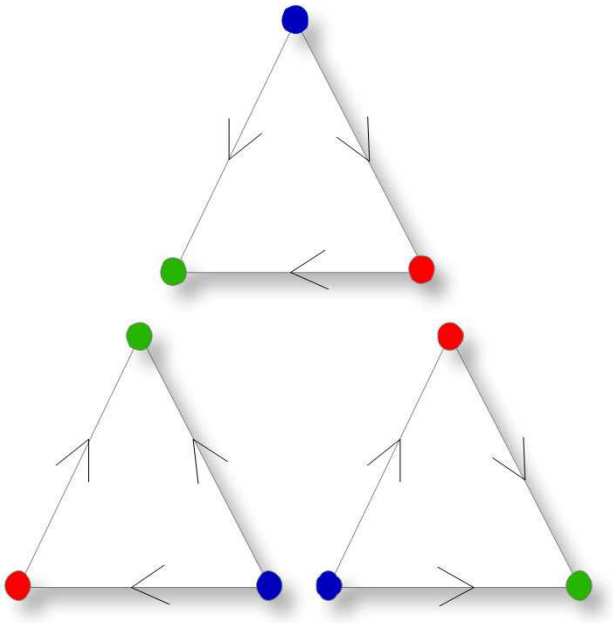
THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Queen Mary University of London

Queen Mary, University of London

The London School of Economics and Political Science

Two One-Day Colloquia in Combinatorics 2013



15th & 16th May 2013

If attending both days, please keep this programme for day two

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INFORMATION

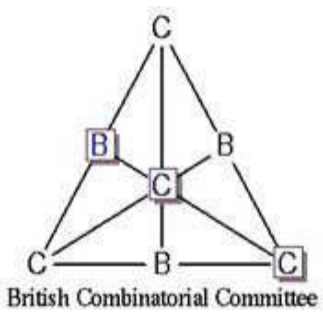
Those interested are welcome to attend for all or any part of the event; it is hoped that many people will be able to attend for both days.

Some funds are available to contribute to the **basic** travel expenses of **research students** who attend the meetings. We ask you to keep costs to a minimum, using public transport on **all** occasions and off-peak student travel tariffs wherever possible. Receipts for all journeys must be maintained as proof of travel. At this stage, we are unable to confirm the maximum amount available; please contact Rebecca Lumb (r.c.lumb@lse.ac.uk) for further information.

Event organisers: Prof Peter Keevash (QMUL) and Dr Jozef Skokan (LSE).

SUPPORT

Support for this event by the London Mathematical Society (www.lms.ac.uk) and the British Combinatorial Committee (www.maths.qmul.ac.uk/~pjc/bcc) is gratefully acknowledged.



WEDNESDAY 15th MAY 2013:
Schedule

The first day of the Colloquia in Combinatorics will be held at Queen Mary, University of London on Wednesday 15th May, starting at 10.30am. Everyone interested is welcome to attend any part of the event. All the talks will be held in the Maths Lecture Theatre, Mathematical Sciences Building, Mile End Campus, QMUL.

Time	Speaker (Institution)	Presentation title
10:00	**Coffee**	
10:30	Anusch Taraz (Munich)	Density and Ramsey results concerning graphs with sublinear bandwidth
11:20	Julia Böttcher (LSE)	A Blow-up Lemma for sparse graphs
12:10	**Lunch** *(own arrangements – options on campus and nearby)*	
13:30	Wojciech Samotij (Tel Aviv)	Typical structure of graph homomorphisms
14:20	Danny Hefetz (Birmingham)	Winning strong games through fast strategies for weak games
15:10	**Afternoon tea break**	
15:40	Simon Griffiths (IMPA)	The triangle-free process and R(3,k)
16:30	Ben Green (Cambridge)	The sum-free set constant is 1/3
17:20	**End**	

Density and Ramsey results concerning graphs with sublinear bandwidth

Anusch Taraz

The existence of Hamilton paths and cycles in host graphs satisfying certain conditions is one of the central questions in extremal graph theory. We survey recent results that generalize these questions from paths to spanning graphs with sublinear bandwidth and discuss bounds on the 2- and 3-colour Ramsey numbers of planar graphs and grids in particular.

A Blow-up Lemma for sparse graphs

Julia Böttcher

The Blow-Up Lemma of Komlós, Sárközy and Szemerédi is an important tool for embedding large graphs H into dense graphs G. We recently obtained versions of this lemma for subgraphs G of sparse random and pseudo-random graphs.

In the talk I will explain our results, outline the methods we use in the proofs and describe some applications.

Joint work with Peter Allen, Hiep Hán, Yoshi Kohayakawa and Yury Person

Typical structure of graph homomorphisms

Wojciech Samotij

Given two graphs G and H, a graph homomorphism from G to H is a mapping of $V(G)$ to $V(H)$ that maps edges of G to edges of H. Counting and describing the typical structure of homomorphisms between graphs have many interesting aspects and a surprising number of applications. Numerous models in statistical mechanics and questions in extremal graph theory can be phrased in these terms.

In this talk, we will focus our attention on the case when H is some small fixed graph, which can be thought of as a generalization of graph coloring. For many natural classes C of graphs, one observes the following phenomenon: A typical homomorphism from every G in C to H is very rigid, exhibiting strong spatial correlations. We will discuss several examples of this phenomenon, focusing on two particular settings:

(i) G is (a large subbox of) the d-dimensional integer grid;
(ii) G is a regular bipartite graph with strong expansion properties.

We will also state several open questions. No prior knowledge of graph homomorphism or expander graphs will be assumed.

Joint work with Ron Peled (Tel Aviv University) and Amir Yehudayoff (Technion).

Winning strong games through fast strategies for weak games

Danny Hefetz

Given a strong game which is known to be a first player's win, one would like to know how to win the game, that is, to have an explicit winning strategy for the first player. Unfortunately, this is a very hard problem in general and very few such strategies are known. In this talk we will see how such strategies can be found by using explicit fast winning strategies for the corresponding weak games.

The triangle-free process and $\mathrm{R}(3,\mathrm{k})$

Simon Griffiths

The *triangle-free process* (introduced by Bollobás and Erdős) starts with the empty graph on n vertices, and at each step thereafter a uniformly random edge is added subject to the condition that no triangle is created in the graph. The process ends when we reach a maximal triangle-free graph; which we denote $G_{n,\triangle}$. Bohman, using the differential equations method of Wormald, proved that

$$e\big(G_{n,\triangle}\big) \;=\; \Theta\big(n^{3/2}\sqrt{\log n}\big)\,,$$

with high probability.

In this talk we discuss recent progress in understanding this process. Using the self-correcting nature of families of random variables associated with the evolution of the process we prove that

$$e\big(G_{n,\triangle}\big) \;=\; \left(\frac{1}{2\sqrt{2}} + o(1)\right) n^{3/2}\sqrt{\log n}\,,$$

with high probability.

In addition, this improved understanding allows us to bound the independence number of $G_{n,\triangle}$ by $(\sqrt{2}+o(1))\sqrt{n\log n}$, which implies the following lower bound on off-diagonal Ramsey numbers:

$$\left(\frac{1}{4} - o(1)\right)\frac{k^2}{\log k} \;\le\; R(3,k) \;\le\; \big(1+o(1)\big)\frac{k^2}{\log k}\,,$$

the upper bound here is due to Shearer.

Based on joint work with Gonzalo Fiz Pontiveros and Robert Morris. Similar results have been obtained independently by Thomas Bohman and Peter Keevash.

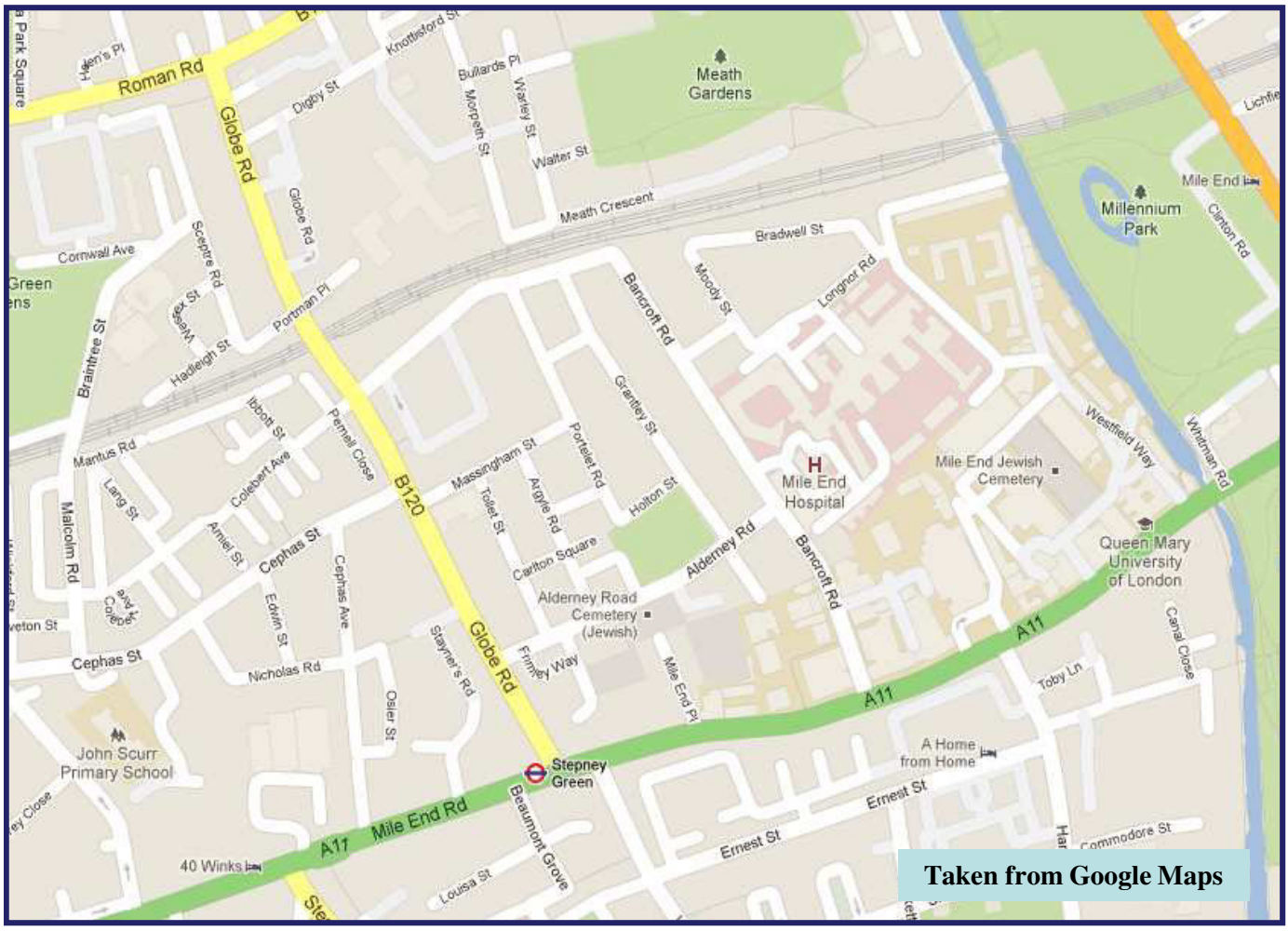
The sum-free set constant is $1/3$

Ben Green

A well-known argument of Erdős, often used as a simple example to illustrate the probabilistic method, proves that any set of n integers contains a sum-free subset of size at least $n/3$. (Sum-free means it has no solutions to $x + y = z$.) Recently, jointly with Sean Eberhard and Freddie Manners, we have shown that the constant $1/3$ is best possible. The proof uses an "arithmetic" version of the regularity lemma, some sumset estimates and the Brunn-Minkowski theorem about convex bodies. I will try and give an overview of it.

PLACES TO EAT: in and around QMUL

Drapers Bar and Kitchen – wide range to suit all dietary requirements, Bancroft Road
Drunken Monkey – Asian fusion, Westfield Way
Greedy Cow – gastropub food, Grove Road
Half Moon Pub – Wetherspoons serving standard pub food, Mile End Road
Matsu – Japanese food, Mile End Road
Morgan Arms – Up-market pub food, Morgan Street
Mucci's – Italian trattoria, Library Square
Nandos – Portuguese Chicken, Mile End Road
Pride of Asia – Bangladeshi restaurant with all-you-can-eat buffet, Mile End Road
The Curve – international food to eat-in or take away, Westfield Way
The Jasmine Kitchen – railway arch café serving Thai food, White Church Lane



Taken from Google Maps

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Information

Visitors who require further information or assistance please go to the Main Reception in the Queens' Building.

Please do not smoke on the campus.

These premises are alarmed and monitored by CCTV, please call security on 020 7882 5000 for more information.

Library/bookshop

Fitness centre

Bar

Coffee place

Eatery

Staff Car Park

Bicycle Parking

Cash Machine

THURSDAY 16th MAY 2013:
Schedule

The second day of the Colloquia in Combinatorics will be held at the London School of Economics and Political Science on Thursday 16th May, starting at 10.00am. Everyone interested is welcome to attend any part of the event. The talks will be held in the New Theatre (room number: EAS.E171), East Building, LSE; refreshments breaks will be taken in EAS.E168, East Building, LSE.

Time	Speaker (Institution)	Presentation title
10:00	Roman Glebov (Warwick)	On bounded degree spanning trees in the random graph
10:50	**Coffee break** *(room EAS.E168)*	
11:20	Endre Szemerédi (Budapest)	A new proof of the Pósa-Seymour Conjecture
12:10	Gábor Kun (Budapest)	A measurable version of the Lovász Local Lemma
13:00	**Lunch** *(own arrangements – options on campus and nearby)*	
14:10	Viresh Patel (Birmingham)	A conjecture of Thomassen on Hamilton cycles in highly connected tournaments
15:00	**Afternoon tea break** *(room EAS.E168)*	
15:30	Julia Wolf (Paris)	Sumsets, sampling and almost periodicity
16:20	Noga Alon (Tel Aviv)	**THE NORMAN BIGGS LECTURE:** Random Cayley graphs
17:20	**End**	

On bounded degree spanning trees in the random graph

Roman Glebov

The appearence of certain spanning subraphs in the random graph is a well-studied phenomenon in probabilistic graph theory. In this talk, we present results on the threshold for the appearence of bounded-degree spanning trees in $G(n,p)$ as well as for the corresponding universality statements. In particular, we show hitting time thresholds for some classes of bounded degree spanning trees.

Joint work with Daniel Johannsen and Michael Krivelevich.

A new proof of the Pósa-Seymour Conjecture

Endre Szemerédi

In 1974 Paul Seymour conjectured that any graph G of order n and minimum degree at least $(\frac{k-1}{k})n$ contains the $(k-1)^{th}$ power of a Hamiltonian cycle. This conjecture was proved by Komlós, Sárközy and Szemerédi earlier with the help of the Regularity Lemma – Blow-up Lemma method for $n \geq n_0$ where n_0 is very large. Here we present another proof that avoids the use of the Regularity Lemma and thus the resulting n_0 is much smaller. The main ingredient is a new kind of connecting lemma.

This work is joint with Asif Jamshed.

A measurable version of the Lovász Local Lemma

Gábor Kun

The Lovász Local Lemma was first applied to hypergraph colouring problems. Lovász and Erdős proved that for every subset S of the real numbers if $k \gg 1 + |S|\log(|S|)$ then the real line can be coloured by k colours so that every translate $S + x$ will contain all k colours. But can we get measurable colour classes in similar theorems?

We give a measurable version of the Lovász Local Lemma. We apply this to the dynamical version of the von Neumann problem.

A conjecture of Thomassen on Hamilton cycles in highly connected tournaments

Viresh Patel

A conjecture of Thomassen from 1982 states that for every k there is an $f(k)$ such that every strongly $f(k)$-connected tournament contains k edge-disjoint Hamilton cycles. A classical theorem of Camion, that every strongly connected tournament contains a Hamilton cycle, implies that $f(1) = 1$. Until now, even the existence of $f(2)$ was open. In this talk, I will discuss a proof of Thomassen's conjecture. Our methods in fact allow us to show that $f(k) = O(k^2 \log^2 k)$, which is best possible up to the logarithmic factor.

This is joint work with Daniela Kühn, John Lapinskas, and Deryk Osthus.

Sumsets, sampling and almost periodicity

Julia Wolf

So-called "almost-periodicity" results for sumsets, first introduced by Croot and Sisask in 2009, have led to important quantitative advances in additive combinatorics in recent years. We explain the general philosophy and give a new statement and proof that avoids L^p norms and relies exclusively on Chernoff-type tail estimates. If time permits, we will sketch an application to the decoding of Reed-Muller codes of order 2.

This is joint work with Eli Ben-Sasson, Noga Ron-Zewi and Madhur Tulsiani.

"The Norman Biggs Lecture"

Random Cayley Graphs

Noga Alon

The study of random Cayley graphs of finite groups is related to the investigation of Expanders and to problems in Combinatorial Number Theory and in Information Theory. I will discuss this topic, describing the motivation and focusing on the question of estimating the chromatic number of a random Cayley graph of a given group with a prescribed number of generators.

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

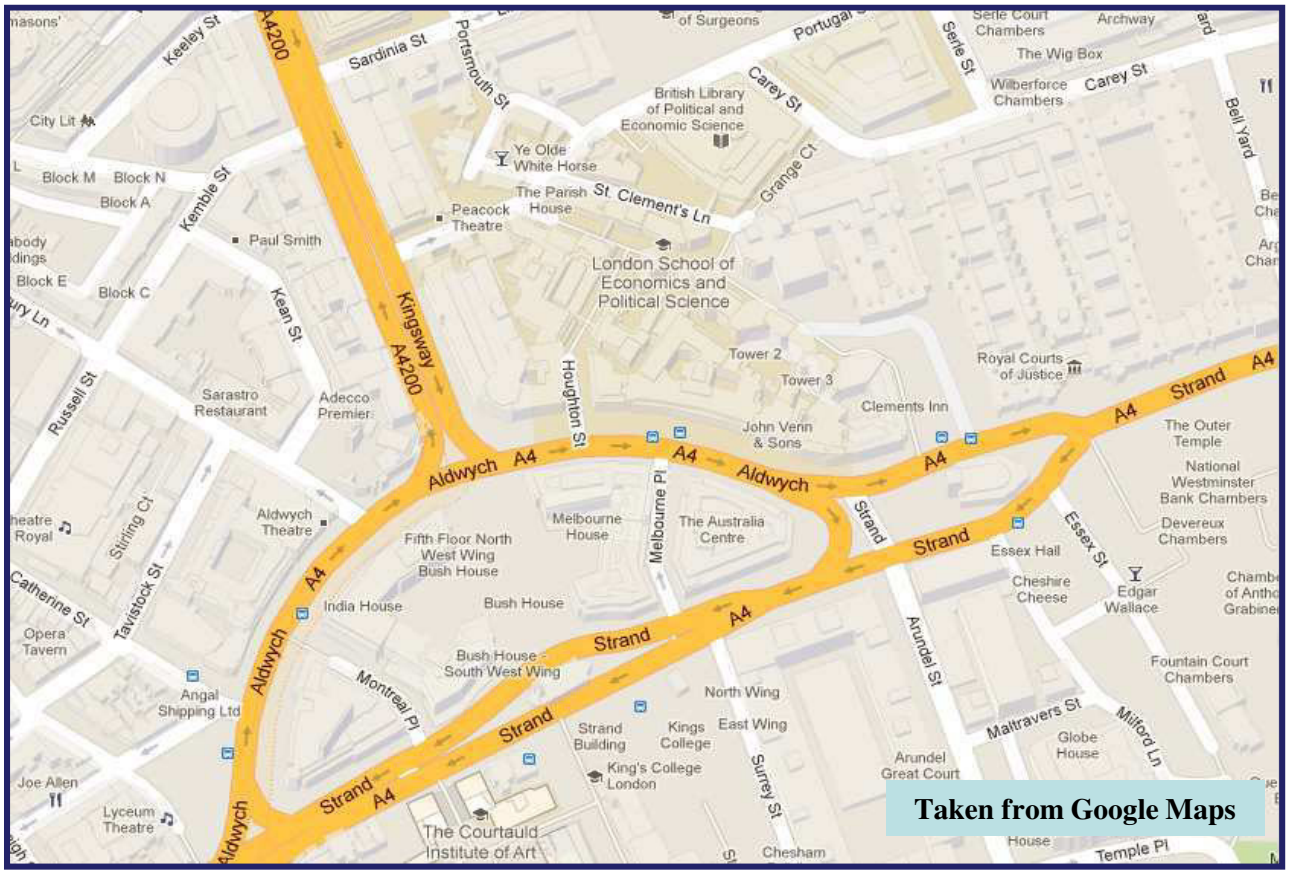
PLACES TO EAT: in and around LSE

Close by:

All Bar One - Kingsway
Belgo - Kingsway
Café Amici - Kingsway
Café Nero - Kingsway
Costa - Kingsway
EAT - Kingsway
Hot - Kingsway
Paul - Kingsway
Pret a Manger - Kingsway
Sainsburys - Kingsway
Starbucks - Kingsway
Subway - Kingsway
The Delaunay - Aldwych
Wasabi - Kingsway

On campus:

3 Tuns - Ground floor, Clare Market St
Café 54 - Ground floor, New Academic Building
Fourth Floor Café Bar - Old Building
Fourth Floor Restaurant - Old Building
George IV Pub - Portugal Street
LSE Garrick - Ground floor, Columbia House
Mezzanine Café - New Academic Building
Plaza Café - John Watkins Plaza



Taken from Google Maps

Disabled access information

- Disabled lift
- Disabled parking
- Toilets for wheelchair user
- Lift
- Unisex toilets
- disabled access

Disabled access

Portable ramp for 20 Kingsway (**KSW** only) is located in entrance foyer. Please call 020 7955 6200 for Security staff to set up the ramp on request.

After 6.30pm, please call Security Control on 020 7955 6200 to ensure that any disabled access doors are open.

Student Services Centre
Ground floor, Old Building

Graham Wallas Room
OLD 5.25, Old Building

Hong Kong Theatre
Ground floor, Clement House

New Theatre EAS E171, East Building

Old Theatre
Ground floor, Old Building

Shaw Library Sixth floor, Old Building

Sheikh Zayed Theatre
New Academic Building

Thai Theatre New Academic Building

The Wolfson Theatre
New Academic Building

Vera Anstey Room
Between ground and first floor, Old Building

3 Tuns
Ground floor, Clare Market St

Café 54
Ground floor, New Academic Building

Daily Grind Tower 1/2 Reception

Fourth Floor Café Bar Old Building

Fourth Floor Restaurant
Old Building

George IV pub Between LCH and KGS, Portugal Street

LSE Garrick Ground floor, Columbia House

Mezzanine Café New Academic Building

Plaza Café John Watkins Plaza

Senior Common Room and Dining Room Fifth floor, Old Building

Student Common Room
Ground floor, King's Chambers

ALD	**Aldwych House** *Aldwych*
ANC	**The Anchorage**
CMK	**Clare Market** *Houghton Street*
CKM	**Clement House** *Aldwych*
COL	**Columbia House** *Aldwych*
CON	**Connaught House** *Aldwych*
COW	**Cowdray House** *Portugal Street*
EAS	**East Building** *Houghton Street*
KGS	**King's Chambers** *Portugal Street*
KSW	**20 Kingsway**
50L	**50 Lincoln's Inn Fields** *Portsmouth Street*
32L	**32 Lincoln's Inn Fields**
LCH	**Lincoln Chambers** *Portsmouth Street*
LAK	**Lakatos Building** *Portugal Street*
LRB	**Lionel Robbins Building, Library** and **LSE Research Lab**
NAB	**New Academic Building** *Lincoln's Inn Fields*
NSC	**New Students' Centre Development** *Sheffield Street*
OLD	**Old Building** *Houghton Street*
PAR	**Parish Hall** *Sheffield Street*
PEA	**Peacock Theatre** *Portugal Street*
POR	**1 Portsmouth Street**
SAR	**Sardinia House** *Sardinia Street*
SHF	**Sheffield Street**
STC	**St Clement's** *Clare Market*
TW1	**Tower One** *Clement's Inn*
TW2	**Tower Two** *Clement's Inn*
TW3	**Tower Three** *Clement's Inn*

January 2013