

138-144 and 145-148 Friar Street: TB+A supplementary information in relation to PR6

Sustainable Design and Construction SPD Section 8.6 Ground-Source and Air-Source Heat Pump

Calculated system seasonal efficiency comparison

While it is generally accepted that GSHPs have higher efficiencies than ASHPs because of the higher and more stable ground temperatures, compared to air temperatures, the VRF system proposed for both buildings has a higher efficiency than other heat pumps because it distributes surplus heat from cooling operations to rooms needing heat and vice versa.

The higher efficiency of the VRF system also rules out a hybrid ASHP/GSHP system.

	ASHP (VRF)	GSHP
SCOP @ 10oC average air temperature	5.5	
SEER@ 10oC average air temperature	6.5	
SCOP @ 13oC average air temperature		4.5
SEER@ 13oC average air temperature		5.5

Evidence on any constraints on boreholes related to existing utilities or other sub-surface infrastructure

The presence of existing buildings on site has not allowed any in depth investigation of the sub-surface infrastructure pre-demolition. Given the location of the existing and proposed buildings along a busy city street, it is probable that some utilities may cross the sites. For 145-148 Friar Street, it will not be possible to drill boreholes under the retained part of the building.

Borehole spatial constraints

Boreholes are only feasible below the footprint of the non-retained part of the sites.

GSHP piles need to be 10m apart from each other in any one direction, therefore the number of piles is limited by the site dimensions. This means a maximum of 6 piles for 145-148 Friar Street and 12 piles for 138-144 Friar Street. This would represent approximately a quarter of the space heating demand for each building. Therefore three quarters would still need to be provided by ASHP.

Any other technical reason for not deploying GSHP

In accordance with RBC policy CC4 on decentralised energy, we have designed the heating/cooling system to be compatible with a future connection to a DHN. This would be financially viable with the proposed VRF system when it is replaced at the end of its life in 15 years time. The significant capital investment in GSHP thermal piles would become prohibitive if connection to a DHN was mandated over the lifespan of the building.