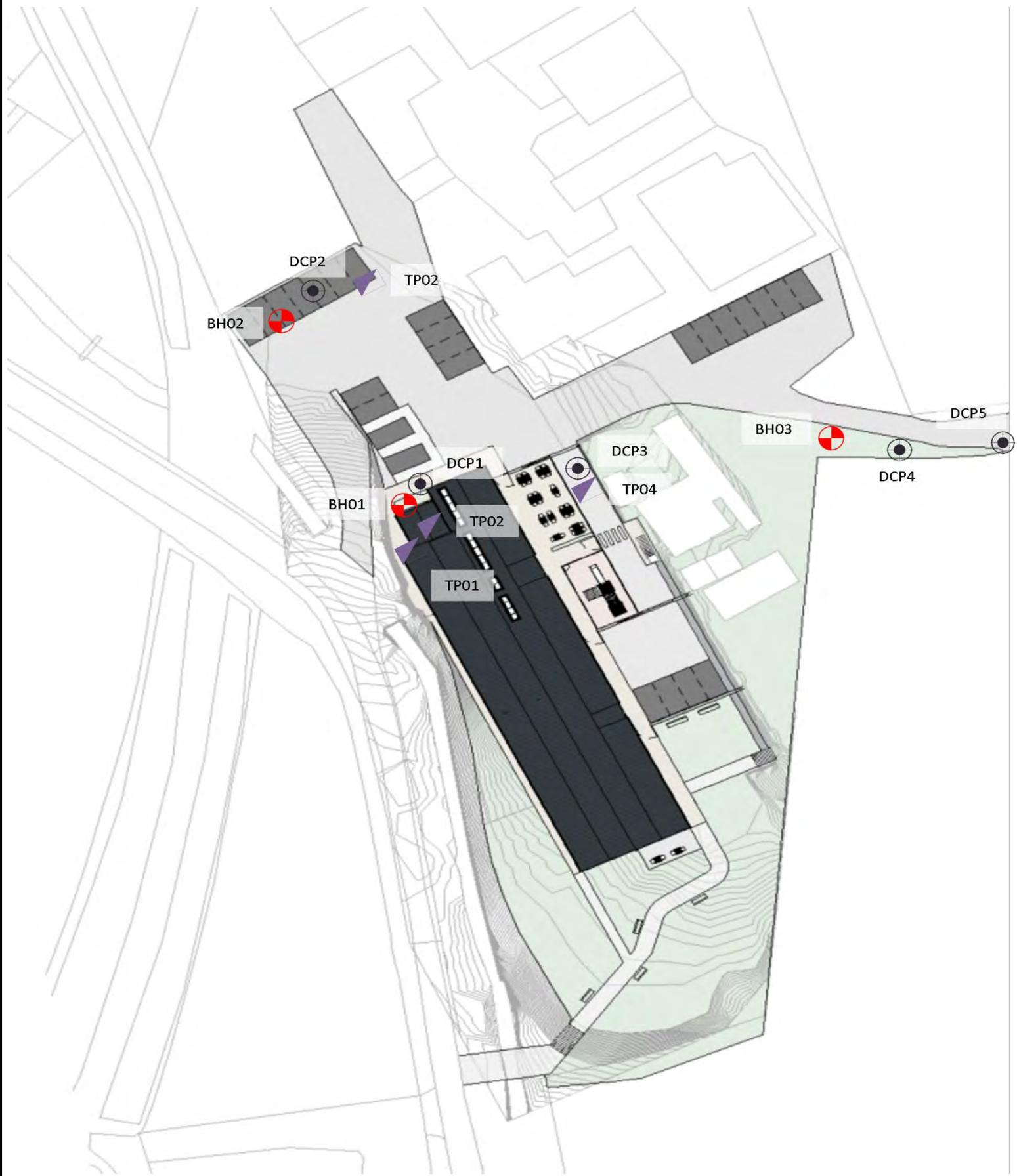


# LAND AT FLORENCE ARTS CENTRE

INTRUSIVE GROUND INVESTIGATION  
FIELDWORKS REPORT



**SPIRE  
GEOTECHNICAL**  
Geologists & Site Investigation  
Specialists



### EXPLORATORY HOLE LOCATION PLAN

<b>CLIENT</b>	BDN LTD	<b>PROJECT</b>	FLORENCE ARTS CENTRE
<b>STATUS</b>	FINAL	<b>DRAWING NO.</b>	S2442_DWG_03

**GENERAL NOTES**  
 SGL has prepared the drawing for the sole use of the Client and their appointed agents. SGL shall not be responsible for any use of the drawing for any purpose other than that for which it was prepared. Agreement for the use or copying of this drawing by any Third Party must be obtained in writing from SGL. Should the Client require to pass copies of the drawing to other parties for information, no professional liability or warranty shall be extended to other parties by SGL.

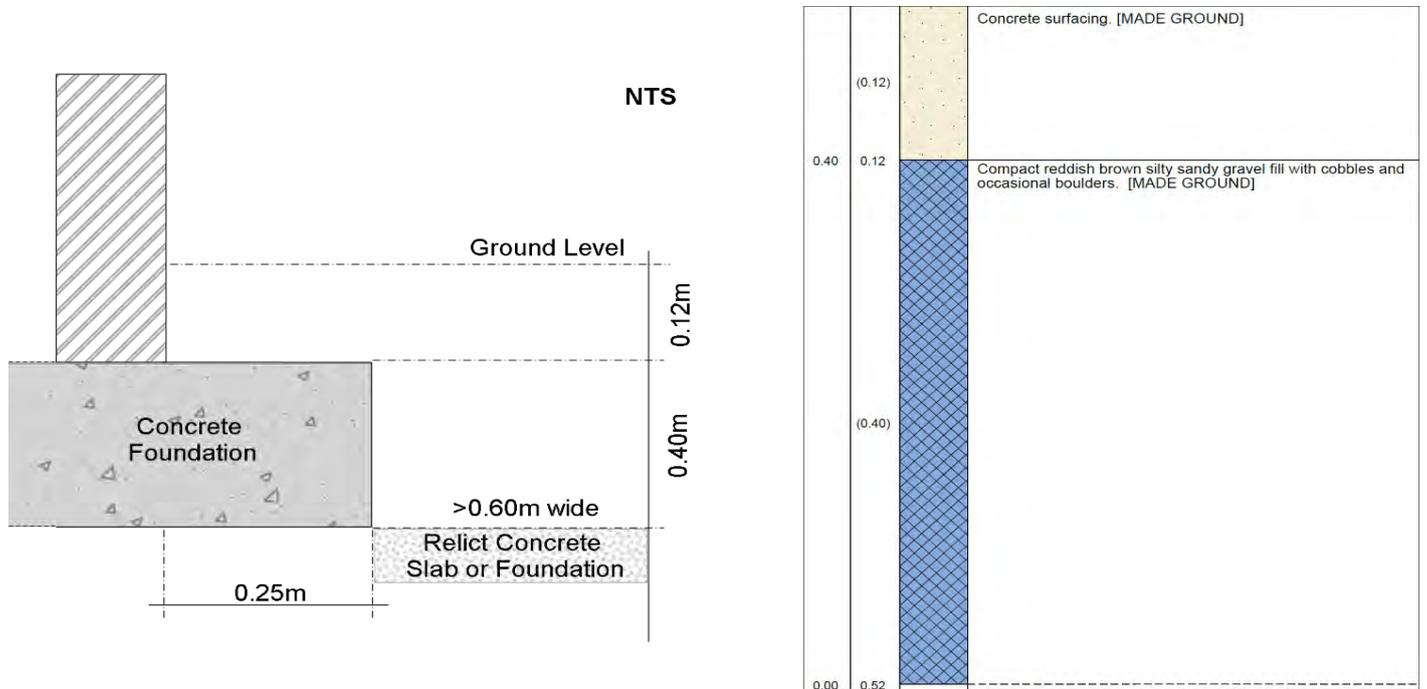
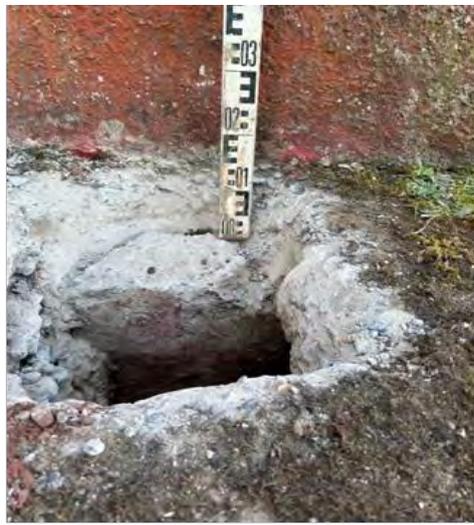


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 EH2 3JP

**YORKSHIRE** International House, King Street,  
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## TRIAL PIT 01 - FOUNDATION EXPOSURE

<b>CLIENT</b>	BDN LTD	<b>PROJECT</b>	FLORENCE ARTS CENTRE
<b>STATUS</b>	FINAL	<b>DRAWING NO.</b>	S2442_DWG_04

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# Key to exploratory hole symbols and abbreviations

## SAMPLE TYPES

ACM - Asbestos sample	AMAL - Amalgamated sample	B - Bulk disturbed sample
BLK - Block sample	C - Core sample	CBR - CBR test sample
D - Disturbed sample	ES - Environmental sample	EW - Environmental water sample
G - Gas sample	J - Jar sample	L - Liner sample
TW - Pushed thin wall sample	U - Undisturbed sample	UT - Undisturbed thin wall sample
W - Water sample		

## IN-SITU TESTS

HV - Hand shear vane	HV(r) - Hand shear vane residual	PID - Photo ionisation detector
PP - Hand penetrometer	SPT - Standard penetration test	SPT(C) - SPT using cone

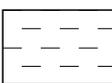
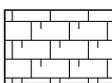
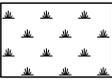
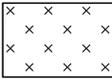
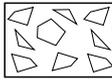
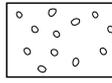
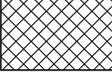
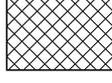
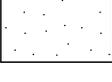
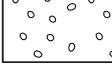
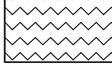
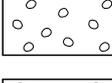
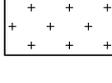
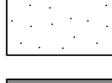
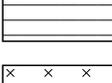
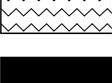
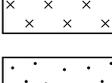
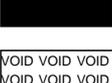
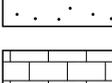
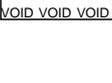
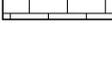
## GROUNDWATER

 Groundwater strike	 Groundwater rest level
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## ROTARY CORE DETAILS

TCR - Total core recovery (%)	SCR - Solid core recovery (%)	RQD - Rock quality designation (%)
FI - Fracture index	NI - Non-intact core	AZCL - Assumed zone of core loss

## LEGEND

 Topsoil	 Clay	 Chalk	 Sand backfill
 Peat	 Silt	 Breccia	 Gravel backfill
 Made ground	 Sand	 Conglomerate	 Arisings
 Concrete	 Gravel	 Metamorphic	 Bentonite
 Wood	 Cobbles	 Igneous	 Concrete
 Brick	 Boulders		 Grout
 Bituminous material	 Mudstone		 Plain pipe
 Gypsum	 Siltstone		
 Coal	 Sandstone		 Slotted pipe
 Void	 Limestone		



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# Hand Pit

# TP01

Sheet 1 of 1

<b>Hole Type</b> HP	<b>Easting</b> 301728.00	<b>Northing</b> 510327.00	<b>Ground Level (m)</b> 0.52	<b>Scale</b> 1:5
<b>Project Name</b> FLORENCE ARTS CENTRE, PHASE 01	<b>Project No.</b> S2442	<b>Start Date</b> 2025-03-10	<b>End Date</b> 2025-03-10	

<b>Client</b> BDN LTD	<b>Contractor</b> SPIRE GEOTECHNICAL LTD	<b>Consultant</b> SDT
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (thickness) (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.50	ES		0.40	0.12		Concrete surfacing. [MADE GROUND]
					0.40	0.12		Compact reddish brown silty sandy gravel fill with cobbles and occasional boulders. [MADE GROUND]
					0.00	0.52	----- End of Trial Pit at 0.52m	

<b>Remarks</b> Manually excavated trial pit to expose and record existing foundations. Area scanned for utilities. Positions recorded to GPS Garmin 64Map (+/-2m). Concrete reinstatement on completion. Materials recorded to BS5930. No groundwater encountered.	<b>Method, Plant, Stability, Dimensions</b> 0.00 - 0.52m IP Manual excavation	<b>Logger</b> SDT
	<b>Checked By:</b> SDT <b>Approved By:</b> SDT	





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# Hand Pit

**TP03**  
Sheet 1 of 1

<b>Hole Type</b> HP	<b>Easting</b> 301763.00	<b>Northing</b> 510327.00	<b>Ground Level (m)</b> 0.70	<b>Scale</b> 1:5
<b>Project Name</b> FLORENCE ARTS CENTRE, PHASE 01	<b>Project No.</b> S2442	<b>Start Date</b> 2025-03-10	<b>End Date</b> 2025-03-10	

<b>Client</b> BDN LTD	<b>Contractor</b> SPIRE GEOTECHNICAL LTD	<b>Consultant</b> SDT
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.25 - 0.50	ES		0.00	0.70		Grass overlying a reddish brown silty very sandy medium coarse sub angular and sub rounded gravel of ballast gravel. Occasional shale and cobbles. [MADE GROUND]
								End of Trial Pit at 0.70m

<b>Remarks</b> Manually excavated trial pit to expose future road pavement formation. Area scanned for utilities. Positions recorded to GPS Garmin 64Map (+/-2m). Materials recorded to BS5930. No groundwater encountered.	<b>Method, Plant, Stability, Dimensions</b> 0.00 - 0.70m IP Manual excavation	<b>Logger</b> SDT
		<b>Checked By:</b> SDT <b>Approved By:</b> SDT



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# Hand Pit

**TP04**  
 Sheet 1 of 1

<b>Hole Type</b> HP	<b>Easting</b> 301730.00	<b>Northing</b> 510305.00	<b>Ground Level (m)</b> 0.80	<b>Scale</b> 1:5
<b>Project Name</b> FLORENCE ARTS CENTRE, PHASE 01	<b>Project No.</b> S2442	<b>Start Date</b> 2025-03-10	<b>End Date</b> 2025-03-10	

<b>Client</b> BDN LTD	<b>Contractor</b> SPIRE GEOTECHNICAL LTD	<b>Consultant</b> SDT
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) <small>(thickness)</small>	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.20 - 0.40	ES		0.72	0.08		Grass overlying a brown very clayey sandy gravel. Medium coarse rounded gravel with rootlets. [MADE GROUND]
					0.72	0.08		Dark brownish grey silty very sandy fine medium and coarse gravel with ash, brick, slate and sandstone. Occasional cobbles. [MADE GROUND]
					0.00	0.80		End of Trial Pit at 0.80m

<b>Remarks</b> Manually excavated trial pit to expose future road pavement formation. Area scanned for utilities. Positions recorded to GPS Garmin 64Map (+/-2m). Materials recorded to BS5930. No groundwater encountered.	<b>Method, Plant, Stability, Dimensions</b> 0.00 - 0.80m IP Manual excavation	<b>Logger</b> SDT
		<b>Checked By:</b> SDT <b>Approved By:</b> SDT



# Borehole Log

**BH01**  
 Sheet 1 of 1

<b>Hole Type</b> BH	<b>Easting</b> 301731.00	<b>Northing</b> 510321.00	<b>Ground Level (m)</b> 4.30	<b>Scale</b> 1:25
<b>Project Name</b> FLORENCE ARTS CENTRE, PHASE 01	<b>Project No.</b> S2442		<b>Start Date</b> 2025-03-10	<b>End Date</b> 2025-03-10

<b>Client</b> BDN LTD	<b>Contractor</b> SPIRE GEOTECHNICAL LTD	<b>Consultant</b> SDT
--------------------------	---	--------------------------

Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (thickness) (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
[Cross-hatched pattern]					4.16	(0.14) 0.14	[Cross-hatched pattern]	Concrete surfacing. [MADE GROUND]
		0.25 - 0.50	ES				[Cross-hatched pattern]	Loose reddish brown silty sandy gravel fill with cobbles and occasional boulders. [MADE GROUND]
		0.75 - 1.00	ES				[Cross-hatched pattern]	
		1.00 1.00 1.00	SPT D B	N=6 (1,1/2,1,2,1)		(1.66)	[Cross-hatched pattern]	
		2.00 2.00 2.00	SPT HV D	N=7 (1,1/2,2,1,2) 55 (kPa)	2.50	1.80	[Horizontal lines pattern]	Firm and stiff (medium and high strength) brown sand gravelly CLAY . Sand is fine to medium. Gravel is medium coarse sub angular with occasional cobbles. [GLACIAL TILL]
		2.50 2.50 2.50	HV D B	80 (kPa)			[Horizontal lines pattern]	
		3.00 3.00	SPT D	N=7 (2,2/1,2,2,2)		(2.50)	[Horizontal lines pattern]	
		3.50 3.50	HV B	66 (kPa)			[Horizontal lines pattern]	
	4.00 4.00	SPT D	N=50 (3,7/12,12,13,13 for 40mm)			[Horizontal lines pattern]		
				0.00	4.30			End of Borehole at 4.30m

<b>Remarks</b> Borehole progressed via dynamic sampling methods. Area scanned for utilities. Positions recorded to GPS Garmin 64Map (+/-2m). Materials recorded to BS5930. No groundwater encountered.	<b>Method, Plant, Stability, Dimensions</b> 0.00 - 4.30m BH WS - Dynamic Sampler	<b>Logger</b> SDT
	<b>Checked By:</b> SDT <b>Approved By:</b> SDT	



# Borehole Log

**BH01**  
 SUPPLEMENTARY INFO

<b>Hole Type</b> BH	<b>Easting</b> 301731.00	<b>Northing</b> 510321.00	<b>Ground Level (m)</b> 4.30	<b>Scale</b> 1:25
<b>Project Name</b> FLORENCE ARTS CENTRE, PHASE 01	<b>Project No.</b> S2442		<b>Start Date</b> 2025-03-10	<b>End Date</b> 2025-03-10

<b>Client</b> BDN LTD	<b>Contractor</b> SPIRE GEOTECHNICAL LTD	<b>Consultant</b> SDT
--------------------------	---	--------------------------

## SPT - Details

Top Depth (m)	Type	Results	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio
1.00		N=6 (1,1/2,1,2,1)				
2.00		N=7 (1,1/2,2,1,2)				
3.00		N=7 (2,2/1,2,2,2)				
4.00		N=50 (3,7/12,12,13,13 for...)				

<b>Remarks</b> Borehole progressed via dynamic sampling methods. Area scanned for utilities. Positions recorded to GPS Garmin 64Map (+/-2m). Materials recorded to BS5930. No groundwater encountered.	<b>Method, Plant, Stability, Dimensions</b> 0.00 - 4.30m BH WS - Dynamic Sampler	<b>Logger</b> SDT
---	---	----------------------

Checked By: SDT Approved By: SDT



# Borehole Log

**BH02**  
 Sheet 1 of 1

<b>Hole Type</b> BH	<b>Easting</b> 301756.00	<b>Northing</b> 510341.00	<b>Ground Level (m)</b> 4.35	<b>Scale</b> 1:25
<b>Project Name</b> FLORENCE ARTS CENTRE, PHASE 01	<b>Project No.</b> S2442	<b>Start Date</b> 2025-03-10	<b>End Date</b> 2025-03-10	

<b>Client</b> BDN LTD	<b>Contractor</b> SPIRE GEOTECHNICAL LTD	<b>Consultant</b> SDT
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
[Cross-hatched pattern]		0.25 - 0.50	ES			(0.90)	[Cross-hatched pattern]	Grass overlying a reddish brown silty very sandy medium coarse sub angular and sub rounded gravel of ballast gravel. Occasional shale and cobbles. [MADE GROUND]
		1.00 1.00 1.00	SPT D B	N=7 (1,2/3,2,1,1)	3.45	0.90	[Cross-hatched pattern]	Brown very sandy gravelly clay with medium coarse gravel fragments of brick and sandstone. [MADE GROUND]
		2.00 2.00	SPT D	N=11 (2,4/4,5,1,1)		(1.70)	[Cross-hatched pattern]	
		2.50 2.50	D B		1.75	2.60	[Cross-hatched pattern]	Firm (medium strength) brown sand gravelly CLAY . Sand is fine to medium. Gravel is medium coarse sub angular with occasional cobbles. [GLACIAL TILL]
		2.80	HV	60 (kPa)			[Cross-hatched pattern]	
		3.00 3.00	SPT D	N=9 (1,1/3,2,2,2)		(1.75)	[Cross-hatched pattern]	
		3.50 3.50	HV B	48 (kPa)			[Cross-hatched pattern]	
		4.00 4.00	SPT D	N=50 (3,7/12,12,13,13 for 30mm)			[Cross-hatched pattern]	
					0.00	4.35		End of Borehole at 4.35m

<b>Remarks</b> Borehole progressed via dynamic sampling methods. Area scanned for utilities. Positions recorded to GPS Garmin 64Map (+/-2m). Materials recorded to BS5930. No groundwater encountered.	<b>Method, Plant, Stability, Dimensions</b> 0.00 - 4.35m BH WS - Dynamic Sampler	<b>Logger</b> SDT
	<b>Checked By:</b> SDT <b>Approved By:</b> SDT	



# Borehole Log

## BH02

SUPPLEMENTARY INFO

<b>Hole Type</b> BH	<b>Easting</b> 301756.00	<b>Northing</b> 510341.00	<b>Ground Level (m)</b> 4.35	<b>Scale</b> 1:25
<b>Project Name</b> FLORENCE ARTS CENTRE, PHASE 01	<b>Project No.</b> S2442		<b>Start Date</b> 2025-03-10	<b>End Date</b> 2025-03-10

<b>Client</b> BDN LTD	<b>Contractor</b> SPIRE GEOTECHNICAL LTD	<b>Consultant</b> SDT
--------------------------	---	--------------------------

### SPT - Details

Top Depth (m)	Type	Results	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio
1.00		N=7 (1,2/3,2,1,1)				
2.00		N=11 (2,4/4,5,1,1)				
3.00		N=9 (1,1/3,2,2,2)				
4.00		N=50 (3,7/12,12,13,13 for...)				

<b>Remarks</b> Borehole progressed via dynamic sampling methods. Area scanned for utilities. Positions recorded to GPS Garmin 64Map (+/-2m). Materials recorded to BS5930. No groundwater encountered.	<b>Method, Plant, Stability, Dimensions</b> 0.00 - 4.35m BH WS - Dynamic Sampler	<b>Logger</b> SDT
	<b>Checked By:</b> SDT <b>Approved By:</b> SDT	



# Borehole Log

**BH03**  
Sheet 1 of 1

<b>Hole Type</b> BH	<b>Easting</b> 301742.00	<b>Northing</b> 510272.00	<b>Ground Level (m)</b> 3.40	<b>Scale</b> 1:25
<b>Project Name</b> FLORENCE ARTS CENTRE, PHASE 01	<b>Project No.</b> S2442	<b>Start Date</b> 2025-03-10	<b>End Date</b> 2025-03-10	

<b>Client</b> BDN LTD	<b>Contractor</b> SPIRE GEOTECHNICAL LTD	<b>Consultant</b> SDT
--------------------------	---	--------------------------

Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (thickness) (m)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
[Cross-hatch pattern]		0.20 - 0.40	ES		3.25	0.15	[Blue cross-hatch]	Placed cobbles and boulders. [MADE GROUND]	
						0.15		[Brown diagonal lines]	Greyish brown silty gravelly sand. Topsoil material with rare glass inclusions. [TOPSOIL]
						3.00	0.40	[Yellow with dots]	Loose brown silty slightly gravelly fine medium SAND. [GLACIAL TILL]
		1.00	SPT	N=9 (2,3/2,3,2,2)					
		1.00	D						
		1.00	B						
		1.50	D						
		2.00	SPT	N=8 (1,2/2,3,1,2)					
		2.00	D						
		2.00	B						
		3.00	SPT	N=50 (7,12/25,25 for 10mm)					
		3.00	D						
		3.00	B						
					0.00	3.40		End of Borehole at 3.40m	

<b>Remarks</b> Borehole progressed via dynamic sampling methods. Area scanned for utilities. Positions recorded to GPS Garmin 64Map (+/-2m). Materials recorded to BS5930. No groundwater encountered.	<b>Method, Plant, Stability, Dimensions</b> 0.00 - 3.40m BH WS - Dynamic Sampler	<b>Logger</b> SDT
	<b>Checked By:</b> SDT <b>Approved By:</b> SDT	



# Borehole Log

## BH03

SUPPLEMENTARY INFO

<b>Hole Type</b> BH	<b>Easting</b> 301742.00	<b>Northing</b> 510272.00	<b>Ground Level (m)</b> 3.40	<b>Scale</b> 1:25
<b>Project Name</b> FLORENCE ARTS CENTRE, PHASE 01	<b>Project No.</b> S2442		<b>Start Date</b> 2025-03-10	<b>End Date</b> 2025-03-10

<b>Client</b> BDN LTD	<b>Contractor</b> SPIRE GEOTECHNICAL LTD	<b>Consultant</b> SDT
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### SPT - Details

Top Depth (m)	Type	Results	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio
1.00		N=9 (2,3/2,3,2,2)				
2.00		N=8 (1,2/2,3,1,2)				
3.00		N=50 (7,12/25,25 for 10m...				

**Remarks**  
 Borehole progressed via dynamic sampling methods. Area scanned for utilities. Positions recorded to GPS Garmin 64Map (+/-2m). Materials recorded to BS5930. No groundwater encountered.

**Method, Plant, Stability, Dimensions**  
 0.00 - 3.40m BH WS - Dynamic Sampler

**Logger**  
 SDT

Checked By: SDT Approved By: SDT

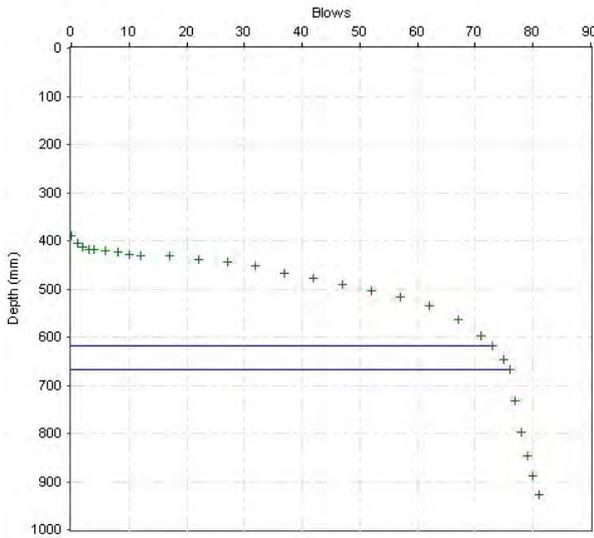
# DCP Layer Strength Analysis Report

Project Name: S2442 Florence Arts Centre DCP

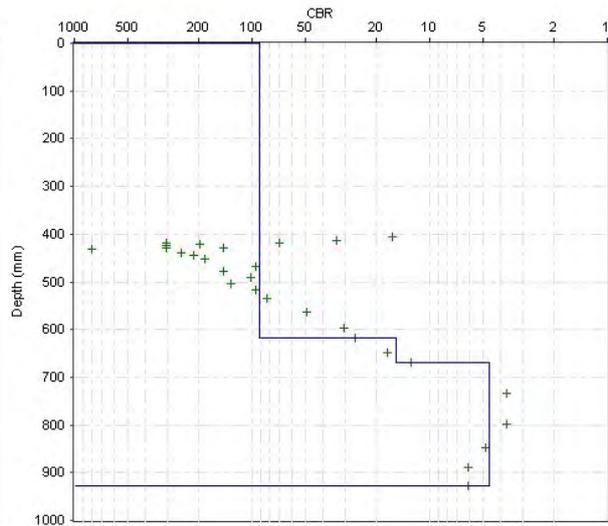
Chainage (km): 1.000  
 Direction:  
 Location/Offset: Lay-by / other  
 Cone Angle: 60 degrees  
 Zero Error (mm): 0  
 Test Date: 10/03/2025

Surface Type: Unpaved  
 Thickness (mm): 0  
 Base Type:  
 Thickness (mm):  
 Surface Moisture: Unknown  
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 1.000



Layer Boundaries Chart



CBR Chart

### Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	3.12	91	618	618
2	16.67	15	50	668
3	52.00	5	260	928

### CBR Relationship:

TRL equation:  $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by .....

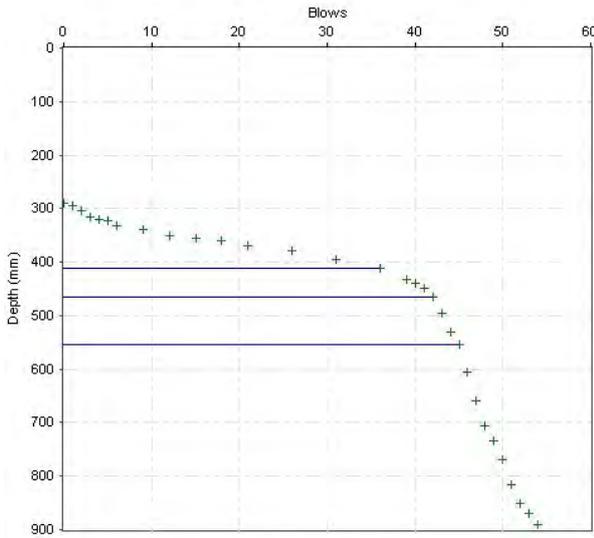
# DCP Layer Strength Analysis Report

Project Name: S2442 Florence Arts Centre DCP

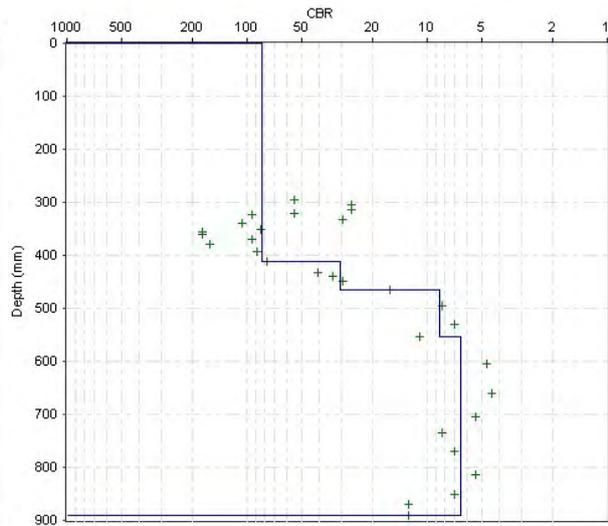
Chainage (km): 2.000  
 Direction:  
 Location/Offset: Lay-by / other  
 Cone Angle: 60 degrees  
 Zero Error (mm): 0  
 Test Date: 10/03/2025

Surface Type: Unpaved  
 Thickness (mm): 0  
 Base Type:  
 Thickness (mm):  
 Surface Moisture: Unknown  
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 2.000



Layer Boundaries Chart



CBR Chart

### Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	3.39	83	412	412
2	8.83	30	53	465
3	29.33	8	88	553
4	37.44	7	337	890

### CBR Relationship:

TRL equation:  $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

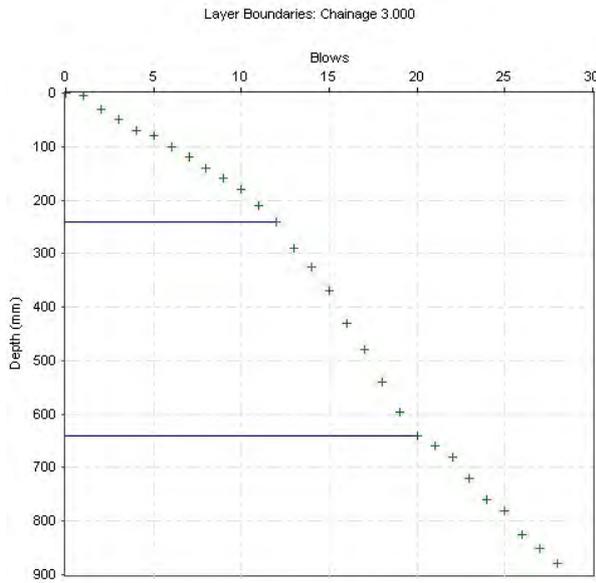
Report produced by .....

# DCP Layer Strength Analysis Report

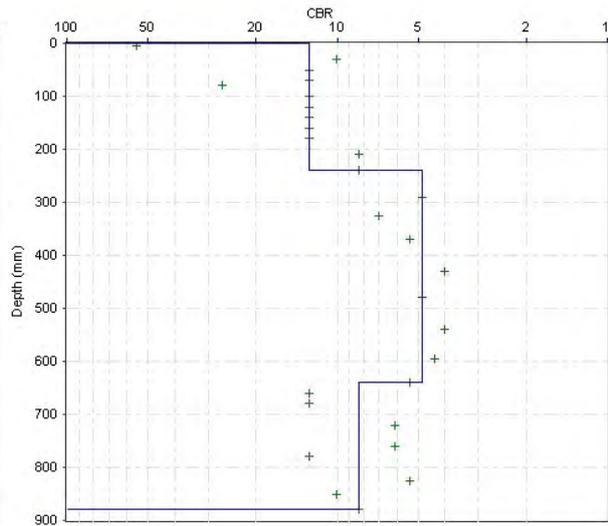
Project Name: S2442 Florence Arts Centre DCP

Chainage (km): 3.000  
 Direction:  
 Location/Offset: Lay-by / other  
 Cone Angle: 60 degrees  
 Zero Error (mm): 0  
 Test Date: 10/03/2025

Surface Type: Unpaved  
 Thickness (mm): 0  
 Base Type:  
 Thickness (mm):  
 Surface Moisture: Unknown  
 Moisture adjustment factor: Not adjusted



Layer Boundaries Chart



CBR Chart

### Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	20.00	13	240	240
2	50.00	5	400	640
3	30.00	8	240	880

### CBR Relationship:

TRL equation:  $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by .....

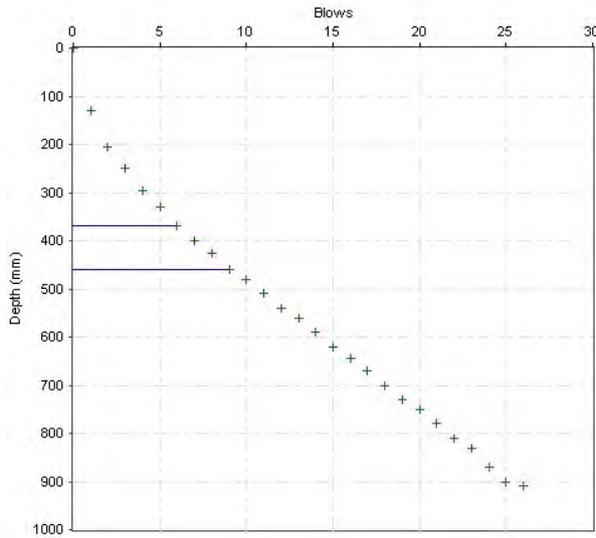
# DCP Layer Strength Analysis Report

Project Name: S2442 Florence Arts Centre DCP

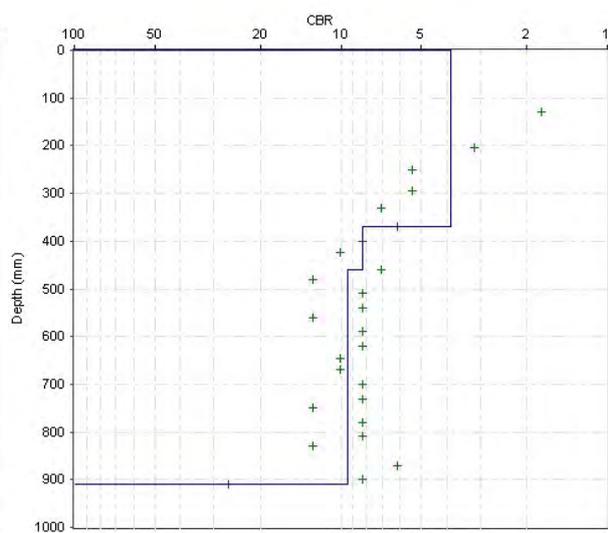
Chainage (km): 4.000  
 Direction:  
 Location/Offset: Lay-by / other  
 Cone Angle: 60 degrees  
 Zero Error (mm): 0  
 Test Date: 10/03/2025

Surface Type: Unpaved  
 Thickness (mm): 0  
 Base Type:  
 Thickness (mm):  
 Surface Moisture: Unknown  
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 4.000



Layer Boundaries Chart



CBR Chart

### Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	61.67	4	370	370
2	30.00	8	90	460
3	26.47	9	450	910

### CBR Relationship:

TRL equation:  $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

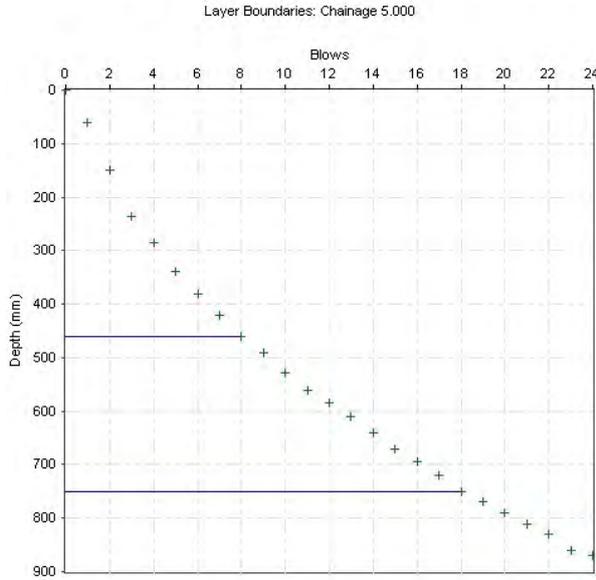
Report produced by .....

# DCP Layer Strength Analysis Report

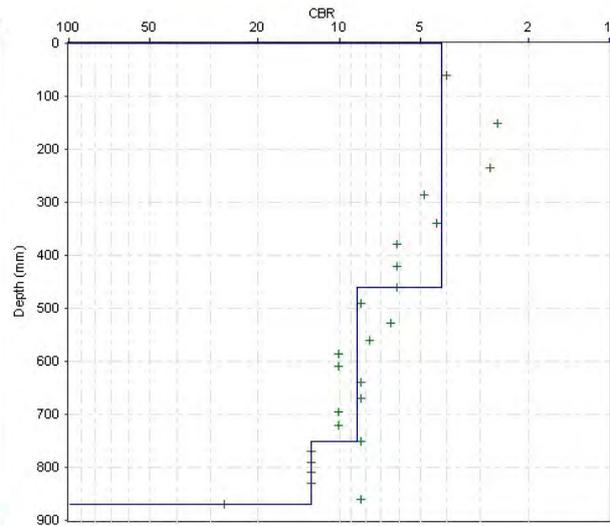
Project Name: S2442 Florence Arts Centre DCP

Chainage (km): 5.000  
 Direction:  
 Location/Offset: Lay-by / other  
 Cone Angle: 60 degrees  
 Zero Error (mm): 0  
 Test Date: 10/03/2025

Surface Type: Unpaved  
 Thickness (mm): 0  
 Base Type:  
 Thickness (mm):  
 Surface Moisture: Unknown  
 Moisture adjustment factor: Not adjusted



Layer Boundaries Chart



CBR Chart

### Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	57.50	4	460	460
2	29.00	9	290	750
3	20.00	13	120	870

### CBR Relationship:

TRL equation:  $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by .....

## **SPIRE GEOTECHNICAL LTD (SGL)**

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Specialists