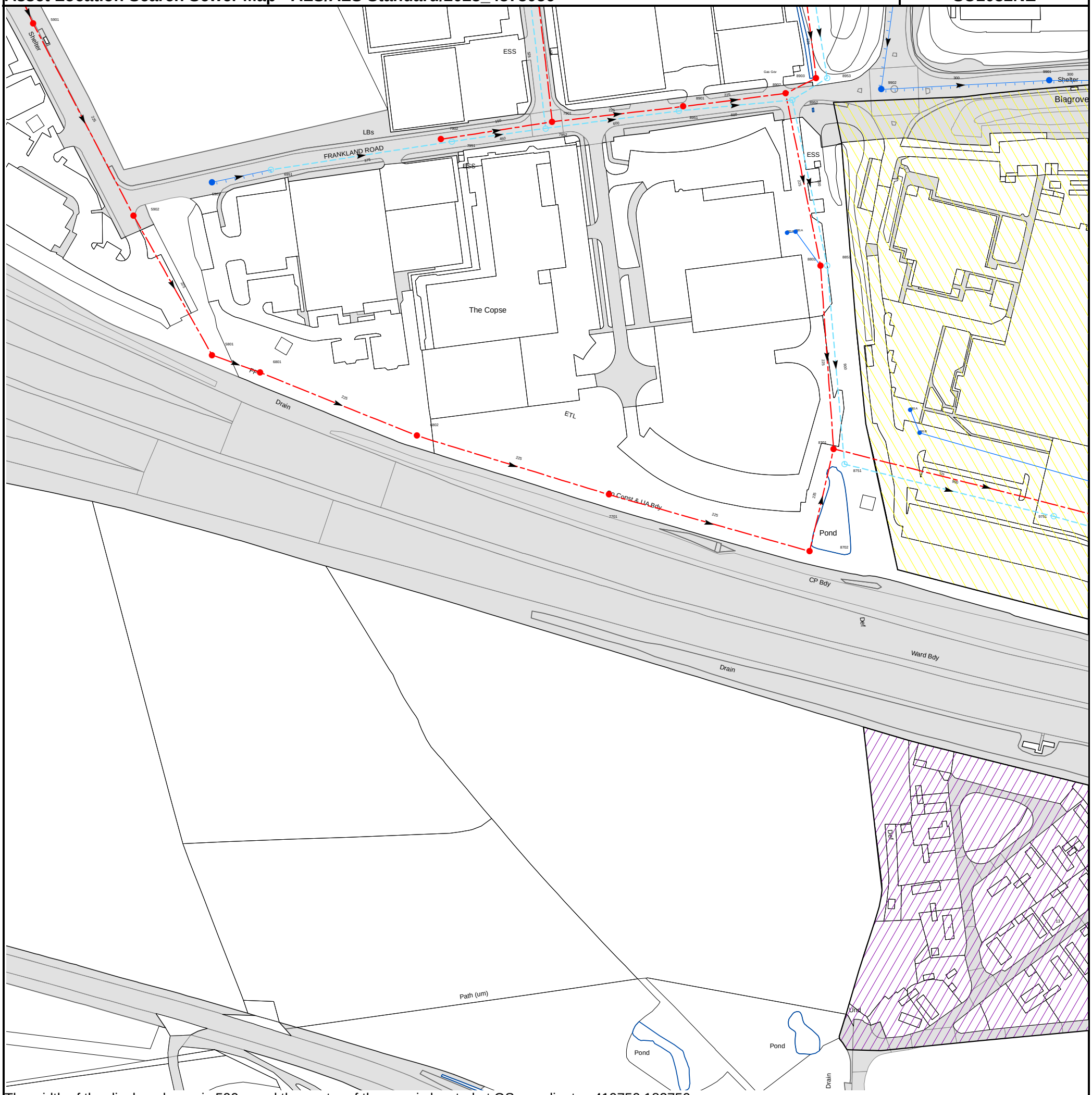
Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2023_4873056

SU1082NE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 410750,182750

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

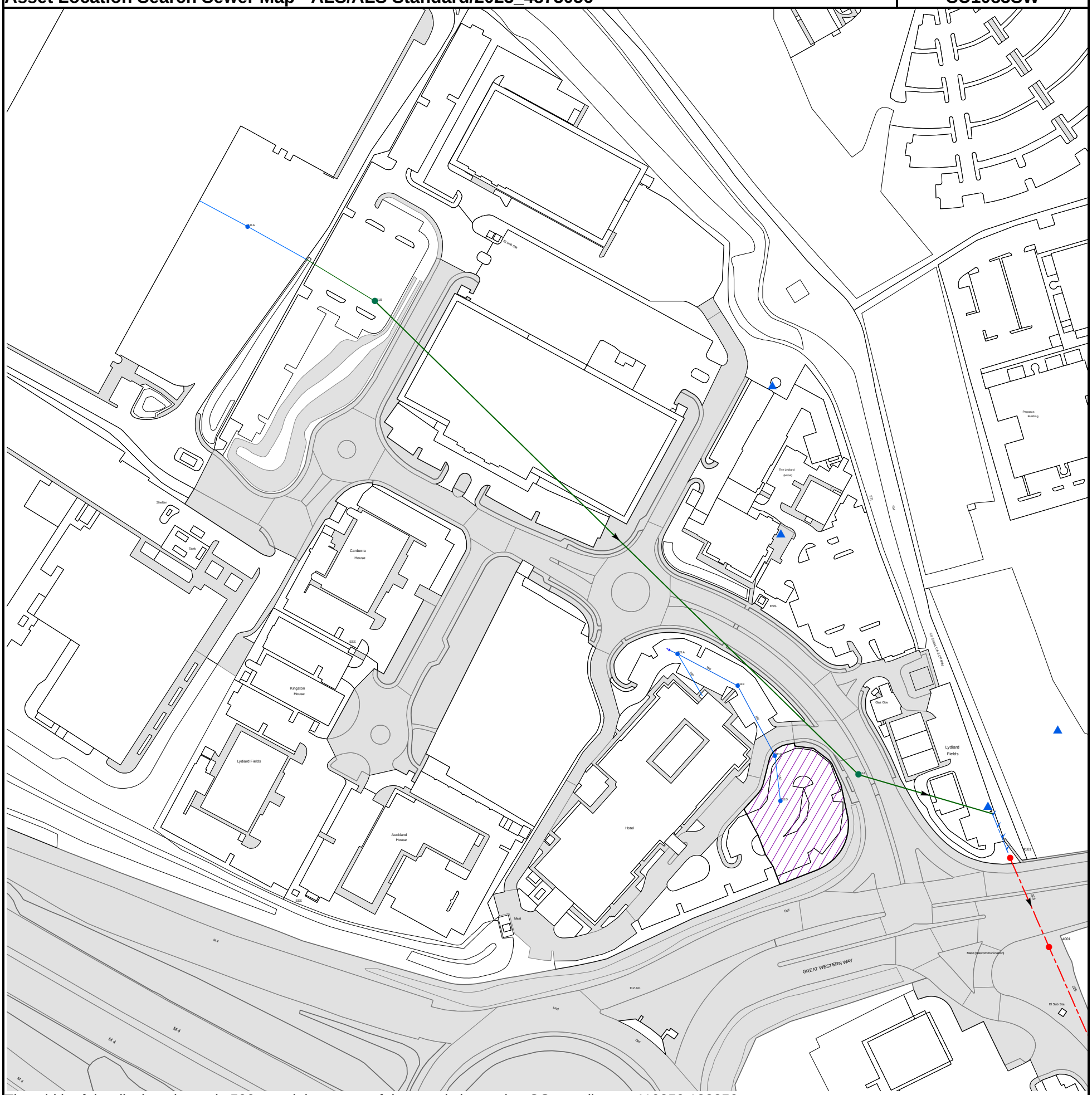
Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8951	98.2	96.04
8901	98.2	95.26
8952	97.78	95.63
8902	97.7	94.66
9902	n/a	n/a
9901	n/a	n/a
8953	n/a	n/a
8903	n/a	n/a
7951	98.96	96.73
7902	98.84	96.41
7952	98.6	96.4
7901	98.6	95.86
9751	n/a	n/a
981B	n/a	n/a
5902	n/a	n/a
5801	n/a	n/a
6801	n/a	n/a
6802	n/a	n/a
7701	n/a	n/a
881B	n/a	n/a
881A	n/a	n/a
8702	n/a	n/a
8801	96.49	93.76
8851	96.49	94.76
8701	95.84	92.91
8751	95.83	93.9
981A	n/a	n/a
5901	n/a	n/a
5903	n/a	n/a
6951	n/a	n/a

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Asset Location Search Sewer Map - ALS/ALS Standard/2023_4873056	SU1083SW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 410250,183250

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 410250,183250

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
311D	110.2	109
311C	109.8	108.7
311B	109.8	108
321A	109.8	107.3
131A	n/a	n/a
131B	n/a	n/a
311A	n/a	n/a
4101	n/a	n/a
4001	111.15	109.8

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

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2023_4873056



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

Scale:	1:7161
Width:	2000m
Printed By:	Skrishna1
Print Date:	24/08/2023
Map Centre:	410538,182708
Grid Reference:	SU1082NE

Comments:

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

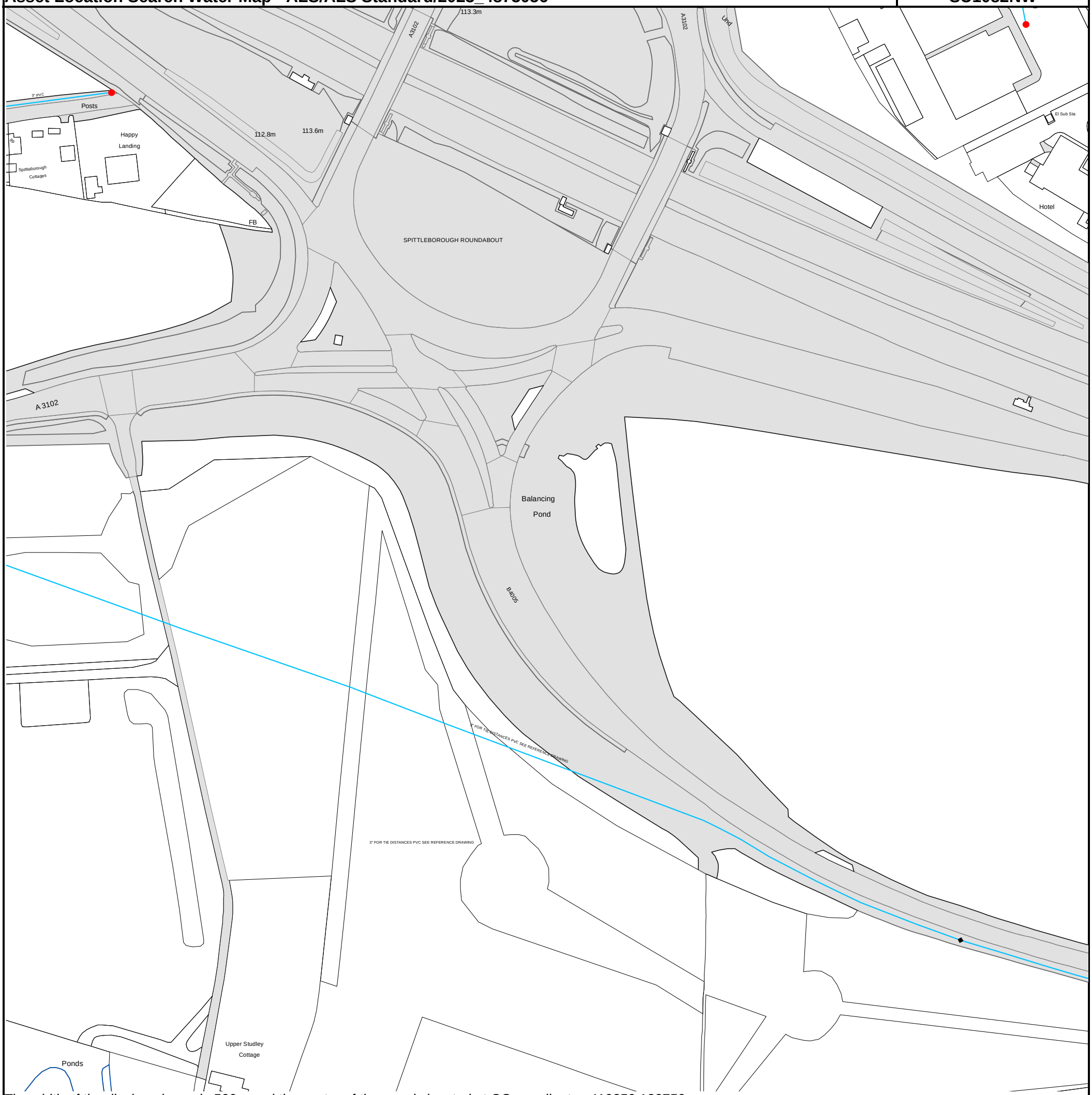
- Casement — Ducts may contain high voltage cables. Please check with Thames Water.
- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters.
Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.
If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2023_4873056

SU1082NW



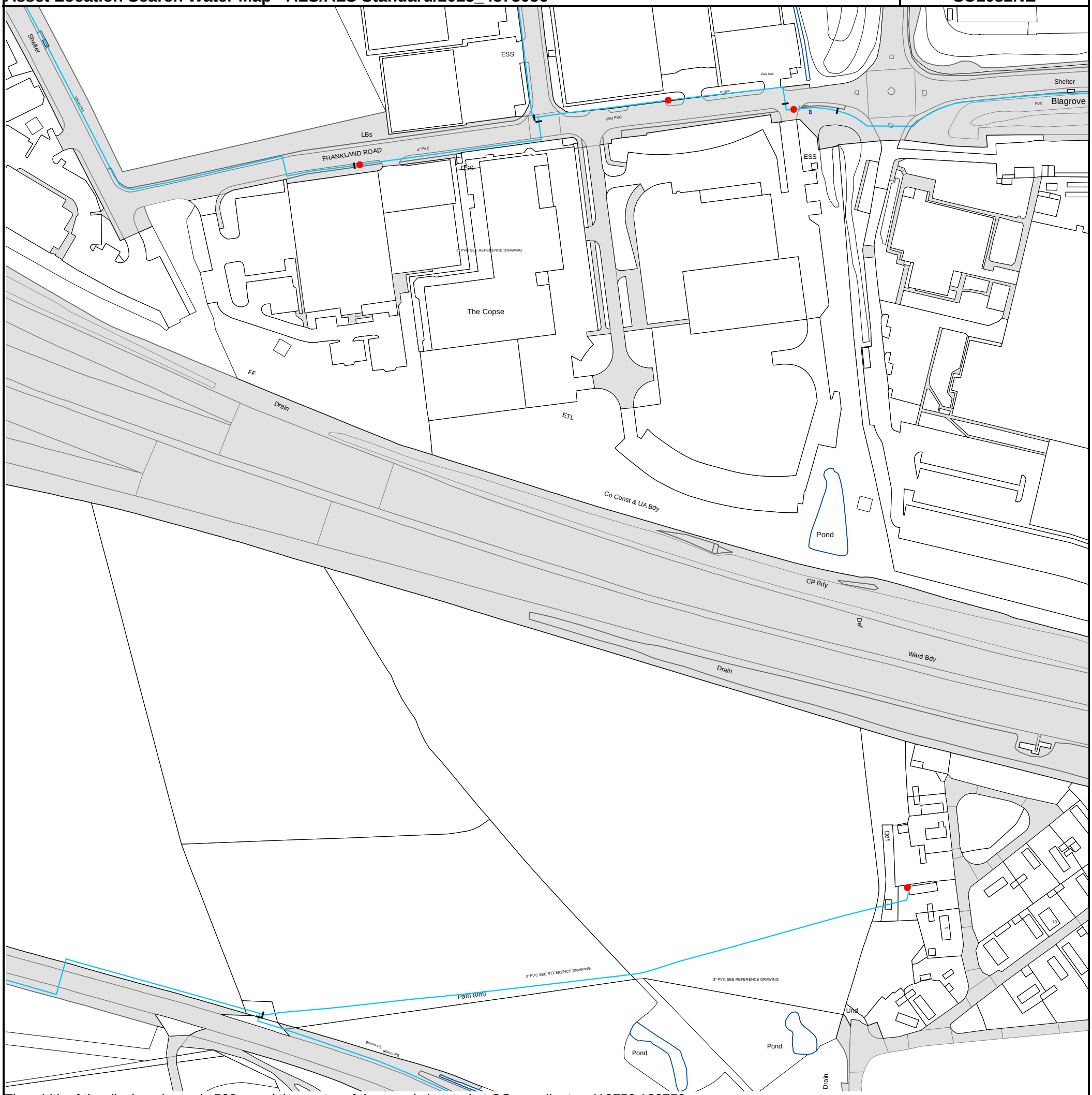
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 410250,182750

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

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Asset Location Search Water Map - ALS/ALS Standard/2023_4873056

SU1082NE



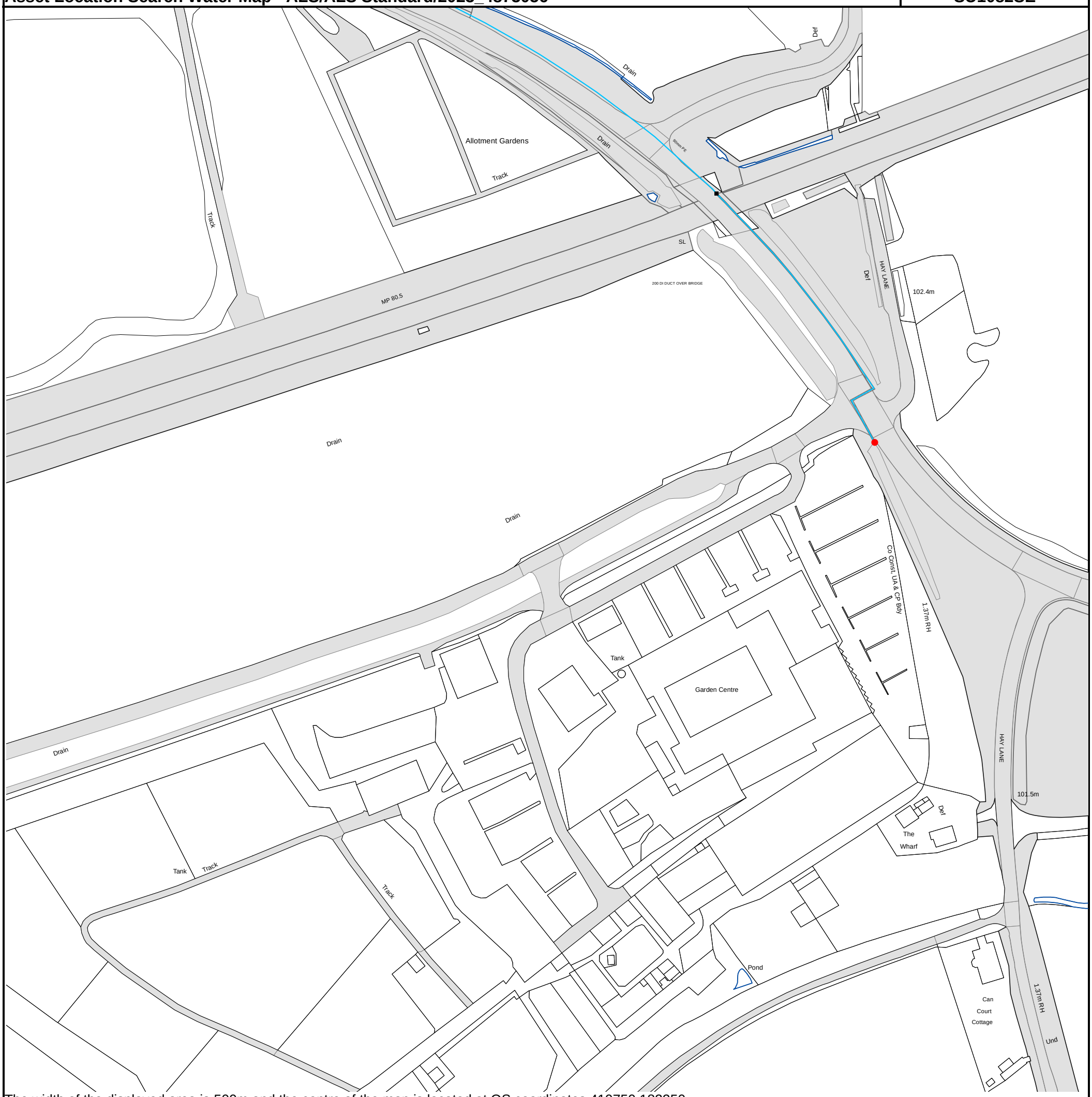
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 410750,182750

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

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Asset Location Search Water Map - ALS/ALS Standard/2023_4873056

SU1082SE

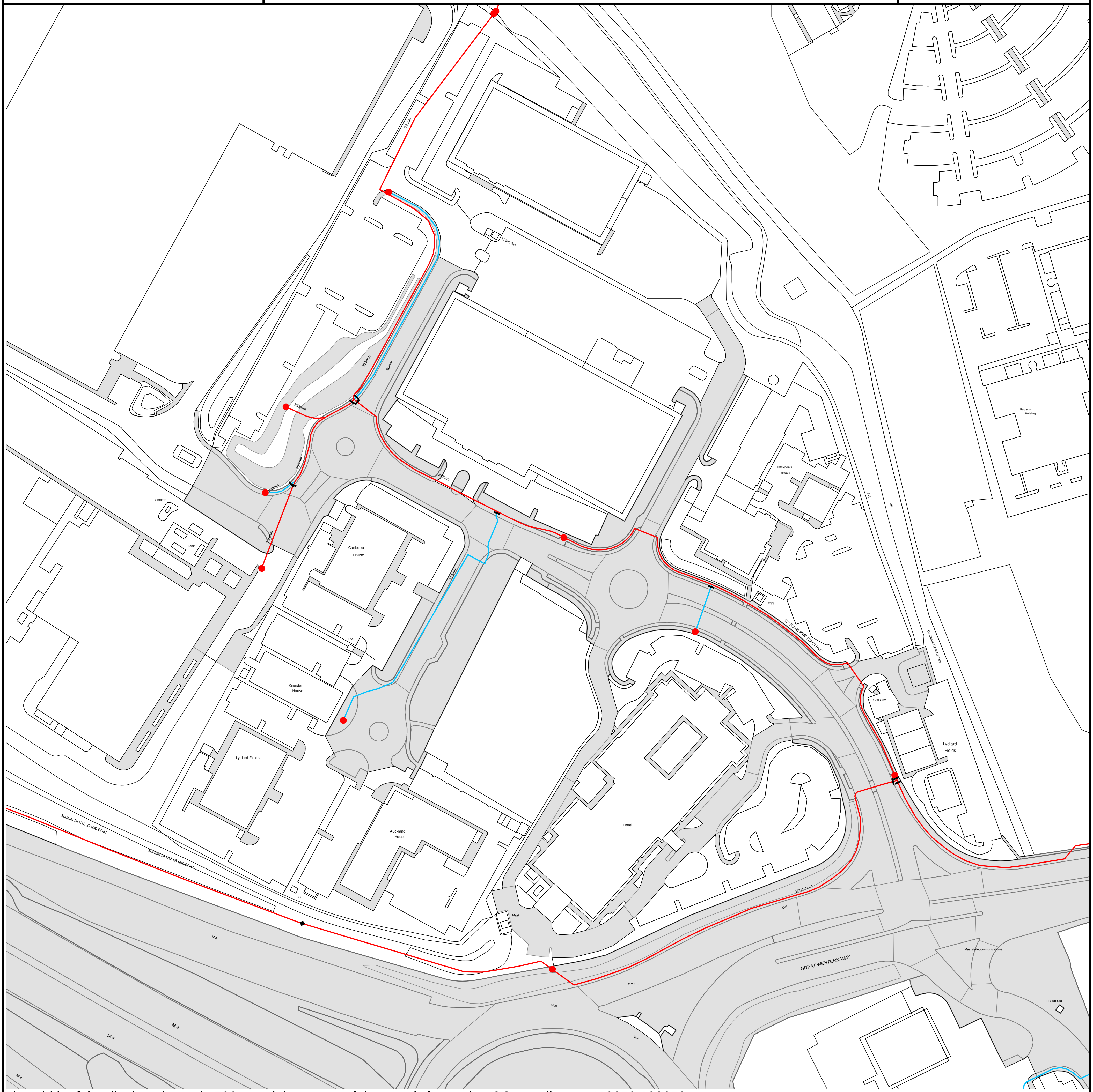


The width of the displayed area is 500m and the centre of the map is located at OS coordinates 410750,182250

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

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Asset Location Search Water Map - ALS/ALS Standard/2023_4873056	SU1083SW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 410250,183250

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

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Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2023_4873056



0 45 90 180 270 360
Meters

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

Scale:	1:7161
Width:	2000m
Printed By:	Skrishna1
Print Date:	24/08/2023
Map Centre:	410538,182708
Grid Reference:	SU1082NE

Comments:

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger
- **Casement:** Ducts may contain high voltage cables. Please check with Thames Water.

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Payment Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment within 14 days of the date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service or will be held to be invalid.
4. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
6. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800.

If you are unhappy with our service, you can speak to your original goods or customer service provider. If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to £25,000 to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0300 034 2222 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**
Please Call **0800 009 4540** quoting your invoice number starting CBA or ADS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number