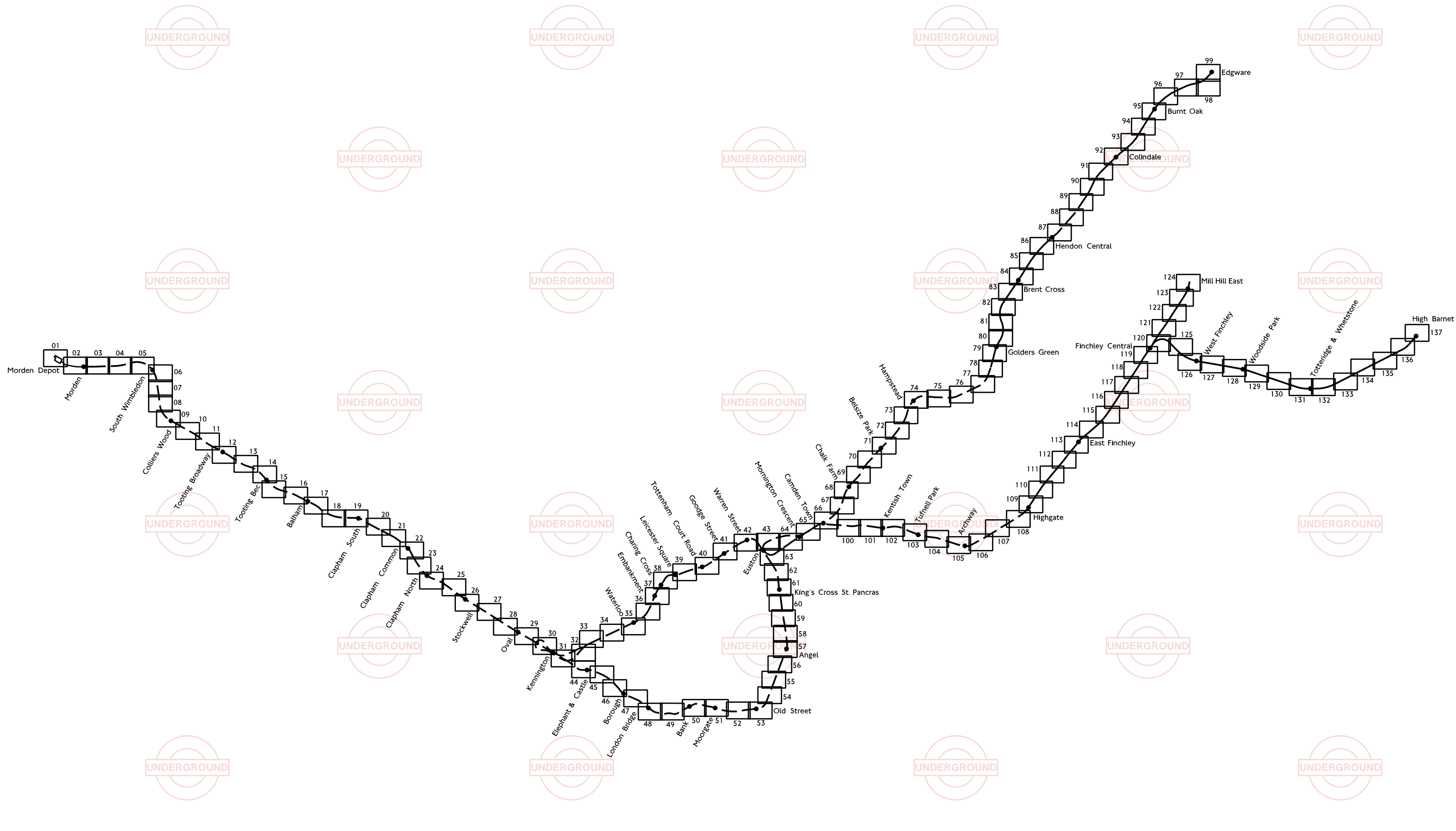



Appendix C. SED Drawings



Northern line

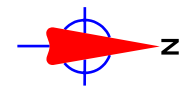


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543

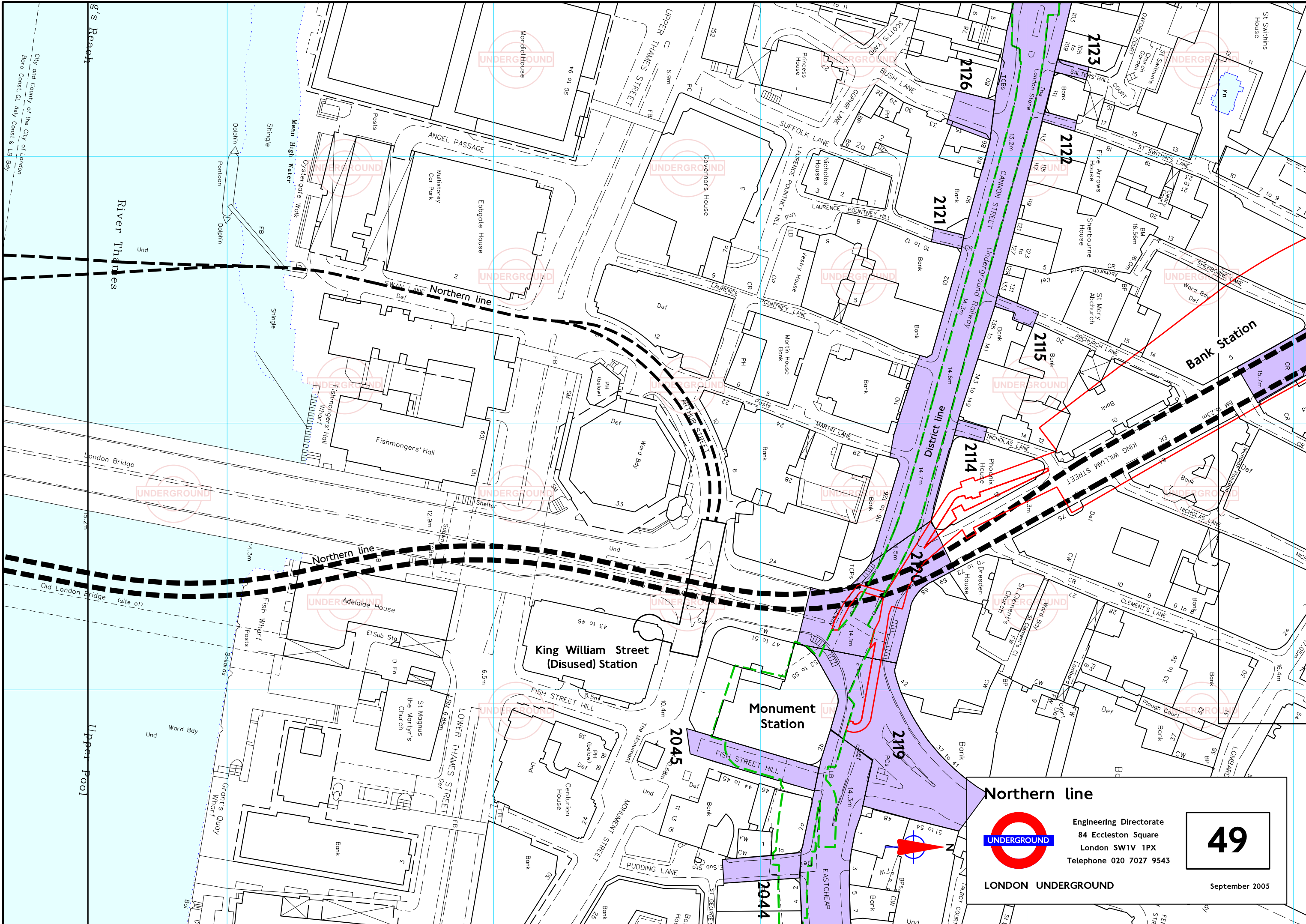
00

LONDON UNDERGROUND


September 2005



	Bakerloo line		LUL running rights with track and equipment shown in line colour
	Central line		Deep level tube shown in line colour
	Circle & Hammersmith line		Sub-surface lines and station areas edged in line colour
	District line		Vent shafts and cross passages in line colour
	East London line		LUL Sub-surface structure edged in line colour
	Jubilee line		Various coloured hatching indicating approximate location of asset
	Metropolitan line		Structure reference number
	Northern line		Embankment reference number
	Piccadilly line		100m Grid
	Victoria line		Live cable routes
	Waterloo & City line		
	Docklands Light Railway		
	National Rail		
	Ex-Tramway, abandoned and transferred routes		



Northern line

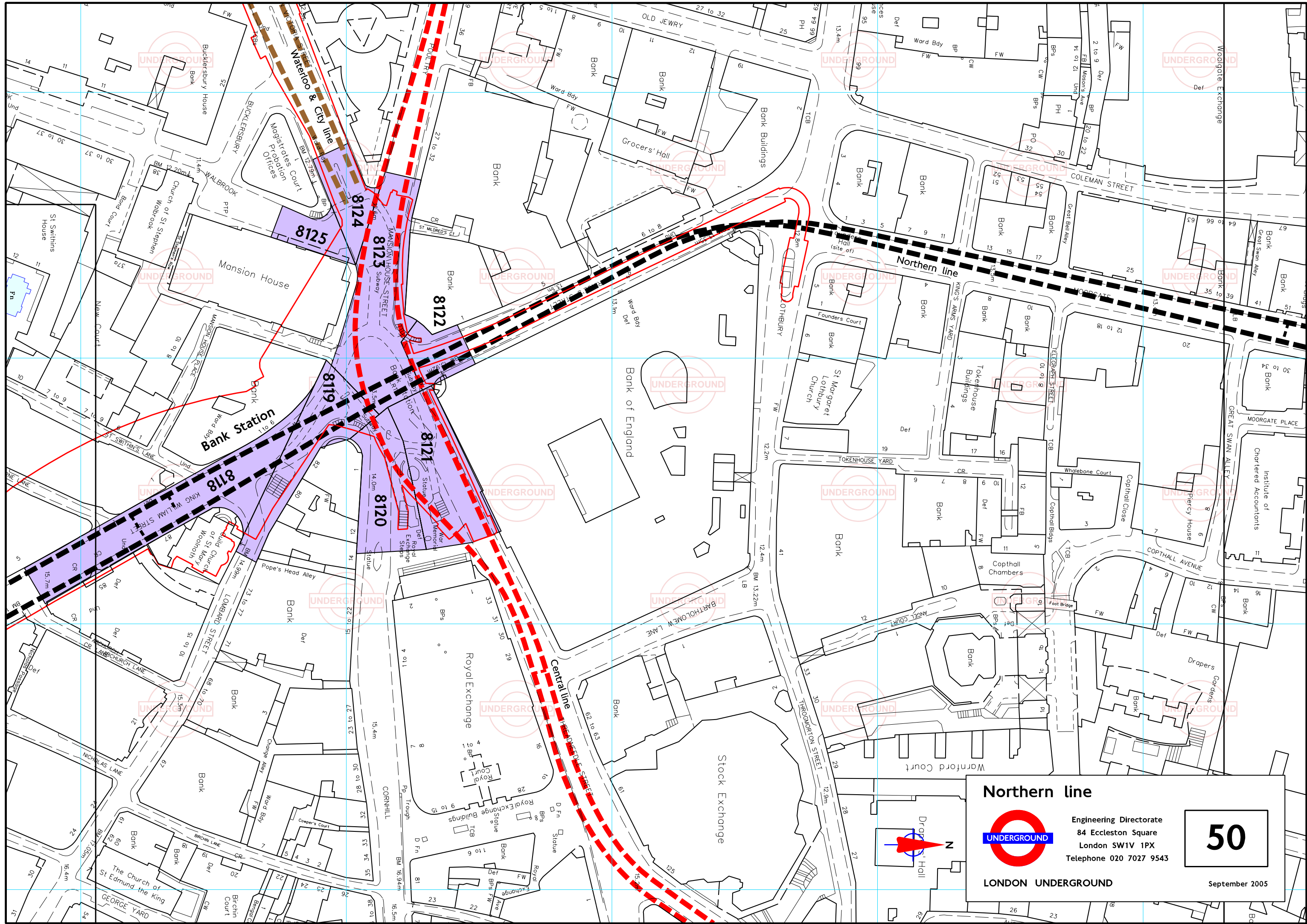


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543


49

LONDON UNDERGROUND

September 2005



Northern line

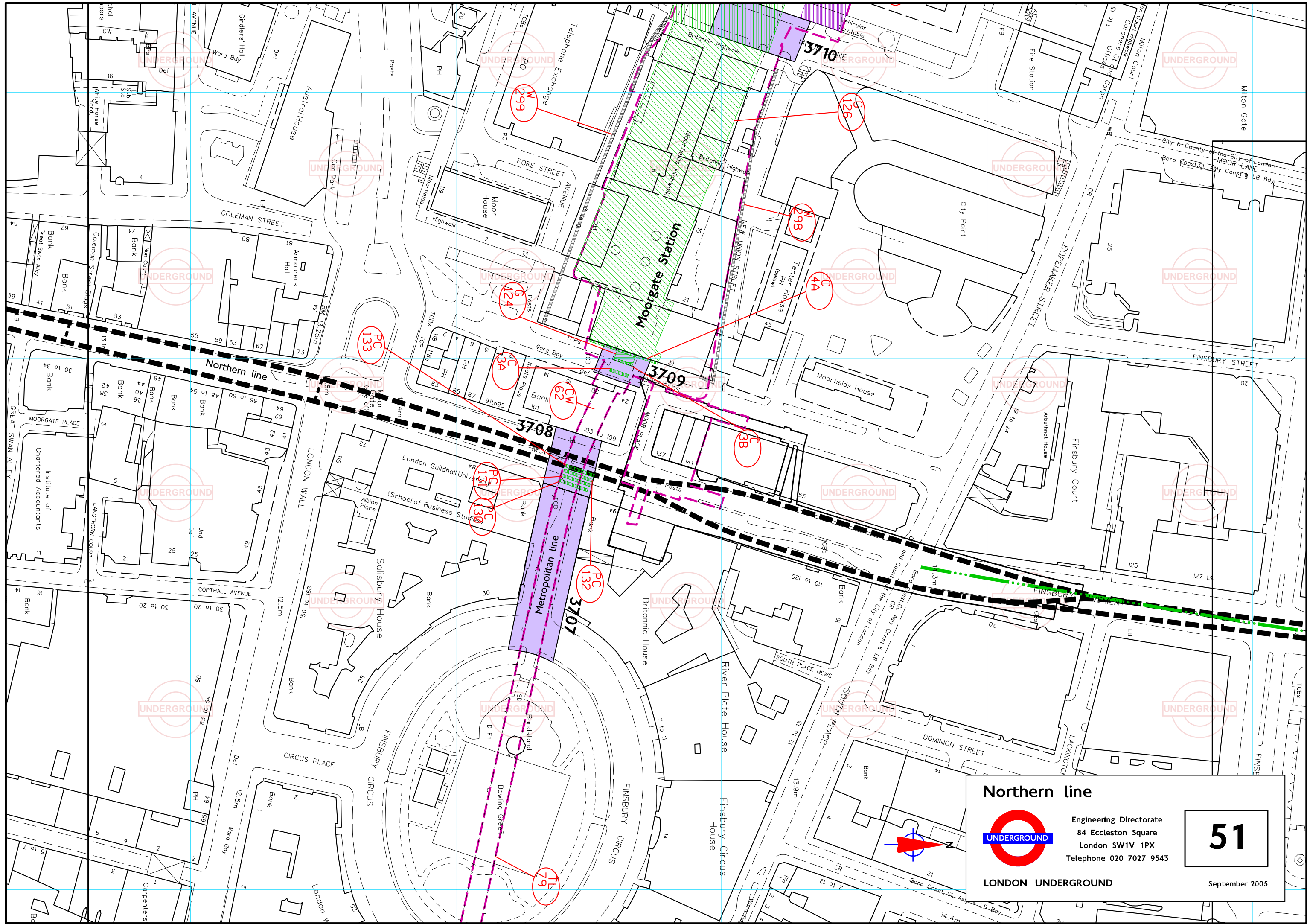


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543


50

LONDON UNDERGROUND

September 2005



Northern line

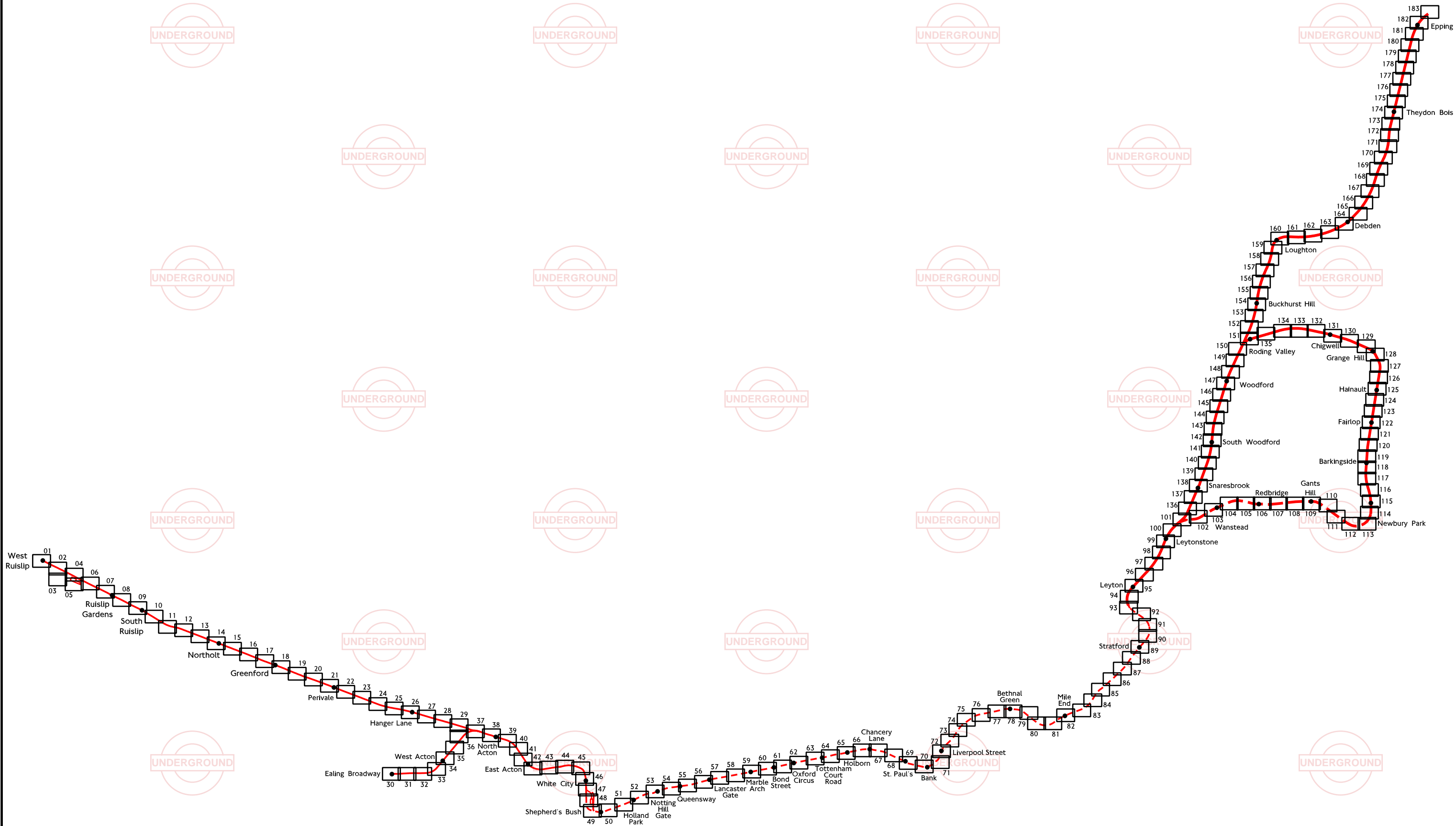


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543


51

LONDON UNDERGROUND

September 2005



Central line



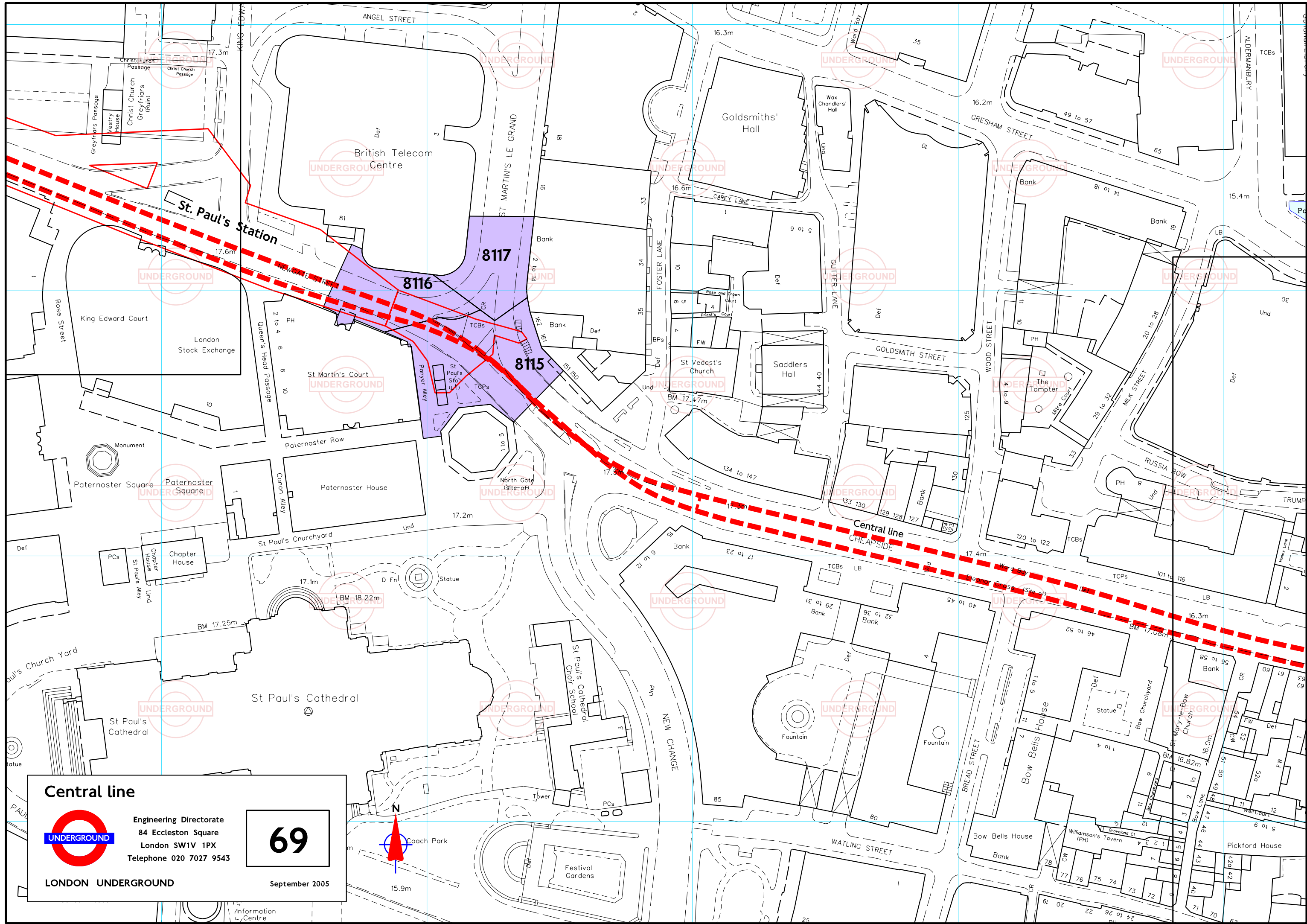
Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543

00

LONDON UNDERGROUND

September 2005

	Bakerloo line		LUL running rights with track and equipment shown in line colour
	Central line		Deep level tube shown in line colour
	Circle & Hammersmith line		Sub-surface lines and station areas edged in line colour
	District line		Vent shafts and cross passages in line colour
	East London line		LUL Sub-surface structure edged in line colour
	Jubilee line		Various coloured hatching indicating approximate location of asset
	Metropolitan line		Structure reference number
	Northern line		Embankment reference number
	Piccadilly line		100m Grid
	Victoria line		Live cable routes
	Waterloo & City line		
	Docklands Light Railway		
	National Rail		
	Ex-Tramway, abandoned and transferred routes		



Central line

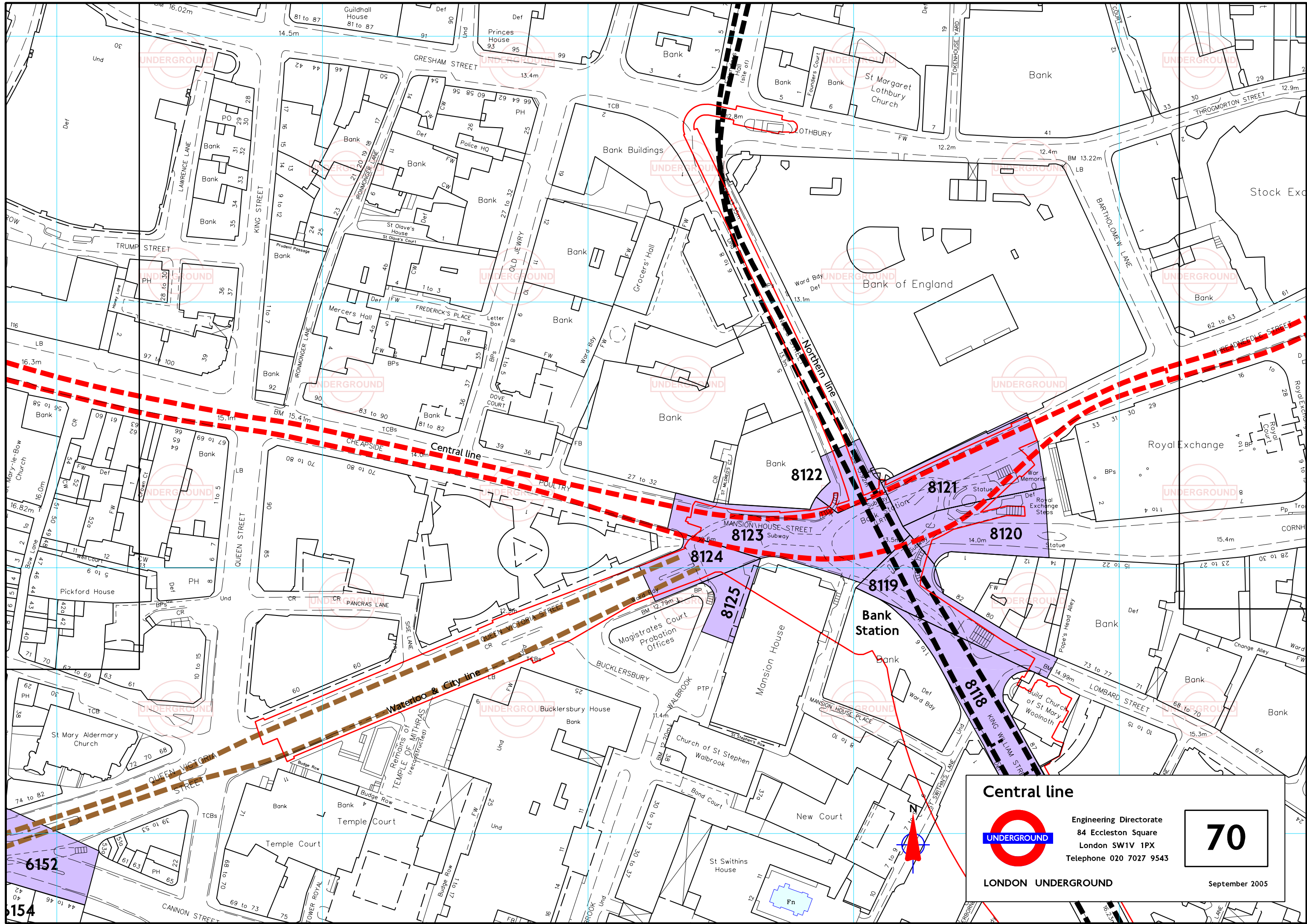


Engineering Directorate
 84 Eccleston Square
 London SW1V 1PX
 Telephone 020 7027 9543


69

LONDON UNDERGROUND

September 2005



Central line

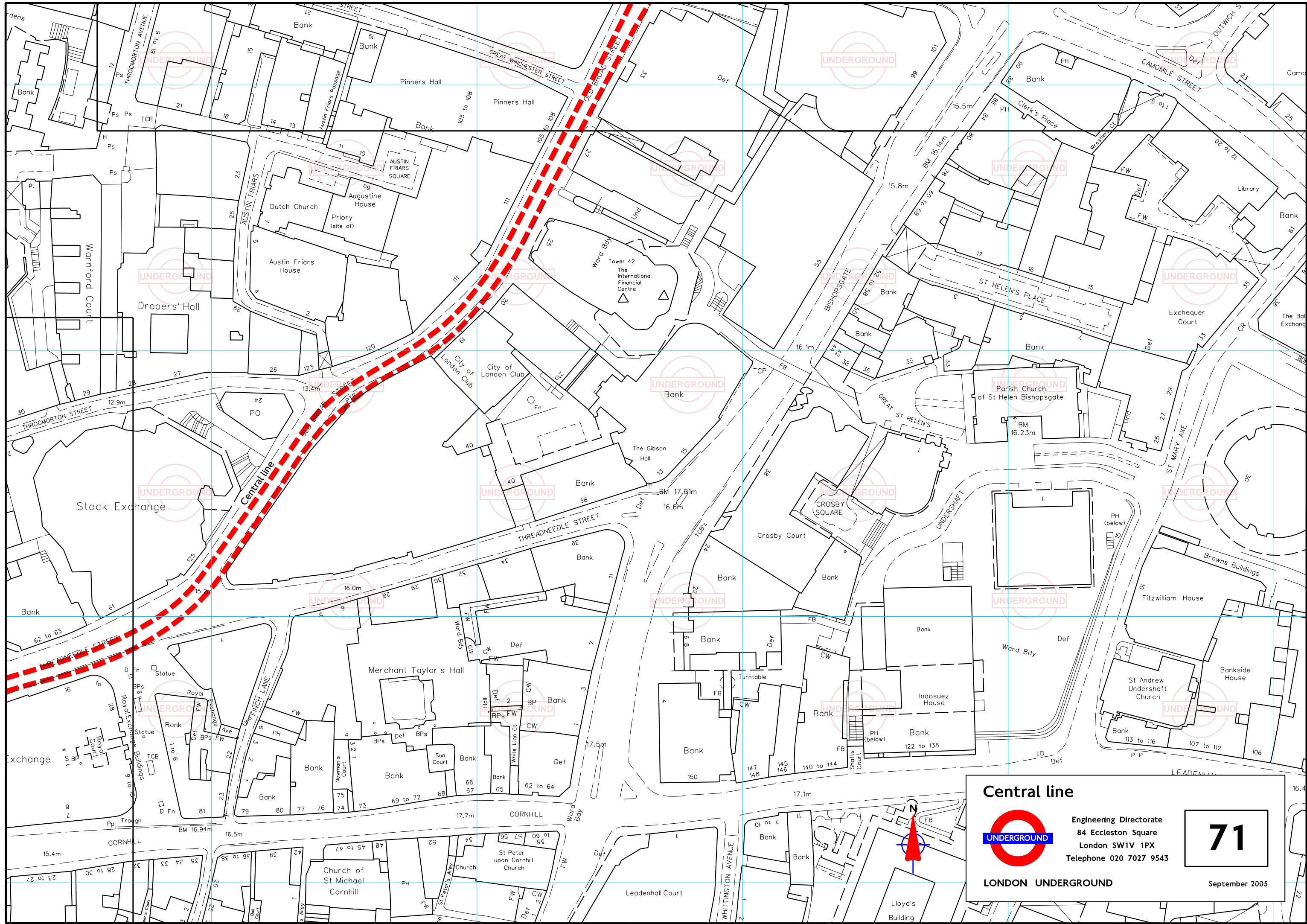


Engineering Directorate
 84 Eccleston Square
 London SW1V 1PX
 Telephone 020 7027 9543


70

LONDON UNDERGROUND

September 2005



Central line

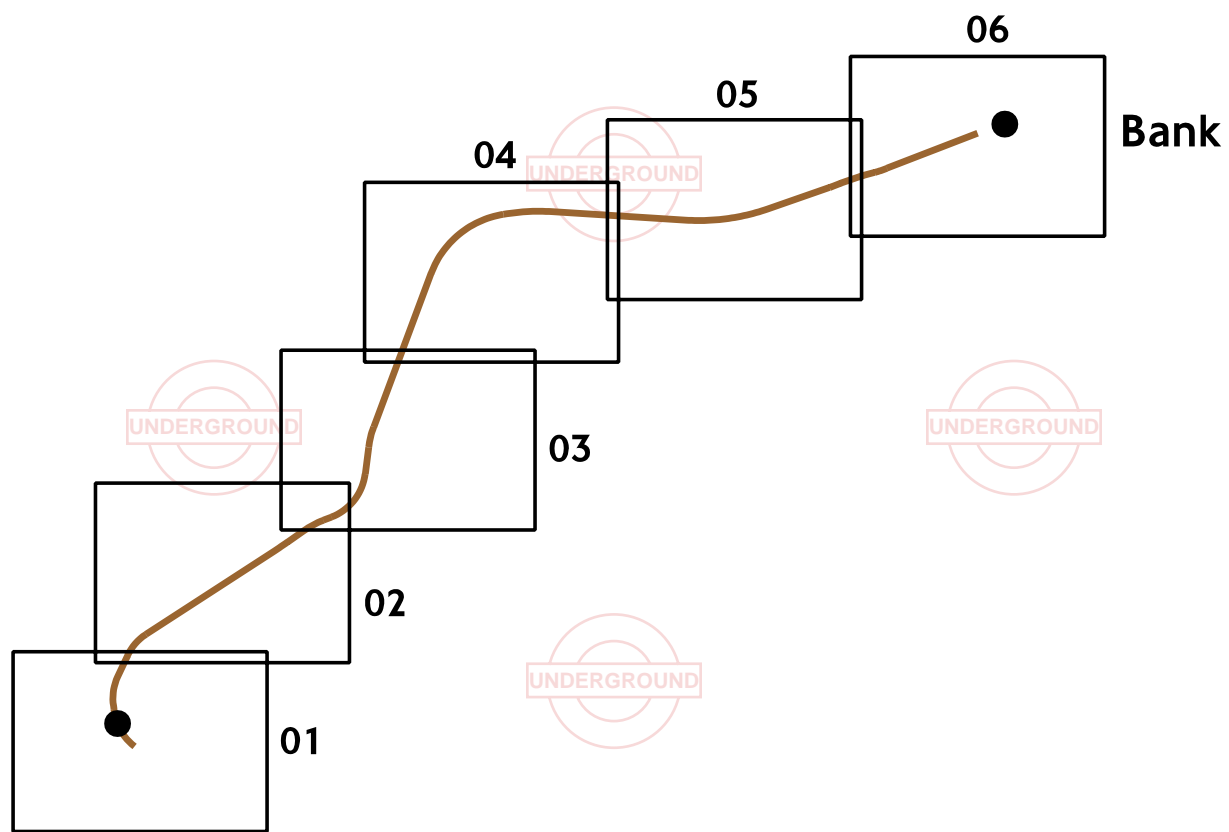
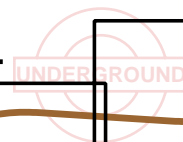


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543

71

LONDON UNDERGROUND

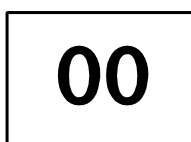
September 2005



Waterloo & City line



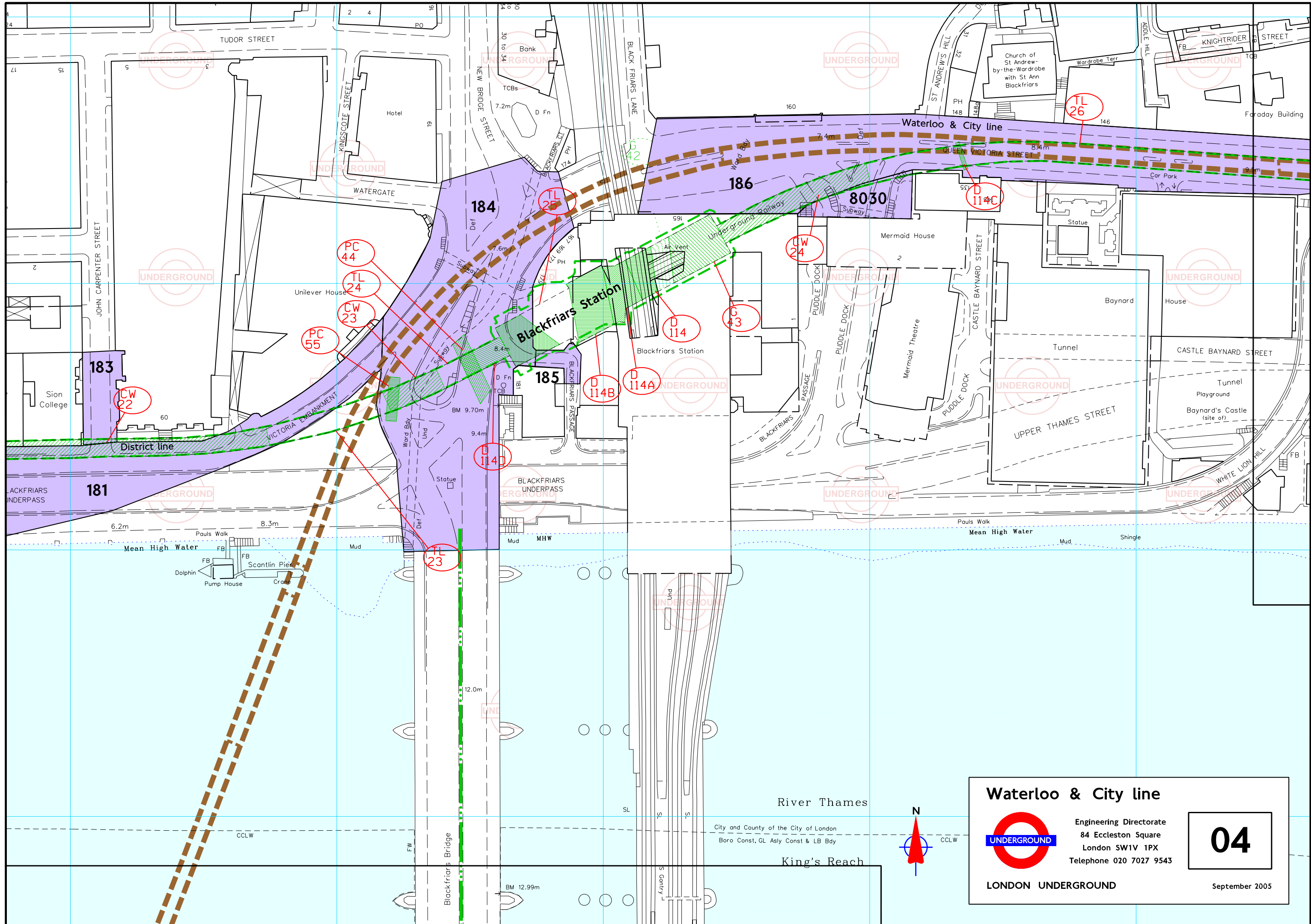
Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543




LONDON UNDERGROUND

September 2005

	Bakerloo line		LUL running rights with track and equipment shown in line colour
	Central line		Deep level tube shown in line colour
	Circle & Hammersmith line		Sub-surface lines and station areas edged in line colour
	District line		Vent shafts and cross passages in line colour
	East London line		LUL Sub-surface structure edged in line colour
	Jubilee line		Various coloured hatching indicating approximate location of asset
	Metropolitan line		Structure reference number
	Northern line		Embankment reference number
	Piccadilly line		100m Grid
	Victoria line		Live cable routes
	Waterloo & City line		
	Docklands Light Railway		
	National Rail		
	Ex-Tramway, abandoned and transferred routes		



Waterloo & City line

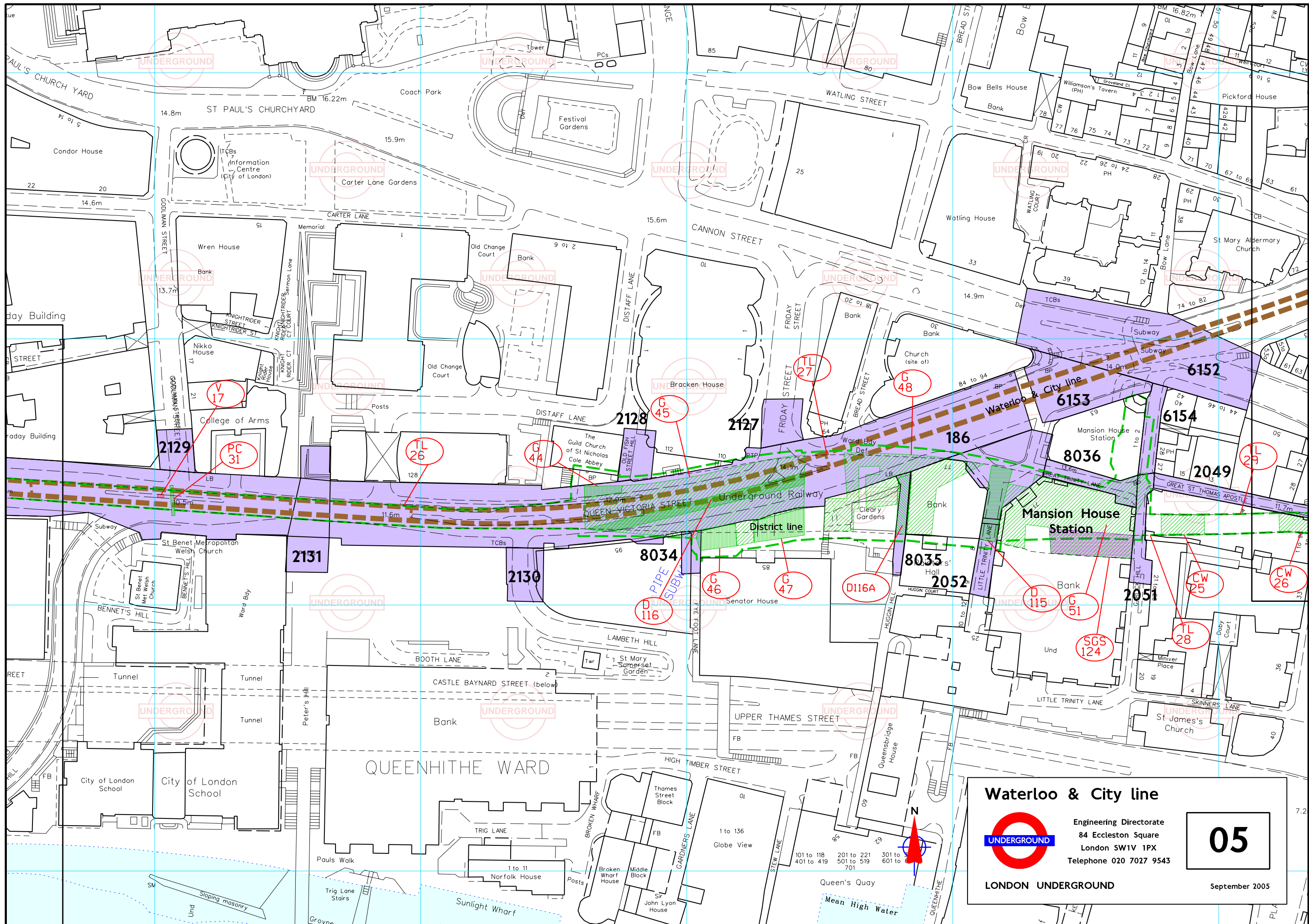


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543


04

LONDON UNDERGROUND

September 2005



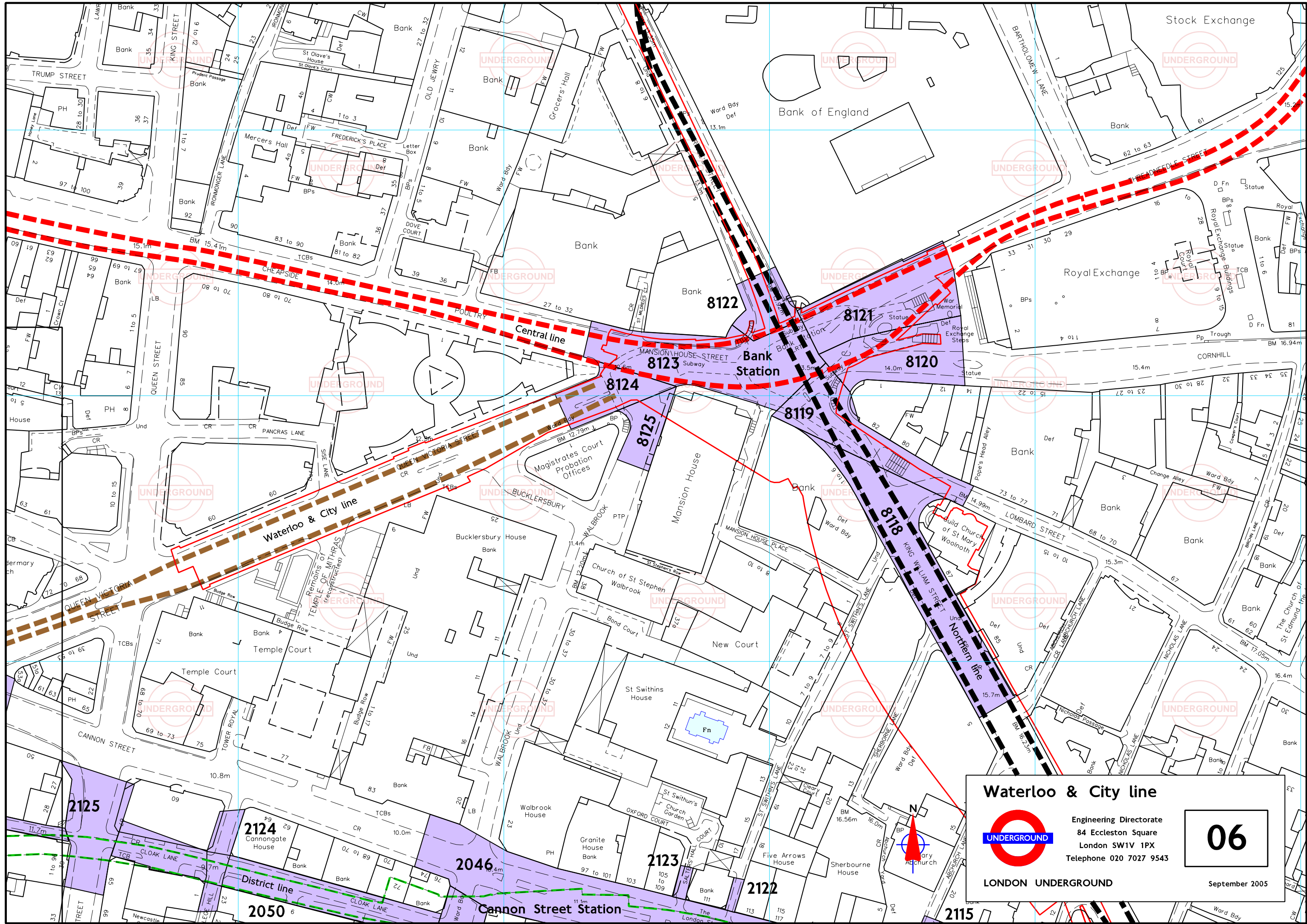
Waterloo & City line

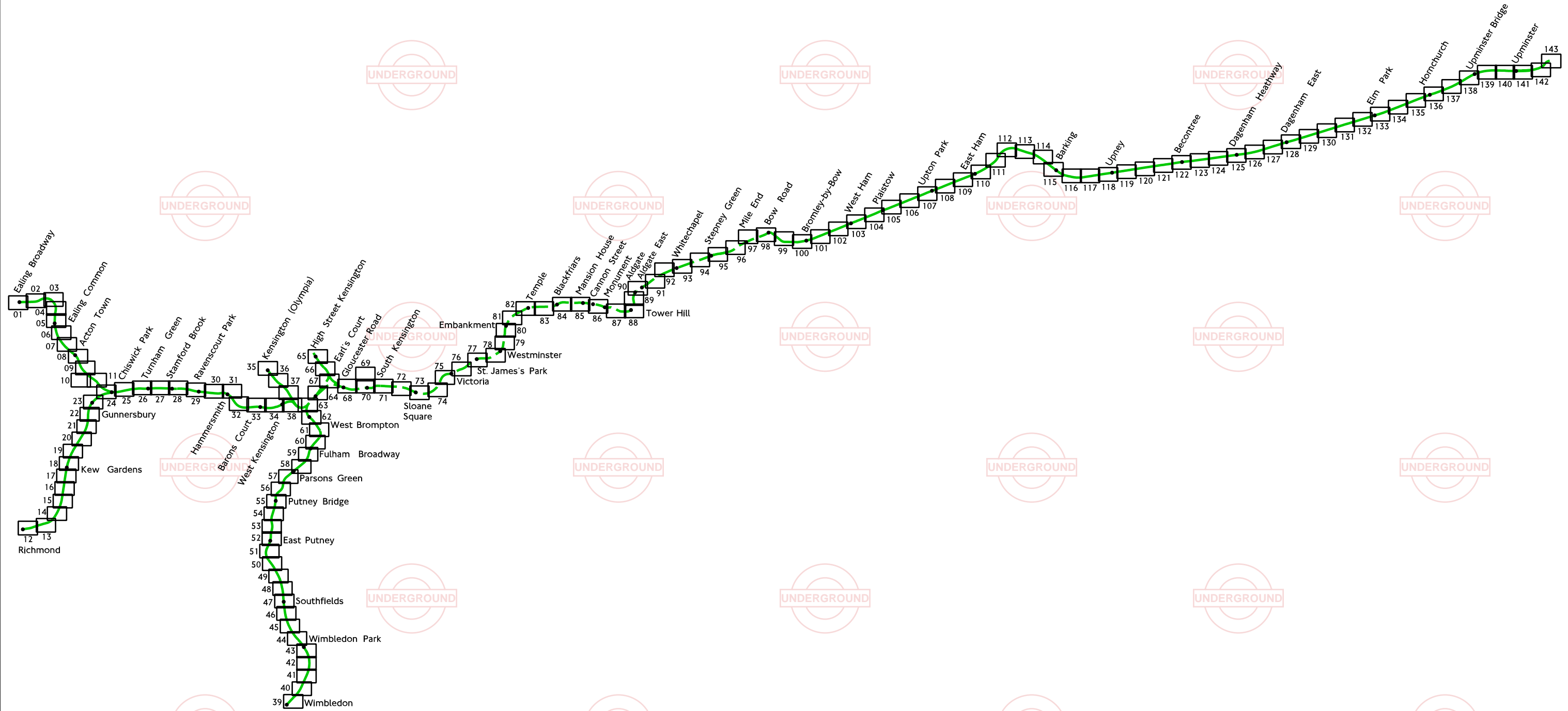


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543


05

LONDON UNDERGROUND September 2005













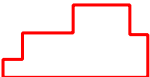














District line

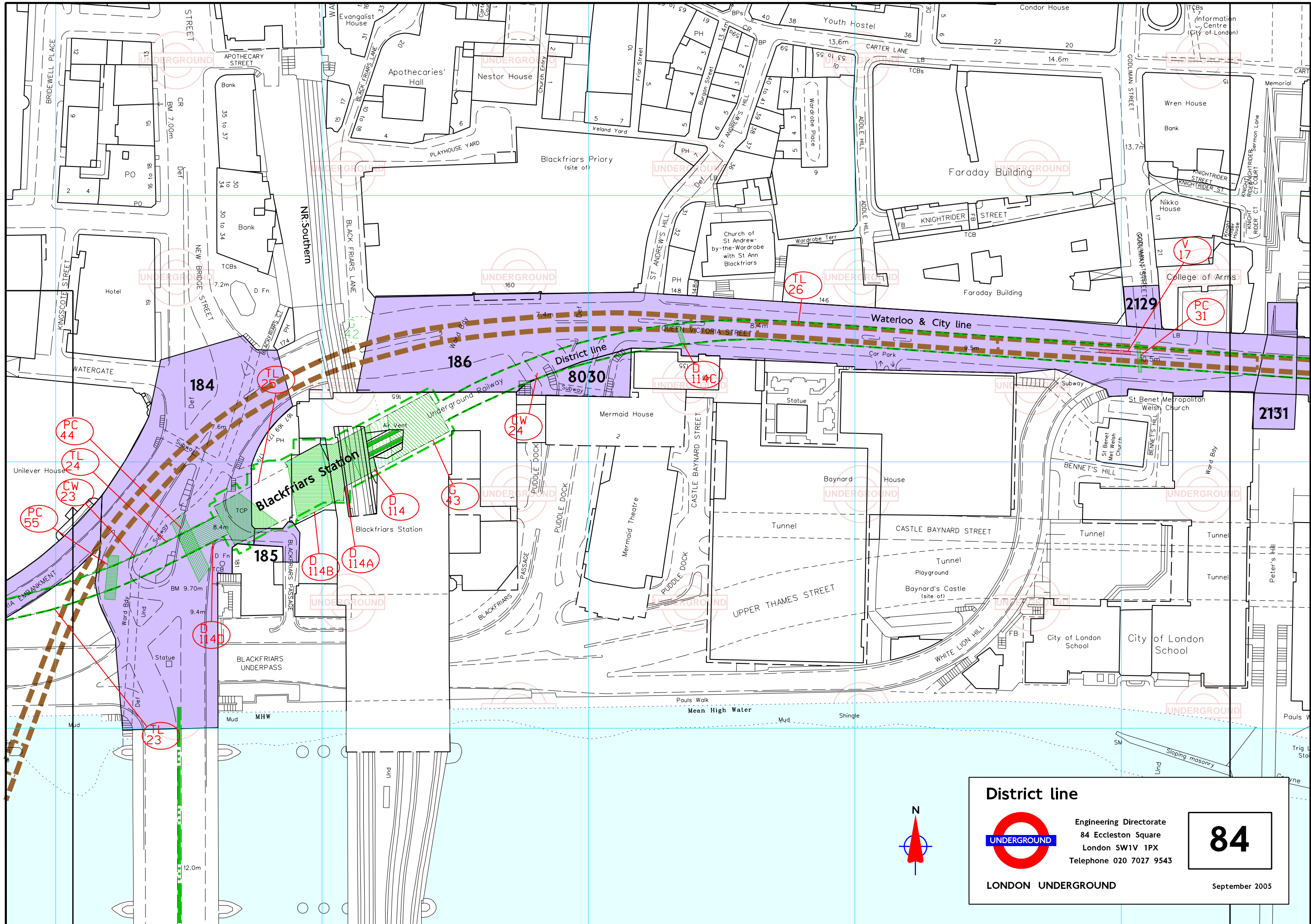


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543


00

LONDON UNDERGROUND September 2005

	Bakerloo line		LUL running rights with track and equipment shown in line colour
	Central line		Deep level tube shown in line colour
	Circle & Hammersmith line		Sub-surface lines and station areas edged in line colour
	District line		Vent shafts and cross passages in line colour
	East London line		LUL Sub-surface structure edged in line colour
	Jubilee line		Various coloured hatching indicating approximate location of asset
	Metropolitan line		Structure reference number
	Northern line		Embankment reference number
	Piccadilly line		100m Grid
	Victoria line		Live cable routes
	Waterloo & City line		
	Docklands Light Railway		
	National Rail		
	Ex-Tramway, abandoned and transferred routes		



District line

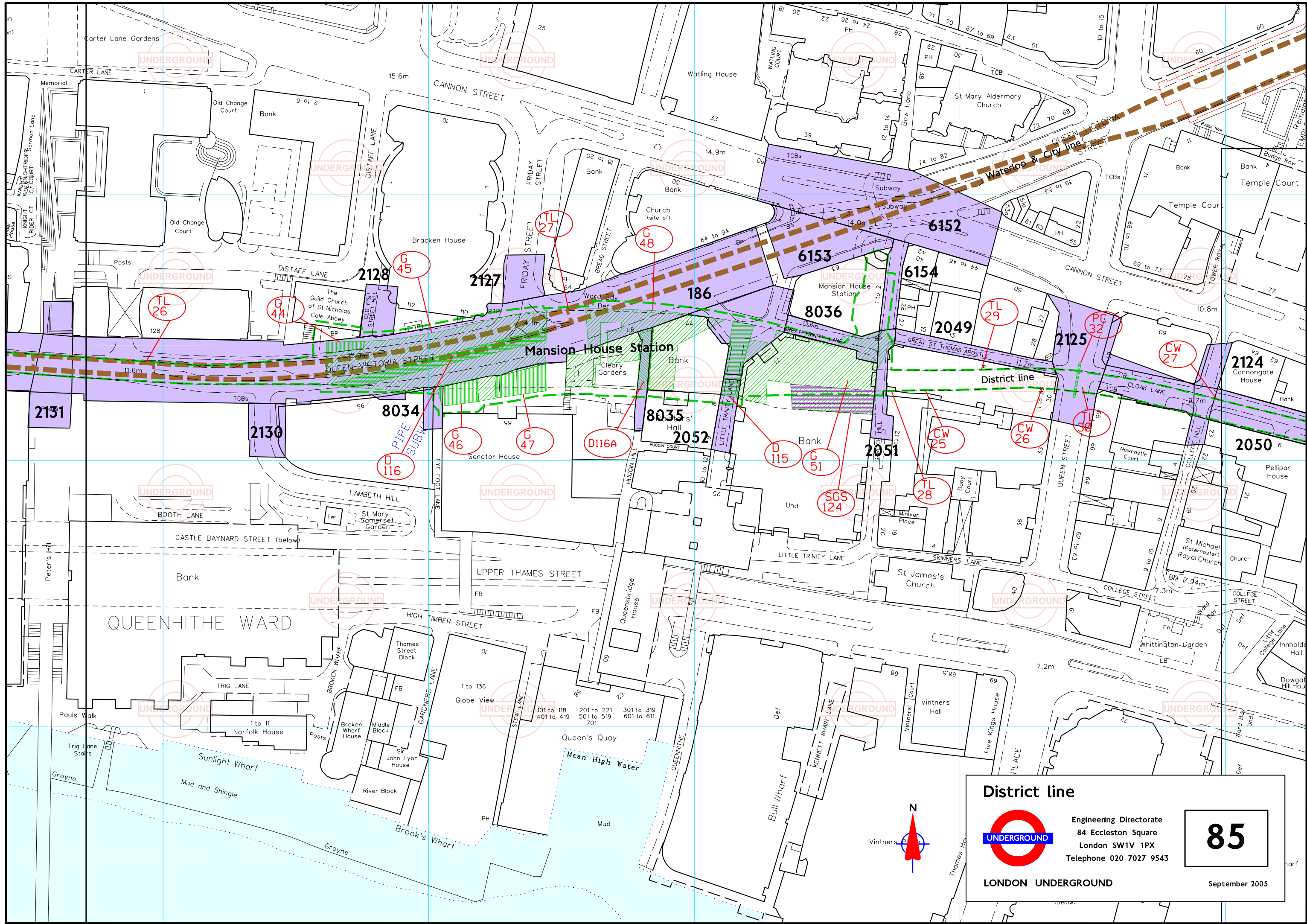


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543

84

LONDON UNDERGROUND

September 2005



District line

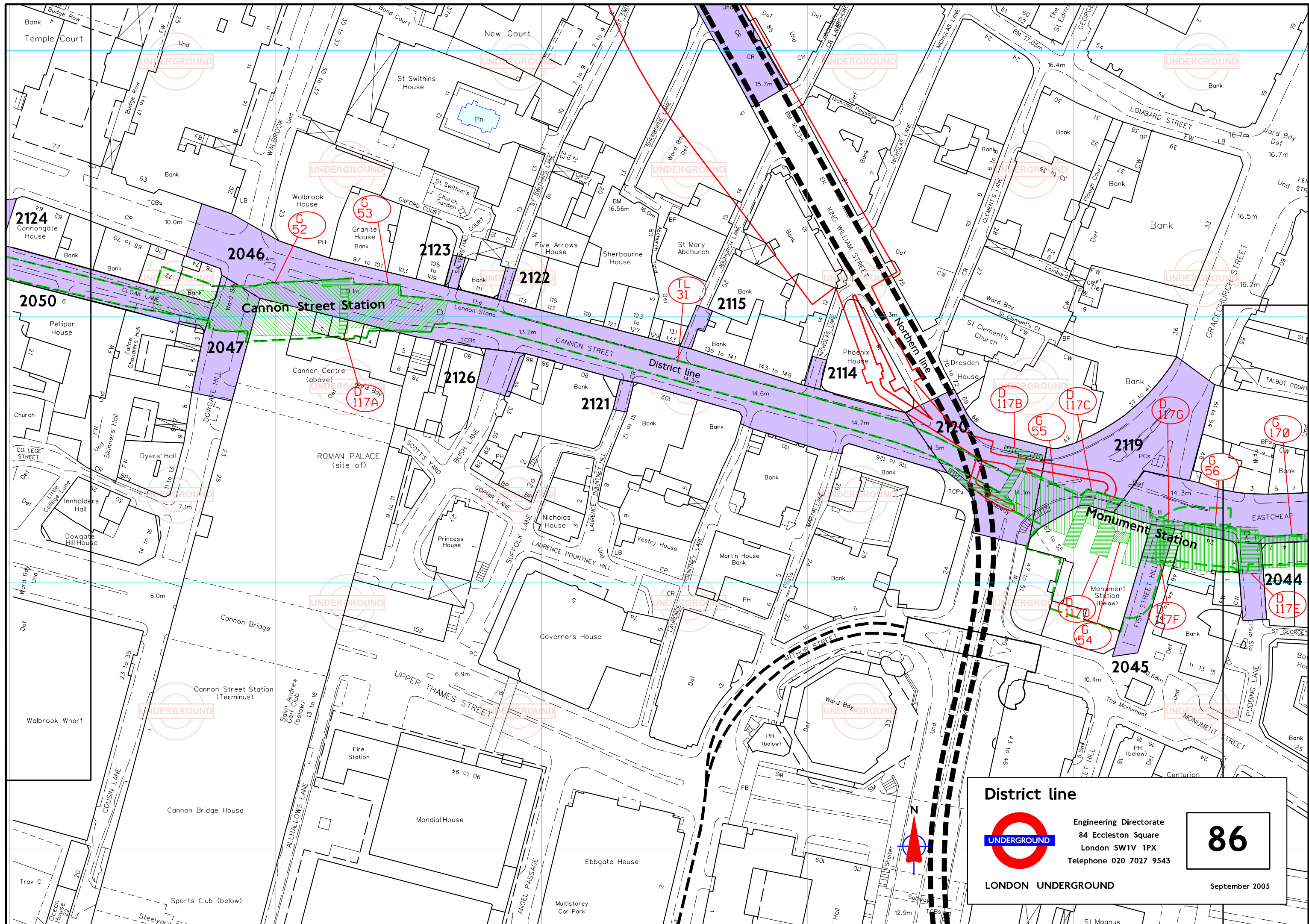


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543


85

LONDON UNDERGROUND

September 2005



District line

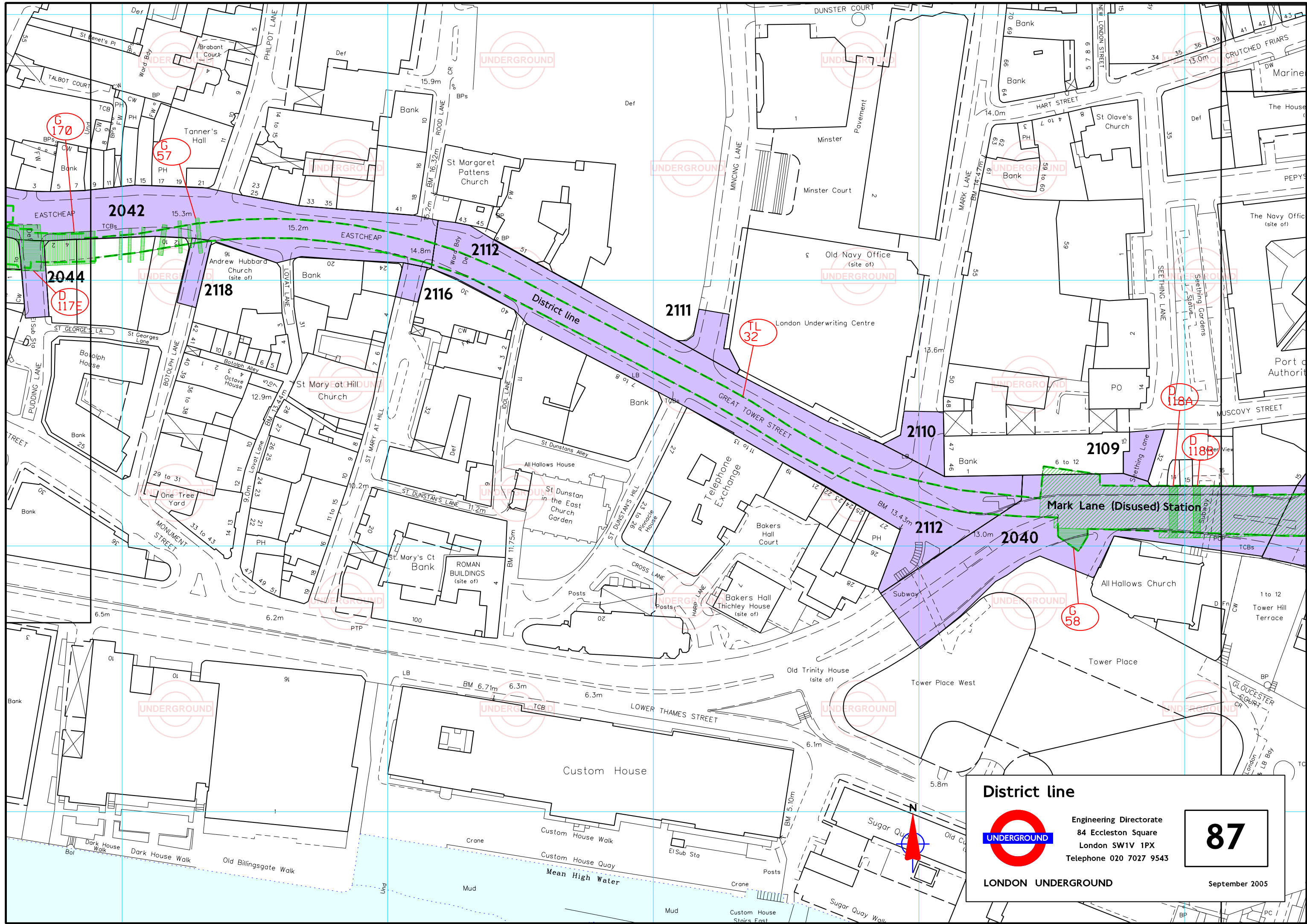


Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543


86

LONDON UNDERGROUND

September 2005



District line



Engineering Directorate
84 Eccleston Square
London SW1V 1PX
Telephone 020 7027 9543

87

LONDON UNDERGROUND

September 2005

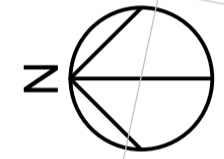
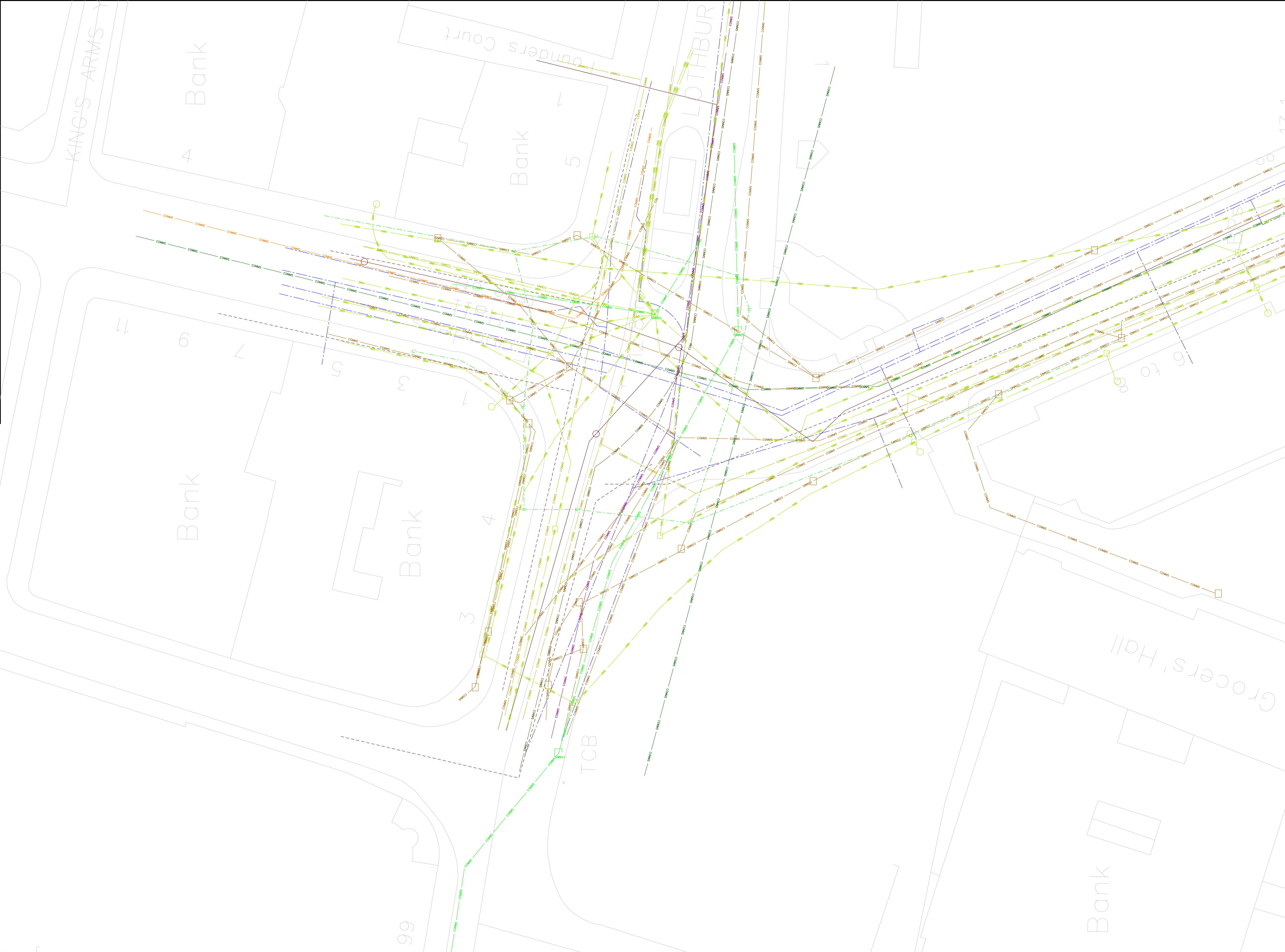
Appendix D. Services/Utilities Location Plans

Notes:

1. The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
2. The line and locations of all services shown on this drawing have been taken from existing asset records.
3. Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

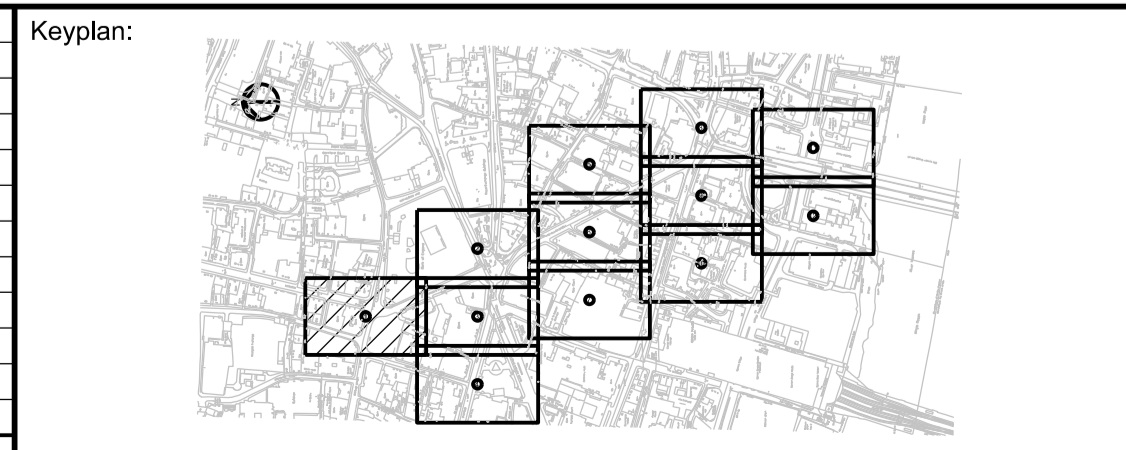
Legend:

	THUS Limited
	51 Degrees and Interoute
	Global Crossing
	FiberNet Network Solutions
	euNetworks Group Limited
	EasyNet Global Services
	Virgin Media
	British Telecommunications plc
	Cable & Wireless Worldwide plc
	Transport for London
	Abovenet
	Verizon
	Level (3) Communications
	Colt Technology Services Group Limited
	National Grid
	Thames Water Utilities Limited (Water Supply)
	Thames Water Utilities Limited (Sewer)
	EDF Energy



This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd. License number 10003871/0463045

Ver.	Date	Description	By	Chkd	App
P01	19/07/11	Preliminary Issue	ARC	DAA	MS



Client Authorisation Status: Client Authorisation Status

RIBA Stage: RIBA Stage D

Model File Versions:

Mott MacDonald House,
8-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



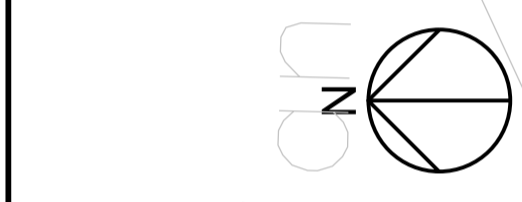
Contract: Bank Station Capacity Upgrade	
Originator: Mott MacDonald	
Location: Bank Station N133	
Title: Existing Combined Utilities Sheet 1 of 12	By: ARC
	Chk: DAA
LUSTN No: LUSTN-0008798-DWG-001111	App: MS
Scale: 1:200@ A1	Ver: S0
Drawing and CAD file No: N133-BCR-MMD-00-Z-DR-U-0001	

Notes:

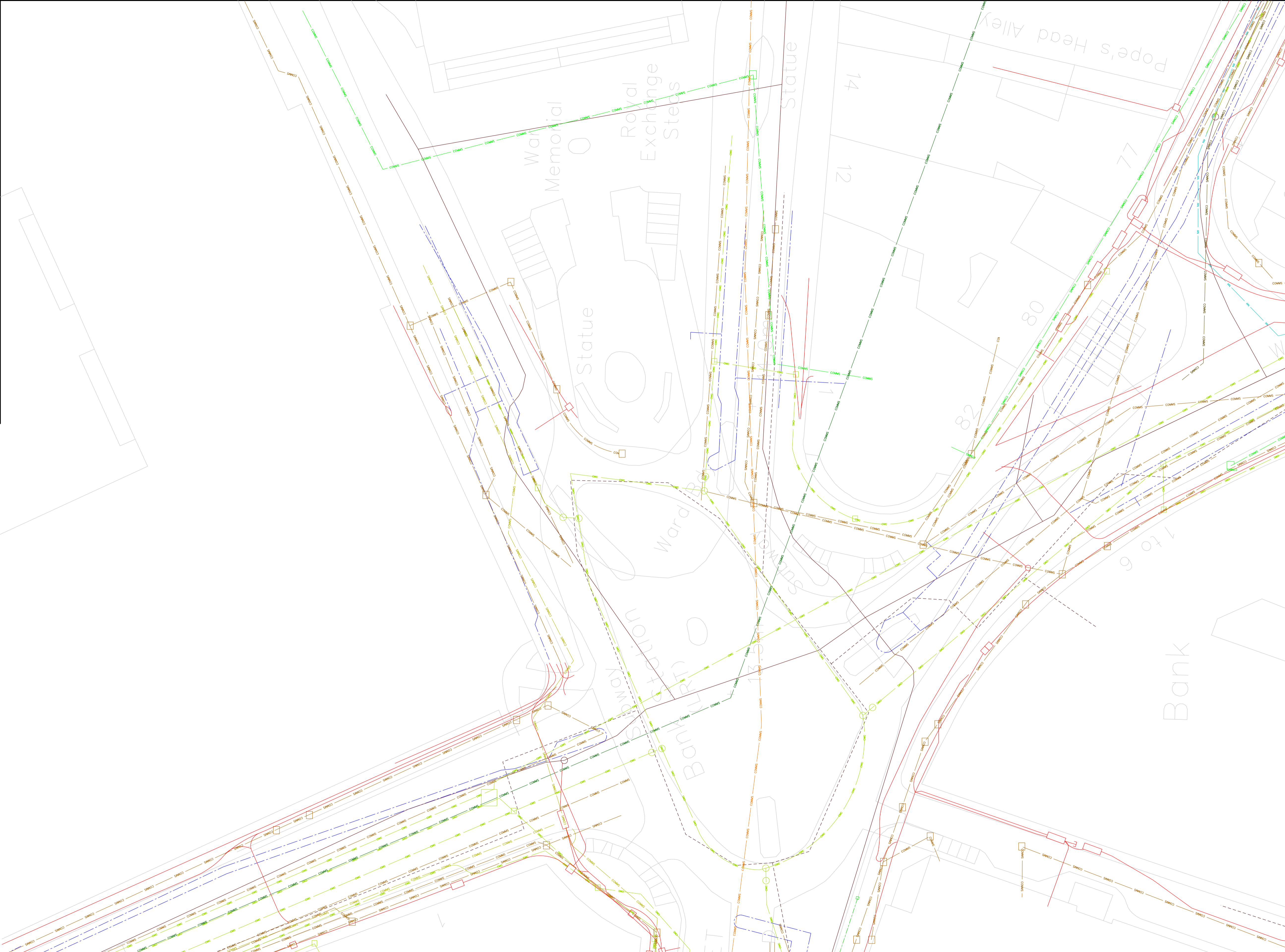
1. The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
2. The line and locations of all services shown on this drawing have been taken from existing asset records.
3. Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

Legend:

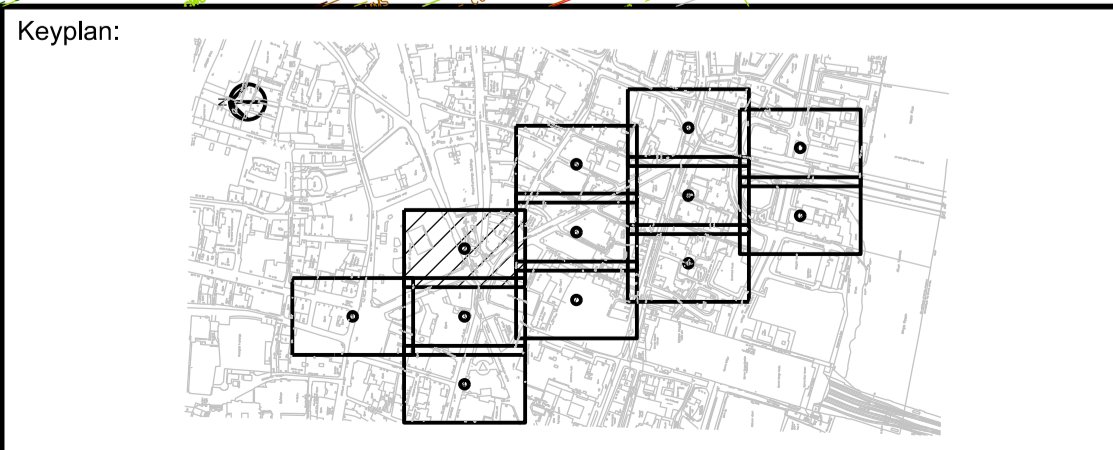
	THUS Limited
	51 Degrees and Interoute
	Global Crossing
	FiberNet Network Solutions
	euNetworks Group Limited
	EasyNet Global Services
	Virgin Media
	British Telecommunications plc
	Cable & Wireless Worldwide plc
	Transport for London
	Abovenet
	Verizon
	Level (3) Communications
	Colt Technology Services Group Limited
	National Grid
	Thames Water Utilities Limited (Water Supply)
	Thames Water Utilities Limited (Sewer)
	EDF Energy



This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd, Licence number 10003871/0463895



Ver.	Date	Description	By	Chkd	App
P01	19/07/11	Preliminary Issue	ARC	DAA	MS



Client Authorisation Status

RIBA Stage: _____

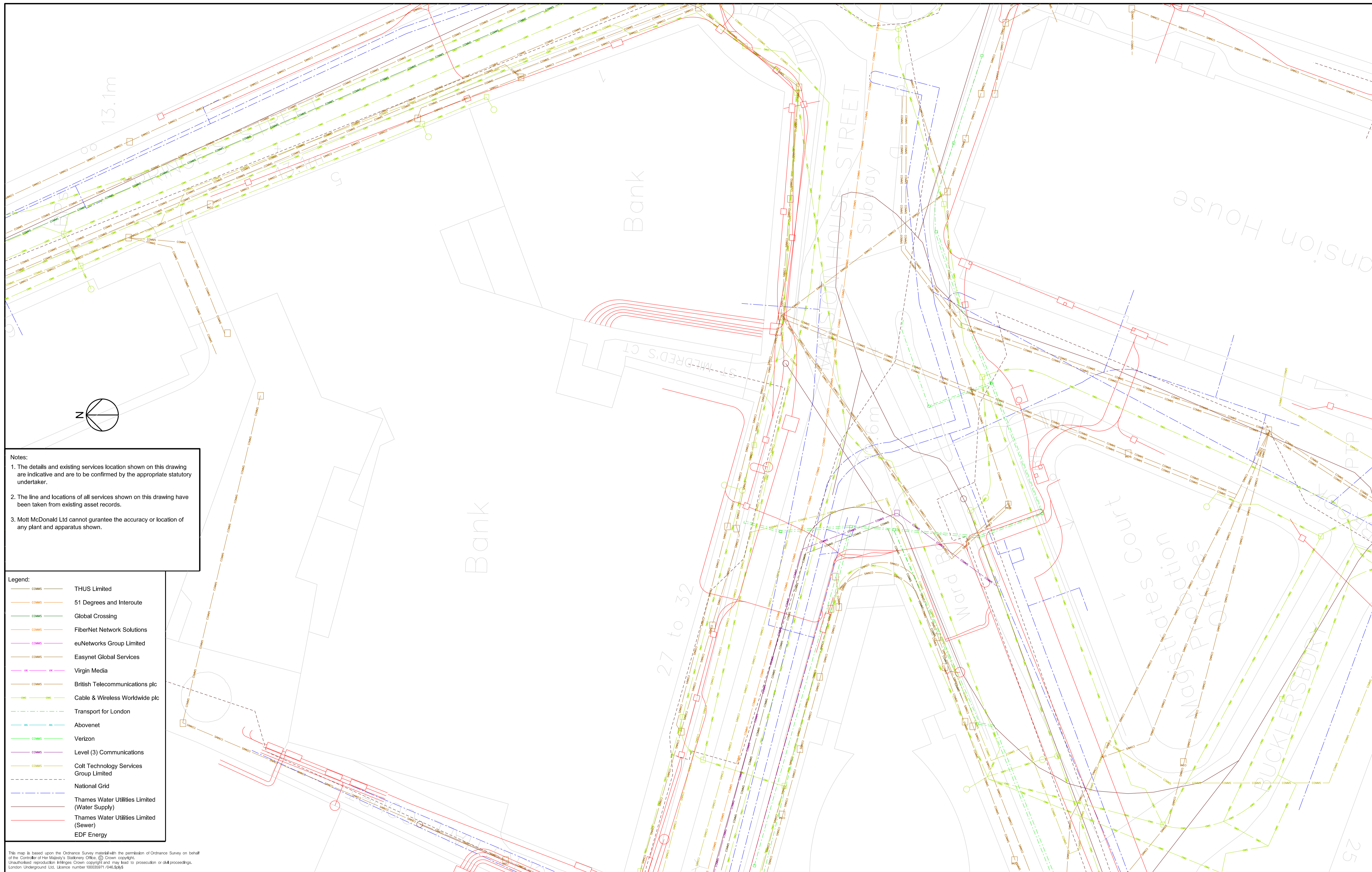
Model File Versions: _____

Mott MacDonald House,
5-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England

London Underground



Contract: Bank Station Capacity Upgrade	
Originator: Mott MacDonald	
Location: Bank Station N133	
Title: Existing Combined Utilities Sheet 2 of 12 RIBA Stage D	By: ARC
LUSTN No: LUSTN-0008798-DWG-001112	Chk: DAA
Scale: 1:200@ A1	App: MS
Drawing and CAD file No: N133-BCR-MMD-00-Z-DR-U-0002	Suitability: S0



Notes:

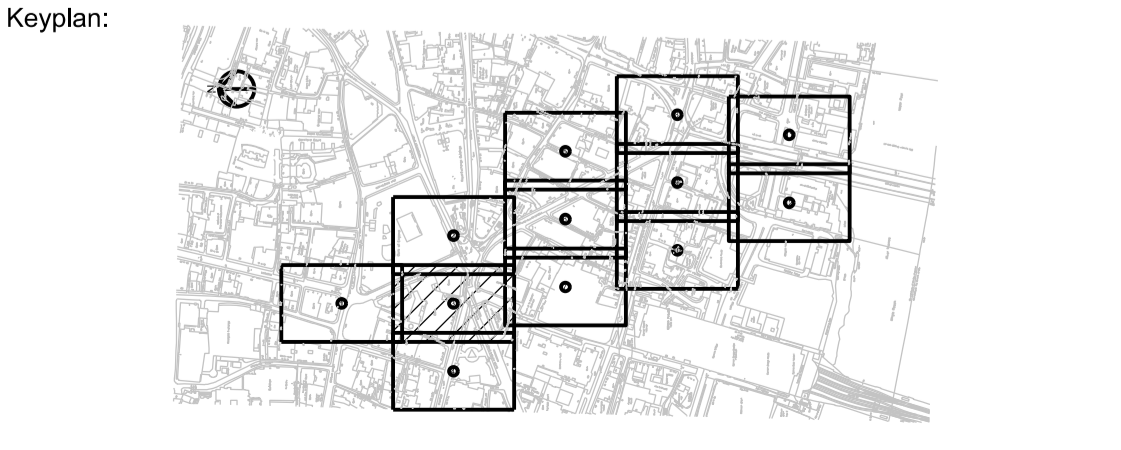
1. The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
2. The line and locations of all services shown on this drawing have been taken from existing asset records.
3. Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

Legend:

	THUS Limited
	51 Degrees and Interoute
	Global Crossing
	FiberNet Network Solutions
	euNetworks Group Limited
	Easynet Global Services
	Virgin Media
	British Telecommunications plc
	Cable & Wireless Worldwide plc
	Transport for London
	Abovenet
	Verizon
	Level (3) Communications
	Colt Technology Services Group Limited
	National Grid
	Thames Water Utilities Limited (Water Supply)
	Thames Water Utilities Limited (Sewer)
	EDF Energy

This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd, Licence number 100035971/0463045

Ver.	Date	Description	ARC	DAA	MS
P01	19/07/11	Preliminary Issue			
			By	Chkd	App



Client Authorisation Status: Client Authorisation Status

RIBA Stage: RIBA Stage D

Model File Versions:

Mott MacDonald House, 5-10 Sydenham Road, Croydon, Surrey, CR9 3EE, England



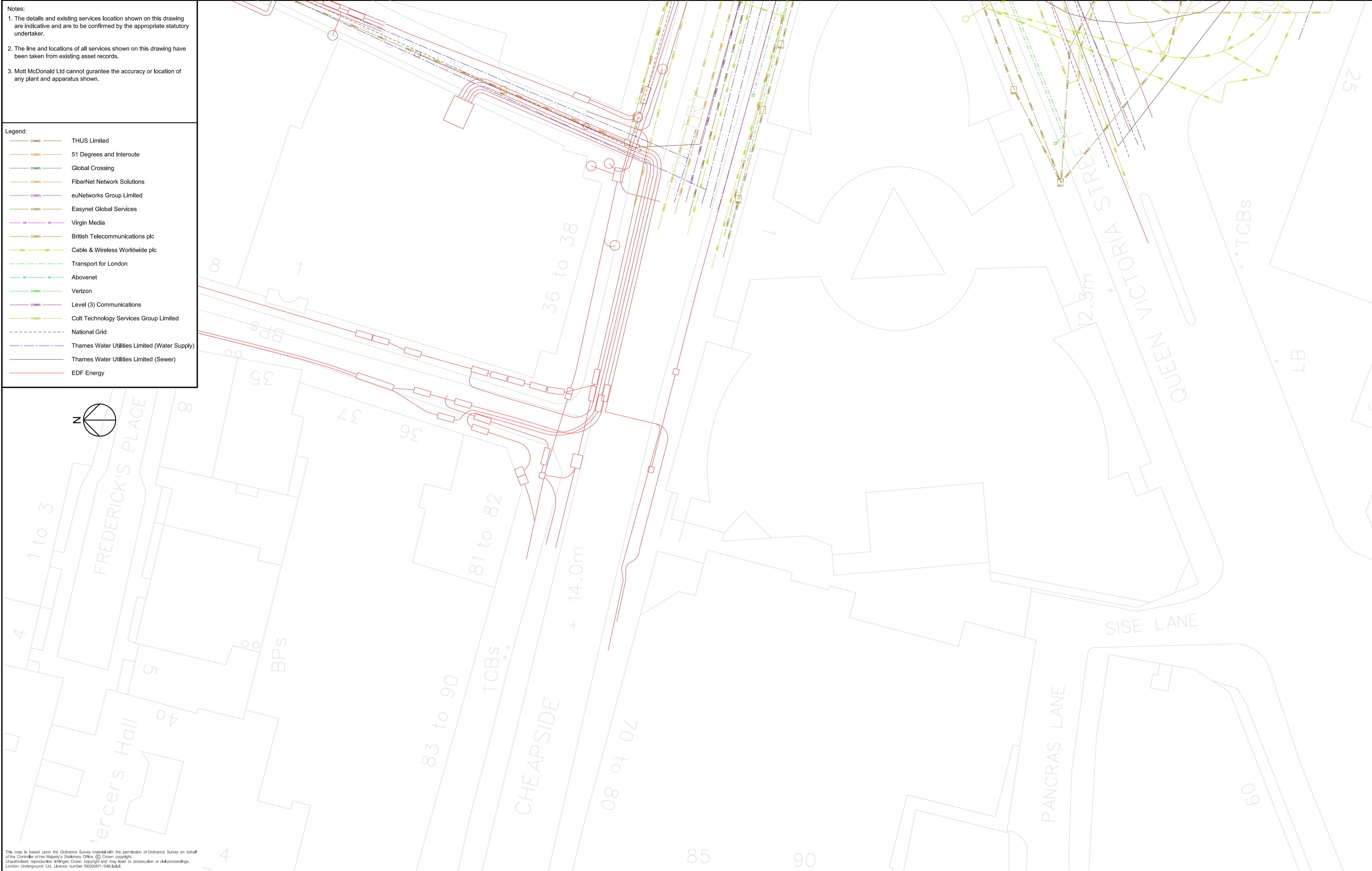
Contract: Bank Station Capacity Upgrade		By: ARC
Originator: Mott MacDonald		Chk: DAA
Location: Bank Station N133		App: MS
Title: Existing Combined Utilities Sheet 3 of 12		Suitability: S0
LUSTN No: LUSTN-0008798-DWG-001113	Drawing and CAD file No: N133-BCR-MMD-00-Z-DR-U-0003	Ver:
Scale: 1:200@ A1		

Notes:

- The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
- The line and locations of all services shown on this drawing have been taken from existing asset records.
- Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

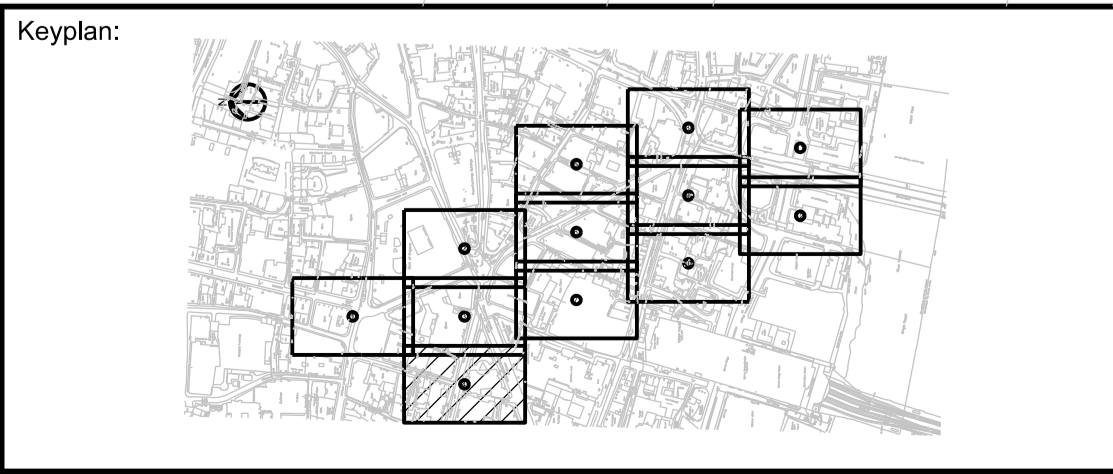
Legend:

	THUS Limited
	51 Degrees and Interoute
	Global Crossing
	FiberNet Network Solutions
	euNetworks Group Limited
	Easynet Global Services
	Virgin Media
	British Telecommunications plc
	Cable & Wireless Worldwide plc
	Transport for London
	Abovenet
	Verizon
	Level (3) Communications
	Colt Technology Services Group Limited
	National Grid
	Thames Water Utilities Limited (Water Supply)
	Thames Water Utilities Limited (Sewer)
	EDF Energy



This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd, Licence number 10003871/0463495

Ver.	Date	Description	By	Chkd	App
P01	19/07/11	Preliminary Issue	ARC	DAA	MS



Client Authorisation Status: **Client Authorisation Status**

RIBA Stage: **RIBA Stage D**

Model File Versions:

Mott MacDonald House,
5-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



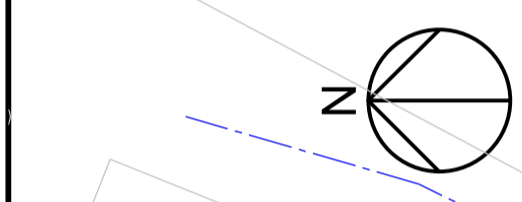
Contract:	Bank Station Capacity Upgrade
Originator:	Mott MacDonald
Location:	Bank Station N133
Title:	Existing Combined Utilities Sheet 4 of 12
LUSTN No:	LUSTN-0008798-DWG-001114
Scale:	1:200@ A1
Drawing and CAD file No.:	N133-BCR-MMD-00-Z-DR-U-0004
By:	ARC
Chk:	DAA
App:	MS
Ver:	S0
Suitability:	S0

Notes:

1. The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
2. The line and locations of all services shown on this drawing have been taken from existing asset records.
3. Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

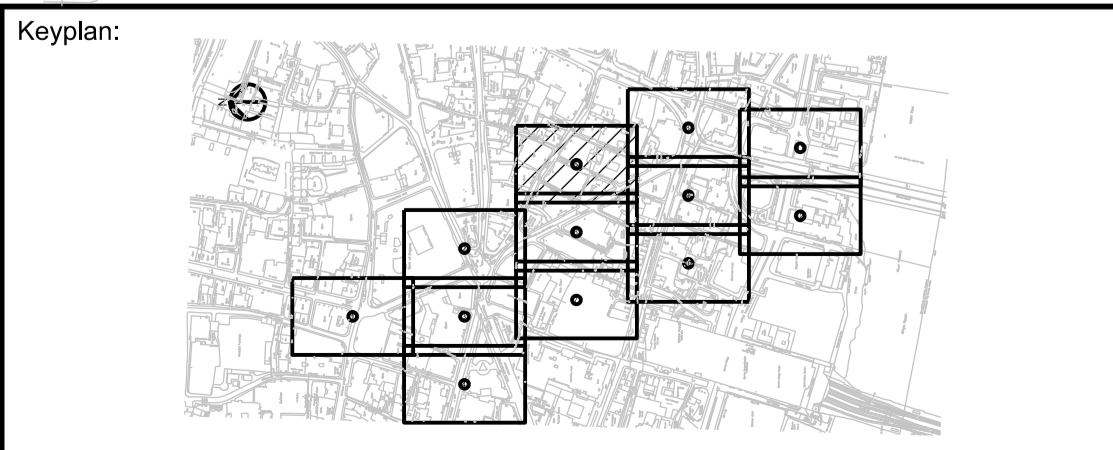
Legend:

	THUS Limited
	51 Degrees and Interute
	Global Crossing
	FiberNet Network Solutions
	euNetworks Group Limited
	Easynet Global Services
	Virgin Media
	British Telecommunications plc
	Cable & Wireless Worldwide plc
	Transport for London
	Abovenet
	Verizon
	Level (3) Communications
	Colt Technology Services Group Limited
	National Grid
	Thames Water Utilities Limited (Water Supply)
	Thames Water Utilities Limited (Sewer)
	EDF Energy



This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd, Licence number 10003871/0463895

Ver.	Date	Description	By	Chkd	App
P01	19/07/11	Preliminary Issue	ARC	DAA	MS



Client Authorisation Status: **Client Authorisation Status**

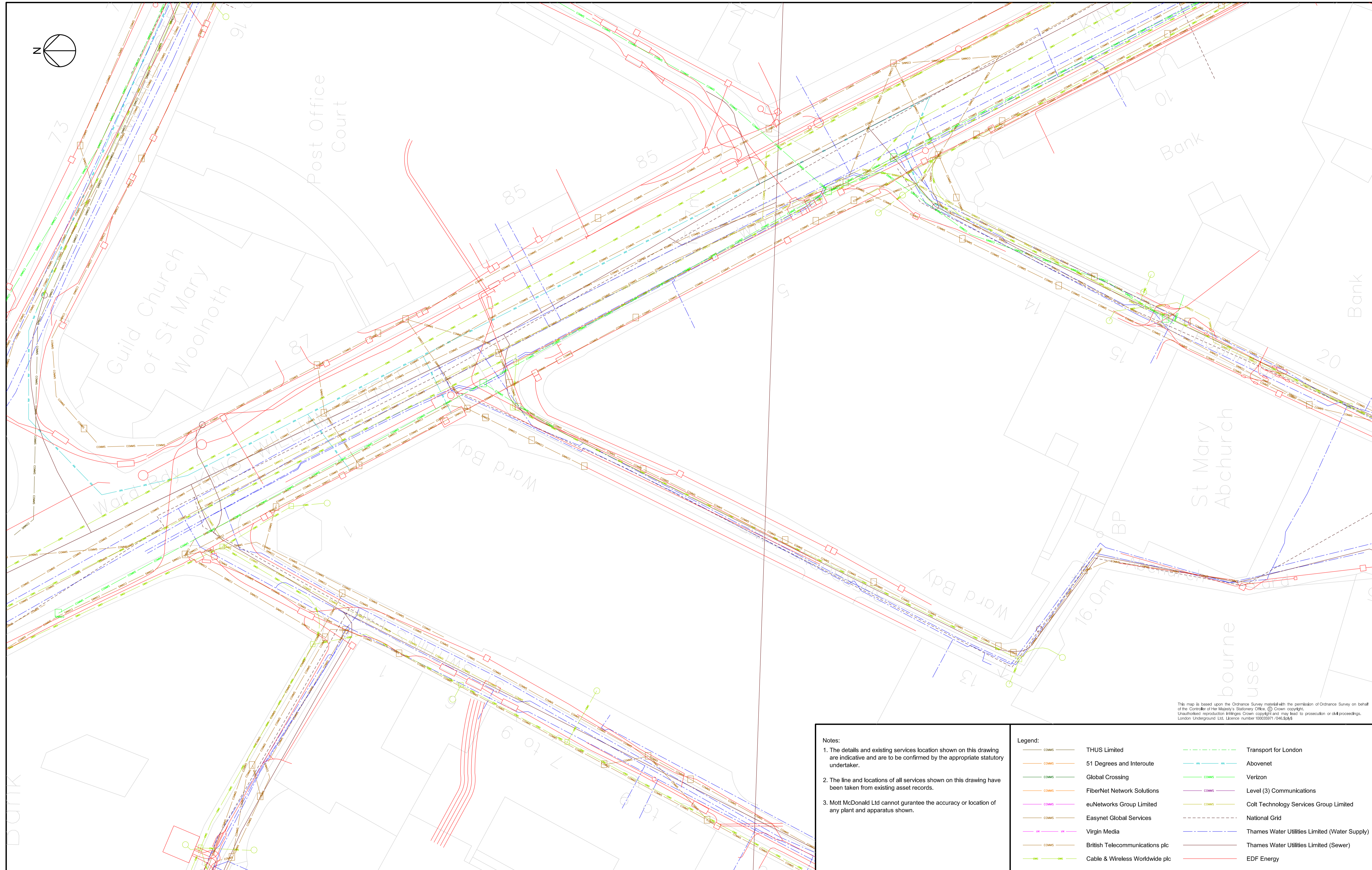
RIBA Stage: **RIBA Stage D**

Model File Versions:

Mott MacDonald House,
8-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



Contract: Bank Station Capacity Upgrade	
Originator: Mott MacDonald	
Location: Bank Station N133	
Title: Existing Combined Utilities	By: ARC
Sheet 5 of 12	Chk: DAA
LUSTN No: LUSTN-0008798-DWG-001115	App: MS
Scale: 1:200@ A1	Ver: S0
Drawing and CAD file No: N133-BCR-MMD-00-Z-DR-U-0005	



This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd. Licence number 10002971/0465448

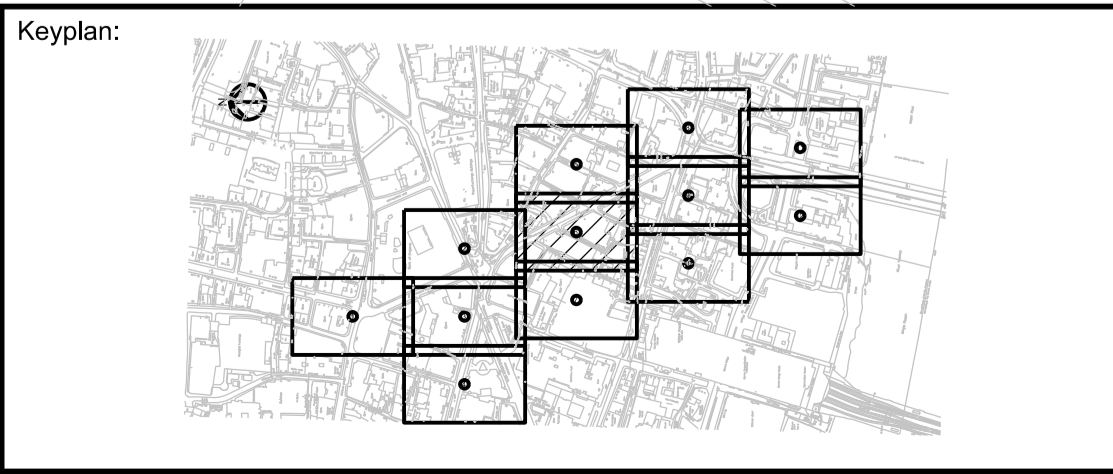
Notes:

- The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
- The line and locations of all services shown on this drawing have been taken from existing asset records.
- Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

Legend:

	THIS Limited		Transport for London
	51 Degrees and Interoute		Abovenet
	Global Crossing		Verizon
	FiberNet Network Solutions		Level (3) Communications
	euNetworks Group Limited		Colt Technology Services Group Limited
	Easynet Global Services		National Grid
	Virgin Media		Thames Water Utilities Limited (Water Supply)
	British Telecommunications plc		Thames Water Utilities Limited (Sewer)
	Cable & Wireless Worldwide plc		EDF Energy

Ver.	Date	Description	By	Chkd	App
P01	19/07/11	Preliminary Issue	ARC	DAA	MS

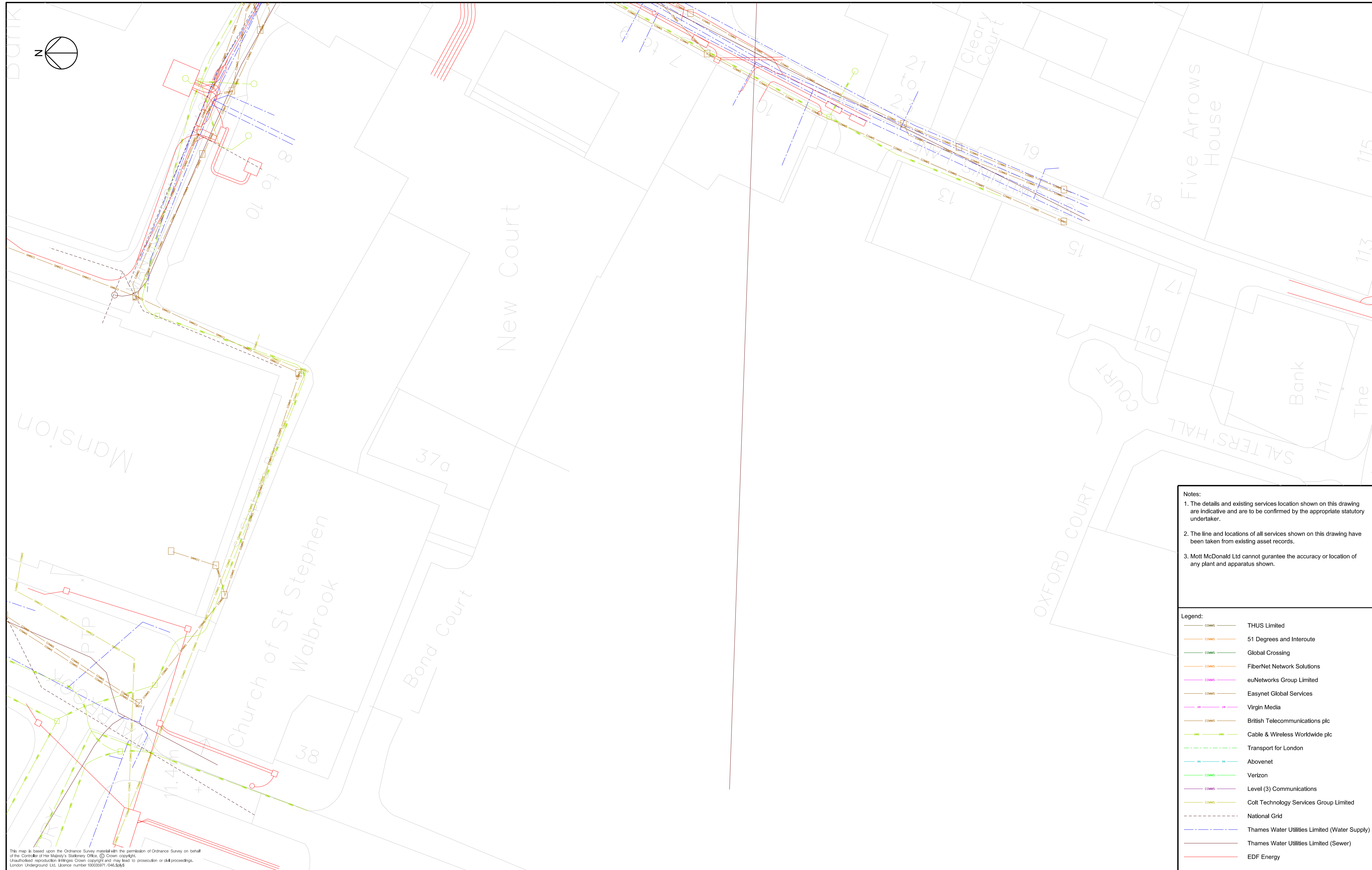


Client Authorisation Status: Client Authorisation Status
 RIBA Stage: RIBA Stage D
 Model File Versions:

Mott MacDonald House,
8-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



Contract: Bank Station Capacity Upgrade	
Originator: Mott MacDonald	
Location: Bank Station N133	
Title: Existing Combined Utilities Sheet 6 of 12	By: ARC Chk: DAA
LUSTN No: LUSTN-0008798-DWG-001116	App: MS
Scale: 1:200@ A1	Ver: S0
Drawing and CAD file No: N133-BCR-MMD-00-Z-DR-U-0006	



Notes:

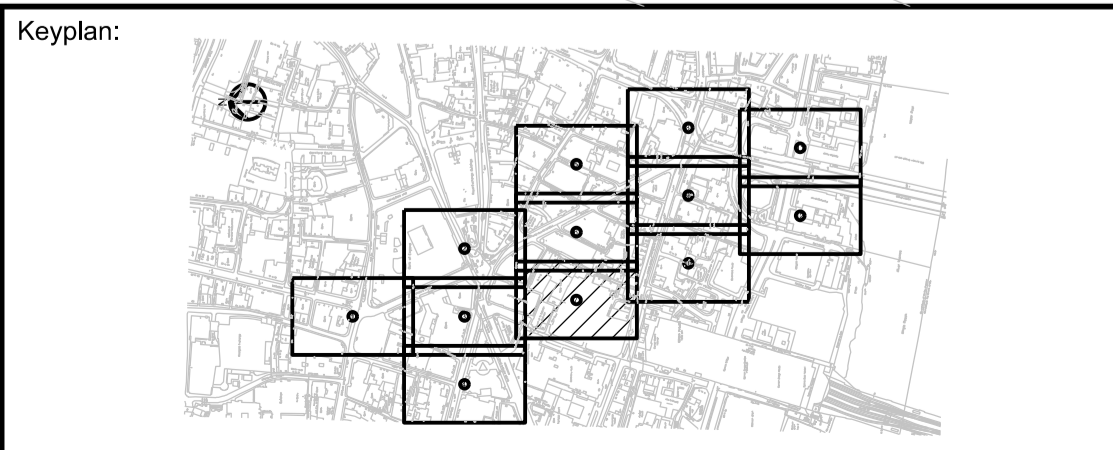
1. The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
2. The line and locations of all services shown on this drawing have been taken from existing asset records.
3. Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

Legend:

	COAGS	THUS Limited
	COAGS	51 Degrees and Interoute
	COAGS	Global Crossing
	COAGS	FiberNet Network Solutions
	COAGS	euNetworks Group Limited
	COAGS	Easynet Global Services
	VM	Virgin Media
	COAGS	British Telecommunications plc
	COAGS	Cable & Wireless Worldwide plc
	COAGS	Transport for London
	COAGS	Abovenet
	COAGS	Verizon
	COAGS	Level (3) Communications
	COAGS	Colt Technology Services Group Limited
		National Grid
		Thames Water Utilities Limited (Water Supply)
		Thames Water Utilities Limited (Sewer)
		EDF Energy

This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd, Licence number 10003871/0463045

Ver.	Date	Description	ARC	DAA	MS
P01	19/07/11	Preliminary Issue			
			By	Chkd	App



Client Authorisation Status: **Client Authorisation Status**

RIBA Stage: **RIBA Stage D**

Model File Versions:

Mott MacDonald House,
8-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



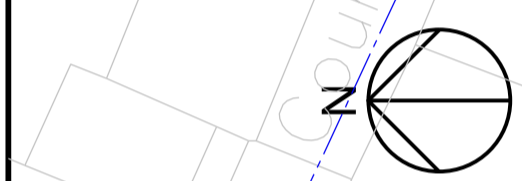
Contract: Bank Station Capacity Upgrade	
Originator: Mott MacDonald	
Location: Bank Station N133	
Title: Existing Combined Utilities Sheet 7 of 12	By: ARC
	Chk: DAA
LUSTN No: LUSTN-0008798-DWG-001117	App: MS
Scale: 1:200@ A1	Drawing and CAD file No.: N133-BCR-MMD-00-Z-DR-U-0007
	Ver: S0

Notes:

1. The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
2. The line and locations of all services shown on this drawing have been taken from existing asset records.
3. Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

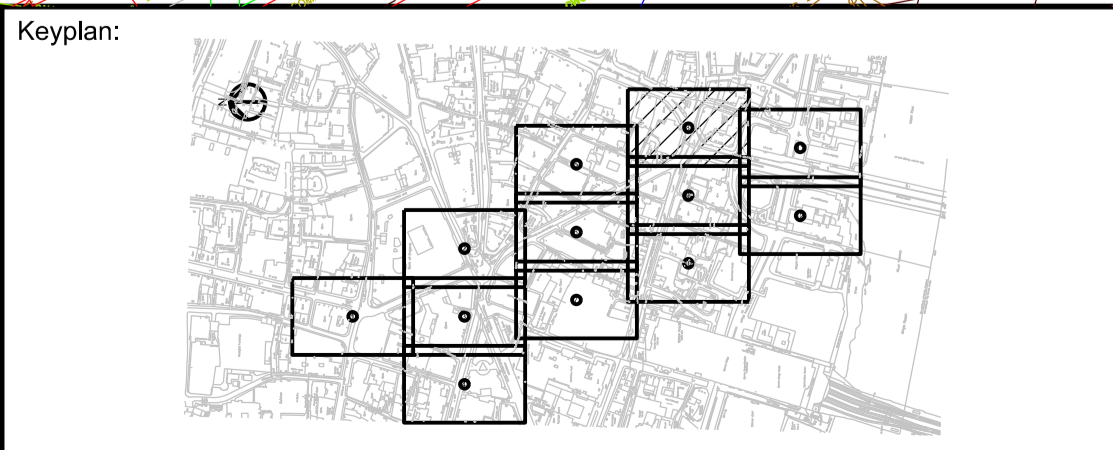
Legend:

	THUS Limited
	51 Degrees and Interute
	Global Crossing
	FiberNet Network Solutions
	euNetworks Group Limited
	EasyNet Global Services
	Virgin Media
	British Telecommunications plc
	Cable & Wireless Worldwide plc
	Transport for London
	Abovenet
	Verizon
	Level (3) Communications
	Colt Technology Services Group Limited
	National Grid
	Thames Water Utilities Limited (Water Supply)
	Thames Water Utilities Limited (Sewer)
	EDF Energy



This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd, Licence number 10003871 (04/03/05)

Ver.	Date	Description	ARC	DAA	MS
P01	19/07/11	Preliminary Issue			
			By	Chkd	App



Client Authorisation Status: **Client Authorisation Status**

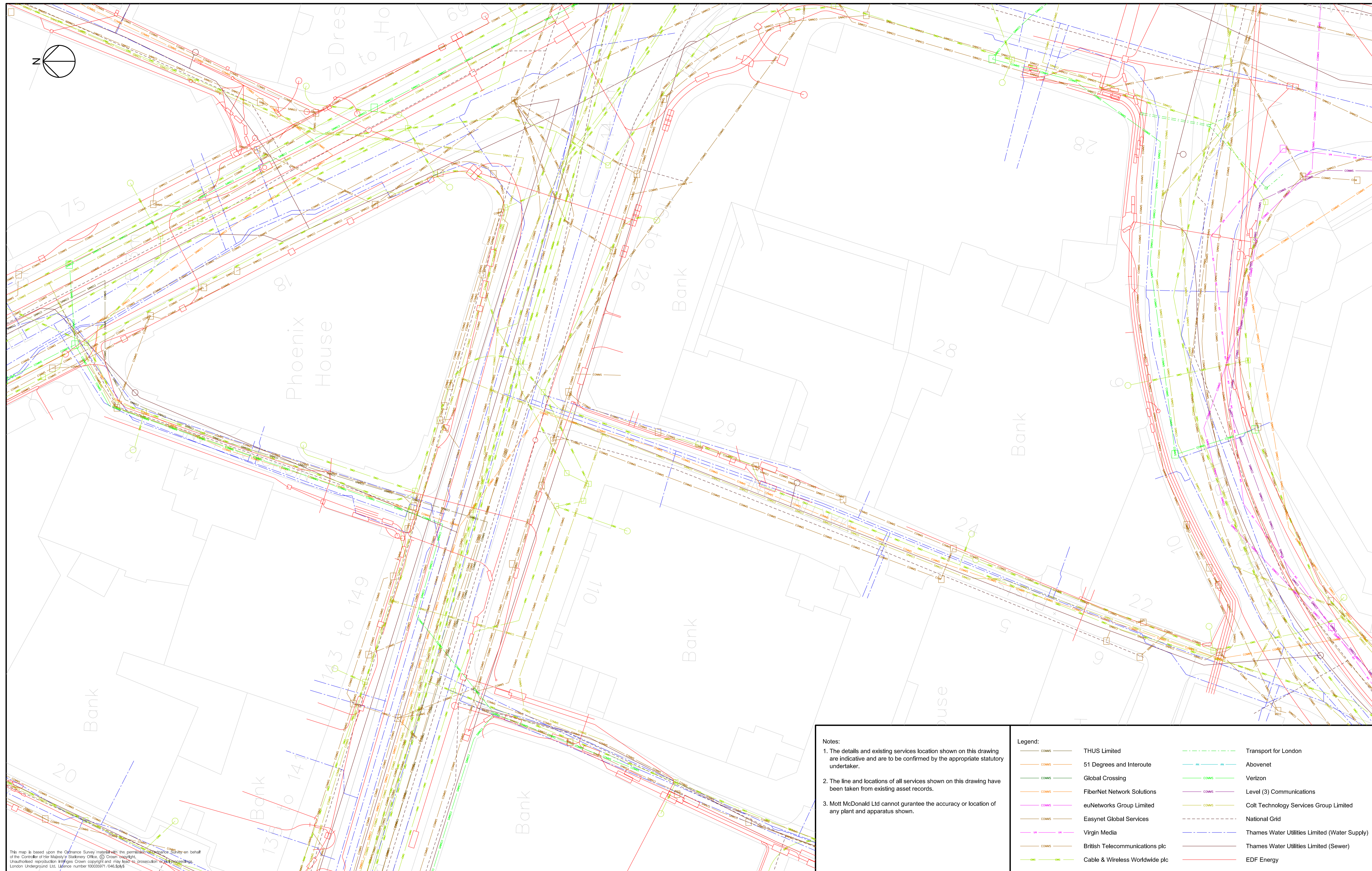
RIBA Stage: **RIBA Stage D**

Model File Versions:

Mott MacDonald House,
5-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



Contract: Bank Station Capacity Upgrade	
Originator: Mott MacDonald	By: ARC
Location: Bank Station N133	Chk: DAA
Title: Existing Combined Utilities Sheet 8 of 12	App: MS
LUSTN No: LUSTN-0008798-DWG-001118	Ver: S0
Scale: 1:200@ A1	Drawing and CAD file No.: N133-BCR-MMD-00-Z-DR-U-0008



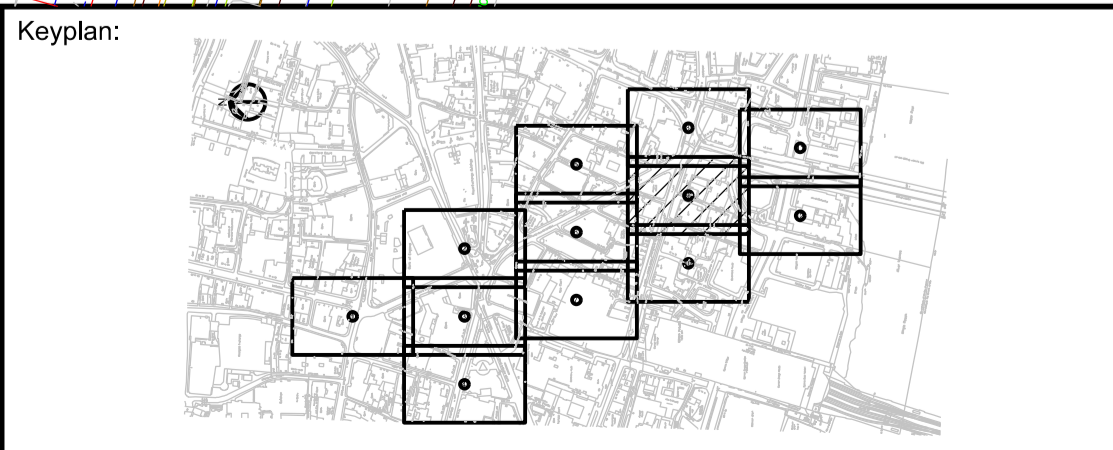
This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or proceedings. London Underground Ltd. Licence number 10003871 (04/03/05)

- Notes:**
- The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
 - The line and locations of all services shown on this drawing have been taken from existing asset records.
 - Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

Legend:

— COMMS —	THUS Limited	—	Transport for London
— COMMS —	51 Degrees and Interoute	—	Abovenet
— COMMS —	Global Crossing	—	Verizon
— COMMS —	FiberNet Network Solutions	—	Level (3) Communications
— COMMS —	euNetworks Group Limited	—	Colt Technology Services Group Limited
— COMMS —	Easynet Global Services	—	National Grid
—	Virgin Media	—	Thames Water Utilities Limited (Water Supply)
— COMMS —	British Telecommunications plc	—	Thames Water Utilities Limited (Sewer)
—	Cable & Wireless Worldwide plc	—	EDF Energy

Ver.	Date	Description	ARC	DAA	MS
P01	19/07/11	Preliminary Issue			
			By	Chkd	App

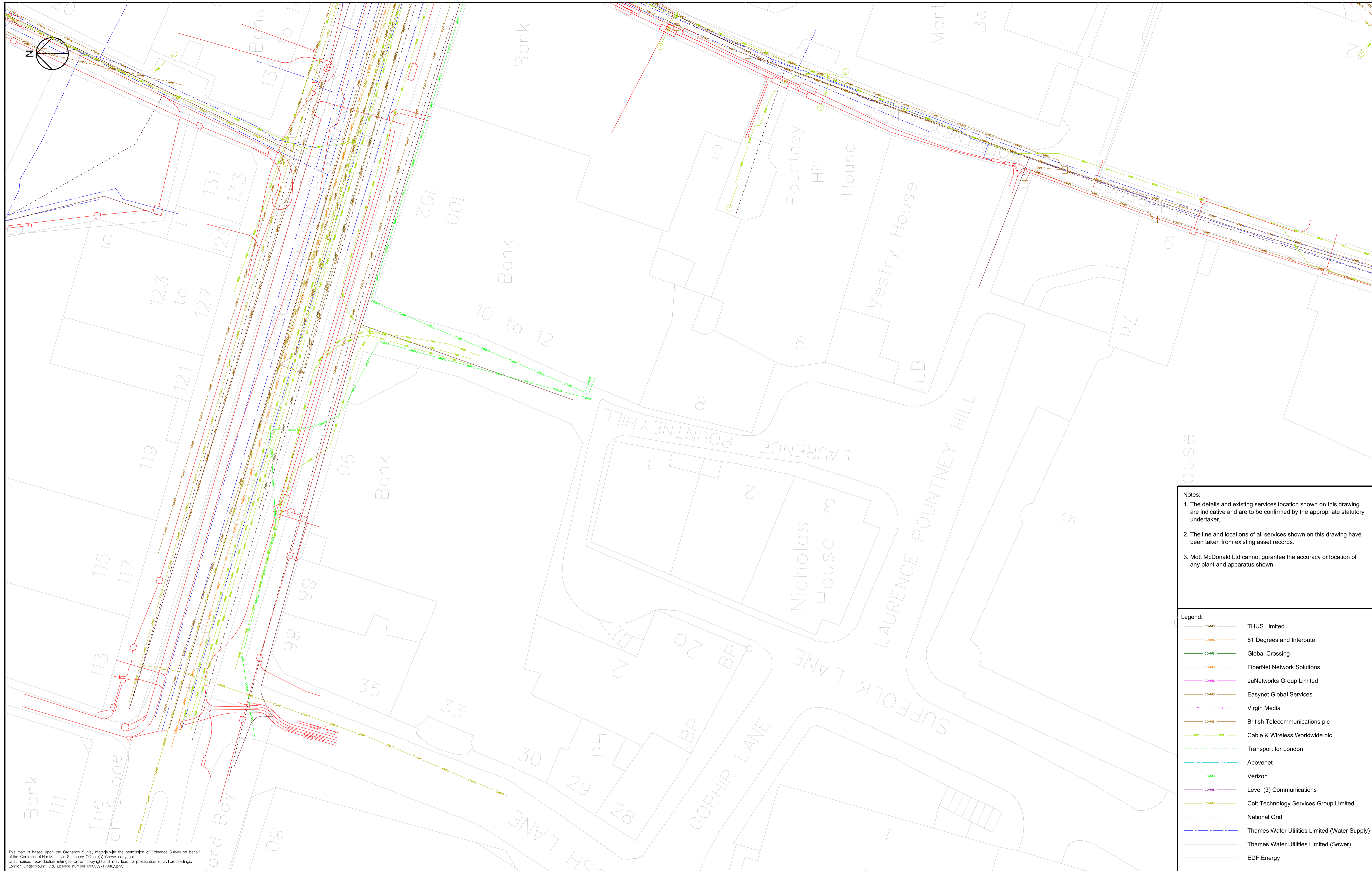


Client Authorisation Status: Client Authorisation Status
 RIBA Stage: RIBA Stage D
 Model File Versions:

Mott MacDonald House,
5-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



Contract: Bank Station Capacity Upgrade	
Originator: Mott MacDonald	
Location: Bank Station N133	
Title: Existing Combined Utilities Sheet 9 of 12	By: ARC Chk: DAA
LUSTN No: LUSTN-0008798-DWG-001119	App: MS
Scale: 1:200@ A1	Drawing and CAD file No: N133-BCR-MMD-00-X-DR-U-0009 Ver: Suitability: S0



Notes:

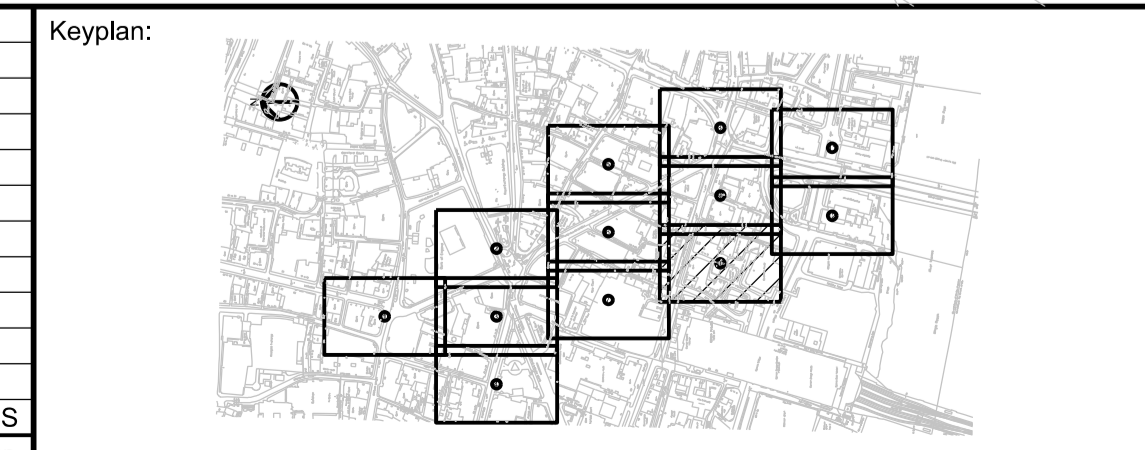
1. The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
2. The line and locations of all services shown on this drawing have been taken from existing asset records.
3. Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

Legend:

	COAGS	THUS Limited
	COAGS	51 Degrees and Interoute
	COAGS	Global Crossing
	COAGS	FiberNet Network Solutions
	COAGS	euNetworks Group Limited
	COAGS	Easynet Global Services
	COAGS	Virgin Media
	COAGS	British Telecommunications plc
	COAGS	Cable & Wireless Worldwide plc
	COAGS	Transport for London
	COAGS	Abovenet
	COAGS	Verizon
	COAGS	Level (3) Communications
	COAGS	Colt Technology Services Group Limited
		National Grid
		Thames Water Utilities Limited (Water Supply)
		Thames Water Utilities Limited (Sewer)
		EDF Energy

This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd, Licence number 10003871 (0463)045

Ver.	Date	Description	By	Chkd	App
P01	19/07/11	Preliminary Issue	ARC	DAA	MS

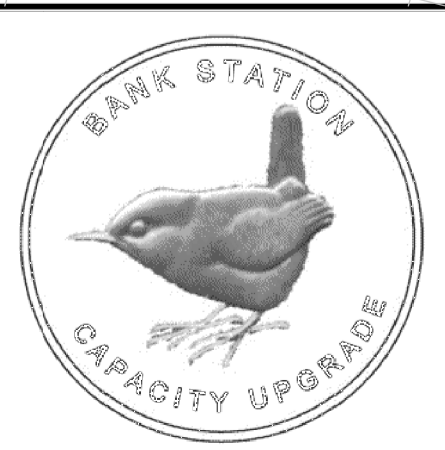


Client Authorisation Status:
Client Authorisation Status

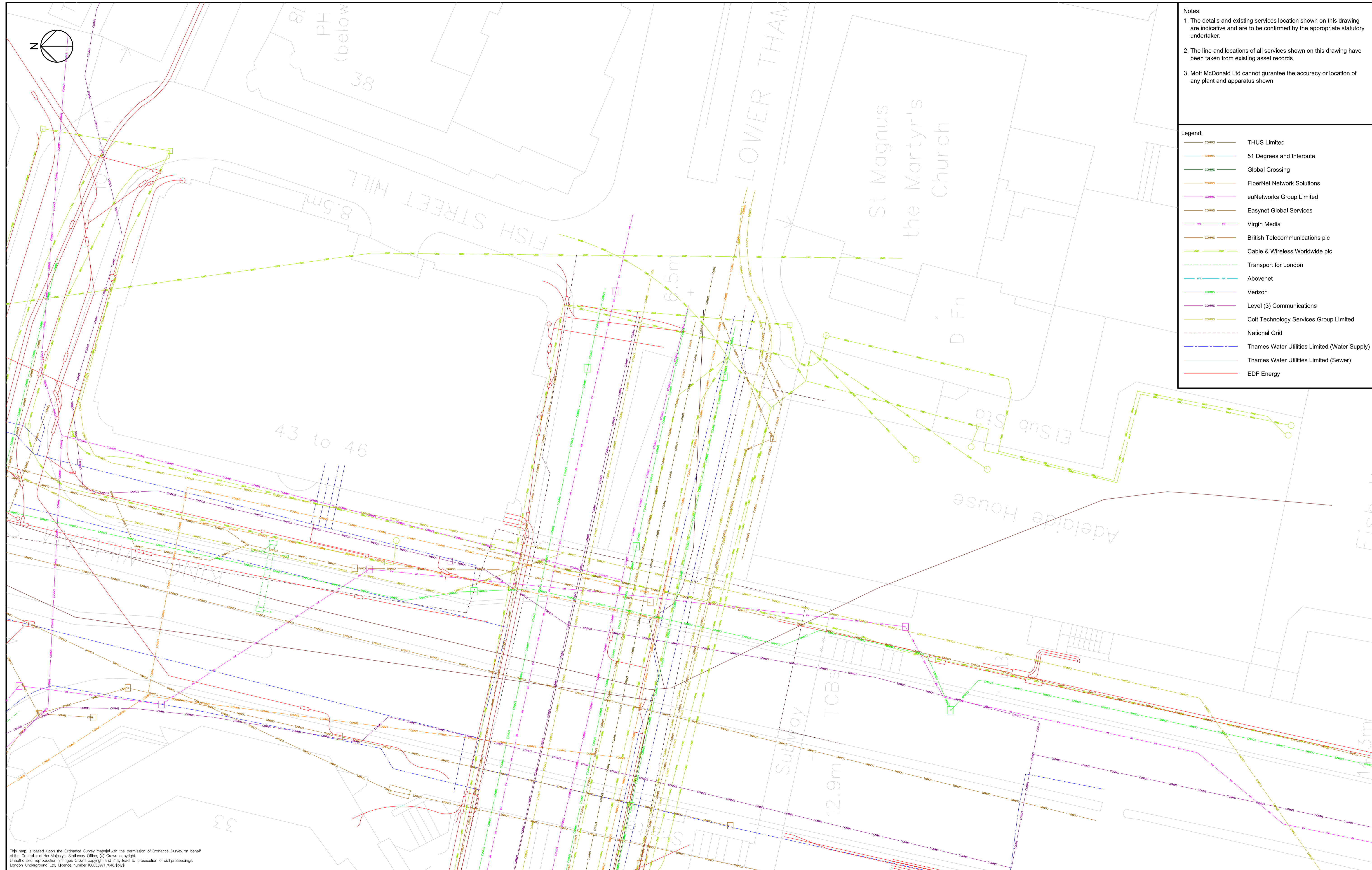
RIBA Stage:
RIBA Stage D

Model File Versions:

Mott MacDonald House,
5-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



Contract: Bank Station Capacity Upgrade	
Originator: Mott MacDonald	
Location: Bank Station N133	
Title: Existing Combined Utilities Sheet 10 of 12	By: ARC
LUSTN No: LUSTN-0008798-DWG-001120	Chk: DAA
Scale: 1:200@ A1	App: MS
Drawing and CAD file No.: N133-BCR-MMD-00-Z-DR-U-0010	Suitability: S0



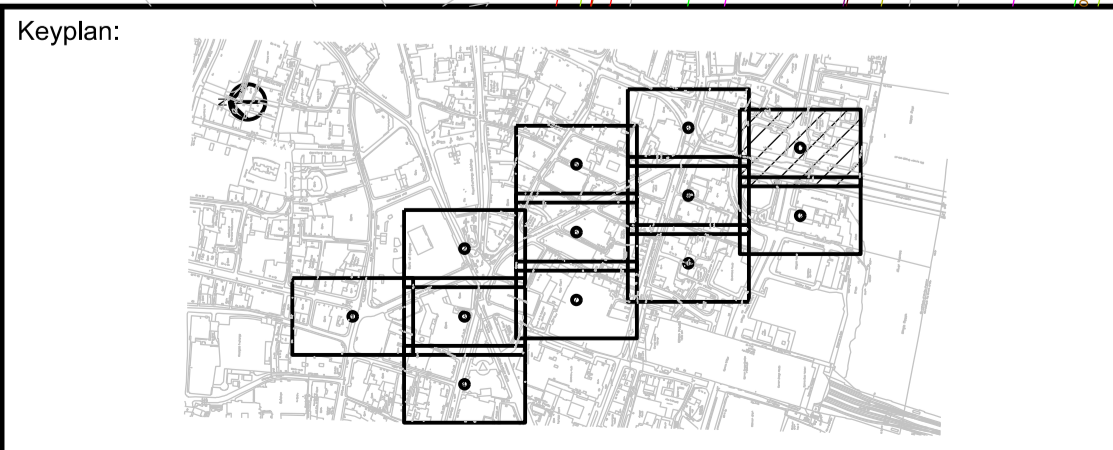
- Notes:
1. The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
 2. The line and locations of all services shown on this drawing have been taken from existing asset records.
 3. Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

Legend:

	THUS Limited
	51 Degrees and Interoute
	Global Crossing
	FiberNet Network Solutions
	euNetworks Group Limited
	Easynet Global Services
	Virgin Media
	British Telecommunications plc
	Cable & Wireless Worldwide plc
	Transport for London
	Abovenet
	Verizon
	Level (3) Communications
	Colt Technology Services Group Limited
	National Grid
	Thames Water Utilities Limited (Water Supply)
	Thames Water Utilities Limited (Sewer)
	EDF Energy

This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd, License number 10003871 (04/03/05)

Ver.	Date	Description	ARC	DAA	MS
P01	19/07/11	Preliminary Issue			
By	Chkd	App			



Client Authorisation Status: Client Authorisation Status

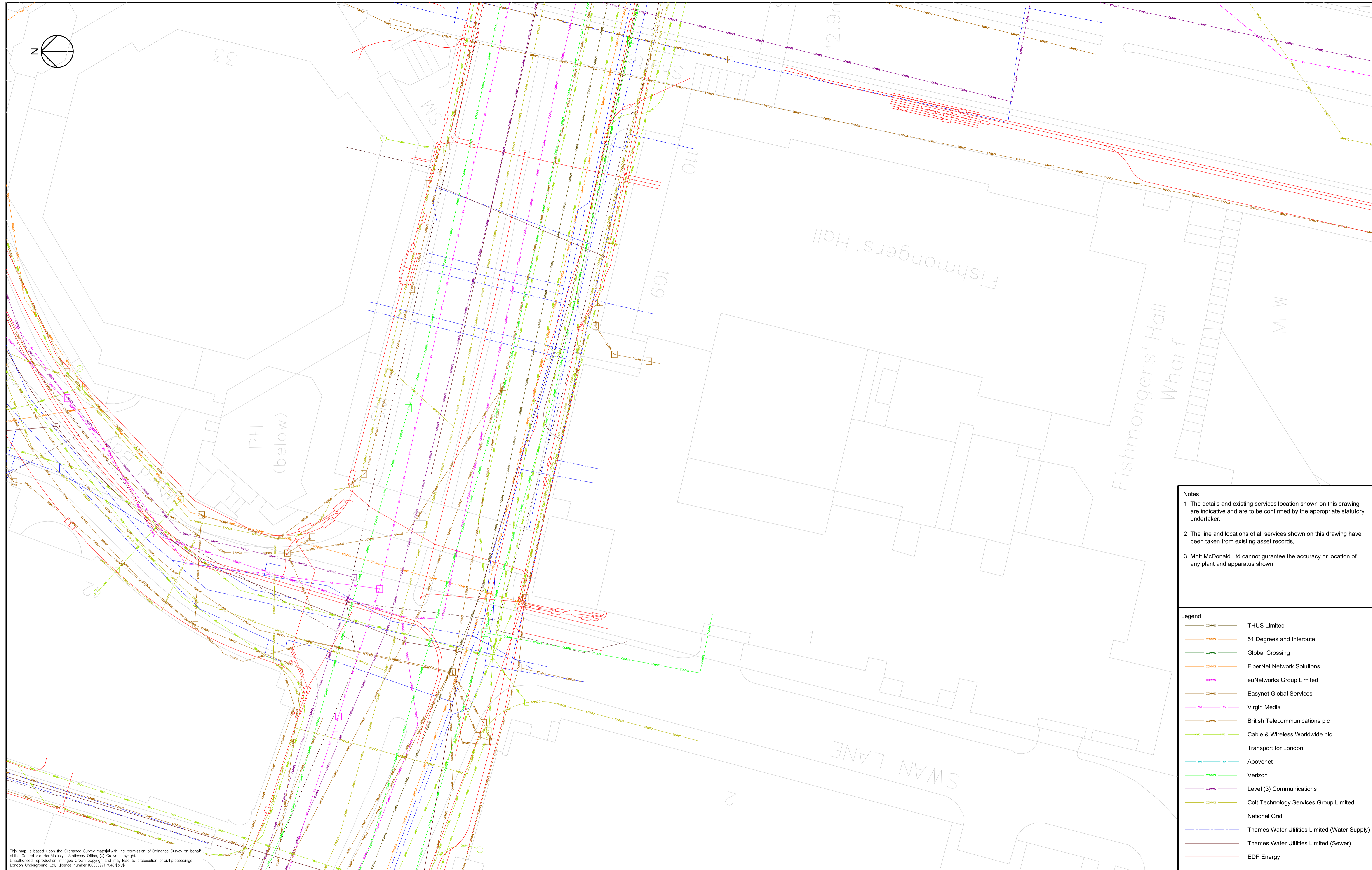
RIBA Stage: RIBA Stage D

Model File Versions:

Mott MacDonald House,
5-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



Contract:	Bank Station Capacity Upgrade
Originator:	Mott MacDonald
Location:	Bank Station N133
Title:	Existing Combined Utilities Sheet 11 of 12
LUSTN No:	LUSTN-0008798-DWG-001121
Scale:	1:200@ A1
Drawing and CAD file No.:	N133-BCR-MMD-00-Z-DR-U-0011
By:	ARC
Chk:	DAA
App:	MS
Ver:	S0



Notes:

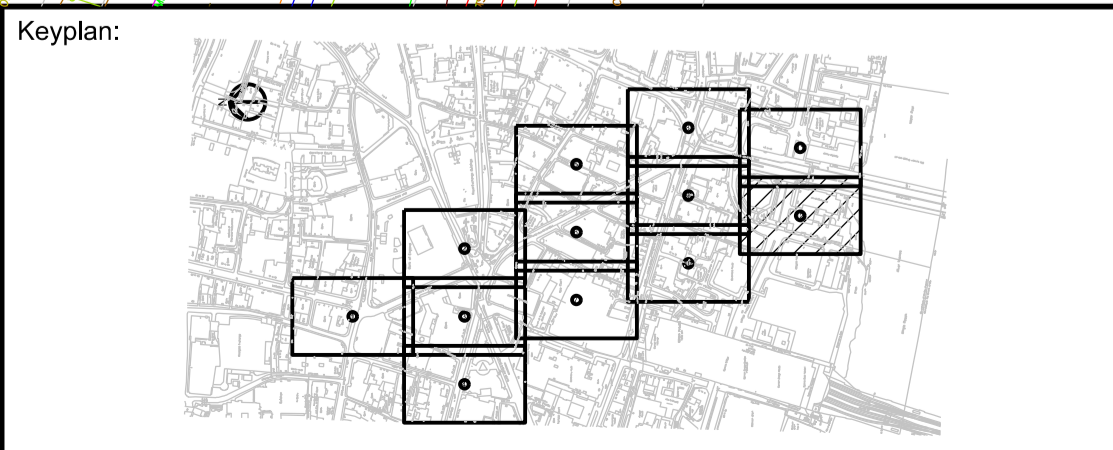
1. The details and existing services location shown on this drawing are indicative and are to be confirmed by the appropriate statutory undertaker.
2. The line and locations of all services shown on this drawing have been taken from existing asset records.
3. Mott MacDonald Ltd cannot guarantee the accuracy or location of any plant and apparatus shown.

Legend:

	THUS Limited
	51 Degrees and Interoute
	Global Crossing
	FiberNet Network Solutions
	euNetworks Group Limited
	Easynet Global Services
	Virgin Media
	British Telecommunications plc
	Cable & Wireless Worldwide plc
	Transport for London
	Abovenet
	Verizon
	Level (3) Communications
	Colt Technology Services Group Limited
	National Grid
	Thames Water Utilities Limited (Water Supply)
	Thames Water Utilities Limited (Sewer)
	EDF Energy

This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. London Underground Ltd, Licence number 10003971 (04/03/05)

Ver.	Date	Description	ARC	DAA	MS
P01	19/07/11	Preliminary Issue			
			By	Chkd	App



Client Authorisation Status: **Client Authorisation Status**

RIBA Stage: **RIBA Stage D**

Model File Versions:

Mott MacDonald House,
5-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



Contract: Bank Station Capacity Upgrade	
Originator: Mott MacDonald	
Location: Bank Station N133	
Title: Existing Combined Utilities	By: ARC
Sheet 12 of 12	Chk: DAA
LUSTN No: LUSTN-0008798-DWG-001122	App: MS
Scale: 1:200@ A1	Suitability: S0
Drawing and CAD file No: N133-BCR-MMD-00-Z-DR-U-0012	Ver:



position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind
thereover is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

meter intervals

GLE hardcopy facility - Normal Map.

The plot is centred on (533080, 180714), which is in TQ3380NW. Printed on 26 September 2008 at 16:15:23 by HWOODWAR.

Comments:
TOWER



position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind
alsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

metre intervals

LDLE hardcopy facility - Normal Map.
The plot is centred on (532580, 181214), which is in TQ3281SE. Printed on 26 September 2008 at 16:17:51 by HWOODWAR.

Comments:
DRAWER



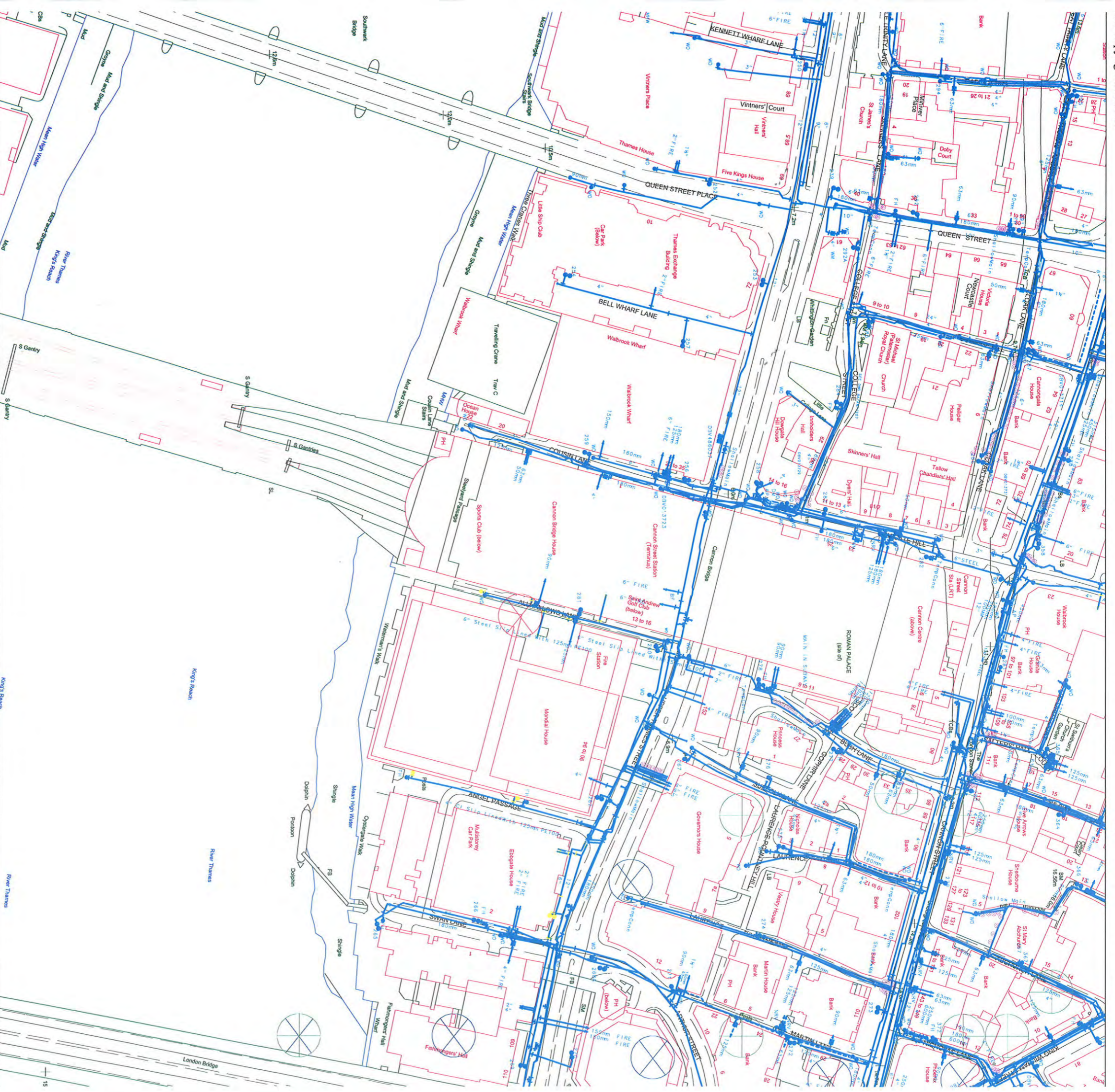
position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind
alsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

metre intervals

OGLE hardcopy facility - Normal Map.

the plot is centred on (5333080, 181214), which is in TQ03381SW. Printed on 26 September 2008 at 16:25:36 by HWOODWAR.

Comments:
MWER

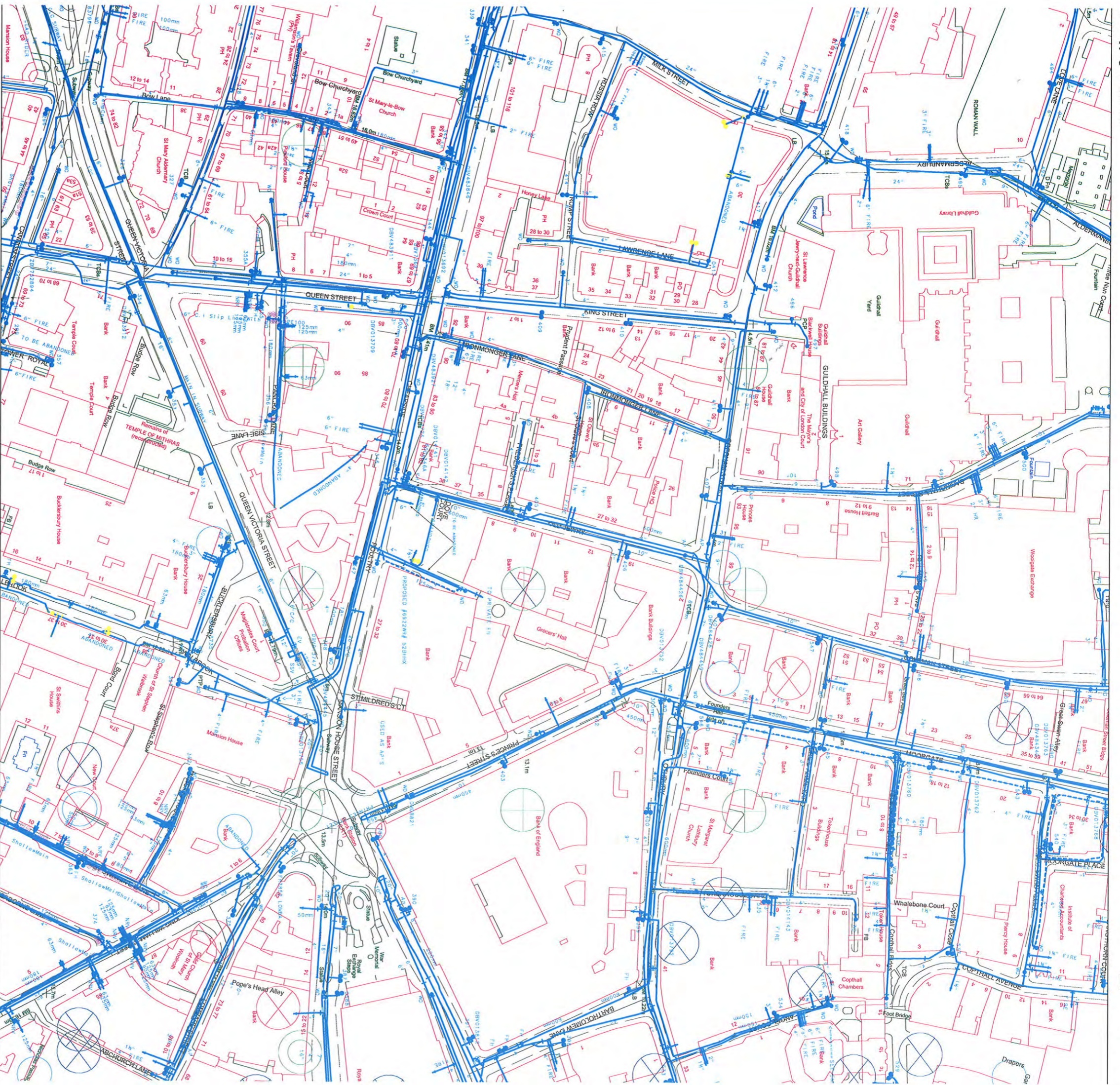


position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind
thereover is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

metre intervals

VGLE hardcopy facility - Normal Map.
The plot is centred on (532580 , 180714), which is in TQ03280NE. Printed on 26 September 2008 at 16:14:23 by HWOODWAR.

Comments:
ALTER



position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

1) metre intervals

IGLE hardcopy facility - Normal Map.
The plot is centred on (532580 , 181214), which is in TQ3281SE. Printed on 26 September 2008 at 16:23:38 by HWOODWAR.

Comments:
ALTER

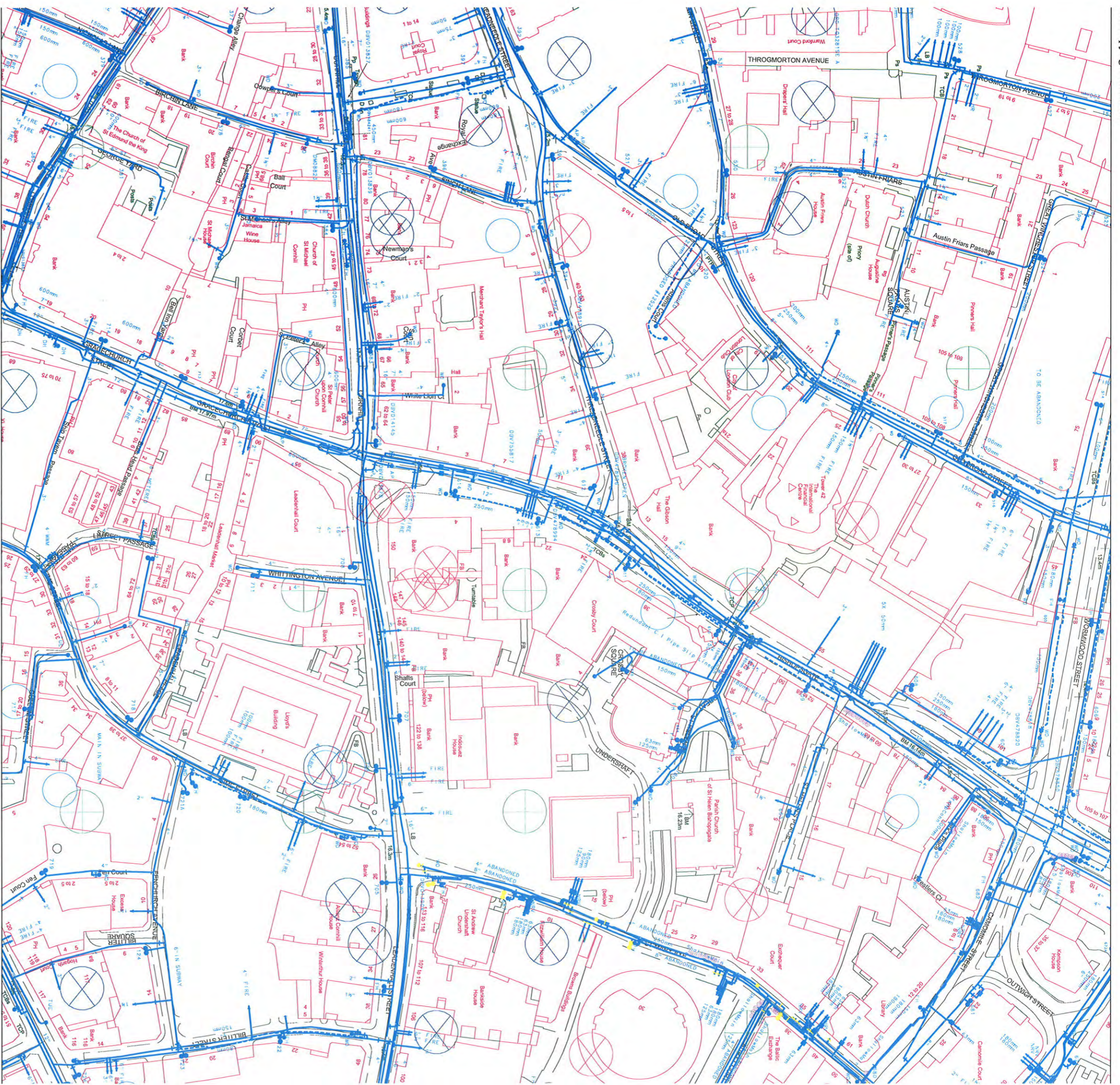


The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

1 metre intervals

1:5000 scale hardcopy facility - Normal Map.
The plot is centred on (533080 , 180714), which is in TQ3380NW. Printed on 26 September 2008 at 16:16:25 by HWOODWAR.

Comments:
ATER



position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind
thereover is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

metre intervals

OGLE hardcopy facility - Normal Map.
The plot is centred on (533080, 181214), which is in TQ3381SW. Printed on 26 September 2008 at 16:27:32 by HWOODWAR.

Comments:
ATER

Appendix E. Available Exploratory Hole Record Sheets

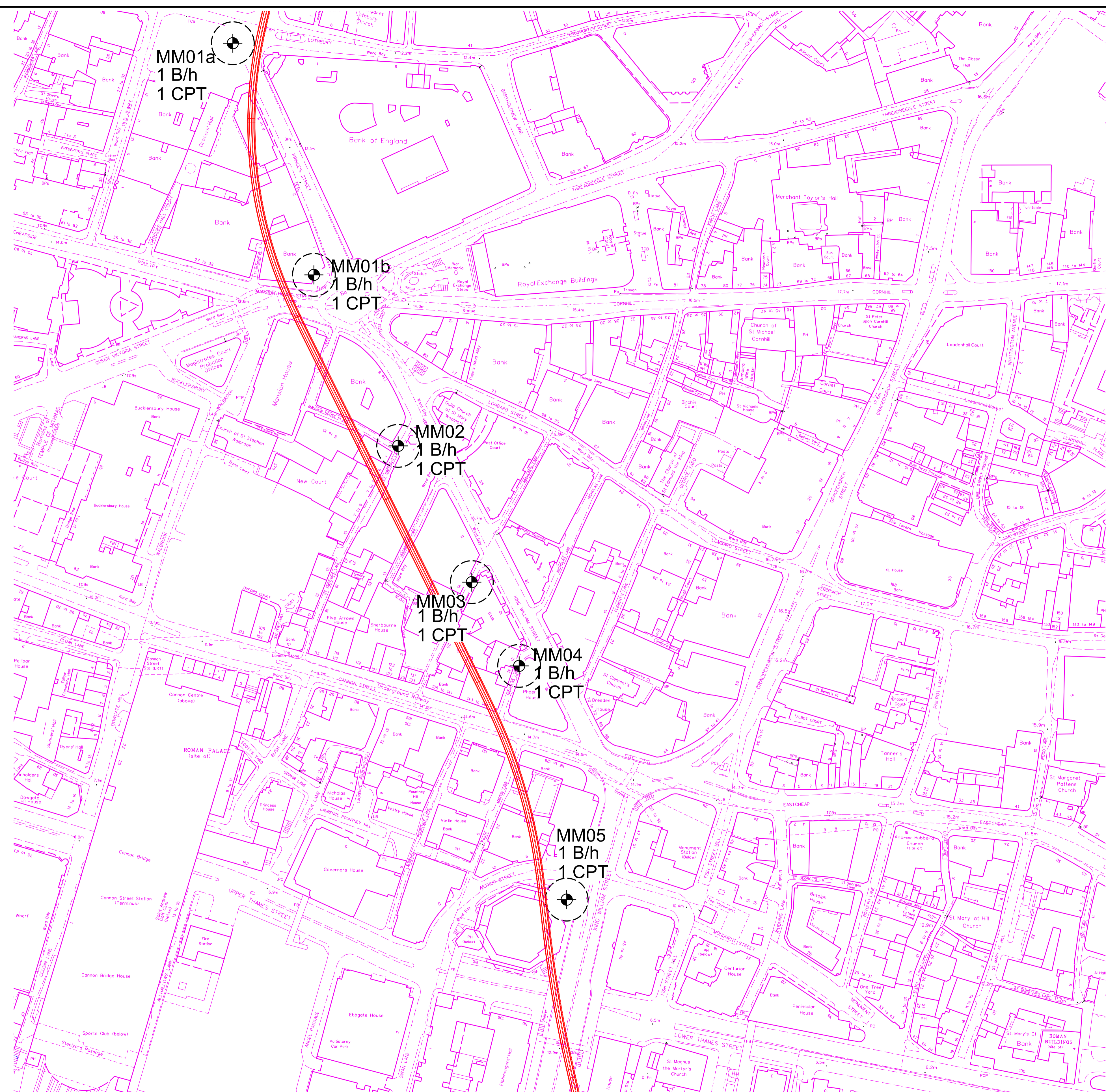
Table E1: Existing Available Exploratory Hole Record Sheets

Number	Borehole Reference No.	Date of Construction	Ground Investigation Contractor	Approximate Depth (m)	Date received by MM	Source of Data	Assessment of Quality
1	NMR Bank BH01	August 2007	NWH	52.3	April 2010	Arup	Good
2	KWSt BH01	February 1982	Wembley	41.0	February 2010	SRMcA	Moderate
3	KWSt BH02	February 1982	Wembley	37.5	February 2010	SRMcA	Moderate
4	KWSt BH03	February 1982	Wembley	42.5	February 2010	SRMcA	Moderate
5	KWSt BH04	February 1982	Wembley	50.0	February 2010	SRMcA	Moderate
6	WSq BH101	November 2007	Soiltechnics	50.0	February 2010	LUL	Moderate/Good
7	WSq BH103	March 2008	Soiltechnics	26.1	February 2010	LUL	Moderate/Good
8	WSq BH104	November 2007	Soiltechnics	12.4	February 2010	LUL	Moderate/Good
9	WSq BH105	November 2007	Soiltechnics	45.7	February 2010	LUL	Moderate/Good
10	MBE BH01	April 1973	Ground Expln	Not Known	January 2010	BGS	Poor
11	TQ38SW BH01	1954	Not known	Not Known	January 2010	BGS	Poor
12	TQ38SW BH02	1954	Not known	Not Known	January 2010	BGS	Poor
13	TQ38SW BH03	1954	Not known	Not Known	January 2010	BGS	Poor
14	TQ38SW BH04	1954	Not known	Not Known	January 2010	BGS	Poor
15	TQ38SW BH05	1954	Not known	Not Known	January 2010	BGS	Poor
16	TQ38SW BH06	1954	Not known	Not Known	January 2010	BGS	Poor
17	TQ38SW BH07	1954	Not known	Not Known	January 2010	BGS	Poor
18	TQ38SW BH08	1954	Not known	Not Known	January 2010	BGS	Poor
19	TQ38SW BH09	1954	Not known	Not Known	January 2010	BGS	Poor
20	KWSt – Bri BH01	1973	Fdn Engineering	17.2	January 2010	BGS	Moderate
21	KWSt – Bri BH02	1973	Fdn Engineering	17.0	January 2010	BGS	Moderate
22	KWSt – Bri BH03	1973	Fdn Engineering	16.8	January 2010	BGS	Moderate
23	KWSt – Bri BH04	1973	Fdn Engineering	16.8	January 2010	BGS	Moderate
24	KWSt – Bri BH05	1973	Fdn Engineering	23.3	January 2010	BGS	Moderate
25	KWSt – Bri BH06	1973	Fdn Engineering	23.3	January 2010	BGS	Moderate
26	TQ38/411A BH256/776A	1935	Not Known	93	January 2010	BGS	Poor
27	TQ38/411A BH256/776A	1935	Not Known	93	January 2010	BGS	Poor
28	TQ38/411A BH256/776B	1935	Not Known	107.9	January 2010	BGS	Poor
29	TQ38SW/1697 BH01	1974	Wimpey Labs	21	January 2010	BGS	Moderate/Good
30	TQ38SW/1698 BH02	1974	Wimpey Labs	52.3	January 2010	BGS	Moderate/Good
31	TQ38SW/1699 BH03	1974	Wimpey Labs	19.75	January 2010	BGS	Moderate/Good
32	TQ38SW/1716 Well A	1916	Not Known	85	January 2010	BGS	Poor
33	TQ38SW/1717 Well B	1925	Not Known	88	January 2010	BGS	Poor
34	TQ38SW/1132	1974	Wimpey	70	January	BGS	Moderate/Poor

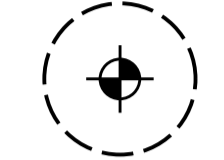
Number	Borehole Reference No.	Date of Construction	Ground Investigation Contractor	Approximate Depth (m)	Date received by MM	Source of Data	Assessment of Quality
	BH04		Labs		2010		
35	TQ38SW/1840	Not known	Gd Expln	8.2	January 2010	BGS	Very Poor
36	TQ38SW/1941 BH01	1970	Not Known	27.4	January 2010	BGS	Moderate/Poor
37	TQ38SW/1941 BH02	1970	Not Known	21.2	January 2010	BGS	Moderate/Poor
38	TQ38SW/1941 BH03	1970	Not Known	18.3	January 2010	BGS	Moderate/Poor
39	TQ38SW/1941 BH04	1970	Not Known	18.3	January 2010	BGS	Moderate/Poor
40	TQ38SW/1945	1968	Grd Expln	24.4	January 2010	BGS	Poor
41	TQ38SW/1981 BH01	1975	Albury Labs	18	January 2010	BGS	Moderate/Poor
42	TQ38SW/2007 BH01	1973	Wimpey Labs	56	January 2010	BGS	Poor (incomplete b/h)
43	TQ38SW/2014 BH01	1972	Not Known	6.7	January 2010	BGS	Poor
44	TQ38SW/2015 BH02	1972	Not Known	14	January 2010	BGS	Poor
45	TQ38SW/2048 BH05	1979	Not Known	13.5	January 2010	BGS	Moderate/Poor
46	TQ38SW/2048 BH06	1979	Not Known	33	January 2010	BGS	Moderate/Poor
47	TQ38SW/2796	Not Known	Not Known	121.9	January 2010	BGS	Poor
48	TQ38SW/2798	1946	A Williams	189.6	January 2010	BGS	Poor
49	TQ38SW/2799	1915	A Williams	137.2	January 2010	BGS	Poor
50	TQ38SW/2808	1921	A Williams	128	January 2010	BGS	Poor
51	TQ38SW/2815	1937	Not Known	182.9	January 2010	BGS	Poor
52	TQ38SW/2816	1938	Not Known	167.6	January 2010	BGS	Poor
53	TQ38SW/2820A	1916	Not Known	137.2	January 2010	BGS	Poor
54	TQ38SW/2820	1925	Not Known	137.2	January 2010	BGS	Poor
55	TQ38SW/2821	1924	Not Known	137.5	January 2010	BGS	Poor
56	TQ38SW/427	1914	Not Known	152.4	January 2010	BGS	Poor
57	TQ38SW/393	1910	Not Known	Not Known	January 2010	BGS	Poor
58	TQ38SW/393A	1910	Not Known	121.9	January 2010	BGS	Poor
59	TQ38SW/393B	1910	Not Known	146.3	January 2010	BGS	Poor
60	TQ38SW/354A	1911	Not Known	137.2	January 2010	BGS	Poor
61	TQ38SW/354B	1930	Not Known	152.4	January 2010	BGS	Poor
62	TQ38SW/719A	Not Known	Not Known	109.4	January 2010	BGS	Poor
63	TQ38SW/719B	Not Known	Not Known	88.7	January 2010	BGS	Poor
64	TQ38SW/719C	Not Known	Not Known	115.8	January 2010	BGS	Poor
65	TQ38SW/395	Not Known	Messrs Isler	137.2	January 2010	BGS	Poor
66	Regis Hse BH01	1994	LTG	45.45	January 2010	BGS	Moderate
67	Regis Hse BH02	1994	LTG	285	January 2010	BGS	Moderate
68	Regis Hse	1994	LTG	15.0	January	BGS	Moderate

Number	Borehole Reference No.	Date of Construction	Ground Investigation Contractor	Approximate Depth (m)	Date received by MM	Source of Data	Assessment of Quality
	BH03				2010		
69	Regis Hse BH04	1994	LTG	15.5	January 2010	BGS	Moderate
70	Regis Hse BH05C	1994	LTG	20.0	January 2010	BGS	Moderate
71	Regis Hse BH06	1994	LTG	25.0	January 2010	BGS	Moderate
72	TQ38SW/65	1869	Not Known	22.6	January 2010	BGS	Poor
73	TQ38SW74	Not Known	Not Known	11.5	January 2010	BGS	Poor
74	TQ38SW/787 BH01	1964	GKN	32.8	January 2010	BGS	Moderate/Poor
75	TQ38SW/392	Not Known	Not Known	69.3	January 2010	BGS	Very Poor
76	TQ38SW/392 BH01A	1921	Messrs Isler	137.8	January 2010	BGS	Poor
77	TQ38SW/396 761A	Not Known	Not Known	64	January 2010	BGS	Very Poor
78	TQ38SW/396 761B	Not Known	Not Known	107	January 2010	BGS	Very Poor
79	TQ38SW/396A	1915	A Williams	137.2	January 2010	BGS	Very Poor
80	TQ38SW/396B	1932	A Williams	189.6	January 2010	BGS	Very Poor
81	TQ38SW/403	1921	A Williams	128	January 2010	BGS	Very Poor
82	TQ38SW/403	1928	Not Known	152.4	January 2010	BGS	Very Poor
83	TQ38SW/411A	Not Known	Not Known	93.1	January 2010	BGS	Very Poor
84	TQ38SW/411B	Not Known	Not Known	107.9	January 2010	BGS	Very Poor
85	TQ38SW/425A	1916	J J Elam	137.2	January 2010	BGS	Very Poor
86	TQ38SW/425B	1925	J J Elam	142.6	January 2010	BGS	Very Poor

Appendix F. Ground Investigation Proposals



Note:-
Acceptable "Zone" in which
exploratory holes can be
located. i.e :-



The Actual exploratory hole
locations will be subject to the
agreement of the affected
External Stakeholders.

LEGEND
B/h - Borehole
CPT - Cone Penetration Test Hole

Dated \$DATES

Ver.	Date	Description	By	Chkd	App
P1	21/05/2010	Incorporating LUL Comments and Changes to Scheme Alignment.	RGH	GT	MS

Keyplan:

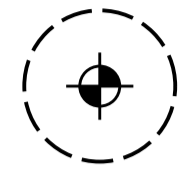
Client Authorisation Status:	Client Authorisation Status
RIBA Stage:	RIBA Stage D
Model File Versions:	RIBA Stage D

Mott MacDonald House,
5-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England

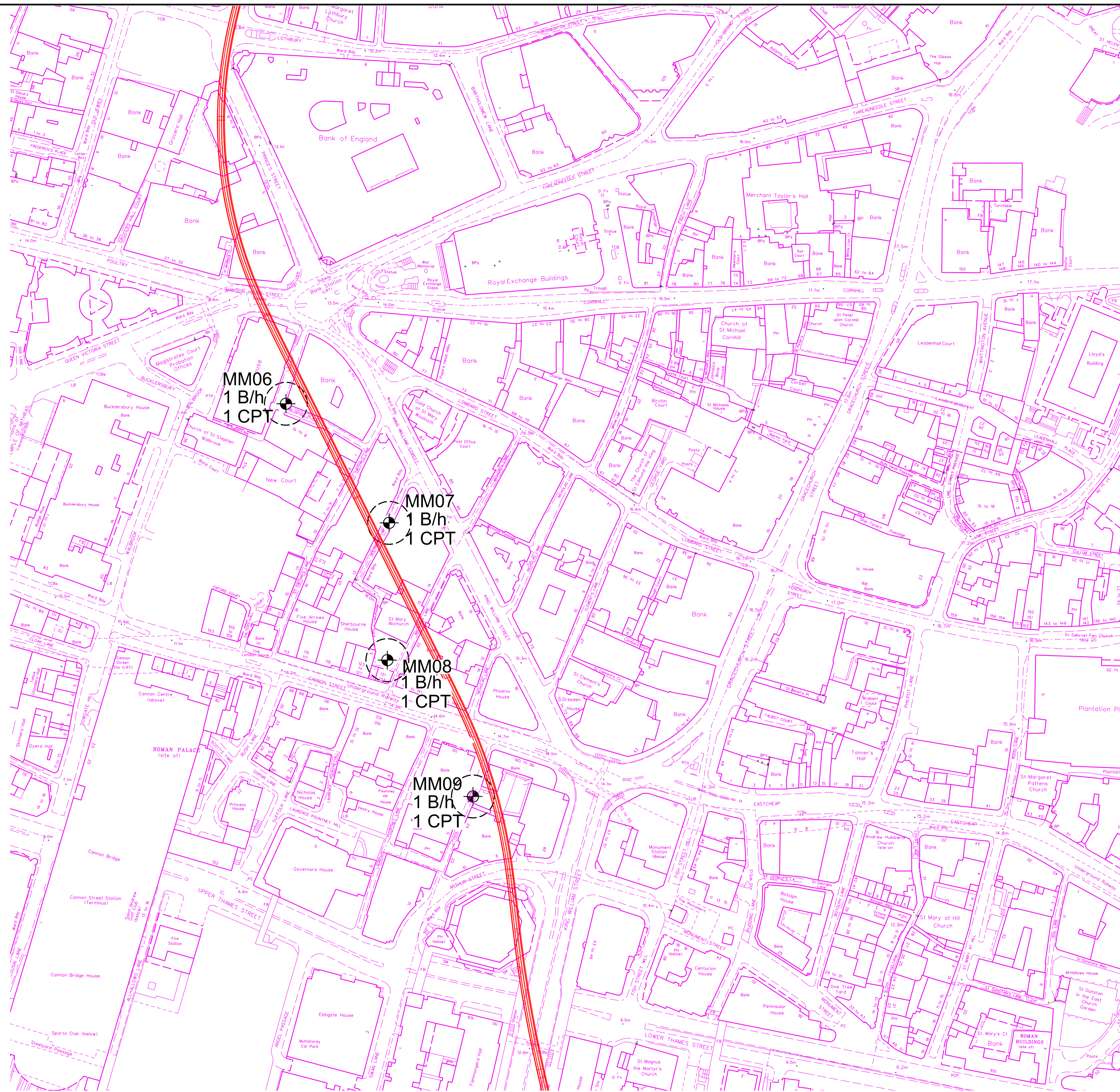


Contract:	Bank Station Congestion Relief Project
Originator:	Mott MacDonald
Location:	Bank Station N133
Title:	Ground Investigation - Phase 1 Exploratory Hole Location Plan
LUSTN No:	
Scale:	1250@A1
Drawing and CAD file No.:	N133-BCR-MMD-00-X-DR-C-2000
Ver.:	P2
Suitability:	S0

Note:-
Acceptable "Zone" in which
exploratory holes can be
located. i.e :-



The Actual exploratory hole
locations will be subject to the
agreement of the affected
External Stakeholders.



LEGEND	
	B/h - Borehole
	CPT - Cone Penetration Test Hole

Ver.	Date	Description	By	Chkd	App
P2	20/07/2011	Created for RIBA D Technical Specification for a Ground Report	CAL	GT	MS
P1	21/05/2010	Incorporating LUL Comments and Changes to Scheme Alignment.	RGH	GT	MS

Keyplan:	
----------	--

Client Authorisation Status:	Client Authorisation Status
RIBA Stage:	RIBA Stage D
Model File Versions:	

Mott MacDonald House,
5-10 Sydenham Road
Croydon, Surrey, CR9 3EE
England



Contract:	Bank Station Congestion Relief Project		
Originator:	Mott MacDonald		
Location:	Bank Station N133		
Title:	Ground Investigation - Phase 2 Exploratory Hole Location Plan	By:	CAL
		Chk:	GRT
LUSTN No:		App:	MS
Scale:	1250@A1	Drawing and CAD file No:	N133-BCR-MMD-00-X-DR-C-2001
		Ver:	P2
		Suitability:	S0

Table G.1: Borehole Schedule

Exploratory Hole	Location	Approximate Anticipated Depth / Level	Remarks
Borehole MM01a – Phase 1	At the junction of Prince's Street and Lothbury,	50m / 113.1mTD (0-12 CP 12-50 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.
Borehole MM01b – Phase1	Adiacent to the Bank of England	50m / 113.1mTD (0-12 CP 12-50 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.
Borehole MM02 – Phase 1	St Swithin Lane	50m / 114mTD (0-12 CP 12-50 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.
Borehole MM03 – Phase 1	Abchurch Lane	65m / 115.5mTD (0-12 CP 12-65 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Self Boring Pressuremeter tests to be carried out at specified intervals in the London Clay/Lambeth Group. Prove Upnor Formation in order to define "rigid boundary" for subsequent modelling purposes. Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.
Borehole MM04 – Phase 1	Nicolas Lane	50m / 115.5mTD (0-12 CP 12-50 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Self Boring Pressuremeter tests to be carried out at specified intervals in the London Clay/Lambeth Group. Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.

Exploratory Hole	Location	Approximate Anticipated Depth / Level	Remarks
Borehole MM05 – Phase 1	King William Street	50m / 112.9mTD (0-12 CP 12-50 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.
Borehole MM06 – Phase 2	Adjacent Mansion House	50m / 113.5mTD (0-12 CP 12-50 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.
Borehole MM07 – Phase 2	Sherborne Lane	50m / 113.5mTD (0-12 CP 12-50 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.
Borehole MM08 – Phase 2	Adjacent to St Mary Abchurch	50m / 114.3mTD (0-12 CP 12-50 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.
Borehole MM09 – Phase 2	Cannon Street	50m / 114.7mTD (0-12 CP 12-50 RC)	Detailed sampling and testing Superficial Deposits/London Clay. Rotary core from 1m below the top of London Clay to obtain high quality samples for advanced laboratory testing and for logging purposes (split/describe). Standpipe/standpipe piezometer to be installed within superficial deposits/London Clay.

Notes

1. All depths and levels are approximate.
2. CP – Cable Percussion; RC – Rotary Core.
3. mTD – metres Tunnel Datum. Tunnel Datum is Ordnance Survey plus 100m.

Table G.2: CPT Schedule

Hole Identifier	Location	Approximate Anticipated Depth (m)	Remarks
CPT01a – Phase 1	At Junction of Prince Street and Lothbury	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay.
CPT01b – Phase 1	Adjacent Bank of England	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay.
CPT(S)02 – Phase 1	St Swithin's Lane	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay. Piezo-cone dissipation testing will be required at approximately 2 locations
CPT03 – Phase 1	Abchurch Lane	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay.
CPT(S)04 – Phase 1	Nicholas Lane	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay. Piezo-cone dissipation testing will be required at approximately 2 locations
CPT05 – Phase 1	King William Street	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay.
CPT06 – Phase 2	Adjacent to the Mansion House	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay.
CPT07 – Phase 2	Sherborne Lane	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay.
CPT(S)08 – Phase 2	Adjacent to St Mary Abchurch	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay. Piezo-cone dissipation testing will be required at approximately 2 locations
CPT09 – Phase 2	Cannon Street	37 (includes 12m pre-bore)	To establish stiffness and strength parameters in the London Clay..

Notes

1. CPT Cone Penetration Test (15 cm²) hole.
2. CPT(S) Seismic Cone Penetration Test hole.

Appendix G. Preliminary Geotechnical Risk Register

PRELIMINARY GEOTECHNICAL RISK REGISTER

Date:05/09/11

Project Phase: Desk Study

Project: Bank Station Capacity Upgrade - RIBA Stage D

NOTE: RISK TYPES; HS = Health & Safety, T = Time, C = Cost, R = Reputation, E = Environment
Risk: I = Intolerable, S = Significant, T = Tolerable, N = Negligible

Risk Assessment carried out by: SD
Next risk assessment (Date): On completion of Ground Investigation.

Threat	Consequences	IMPACT	LIKELIHOOD	RISK	RISK TYPE	Potential Risk Control Measures / Actions	IMPACT	LIKELIHOOD	RESIDUAL RISK	OWNER	Action (by whom and when)	Current Risk Ranking
Potential presence of buried concrete (reinforced and un-reinforced) and brick structures within the Made Ground.	Delay to construction programme, additional cost, potential claims by piling contractor.	M	H	S	TCR	Review of preliminary scheme layout in relation to locations where known buried structures could exist. Undertake additional ground investigation if necessary. Prepare strategy to deal with such impacts.	L	H	T			
Unexploded Ordnance	Death or severe injury, and destruction of works.	VH	M	S	HSTCR	Detailed investigation and appropriate detection for ordnance.	H	L	T			
Compressibility of materials.	Shallow foundations could be subject to long term settlements.	L	L	N	TCR	Design of shallow foundations to consider potential for long term consolidation settlements.	L	L	N			
Significant variability in the thickness of the Made Ground across the site area.	Delay to construction programme, additional cost, potential claims by main works contractor.	L	M	T	TCR	Review of preliminary scheme layout for underground works in relation to locations where buried structures could exist based on historic building information e.g. former basements that may have been removed or infilled. Undertake additional ground investigation if necessary.	L	M	T			
Dewatering of Alluvium and underlying River Terrace Deposits.	Dewatering of the Alluvium and underdrainage through the River Terrace Deposits leads to consolidation settlement of the Alluvium and damage to buildings founded on Alluvium.	L	L	N	TCR	Design of dewatering and well-point locations to consider potential effects on existing structures. Consider impermeable barriers and/or groundwater recharge.	L	L	N			
Local variations in the elevation of the interface between the River Terrace Deposits and the London Clay.	Poor definition of the ground model could have an adverse effect on the design and performance of the proposed structures.	M	M	T	TCR	Undertake ground investigation to further define the ground model.	M	M	T			
Underground works through water-bearing gravel filled scour hollows in the top of the London Clay.	Excavations into the London Clay unexpectedly encountering River Terrace Deposits could lead to local face instability particularly in the presence of groundwater requiring immediate works to support the face.	M	M	T	TCR	Undertake ground investigation to define the variability in the interface between the River Terrace Deposits and London Clay for the underground works.	L	L	N			
Presence of 'greasy backs'	The presence of 'greasy backs' can give rise to slips and overbreak during excavation of the London Clay. Delay to construction programme, additional cost, potential claims by main works contractor	M	M	T	TCR	Undertake additional boreholes and high quality sampling and logging to assess as far as reasonably practical whether there is the potential for 'greasy backs'.	M	M	T			
The presence of existing foundations could be an obstruction to the construction of the works.	Breaking through buried foundations would have a cost and programme implication. Delay to construction programme, additional cost, potential claims by main works contractor. Damage to existing infrastructure.	M	M	T	TCR	Undertake additional desk study search to confirm the foundation detail and/or ground investigations.	L	M	T			

PRELIMINARY GEOTECHNICAL RISK REGISTER

Date:05/09/11

Project Phase: Desk Study

Project: Bank Station Capacity Upgrade - RIBA Stage D

NOTE: RISK TYPES; HS = Health & Safety, T = Time, C = Cost, R = Reputation, E = Environment
 Risk: I = Intolerable, S = Significant, T = Tolerable, N = Negligible

Risk Assessment carried out by: SD
 Next risk assessment (Date): On completion of Ground Investigation.

Threat	Consequences	IMPACT	LIKELIHOOD	RISK	RISK TYPE	Potential Risk Control Measures / Actions	IMPACT	LIKELIHOOD	RESIDUAL RISK	OWNER	Action (by whom and when)	Current Risk Ranking
London Bridge Sewer and Low Level Sewers Nos. 1 and 2 are in close proximity to the works.	The sewers are adversely affected by the proposed construction works. Differential subsidence leading to distress of structures. 'Drag-down' of adjacent structures.	M	M	T	TCR	Undertake additional desk study to confirm the precise location and dimensions of the sewer. Complete a condition survey; line and level survey and visual inspection of the sewer. Undertake impact assessment. Design appropriate mitigation measures.	L	M	T			
St Mary Abchurch - the new platform tunnel and shaft are to be constructed in close proximity.	The possibility exists that the building could be adversely affected if its foundations are disturbed by ground movements. Differential settlement leading to distress of adjacent structures.	M	M	T	TCR	Additional desk study search to confirm the foundation details; intrusive investigation may potentially be required. A potential building damage assessment will be required. Mitigation measures may need to be implemented as part of the construction works.	L	M	T			
		M	M	T	TCR		M	L	T			