AJ Specification Awards 2019

by RM_A Architects
October 2019

THE FORGE

telfordhomes

RM_A

Radmat

Aerial photo before site demolition

Constraints and Opportunities Diagram

Concept Diagram

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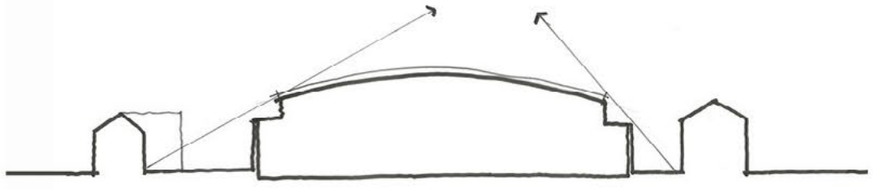
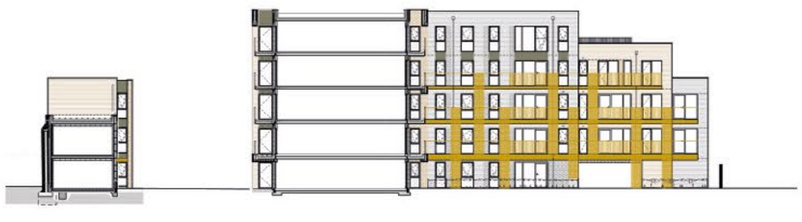
The Forge is a newly completed residential development by Telford Homes near Upton Park, in the London Borough of Newham. It includes 192 new homes, split between 5 courtyard garden blocks, a 14 storey tower and 6 unique townhouses. The project delivers a new tree lined public street, including a new pedestrian and cycle route, unlocking a previously impermeable site to link the wider urban realm. 35% of the scheme has been sold to L&Q Housing Association for affordable housing, both Shared Ownership and Rental. The remainder of the site has been sold to M&G investments as a Private Rental Scheme. The scheme was handed over in July/ August 2019.

RM_A Architects have designed and delivered the project for Telford from its inception in early 2014 through to this handover, achieving 'Resolution to Grant' in September 2015 and Full Planning Consent in May 2016. The site was formally occupied by a large bus garage building, built in 1929, that had been replaced by a new and larger facility elsewhere in the borough. The site was surrounded by existing residential properties and their associated gardens, on its 2 principal boundaries to the east and west. This presented challenges in maintaining the privacy of these neighbours whilst maximising the development potential of the site.

A new community linking street



Existing site section diagram



Proposed site section

View looking north from the 6th floor communal roof terrace

View looking west of a typical communal courtyard garden

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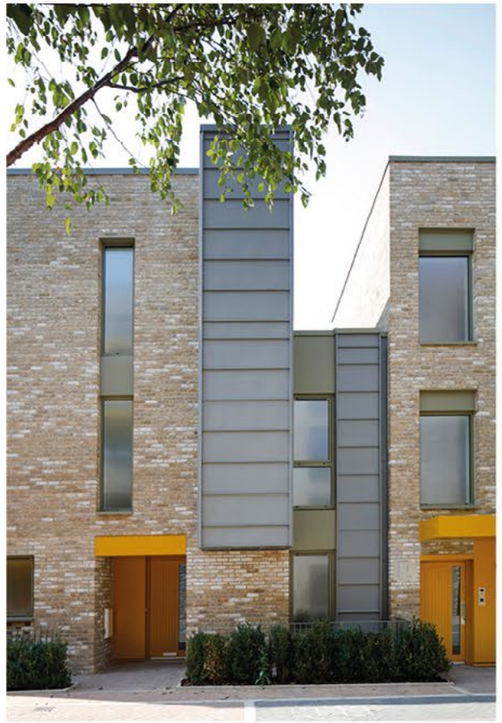
The scheme included a series of different roofs, at different levels, that broadly mimicked the profile and massing of the existing bus garage, minimising the impact on existing neighbours. The majority of the new homes are contained within a central 5 storey block running north-south through the centre of the site. To the east of this spine block a series of perpendicular wings step down in height toward the eastern boundary. Together, these blocks enclose a series of ground and first floor courtyards providing communal amenity garden space for residents. Although secured by gates, the ground level gardens have direct connections to the street via external undercroft links. Toward the south of the site, the impact on existing residential neighbours was less significant and allowed a focal point 14 storey tower, overlooking the existing Priory Park to the south.

Street elevation of the main apartment spine block and marker toner



Detail street elevation
photo of a town house and
adjacent walk up flats

The new tree lined
public street

Detail street elevation
photo of the spine block
apartments

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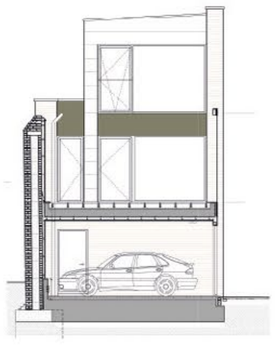
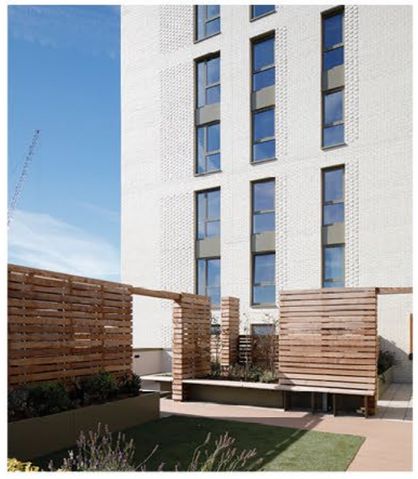
RM_A' s scheme delivers a new public street running north-south through the site, to the west of the spine block, improving the permeability and connectivity of the area, particularly between new and existing communities to the southeast of the scheme and Upton Park tube station and Green Street to the north west. The existing bus garage wall to the west has been retained with 6 unique town houses and bookend apartment blocks placed hard up against this boundary. The existing bus garage was not listed and there are finer examples of other transport buildings from the same period elsewhere in London. Retaining this wall minimised disruption for existing neighbours during construction and maintained their privacy after completion, whilst also provide some memory of the site's existing use. This smaller north-south linear block ensures that the new street is 2 sided, with multiple private and communal building entrances and windows, providing activity and passive surveillance of the public realm.



Southern elevation/
section through town
houses car port, first
floor private terrace and
retained Bus Garage wall

Street Elevation of
the town houses and
bookendapartments blocks

6th floor communal roof terrace under construction



6th floor communal roof terrace

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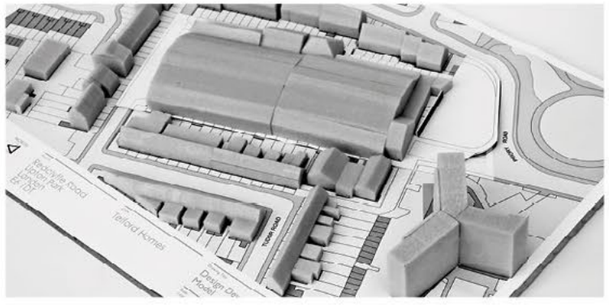
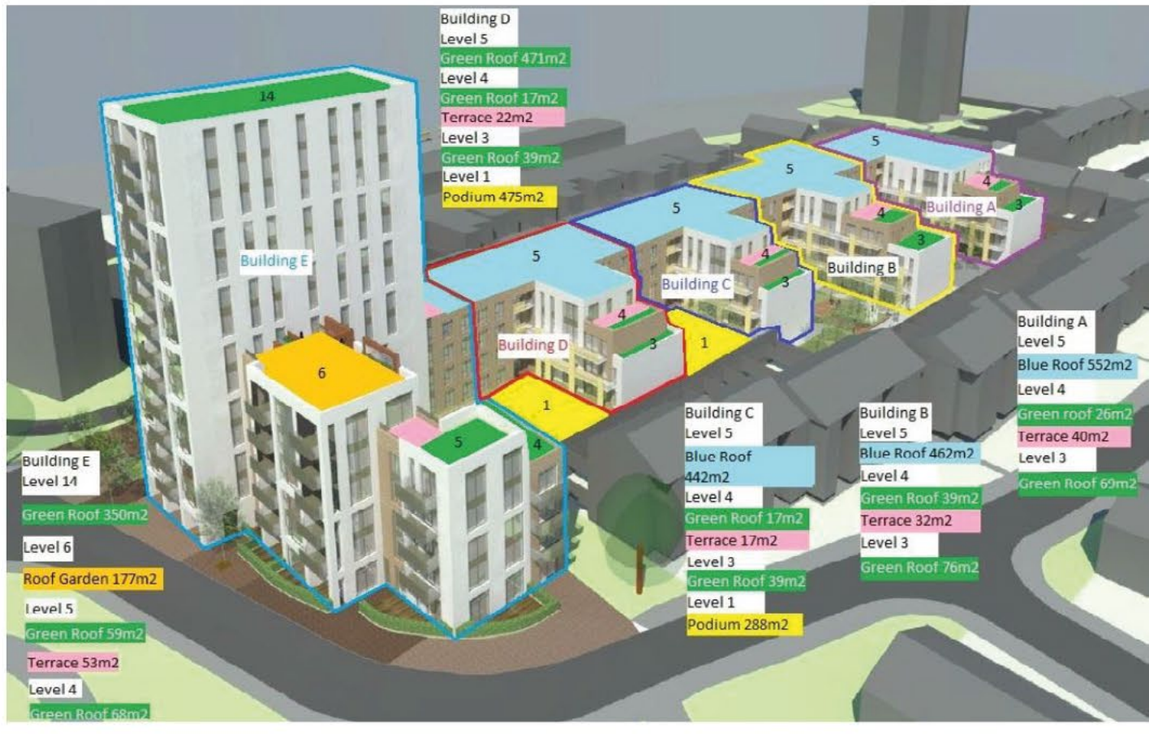
The different set back roofs provided multiple opportunities for roof terraces, providing private external amenity spaces for flats. All the homes benefit from private amenity, in accordance with the London Plan as a minimum, either in the form of projecting steel bolt-on or inset RC balconies or roof terraces. A 6th floor communal roof terrace is provided on the eastern side of the tower block, overlooking Priory Park to the south.

Detail photo of private terraces and balconies

Street entrance detail photo





Existing Bus Garage images
and massing model

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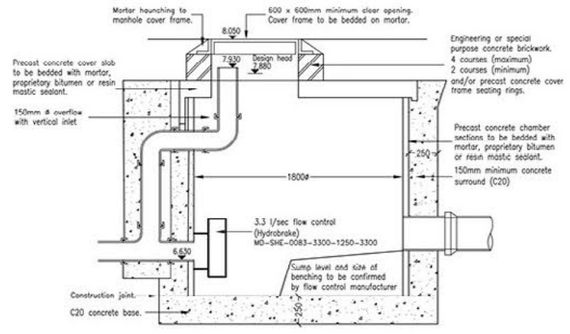
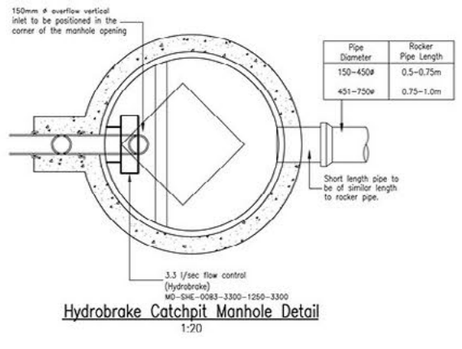
A key constraint of the original planning consent was an extremely onerous limitation on the maximum site discharge rate for surface water, of 3.3litres a second. This resulted from the site's location in a "critical drainage area". This maximum discharge rate is considerably lower than the 5 litres a second equivalent greenfield run off rate, based upon calculations stipulate in the "DEFRA rainfall Management for Development" document. The limitation figure was calculated as part of the Flood Risk Assessment that was submitted with the original planning application and was prepared by RPS. 87% of the existing site area, of just under a hectare, was impermeable, with no attenuation of storm water. This included a large single span curved roof over the existing bus garage, of approximately 110m by 50m, along with roofs over smaller associated buildings. The remainder of the site almost entirely comprised hardstanding. Like many urban brownfield sites its former use as a bus garage and maintenance depot had left a significant amount of ground contamination which has had to be remediated and capped off as part of the works. This included contaminated ground water and the remediation strategy influenced and restricted proposed site drainage options. Therefore, the redevelopment of this site has delivered considerable environmental benefits, alongside the improvements in townscape and pedestrian permeability to the benefit of the wider community.

The restricted run off rate presented the Design Team with significant challenges in the design and specification of the roofs and drainage systems. A truly collaborative approach was required between:

- Telford Homes (TH), Client and Main Contractor
- RM_A Architects (RM_A)
- PTA Consult (PTA), Structural and Civil Engineers
- Standerwick Land Design (SLD), Landscape Architects
- Mendick Waring, (MW) M&E Consultant and Radmat Building Products, the roof system manufacturer and supplier and their approved contractor, Noble House Services.

With the exception of amenity areas, the remainder and majority of the roofs proposed in the planning scheme were green living roofs. There were also a series of courtyard gardens at ground level and at first floor, above the main carpark. Whilst this extent of soft landscape areas greatly assists in reducing and delaying surface water runoff in storm events, this alone was not sufficient to achieve the planning target. Given the constraints of a contaminated and tight urban site, ground level SUDS were eliminated due to ground quality, the lack of space and because priority was given to usable amenity spaces. The team had to pursue a combined system of blue roofs, buried attenuation tanks and a hydro break.





Hydrobrake Catchpit Manhole Detail
1:20

PTA Hydrobrake detail

Radmat
Building products
guaranteed roofing solutions

AttenU8
Blue Roof System

***CRM* Stormflow** Stormwater Management Software

Client:	Telford Homes
Project:	Redclyffe Road
Location:	London
Catchment:	Blocks A – D, Level 5 (Main roof (50%))

Catchment Details:			
Buildings	0	m²	x 95 %
Dense surfacing	925	m²	x 90 %
Effective Area	832.5	m²	

Storage Details:		
Length	925	m
Width	1	m
Depth	0.06	m
Porosity	95	%
Area Increase	0	%

Rainfall Details - FSR Method:			
Return Period	100	years	
Climate Change Factor	30	%	
r value	0.44		
M5-60	20.7	mm	
Summer Storm Profile			

Duration	Intensity mm	Intensity mm/h	Required storage (m³)
5 min	19.5	233.8	15.973
10 min	28.7	172.3	23.410
15 min	34.4	137.7	27.914
30 min	44.1	88.0	35.480
45 min	50.3	67.1	39.642
60 min	54.5	54.5	42.370
2 hours	64.7	32.3	47.733
6 hours	80.8	13.4	40.752
24 hours	104.1	4.3	35.883

Outflow Details:		
Infiltration rate	0	m/hr
Attenuation Control	Orifice Plate	
Control Diameter	28	mm
Discharge rate	0.9	l/s
Orifice depth	0.24	m

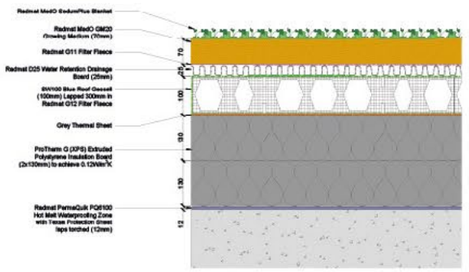
Results:	
Outcome:	Pass
Critical Storm Duration	3.02 hrs
Hmax	0.057 m
Required Volume	49.094 m3
Time to half empty	7.7 hrs

The calculations above are based on 50% of the main roof area assuming the blue roof extends to the edge of the parapet, and a 0.3m wide section of wider boxes is provided at the edge. The effect of the penetrations has been considered not particularly significant in the overall storage provision, and the calculations have allowed a 5% overprovision in storage which will allow for these penetrations

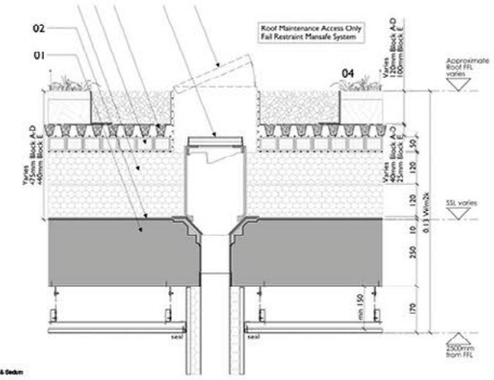
Total nett storage on this roof (allowing for 5% box structure and 5% for penetrations) – 99.8 m³
Total peak outflow from this roof = 1.9 l/s
Critical duration of storage – 3.0 hours

Radmat Building Products Ltd, Esha House, St Mary's Business Park, Albany Road, Market Harborough, LE16 7EB
Tel 01858 410372, Fax: 01858 410572, e-mail: techenquiries@radmat.com, web: www.radmat.com, Reg No: 3159762

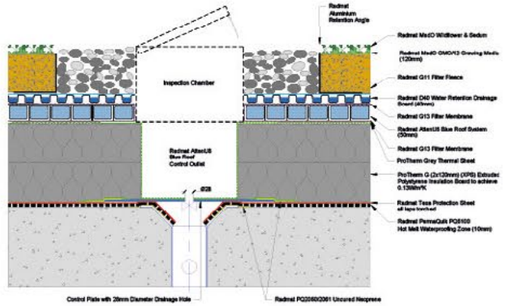
Radmat drainage calculations



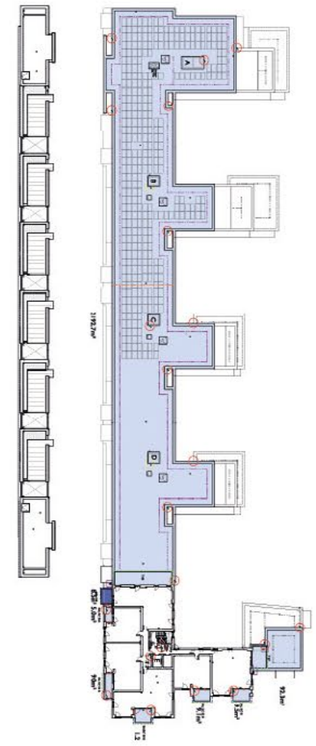
Green / blue roof built up detail



Snorkel outlet detail



Flow control outlet detail



6th floor drainage diagram

Roof specification diagram

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At an early stage of their working drawings RM_A developed a series of simple drainage strategy and roof specification diagrams, to identify the total area and specification of all roofs and to clearly identify the position and number of all rainwater outlets. These greatly assisted coordination with the rest of the design team, as well as discharge of Building Control and Warranty Conditions with the NHBC. These drawings also evolved during the period as different options were explored and the final specification and detailing was refined. As the value of the roofing system contract exceeded £1million this required additional approval against the NHBC Warranty.

RM_A and Telford arranged a series of workshops with Radmat Building Products, a specialist roofing system supplier, and the design team to explore and finalise the final drainage strategy and roof specification. Radmat assisted greatly by providing typical roof details, u-value calculations, blue roof and NBS specification documents, for all the key roofs and terraces on the scheme.

This eventually led to the confirmation of the main 5th floor and 14th floor roof specifications to include a blue roof water storage reservoir, beneath a more standard green roof build up. The dead and live load implications of these roofs had to be considered by PTA in their structural design and calculations. Although these roofs are designed with multiple gravity and through wall outlets, similar to a conventional roof, the majority are excluded from providing the primary drainage flow in a Blue Roof design to enable controlled rainwater attenuation at roof level. Those outlets that are used, in this case 2 outlets at each end of the roof, are fitted with a flow control device that reduces the orifice diameter of the rainwater outlet, in this case a standard Harmer AV400. The remaining gravity outlets and through wall outlets are fitted with 'snorkels' that prevent the outlet from functioning during normal rainfall but in the event of the Blue Roof reaching capacity enables them to act as overflows. The size of these orifice restrictors was determined by Radmat's flow rate modelling, based upon specific storm events for the geographical locality. The outlets themselves are standard Harmer cast in drains with the addition of the Radmat snorkels and flow restrictors. This means that the time taken to drain the roof can be delayed by several hours, reducing the impact on the local sewage network by giving it time to recover. The system had to be designed to accommodate a 1 in 100 year storm event. , plus 30% for climate change, yet it will half drain itself in under 8 hours in readiness for a subsequent storm event, in accordance with emerging Blue Roof design standards.

Typical block entrance

The new public route with its street trees

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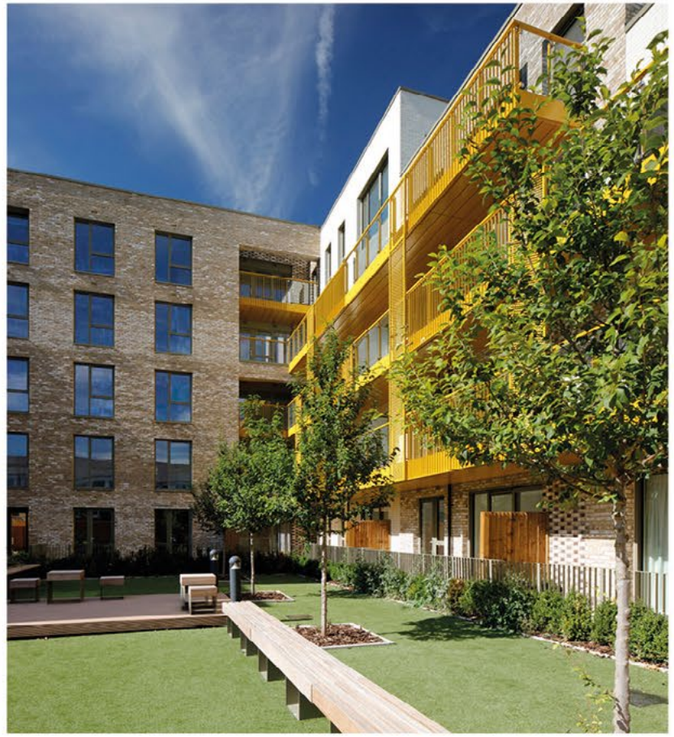
First floor podium garden



Ground floor courtyard garden

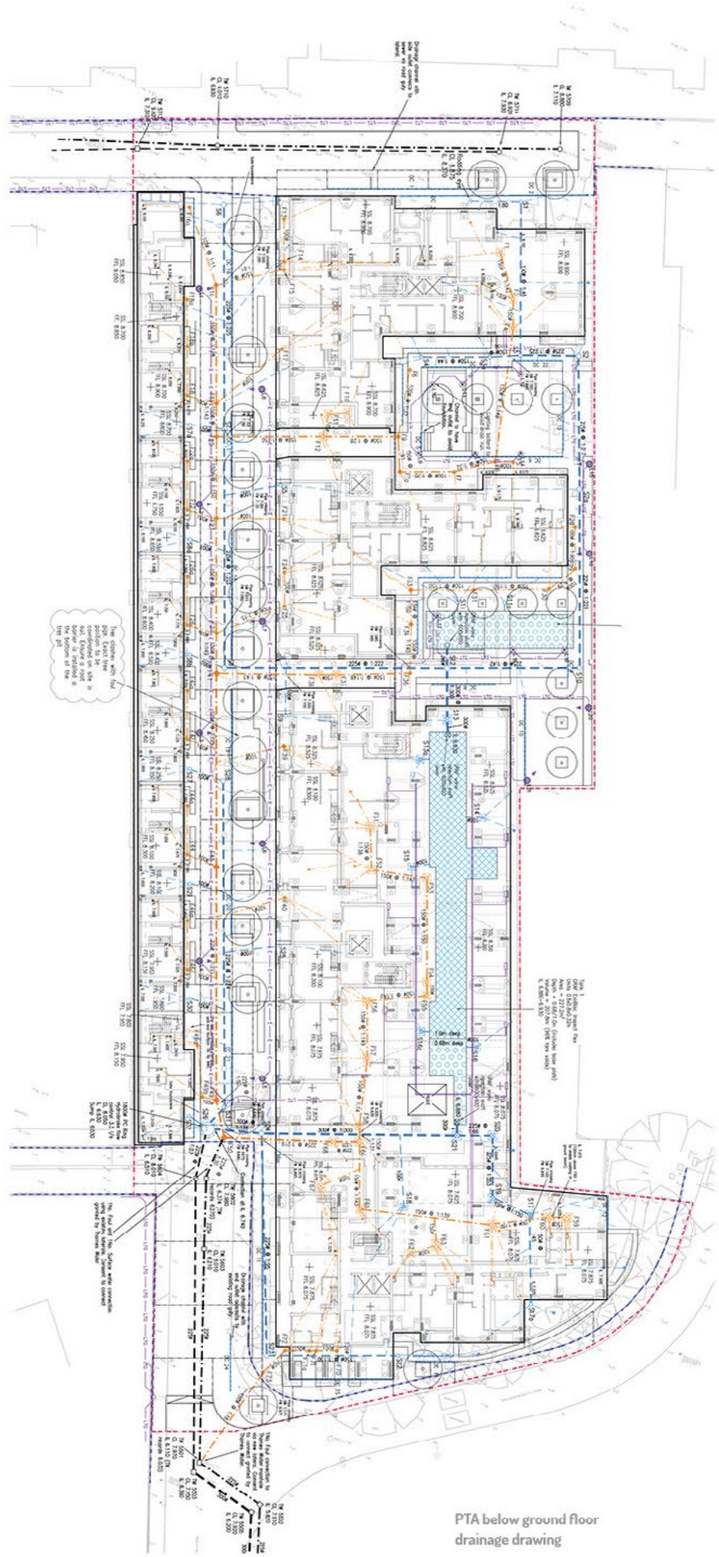
At the time of design, Blue Roof specification was relatively new to the British construction market and ahead of the inclusion of Blue Roofs within the London Plan. The regulations or design codes that underpin this specification are still being further developed but are reinforced by the vast knowledge within the Sustainable Urban Drainage industry, UK roofing industry and legislative bodies. Radmat's Head of Technical & Operations, Mark Harris chairs the British Green Roof Organisation trade board and assists in developing industry agreed regulation. This gave the Design Team a unique insight into the regulations before they were officially agreed and published in their current form.

The key Radmat waterproofing products used included the following:

- PermaQuik PQG100 to main areas
- Radmat Geocells, G12 fleece, Flow Restrictors and Overflow Snorkel of multiple heights and dimensions.
- ProTherm G XENERGY SL-EP XPS insulation to achieve 0.13 W/m2K u-value
- ProTherm Quantum PURL VIP insulation to overcome reduced height access door thresholds.
- Green roofs consisting of pregrown sedum blanket for overlooked areas and wildflower seeds around PV panels of main roofs

The above ground surface water drainage from the buildings fed into a below ground drainage scheme, along with the surface water drainage from hard and soft landscaped areas at ground level, including the new public street. These ground surface areas required additional attenuation in the form of below ground attenuation tanks that complimented and worked in parallel with the blue and green roof attenuation systems from the buildings. This system was designed by PTA's Civils department and this ultimately fed into a final Hydrobreak, before it left the site and discharged into the existing public sewer system.

PTA also coordinated the finished levels and surface drainage at ground level in coordination with RM_A and SLD's work on the landscaping and building entrances. The design and coordination of the below ground drainage system was particularly hindered and complicated by the shallow invert level of the existing connection to the public sewer system. To maintain a gravity fed system and negate the need for mechanical pumps, both foul and surface water drainage had to be cast into and through pile caps and ground beams. This also limited the depth of attenuation tanks which were difficult to accommodate within the tight constraints of the site. Multiple tank crates were installed within the limited voids left between pile caps, crane bases, tree pits, drainage and other service runs. These were located below the slab of the carpark but to achieve the volume required for the attenuation rates, additional tanks were also installed under the landscaped courtyards. A series of mature street trees have been installed along the new linking road and in the communal gardens and were selected from a nursery by RM_A and SLD. Significant coordination was required between the whole design team to finalised the landscaping, tree pits, service runs and drainage.



PTA below ground floor drainage drawing

The 5th floor blue/green roof toward the end of construction (greenery yet to establish)

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In addition to drainage requirements, the roofs and landscaping also incorporate a number of other key issues. The thermal performance and U-values encompassed a key part of the SAP assessments and the overall Energy Assessment for the scheme. Radmat were able to confirm the U-values for each roof, based upon preliminary RM_A details. These were fed into MW's Energy Assessment and led to confirmation of the requirement for a series of PV panels on the northern end of the main 5th floor roof, setback from the shadow cast by the taller tower element to the south. The roofs also incorporated ecological requirements for bio-diversity with different growing medium formulations and planting incorporated on different roofs. These habitat roofs have been included to promote environments that will support bees, butterflies and birds. This specification was coordinated between Radmat and SLD. The communal roof gardens and podiums and 1st and 6th floor included some significant planting, trees and hard landscape elements.

The roofs also incorporated M&E elements such as the PV panels, communal district heating CHP and boiler flues, smoke and environmental control fans, roof and façade access and safety equipment along with COMMs equipment. . The siting of PV panels over a green roof will boost the performance of these panels by reducing their surface temperature because heat gains from the roof are significantly reduced as the green roof evapotranspirates retained rainwater.

Additional benefits of the green roofs, include UV protection of waterproof membranes and reduction in roof surface temperatures, minimising the scheme's contribution to the urban heat island affect (Albedo). Green roofs also assist in cleansing and improving the local air quality by absorbing particle and gas pollutants, which is particularly applicable on an urban site such as this which is located close to Green Street, a significant London Arterial road. Once the planting has fully established, they will also provide an extremely pleasant green outlook from all overlooking windows within the scheme and from existing neighbouring tower blocks.

Roof access equipment and M&T incorporated within green roofs