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Underground Urbanism

A London Fusion Design Innovation Award

Report on

The potential re-use of Crossrail grout shafts

In partnership with



Royal College of Art

THE HELEN HAMLYN CENTRE FOR DESIGN

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Crossrail grout shaft, central London

1 Introduction

From Helsinki to Hong Kong there is a growing appreciation of the role underground spaces can play in supporting urban life, this case study imagines how some of London's smallest underground spaces could be brought to life. The study was initiated by Urben, a London based planning and design practice who have previously undertaken research into the planning and design of underground spaces and in September 2014 were granted a Design Innovation Award by the London Creative and Digital Fusion programme. The Award enabled Urben and the Helen Hamlyn Centre for Design at the Royal College of Art to combine their expertise and demonstrate the potential for better use of underground spaces in London.

This case study focuses on the grout shafts used to mitigate effects of subsidence on buildings along the route of Crossrail - a major new underground rail service that stretches 118 km across London. Building these temporary shafts has created a by-product: new spaces in the heart of a dense and dynamic city. Spaces that although relatively narrow, are the equivalent depth of a six storey building, are structurally sound and have already benefited from investment of materials, labour and technical expertise. Urben saw a unique opportunity to achieve higher and better uses for some of these shafts rather than simply backfilling them with concrete when no longer required by the Crossrail project.

Working with key stakeholders from Crossrail, the City of Westminster, the New West End Company and Grosvenor Properties, Urben hopes to inspire cities to use both their above and below ground resources in efficient and creative ways.

2 International Overview

In cities around the world there are currently some fantastically innovative uses of underground spaces, a few of which are summarised here.

Canada

Toronto and Montreal in Canada have extensive networks of underground malls to protect from harsh winter weather. In Toronto the PATH network connects over 50 buildings across a 30km underground retail arcade with 125 ground level access points.

China

Research into the development of underground space in Hong Kong has been steadily building and a Territory-wide Study on Underground Space Development in the Urban Areas of Hong Kong was recently commissioned, focusing on Tsim Sha Tsui West, Causeway Bay, Happy Valley and Admiralty / Wan Chai.

Japan

In 2007 the Deep Space Utilization Law was introduced to legalise the development of spaces at least 40 metres below ground level for public utility infrastructure. The most significant attribute of this law is that when a road, railway or water utility company for example wishes to build a tunnel at 40 meters or more under the ground, they are not required to receive the consent of parties owning or renting the land above the tunnel, nor are they required to pay them any compensation.

Malaysia

In 2007 The SMART (Storm water Management and Road Tunnel) infrastructure project in Kuala Lumpur introduced an 9.7km long, underground roadway and storm water retention tunnel that is divided into three sections that can be collated to absorb urban flood waters.

Netherlands

In the Netherlands the cities of Arnhem and Zwolle are employing a three dimensional approach to spatial planning with an occupation layer (e.g. housing and offices), network layer (e.g. road and rail infrastructure), and an underground layer with subsurface functions such as storage of water. In 2008 Architects Zwarts

& Jansma worked with engineering company Strukton to propose the AMFORA (Alternative Multifunctional Underground Space Amsterdam) project to build almost 50 km of tunnels underneath the canals in the centre of Amsterdam. However the concept does not appear in Plan Amsterdam: Structural Vision Amsterdam 2040.



Proposed Lowline park, New York

USA

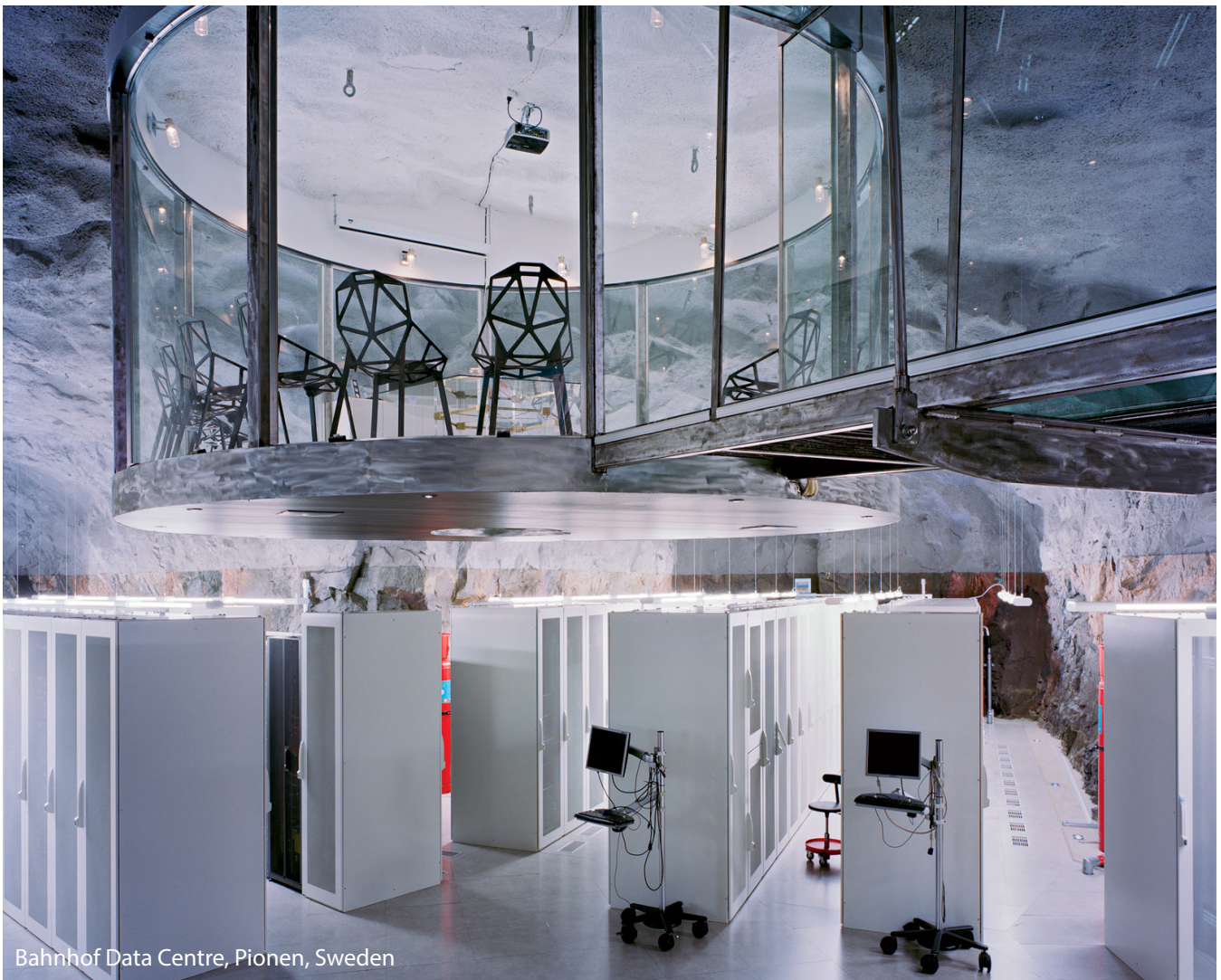
The Lowline in New York is proposed to be the world's first underground public park. Located in a former trolley terminus the space is to be illuminated by a prototype solar collection dish at street level. The project is still in the process of gaining consents and securing funding but hopes to open in 2018.

Mexico

The "Earthscraper" in Mexico City is described as "ongoing" by the architects BNKR, however this project might well be the most difficult to realise with over 775,000 sqm floor area inverted into a pyramid extending 300 metres below ground and finished with a glass public square at ground level.

Sweden

In 2008 an underground hydrogen bomb shelter built in the 1970s beneath the Pionen White Mountains south of Stockholm, was expanded to accommodate a data centre and office for Bahnhof Internet service providers. Practically, the space is centrally located, already had a power supply and was ultra secure. However its most appealing attribute is the knowingly futuristic design that architects Albert France-Lanord utilised to create an environment not dissimilar to the lair of a James Bond villain (below).



Bahnhof Data Centre, Pionen, Sweden

Singapore

In Singapore the Urban Redevelopment Authority (URA) has proposed 29km of underground links to improve pedestrian access and reduce congestion at ground level. At 20 designated locations private developers can receive cash grants from the URA to reimburse the cost of constructing pedestrian walkways beneath their properties, with the spaces also being exempt from the usual caps on Gross Floor Area (GFA).

France

In Paris a mayoral candidate recently asked Architects Manal Rachdi and Nicolas Laisné to create concepts for eight disused underground metro stations. Potential uses for the metro stations included nightclubs, swimming pools, concert halls and restaurants.

Helsinki

However the leader in macro scale, underground masterplanning is Helsinki who have a masterplan that coordinates, connects, safeguards and provides a framework for the use of 600 underground spaces. Of the 400 spaces that already exist primarily in the form of bedrock caverns, you can find land uses ranging from public swimming pools to data centres (where less energy is needed to cool the equipment and the surplus heat generated is then used for residential heating).

3 Underground London

London has long relied on tunnels for security, logistics, transport and utilities. The oldest building in the city, the Tower of London was first built for William, Duke of Normandy following his conquest and subsequent coronation in 1066. The Tower continued to expand and fortify under successive monarchs, many of whom relied on its network of secret tunnels to ferry goods, prisoners and even forbidden lovers.

However, it was 1843 before an underwater tunnel was first attempted. Designed and constructed by Sir Marc Brunel it opened initially as a pedestrian tunnel, but in 1869 was converted to a railway tunnel that is now part of the London Overground Network. Briefly described as the 8th Wonder of the World, the Thames Tunnel was a tourist attraction with visitors promenading through it's below ground arches.

The technology used to construct the Thames Tunnel no doubt influenced the design and construction of the London Sewer System. Designed by Engineer Sir Joseph Bazalgette, the combined sewer and storm water system was vital to address the public health and amenity crisis caused by sewerage in the River Thames. Constructed between 1859 and 1865, the sewer also incorporated several of London's "lost" underground rivers and still serves modern day London.

The 1860's were an exciting time for big thinking engineering projects, with London's first underground rail line opened in 1863; the Metropolitan line was constructed using cut and cover techniques and operated initially with steam trains. The London Underground train system quickly grew to become a critical part of London's infrastructure and identity, beginning with 40,000 passengers there are now more than 1,107 million passenger journeys per year.

The expanding underground rail network was used as a shelter for London residents in both the first and second world wars. To protect citizens from air bombing raids, between 1940 and 1942 eight deep level shelters were constructed below existing underground rail station tunnels. Able to hold up to 8,000 people each, the shelters were adapted for accommodation and medical purposes.

Key government and military figures including Prime Minister Winston Churchill were also protected in underground spaces, primarily the Cabinet War Rooms, a 1.5m thick concrete bunker which served as a command centre for the Allies in the Second World War. The history of Londoners using underground spaces for safety and security could be considered an important factor in their perceptions of underground space when compared to residents of other cities.



Londoner's seeking shelter underground during Second World War

London's transport and utilities infrastructure has continued to expand below ground level, most notably the creation of the Channel Tunnel (1994); the Jubilee Line Extension (1999); Crossrail which is currently under construction (estimated opening late 2018); and the proposed Thames Tideway sewer tunnel (estimated operation 2023). Second phases of the Crossrail and High Speed rail projects are also planned.

Although London's residential, recreation and retail land uses are still primarily at ground or above ground level, interest seems to be growing in utilizing below ground spaces. The Canary Wharf Group recently added a further 44,000 sq ft of predominantly basement level retail space at Jubilee Place, connecting to an existing mall and train station beneath a cluster of office towers. This is arguably London's only genuine planned underground space at the moment, built on a model similar to those examples that can be found in Canada, which may be attributable to the history of the Canary Wharf development, which was planned in the North American model.

At a domestic scale, there is a trend for residential basement extensions, particularly in London's wealthier suburbs where "iceberg houses" that are even bigger below surface level than they appear above are digging out substantial new living spaces for home cinemas, cigar rooms and private beauty spas.

The trend for lower level luxury also seems present in the retail and leisure sector. A cavernous basement in part of the former Regent Palace Hotel has reopened as Brasserie Zedel and basement level nightclubs at the Edition and Ace Hotels have also recently opened, building on the popularity of similar bars No 41, Whisky Mist and Bodo Schloss. Basement spaces are often preferred for these uses as they can successfully operate without natural light, and indeed are often designed around that central theme. In addition they provide spaces that are insulated for noise (minimizing disturbance to adjacent land uses).

City of Westminster recently announced their intention to lease a former air raid shelter beneath Soho Square and it is thought that Transport for London might soon lease some of their disused underground spaces.



Zero Carbon Food, London

In trying to identify further unique business opportunities for under-utilised (and potentially undervalued land), there are currently several quirky projects hoping to adapt London's underground spaces, namely:

- The Old London Underground Company hopes to raise £200m capital to use 26 former train stations for shopping, tourism and events;
- British Postal Museum & Archive are attempting to restore sections of the pneumatic mail rail system as part of a new postal museum; and
- Zero Carbon Food is trialling the hydroponic production of vegetables in former air raid shelters 33 metres below ground (above). Using LED lights and hydroponic watering, the tunnel maintains a temperature of 16 degrees Celsius year round and gets food from farm to market in 4 hours.

Notwithstanding the 'subterranean building boom' described by the Financial Times last year, there is no strategic spatial plan and very few policies to guide how new or existing underground spaces should be developed in a safe, resourceful manner.

4 What is the potential ?

There are 13 grout shafts in central London associated with the Crossrail project. This case study focuses on the shafts in Soho and Mayfair as they are most prolific in these locations and generally exist in a less constrained setting than the shafts in Camden and the City of London.



Crossrail grout shaft, central London

The grout shafts in Soho and Mayfair are found close to major new transport interchanges at the Tottenham Court Road and Bond Street, where Crossrail stations are scheduled to open in 2018. These areas are rich in history and culture, attracting millions of visitors from around the world annually, as well serving the business, housing and leisure needs of Londoners. The grout shafts in these two areas range between 13 and 18 metres in depth and measure 4.5 metres in diameter - the equivalent of up to a 286 cubic metre volume space. With commercial land values in Mayfair reaching up to £1,350 per sqm there is not only an incentive to achieve highest and best use of space, but also an opportunity to improve the provision of community services and commercial or creative uses that are increasingly unable to afford to be based in these areas.

The potential for grout shafts to be converted to passive or active uses is dependant on their specific context. Through their Innovatei8 programme Crossrail is considering the potential for drawing energy through heat sourced from deep below the ground. The impacts of urban flooding might also be mitigated by using the shafts to store storm-water runoff, with the water potentially then filtered for reuse by local government or businesses. These examples of passive, storage based uses are most appropriate for those shafts constrained by virtue of their location in roadways that have been temporarily stopped up for the project.

The varying potential for reuse of the grout shafts in Soho and Mayfair is summarised in the table on the next page.

Our project focuses on more technically complex and innovatively designed responses to a few spaces that offer the greatest potential for commercial or social return. Active uses for these spaces were considered to range from climbing walls to spa retreats, food production or micro pod style hotels. By considering innovative projects like the farm using ultraviolet lights to grow salad vegetables in an air raid shelter below Clapham, or the Late Night Chameleon Club underground fashion store and bar in Shoreditch, the project team sought to create amazing, inspirational and useful spaces.

Table showing potential for re-use of Crossrail Grout Shafts in Soho and Mayfair

LOCATION	SETTING	HEAT	WATER	BIKE	ACTIVE	COMMENT
Davies Mews	Road (shared surface)	Yes	Yes	N-S*	Yes	Bar, gallery / events space integrated into setting of a newly landscaped, pedestrian focused Mews.
Haunch of Venison Yard	Road (lane with few vehicles)	Yes	Yes	N-S	Yes	Archive facility or wine cellar to support adjoining Bonhams auction house
Tenterden Street	Road (shared surface)	Yes	Yes	N-S	Yes	Potential bike storage, bar or cafe pending vehicle access arrangements and adjoining development.
South Molton Lane	Road (low traffic)	Yes	Yes	N-S	Yes	Potential welcome point, cafe and automated storage for folding bikes, parcels, luggage and shopping.
Dering Yard	Private property	Yes	Yes	N-S	No	Beneath / incorporated into Great Portland Estate development.
Sheraton Street	Road	Yes	Yes	N-S	No	Potential for commercial use dependant on closure of road to traffic & use of adjoining buildings.
Soho Square NW	Road	Yes	Yes	N-S	No	Development of ground level structures likely to be limited by vehicle access & visual amenity impacts.
Soho Square W	Road	Yes	Yes	N-S	No	Development of ground level structures likely to be limited by vehicle access & visual amenity impacts.
Soho Square NE	Road	Yes	Yes	N-S	No	Development of ground level structures likely to be limited by vehicle access & visual amenity impacts.
Soho Square SE	Road	Yes	Yes	N-S	No	Development of ground level structures likely to be limited by vehicle access & visual amenity impacts.
Goslett Yard	Pedestrian	Yes	Yes	N-S	Yes	Potential cafe / bar / parcel collection in pedestrian space at rear of Tottenham Court Road Station.
Dean Street	Pedestrian	Yes	No	No	No	Beneath entrance to Tottenham Court Road Crossrail Station.

*N-S = Non-standard bike storage such as compact, automated storage for folding bikes

5 Demand for space

Our case study focuses on the grout shafts at South Molton Lane and Davies Mews in Mayfair. These two locations are in close proximity to the Bond Street Station western ticket hall that along with Crossrail is due to open in 2018, bringing a further 65,000 passengers to the area each day. Prior to Crossrail opening, from 12 September 2015 Oxford Circus and Bond Street stations will also be open all night on Fridays and Saturdays, changing the existing patterns of pedestrian use in the area. The West End is already the UK's busiest shopping and entertainment precinct and if designed intelligently, the grout shaft at South Molton Lane offers an opportunity to welcome and serve visitors, residents and workers in the area.



Old Bond Street, London



For over three hundred years Bond Street and surrounding Mayfair have been a world renowned destination for the sale of art and luxury goods. The popularity of this area with international residential and commercial property investors is such that there is increasing pressure on smaller galleries and emerging artists to find exhibition space, similarly there is a lack of small retailers selling basic daily goods. The grout shaft in Davies Mews could act as a catalyst to create a positive shared place, improve amenity for residents, support pedestrian movement through the area, and provide a unique, flexible space for retail and events.

6 Site Location

Although the grout shafts are relatively uniform in their dimensions, it was important to refine down the list of potential locations and typologies for the case study. It was decided that the grout shafts at Davies Mews and South Molton Lane each benefited from being set in a pedestrianised environment with opportunities to integrate ground level structures and upgrade the surrounding public realm. The majority of ground floor uses in the area are retail in nature, with upper floors of buildings used predominantly as offices, with a few in residential use.



General area plan, with suggested site boundaries in red & approximate grout shaft locations in blue

7 Site Context

South Molton Lane

The South Molton Lane grout shaft is located on the corner of Davies Street, opposite the entrance of the proposed Crossrail Bond Street Station west ticket hall. The shaft is situated within the context of a wide paved area beside a Plane Tree outside the Grade II listed Greys Antique market. Potential exists to extend the existing footway into a paved space shared between delivery vehicles and pedestrians.



Davies Street looking south - L - R: Bosideng store, offices & penthouse; Grays Antiques ; new Crossrail ticket hall site

Already a busy central London destination, the arrival of Crossrail is a key driver for the Bond Street Development Plan by City of Westminster, Transport for London and New West End Company to upgrade nearby public realm. This site has the potential to act as a welcome hub for visitors to the area, with a cafe for people to meet, space for a local concierge to help provide directions to tourists and within the shaft, store shoppers bags or retailers stock for collection outside of trading hours.



Davies Mews

Although the shaft is located close to the centre of a relatively narrow mews, potential exists to improve the public realm of the surrounding space and create a bespoke solution for a characterful, cultured area. The Running Horseman public house (also Grade II listed) and rear of Greys Antiques adjoin the northern edge of Davies Mews and on the southern side is a row of three to six storey commercial and residential buildings. Mayfair is home to world renown galleries and auction houses, plus many fine dining venues, however in recent years smaller galleries have sometimes felt compelled by record property values to leave the area. By creating a boutique gallery and bar that is available for exclusive hire a new kind of space could be created to add diversity to Mayfair's attractions.



Davies Mews looking east with Running Horseman public house on left



Davies Mews looking west from South Molton Lane

8 Design Challenges

Scale

Whilst the central location of the grout shaft is an advantage, there is no denying that their dimensions represent one of several challenges to re-purposing this specific type of an underground space. At four and a half metres in diameter and up to 14 metres in depth, these grout shafts are narrow, deep spaces that require a carefully considered design to provide access for people or possessions. Automated cycle storage was initially considered an appropriate reuse of the grout shafts, however the scale of lifting mechanism would curtail the number of regular sized bikes able to be stored. If however folding bicycles or smaller goods were to be stored using an automatic retrieval storage system the number of such goods could increase to a viable number.

The intimate scale of the bar and exhibition space proposed for the Davies Mews is likely to prove part of it's appeal as a special, hidden place.

Contracts

There is a very narrow window of opportunity available to prevent backfilling of the grout shafts by contractors as part of their demobilisation works. Variations to existing contracts could result in fees or penalties being incurred and therefore goodwill and upfront communication is needed to safeguard these spaces. The sustainability team at Crossrail are appealing to contractors that gravel, rather than foamed concrete be used to backfill the shafts as this should at least be excavated out of the shafts with relative ease.

Structural Integrity

Although the grout shafts were designed to safely accommodate the staff working within them, further testing and possibly reinforcement is needed before they could be used for any other purpose.

Utilities

Tightly packed utilities were temporarily diverted for the grout shafts to be constructed and consent is likely to be required from utility providers to leave those diversions in place. Although the grout shaft compounds currently have access to power and water, new connections would be required for any alternate use.



Grout shaft at Dering Yard, Mayfair

De-watering

Mechanical de-watering of the grout shafts is likely to be required should they be used for any other purpose.

Roadways

Temporary road closures of Davies Mews, South Molton Lane and Davies Street have been in place for the two grout shafts would require the permanent closure of Davies Mews at the corner of Davies Street and indeed it is envisioned that the remainder of Davies Mews be a shared space for pedestrians and local vehicles only, restricted by bollards at either end of the Mews. New flagstone paving and lighting could also be used to create a characterful setting, integrated with the fountain / bar space for special events such as product launches.

It is also proposed that the roadway at the juncture of South Molton Lane and Davies Street through to Oxford Street remain closed to traffic. Although a stopping up order would be required to permanently close these roadways, pedestrian numbers in the area are expected to increase significantly as passenger numbers increase from 155,000 to 220,000 per day once the new Crossrail Bond Street west station opens in 2018.

Investment

Considerable investment would be required to convert the grout shafts into (clean, dry, safe, functional and aesthetically pleasing) storage, leisure or retail uses. It is estimated that each grout shaft would cost £44,000 to backfill and make good. Early stage estimates for developing the grout shaft at South Molton Lane require an investment of approximately £500,000. These project cost estimates are likely to be refined during (yet to be commissioned) detailed design.

The estimated development costs might seem high, however with retail tenancy up to £1,350 per sqm in Mayfair, such an investment is likely to deliver a sustainable return creating a welcome point with automated parcel storage / collection facility will provide a service shared by many visitors, workers and retailers engaging with the West End.

Resources

The investment required for the project to proceed should also be considered in a broader context of making best use of resources already expended, and limiting the need for further materials such as foamed concrete that have a low value use (filling a large hole in the ground).

Convention

One of the greatest challenges to the success of this project is people's ability to perceive something not yet seen. This is an unconventional, even provocative project that uses a (literally) small case study to help people better appreciate the resources beneath their city.



Former public convenience converted to residential dwelling

9 Potential Uses

The grout shafts were considered potentially suitable for a number of different uses as summarised below.

Cycle storage

Finding somewhere safe to store your bike in London can be difficult. For reasons of security, visual amenity and footway congestion, the storage of bikes on and near Bond Street is also recognised as a problem. However, given there are several international products already providing underground automated cycle storage, and the width of the grout shafts is considered too narrow for full scale bikes, this typology was not pursued.

Waste

Bond Street is a historic, prestigious shopping precinct, unfortunately it is also blighted by waste. Although wardens clean up minor litter and chewing gum, commercial waste from is not well coordinated, resulting in litter bags being left on the footpath for collection by a variety of contractors at different times of the day and night. None of the Mayfair grout shaft locations were considered appropriate locations for waste consolidation and given underground waste storage systems are an established technology, it was decided other typologies would be more appropriate as case studies.

Heat Extraction

Crossrail's Innovate 18 project is exploring the feasibility of using grout and interception shafts for ground source heat extraction, however it is not thought that these shafts are deep enough to act as a meaningful source of energy.

Water storage

The grout shafts could be used as overflow storage for rainwater, then treated for re-use in landscaping.

Parcels

Changes in technology and escalating property prices are forcing many Royal Mail post & collection offices to close, including within Mayfair, Soho & Holborn where the grout shafts are located. There could be potential to create a small, manned kiosk at ground level with automated storage below ground.



Car parking

Automated, stacked car parking using hydraulic lifts is proven technology, however although small car storage and charging could be incorporated into the grout shafts, it was not seen as the best use of space.

Bar

With a compact spiral staircase and lift positioned on one side of the shaft, small private dining or cellar rooms could be created in the floors below a ground level entrance. Alternatively, barrels of beer and wine could be stored underground with drinks piped to a compact ground level bar. Precedents for micro and subterranean bars in London, include Gordons in Embankment, El Pepito Kings Cross and Euston Tap.

Studio / workshop

With a small retail space at ground level and workshop with storage below, a florist, cobbler, artist or tailor could make the most of a small space in a strategic location.

Recreation

Given the height of the shafts, an indoor rock climbing & abseiling facility was considered possible.

Hospitality

A day spa or micro pod hotel with reception at ground level and treatment or resting rooms accessed by a lift or staircase, were also considered possibilities.

Cafe

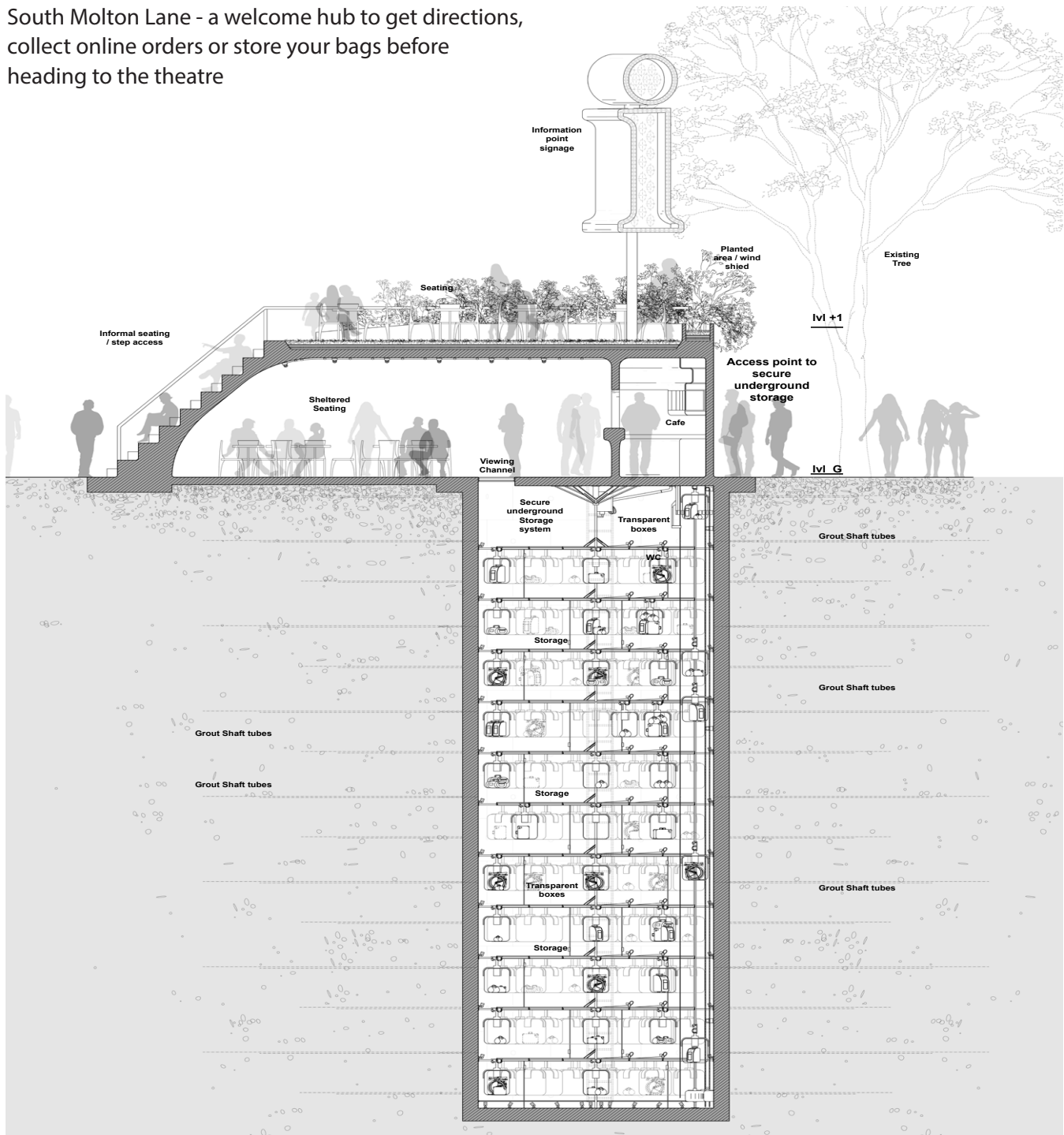
With a distribution kiosk at ground level and seating spilling out to a surrounding courtyard, the lower levels of shafts could be accessed by a compact lift and used for roasting coffee, baking bread and storing packaging or furniture. A ground level kiosk could be skewed from alignment with the shaft below and configured with a larger, differently shaped footprint. Architectural shutters folding down from the roof overnight could be raised into a canopy to shelter customers whilst they wait for their order.

The Attendant Cafe Fitzrovia (pictured below) is located in a former underground public convenience that lay disused for many years before the freehold was offered for sale by the City of Westminster. The 390 sq ft below ground space seats approximately 30 people and provides a smaller retail unit than most available locally.



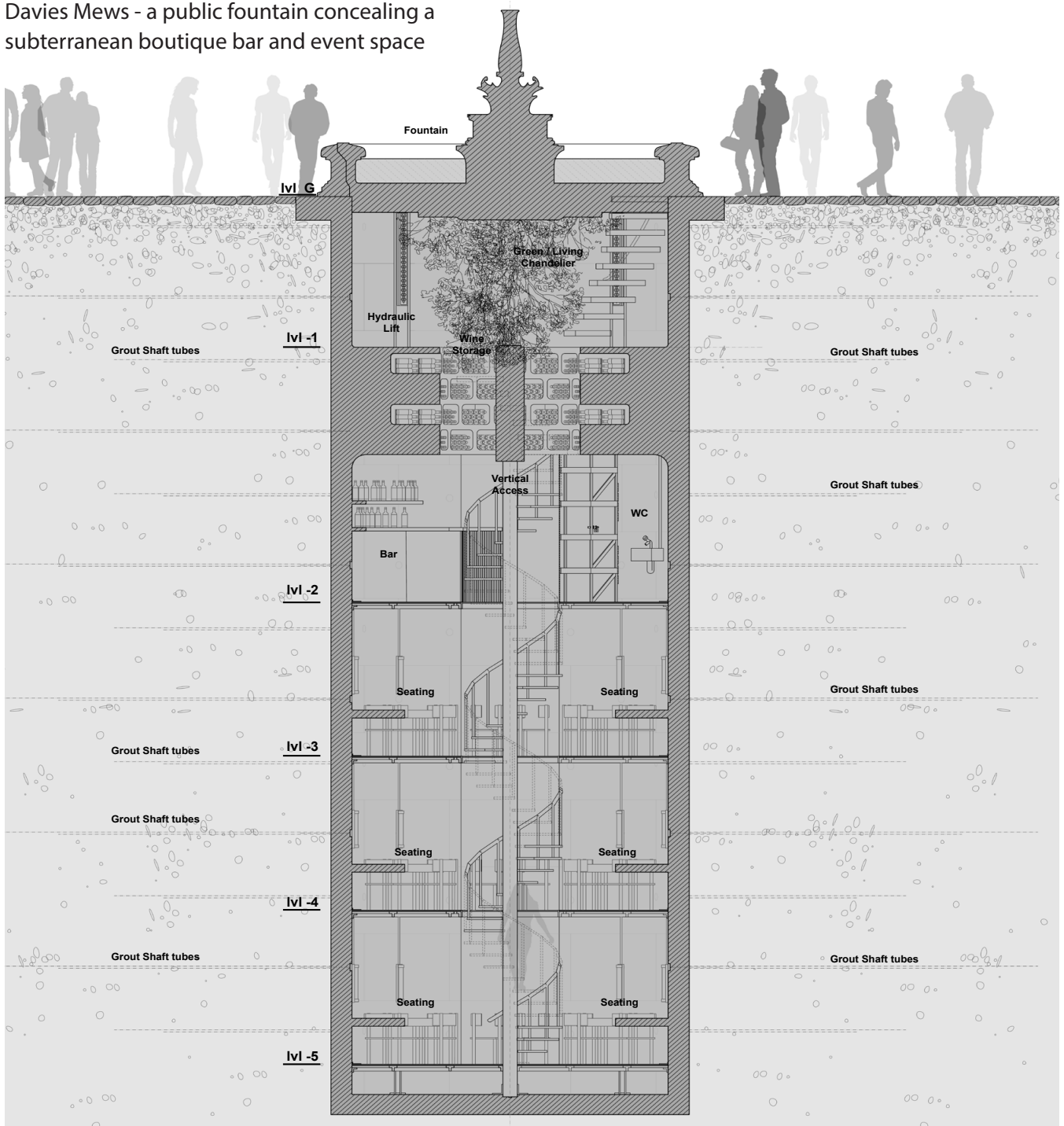
10 Architectural Design Response

South Molton Lane - a welcome hub to get directions, collect online orders or store your bags before heading to the theatre



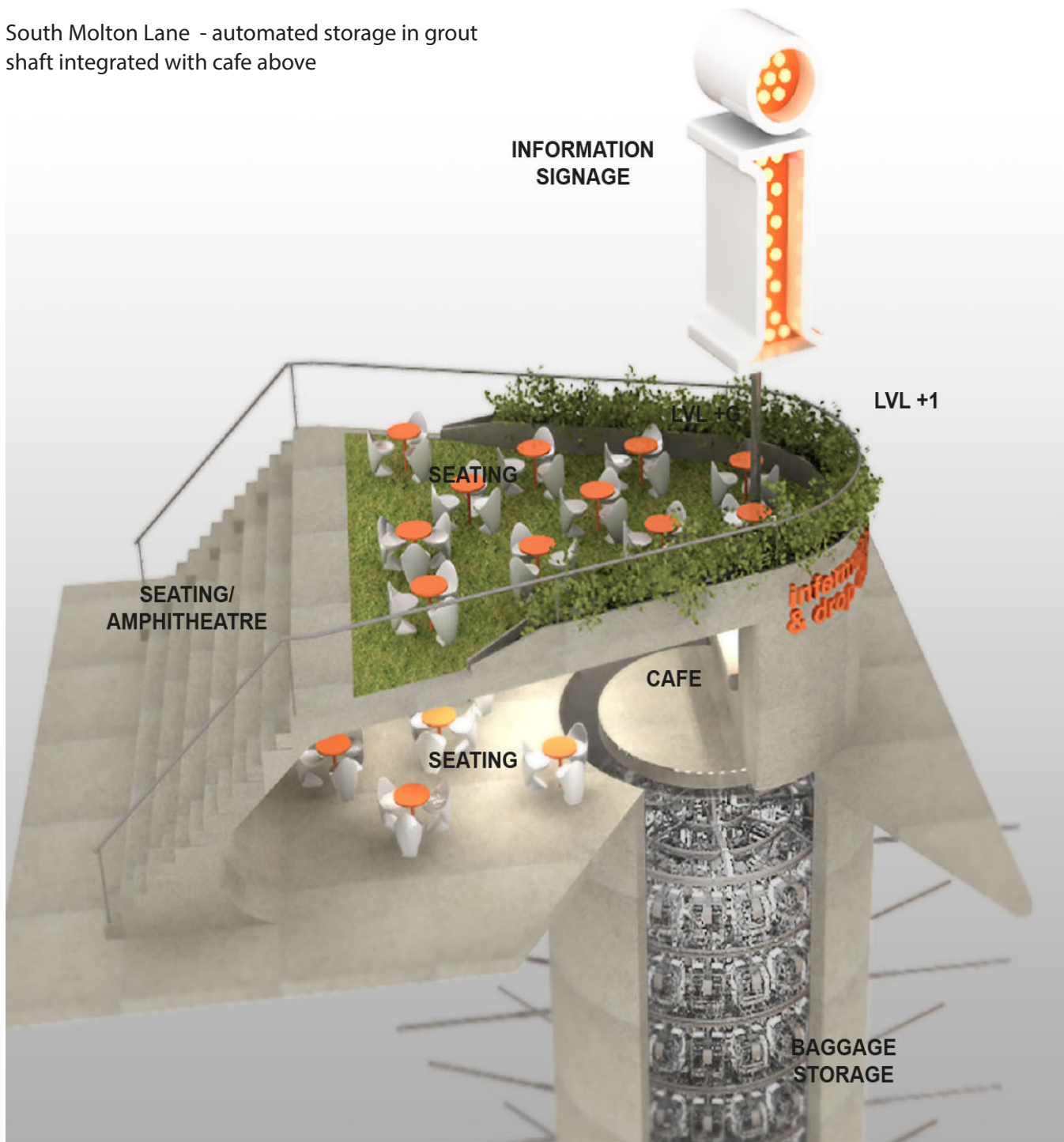
Architectural Design : Jordan Jon Hodgson for Urben

Davies Mews - a public fountain concealing a subterranean boutique bar and event space



Architectural Design : Jordan Jon Hodgson for Urben

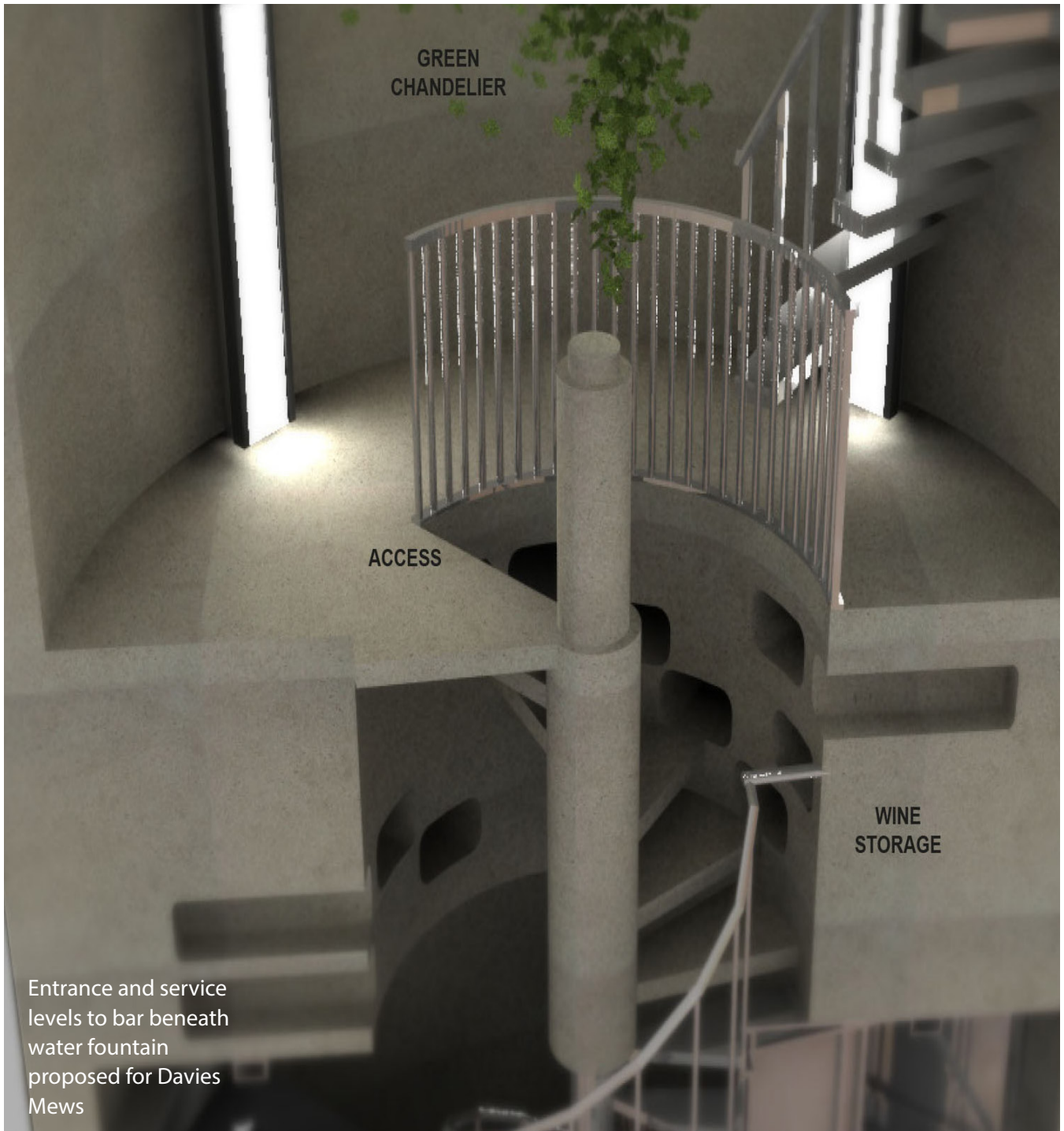
South Molton Lane - automated storage in grout shaft integrated with cafe above



Architectural Design : Jordan Jon Hodgson for Urben



Architectural Design : Jordan Jon Hodgson for Urben



Entrance and service levels to bar beneath water fountain proposed for Davies Mews



SEATING

Potential internal arrangement of
Davies Mews Bar / exhibition space

Architectural Design : Jordan Jon Hodgson for Urben

11 Management and Operation

South Molton Lane

Despite the long standing success of Oxford Street, Bond Street and the West End of London generally, innovation is needed to ensure it remains an attractive destination for London residents and visitors. New West End Company (NVEC) is the Business Improvement District elected to represent the large number of retailers in the area and they provide overarching marketing, operations and management services. The welcome hub proposed for South Molton Lane could provide a shared service for retailers and enhance the existing customer experience by offering a space to safely store shopping whilst going for dinner or to the theatre; pick up online shopping orders after retail closing hours; meet friends; or get directions from one of the NVEC / Welcome People ambassadors. Operation of the automatic storage and retrieval system proposed for the grout shaft would be paid for by users on a time charge basis. A ground floor cafe with first level roof terrace is proposed to assist wayfinding, activate the streetscape, provide an informal meeting place and generate revenue. The multi-function space could also be used to hire or store of Brompton or other folding bikes; host small performances or act as a community police station after hours.

Davies Mews

Our concept for the Davies Mews grout shaft is provocative and playful, yet is likely to be attractive as a destination wine bar and events space, particularly if set within an improved public realm of a cobblestone paved Mews with improved lighting and soft landscaping.

The bar could also potentially be integrated into operation of the adjoining Running Horseman Pub or made available only by booking in advance with a portion of the available sessions reserved for exhibiting work by emerging artists. The lower levels of the bar order wine directly from guest's tables which is then delivered using a dumb waiter. Although the space is small, it is hoped people will be attracted to a unique, cosy space similar to other small London venues such as the Euston Tap or El Pepito bar.



12 Implementation

The objective of this research project is to encourage efficient and creative use of underground spaces. To further these concepts for reuse of Crossrail grout shafts (or other uses in similar spaces), it would be necessary to commission further stages of work including those set out below.

Feasibility & Design

Detailed surveys would need to be undertaken including for topographical conditions; the presence of utilities (water, gas, power, telecommunications and waste water) & their potential for new connections; a structural condition assessment; and rates of ground water discharge. With respect to the commercial viability of any redevelopment, a study indicating potential Return on Investment and market demand should also be commissioned. Detailed architectural drawings and plans would be needed, along with plans and specifications for utilities, heating, ventilation, cooling and emergency access and egress.

Engagement

Initial conversations with stakeholders (the City of Westminster, New West End Company, Transport for London and Grosvenor) would need to be expanded to include adjoining residents and businesses.

Legal

Several legal and contractual considerations would be important in progressing reuse of these spaces, namely: variations to existing construction contracts to backfill the shafts; status and possible retention of existing temporary road and utility diversions or stopping up orders; land ownership including subsoil rights and the assignment of leases; and provision for ongoing access by the infrastructure provider.

Consent

Outline and detailed planning consent would need to be sought, along with building regulations consent.



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