

Reference	Cover Level (m)	Invert Level (m)	Depth to Soffit (m)	Cover Type	MH Type and Size
S1	70.800	69.975	0.600	A15	Rodding Eye
S2	70.800	69.746	0.829	A15	Wavin 6000 series
S3	70.800	69.576	0.999	A15	Wavin 6000 series
S4	70.840	69.280	1.185	D400	12000 PCC
S5	70.780	69.093	1.387	D400	12000 PCC
S6	70.750	68.926	1.524	D400	12000 PCC
S7	70.750	70.050	0.475	A15	Rodding Eye
S8	70.750	69.888	0.688	A15	Wavin 6000 series
S9	70.750	69.788	0.737	A15	Wavin 6000 series
S10	70.750	69.596	0.904	A15	Wavin 6000 series
S11	70.750	69.406	1.119	D400	12000 PCC
S12	70.690	69.340	1.125	D400	12000 PCC
S13	70.690	68.450	2.040	D400	12000 PCC
S14	70.700	69.653	0.822	D400	12000 PCC (break chamber)

Reference	Cover Level (m)	Invert Level (m)	Depth to Soffit (m)	Cover Type	MH Type and Size
F1	70.850	69.200	1.500	D400	12000 PCC
F2	70.850	69.013	1.687	D400	12000 PCC
F3	70.850	68.901	1.799	D400	12000 PCC
F4	70.850	68.718	1.964	D400	12000 PCC
F5	70.725	68.240	2.335	D400	12000 PCC
F6	70.725	68.075	1.500	D400	12000 PCC
F7	70.700	68.475	1.875	D400	12000 PCC
F8	70.700	68.566	1.984	D400	12000 PCC
F9	70.600	68.990	2.360	D400	12000 PCC

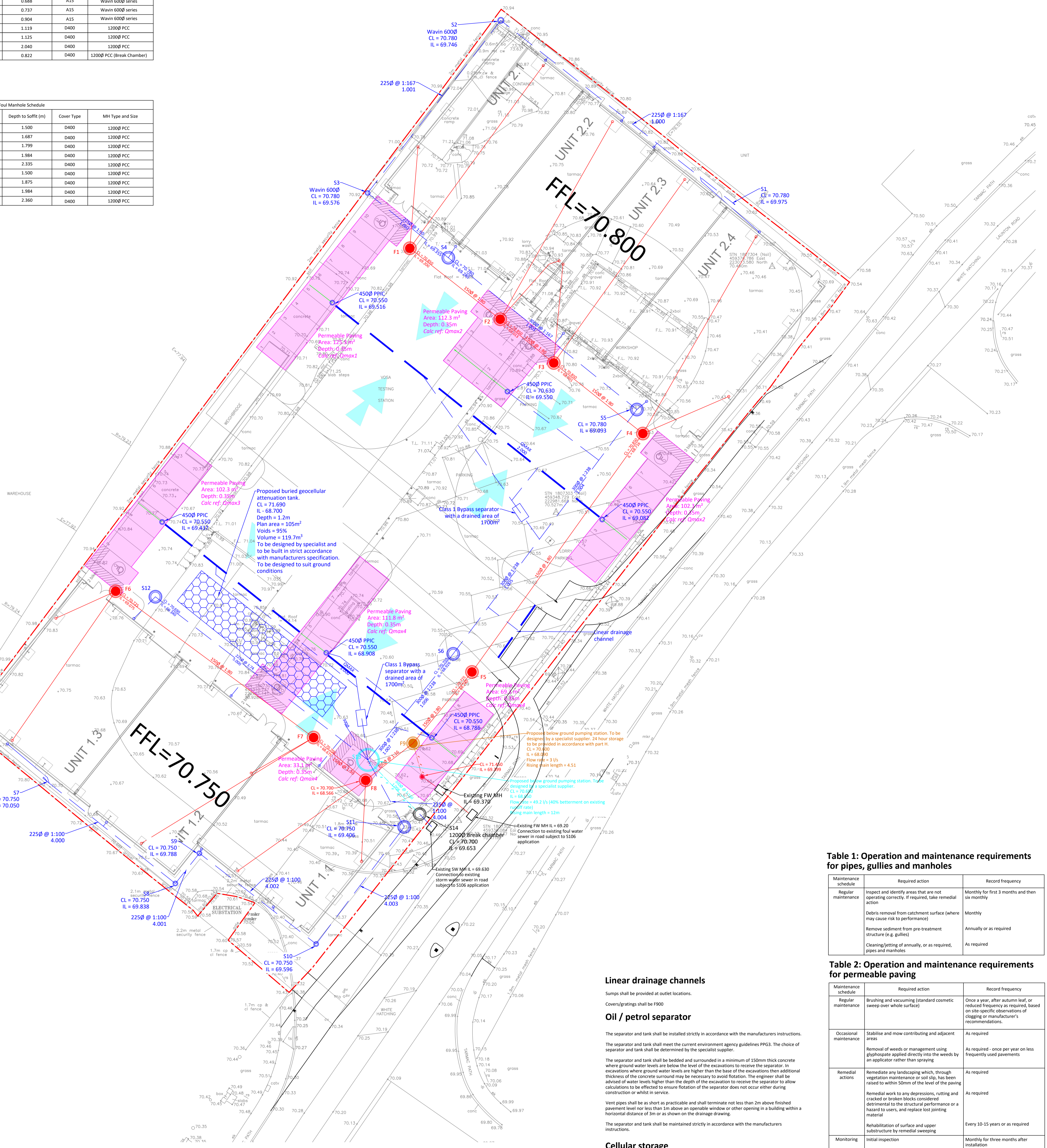


Table 1: Operation and maintenance requirements for pipes, gullies and manholes

Maintenance schedule	Required action	Record frequency
Regular maintenance	Inspect and identify areas that are not operating correctly. If required, take remedial action.	Monthly for first 3 months and then six monthly
Occasional maintenance	Debris removal from catchment surface (where may cause risk to performance)	Monthly
Remedial actions	Remove sediment from pre-treatment structure (e.g. gullies)	Annually or as required
Monitoring	Cleaning/jetting of annually, or as required, pipes and manholes	As required

Table 2: Operation and maintenance requirements for permeable paving

Maintenance schedule	Required action	Record frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
Remedial actions	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required - once per year on less frequently used pavements
Monitoring	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
Remedial actions	Remediate work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance of a hard-wearing, and replace lost paving material	As required
Monitoring	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10-15 years or as required
Monitoring	Initial inspection	Monthly for three months after installation
Regular maintenance	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action	Three-monthly, 48 hours after large storms in first six months
Occasional maintenance	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
Monitoring	Monitor inspection chambers	Annually

Table 3: Operation and maintenance requirements for cellular storage

Maintenance schedule	Required action	Record frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, and then six monthly
Occasional maintenance	Debris removal from catchment surface (where may cause risk to performance)	Monthly
Remedial actions	Where rainfall infiltrates into blocks from above, check surface of filter for blockages by silt, algae or other matter. Remove and replace surface infiltration medium as necessary	Monthly and after large storms
Monitoring	Remove sediment from pre-treatment structures	Annually, or as required
Remedial actions	Repair/rehabilitation of inlets, outlets, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are all in good condition and operating as designed	Annually and after large storms

Linear drainage channels

Sumps shall be provided at outlet locations. Covers/gratings shall be 900

Oil / petrol separator

The separator and tank shall be installed strictly in accordance with the manufacturers instructions. The separator and tank shall meet the current environment agency guidelines PPG3. The choice of separator and tank shall be determined by the specialist supplier. The separator and tank shall be bedded and surrounded in a minimum of 150mm thick concrete where ground water levels are below the level of the excavations to receive the separator. In excavations where ground water levels are higher than the base of the excavations then additional thickness of concrete surround may be necessary to avoid flotation. The engineer shall be advised of water levels higher than the depth of the excavation to receive the separator to allow calculations to be effected to ensure flotation of the separator does not occur either during construction or whilst in service. Vent pipes shall be as short as practicable and shall terminate not less than 2m above finished pavement level nor less than 1m above an operable window or other opening in a building within a horizontal distance of 3m or as shown on the drainage drawing. The separator and tank shall be maintained strictly in accordance with the manufacturers instructions.

Cellular storage

The structural design of the cellular units shall be in accordance with "Structural design of buried pipelines under various conditions of loading" BS8135, "Highways Agency Specification for Highway Works", and Sewers for Adoption, 6th Edition. The cellular units have been designed to receive: Distributed load = 50kN/m² Concentrated load = 100kN Dynamic factor = 2 Material factor = 1.5 unfactored in addition to the dead load of the ground. The cellular units shall be designed not to float. The contractor shall provide to the designer of the cellular units the type of construction plant likely to be used in the area of the cellular units prior to construction. It is essential that pipe work through the cellular units is provided in order to allow the system to be maintained. The design of the cellular units shall provide full details of how the cellular units shall be maintained during the life time of the system. Installation of the cellular units shall be carried out by competent personnel only and strictly in accordance with manufacturers requirements. Reference shall be made to CIRIA C698, site hand book for the construction of SUDS, prior to construction. The design of the cellular units shall demonstrate compliance with Ciria C698, structural design of modular gullies and drainage tanks. The main contractor and the supplier/installer of the cellular units shall ensure that the installation is co-ordinated with other site works to include, but not limited to, understanding what construction plant may traffic close to or over the cellular units.

Rev	Description	By	Checked	Date
Rev C6	Permeable paving areas, depths and references included following LFA comments.	HS	TH	12.04.2022
Rev C5	Flood route arrows and rising main references included following LFA comments.	HS	TH	23.03.2022
Rev C4	ACD drainage channel in site entrance revised to suit new access arrangement	HS	HS	10.12.2021
Rev C3	ACD drainage channel type added to key.	HS	WRA	18.11.2021
Rev C2	Issued for construction	HS	WRA	14.10.2021
Rev C1	Issued for construction	HS	WRA	30.09.2021
Rev D	Manhole schedule added	HS	WRA	07.09.2021
Rev C	Drainage amended to suit client comments	HS	WRA	23.08.2021
Rev B	Drainage amended to suit client comments	HS	WRA	13.08.2021
Rev A	Revised to suit client comments - RWPs positions amended	HS	WRA	12.07.2021

General notes

All dimensions are in metres unless otherwise stated. All levels are in metres. This drawing is to be read in conjunction with all relevant Engineers and Architects drawings, Specifications, Reports and Engineering Details. Do not scale from this drawing.

Drainage notes

The storm water drainage system has generally been designed not to flood for a 1 in 100 year event plus an allowance of 40% for climate change. The location of existing drainage must be accurately located prior to commencement of any excavations, including levels or any other works which may affect drainage before those works commence. All manhole covers within vehicular areas shall be 900. Existing manhole covers within vehicular areas shall be replaced with 900 covers where necessary and if the existing covers are damaged. Cover levels are to be adjusted to suit proposed levels. New manhole covers within non vehicular areas may be 825. RWPs must have rodding access. RWPs locations are indicative. All connections from downpipes, gullies and linear drainage channels to be 1500 unless noted otherwise.

Health, Safety & The Environment

In accordance with the Construction (Design and Management) Regulations 2015, the designs and details on this drawing have been the subject of a Designers Risk Assessment, to identify risks in the construction, use, or demolition of the scheme. It is not considered necessary for Designers to highlight obvious and/or common risks (such as deep excavations, manual handling and working around heavy plant) which Contractors should be familiar with, and be able to control by good management and site practice. So far as is reasonably practicable, the risks inherent in the design have been eliminated. Where it has been considered that elimination of a risk (or part of a risk) is not reasonably practicable, it has been reduced. Significant unusual residual risks are identified on the drawing by use of a Yellow Caution Marker, beside the measures which have been adopted to eliminate and/or reduce them.

Drawing Key

- Site boundary
- Existing Foul drainage
- Proposed Storm Drainage (12000 PCC MH)
- Proposed Storm Drainage (4500 PPIC)
- Proposed Storm Water pumping station
- Proposed Storm Water Rising Main
- Proposed Foul Drainage
- Proposed Foul Water pumping station
- Proposed Foul Water Rising Main
- Proposed ACD Drainage Channel - CMAX 225
- Proposed Rodding Eye
- Perforated Pipes for Parking Bays
- Proposed Tanked Permeable Paving
- Flood Route Arrows

Management of Surface Water

Current Conditions
The site is greenfield therefore greenfield runoff rates shall be used.

Storm Water Drainage Outfalls
It is a requirement of the Building Regulations 2000 (part H) to dispose of surface water collected by a development in the following list of priorities:
1. Infiltration systems where ground conditions permit.
2. To watercourses.
3. To sewers.

Each of these is considered separately below:
Infiltration Systems
Infiltration testing has been carried out by JPP Geotechnical and Environmental which determined that soakaway are not feasible for the site.
Watercourses
There are no watercourses within the vicinity of the site.
Sewers
There are storm and foul sewers located in Launton Road which the site will outfall to.
Storm water drainage strategy
The storm drainage will discharge to the existing outfall for the site. The storm drainage is to be pumped due to shallow levels on the site. The storm drainage will outfall at 49.2 (this is a 40% betterment to the existing discharge rate). Foul water will outfall to the existing foul water sewer in Launton Road. Foul water will also have to be pumped from the northern area of the site.
Storm water will be attenuated via a geocellular tank.
Attenuation will be provided for a 1 in 100 year event plus a 40% allowance for climate change in the form of geo-modular storage tanks and tanked permeable paving.
SUDS treatment
The parking bays will be permeable block paved with a tanked permeable sub-base. The service yard will drain via a bypass separator which will provide proprietary treatment.

 Northampton 1 Broomfield Way, Broomfield, Northampton NN4 9JQ T: 0300 9999121 Warwick Unit 12A, Warwick Innovation Centre, Warwick Technology Park, Gales Hill, Warwick, CV34 6JH T: 02479 100030 Milton Keynes Suite 213, 214, Forum, Broomfield Drive, Unford Wood, Milton Keynes, MK14 8LJ T: 02058 884133	E: mail@jppuk.net W: jppuk.net	<ul style="list-style-type: none"> Infrastructure Design Geotechnical & Environmental Structural Engineering Surveying Planning Services Professional Advice 	<table border="1"> <tr><td>Drawn By:</td><td>RS</td><td>Client:</td><td>Markbank Construction Ltd</td></tr> <tr><td>Chk'd By:</td><td>WRA</td><td>Project:</td><td>Proposed redevelopment, Morley Site Arkwright Road, Bicester</td></tr> <tr><td>Scale @ A0:</td><td>1:200</td><td>Title:</td><td>Proposed Drainage Layout</td></tr> <tr><td>Date:</td><td>08.07.2021</td><td>Status:</td><td>CONSTRUCTION</td></tr> <tr><td>Project No.:</td><td>23200</td><td>Drawing No.:</td><td>E10</td></tr> <tr><td>Rev:</td><td>C6</td><td>Rev:</td><td>C6</td></tr> </table>	Drawn By:	RS	Client:	Markbank Construction Ltd	Chk'd By:	WRA	Project:	Proposed redevelopment, Morley Site Arkwright Road, Bicester	Scale @ A0:	1:200	Title:	Proposed Drainage Layout	Date:	08.07.2021	Status:	CONSTRUCTION	Project No.:	23200	Drawing No.:	E10	Rev:	C6	Rev:	C6
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