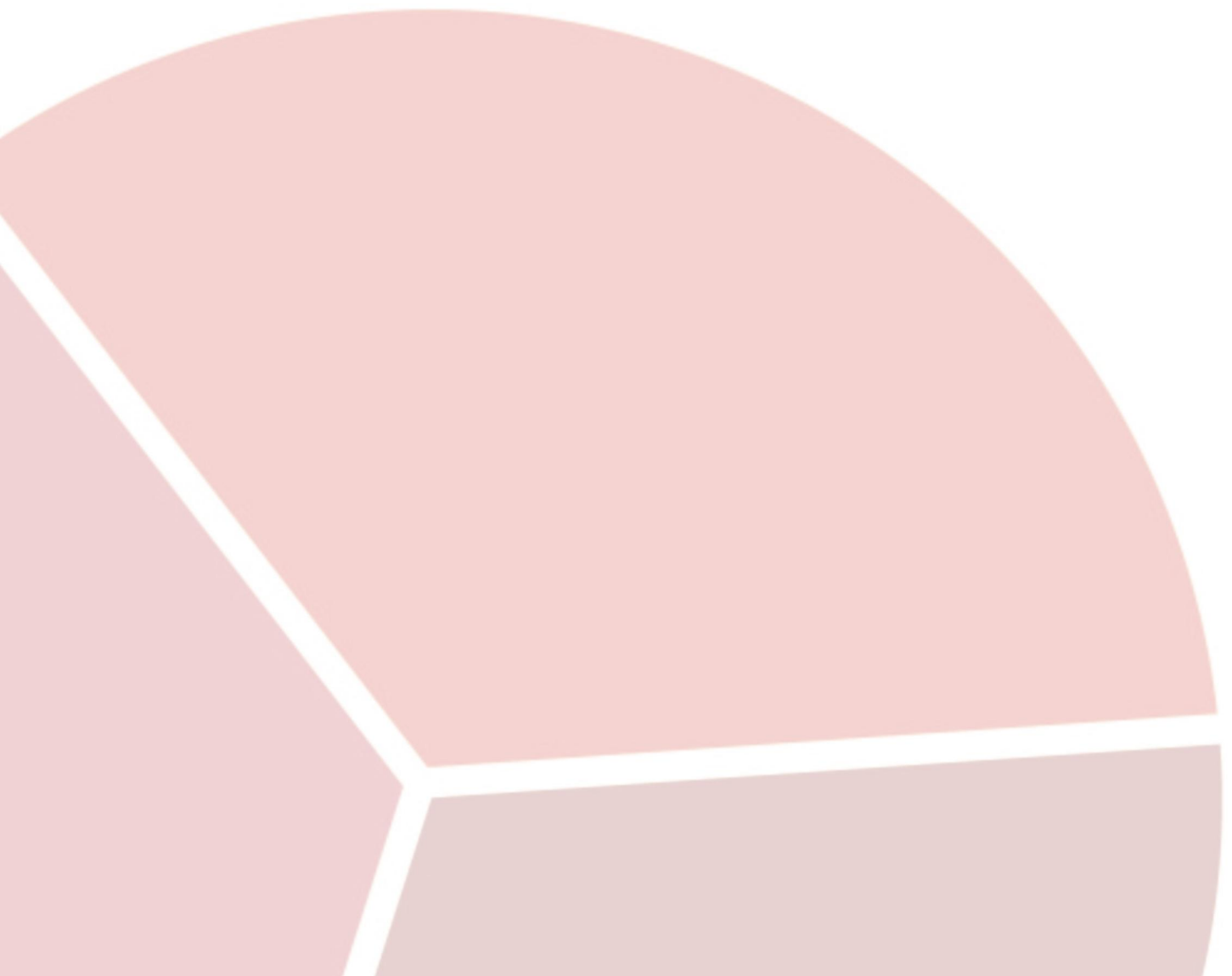




**SuDS Operation and Maintenance
Statement**

**Phase 2 Bakers Quay
RDL00415**

000415-JPL-ZZ-ZZ-RP-D-2001-A3-C01





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1.0 Terms of Reference

1.1 Report Details

Jackson Purdue Lever has been appointed by Rokeby Developments to prepare a SuDS Operation and Maintenance Statement. No liability is accepted to any third party for all or part of this report in connection with this or any other development.

This document has been produced, the contents of which are based on current best practice guidance, to demonstrate the effectiveness and longevity of the SuDS features designed within the drainage strategy.

Proposals contained within, or forming part of this report, represent the design intent and may be subject to alteration or adjustment during completion of the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

The surface water network has been designed to accommodate the 1 in 100 year storm rainfall event plus an allowance of 40% for climate change. As the flows are generally being attenuated on site, and within SuDS features, there will be a period of time after storm events where the network is still partially or fully surcharged and is discharging runoff. Should any surcharging still be present 48 hours after the end of the storm, appropriate action should be taken as noted within the following sections.

This document is intended to give an overview of the operation and maintenance for the range of SuDS features included within the drainage strategy and in relation to typical/standard details only. Where proprietary products are specified the manufacturer's recommendations should be followed in the first instance, unless specifically noted otherwise due to project constraints.

The recommended operation and maintenance intervals are indicative only and should initially be undertaken on a more frequent basis to ensure that there are no unforeseen issues with the construction and early operation. The frequency can then be adjusted to suit the Client's wider site maintenance programme.

Maintenance responsibility for the system is expected to revert to the Client's estate management team at the end of the contractor's defects liability period.

1.2 Report History

Status - Revision	Author	Approved	Issued Date	Purpose
A3-C01	RKM	DA	22/04/2022	Issued for Planning



2.0 Pipes and Manholes

2.1 Location and Description

The proposed pipes and manholes are shown on the drainage layout drawing included within **Appendix A**.

The pipes and manholes have been designed in accordance with CIRIA C753 and all current British Standards. Where specified, proprietary products are to be installed and maintained in accordance with the manufacturer's recommendations.

2.2 Operation

The pipes are intended to be surface water conveyance features. These features are intended to be dry except during rainfall events and have been designed to be self-cleansing as a result of the gradients proposed.

Access for maintenance has been provided through inspection chambers, manholes and rodding eyes.

2.3 Inspection and Maintenance Regime

Regular inspection and maintenance are an important factor for the effective operation of these features and to identify areas which may have been obstructed/clogged and are not operating correctly.

A recommended schedule of maintenance activities is included in the table below:

Maintenance Schedule	Required Action	Typical Frequency
Occasional Maintenance	Remove or control tree roots where they are encroaching pipe runs, using recommended methods (e.g. NJUG, 2018 or BS 3998:2010)	As required
Remedial Actions	Clear pipework of blockages	As required
Monitoring	Initial inspection should be provided using a post-construction CCTV survey	Once (post-construction)
	Inspect for evidence of poor operation	Monthly (during the first year), then annually



3.0 Channel Drains

3.1 Location and Description

The proposed channel drains are shown on the drainage layout drawing included within **Appendix A**.

The channel drains have been designed in accordance with CIRIA C753 and all current British Standards. Where specified, proprietary products are to be installed and maintained in accordance with the manufacturer's recommendations.

3.2 Operation

The channel drains are intended to be surface water collection and conveyance features. These features are intended to be dry except during rainfall events.

The surface water should enter the drainage channel from runoff from adjacent impermeable surfaces and typically consist of a channel with a removable grate.

Access for maintenance has been provided through access chambers, rodding points and the removable cover grates.

3.3 Inspection and Maintenance Regime

Regular inspection and maintenance are an important factor for the effective operation of these features and to identify areas which may have been obstructed/clogged and are not operating correctly.

A recommended schedule of maintenance activities is included in the table below:

Maintenance Schedule	Required Action	Typical Frequency
Routine Maintenance	Remove litter and debris and inspect for sediment accumulation	Six monthly
Remedial Actions	Clear pipework of blockages	As required
Monitoring	Inspect for evidence of poor operation	Monthly (during the first year), then annually
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly (during the first year), then annually



4.0 Flow Control Chambers/Devices

4.1 Location and Description

The proposed flow control chambers/devices are shown on the drainage layout drawing included within **Appendix A**.

The flow control chambers/devices have been designed in accordance with CIRIA C753 and all current British Standards. Where specified, proprietary products are to be installed and maintained in accordance with the manufacturer's recommendations.

4.2 Operation

The flow control chamber/device is intended to restrict the discharge rate of surface water leaving the site to a designed rate utilising devices such as an orifice plate, vortex separator or mechanical float control.

Access for maintenance has been provided through the chamber itself.

4.3 Inspection and Maintenance Regime

Regular inspection and maintenance are an important factor for the effective operation of these features and to identify areas which may have been obstructed/clogged and are not operating correctly.

A recommended schedule of maintenance activities is included in the table below:

Maintenance Schedule	Required Action	Typical Frequency
Routine Maintenance	Remove litter and debris and inspect for sediment accumulation	Annually
Regular Maintenance	Check any penstocks and other mechanical devices	Annually
Remedial Actions	Clear pipework of blockages, utilise penstock to clear chamber if required	As required
Monitoring	Initial inspection should be provided using a post-construction CCTV survey	Once (post-construction)
	Inspect for evidence of poor operation	Monthly (during the first year), then annually



5.0 Filter Drains

5.1 Location and Description

The proposed filter drains are shown on the drainage layout drawing included within **Appendix A**.

The filter drains have been designed in accordance with CIRIA C753 and all current British Standards. Where specified, proprietary products are to be installed and maintained in accordance with the manufacturer's recommendations.

5.2 Operation

The filter drains are intended to be surface water conveyance, water quality improvement and attenuation storage features. These features are intended to be dry except during rainfall events, although there will be some water retained within the stone layer below the outlet pipe.

The surface water should permeate out of the perforated pipe into the permeable stone around within the trench and then back into the pipe.

Access for maintenance has been provided through inspection chambers and manholes.

5.3 Inspection and Maintenance Regime

Regular inspection and maintenance are an important factor for the effective operation of filter drains.

A recommended schedule of maintenance activities is included in the table below:

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly, or as required
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (e.g. NJUG, 2018 or BS 3998:2010)	As required



	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required



6.0 Pervious Pavements

6.1 Location and Description

The proposed pervious pavements are shown on the drainage layout drawing included within **Appendix A**.

The pervious pavements have been designed in accordance with CIRIA C753 and all current British Standards. Where specified, proprietary products are to be installed and maintained in accordance with the manufacturer's recommendations.

6.2 Operation

The pervious pavements are intended to be surface water collection, water quality improvement and attenuation storage features. These features are intended to be dry except during rainfall events.

The surface water should enter the pervious pavement from direct rainfall and runoff from adjacent impermeable surfaces and permeate down through the surface through the gaps and into the permeable stone within the sub-base below.

Specific access for maintenance has not been provided as the pervious pavements can be directly accessed.

6.3 Inspection and Maintenance Regime

Regular inspection and maintenance are an important factor for the effective operation of pervious pavements.

A recommended schedule of maintenance activities is included in the table below:

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Annually, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required



	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – annually on less frequently used pavements
Remedial Actions	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 work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years, or as required (if infiltration performance is reduced due to significant clogging)
	Remove build-up of sediment	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three monthly, 48hrs after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually



7.0 Attenuation Storage Tanks

7.1 Location and Description

The proposed attenuation storage tanks are shown on the drainage layout drawing included within **Appendix A**.

The attenuation storage tanks have been designed in accordance with CIRIA C753 and all current British Standards. Where specified, proprietary products are to be installed and maintained in accordance with the manufacturer's recommendations.

7.2 Operation

The attenuation storage tanks are intended to be surface water attenuation storage features. These features are intended to be dry except during rainfall events.

Access for maintenance has been provided through inspection chambers and manholes.

7.3 Inspection and Maintenance Regime

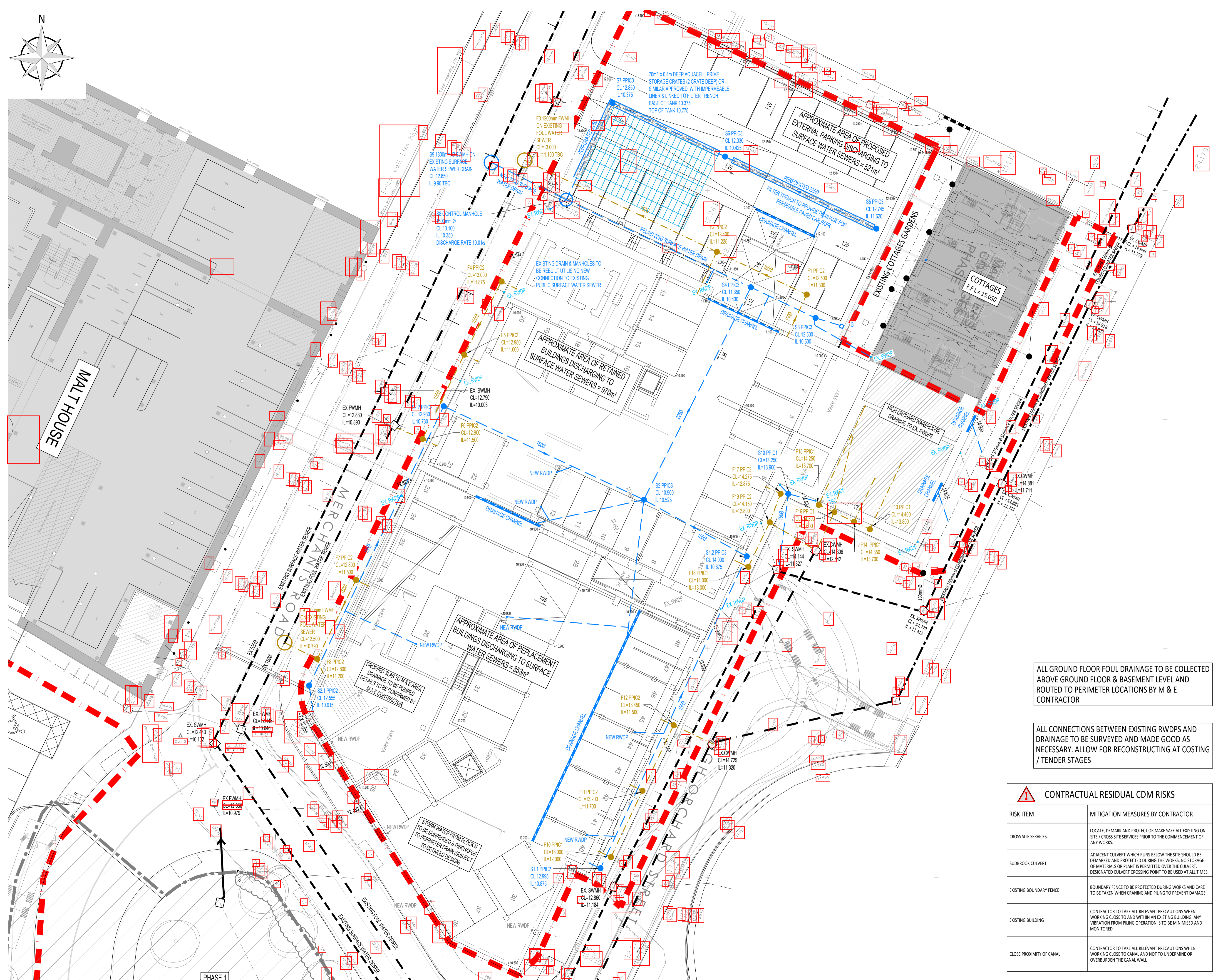
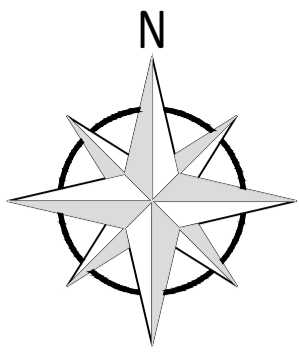
Regular inspection and maintenance are an important factor for the effective operation of attenuation storage tanks.

A recommended schedule of maintenance activities is included in the table below:

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly, if required, take remedial action	Monthly for three months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface or filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every five years, or as required

Appendix A

Proposed Drainage Layouts



- © Jackson Consulting Engineers Limited
- DO NOT SCALE THIS DRAWING. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS ON SITE PRIOR TO COMMENCING THE WORKS.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
 - ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE. ALL LEVELS IN METRES UNLESS NOTED OTHERWISE.
 - ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
 - THIS DRAWING IS BASED ON GREENHATCH GROUP DRAWING No. 287748-T REVISION 0 DATED 02.05.2019, ROBERTS LIMBRICK ARCHITECTS DRAWING No. 9959_SK03 DATED 12.04.2022 & THORNLEY LUMB DRAWING No. C8057-TLP- LOWER GROUND FLOOR MEP SERVICES DATED 15.03.2022

LINETYPE KEY

	DENOTES EXISTING ADOPTED COMBINED WATER DRAINAGE ROUTES
	DENOTES EXISTING ADOPTED FOUL WATER DRAINAGE ROUTES
	DENOTES EXISTING ADOPTED SURFACE WATER DRAINAGE ROUTES
	DENOTES PHASE 1 PRIVATE FOUL WATER DRAINAGE ROUTES
	DENOTES PHASE 1 PRIVATE SURFACE WATER DRAINAGE ROUTES
	DENOTES PROPOSED SURFACE WATER DRAINAGE
	DENOTES PROPOSED FOUL WATER DRAINAGE

THIS DRAWING IS FOR COSTING PURPOSES ONLY AND IS SUBJECT TO CHANGE FOLLOWING DETAILED DESIGN

FOR DRAINAGE DETAILS REFER TO DRAWING NO. XX0415-JPL-XX-XX-DR-D-4301

Rev.	Date	Revision Description	Drawn	Auth'd
C02	25.04.22	UPDATED FOR REVISED SCHEME	RKM	DA
C01	21.04.20	ISSUED FOR TENDER	RKM	DA
P04	09.03.20	UPDATED TO REFLECT LATEST ARCHITECT'S DRAWINGS & DRAINAGE STRATEGY	RKM	DA
P03	18.02.20	ROOF, GROUND FLOOR & EX RWDP NOTES ADDED. INVERTS & CHANNELS ADDED TO SW	RKM	DA
P02	13.02.20	PROPOSED FOUL DRAINAGE ADDED	CE	DA
P01	05.06.18	ISSUED FOR COMMENT	MWH	DA



Project Title

PHASE 2 BAKERS QUAY GLOUCESTER

Description

THE DOWNINGS LEVELS & DRAINAGE LAYOUT

Date	JUN 2018	Drawn	MWH
Scale	1:150 @A1	Authorised	DA
JPL Ref.	RDL00415		

BIM Ref.	Project	Org.	Vol.	Level	Type	Role	Number
	000415	JPL	ZZ	ZZ	DR	D	4100

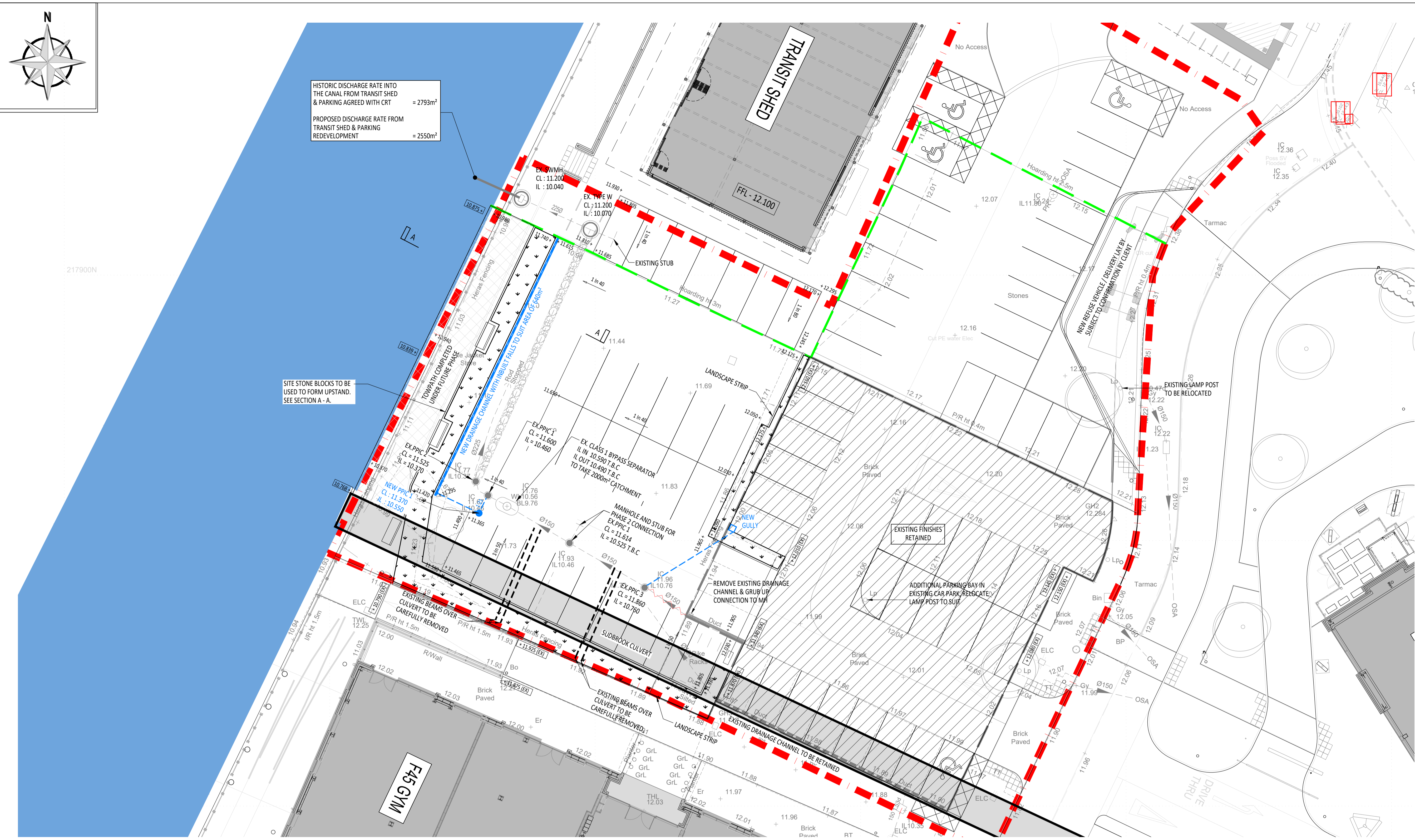
Suitability	Revision
A3 - Developed Design	C02



ALL GROUND FLOOR FOUL DRAINAGE TO BE COLLECTED ABOVE GROUND FLOOR & BASEMENT LEVEL AND ROUTED TO PERIMETER LOCATIONS BY M & E CONTRACTOR

ALL CONNECTIONS BETWEEN EXISTING RWDPs AND DRAINAGE TO BE SURVEYED AND MADE GOOD AS NECESSARY. ALLOW FOR RECONSTRUCTING AT COSTING / TENDER STAGES

CONTRACTUAL RESIDUAL CDM RISKS	
RISK ITEM	MITIGATION MEASURES BY CONTRACTOR
CROSS SITE SERVICES	LOCATE, DEMARK AND PROTECT OR MAKE SAFE ALL EXISTING ON SITE / CROSS SITE SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORKS.
SUBDROOK CULVERT	ADJACENT CULVERT WHICH RUNS BELOW THE SITE SHOULD BE DEMARKED AND PROTECTED DURING THE WORKS. NO STORAGE OF MATERIALS OR PLANT IS PERMITTED OVER THE CULVERT. DESIGNATED CULVERT CROSSING POINT TO BE USED AT ALL TIMES.
EXISTING BOUNDARY FENCE	BOUNDARY FENCE TO BE PROTECTED DURING WORKS AND CARE TO BE TAKEN WHEN CRANING AND PILING TO PREVENT DAMAGE.
EXISTING BUILDING	CONTRACTOR TO TAKE ALL RELEVANT PRECAUTIONS WHEN WORKING CLOSE TO AND WITHIN AN EXISTING BUILDING. ANY VIBRATION FROM PILING OPERATION IS TO BE MINIMISED AND MONITORED.
CLOSE PROXIMITY OF CANAL	CONTRACTOR TO TAKE ALL RELEVANT PRECAUTIONS WHEN WORKING CLOSE TO CANAL AND NOT TO UNDERMINE OR OVERBURDEN THE CANAL WALL.



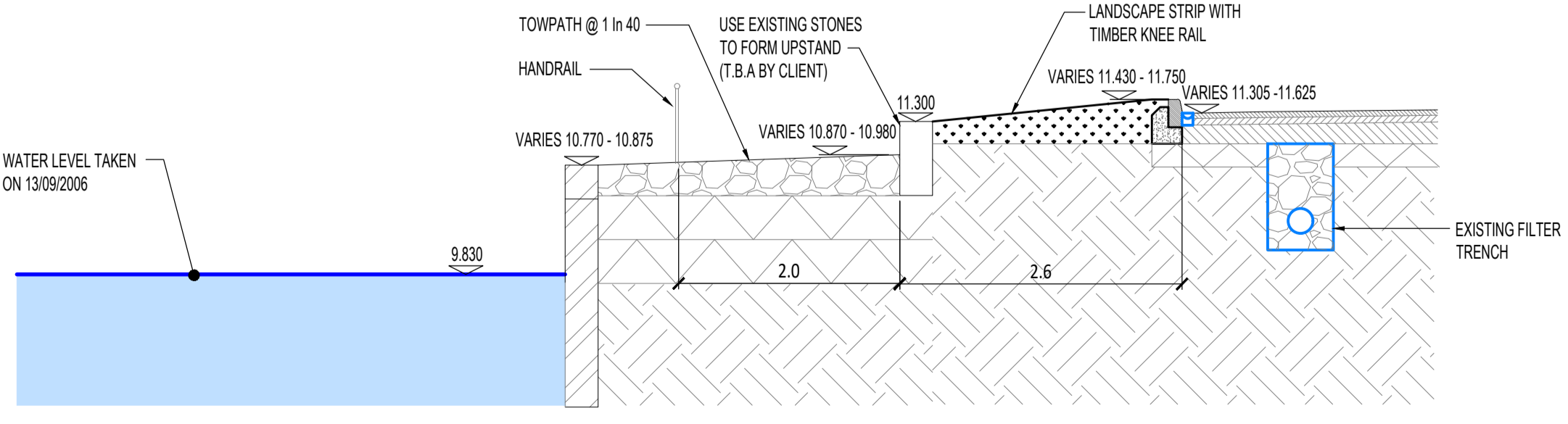
HISTORIC DISCHARGE RATE INTO THE CANAL FROM TRANSIT SHED & PARKING AGREED WITH CRT = 2793m³

PROPOSED DISCHARGE RATE FROM TRANSIT SHED & PARKING REDEVELOPMENT = 2550m³

SITE STONE BLOCKS TO BE USED TO FORM UPSTAND. SEE SECTION A - A.

KEY

- DENOTES EXISTING HOARDING LINE
- DENOTES PROPOSED SURFACE WATER DRAINAGE (150mm Ø U.N.O.)
- DENOTES EXISTING SURFACE WATER DRAINAGE TAKEN FROM SURVEY & AS BUILT INFORMATION
- 12.125 + DENOTES PROPOSED LEVEL
- 12.150 [EX] - DENOTES EXISTING LEVEL



SECTION A - A
(SCALE 1:50)

- DO NOT SCALE THIS DRAWING. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS ON SITE PRIOR TO COMMENCING THE WORKS.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
- ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE. ALL LEVELS IN METRES UNLESS NOTED OTHERWISE.
- ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
- THIS DRAWING IS BASED ON GREENHATCH GROUP DRAWING No. 287748-T REVISION 0 DATED 02.05.2019 & WHITMAN COX ARCHITECTS DRAWING No. 17-286-WCA-PL-1006 REVISION D DATED 09.05.2020

CONTRACTUAL RESIDUAL CDM RISK

CROSS SITE SERVICES
LOCATE, DEMARK AND PROTECT OR MAKE SAFE ALL EXISTING ON SITE / CROSS SITE SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORKS.

SUBDROCK CULVERT
ADJACENT CULVERT WHICH RUNS BELOW THE SITE SHOULD BE DEMARKED AND PROTECTED DURING THE WORKS. NO STORAGE OF MATERIALS OR PLANT IS PERMITTED OVER THE CULVERT. DESIGNATED CULVERT CROSSING POINT TO BE USED AT ALL TIMES.

EXISTING BOUNDARY FENCE
BOUNDARY FENCE TO BE PROTECTED DURING WORKS AND CARE TO BE TAKEN WHEN CRANING AND PILING TO PREVENT DAMAGE.

EXISTING BUILDINGS
CONTRACTOR TO TAKE ALL RELEVANT PRECAUTIONS WHEN WORKING CLOSE TO AND WITHIN AN EXISTING BUILDING. ANY VIBRATION FROM PILING OPERATION IS TO BE MINIMISED AND MONITORED

CLOSE PROXIMITY OF CANAL
CONTRACTOR TO TAKE ALL RELEVANT PRECAUTIONS WHEN WORKING CLOSE TO CANAL AND NOT TO UNDERMINE OR OVERBURDEN THE CANAL WALL

Rev.	Date	Revision Description	Drawn	Auth'd
A2-002	25.04.22	UPDATED TO REFLECT LATEST ARCHITECTS LAYOUT & DISCHARGE RATES INTO CANAL INDICATED	RKM	DA
A2-001	01.02.22	ISSUED FOR INFORMATION	RKM	DA



Project Title
**PHASE 2
BAKERS QUAY
GLOUCESTER**

Description
**PROPOSED LEVELS &
DRAINAGE LAYOUT
TO CAR PARK**

Date	FEB 2022	Drawn	RKM
Scale	1:150 @A1	Authorised	DA
JPL Ref.	RDL00415		

BIM Ref.	Project	Org.	Vol.	Level	Type	Role	Number
	000415	JPL	ZZ	ZZ	DR	D	4106

Suitability	A3 - Developed Design	Revision	C02
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