

**SURFACE WATER AND FOUL WATER DRAINAGE STRATEGY
INCORPORATING AN ASSESSMENT OF FLOOD RISK**

for

CITYSIDE UK Ltd.

PROPOSED RESIDENTIAL APARTMENTS

at

SPARTH HOUSE, MANCHESTER ROAD, ROCHDALE, OL11 3QY

JULY 2025

Project No.: 11610				
Issue Date	Revision	Status	Issued By	Checked By
04.07.2025	P1	First Issue	R Ford	KLH
31.10.2025	P2	Second Issue	R Ford	KLH
19.12.2025	P3	Third Issue	K Harrison	T Fryars

**Reid Jones Partnership Ltd
3 Cross Street
Preston
PR1 3LT**

Tel: 01772 498007

Email: enq@reidjonespartnership.co.uk



CONTENTS

SECTION	TITLE	PAGE
1	INTRODUCTION	3
2	BASE INFORMATION	4
3	PROPOSED DRAINAGE STRATEGY	6
4	SUMMARY AND CONCLUSIONS	9

APPENDICES

A	Location plan
B	United Utilities sewer records
C	Proposed drainage layout
D	Urban Green General Arrangement Plan
E	Infiltration Test Results
F	Surface water drainage design

1. INTRODUCTION

- 1.1 This surface water and foul water drainage strategy, including an assessment of flood risk, has been prepared on behalf of Cityside UK Ltd in support of a planning application for a proposed residential care home development at Sparth House, 185 Manchester Road, Rochdale, OL11 3QY. A location plan is provided in Appendix A.
- 1.2 This drainage strategy outlines the existing site conditions and details the proposed development. It assesses the potential impacts on the current drainage infrastructure and sets out a strategy for the design and implementation of new drainage systems to serve the development.

2. BASE INFORMATION

Existing site

- 2.1 The proposal concerns a roughly rectangular parcel of land, approximately 1,868 m² in area, located within Rochdale in the vicinity of The Highfield Hospital. The site is currently a domestic property with a large rear garden.
- 2.2 The site is bounded by Manchester Road to the west, domestic properties to the north and south and a private road / land to the east, which in turn is bordered by Castleton Bowling Club.

Understanding of existing drainage local to the site

- 2.3 The nearest Main River is the River Roch that is located approx. 1km to the west of the site.
- 2.4 The nearest off-site surface water feature is an unnamed ordinary watercourse located 118m to the northwest of the site within third party land, Mandale Park.
- 2.5 Sewer records obtained from United Utilities, included in Appendix B, indicate the presence of a 300mm diameter public combined sewer located within Manchester Road. The sewer flows southward beneath Manchester Road and conveys both foul water and surface water runoff from the surrounding urban area.
- 2.6 The existing domestic property drains to the public sewer.

Site geology

- 2.7 Trial holes categorise the soil as gravelly silty fine to medium sand that becomes more clayey with depth.

Flood risk

- 2.8 The Flood Map for Planning identifies the site lying within Flood Zone 1, the lowest risk, and is identified as land assessed as having a less than 0.1% annual probability of river or sea flooding.

- 2.9 The Long Term Flood Risk map on the GOV.uk website shows the site is at a very low risk of surface water flooding. A very low risk means that each year, this area has a chance of flooding of less than 0.1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.
- 2.10 The Rochdale Canal lies approx. 750m to the southeast of the site.
- 2.11 The Environment Agency risk of flooding from reservoirs map identifies the site is not at risk.
- 2.12 United Utilities sewer mapping indicates the presence of a 300mm diameter public combined sewer located within Manchester Road flowing to the south. If the sewer were to surcharge, then it would flow along Manchester Road and not affect the site.
- 2.13 Groundwater flooding is not considered to be a significant flood risk factor.
- 2.14 Surface water runoff from the development will be controlled prior to discharge from the developed site and attenuation provided. As such there will be no change to the flood risk upstream or downstream of this location.

Proposed development

- 2.15 The proposal involves the development of a low-rise residential care home on a site that is currently in use as a private domestic property.

3. PROPOSED DRAINAGE STRATEGY

3.1 The proposed drainage layout is included within Appendix C.

Surface water drainage

3.2 In accordance with the National Standards for Sustainable Drainage, the drainage strategy should incorporate the use of Sustainable Drainage (SUDS) where possible. In the first instance surface water runoff should be collected for non-potable use. After which water should be disposed of via infiltration. If drainage cannot be achieved solely through infiltration due to site conditions or contamination risks, the preferred options are (in order of preference):

- (i) a controlled discharge to a local waterbody or watercourse, or
- (ii) a controlled discharge into the public sewer network (depending on availability and capacity).

3.4 Appendix D shows proposals for incorporation of Rainwater Garden areas for on-site use of non-potable water. Attic areas within the scheme are utilised as accommodation with vaulted ceilings and roof levels cannot be raised due to consideration of neighbouring properties. Installation of a header tank, pressure vessels and disinfection equipment necessary to re-use non-potable water for WCs is therefore not possible.

3.5 The rates and volume of discharge should be restricted to the pre-development values as far as practicable.

3.6 Soakaway tests have been carried out on the site. Infiltration rates varied from 3.34×10^{-7} m/ sec to 5.82×10^{-6} m/ sec. The low infiltration rates measured are unsuitable for complete discharge of surface water runoff via infiltration. It is proposed to use permeable asphalt to hard landscaped areas to allow as much surface water as possible to infiltrate slowly into the ground, with outlets to an attenuation tank to cater for periods of sustained heavy rainfall when the infiltration rate will not allow full permeation.

- 3.7 The nearest off-site surface water feature is an unnamed ordinary watercourse located 118m to the northwest of the site within third party land, Mandale Park. A site survey has been carried out to investigate the possibility of a controlled discharge to this watercourse. The watercourse is a shallow ditch adjacent to a footpath through a densely wooded area of the park (fig 1 and 2).

The works required to install a surface water drainage run to discharge to this ditch are considered excessive and counter productive to the aims and ethos of the SUDS hierarchy. These works would require the following:

- A phased partial closure of Manchester Road to install the drainage run at a depth of at least 1.2mBGL.
- Completion of a build over agreement between the client and United Utilities for the 300mm diameter vitrified clay sewer located at approx. 3.1m depth.
- The drainage run would need to avoid all public utilities buried within Manchester Road while maintaining a suitable depth and fall to route to the water feature.
- Removal of at least 200m² of green vegetation through a public park to the ditch during the enabling works. This green vegetation includes mature trees which should be corroborated by an arboriculturist prior to tendering for the works.
- Excavation of at least 200m² of ground containing mature tree roots and wildlife habitat. It is likely to be necessary to fell trees between Manchester Road and the water course to safely install the buried drainage run.
- An agreement with Rochdale Borough Council to all of the above prior to tendering for these works.
- A loss of public amenity space for the duration of the works.
- Re-wilding/ planting of the construction area and reinstatement of the public footpath.

It is considered that the works would have a disproportional negative impact on the environment and the local community and the cost and complexity of this work is unviable.

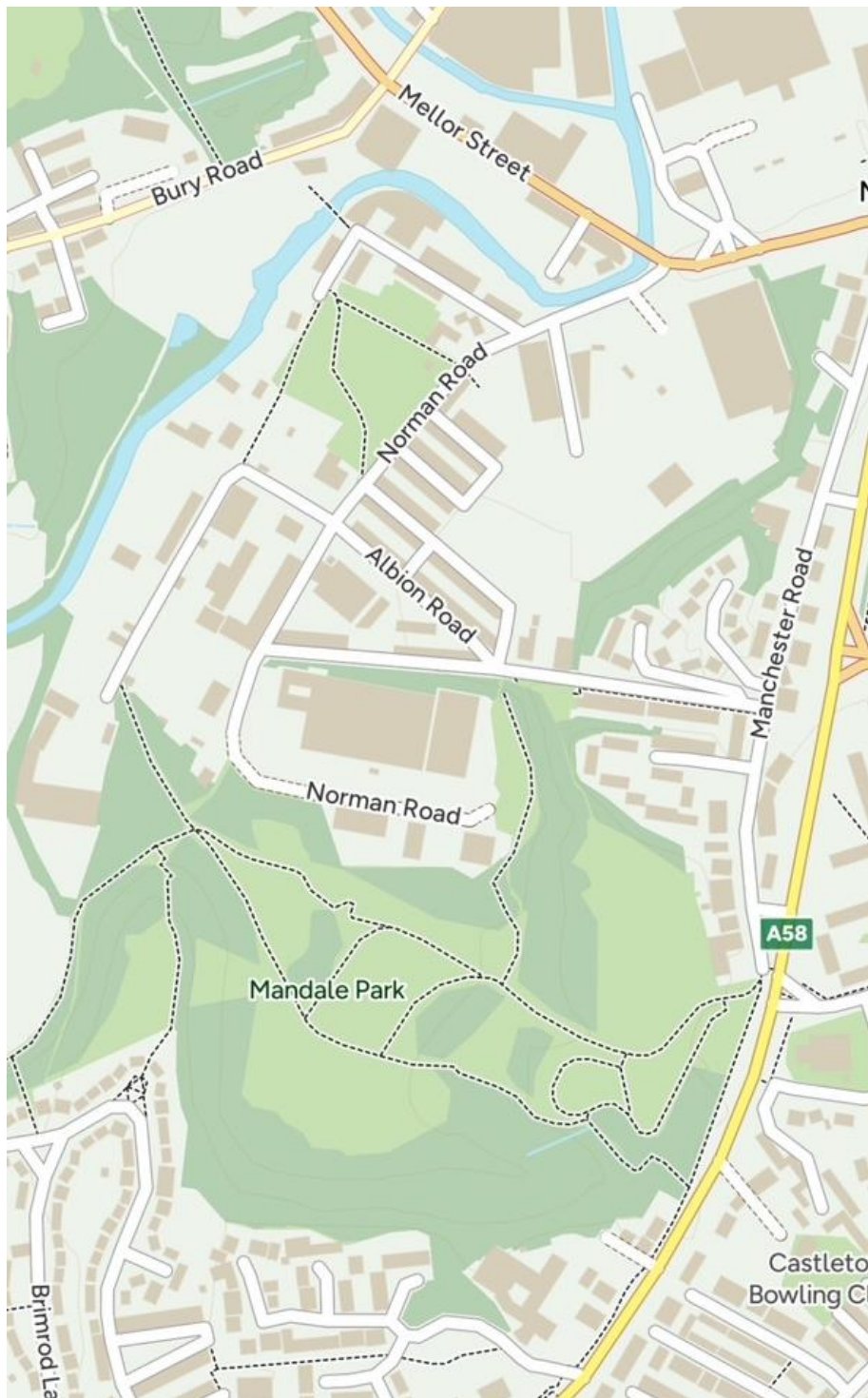


Figure 1



Figure 2



Photo 1 - View of Mandale Park from east side of Manchester Road



Photo 2 - Entrance to Mandale Park opposite site.



Photo 3 - Ditch adjacent to footpath identified as Water Course on OS Map



Photo 4 - Continuation of ditch away from footpath

- 3.8 United Utilities sewer records indicate a 300mm diameter public combined sewer located within Manchester Road flowing southward. This sewer conveys both foul water and surface water runoff from the surrounding urban area.
- 3.9 It is therefore intended that rain garden planting will be incorporated into the external works to use non-potable water within the site. Permeable asphalt will be used to allow infiltration of rainwater to the ground below tarmac areas with connection to the attenuation tank to cater for periods of sustained heavy rainfall on low permeability sub-soil. New surface water drainage will be constructed, appropriately sized to take surface water runoff from the new roofs and hardstanding areas not used in rain gardens or disposed of through infiltration. This will be controlled to the existing pre-development Greenfield runoff rate, Q_{bar} , or 2.0 l/s whichever is the greater, allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 45% on stored volumes to discharge into the public combined sewer located within Manchester Road. The additional 45% is to allow for climate change and has been included in the surface water volume.

3.10 To determine the restricted surface water discharge rate from the developed site, the pre-development Greenfield runoff rates have been calculated using the 'Causeway Flow' programme. The calculations are based upon the area of the development site and this has been measured as 0.187ha. The existing pre-development Greenfield runoff rates have been calculated as below:

Pre-development discharge

Site Makeup	Brownfield ▼
Brownfield Method	Greenfield ▼
Greenfield Method	IH124 ▼
Positively Drained Area (ha)	0.187
SAAR (mm)	1129
Soil Index	5 ▼
SPR	0.53
Region	10 ▼
Betterment (%)	0
	Calc
QBar (l/s)	2.1

Return Period (years)	Growth Factor	Q (l/s)
1	0.85	
30	1.95	
100	2.48	

3.11 As the existing pre-development Greenfield runoff rate, Qbar, has been calculated as 2.1 l/s, it is intended that new surface water drainage will therefore be constructed, appropriately sized to take surface water runoff from the proposed development and be attenuated to 2.1 l/s prior to a controlled discharge into the public combined sewer located within Manchester Road.

- 3.12 The proposed surface water drainage for the development will take runoff from the building roofs and hardstanding areas.
- 3.13 A surface water drainage design has been carried out for the proposed development for all events up to the 100 year critical rain storm plus 45% for climate change on stored volumes. Attenuation is provided within underground storage located beneath hardstanding areas. The surface water drainage design is included within Appendix F.

Foul Water Drainage

- 3.14 United Utilities sewer records indicate a 300mm diameter public combined sewer located within Manchester Road flowing southward. This sewer conveys both foul water and surface water runoff from the surrounding urban area.
- 3.15 Foul water from the developed site is to discharge into the public combined sewer within Manchester Road.

4. SUMMARY AND CONCLUSIONS

- 4.1 This surface water and foul water drainage strategy, along with an assessment of flood risk, has been prepared on behalf of Cityside UK Ltd in support of a planning application for a proposed residential care home development at Sparth House, 185 Manchester Road, Rochdale, OL11 3QY.
- 4.2 The risk of flooding to the development site is low.
- 4.3 Rain Garden Planting is incorporated into the scheme for non-potable water use. Permeable asphalt is incorporated to allow infiltration of rainwater on hardstanding areas, limited by the low permeability of the subsoil. New surface water drainage will be constructed, appropriately sized, to take excess surface water runoff from the proposed building roofs and hardstanding areas and be attenuated to 2.1 l/s prior to a controlled discharge being made into the public combined sewer located within Manchester Road.
- 4.4 Foul water from the developed site is to discharge into the public combined sewer within Manchester Road.

APPENDIX A

LOCATION PLAN

Cycle Racing Facility

El Sub Sta

Shelter

Issues

Path

MULBERRY
CLOSE

The Hollies

Hollies
Lodge

Sparth
Cottage

Castleton
Bowling Club

Sta

ARBURY AVENUE

212

206

208

210

212

214

216

218

220

222

224

226

228

230

232

234

236

238

240

242

244

246

248

250

252

254

256

258

260

262

264

266

268

270

272

274

276

278

280

282

284

286

288

290

292

294

296

298

300

302

304

306

308

310

312

314

316

318

320

322

324

326

328

330

332

334

336

338

340

342

344

346

348

350

352

354

356

358

360

362

364

366

368

370

372

374

376

378

380

382

384

386

388

390

392

394

396

398

400

402

404

406

408

410

412

414

416

418

420

422

424

426

428

430

432

434

436

438

440

442

444

446

448

450

452

454

456

458

460

462

464

466

468

470

472

474

476

478

480

482

484

486

488

490

492

494

496

498

500

502

504

506

508

510

512

514

516

518

520

522

524

526

528

530

532

534

536

538

540

542

544

546

548

550

552

554

556

558

560

562

564

566

568

570

572

574

576

578

580

582

584

586

588

590

592

594

596

598

600

602

604

606

608

610

612

614

616

618

620

622

624

626

628

630

632

634

636

638

640

642

644

646

648

650

652

654

656

658

660

662

664

666

668

670

672

674

676

678

680

682

684

686

688

690

692

694

696

698

700

702

704

706

708

710

712

714

716

718

720

722

724

726

728

730

732

734

736

738

740

742

744

746

748

750

752

754

756

758

760

762

764

766

768

770

772

774

776

778

780

782

784

786

788

790

792

794

796

798

800

802

804

806

808

810

812

814

816

818

820

822

824

826

828

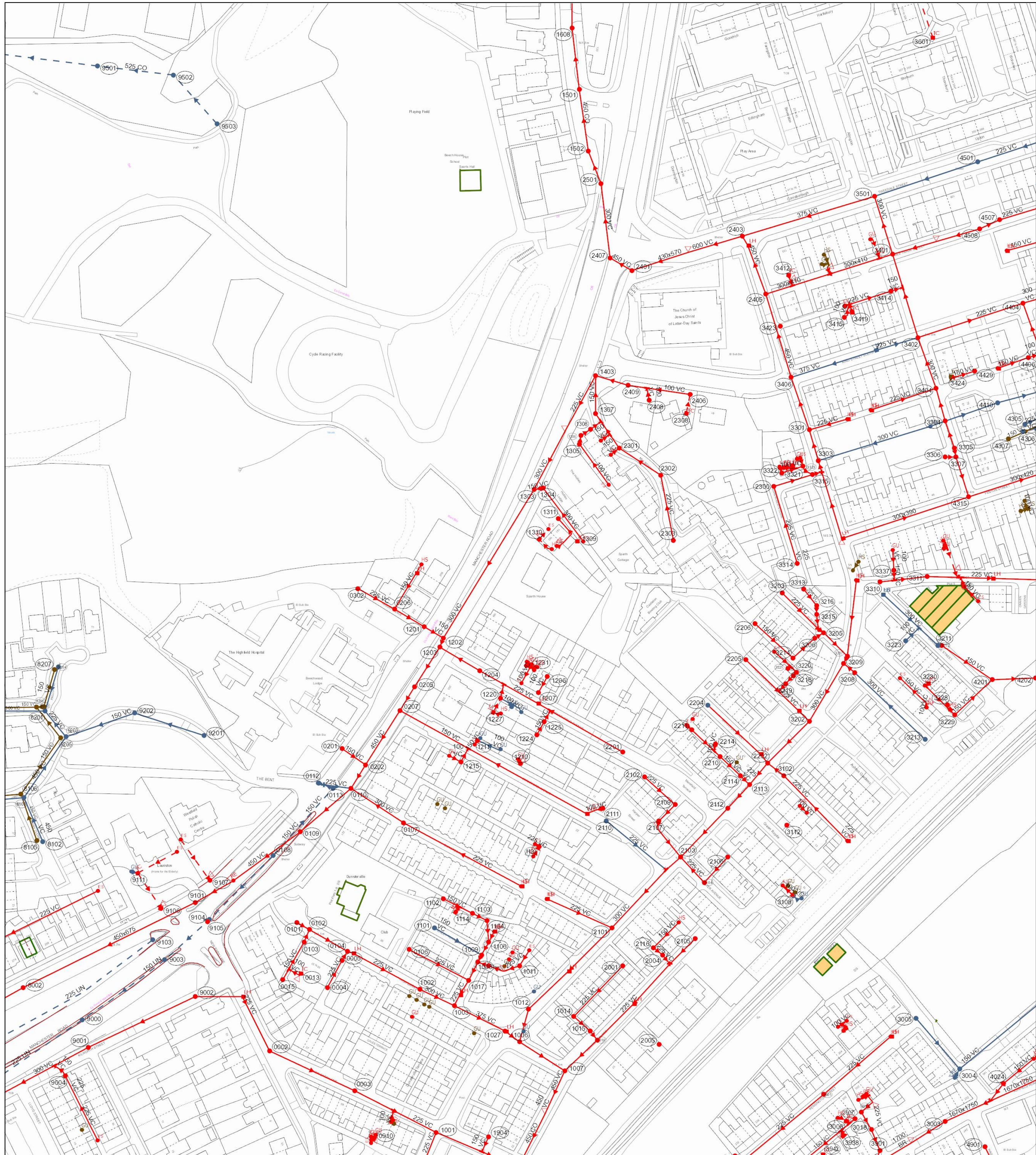
830

832

834

APPENDIX B

UNITED UTILITIES SEWER RECORDS



Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
2303	145.39	CO	143.77	225	225	VC	28.23427	1 in 25	
1501	141.09	CO	135.4	450	450	CO	34.23449	1 in 73	
2201	144.09	CO	141.05	225	225	VC	90.91844	1 in 62	
3005	141.47	SW	138.97	150	150	VC	36.87818	1 in 184	
1009	141.99	CO	140.2	225	225	VC	4.472136		
2105	143.62	SW	0	450	450	VC	15.78859		
0202	142.41	CO	0	450	450	VC	15.26434		
2316	142.03	SW	140.92	150	150	VC	5.385165		
0113	142.03	SW	140.92	150	150	VC	42.53801	1 in 6	
2110	142.44	CO	140.88	225	225	VC	19.10407	1 in 74	
0002	140.66	CO	137.13	225	225	VC	51.80412	1 in 88	
8002	140.83	CO	138.49	225	225	VC	65.36097	1 in 20	
3337	144.74	CO	141.8	150	150	VC	5.53101		
2113	142.23	CO	140.71	150	150	VC	7.071068		
2305	142.23	CO	140.71	150	150	VC	17.69181	1 in 106	
3221	137.01	CO	135.75	450	450	VC	22.35625		
3307	137.01	CO	135.75	450	450	VC	7.791801		
0109	137.01	CO	135.75	450	450	VC	23.06079		
2206	145.07	CO	141.35	300	300	VC	46.3596		
4404	145.07	CO	141.35	300	300	VC	28.3196		
8002	136.82	CO	133.34	450	450	VC	69.20304		
2403	142.51	CO	138.49	600	600	VC	67.60178	1 in 33	
9104	140.42	SW	138.86	150	150	VC	31.32052	1 in 44	
4507	145.01	CO	141.95	225	225	VC	34.68042	1 in 60	
1305	145.01	CO	141.95	225	225	VC	98.5225	1 in 81	
0302	145.01	CO	141.95	225	225	VC	4.811172		
1231	145.01	CO	141.95	225	225	VC	10.38524		
1027	145.01	CO	141.95	225	225	VC	23.18636		
2301	145.01	CO	141.95	225	225	VC	10		
3406	144.04	CO	141.22	450	450	VC	23.02173		
9103	138.73	CO	135.44	300	300	VC	48.08326		
3415	138.73	CO	135.44	300	300	VC	208.4164		
9001	138.73	CO	135.44	300	300	VC	8.379149		
1201	138.73	CO	135.44	300	300	VC	82.10553	1 in 24	
1201	138.73	CO	135.44	300	300	VC	6.403124		
1201	138.73	CO	135.44	300	300	VC	12.32476		
3303	145.11	CO	141.25	225	225	VC	10.38532		
3305	145.11	CO	141.25	225	225	VC	5.09902		
0201	141.88	CO	137.78	150	150	VC	15.81139		
1015	142.44	CO	141.25	225	225	VC	6.403124		
3308	145.25	CO	140.05	150	150	VC	6		
1202	145.25	CO	140.05	150	150	VC	5.385165		
2214	142.81	CO	141.16	225	225	VC	3.782918		
3314	142.81	CO	141.16	225	225	VC	44.52811	1 in 99	
1007	141.59	CO	136.62	450	450	VC	26.40076	1 in 20	
2001	143.78	CO	142.5	225	225	VC	38.8973	1 in 53	
4202	143.33	CO	139.46	150	150	VC	52.80151	1 in 32	
8207	145.11	CO	142.33	300	300	VC	21.34323		
3305	145.11	CO	142.33	300	300	VC	15.81139	1 in 132	
1120	143.72	CO	139.15	225	225	VC	2.896286		
2101	143.72	CO	139.15	225	225	VC	64.35403	1 in 50	
2103	144.48	CO	140.21	300	300	VC	54.49357	1 in 53	
0104	144.48	CO	140.21	300	300	VC	45.22176		
2211	144.48	CO	140.21	300	300	VC	21.50841		
3018	144.48	CO	140.21	300	300	VC	12.43065		
1001	139.22	CO	135.89	225	225	VC	64.07809	1 in 41	
0003	140.32	CO	136.54	225	225	VC	50.50711	1 in 80	
8102	140.32	CO	136.54	225	225	VC	26.45106		
4901	140.17	CO	138.18	225	225	VC	24.06675	1 in 26	
1004	140.17	CO	138.18	225	225	VC	0.046937		
1106	141.79	CO	140.64	150	150	VC	8.062258		
1101	141.79	CO	140.64	150	150	VC	30.01666	1 in 73	
3205	141.79	CO	140.64	150	150	VC	18.38478		
3402	144.56	CO	141.81	225	225	VC	61.02778	1 in 139	
3209	144.56	CO	141.81	225	225	VC	37.21559		
1204	141.75	CO	138.56	225	225	VC	25.53387		
3206	142.27	CO	142.84	150	150	VC	5.830502		
1012	142.49	CO	137.84	300	300	VC	19.68154		
0103	141.36	CO	138.89	150	150	VC	7.815713	1 in 98	
2407	141.36	CO	138.89	150	150	VC	41.30375		
3301	144.57	CO	141.67	375	375	VC	43.67972	1 in 79	
3307	144.57	CO	141.67	375	375	VC	43.56815		
8205	142.11	CO	140.5	150	150	VC	21.48727		
3315	142.11	CO	140.5	150	150	VC	5.252078		
1308	141.22	CO	136.53	450	450	VC	7.10235	1 in 97	
2001	141.22	CO	136.53	450	450	VC	19.31321	1 in 27	
1014	142.87	CO	141.75	225	225	VC	12.04159		
1220	142.87	CO	141.75	225	225	VC	7.843607		
1304	140.61	CO	137.93	150	150	VC	5.107324	1 in 11	
4306	145.27	SW	144.27	225	225	VC	15.52417	1 in 29	
2303	145.01	CO	141.95	225	225	VC	36.87424		
3311	145.04	CO	141.91	225	225	VC	69.02904		
3313	145.04	CO	141.91	225	225	VC	11.40175		
3219	141.33	CO	138.62	150	150	VC	5.789088		
0101	141.33	CO	138.62	150	150	VC	8.962258		
3218	141.33	CO	138.62	150	150	VC	5.985033		
1008	141.33	CO	138.62	150	150	VC	11.80324		
8201	141.33	CO	138.62	150	150	VC	40.18146		
4329	141.47	CO	137.22	150	150	VC	5.173666		
2401	141.47	CO	137.22	150	150	VC	13.89244	1 in 52	
3212	144.8	CO	141.13	150	150	VC	33.87855		
3215	144.8	CO	141.13	150	150	VC	8.062258		
4508	144.81	CO	142.07	225	225	VC	12.08305	1 in 151	
1211	144.81	CO	142.07	225	225	VC	2.715405		
9003	138.28	CO	135.37	150	150	VC	56.37	1 in 31	
1103	142.69	CO	141.04	150	150	VC	8.942722	1 in 64	
2405	142.69	CO	141.04	150	150	VC	34.62331		
3001	139.28	CO	136.9	225	225	VC	59.66574	1 in 30	
1201	140.24	CO	135.84	450	450	VC	105.9906	1 in 63	
8201	140.24	CO	135.84	450	450	VC	51.39		
3012	140.24	CO	135.84	450	450	VC	11.15581		
3202	145.09	CO	141.53	300	300	VC	32.52691	1 in 163	
2202	144.87	CO	141.28	300	300	VC	15.6205		
2409	144.87	CO	141.28	300	300	VC	18.61581		
3102	144.87	CO	141.89	225	225	VC	11.40175	1 in 52	
0207	144.87	CO	141.89	225	225	VC	35.51066		
1016	144.87	CO	141.89	225	225	VC	24.75884		
4024	144.87	CO	141.89	225	225	VC	12.14024		
1225	144.87	CO	141.89	225	225	VC	7.108787		
0102	144.87	CO	141.89	225	225	VC	24.18677		
1003	144.87	CO	141.89	225	225	VC	31.34065	1 in 144	
3304	145	CO	142.19	300	300	VC	18.68154		
2406	145	CO	142.19	300	300	VC	34.66432		
1306	145	CO	142.19	300	300	VC	6.451639		
2408	145	CO	142.19	300	300	VC	6.83573		
3004	141	SW	139.76	150	150	VC	132.1363	1 in 200	
2116	141.75	CO	140.64	150	150	VC	6.403124		
9203	141.75	CO	140.64	150	150	VC	18.30528		
1017	141.75	CO	140.64	150	150	VC	18.14219		
1104	142.67	CO	140.88	150	150	VC	12.94159		
2112	144.83	CO	140.86	300	300	VC	37.48333	1 in 59	
1107	144.83	CO	140.86	300	300	VC	4.123106		
4315	145.38	CO	141.85	300	300	VC	61.88387	1 in 132	
0005	141.13	CO	138.99	225	225	VC	5.830502		
4305	145.32	SW	143.95	150	150	VC	7.815773	1 in 27	
1203	145.32	SW	143.95	150	150	VC	26.70681		
8103	145.32	SW	143.95	150	150	VC	40.85668		
0106	141.61	CO	137.78	150	150	VC	21.0238	1 in 102	
1002	141.58	CO	137.78	150	150	VC	37.12427		
0110	142.11	CO	135.98	450	450	VC	36.87818	1 in 168	
1102	142.4	CO	140.78	150	150	VC	17.88654	1 in 66	
3322	142.4	CO	140.78	150	150	VC	12.22518		
2302	142.4	CO	140.78	150	150	VC	27.43936		
1403	141.09	CO	138.19	225	225	VC	35.35334	1 in 74	
3501	143.8	CO	140.17	375	375	VC	76.24303	1 in 52	
0108	141.5	SW	140.98	150	150	VC	49.57622	1 in 190	
0206	141.34	CO	138.38	225	225	VC	19.05995		
3206	145.29	CO	142.34	300	300	VC	7.41025		
4508	144.81	CO	142.09	225	225	VC	25	1 in 50	
2204	144.87	CO	142.39	225	225	VC	46.02635	1 in 38	
3401	144.08	CO	141.37	300	300	VC	33.52811	1 in 80	
3108	144.08	CO	1						

APPENDIX C

PROPOSED DRAINAGE LAYOUT

DRAINAGE NOTES

- UN-ADOPTED FW & SW DRAINAGE IS TO BE CONSTRUCTED IN ACCORDANCE WITH CURRENT BUILDING REGULATIONS, INCLUDING APPROVED DOCUMENT H (UPDATED 2015); BS EN 752:2008 AND OTHER RELEVANT STANDARDS AND CERTIFICATES.
- THE LOCATION AND LEVELS OF EXISTING DRAINAGE PIPES AND CULVERTS MUST BE CHECKED ON-SITE PRIOR TO CONSTRUCTION.
- ALL EXISTING SERVICES TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY DRAINAGE WORKS, AND WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORKS.
- DRAINS ARE TO BE CONSTRUCTED USING FLEXIBLY JOINTED VITRIFIED CLAY PIPES TO BS 65 (1991) AND BS EN 295 (2012 / 2013); OR UPVC BUILDING DRAINAGE SYSTEM PIPEWORK TO BS 4660 (2000), BS EN 13589-1 (2010) * BS EN 1401-1 (2009); BEDDED & BACKFILLED IN ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS.
- BACKFILLING OF DRAIN TRENCHES ADJACENT TO DWELLINGS OR OTHER STRUCTURES TO BE IN ACCORDANCE WITH BS EN 1610 (1998) AND APPROVED DOCUMENT H.

- ACCESS FITTINGS & INSPECTION CHAMBERS <1.2m DEEP ARE TO BE CLAYWARE OR PRE-FORMED POLYPROPYLENE AS APPROPRIATE TO THE NUMBER OF CONNECTIONS. POLYPROPYLENE CHAMBERS CAN BE USED UP TO 3m DEEP BUT REQUIRE A MAX 350mm DIAMETER RESTRICTOR RING TO PREVENT MAN ENTRY. INSPECTION CHAMBER SIZES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH BS EN 752 (2008).
- MANHOLE CHAMBERS ARE TO BE OF PRECAST CONCRETE CONSTRUCTION WITH 150mm INSITU CONCRETE SURROUND WITH A MINIMUM CLEAR OPENING OF 600mm.
- POLYPROPYLENE INSPECTION CHAMBERS ARE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- COVER LEVELS INDICATED ON THE DRAWINGS ARE NOMINAL AND MAY BE ADJUSTED TO SUIT FINISHED LEVELS AS NECESSARY. INSPECTION CHAMBER COVERS SHOULD BE GRADE A15 FOR PEDESTRIAN AREAS ONLY, C250 FOR LIGHTLY TRAFFICKED ROADS AND SMALL PRIVATE CAR PARKS, AND D400 WITHIN THE ACCESS ROAD.

- WHERE DRAINS PASS THROUGH FOUNDATIONS OR OTHER RIGID STRUCTURES, A LINTEL OR SLEEVE IS TO BE USED & PROVISION FOR FLEXIBILITY IS TO BE MADE WITH ROCKER PIPES.

- ANY EXISTING LAND DRAINS SEVERED BY SITE OPERATIONS SHOULD BE DIVERTED AROUND ANY PROPERTIES/BUILDINGS AND RECONNECTED TO THE EXISTING LAND DRAINAGE SYSTEM VIA A SILT TRAP.
- CONCRETE PROTECTION REQUIRED TO PIPES WHERE DEPTH OF PIPE FROM GROUND LEVEL TO BARREL IS <0.6m WITHIN NON-TRAFFICKED AREAS; <0.9m WITHIN DOMESTIC DRIVEWAYS AND LIGHT ROADS; AND <1.2 m WITHIN THE PUBLIC HIGHWAY, OTHERWISE PIPES TO BE LAID IN CLASS S BEDDING (150mm GRANULAR BED & SURROUND).
- WHERE PIPES RUN UNDER BUILDINGS AND WHERE COVER TO UNDERSIDE OF SLAB IS LESS THAN 300mm, PROVIDE A CONCRETE BED AND SURROUND.
- UNLESS NOTED OTHERWISE, ALL FOUL DRAINS ARE 150mm DIA. AND SURFACE WATER DRAINS ARE 150mm DIA. SURFACE WATER CONNECTIONS FROM RWP'S TO BE 100mm DIA.
- MINIMUM GRADIENTS (UNLESS NOTED OTHERWISE):

FOUL
IN ACCORDANCE WITH BUILDING REGS DOC H TABLE 6.
100 DIA FROM OUTLETS WITHIN BUILDING TO INSPECTION CHAMBER 1:40,
THEREAFTER 1:80
150 DIA IN ACCORDANCE WITH BUILDING REGS DOC H TABLE 6.
SURFACE WATER
100 DIA 1:100, 150 DIA 1:150

- ALL REDUNDANT DRAINS AND CHAMBERS TO BE REMOVED AS FAR AS PRACTICABLE OR ELSE GROUTED AND SEALED.
- BEDDING AND BACKFILL TO CONFORM TO THE REQUIREMENT OF THE WATER INDUSTRY SPECIFICATION 4-08-02 (TABLE A2).
- THE CHAMBER SIZE OF MANHOLES WITH MORE THAN ONE CONNECTION MAY NEED TO BE INCREASED AN INCREMENT TO ACCOMMODATE THE CONNECTORS AND BENDS.
- THE POSITIONS OF SVP'S, STUB-STACKS, WC OUTLETS AND RAINWATER DOWNPIPES ARE TO BE ACCURATELY LOCATED FROM THE ARCHITECT'S DRAWINGS.
- CATCHPIT CHAMBERS ARE REQUIRED TO HAVE A MINIMUM 300mm SUMP.
- COVER TO ATTENUATION TANKS BELOW CAR PARK ASSUMED TO BE MINIMUM 650MM IN LINE WITH POLYPIPE POLYSTORM DETAILS FOR VEHICLES <9000KG.

LEGEND

- EXISTING COMBINED DRAIN
- PROPOSED SURFACE WATER DRAIN
- PROPOSED FOUL DRAIN
- PROPOSED COMBINED DRAIN
- MH
- EXISTING COMBINED MANHOLE
- PROPOSED COMBINED MANHOLE
- PROPOSED FOUL INSPECTION CHAMBER/ MANHOLE
- PROPOSED SURFACE WATER INSPECTION CHAMBER/ MANHOLE
- RWP
- PROPOSED RAINWATER PIPE WITH WATER BUTTS & HYDRO PLANTERS TO LANDSCAPE ARCHITECT'S DETAILS
- SVP
- G
- PROPOSED SOIL VENT PIPE
- PROPOSED GULLY
- PROPOSED RODDING EYE
- PROPOSED GEOCELLULAR ATTENUATION WRAPPED IN GEOTEXTILE MEMBRANE, SEE DETAIL
- PROPOSED SURFACE WATER OVERFLOW DRAW-OFF MANHOLE
- PROPOSED PERMEABLE ASPHALT SEE TYPICAL DETAIL ON 11610-401

P5	PERMEABLE PAVING & RAIN GARDEN	TF	KLH	19.12.25
P4	SCHEME REVISED	KLH	TF	04.07.25
P3	DETAILS ADDED	SHR	KLH	05.02.24
P2	SOAKAWAY REMOVED DRAINAGE RUN AMENDED	SHR	KLH	19.01.24
P1	ISSUED FOR INFORMATION	SHR	KLH	17.11.23
Rev	Details	Drawn By	Chk/App By	Date

Client:
CS MANCHESTER ROAD LTD

Project:
72 BED NURSING HOME SPARTH HOUSE ROCHDALE

Title:
PROPOSED DRAINAGE GENERAL ARRANGEMENT

Issued For:
INFORMATION

Reid Jones partnership

Consulting Civil & Structural Engineers

9 Orrell Road
Orrell, Wigan
WNG 9EY
Tel 01942 216006

3 Cross Street
Preston
PR1 3LT
Tel 01772 498007

en@reidjonespartnership.co.uk
www.reidjonespartnership.co.uk

ISO 9001:2015
REGISTERED
QUALITY MANAGEMENT

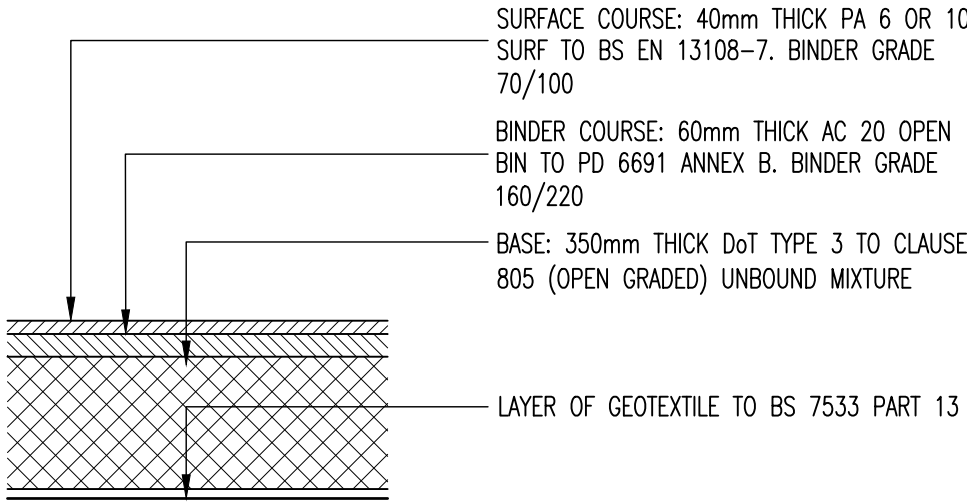
Scale:	1:100	@	(A1)
Project No:	11610	Drawing No:	400
Issue:	P5		

DO NOT SCALE - USE FIGURED DIMENSIONS ONLY.
This drawing is confidential and is the property of Reid Jones Partnership. It must not be disclosed to any third party, copied or lent without prior written consent. The contractor is to check all dimensions on site prior to commencement of works.

PROPOSED DRAINAGE GENERAL ARRANGEMENT
1:100

NOTE
GULLY POSITIONS TO BE CONFIRMED BY ARCHITECT
SVP POSITIONS TO BE CONFIRMED BY ARCHITECT

**PRELIMINARY DRAWING.
NOT FOR CONSTRUCTION.**



PERMEABLE ASPHALT CONSTRUCTION
(SHARED ACCESS AND HARDSTANDINGS)

1:20

P1	ISSUED FOR INFORMATION	TF	KLH	18.12.25
Rev	Details	Drawn By	Chd/App By	Date

Client:

CS MANCHESTER ROAD LTD

Project:

72 BED NURSING HOME
SPARTH HOUSE
ROCHDALE

Title:

PROPOSED DRAINAGE
TYPICAL DETAILS

Issued For:

INFORMATION

Reid Jones partnership

Consulting Civil & Structural Engineers

9 Orrell Road

Orrell, Wigan

WN5 5EY

Tel 01942 216006

E-mail: eng@reidjonespartnership.co.uk

Web address: www.reidjonespartnership.co.uk

3 Cross Street

Preston

PR1 3LT

Tel 01772 498007

Scale: 1:100 @ (A1)

Project No: 11610

Drawing No: 401

Issue: P1

DO NOT SCALE - USE FIGURED DIMENSIONS ONLY.
This drawing is confidential and is the property of Reid Jones Partnership. It must not be disclosed to any third party, copied or lent without prior written consent. The contractor is to check all dimensions on site prior to commencement of works.

QMS

ISO 9001:2015
REGISTERED
QUALITY MANAGEMENT

PRELIMINARY DRAWING.
NOT FOR CONSTRUCTION.

APPENDIX D

URBAN GREEN GENERAL ARRANGEMENT



KEY

Hard Works

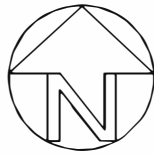
- Vehicular Bitmac Surfing** NBS Q22 110
To roads
Black colour. To engineer specification & recommendation
- Pedestrian Bitmac Surfing** NBS Q22 110
To sidewalks
Black colour. To engineer specification & recommendation
- Precast Concrete Block Paving**
To entrance paths
Hardscape Ecogranite Permeable Aquasett Paving, colour Truro, 200x100x80mm or equal approved.
- Precast Concrete Flag Paving**
To private paths and patios
Hardscape Ecogranite Permeable Aquasett Paving, colour Tintagel, 250x150x60mm or equal approved.
- Resin Bound Gravel Surfacing**
To pathways
Addaset Resin Bound Porous Decorative Surfacing in 'Honey' 6mm, or equal approved.
- Self Binding Gravel Surfacing**
Natural colour.
- Sand/Gravel**
Grey colour.
Supplier tbc
- Stepping Stone Flags**
Concrete Paving Flag
Hardscape Newgrange Textured Paving, colour Buff, 450x450x50mm, or equal approved.
- Timber Panel Fence**
Jacksons Fencing Canterbury Comb Slatted Fence Panels. 1830mm hgh. With matching gates.
- Raised Planters**
Constructed from timber sleepers
- Timber Bench**
broxap Medway Seat or similar and approved. Colour Traffic White.
- Table and Chairs Set**
Details tbc
- Timber Arches**
Square arch features, details tbc
- Timber Posts**
91mx91mm, Varying heights - 1.2m, 1.5m, 1.8m
- Sail Canopies**
details tbc
- Catenary Lighting**
Details tbc
- Bollards**
broxap Semi Domed Sheffield Stainless Steel Bollard
- Door Protection**
broxap root fixed door barrier, 1020 x 450mm and tube diameter 42mm, stainless steel matt satin polished.

Soft Works

- Existing Trees**
to be retained - refer to arboricultural drawings
- Proposed Tree Planting**
Species and stock size tbc
- Proposed Specimen Shrub Planting**
Species and container size tbc
- Proposed Hedge Planting**
Species tbc
- Proposed Ornamental Shrub Planting**
Ornamental shrub mix.
- Proposed Semi-Native Shrub Planting**
Semi-native shrub mix.
- Proposed Sensory Mixed Planting**
Herbaceous/ grass perennial & shrub mix.
- Proposed Turf Grass**
To lawn.
- Proposed Wildflower Meadow**
Species rich grass & wildflower seed mix.
- Proposed Rain Garden Planting**
To rain garden SUDS

Do not scale this drawing (printed or electronic version).
Contractors must check all dimensions from site.
This drawing is copyright and is for use on this site only. This drawing should be read in conjunction with all relevant consultants drawings and specialist subcontractors / supply chain drawings and specifications.
All works to be carried out in accordance with the latest British Standards / Codes of Practice unless specifically directed otherwise in the specification.
Responsibility for the reproduction of this drawing in paper form, or issued in electronic format, lies with the recipient to check that all information has been replicated in full and is correct when compared to the original paper or electronic image.
Graphical representations of equipment on this drawing have been co-ordinated, but are approximations only. Please refer to the specifications and / or details for actual sizes and / or specific contractor construction information.

Notes:-



P06	10/12/25	UPDATED TO COMMENTS	JW	SW
P05	09/12/25	UPDATED TO COMMENTS	JW	SW
P04	03/07/25	UPDATED TO COMMENTS	MA	SW
P03	27/06/25	UPDATED TO COMMENTS	MA	SW
P02	24/06/25	FIRST ISSUE	MA	SW
P01	02/02/24	DRAFT ISSUE	RS	SA
REV.	DATE	DESCRIPTION	DRAWN	CHK'D



A: Ground Floor, The Tower,
Deva City Office Park, Trinity Way,
Manchester M3 7BF
T: +44 (0) 161 312 3131
weareurbangreen.co.uk

Client: **CITY-SIDE (T/A CS MANCHESTER ROAD LIMITED)**

Project: **185 MANCHESTER ROAD, ROCHDALE**

Title: **GENERAL ARRANGEMENT PLAN**

Issue: **PLANNING**

Drawn: **RS** Checked: **SA** Approved: **MT**

Project: **UG2266** Scale @ A2: **1:200** Date: **02/02/24**

Dwg No: **UG_2266_LAN_GA_DRW_101** Revision: **P06**

APPENDIX E

INFILTRATION TEST RESULTS

**SUB SURFACE**

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS

3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Insitu Test Results

Site: SPARTH HOUSE, MANCHESTER ROAD, ROCHDALE, OL11 3QY

Job Number

8275

Client: CS MANCHESTER ROAD LIMITED

Sheet:

Engineer:

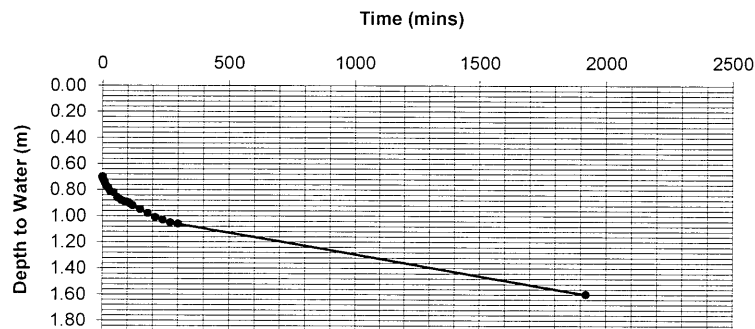
1 / 3

SOAKAWAY TEST (WITH GRAVEL INFILL)

Position: TP1

Test Number: 1

Date: 20/10/25



Time (min)	Depth (m)
0	0.70
0.5	0.70
1	0.70
2	0.71
4	0.72
6	0.73
8	0.74
10	0.75
15	0.77
20	0.78
25	0.79
30	0.81
45	0.82
60	0.86
75	0.88
90	0.89
105	0.90
120	0.92
150	0.95
180	0.98
210	1.01
240	1.03
270	1.05
300	1.06
1920	1.60

Length of pit: L = 1.50 m
Width of pit: W = 0.35 m
Depth of pit: D = 1.90 m
Base area of pit: A = 0.53 m²

100% effective depth D100 = 0.70 m
75% effective depth D75 = 1.00 m
50% effective depth D50 = 1.30 m
25% effective depth D25 = 1.60 m

time to D75 T75 = 12000 sec
time to D25 T25 = 115200 sec

time from D75 to D25 t_{p75-25} = 103200 sec
(T25 - T75)

volume between D75 & D25* V_{p75-25} = 0.09 m³
(A x (D25 - D75)) x 30%

surface area to D50 inc. base a_{p50} = 2.75 m²
((2x(D-D50)x(W+L)) + A)

SOIL INFILTRATION RATE

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

$$f = 3.34E-07 \text{ m/sec}$$

Test Strata: See TP1 Log.

Remarks: * 30% correction applied to volume to allow for gravel infill
Value extrapolated to obtain Soil Infiltration Rate.

**SUB SURFACE**

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS

3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Insitu Test Results

Site: SPARTH HOUSE, MANCHESTER ROAD, ROCHDALE, OL11 3QY

Client: CS MANCHESTER ROAD LIMITED

Engineer:

Job Number

8275

Sheet:

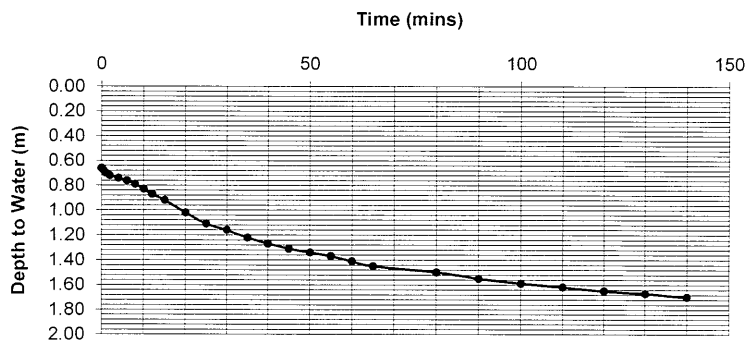
2 / 3

SOAKAWAY TEST (WITH GRAVEL INFILL)

Position: TP2

Test Number: 1

Date: 20/10/25



Length of pit: L = 1.60 m
Width of pit: W = 0.40 m
Depth of pit: D = 2.00 m
Base area of pit: A = 0.64 m²

100% effective depth D100 = 0.66 m
75% effective depth D75 = 1.00 m
50% effective depth D50 = 1.33 m
25% effective depth D25 = 1.67 m

time to D75 T75 = 1140 sec
time to D25 T25 = 7800 sec

time from D75 to D25 t_{p75-25} = 6660 sec
(T25 - T75)

volume between D75 & D25* V_{p75-25} = 0.13 m³
(A x (D25 - D75)) x 30%

surface area to D50 inc. base a_{p50} = 3.32 m²
((2x(D-D50)x(W+L)) + A)

Time (min)	Depth (m)
0	0.66
0.5	0.68
1	0.70
2	0.72
4	0.74
6	0.76
8	0.79
10	0.83
12	0.87
15	0.92
20	1.02
25	1.11
30	1.16
35	1.22
40	1.27
45	1.31
50	1.34
55	1.37
60	1.41
65	1.45
80	1.50
90	1.55
100	1.59
110	1.62
120	1.65
130	1.67
140	1.70

SOIL INFILTRATION RATE

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

$$f = 5.82E-06 \text{ m/sec}$$

Test Strata: See TP2 Log.

Remarks: * 30% correction applied to volume to allow for gravel infill

**SUB SURFACE**

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS

3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Insitu Test Results

Site:

Client:

Engineer:

Job Number

8275

Sheet:

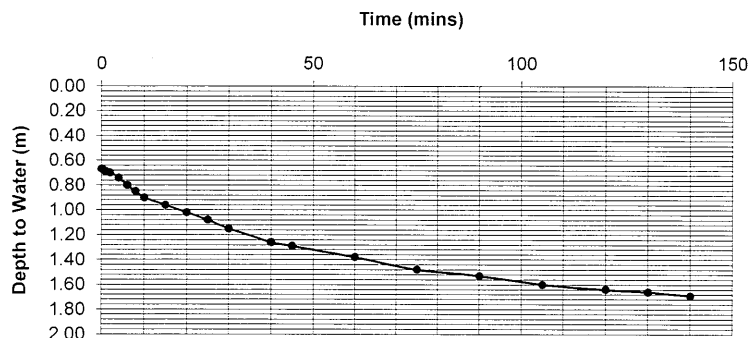
3 / 3

SOAKAWAY TEST (WITH GRAVEL INFILL)

Position: TP2

Test Number: 2

Date: 20/10/25



Time (min)	Depth (m)
0	0.67
0.5	0.68
1	0.69
2	0.70
4	0.74
6	0.80
8	0.85
10	0.90
15	0.96
20	1.02
25	1.08
30	1.15
40	1.26
45	1.29
60	1.38
75	1.48
90	1.53
105	1.60
120	1.64
130	1.66
140	1.69

Length of pit: L = 1.60 m
Width of pit: W = 0.40 m
Depth of pit: D = 2.00 m
Base area of pit: A = 0.64 m²

100% effective depth D100 = 0.67 m
75% effective depth D75 = 1.00 m
50% effective depth D50 = 1.34 m
25% effective depth D25 = 1.67 m

time to D75 T75 = 1100 sec
time to D25 T25 = 8000 sec

time from D75 to D25 t_{p75-25} = 6900 sec
(T25 - T75)

volume between D75 & D25* V_{p75-25} = 0.13 m³
(A x (D25 - D75)) x 30%

surface area to D50 inc. base a_{p50} = 3.30 m²
((2x(D-D50)x(W+L)) + A)

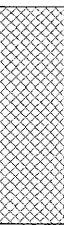
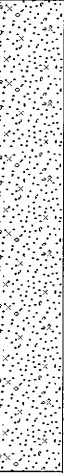
SOIL INFILTRATION RATE

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

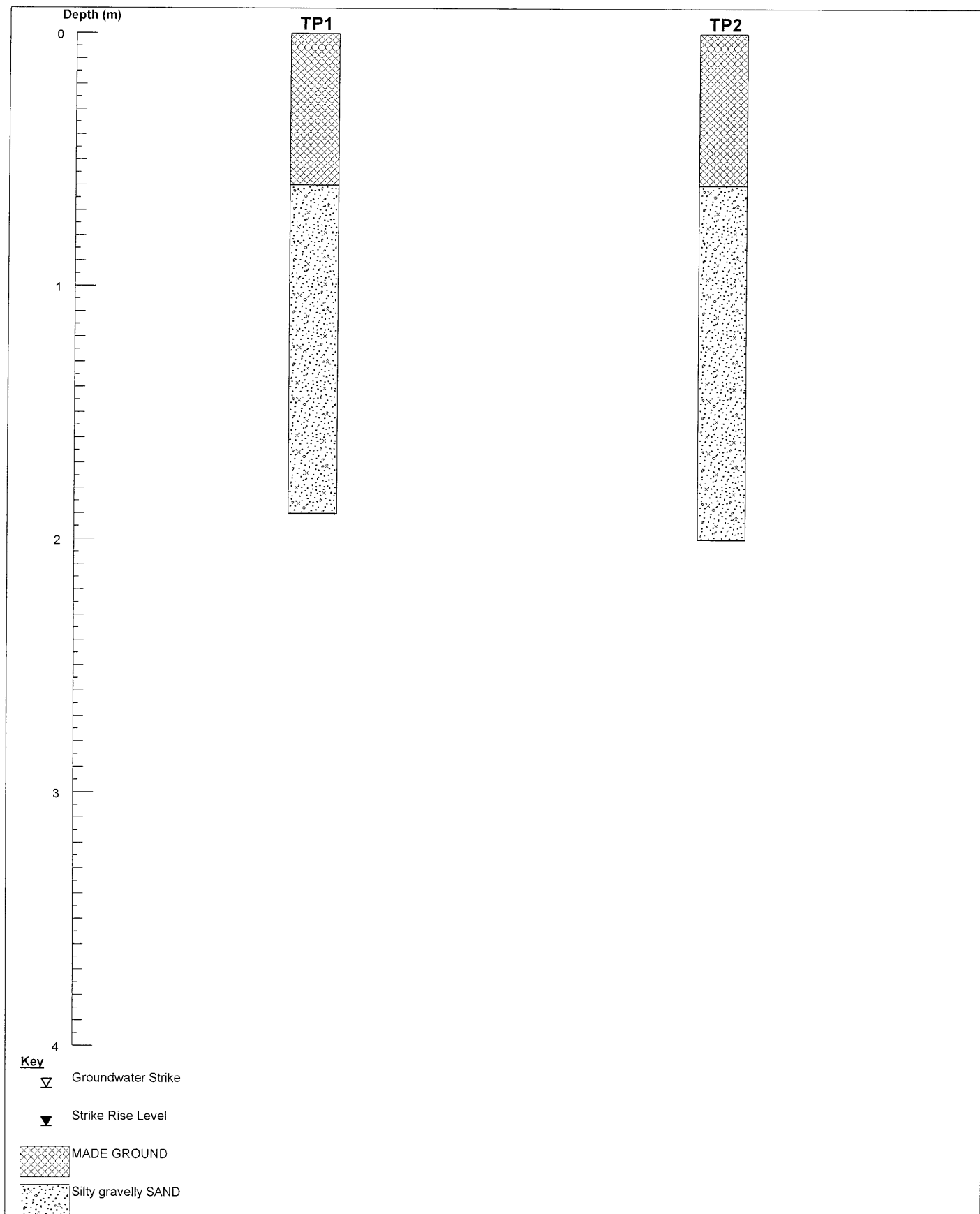
$$f = 5.61E-06 \text{ m/sec}$$

Test Strata: See TP2 Log.

Remarks: * 30% correction applied to volume to allow for gravel infill

 SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907					Site SPARTH HOUSE, MANCHESTER ROAD, ROCHDALE, OL11 3QY			Trial Pit Number TP1		
Excavation Method MACHINE EXCAVATED		Dimensions 0.35 x 1.50		Ground Level (mOD)		Client CS MANCHESTER ROAD LIMITED		Job Number 8275		
		Location		Dates 20/10/2025		Engineer		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water	
0.20-0.40	B				(0.60)	MADE GROUND: Dark brown gravelly silty fine to coarse sand with frequent roots and rootlets. Gravel sized fragments are fine to coarse stone.				
0.80-1.00	B				0.60 (1.30)	Brownish grey gravelly silty fine to medium SAND. Gravel is subangular to subrounded fine to coarse sandstone.				
1.50-1.70	B				1.90	... below 1.50m: brown ... below 1.80m: clayey Complete at 1.90m				
			20/10/2025: DRY							
Plan						Remarks No groundwater encountered. Trial pit sides remained stable and vertical. On completion backfilled with arisings.				
						Scale (approx) 1:20		Logged By SS		
								Figure No. 8275.TP1		

SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907						Site SPARTH HOUSE, MANCHESTER ROAD, ROCHDALE, OL11 3QY			Trial Pit Number TP2	
Excavation Method MACHINE EXCAVATED		Dimensions 0.40 x 1.60		Ground Level (mOD)		Client CS MANCHESTER ROAD LIMITED		Job Number 8275		
		Location		Dates 20/10/2025		Engineer		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water		
0.20-0.40	B				(0.60)	MADE GROUND: Dark brown ashy gravelly cobbly silty fine to coarse sand. Gravel and cobble sized fragments are fine to coarse stone and brick.				
0.80-1.00	B				0.60	Brownish grey gravelly silty fine to medium SAND. Gravel is subangular to subrounded fine to coarse sandstone.				
1.50-1.70	B				(1.40)	... below 1.40m: brown				
			20/10/2025: DRY		2.00	Complete at 2.00m				
Plan					Remarks					
					No groundwater encountered. Trial pit sides remained stable and vertical. On completion backfilled with arisings.					
					Scale (approx)	Logged By	Figure No.			
					1:20	SS	8275.TP2			



SS SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907		Nominal Section		
Site	Date Drawn	Date Checked	Sheet	Job Number
SPARTH HOUSE, MANCHESTER ROAD, ROCHDALE, OL11 3QY	23/10/2025		1/1	8275
Client	Drawn By	Checked By	Scale	Figure No.
CS MANCHESTER ROAD LIMITED			1:20[V]	8275

APPENDIX F

SURFACE WATER DRAINAGE DESIGN

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	75.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	2.000
Ratio-R	0.280	Preferred Cover Depth (m)	0.800
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
1	0.021	5.00	141.700	450	0.950
2	0.009	5.00	141.700	450	1.287
3	0.004	5.00	141.700	450	1.388
4	0.031	5.00	141.700	450	1.641
5			141.600	450	1.608
6	0.015	5.00	141.700	450	1.000
att 1	0.019	5.00	141.500	450	1.800
7	0.016	5.00	141.700	450	0.950
8	0.016	5.00	141.700	450	1.000
9	0.004	5.00	141.700	450	1.337
10			141.600	450	1.540
11	0.014	5.00	141.700	450	1.000
att 2	0.019	5.00	141.500	450	1.800
12			141.300	1200	1.620
13			141.300	1200	1.700

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	20.000	0.600	140.750	140.413	0.337	59.3	150	5.25	54.5
1.001	2	3	6.000	0.600	140.413	140.312	0.101	59.4	150	5.33	54.2
1.002	3	4	15.000	0.600	140.312	140.059	0.253	59.3	150	5.52	53.5
1.003	4	5	4.000	0.600	140.059	139.992	0.067	59.7	150	5.57	53.3
1.004	5	att 1	1.000	0.600	139.992	139.952	0.040	25.0	150	5.58	53.3
2.000	6	att 1	1.000	0.600	140.700	140.400	0.300	3.3	100	5.00	55.5
1.005	att 1	12	1.000	0.600	139.700	139.680	0.020	50.0	150	5.59	53.2
3.000	7	9	23.000	0.600	140.750	140.363	0.387	59.4	150	5.29	54.4
4.000	8	9	6.000	0.600	140.700	140.413	0.287	20.9	100	5.06	55.3
3.001	9	10	18.000	0.600	140.363	140.060	0.303	59.4	150	5.52	53.5
3.002	10	att 2	1.000	0.600	140.060	140.020	0.040	25.0	150	5.53	53.5
5.000	11	att 2	1.000	0.600	140.700	140.400	0.300	3.3	100	5.00	55.5
3.003	att 2	12	1.000	0.600	139.700	139.680	0.020	50.0	150	5.54	53.4
1.006	12	13	3.000	0.600	139.680	139.600	0.080	37.5	150	5.62	53.1

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.308	23.1	4.1	0.800	1.137	0.021	0.0
1.001	1.307	23.1	5.9	1.137	1.238	0.030	0.0
1.002	1.308	23.1	6.6	1.238	1.491	0.034	0.0
1.003	1.304	23.0	12.5	1.491	1.458	0.065	0.0
1.004	2.022	35.7	12.5	1.458	1.398	0.065	0.0
2.000	4.267	33.5	3.0	0.900	1.000	0.015	0.0
1.005	1.426	25.2	19.0	1.650	1.470	0.099	0.0
3.000	1.307	23.1	3.1	0.800	1.187	0.016	0.0
4.000	1.696	13.3	3.2	0.900	1.187	0.016	0.0
3.001	1.307	23.1	7.0	1.187	1.390	0.036	0.0
3.002	2.022	35.7	7.0	1.390	1.330	0.036	0.0
5.000	4.267	33.5	2.8	0.900	1.000	0.014	0.0
3.003	1.426	25.2	13.3	1.650	1.470	0.069	0.0
1.006	1.648	29.1	32.2	1.470	1.550	0.168	0.0

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	141.700	0.950	450					
				0	1.000	140.750	150	
2	141.700	1.287	450		1	1.000	140.413	150
				0	1.001	140.413	150	
3	141.700	1.388	450		1	1.001	140.312	150
				0	1.002	140.312	150	
4	141.700	1.641	450		1	1.002	140.059	150
				0	1.003	140.059	150	
5	141.600	1.608	450		1	1.003	139.992	150
				0	1.004	139.992	150	
6	141.700	1.000	450					
				0	2.000	140.700	100	
att 1	141.500	1.800	450		1	2.000	140.400	100
				2	1.004	139.952	150	
				0	1.005	139.700	150	
7	141.700	0.950	450					
				0	3.000	140.750	150	

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
8	141.700	1.000	450		0	4.000	140.700	100
9	141.700	1.337	450		1	4.000	140.413	100
					2	3.000	140.363	150
					0	3.001	140.363	150
10	141.600	1.540	450		1	3.001	140.060	150
					0	3.002	140.060	150
11	141.700	1.000	450		0	5.000	140.700	100
att 2	141.500	1.800	450		1	5.000	140.400	100
					2	3.002	140.020	150
					0	3.003	139.700	150
12	141.300	1.620	1200		1	3.003	139.680	150
					2	1.005	139.680	150
					0	1.006	139.680	150
13	141.300	1.700	1200		1	1.006	139.600	150

Simulation Settings

Rainfall Methodology	FSR	Summer CV	1.000	Additional Storage (m ³ /ha)	20.0
Rainfall Events	Singular	Winter CV	1.000	Starting Level (m)	
FSR Region	England and Wales	Analysis Speed	Normal	Check Discharge Rate(s)	x
M5-60 (mm)	19.000	Skip Steady State	x	Check Discharge Volume	x
Ratio-R	0.280	Drain Down Time (mins)	240		

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	0	0	0
30	40	0	0	100	45	0	0

Node 12 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	139.680	Product Number	CTL-SHE-0062-2100-1600-2100
Design Depth (m)	1.600	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.1	Min Node Diameter (mm)	1200

Node att 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	139.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	86.0	0.0	0.800	86.0	0.0	0.801	0.0	0.0

Node att 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	139.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	86.0	0.0	0.800	86.0	0.0	0.801	0.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	140.793	0.043	4.1	0.0256	0.0000	OK
15 minute summer	2	10	140.468	0.055	5.9	0.0165	0.0000	OK
15 minute summer	3	10	140.366	0.054	6.6	0.0118	0.0000	OK
15 minute summer	4	11	140.151	0.092	12.5	0.0492	0.0000	OK
15 minute summer	5	11	140.076	0.084	12.4	0.0134	0.0000	OK
15 minute summer	6	10	140.723	0.023	2.9	0.0107	0.0000	OK
480 minute summer	att 1	328	139.883	0.183	4.3	15.0292	0.0000	SURCHARGED
15 minute summer	7	10	140.787	0.037	3.1	0.0183	0.0000	OK
15 minute summer	8	10	140.735	0.035	3.1	0.0166	0.0000	OK
15 minute summer	9	10	140.421	0.058	7.0	0.0126	0.0000	OK
15 minute summer	10	11	140.118	0.058	6.9	0.0093	0.0000	OK
15 minute summer	11	10	140.722	0.022	2.7	0.0099	0.0000	OK
480 minute summer	att 2	328	139.883	0.183	3.0	15.0066	0.0000	SURCHARGED
480 minute summer	12	328	139.884	0.204	2.6	0.2309	0.0000	SURCHARGED
15 minute summer	13	1	139.600	0.000	1.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	4.1	0.816	0.176	0.0997	
15 minute summer	2	1.001	3	5.8	0.995	0.250	0.0348	
15 minute summer	3	1.002	4	6.5	0.763	0.280	0.1276	
15 minute summer	4	1.003	5	12.4	1.154	0.537	0.0429	
15 minute summer	5	1.004	att 1	12.4	1.468	0.347	0.0085	
15 minute summer	6	2.000	att 1	2.9	2.334	0.086	0.0012	
480 minute summer	att 1	1.005	12	1.7	0.310	0.066	0.0176	
15 minute summer	7	3.000	9	3.1	0.646	0.133	0.1104	
15 minute summer	8	4.000	9	3.1	1.331	0.232	0.0139	
15 minute summer	9	3.001	10	6.9	1.098	0.297	0.1126	
15 minute summer	10	3.002	att 2	6.9	1.286	0.192	0.0054	
15 minute summer	11	5.000	att 2	2.7	2.295	0.080	0.0012	
480 minute summer	att 2	3.003	12	1.7	0.315	0.066	0.0176	
480 minute summer	12	Hydro-Brake®	13	1.6				50.3

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	140.822	0.072	10.8	0.0431	0.0000	OK
15 minute summer	2	11	140.573	0.160	15.3	0.0479	0.0000	SURCHARGED
15 minute summer	3	11	140.519	0.207	15.7	0.0449	0.0000	SURCHARGED
15 minute summer	4	11	140.380	0.321	30.5	0.1724	0.0000	SURCHARGED
600 minute winter	5	570	140.321	0.329	3.9	0.0523	0.0000	SURCHARGED
15 minute summer	6	10	140.743	0.043	7.7	0.0197	0.0000	OK
600 minute winter	att 1	570	140.319	0.619	6.0	50.7949	0.0000	SURCHARGED
15 minute summer	7	10	140.812	0.062	8.3	0.0306	0.0000	OK
15 minute summer	8	10	140.763	0.063	8.3	0.0302	0.0000	OK
15 minute summer	9	10	140.470	0.107	18.6	0.0235	0.0000	OK
600 minute winter	10	570	140.319	0.259	2.2	0.0411	0.0000	SURCHARGED
15 minute summer	11	10	140.741	0.041	7.2	0.0180	0.0000	OK
600 minute winter	att 2	570	140.319	0.619	5.2	50.7797	0.0000	SURCHARGED
600 minute winter	12	570	140.320	0.640	3.5	0.7239	0.0000	SURCHARGED
15 minute summer	13	1	139.600	0.000	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	10.7	1.010	0.464	0.2571	
15 minute summer	2	1.001	3	13.8	1.151	0.597	0.1056	
15 minute summer	3	1.002	4	17.1	0.985	0.741	0.2641	
15 minute summer	4	1.003	5	30.3	1.724	1.317	0.0704	
600 minute winter	5	1.004	att 1	3.9	1.116	0.108	0.0176	
15 minute summer	6	2.000	att 1	7.7	2.851	0.229	0.0027	
600 minute winter	att 1	1.005	12	1.8	0.311	0.072	0.0176	
15 minute summer	7	3.000	9	8.2	0.806	0.356	0.2336	
15 minute summer	8	4.000	9	8.2	1.676	0.619	0.0295	
15 minute summer	9	3.001	10	18.3	1.347	0.791	0.2443	
600 minute winter	10	3.002	att 2	3.4	0.987	0.095	0.0176	
15 minute summer	11	5.000	att 2	7.2	2.817	0.214	0.0026	
600 minute winter	att 2	3.003	12	1.7	0.331	0.069	0.0176	
600 minute winter	12	Hydro-Brake®	13	1.6				62.4

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	140.819	0.069	10.0	0.0412	0.0000	OK
15 minute summer	2	11	140.514	0.100	14.2	0.0300	0.0000	OK
15 minute summer	3	11	140.479	0.167	15.7	0.0363	0.0000	SURCHARGED
15 minute summer	4	11	140.346	0.287	29.1	0.1543	0.0000	SURCHARGED
480 minute winter	5	448	140.247	0.255	4.6	0.0406	0.0000	SURCHARGED
15 minute summer	6	10	140.741	0.041	7.1	0.0187	0.0000	OK
480 minute winter	att 1	464	140.246	0.546	6.5	44.7982	0.0000	SURCHARGED
15 minute summer	7	10	140.809	0.059	7.6	0.0292	0.0000	OK
15 minute summer	8	10	140.759	0.059	7.6	0.0284	0.0000	OK
15 minute summer	9	10	140.463	0.100	17.0	0.0220	0.0000	OK
480 minute winter	10	464	140.246	0.186	2.3	0.0295	0.0000	SURCHARGED
15 minute summer	11	10	140.739	0.039	6.7	0.0172	0.0000	OK
480 minute winter	att 2	464	140.246	0.546	4.8	44.7885	0.0000	SURCHARGED
600 minute summer	12	555	140.246	0.566	3.5	0.6400	0.0000	SURCHARGED
15 minute summer	13	1	139.600	0.000	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	9.9	0.994	0.429	0.2018	
15 minute summer	2	1.001	3	13.8	1.186	0.596	0.0904	
15 minute summer	3	1.002	4	15.4	0.877	0.668	0.2641	
15 minute summer	4	1.003	5	28.8	1.637	1.251	0.0704	
480 minute winter	5	1.004	att 1	4.3	1.155	0.120	0.0176	
15 minute summer	6	2.000	att 1	7.1	2.809	0.211	0.0025	
480 minute winter	att 1	1.005	12	2.1	0.344	0.083	0.0176	
15 minute summer	7	3.000	9	7.5	0.795	0.327	0.2177	
15 minute summer	8	4.000	9	7.6	1.649	0.567	0.0275	
15 minute summer	9	3.001	10	16.8	1.326	0.727	0.2280	
480 minute winter	10	3.002	att 2	3.2	0.998	0.089	0.0176	
15 minute summer	11	5.000	att 2	6.7	2.779	0.199	0.0024	
480 minute winter	att 2	3.003	12	1.9	0.310	0.076	0.0176	
600 minute summer	12	Hydro-Brake®	13	1.6				61.5

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	1	675	141.099	0.349	2.3	0.2099	0.0000	SURCHARGED
720 minute winter	2	675	141.099	0.686	2.1	0.2051	0.0000	SURCHARGED
720 minute winter	3	675	141.095	0.783	2.4	0.1700	0.0000	SURCHARGED
960 minute winter	4	750	141.098	1.039	5.9	0.5578	0.0000	SURCHARGED
480 minute winter	5	448	141.107	1.115	28.1	0.1772	0.0000	SURCHARGED
960 minute winter	6	735	141.105	0.405	14.4	0.1861	0.0000	SURCHARGED
480 minute winter	att 1	456	141.154	1.454	66.5	65.9387	0.0000	SURCHARGED
720 minute winter	7	645	141.093	0.343	1.1	0.1702	0.0000	SURCHARGED
960 minute winter	8	735	141.091	0.391	1.1	0.1873	0.0000	SURCHARGED
720 minute winter	9	630	141.091	0.728	3.0	0.1594	0.0000	SURCHARGED
960 minute winter	10	810	141.112	1.051	23.7	0.1672	0.0000	SURCHARGED
720 minute winter	11	585	141.099	0.399	3.9	0.1751	0.0000	SURCHARGED
480 minute winter	att 2	456	141.283	1.583	66.6	65.9865	0.0000	FLOOD RISK
960 minute winter	12	735	141.104	1.424	63.5	1.6105	0.0000	FLOOD RISK
15 minute summer	13	1	139.600	0.000	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	1	1.000	2	-2.0	0.635	-0.086	0.3521	
720 minute winter	2	1.001	3	2.2	0.760	0.095	0.1056	
720 minute winter	3	1.002	4	5.3	0.625	0.227	0.2641	
960 minute winter	4	1.003	5	3.8	0.874	0.164	0.0704	
480 minute winter	5	1.004	att 1	28.7	1.628	0.802	0.0176	
960 minute winter	6	2.000	att 1	-14.2	-1.810	-0.423	0.0078	
480 minute winter	att 1	1.005	12	39.1	2.222	1.552	0.0176	
720 minute winter	7	3.000	9	1.6	0.490	0.067	0.4049	
960 minute winter	8	4.000	9	1.0	0.949	0.076	0.0469	
720 minute winter	9	3.001	10	2.5	0.847	0.108	0.3169	
960 minute winter	10	3.002	att 2	-16.0	0.941	-0.446	0.0176	
720 minute winter	11	5.000	att 2	8.3	1.792	0.249	0.0078	
480 minute winter	att 2	3.003	12	50.2	2.853	1.993	0.0176	
960 minute winter	12	Hydro-Brake®	13	2.0				103.6