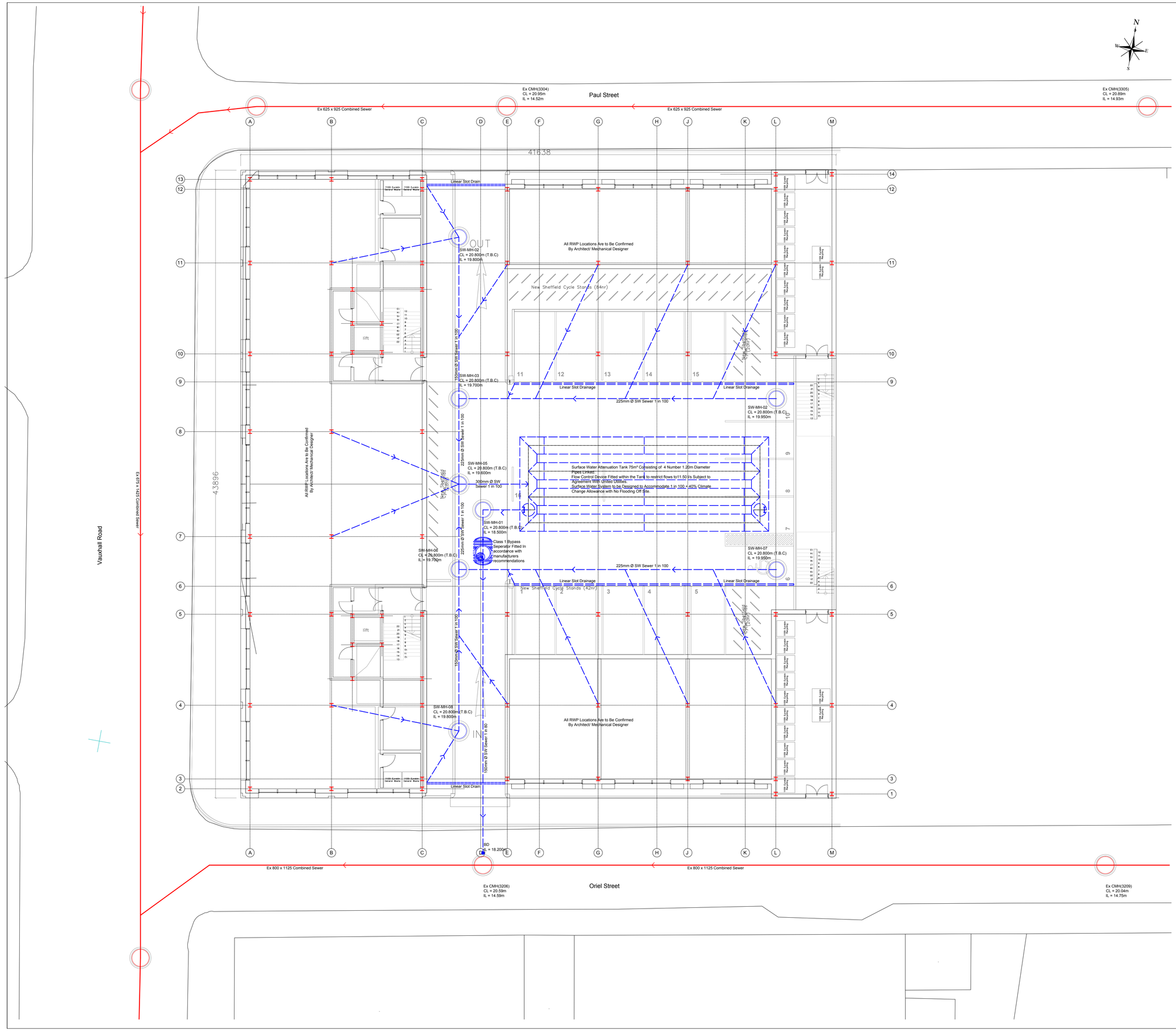

DRAINAGE NOTES

1. This drawing shall be read in conjunction with all other relevant drawings
2. Any ambiguities, omissions and errors on Drawings, shall be brought to the Engineers attention immediately.
3. The Contractor shall confirm the location and level of existing drainage outfalls prior to commencement of the drainage works.
4. Exact locations of proposed manholes and inspection chambers to be determined on site.
5. All pipes built into the manhole inverts shall be installed with soffits levels. Unless shown otherwise.
6. Connections to road gulleys shall be in 150mm nominal bore. Connections to other terminal fittings shall be in 100mm nominal bore pipe. Unless shown otherwise.
7. Cover levels shown are approximate and shall be adjusted and confirm on site by the Contractor.
8. The Contractor shall control accurate line and level of pipe laying by use of an optical laser.
9. The Contractor shall protect the pipeline from damage by site traffic during construction.
10. Pipework and fittings shall comply with the following requirements except where noted otherwise:
11. All rest bend to stacks of more than 3 storeys (i.e extending above Ground + 3) to be 750mm below lowest branch, i.e min 650mm below GFFL. All other rest bends to be minimum 450mm below FFL.
12. All drains passing through walls or foundations to have 600mm long rocker pipes either side with concrete surround and soft joint at coupling.
13. All SVP and stub stack connections to have sealed access covers for rodding and cleaning.
14. Pipework with less than 600mm cover from finished road level shall be protected with a 150mm C20 concrete bed and surround. Flexible joints shall be maintained at 5 metre centres on pipe joints with compressable sheet 18mm thick.
15. Trenches in highways and car parking areas shall be backfilled with Type 1 granular sub-base.
16. Soft spots in the trench formation shall be removed and replaced with granular bedding unless instructed otherwise.
17. Road gulleys shall be constructed using a 900mm deep x 375mm diameter gulley pot, surrounded by 150mm thickness C20 concrete, with rodding eye and chained stopper.
18. Gulley covers shall be Grade B captive hinged ductile iron to BS497 black coated.
19. Unless noted otherwise manhole covers shall be ductile iron to BS497 black coated with 600 x 600 square opening as follows:-
    Highways - Class D400
    Car Parks - Class C250
    Landscaped - Class B125
20. Connections in pipes between manholes runs shall be formed by using purpose made 45° junction fittings to BS65. Bend fittings shall be provided where appropriate to direct the flow into the main runs. Alternatively main pipes may be diamond cored to take lateral connections with a saddle fitting to BS65 and 150mm C20 concrete surround.
21. The Contractor shall confirm the location of all existing statutory undertakers apparatus and service connections by trial pits prior to opening up for the works.
22. All inlet and Outlet pipes from manholes require rocker pipes in accordance with UU standard Details.

Materials

1. Protection to drains and gully connections may be concrete bed and surround between cover depths of 450mm to 200m.
2. All pipes and joints for use in drains shall comply with the manufacturers requirements.
3. **Clay Pipes**

a. Clay pipes to be used for sewage shall be British Standard pipes and pipes for surface water shall be either 'British Standard' or 'British Standard
b. Surface Water' all manufactured to the requirements of BS EN 295 and BS65:1991. The pipes shall be Type 1 sockets and supplied complete with the manufacturer's recommended flexible joints, or with Type 2 Sockets for cement mortar joints or plan ended pipes supplied with sleeve couplings;
c. Watertight Flexible Joints for clayware pipes shall comply with BS EN 295 and BS65:1991.

4. **Concrete Pipes**

a. Concrete pipes for general drainage shall comply with the requirements of BS EN 1916:2002 and BS5911-1:2002, except that they may be complete
b. with watertight flexible joints, as supplied by the manufacturer
c. Watertight flexible joints shall be so constructed as to tolerate a longitudinal movement of ±10mm without breaking the seal;

5. **Un-plasticised Polyvinyl Chloride (PVC-U) Pipes** shall conform to BS EN 1401-1:2009, BS EN 13598-1:2003, BS3506:1969 and BS4660:2000 for pipes up to 160mm nominal external diameter and to BS EN 1401-1:2009 for pipes above 200mm nominal external diameter
6. **Pipe bedding and backfill** of Underground pipes should be in accordance with BS EN 5955: Part 6 Installation of PVC-u pipework for gravity drains and sewers, or the BBA Certificate.
7. Suitable material is defined as granular material in accordance with the recommendations of BS EN 5955: Part 6: 1980 having a nominal particle size not exceeding 10mm or 14mm for 110mm and 160mm diameter pipes respectively, or that which passes the tests described in appendix A of the above standard.
8. **Drains under buildings :**

d. Where drains are required to be laid under buildings, deep hardcore from within the foundation boundaries should be compacted prior to excavating the trench for the pipe. Suitable material should then be employed for the bedding and backfilling.
e. When trenches are dug from original ground, pipes may be laid and surrounded with appropriate material before the top layer of hardcore is placed.
f. Where pipes pass through a wall or foundations of a building, they should be protected by a lintel or sleeve.

9. **Shallow drains :** Where there is risk of damage, pipes laid at less than 600mm depth (not under a road) should be protected by use of a paving slab or similar. A minimum 75mm cushioning layer of granular material must be laid between any slab and the crown of the pipe.
10. **Pipes laid under roads** : The minimum cover under roads should be 0.9m from the top of the pipe. Where this is less than 0.9m additional protection is required ie. reinforced bridging slabs.

Drainage Key

Klargester or Similar NSB?? Class 1 Bypass Separator Fitted With Alarm — Denotes : Proposed New Surface Water Petrol Interceptor

F-MH — Denotes : Proposed New Foul Water Manhole Chamber

S-MH — Denotes : Proposed New Surface Water Manhole Chamber

F+C — Denotes : Proposed New Foul Water Manhole Chamber

S+C — Denotes : Proposed New Surface Water Manhole Chamber

100Ø (F) 1 in 60 (Capacity 6.80 l/s) — Denotes : Proposed New Foul Water Drains

100Ø (S) 1 in 60 (Capacity 6.80 l/s) — Denotes : Proposed New Surface Water Drains

BD — Denotes : Proposed External Drainage Backdrop

Denotes : Proposed Below Ground Surface Water Attenuation Tank To Accommodate the 1 in 100 + 40% Climate Change Requirement

Area Ref	Site Area m²	Dev Area m²	1 in 30	1 in 100 + 40%	Restriction
Phase 1	1828m²	1828m²	34m³	75m³	11.51 l/s
					11.51 l/s Total

Proposed Surface Water Drainage Strategy

The existing ground conditions on site are generally clay with sandstone beneath. As a result the use of soakaways for the site will unlikely be effective and the use of below ground attenuation will be required to satisfy the total required surface water discharge rate of of each of the individual developments.

Attenuation for the development will be achieved by means of below ground storage to achieve the 1 in 100 year rainfall event + 40% Climate Change allowance with no offsite flooding occuring.

Attenuation for the 1 in 100year + 30% climate change to have minor flooding of no more than 100mm to car parking areas by creating falls to the slot drains to achieve any additional volume required.

All of the proposed finished floor Levels of the commercial spaces at ground floor level will be set to mitigate any risk of flooding from the development site.

The development will have a petrol interceptors to restrict oil from entering the system.

Preliminary for Planning Purposes Only

Rev.	Date	Description	Status	by
P1	11.03.2019	FIRST ISSUE	PRELIMINARY	MDJ

Project: L3 Vauxhall Road, Liverpool
Phase 1

Title: Proposed Drainage Strategy

MUIR
ASSOCIATES (UK) LIMITED
Trinity Chambers,
18, Ivy Street,
Birkenhead, Merseyside,
CH41 5EF
Tel: 0151 650 1200
Fax: 0151 650 1201

Director	Proj. Eng.	Client	
Drawn by M.D.Jones	Checked by	Drawing Number 19-1038-01-200	Rev. P1
Scale 1:125 @ A1	Date Mar 2019		