

Introduction

This report is to cover the flood displacement and compensatory volume query from the Environment agency received 8th February 2024 (email). EA letter ref SO/2023/123819/02-L01 with the recommendation:

'The applicant should update the FRA to include a section covering compensatory storage. This should clearly detail the volume of flood storage lost in flood zone 3 as a result of the proposed development, as well as specific and clear plans for compensating for this loss of storage.'

Minimisation of flood water displacement is noted in the existing DP Squared flood risk assessment as a strategy in the executive summary. This notes some under slab storage will be allowed for in the final design to compensate for the flood water displaced due to flood resistant areas in the building that need to be supported at foundation level. This flood displacement, flood resilience and flood resistant approach has been developed with Simpson Haugh (Architect) and Caldwell (MEP) to ensure as little flood displacement, as necessary. This design approach is also discussed in the Simpson Haugh Design access statement 10489-SHP-RP-B5D8-DAS01 issued for planning. That document also provides general information on the project.

For information on the Charles Street Flood risk assessment (FRA) please refer to DP Squared report '1983-CS-DP2-A180-RP-XX-9041 Rev P06 Flood risk assessment and drainage strategy'.

Design development

A detailed design for the flood water displacement and compensatory volume was not included in the FRA up to this point as the design levels and areas are still in design development. This report is complimentary to the FRA to demonstrate the flood compensatory volumes available for the various possible flood events.

Design development since the initial FRA has included coordination of setting out for all the design team. This means the developed design allows for a preliminary calculation of the flood water displacement and compensatory volume.

Information used

The flood level information for the events for 1 in 2year to 1 in 100year + 35 % climate change are taken from the EA model table using Node 2. The table and the flood map showing node 2 are in Appendix C in the DP2 FRA.

EA guidance on floodplain compensation.

Displaced volumes have been coordinated with design team and calculated from the DP2 drawings. There are two main flood water displaced areas. Under the main core from level 30,5mAOD upward, Area A1 **on the displacing area plans attached**. Area A2, under the ground floor lobby and switch room from level 31.6mAOD, is shown on the displacement plans as its actual shape and its equivalent area. The equivalent area was produced to make the calculations of volumes easier.

Flood water displacement and compensatory volume strategy

EA guidance notes no flood water compensatory volume should be lower than the lowest part of the site, water should be able to flow freely in and out. The theory for the Charles Street building is open sided areas to allow flood water under the garden area slab to the front of the building from the already open bike store and bin store to the rear. Openings will be allowed for in the walls of the bike store and bin store to allow water to flow freely in and out of the garden slab undercroft. Please refer to the Simpson Haugh Design Access statement 10489-SHP-RP-B5D8-DAS01 for further explanation and drawings of those areas at ground floor.

The Section drawing attached shows the amount of the car park that is to be removed across the site that will become the flood compensatory volume.

Calculations

The calculations for the displaced and compensatory volumes are shown in the attached table. The table collates the inputs and outputs to show the seven different flood events considered. Also included are columns showing the displaced volumes were the full area of the site occupied by a building.

The areas A1 and A2 are multiplied by their respective widths at levels 30.5m (lowest site level) and 31.3m (underside of garden slab) to get the volumes of displacement.

The flood compensatory volume or 'Available volume' in the table is provided by:

- the excavation of the car park build up to a level 30.5m across the site
- underside of the slab (31.3m)
- remaining area of the site unimpeded by the volumes of displacement.

Conclusions

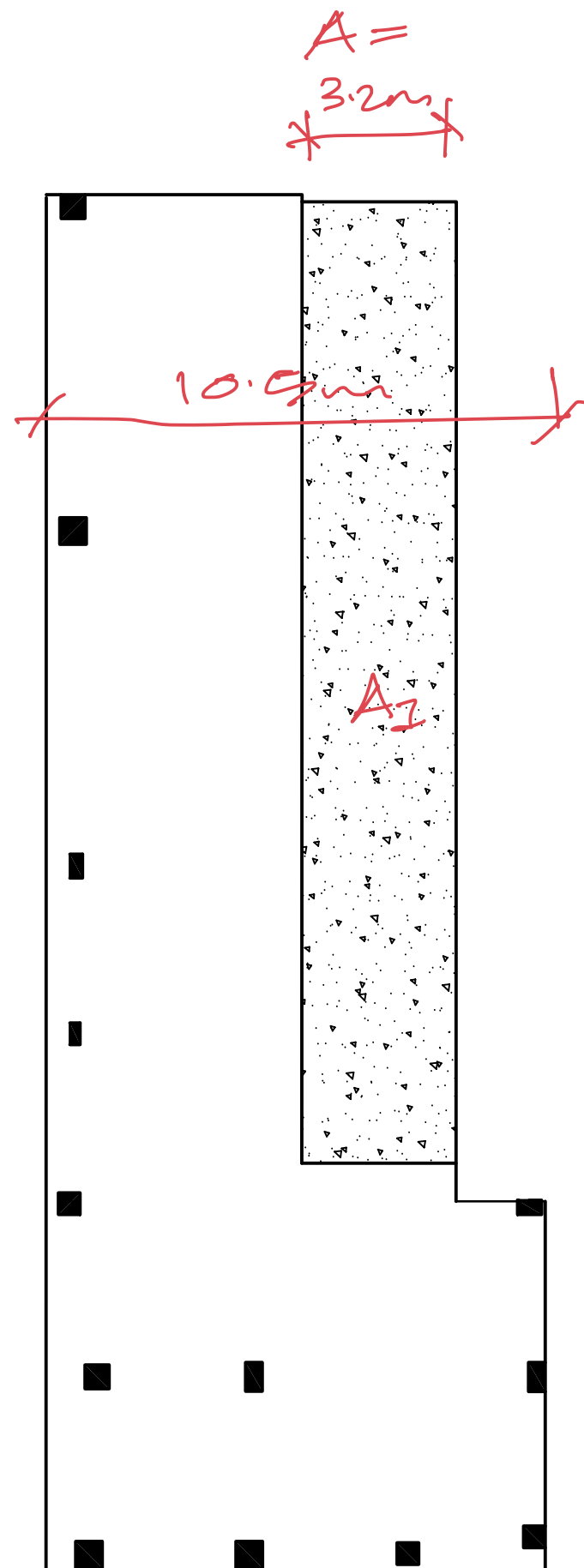
From the calculations in the table carried out, the provision of flood compensatory volume on the site provides for nominal or no flood water displacement for all but the most onerous of flood events, 1 in 100 year + 35% climate change. The volume of flood water displacement is reduced in that event by over 50%. In comparison a full site footprint building causes a much greater level of displacement and cannot provide a compensatory volume in any flood event.

In the 1 in 100-year event +35% climate change event approximately 120m³ of flood water would be displaced after the compensatory volume is full. This volume is displacement but in the context of that event in Manchester city centre based on the EA flood map attached, it would not add any significant levels to the surrounding area as all of Charles Street would be under more than 1m of flood water.

Node 2 information from EA

Event (year)	mAOD	m	Lowest point on site	Underside of garden slab	Cross section A	Width A	Cross section B	Width B	Volume displace d	Available volume	Cross section C	Width C	Full site volume
			Above 30.5mAOD	Above 31.3mAOD									
5	29.73		-0.77	-1.57	0.00	3.20	0.00	5.76	0.00	0.00	0	10.5	0.00
10	30.17	0.44	-0.33	-1.13	0.00	3.20	0.00	5.76	0.00	0.00	0	10.5	0.00
25	30.77	0.60	0.27	-0.53	0.95	3.20	0.00	5.76	3.04	140.15	0.95	10.5	9.98
50	31.44	0.67	0.94	0.14	8.29	3.20	2.80	5.76	42.66	140.15	11.46	10.5	120.33
75	31.95	0.51	1.45	0.65	8.29	3.20	13.00	5.76	101.41	140.15	25.67	10.5	269.54
100	32.39	0.44	1.89	1.09	8.29	3.20	21.80	5.76	152.10	140.15	38.22	10.5	401.31
100 + CC	33.33	0.94	2.83	2.03	8.29	3.20	40.60	5.76	260.38	140.15	65.05	10.5	683.03

	No impact on building
	No flood displacement
	Nominal Flood displacment
	Flood displacement

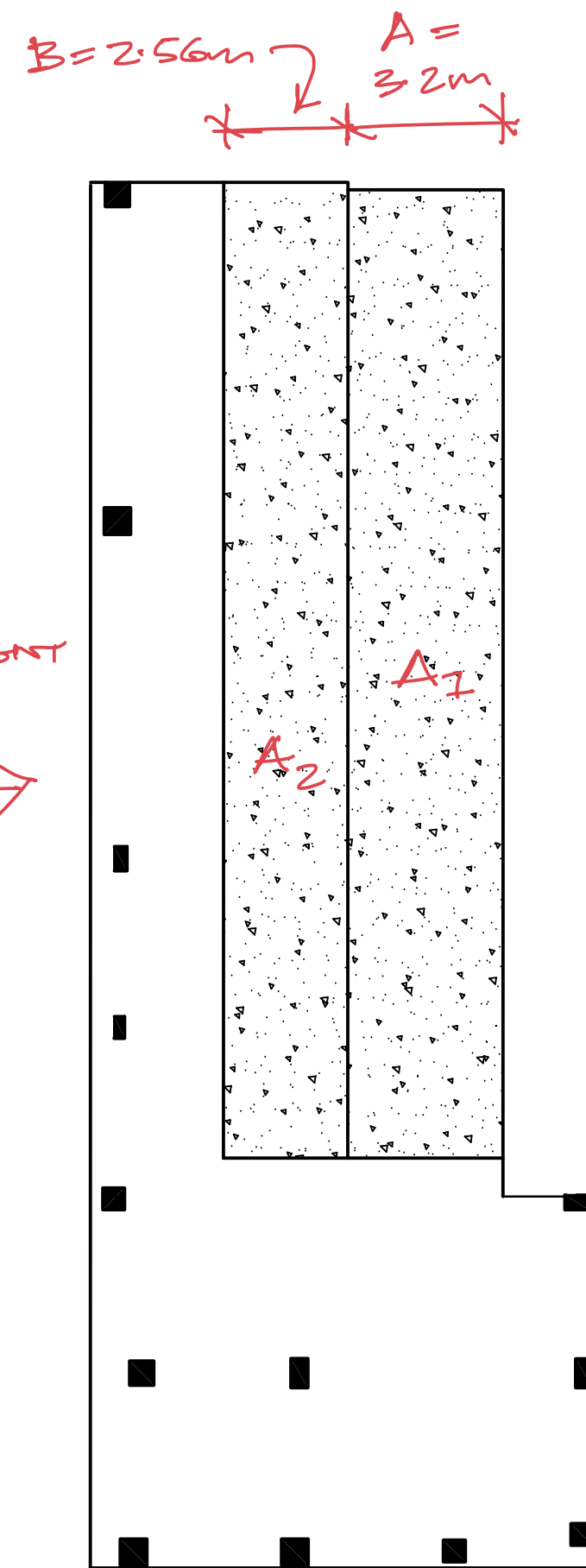


DISPLACING AREA TO 30.5m AOD

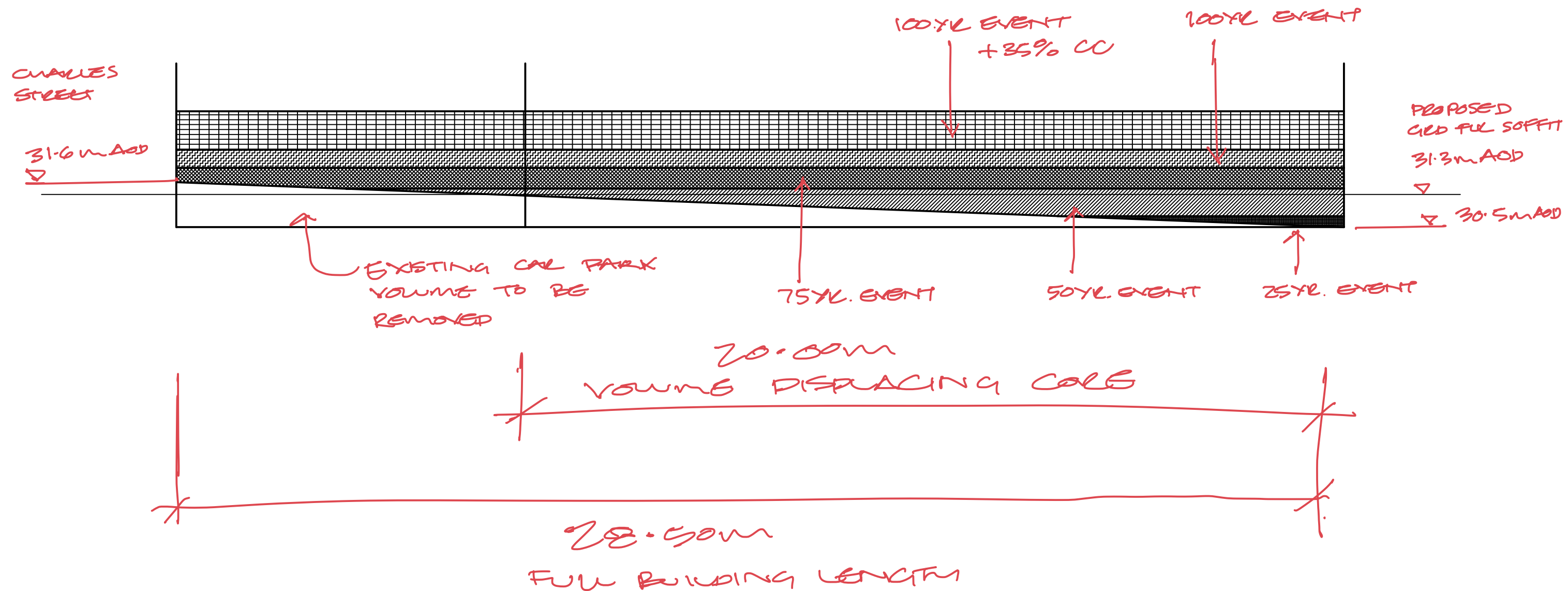


DISPLACING AREA FROM 31.2m AOD

EQUIVALENT
AREA
⇒



EQUIVALENT DISPLACING
AREA FROM 31.2m AOD



SECTION THROUGH SITE SHOWING FLOOD EVENT EXTENT (LEVELS WILL BE SHOWN IN TABLE)

Detailed Flood Map Centred on York Street, Manchester, M1 7DE.

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