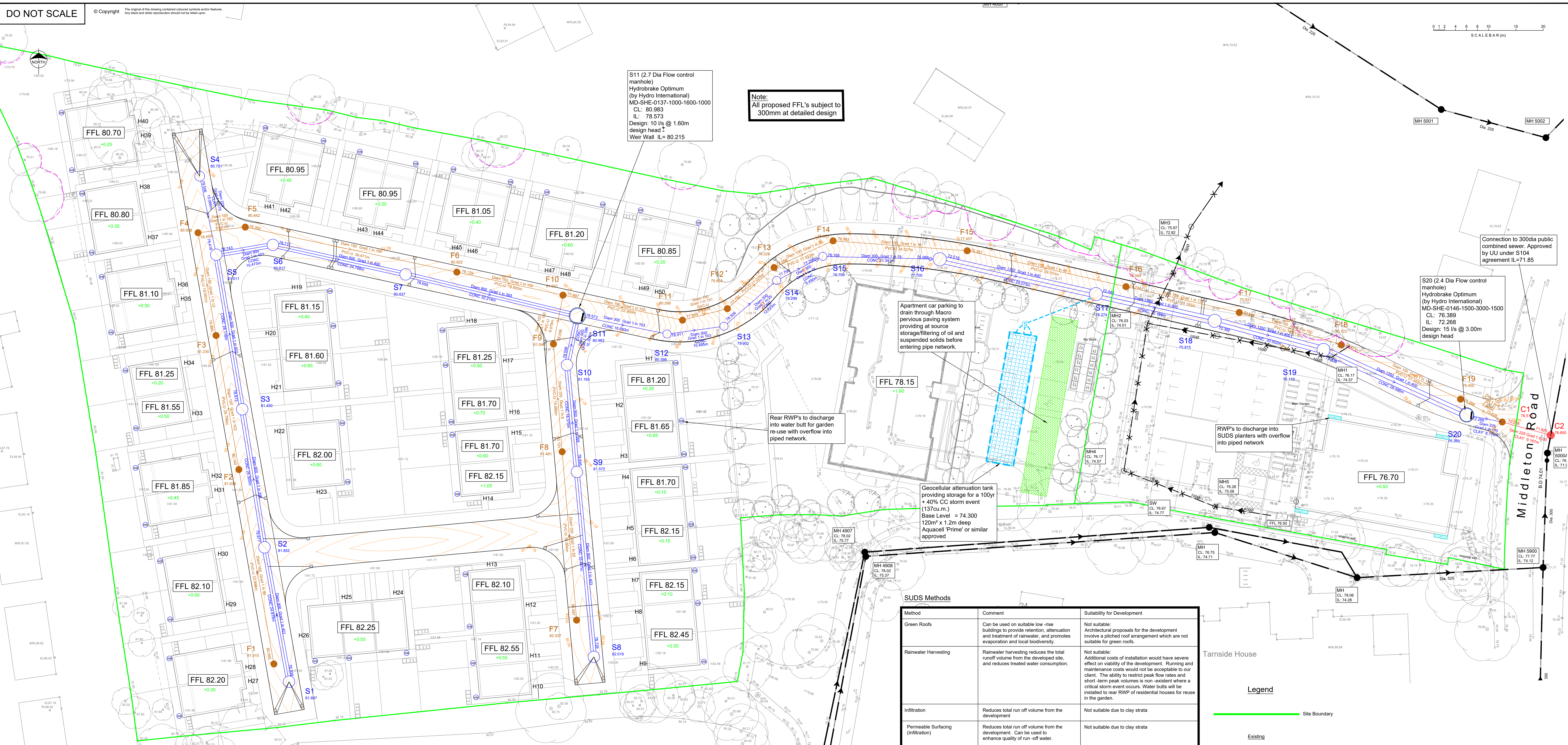


DO NOT SCALE

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0 1 2 4 6 8 10 15 20
SCALE BAR (m)



Note:
All proposed FFL's subject to
300mm at detailed design

S11 (2.7 Dia Flow control
manhole)
Hydrobrake Optimum
(by Hydro International)
MD-SHE-0137-1000-1600-1000
CL: 80.993
IL: 78.573
Design: 10 l/s @ 1.60m
design head ±
Weir Wall IL= 80.215

Apartment car parking to
drain through Macro
pervious paving system
providing at source
storage/filtering of oil and
suspended solids before
entering pipe network.

Rear RWP's to discharge
into water butt for garden
re-use with overflow into
piped network.

Geocellular attenuation tank
providing storage for a 100yr
storm event
(137cu.m.)
Base Level = 74.300
120m² x 1.2m deep
Aquacell 'Prime' or similar
approved

RWP's to discharge into
SUDS planters with overflow
into piped network

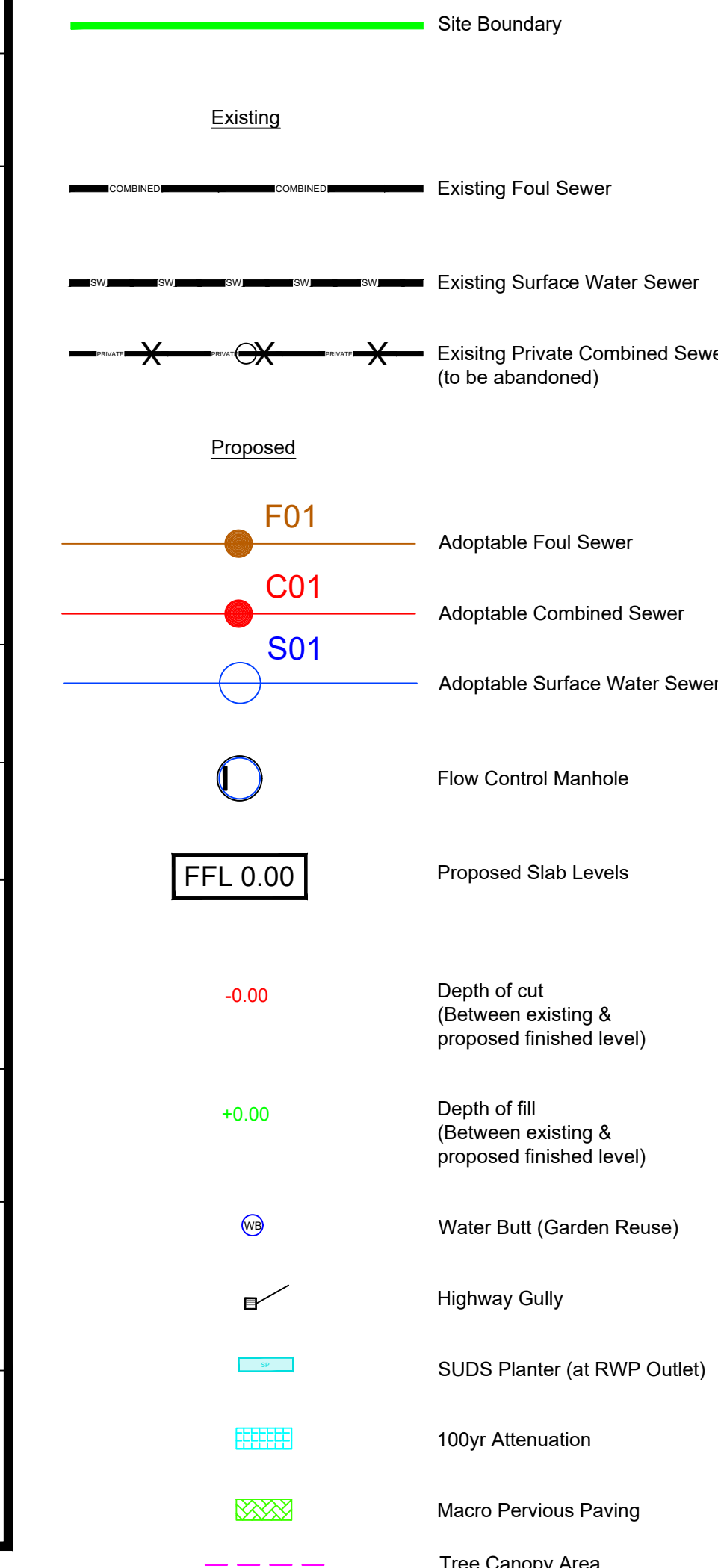
Connection to 300dia public
combined sewer. Approved
by UU under S104
agreement IL=71.85

S20 (2.4 Dia Flow control
manhole)
Hydrobrake Optimum
(by Hydro International)
MD-SHE-0146-1500-3000-1500
CL: 76.389
IL: 72.268
Design: 15 l/s @ 3.00m
design head

SUDS Methods

Method	Comment	Suitability for Development
Green Roofs	Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity.	Not suitable: Architectural proposals for the development involve a pitched roof arrangement which are not suitable for green roofs.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site, and reduces treated water consumption.	Not suitable: Additional costs of installation would have severe effect on viability of the development. Running and maintenance costs would not be acceptable to our client. The ability to restrict peak flow rates and short-term peak volumes is non-existent where a critical storm event occurs. Water butts will be installed to rear RWP of residential houses for reuse in the garden.
Infiltration	Reduces total run off volume from the development.	Not suitable due to clay strata
Permeable Surfacing (Infiltration)	Reduces total run off volume from the development. Can be used to enhance quality of run-off water.	Not suitable due to clay strata
Permeable Surfacing (Tanked)	Can be used to enhance quality of run-off water. Sub-base provides 'source' storage and reduces the volume of storage downstream. The storage can be created with selection of the stone fill or use of plastic box systems. Impermeable membrane at base of construction to prevent impact on pavement stability	Not suitable: Long term maintenance required and risk of reduction in permeability. Specialist maintenance required to maintain porous surfaces. No services to run beneath areas of permeable surface (due to presence of base impermeable barrier which is very difficult to excavate through and reinstatement if required). Spatial constraints of site do not allow alternative routes for services along plot frontages. Difficult to install small areas of tanked systems that require very small flow controls which can lead to maintenance issues. Presence of shallow sewers on site will make it difficult to install. Construction sequence can make it difficult to construct without use of a sacrificial road base surface.
Macro-Previous Paving	Provide at source surface water storage and removal of oil and suspended solids.	Suitable: To be installed in apartment car park bays to provide at source surface water storage and improve water quality prior to discharge into piped system.
Swales, basins and ponds	Provide areas for above ground surface run off storage. Swales also allow filtering of particulate matter, improving water quality.	Suitable: Space constraints on site do not permit large above ground areas for flood storage. No scope to reduce plot numbers due to site viability
Bio-Retention Areas	Collect and retain run-off to help improve water quality, prior to discharge in piped system or infiltration	Suitable: Space constraints on site do not permit large above ground areas for flood storage. No scope to reduce plot numbers due to site viability however SUDS planters can be provided on RWPs of the club house with overflow to piped network.
Highway Tree Planters	Suitable as traffic calming features. Can be used as surface water run off storage and improve water quality prior to discharge in piped system or infiltration.	Not Suitable: Due to the site topography, driveway locations, junctions and steep highway gradients there are no suitable locations to introduce tree planters. Site geology not suitable for infiltration.
Geocellular storage	Suitable for sites with insufficient space for basins etc. Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. Generally, be suitable for adoption by the statutory water company (e.g. United Utilities).	Suitable: Subject to detailed design and drainage layout suitable for attenuation. Infiltration not suitable due to soil conditions, clay strata.
Large Pipes, conduits and tanks	Suitable for sites with insufficient space for basins etc. Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. Generally, be suitable for adoption by the statutory water company (e.g. United Utilities).	Suitable: Large diameter on-line pipes can be located within the highway corridor and will be adopted by United Utilities via S104 agreement

Legend



Drainage Strategy

Existing Drainage

Existing drainage, foul and surface water (roof and hardstanding) areas, drain via a private combined network before discharging into the public combined sewer on White House Avenue.

Proposed Surface Water

- Infiltration**
The Site Investigation Report has determined soakaways are unlikely to be feasible due to unsuitable soil conditions, clay strata.
- Watercourse**
There is no watercourse close to the development.
- Surface Water**
Levels don't allow for the site to be drained to SW sewers in Couthill Drive.
- Combined Sewer**
SW sewer discharges into combined sewer in Middleton Rd via gravity drainage network.

The proposed drainage networks will be designed for 100-year storm event plus an additional 40% allowance for climate change. Attenuation will be provided within oversized on-line pipes and off-line buried cellular crates. All on-line pipes and manholes will be offered to United Utilities for adoption under a S104 Agreement and all off-line components will be maintained by a management company.

All flows will be contained within the drainage network and will result in no overland flows for a 100-year storm event plus and additional 40% climate change.

Proposed Foul

Discharge to the existing combined sewer in Middleton Road via a gravity drainage network.

Proposed Surface Water

Discharge to the existing combined sewer in Middleton Road via a gravity drainage network.

Surface Water Flow Rates

Site Area = 19725sq.m.

Impermeable Area = 2165sq.m

Existing Brownfield Run-off Rate
(Based on 50mm/hr rainfall intensity)

= A x I

= 2165sq.m x 50mm/hr

= 30 l/s

Existing Greenfield Run-off Rate

= 12.25 l/s (based on site Area)

= 19725sq.m x 1765sq/m

Proposed Run-off Rate

= Brownfield less 50% + Qbar

= 15l/s + 12.25l/s = 27.25l/s

Following discussions with UU a flow rate of 15l/s has been agreed

SUDS Strategy

The prime function of SuDS, as with conventional drainage, is to provide effective surface water drainage, ensuring the greatest degree of flood risk protection over the long term both within and downstream of the development and prevent pollution. However, SuDS approaches can bring wider benefits too. Appropriately designed, constructed and maintained, SuDS are more sustainable than conventional drainage systems and can help to:

- Reduce run-off surface water flow-rates and/or volumes and hence reduce the risk of flooding
- Encourage natural groundwater re-charge
- Reduce pollutant concentrations in storm water
- Provide habitat for wildlife.

There are many site-specific factors which will influence the choice of any single or combination of SuDS devices used within a development. The primary factors are:

- Whether the development is domestic, commercial or industrial
- Whether the underlying ground is contaminated. If so, infiltration systems will most probably not be permitted.
- Whether the underlying ground is permeable enough for infiltration systems to be considered.
- Whether the ground water levels are deep enough for infiltration systems to be considered
- Whether the site is steeply sloping and its general topography
- The availability of space inside the development for each potential SuDS facility.
- Health & Safety aspects should the development be likely to be inhabited or used by children.

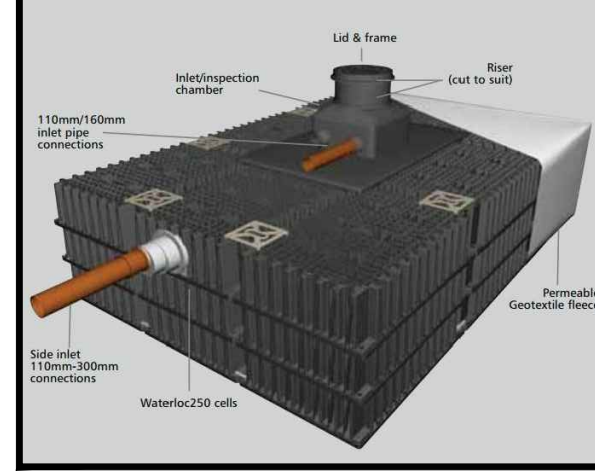
To ensure no increased flood risk to offsite land and development, disposal of surface water to the ground is encouraged and runoff volumes will be reduced through the SuDS management train where ground conditions permit. Where ground conditions are unsuitable, a discharge to an open water body / sewer will be necessary with rates restricted to the existing site conditions.



Water Butt



SUDS Planter



Cellular Storage



Macro Pervious Paving System

APPROVAL

chartered consulting engineers
Tel: 01244 684910
Fax: 01244 684911
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Park House
Sandpiper Court
Chester Business Park
Chester
CH4 3QU

Client

BRANLEY HOMES LTD

Project

White House Club, Middleton Road,
Manchester

Title

Drainage Strategy

DRAWING NUMBER

7424 / SK08

SCALE AT A0

1:500

DATE

JUNE 20

DRAWN

LW

CHECKED

AJ

REVISION

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