Project:	**Union UP4**	Date:	**25/06/2026**
Prepared By:	**Richard Watt**	Edited:	**UG**
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Topic:	**Union UP4 – Responses to GLA comments**		

Introduction

This design note has been prepared following a meeting held between the Greater London Authority (GLA) and the UP4 Project team on 10.06.2026, in response to the GLA's request for further clarification on specific aspects of the Union UP4 planning submission.

This note addresses the following three items raised by the GLA and discussed in the meeting, referred to herein as:

- Safeguarded DHN route,
- Further details on the cooling system and SEER
- Expected water usage

The information set out below provides additional technical explanation, and supporting evidence to address the queries raised and discussed in the meeting in order to provide assurance regarding he GLA's concerns.

Item 1: Safeguarded DHN Route

The GLA raised concern that the scheme is not compatible with waste heat recovery.

In response:

Please see attached a proposed indicative safeguarded route to a site boundary for connection to a possible future District Heat Network should the data hall cooling technologies change in the future to allow waste heat recovery to be feasible. This was presented in the meeting with the GLA and welcomed by them.

Item 2: Further details on the cooling system and SEER

The GLA raised concern that the SEER appears high as they would expect an SEER of 7-10 based on similar projects, and that being an air-cooled system the calculation should consider relative humidity.

In response:

The Direct Air Optimisers (DAO) are highly efficient as they cool the data center's IT load via 100% free air cooling year-round, without any mechanical based cooling. Instead, they maximise the use of ambient air, optimising it as required to achieve the specified supply air conditions.

Please see attached a technical sheet provided by the manufacturer (Bladeroom) that illustrates how the DAO system works as an all air (no refrigeration) system. It also details the different operating situations to achieve the set internal conditions, and provides a psychrometric chart showing the outdoor air conditions (dry-bulb, wet-bulb, relative humidity) the DAO will operate in.

System Operation

To achieve the calculated setpoint, the DAO modulates dampers to control the proportion of fresh external air and recirculated return air. An adiabatic (evaporative) system is activated only when necessary to cool and/or humidify the air. The operation of these components depends on external conditions, determining the DAO's active operating zone to meet the calculated setpoint. Temperature control is achieved as follows:

- **Winter operation (outdoor air is < required setpoint temperature):**
  Outdoor air is mixed with warmer return air to achieve a blended supply setpoint temperature. The return air mixed proportion varies with external conditions.
- **Summer operation (outdoor air > required setpoint temperature):**
  Outdoor air is cooled using ambient (unconditioned) water to maintain a setpoint supply temperature. The water usage is minimal (approx. 0.0002 l/kW), well below industry norms. Pump energy demand is low and limited to a small number of annual operating hours, with negligible impact on the overall SEER.

The annual hours within each operating condition are in Table 1 below and shows that for 8,686 hours of the year (of 8,760 total) the system is only using fan energy for cooling, which drives its high efficiency:

Table 1 DAO operating zones

Zone	Dampers	Adiabatic Cooler	Annual Hours of Operation
1	Mix	On (humidification only)	**39**
3	Mix	**Off**	8637
4	Mix	**Off**	49
5	100% Fresh Air	On	**35**
7	100% Fresh Air	On	**0**

Given that ambient conditions only influence the operation of dampers and the adiabatic system, both of which require minimal power input (e.g. <1kW at full adiabatic load), and that no mechanical cooling is used, the system's SEER remains effectively constant throughout the year.

The main power consumers within the DAOs are the EC fans, which modulate in direct response to the IT load in the data hall. As this demand is independent of external conditions, seasonal changes have no impact on fan energy usage.

Benchmarking

For comparison, high level indicative SEER ranges observed on comparable projects using different cooling technologies are provided below in Table 2:

Table 2 High level technology SEERs

Technology	Description	SEER seen on other projects
Air cooled chiller	Air cooled refrigeration cycle	~ 3.5 - 7
Water cooled chiller	Water cooled refrigeration cycle (cooling towers)	~ 5 - 10
Fluid cooler	Water to air heat transfer (closed water loop, no refrigeration cycle)	~ 17
Indirect Air Optimiser	Air to air heat transfer (via plate heat exchanger)	~ <29
Direct Air Optimiser	Direct air mixing (no heat exchanger)	~ 35+

We can confirm that a Direct Air Optimisation (DAO) system has also been used in the adjacent Union Park 1, 2 and 3 schemes, with calculated SEER values ranging from 41 to 44. These calculations were provided by the manufacturer and have been modelled in the final As-Built BRUKL submission provided to Building Control. We have attached the final As-Built Practical Completion BRUKL for Union UP1 for reference showing an cooling SEER value of 44.

Consideration of Humidity

The psychrometric chart provided by BladeRoom confirms that annual hourly weather data (8,760 hours) which uses both dry-bulb and wet-bulb temperatures, has been used in the SEER calculation.

For a limited number of hours annually (74 hours), conditions fall outside the full fresh-air operating window. During these periods (zones 1 and 5), small pumps operate to circulate water to the adiabatic system to provide more cooling.

Supporting Information attached:

- BladeRoom high level technical description sheet.
- As-built Practical Completion BRUKL for UP1 (accepted by Building Control) is attached.

Item 3: Expected water usage

The GLA raised concern around a risk of high water usage for the cooling, in conflict with Policy SI5.

In response:

The most common industry metric for water use is Water Usage Effectiveness (WUE), which measures litres of water used per kWh of IT power used. The Climate Neutral Data Centre Pact (CNDCP) is a voluntary industry agreement that more than 90% of Europe's data centres have committed to. It requires Pact members to set water efficiency targets, including a WUE of 0.4 L/kWh for new data centres.

A Water Usage Effectiveness (WUE) assessment for UP4 has been prepared by Bladeroom and is attached. It shows that the proposed design has a WUE of 0.0002 l/kWh of cooling which is significantly less that than the CNDCP target of 0.4 l/kWh.

During winter months the system's calculated setpoint targets the lower end of the range to maximise the use of outside air, while in summer it shifts towards the upper (warmer) end - both approaches minimise water consumption.

The psychrometric chart attached to BladeRoom's illustration sheet shows that there are only 74 hours in the year that water is expected to be used for adiabatic cooling. This is the equivalent of roughly 3-4 typical households per annum.

Supporting Information attached:

- Manufacturer Water Use Effectiveness (WUE) calculation.