ARMSTRONG STOKES & CLAYTON LIMITED

Civil & Structural Engineering Consultants

Coventry Stadium, Brandon

Flood Risk Assessment

July 2021

AUTHOR:	JS
CHECKED:	JLW
APPROVED:	JS
REPORT REF:	INV109/2021/FRA
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CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 This Flood Risk Assessment (FRA) has been produced by Armstrong Stokes & Clayton on behalf of Coventry Stadium, Brandon in support of an outline planning application for the proposed residential re-development of the Coventry Stadium site, Brandon, Coventry CV8 3GJ.

1.2 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF) and the accompanying Planning Practice Guidance (PPG), and in consultation with Warwickshire County Council (WCC) in their role as the Lead Local Flood Authority (LLFA), the Environment Agency, Severn Trent Water and Rugby Borough Council.

2.0 PLANNING POLICY

National

2.1 The NPPF and PPG provide national planning guidance on the management of flood risk in respect to new development.

2.2 Paragraph 155 of the NPPF document states *'Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.'*

2.3 For the purposes of applying the NPPF, PPG states *'flood risk is a combination of the probability and the potential consequences of flooding from all sources – including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources'.*

2.4 For the purposes of applying the NPPF, PPG states *'areas at risk from all sources of flooding are included. For fluvial (river) and sea flooding, this is principally land within Flood Zones 2 and 3. It can also include an area within Flood Zone 1 which the Environment Agency has notified the local planning authority as having critical drainage problems'.*

2.5 PPG states that the key objectives of a site specific FRA is to establish;

- *whether a proposed development is likely to be affected by current or future flooding from any source;*
- *whether it will increase flood risk elsewhere;*
- *whether the measures proposed to deal with these effects and risks are appropriate;*
- *the evidence for the local planning authority to apply (if necessary) the Sequential Test, and;*

- *whether the development will be safe and pass the Exception Test, if applicable.*

2.6 PPG also refers to a FRA being appropriate to the scale, nature and location of the development and be credible and fit for purpose. A site specific FRA should always be proportionate to the degree of flood risk and make optimum use of information already available, including information in a SFRA for the area, and the interactive flood risk maps available on the Environment Agency's web site.

Local

2.7 Rugby Borough Council has prepared a joint Strategic Flood Risk Assessment (SFRA) with Stratford-on-Avon District Council, Warwickshire County Council and North Warwickshire Borough Council, dated September 2013. This document provides further, more local guidance in respect of flood risk. This FRA has been prepared with reference to the SFRA.

3.0 EXISTING SITE

General

3.1 The application site is Brownfield with a total gross area of approx. 10.86 ha, although it should be noted that the developable area for the residential element will be in the region of 4.0 ha. An OS based location plan identifying the site is included within **Appendix A**.

3.2 The site consists of the former Coventry Stadium, previously used for speedway and greyhound racing. The premises consist of the stadium itself, a selection of outbuildings and large car parking area.

3.3 The site is bound to the north-west by Binley Woods, to the north-east by Gossett Lane and residential property, to the south-east by Speedway Lane and residential property beyond, and to the south-west by Rugby Road (A428) and residential property.

3.4 Shallow open watercourses run along the north-eastern and north-western boundaries of the site.

Levels

3.5 A fully contoured topographical survey of the site, relative to OSBM, has been carried out. A copy of the survey drawing is included within **Appendix B**.

3.6 The survey confirms that the site is generally level with a slight prevailing fall from east to west. The highest ground level noted on the survey is approx. 97.04m AOD, towards the eastern corner, with the lowest ground level noted as being approx. 94.81m AOD towards the western corner.

Drainage

3.7 An extract of the public sewer records has been obtained from Severn Trent Water following the submission of a Network Development enquiry. A copy of the water authority response is included within **Appendix C**.

3.8 The sewer records confirm that there is a public foul sewer located within Rugby Road. The records also illustrate the presence of surface water manholes, whilst no data or status is provided.

3.9 There are no public sewers situated within the application site, whilst a private drainage outfall from the stadium buildings does exist. This sewer flows in a southerly direction from the site.

3.10 From a site walkover, it is evident that much of the site consists of well compacted unmade surfacing with little evidence of a formal surface water drainage network. It was also noted that some of the existing building rainwater pipes discharge directly onto the ground.

3.11 The site lies within the general Greenfield catchment of the open watercourse that runs along the north-western boundary of the site.

4.0 POTENTIAL SOURCES OF FLOODING

Fluvial / Tidal Flooding

4.1 The nearest potential primary source of fluvial / tidal flooding is represented by the River Avon, which is located approx. 1.5 km to the south of the application site. The River Avon is classified as 'Main River'. In addition, there exists an 'Ordinary' watercourse network situated to the north of the site.

4.2 An extract of the Environment Agency's on-line flood mapping is shown in Figure 1 below. The dark blue areas represent Flood Zone 3, land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. The light blue areas represent Flood Zone 2, land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year. All remaining areas are classified as Flood Zone 1, land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year.

4.3 The application site location is indicated on the flood mapping extract in *Figure 1* below, confirming that it lies within Flood Zone 1.

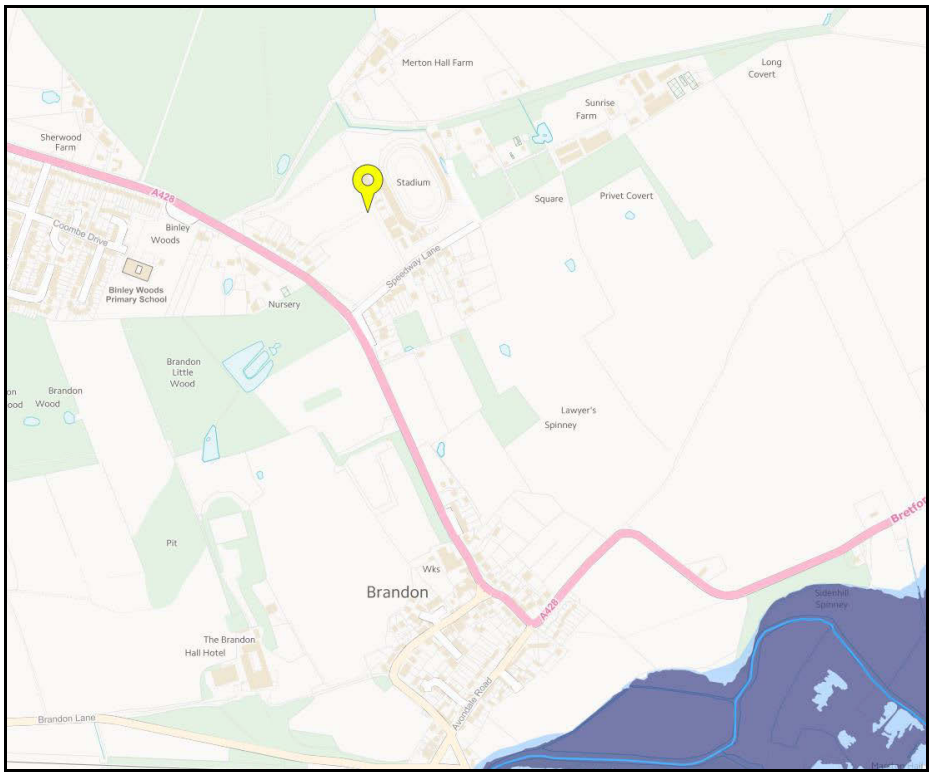


Figure 1 – Environment Agency Floodplain Mapping Extract

Groundwater

4.4 Groundwater flooding is highly variable and dependant on localised ground conditions.

4.5 The SFRA contains no specific records of groundwater flooding but includes extracts of the Environment Agency's Areas Susceptible to Groundwater Flooding (AStGWF) mapping. This mapping suggests that the site lies within an area with a 25 – 50% risk of groundwater flooding.

4.6 Whilst no site specific records of the groundwater levels are currently available, we are not aware of any anecdotal evidence to suggest that the site is particularly prone to groundwater flooding.

4.7 The site is not located within an Environment Agency groundwater Source Protection Zone (SPZ).

Surface Water / Overland Flows

4.8 The Environment Agency on-line surface water flood mapping indicates that the central area of the site is susceptible to surface water flooding. An extract of the mapping is shown in *Figure 2* below.

Figure 2 – Environment Agency Surface Water Flood Mapping Extract

4.9 Initial site investigations suggest that the flooding indicated is due to the lack of a surface water drainage system serving the existing large car parking area. Whilst the car park is largely unmade hardcore, and permeable by definition, it has become very well compacted over many years thus becoming impermeable, with no formal drainage arrangements being provided.

Existing Sewers

4.10 The SFRA contains sewer flooding mapping based on records supplied by Severn Trent Water within the Borough on a postcode basis from their DG5 register. The mapping suggests that the site lies within an area that has experienced 1 – 5 incidents.

4.11 We are not aware of any evidence of flooding problems affecting the site associated with the local public sewer network or any nearby private drainage networks.

Reservoirs, Canals & Other Artificial Sources

4.12 There are no artificial sources identified within the vicinity that would pose a flood risk to the site.

5.0 PROPOSED DEVELOPMENT

General

5.1 It is proposed to develop the site to accommodate 124 No. residential units, together with associated access roads, parking, driveways, gardens and landscaped open spaces. In addition, the development proposals include for an all-weather sports pitch with a small pavilion, which will accommodate changing room facilities.

5.2 The proposed development illustrative masterplan, prepared by Barton Willmore, is included within **Appendix D**.

Levels

5.3 The proposed finished development levels have yet to be finalised, however, it is expected that they will generally reflect the existing prevailing topography, with some low level localised raising of levels to facilitate drainage and access.

Foul Drainage

5.4 Based on a proposed development of 124 residential dwellings @ 4000 l/unit/day, the peak foul discharge generated will be approx. 5.74 l/s. In addition, the foul run-off generated by the pavilion / changing rooms will be less than 1.0 l/s.

5.5 Subject to confirmation of available capacity from Severn Trent Water, it is proposed to connect the proposed foul discharge from the new development to the public foul sewer within Rugby Road.

5.6 Within the Developer Enquiry response, STW preference is to discharge the development flows to the 225mm diameter public sewer at manhole 3202 within Rugby Road. However, the final point of connection will be agreed at the detailed design stage in accordance with a Section 106 of the Water Industry Act 1991.

5.7 Based on the existing topography and the indicted invert level of the public sewer, it is evident that a gravity connection from all parts of the development will not be feasible. It will therefore be necessary to provide an on site foul pumping station.

5.8 It is expected that the proposed main on site foul drainage network, including the pumping station, will be offered to Severn Trent Water for adoption under Section 104 of the Water Industry Act 1991.

Surface Water Drainage

5.9 A sustainable surface water drainage strategy that does not increase discharge rates and therefore does not increase the risk of flooding to other areas should be provided in accordance with the NPPF and the SFRA. Furthermore, the surface water drainage strategy should actively seek to reduce positive discharge levels via the use of a sustainable drainage system (SuDS) wherever possible.

5.10 Whilst a detailed ground investigation study is not available, from a preliminary assessment undertaken previously, the site may be underlain by Dunsmore Gravel superficial deposits over Mercia Mudstone Group bedrock. The study therefore suggests that the formation may be suitable for the inclusion of some infiltration SuDS techniques, whilst no firm evidence is available.

5.11 In the absence of any site specific intrusive investigations and firm soil infiltration rates, and with consideration that the EA surface water mapping highlights the potential for some standing water on site, thus suggesting infiltration may not be feasible, an attenuation based surface water drainage strategy is proposed.

5.12 With respect to the attenuation, open features are always preferable to below ground structures where possible as they offer wider ecological and biodiversity benefits. In this instance, it is proposed to provide on-line balancing pond features.

5.13 Whilst the site is classified as Brownfield, with the speedway stadium and large hardcore areas present, as a robust approach for the purpose of this report, an equivalent Greenfield discharge to the watercourse is to be promoted for the development.

5.14 An assessment of Greenfield run-off has therefore been undertaken using the Micro Drainage software suite, adopting the ICP SUDS method. Assessing the extent of the proposed development and impermeable area associated with the development, a maximum area of 3.66 ha has been utilised for calculation purposes, confirming an average (QBAR) run-off rate of 16.1 l/s for the site. This will promote a reduction in surface water run-off in the post development scenario when compared to the existing site. A copy of the results is included within **Appendix E**.

5.15 Assessing the proposed contributing area of the development, a measured impermeable area of 1.94 ha has been established.

5.16 Preliminary attenuation calculations have been undertaken using the Micro Drainage software suite to assess the likely maximum size of the pond feature required in order to confirm that sufficient space has been allocated within the development proposals. A summary of the balancing pond design criteria is as follows:

- Contributing Imp. Area – 1.94 ha
- Design Event – 1 in 100 year (plus a 40% allowance for climate change)
- Max. Discharge – 16.1 l/s
- Max. Overall Depth – 1.3m (1.0m effective)
- Bank Slopes – 1 in 4

5.17 A copy of the calculation output is included within **Appendix E**. In summary, a storage volume of approx. 1118.2m3 will be required within a plan area of approx. 1626.5m2.

5.18 Whilst the development illustrative masterplan provides more than sufficient available landscape area to accommodate a single pond of this size, due to the prevailing topography, and with consideration of the depth of the receiving watercourse and to minimise the need to increase site levels to achieve a gravity outfall to it, it will be necessary to reduce the depth of the pond thus that it covers a larger area but at a shallower depth. It is therefore proposed to provide two inter-connecting on-line ponds, with areas of circa 1810m2 and 870m2

respectively, both to a maximum depth of 0.8m. A copy of a Preliminary Surface Water Drainage Plan, illustrating the proposed ponds and supporting surface water drainage network is included within **Appendix F**.

5.19 Whilst a primary infiltration SuDS scheme has been discounted at this stage, infiltration SuDS should not be totally dismissed. It is proposed to utilise a Green roof for the pavilion / changing rooms associated with the all-weather sports pitch, with an impermeable car park and sustainable drainage system for the all-weather sports pitch also included. Should infiltration not be possible, attenuation will be offered within the structure of each feature, with flows retained within the storage media below the surface (min void content 30%), with any residual flow discharging to the attenuation ponds.

5.20 In addition, permeable paving for the construction of shared driveways and private parking areas will be promoted at the detailed design stage for the residential element of the scheme. Even when ground conditions prove not entirely suitable for infiltration SuDS, permeable paving can be utilised as a valuable initial treatment train and may also reduce the extent of the on site attenuation.

5.21 Consideration should also be given to the incorporation of water butts on individual rainwater pipes, with overflows draining to the surface water network. Whilst the incorporation of water butts will not reduce the design criteria of the receiving system, their inclusion will delay the time of entry and provide the facility for some surface water run-off to be stored and used for irrigation.

5.22 In terms of other SuDS techniques, whilst a green roof is being promoted for the pavilion, the use on individual properties with standard pitched or hip type roofs would not be suitable. Rainwater harvesting systems are likely to prove cost prohibitive.

5.23 Whilst the site does not lie within a groundwater SPZ, the proposed surface water drainage system should be designed in accordance with all relevant Environment Agency Pollution Prevention Guidance (PPG).

5.24 It is expected that the proposed main on site surface water drainage network will be offered to Severn Trent Water for adoption under Section 104 of the Water Industry Act 1991. The maintenance of the balancing ponds will be undertaken by a management company in perpetuity.

5.25 At detailed design stage the discharge to the watercourse will be subject to LLFA approval in accordance with the Land Drainage Act 1991.

6.0 VULNERABILITY & COMPATIBILITY

General

6.1 In accordance with Table 2: Flood Risk Vulnerability Classification, contained within the PPG, residential usage (Class C3) is classified as 'more vulnerable' development.

6.2 More vulnerable development uses are appropriate for location within Flood Zone 1.

Sequential Test

6.3 Paragraph 158 of the NPPF states *'The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The SFRA will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.'*

6.4 In this instance, the site is considered to be sequentially acceptable as the proposed development will be located within Flood Zone 1.

Exception Test

6.5 In accordance with Table 3: Flood risk vulnerability and flood zone 'compatibility', contained within the PPG, the Exception Test is not required in this instance.

6.6 Whilst the Exception Test is not required, it should be noted that this FRA demonstrates that, in accordance with paragraphs 160 and 161 of the NPPF, the proposed development will be safe for its lifetime, taking in to account the vulnerability of its users. It also demonstrates that there will be no increase in flood risk to other areas.

7.0 ASSESSMENT OF FLOOD IMPACT

Fluvial / Tidal Flooding

7.1 Based on the current Environment Agency indicative flood mapping, the application site is located within Flood Zone 1 so the proposed development can therefore be considered to be at the lowest probability of fluvial flooding (<1%).

7.2 We are not aware of any historical records or anecdotal evidence to suggest that the site has been affected by flooding via this source.

Groundwater

7.3 No specific information relating to groundwater levels on the site is available, however, there is no evidence to suggest that the site is susceptible to groundwater flooding.

7.4 In the absence of any historical records or anecdotal evidence to suggest otherwise, and based on the information contained within the SFRA, the risk of groundwater flooding to the proposed development is therefore considered to be low.

Surface Water / Overland Flows

7.5 Whilst the Environment Agency surface water mapping suggests that the central part of the site is susceptible to surface water flooding, as previously stated, it is noted that there is a notable lack of positive surface water drainage provision within the existing development.

7.6 The existing scenario will clearly change in the post development scenario, with the proposed development being served by a fully engineered surface water drainage network in accordance with all current requirements.

Existing Sewers

7.7 We are not aware of any records or anecdotal evidence to suggest that the development will be subject to flooding resulting from deficiencies with the existing public or any private drainage networks.

7.8 The risk of flooding to the proposed development from this source is therefore considered to be low.

Proposed Drainage

7.9 There will clearly be an increase in peak foul discharge in the post development scenario. On the basis that Severn Trent Water confirms that sufficient capacity is available within the local public sewer network, no increase in flood risk to other areas via this source is expected.

7.10 An attenuation based surface water drainage system restricting the positive surface water discharge from the development to a maximum rate of 16.1 l/s, the Greenfield QBAR equivalent, should ensure no increase in the risk of flooding to the development or other areas via this source in lower order rainfall events, and a reduction in flood risk in more extreme events.

Reservoirs, Canals & Other Artificial Sources

7.11 No potential artificial sources of flooding have been identified within the vicinity of the site.

8.0 CONCLUSIONS & RECOMMENDATIONS

General

8.1 With consideration of all the information available, including that contained within the SFRA, the risk of flooding to the proposed development from all sources is considered to be low.

Mitigation Measures

8.2 As the proposed development will be located within Flood Zone 1, it will not displace floodwater in the 1 in 100 year event. No floodwater storage mitigation measures are therefore proposed.

8.3 The implementation of an attenuation based sustainable surface water drainage strategy, as outlined within Section 5 of this report, will ensure that there is no increase in flood risk to surrounding areas resulting from the disposal of surface water run-off in the post development scenario during lower order rainfall events and a reduction in flood risk in more extreme events.

8.4 A safe dry route of access / egress will be readily available from all parts of the proposed development.

Residual Flood Risk

8.5 Whilst flood risk can never be entirely eliminated, it is considered that the residual flood risk to the development from all sources will be low.

8.6 There will be no increase in the residual flood risk to other areas as a result of the development proposals.

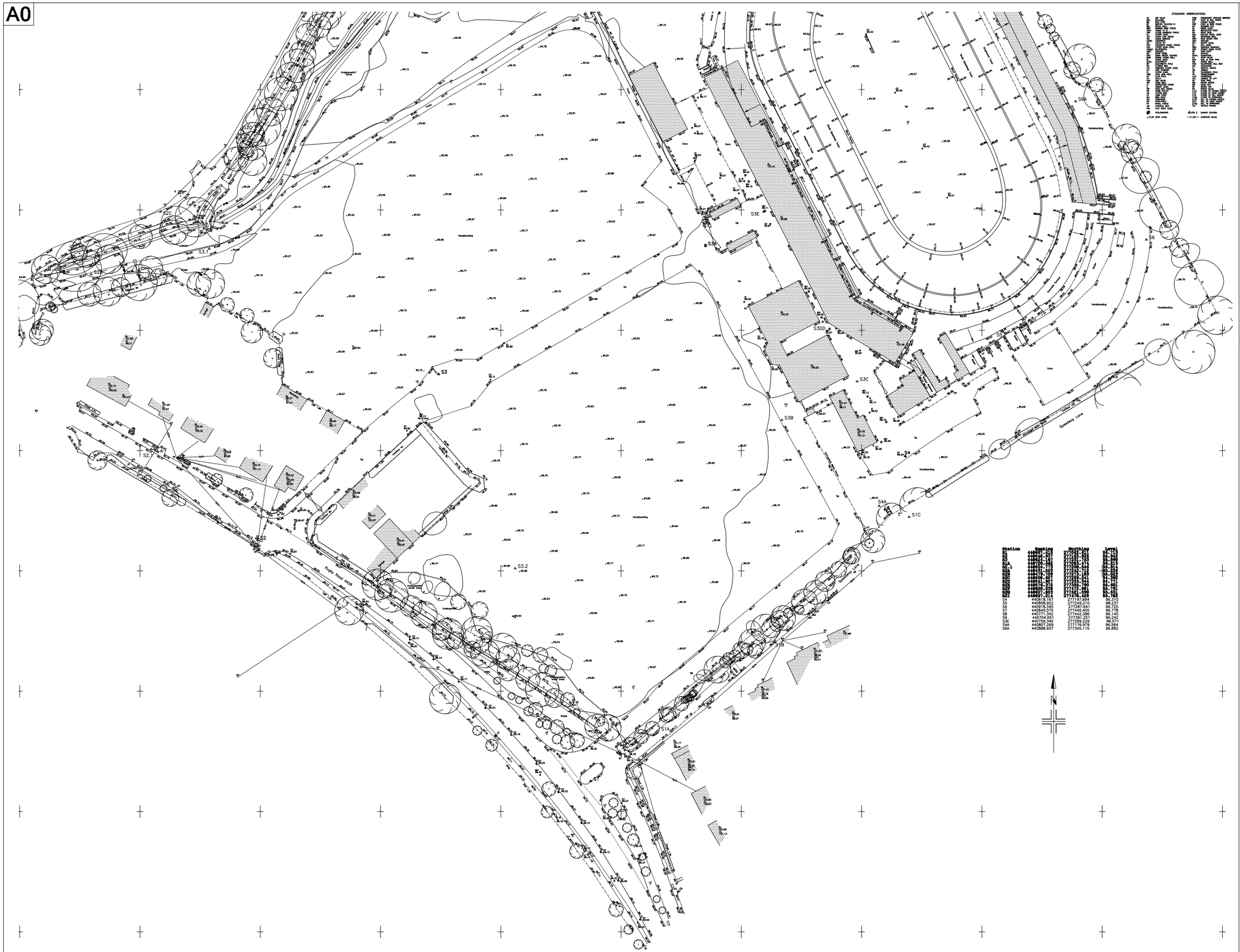
APPENDICES

APPENDIX A

APPENDIX A – LOCATION PLAN (NTS)

APPENDIX B

A0



The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work starts. The Contractor is to comply in all respects with current Building Legislation, British Standard Specifications , Building Regulations, Construction (Design & Management) Regulations, Party Wall Act, etc. whether or not specifically stated on this drawing. This drawing must be read with and checked against any structural, geotechnical or other specialist documentation provided. This drawing is not intended to show details of foundations, ground conditions or ground contaminants. Each area of ground relied upon to support any structure depicted (including drainage) must be investigated by the Contractor. A suitable method of foundation should be provided allowing for existing ground conditions. Any services or field ground, contaminates on or within the ground, should be further investigated by a suitable expert. Any earthwork constructions shown indicate typical slopes for guidance only & should be further investigated by a suitable expert.
Where existing trees are to be retained they should be subject to a full Arboricultural Inspection for safety. All trees are to be planted so as to ensure they are a minimum of 5 metres from buildings and 3 metres from drainage and services. A suitable method of foundation is to be provided to accommodate the proposed tree planting.
Geoff Perry Associates Limited do not accept any responsibility for any losses (financial or otherwise) to any Client or third party arising out of the Clients (be it Developer or Contractor but not limited thereto) non-compliance with afore mentioned proviso.

This survey has been orientated to the Ordnance Survey (O.S) National Grid (OSGB36) via a Global Position System (GPS) and the O.S. Active Network (OS Net).
A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN02 & OSGM02 transformation models. The survey has been correlated to this point and a further one or more OSGB36 points established to create a true O.S. bearing for angle orientation.
No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.
Please refer to Survey Station Table to enable establishment of the on-site grid.
3D Information frozen on layer TRIANGLES

Scale Check:

Revisions:

Rev A; additional information added to nothern boundary. June 14

Client:
Investin PLC

Project:
Coventry Stadium,
Coventry

Title:
Site Survey
1 of 2

Date: June 2014 **Scale:** 1:500 @ A0
Drawn by: DW **Checked by:** ICP

Job No.	Drwg No.	Rev.
S 219	447	A

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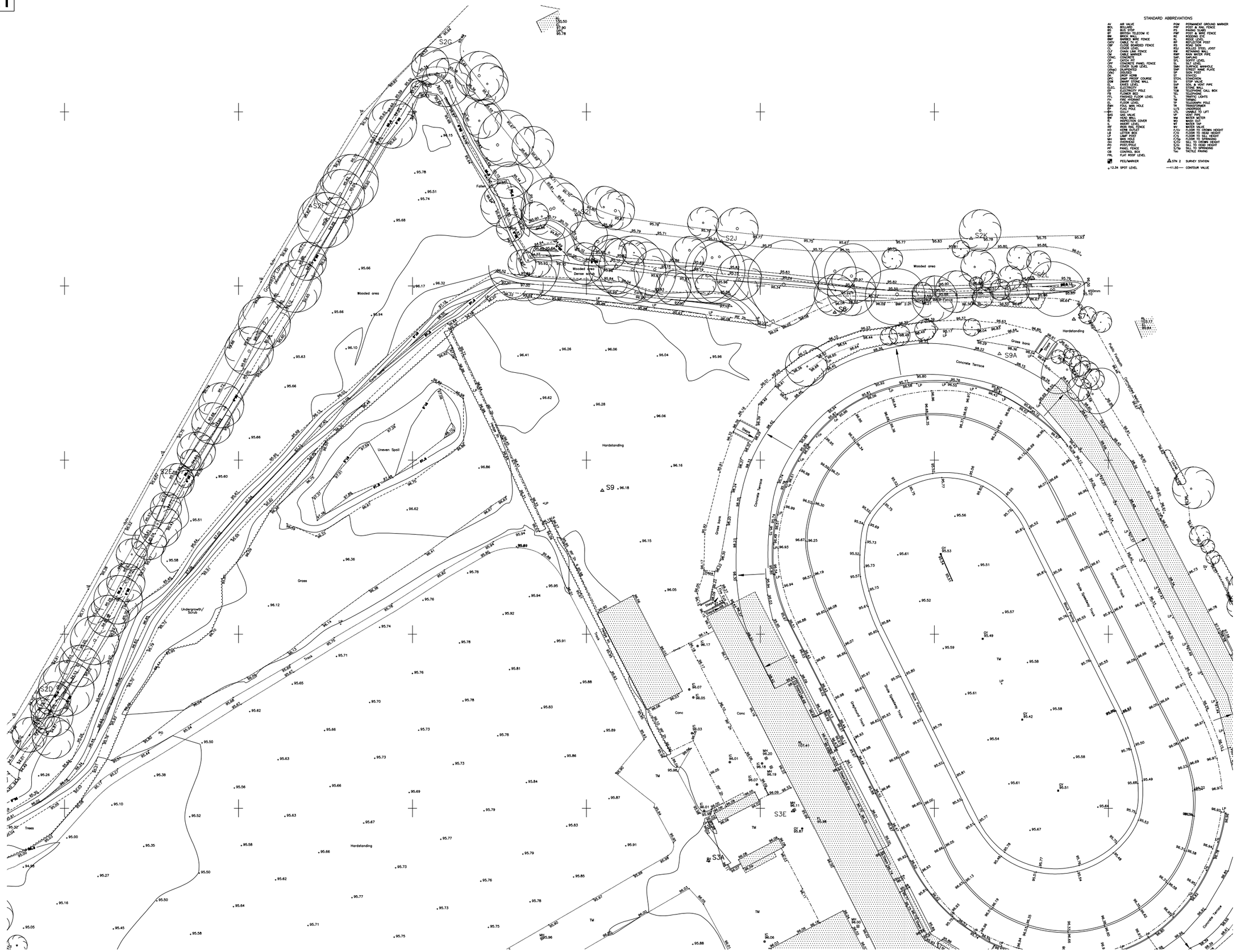
A1



STANDARD ABBREVIATIONS

AV	AIR VALVE	PDM	PERMANENT GROUND MARKER
BOL	BOLLARD	PBF	POST & RAIL FENCE
BS	BUS STOP	PS	PAVING SLABS
BT	BRITISH TELECOM IC	PWF	POST & WIRE FENCE
BW	BRICK WALL	RC	RODDING EYE
CBF	CLOSE BOARDED FENCE	RE	REFLECTION
CATV	CABLE TV IC	RP	REFLECTOR POST
CBF	CLOSE BOARDED FENCE	RS	ROAD SIGN
CL	COVER LEVEL	RSJ	ROLLED STEEL JOIST
CLF	CHAIN LINK FENCE	RWP	RAIN WATER PIPE
CM	CABLE MARKER	RWP	RAIN WATER PIPE
CONC	CONCRETE	SAP	SAPLING
CP	CATCH PIT	SFL	SOFFIT LEVEL
CPF	CLOSE PANEL FENCE	SL	SLOPE
CSL	COVER SLAB LEVEL	SMH	SURFACE MANHOLE
(dmg)	DILAPIDATED	SNP	STREET NAME PLATE
(dis)	DISUSED	SP	SIGN POST
DP	DRIP PIPE	STL	STAYED
DPC	DAMP PROOF COURSE	STN	STATION
DSW	DWARF STONE WALL	SV	STOP VALVE
EL	EAVES LEVEL	SVP	SOIL & VENT PIPE
ELEC.	ELECTRIC	TBM	TEMP BENCH MARK
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
FB	FLOWER BED	TEL	TELEPHONE
FFL	FINISHED FLOOR LEVEL	TL	TRAFFIC LIGHTS
FH	FIRE HYDRANT	TM	TRIBEL
FL	FLOOR LEVEL	TP	TELEGRAPH POLE
FM	FOUL MAN HOLE	TR	TRANSFORMER
FP	FLAG POLE	U/S	UNDERSIDE
G	GULLY	UP	UPPER TO LIFT
GV	GAS VALVE	VP	VENT PIPE
HB	HOSE BIBB	WM	WATER METER
IC	INSPECTION COVER	WO	WASH OUT
IL	INVERT LEVEL	WT	WATER TANK
LP	LAMP POST	WV	WATER VALVE
MH	MANHOLE	F/CH	FLOOR TO CROWN HEIGHT
OF	OVERFLOW	F/H	FLOOR TO HEAD HEIGHT
OHL	OVERHEAD	F/S	FLOOR TO SILL HEIGHT
PO	POST/POLE	S/CH	SILL TO CROWN HEIGHT
PP	PANEL FENCE	S/H	SILL TO HEAD HEIGHT
PR	CONTROL BOX	S/SP	SILL TO SPRINGING
PRL	FLAT ROOF LEVEL	TAC	TACTILE PAVING
	PEG/MARKER	STN 2	SURVEY STATION
12.34	SPOT LEVEL	41.50	CONTOUR VALUE

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3D information frozen on layer TRIANGLES

Scale Check:

1:20 - 0 200mm 400mm 600mm 800mm 1000 1200
1:100 - 0 1m 2m 3m 4m 5m 6m
1:50 - 0 1m 2m 3m 4m 5m 6m
1:5 - 0 100mm 200mm 300mm 400mm

Revisions:

Rev A; additional information added to nothern boundary. June 14

Client: Investin PLC

Project: Coventry Stadium, Coventry

Title: Site Survey 2 of 2

Date: June 2014 **Scale:** 1:500 @ A1
Drawn by: DW **Checked by:** ICP

Job No.	Drwg No.	Rev.
S 219	447	A

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APPENDIX C

WONDERFUL ON TAP

SEVERN TRENT

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Leicester Water Centre
Gorse Hill
Anstey
Leicester
LE7 7GU

Tel: 024 777 16843

www.stwater.co.uk
net.dev.east@severntrent.co.uk

Contact: Asset Protection East (waste water)

Our Ref: 8480099

Armstrong, Stokes and Clayton
Regus House
Herald Way
Pegasus Business Park
Castle Donington
Derbyshire
DE74 2TZ

FAO: Jonathan Bullock

13th May 2021

Dear Sir / Madam,

Brandon Stadium, Speedway Lane, Coventry, CV8 3GL
Proposed 124 dwellings (440693, 277230)

I refer to your 'Development Enquiry Request' in respect of the above named site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes (SGN) which refer to surface water disposal from development sites.

Protective Strips

There are no public sewers, as shown on the public records, located within the development site.

Due to recent change in legislation, there could be sewers, which have transferred over to the Company that are not shown on the statutory sewer records but may be located on your client's land. These sewers will have protective strips that we will not allow to be built over. The sewers could be identified whilst the land is being surveyed. If this is the case, please contact us for further guidance upon discovery.

Please note: there is no guarantee that you will be able to build over or close to any Severn Trent sewers, and where a diversion is required there is no guarantee that you will be able to undertake those works

on a self-lay basis. Every approach to build near to or divert our assets has to be assessed on its own merit and the decision of what is or isn't permissible is taken based on the risk to the asset and the wider catchment it serves. It is vital therefore that you contact us at the earliest opportunity to discuss the implications of our assets crossing your site. Failure to do so could significantly affect the costs and timescales of your project if it transpires diversionary works need to be carried out by Severn Trent.

Foul Water Drainage

I would assume an existing foul connection from the stadium exists and I would be grateful to know where the existing connection is located.

According to the sewer records the nearest public foul sewers are located within private gardens to the west and the south of the site.

My concern with a new connection for the housing development to these are they are only 150mm dia and would require the permission of the property owner where the connection is to be made, or a S98 sewer requisition commissioned from Severn Trent, if the owners permission is not granted.

Please submit information regarding the existing foul connection along with existing flows, and the number of days per average week that these flows would be discharging to the public sewers. Where this is not submitted or there is no existing connection, my preferred option would be a gravity connection to the public 225mm dia foul sewer to the west in Rugby Road at MH 3202. This sewer network could deal with the flows from the new development more effectively than the sewer network to the south. Where a pumped discharge is required, though I think this is unlikely, sewer modelling may be required.

Surface Water Drainage

Under the terms of Section H of the Building Regulations 2010, the disposal of surface water by means of soakaways should be considered as the primary method. If this is not practical and no watercourse is available as an alternative, the use of sewerage should be considered. In addition, other sustainable drainage methods should also be explored before a discharge to the public sewerage system is considered.

If ground conditions are not suitable, for soakaways and other SUDs techniques, evidence should be submitted. The evidence should be either percolation test results or by the submission of a statement from

the SI consultant (extract or a supplementary letter). This would satisfy the SGN (enclosed).

Subject to the above, can you please provide further information, to demonstrate how the former impermeable areas on the site are currently drained, if indeed they are positively drained, identifying which impermeable areas drain to which pipeline and the connections/outfalls to the public sewerage system identified. Ideally, a drainage survey of the existing site is required.

Due to the fact there is a watercourse / land drainage ditch alongside the existing stadium in Gossett Lane, I would suggest that the existing site drains to that watercourse, The new development should drain all surface water (even if some now goes to the public foul network) as the most sustainable way to drain the new development.

Please discuss with the LLFA on all matters relating to a suitable sustainable surface water drainage strategy for this development. The LLFA will determine the point of discharge and the rate of discharge for this development.

Severn Trent policy is now to ensure that all surface water for any development goes to alternative discharge points other than public sewers, especially combined and foul where there is a sustainable alternative nearby, wherever is possible.

Any flows generated by the site in excess of the permitted discharge rate will have to be attenuated within the development site.

Connections

For any new connections including the use, reuse and indirect to the public sewerage system, the developer will need to submit Section 106 application. Our Developer Services department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 707 6600 or download from www.stwater.co.uk

Please quote the above reference number in any future correspondence (including e-mails) with STW Limited. Please send **all correspondence** to the net.dev.east@severntrent.co.uk email inbox address, a response will be made within 15 days.

If you require a VAT receipt for the application fee please email MISCINCOME.NC@SEVERNTRENT.CO.UK quoting the above Reference Number.

WONDERFUL ON TAP

SEVERN TRENT

Please note that Developer Enquiry responses are only valid for 6 months from the date of this letter.

Yours sincerely,

Keith Baker
Senior Evaluation Technician
Asset Protection East (wastewater)
Asset Strategy & Planning
Chief Engineer

SUPPLEMENTARY GUIDANCE NOTES RELATING TO DISPOSAL OF SURFACE WATER

Introduction

The purpose of this guidance note is to provide advice to applicants when completing the surface water drainage design for a new development, both for Greenfield and Brownfield sites. This does not affect foul drainage disposal which should be discussed with Severn Trent as early as possible to ensure additional flows can be accommodated without undue delay to the development.

Lead Local Flood Authority (LLFA) Consultation

Since April 2015, the LLFA have assumed the role of being a statutory consultee in the planning process for developments of 10 dwellings or more; or equivalent non-residential and/or mixed development. The LLFAs role is vital to ensure that surface water disposal on new development is adequately assessed so that the local planning authority can satisfy themselves that drainage proposals are satisfactory and to make sure, through the use of planning conditions or planning obligations, that there are clear arrangements in place for future maintenance of sustainable drainage systems (SuDS) over the lifetime of the development. This will also ensure surface water disposal aligns with local planning policies, flood risk strategies and national policies, such as the National Planning Policy Framework (NPPF).

It is strongly recommend that the LLFA are involved in early pre-application discussions when the development of a site is initially being considered. Pre-application discussions will help to ensure that SuDS are appropriately considered ahead of or as part of preliminary development layouts, and that they are fully integrated into the final development layout. Whilst Severn Trent are willing to advise on sewerage availability this does to negate the planning requirement relating to adequacy of SuDS on new development.

SuDS Hierarchy

Severn Trent is fully supportive of the fundamental SuDS principle that priority should be given to managing surface water as close to source as possible. In accordance with national standards and guidance a sequential series of checks should be undertaken to ensure the relevant SuDS features are being proposed whereby (in order of priority) rainwater re-use, infiltration to ground and controlled discharge to a water body are properly considered ahead of any controlled connection to a culverted watercourse/other drainage system or public surface water sewer.

A controlled connection to a public combined/foul sewer would only be considered under rare exceptional circumstances where all other options have been completely exhausted. Acceptance of surface water into a combined sewer is not only unsustainable because of the need to convey/treat rainwater but is also takes away existing capacity which could constraint the connection of foul flows on future development. It is also possible that connection of additional surface water flows will require capacity upgrades to the existing sewerage system which may delay development.

Connection to a Public Sewer

Whilst Severn Trent will be able to provide advice on potential public surface water sewer connection options, it is essential that a developer contacts the LLFA as early as possible to discuss surface water disposal as they will be able to provide guidance on surface water flood risk policy which may influence SuDS requirements. It is strongly recommended that LLFA discussions take place before contacting Severn Trent. Where the outcome of LLFA discussions concludes that a controlled discharge to the public sewerage system is the only viable option then Severn Trent would be pleased to discuss sewer connection options, satisfied that the LLFA have been consulted in line with their surface water management role and in their capacity as statutory consultee.

Evidence must be provided to demonstrate why the sequential SuDS checks have concluded that a connection to the public sewer is required. This must include a Site Investigation Report including percolation test data/graphs/calculations/results together with relevant correspondence with the LLFA.

Design Standards

Surface water disposal design should consider the interactions between the adoptable sewer design criteria based on a 30 year design storm (outlined in 'Sewers For Adoption') and the "Non-statutory technical standards for SuDS" requirement to restrict discharge from a site up to and including the 1 in 100 year critical storm event plus an allowance for climate change as required by the LLFA.

For Greenfield development, the peak runoff rate should never exceed the peak pre-development run-off rates/volumes for the same rainfall event irrespective of the design storm duration consistent with the national non-statutory technical standards. For developments which were previously developed (Brownfield), the peak runoff rate must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment again for the same rainfall event. This requirement to remove pre-development surface water discharges to the sewerage system will help remove capacity constraints and aid future development.

To establish the pre-development run-off rates a detailed existing drainage survey will be required indicating pipe locations including sizes and levels, impermeable area connectivity to each pipe and topographical information to support existing drainage assumptions. Photographs of the existing buildings and surface features should be provided and where necessary a CCTV sewer survey should be provided to support the drainage survey to demonstrate connectivity.

In line with 'Sewers for Adoption', the drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event. For higher storm return periods the drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station, electricity substation, water booster station) within the development.

Small Developments

Whilst developments of fewer than 10 dwellings (or their equivalent) are excluded from the post April 2015 planning requirements the underlying principles regarding sustainable surface water management are still valid. The collective impacts of surface water discharges from smaller developments can have an adverse impact on flood risk, especially in smaller rural catchments where smaller sewerage systems are more susceptible to increases in surface water inflow. On small developments infiltration to ground and peak flow attenuation must be considered to mitigate flood risk in the community but where a sewer connection is envisaged then the developer is recommended to discuss surface water disposal options with Severn Trent as early as possible.

Contact

For further assistance please contact our Asset Protection teams via:

net.dev.west@severntrent.co.uk

(Birmingham & Black Country, Staffordshire, Shropshire, Worcestershire, Gloucestershire, Herefordshire, Powys)

net.dev.east@severntrent.co.uk

(Derbyshire, Leicestershire, Nottinghamshire, Warwickshire, Coventry)

Additional Guidance Notes

If you experience difficulty in the provision of off-site sewers to serve your proposed development, an application for requisition sewers under Section 98 Water Act 2003 may be appropriate on request to this office.

If there are existing public sewers within the curtilage of the development site that may affect the proposed development, the option to divert them under Section 185 Water Act 2003 may be available. All costs incurred would lay with the Applicant.

All potentially adoptable sewers must be designed and constructed in accordance with the guidelines in Sewers for Adoption (6th Edition), after 1st May 2006. A Severn Trent Water Addendum for Foul Sewage Pumping Stations will be available at www.wrcplc.co.uk/sfa.

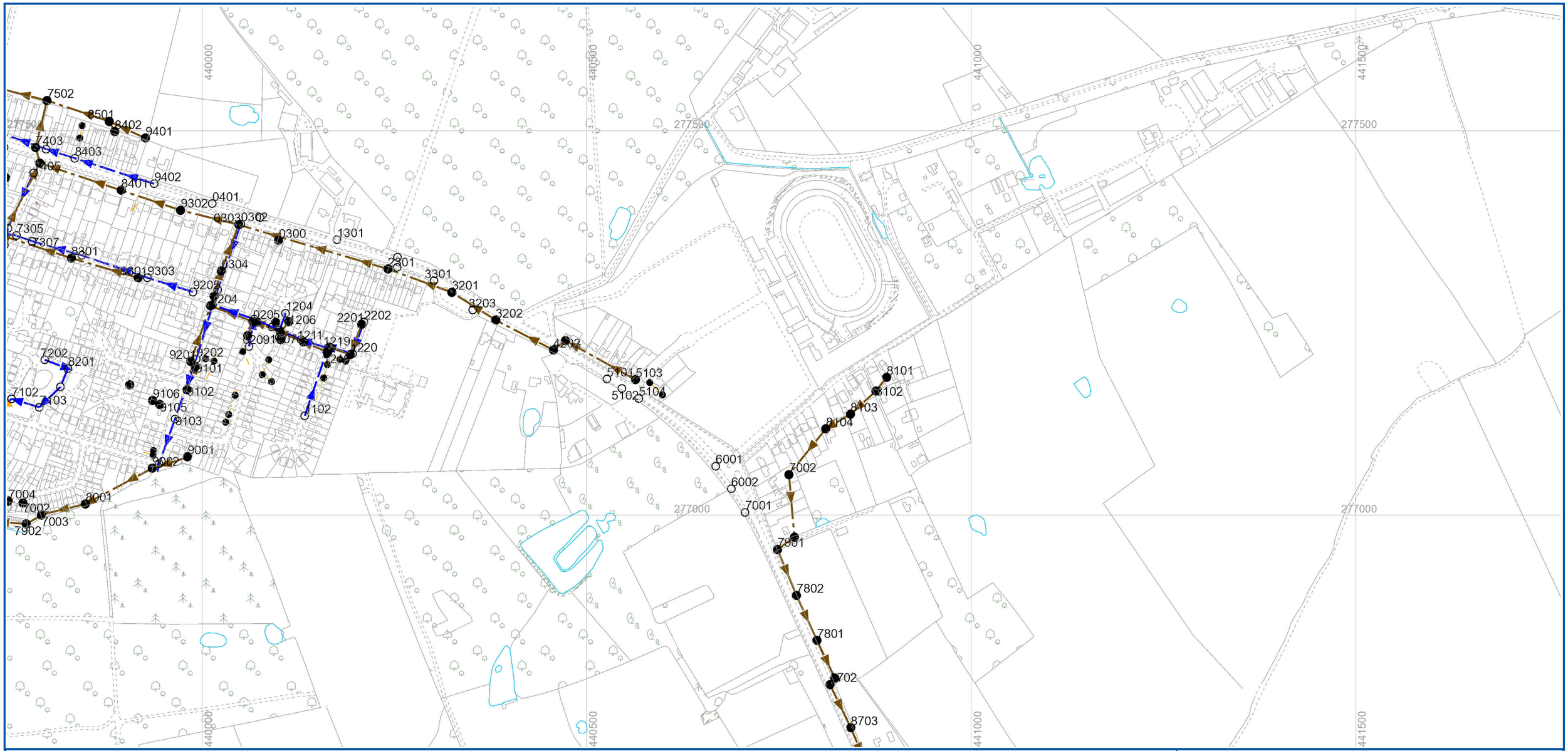
If the sewers are to be offered for adoption or if the development works could affect the public sewerage system, the Developer should approach Severn Trent Water Ltd to discuss their proposals in detail. This is to ensure the Developer is aware of the Company's requirements which could affect the development design and/or programme.

In cases where the complexity of both the existing receiving sewerage system and the proposed additional sewerage necessitates the construction of a suitable computer model, Severn Trent Water will carry this out where required.

Severn Trent Water has no knowledge of any specific land drainage issues involving this site. The Developer is to contact and seek approval of The Environment Agency, Local Authority etc. regarding any means of surface water disposal to the land drainage system, required attenuation, discharge consent etc.

Severn Trent have now contracted out sewer record provision to a third-party partner called digdat Utilities Services. All enquiries with respect to the supply of sewer records only should be directed to http://www.digdat.co.uk/

Asset Protection
Waste Water East



LEGEND

LandlineLine
- Polygon Closing Line
- Property Closing Line
- Bottom Of Slope
- Top Of Slope
- Step
- Mean High Water
- Traffic Calming
- Standard Gauge Track
- Bottom Of Cliff
- Top Of Cliff
- Mean Low Water
- Path
- Overhead Construction
- Culvert
- Pylon
- Ridge Or Rock Line
- Narrow Gauge Track
- Railway Buffer
- Tunnel Edge
- Line Of Posts
- Drain
- Default Line
- Building Outline
- Edge Line
- Road Or Track
- Building Division
- Inland water Line
- General Surface Natural Line
- Building Overhead Line
- Landform Natural Line
- Historic Interest Line
- Landform Manmade Line
- Unclassified

LandlineArea
- Other
- Mixed Woodland Fill
- Nonconiferous Tree Fill
- Coniferous Tree Fill
- Orchard Fill
- Coppice Or Osiers Fill
- Scrub Fill
- Boulders Fill
- Rock Fill
- Scree Fill
- Rough Grassland Fill
- Heath Fill
- Saltmarsh Fill
- Marsh Fill
- Reeds Fill
- Slope Fill
- Cliff Fill

Ancillary
- Balancing Lagoon
- Grease Trap
- Interceptor
- Screen

Chamber
- Flushing Chamber
- Soakaway
- Overflow

Fitting
- Blind Shaft
- Facility Connector
- Head Node
- Lamphole
- Sewerage Air Valve
- Sewerage Chemical Injection Point
- Sewerage Hatch Box
- Sewerage Pressure Washout
- Vent Column
- Waste Water Outfall

Control Valve
- Hydrobrake
- Penstock
- Sewerage Isolation Valve
- Sewerage Non Return Valve

Manhole
- Foul Bifurcation Manhole
- Combined Bifurcation Manhole
- Surface Water Bifurcation Manhole
- Dual Manhole
- Foul Single Manhole
- Combined Single Manhole
- Surface Water Single Manhole
- Twin Manhole
- Foul Adopted Manhole
- Combined Adopted Manhole
- Surface Adopted Manhole
- Transferred Manhole
- Unsurveyed Manhole

Operational Site

Waste Water Pump
- S104
- Transferred Asset
- S102
- Null STW
- Adopted Sewer
- None
- Highway Drain
- Null Private
- S24

Storage
- Disposal Site
- Off-Line Waste Water Storage
- On-Line Waste Water Storage
- Wet Well

Waste Water Process Structure
- Sewage Treatment Point
- Sewage Treatment Structure
- Sludge Treatment Point
- Sludge Treatment Structure

Gravity Sewer Pipe
- Foul Gravity Sewer
- Combined Gravity Sewer
- Surface Water Gravity Sewer
- S104 Surface Water Gravity Sewer
- S104 Combined Gravity Sewer
- S104 Foul Gravity Sewer
- Private Surface Water Gravity Sewer
- Private Combined Gravity Sewer
- Private Foul Gravity Sewer
- Surface Water Unsurveyed Pipe
- Combined Unsurveyed Pipe
- Foul Unsurveyed Pipe
- Transferred Surface Water Sewer
- Transferred Combined Sewer
- Transferred Foul Sewer
- Disposal Pipe
- Overflow Pipe
- Culverted Water Course
- Waste Internal Site Pipe

Pressure Sewer Pipe
- Surface Water Pressure Sewer
- Combined Pressure Sewer
- Foul Pressure Sewer
- S104 Surface Water Pressure Sewer
- S104 Combined Pressure Sewer
- S104 Foul Pressure Sewer
- Private Surface Water Pressure Sewe
- Private Combined Pressure Sewer
- Private Foul Pressure Sewer
- Surface Water Vacuum Sewer
- Foul Vacuum Sewer
- Combined Vacuum Sewer
- S104 Surface Water Vacuum Sewer
- S104 Combined Vacuum Sewer
- S104 Foul Vacuum Sewer
- Private Surface Water Vaccum Sewe
- Private Combined Vacuum Sewer
- Private Foul Vacuum Sewer
- Surface Water Siphon

Service Pipe
- Sewer Service Connection
- Gravity Sewer Others
- Combined Siphon
- Foul Siphon
- Private Surface Wa
- Private Combined Sip
- Private Foul Siphon
- S104 Surface Wate
- S104 Combined Sph
- S104 Foul Siphon
- Surface Water Lat
- Combined Unsurvey
- Foul Unsurveyed Pipe
- Disposal Pipe
- Surface Water Late
- Combined Lateral Dr
- Foul Lateral Drain
- S104 Surface Wate
- S104 Combined Late
- S104 Foul Lateral Dra
- Private Surface Wate
- Private Combined La
- Private Foul Lateral D

MATERIALS

-	NONE
AC	ASBESTOS CEME
BR	BRICK
CC	CONCRETE BOX CULVERT
CI	CAST IRON
CO	CONCRETE
CSB	CONCRETE SEGMENTS (BOLTED)
CSU	CONCRETE SEGMENTS (UNBOLTED)
DI	DUCTILE IRON
GRP	GLASS REINFORCED PLASTIC
MAC	MASONRY IN REGULAR COURSES
MAR	MASONRY RANDOMLY COURSED
PE	POLYETHELENE
PF	PITCH
PP	POLYPROPYLENE
PSC	PLASTIC STEEL COMPOSITE
PVC	POLYVINYL CHLORIDE
RPM	REINFORCED PLASTIC MATRIX
SI	SPUN (GREY) IRON
ST	STEEL
U	UNKNOWN
VC	VITRIFIED CLAY
XXX	OTHER

CATEGORIES

W	WEIR
C	CASCADE
DB	DAMBOARD
SE	SIDE ENTRY
FV	FLAP VALVE
BD	BACK DROP
S	SIPHON
D	HIGHWAY DRAIN
S104	SECTION 104

SHAPE

C	CIRCULAR
E	EGG SHAPED
O	OTHER
R	RECTANGLE
S	SQUARE
T	TRAPEZOIDAL
U	UNKNOWN

PURPOSE

C	COMBINED
E	FINAL EFFLUENT
F	FOUL
L	SLUDGE
S	SURFACE WATER

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0345 601 6616

SEWER RECORD

O/S Map Scale: 1:5,000 **This map is centred upon:**

Date of Issue: 13-05-21 **X:** 440756.50 **Y:** 277179.73

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3 On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, Transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on the map.

5 Ordnance Survey licence number:**100031673**

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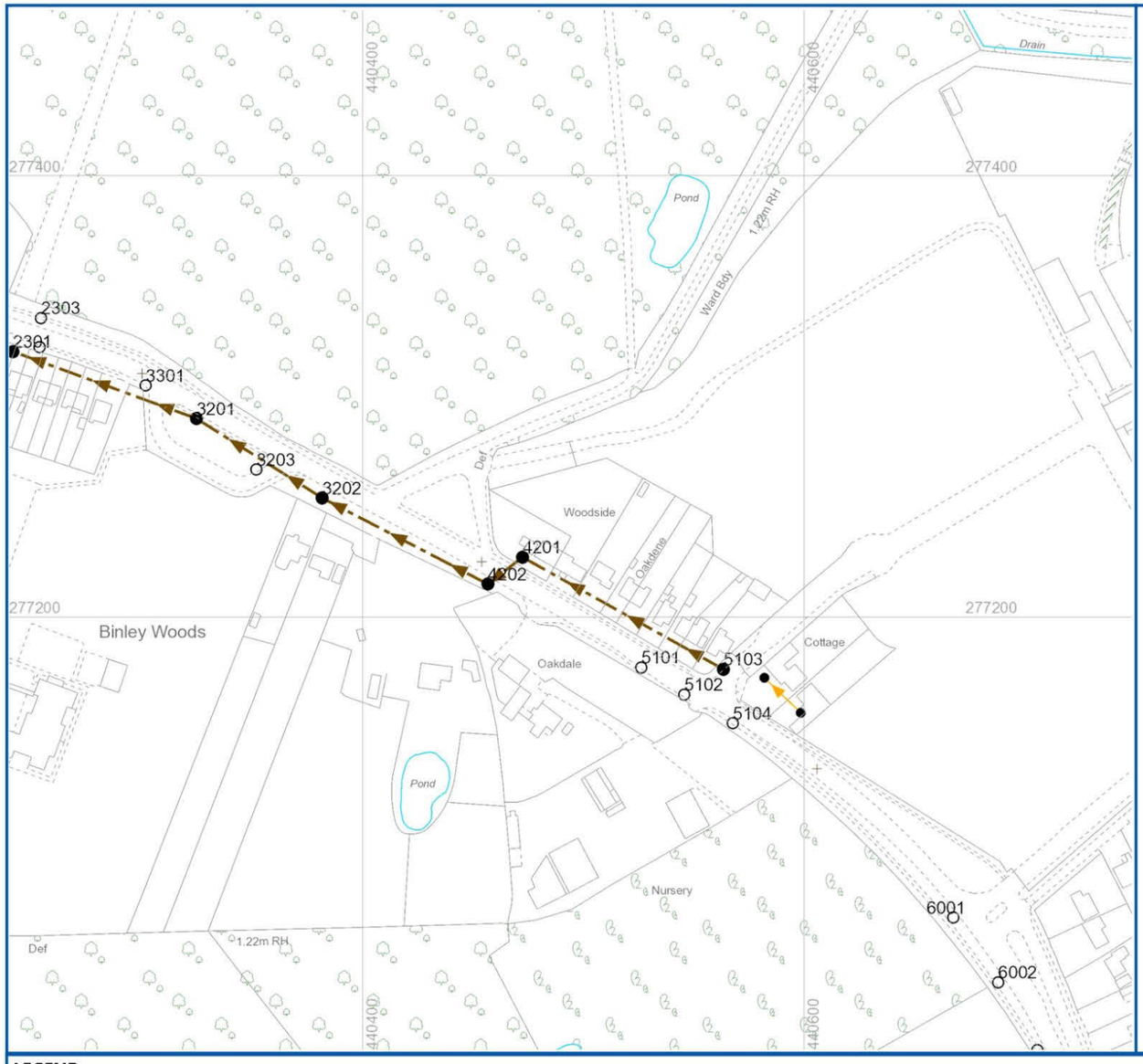

Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
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SP40774202	95.2969	93.717	93.096	F	<UNK>	C	150	<UNK>	136.34	31/12/1899 00:00:00
SP40773202	94.916	93.076	92.823	F	<UNK>	C	225	<UNK>	269.68	31/12/1899 00:00:00
SP40773201	94.9729	92.803	92.498	F	<UNK>	C	225	<UNK>	281.68	31/12/1899 00:00:00
SP40772301	94.718	92.478	91.532	F	<UNK>	C	225	<UNK>	212.14	31/12/1899 00:00:00
SP40775103	96.0039	94.674	93.999	F	<UNK>	C	150	<UNK>	155.99	31/12/1899 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	C	VC	<UNK>	<UNK>	<UNK>	<UNK>	31/12/1899 00:00:00

LEGEND

LandlinePoint
Spot Height
Emergency Telephone
Site Of Heritage
Culvert
Positioned Nonconiferous Tree
Inland Water
Roadside
Overhead Construction
Rail
Positioned Coniferous Tree
Boundary Post Or Stone
Triangulation Point Or Pillar
Historic Interest
Landform
Tidal Water
Structure
LandlineTex
LandlineLine
Polygon Closing Line
Property Closing Line
Bottom Of Slope
Top Of Slope
Step
Mean High Water
Traffic Calming
Standard Gauge Track
Bottom Of Cliff
Top Of Cliff
Mean Low Water
Path
Overhead Construction
Culvert
Pylon
Ridge Or Rock Line
Narrow Gauge Track
Railway Buffer
Tunnel Edge
Line Of Posts
Drain
Default Line
Building Outline
Edge Line
Road Or Track
Building Division
Inland water Line
General Surface Natural Line
Building Overhead Line
Landform Natural Line
Historic Interest Line
Landform Manmade Line
Unclassified
LandlineArea
Other
Mixed Woodland Fill
Nonconiferous Tree Fill
Coniferous Tree Fill
Orchard Fill
Coppice Or Osiers Fill
Scrub Fill
Boulders Fill
Rock Fill
Scree Fill
Rough Grassland Fill
Heath Fill
Saltmarsh Fill
Marsh Fill
Reeds Fill
Slope Fill
Cliff Fill
Ancillary
Balancing Lagoon
Grease Trap
Interceptor
Screen
Chamber
Flushing Chamber
Soakaway
Overflow
Fitting
Blind Shaft
Facility Connector
Head Node
Lamphole
Sewerage Air Valve
Sewerage Chemical Injection Point
Sewerage Hatch Box
Sewerage Pressure Washout
Vent Column
Waste Water Outfall
Control Valve
Hydrobrake
Penstock
Sewerage Isolation Valve
Sewerage Non Return Valve
Manhole
Foul Bifurcation Manhole
Combined Bifurcation Manhole
Surface Water Bifurcation Manhole
Dual Manhole
Foul Single Manhole
Combined Single Manhole
Surface Water Single Manhole
Twin Manhole
Foul Adopted Manhole
Combined Adopted Manhole
Surface Adopted Manhole
Transferred Manhole
Unsurveyed Manhole
Operational Site
Waste Water Pump
S104
Transferred Asset
S102
Null STW
Adopted Sewer
None
Highway Drain
Null Private
S24
Storage
DS Disposal Site
Off-Line Waste Water Storage
On-Line Waste Water Storage
Wet Well
Waste Water Process Structure
STP Sewage Treatment Point
STS Sewage Treatment Structure
SLTP Sludge Treatment Point
SLTS Sludge Treatment Structure
Gravity Sewer Pipe
Foul Gravity Sewer
Combined Gravity Sewer
Surface Water Gravity Sewer
S104 Surface Water Gravity Sewer
S104 Combined Gravity Sewer
S104 Foul Gravity Sewer
Private Surface Water Gravity Sewer
Private Combined Gravity Sewer
Private Foul Gravity Sewer
Surface Water Unsurveyed Pipe
Combined Unsurveyed Pipe
Foul Unsurveyed Pipe
Transferred Surface Water Sewer
Transferred Combined Sewer
Transferred Foul Sewer
Disposal Pipe
Overflow Pipe
Culverted Water Course
Waste Internal Site Pipe
Sewer Service Connection
Gravity Sewer Others
Pressure Sewer Pipe
Surface Water Pressure Sewer
Combined Pressure Sewer
Foul Pressure Sewer
S104 Surface Water Pressure Sewer
S104 Combined Pressure Sewer
S104 Foul Pressure Sewer
Private Surface Water Pressure Sewer
Private Combined Pressure Sewer
Private
Surface
Foul Va
Combi
S104 Si
S104 Cr
S104 Fo
Private
Private
Private
Surface
Combi
Foul Sy
Private
Private
S104 Si
S104 Cr
S104 Fo
Surface
Combi
Foul Us
Disposa

MATERIALS

- - NONE
- AC - ASBESTOS CEME
- BR - BRICK
- CC - CONCRETE BOX CULVERT
- CI - CAST IRON
- CO - CONCRETE
- CSB CONCRETE SEGMENTS (BOLTED)
- CSU - CONCRETE SEGMENTS (UNBOLTED)
- DI - DUCTILE IRON
- GRP - GLASS REINFORCED PLASTIC
- MAC - MASONRY IN REGULAR COURSES
- MAR - MASONRY RANDOMLY COURSED
- PE - POLYETHLENE
- PF - PITCH
- PP - POLYPROPYLENE
- PSC - PLASTIC STEEL COMPOSITE
- PVC - POLYVINYL CHLORIDE
- RPM - REINFORCED PLASTIC MATRIX
- SI - SPUN (GREY) IRON
- ST - STEEL
- U - UNKNOWN
- VC - VITRIFIED CLAY
- XXX - OTHER

CATEGORIES

- W - WEIR
- C - CASCADE
- DB - DAMBOARD
- SE - SIDE ENTRY
- FV - FLAP VALVE
- BD - BACK DROP
- S - SIPHON
- D - HIGHWAY DRAIN
- S104 - SECTION 104

SHAPE

- C - CIRCULAR
- E - EGG SHAPED
- O - OTHER
- R - RECTANGLE
- S - SQUARE
- T - TRAPEZOIDAL
- U - UNKNOWN

PURPOSE

- C - COMBINED
- E - FINAL EFFLUENT
- F - FOUL
- L - SLUDGE
- S - SURFACE WATER

N W E S

SEVERN TRENT

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0345 601 6616

SEWER RECORD (Tabular)

O/S Map Scale: 1:2,500 **This map is centred upon:**

Date of Issue: 13-05-21 **X:** 440494.03 **Y:** 277239.53

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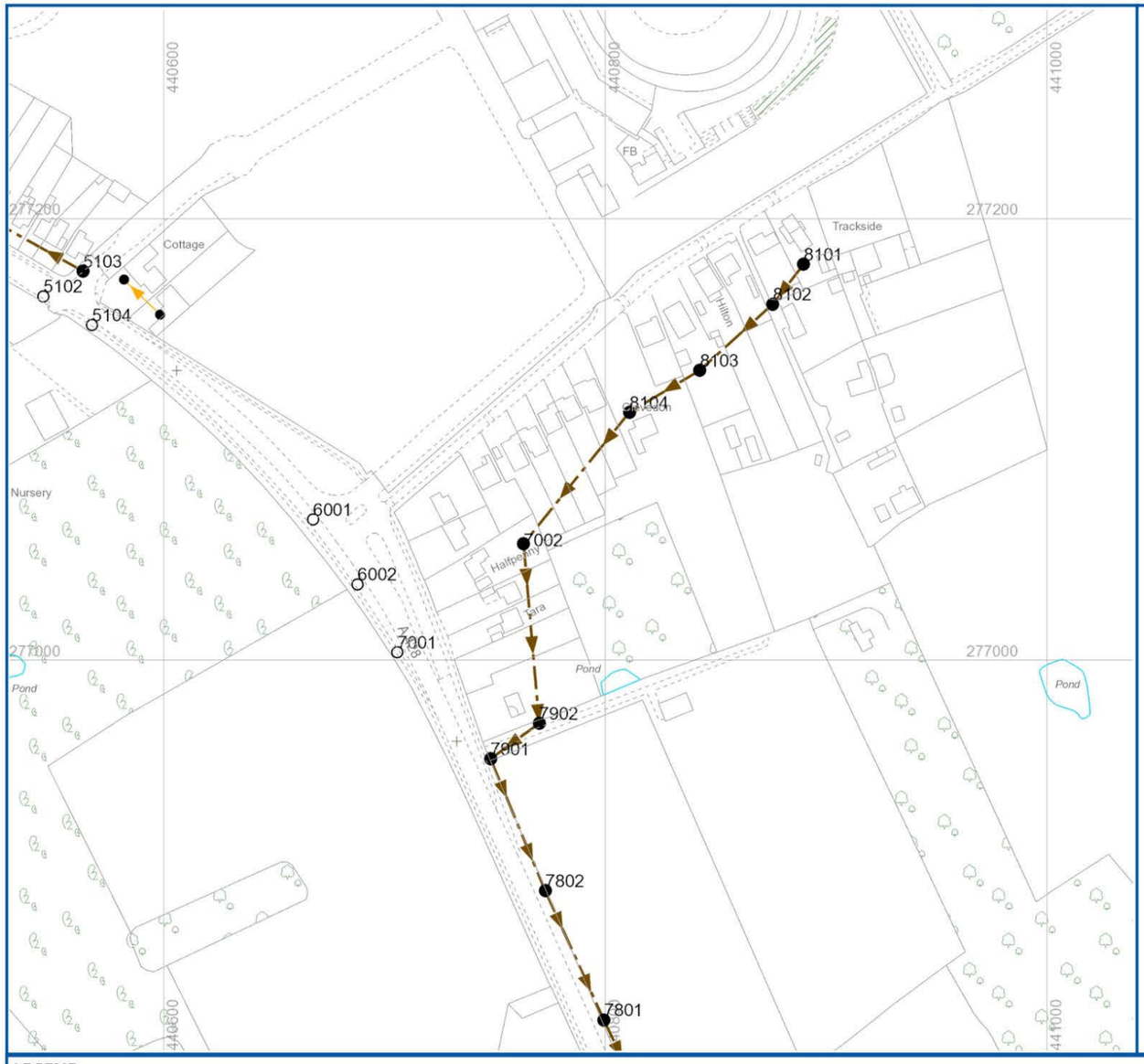
5 Ordnance Survey licence number: **100031673**



Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
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SP40778104	<UNK>	<UNK>	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP40778102	<UNK>	<UNK>	94.88	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP40767801	92.275	91.165	88.796	F	<UNK>	C	150	<UNK>	22.84	31/12/1899 00:00:00
SP40778101	96.61	95.9	<UNK>	F	VC	C	100	<UNK>	0	31/12/1899 00:00:00
SP40767902	95.6399	93.16	93.13	F	VC	C	150	<UNK>	906.67	31/12/1899 00:00:00
SP40778103	96.567	94.82	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP40775103	96.0039	94.674	93.999	F	<UNK>	C	150	<UNK>	155.99	31/12/1899 00:00:00
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SP40767901	95.5329	93.12	92.27	F	VC	C	150	<UNK>	76.02	31/12/1899 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	C	VC	<UNK>	<UNK>	<UNK>	<UNK>	31/12/1899 00:00:00

LEGEND

LandlinePoint
Spot Height
Emergency Telephone
Site Of Heritage
Culvert
Positioned Nonconiferous Tree
Inland Water
Roadside
Overhead Construction
Rail
Positioned Coniferous Tree
Boundary Post Or Stone
Triangulation Point Or Pillar
Historic Interest
Landform
Tidal Water
Structure
LandlineTex
LandlineLine
Polygon Closing Line
Property Closing Line
Bottom Of Slope
Top Of Slope
Step
Mean High Water
Traffic Calming
Standard Gauge Track
Bottom Of Cliff
Top Of Cliff
Mean Low Water
Path
Overhead Construction
Culvert
Pylon
Ridge Or Rock Line
Narrow Gauge Track
Railway Buffer
Tunnel Edge
Line Of Posts
Drain
Default Line
Building Outline
Edge Line
Road Or Track
Building Division
Inland water Line
General Surface Natural Line
Building Overhead Line
Landform Natural Line
Historic Interest Line
Landform Manmade Line
Unclassified
LandlineArea
Other
Mixed Woodland Fill
Nonconiferous Tree Fill
Coniferous Tree Fill
Orchard Fill
Coppice Or Osiers Fill
Scrub Fill
Boulders Fill
Rock Fill
Scree Fill
Rough Grassland Fill
Heath Fill
Saltmarsh Fill
Marsh Fill
Reeds Fill
Slope Fill
Cliff Fill
Ancillary
Balancing Lagoon
Grease Trap
Interceptor
Screen
Chamber
Flushing Chamber
Soakaway
Overflow
Fitting
Blind Shaft
Facility Connector
Head Node
Lamphole
Sewerage Air Valve
Sewerage Chemical Injection Point
Sewerage Hatch Box
Sewerage Pressure Washout
Vent Column
Waste Water Outfall
Control Valve
Hydrobrake
Penstock
Sewerage Isolation Valve
Sewerage Non Return Valve
Manhole
Foul Bifurcation Manhole
Combined Bifurcation Manhole
Surface Water Bifurcation Manhole
Dual Manhole
Foul Single Manhole
Combined Single Manhole
Surface Water Single Manhole
Twin Manhole
Foul Adopted Manhole
Combined Adopted Manhole
Surface Adopted Manhole
Transferred Manhole
Unsurveyed Manhole
Operational Site
Waste Water Pump
S104
Transferred Asset
S102
Null STW
Adopted Sewer
None
Highway Drain
Null Private
S24
Storage
Disposal Site
Off-Line Waste Water Storage
On-Line Waste Water Storage
Wet Well
Waste Water Process Structure
Sewage Treatment Point
Sewage Treatment Structure
Sludge Treatment Point
Sludge Treatment Structure
Gravity Sewer Pipe
Foul Gravity Sewer
Combined Gravity Sewer
Surface Water Gravity Sewer
S104 Surface Water Gravity Sewer
S104 Combined Gravity Sewer
S104 Foul Gravity Sewer
Private Surface Water Gravity Sewer
Private Combined Gravity Sewer
Private Foul Gravity Sewer
Surface Water Unsurveyed Pipe
Combined Unsurveyed Pipe
Foul Unsurveyed Pipe
Transferred Surface Water Sewer
Transferred Combined Sewer
Transferred Foul Sewer
Disposal Pipe
Overflow Pipe
Culverted Water Course
Waste Internal Site Pipe
Sewer Service Connection
Gravity Sewer Others
Pressure Sewer Pipe
Surface Water Pressure Sewer
Combined Pressure Sewer
Foul Pressure Sewer
S104 Surface Water Pressure Sewer
S104 Combined Pressure Sewer
S104 Foul Pressure Sewer
Private Surface Water Pressure Sewer
Private Combined Pressure Sewer

MATERIALS

- - NONE
AC - ASBESTOS CEME
BR - BRICK
CC - CONCRETE BOX CULVERT
CI - CAST IRON
CO - CONCRETE
CSB CONCRETE SEGMENTS (BOLTED)
CSU - CONCRETE SEGMENTS (UNBOLTED)
DI - DUCTILE IRON
GRP - GLASS REINFORCED PLASTIC
MAC - MASONRY IN REGULAR COURSES
MAR - MASONRY RANDOMLY COURSED
PE - POLYETHLENE
PF - PITCH
PP - POLYPROPYLENE
PSC - PLASTIC STEEL COMPOSITE
PVC - POLYVINYL CHLORIDE
RPM - REINFORCED PLASTIC MATRIX
SI - SPUN (GREY) IRON
ST - STEEL
U - UNKNOWN
VC - VITRIFIED CLAY
XXX - OTHER

CATEGORIES

W - WEIR
C - CASCADE
DB - DAMBOARD
SE - SIDE ENTRY
FV - FLAP VALVE
BD - BACK DROP
S - SIPHON
D - HIGHWAY DRAIN
S104 - SECTION 104

SHAPE

C - CIRCULAR
E - EGG SHAPED
O - OTHER
R - RECTANGLE
S - SQUARE
T - TRAPEZOIDAL
U - UNKNOWN

PURPOSE

C - COMBINED
E - FINAL EFFLUENT
F - FOUL
L - SLUDGE
S - SURFACE WATER

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0345 601 6616

SEWER RECORD (Tabular)

O/S Map Scale: 1:2,500 **This map is centred upon:**

Date of Issue: 13-05-21 **X:** 440784.41 **Y:** 277058.95

Disclaimer Statement:

1 Do not scale off this Map.

2 This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems.

3 On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on the map.

5 Ordnance Survey licence number: **100031673**

APPENDIX D

The scaling of this drawing cannot be assured

Revision	Date	Drn	Ckd
-	-	-	-

LEGEND

Boundaries and Rights of Way

- Site Boundary
- Existing PROW- Footpath
- Existing PROW- Bridleway
- Existing PROW- Twelve O'Clock Ride

EXISTING ELEMENTS

- Existing Tree/ Hedgerow Planting

PROPOSED ELEMENTS

Planting

- Proposed Trees/ Hedgerow Planting around Boundary
- Proposed trees
- Proposed hedges
- Proposed Boundary Hedge & fence: the extent and alignment of new hedge will be subject to detailed condition survey of existing vegetation
- Wetland Planting
- Meadow Grassland
- Bunding
- Proposed Rain Garden
- Proposed Grass Planting
- Proposed Car Parking
- Proposed Overflow Parking

Surfacing and Paving

- Cycle/Footpath - Bitmac with crushed stone surface dressing
- Informal Path - Worn/Mown Grass
- Enhanced Highway Paving
- Enhanced Pedestrian Paving

Waterbodies

- Attenuation Ponds & Basins

Playspaces

- Play Area
- 3G ATP Pitch
- Trim Trail
- Sculpture / Public Art

Buildings

- Proposed Pavillion with Green Roof

0 10 20 30 40 50m

N

Project
Brandon Stadium
Coventry

Drawing Title
Illustrative Landscape Masterplan

Date	Scale	Drawn by	Check by
01/07/21	1:1000 @ A1	LA	RMcW

Project No	Drawing No	Revision
27510	001	I

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J:\27000\27510 - Brandon Stadium, Coventry\A4 - Dwgs & Registers\Landscape\Drawings\27510 - Illustrative Landscape Masterplan RevI.dwg - A1

APPENDIX E

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	3.660	Urban	0.000
SAAR (mm)	700	Region Number	Region 4

Results l/s

QBAR Rural	16.1
QBAR Urban	16.1
Q100 years	41.3
Q1 year	13.3
Q30 years	31.5
Q100 years	41.3

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.188	0.488	16.1	467.0	O K
30 min Summer	99.312	0.612	16.1	609.6	O K
60 min Summer	99.427	0.727	16.1	751.6	O K
120 min Summer	99.525	0.825	16.1	878.2	O K
180 min Summer	99.568	0.868	16.1	935.3	O K
240 min Summer	99.588	0.888	16.1	962.7	O K
360 min Summer	99.599	0.899	16.1	977.2	O K
480 min Summer	99.593	0.893	16.1	969.3	O K
600 min Summer	99.582	0.882	16.1	954.5	O K
720 min Summer	99.570	0.870	16.1	938.8	O K
960 min Summer	99.545	0.845	16.1	905.1	O K
1440 min Summer	99.492	0.792	16.1	835.1	O K
2160 min Summer	99.407	0.707	16.1	726.2	O K
2880 min Summer	99.316	0.616	16.1	614.3	O K
4320 min Summer	99.159	0.459	16.1	435.6	O K
5760 min Summer	99.038	0.338	16.1	307.5	O K
7200 min Summer	98.955	0.255	15.9	225.1	O K
8640 min Summer	98.904	0.204	15.5	176.7	O K
10080 min Summer	98.880	0.180	14.5	154.6	O K
15 min Winter	99.239	0.539	16.1	524.7	O K
30 min Winter	99.375	0.675	16.1	686.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	132.861	0.0	470.3	26
30 min Summer	87.290	0.0	619.7	40
60 min Summer	54.663	0.0	788.9	70
120 min Summer	33.095	0.0	955.9	128
180 min Summer	24.358	0.0	1055.6	186
240 min Summer	19.485	0.0	1126.0	244
360 min Summer	14.144	0.0	1226.1	362
480 min Summer	11.275	0.0	1303.0	472
600 min Summer	9.449	0.0	1364.9	522
720 min Summer	8.176	0.0	1416.9	582
960 min Summer	6.502	0.0	1501.5	710
1440 min Summer	4.700	0.0	1625.2	984
2160 min Summer	3.392	0.0	1772.7	1396
2880 min Summer	2.689	0.0	1873.2	1768
4320 min Summer	1.935	0.0	2018.9	2508
5760 min Summer	1.531	0.0	2136.1	3176
7200 min Summer	1.276	0.0	2224.5	3824
8640 min Summer	1.099	0.0	2297.9	4496
10080 min Summer	0.968	0.0	2359.1	5152
15 min Winter	132.861	0.0	527.5	26
30 min Winter	87.290	0.0	694.3	40

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	99.501	0.801	16.1	846.0	O K
120 min Winter	99.609	0.909	16.1	991.2	O K
180 min Winter	99.658	0.958	16.1	1059.2	O K
240 min Winter	99.682	0.982	16.1	1094.1	O K
360 min Winter	99.699	0.999	16.1	1118.2	O K
480 min Winter	99.698	0.998	16.1	1117.5	O K
600 min Winter	99.688	0.988	16.1	1102.3	O K
720 min Winter	99.672	0.972	16.1	1079.2	O K
960 min Winter	99.641	0.941	16.1	1036.1	O K
1440 min Winter	99.572	0.872	16.1	940.5	O K
2160 min Winter	99.455	0.755	16.1	786.3	O K
2880 min Winter	99.315	0.615	16.1	613.1	O K
4320 min Winter	99.079	0.379	16.1	349.9	O K
5760 min Winter	98.930	0.230	15.7	201.4	O K
7200 min Winter	98.877	0.177	14.3	151.7	O K
8640 min Winter	98.856	0.156	12.4	132.6	O K
10080 min Winter	98.842	0.142	11.0	120.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	54.663	0.0	884.0	68
120 min Winter	33.095	0.0	1071.0	126
180 min Winter	24.358	0.0	1182.6	184
240 min Winter	19.485	0.0	1261.4	240
360 min Winter	14.144	0.0	1373.4	354
480 min Winter	11.275	0.0	1459.5	464
600 min Winter	9.449	0.0	1528.6	570
720 min Winter	8.176	0.0	1586.7	664
960 min Winter	6.502	0.0	1681.2	752
1440 min Winter	4.700	0.0	1818.8	1062
2160 min Winter	3.392	0.0	1985.7	1520
2880 min Winter	2.689	0.0	2098.5	1908
4320 min Winter	1.935	0.0	2262.5	2600
5760 min Winter	1.531	0.0	2392.7	3176
7200 min Winter	1.276	0.0	2491.9	3752
8640 min Winter	1.099	0.0	2574.4	4424
10080 min Winter	0.968	0.0	2643.7	5152

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.940

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.647	4	8	0.647	8	12	0.646

Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	802.6	0.700	1245.0	1.400	1626.5	2.100	1626.5
0.100	866.4	0.800	1310.0	1.500	1626.5	2.200	1626.5
0.200	929.9	0.900	1374.0	1.600	1626.5	2.300	1626.5
0.300	992.9	1.000	1437.0	1.700	1626.5	2.400	1626.5
0.400	1056.3	1.100	1500.1	1.800	1626.5	2.500	1626.5
0.500	1120.2	1.200	1563.4	1.900	1626.5		
0.600	1183.5	1.300	1626.5	2.000	1626.5		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0181-1610-1000-1610
Design Head (m)	1.000
Design Flow (l/s)	16.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	181
Invert Level (m)	98.700
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	16.1
Flush-Flo™	0.327	16.1
Kick-Flo®	0.709	13.7
Mean Flow over Head Range	-	13.6

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)
0.100	6.4	1.200	17.5	3.000	27.1	7.000	40.8
0.200	15.4	1.400	18.8	3.500	29.2	7.500	42.2
0.300	16.1	1.600	20.1	4.000	31.2	8.000	43.6
0.400	16.0	1.800	21.2	4.500	33.0	8.500	44.9
0.500	15.7	2.000	22.3	5.000	34.7	9.000	46.1
0.600	15.1	2.200	23.4	5.500	36.3	9.500	47.4
0.800	14.5	2.400	24.4	6.000	37.9		
1.000	16.1	2.600	25.3	6.500	39.4		

APPENDIX F

TOTAL ATTENUATION VOLUME
FOR SUDS PONDS = 1118.0m3

SuDS Attenuation Pond
870m2 @ 0.8m Deep

Bed94.56

HEADWALL
SIL94.78

SIL94.80

Grass Channel

SuDS Attenuation Pond
180m2 @ 0.8m Deep

CONTROL CHAMBER
Hydrobrake 16.1 l/s
SIL94.43

HEADWALL

BED94.45

HEADWALL
SIL94.65

SIL94.67

SIL94.87

FOUL PUMPING
STATION

SIL95.20

SIL94.78

SIL95.60

SIL95.65

SIL95.36

SIL95.09

SIL95.15

SIL95.30

SIL95.35

SIL95.48

SIL95.04

SIL95.76

SIL95.20

SIL95.60

SIL95.41

SIL95.60

SIL95.80

SIL95.75

SIL95.76

SIL96.05

SIL96.05

SIL96.10

SIL95.24

SIL95.41

SIL95.57

SIL95.71

SIL95.45

SIL95.65

SIL95.73

SIL95.77

SIL96.05

SIL96.00

SIL96.12

HEADWALL
SIL94.00

SIL94.02

Approximate Position
of All Weather Pitch

95.3m

Armstrong
Stokes &
Clayton Limited

NOTES

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS MUST BE CHECKED/VERIFIED ON SITE

KEY:

SURFACE WATER DRAINAGE

Armstrong Stokes & Clayton Limited

Civil & Structural Engineering Consultants

Regus House, Herald Way, Pegasus Business Park, Castle Donington, Derbyshire, DE74 2TZ

Tel: 01332 638 046

Client:

Brandon Estates Limited

Job Title:

Proposed Development at
Brandon Stadium
Speedway Lane

Drawing Title:

Surface Water Drainage Strategy Plan

Drawing number:

INV109/101/P

Drawn:	Date:	Scale:	
JS	June 21	1:500	A0

Preliminary □ Detailed ■ Tender □ As Built □