

Application for Approval of Details Reserved by Condition

Town and Country Planning Act 1990 (as amended); Planning (Listed Buildings and Conservation Areas) Act 1990 (as amended)

Publication of applications on planning authority websites

Please note that the information provided on this application form and in supporting documents may be published on the Authority's website. If you require any further clarification, please contact the Authority's planning department.

Site Location

Disclaimer: We can only make recommendations based on the answers given in the questions.

If you cannot provide a postcode, the description of site location must be completed. Please provide the most accurate site description you can, to help locate the site - for example "field to the North of the Post Office".

Number

Suffix

Property Name

Address Line 1

Address Line 2

Address Line 3

Town/city

Postcode

Description of site location must be completed if postcode is not known:

Easting (x)

Northing (y)

Description

Rudloe Drive, Quedgeley - phase 2

Applicant Details

Name/Company

Title

Mr

First name

Rob

Surname

Stroud

Company Name

Vistry Homes Ltd

Address

Address line 1

Cleeve Hall

Address line 2

Cheltenham Road

Address line 3

Town/City

Cheltenham

County

Glos

Country

Postcode

GL52 8GD

Are you an agent acting on behalf of the applicant?

☐ Yes

☒ No

Contact Details

Primary number

***** REDACTED *****

Secondary number

Fax number

Email address

Description of the Proposal

Please provide a description of the approved development as shown on the decision letter

Application for approval of reserved matters (access, appearance, layout, scale and landscaping) for the construction of 150 dwellings including public open space and infrastructure

Reference number

22/00553/REM

Date of decision (date must be pre-application submission)

03/11/2022

Please state the condition number(s) to which this application relates

Condition number(s)

Outline conditions 6 and 8

Has the development already started?

☐ Yes

☒ No

Part Discharge of Conditions

Are you seeking to discharge only part of a condition?

☐ Yes

☒ No

Discharge of Conditions

Please provide a full description and/or list of the materials/details that are being submitted for approval

RDQUE-PJA-XX-D2-Y-0210-00 Drainage Layout (Sheet 1 of 3) Rev T2
RDQUE-PJA-XX-D2-Y-0211-00 Drainage Layout (Sheet 2 of 3) Rev T2
RDQUE-PJA-XX-D2-Y-0212-00 Drainage Layout (Sheet 3 of 3) Rev T2
RDQUE-PJA-XX-D2-Y-0406-00 Flow Control Chamber Detail Rev A1
RDQUE-PJA-XX-D2-Y-0407-00 Flow Control Chamber Detail Rev A1
RDQUE-PJA-XX-D2-Y-0410-00 Headwall Details (Sheet 1 of 2) Rev A4
RDQUE-PJA-XX-D2-Y-0411-00 Headwall Details (Sheet 2 of 2) Rev A4
RDQUE-PJA-XX-D2-Y-0412-00 Manhole Schedule Rev A1
RDQUE-PJA-XX-D2-Y-0413-00 Pipe Schedule Rev A1
RDQUE-PJA-XX-D2-Y-0416-00 Detention Basin Cross Sections (Sheet 1 of 2) Rev T3 (1)
RDQUE-PJA-XX-D2-Y-0417-00 Detention Basin Cross Sections (Sheet 2 of 2) Rev T3
06396 Technical Note Drainage Strategy (Full)-part-3
2022.09.01 SW Network 2 Calcs
2022.09.01 SW Network 3 Calcs
2022.09.30 SW Network 1 Calcs
2022.09.30 SW Network 4 Calcs
06396 Technical Note Drainage Strategy (Full)-part-1
06396 Technical Note Drainage Strategy (Full)-part-2
06396 Technical Note Drainage Strategy (Full)-part-3

Site Visit

Can the site be seen from a public road, public footpath, bridleway or other public land?

- ☒ Yes
☐ No

If the planning authority needs to make an appointment to carry out a site visit, whom should they contact?

- ☐ The agent
☒ The applicant
☐ Other person

Pre-application Advice

Has assistance or prior advice been sought from the local authority about this application?

- ☐ Yes
☒ No

Declaration

I / We hereby apply for Approval of details reserved by a condition (discharge) as described in this form and accompanying plans/drawings and additional information. I / We confirm that, to the best of my/our knowledge, any facts stated are true and accurate and any opinions given are the genuine options of the persons giving them. I / We also accept that: Once submitted, this information will be transmitted to the Local Planning Authority and, once validated by them, be made available as part of a public register and on the authority's website; our system will automatically generate and send you emails in regard to the submission of this application.

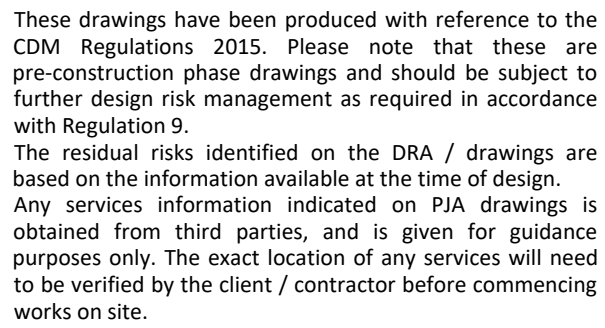
☒ I / We agree to the outlined declaration

Signed

Chloe Griffin

Date

27/01/2023



Location	Cover to concrete	Bidding Cement/Grace Pavement	Bidding Pavement Pipe	Backfill
Driveway (HDV)	>1.2m	Class 5	Class 5 (5'x10')	Type 1 Granular
Driveway (car/parking)	>0.6m	Class 5 (Concrete)	Class 5 (5'x10')	Type 1 Granular
Hard soil and Landscaping	>0.6m	Class 5	Class 5 (5'x10')	Suitable as dug material

Pipes Penetrating Walls.

Penetrating to be drilled and through walls to give pipes at least 150mm clearance to be made on top. Brickwork over pipe shall be supported by a wall. Opening to be masked each side with rigid sheet.

Pipes embedded in walls shall have joints formed within 150mm of exterior wall. Adjacent to wall, the concrete shall be 600mm length with flexible joints shall continue to exterior wall.

All pipes beneath buildings to be BS85 in concrete. Where cover is less than 150mm the concrete is to be cast integrally with the floor slab.

All drains in the vicinity of existing or proposed trees to be installed in accordance with the requirements of NIBIC Practice Note 3.

26. Ventilation shall be provided at the head of the four drainage manholes.

The first flexible joint in pipes adjoining a manhole shall be at least 300mm from 600mm diameter manhole and 150mm from the connecting to a rocker pipe. The length of the rocker pipe shall be as follows;

Pipe Size	Length of Rocker Pipe
150-600mm	600mm
675-750mm	1200mm
over 750mm	1500mm

All manholes and inspection chambers situated in areas subject to vehicular loading to have class EN12124 and those subject to vehicular loading may have class B125 covers and frames.

Manholes and frames to be laid paved areas to have 150mm deep cover frames and bedded suitable for the size of blocks in use. The concrete haunching is NOT to be broken out to allow for block replacement.

Drainage frames must be laid to manhole risers by use of plastic covers (see Fig. 10) (Pipes to be marked with yellow FRASO black ties). The ground works contractor will be held fully responsible for any accidents due to incorrect fitting or failure to install the manufacturer's instructions.

27. Cover levels for manholes are approximate only and should be adjusted to match surrounding levels.

28. All pipe and manholes/frames shall be offered for adoption or an existing public sewerage should be in accordance with "Sewers for Adoption, current Edition" and the Adopting Water Authority's recommendations.

29. Requirement for Land Drains to be assessed on spot by the Site Engineer.

30. Road gullies shall be trapped 4500 x 900mm deep with Class D 400 frame and grate BS EN 124.

31. All drains to be laid to the type to be backfilled with imported granular fill to Class G1/G35 (Capping material) to (SHW) Table 6/3 & incorporated in accordance with Table 6/4.

32. All drains to be tested bed and accepted by the Engineer and after backfilling, with either air test or water test, in accordance with BS EN 1610.


ANY WORKS UNDERTAKEN PRIOR TO RECEIPT OF TECHNICAL APPROVAL FOR THEIR RESPECTIVE PROPOSALS IS DONE AT THE CONTRACTOR'S OWN RISK.

T2	15/11/22	Revised to suit agreed planning strategy. Revised for Tender submission.			SJW
PI	15/07/22	Updated for drainage technical note.			SJW

Seven House - High Street
Longbridge - Birmingham
B31 2UQ [REDACTED]

Bristol
Exeter - London - Reading
pija.co.uk

CLIENT



PROJECT

DRAWING TITLE

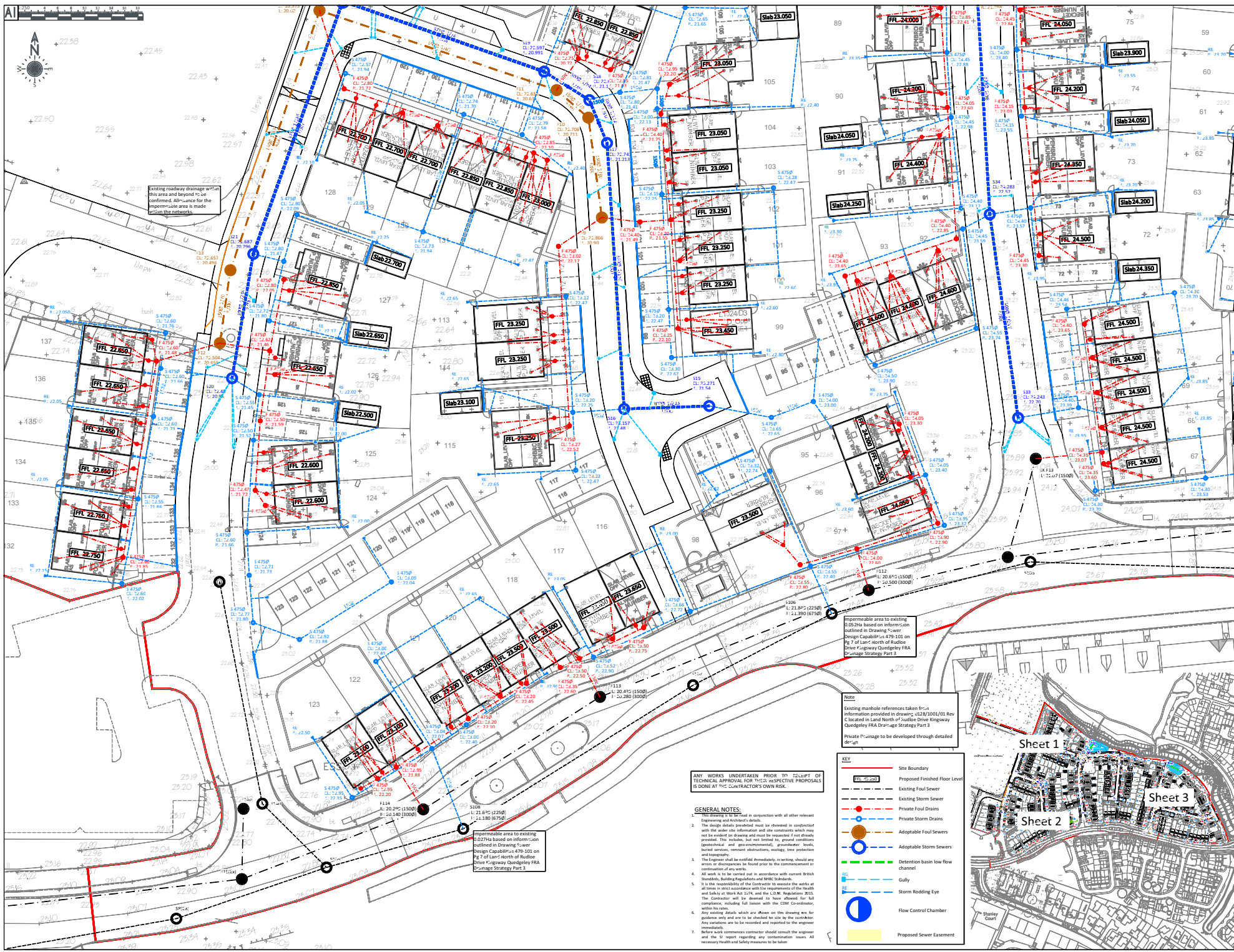
DRAWING ISSUE STATUS

TENDER

P/JA Job No. SUB-CODE DRAWING NO. REVISION

BIM DRAWING REFERENCE

SCALE	DRAWN	REVISED	DATE
-------	-------	---------	------



NOTES
These drawings have been produced with reference to the CDMA Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design and construction as required in accordance with Regulation 5.
The residual risks identified on the DRA / drawings are based on the information available at the time of design.
Any services information indicated on PJA drawings is obtained from third parties, and is given for guidance purposes only. The exact location of any services will need to be verified by the client / contractor before commencing works on site.

- DRAINAGE NOTES:**
- Drainage works to start at the foul connection level and be reported immediately as they may alter the design.
 - The Contractor shall maintain the level of the foul line and level with existing foul and surface water pipes before commencing any works.
 - All drainage work is to be strictly in accordance with the requirements of the Building Regulations 2013, Approved Document Part 3, "Drainage and waste disposal".
 - All existing land drains encountered on site during construction are to be re-connected.
 - Temporary protection is to be provided to drainage work during construction as necessary.
 - Prior to commencing work on the drainage, all existing drains, sewers, manholes and outfalls to remain shall be located, identified and a CCTV audit/visual survey carried out. Where necessary, protection to the existing drainage infrastructure shall be provided.
 - All existing sewers and manholes abandoned due to the proposed works are to be either removed, and suitably backfilled or grouted up.
 - All pipes to be 300 or 150mm dia. and laid at a 1 in 100 unless stated otherwise.
 - All concrete to be in accordance with BS EN 206-1, BS 8000 and the recommendations of BRE Specialized Group (Concrete in Aggressive Conditions).
 - Unless stated otherwise, the concrete shall be designated as Class 35/45 C35 or as required and subject to the approval of the Engineer.
 - The following types of pipe may be used unless noted or agreed otherwise:
 - Pipes to be 300mm diameter to be Structural Walling to BS EN 12450 or 12451 or 12452, PVC-U to BS EN 14601 or Unfilled Clay to BS EN 12450.
 - Structural Walling to BS EN 12451, Polypropylene to BS EN 12450 or PVC-U to BS EN 14601.
 - Both Clay and Concrete pipes shall be strength class 120 (BS EN 12450) or strength class 120/135 (BS EN 12451). The minimum length of a pipe shall be 2000mm. Pipes shall have a minimum joint offset of 200mm.
 - All pipes shall be installed in a trench, and shall be installed in accordance with Part 6, Clause 2.3 to 2.5, Diagram 7 and 8.
 - All drains in the vicinity of existing or proposed trees to be installed in accordance with the requirements of BS EN 12450:2015.
 - The first flexible joint in pipes adjoining a manhole shall be a maximum length of 600mm from the inside face of the manhole, connecting to a rigid pipe. The length of the rigid pipe shall be as follows:
 - For 150mm: 1000mm
 - For 225mm: 1500mm
 - For 300mm: 2000mm
 - All manholes and inspection chambers shall be installed in areas subject to vehicular loading to have class D400 covers and frames to BS EN 12450 and shall be subject to vehicular loading may have class B125 covers and frames.
 - Manholes located under slab paved areas to have 1500mm deep cover frames and installed suitable for the size of the Slabs in use. The concrete base shall be 100mm below the slab surface for each paving installation.
 - Drainage frames must be set to manhole risers by use of manufacturers tie line. Purpose of H80000 ring and H80000 block line. The ground water contractor will be held fully responsible for any accidents due to incorrect fitting or failure to use the correct manhole frame equipment.
 - Cover levels for manholes are approximate only and should be subject to individual circumstances.
 - All works to manholes must be offered for inspection and approval by the Engineer.
 - Requirement for Land Drains to be assessed on site by the Site Manager.
 - Road gullies shall be spaced 400m or 300m deep with Class D400 frames and gullies to BS EN 12450.
 - All manholes, joint trenches etc. to be installed with integral gullies to Class B125 (BS EN 12450) or as required by the Engineer.
 - All gullies shall be installed before and after backfilling, using either an test or water test, in accordance with BS EN 12450.

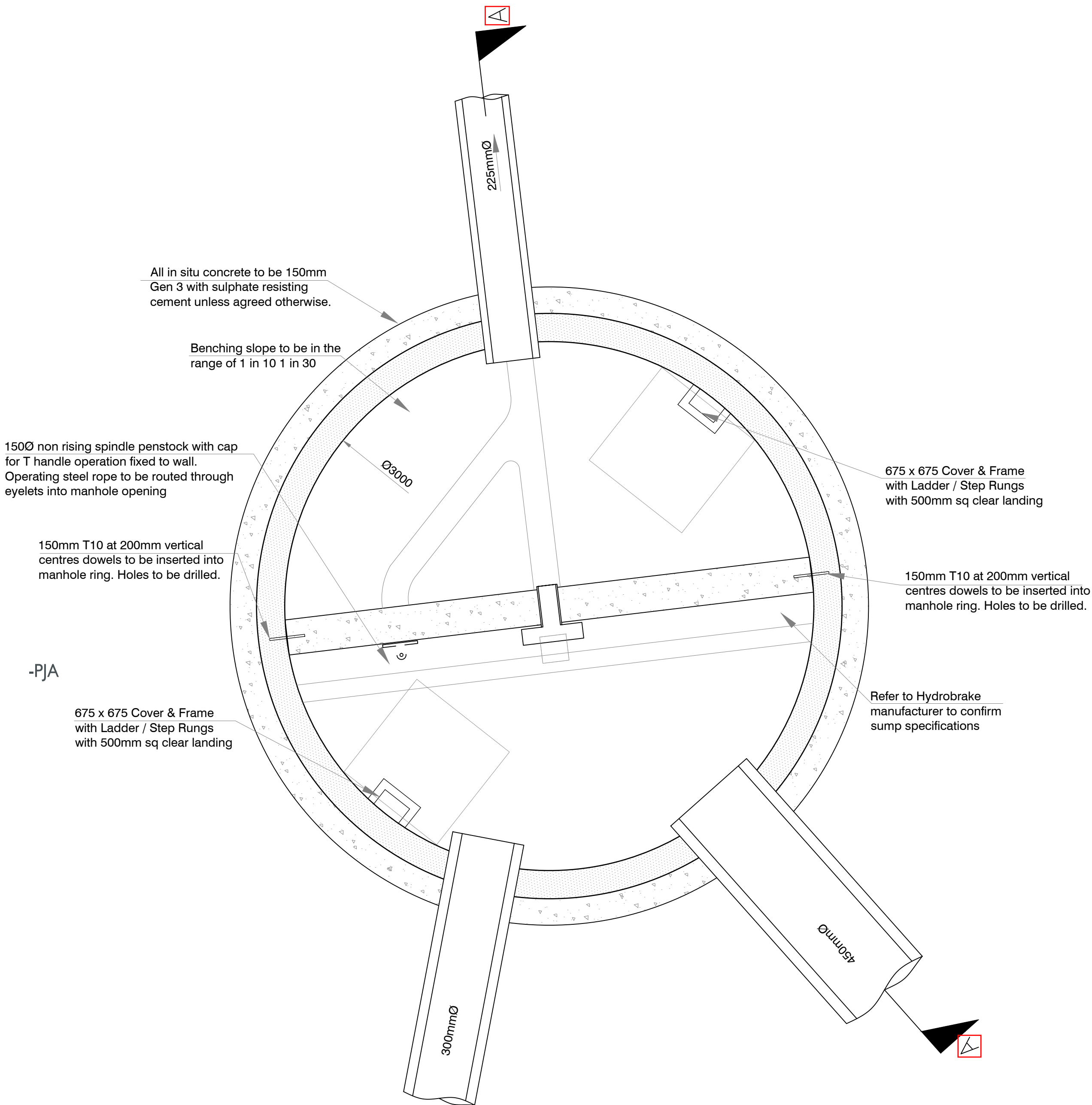
PJA
Linden Homes
Rudloe Drive Quequeley

TENDER
06396 - - 0211 - T2
RDQUE-PJA-XX-02-Y021-00

06/07/22
01/07/2022

FLOW CONTROL CHAMBER

PLAN



Flow Control Device Details
Device = MD-SHE-0194-2000-1330-2000
Design Head = 1330mm
Max Discharge = 20 l/s

Refer to manufactures specification for further details

- ## GENERAL NOTES:
- This drawing is to be read in conjunction with all other relevant Engineering and Architect's details.
 - Any detail, drawing, presentation, etc. to be reviewed in conjunction with the wider site information and site constraints which may not be evident on drawing and must be requested if not already provided. This includes, but is not limited to, geotechnical and geo-environmental, groundwater levels, buried services, remnant obstructions, ecology, tree protection and topography.
 - The Engineer shall be notified immediately, in writing, should any errors or discrepancies be found prior to the commencement or continuation of any work.
 - All work to be carried out in accordance with current British Standards, Building Regulations and NHBC Standards.
 - It is the responsibility of the Contractor to execute the works at all times in accordance with the requirements of the Health and Safety at Work Act 1974, and the C.D.M. Regulations 2015. The Contractor will be deemed to have allowed for full compliance including full liaison with the CDM Co-ordinating, within his risks.
 - Any existing details which are shown on this drawing are for guidance only and are to be taken in conjunction with the Engineer's instructions.
 - Any variations are to be recorded and reported to the engineer immediately.
 - Before work commences Contractor should consult the engineer and the Engineer will report regarding any contamination issues. All necessary Health and Safety measures to be taken

ADOPTABLE DRAINAGE NOTES:

- This drawing is subject to approval by Local Authority, Building Regulations and Highways Department. The Engineer shall be responsible for the granting of these approvals is carried out at risk to the sewer.
- 7 Prior to commencing work on the drainage, all existing drains, sewers, manholes and outfalls to remain shall be located, identified and CCTV surveyed. All existing drains, sewers and outfalls need to be inspected to the existing drainage infrastructure shall be necessary.
- 8 All existing sewers and manholes abandoned due to the proposed works are to be either removed, and suitably backfilled or grouted.
- 9 All manhole covers to comply with BS EN124, and be kitemarked
- 10 All cover plates for manholes are approximate type and should be replaced with the following:
- 11 In covered paved areas "infill" type covers should not be used, and Frames must be 600mm square
- 12 All manhole and drainage covers shall comply with BS EN124, BS EN13598-1 and HA104/09.
- 13 Class E600 in areas of heavy loading.
- 14 Where there is no trafficable surface water ingress, hard shoulder, parking area and services yards).
- 15 Manhole covers on foot only sewers shall be of low leakage types such as, to prevent excessive surface water ingress,
- 16 Drainage pipes 1000mm Ø unless stated otherwise.
- 17 Pipes
- 18 Vitrified clay to BS EN295 or Concrete to BS 5911 or UPVC pipes to BS EN 1452 or Thermoplastic Structured wall pipes complying with BS EN 1228 to be installed in accordance with the relevant joint stiffness.
- 19 All pipes to be minimum diameter or larger than, to be concrete pipes, BS EN 5911, unless noted otherwise.
- 20 All pipes to be laid with soffits level, unless noted otherwise.
- 21 Where a trench is deeper than 1000mm under ground, driveway - concrete bed and surround or concrete protection slab is required.
- 22 All concrete to drainage, manholes bases, surrounds etc to be in accordance with the BRE special design 1, concrete in aggressive ground to be in accordance with BRE special design 2.
- 23 Aggregates
- 24 Imported granular fill to Class GtS-95 (Capping material) to BSI Part 1.
- 25 All pipelines shall be tested both before and after backfilling, using either air test or water test, in accordance with BS EN 1610.
- 26 All pipelines shall be tested to 1.5 times working pressure, shall be flushed out and CCTV surveyed prior to being free of all silt and debris and approved by the Engineer.
- 27 Written reports and video logs to be forwarded to the Engineers for approval.
- 28 Flow control Chamber Detail
- 29 Where flow control chambers are provided by the CCTV report agreed with the Engineers.
- 30 Where flow control lateral drains need to be constructed in accordance with the Water UK/WK "Design and Construction Guidance"
- 31 Access to sewers/manholes: being offered for adoption or on existing public highways should be adopted with "Design and Construction Guidance" and the Adopting Water Authority's recommendations

Flow Control Chamber Data

06396	0406	A1
Other types of flow control device have different pump configurations, always consult manufacturer.		
The warning sign is to be 40mm high red lettering on a white background. The plastic base dimensions are to be approx. 300mm x 300mm x 6mm.		
The base is to be resistant to attack by sewage environment.		
The warning sign is to be mounted on a removable safety grid available from cover manufacturer.		
The sign in the manhole is to read 'Caution - Flow Control Device Located here'.		
A sign must be fitted in the upstream MH to read 'Caution - Flow Control Device Down Stream'.		
A sign must be fitted in the downstream MH which reads 'Caution - Flow Control Device Up Stream'.		

ANY WORKS UNDERTAKEN PRIOR TO RECEIPT OF TECHNICAL APPROVAL FOR THEIR RESPECTIVE PROPOSALS IS DONE AT THE CONTRACTOR'S OWN RISK.

AI	15.11.22	Revised for Approval revision status.	SWJ

Seven House - High Street
Longbridge - Birmingham
B31 2UQ - [REDACTED]
- Bristol
Exeter - London - Reading
pja.co.uk

CLIENT

PROJECT

DRAWING TITLE

DRAWING ISSUE STATUS

APPROVAL

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
-------------	----------	-------------	----------

BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
-------	-------	----------	------

Other types of flow control device have different sump configurations, always consult manufacturer.

The warning signs are to be 40mm high red lettering on a white plastic base. The plastic base dimensions are to be approx. 300mm x 300mm x 6mm.

The base is to be resistant to attack by sewage environment.

The warning sign is to be mounted on a removable safety grid available from cover manufacturer.

The sign in the manhole is to read 'Caution - Flow Control Device Located here'.

A sign must be fitted in the upstream MH to read 'Caution - Flow Control Device Down Stream'.

A sign must be fitted in the downstream MH which reads 'Caution - Flow Control Device Up Stream'.

ANY WORKS UNDERTAKEN PRIOR TO RECEIPT OF TECHNICAL APPROVAL FOR THEIR RESPECTIVE PROPOSALS IS DONE AT THE CONTRACTOR'S OWN RISK.

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9.

The residual risks identified on the DRA / drawings are based on the information available at the time of design.

Any services information indicated on PJA drawings is obtained from third parties, and is given for guidance purposes only. The exact location of any services will need to be verified by the client / contractor before commencing works on site.

- GENERAL NOTES:**
- This drawing is to be read in conjunction with all other relevant Engineering and Architect details.
 - The design details presented must be reviewed in conjunction with the wider site information and site constraints which may not be evident on drawing and must be requested if not already provided. This includes, but not limited to, ground conditions (geotechnical and geo-environmental), groundwater levels, buried services, remnant obstructions, ecology, tree protection and topography.
 - The Engineer shall be notified immediately, in writing, should any errors or discrepancies be found prior to the commencement or continuation of any works.
 - All work is to be carried out in accordance with current British Standards, Building Regulations and NIRC Standards.
 - It is the responsibility of the Contractor to execute the works at all times in strict accordance with the requirements of the Health and Safety at Work Act 1974, and the C.D.M. Regulations 2015. The Contractor will be deemed to have allowed for full compliance, including full liaison with the CDM Co-ordinator, within his rates.
 - Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
 - Before work commences contractor should consult the engineer and the SI report regarding any contamination issues. All necessary Health and Safety measures to be taken

- ADOPTABLE DRAINAGE NOTES:**
- This drawing is subject to approval by Local Authority, Building Control and / or Sewerage Undertaker. Any works undertaken prior to the granting of these approvals is carried out at at risk to others.
 - Prior to commencing work on the drainage, all existing drains, sewers manholes and outfalls to remain shall be located, identified and a CCTV condition survey carried out. Where necessary, protection to the existing drainage infrastructure shall be provided.
 - All existing sewers and manholes abandoned due to the proposed works are to be either removed, and suitably backfilled or grouted up.
 - All manhole covers to comply with BS EN 124, and be Kitemarked.
 - Cover levels for manholes are approximate only and should be adjusted to match surrounding levels.
 - In block paved areas 'tuffit' type covers should not be used, and frames must be 150mm deep.
 - All manhole and drainage covers shall comply with BS EN124, BS EN13598-1 and HA104/09.
 - Cover strengths to be:-
Class F600 in areas of heavy loading.
Class D400 in all trafficked areas (roads, hard shoulder, parking areas and services yards).
Manhole covers on foul only sewers shall be of low leakage types in order to prevent excessive surface water ingress.
Pipes to be:-
Vitrified clay to BS EN 295 or Concrete to BS 5911 or UPVC pipes to BS EN 1452 or Thermoplastic Structured wall pipes complying with WIS 4-35-01. BS Kitemarked. Class 8kN/m² nominal short term ring stiffness.
 - All sewer pipes 300mm diameter or larger, to be concrete pipes, to BS 5911, unless noted otherwise.
 - All pipes to be laid with soffits level, unless noted otherwise.
 - Where cover to pipes is less than 1200mm under carriageway - concrete bed and surround or concrete protection slab is required.
 - All concrete to drainage, manholes bases, surrounds etc to be in accordance with the BRE special digest 1 - Concrete in aggressive ground. Refer to site investigation report for sulphate requirements.
 - Underfoot Drives: Underfoot Drives shall be imported material or C15 concrete to BS 4487 Table 6/1 & compacted in accordance with Table 6/4.
 - All pipelines shall be tested both before and after backfilling, using either air test or water test, in accordance with BS EN 1610.
 - Upon completion of the drainage works all drains shall be flushed out and CCTV surveyed to be free of all silt and debris and to have no joints, cracks or other defects. A copy of the written report and video is to be forwarded to the Engineer for rectification unless indicated otherwise by the CCTV report and agreed with the Engineer.
 - Demarcation manholes and lateral drains need to be constructed in accordance with the Water UK/Wr: "Design and Construction Guidance".
 - All works to sewers/ manholes being offered for adoption or on existing public sewers should be in accordance with "Design and Construction Guidance" and the Adopting Water Authority's recommendations.

06396 0407 AI

RDQUE

AI@

AI	15.11.22	Revised for Approval revision status.			SWJ

Seven House - High Street
Longbridge - Birmingham
B31 2UQ

- Bristol
Exeter - London - Reading
pja.co.uk

CLIENT

PROJECT

DRAWING TITLE

DRAWING ISSUE STATUS

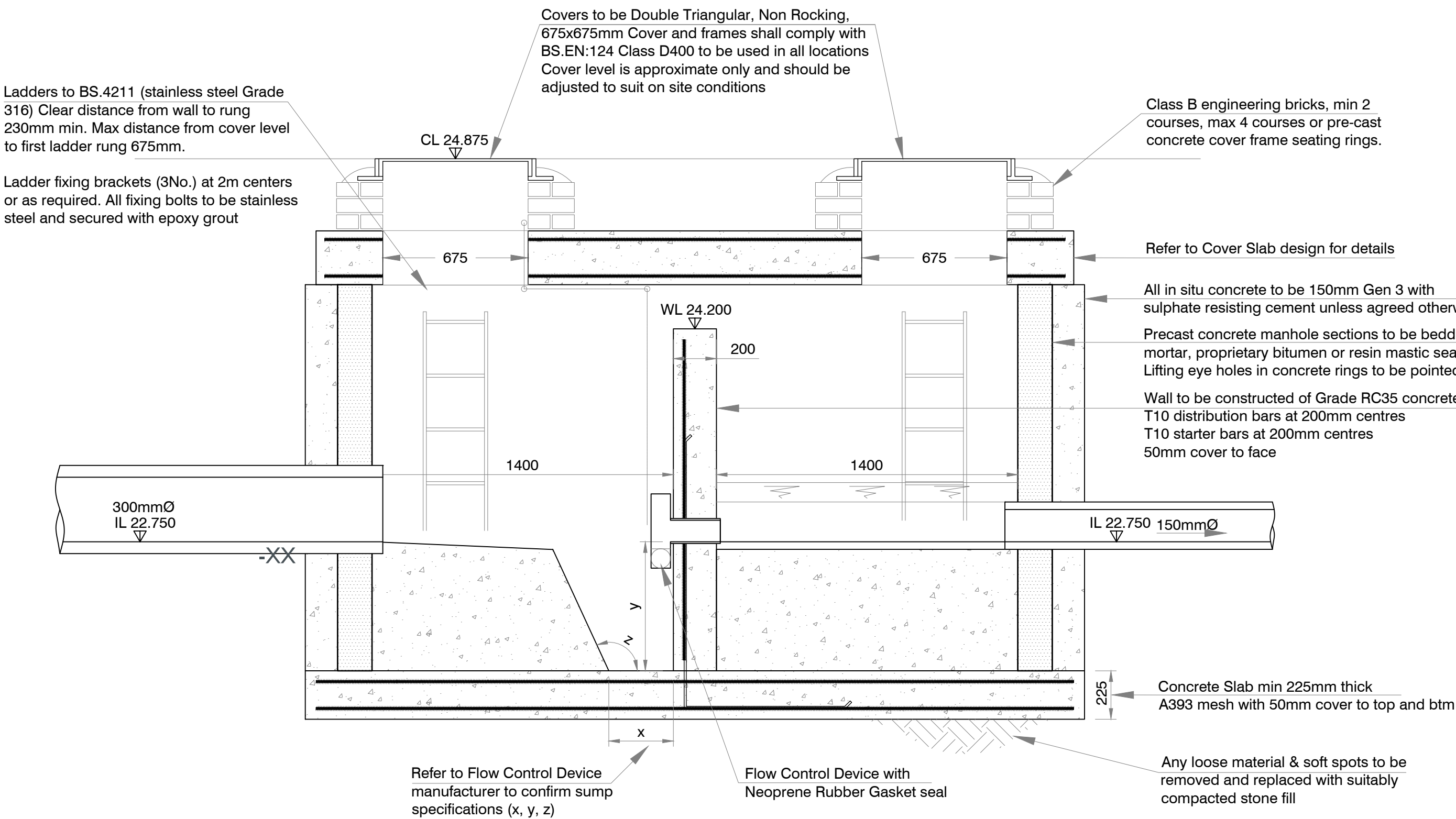
APPROVAL

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
-------------	----------	-------------	----------

BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
-------	-------	----------	------

FLOW CONTROL CHAMBER SECTION A-A

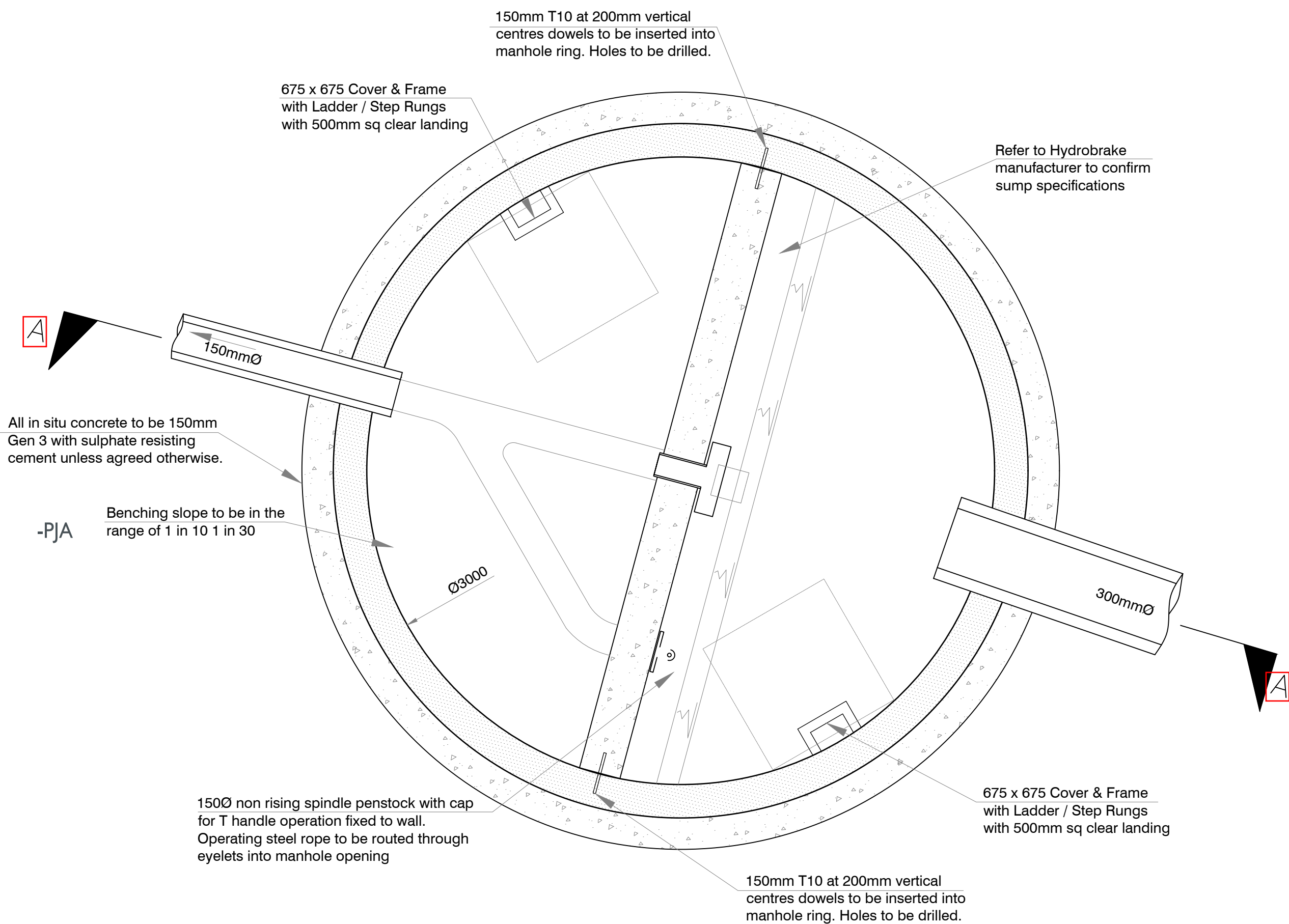


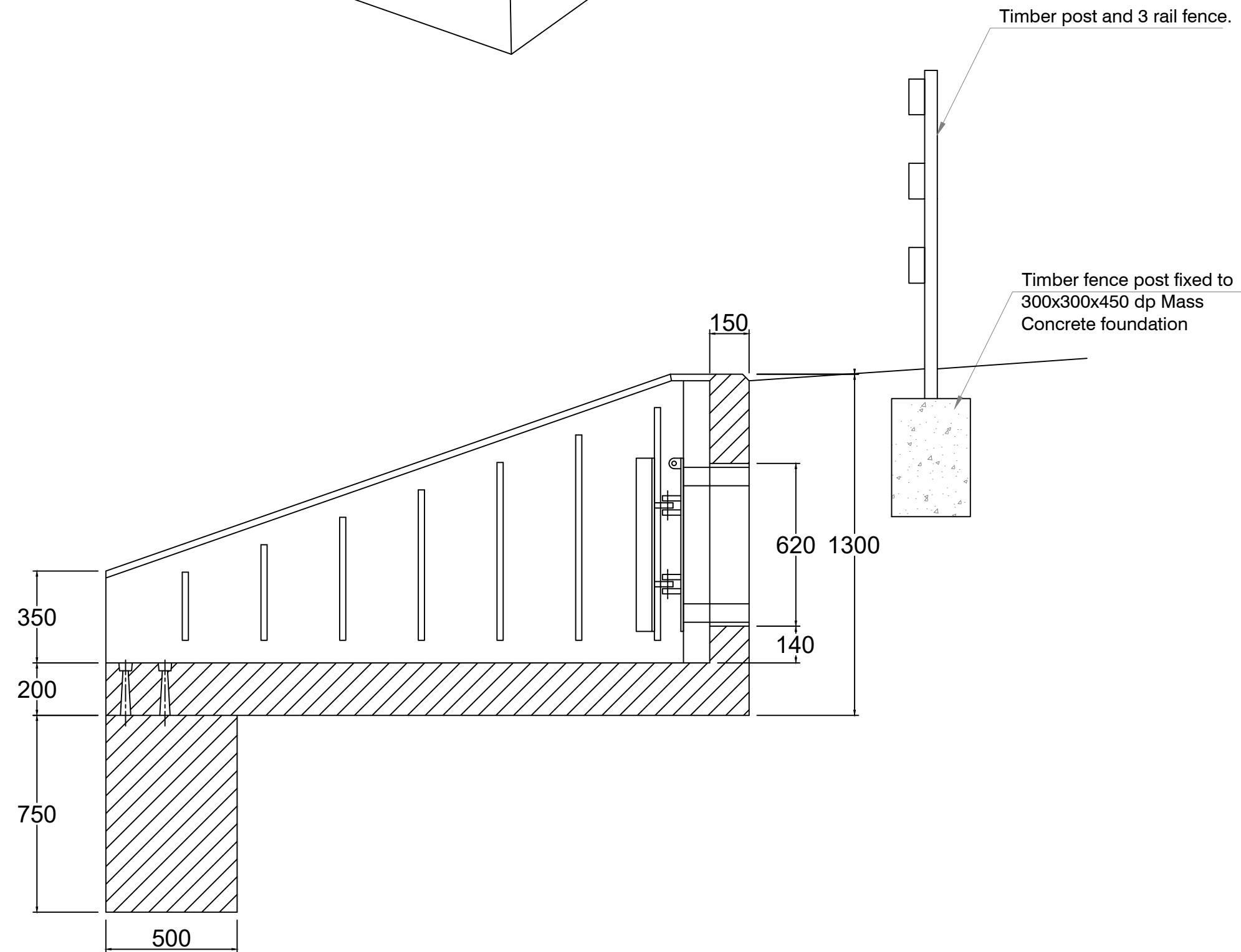
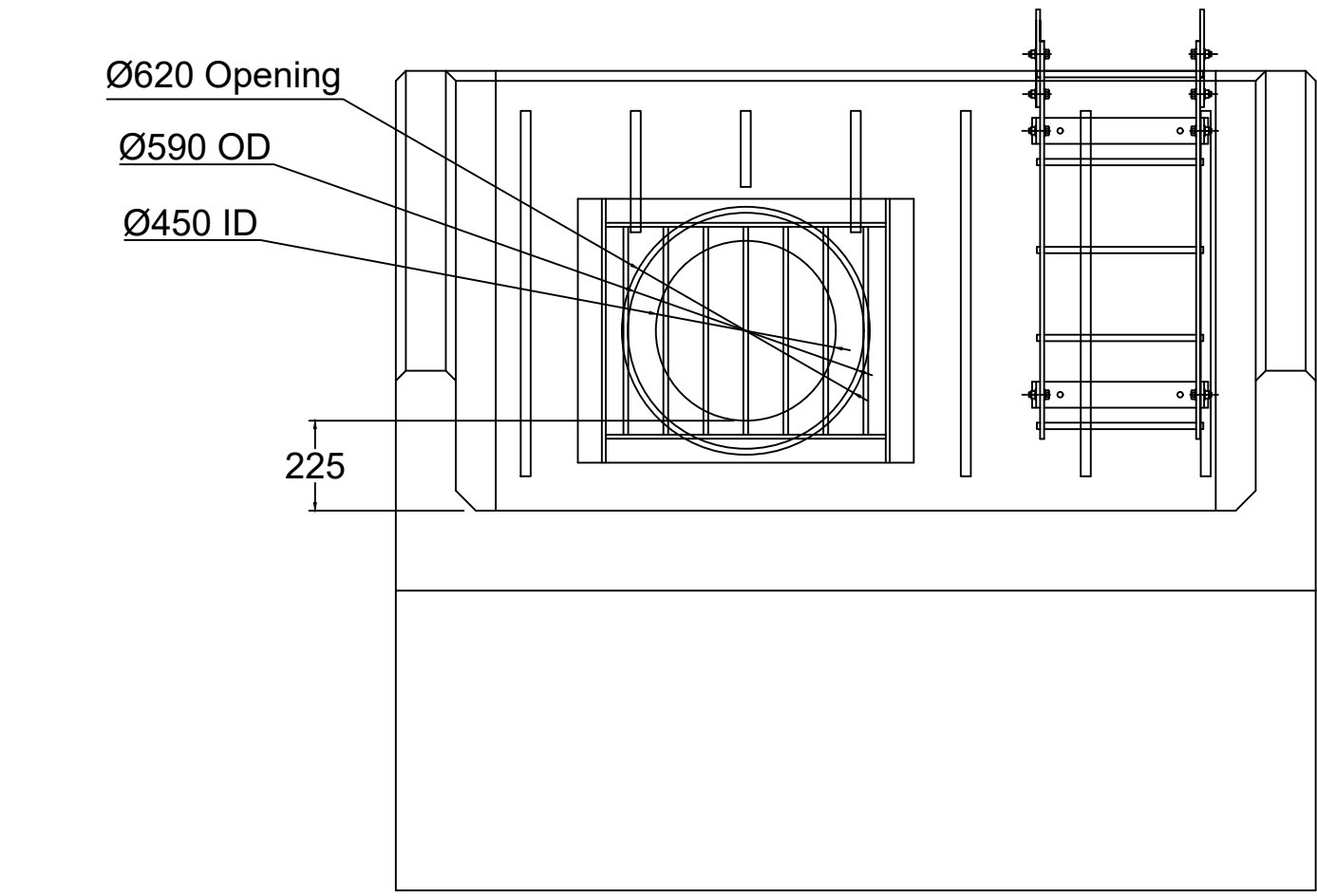
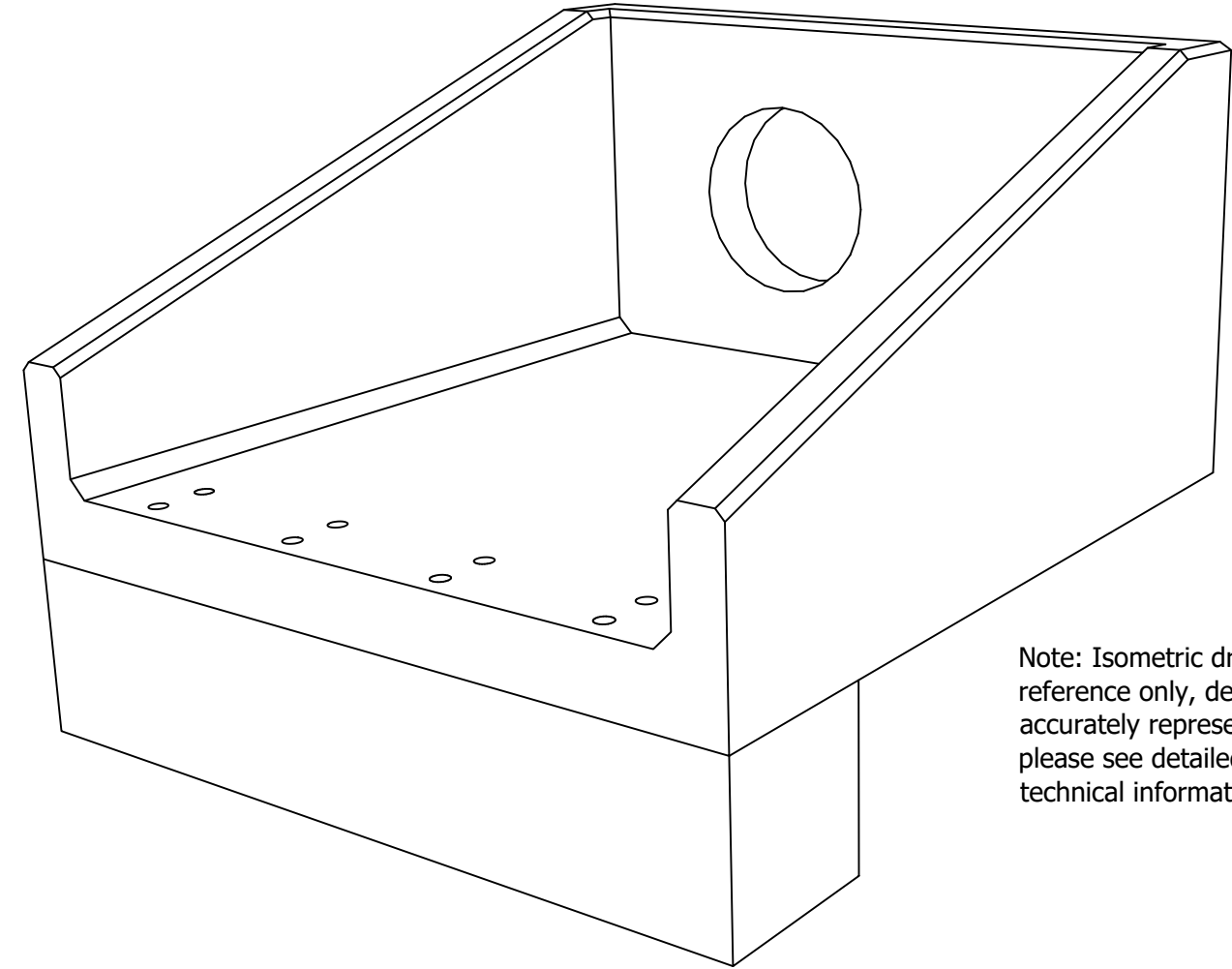
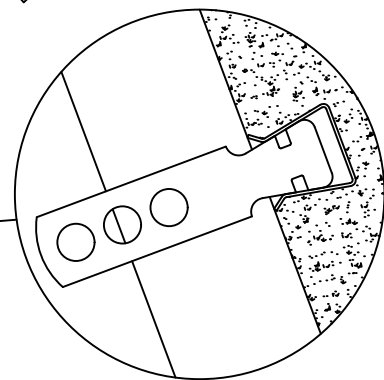
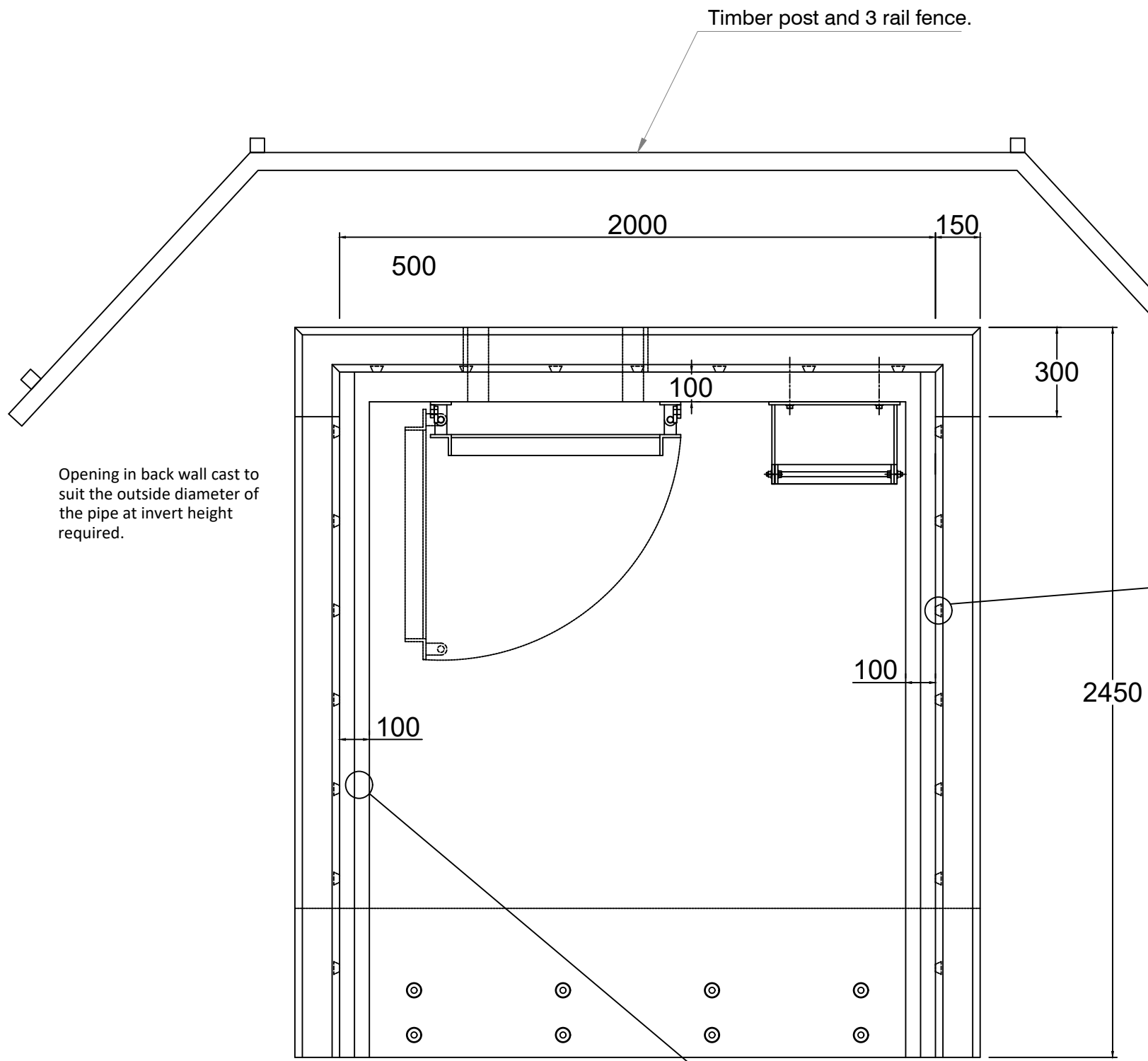
The use of any other flow control will invalidate any design based on this data, which may lead to adverse hydraulic effect, including loss of upstream storage efficiency and increased potential for flooding.

Flow Control Device Details
Device = MD-SHE-0088-4000-1450-4000
Design Head = 1450mm
Max Discharge = 4 l/s

Refer to manufactures specification for further details

FLOW CONTROL CHAMBER PLAN





Sewers for Adoption / Sewers for Scotland Outfall Safety Grille - SFA1 450

- In accordance with Figure C.6 Typical Outfall Safety Grille - for outfalls of 350mm diameter or greater - Sewers for Adoption 7th Edition
- Material Grade is to be: BS EN 10025 S275
- All mild steel to be hot dipped galvanised after fabrication
- Galvanising to BS EN: 1461
- Welding to BS EN 1011-2:2001
- Hinged on one side with padlock facility
- Weight Approx: 55kg

NOTES:

- All dimensions in mm
- All measurements ± 1mm

- Opening in back wall cast to suit outside diameter of the pipework
- Invert level of pipe can be set to your specification

Headwall Installation
Units should be bedded on minimum 200mm thick well compacted Class 6A* selected well graded granular material.
*Manual of contract documents for Highway Works, Volume (MCHW1) specification for Highway Works, Series 600 (Nov.09).
Set the headwall level or with a slight fall 1:50 from pipe to spill mouth.

Handling

- Weight of concrete is based on 2.4 tonne/m³+5% is recommended for sizing lifting equipment.
- All lifting points shall be used as specified below
- Unit to be lifted as per lifting diagram

Concrete

- Mix ref: Self compacting DCA/D54 Mix
- Lifting strength based on 2 cubes = 30N/mm²
- Characteristic 28 day cube strength = 50N/mm²
- Concrete provides Design Classification Class 4 (SD4) to special Digest 1, Table F2.

Reinforcement

- Reinforcement to BS EN 13369
- Scheduling, dimensioning, bending & cutting to BS8666
- Cage to be machine tied with steel wire

Manufacture

- Manufacture to BS EN 15268:2008 precast concrete products - Retaining wall elements, Factory Production Control certificate number: 0086-CPR-650448 & BS EN 13369
- Tolerances to BS EN 13369 clause 4.3.1.1
- Finishing:

- Marking: Units shall be indelibly marked to show:
 - Mould reference code
 - De-mould date
 - Job reference number & unique product number
 - Unit weight (kg)

Design

- Concrete design to EC2
- Althon have designed the concrete units only, the site conditions should be assessed for suitability by the scheme designer
- Units are designed to withstand a vertical live load surcharge of 10kN/m²
- Weight of soil = 18kN/m³
- Angle of internal friction = 30 Deg.
- Design Life: >100 years

Unit Cover	Size (mm)	Unit Cover	Size (mm)
Ø620	Ø620	Ø620	Ø620
Ø620	Ø620	Ø620	Ø620
Ø620	Ø620	Ø620	Ø620

Fabrication Specification

- Manufacture IAW EN 1090-2 EXC CLASS 1
- Material grade is to be: BS EN 10025 S275
- Welding carried out IAW EN 1090-2 PARA 7.5.4 - 7.5.18
- All fillet and butt welds to have a minimum throat thickness of 6mm & joints to be fully welded where possible.
- Ensure vertical flats are fully welded both sides where possible.
- All sharp edges and burrs are to be removed.
- Remove all weld splatter.
- Holes by punching are permitted with reaming.
- Galvanising is carried out after fabrication to BS EN-ISO 1461

Handrail / Ladder Specification

- Kee Klamp® Galvanised Size 8 Fittings
- Size 8 48.3mm OD 3.2mm Wall Thickness Galvanised Medium Duty Tube to BS EN 10255
- 360N/m Design Load at stated in BS 8118, BS 6180, BS 6399 & BS 7518. Civil Engineering Specification for the Water Industry (CESWI) 7th Edition Clause 2.60 Handrails & Balusters & The Engineering Equipment and Materials Users' Association (EEMUA) Publication 105 7th Edition Factory Stairways, Ladders and Handrails
- Other design loads available on request
- GRP/FRP Handrails also available

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9.

The residual risks identified on the DRA / drawings are based on the information available at the time of design.

Any services information indicated on PIA drawings is obtained from third parties, and is given for guidance purposes only. The exact location of any services will need to be verified by the client / contractor before commencing works on site.

GENERAL NOTES:

- This drawing is to be read in conjunction with all other relevant Engineering and Architect's details.
- The design details presented must be reviewed in conjunction with the wider site information and site constraints which may not be evident on drawing and must be requested if not already provided. This includes, but not limited to, ground conditions (geotechnical and geo-environmental), groundwater levels, buried services, remnant obstructions, ecology, tree protection and topography.
- The Engineer shall be notified immediately, in writing, should any errors or discrepancies be found prior to the commencement or continuation of any works.
- All work is to be carried out in accordance with current British Standards, Building Regulations and NHBC Standards.
- It is the responsibility of the Contractor to execute the works at all times in strict accordance with the requirements of the Health and Safety at Work Act 1974, and the C.D.M. Regulations 2015. The Contractor will be deemed to have allowed for full compliance, including full liaison with the CDM Co-ordinator, within his rates.
- Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
- Before work commences contractor should consult the engineer and the SI report regarding any contamination issues. All necessary Health and Safety measures to be taken

ADOPTABLE DRAINAGE NOTES:

- This drawing is subject to approval by Local Authority, Building Control and / or Sewerage Undertaker. Any works undertaken prior to the granting of these approvals is carried out at risk to others.
- Prior to commencing work on the drainage, all existing drains, sewers manholes and outfalls to remain shall be located, identified and a CCTV condition survey carried out. Where necessary, protection to the existing drainage infrastructure shall be provided.
- All existing sewers and manholes abandoned due to the proposed works are to be either removed, and suitably backfilled or grouted up.
- All manhole covers to comply with BS EN 124, and be kitemarked.
- Cover levels for manholes are approximate only and should be adjusted to match surrounding levels.
- All manhole and drainage covers shall comply with BS EN124, BS EN13598-1 and HA104/09.
 - Cover strengths to be:
 - Class 5000 in areas of heavy loading.
 - Class D400 in all trafficked areas (roads, hard shoulder, parking areas and services yards).
 - Manhole covers on foul only sewers shall be of low leakage types in order to prevent excessive surface water ingress.
- Drainage pipes 100mm Ø unless stated otherwise.
 - Pipes to be:-
 - Vitrified clay to BS EN 395 or Concrete to BS 5911 or UPVC pipes to BS EN 1452 or Thermoplastic Structured wall pipes complying with WIS 4-35-01. BSI kitemarked. Class 8kN/m² nominal short term stiffness.
 - All sewer pipes 300mm diameter or larger, to be concrete pipes, to BS 5911, unless noted otherwise.
 - All pipes to be laid with soffits level, unless noted otherwise.
- Where cover to pipes is less than 1200mm under carriageway - concrete bed and surround or concrete protection slab is required.
- All concrete to drainage, manholes bases, surrounds etc to be in accordance with the BRE special digest 1 - Concrete in aggressive ground. Refer to site investigation report for sulphate requirements.
- All manholes, pipe trenches etc. to be backfilled with imported granular fill to Class 8/1 sD5 (Capping material) to (SDW) Table 6/1 & compacted in accordance with Table 6/4.
- All pipelines shall be tested both before and after backfilling, using either air test or water test, in accordance with BS EN 1610.
- Upon completion of the drainage works all drains shall be flushed out and CCTV surveyed and shown to be free of all silt and debris and to have no joint displacements or other defects. A copy of the written report and video is to be forwarded to the Engineers for comment. Any defects shall be attributable to the contractor for rectification unless indicated otherwise by the CCTV report and agreed with the Engineers.
- All works to sewers/ manholes being offered for adoption or on existing public sewers should be in accordance with "Design and Construction Guidance" and the Adopting Water Authority's recommendations

Headwall detail based on Althon headwall "RSFA008 10 2450 Headwall, 750 x 500mm Toe, SFA1 450 Outfall Safety Grille, Dovetail slots".
Dovetail slots provided within pre-cast headwall to finish headwall in stone pitching approximately 100mm max thickness.
Engineer to be notified of any changes to design that may affect headwall specified on this drawing.
Headwall reference on drainage plan, "S38 Basin" and "S41".
ANY WORKS UNDERTAKEN PRIOR TO RECEIPT OF TECHNICAL APPROVAL FOR THEIR RESPECTIVE PROPOSALS IS DONE AT THE CONTRACTOR'S OWN RISK.

A4	15.11.22	Revised to Approval revision status	SWJ
P3	12.10.22	Notes added regarding stone pitching specification and colour	SWJ
P2	10.10.22	Updated to suit comments received from LA Drainage and Landscape officers.	SWJ
PI	03.10.22	Updated to reflect latest design.	SWJ

Seven House - High Street
Longbridge - Birmingham
B31 2UQ

- Bristol
Exeter - London - Reading
pjs.co.uk

CLIENT

Linden
HOMES

PROJECT

Rudloe Drive Quedgeley

DRAWING TITLE

Headwall Detail
450Ø Pipe Diameter

DRAWING ISSUE STATUS

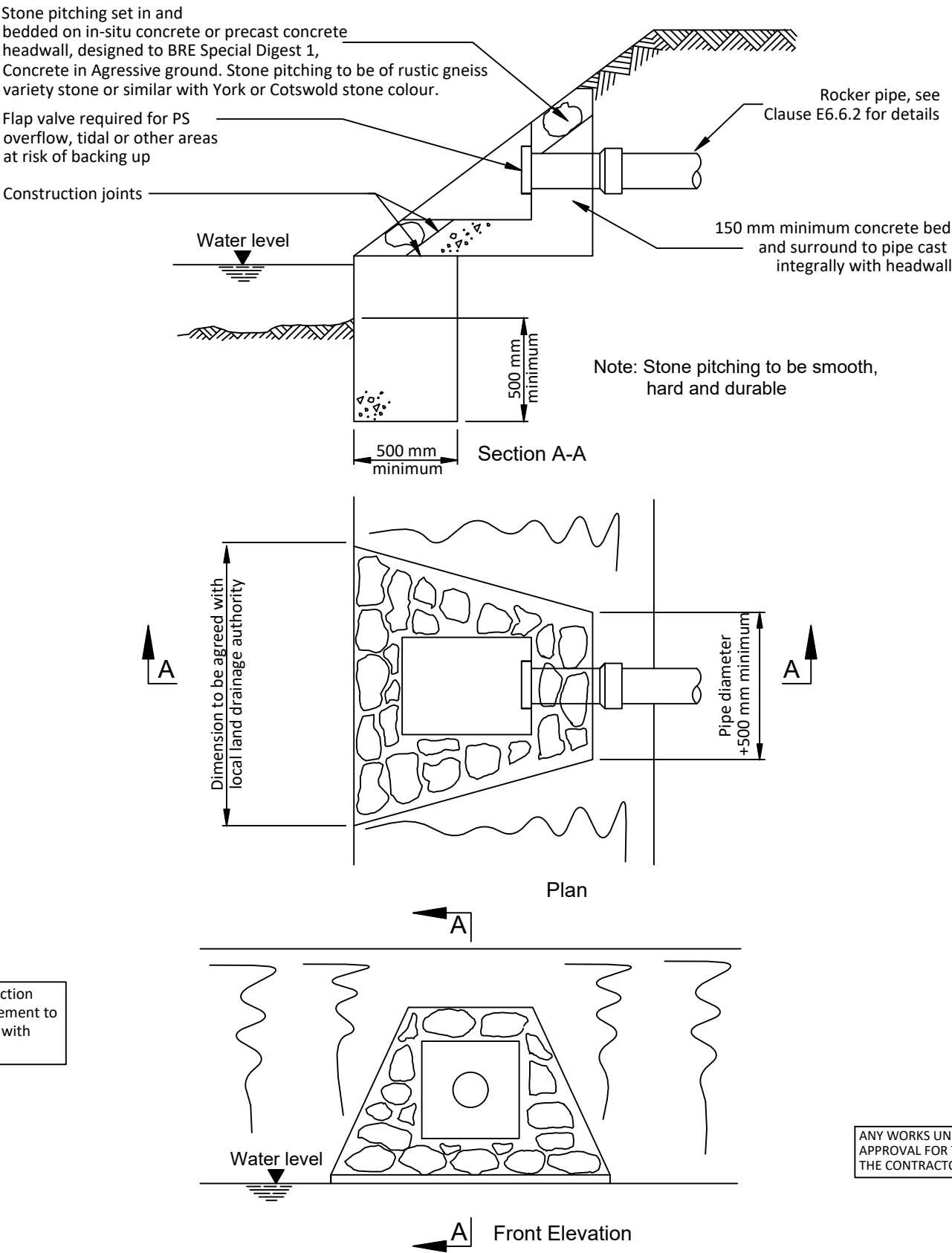
APPROVAL

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06396	0410	A4	

RDQUE

SCALE	DRAWN	REVIEWED	DATE
A1 @			

FIGURE C1
TYPICAL DETAIL OF OUTFALL TO WATERCOURSE
Suitable for outfall pipes of less than 350 mm



Headwall shown from the Design and Construction Guidance specification, Final headwall arrangement to be agreed with adopting authority, to comply with their H&S requirements

ANY WORKS UNDERTAKEN PRIOR TO RECEIPT OF TECHNICAL APPROVAL FOR THEIR RESPECTIVE PROPOSALS IS DONE AT THE CONTRACTOR'S OWN RISK.

Headwall to be finished in stone pitching and have treated timber guard rail around the top of the headwall for safety purposes.

Headwall detail based on Sewerage Sector Guidance Outfall figure C1, for pipes up to 350mm diameter. All details subject to approval with Adopting sewerage undertaker.

Engineer to be notified of any changes to design that may affect headwall specified on this drawing.

Headwall reference on drainage plan, "S2 Basin".

GENERAL NOTES:

1. This drawing is to be read in conjunction with all other relevant Engineering and Architect's details.
2. The design details presented must be reviewed in conjunction with the wider site information and site constraints which may not be evident on drawing and must be requested if not already provided. This includes, but not limited to, ground conditions (geotechnical and geo-environmental), groundwater levels, buried services, remnant obstructions, ecology, tree protection and topography.
3. The Engineer shall be notified immediately, in writing, should any errors or discrepancies be found prior to the commencement or continuation of any works.
4. All work is to be carried out in accordance with current British Standards, Building Regulations and NHBC Standards.
5. It is the responsibility of the Contractor to execute the works at all times in strict accordance with the requirements of the Health and Safety at Work Act 1974, and the C.D.M. Regulations 2015. The Contractor will be deemed to have allowed for full compliance, including full liaison with the CDM Co-ordinator, within his rates.
6. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
7. Before work commences contractor should consult the engineer and the SI report regarding any contamination issues. All necessary Health and Safety measures to be taken

ADOPTABLE DRAINAGE NOTES:

1. This drawing is subject to approval by Local Authority, Building Control and / or Sewerage Undertaker. Any works undertaken prior to the granting of these approvals is carried out at at risk to others.
2. Prior to commencing work on the drainage, all existing drains, sewers manholes and outfalls to remain shall be located, identified and a CCTV condition survey carried out. Where necessary, protection to the existing drainage infrastructure shall be provided.
3. All existing sewers and manholes abandoned due to the proposed works are to be either removed, and suitably backfilled or grouted up.
4. All manhole covers to comply with BS.EN.124, and be Kitemarked
5. Cover levels for manholes are approximate only and should be adjusted to match surrounding levels.
6. All manhole and drainage covers shall comply with BS.EN124, BS.EN13598-1 and HA104/09.
Cover strengths to be:-
Class E600 in areas of heavy loading.
Class D400 in all trafficked areas (roads, hard shoulder, parking areas and services yards).
Manhole covers on foul only sewers shall be of low leakage types in order to prevent excessive surface water ingress.
7. Drainage pipes 100mm Ø unless stated otherwise.
Pipes to be :-
Vitrified clay to BS EN 295 or Concrete to BS 5911 or UPVC pipes to BS EN 1452 or Thermoplastic Structured wall pipes complying with WIS 4-35-01. BSi kitemarked. Class 8kM/m² nominal short term ring stiffness.
8. All sewer pipes 300mm diameter or larger, to be concrete pipes, to BS.5911, unless noted otherwise
9. All pipes to be laid with soffits level, unless noted otherwise.
10. Where cover to pipes is less than 1200mm under carriageway - concrete bed and surround or concrete protection slab is required.
11. All concrete to drainage, manholes bases, surrounds etc to be in accordance with the BRE special digest 1 - Concrete in aggressive ground. Refer to site investigation report for sulphate requirements.
12. All manholes, pipe trenches etc. to be backfilled with imported granular fill to Class 6F1-6F5 (Capping material) to (SHW) Table 6/1 & compacted in accordance with Table 6/4.
13. All pipelines shall be tested both before and after backfilling, using either air test or water test, in accordance with BS EN 1610.
14. Upon completion of the drainage works all drains shall be flushed out and CCTV surveyed and shown to be free of all silt and debris and to have no joint displacements or other defects. A copy of the written report and video is to be forwarded to the Engineers for comment. Any defects shall be attributable to the contractor for rectification unless indicated otherwise by the CCTV report and agreed with the Engineers.
15. All works to sewers/ manholes being offered for adoption or on existing public sewers should be in accordance with "Design and Construction Guidance" and the Adopting Water Authority's recommendations

A4	15.11.22	Revised to Approval revision status	SWJ
P3	12.10.22	Notes added regarding stone pitching specification and colour.	SWJ
P2	10.10.22	Updated to suit comments received from LA Drainage and Landscape officers.	SWJ
PI	03.10.22	Updated to reflect latest design	SWJ

Seven House · High Street
Longbridge · Birmingham
B31 2UQ
Bristol
Exeter · London · Reading
pja.co.uk

CLIENT

Linden
HOMES

PROJECT

Rudloe Drive, Quedgeley

DRAWING TITLE
Headwall Detail
300Ø Pipe Diameter

DRAWING ISSUE STATUS

PJA JOB No. SUB-CODE DRAWING NO. REVISION
06396 **0411** **A4**

Revision
BIM DRAWING REFERENCE

RDQUE **-PJA**

SCALE DRAWN REVIEWED DATE

GENERAL NOTES:

1. This drawing is to be read in conjunction with all other relevant Engineering and Architect's details.
2. The design details presented must be reviewed in conjunction with the wider site information and site constraints which may not be evident on drawing and must be requested if not already provided. This includes, but not limited to, ground conditions (geotechnical and geo-environmental), groundwater levels, buried services, remnant obstructions, ecology, tree protection and topography.
3. The Engineer shall be notified immediately, in writing, should any errors or discrepancies be found prior to the commencement or continuation of any works.
4. All work is to be carried out in accordance with current British Standards, Building Regulations and NHBC Standards.
5. It is the responsibility of the Contractor to execute the works at all times in strict accordance with the requirements of the Health and Safety at Work Act 1974, and the C.D.M. Regulations 2015. The Contractor will be deemed to have allowed for full compliance, including full liaison with the CDM Co-ordinator, within his rates.
6. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
7. Before work commences contractor should consult the engineer and the SI report regarding any contamination issues. All necessary Health and Safety measures to be taken

ANY WORKS UNDERTAKEN PRIOR TO RECEIPT OF TECHNICAL APPROVAL FOR THEIR RESPECTIVE PROPOSALS IS DONE AT THE CONTRACTOR'S OWN RISK.

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9.

The residual risks identified on the DRA / drawings are based on the information available at the time of design.

Any services information indicated on PJA drawings is obtained from third parties, and is given for guidance purposes only. The exact location of any services will need to be verified by the client / contractor before commencing works on site.

ADOPTABLE DRAINAGE NOTES:

1. This drawing is subject to approval by Local Authority, Building Control and / or Sewerage Undertaker. Any works undertaken prior to the granting of these approvals is carried out at at risk to others.
2. Prior to commencing work on the drainage, all existing drains, sewers manholes and outfalls to remain shall be located, identified and a CCTV condition survey carried out. Where necessary, protection to the existing drainage infrastructure shall be provided.
3. All existing sewers and manholes abandoned due to the proposed works are to be either removed, and suitably backfilled or grouted up.
4. All manhole covers to comply with BS EN 124, and be Kitemarked
5. Cover levels for manholes are approximate only and should be adjusted to match surrounding levels.
6. In block paved areas 'Infill' type covers should not be used, and frames must be 150mm deep.
7. All manhole and drainage covers shall comply with BS.EN124, BS.EN13598-1 and HA104/09.
Cover strengths to be:-
Class E600 in areas of heavy loading.
Class D400 in all trafficked areas (roads, hard shoulder, parking areas and services yards).
Manhole covers on foul only sewers shall be of low leakage types in order to prevent excessive surface water ingress.
8. Drainage pipes 100mm Ø unless stated otherwise.
Pipes to be :-
Vitrified clay to BS EN 295 or Concrete to BS 5911 or UPVC pipes to BS EN 1452 or Thermoplastic Structured wall pipes complying with WIS 4-35-01. BSI kitemarked. Class 8kM/m² nominal short term ring stiffness.
9. All sewer pipes 300mm diameter or larger, to be concrete pipes, to BS.5911, unless noted otherwise
10. All pipes to be laid with soffits level, unless noted otherwise.
11. Where cover to pipes is less than 1200mm under carriageway - concrete bed and surround or concrete protection slab is required.
12. All concrete to drainage, manholes bases, surrounds etc to be in accordance with the BRE special digest 1 - Concrete in aggressive ground. Refer to site investigation report for sulphate requirements.
13. All manholes, pipe trenches etc. to be backfilled with imported granular fill to Class 6F1-6F5 (Capping material) to (SHW) Table 6/1 & compacted in accordance with Table 6/4.
14. All pipelines shall be tested both before and after backfilling, using either air test or water test, in accordance with BS EN 1610.
15. Upon completion of the drainage works all drains shall be flushed out and CCTV surveyed and shown to be free of all silt and debris and to have no joint displacements or other defects. A copy of the written report and video is to be forwarded to the Engineers for comment. Any defects shall be attributable to the contractor for rectification unless indicated otherwise by the CCTV report and agreed with the Engineers.
16. Demarcation manholes and lateral drains need to be constructed in accordance with the Water UK/WRC "Design and Construction Guidance".
17. All works to sewers/ manholes being offered for adoption or on existing public sewers should be in accordance with "Design and Construction Guidance" and the Adopting Water Authority's recommendations

Surface Water							
MH No.	MANHOLE DIAMETER (mm)	MANHOLE TYPE	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH TO SOFFIT (m)	EASTING (m)	NORTHING (m)
S1		Private Headwall	24.715	23.029	1.386	381435.071	213388.534
S2 Basin		Adoptable Headwall	24.557	23.000	1.257	381421.910	213394.961
S3	1350	Type C	24.500	22.875	1.325	381417.238	213399.286
S4 FCC	3000	Type B	24.875	22.750	1.975	381409.974	213400.176
S5	1200	Type B	24.300	22.367	1.783	381376.943	213404.225
S6		Ex Headwall Outfall	22.863	22.185	0.528	381377.329	213413.126
S7	1350	Type C	24.734	23.300	1.134	381488.417	213322.296
S8	1200	Type C	24.926	23.205	1.421	381474.271	213315.222
S9	1200	Type B	25.006	23.155	1.551	381465.802	213316.240
S10	1200	Type C	24.462	22.900	1.262	381424.210	213326.883
S11	1350	Type C	24.579	23.000	1.279	381404.937	213361.743
S12	1350	Type C	24.005	22.475	1.230	381397.986	213333.354
S13	1350	Type C	23.971	22.300	1.296	381391.975	213309.729
S14		Ex Manhole/Stub Outfall	24.421	22.200	1.846	381386.489	213287.725
S15	1350	Type C	23.271	21.540	1.431	381244.006	213321.441
S16	1350	Type C	23.157	21.480	1.377	381231.246	213320.990
S17	1350	Type C	22.741	21.213	1.228	381228.674	213360.918
S18	1350	Type C	22.677	21.151	1.226	381226.032	213367.341
S19	1350	Type C	22.597	20.991	1.231	381219.243	213371.629
S20	1350	Type C	22.450	20.950	1.200	381172.439	213325.611
S21	1350	Type B	22.687	20.796	1.516	381175.621	213344.259
S22	1500	Type C	22.348	20.428	1.395	381189.051	213382.212
S23	1350	Type C	22.969	21.344	1.400	381263.353	213415.211
S24	1500	Type C	21.965	20.132	1.233	381206.739	213435.660
S25	1500	Type C	21.669	20.026	1.043	381156.724	213453.819
S26		Ex Manhole/Stub Outfall	21.623	19.990	1.033	381146.748	213469.005
S27	1350	Type C	24.299	22.700	1.299	381341.833	213345.073
S28	1350	Type C	24.241	22.530	1.411	381345.212	213384.061
S29	1350	Type C	23.967	22.431	1.236	381346.537	213407.832
S30	1350	Type C	23.942	22.185	1.382	381339.418	213411.109
S31	1350	Type C	23.722	22.095	1.252	381316.123	213410.283
S32	1350	Type C	23.547	22.040	1.132	381299.148	213409.296
S33	1350	Type C	24.243	22.700	1.243	381290.336	213319.664
S34	1350	Type C	24.283	22.570	1.413	381286.088	213350.206
S35	1350	Type C	23.669	22.110	1.184	381283.952	213387.871
S36	1350	Type C	23.524	22.060	1.089	381288.719	213403.473
S37	1350	Type C	23.550	21.944	1.156	381295.226	213414.891
S38 Basin		Adoptable Headwall	23.133	21.900	0.783	381305.720	213426.787
S39 FCC	3000	Type B	23.795	21.870	1.700	381301.768	213432.353
S40		Ex Headwall Outfall	22.186	21.810	0.151	381300.914	213442.819
S41	1350	Adoptable Headwall	23.057	21.920	0.687	381303.329	213420.436

Foul Network							
MH No.	MANHOLE DIAMETER (mm)	MANHOLE TYPE	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH TO SOFFIT (m)	EASTING (m)	NORTHING (m)
F1	1200	Type B	24.210	22.130	1.930	381343.550	213387.563
F2	1200	Type B	24.044	21.905	1.989	381344.774	213405.500
F3	1200	Type B	23.944	21.850	1.945	381337.570	213409.608
F4	1200	Type B	23.525	21.573	1.803	381296.075	213407.209
F5	1200	Type B	23.745	21.788	1.807	381285.763	213383.712
F6	1200	Type B	23.550	21.644	1.756	381288.186	213394.960
F7	1200	Type B	23.428	21.500	1.778	381286.077	213408.227
F8	1200	Type B	22.309	20.520	1.639	381226.813	213430.010
F9	1200	Type B	22.866	20.900	1.816	381227.904	213349.727
F10	1200	Type B	22.706	20.711	1.845	381225.873	213364.714
F11	1200	Type B	22.632	20.630	1.852	381221.118	213368.847
F12	1350	Type B	22.504	20.655	1.699	381170.610	213330.882
F13	1200	Type B	22.657	20.496	2.011	381172.190	213341.828
F14	1200	Type B	22.373	20.000	2.223	381185.547	213380.800
F15	1200	Type B	21.898	19.590	2.158	381206.070	213438.452
F16	1200	Type B	21.686	19.278	2.258	381161.386	213454.057
F17		Ex Manhole/Stub Outfall	21.682	19.178	2.354	381152.573	213466.136
F18	1200	Type B	24.760	22.900	1.710	381487.904	213318.633
F19	1200	Type B	24.920	22.705	2.065	381473.460	213313.646
F20	1200	Type B	25.016	22.565	2.301	381462.528	213315.282
F21	1200	Type B	24.615	22.600	1.865	381407.809	213363.516
F22	1200	Type B	23.966	22.000	1.816	381399.710	213330.777
F23	1200	Type B	23.991	21.588	2.253	381393.938	213307.810
F24		Ex Manhole/Stub Outfall	24.437	21.230	3.057	381389.110	213289.628

AI	15.11.22	Revised to suit latest design. Updated to Approval revision status.	SWJ

Seven House - High Street
Longbridge - Birmingham
B31 2UQ

Bristol
Exeter - London - Reading
pja.co.uk

CLIENT

Linden

HOMES

PROJECT

Rudloe Drive Quedgeley

DRAWING TITLE

Manhole Schedule

DRAWING ISSUE STATUS

APPROVAL

PJA JOB No. SUB-CODE DRAWING NO. REVISION

063960412AI

ReBIM DRAWING REFERENCE

RDQUE

SCALE DRAWN REVIEWED DATE

A2@

GENERAL NOTES:

- This drawing is to be read in conjunction with all other relevant Engineering and Architect's details.
- The design details presented must be reviewed in conjunction with the wider site information and site constraints which may not be evident on drawing and must be requested if not already provided. This includes, but not limited to, ground conditions (geotechnical and geo-environmental), groundwater levels, buried services, remnant obstructions, ecology, tree protection and topography.
- The Engineer shall be notified immediately, in writing, should any errors or discrepancies be found prior to the commencement or continuation of any works.
- All work is to be carried out in accordance with current British Standards, Building Regulations and NHBC Standards.
- It is the responsibility of the Contractor to execute the works at all times in strict accordance with the requirements of the Health and Safety at Work Act 1974, and the C.D.M. Regulations 2015. The Contractor will be deemed to have allowed for full compliance, including full liaison with the CDM Co-ordinator, within his rates.
- Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
- Before work commences contractor should consult the engineer and the SI report regarding any contamination issues. All necessary Health and Safety measures to be taken

ANY WORKS UNDERTAKEN PRIOR TO RECEIPT OF TECHNICAL APPROVAL FOR THEIR RESPECTIVE PROPOSALS IS DONE AT THE CONTRACTOR'S OWN RISK.

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9.

The residual risks identified on the DRA / drawings are based on the information available at the time of design.

Any services information indicated on PJA drawings is obtained from third parties, and is given for guidance purposes only. The exact location of any services will need to be verified by the client / contractor before commencing works on site.

ADOPTABLE DRAINAGE NOTES:

- This drawing is subject to approval by Local Authority, Building Control and / or Sewerage Undertaker. Any works undertaken prior to the granting of these approvals is carried out at at risk to others.
- Prior to commencing work on the drainage, all existing drains, sewers manholes and outfalls to remain shall be located, identified and a CCTV condition survey carried out. Where necessary, protection to the existing drainage infrastructure shall be provided.
- All existing sewers and manholes abandoned due to the proposed works are to be either removed, and suitably backfilled or grouted up.
- All manhole covers to comply with BS.EN.124, and be Kitemarked
- Cover levels for manholes are approximate only and should be adjusted to match surrounding levels.
- In block paved areas 'Infill' type covers should not be used, and frames must be 150mm deep.
- All manhole and drainage covers shall comply with BS.EN124, BS.EN13598-1 and HA104/09.
Cover strengths to be:-
Class E600 in areas of heavy loading.
Class D400 in all trafficked areas (roads, hard shoulder, parking areas and services yards).
Manhole covers on foul only sewers shall be of low leakage types in order to prevent excessive surface water ingress.
- Drainage pipes 100mm Ø unless stated otherwise.
Pipes to be :-
Vitrified clay to BS EN 295 or Concrete to BS 5911 or UPVC pipes to BS EN 1452 or Thermoplastic Structured wall pipes complying with WIS 4-35-01. BSi kitemarked. Class 8kM/m² nominal short term ring stiffness.
- All sewer pipes 300mm diameter or larger, to be concrete pipes, to BS.5911, unless noted otherwise
- All pipes to be laid with soffits level, unless noted otherwise.
- Where cover to pipes is less than 1200mm under carriageway - concrete bed and surround or concrete protection slab is required.
- All concrete to drainage, manholes bases, surrounds etc to be in accordance with the BRE special digest 1- Concrete in aggressive ground. Refer to site investigation report for sulphate requirements.
- All manholes, pipe trenches etc. to be backfilled with imported granular fill to Class 6F1-6F5 (Capping material) to (SHW) Table 6/1 & compacted in accordance with Table 6/4.
- All pipelines shall be tested both before and after backfilling, using either air test or water test, in accordance with BS EN 1610.
- Upon completion of the drainage works all drains shall be flushed out and CCTV surveyed and shown to be free of all silt and debris and to have no joint displacements or other defects. A copy of the written report and video is to be forwarded to the Engineers for comment. Any defects shall be attributable to the contractor for rectification unless indicated otherwise by the CCTV report and agreed with the Engineers.
- Demarcation manholes and lateral drains need to be constructed in accordance with the Water UK/WRc "Design and Construction Guidance".
- All works to sewers/ manholes being offered for adoption or on existing public sewers should be in accordance with "Design and Construction Guidance" and the Adopting Water Authority's recommendations

Surface Water Network 1						
PIPE NUMBER	U/S MH	D/S MH	LENGTH (m)	DIAMETER (mm)	U/S DEPTH (m)	D/S DEPTH (m)
1.000	S1	S2 Basin	13.596	300	1.686	1.557
1.001	S2 Basin	S3	5.167	300	1.557	1.625
1.002	S3	S4 FCC	5.143	300	1.625	2.125
1.003	S4 FCC	S5	31.178	150	2.125	1.933
1.004	S5	S6	8.309	150	1.933	0.678

Surface Water Network 2						
PIPE NUMBER	U/S MH	D/S MH	LENGTH (m)	DIAMETER (mm)	U/S DEPTH (m)	D/S DEPTH (m)
1.000	S7	S8	14.542	300	1.434	1.721
1.001	S8	S9	7.330	300	1.721	1.851
1.002	S9	S10	41.731	300	1.851	1.562
1.003	S10	S12	25.735	300	1.562	1.530
1.004	S12	S13	23.028	300	1.530	1.596
1.005	S13	S14	21.402	375	1.671	2.221
2.000	S11	S12	27.877	300	1.579	1.530

Surface Water Network 3						
PIPE NUMBER	U/S MH	D/S MH	LENGTH (m)	DIAMETER (mm)	U/S DEPTH (m)	D/S DEPTH (m)
1.000	S15	S16	11.418	300	1.731	1.677
1.001	S16	S17	38.660	300	1.677	1.528
1.002	S17	S18	5.596	300	1.528	1.526
1.003	S18	S19	6.680	300	1.526	1.531
1.004	S19	S22	30.568	375	1.606	1.779
1.005	S22	S24	54.799	525	1.920	1.758
1.006	S24	S25	51.709	600	1.833	1.643
1.007	S25	S26	16.670	600	1.643	1.633
2.000	S20	S21	17.568	300	1.500	1.816
2.001	S21	S22	38.834	375	1.891	1.770
3.000	S23	S24	58.769	225	1.625	1.458

Surface Water Network 4						
PIPE NUMBER	U/S MH	D/S MH	LENGTH (m)	DIAMETER (mm)	U/S DEPTH (m)	D/S DEPTH (m)
1.000	S27	S28	37.784	300	1.599	1.711
1.001	S28	S29	22.459	300	1.711	1.536
1.002	S29	S30	6.487	300	1.536	1.682
1.003	S30	S31	21.960	375	1.757	1.627
1.004	S31	S32	15.654	375	1.627	1.507
1.005	S32	S37	5.482	375	1.507	1.531
1.006	S37	S41	8.469	450	1.606	1.137
1.007	S41	S38 Basin	5.436	450	1.137	1.233
1.008	S38 Basin	S39 FCC	4.651	450	1.233	1.925
1.009	S39 FCC	S40	9.001	225	1.925	0.376
2.000	S33	S34	29.487	300	1.543	1.713
2.001	S34	S35	36.375	300	1.713	1.484
2.002	S35	S36	14.964	375	1.559	1.464
2.003	S36	S37	11.792	375	1.464	1.531

Foul Water Network 1						
PIPE NUMBER	U/S MH	D/S MH	LENGTH (m)	DIAMETER (mm)	U/S DEPTH (m)	D/S DEPTH (m)
1.000	F1	F2	16.778	150	2.080	2.139
1.001	F2	F3	7.093	150	2.139	2.095
1.002	F3	F4	40.364	150	2.095	1.953
1.003	F4	F7	8.850	150	1.953	1.928
1.004	F7	F8	61.941	150	1.928	1.789
1.005	F8	F15	21.195	150	1.789	2.308
1.006	F15	F16	46.130	150	2.308	2.408
1.007	F16	F17	13.752	150	2.408	2.504
2.000	F5	F6	10.305	150	1.957	1.906
2.001	F6	F7	12.234	150	1.906	1.928
3.000	F9	F10	13.924	150	1.966	1.995
3.001	F10	F11	5.101	150	1.995	2.002
3.002	F11	F14	36.325	150	2.002	2.373
3.003	F14	F15	59.996	150	2.373	2.308
4.000	F12	F13	9.785	150	1.849	2.161
4.001	F13	F14	39.998	150	2.161	2.373

Foul Water Network 2						
PIPE NUMBER	U/S MH	D/S MH	LENGTH (m)	DIAMETER (mm)	U/S DEPTH (m)	D/S DEPTH (m)
1.000	F18	F19	14.081	150	1.860	2.215
1.001	F19	F20	9.854	150	2.215	2.451
1.002	F20	F22	63.501	150	2.451	1.966
1.003	F22	F23	22.481	150	1.966	2.403
1.004	F23	F24	17.611	150	2.403	3.207
2.000	F21	F22	32.526	150	2.015	1.966

AI	15.11.22	Updated to suit latest design. Revised to Approval revision status.	SWJ

Seven House - High Street
Longbridge - Birmingham
B31 2UQ

- Bristol
Exeter - London - Reading
pja.co.uk

CLIENT



PROJECT

Rudloe Drive Quedgeley

DRAWING TITLE

Pipe Schedule

DRAWING ISSUE STATUS

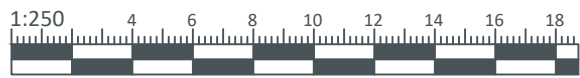
APPROVAL

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06396		0413	AI

Re BIM DRAWING REFERENCE

RDQUE

SCALE	DRAWN	REVIEWED	DATE
A2@			

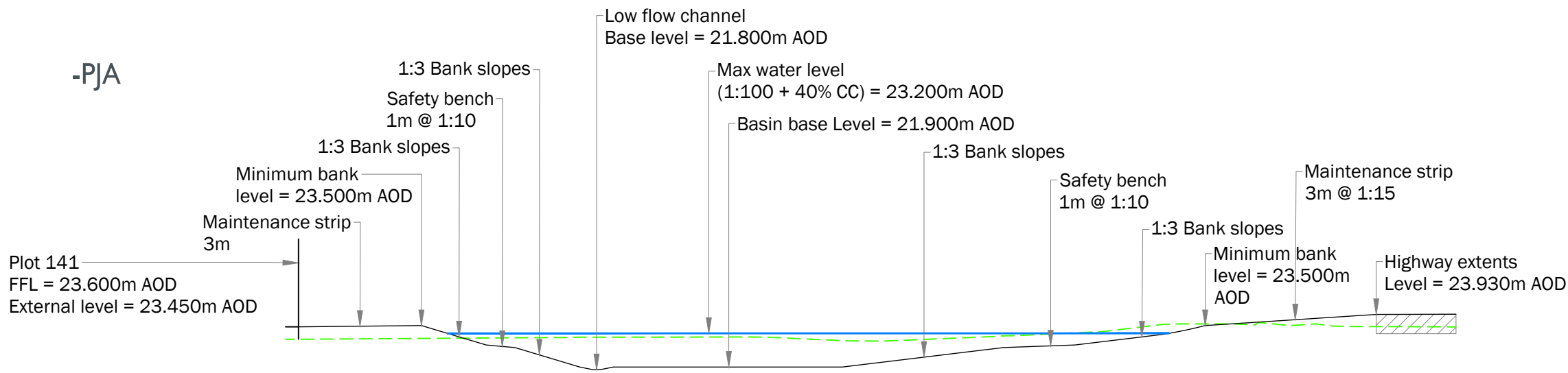
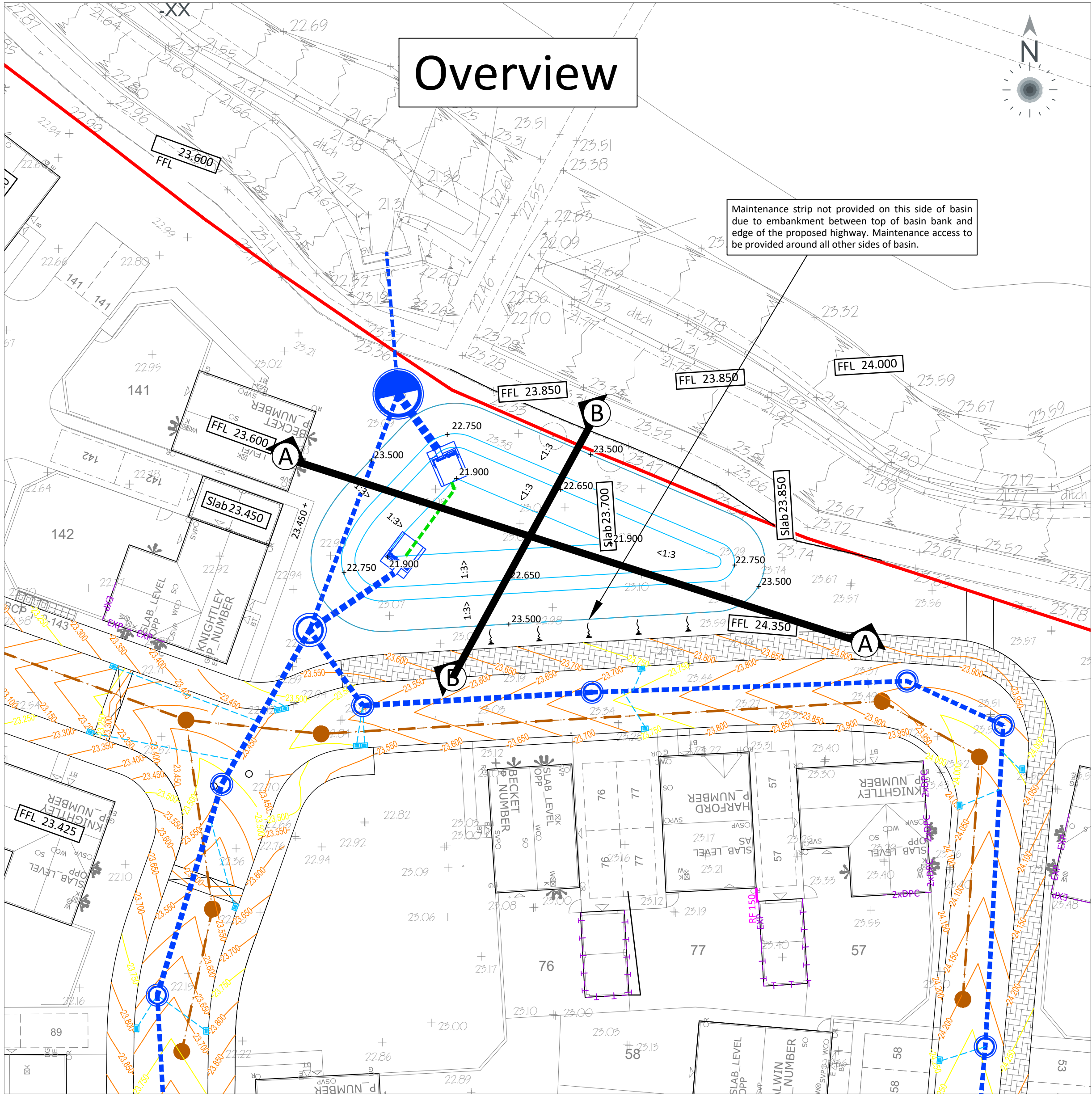


These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9.

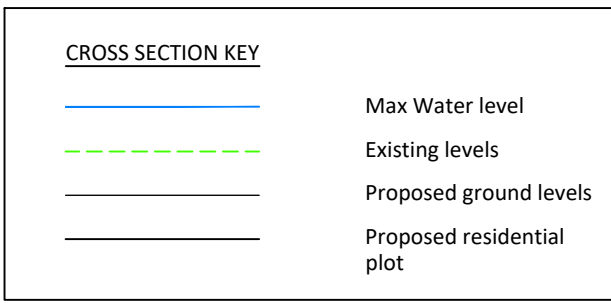
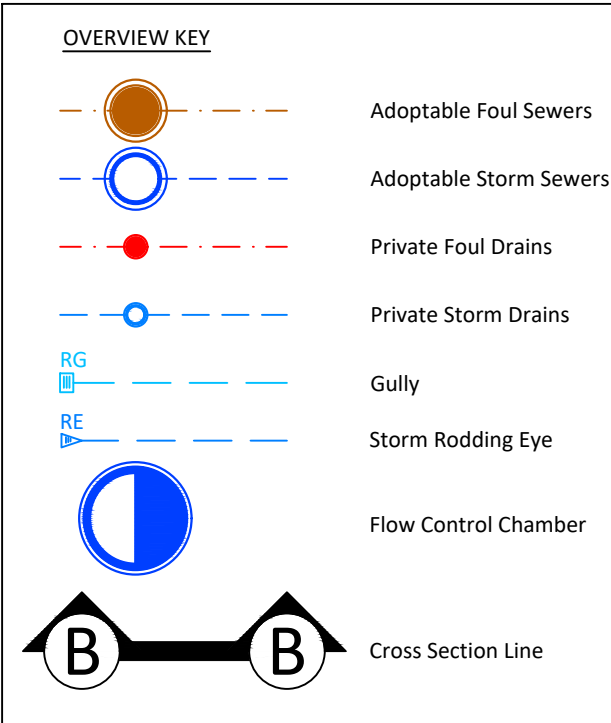
The residual risks identified on the DRA / drawings are based on the information available at the time of design. Any services information indicated on PJA drawings is obtained from third parties, and is given for guidance purposes only. The exact location of any services will need to be verified by the client / contractor before commencing works on site.

LHS Detention Basin - Section A-A

Vertical & Horizontal Scale: 1:200

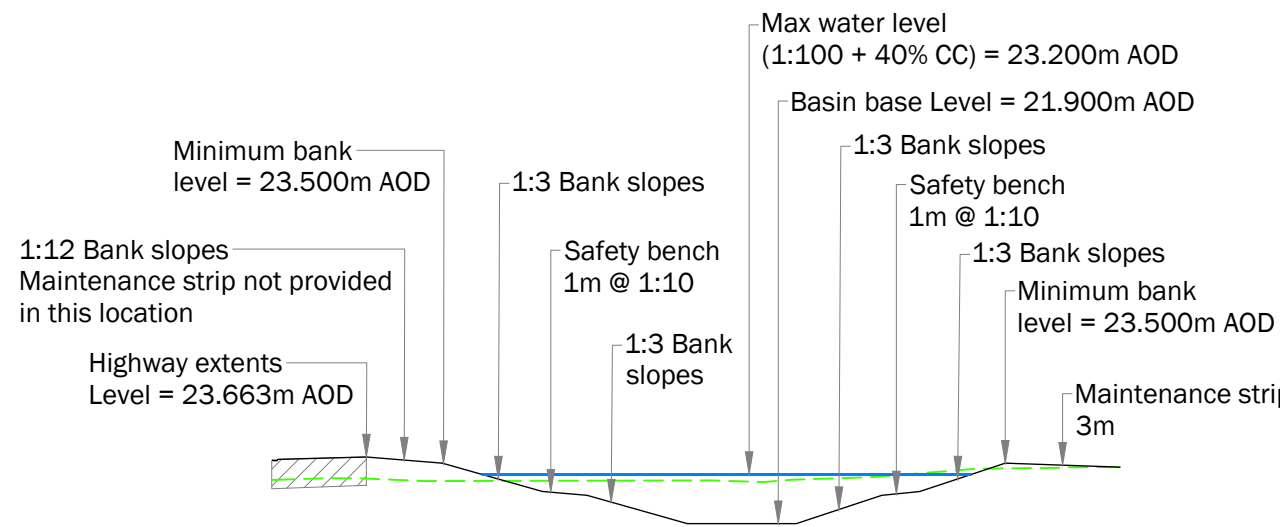


Proposed Levels (m)	Existing Levels (m)	Chainage (m)
— 23.500 —	22.968 22.969 22.979	0.000 0.091 1.737
— 22.965 —		
— 22.666 —		
21.900	23.037 23.036 23.050	10.325 10.440 11.762
— 21.900 —		
21.900	23.059 23.050	17.873 18.611
— 21.900 —		
21.900	22.911	21.599
22.063	22.898	23.000
22.209		
— 22.355 —		
— 22.650 —	23.080	27.373
22.705		
22.750		
22.905	23.266	31.496
23.062	23.546	33.807
23.237	23.564	34.580
— 23.500 —	23.562	36.533
	23.572	37.374
	23.499	38.699
	23.563	39.696
23.930	23.462	41.273 42.032
23.932		43.285
	23.449	44.751
23.937	23.444	45.108 45.108



LHS Detention Basin - Section B-B

Vertical & Horizontal Scale: 1:200

[illegible]

PRELIMINARY SCHEME
For comment and review only.
Design is based upon information available at the time.
Design is subject to full review as additional information becomes available.
Design is subject to full review upon receipt of comments from

- Development Control
- LA Planning Authority
- Environment Agency
- LA Highways Department
- Sewerage Undertaker

Detention basins are designed with 300mm freeboard and low flow channels along the desired flow route.

T3	15.11.22	Updated to Tender revision status.	SWJ
P2	19.10.22	Amended to suit revised layout.	SWJ
P1	03.10.22	Basin cross sections updated and drawing title revised.	SWJ

Seven House - High Street
Longbridge - Birmingham
31 2UQ - [REDACTED]
[REDACTED] - Bristol
Exeter - London - Reading
pja.co.uk

CLIENT

Linden
HOMES

PROJECT

DRAWING TITLE

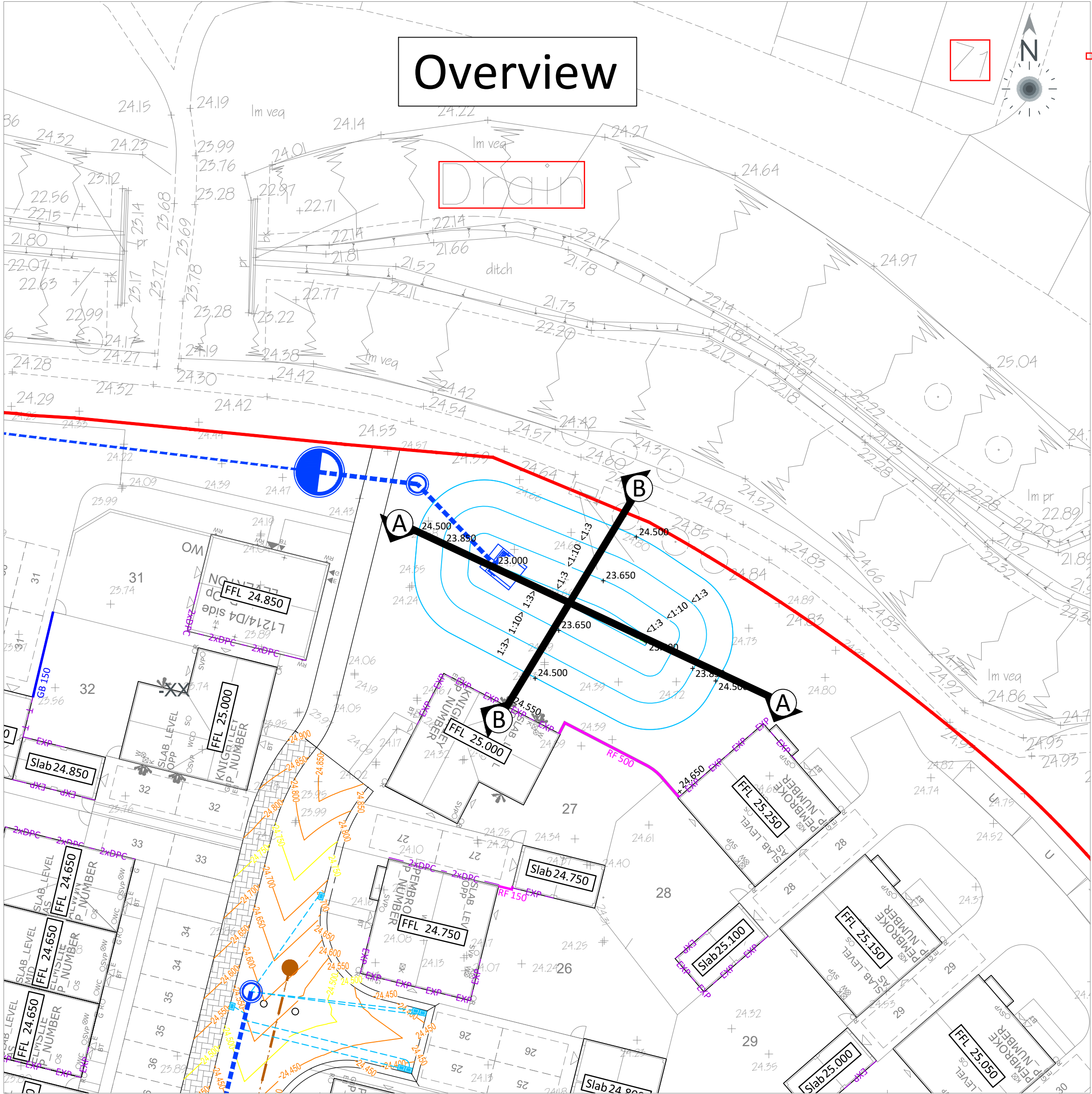
DRAWING ISSUE STATUS

TENDER

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
-------------	----------	-------------	----------

Re
BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
-------	-------	----------	------



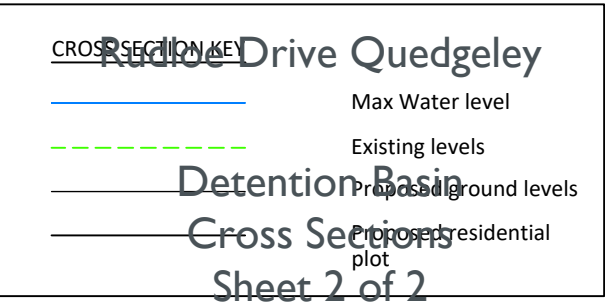
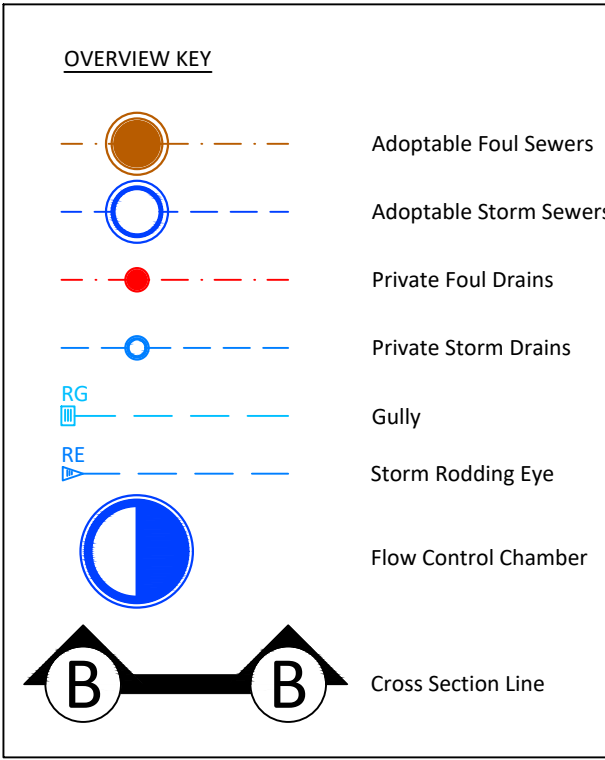
RHS Detention Basin - Section A-A

Vertical & Horizontal Scale: 1:200



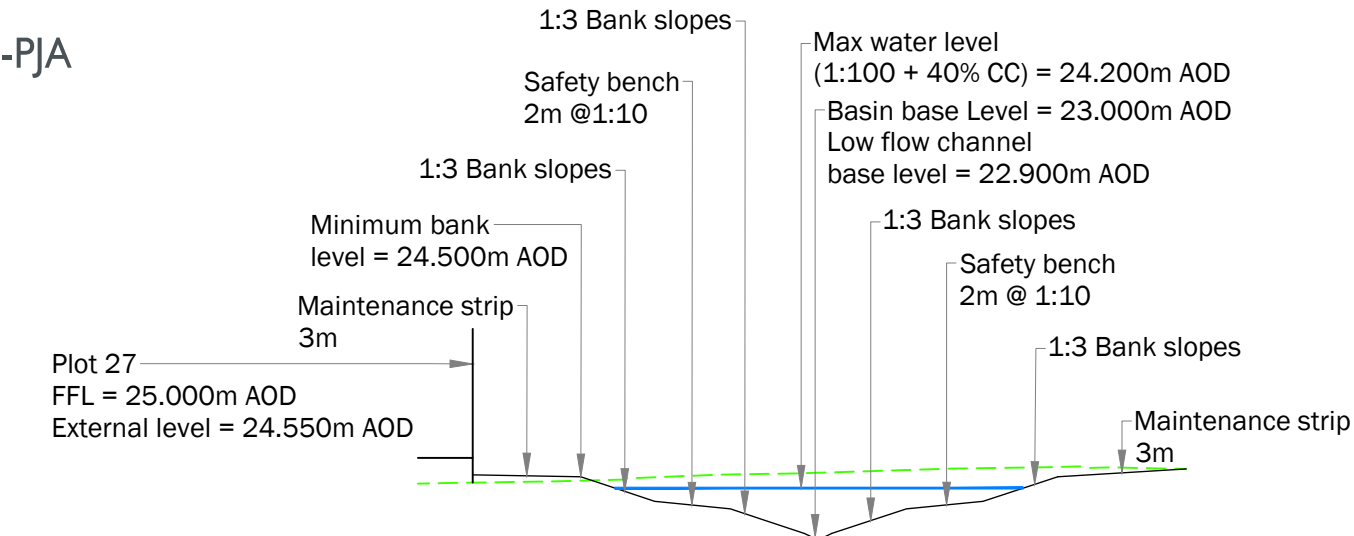
Chainage (m)	0.000	2.066	6.754	9.331	12.807	17.669	18.186	19.665	23.516	28.499	29.257	31.335	
Existing Levels (m)	24.726	24.700	24.723	24.737	24.532	24.604	24.622	24.576	24.473	24.514	24.531	24.485	
Proposed Levels (m)			24.500	23.850	23.650	23.000	23.000	23.000	23.028	23.650	23.837	24.218	24.500

- GENERAL NOTES:
- This drawing is to be read in conjunction with all other relevant Engineering and Architect's details.
 - The design details presented must be reviewed in conjunction with the wider site information and site constraints which may not be evident on drawing and must be requested if not already provided. This includes, but not limited to, ground conditions (geotechnical and geo-environmental), groundwater Levels, buried services, remnant obstructions, ecology, tree protection and topography.
 - The Engineer shall be notified immediately, in writing, should any errors or discrepancies be found prior to the commencement or continuation of any works.
 - All work is to be carried out in accordance with current British Standards, Building Regulations and NHBC Standards.
 - It is the responsibility of the Contractor to execute the works at all times in strict accordance with the requirements of the Health and Safety at Work Act 1974, and the CDM Regulations 2015. The Contractor will be deemed to have allowed for full compliance, including full liaison with the CDM Co-ordinator, within his rates.
 - Any Existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
 - Before work commences contractor should consult the engineer and the S.I. report regarding any contamination issues. All necessary Health and Safety measures to be taken



RHS Detention Basin - Section B-B

Vertical & Horizontal Scale: 1:200



Chainage (m)	0.000	0.600	3.473	5.446	5.522	7.949	10.062	14.150	16.631	17.499	18.350	20.327
Existing Levels (m)	24.318	24.330	24.376	24.425	24.456	24.554	24.590	24.717	24.752	24.775	24.749	24.708
Proposed Levels (m)			24.500	23.850	23.650	23.000	23.000	23.650	23.796	24.500		

- PRELIMINARY SCHEME
- For comment and review only.
- Design is based upon information available at the time. Design is subject to full review as additional information becomes available.
- Design is subject to full review upon receipt of comments from:
- Development Control
 - LA Planning Authority
 - Environment Agency
 - LA Highways Department
 - Sewerage Undertaker
- Detention basins are designed with 300mm freeboard and low flow channels along the desired flow route.

T3	15.11.22	Revised for Tender submission status.	SWJ
P2	19.10.22	Amended to suit revised layout	SWJ
P1	03.10.22	Basin cross sections updated and drawing title revised.	SWJ

Seven House - High Street
Longbridge - Birmingham
B31 2UQ

Bristol
Exeter - London - Reading
pja.co.uk

CLIENT

Linden
HOMES

PROJECT

DRAWING TITLE


DRAWING ISSUE STATUS

TENDER









PJA JOB No. SUB-CODE DRAWING NO. REVISION

BIM DRAWING REFERENCE

SCALE DRAWN REVIEWED DATE

PJA		Page 1
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 01/09/2022	Designed by SWJ	
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC	
Innovyze	Network 2019.1	

Network Design Table for Surface Network 2

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow	k (l/s)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.000	12.768	0.060	212.8	0.022	5.00		0.0 0.600	o	300	Pipe/Conduit		
1.001	40.010	0.267	149.9	0.086	0.00		0.0 0.600	o	300	Pipe/Conduit		
1.002	6.946	0.062	112.0	0.011	0.00		0.0 0.600	o	300	Pipe/Conduit		
1.003	8.030	0.085	94.5	0.086	0.00		0.0 0.600	o	300	Pipe/Conduit		
1.004	31.993	0.422	75.8	0.101	0.00		0.0 0.600	o	375	Pipe/Conduit		
2.000	18.918	0.079	239.5	0.159	5.00		0.0 0.600	o	300	Pipe/Conduit		
2.001	40.259	0.218	184.7	0.116	0.00		0.0 0.600	o	375	Pipe/Conduit		
1.005	56.299	0.221	254.7	0.066	0.00		0.0 0.600	o	525	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)
1.000	50.00	5.20	21.540	0.022	0.0	0.0	0.0	1.07	75.9	3.0
1.001	50.00	5.72	21.480	0.108	0.0	0.0	0.0	1.28	90.6	14.6
1.002	50.00	5.80	21.213	0.119	0.0	0.0	0.0	1.48	105.0	16.1
1.003	50.00	5.88	21.151	0.205	0.0	0.0	0.0	1.62	114.4	27.8
1.004	50.00	6.13	20.991	0.306	0.0	0.0	0.0	2.08	230.0	41.4
2.000	50.00	5.31	20.950	0.159	0.0	0.0	0.0	1.01	71.5	21.5
2.001	50.00	5.82	20.796	0.275	0.0	0.0	0.0	1.33	146.9	37.2
1.005	50.00	6.81	20.428	0.647	0.0	0.0	0.0	1.40	302.8	87.6

06396
Rudloe Drive
Quedgeley

Designed by SWJ

Checked by DMcC

Network 2019.1



Manhole Schedules for Surface Network 2

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out			Pipes In			Backdrop (mm)
					PN	Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	Diameter (mm)	
S15	23.271	1.731	Open Manhole	1350	1.000	21.540	300				
S16	23.157	1.677	Open Manhole	1350	1.001	21.480	300	1.000	21.480	300	
S17	22.741	1.528	Open Manhole	1350	1.002	21.213	300	1.001	21.213	300	
S18	22.677	1.526	Open Manhole	1350	1.003	21.151	300	1.002	21.151	300	
S19	22.597	1.606	Open Manhole	1350	1.004	20.991	375	1.003	21.066	300	
S20	22.450	1.500	Open Manhole	1350	2.000	20.950	300				
S21	22.687	1.891	Open Manhole	1350	2.001	20.796	375	2.000	20.871	300	
S22	22.348	1.920	Open Manhole	1500	1.005	20.428	525	1.004	20.569	375	
								2.001	20.578	375	
S23	22.969	1.625	Open Manhole	1350	3.000	21.344	225				
S24	21.965	1.833	Open Manhole	1500	1.006	20.132	600	1.005	20.207	525	
								3.000	20.507	225	
S25	21.669	1.643	Open Manhole	1500	1.007	20.026	600	1.006	20.026	600	
S26	21.623	1.633	Open Manhole	1500		OUTFALL		1.007	19.990	600	

06396
Rudloe Drive
Quedgeley

Designed by SWJ

Checked by DMcC

Network 2019.1

Manhole Schedules for Surface Network 2

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S15	381244.006	213321.441	381244.006	213321.441	Required	
S16	381231.246	213320.990	381231.246	213320.990	Required	
S17	381228.674	213360.918	381228.674	213360.918	Required	
S18	381226.032	213367.341	381226.032	213367.341	Required	
S19	381219.243	213371.629	381219.243	213371.629	Required	
S20	381172.439	213325.611	381172.439	213325.611	Required	
S21	381175.621	213344.259	381175.621	213344.259	Required	
S22	381189.051	213382.212	381189.051	213382.212	Required	

06396
Rudloe Drive
Quedgeley

Designed by SWJ

Checked by DMcC

Network 2019.1





Manhole Schedules for Surface Network 2


MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S23	381263.353	213415.211	381263.353	213415.211	Required	
S24	381206.739	213435.660	381206.739	213435.660	Required	
S25	381156.724	213453.819	381156.724	213453.819	Required	
S26	381146.748	213469.005			No Entry	


Free Flowing Outfall Details for Surface Network 2


Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
1.007	S26	21.623	19.990	0.000	1500	0


PJA		Page 6
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 01/09/2022 File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Designed by SWJ Checked by DMcC	
Innovyze	Network 2019.1	
<div>Simulation Criteria for Surface Network 2</div> <div>Volumetric Runoff Coeff 0.750 Manhole Headloss Coeff (Global) 0.500 Inlet Coeffiecient 0.800 Areal Reduction Factor 1.000 Foul Sewage per hectare (l/s) 0.000 Flow per Person per Day (l/per/day) 0.000 Hot Start (mins) 0 Additional Flow - % of Total Flow 0.000 Run Time (mins) 60 Hot Start Level (mm) 0 MADD Factor * 10m³/ha Storage 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0</div> <div>Synthetic Rainfall Details</div> <div>Rainfall Model FEH Summer Storms Yes Return Period (years) 5 Winter Storms No FEH Rainfall Version 2013 Cv (Summer) 0.750 Site Location GB 381375 213365 SO 81375 13365 Cv (Winter) 0.840 Data Type Point Storm Duration (mins) 30</div>		
©1982-2019 Innovyze		


PJA										Page 7	
Seven House, High Street Longbridge Birmingham, B31 2UQ					06396 Rudloe Drive Quedgeley						
Date 01/09/2022					Designed by SWJ						
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX					Checked by DMcC						
Innovyze					Network 2019.1						
<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2</u>											
<u>Simulation Criteria</u>											
Areal Reduction Factor 1.000			Manhole Headloss Coeff (Global) 0.500			MADD Factor * 10m³/ha Storage 0.000					
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 0				Number of Storage Structures 0				Number of Real Time Controls 0			
<u>Synthetic Rainfall Details</u>											
Rainfall Model					FEH		Data Type		Point		
FEH Rainfall Version					2013 Cv (Summer)		0.750				
Site Location GB 381375 213365 SO 81375 13365					Cv (Winter)		0.840				
Margin for Flood Risk Warning (mm)					300.0		DVD Status		ON		
Analysis Timestep 2.5 Second Increment (Extended)					Inertia Status		ON				
DTS Status					ON						
Profile(s)					Summer and Winter						
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440											
Return Period(s) (years) 2, 30, 100											
Climate Change (%) 0, 0, 40											

PJA		Page 8									
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley										
Date 01/09/2022	Designed by SWJ										
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC										
Innovyze	Network 2019.1										
<p><u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2</u></p>											
<table> <thead> <tr> <th></th><th>US/MH</th><th>Level</th></tr> <tr> <th>PN</th><th>Name</th><th>Exceeded</th></tr> </thead> <tbody> <tr> <td>1.000</td><td>S15</td><td></td></tr> </tbody> </table>				US/MH	Level	PN	Name	Exceeded	1.000	S15	
	US/MH	Level									
PN	Name	Exceeded									
1.000	S15										
©1982-2019 Innovyze											

PJA															Page 9	
Seven House, High Street Longbridge Birmingham, B31 2UQ						06396 Rudloe Drive Quedgeley										
Date 01/09/2022						Designed by SWJ										
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX						Checked by DMcC										
Innovyze						Network 2019.1										
2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2																

PJA		Page 10									
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley										
Date 01/09/2022	Designed by SWJ										
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC										
Innovyze	Network 2019.1										
<p><u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2</u></p>											
<table> <thead> <tr> <th></th><th>US/MH</th><th>Level</th></tr> <tr> <th>PN</th><th>Name</th><th>Exceeded</th></tr> </thead> <tbody> <tr> <td>1.007</td><td>S25</td><td></td></tr> </tbody> </table>				US/MH	Level	PN	Name	Exceeded	1.007	S25	
	US/MH	Level									
PN	Name	Exceeded									
1.007	S25										
©1982-2019 Innovyze											

PJA										Page 11	
Seven House, High Street Longbridge Birmingham, B31 2UQ					06396 Rudloe Drive Quedgeley						
Date 01/09/2022					Designed by SWJ						
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX					Checked by DMcC						
Innovyze					Network 2019.1						
<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2</u>											
<u>Simulation Criteria</u>											
Areal Reduction Factor 1.000			Manhole Headloss Coeff (Global) 0.500			MADD Factor * 10m³/ha Storage 0.000					
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 0				Number of Storage Structures 0				Number of Real Time Controls 0			
<u>Synthetic Rainfall Details</u>											
Rainfall Model						FEH Data Type Point					
FEH Rainfall Version						2013 Cv (Summer) 0.750					
Site Location GB 381375 213365 SO 81375 13365						Cv (Winter) 0.840					
Margin for Flood Risk Warning (mm)						300.0		DVD Status ON			
Analysis Timestep 2.5 Second Increment (Extended)								Inertia Status ON			
DTS Status								ON			
Profile(s)						Summer and Winter					
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440											
Return Period(s) (years)						2, 30, 100					
Climate Change (%)						0, 0, 40					

PJA		Page 12									
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley										
Date 01/09/2022	Designed by SWJ										
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC										
Innovyze	Network 2019.1										
<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2</u>											
<table><tr><td></td><td>US/MH</td><td>Level</td></tr><tr><td>PN</td><td>Name</td><td>Exceeded</td></tr><tr><td>1.000</td><td>S15</td><td></td></tr></table>				US/MH	Level	PN	Name	Exceeded	1.000	S15	
	US/MH	Level									
PN	Name	Exceeded									
1.000	S15										
©1982-2019 Innovyze											

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

										Water	Surcharged	Flooded			Pipe	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	
1.001	S16	15 Winter	30	+0%	100/15 Summer				21.625	-0.155	0.000	0.46			38.7	OK
1.002	S17	15 Winter	30	+0%	100/15 Summer				21.419	-0.094	0.000	0.70			43.6	OK
1.003	S18	15 Winter	30	+0%	100/15 Summer				21.398	-0.053	0.000	0.99			72.3	OK
1.004	S19	15 Summer	30	+0%	100/15 Summer				21.188	-0.178	0.000	0.52			106.9	OK
2.000	S20	15 Winter	30	+0%	100/15 Summer				21.173	-0.077	0.000	0.88			54.6	OK
2.001	S21	15 Winter	30	+0%	100/15 Summer				21.037	-0.134	0.000	0.71			95.2	OK
1.005	S22	15 Winter	30	+0%	100/15 Summer				20.870	-0.083	0.000	0.76			207.0	OK
3.000	S23	15 Winter	30	+0%	100/15 Summer				21.476	-0.093	0.000	0.63			37.2	OK
1.006	S24	15 Winter	30	+0%	30/15 Winter				20.756	0.024	0.000	1.00			270.7	SURCHARGED
1.007	S25	15 Winter	30	+0%	100/15 Summer				20.626	0.000	0.000	1.42			271.8	OK

PN	US/MH Name	Level Exceeded
1.001	S16	
1.002	S17	
1.003	S18	
1.004	S19	
2.000	S20	
2.001	S21	
1.005	S22	
3.000	S23	
1.006	S24	


PJA		Page 14									
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley										
Date 01/09/2022	Designed by SWJ										
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC										
Innovyze	Network 2019.1										
<p><u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2</u></p>											
<table> <thead> <tr> <th></th><th>US/MH</th><th>Level</th></tr> <tr> <th>PN</th><th>Name</th><th>Exceeded</th></tr> </thead> <tbody> <tr> <td>1.007</td><td>S25</td><td></td></tr> </tbody> </table>				US/MH	Level	PN	Name	Exceeded	1.007	S25	
	US/MH	Level									
PN	Name	Exceeded									
1.007	S25										
©1982-2019 Innovyze											


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

										Water	Surcharged	Flooded			Pipe	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.001	S16	15	Winter	100	+40%	100/15	Summer			22.346	0.566	0.000	0.70		59.3	SURCHARGED
1.002	S17	15	Winter	100	+40%	100/15	Summer			22.210	0.697	0.000	1.09		68.2	SURCHARGED
1.003	S18	15	Winter	100	+40%	100/15	Summer			22.128	0.677	0.000	1.53		111.9	SURCHARGED
1.004	S19	15	Winter	100	+40%	100/15	Summer			21.928	0.562	0.000	0.83		169.2	SURCHARGED
2.000	S20	15	Winter	100	+40%	100/15	Summer			22.160	0.910	0.000	1.57		97.2	FLOOD RISK
2.001	S21	15	Winter	100	+40%	100/15	Summer			21.964	0.793	0.000	1.23		164.7	SURCHARGED
1.005	S22	15	Winter	100	+40%	100/15	Summer			21.634	0.681	0.000	1.32		361.8	SURCHARGED
3.000	S23	15	Winter	100	+40%	100/15	Summer			22.254	0.685	0.000	1.09		64.4	SURCHARGED
1.006	S24	15	Winter	100	+40%	30/15	Winter			21.225	0.493	0.000	1.87		504.7	SURCHARGED
1.007	S25	15	Winter	100	+40%	100/15	Summer			20.816	0.190	0.000	2.62		500.6	SURCHARGED








PN	US/MH Name	Level Exceeded
1.001	S16	
1.002	S17	
1.003	S18	
1.004	S19	
2.000	S20	
2.001	S21	
1.005	S22	
3.000	S23	
1.006	S24	

PJA		Page 18									
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley										
Date 01/09/2022	Designed by SWJ										
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC										
Innovyze	Network 2019.1										
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2</u>											
<table><thead><tr><th></th><th>US/MH</th><th>Level</th></tr><tr><th>PN</th><th>Name</th><th>Exceeded</th></tr></thead><tbody><tr><td>1.007</td><td>S25</td><td></td></tr></tbody></table>				US/MH	Level	PN	Name	Exceeded	1.007	S25	
	US/MH	Level									
PN	Name	Exceeded									
1.007	S25										
©1982-2019 Innovyze											

PJA		Page 0																											
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley																												
Date 01/09/2022	Designed by SWJ																												
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC																												
Innovyze	Network 2019.1																												
<p align="center"><u>STORM SEWER DESIGN by the Modified Rational Method</u></p> <p align="center"><u>Design Criteria for Surface Network 3</u></p> <p align="center">Pipe Sizes STANDARD Manhole Sizes STANDARD</p> <table> <tr> <td colspan="2">FEH Rainfall Model</td> <td></td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Volumetric Runoff Coeff. 0.750</td> </tr> <tr> <td></td> <td></td> <td>PIMP (%) 100</td> </tr> <tr> <td>FEH Rainfall Version</td> <td>2013</td> <td>Add Flow / Climate Change (%) 0</td> </tr> <tr> <td>Site Location GB 381375 213365 SO 81375 13365</td> <td></td> <td>Minimum Backdrop Height (m) 0.000</td> </tr> <tr> <td>Data Type</td> <td>Point</td> <td>Maximum Backdrop Height (m) 0.000</td> </tr> <tr> <td>Maximum Rainfall (mm/hr)</td> <td>500</td> <td>Min Design Depth for Optimisation (m) 1.200</td> </tr> <tr> <td>Maximum Time of Concentration (mins)</td> <td>30</td> <td>Min Vel for Auto Design only (m/s) 1.00</td> </tr> <tr> <td>Foul Sewage (l/s/ha)</td> <td>0.000</td> <td>Min Slope for Optimisation (1:X) 500</td> </tr> </table> <p align="center">Designed with Level Soffits</p>			FEH Rainfall Model			Return Period (years)	100	Volumetric Runoff Coeff. 0.750			PIMP (%) 100	FEH Rainfall Version	2013	Add Flow / Climate Change (%) 0	Site Location GB 381375 213365 SO 81375 13365		Minimum Backdrop Height (m) 0.000	Data Type	Point	Maximum Backdrop Height (m) 0.000	Maximum Rainfall (mm/hr)	500	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
FEH Rainfall Model																													
Return Period (years)	100	Volumetric Runoff Coeff. 0.750																											
		PIMP (%) 100																											
FEH Rainfall Version	2013	Add Flow / Climate Change (%) 0																											
Site Location GB 381375 213365 SO 81375 13365		Minimum Backdrop Height (m) 0.000																											
Data Type	Point	Maximum Backdrop Height (m) 0.000																											
Maximum Rainfall (mm/hr)	500	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																											
<p align="center"><u>Network Design Table for Surface Network 3</u></p> <p align="center">« - Indicates pipe capacity < flow</p> <table> <tr> <th>PN</th> <th>Length</th> <th>Fall</th> <th>Slope</th> <th>I.Area</th> <th>T.E.</th> <th>Base</th> <th>k</th> <th>HYD</th> <th>DIA</th> <th>Section</th> <th>Type</th> <th>Auto</th> </tr> <tr> <th>(m)</th> <th>(m)</th> <th>(1:X)</th> <th>(ha)</th> <th>(mins)</th> <th>Flow</th> <th>(l/s)</th> <th>(mm)</th> <th>SECT</th> <th>(mm)</th> <th></th> <th></th> <th>Design</th> </tr> </table> <p align="center"><u>Network Results Table</u></p>			PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Section	Type	Auto	(m)	(m)	(1:X)	(ha)	(mins)	Flow	(l/s)	(mm)	SECT	(mm)			Design	
PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Section	Type	Auto																	
(m)	(m)	(1:X)	(ha)	(mins)	Flow	(l/s)	(mm)	SECT	(mm)			Design																	
©1982-2019 Innovyze																													


PJA		Page 1																								
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley																									
Date 01/09/2022	Designed by SWJ																									
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC																									
Innovyze	Network 2019.1																									
<div>Network Design Table for Surface Network 3</div> <table><thead><tr><th>PN</th><th>Rain</th><th>T.C.</th><th>US/IL</th><th>Σ I</th><th>Area</th><th>Σ Base</th><th>Foul</th><th>Add Flow</th><th>Vel</th><th>Cap</th><th>Flow</th></tr><tr><th></th><th>(mm/hr)</th><th>(mins)</th><th>(m)</th><th></th><th>(ha)</th><th>Flow (l/s)</th><th>(l/s)</th><th>(l/s)</th><th>(m/s)</th><th>(l/s)</th><th>(l/s)</th></tr></thead></table>			PN	Rain	T.C.	US/IL	Σ I	Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow		(mm/hr)	(mins)	(m)		(ha)	Flow (l/s)	(l/s)	(l/s)	(m/s)	(l/s)	(l/s)
PN	Rain	T.C.	US/IL	Σ I	Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow															
	(mm/hr)	(mins)	(m)		(ha)	Flow (l/s)	(l/s)	(l/s)	(m/s)	(l/s)	(l/s)															
©1982-2019 Innovyze																										

Network Design Table for Surface Network 3

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow	k (l/s)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.000	15.817	0.095	166.5	0.055	5.00		0.0	0.600	o	300	Pipe/Conduit	
1.001	8.530	0.050	170.6	0.039	0.00		0.0	0.600	o	300	Pipe/Conduit	
1.002	42.931	0.255	168.4	0.024	0.00		0.0	0.600	o	300	Pipe/Conduit	
1.003	27.010	0.425	63.6	0.089	0.00		0.0	0.600	o	300	Pipe/Conduit	
2.000	29.227	0.525	55.7	0.068	5.00		0.0	0.600	o	300	Pipe/Conduit	
1.004	24.378	0.100	243.8	0.058	0.00		0.0	0.600	o	300	Pipe/Conduit	
1.005	22.677	0.100	226.8	0.066	0.00		0.0	0.600	o	375	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)
1.000	168.11	5.22	23.300	0.055	0.0	0.0	0.0	1.22	85.9	25.0
1.001	166.82	5.34	23.205	0.094	0.0	0.0	0.0	1.20	84.9	42.5
1.002	160.65	5.93	23.155	0.118	0.0	0.0	0.0	1.21	85.5	51.3
1.003	158.40	6.16	22.900	0.207	0.0	0.0	0.0	1.98	139.6	88.8
2.000	167.96	5.23	23.000	0.068	0.0	0.0	0.0	2.11	149.3	30.9
1.004	154.54	6.56	22.475	0.333	0.0	0.0	0.0	1.00	70.9«	139.4
1.005	151.67	6.88	22.300	0.399	0.0	0.0	0.0	1.20	132.4«	163.9

PJA		Page 3
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 01/09/2022	Designed by SWJ	
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC	
Innovyze	Network 2019.1	

Manhole Schedules for Surface Network 3

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S7	24.829	1.529	Open Manhole	1350	1.000	23.300	300				
S8	24.921	1.716	Open Manhole	1200	1.001	23.205	300	1.000	23.205	300	
S9	25.001	1.846	Open Manhole	1200	1.002	23.155	300	1.001	23.155	300	
S10	24.457	1.557	Open Manhole	1200	1.003	22.900	300	1.002	22.900	300	
S11	24.574	1.574	Open Manhole	1350	2.000	23.000	300				
S12	24.005	1.530	Open Manhole	1350	1.004	22.475	300	1.003	22.475	300	
								2.000	22.475	300	
S13	23.971	1.671	Open Manhole	1350	1.005	22.300	375	1.004	22.375	300	
S14	24.421	2.221	Open Manhole	1200		OUTFALL		1.005	22.200	375	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S7	381488.417	213322.297	381488.417	213322.297	Required	
S8	381474.271	213315.222	381474.271	213315.222	Required	

PJA		Page 5
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 01/09/2022	Designed by SWJ	
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC	
Innovyze	Network 2019.1	

Free Flowing Outfall Details for Surface Network 3

Outfall Pipe Number	Outfall C. Level Name (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	S14	24.421	22.200	0.000	1200

Simulation Criteria for Surface Network 3


Volumetric Runoff Coeff	0.750	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m ³ /ha Storage	0.000	Output Interval (mins)	1


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


Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	5	Winter Storms	No
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 381375 213365 SO 81375 13365	Cv (Winter)	0.840
Data Type	Point Storm	Duration (mins)	30

©1982-2019 Innovyze

PJA										Page 6	
Seven House, High Street Longbridge Birmingham, B31 2UQ					06396 Rudloe Drive Quedgeley						
Date 01/09/2022					Designed by SWJ						
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX					Checked by DMcC						
Innovyze					Network 2019.1						
<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3</u>											
<u>Simulation Criteria</u>											
Areal Reduction Factor 1.000			Manhole Headloss Coeff (Global) 0.500			MADD Factor * 10m³/ha Storage 0.000					
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 0				Number of Storage Structures 0				Number of Real Time Controls 0			
<u>Synthetic Rainfall Details</u>											
Rainfall Model					FEH		Data Type		Point		
FEH Rainfall Version					2013 Cv (Summer)		0.750				
Site Location GB 381375 213365 SO 81375 13365					Cv (Winter)		0.840				
Margin for Flood Risk Warning (mm)					300.0		DVD Status		ON		
Analysis Timestep 2.5 Second Increment (Extended)					Inertia Status		ON				
DTS Status					ON						
Profile(s)					Summer and Winter						
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440											
Return Period(s) (years) 2, 30, 100											
Climate Change (%) 0, 0, 40											


PJA		Page 7									
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley										
Date 01/09/2022	Designed by SWJ										
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC										
Innovyze	Network 2019.1										
<p><u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3</u></p>											
<table> <thead> <tr> <th></th><th>US/MH</th><th>Level</th></tr> <tr> <th>PN</th><th>Name</th><th>Exceeded</th></tr> </thead> <tbody> <tr> <td>1.000</td><td>S7</td><td></td></tr> </tbody> </table>				US/MH	Level	PN	Name	Exceeded	1.000	S7	
	US/MH	Level									
PN	Name	Exceeded									
1.000	S7										
©1982-2019 Innovyze											


PJA		Page 8
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 01/09/2022	Designed by SWJ	
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC	
Innovyze	Network 2019.1	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH		Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status
	Name	Storm							Level (m)	Depth (m)	Volume (m³)			Flow (l/s)	
1.001	S8	15 Winter	2	+0%	100/15 Summer				23.301	-0.204	0.000	0.22		13.4	OK
1.002	S9	15 Winter	2	+0%	100/15 Summer				23.248	-0.207	0.000	0.21		16.4	OK
1.003	S10	15 Winter	2	+0%	100/15 Summer				22.995	-0.205	0.000	0.22		27.7	OK
2.000	S11	15 Winter	2	+0%	100/15 Summer				23.055	-0.245	0.000	0.08		10.4	OK
1.004	S12	15 Winter	2	+0%	30/15 Summer				22.663	-0.112	0.000	0.71		44.6	OK
1.005	S13	15 Winter	2	+0%	30/15 Summer				22.481	-0.194	0.000	0.47		52.7	OK

US/MH		Level
PN	Name	Exceeded
1.001	S8	
1.002	S9	
1.003	S10	
2.000	S11	
1.004	S12	
1.005	S13	


PJA										Page 9	
Seven House, High Street Longbridge Birmingham, B31 2UQ					06396 Rudloe Drive Quedgeley						
Date 01/09/2022					Designed by SWJ						
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX					Checked by DMcC						
Innovyze					Network 2019.1						
<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3</u>											
<u>Simulation Criteria</u>											
Areal Reduction Factor 1.000			Manhole Headloss Coeff (Global) 0.500			MADD Factor * 10m³/ha Storage 0.000					
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 0				Number of Storage Structures 0				Number of Real Time Controls 0			
<u>Synthetic Rainfall Details</u>											
Rainfall Model			FEH			Data Type Point					
FEH Rainfall Version			2013 Cv (Summer)			0.750					
Site Location GB 381375 213365 SO 81375 13365			Cv (Winter)			0.840					
Margin for Flood Risk Warning (mm)			300.0			DVD Status ON					
Analysis Timestep 2.5 Second Increment (Extended)			Inertia Status ON								
DTS Status			ON								
Profile(s)			Summer and Winter								
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440											
Return Period(s) (years) 2, 30, 100											
Climate Change (%) 0, 0, 40											


PJA		Page 10									
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley										
Date 01/09/2022	Designed by SWJ										
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC										
Innovyze	Network 2019.1										
<p><u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3</u></p>											
<table> <thead> <tr> <th></th><th>US/MH</th><th>Level</th></tr> <tr> <th>PN</th><th>Name</th><th>Exceeded</th></tr> </thead> <tbody> <tr> <td>1.000</td><td>S7</td><td></td></tr> </tbody> </table>				US/MH	Level	PN	Name	Exceeded	1.000	S7	
	US/MH	Level									
PN	Name	Exceeded									
1.000	S7										
©1982-2019 Innovyze											

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH		Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Pipe		Status
	Name	Storm							Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	
1.001	S8	15 Winter	30	+0%	100/15 Summer				23.365	-0.140	0.000	0.54	33.3	OK
1.002	S9	15 Winter	30	+0%	100/15 Summer				23.311	-0.144	0.000	0.52	41.3	OK
1.003	S10	15 Winter	30	+0%	100/15 Summer				23.107	-0.093	0.000	0.55	68.6	OK
2.000	S11	15 Winter	30	+0%	100/15 Summer				23.085	-0.215	0.000	0.18	23.7	OK
1.004	S12	15 Winter	30	+0%	30/15 Summer				22.982	0.207	0.000	1.71	107.7	SURCHARGED
1.005	S13	15 Winter	30	+0%	30/15 Summer				22.686	0.011	0.000	1.11	126.1	SURCHARGED

PN	US/MH Name	Level Exceeded
1.001	S8	
1.002	S9	
1.003	S10	
2.000	S11	
1.004	S12	
1.005	S13	


PJA										Page 12	
Seven House, High Street Longbridge Birmingham, B31 2UQ					06396 Rudloe Drive Quedgeley						
Date 01/09/2022					Designed by SWJ						
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX					Checked by DMcC						
Innovyze					Network 2019.1						
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3</u>											
<u>Simulation Criteria</u>											
Areal Reduction Factor 1.000			Manhole Headloss Coeff (Global) 0.500			MADD Factor * 10m³/ha Storage 0.000					
Hot Start (mins) 0			Foul Sewage per hectare (l/s) 0.000			Inlet Coefficient 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 0				Number of Storage Structures 0				Number of Real Time Controls 0			
<u>Synthetic Rainfall Details</u>											
Rainfall Model					FEH		Data Type Point				
FEH Rainfall Version					2013 Cv (Summer) 0.750						
Site Location GB 381375 213365 SO 81375 13365					Cv (Winter) 0.840						
Margin for Flood Risk Warning (mm)					300.0		DVD Status ON				
Analysis Timestep 2.5 Second Increment (Extended)					Inertia Status ON						
DTS Status					ON						
Profile(s)					Summer and Winter						
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440											
Return Period(s) (years) 2, 30, 100											
Climate Change (%) 0, 0, 40											

PJA		Page 13									
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley										
Date 01/09/2022	Designed by SWJ										
File 22.08.30 SITE3D DRAINAGE MODELS (REV D).MDX	Checked by DMcC										
Innovyze	Network 2019.1										
<p><u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3</u></p>											
<table> <thead> <tr> <th></th><th>US/MH</th><th>Level</th></tr> <tr> <th>PN</th><th>Name</th><th>Exceeded</th></tr> </thead> <tbody> <tr> <td>1.000</td><td>S7</td><td></td></tr> </tbody> </table>				US/MH	Level	PN	Name	Exceeded	1.000	S7	
	US/MH	Level									
PN	Name	Exceeded									
1.000	S7										
©1982-2019 Innovyze											

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

										Water	Surcharged	Flooded	Pipe		
PN	US/MH	Storm	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Flow	Status
	Name		Period	Change	Surge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	
1.001	S8	15 Winter	100	+40%	100/15 Summer				24.396	0.891	0.000	0.87		53.1	SURCHARGED
1.002	S9	15 Winter	100	+40%	100/15 Summer				24.315	0.860	0.000	0.83		66.4	SURCHARGED
1.003	S10	15 Winter	100	+40%	100/15 Summer				24.149	0.949	0.000	0.87		109.2	SURCHARGED
2.000	S11	15 Winter	100	+40%	100/15 Summer				23.918	0.618	0.000	0.30		40.5	SURCHARGED
1.004	S12	15 Winter	100	+40%	30/15 Summer				23.800	1.025	0.000	2.87		181.5	FLOOD RISK
1.005	S13	15 Winter	100	+40%	30/15 Summer				22.940	0.265	0.000	1.90		214.6	SURCHARGED

	US/MH	Level
PN	Name	Exceeded
1.001	S8	
1.002	S9	
1.003	S10	
2.000	S11	
1.004	S12	
1.005	S13	

PJA		Page 0
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022 File 22.09.26 SITE3D DRAINAG...	Designed by SWJ Checked by DMcC	
Innovyze	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes	STANDARD	Manhole Sizes	STANDARD
FEH Rainfall Model			
Return Period (years)			5
FEH Rainfall Version			2013
Site Location	GB 381375 213365	SO 81375 13365	
Data Type			Point
Maximum Rainfall (mm/hr)			50
Maximum Time of Concentration (mins)			30
Foul Sewage (l/s/ha)			0.000
Volumetric Runoff Coeff.			0.750
PIMP (%)			100
Add Flow / Climate Change (%)			0
Minimum Backdrop Height (m)			0.000
Maximum Backdrop Height (m)			0.000
Min Design Depth for Optimisation (m)			1.200
Min Vel for Auto Design only (m/s)			1.00
Min Slope for Optimisation (1:X)			500









Designed with Level Soffits

Time Area Diagram for Surface Network 1

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.376	4-8	0.219
Total Area Contributing (ha) = 0.595			
Total Pipe Volume (m³) = 22.454			


Network Design Table for Surface Network 1

« - 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
1.000	39.134	0.170	230.2	0.077	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	23.809	0.099	240.5	0.122	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	7.837	0.171	45.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	23.310	0.090	259.0	0.024	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.004	17.004	0.055	309.0	0.040	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	6.832	0.021	325.0	0.006	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.000	30.837	0.130	237.2	0.047	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	37.725	0.385	98.0	0.071	0.00	0.0	0.600	o	300	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)
1.000	50.00	5.63	22.700	0.077	0.0	0.0	0.0	1.03	72.9	10.4
1.001	50.00	6.03	22.530	0.199	0.0	0.0	0.0	1.01	71.4	26.9
1.002	50.00	6.08	22.431	0.199	0.0	0.0	0.0	2.33	164.6	26.9
1.003	50.00	6.43	22.185	0.223	0.0	0.0	0.0	1.12	123.8	30.2
1.004	50.00	6.70	22.095	0.263	0.0	0.0	0.0	1.03	113.3	35.6
1.005	50.00	6.82	22.040	0.269	0.0	0.0	0.0	1.00	110.4	36.4
2.000	50.00	5.51	22.700	0.047	0.0	0.0	0.0	1.02	71.9	6.4
2.001	50.00	5.90	22.570	0.118	0.0	0.0	0.0	1.59	112.3	16.0

PJA		Page 1
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022 File 22.09.26 SITE3D DRAINAG...	Designed by SWJ Checked by DMcC	
Innovyze	Network 2019.1	

Network Design Table for Surface Network 1

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
2.002	16.314	0.050	326.3	0.105	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.003	13.142	0.041	320.5	0.075	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.006	9.819	0.024	409.1	0.028	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	6.786	0.020	339.3	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	6.826	0.030	227.5	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	10.501	0.060	175.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.002	50.00	6.17	22.110	0.223	0.0	0.0	0.0	1.00	110.2	30.2
2.003	50.00	6.39	22.060	0.298	0.0	0.0	0.0	1.01	111.2	40.4
1.006	50.00	6.98	21.944	0.595	0.0	0.0	0.0	1.00	158.9	80.6
1.007	50.00	7.08	21.920	0.595	0.0	0.0	0.0	1.10	174.6	80.6
1.008	50.00	7.17	21.900	0.595	0.0	0.0	0.0	1.34	213.7	80.6
1.009	50.00	7.35	21.870	0.595	0.0	0.0	0.0	0.99	39.2	80.6

Free Flowing Outfall Details for Surface Network 1


Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009	S40	22.186	21.810	0.000	0	0

Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
		Number of Storage Structures	1
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	5	Winter Storms	No
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 381375 213365 SO 81375 13365	Cv (Winter)	0.840
Data Type	Point	Storm Duration (mins)	30

PJA		Page 2
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022	Designed by SWJ	
File 22.09.26 SITE3D DRAINAG...	Checked by DMcC	
Innovyze	Network 2019.1	

Online Controls for Surface Network 1


Hydro-Brake® Optimum Manhole: S39 FCC, DS/PN: 1.009, Volume (m³): 14.3

Unit Reference	MD-SHE-0194-2000-1330-2000	Sump Available	Yes
Design Head (m)	1.330	Diameter (mm)	194
Design Flow (l/s)	20.0	Invert Level (m)	21.870
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
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)	1.330	20.0	Kick-Flo®	0.895	16.6
Flush-Flo™	0.406	20.0	Mean Flow over Head Range	-	17.2

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)
0.100	6.7	0.800	18.2	2.000	24.3	4.000	33.9	7.000	44.4
0.200	18.0	1.000	17.5	2.200	25.4	4.500	35.8	7.500	45.9
0.300	19.7	1.200	19.0	2.400	26.5	5.000	37.7	8.000	47.4
0.400	20.0	1.400	20.5	2.600	27.5	5.500	39.5	8.500	48.8
0.500	19.8	1.600	21.8	3.000	29.5	6.000	41.2	9.000	50.1
0.600	19.5	1.800	23.1	3.500	31.8	6.500	42.8	9.500	51.5

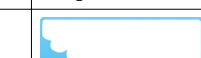
PJA		Page 3
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022 File 22.09.26 SITE3D DRAINAG...	Designed by SWJ Checked by DMcC	
Innovyze	Network 2019.1	

Storage Structures for Surface Network 1

Tank or Pond Manhole: S38 Basin, DS/PN: 1.008

Invert Level (m) 21.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	46.5	0.750	159.8	0.850	224.5	1.600	393.2	1.601	393.2

PJA		Page 4
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022	Designed by SWJ	
File 22.09.26 SITE3D DRAINAG...	Checked by DMcC	
Innovyze	Network 2019.1	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
		Number of Storage Structures	1
		Number of Real Time Controls	0

Synthetic Rainfall Details


Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 381375 213365 SO 81375 13365	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.
1.000	S27	15 Winter	2	+0%	30/15 Winter				22.784	-0.216	0.000	0.17
1.001	S28	15 Winter	2	+0%	30/15 Summer				22.667	-0.163	0.000	0.42
1.002	S29	15 Winter	2	+0%	30/15 Summer				22.535	-0.196	0.000	0.26
1.003	S30	15 Winter	2	+0%	30/15 Summer				22.335	-0.225	0.000	0.28
1.004	S31	15 Winter	2	+0%	30/15 Summer				22.283	-0.187	0.000	0.36
1.005	S32	30 Winter	2	+0%	30/15 Summer				22.269	-0.146	0.000	0.41
2.000	S33	15 Winter	2	+0%	100/15 Summer				22.766	-0.234	0.000	0.11
2.001	S34	15 Winter	2	+0%	100/15 Summer				22.650	-0.220	0.000	0.16
2.002	S35	15 Winter	2	+0%	30/15 Summer				22.288	-0.197	0.000	0.33
2.003	S36	30 Winter	2	+0%	30/15 Summer				22.272	-0.163	0.000	0.38
1.006	S37	30 Winter	2	+0%	30/15 Summer				22.266	-0.128	0.000	0.67
1.007	S41	30 Winter	2	+0%	30/15 Summer				22.256	-0.114	0.000	0.61
1.008	S38 Basin	30 Winter	2	+0%	30/15 Summer				22.248	-0.102	0.000	0.18
1.009	S39 FCC	30 Winter	2	+0%	2/15 Summer				22.238	0.143	0.000	0.61

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S27		11.6	OK	
1.001	S28		26.9	OK	
1.002	S29		26.8	OK	
1.003	S30		29.6	OK	
1.004	S31		33.2	OK	
1.005	S32		29.1	OK	
2.000	S33		7.1	OK	
2.001	S34		16.2	OK	
2.002	S35		29.1	OK	
2.003	S36		32.2	OK	
1.006	S37		63.2	OK	
1.007	S41		62.5	OK	
1.008	S38 Basin		23.8	OK	
1.009	S39 FCC		19.9	SURCHARGED	

PJA		Page 5
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022 File 22.09.26 SITE3D DRAINAG...	Designed by SWJ Checked by DMcC	
Innovyze	Network 2019.1	

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

Simulation Criteria

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0


Synthetic Rainfall Details

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

	Profile(s)	Summer and Winter
	Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
	Return Period(s) (years)	2, 30, 100
	Climate Change (%)	0, 0, 40

PN	US/MH		Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.
	Name									Level (m)	Depth (m)	Volume (m³)	
1.000	S27	15	Winter	30	+0%	30/15	Winter			23.021	0.021	0.000	0.37
1.001	S28	15	Winter	30	+0%	30/15	Summer			22.938	0.108	0.000	0.95
1.002	S29	15	Winter	30	+0%	30/15	Summer			22.852	0.121	0.000	0.54
1.003	S30	60	Winter	30	+0%	30/15	Summer			22.790	0.230	0.000	0.34
1.004	S31	60	Winter	30	+0%	30/15	Summer			22.735	0.265	0.000	0.46
1.005	S32	60	Winter	30	+0%	30/15	Summer			22.702	0.287	0.000	0.60
2.000	S33	15	Winter	30	+0%	100/15	Summer			22.802	-0.198	0.000	0.25
2.001	S34	60	Winter	30	+0%	100/15	Summer			22.713	-0.157	0.000	0.21
2.002	S35	60	Winter	30	+0%	30/15	Summer			22.708	0.223	0.000	0.45
2.003	S36	60	Winter	30	+0%	30/15	Summer			22.704	0.269	0.000	0.65
1.006	S37	60	Winter	30	+0%	30/15	Summer			22.699	0.305	0.000	1.05
1.007	S41	60	Winter	30	+0%	30/15	Summer			22.694	0.324	0.000	0.94
1.008	S38 Basin	60	Winter	30	+0%	30/15	Summer			22.690	0.340	0.000	0.18
1.009	S39 FCC	60	Winter	30	+0%	2/15	Summer			22.689	0.594	0.000	0.61

PN	US/MH Name	Overflow (1/s)	Pipe Flow (1/s)	Status	Level Exceeded
1.000	S27		25.2	SURCHARGED	
1.001	S28		60.0	SURCHARGED	
1.002	S29		56.3	SURCHARGED	
1.003	S30		36.3	SURCHARGED	
1.004	S31		42.6	SURCHARGED	
1.005	S32		42.7	SURCHARGED	
2.000	S33		16.1	OK	
2.001	S34		22.3	OK	
2.002	S35		40.7	SURCHARGED	
2.003	S36		54.4	SURCHARGED	
1.006	S37		98.6	SURCHARGED	
1.007	S41		96.5	SURCHARGED	
1.008	S38 Basin		24.7	SURCHARGED	
1.009	S39 FCC		19.9	SURCHARGED	

PJA		Page 6
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022	Designed by SWJ	
File 22.09.26 SITE3D DRAINAG...	Checked by DMcC	
Innovyze	Network 2019.1	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details


Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 381375 213365 SO 81375 13365 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)
1.000	S27	15 Winter	100	+40%	30/15 Winter				24.101	1.101	0.000
1.001	S28	15 Winter	100	+40%	30/15 Summer				24.017	1.187	0.000
1.002	S29	15 Winter	100	+40%	30/15 Summer				23.708	0.977	0.000
1.003	S30	15 Winter	100	+40%	30/15 Summer				23.522	0.962	0.000
1.004	S31	15 Winter	100	+40%	30/15 Summer				23.416	0.946	0.000
1.005	S32	15 Winter	100	+40%	30/15 Summer				23.299	0.884	0.000
2.000	S33	15 Winter	100	+40%	100/15 Summer				23.659	0.659	0.000
2.001	S34	15 Winter	100	+40%	100/15 Summer				23.581	0.711	0.000
2.002	S35	15 Winter	100	+40%	30/15 Summer				23.432	0.947	0.000
2.003	S36	15 Winter	100	+40%	30/15 Summer				23.332	0.897	0.000
1.006	S37	120 Winter	100	+40%	30/15 Summer				23.204	0.810	0.000
1.007	S41	120 Winter	100	+40%	30/15 Summer				23.198	0.828	0.000
1.008	S38 Basin	120 Winter	100	+40%	30/15 Summer				23.194	0.844	0.000
1.009	S39 FCC	120 Winter	100	+40%	2/15 Summer				23.192	1.097	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S27	0.64		43.2	FLOOD RISK	
1.001	S28	1.78		113.0	FLOOD RISK	
1.002	S29	1.05		108.7	FLOOD RISK	
1.003	S30	1.12		118.9	SURCHARGED	
1.004	S31	1.48		137.0	SURCHARGED	
1.005	S32	1.96		139.1	FLOOD RISK	
2.000	S33	0.40		26.1	SURCHARGED	
2.001	S34	0.62		64.3	SURCHARGED	
2.002	S35	1.40		125.3	FLOOD RISK	
2.003	S36	2.00		168.1	FLOOD RISK	
1.006	S37	1.29		121.5	SURCHARGED	
1.007	S41	1.18		120.9	SURCHARGED	
1.008	S38 Basin	0.19		25.7	SURCHARGED	
1.009	S39 FCC	0.61		20.0	SURCHARGED	

PJA		Page 0
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022 File 22.09.26 SITE3D DRAINAG...	Designed by SWJ Checked by DMcC	
Innovyze	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 4

Pipe Sizes	STANDARD	Manhole Sizes	STANDARD
FEH Rainfall Model			
Return Period (years)			5
FEH Rainfall Version			2013
Site Location	GB 381375 213365	SO 81375 13365	
Data Type			Point
Maximum Rainfall (mm/hr)			50
Maximum Time of Concentration (mins)			30
Foul Sewage (l/s/ha)			0.000
Volumetric Runoff Coeff.			0.750
PIMP (%)			100
Add Flow / Climate Change (%)			0
Minimum Backdrop Height (m)			0.000
Maximum Backdrop Height (m)			0.000
Min Design Depth for Optimisation (m)			1.200
Min Vel for Auto Design only (m/s)			1.00
Min Slope for Optimisation (1:X)			500






Designed with Level Soffits

Time Area Diagram for Surface Network 4

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.163	4-8	0.071
Total Area Contributing (ha) = 0.234			
Total Pipe Volume (m³) = 2.748			


Network Design Table for Surface Network 4

« - 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
1.000	14.646	0.029	505.0	0.124	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	6.366	0.125	50.9	0.110	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	7.318	0.125	58.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	33.278	0.383	86.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	8.909	0.182	49.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.35	23.029	0.124	0.0	0.0	0.0	0.69	49.0	16.8
1.001	50.00	5.40	23.000	0.234	0.0	0.0	0.0	2.21	156.1	31.7
1.002	50.00	5.46	22.875	0.234	0.0	0.0	0.0	2.06	145.5	31.7
1.003	50.00	5.97	22.750	0.234	0.0	0.0	0.0	1.08	19.1«	31.7
1.004	50.00	6.08	22.367	0.234	0.0	0.0	0.0	1.44	25.5«	31.7

PJA		Page 1
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022 File 22.09.26 SITE3D DRAINAG...	Designed by SWJ Checked by DMcC	
Innovyze Network 2019.1		

Free Flowing Outfall Details for Surface Network 4

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004	S6	22.863	22.185	0.000	0	0

Simulation Criteria for Surface Network 4


Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	5	Winter Storms	No
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 381375 213365 SO 81375 13365	Cv (Winter)	0.840
Data Type	Point	Storm Duration (mins)	30

©1982-2019 Innovyze

PJA		Page 2
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022	Designed by SWJ	
File 22.09.26 SITE3D DRAINAG...	Checked by DMCC	
Innovyze	Network 2019.1	

Online Controls for Surface Network 4


Hydro-Brake® Optimum Manhole: S4 FCC, DS/PN: 1.003, Volume (m³): 15.4

Unit Reference	MD-SHE-0088-4000-1450-4000	Sump Available	Yes
Design Head (m)	1.450	Diameter (mm)	88
Design Flow (l/s)	4.0	Invert Level (m)	22.750
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)	1.450	4.0	Kick-Flo®	0.786	3.0
Flush-Flo™	0.385	3.8	Mean Flow over Head Range	-	3.4

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)
0.100	2.7	0.800	3.0	2.000	4.6	4.000	6.4	7.000	8.4
0.200	3.5	1.000	3.4	2.200	4.9	4.500	6.8	7.500	8.6
0.300	3.7	1.200	3.7	2.400	5.1	5.000	7.1	8.000	8.9
0.400	3.8	1.400	3.9	2.600	5.2	5.500	7.5	8.500	9.2
0.500	3.7	1.600	4.2	3.000	5.6	6.000	7.8	9.000	9.4
0.600	3.6	1.800	4.4	3.500	6.0	6.500	8.1	9.500	9.7


PJA		Page 3
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022 File 22.09.26 SITE3D DRAINAG...	Designed by SWJ Checked by DMcC	
Innovyze	Network 2019.1	

Storage Structures for Surface Network 4

Tank or Pond Manhole: S2 Basin, DS/PN: 1.001

Invert Level (m) 23.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	7.9	0.650	72.9	0.850	165.1	1.500	279.2	1.501	279.2

PJA		Page 4
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022	Designed by SWJ	
File 22.09.26 SITE3D DRAINAG...	Checked by DMCC	
Innovyze	Network 2019.1	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Surface Network 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details


Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 381375 213365 SO 81375 13365	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.
1.000	S1	120 Winter	2	+0%	2/15 Winter				23.424	0.095	0.000	0.20
1.001	S2 Basin	120 Winter	2	+0%	2/15 Summer				23.422	0.122	0.000	0.09
1.002	S3	120 Winter	2	+0%	2/15 Summer				23.420	0.245	0.000	0.08
1.003	S4 FCC	120 Winter	2	+0%	2/15 Summer				23.419	0.519	0.000	0.20
1.004	S5	480 Winter	2	+0%					22.408	-0.109	0.000	0.17

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1		6.4	SURCHARGED	
1.001	S2 Basin		7.8	SURCHARGED	
1.002	S3		6.9	SURCHARGED	
1.003	S4 FCC		3.7	SURCHARGED	
1.004	S5		3.7	OK	

PJA		Page 5
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022	Designed by SWJ	
File 22.09.26 SITE3D DRAINAG...	Checked by DMcC	
Innovyze	Network 2019.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Surface Network 4

Simulation Criteria

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

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details


Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 381375 213365 SO 81375 13365 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.
1.000	S1	120 Winter	30	+0%	2/15 Winter				23.836	0.507	0.000	0.45
1.001	S2 Basin	120 Winter	30	+0%	2/15 Summer				23.834	0.534	0.000	0.08
1.002	S3	120 Winter	30	+0%	2/15 Summer				23.832	0.657	0.000	0.07
1.003	S4 FCC	120 Winter	30	+0%	2/15 Summer				23.830	0.930	0.000	0.20
1.004	S5	1440 Winter	30	+0%					22.408	-0.109	0.000	0.17

		<u>Pipe</u>			
PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1		14.1	SURCHARGED	
1.001	S2 Basin		7.1	SURCHARGED	
1.002	S3		6.3	SURCHARGED	
1.003	S4 FCC		3.7	SURCHARGED	
1.004	S5		3.7	OK	

PJA		Page 6
Seven House, High Street Longbridge Birmingham, B31 2UQ	06396 Rudloe Drive Quedgeley	
Date 30/09/2022	Designed by SWJ	
File 22.09.26 SITE3D DRAINAG...	Checked by DMcC	
Innovyze	Network 2019.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 4

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
		Number of Storage Structures	1
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 381375 213365 SO 81375 13365	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.
1.000	S1	240 Winter	100	+40%	2/15 Winter				24.198	0.869	0.000	0.52
1.001	S2 Basin	240 Winter	100	+40%	2/15 Summer				24.196	0.896	0.000	0.07
1.002	S3	240 Winter	100	+40%	2/15 Summer				24.194	1.019	0.000	0.06
1.003	S4 FCC	240 Winter	100	+40%	2/15 Summer				24.192	1.292	0.000	0.22
1.004	S5	240 Winter	100	+40%					22.409	-0.108	0.000	0.18

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1		16.4	SURCHARGED	
1.001	S2 Basin		6.5	SURCHARGED	
1.002	S3		5.5	SURCHARGED	
1.003	S4 FCC		4.0	SURCHARGED	
1.004	S5		4.0	OK	