Soakaway Design f -value from field tests

IGSL

Contract: Monaghan, Active Travel
Test No. SA03
Engineer CORA
Date: 04/05/2023

24665

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	DRY
0.30	1.60	Firm to stiff, greyish brown, slightly sandy gravelly slightly silty CLAY with high cobbles and low boulders content	

Location: E:667448.448; N:833888.586; G.L. 83.582mOD
Notes: SA03 done for Civic Offices project

Field Data

Depth to Water (m)	Elapsed Time (min)
0.540	0.00
0.540	1.00
0.540	2.00
0.540	3.00
0.550	4.00
0.550	5.00
0.550	6.00
0.550	7.00
0.550	8.00
0.550	9.00
0.550	10.00
0.550	12.00
0.550	14.00
0.550	16.00
0.550	18.00
0.550	20.00
0.550	25.00
0.550	30.00

Field Test

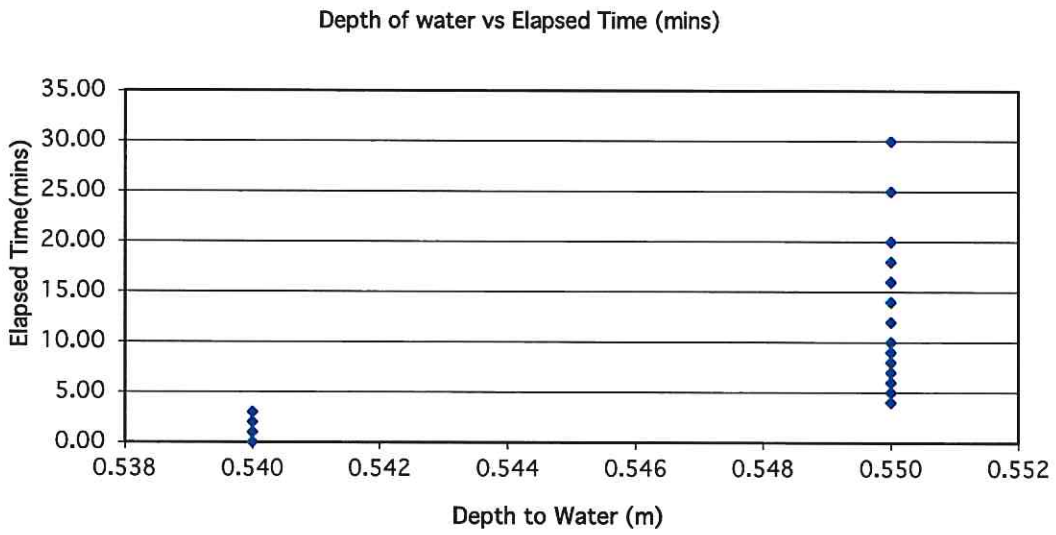
Depth of Pit (D)	1.60	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.54	m
Final depth to water =	0.55	m
Elapsed time (mins)=	30.00	
Top of permeable soil		m
Base of permeable soil		m

Water movement stoped at 0.55m

Base area=	1	m2
*Av. side area of permeable stratum over test perio	5.275	m2
Total Exposed area =	6.275	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 5.3E-05 m/min or 8.85347E-07 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Monaghan, Active Travel
Test No. SA04
Engineer CORA
Date: 04/05/2023

24665

Summary of ground conditions

from	to	Description	Ground water
0.00	0.25	TOPSOIL	
0.25	0.50	Soft, brown, sl. sandy sl. gravelly CLAY with low cobbles and hair rrots content	
0.50	1.30	Firm to stiff, brown, slightly sandy gravelly CLAY with high subangular to subrour	DRY
		cobbles and low boulders content	
1.30		Obstruction - boulders	

Location: E:667494.53; N:833936.177; G.L. 79.506mOD
Notes: SA04 done for Civic Offices project

Field Data

Depth to Water (m)	Elapsed Time (min)
0.480	0.00
0.480	1.00
0.480	2.00
0.480	3.00
0.480	4.00
0.480	5.00
0.480	6.00
0.480	7.00
0.480	8.00
0.480	9.00
0.480	10.00
0.480	12.00
0.480	14.00
0.480	16.00
0.480	18.00
0.480	20.00
0.480	25.00
0.480	30.00

Field Test

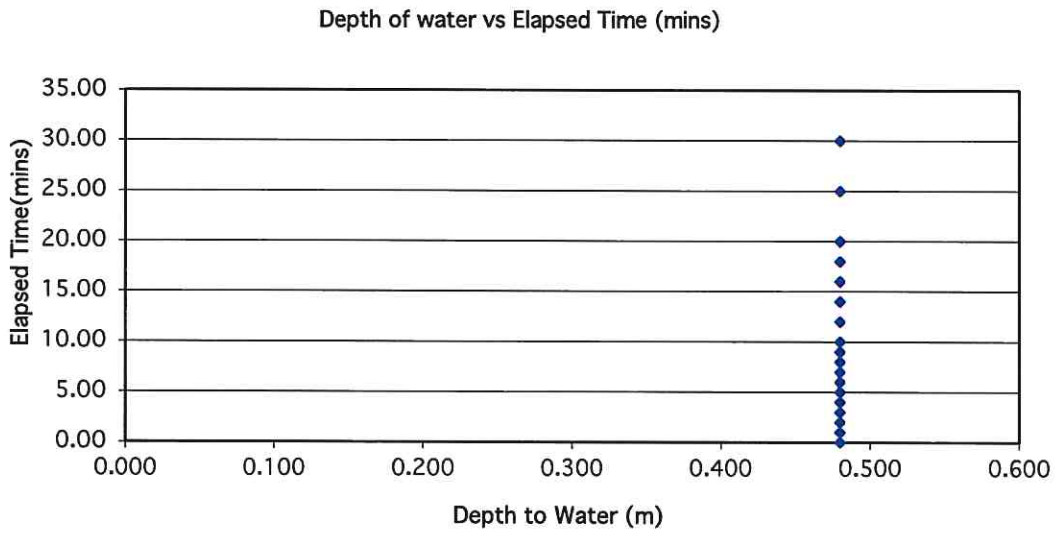
Depth of Pit (D)	1.30	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.50	m
Initial depth to Water =	0.48	m
Final depth to water =	0.48	m
Elapsed time (mins)=	30.00	
Top of permeable soil		m
Base of permeable soil		m

No Water Movement

Base area=	0.75	m2
*Av. side area of permeable stratum over test perio	3.28	m2
Total Exposed area =	4.03	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
SA 01

SA 01 – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
SA 02

SA 02 – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
SA 03

SA 03 – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
SA 04

SA 04 – spoil

Appendix Va Geotechnical Laboratory Data

IGSL Ltd
Materials Laboratory
Unit J5, M7 Business Park
Newhall, Naas
Co. Kildare
045 846176

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

Tested in accordance with BS1377:Part 2:1990, clauses 3.2, 4.3, 4.4 & 5.3**

Report No. **R147891** Contract No. 24665/1 Contract Name: Monaghan Town Active Travel Development Site

Customer Cora

Samples Received: 09/06/23 Date Tested: 09/06/23

BH/TP*	Sample No.	Depth* (m)	Lab. Ref	Sample Type*	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
BH01	AA192933	2.0	A23/1710	B	18	28	14	14	67	WS	4.4	C L	Brown sandy gravelly CLAY
BH02	AA197802	1.0	A23/1711	B	14	33	17	16	56	WS	4.4	C L	Brown sandy gravelly CLAY
BH03	AA192935	1.0	A23/1712	B	16	36	19	17	71	WS	4.4	C I	Brown sandy gravelly CLAY
BH05	AA192947	1.0	A23/1714	B	19	32	NP	NP	82	WS	4.4		Brown sandy gravelly SILT
TP01	AA200193	0.7	A23/1716	B	14	30	16	14	61	WS	4.4	C L	Grey brown sandy gravelly CLAY
TP03	AA200179	0.6	A23/1717	B	14	33	19	14	72	WS	4.4	C L	Grey brown sandy gravelly CLAY

Preparation: WS - Wet sieved
AR - As received
NP - Non plastic

Liquid Limit Clause: 4.3 Cone Penetrometer definitive method
4.4 Cone Penetrometer one point method

Sample Type: B - Bulk Disturbed
U - Undisturbed

Remarks:
Results relate only to the specimen tested,in as received condition unless otherwise noted.
NOTE: **These clauses have been superceded by EN 17892-1 and EN17892-12.
Opinions and interpretations are outside the scope of accreditation. * denotes Customer supplied information.

IGSL Ltd Materials Laboratory

Persons authorized to approve reports
H Byrne (Laboratory Manager)

Approved by | Date: 18/07/23 | Page: 1 of 1

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	97	
28	92	
20	91	
14	88	
10	86	
6.3	83	
5	81	
3.35	78	
2	73	
1.18	70	SAND
0.6	65	
0.425	62	
0.3	59	
0.15	52	
0.063	43	SILT/CLAY
0.037	35	
0.027	32	
0.017	29	
0.010	25	
0.007	22	
0.005	19	
0.002	11	

Contract No. 24665/1 Report No. R147892
Contract Name : Monaghan Town Active Travel Development Site
BH/TP No. BH04A
Sample No.* AA192941 Lab. Sample No. A23/1713
Sample Type: B
Depth* (m) 3.00 Customer: CORA
Date Received 09/06/2023 Date Testing started 09/06/2023
Description: Grey slightly sandy, slightly gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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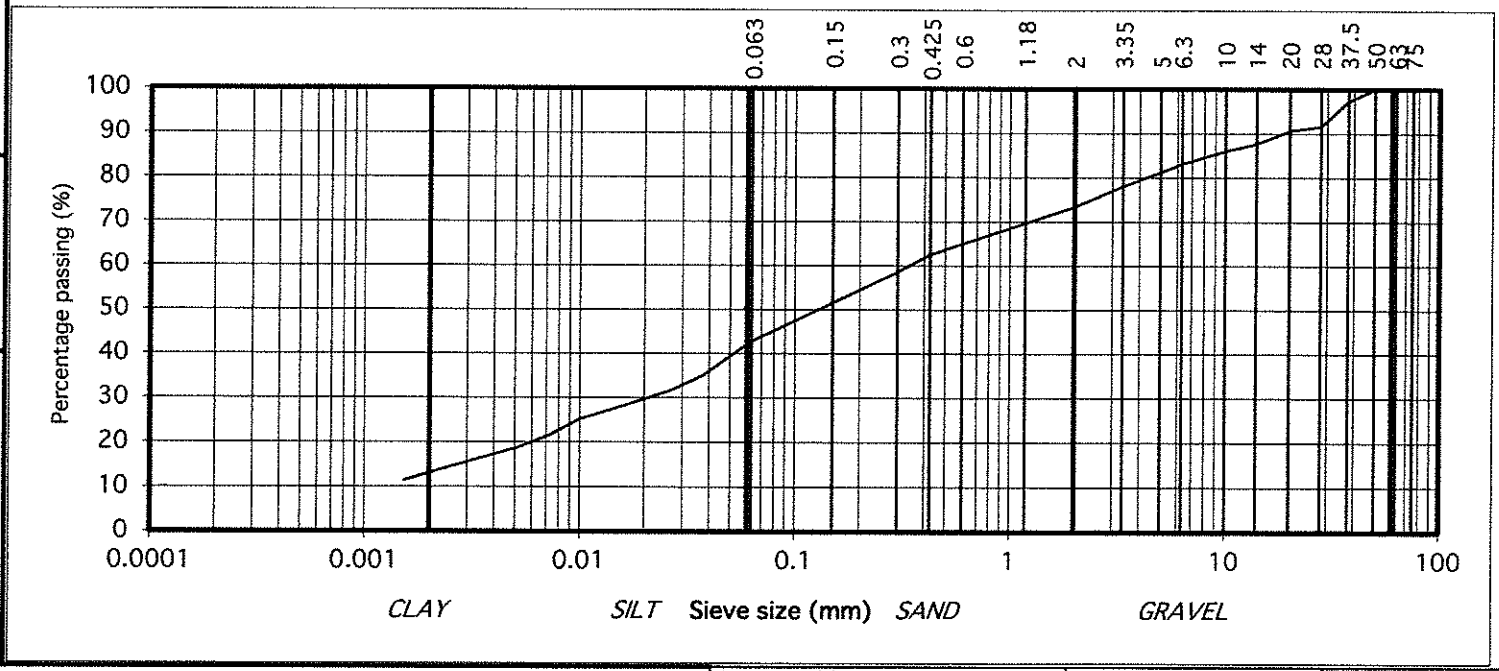

IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	18/07/23	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	94	GRAVEL
37.5	94	
28	89	
20	88	
14	86	
10	85	
6.3	82	
5	80	
3.35	77	
2	74	
1.18	72	SAND
0.6	67	
0.425	64	
0.3	58	
0.15	48	
0.063	38	SILT/CLAY
0.037	31	
0.027	28	
0.017	25	
0.010	22	
0.007	19	
0.005	17	
0.002	10	

Contract No. 24665/1 Report No. R147893
Contract Name : Monaghan Town Active Travel Development Site
BH/TP No. BH08
Sample No.* AA192947 Lab. Sample No. A23/1715
Sample Type: B
Depth* (m) 2.00 Customer: CORA
Date Received 09/06/2023 Date Testing started 09/06/2023
Description: Grey sandy, slightly gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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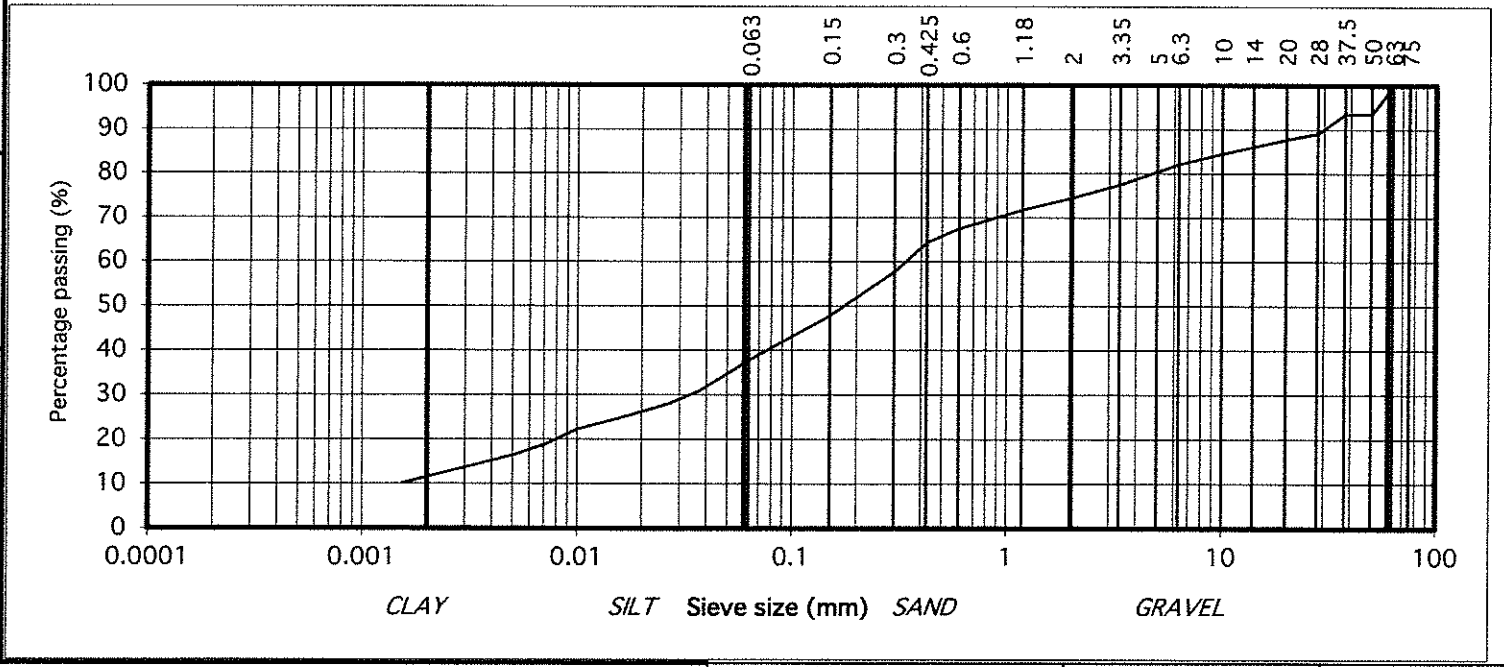


IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	18/07/23	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**

(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	99	
20	98	
14	96	
10	95	
6.3	93	
5	92	
3.35	90	
2	87	
1.18	84	SAND
0.6	81	
0.425	79	
0.3	75	
0.15	66	
0.063	55	SILT/CLAY
0.037	46	
0.027	41	
0.017	35	
0.010	29	
0.007	26	
0.005	21	
0.002	14	

Contract No. 24665/1 Report No. R147894

Contract Name : Monaghan Town Active Travel Development Site

BH/TP No. TP05

Sample No.* AA200182 Lab. Sample No. A23/1718

Sample Type: B

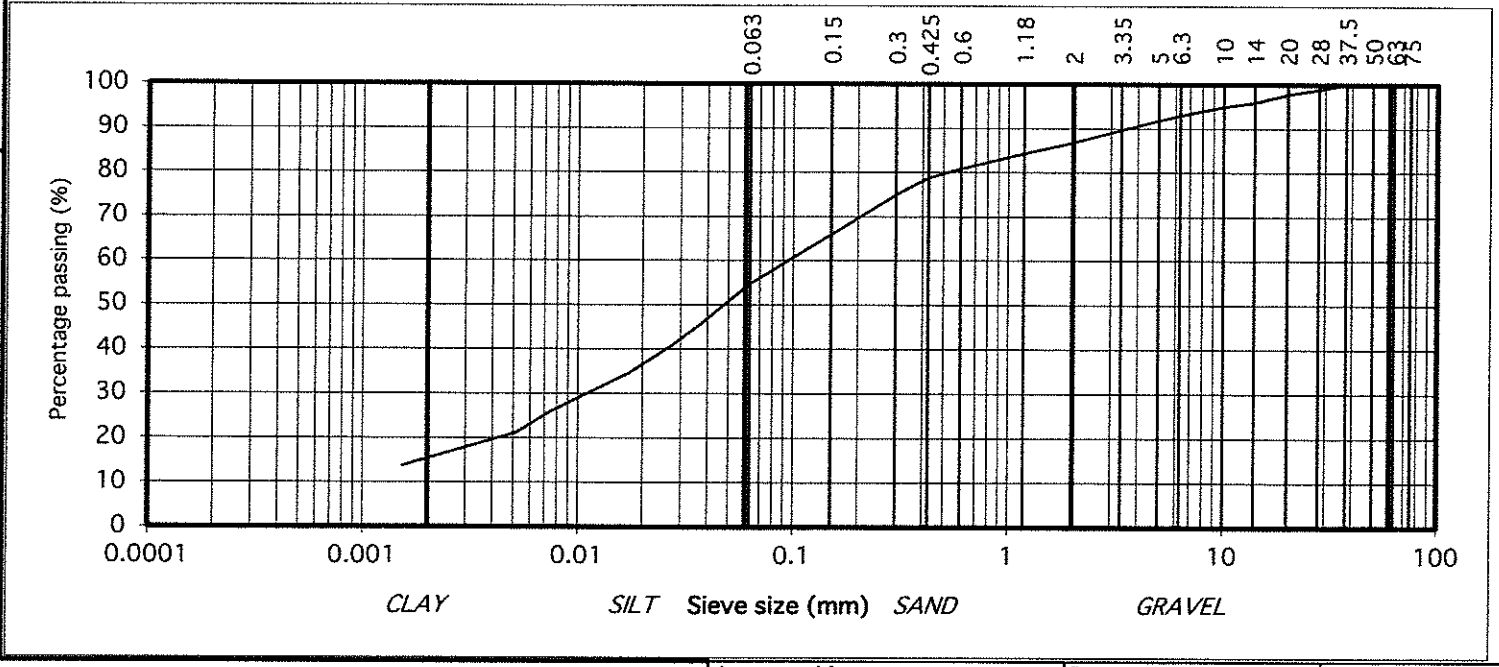
Depth* (m) 0.70 Customer: CORA

Date Received 09/06/2023 Date Testing started 09/06/2023

Description: Brown slightly sandy, slightly gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**

(note: Sedimentation stage not accredited)

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1331

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	96	
28	92	
20	91	
14	88	
10	85	
6.3	81	
5	78	
3.35	74	
2	69	
1.18	65	SAND
0.6	60	
0.425	56	
0.3	51	
0.15	39	
0.063	28	SILT/CLAY
0.038	23	
0.027	21	
0.017	18	
0.010	16	
0.007	15	
0.005	12	
0.002	9	

Contract No. 24665/1 Report No. R147895

Contract Name : Monaghan Town Active Travel Development Site

BH/TP No. TP09

Sample No.* AA200191 Lab. Sample No. A23/1719

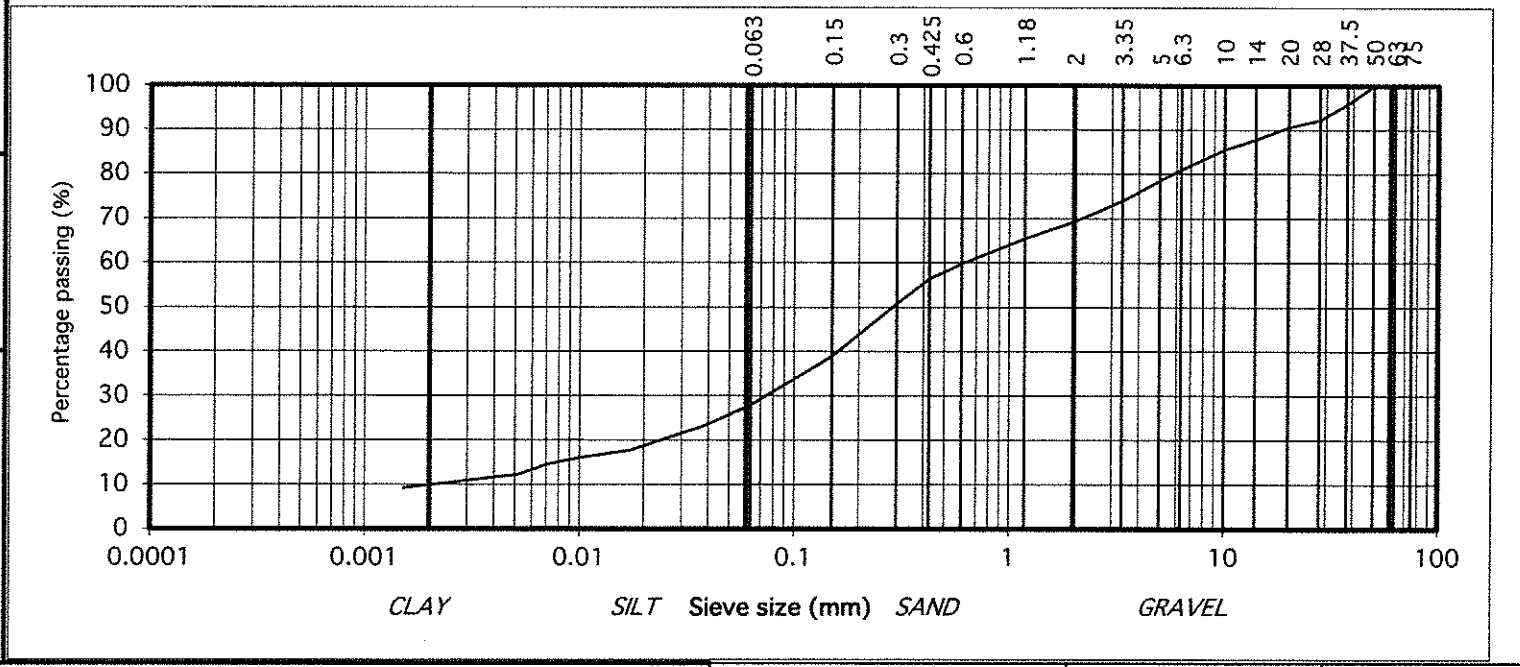
Sample Type: B

Depth* (m) 0.70 Customer: CORA

Date Received 09/06/2023 Date Testing started 09/06/2023

Description: Grey brown sandy, slightly gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	90	GRAVEL
37.5	82	
28	80	
20	75	
14	71	
10	68	
6.3	63	
5	60	
3.35	57	
2	52	
1.18	48	SAND
0.6	42	
0.425	39	
0.3	34	
0.15	29	
0.063	20	SILT/CLAY
0.038	17	
0.027	15	
0.017	13	
0.010	12	
0.007	11	
0.005	9	
0.002	7	

Contract No. 24665/1 Report No. R147896
Contract Name : Monaghan Town Active Travel Development Site
BH/TP No. TP12
Sample No.* AA205178 Lab. Sample No. A23/1720
Sample Type: B
Depth* (m) 0.80 Customer: CORA
Date Received 09/06/2023 Date Testing started 09/06/2023
Description: Brown slightly sandy, gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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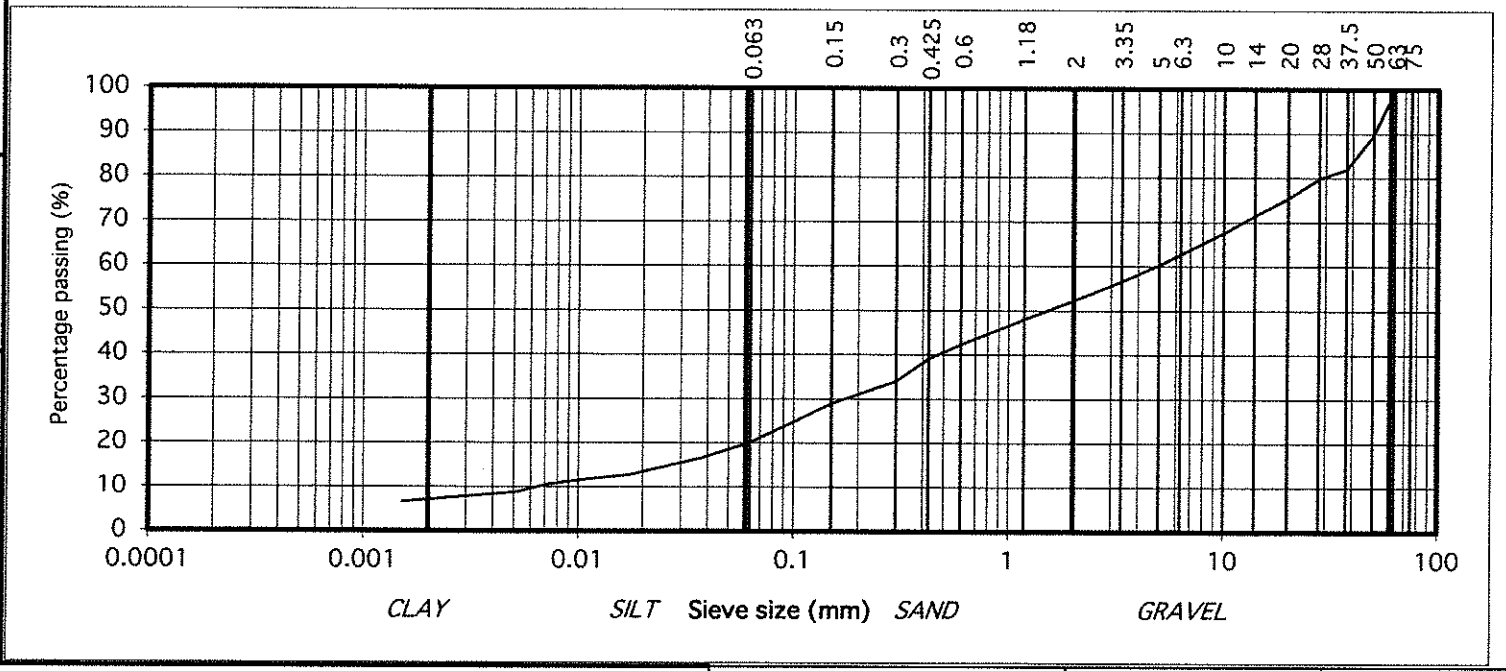

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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**

(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	93	
28	89	
20	86	
14	82	
10	77	
6.3	72	
5	69	
3.35	60	
2	53	
1.18	49	SAND
0.6	45	
0.425	43	
0.3	40	
0.15	34	
0.063	26	SILT/CLAY
0.038	23	
0.027	21	
0.017	19	
0.010	17	
0.007	15	
0.005	13	
0.002	10	

Contract No. 24665/1 Report No. R147897

Contract Name : Monaghan Town Active Travel Development Site

BH/TP No. TP14

Sample No.* AA205176 Lab. Sample No. A23/1721

Sample Type: B

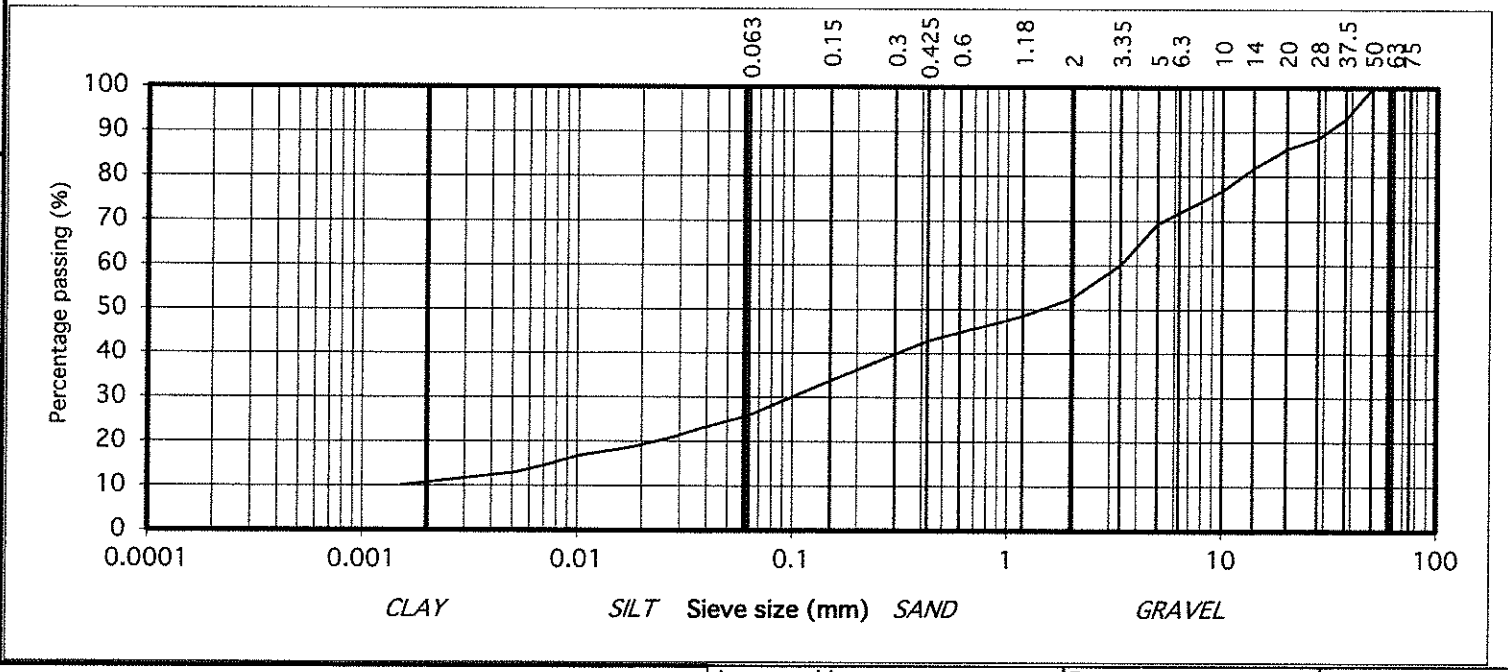
Depth* (m) 1.50 Customer: CORA

Date Received 09/06/2023 Date Testing started 09/06/2023

Description: Grey brown slightly sandy, gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

Report No.	**R147898**
Contract No.	24665/1
Contract Name:	Monaghan Town Active Travel Development Site
Customer:	CORA
BH/TP*	TP01
Sample No.*	AA200193
Depth* (m)	0.70
Sample Type:	B
Lab Sample No.	A23/1716
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	09/06/23
Date Tested:	09/06/23
Sample Cert:	Not Provided
Moisture Content (%):	15
% Particles > 20mm (By dry mass):	16
MCV:	6.6
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Grey brown sandy gravelly CLAY

Results relate only to the specimen tested, in as received condition unless otherwise noted.
Opinions and interpretations are outside the scope of accreditation.
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Persons authorised to approve reports
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H Byrne (Laboratory Manager)

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IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

Report No.	**R147899**
Contract No.	24665/1
Contract Name:	Monaghan Town Active Travel Development Site
Customer:	CORA
BH/TP*	TP03
Sample No.*	AA200179
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A23/1717
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	09/06/23
Date Tested:	09/06/23
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	15
MCV:	7.3
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Grey brown sandy gravelly CLAY

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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H Byrne (Laboratory Manager)

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IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

Report No.	**R147900**
Contract No.	24665/1
Contract Name:	Monaghan Town Active Travel Development Site
Customer:	CORA
BH/TP*	TP05
Sample No.*	AA200182
Depth* (m)	0.70
Sample Type:	B
Lab Sample No.	A23/1718
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	09/06/23
Date Tested:	09/06/23
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	11
MCV:	6.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, slightly gravelly, SILT/CLAY

Results relate only to the specimen tested, in as received condition unless otherwise noted.
Opinions and interpretations are outside the scope of accreditation.
* denotes Customer supplied information.
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Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

IGSL Ltd Materials Laboratory	Approved by	Date	Page
		18/07/23	1 of 1

IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

Report No.	**R147901**
Contract No.	24665/1
Contract Name:	Monaghan Town Active Travel Development Site
Customer:	CORA
BH/TP*	TP09
Sample No.*	AA200191
Depth* (m)	0.70
Sample Type:	B
Lab Sample No.	A23/1719
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	09/06/23
Date Tested:	09/06/23
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	11
MCV:	6.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Grey brown sandy, slightly gravelly, SILT/CLAY

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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H Byrne (Laboratory Manager)

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IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

Report No.	**R147902**
Contract No.	24665/1
Contract Name:	Monaghan Town Active Travel Development Site
Customer:	CORA
BH/TP*	TP12
Sample No.*	AA205178
Depth* (m)	0.80
Sample Type:	B
Lab Sample No.	A23/1720
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	09/06/23
Date Tested:	09/06/23
Sample Cert:	Not Provided
Moisture Content (%):	10
% Particles > 20mm (By dry mass):	21
MCV:	6.7
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, gravelly, SILT/CLAY

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

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IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

Report No.	**R147903**
Contract No.	24665/1
Contract Name:	Monaghan Town Active Travel Development Site
Customer:	CORA
BH/TP*	TP14
Sample No.*	AA205176
Depth* (m)	1.50
Sample Type:	B
Lab Sample No.	A23/1721
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	09/06/23
Date Tested:	09/06/23
Sample Cert:	Not Provided
Moisture Content (%):	14
% Particles > 20mm (By dry mass):	15
MCV:	7.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Grey brown slightly sandy, gravelly, SILT/CLAY

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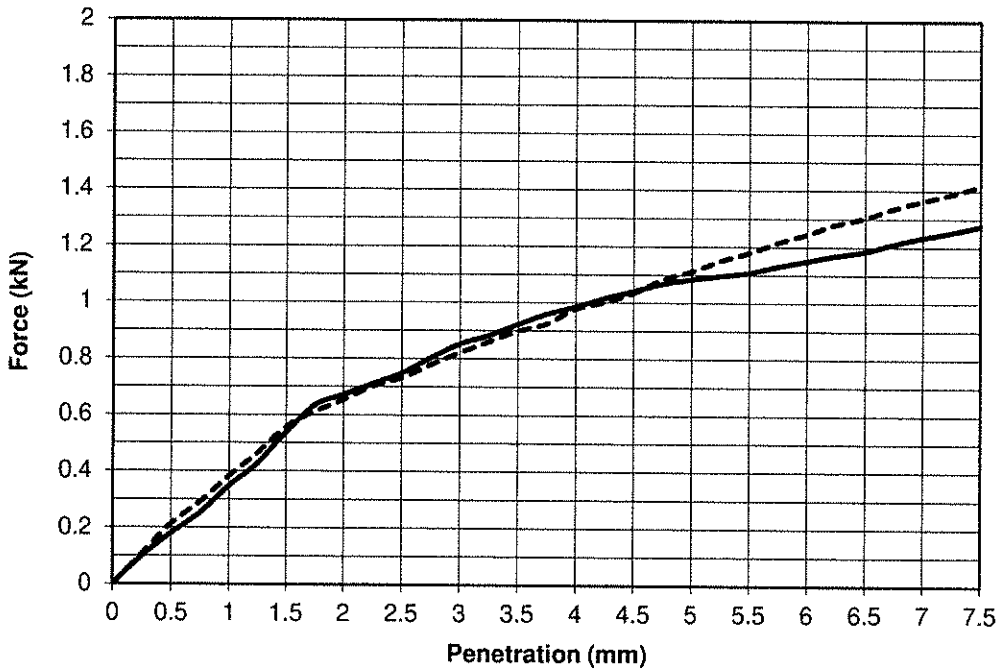
IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

Report No.	R147904	Contract	Monaghan Town Active Travel Development Site
Contract No.	24665/1	Customer	Cora
Date received	09/06/23	Date Tested	15/06/23
BH/TP No.*	TP01	Sample No.*	AA200193 Type: B
Depth* (m)	0.70	Lab sample No.	A23/1716



Key: ———— Top ---------- Base

Description:	Grey brown sandy gravelly CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.01
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.76
% Material >20mm:	13		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**5.7**	**5.6**
Moisture Content %	14	14

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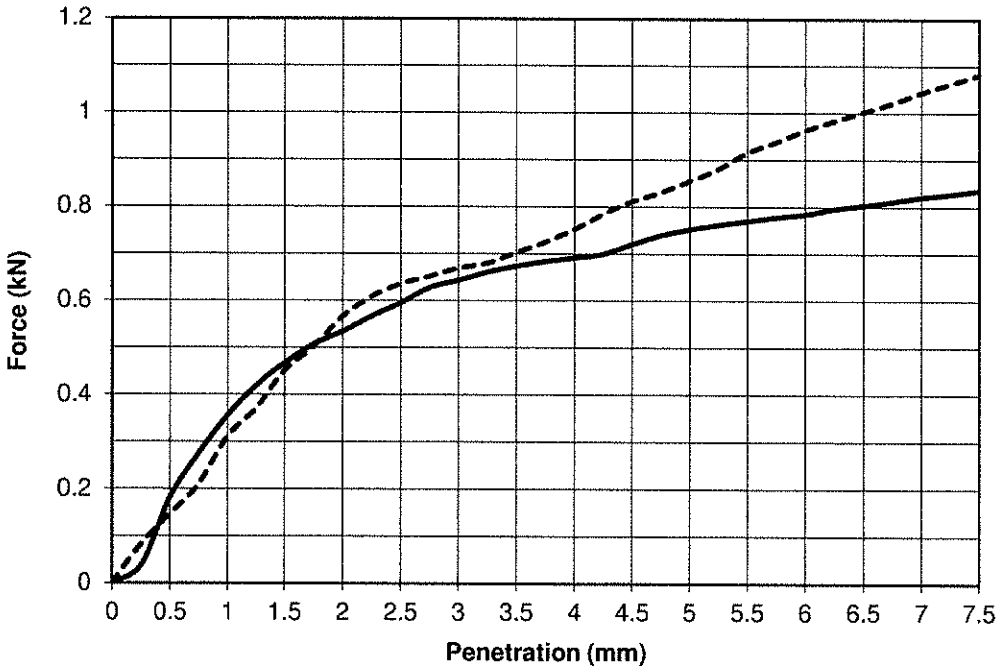
IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1331

Report No.	R147905	Contract	Monaghan Town Active Travel Development Site
Contract No.	24665/1	Customer	Cora
Date received	09/06/23	Date Tested	15/06/23
BH/TP No.*	TP03	Sample No.*	AA200179 Type: B
Depth* (m)	0.60	Lab sample No.	A23/1717



Key: ———— Top ---------- Base

Description:	Grey brown sandy gravelly CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.03
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.82
% Material >20mm:	10		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**4.5**	**4.8**
Moisture Content %	12	11

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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IGSL Ltd Materials Laboratory	Approved by	Date	Page No.
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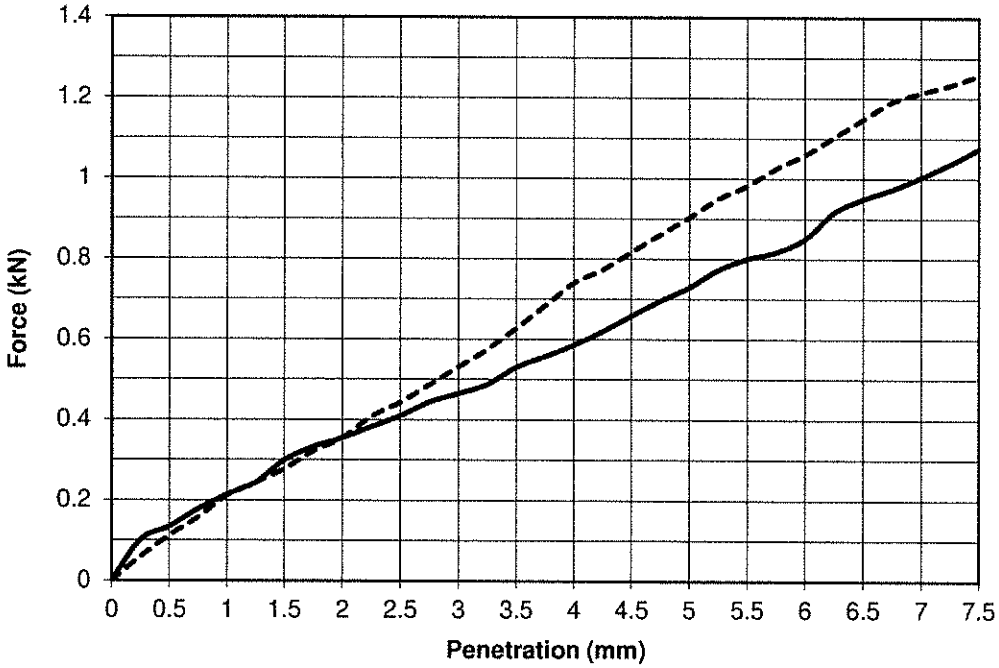
IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1337

Report No.	R147906	Contract	Monaghan Town Active Travel Development Site
Contract No.	24665/1	Customer	Cora
Date received	09/06/23	Date Tested	15/06/23
BH/TP No.*	TP05	Sample No.*	AA200182 Type: B
Depth* (m)	0.70	Lab sample No.	A23/1718



Key: ———— Top ---------- Base

Description:	Brown slightly sandy, slightly gravelly, SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.08
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.83
% Material >20mm:	10		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**3.7**	**4.5**
Moisture Content %	14	13

Results relate only to the specimen tested, in as received condition unless otherwise noted

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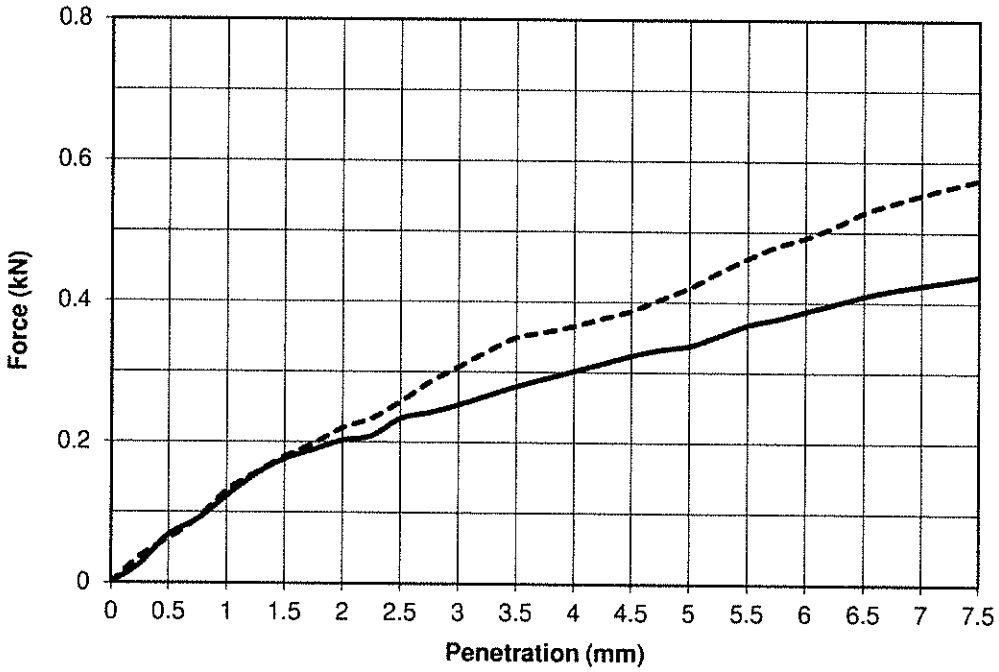
IGSL Ltd Materials Laboratory	Approved by	Date	Page No.
		18/07/23	1 of 1

IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

Report No.	R147907	Contract	Monaghan Town Active Travel Development Site
Contract No.	24665/1	Customer	Cora
Date received	09/06/23	Date Tested	15/06/23
BH/TP No.*	TP09	Sample No.*	AA200191 Type: B
Depth* (m)	0.70	Lab sample No.	A23/1719



Key: ———— Top ---------- Base

Description:	Grey brown sandy, slightly gravelly, SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.11
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.85
% Material >20mm:	13		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.8**	**2.1**
Moisture Content %	14	14

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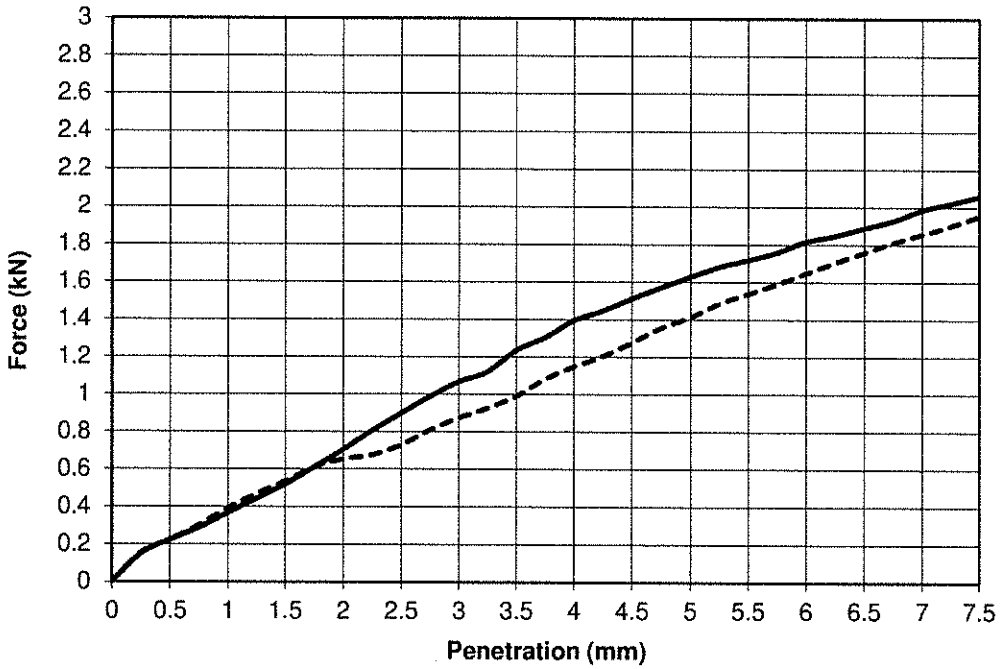
IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1331

Report No.	R147908	Contract	Monaghan Town Active Travel Development Site
Contract No.	24665/1	Customer	Cora
Date received	09/06/23	Date Tested	15/06/23
BH/TP No.*	TP12	Sample No.*	AA205178 Type: B
Depth* (m)	0.80	Lab sample No.	A23/1720



Key: ———— Top ---------- Base

Description:	Brown slightly sandy, gravelly, SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	10	Bulk Density (Mg/m^3):	2.15
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.95
% Material >20mm:	21		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**8.2**	**7.1**
Moisture Content %	10	10

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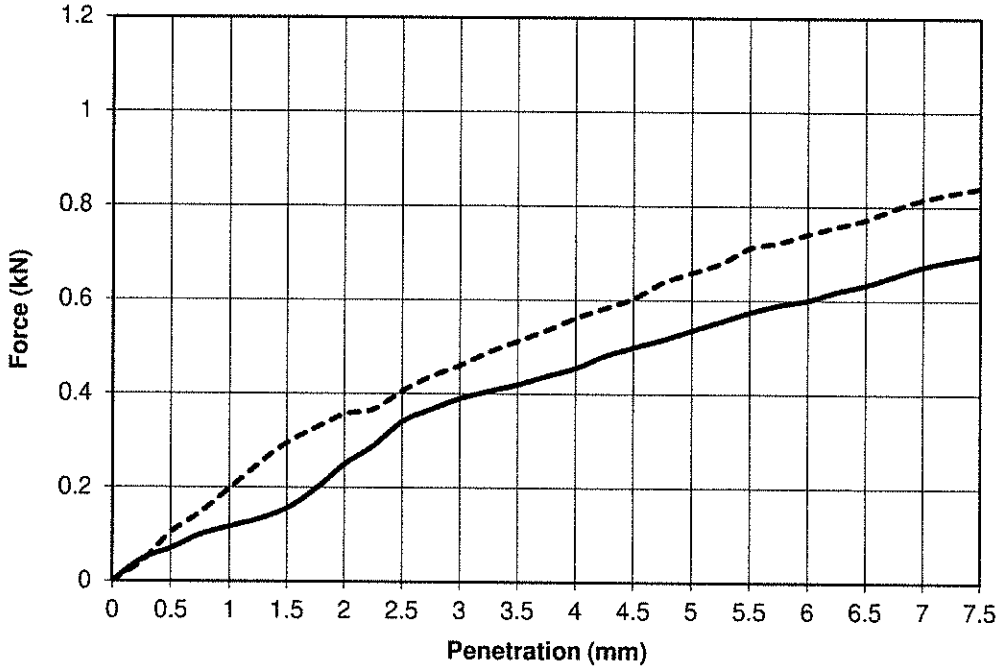
IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1331

Report No.	R147909	Contract	Monaghan Town Active Travel Development Site
Contract No.	24665/1	Customer	Cora
Date received	09/06/23	Date Tested	15/06/23
BH/TP No.*	TP14	Sample No.*	AA205176 Type: B
Depth* (m)	1.50	Lab sample No.	A23/1721



Key: ———— Top ---------- Base

Description:	Grey brown slightly sandy, gravelly, SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.04
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.79
% Material >20mm:	15		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**2.7**	**3.3**
Moisture Content %	14	13

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IGSL Ltd
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M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

Report No. R147910 Contract No. 24665/1

Contract Name: Monaghan Town Active Travel Development Site

Location*: TP01

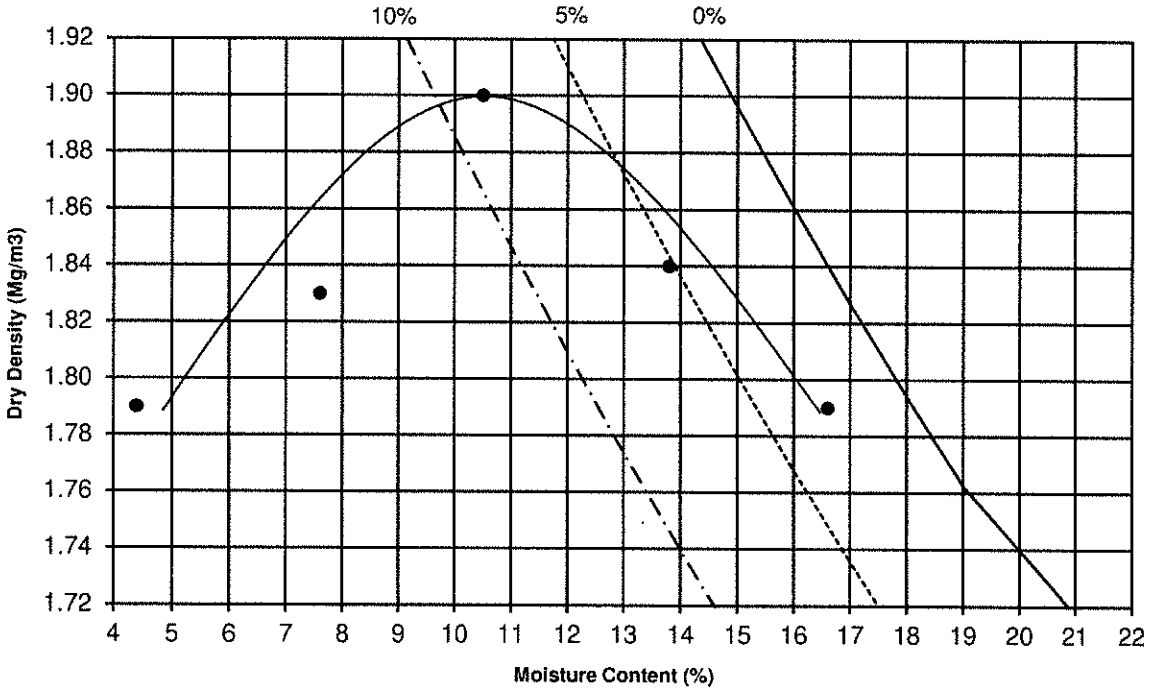
Sample No*. AA200193 Depth* (m) 0.7 Material Type B

Lab sample no. A23/1716 Customer: CORA

Date Received: 09/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 03/07/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.90	1.79	1.83	1.84	1.79		
Moisture Content (%)	11	4.4	7.6	14	17	0	



Maximum Dry Density (Mg/m^3): 1.90 Optimum Moisture Content (%): 11

Description: Brown sandy gravelly SILT/CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 13

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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

Report No. R147911 Contract No. 24665/1

Contract Name: Monaghan Town Active Travel Development Site

Location*: TP03

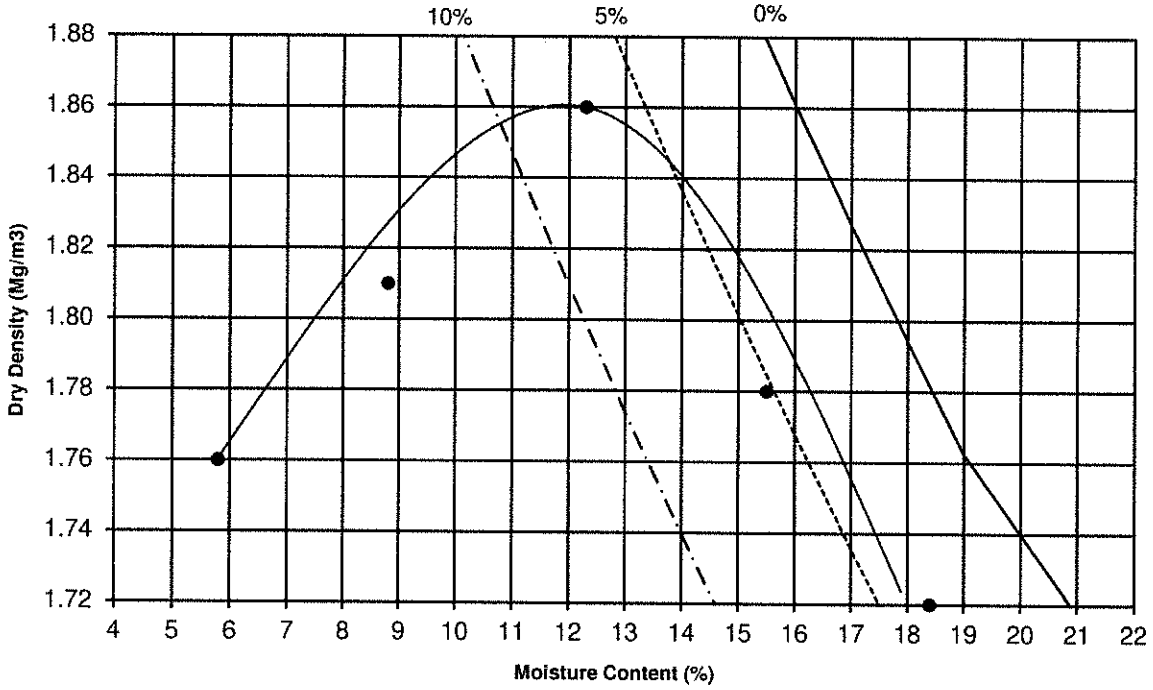
Sample No*. AA200179 Depth* (m) 0.7 Material Type B

Lab sample no. A23/1717 Customer: CORA

Date Received: 09/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 03/07/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.86	1.76	1.81	1.78	1.72		
Moisture Content (%)	12	5.8	8.8	16	18	0	



Maximum Dry Density (Mg/m^3): 1.86 Optimum Moisture Content (%): 12

Description: Brown sandy gravelly SILT/CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 10

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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

Report No. R147912 Contract No. 24665/1

Contract Name: Monaghan Town Active Travel Development Site

Location*: TP05

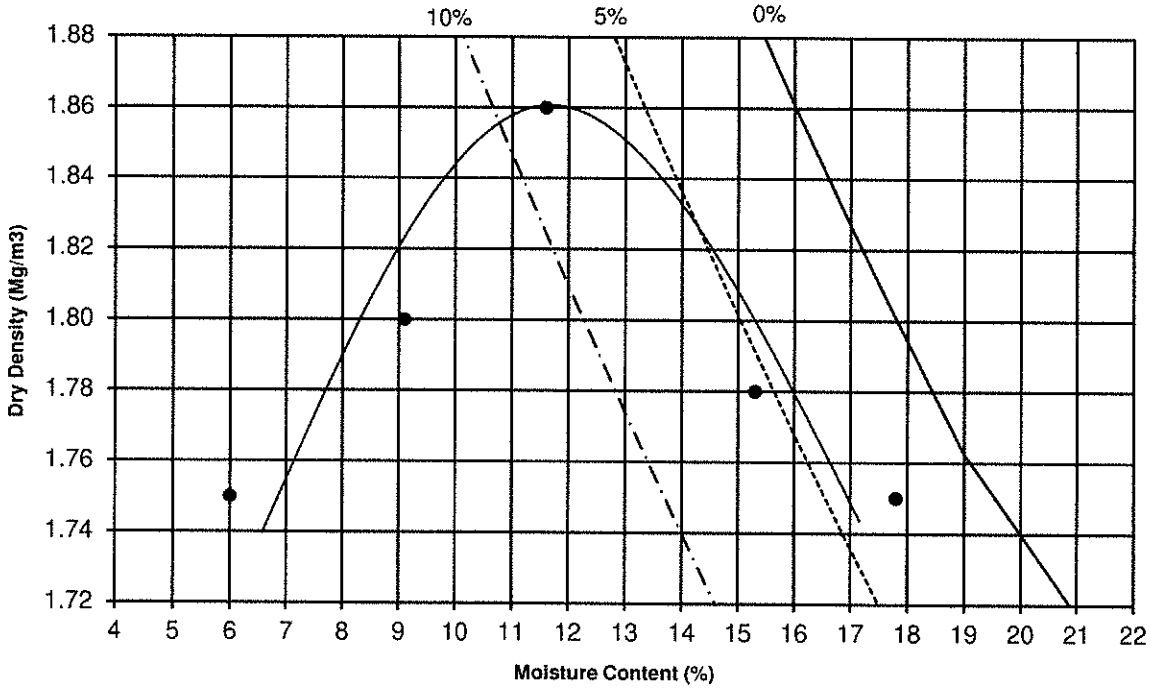
Sample No*. AA200182 Depth* (m) 0.7 Material Type B

Lab sample no. A23/1718 Customer: CORA

Date Received: 09/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 03/07/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.86	1.75	1.80	1.78	1.75		
Moisture Content (%)	12	6.0	9.1	15	18	0	



Maximum Dry Density (Mg/m^3): 1.86 Optimum Moisture Content (%): 12

Description: Brown slightly sandy, slightly gravelly, SILT/CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 10

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IGSL Ltd
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M7 Business Park
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Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1337

Report No. R147913 Contract No. 24665/1

Contract Name: Monaghan Town Active Travel Development Site

Location*: TP09

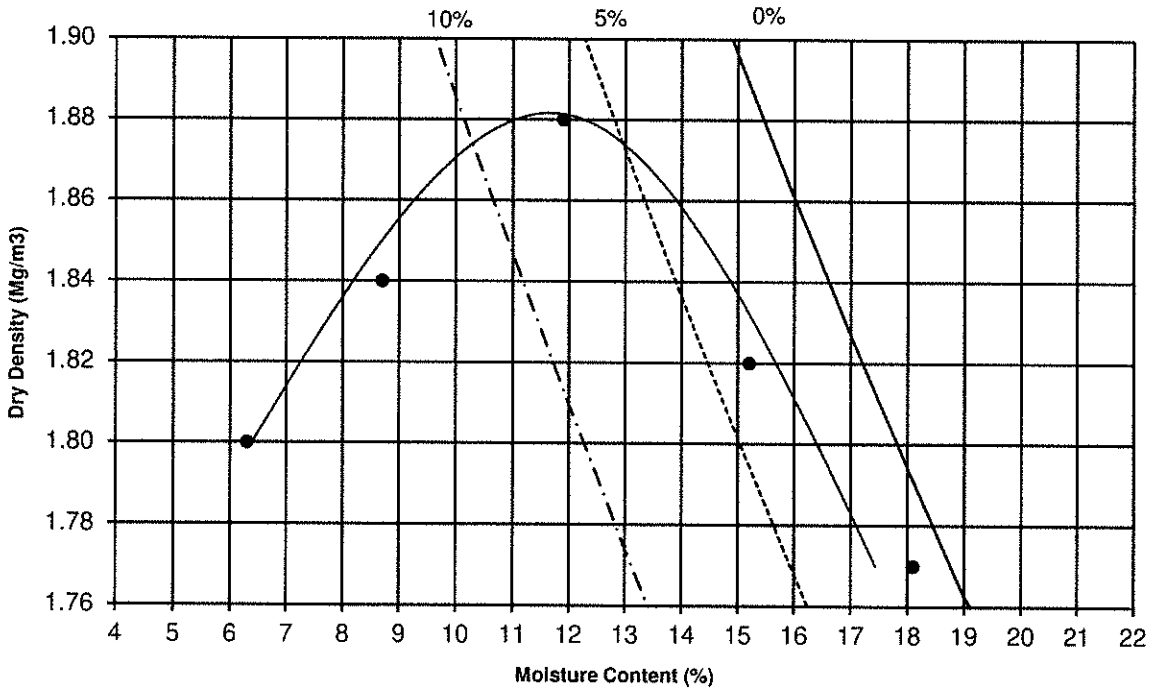
Sample No*. AA200191 Depth* (m) 0.7 Material Type B

Lab sample no. A23/1719 Customer: CORA

Date Received: 09/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 03/07/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.88	1.80	1.84	1.82	1.77		
Moisture Content (%)	12	6.3	8.7	15	18	0	



Maximum Dry Density (Mg/m^3): 1.88 Optimum Moisture Content (%): 12

Description: Grey brown sandy, slightly gravelly, SILT/CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 13

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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

Report No. R147914 Contract No. 24665/1

Contract Name: Monaghan Town Active Travel Development Site

Location*: TP12

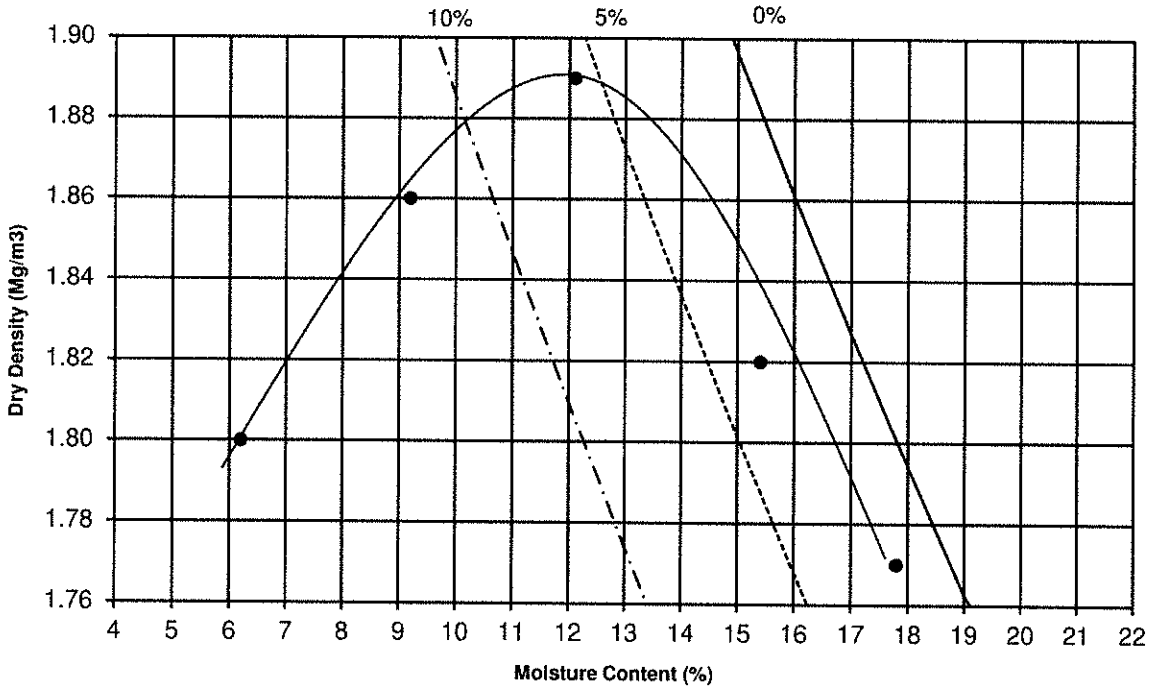
Sample No*. AA205179 Depth* (m) 0.8 Material Type B

Lab sample no. A23/1720 Customer: CORA

Date Received: 09/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 03/07/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.89	1.80	1.86	1.82	1.77		
Moisture Content (%)	12	6.2	9.2	15	18	0	



Maximum Dry Density (Mg/m^3): 1.89 Optimum Moisture Content (%): 12

Description: Brown slightly sandy, gravelly, SILT/CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 19

Results relate only to the specimen tested, In as received condition unless otherwise noted.
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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 131T

Report No. R147915 Contract No. 24665/1

Contract Name: Monaghan Town Active Travel Development Site

Location*: TP14

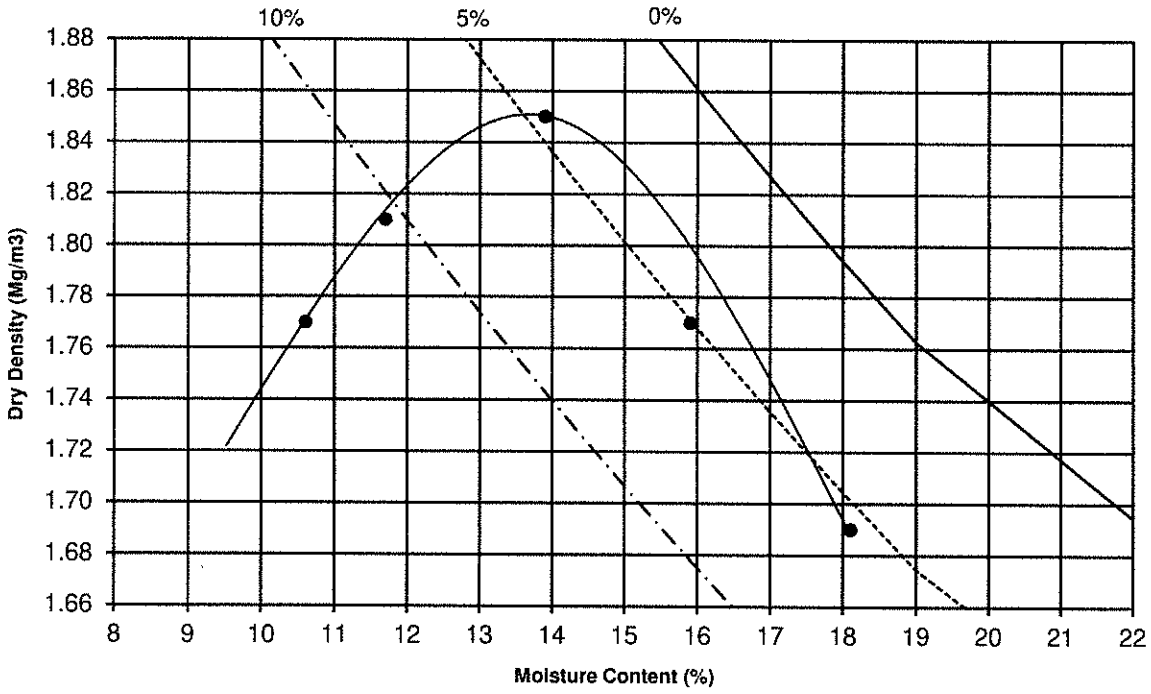
Sample No*. AA205176 Depth* (m) 1.5 Material Type B

Lab sample no. A23/1721 Customer: CORA

Date Received: 09/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 03/07/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.77	1.69	1.85	1.81	1.77		
Moisture Content (%)	11	18	14	12	16	0	



Maximum Dry Density (Mg/m^3): 1.85 Optimum Moisture Content (%): 14

Description: Grey brown slightly sandy, gravelly, SILT/CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 14

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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H Byrne (Laboratory Manager)

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Appendix Vb Chemical / Environmental Laboratory Data

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	23-19446-1
Initial Date of Issue:	19-Jun-2023
Re-Issue Details:	
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	24665 / 1 Monaghan Town Active Travel Development Site(CORA)
Quotation No.:	Q20-19951
Order No.:	
No. of Samples:	18
Turnaround (Wkdays):	7
Date Approved:	19-Jun-2023
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	08-Jun-2023
Date Instructed:	08-Jun-2023
Results Due:	16-Jun-2023

Results - Leachate

Project: 24665 / 1 Monaghan Town Active Travel Development Site(CORA)

Client: IGSL				Chemtest Job No.:		23-19446	23-19446	23-19446	23-19446	23-19446	23-19446
Quotation No.: Q20-19951				Chemtest Sample ID.:		1653387	1653389	1653392	1653395	1653398	1653402
Order No.:				Client Sample Ref.:		AA192931	AA192934	AA171710	AA200184	AA200195	AA205173
				Sample Location:		BH01	BH03	BH07	TP04	TP08	TP13
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.50	0.50	0.80	0.50	0.80	0.60
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**						
pH	U	1010	10:1		N/A	8.4	8.1	8.8	8.9	8.9	8.2
Ammonium	U	1220	10:1	mg/l	0.050	0.22	0.13	0.11	0.11	0.12	0.15
Ammonium	N	1220	10:1	mg/kg	0.10	2.5	1.4	1.5	1.6	1.7	1.6
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: 24665 / 1 Monaghan Town Active Travel Development
Site(CORA)

Client: IGSL				Chemtest Job No.:	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446
Quotation No.: Q20-19951				Chemtest Sample ID.:	1653387	1653388	1653389	1653390	1653391	1653392	1653393	1653394	1653395
Order No.:				Client Sample Ref.:	AA192931	AA197802	AA192934	AA192939	AA192947	AA171710	AA200193	AA200179	AA200184
				Sample Location:	BH01	BH02	BH03	BH04A	BH05	BH07	TP01	TP03	TP04
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.00	0.50	1.00	1.00	0.80	0.70	0.60	0.50
				Asbestos Lab:	DURHAM		DURHAM			NEW-ASB			NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-		-			-			-
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected			No Asbestos Detected			No Asbestos Detected
Moisture	N	2030	%	0.020	25	7.0	22	11	11	6.8	10	16	10
pH (2.5:1)	N	2010		4.0		[A] 8.6		[A] 8.5	[A] 8.5				
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40		[A] < 0.40			[A] < 0.40			[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010				
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010				
Total Sulphur	U	2175	%	0.010		[A] 0.032		[A] 0.015	[A] 0.019				
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 2.7		[A] 3.2			[A] 2.3			[A] 2.2
Chloride (Water Soluble)	U	2220	g/l	0.010		[A] 0.11		[A] < 0.010	[A] < 0.010				
Nitrate (Water Soluble)	N	2220	g/l	0.010		< 0.010		< 0.010	< 0.010				
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50		[A] < 0.50			[A] < 0.50			[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 14		[A] 4.7			[A] 2.5			[A] 4.6
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01		< 0.01	< 0.01				
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.024	[A] 0.057	[A] 0.018	[A] 0.029	[A] 0.031	[A] 0.014			[A] 0.053
Arsenic	U	2455	mg/kg	0.5	3.3		3.6			3.3			5.1
Barium	U	2455	mg/kg	0	28		39			38			34
Cadmium	U	2455	mg/kg	0.10	< 0.10		< 0.10			< 0.10			< 0.10
Chromium	U	2455	mg/kg	0.5	15		16			15			18
Molybdenum	U	2455	mg/kg	0.5	< 0.5		< 0.5			< 0.5			< 0.5
Antimony	N	2455	mg/kg	2.0	< 2.0		< 2.0			< 2.0			< 2.0
Copper	U	2455	mg/kg	0.50	10		13			11			13
Mercury	U	2455	mg/kg	0.05	< 0.05		< 0.05			0.05			0.07
Nickel	U	2455	mg/kg	0.50	23		31			21			28
Lead	U	2455	mg/kg	0.50	8.1		12			14			20
Selenium	U	2455	mg/kg	0.25	< 0.25		< 0.25			< 0.25			< 0.25
Zinc	U	2455	mg/kg	0.50	29		38			37			62
Chromium (Trivalent)	N	2490	mg/kg	1.0	15		16			15			18
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50			< 0.50			< 0.50
Organic Matter	U	2625	%	0.40							[A] 2.5	[A] 1.8	
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10		< 10			< 10			< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0

Results - Soil

Project: 24665 / 1 Monaghan Town Active Travel Development Site(CORA)

Client: IGSL				Chemtest Job No.:	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446
Quotation No.: Q20-19951				Chemtest Sample ID.:	1653387	1653388	1653389	1653390	1653391	1653392	1653393	1653394	1653395
Order No.:				Client Sample Ref.:	AA192931	AA197802	AA192934	AA192939	AA192947	AA171710	AA200193	AA200179	AA200184
				Sample Location:	BH01	BH02	BH03	BH04A	BH05	BH07	TP01	TP03	TP04
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.00	0.50	1.00	1.00	0.80	0.70	0.60	0.50
				Asbestos Lab:	DURHAM		DURHAM			NEW-ASB			NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0		[A] < 5.0			[A] < 5.0			[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0		[A] < 5.0			[A] < 5.0			[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10		[A] < 10			[A] < 10			[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0			[A] < 1.0			[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] 0.17		[A] < 0.010			[A] < 0.010			[A] < 0.010
Pyrene	N	2800	mg/kg	0.010	[A] 0.18		[A] < 0.010			[A] < 0.010			[A] < 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010			[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] 0.35		[A] < 0.20			[A] < 0.20			[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010			[A] < 0.0010			[A] < 0.0010

Results - Soil

Project: 24665 / 1 Monaghan Town Active Travel Development
Site(CORA)

Client: IGSL			Chemtest Job No.:	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446
Quotation No.: Q20-19951			Chemtest Sample ID.:	1653387	1653388	1653389	1653390	1653391	1653392	1653393	1653394	1653395
Order No.:			Client Sample Ref.:	AA192931	AA197802	AA192934	AA192939	AA192947	AA171710	AA200193	AA200179	AA200184
			Sample Location:	BH01	BH02	BH03	BH04A	BH05	BH07	TP01	TP03	TP04
			Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):	0.50	1.00	0.50	1.00	1.00	0.80	0.70	0.60	0.50
			Asbestos Lab:	DURHAM		DURHAM			NEW-ASB			NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010			[A] < 0.0010			[A] < 0.0010
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010			[A] < 0.0010			[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010			[A] < 0.0010			[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010			[A] < 0.0010			[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010			[A] < 0.0010			[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010			[A] < 0.0010			[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010			[A] < 0.0010			[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10		< 0.10			< 0.10			< 0.10

Results - Soil

Project: 24665 / 1 Monaghan Town Active Travel Development Site(CORA)

Client: IGSL				Chemtest Job No.:	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446
Quotation No.: Q20-19951				Chemtest Sample ID.:	1653396	1653397	1653398	1653399	1653400	1653401	1653402	1653403	1653404
Order No.:				Client Sample Ref.:	AA200182	AA200188	AA200195	AA200196	AA200191	AA205178	AA205173	AA205175	AA205176
				Sample Location:	TP05	TP07	TP08	TP08	TP09	TP12	TP13	TP14	TP14
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.70	0.50	0.80	1.80	0.70	0.80	0.60	0.70	1.50
				Asbestos Lab:			COVENTRY				NEW-ASB		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A			-				-		
Asbestos Identification	U	2192		N/A			No Asbestos Detected				No Asbestos Detected		
Moisture	N	2030	%	0.020	13	12	10	7.8	11	11	19	17	13
pH (2.5:1)	N	2010		4.0		[A] 8.0		[A] 8.6				[A] 7.8	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40			[A] < 0.40				[A] 0.52		
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010		[A] < 0.010				[A] < 0.010	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010		[A] < 0.010				[A] 0.24	
Total Sulphur	U	2175	%	0.010		[A] 0.034		[A] 0.027				[A] 0.077	
Sulphur (Elemental)	U	2180	mg/kg	1.0			[A] 2.6				[A] 3.8		
Chloride (Water Soluble)	U	2220	g/l	0.010		[A] 0.028		[A] < 0.010				[A] < 0.010	
Nitrate (Water Soluble)	N	2220	g/l	0.010		0.017		< 0.010				< 0.010	
Cyanide (Total)	U	2300	mg/kg	0.50			[A] < 0.50				[A] < 0.50		
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50			[A] 3.3				[A] 3.3		
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01		< 0.01				< 0.01	
Sulphate (Acid Soluble)	U	2430	%	0.010		[A] 0.065	[A] 0.033	[A] 0.045			[A] 0.040	[A] 0.075	
Arsenic	U	2455	mg/kg	0.5			4.5				5.3		
Barium	U	2455	mg/kg	0			48				43		
Cadmium	U	2455	mg/kg	0.10			< 0.10				< 0.10		
Chromium	U	2455	mg/kg	0.5			27				28		
Molybdenum	U	2455	mg/kg	0.5			< 0.5				< 0.5		
Antimony	N	2455	mg/kg	2.0			< 2.0				< 2.0		
Copper	U	2455	mg/kg	0.50			21				18		
Mercury	U	2455	mg/kg	0.05			< 0.05				< 0.05		
Nickel	U	2455	mg/kg	0.50			43				37		
Lead	U	2455	mg/kg	0.50			16				13		
Selenium	U	2455	mg/kg	0.25			< 0.25				< 0.25		
Zinc	U	2455	mg/kg	0.50			48				41		
Chromium (Trivalent)	N	2490	mg/kg	1.0			27				28		
Chromium (Hexavalent)	N	2490	mg/kg	0.50			< 0.50				< 0.50		
Organic Matter	U	2625	%	0.40	[A] 1.1				[A] 1.1	[A] 1.0			[A] 1.1
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10			< 10				< 10		
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0		
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0		
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0		
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0		
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0		
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0		

Results - Soil

Project: 24665 / 1 Monaghan Town Active Travel Development
Site(CORA)

Client: IGSL					Chemtest Job No.:	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446
Quotation No.: Q20-19951					Chemtest Sample ID.:	1653396	1653397	1653398	1653399	1653400	1653401	1653402	1653403	1653404
Order No.:					Client Sample Ref.:	AA200182	AA200188	AA200195	AA200196	AA200191	AA205178	AA205173	AA205175	AA205176
					Sample Location:	TP05	TP07	TP08	TP08	TP09	TP12	TP13	TP14	TP14
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.70	0.50	0.80	1.80	0.70	0.80	0.60	0.70	1.50
					Asbestos Lab:			COVENTRY				NEW-ASB		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0			[A] < 5.0				[A] < 5.0			
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0			[A] < 1.0				[A] < 1.0			
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0			[A] < 5.0				[A] < 5.0			
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0			[A] < 10				[A] < 10			
Benzene	U	2760	µg/kg	1.0			[A] < 1.0				[A] < 1.0			
Toluene	U	2760	µg/kg	1.0			[A] < 1.0				[A] < 1.0			
Ethylbenzene	U	2760	µg/kg	1.0			[A] < 1.0				[A] < 1.0			
m & p-Xylene	U	2760	µg/kg	1.0			[A] < 1.0				[A] < 1.0			
o-Xylene	U	2760	µg/kg	1.0			[A] < 1.0				[A] < 1.0			
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0			[A] < 1.0				[A] < 1.0			
Naphthalene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Acenaphthylene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Acenaphthene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Fluorene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Phenanthrene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Anthracene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Fluoranthene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Pyrene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Benzo[a]anthracene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Chrysene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Benzo[b]fluoranthene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Benzo[k]fluoranthene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Benzo[a]pyrene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Coronene	N	2800	mg/kg	0.010			[A] < 0.010				[A] < 0.010			
Total Of 17 PAH's	N	2800	mg/kg	0.20			[A] < 0.20				[A] < 0.20			
PCB 28	N	2815	mg/kg	0.0010			[A] < 0.0010				[A] < 0.0010			

Results - Soil

Project: 24665 / 1 Monaghan Town Active Travel Development
Site(CORA)

Client: IGSL				Chemtest Job No.:	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446	23-19446
Quotation No.: Q20-19951				Chemtest Sample ID.:	1653396	1653397	1653398	1653399	1653400	1653401	1653402	1653403	1653404
Order No.:				Client Sample Ref.:	AA200182	AA200188	AA200195	AA200196	AA200191	AA205178	AA205173	AA205175	AA205176
				Sample Location:	TP05	TP07	TP08	TP08	TP09	TP12	TP13	TP14	TP14
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.70	0.50	0.80	1.80	0.70	0.80	0.60	0.70	1.50
				Asbestos Lab:			COVENTRY				NEW-ASB		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 52	N	2815	mg/kg	0.0010			[A] < 0.0010				[A] < 0.0010		
PCB 90+101	N	2815	mg/kg	0.0010			[A] < 0.0010				[A] < 0.0010		
PCB 118	N	2815	mg/kg	0.0010			[A] < 0.0010				[A] < 0.0010		
PCB 153	N	2815	mg/kg	0.0010			[A] < 0.0010				[A] < 0.0010		
PCB 138	N	2815	mg/kg	0.0010			[A] < 0.0010				[A] < 0.0010		
PCB 180	N	2815	mg/kg	0.0010			[A] < 0.0010				[A] < 0.0010		
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010			[A] < 0.0010				[A] < 0.0010		
Total Phenols	U	2920	mg/kg	0.10			< 0.10				< 0.10		

Results - Single Stage WAC

Project: 24665 / 1 Monaghan Town Active Travel Development Site(CORA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19446						
Chemtest Sample ID:	1653387						
Sample Ref:	AA192931						
Sample ID:							
Sample Location:	BH01						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 2.4	3	5	6
Loss On Ignition	2610	U	%	5.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.35	100	--	--
pH	2010	U		7.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0080	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0002	0.0023	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0006	0.0058	0.5	10	30
Nickel	1455	U	0.0007	0.0066	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.005	0.046	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.15	1.5	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	45	450	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.8	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	25

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 1 Monaghan Town Active Travel Development Site(CORA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19446						
Chemtest Sample ID:	1653389						
Sample Ref:	AA192934						
Sample ID:							
Sample Location:	BH03						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 2.0	3	5	6
Loss On Ignition	2610	U	%	1.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.012	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0003	0.0031	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0008	0.0079	0.5	10	30
Nickel	1455	U	0.0005	0.0050	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.003	0.033	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.10	1.0	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	47	470	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.1	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	22

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 1 Monaghan Town Active Travel Development Site(CORA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19446						
Chemtest Sample ID:	1653392						
Sample Ref:	AA171710						
Sample ID:							
Sample Location:	BH07						
Top Depth(m):	0.80						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 1.3	3	5	6
Loss On Ignition	2610	U	%	10	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.011	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0003	0.0030	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0016	0.016	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0006	0.0062	0.5	10	30
Nickel	1455	U	0.0008	0.0077	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.003	0.035	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.14	1.4	10	150	500
Sulphate	1220	U	2.3	23	1000	20000	50000
Total Dissolved Solids	1020	N	40	400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.4	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.8

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 1 Monaghan Town Active Travel Development Site(CORA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19446						
Chemtest Sample ID:	1653395						
Sample Ref:	AA200184						
Sample ID:							
Sample Location:	TP04						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 1.3	3	5	6
Loss On Ignition	2610	U	%	3.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0060	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0003	0.0029	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0010	0.010	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0008	0.0081	0.5	10	30
Nickel	1455	U	0.0005	0.0053	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.005	0.055	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.12	1.2	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	31	310	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 1 Monaghan Town Active Travel Development Site(CORA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19446						
Chemtest Sample ID:	1653398						
Sample Ref:	AA200195						
Sample ID:							
Sample Location:	TP08						
Top Depth(m):	0.80						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.77	3	5	6
Loss On Ignition	2610	U	%	2.8	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.017	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0061	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0006	0.0060	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0008	0.0076	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0050	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.003	0.034	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.096	< 1.0	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	31	310	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.0	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 1 Monaghan Town Active Travel Development Site(CORA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19446						
Chemtest Sample ID:	1653402						
Sample Ref:	AA205173						
Sample ID:							
Sample Location:	TP13						
Top Depth(m):	0.60						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.34	3	5	6
Loss On Ignition	2610	U	%	4.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		7.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0019	0.019	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0036	0.036	0.5	10	70
Copper	1455	U	0.0058	0.058	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0004	0.0043	0.5	10	30
Nickel	1455	U	0.0056	0.056	0.4	10	40
Lead	1455	U	0.0013	0.013	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.010	0.10	4	50	200
Chloride	1220	U	1.1	11	800	15000	25000
Fluoride	1220	U	0.12	1.2	10	150	500
Sulphate	1220	U	2.0	20	1000	20000	50000
Total Dissolved Solids	1020	N	13	130	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.7	57	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	19

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1653387	AA192931		BH01		A	Amber Glass 250ml
1653387	AA192931		BH01		A	Plastic Tub 500g
1653388	AA197802		BH02		A	Amber Glass 250ml
1653388	AA197802		BH02		A	Plastic Tub 500g
1653389	AA192934		BH03		A	Amber Glass 250ml
1653389	AA192934		BH03		A	Plastic Tub 500g
1653390	AA192939		BH04A		A	Amber Glass 250ml
1653390	AA192939		BH04A		A	Plastic Tub 500g
1653391	AA192947		BH05		A	Amber Glass 250ml
1653391	AA192947		BH05		A	Plastic Tub 500g
1653392	AA171710		BH07		A	Amber Glass 250ml
1653392	AA171710		BH07		A	Plastic Tub 500g
1653393	AA200193		TP01		A	Amber Glass 250ml
1653393	AA200193		TP01		A	Plastic Tub 500g
1653394	AA200179		TP03		A	Amber Glass 250ml
1653394	AA200179		TP03		A	Plastic Tub 500g
1653395	AA200184		TP04		A	Amber Glass 250ml
1653395	AA200184		TP04		A	Plastic Tub 500g
1653396	AA200182		TP05		A	Amber Glass 250ml
1653396	AA200182		TP05		A	Plastic Tub 500g
1653397	AA200188		TP07		A	Amber Glass 250ml
1653397	AA200188		TP07		A	Plastic Tub 500g

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1653398	AA200195		TP08		A	Amber Glass 250ml
1653398	AA200195		TP08		A	Plastic Tub 500g
1653399	AA200196		TP08		A	Amber Glass 250ml
1653399	AA200196		TP08		A	Plastic Tub 500g
1653400	AA200191		TP09		A	Amber Glass 250ml
1653400	AA200191		TP09		A	Plastic Tub 500g
1653401	AA205178		TP12		A	Amber Glass 250ml
1653401	AA205178		TP12		A	Plastic Tub 500g
1653402	AA205173		TP13		A	Amber Glass 250ml
1653402	AA205173		TP13		A	Plastic Tub 500g
1653403	AA205175		TP14		A	Amber Glass 250ml
1653403	AA205175		TP14		A	Plastic Tub 500g
1653404	AA205176		TP14		A	Amber Glass 250ml
1653404	AA205176		TP14		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N--dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.

Test Methods

SOP	Title	Parameters included	Method summary
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key	
U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

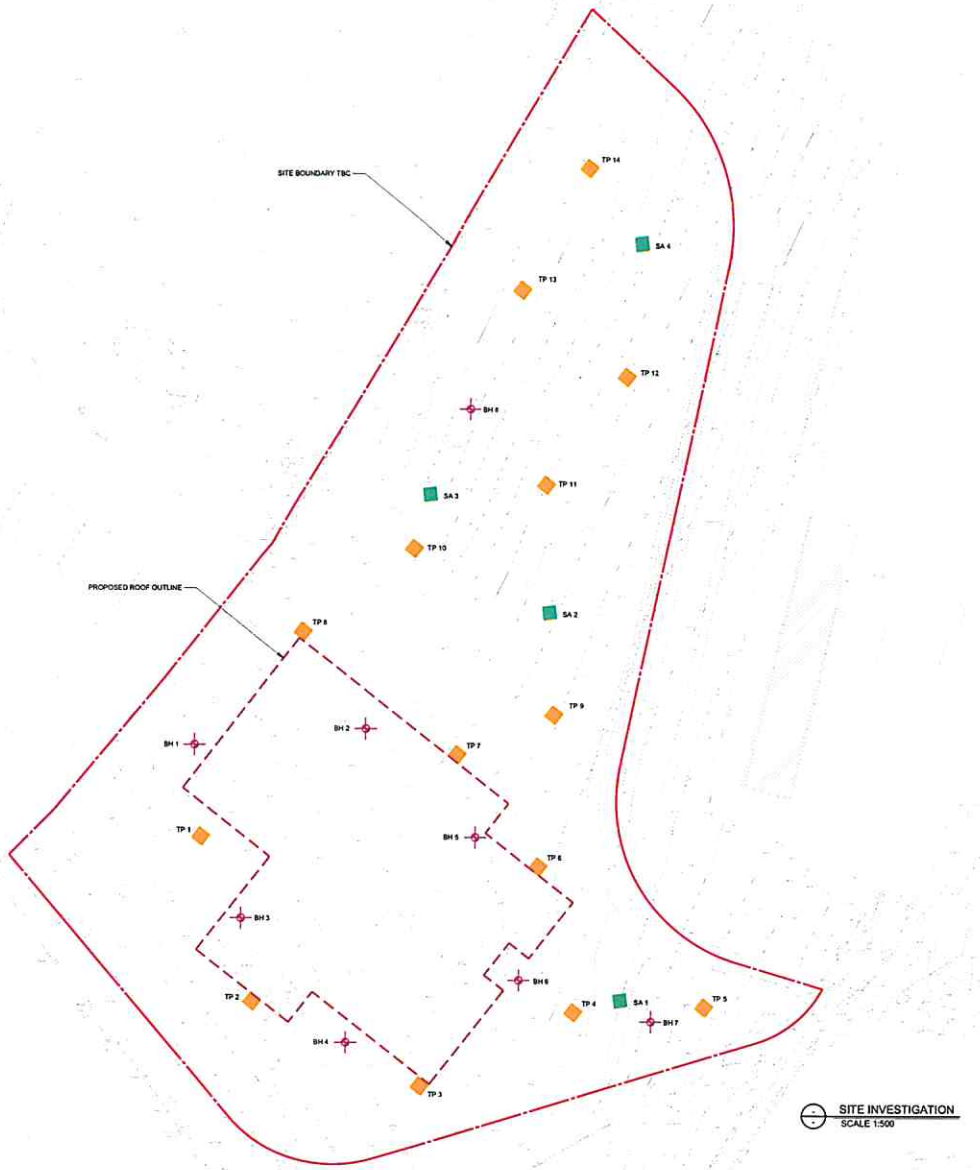
A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix VI Site Plans



SITE INVESTIGATION
SCALE 1:500

REVISION SCHEDULE

REV. NO.	REV. DESCRIPTION	REV. DATE	DRAWN	CHECKED
PL1	ISSUED FOR PLANNING	24/02/2023	BF	JFC

LEGEND

TP # — TRIAL PIT TO 2m BELOW EX GROUND LEVEL
SA # — SOAKAWAY TEST TO BRE 365
BH # — BOREHOLE ESTIMATED AT 6-9m DEEP

IMPORTANT NOTE:

TAKE SAMPLES AT 1m INTERVALS FOR WAC ANALYSIS IN BOREHOLES (BH) AND TRIAL PITS (TP)

Drawing Stage:	PLANNING
Project Details:	
Site Address:	-
Client:	MONAGHAN COUNTY COUNCIL
Architect:	HENRY J LYONS ARCHITECTS
M&E Designer:	-
Contractor:	-

Notes

Drawn by: BF	Checked by: KO'M	Approved by: JFC	Date: FEB '23
Project Name: MONAGHAN CIVIC OFFICES		Scale: 1:500 @ A1	Project Number: 2223
Drawing Title: SITE INVESTIGATION			

Project	Originator	Zone	Level	Type	Discipline	Drawing No	Stage	Revision
2223	CORA	ZZ	ZZ	DR	SK	20	PL	PL1

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Web: www.cora.ie

PROPOSED DEVELOPMENT
ACTIVE TRAVEL ROADWAY
MONAGHAN
MONAGHAN CO. COUNCIL

DBFL
CONSULTING ENGINEERS

CONTENTS

APPENDICES

FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

General.

Recommendations made, and opinions expressed in the report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held for conditions which have not been revealed by exploratory work, or which occur between exploratory hole locations. Whilst the report may suggest the likely configuration of strata, both between exploratory hole locations, or below the maximum depth of the investigation, this is only indicative, and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

Standards

The ground investigation works for this project have been carried out by IGSL in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as BS 5930 (1999), BS 1377 (Parts 1 to 9) and Engineers Ireland Specification & Related Documents for Ground Investigation in Ireland (2006). The following Irish (IS) and European Standards or Norms are referenced:

- IS EN 1997-2 Eurocode 7: 2007 – Geotechnical Design – Part 2: Ground Investigation & Testing
- IS EN ISO 22475-1:2006 Geotechnical Investigation and Sampling – Sampling Methods & Groundwater Measurements
- IS EN ISO 14688-1:2002 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 1: Identification and Description
- IS EN ISO 14688-2:2004 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 2: Classification Principles

Routine Sampling.

Undisturbed samples of soils, predominantly cohesive in nature are obtained unless otherwise stated by a 104mm diameter open-drive tube sampler or Piston Sampler. In granular soils, and where undisturbed sampling is inappropriate, disturbed samples are collected. Smaller disturbed samples are also recovered at intervals to allow a visual examination of the full strata section.

In-Situ Testing.

Standard penetration tests were conducted strictly in accordance with Section 4.6 of IS EN 1997-2:2007. The SPT equipment (hammer energy test) has been calibrated in accordance with EN ISO 22476-3:2005 to obtain the Energy Ratio (E_r) of each hammer. A calibration certificate is available upon request. The E_r is defined as the ratio of the actual energy E_{meas} (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy (E_{theor}) as calculated from the drive weight assembly. The recorded number of blows (N) reported on the engineering logs are uncorrected. In sands, the energy losses due to rod length and the effect of the overburden pressure should be taken into account (see IS EN ISO 22476-3:2005).

Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level. Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc.

Engineering Logging

Soil and rock identification has been based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2002 and IS EN ISO 14689-1:2004.

Where peat has been encountered during site works, samples have been logged in accordance with the Von Post Classification (ref. Von Post, L. 1992. Sveriges Gologiska Undersoknings torvinventering och nogra av dess hittils vunna resultat (SGU peat inventory and some preliminary results) Svenska Mosskulturforeningens Tidskrift, Jonkoping, Swedden, 36, 1-37 & Hobbs N. B. Mire morphology and the properties of some British and foreign peats. QJEG, Vol. 19, 1986).

Retention of Samples.

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded unless a period of retention of samples is agreed, it is our normal practice to discard all soil samples one month after submission of our final report.

Reporting

Recommendations made and opinions expressed in this report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held by IGSL Ltd for ground conditions between exploratory hole locations.

The engineering logs provide ground profiles and configuration of strata relevant to the investigation depths achieved and caution should be taken when extrapolating between exploratory points. No liability is accepted for ground conditions extraneous to the investigation points. Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction, mining works or karstification below or close to the site.

This report has been prepared for the project client and the information should not be used without prior written permission. Any recommendations developed in this report specifically relate to the proposed development. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

REPORT ON A SITE INVESTIGATION

ACTIVE TRAVEL PROJECT
FOR
MONAGHAN COUNTY COUNCIL

DBFL
CONSULTING ENGINEERS

Report No. 24665 / 1 **July 2023**

I Introduction

A major new development is proposed for Monaghan Town involving construction of new roads to augment existing routes.

An investigation of sub soil conditions in the various areas of the new development has been carried out by IGSL for DBFL, Consulting Engineers, on behalf of Monaghan County Council.

The scheduled site investigation included the following elements.

*	Cable Percussion Boreholes	2 nr.
•	Rotary Core Holes	2 nr.
•	Standpipe Installations	2 nr.
•	Trial Pits	9 nr.
•	CBR by Plate Test	9 nr.
•	BRE Digest 365 Infiltration Tests	4 nr.
•	Slit Trenches	3 nr.
•	Vane Shear Tests	3 nr.
•	Geotechnical Soil and Rock Laboratory Tests	
*	Chemical and Environmental LaboratoryTests	

This report includes all factual data from field and laboratory operations and discusses these findings relative to foundation and infrastructural design for the proposed new developments.

II Fieldwork

This development is to take place along new access roadways in Monaghan Town.

The exploratory locations are noted on the drawings enclosed in Appendix IX and were marked out by IGSL on site. All locations have been referenced to national grid and ground levels established.

The various elements of the investigation are detailed in the following paragraphs. All field works were supervised by an experienced geotechnical engineer who carefully recorded stratification, took photographs as necessary, recovered samples and prepared detailed records.

Close liaison was maintained throughout with DBFL Consulting Engineers and Monaghan County Council personnel.

All appropriate documentation was submitted and approved prior to site commencement. Each location was scanned electronically (CAT) to ensure that existing services were not damaged. A shallow trial pit was also opened by hand at borehole / corehole locations to confirm this.

Drawings from the various utilities have been examined to ensure that major services were avoided.

Statutory HSE safety precautions relating to general safety and COVID 19 were strictly observed, with working areas restricted to IGSL personnel only, to ensure safety of the general public.

Boreholes

Boreholes were 200mm diameter and were constructed using conventional cable percussion equipment. Holes were referenced BH01 and BH02. A trial pit was opened at each borehole location to 1.00 metre deep to ensure that underground services were not damaged.

The holes were located either side of the existing canal, where a new bridge is proposed. Commencing surface in both locations was topsoil / grass.

BH02 was relocated slightly northwards because of safety of access at the original position.

Detailed geotechnical records are contained in Appendix I to this report - the records give details of stratification, sampling, in-situ testing and groundwater. Note is also taken of any obstructions to normal boring requiring the use of the heavy chisel for advancement. It was not possible to recover undisturbed samples because of the hard and granular nature of the strata encountered.

BH01 on the northern side of the stream encountered soft to firm slightly gravelly SILT/CLAY to a depth of 3.20 metres. Stiff grey gravelly SILY/CLAY extends from 3.20 to 4.00 metres and overlies dense sandy GRAVEL from 4.00 to 4.60 metre. Boring was terminated on boulder obstruction following a period of chiselling at 4.60 metres BGL.

At **BH02** stiff brown sandy gravelly CLAY , typically containing cobble and boulder material, is encountered at 1.20 metres below variable FILL. This stratum continues to about 3.50 metres where dense GRAVEL is again encountered. This borehole was terminated on boulder obstructions in the gravel at 4.40 metres.

The stiff brown or grey gravelly CLAY encountered in both boreholes is a GLACIAL TILL or BOULDER CLAY with the high percentage of coarse material typical of the stratum.

The final refusal depths are **NOT** indicative of rock horizon.

Ground water ingress was noted in both locations, in association with the GRAVEL stratum Details are noted on the individual records.

Rotary Core Drilling

Rotary core drilling was employed at the borehole locations to advance investigation depth, establish bedrock horizon and recover representative rock core.

A BT-44 drilling rig was used to drill in each location using triple tube core drilling technique and an air-mist coolant. Symmetrix open hole drilling (100mm diameter) was used through the overburden deposits.

Detailed drilling records are presented in Appendix II with accompanying core photographs. The records note Total and Solid Core Recovery (TCR / SCR) and provide a detailed geological description of the bedrock.

Drilling continued in stiff gravelly CLAY (Boulder Clay) in each location to respective depths of 7.50 metres, with numerous boulders noted.

Bedrock was noted at 7.50 metres and 3.00 metres of solid core was recovered Strong to very strong blue grey fine grained LIMESTONE has been identified by the geologist.

A slotted PVC standpipe was installed in both locations to facilitate on-going monitoring of ground water level. The installations were sealed at surface and protected by a steel cover. While no free water was noted during drilling, water level was noted in the standpipes at the end of drilling.

Sub samples of the core were selected for Point Load Test in the laboratory.

The rotary core findings are summarised in the following table.

Hole No.	Overburden	Core Recovered	Standpipe Water Level
RC01 R	0 – 7.50	7.50 – 10.50	0 – 10.50 (6.55 m BG)
RC02 R	0 – 7.50	7.50 – 10.50	0 – 10.50 (4.85 m BG)

Trial Pits

Trial Pits were scheduled in nine locations widely spaced along the new routes and referenced TP01R to TP09R. A tracked excavator was used under engineering supervision. Detailed records with supporting photographs for each location are presented in Appendix III. These records note the soil stratification and record sampling and ground water details.

Trial Pits TP01 to TP05 located in the lower southern area encountered MADE GROUND deposits to varying depths overlying soils varying from very soft SILT (TP01) to soft to firm brown sandy gravelly CLAY (TP03 to TP05). TP02 encountered MADE GROUND to the full-excavated depth of 2.50 metres.

Trial Pits TP06 to TP09 all noted topsoil overlying brown gravelly CLAY (boulder clay). The stratum is initially soft to firm, increasing in strength with penetration to firm/stiff. Excavation depths varied from 1.50 to 2.30 metres, with boulder obstructions preventing advancement. Ground water was noted in several locations.

Trial Pit details are summarised as follows:

Ref No.	Fill	Soft Silt Clay	Firm Stiff gravelly CLAY	Water
TP01R	0 – 2.10	2.10 – 2.60		2.10
TP02R	0 – 2.50			Dry
TP03R	0 – 1.70	1.79 – 2.20	2.20 – 3.00	Dry
TP04R	0 – 1.40	1.40 – 2.00	2.00 – 3.00	Dry
TP05R	0 – 1.70		1.70 – 1.80	Dry

Ref No.	Topsoil	Soft gravelly Clay	Firm gravelly CLAY	Water
TP06R	0 – 0.20	0.20 – 0.50	0.50 – 1.70	1.00
TP07R	0 – 0.20	0.20 – 0.50	0.50 – 2.30	Dry
TP08R	0 – 0.25	0.25 – 0.85	0.85 – 1.80	1.80
TP09R	0 – 0.25	0.25 – 0.50	0.50 – 1.50	0.50

Trial Pits were backfilled with the excavated spoil, compacted in layers, the disturbed areas were levelled and coarse material was removed.

BRE Digest 365 Test

Infiltration testing was performed at six locations as specified in accordance with BRE Digest 365 'Soakaway Design'. Tests are referenced SA01R to SA06R. Detailed data is presented in Appendix IV. All locations have been surveyed with co-ordinates provided.

To obtain a measure of the infiltration rate of the sub-soils, water is poured into the test pit, and records taken of the fall in water level against time. The test is carried out over two cycles following initial soakage.

The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute. In these calculations the exposed area is the sum of the base area and the average internal area of the permeable stratum over the test duration. Design is based on the slowest infiltration rate, which has been calculated from the final cycle.

The stratification in the test areas comprised Topsoil over either MADE GROUND or soft to firm brown gravelly CLAY. Details are noted with photographs on the individual records.

Results are summarised as follows:

Test No.	Depth	Soil Type	Infiltration Rate (f) (Metres/ Minute)
SA01R	1.70	MADE GROUND	0.0000 (Fail)
SA02R	1.30	MADE GROUND	4E-05
SA03R	1.70	MADE GROUND	0.0000 (Fail)
SA04R	1.60	MADE GROUND	0.00102
SAO5R	1.40	Gravelly CLAY	0.00028
SA06R	1.60	Gravelly CLAY	0.0000 (Fail)

The results confirm zero to very low permeability for the cohesive gravelly clay soils present on the site.

Plate Bearing Tests

In situ CBR value and Modulus of Subgrade Reaction was established by Plate Bearing Test. Tests are referenced PBT01R to PBT 09R and were located at the similarly numbered Trial Pit locations.

A steel plate is loaded and off-loaded incrementally over two stages and the deflection under load and recovery under off-load is measured by a system of dial gauges. The data is processed and load settlement graphs are prepared. An equivalent CBR value is calculated in accordance with NRA HD25-26/10.

Results are summarised in the following table and individual test records are found in Appendix V.

Test No.	Depth	Soil Type	CBR at Load Cycle (%)	CBR at Reload (%)
PBT 01	0.50	FILL	1.3	2.3
PBT 02	0.50	FILL	1.1	1.5
PBT 03	0.60	FILL	1.0	1.3
PBT 04	0.60	FILL	1.1	1.2
PBT 05	0.50	FILL	3.1	3.5
PBT 06	0.60	Clay	1.1	10.6
PBT 07	0.60	Clay	2.3	2.9
PBT 08	0.60	Clay	1.3	3.8
PBT 09	0.60	Clay	3.8	9.5

Slit Trenches

Four slit trenches were opened in specified locations and are referenced ST01 to ST04.

Trenches were opened using a combination of machine and hand excavation. Hard surfaces were saw cut prior to removal of surfacing. Trenches were 0.50 or 1.00 metres wide and were excavated to depths between 1.30 and 1.80 metres.

Detailed records of each excavation are presented in Appendix VI. These note the trench dimensions, record all services encountered and note the stratification. Photographs of each excavation are also included with the detailed records.

Trench lengths were respectively 12.50 metres, 12.10 metres, 14.85 metres and 14.50 metres.

Shear Vane Tests

Shear vane tests were scheduled at three locations along the canal greenway. A GEONOR H-10 Vane was employed (130mm long X 65mm wide).

Tests were attempted at three depths in each location. In all instances refusal of apparatus was recorded on dense coarse subsoil/fill. Data for each vane test is presented in Appendix VII. Tests are referenced SV01 to SV03.

The stratification was established by Window Sampling and the detailed geotechnical records for each location are presented with the Vane Test data.

In addition HD Dynamic Probes were driven at each location to establish a strength depth pattern for the sub soils. Probe records are also included with the Vane Shear data

MADE GROUND was noted in each location, extending to at least 2.00 metres at SV01 with refusal noted at this depth. Heavy duty probing suggests that variable FILL material may extend to in excess of 3.00 metres in places.

At SV02 and SV03 coarse dense FILL of gravelly CLAY extended to respective depths of 2.50 and 2.00 metres. Stiff gravelly SILT/CLAY was noted below the FILL.

III. Testing

In Situ

Standard penetration tests were carried out at approximate 1.00 metre intervals in the geotechnical boreholes and at 1.50 metres in the Rotary Core Holes to measure relative in-situ soil strength. N values are noted in the right hand column of the individual records, representing the blow count required to drive the standard sampler 300mm into the soil, following initial seating blows. Where full test penetration was not achieved the blow count for a specific penetration is recorded, or refusal is indicated where appropriate. The results of the tests are summarised as follows:

STRATUM	N VALUE RANGE	COMMENT
Gravelly CLAY (Boulder Clay)		
1.00 m BGL	6 to 13	Soft to Firm
2.00 m BGL	10 to 29	Firm to Stiff
3.00 m BGL	26 to 50	Stiff to Hard
4.00 m BGL	> 50	Hard
4.00 to 15.00 m BGL (Rotary Holes)	40 to >50	Hard

Limited penetration SPT tests with refusal were recorded on numerous occasions, reflecting a high concentration of cobble / boulder material in the glacial till

Laboratory

A programme of laboratory testing was scheduled following completion of site operations. Geotechnical testing was carried out by IGSL in it's INAB-Accredited laboratory. Chemical and environmental testing was carried out in the UK by EUROFINS / CHEMTEST Ltd. The test programme included the following elements:

Liquid and Plastic Limits / Moisture Content	IGSL
PSD Grading by Wet Sieve and Hydrometer	IGSL
MCV	IGSL
CBR	IGSL
Compaction	IGSL
Point Load Tests	IGSL
Organic Content	EUROFINS
Sulphate / Chloride / pH	EUROFINS
RILTA Suite Environmental	EUROFINS

All laboratory data is presented in Appendices VIIIa and VIIIb and individual tests are discussed briefly as follows:

Index Properties / Natural Moisture Content

Classification tests have been carried out on samples of the cohesive soils from borehole and trial pit locations.

The results indicate some variation in composition of the soils from CLAY to SILT matrix. The SILT matrix till generally occurs at shallow depth below the topsoil while the CLAY dominant till is noted at greater depth and represents glacial till or boulder clay deposition.

The gravelly CLAY plots in the CI/CL zone of the standard Classification chart indicative of low plasticity soil. Natural Moisture Content ranges from 12 to 26%.

Grading

Wet sieve and hydrometer analysis has been carried out on samples of the cohesive soils from both boreholes and trial pits. The graphs are typically straight line, grading from the fine clay to coarse gravel fraction. The pattern is very typical of glacial till or boulder clay deposition. One sample from the base of BH02 confirms the stratum as clean well-graded fine to coarse GRAVEL with less than 4% passing to the sand fraction

MCV/CBR/Compaction

Four large bulk samples were selected from Trial Pits 04 / 06 / 08 and 09 and a series of tests were scheduled to establish the soil characteristics relative to re-use during the new development.

The tests carried out included MCV (Moisture Condition Value), CBR (California Bearing Ratio), Dry Density / Moisture Content relationship.

The results are summarised as follows:

Ref No.	**TP04R**	**TP06R**	**TP08R**	**TP09R**
Depth	1.70	0.70	0.70	0.60
Natural MC (%)	16	20	23	17
MCV	5.4	4.6	5.7	6.8
CBR (%)	1.25	0.9	1.45	1.9
Max. Dry Density (mg/cu.m.)	2.01	1.89	1.80	1.84
Optimum Moisture (%)	8.1	11	11	11

Organic Content

Three samples of the soils from the site had organic contents established. Samples were generally taken from shallow depths below the topsoil. Values of 1.3 and 2.0% were determined for two locations indicative of very low to negligible organic content. One elevated level of 9.1% was recoded in the FILL material in TP01R.

Point Load Tests

Sub samples of the recovered limestone core have been selected for Diametrial Testing in The Point Load Apparatus. A total of 6 tests were performed and equivalent UCS values have been calculated. Rock strength (UCS) varies from 60 to 136 MPa (with an average value of 101 MPa). This confirms the medium strong to strong classification by the engineering geologist during detailed core logging.

Chemical Suite (Sulphate Chloride pH)

Four samples were sent for analysis to BRE Chemical Suite parameters.
Sulphate concentrations (SO4 2:1 extract) of <0.010 g/l were established with pH values ranging from 8.1 to 8.3. Chloride concentrations (<0.010 to 0.016 g/l) were also determined.

The results indicate a design class of DS-1 (ACEC Classification for Concrete) for sulphate concentrations below 0.5 g/l. No special precautions are necessary to protect below ground foundation concrete.

RILTA Environmental Suite

Seven samples of the sub soils were sent to specialist environmental laboratory EUROFINS and testing was carried out in accordance with RILTA requirements to establish Landfill Waste Acceptance Criteria (WAC).

Detailed results are presented in Appendix VIIIb. In three samples elevated levels of Total Organic Carbon (TOC), Hydrocarbon (Total WAC) and Total Dissolved Solids were established. These are highlighted on the detailed laboratory data sheets.

The elevated levels were obtained from samples from the lower levels of the site where significant depths of MADE GROUND occur. Tests on samples from the higher natural ground to the north of the site were all classed as INERT.

A comprehensive Waste Characterisation Assessment (WCA) will be required by landfill operators. This can be prepared by specialist environmental consultants using the factual data from field and laboratory as presented in this report.

Asbestos screening was carried out on all RILTA samples with no traces of Asbestos noted.

IV. Discussion:

A major development is being undertaken at this site in Monaghan. A new CIVIC CENTRE is to be constructed for Monaghan County Council and a NEW ROAD is to be provided to access the Civic Centre.

A detailed geotechnical investigation has been carried out by IGSL under the direction of DBFL Consulting Engineers.

The factual data from the field and laboratory operations is presented in Sections 1 to III of this report.

This part of the report comments on the various findings with various recommendations for the proposed construction programme.

For the purposes of this report the investigation has been sub-divided into a number of parts as follows:

A; Section from Roosky Vale Eastwards to Proposed New Bridge

B New Bridge

C Proposed Road North from new bridge to proposed CIVIC CENTRE

D Roadway north of CIVIC CENTRE to temporary turning area.

A: NEW ROADWAY Rooskey Vale to New Bridge

This section is parallel to the Ulster Canal Greenway on level ground (OD 56 to 57 metres)

On this section of the proposed development MADE GROUND has been identified in Trial Pits, Window Samples and Slit Trenches extending to depths in excess of 2.00 metres.

Firm grey brown gravelly SILT/CLAY (TILL) was noted in places below the FILL.

The MADE GROUND is variable in composition and in strength with brick, plastic, timber and concrete fragments in a gravelly SILT/CLAY matrix. CBR values of 1 to 2% were recorded at 0.50 metres BGL.

Environmental test data indicates that the MADE GROUND contains elevated levels of contaminated material and may NOT be classed as INERT.

Road construction should comply with current NRA specifications and guidelines. A general discussion of pavement construction on MADE GROUND is included on Page 14 of this document.

The construction programme should included Plate Bearing Tests at intervals to confirm acceptable CBR values on the placed granular fill.

B; NEW BRIDGE

The ground conditions at either side of the stream have been determined by Borehole and Rotary Core Drilling.

At BH01 firm grey gravelly CLAY is noted from 1.10 to 3.20 metres overlying very stiff gravelly CLAY and dense GRAVEL from 4.00 to 4.60 metres. Proof core drilling has established solid limestone bedrock at 7.50 metres BGL, proof cored to 10.50 metres.

BH02 penetrated MADE GROUND to 2.20 metres overlying stiff grey gravelly CLAY and GRAVEL from 3.50 to 4.40 metres. Bedrock was again confirmed from 7.50 to 10.50 metres BGL .

Ground water ingress was noted in both locations in association with the GRAVEL stratum Standpipes were installed to allow long term ground water observation.

In-situ tests have indicated a stratum of stiff grey gravelly CLAY (Boulder Clay) in both boreholes at respective depths of 3.20 and 2.20 metres with an allowable bearing pressure of 150 kPa at 3.00 metre BGL.

Construction of conventionally excavated abutments can be considered, however the depth of excavation (> 3.00 metres) and the presence of ground water suggests that PILING may present a more suitable option from both an engineering and economic viewpoint. LIMESTONE bedrock was confirmed by core drilling at 7.50 metres and will provide the founding medium for PILING.

Specialist Piling contractors should be consulted to establish the most suitable piling technique for this particular location.

C: ROADWAY FROM BRIDGE NW TO CIVIC OFFICES SITE

Trial Pits and CBR tests 4, 5 and 7 were constructed along this section, with ground level increasing from 56 metres OD (TP04R and TP05R) to 72 metres OD (TP07).

The lower part of the route comprises MADE GROUND (1.50 to 1.70 metres) overlying firm grey brown sandy gravelly CLAY (TILL).

TP07R at the NW end encountered virgin soils with Stiff BROWN BOULDER CLAY penetrated from 0.50 to 1.50 metres.

CBR values of 1% to 3% were recorded at 0.50 metres BGL.

A significant increase in CBR values would be expected in the stiff gravelly CLAY encountered in the vicinity of TP07.

It should be noted that an elevated level of Total Organic Carbon was identified in a sample of MADE GROUND from TP05R.

Construction in this area will be similar to that outlined in Area A. The reduced thickness of MADE GROUND in this area is noted and the removal of this material prior to road construction may be an economic option.

D: ROADWAY FROM TP07 TO TP09

This final section slopes steeply (72 to 82 OD approximately) in GLACIAL TILL deposits. The stratification is of topsoil with a thin soft clay layer (GL to 0.50 metres) overlying firm to stiff grey brown gravelly CLAY. A CBR of at least 3% can be assumed at 0.50 metres BGL. CBR values should increase significantly in the stiff gravelly boulder clay. The firm/stiff boulder clay will be quite suitable for road construction.

Given the variations in site levels it is likely that significant cut and fill operations will be required. No major issues will arise with excavation, other than the presence of boulder obstructions and possibly water ingress if gravel zones are encountered.

A detailed programme of laboratory testing has been carried out to establish soil parameters relative to the suitability of excavated material for re-use as engineered fill.

The results reflect a high degree of consistency in the boulder clay over the site area and will allow the appointed contractor to design a suitable programme for earthworks on this site.

GENERAL COMMENTS ON PAVEMENT CONSTRUCTION PARTICULARLY ON MADE GROUND

The trial pits revealed Made Ground to depths in excess of 2.5 metres.

The Made Ground should be assumed to be a heterogeneous material that has not been placed or compacted in an engineering manner, and therefore, variations in its composition and degree of compaction should be anticipated. Organic matter was also noted within the Made Ground in some trial pits.

In view of the anticipated variations within the Made Ground, the capping thicknesses should be designed in accordance with NRA HD 25-26/10 with reference to Section 3.23 ("Soft Subgrades").

In accordance with the aforementioned design manual, soft subgrades can either be improved (e.g. using lime) or removed and replaced with a more suitable material. The thickness removed will typically be between 0.5 and 1.0 m. Although the new material may be of good quality, the new subgrade should be assumed to be equivalent to one of a CBR of 2.5%.

For this site, close inspection of the prepared formation in conjunction with plate bearing tests will be essential to verify the design CBR value and to identify any soft, loose or organic zones. Any residual zones of soft or organic subgrade should be removed and replaced with 6F capping or starter layer material (Class 6A / 6B). Where the soft ground is deep, the removal and replacement of up to 1 metre of subgrade can be expected.

Due to the anticipated high variability of the formation soils, a geotextile separator at subgrade level and geogrid reinforcement within the capping layer would be recommended.

Stripped subgrade should be protected from surface water ingress or disturbance from unnecessary pedestrian or vehicular traffic. The time between stripping to formation level and placement of the capping layer should be minimised.

Any proof rolling of the natural subgrade soils should be performed statically using a smooth roller in order to avoid vibratory disturbance. Initial placement of the capping or starter layer should also be carried out using a static roller for the same reason.

It is important that argillaceous sedimentary rocks (i.e. muddy limestone, calcareous mudstone, shale, etc.) are not used in sub-base, capping or as a starter layer. These have high potential to give rise to degradation (i.e. poor durability and soundness) and slaking and therefore would not be suitable. All granular fills (particularly Series 600 and 800 material) should be thoroughly examined, tested and approved in advance of being used in the pavement construction.

ENVIRONMENTAL

Where elevated contaminant levels occur (generally associated with the FILL deposits over the lower portion of the site) special precautions may be required in off-site disposal of excavated material. It is unlikely that excavated material will be accepted in an INERT facility.

Environmental tests on samples from the boulder clays north of TP 06 indicate that this material can be classed as INERT with no issues arising as to disposal of excavated material either on or off the site.

A waste Characterisation Assessment (WCA) is likely to be required where FILL material is to be disposed of and should be carried out by environmental specialists. This WCA should be submitted to the relevant waste management facility, to confirm suitability for acceptance.

BRE DIGEST 365 TESTS

The test results reflect very low permeability characteristics in the gravelly CLAY soils. This is very typical of the local boulder clays. Clay matrix material is generally unsuited to dispersion of storm or surface water and consideration should be given to the use of a suitable local water course or the Local Authority Drainage System for this development.

FOUNDATION CONCRETE

No special precautions are necessary for protection of below ground concrete.

Appendix I Boring Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project	BOREHOLE NO.	BH01R
		SHEET	Sheet 1 of 1
CO-ORDINATES	667,653.00 E 833,742.61 N	RIG TYPE	Dando 2000
GROUND LEVEL (m AOD)	56.30	BOREHOLE DIAMETER (mm)	200
		BOREHOLE DEPTH (m)	4.60
		DATE COMMENCED	17/05/2023
		DATE COMPLETED	17/05/2023
CLIENT	Monaghan Co.Co.	SPT HAMMER REF. NO.	
ENGINEER	DBFL	ENERGY RATIO (%)	
		BORED BY	P.Allan
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		56.20	0.10						
	Soft brown SILT/CLAY with occasional fine gravel				AA192926 AA197907	B B	0.50 0.50		N = 50/75 mm (25, 50)	
1			55.20	1.10	AA197908	B	1.00		N = 12 (2, 2, 1, 2, 3, 6)	
	Firm grey sandy SILT/CLAY with some gravel									
2					AA197909	B	2.00		N = 10 (15, 5, 2, 2, 2, 4)	
3			53.10	3.20	AA197910	B	3.00		N = 14 (1, 2, 3, 2, 2, 7)	
	Very stiff grey very sandy very gravelly SILT									
4			52.30	4.00					N = 50/150 mm (9, 16, 30, 20)	
	Dense grey fine to coarse GRAVEL with some cobbles									
			51.70	4.60						
5	Obstruction End of Borehole at 4.60 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.4	4.6	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.00	4.00	No	3.00	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
17-05-23	4.60	Nil	3.00	End of BH

REMARKS CATscanned location and hand dug inspection pit was carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24665 - BRIDGE & ROAD SITE.GPJ IGSL.GDT 24/7/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project	**BOREHOLE NO.**	**BH02R**
		SHEET	Sheet 1 of 1
CO-ORDINATES	667,668.30 E 833,709.23 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	56.07	**BOREHOLE DEPTH (m)**	4.40
		DATE COMMENCED	10/05/2023
		DATE COMPLETED	10/05/2023
CLIENT	Monaghan Co.Co.	**SPT HAMMER REF. NO.**	
ENGINEER	DBFL	**ENERGY RATIO (%)**	
		BORED BY	P.Allan
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		55.97	0.10						
	MADE GROUND (Comprised of hardcore road fill)		55.87	0.20						
	MADE GROUND (Comprised of brown gravelly clay fill)									
1			54.87	1.20	AA192927	B	1.00		N = 33 (2, 6, 8, 10, 6, 9)	
	Soft to firm sandy gravelly SILT/CLAY (Possibly Made Ground)									
2			53.87	2.20	AA192928	B	2.00		N = 5 (3, 2, 1, 1, 2, 1)	
	Stiff grey gravelly CLAY									
3					AA192929	B	3.00		N = 22 (3, 6, 10, 3, 6, 3)	
			52.57	3.50						
	Dense grey fine to coarse GRAVEL with some cobbles									
4					AA192930	B	4.00		N = 50/150 mm (19, 40, 10) N = 50/75 mm (25, 50)	
			51.67	4.40						
	Obstruction End of Borehole at 4.40 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.4	1.6	1	
4.2	4.4	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.00	2.00	No	1.50	20	Moderate
4.00	4.00	No	2.50	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
10-05-23	4.40	Nil	3.00	End of BH

REMARKS CATscanned location and hand dug inspection pit was carried out .

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24665 - BRIDGE & ROAD SITE.GPJ IGSL.GDT 24/7/23

Appendix II Rotary Core Logs Photographs

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project	**DRILLHOLE NO**	**RC01R**
		SHEET	Sheet 1 of 2
CO-ORDINATES		**DATE DRILLED**	28/05/2023
GROUND LEVEL (mOD)		**DATE LOGGED**	30/05/2023
RIG TYPE	Beretta T44		
FLUSH	Air/Mist		
CLIENT	Monaghan Co.Co.	**DRILLED BY**	IGSL - JK
ENGINEER	DBFL	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY with occasional boulders.				
1												
2												
3		0	0	0								N = 37 (3, 5, 7, 8, 11, 11)
4												
5												N = 63 (7, 10, 18, 21, 11, 13)
6												
7	7.50								7.50			N = 57 (9, 11, 11, 13, 16, 17)
8		100	79	71				Strong to very strong, thickly to thinly bedded, light blue/grey, fine-grained, LIMESTONE (calci-siltite, sandy limestone with a black argillaceous muddy layer at 9.10-9.30m) , fresh to slightly weathered.				
9	9.00							Discontinuities are wide to closely spaced, smooth to very locally rough, planar to irregular. Apertures are tight to locally moderately open, calcite-veined (1-3mm thick), locally clay smeared, slight iron oxide staining. Dips are subhorizontal to locally 30°.				
		100	66	66								

REMARKS

Hole cased from 0.00-7.50m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
30-05-23	10.50	1.00	10.50	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project	**DRILLHOLE NO**	**RC01R**
		SHEET	Sheet 2 of 2
CO-ORDINATES		**DATE DRILLED**	28/05/2023
GROUND LEVEL (mOD)		**DATE LOGGED**	30/05/2023
RIG TYPE	Beretta T44		
FLUSH	Air/Mist		
CLIENT	Monaghan Co.Co.	**DRILLED BY**	IGSL - JK
ENGINEER	DBFL	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50							End of Borehole at 10.50 m	10.50			
11												
12												
13												
14												
15												
16												
17												
18												
19												

REMARKS

Hole cased from 0.00-7.50m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
30-05-23	10.50	1.00	10.50	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
30-05-23	10.50	7.50	6.55	Water levels recorded 5 mins after end of drilling.

IGSL RC FI 10M 24665 - BRIDGE & ROAD SITE.GPJ IGSL.GDT 6/8/23

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project	DRILLHOLE NO	RC02R
		SHEET	Sheet 1 of 2
CO-ORDINATES		DATE DRILLED	31/05/2023
GROUND LEVEL (mOD)		DATE LOGGED	01/06/2023
CLIENT	Monaghan Co.Co.	DRILLED BY	IGSL - JK
ENGINEER	DBFL	LOGGED BY	D.O'Shea
RIG TYPE	Beretta T44		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of CLAY.				
1												
2												
3									3.00			
4		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY.				N = 27 (3, 4, 5, 8, 7, 7)
5												N = 38 (4, 7, 7, 10, 9, 12)
6												
7	7.50											N = 47 (7, 8, 13, 11, 13, 10)
8		100	23	10				Weak, thinly bedded to structureless, dark grey, fine-grained, LIMESTONE (argillaceous), slightly weathered. Discontinuities are closely spaced, smooth, planar. Apertures are tight, locally claysmeared. Dips are subhorizontal to locally 45°.	7.50 8.00			
9	9.00	100	90	92								

REMARKS

Hole cased from 0.00-7.50m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
01-06-23	10.50	1.00	10.50	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC FI 10M 24665 - BRIDGE & ROAD SITE.GPJ IGSL.GDT 6/8/23

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project	**DRILLHOLE NO**	**RC02R**
		SHEET	Sheet 2 of 2
CO-ORDINATES		**DATE DRILLED**	31/05/2023
GROUND LEVEL (mOD)		**DATE LOGGED**	01/06/2023
CLIENT	Monaghan Co.Co.	**DRILLED BY**	IGSL - JK
ENGINEER	DBFL	**LOGGED BY**	D.O'Shea
RIG TYPE	Beretta T44		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50							Strong to very strong, thickly to thinly bedded, light blue/grey, fine-grained, LIMESTONE (argillaceous muddy), fresh to slightly weathered. Discontinuities are wide to closely spaced, smooth to very locally rough, planar to irregular. Apertures are tight to locally moderately open, calcite-veined (1-3mm thick), locally clay smeared, slight iron oxide staining. Dips are subhorizontal to locally 45°. *(continued)* End of Borehole at 10.50 m	10.50			
11												
12												
13												
14												
15												
16												
17												
18												
19												

REMARKS

Hole cased from 0.00-7.50m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

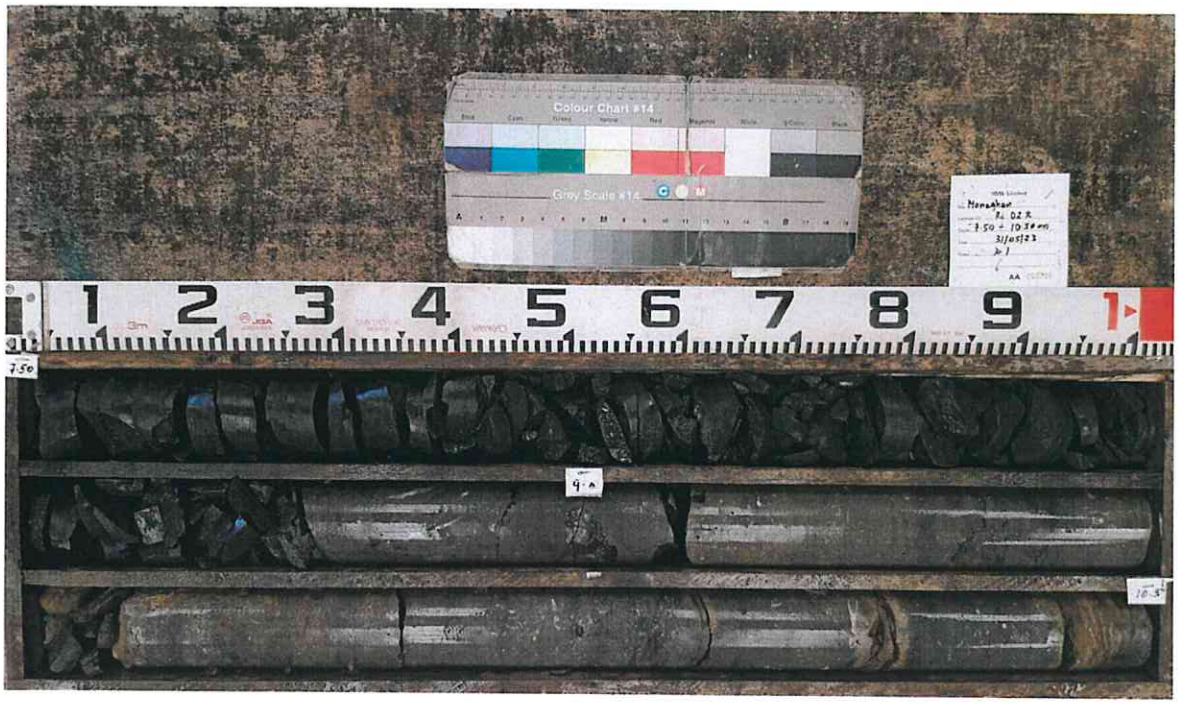
Date	Tip Depth	RZ Top	RZ Base	Type
01-06-23	10.50	1.00	10.50	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
01-06-23	10.50	7.50	4.85	Water levels recorded 5 mins after end of drilling.

RC01R – Box 1 of 1 – 7.50-10.50m

RC02R – Box 1 of 1 – 7.50-10.50m



Appendix III Trial Pit Records
Photographs

TRIAL PIT RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel	**TRIAL PIT NO.**	**TP01R**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	667,612.60 E 833,657.82 N
		DATE STARTED	02/05/2023
		DATE COMPLETED	02/05/2023
CLIENT	Monaghan Co.Co.	**GROUND LEVEL (m)**	56.08
ENGINEER	DBFL/Cora	**EXCAVATION METHOD**	3T Tracked machine

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
MADE GROUND (comprised of brown/grey sandy gravelly clay, angular stones, red brick pieces, roots)		0.10	55.98		AA205155	B	0.60		
1.0 MADE GROUND (comprised of soft grey/dark brown/brown sandy gravelly clay/silt, angular cobbles and boulders, organic matter)		1.00	55.08		AA205156	B	1.60		
2.0 Soft, grey, slightly sandy SILT/CLAY (possible original ground)		2.10	53.98	(Slow)	AA205157	B	2.50		
End of Trial Pit at 2.60m		2.60	53.48						
3.0									
4.0									

Groundwater Conditions
Slow water flow at 2.1m

Stability
TP stable

General Remarks
TP done for Active Travel Road project. PBT01R done in location at 0.5m depth

IGSL TP LOG 24665.GPJ IGSL.GDT 10/5/23

TRIAL PIT RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel	**TRIAL PIT NO.**	**TP02R**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	667,669.21 E 833,702.33 N
		DATE STARTED	02/05/2023
		DATE COMPLETED	02/05/2023
CLIENT	Monaghan Co.Co.	**GROUND LEVEL (m)**	56.19
ENGINEER	DBFL/Cora	**EXCAVATION METHOD**	3T Tracked machine

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL		0.10	56.09						
	MADE GROUND (comprised of brown/grey sandy gravelly clay, angular stones, red brick pieces, roots, timber pieces, occasional plastic rubbish, old steel wires, boulders, concrete pieces)									
1.0						AA205159	B	1.00		
2.0						AA205160	B	2.00		
	TP terminated at 2.5m due to many boulders End of Trial Pit at 2.50m		2.50	53.69						
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP unstable

General Remarks
TP done for Active Travel Road project. PBT02R done in location at 0.6m depth

IGSL TP LOG 24665.GPJ IGSL.GDT 10/5/23

TRIAL PIT RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel	**TRIAL PIT NO.**	**TP03R**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	667,627.81 E 833,761.65 N
		DATE STARTED	03/05/2023
		DATE COMPLETED	03/05/2023
CLIENT	Monaghan Co.Co.	**GROUND LEVEL (m)**	56.94
ENGINEER	DBFL/Cora	**EXCAVATION METHOD**	3T Tracked machine

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.15	56.79						
MADE GROUND (comprised of brown sandy gravelly clay, many cobbles and boulders, red brick pieces)		0.60	56.34		AA205161	B	0.60		
MADE GROUND (comprised of soft grey/dark grey slightly sandy gravelly silty clay, concrete pieces, steel rubbish, many organic pieces, timber pieces, old wires)					AA205162	B	1.40		
1.0									
Soft to firm, grey, slightly sandy gravelly silty CLAY with medium cobbles and organic matter content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded, cobbles are subangular to subrounded.		1.70	55.24						
2.0					AA205163	B	2.30		
3.0 End of Trial Pit at 3.00m		3.00	53.94						
4.0									

Groundwater Conditions
TP dry

Stability
TP slightly unstable

General Remarks
TP done for Active Travel Road project. PBT03R done in location at 0.6m depth

IGSL TP LOG 24665.GPJ IGSL.GDT 10/5/23

TRIAL PIT RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel	**TRIAL PIT NO.**	**TP04R**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	667,651.63 E 833,752.38 N
		DATE STARTED	03/05/2023
		DATE COMPLETED	03/05/2023
CLIENT	Monaghan Co.Co.	**GROUND LEVEL (m)**	56.52
ENGINEER	DBFL/Cora	**EXCAVATION METHOD**	3T Tracked machine

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
MADE GROUND (comprised of brown/grey sandy gravelly clay, cobbles, red brick pieces)		0.30	56.22		AA205164	B	0.70		
1.0									
Soft to firm, brown/grey mottled, slightly sandy gravelly slightly silty CLAY with medium cobbles content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded, cobbles are small subangular to subrounded. (possible original ground)		1.40	55.12		AA205165	B	1.70		
2.0									
					AA205166	B	2.70		
3.0 End of Trial Pit at 3.00m		3.00	53.52						
4.0									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks
TP done for Active Travel Road project. PBT04R done in location at 0.6m depth

TRIAL PIT RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel	**TRIAL PIT NO.**	**TP05R**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	667,594.17 E 833,778.20 N
		DATE STARTED	03/05/2023
		DATE COMPLETED	03/05/2023
CLIENT	Monaghan Co.Co.	**GROUND LEVEL (m)**	57.02
ENGINEER	DBFL/Cora	**EXCAVATION METHOD**	3T Tracked machine

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL									
	MADE GROUND (comprised of brown sandy gravelly clay, cobbles, boulders, red brick pieces, concrete rubble, roots, occasional plastic rubbish)		0.15	56.87		AA205167	B	0.50		
1.0						AA205168	B	1.50		
	Firm, brown, sandy very gravelly CLAY with high cobbles content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded, cobbles are subangular to subrounded		1.70	55.32						
2.0	TP terminated at 1.9m due to boulders End of Trial Pit at 1.90m		1.90	55.12						
3.0										
4.0										

Groundwater Conditions
TP dry

Stability
TP unstable

General Remarks
TP done for Active Travel Road project. PBT05R done in location at 0.5m depth

IGSL TP LOG 24665.GPJ IGSL.GDT 10/5/23

TRIAL PIT RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel	**TRIAL PIT NO.**	**TP06R**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	667,471.46 E 833,759.97 N
		DATE STARTED	03/05/2023
		DATE COMPLETED	03/05/2023
CLIENT	Monaghan Co.Co.	**GROUND LEVEL (m)**	72.31
ENGINEER	DBFL/Cora	**EXCAVATION METHOD**	3T Tracked machine

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.20	72.11						
Soft, brown, slightly sandy slighlty gravelly CLAY with low cobbles content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded, cobbles are small subangular to subrounded.		0.50	71.81						
Soft to firm, greyish brown to brown, slightly sandy very gravelly slightly silty CLAY with high cobbles and boulders content. Sand is fine to coarse, gravel is fine to coarse subangular to angular, cobbles and boulders are subangular to angular.				1 (Seepage)	AA205171	B	0.70		
				2 (Slow)	AA205172	B	1.50		
TP terminated at 1.7m due to boulders or rock End of Trial Pit at 1.70m		1.70	70.61						

1.0
2.0
3.0
4.0

Groundwater Conditions
Seepage at 1.1m, slow water flow at 1.7m

Stability
TP stable

General Remarks
TP done for Active Travel Road project. PBT06R done in location at 0.6m depth

IGSL TP LOG 24665.GPJ IGSL.GDT 10/5/23

TRIAL PIT RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel	**TRIAL PIT NO.**	**TP07R**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	667,498.03 E 833,810.31 N
		DATE STARTED	03/05/2023
		DATE COMPLETED	03/05/2023
CLIENT	Monaghan Co.Co.	**GROUND LEVEL (m)**	72.18
ENGINEER	DBFL/Cora	**EXCAVATION METHOD**	3T Tracked machine

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Soft to firm, brown, slightly sandy CLAY with low gravel and hair roots content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded.		0.20	71.98						
Firm to stiff, brownish grey, slightly sandy gravelly silty CLAY with high cobbles and boulders content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded, cobbles and boulders are subangular to angular.		0.50	71.68		AA205169	B	0.90		
1.0									
2.0					AA205170	B	1.90		
TP terminated at 2.3m due to many boulders End of Trial Pit at 2.30m		2.30	69.88						
3.0									
4.0									

Groundwater Conditions
TP dry

Stability
TP unstable

General Remarks
TP done for Active Travel Road project. PBT07R done in location at 0.6m depth

IGSL TP LOG 24665.GPJ IGSL.GDT 10/5/23

TRIAL PIT RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel	**TRIAL PIT NO.**	**TP08R**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	667,509.66 E 833,891.93 N
		DATE STARTED	04/05/2023
		DATE COMPLETED	04/05/2023
CLIENT	Monaghan Co.Co.	**GROUND LEVEL (m)**	73.83
ENGINEER	DBFL/Cora	**EXCAVATION METHOD**	3T Tracked machine

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.25	73.58						
Soft to firm, brown, slightly sandy slighlty gravelly CLAY with low cobbles and hair roots content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded, cobbles are subangular to subrounded.		0.85	72.98		AA205180	B	0.70		
1.0 Firm to stiff, brownish grey, slightly sandy very gravelly slightly silty CLAY with high cobbles and boulders content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded, cobbles and boulders are subangular to angular.									
TP terminated at 1.8m due to boulders or rock End of Trial Pit at 1.80m 2.0 3.0 4.0		1.80	72.03	1 (Seepage)	AA205181	B	1.70		

Groundwater Conditions
Seppage flow at 1.8m

Stability
TP stable

General Remarks
TP done for Active Travel Road project. PBT08R done in location at 0.6m depth

IGSL TP LOG 24665.GPJ IGSL.GDT 10/5/23

TRIAL PIT RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel	**TRIAL PIT NO.**	**TP09R**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	667,458.08 E 834,009.19 N
		DATE STARTED	04/05/2023
		DATE COMPLETED	04/05/2023
CLIENT	Monaghan Co.Co.	**GROUND LEVEL (m)**	82.75
ENGINEER	DBFL/Cora	**EXCAVATION METHOD**	3T Tracked machine

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.25	82.50						
Soft, brown, slightly sandy slighlty slightly gravelly CLAY with low cobbles and hair roots content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded, cobbles are subangular to subrounded.		0.50	82.25	(Seepage)					
Firm to stiff, brown, slightly sandy very gravelly CLAY with high cobbles and boulders content. Sand is fine to coarse, gravel is fine to coarse subangular to subrounded, cobbles and boulders are subangular to angular. 1.0					AA205182	B	0.60		
TP terminated at 1.5m due to boulders End of Trial Pit at 1.50m		1.50	81.25		AA205183	B	1.40		
2.0									
3.0									
4.0									

Groundwater Conditions
Slightly seppage flow at 0.5m

Stability
TP stable

General Remarks
TP done for Active Travel Road project. PBT09R done in location at 0.6m depth

IGSL TP LOG 24665.GPJ IGSL.GDT 10/5/23

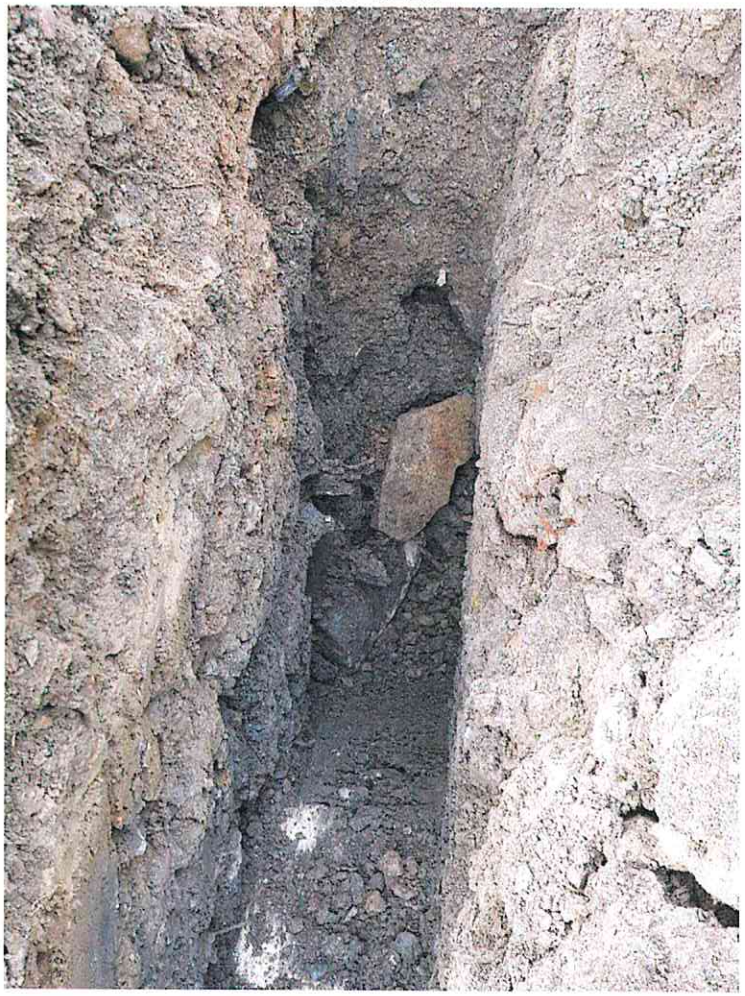
Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
TP 01R

TP 01R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
TP 02R



TP 02R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
TP 03R

TP 03R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
TP 04R

TP 04R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
TP 05R

TP 05R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
TP 06R

TP 06R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
TP 07R

TP 07R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
TP 08R

TP 08R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
TP 09R

TP 09R – spoil

Appendix IV BRE DIGEST 365

Soakaway Design f -value from field tests

IGSL

Contract: Monaghan, Active Travel
Test No. SA01R
Engineer DBFL
Date: 02/05/2023

24665

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL	
0.10	0.80	MADE GROUND (brown/grey sandy gravelly clay, cobbles, occ. plastic rubbish)	
0.80	1.70	Firm to stiff, yellowish brown, slightly sandy slightly gravelly CLAY with low	DRY
		cobbles content (possible original ground)	

Location: E: 667646.368; N:833692.439; G.L. 55.627mOD
Notes: SA01R done for Active Travel Road project

Field Data

Depth to Water (m)	Elapsed Time (min)
0.530	0.00
0.530	1.00
0.530	2.00
0.530	3.00
0.530	4.00
0.530	5.00
0.530	6.00
0.530	7.00
0.530	8.00
0.530	9.00
0.530	10.00
0.530	12.00
0.530	14.00
0.530	16.00
0.530	18.00
0.530	20.00
0.530	25.00
0.530	30.00
0.530	40.00
0.530	50.00
0.530	60.00

Field Test

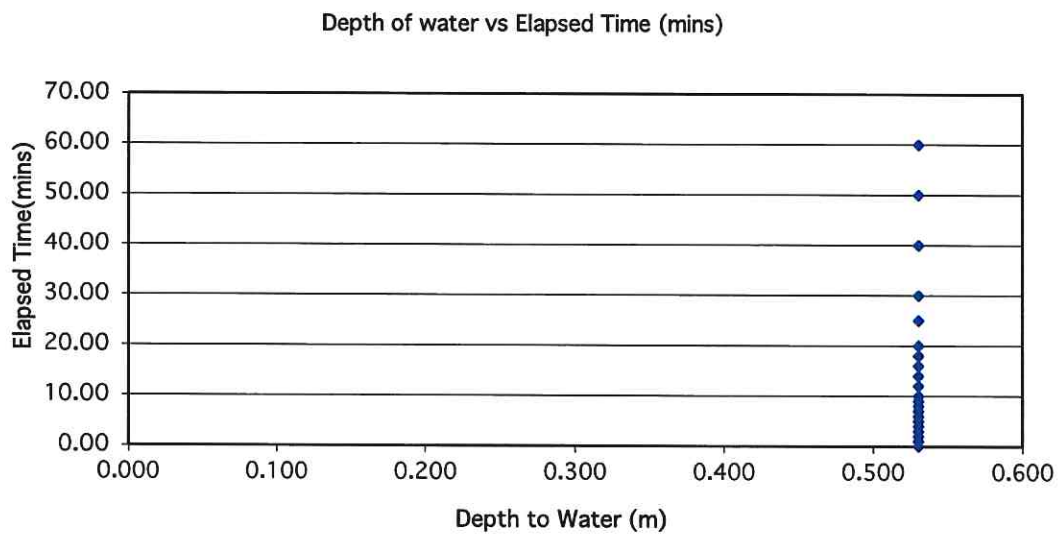
Depth of Pit (D)	1.70	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.70	m
Initial depth to Water =	0.53	m
Final depth to water =	0.530	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No Water Movement

Base area=	0.85	m2
*Av. side area of permeable stratum over test perio	5.148	m2
Total Exposed area =	5.998	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Monaghan, Active Travel
Test No. SA02R
Engineer DBFL
Date: 03/05/2023

24665

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL	DRY
0.10	1.30	MADE GROUND (brown/grey sandy gravelly clay, angular cobbles and boulders, roots, occasional plastic rubbish)	
1.30		Obstruction - boulders	

Location: E:667701.127; N:833726.306; G.L. 56.054mOD
Notes: SA02R done for Active Travel Road project

Field Data

Depth to Water (m)	Elapsed Time (min)
0.550	0.00
0.550	1.00
0.550	2.00
0.550	3.00
0.560	4.00
0.560	5.00
0.560	6.00
0.560	7.00
0.560	8.00
0.560	9.00
0.560	10.00
0.560	12.00
0.560	14.00
0.560	16.00
0.560	18.00
0.560	20.00
0.560	25.00
0.560	30.00
0.560	40.00
0.560	50.00
0.560	60.00

Field Test

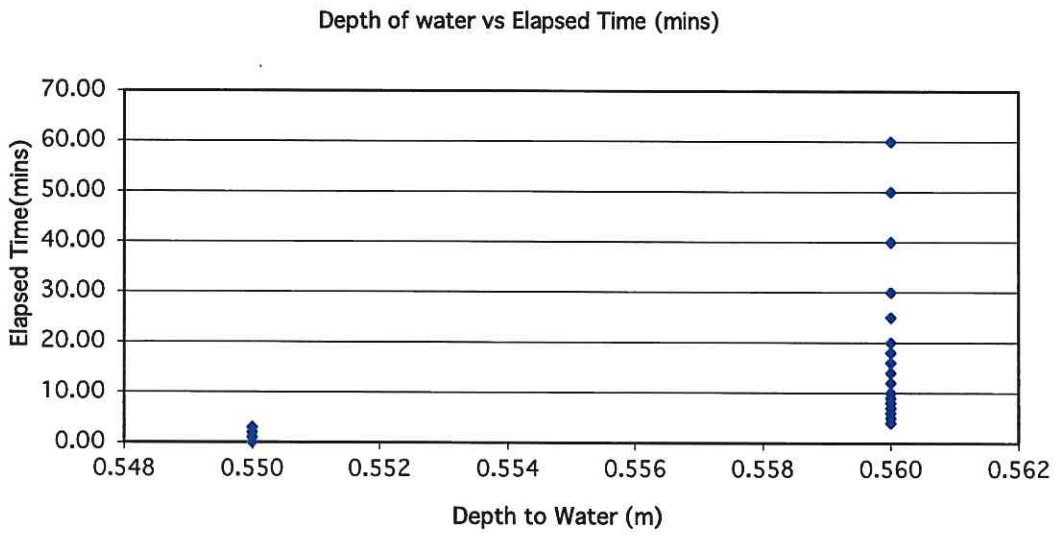
Depth of Pit (D)	1.30	m
Width of Pit (B)	0.70	m
Length of Pit (L)	1.50	m
Initial depth to Water =	0.55	m
Final depth to water =	0.560	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

Water Movement stoped at 0.56m

Base area=	1.05	m2
*Av. side area of permeable stratum over test perio	3.278	m2
Total Exposed area =	4.328	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 4E-05 m/min or 6.73906E-07 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Monaghan, Active Travel
Test No. SA03R
Engineer DBFL
Date: 03/05/2023

24665

Summary of ground conditions

from	to	Description	Ground water
0.00	0.15	TOPSOIL	DRY
0.15	1.70	MADE GROUND (brown sandy gravelly clay, angular cobbles, boulders, red brick pieces, roots)	

Location: E:667632.653; N:833757.907; G.L. 57.157mOD
Notes: SA03R done for Active Travel Road project

Field Data

Depth to Water (m)	Elapsed Time (min)
0.530	0.00
0.530	1.00
0.530	2.00
0.530	3.00
0.530	4.00
0.530	5.00
0.530	6.00
0.530	7.00
0.530	8.00
0.530	9.00
0.530	10.00
0.530	12.00
0.530	14.00
0.530	16.00
0.530	18.00
0.530	20.00
0.530	25.00
0.530	30.00
0.530	40.00
0.530	50.00
0.530	60.00

Field Test

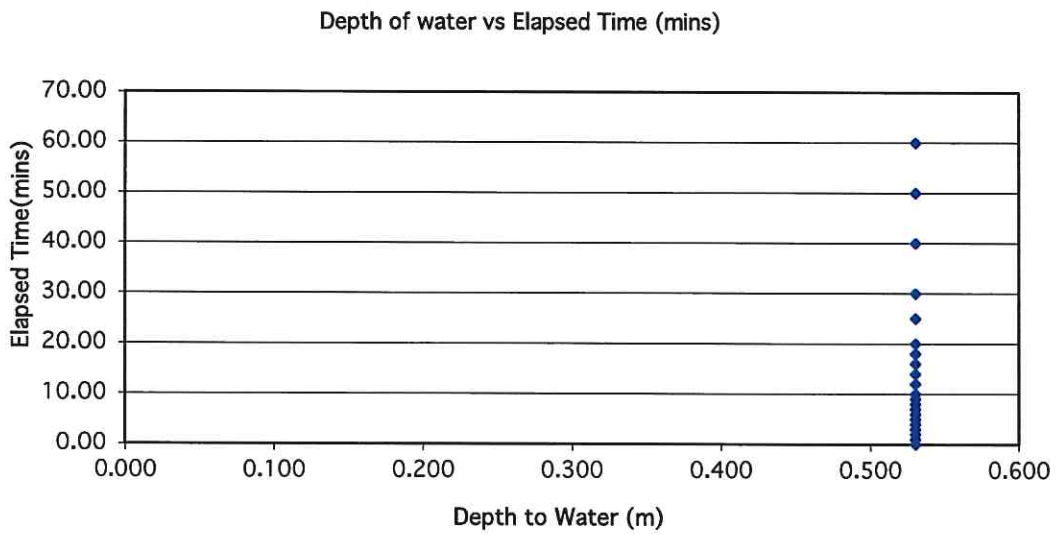
Depth of Pit (D)	1.70	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.50	m
Initial depth to Water =	0.53	m
Final depth to water =	0.530	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No Water Movement

Base area=	0.75	m2
*Av. side area of permeable stratum over test perio	4.68	m2
Total Exposed area =	5.43	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Monaghan, Active Travel
Test No. SA04R
Engineer DBFL
Date: 03/05/2023

24665

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL	DRY
0.10	1.50	MADE GROUND (dark brown/brown sandy gravelly clay, angular cobbles, boulders	
		red brick pieces, roots)	
1.50	1.60	Firm, brown, slightly sandy slightly gravelly CLAY with many cobbles	
1.60		Obstruction - boulders	

Location: E:667598.995; N:833793.538; G.L. 56.986mOD
Notes: SA04R done for Active Travel Road project

Field Data

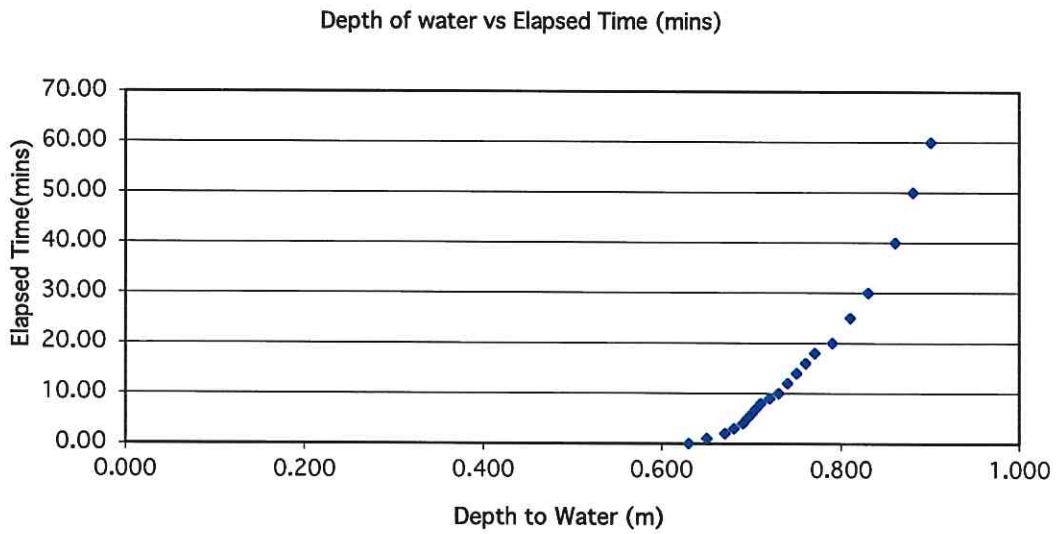
Depth to Water (m)	Elapsed Time (min)
0.630	0.00
0.650	1.00
0.670	2.00
0.680	3.00
0.690	4.00
0.695	5.00
0.700	6.00
0.705	7.00
0.710	8.00
0.720	9.00
0.730	10.00
0.740	12.00
0.750	14.00
0.760	16.00
0.770	18.00
0.790	20.00
0.810	25.00
0.830	30.00
0.860	40.00
0.880	50.00
0.900	60.00

Field Test

Depth of Pit (D)	1.60	m
Width of Pit (B)	0.70	m
Length of Pit (L)	1.60	m
Initial depth to Water =	0.63	m
Final depth to water =	0.900	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1.12	m2
*Av. side area of permeable stratum over test perio	3.841	m2
Total Exposed area =	4.961	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00102 m/min or 1.69321E-05 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Monaghan, Active Travel
Test No. SA05R
Engineer DBFL
Date: 03/05/2023

24665

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	Slow water at 1.3m
0.20	1.10	Soft to firm, brown, sandy gravelly silty CLAY with low cobbles content	
1.10	1.40	Firm, brown, slightly sandy gravelly silty CLAY with high angular cobbles content	
1.40		Obstruction - boulders or rock	

Location: E:667509.452; N:833780.041; G.L. 69.077mOD
Notes: SA05R done for Active Travel Road project

Field Data

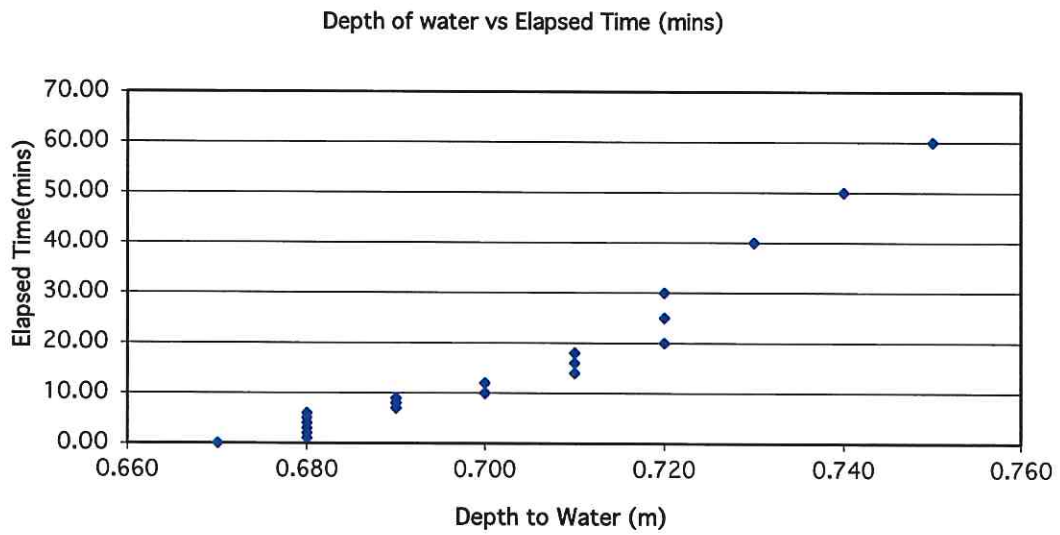
Depth to Water (m)	Elapsed Time (min)
0.670	0.00
0.680	1.00
0.680	2.00
0.680	3.00
0.680	4.00
0.680	5.00
0.680	6.00
0.690	7.00
0.690	8.00
0.690	9.00
0.700	10.00
0.700	12.00
0.710	14.00
0.710	16.00
0.710	18.00
0.720	20.00
0.720	25.00
0.720	30.00
0.730	40.00
0.740	50.00
0.750	60.00

Field Test

Depth of Pit (D)	1.40	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.50	m
Initial depth to Water =	0.67	m
Final depth to water =	0.750	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.75	m2
*Av. side area of permeable stratum over test perio	2.76	m2
Total Exposed area =	3.51	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00028 m/min or 4.74834E-06 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Monaghan, Active Travel
Test No. SA06R
Engineer DBFL
Date: 04/05/2023

24665

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	
0.20	0.90	Soft to firm, brown, slightly sandy slightly gravelly CLAY with low cobbles conten	
0.90	1.60	Firm to stiff, brown, slightly sandy gravelly CLAY with high angular cobbles conte	DRY

Location: E:667522.727; N:833925.614; G.L. 73.67mOD
Notes: SA06R done for Active Travel Road project

Field Data

Depth to Water (m)	Elapsed Time (min)
0.730	0.00
0.730	1.00
0.730	2.00
0.730	3.00
0.730	4.00
0.730	5.00
0.730	6.00
0.730	7.00
0.730	8.00
0.730	9.00
0.730	10.00
0.730	12.00
0.730	14.00
0.730	16.00
0.730	18.00
0.730	20.00
0.730	25.00
0.730	30.00
0.730	40.00
0.730	50.00
0.730	60.00

Field Test

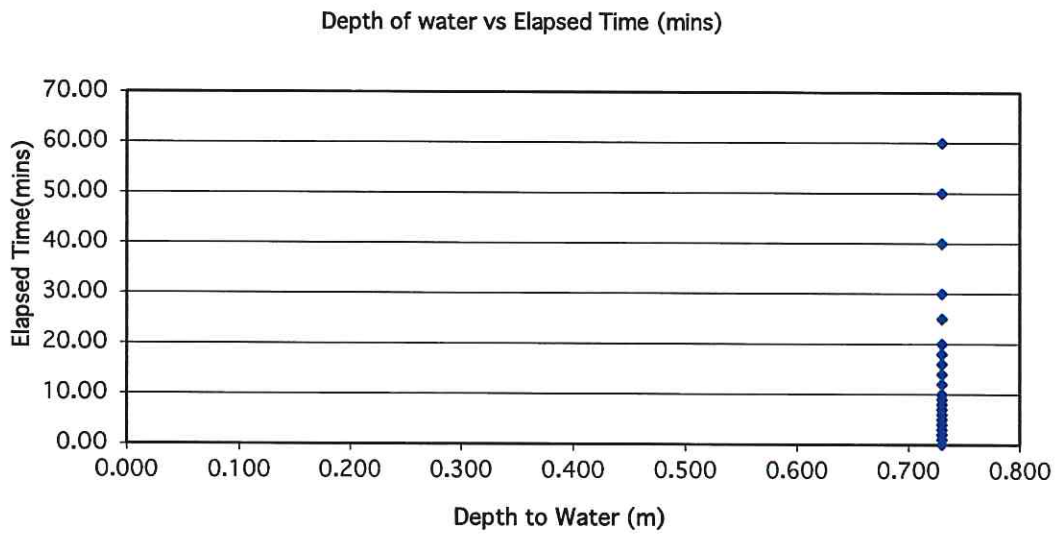
Depth of Pit (D)	1.60	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.73	m
Final depth to water =	0.730	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No Water Movement

Base area=	1	m2
*Av. side area of permeable stratum over test perio	4.35	m2
Total Exposed area =	5.35	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
SA 01R

SA 01R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

IGSL Ltd.

TRIAL PIT PHOTOGRAPHY RECORD
SA 02R

SA 02R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
SA 03R

SA 03R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
SA 04R

SA 04R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
SA 05R

SA 05R – spoil

Project Number: 24665
Site: Monaghan Active Travel
Project Engineer: DBFL/CORA

TRIAL PIT PHOTOGRAPHY RECORD
SA 06R

SA 06R – spoil

Appendix V CBR by Plate Test

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

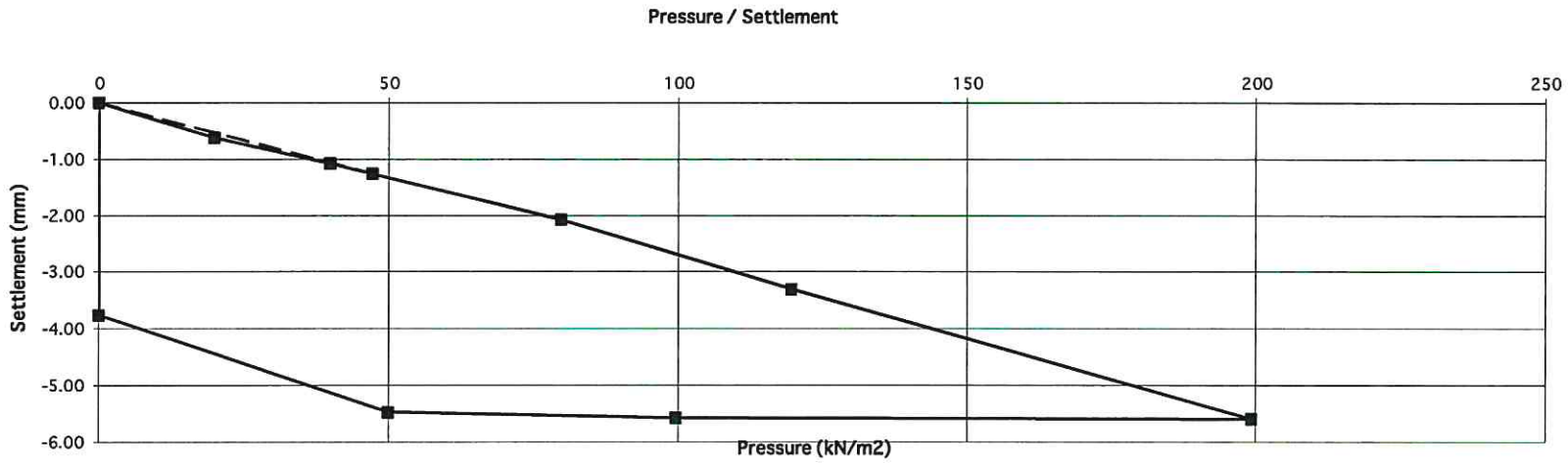
Reference No.	R144697
Contract	Monaghan Active Travel
Test No.	PBT01 - load
Location	TP01R
Depth	0.5m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	02/05/2023

Description of soil under test (natural soil, placed fill, sub-base)

MADE GROUND (sandy gravelly clay, angular cobbles)

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 38
Modulus of subgrade reaction = 17 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.3 %

PLATE TEST REPORT SHEET (F3.1)

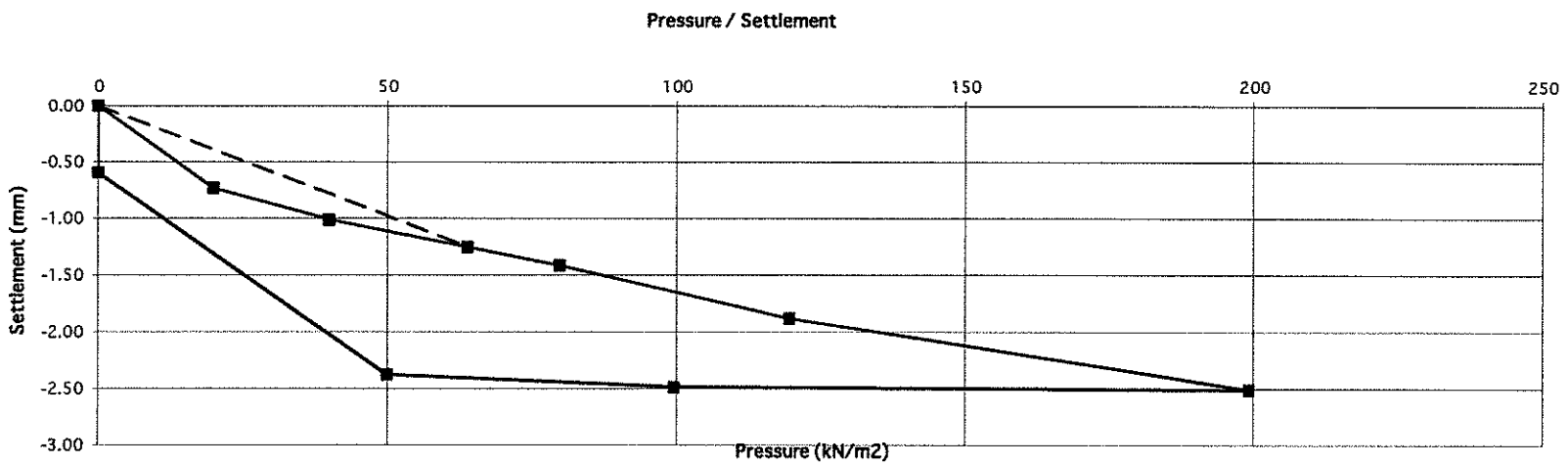
Applied Pressure/Settlement Curve

Reference No.	R144697
Contract	Monaghan Active Travel
Test No.	PBT01 - Reload
Location	TP01R
Depth	0.5m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	02/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
MADE GROUND (sandy gravelly clay, angular cobbles)

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 51
Modulus of subgrade reaction = 23 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.3 %

PLATE TEST REPORT SHEET (F3.1)

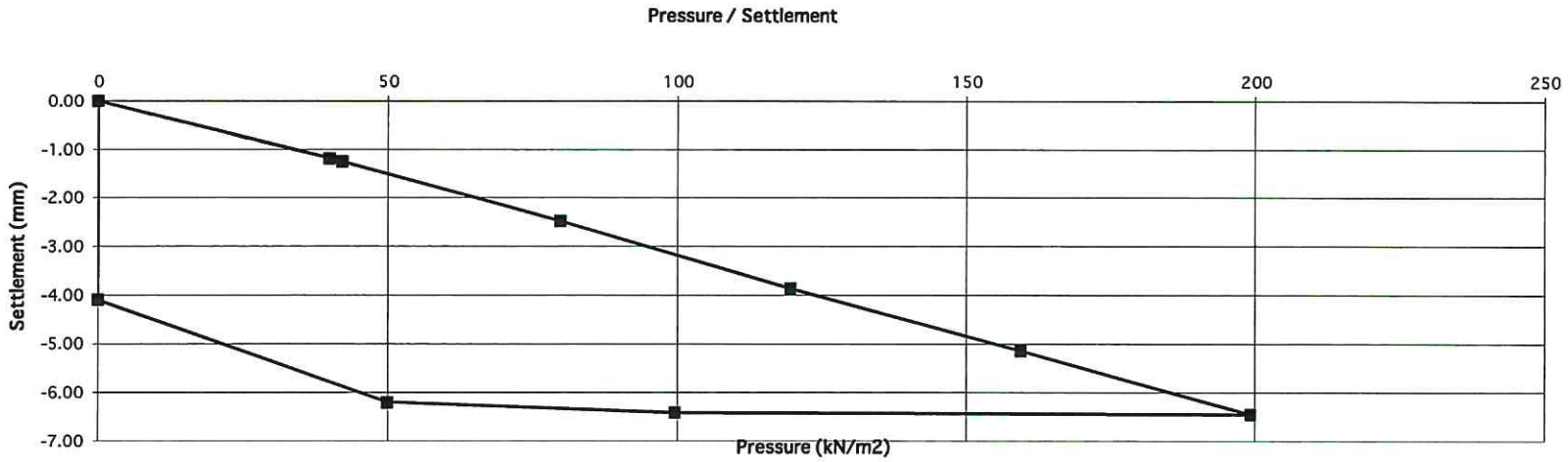
Applied Pressure/Settlement Curve

Reference No.	R144698
Contract	Monaghan Active Travel
Test No.	PBT02 - load
Location	TP02R
Depth	0.5m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	02/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
MADE GROUND (sandy gravelly clay, angular cobbles)

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 34
Modulus of subgrade reaction = 15 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.1 %

PLATE TEST REPORT SHEET (F3.1)

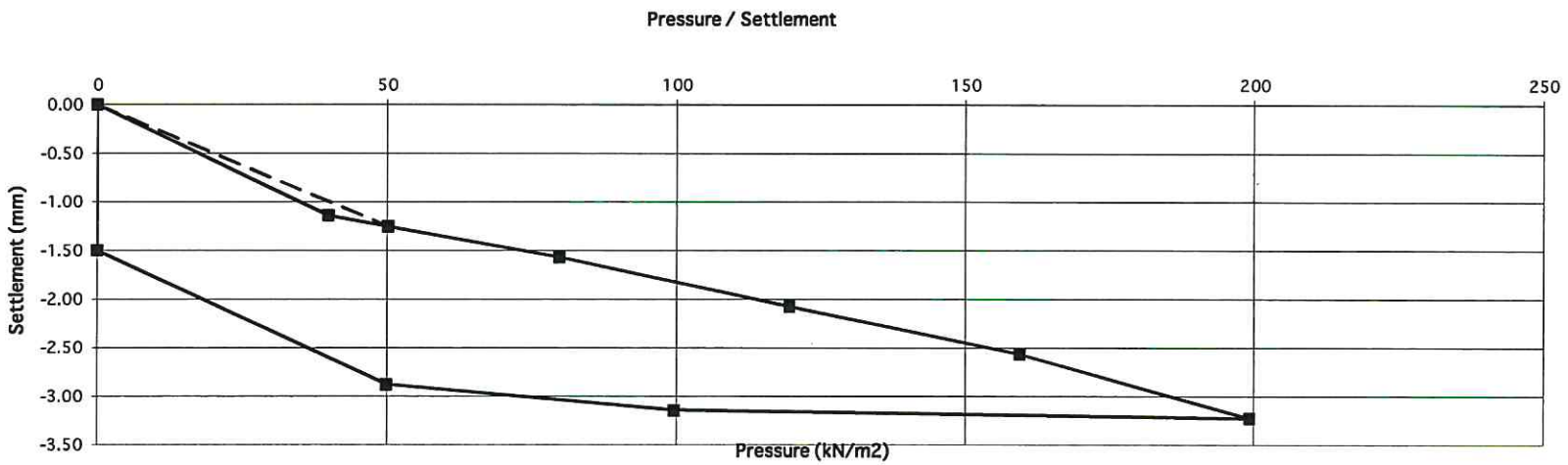
Applied Pressure/Settlement Curve

Reference No.	R144698
Contract	Monaghan Active Travel
Test No.	PBT02 - Reload
Location	TP02R
Depth	0.5m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	02/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
MADE GROUND (sandy gravelly clay, angular cobbles)

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 40
Modulus of subgrade reaction = 18 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.5 %

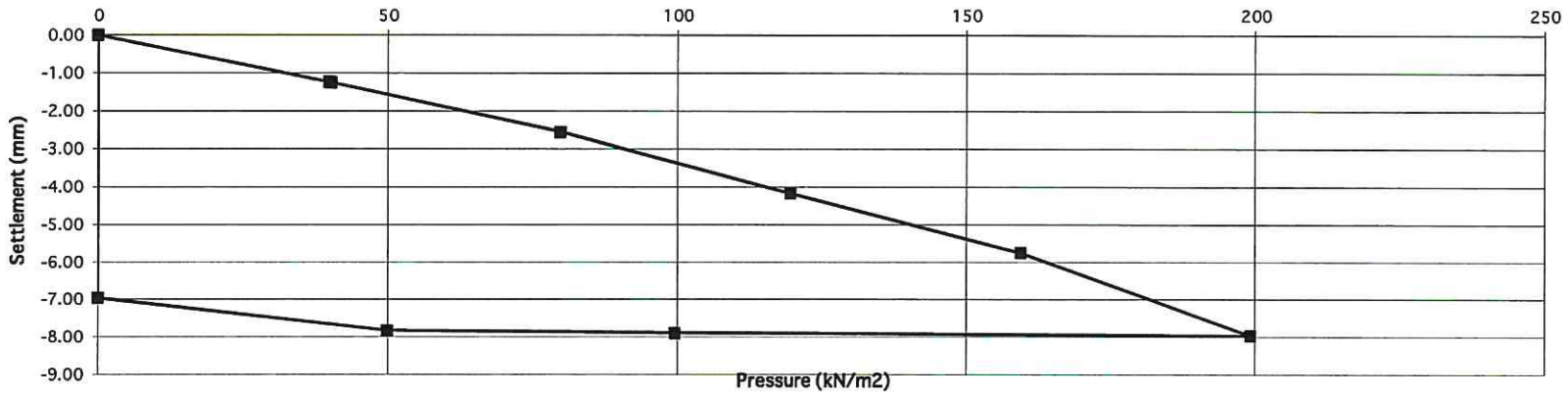
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R144699
Contract	Monaghan Active Travel
Test No.	PBT03 - load
Location	TP03R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	03/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
MADE GROUND (sandy gravelly clay, angular cobbles, orga

Easting (m)
Northing (m)
Ground Level (mOD)
Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 32
Modulus of subgrade reaction = 15 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.0 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

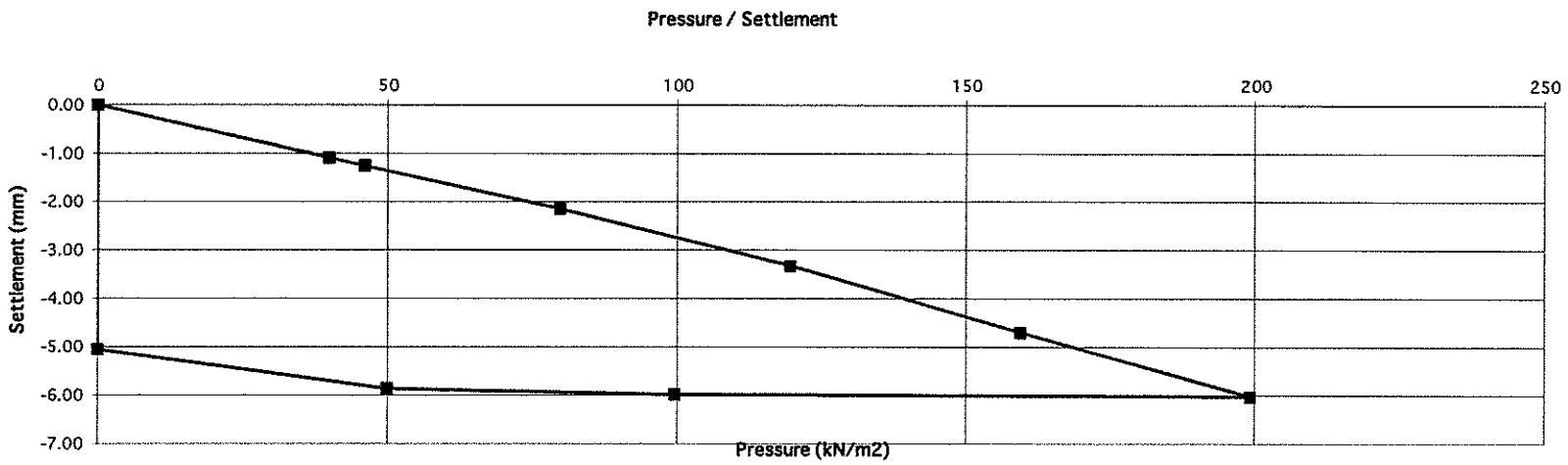
Reference No.	R144699
Contract	Monaghan Active Travel
Test No.	PBT03 - Reload
Location	TP03R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	03/05/2023

Description of soil under test (natural soil, placed fill, sub-base)

MADE GROUND (sandy gravelly clay, angular cobbles, orga

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 37
Modulus of subgrade reaction = 17 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

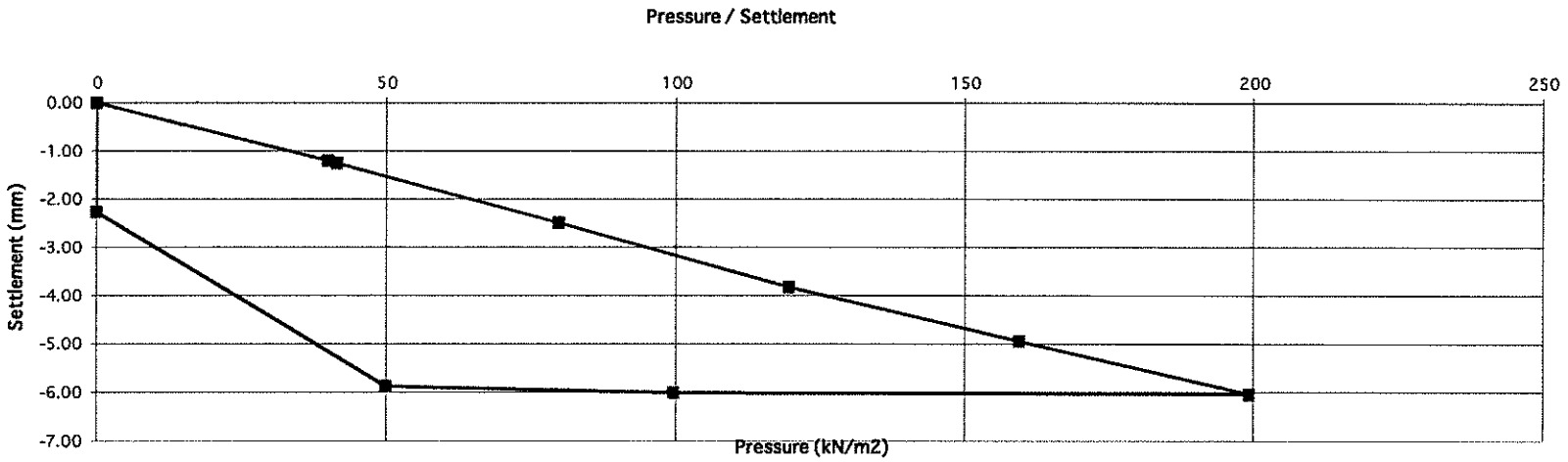
Equivalent CBR value in accordance with NRA HD25-26/10 1.3 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R144700
Contract	Monaghan Active Travel
Test No.	PBT04 - load
Location	TP04R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	03/05/2023

Description of soil under test (natural soil, placed fill, sub-base)	MADE GROUND (sandy gravelly clay, angular cobbles, orga
Easting (m)	
Northing (m)	
Ground Level (mOD)	
Sample Ref No.	N/A
Depth	0.00 m bgl



Gradient at 1.25 mm settlement intersection = 33
Modulus of subgrade reaction = 15 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.1 %

PLATE TEST REPORT SHEET (F3.1)

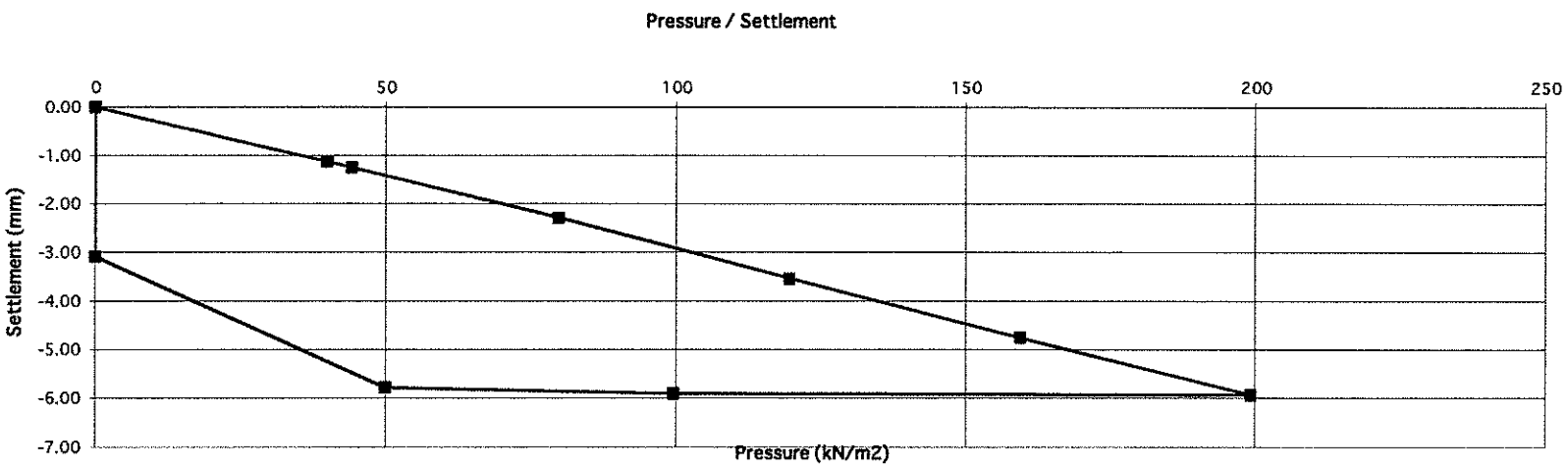
Applied Pressure/Settlement Curve

Reference No.	R144700
Contract	Monaghan Active Travel
Test No.	PBT04 - Reload
Location	TP04R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	03/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
MADE GROUND (sandy gravelly clay, angular cobbles, orga

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 35
Modulus of subgrade reaction = 16 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.2 %

PLATE TEST REPORT SHEET (F3.1)

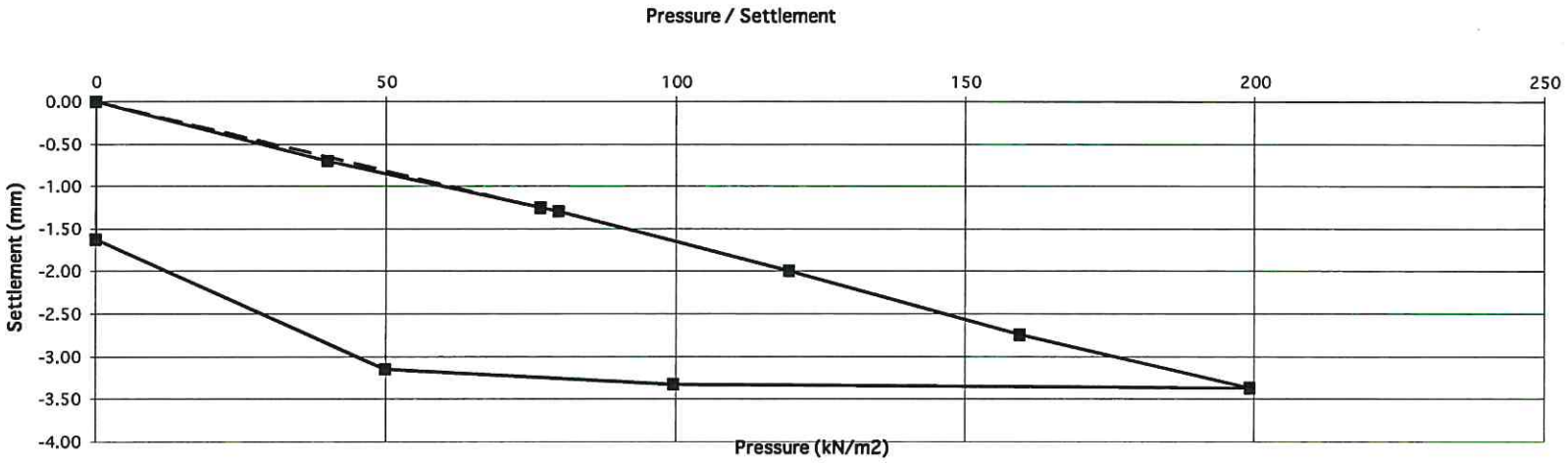
Applied Pressure/Settlement Curve

Reference No.	R144701
Contract	Monaghan Active Travel
Test No.	PBT05 - load
Location	TP05R
Depth	0.5m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	03/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
MADE GROUND (sandy gravelly clay, angular cobbles, bou

Easting (m)
Northing (m)
Ground Level (mOD)

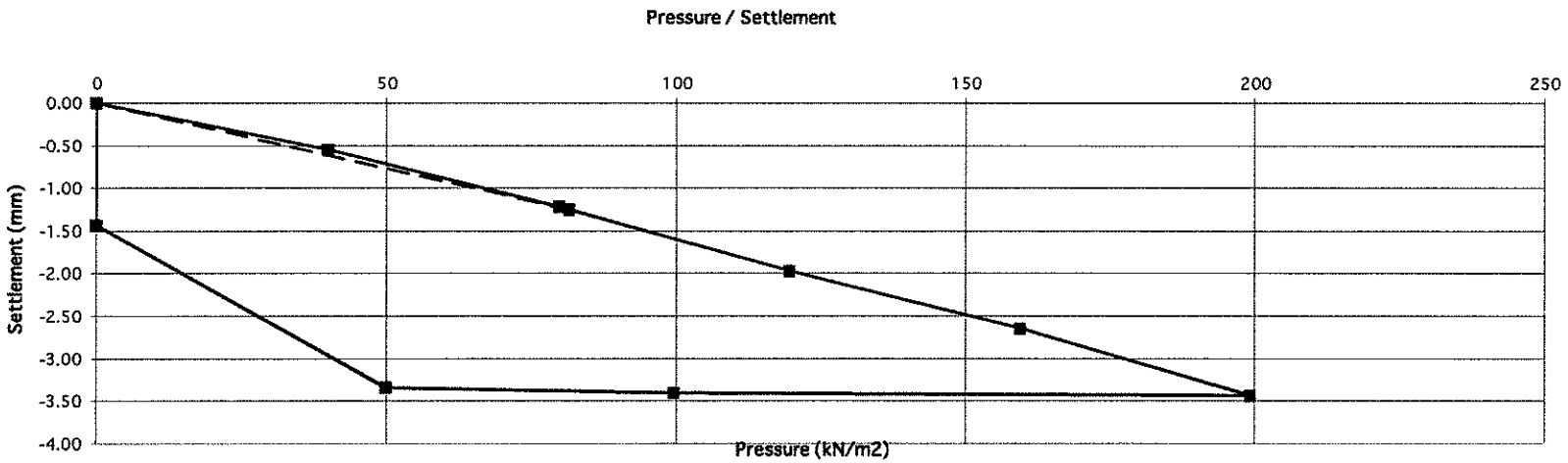
Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 61
Modulus of subgrade reaction = 28 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.1 %

PLATE TEST REPORT SHEET (F3.1)		Applied Pressure/Settlement Curve	
Reference No.	R144701		
Contract	Monaghan Active Travel	Description of soil under test (natural soil, placed fill, sub-base)	
Test No.	PBT05 - Reload	MADE GROUND (sandy gravelly clay, angular cobbles, bou	
Location	TP05R		
Depth	0.5m bgl	Easting (m)	
Client	DBFL	Northing (m)	
Plate Diameter:	300 mm	Ground Level (mOD)	
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test	Sample Ref No. N/A	
Technician	I.Reder	Depth 0.00 m bgl	
Authorised by			
Date	03/05/2023		



Gradient at 1.25 mm settlement intersection = 65
Modulus of subgrade reaction = 30 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.5 %

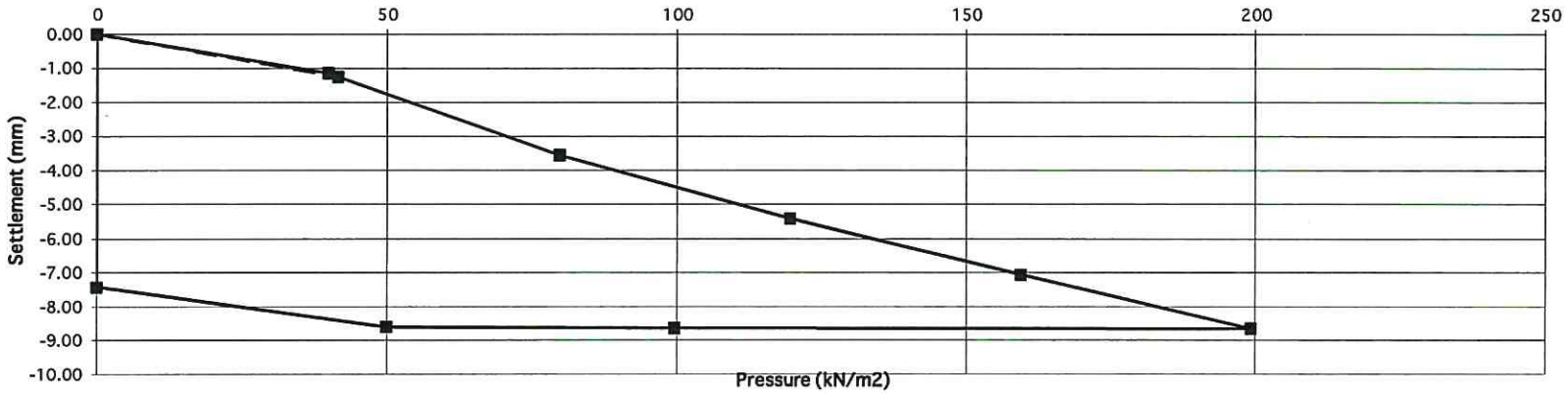
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R144702
Contract	Monaghan Active Travel
Test No.	PBT06 - load
Location	TP06R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	03/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
Greyish brown, slightly sandy gravelly CLAY with cobbles

Easting (m)
Northing (m)
Ground Level (mOD)
Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 33
Modulus of subgrade reaction = 15 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.1 %

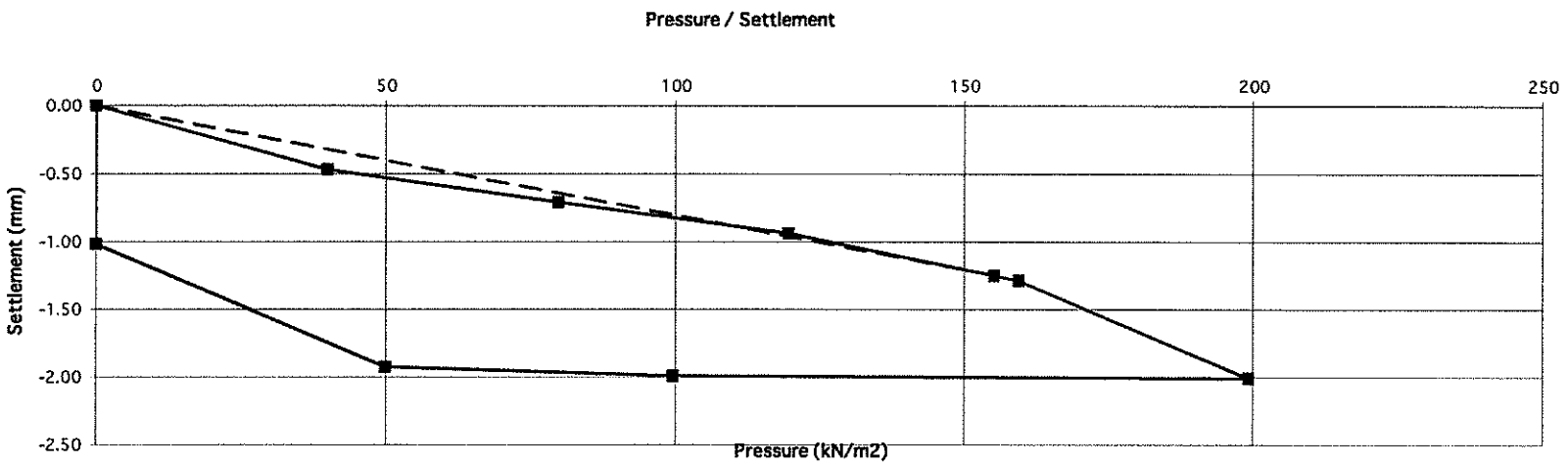
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R144702
Contract	Monaghan Active Travel
Test No.	PBT06 - Reload
Location	TP06R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	03/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
Greyish brown, slightly sandy gravelly CLAY with cobbles

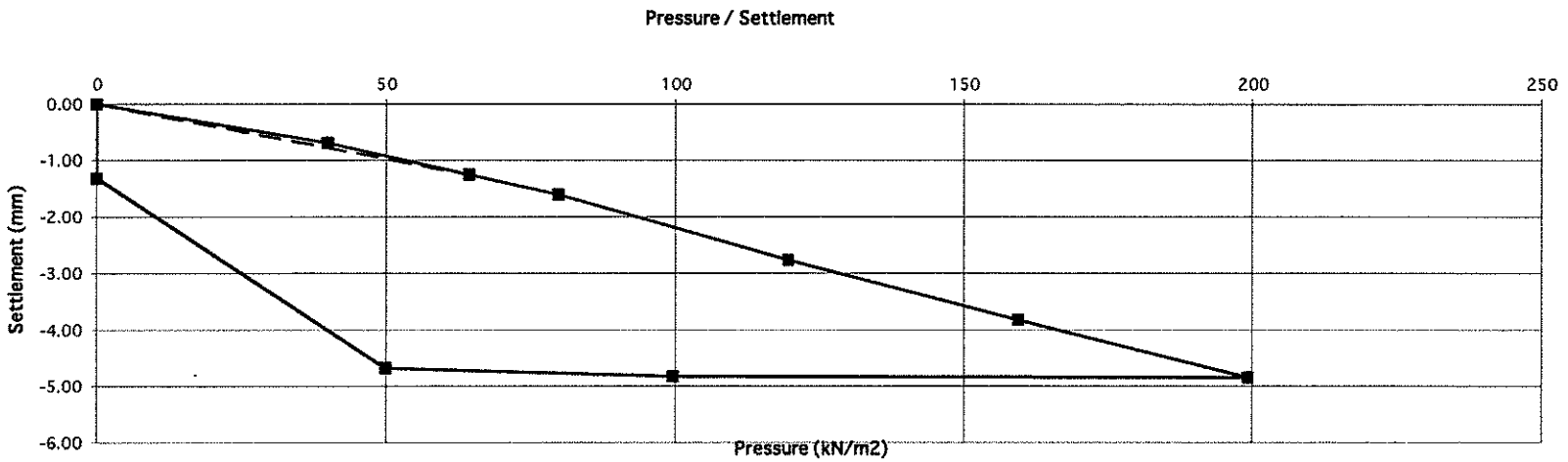
Easting (m)
Northing (m)
Ground Level (mOD)
Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 124
Modulus of subgrade reaction = 57 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 10.6 %

PLATE TEST REPORT SHEET (F3.1)		Applied Pressure/Settlement Curve
Reference No.	R144703	
Contract	Monaghan Active Travel	Description of soil under test (natural soil, placed fill, sub-base)
Test No.	PBT07 - load	Brownish grey, slightly sandy gravelly silty CLAY with cob
Location	TP07R	
Depth	0.6m bgl	
Client	DBFL	Easting (m)
Plate Diameter:	300 mm	Northing (m)
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test	Ground Level (mOD)
Technician	I.Reder	Sample Ref No. N/A
Authorised by		Depth 0.00 m bgl
Date	03/05/2023	



Gradient at 1.25 mm settlement intersection = 51
Modulus of subgrade reaction = 24 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.3 %

PLATE TEST REPORT SHEET (F3.1)

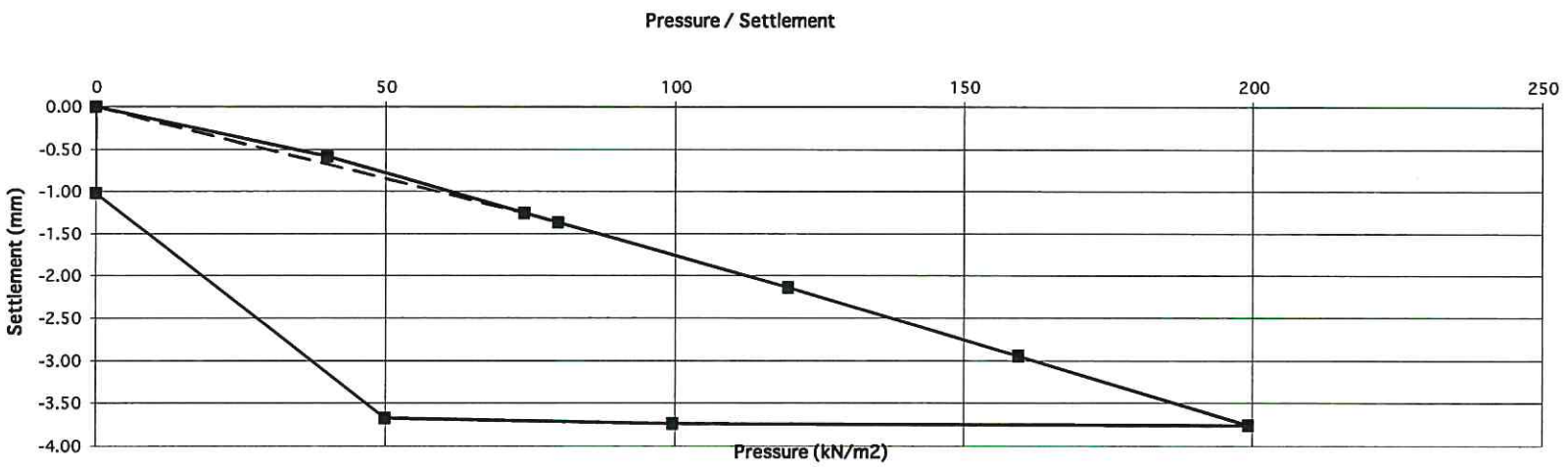
Applied Pressure/Settlement Curve

Reference No.	R144703
Contract	Monaghan Active Travel
Test No.	PBT07 - Reload
Location	TP07R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	03/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
Brownish grey, slightly sandy gravelly silty CLAY with cob

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 59
Modulus of subgrade reaction = 27 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.9 %

PLATE TEST REPORT SHEET (F3.1)

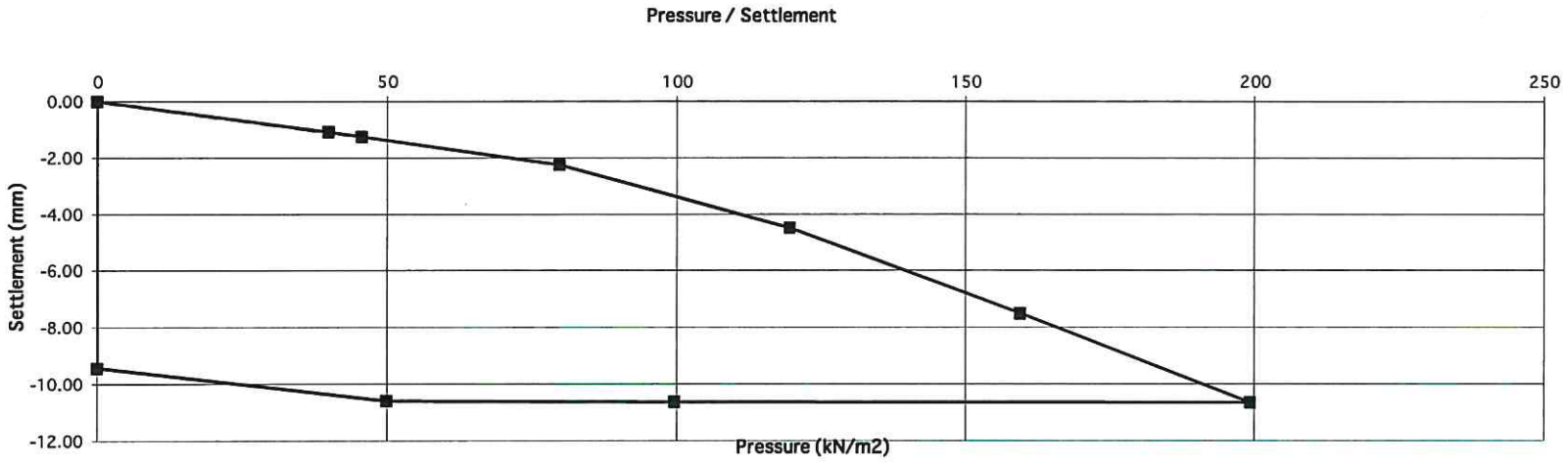
Applied Pressure/Settlement Curve

Reference No.	R144704
Contract	Monaghan Active Travel
Test No.	PBT08 - load
Location	TP08R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	04/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
Brownish grey, sl. sandy sl. gravelly CLAY with occ. cobbl

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 36
Modulus of subgrade reaction = 17 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.3 %

PLATE TEST REPORT SHEET (F3.1)

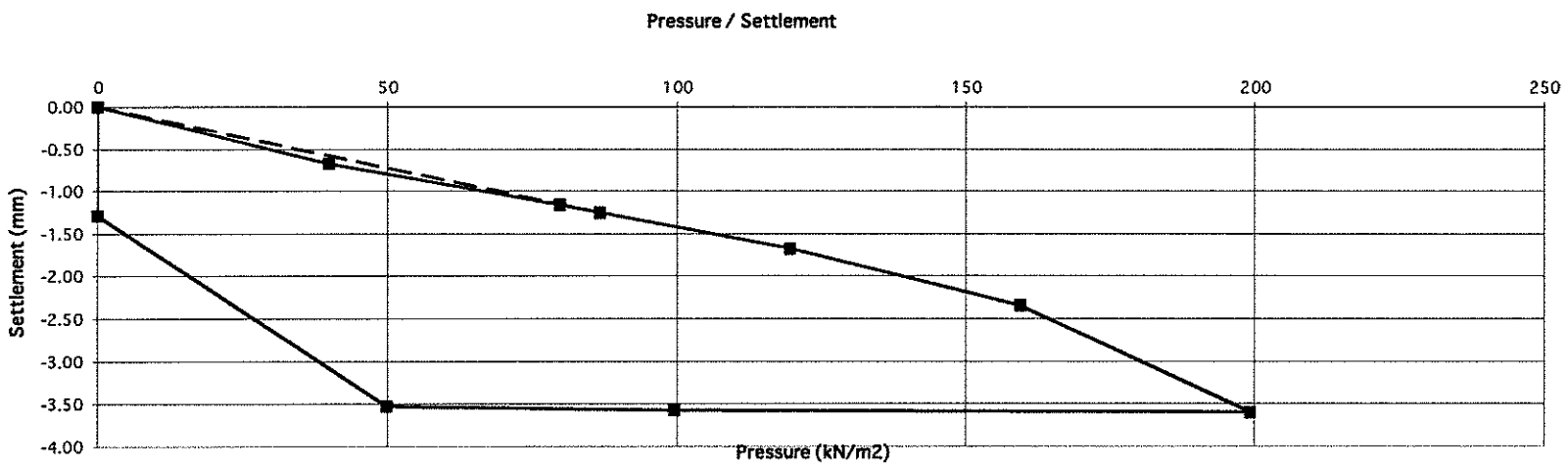
Applied Pressure/Settlement Curve

Reference No.	R144704
Contract	Monaghan Active Travel
Test No.	PBT08 - Reload
Location	TP08R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	04/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
Brownish grey, sl. sandy sl. gravelly CLAY with occ. cobbl

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 69
Modulus of subgrade reaction = 32 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.8 %

PLATE TEST REPORT SHEET (F3.1)

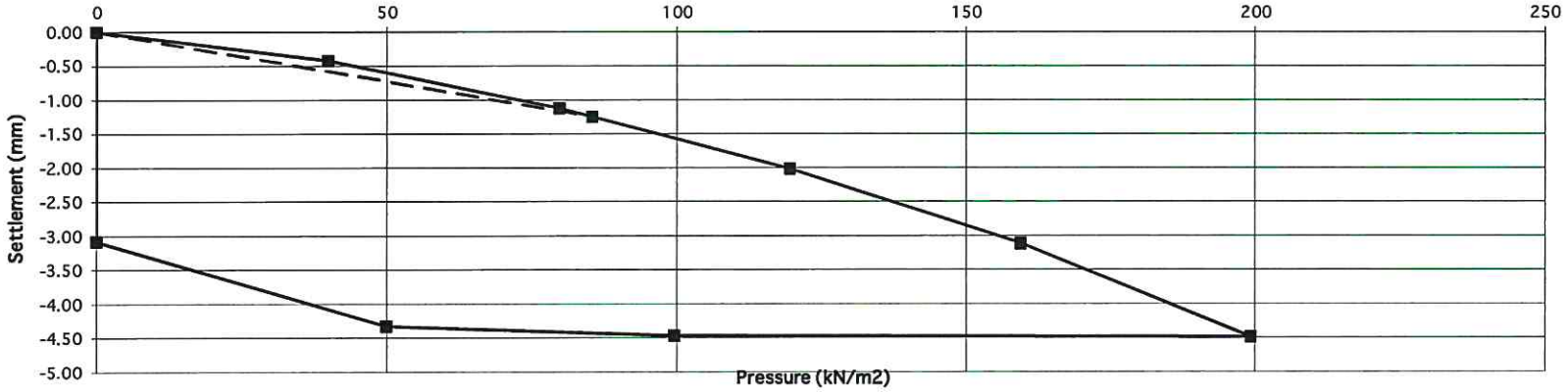
Applied Pressure/Settlement Curve

Reference No.	R144705
Contract	Monaghan Active Travel
Test No.	PBT09 - load
Location	TP09R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	04/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
Brown, sl. sandy very gravelly CLAY with occ. cobbles

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 68
Modulus of subgrade reaction = 31 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.8 %

PLATE TEST REPORT SHEET (F3.1)

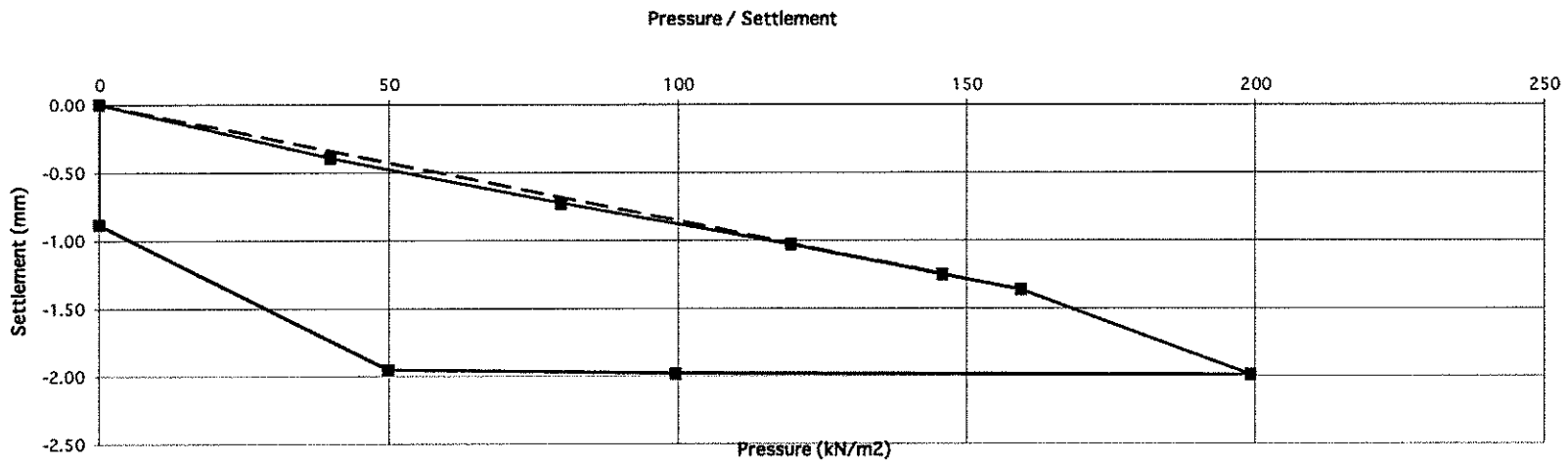
Applied Pressure/Settlement Curve

Reference No.	R144705
Contract	Monaghan Active Travel
Test No.	PBT09 - Reload
Location	TP09R
Depth	0.6m bgl
Client	DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	04/05/2023

Description of soil under test
(natural soil, placed fill, sub-base)
Brown, sl. sandy very gravelly CLAY with occ. cobbles

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 117
Modulus of subgrade reaction = 53 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 9.5 %

Appendix VI Slit Trenches

Report No. 24665	SLIT TRENCH RECORD	FACING DIRECTION: N W E S	IGSL

		Survey				
Project: Monaghan Active Travel		Easting (m)	Northing (m)	Elevation (mOD)	Slit Trench No.	ST01
Engineer: DBFL					Sheet	1 of 1
Crew: I.R. /Flanagans	Start of Trench				Date Commenced	08/05/2023
	End of Trench				Date Completed	08/05/2023

Ground Conditions

From (m)	To (m)	Soil Description
0.00	0.12	TARMAC
0.12	0.55	MADE GROUND (comprised of brown slightly clayey slightly sandy angular gravel and cobbles)
0.55	1.1	MADE GROUND (comprised of grey slightly sandy fine to coarse angular gravel)
1.1	1.5	MADE GROUND (comprised of brown/dark brown, slightly sandy slightly gravelly clay, red brick, timber pieces, pottery pieces, very occasional steel rubbish)

Photograph

Trench Dimensions	
LHS of Trench (m)	0.0
RHS of Trench (m)	12.5
Trench Depth (m)	1.5
Trench Width (m)	1.0

Location

Facing Direction	East
Facing Features	Road
Groundwater	Dry

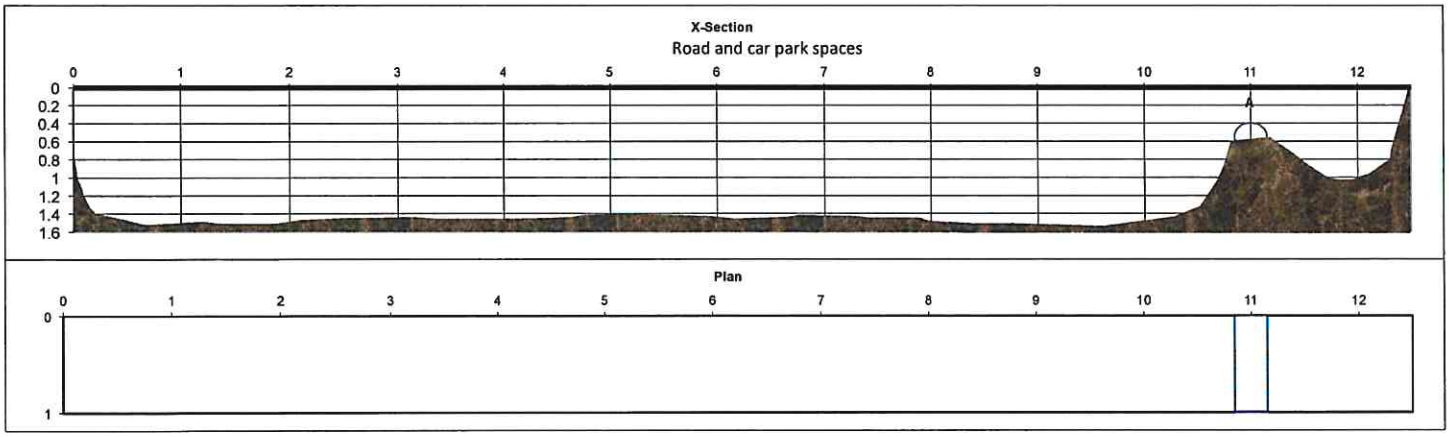
SAMPLES

0.8m (B) Ref.No AA205190

Excavation Quantities

Surface	Length (m)	Material
Road	12.5	
Path (LHS)		
Path (RHS)		
Grass Verge (LHS)		
Grass Verge (RHS)		
Other		
Total Length	12.5	

Zero Metres Taken As: Kerb at parking pay station side



	Diameter (mm)	Material	Description	Distance (m)	Depth to crown (m)	Angle (deg.)
Service A	300	Concrete	Stormwater pipe	11	0.4	90
Service B						
Service C						
Service D						
Service E						
Service F						
Service G						
Service H						
Service I						
Service J						
Service K						
Service L						
Service M						

Report No. 24665	SLIT TRENCH RECORD	FACING DIRECTION: N W E S	IGSL

		Survey				
Project: Monaghan Active Travel		Easting (m)	Northing (m)	Elevation (mOD)	Slit Trench No.	ST02
Engineer: DBFL					Sheet	1 of 1
Crew: I.R. /Flanagans	Start of Trench				Date Commenced	09/05/2023
	End of Trench				Date Completed	09/05/2023

Ground Conditions

From (m)	To (m)	Soil Description
0.00	0.18	TARMAC
0.18	0.35	MADE GROUND (comprised of grey slightly sandy fine to coarse angular gravel and lean-mix)
0.35	0.9	MADE GROUND (comprised of grey slightly sandy fine to coarse angular gravel and cobbles)
0.9	1.3	MADE GROUND (comprised of brown/grey, sandy gravelly clay, cobbles, boulders, angular gravel)

Photograph

Trench Dimensions	
LHS of Trench (m)	0.0
RHS of Trench (m)	12.1
Trench Depth (m)	1.3
Trench Width (m)	1.0
Facing Direction	East
Facing Features	Road
Groundwater	Dry

Location

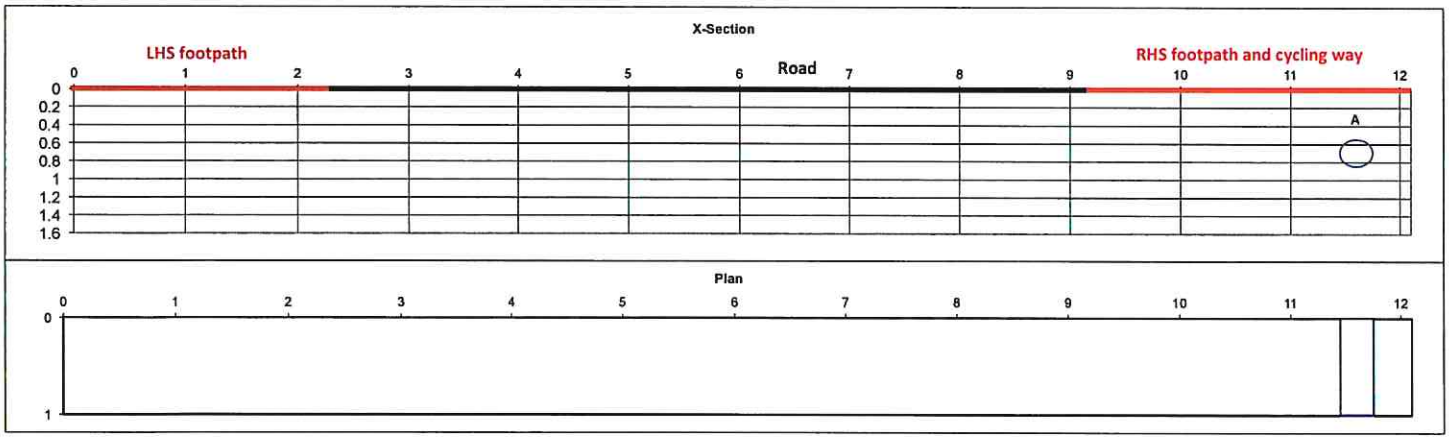
SAMPLES

1.0m (B) Ref.No AA205191

Excavation Quantities

Surface	Length (m)	Material
Road	6.9	
Path (LHS)	2.2	
Path (RHS)	3.0	
Grass Verge (LHS)		
Grass Verge (RHS)		
Other		
Total Length	12.1	

Zero Metres Taken As: Timber fence at footpath



	Diameter (mm)	Material	Description	Distance (m)	Depth to crown (m)	Angle (deg.)
Service A	300	Cast Iron	Unknown	11.6	0.55	90
Service B						
Service C						
Service D						
Service E						
Service F						
Service G						
Service H						
Service I						
Service J						
Service K						
Service L						
Service M						

Report No. 24665	SLIT TRENCH RECORD	FACING DIRECTION: N / W / E / S	IGSL

		Survey				
Project: Monaghan Active Travel		Easting (m)	Northing (m)	Elevation (mOD)	Slit Trench No.	ST03
Engineer: DBFL					Sheet	1 of 1
Crew: I.R. /Flanagans	Start of Trench				Date Commenced	02/05/2023
	End of Trench				Date Completed	02/05/2023

Ground Conditions

From (m)	To (m)	Soil Description
0.00	0.05	TOPSOIL
0.05	0.9	MADE GROUND (comprised of grey/brown sandy gravelly clay, angular stones, red brick, occasional plastic rubbish)
0.9	1.8	MADE GROUND (comprised of grey sandy gravelly clay, cobbles, organic matter) - possible backfilled old canal

Photograph

Trench Dimensions	
LHS of Trench (m)	0.0
RHS of Trench (m)	14.85
Trench Depth (m)	1.8
Trench Width (m)	0.5
Facing Direction	142° South East
Facing Features	Canal Green way
Groundwater	Dry

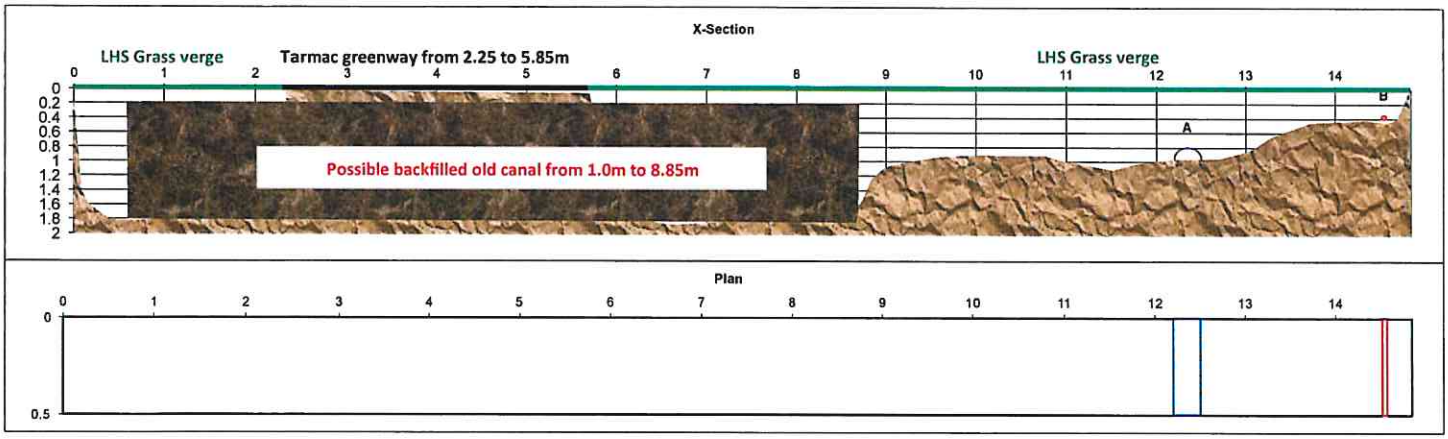
Location

SAMPLES

Excavation Quantities

Surface	Length (m)	Material
Greenway	3.6	
Path (LHS)		
Path (RHS)		
Grass Verge (LHS)	2.25	
Grass Verge (RHS)	9.0	
Other		
Total Length	14.85	

Zero Metres Taken As: timber fence



	Diameter (mm)	Material	Description	Distance (m)	Depth to crown (m)	Angle (deg.)
Service A	300	Cast Iron	Unknown	12.35	0.8	90
Service B	50	PVC	Cable Duct	14.55	0.35	90
Service C						
Service D						
Service E						
Service F						
Service G						
Service H						
Service I						
Service J						
Service K						
Service L						
Service M						

Report No. 24665	SLIT TRENCH RECORD	FACING DIRECTION: N / W / E / S	IGSL

		Survey				
Project: Monaghan Active Travel		Easting (m)	Northing (m)	Elevation (mOD)	Slit Trench No.	ST04
Engineer: DBFL					Sheet	1 of 1
Crew: I.R. /Flanagans	Start of Trench				Date Commenced	02/05/2023
	End of Trench				Date Completed	02/05/2023

Ground Conditions

From (m)	To (m)	Soil Description
0.00	0.10	TOPSOIL
0.1	1.6	MADE GROUND (comprised of firm to stiff grey/brown sandy gravelly clay with cobbles, angular stones, red brick, occasional plastic rubbish)
1.6		Obstruction - big boulders or rubble

Photograph

Trench Dimensions	
LHS of Trench (m)	0.0
RHS of Trench (m)	14.5
Trench Depth (m)	1.6
Trench Width (m)	0.5

Facing Direction	147° South East
Facing Features	Canal Greenway
Groundwater	Dry

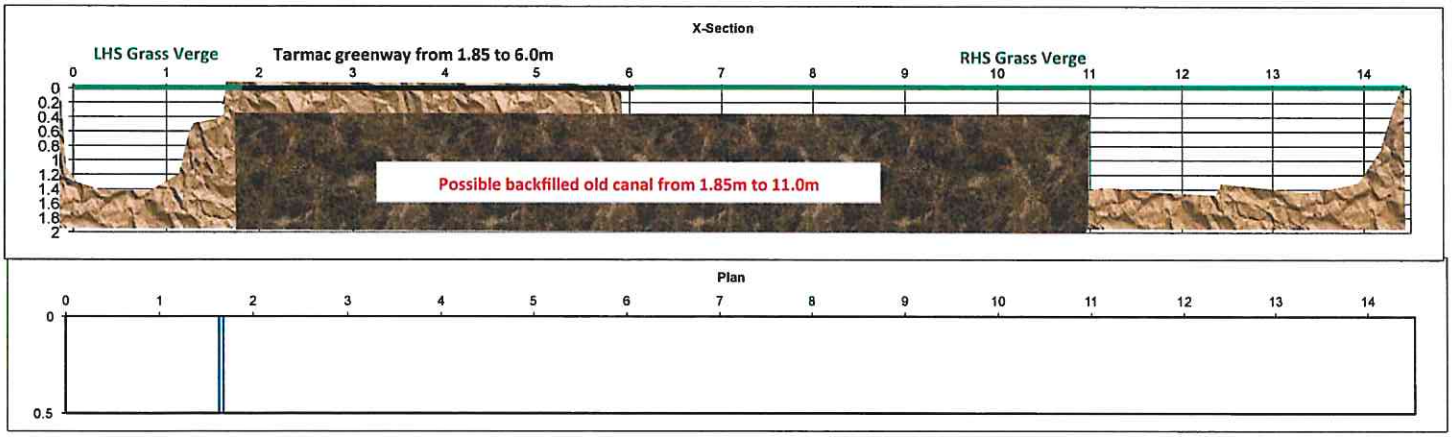
Location

SAMPLES

Excavation Quantities

Surface	Length (m)	Material
Greenway	4.15	
Path (LHS)		
Path (RHS)		
Grass Verge (LHS)	1.85	
Grass Verge (RHS)	8.5	
Other		
Total Length	14.5	

Zero Metres Taken As: timber fence



	Diameter (mm)	Material	Description	Distance (m)	Depth to crown (m)	Angle (deg.)
Service A	50	PVC	Lights cable duct	1.66	0.45	90
Service B						
Service C						
Service D						
Service E						
Service F						
Service G						
Service H						
Service I						
Service J						
Service K						
Service L						
Service M						

Appendix VII Vane Shear Tests

a. Vane Shear Test Data
b. Window Sample Logs
c. Dynamic Probe Logs

Vane Shear Strength from Field Measurement

Project No.	24665
Project Title:	Monaghan Active Travel - road and bridge project
Client:	Monaghan Co. Co.
Borehole No.	SV01 (WS01)

Easting (m)	667616.276
Northing (m)	833670.874
Ground Level (mOD)	55.657

Vane Type	Geonor H-10
Vane Length (mm)	130
Vane Width (mm)	65
Rotational Speed of Vane	0.1 deg/sec (1 rev/sec at rotary handle)

Depth (m)	**Peak Vane Shear Strength (kPa)**			**Residual Shear Strength (kPa)**	
	Gauge Reading	Peak Vane Shear Strength* (kPa)	Time to Reach Peak Shear (sec)	Gauge Reading	Residual Shear Strength* (kPa)
0.5 (Attempt 1)	Ground resistance too high or too cobbly to extract vane from housing				
1.0 (Attempt 2)	Ground resistance too high or too cobbly to extract vane from housing				
1.5 (Attempt 3)	Ground resistance too high or too cobbly to extract vane from housing				

* shear strength calculated using instrument's calibration chart

Vane Shear Strength from Field Measurement

Project No.	24665
Project Title:	Monaghan Active Travel - road and bridge project
Client:	Monaghan Co. Co.
Borehole No.	SV02 (WS02)

Easting (m)	667636.425
Northing (m)	833686.243
Ground Level (mOD)	55.518

Vane Type	Geonor H-10
Vane Length (mm)	130
Vane Width (mm)	65
Rotational Speed of Vane	0.1 deg/sec (1 rev/sec at rotary handle)

Depth (m)	**Peak Vane Shear Strength (kPa)**			**Residual Shear Strength (kPa)**	
	Gauge Reading	Peak Vane Shear Strength* (kPa)	Time to Reach Peak Shear (sec)	Gauge Reading	Residual Shear Strength* (kPa)
0.5 (Attempt 1)	Ground resistance too high or too cobbly to extract vane from housing				
1.5 (Attempt 2)	Ground resistance too high or too cobbly to extract vane from housing				
2.5 (Attempt 3)	Ground resistance too high or too cobbly to extract vane from housing				

* shear strength calculated using instrument's calibration chart

Vane Shear Strength from Field Measurement

Project No.	24665
Project Title:	Monaghan Active Travel - road and bridge project
Client:	Monaghan Co. Co.
Borehole No.	SV03 (WS03)

Easting (m)	667660.367
Northing (m)	833703.834
Ground Level (mOD)	55.87

Vane Type	Geonor H-10
Vane Length (mm)	130
Vane Width (mm)	65
Rotational Speed of Vane	0.1 deg/sec (1 rev/sec at rotary handle)

Depth (m)	**Peak Vane Shear Strength (kPa)**			**Residual Shear Strength (kPa)**	
	Gauge Reading	Peak Vane Shear Strength* (kPa)	Time to Reach Peak Shear (sec)	Gauge Reading	Residual Shear Strength* (kPa)
0.5 (Attempt 1)	Ground resistance too high or too cobbly to extract vane from housing				
1.5 (Attempt 2)	Ground resistance too high or too cobbly to extract vane from housing				
2.5 (Attempt 3)	Ground resistance too high or too cobbly to extract vane from housing				

* shear strength calculated using instrument's calibration chart

WINDOW SAMPLE RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project
CO-ORDINATES	
GROUND LEVEL (mOD)	
CLIENT	Monaghan Co.Co.
ENGINEER	DBFL
PROBE NO.	WS01(SV01)
SHEET	Sheet 1 of 1
DATE DRILLED	04/05/2023
DATE LOGGED	04/05/2023
SAMPLED BY	C.Kavanagh
LOGGED BY	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL		0.10							
	MADE GROUND (comprised of brown/grey mottled sandy gravelly clay, cobbles, angular stones, roots, organic matter)					0.00-1.00	80	114 blows		
1.0	MADE GROUND (comprised of grey/dark greysandy gravelly clay/silt, cobbles, angular stones, organic matter)		1.10			1.00-2.00	90	184 blows		
2.0	Obstruction - possible boulders Final Depth 2.00m		2.00							
3.0										
4.0										
5.0										

General Remarks
WS done for set of Shear Vane tests - for all details see SV01 log

Installations

IGSL WS LOG 24665 - BRIDGE & ROAD SITE.GPJ IGSL.GDT 20/7/23

WINDOW SAMPLE RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project
CO-ORDINATES	
GROUND LEVEL (mOD)	
CLIENT	Monaghan Co.Co.
ENGINEER	DBFL
PROBE NO.	WS02(SV02)
SHEET	Sheet 1 of 1
DATE DRILLED	04/05/2023
DATE LOGGED	04/05/2023
SAMPLED BY	C.Kavanagh
LOGGED BY	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL		0.10							
	MADE GROUND (comprised of brown/grey mottled sandy gravelly clay, cobbles, angular stones, roots, organic matter)					0.00-1.00	100	59 blows		
1.0	Firm, grey/dark grey, slightly sandy gravelly SILT/CLAY with some subangular to subrounded cobbles and organic matter (possible fill)		1.00			1.00-2.00	100	62 blows		
2.0	Firm to stiff, grey sandy very gravelly SILT with some cobbels content		2.50			2.00-3.00	90	199 blows		
3.0	Final Depth 3.00m		3.00							
4.0										
5.0										

General Remarks
WS done for set of Shear Vane tests - for all details see SV02 log

Installations

IGSL WS LOG 24665 - BRIDGE & ROAD SITE.GPJ IGSL.GDT 20/7/23

WINDOW SAMPLE RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project
CO-ORDINATES	
GROUND LEVEL (mOD)	
CLIENT	Monaghan Co.Co.
ENGINEER	DBFL
PROBE NO.	WS03(SV03)
SHEET	Sheet 1 of 1
DATE DRILLED	04/05/2023
DATE LOGGED	04/05/2023
SAMPLED BY	C.Kavanagh
LOGGED BY	I.Reder

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL		0.10							
	MADE GROUND (comprised of brown/grey mottled sandy gravelly clay, cobbles, angular stones, roots, organic matter)					0.00-1.00	100	84 blows		
1.0										
	Firm, grey/dark grey, slightly sandy gravelly SILT/CLAY with some subangular to subrounded cobbles and organic matter (possible fill)		1.30							
						1.00-2.00	100	126 blows		
2.0	Firm to stiff, grey sandy very gravelly SILT with some cobbels content		2.00							
						2.00-3.00	100	177 blows		
3.0	Final Depth 3.00m		3.00							
4.0										
5.0										

General Remarks
WS done for set of Shear Vane tests - for all details see SV03 log

Installations

DYNAMIC PROBE RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project	PROBE NO.	SV01 (DP01)
		SHEET	Sheet 1 of 1
CO-ORDINATES	667,615.64 E 833,674.91 N	DATE DRILLED	04/05/2023
GROUND LEVEL (mOD)		DATE LOGGED	04/05/2023
CLIENT	Monaghan Co.Co.	HAMMER MASS (kg)	50
ENGINEER	DBFL	INCREMENT SIZE (mm)	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0						0.00	0
						0.10	0
						0.20	0
						0.30	10
						0.40	10
						0.50	8
						0.60	4
						0.70	5
						0.80	3
						0.90	4
1.0						1.00	4
						1.10	4
						1.20	12
						1.30	18
						1.40	14
						1.50	13
						1.60	11
						1.70	5
						1.80	3
						1.90	3
2.0						2.00	3
						2.10	4
						2.20	4
						2.30	3
						2.40	4
						2.50	5
						2.60	4
						2.70	2
						2.80	2
						2.90	2
3.0						3.00	1
						3.10	3
						3.20	3
						3.30	3
						3.40	3
						3.50	9
						3.60	18
						3.70	25
						3.80	25
	End of Probe at 3.90 m						
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24665 - BRIDGE & ROAD SITE.GPJ IGSL.GDT 24/7/23

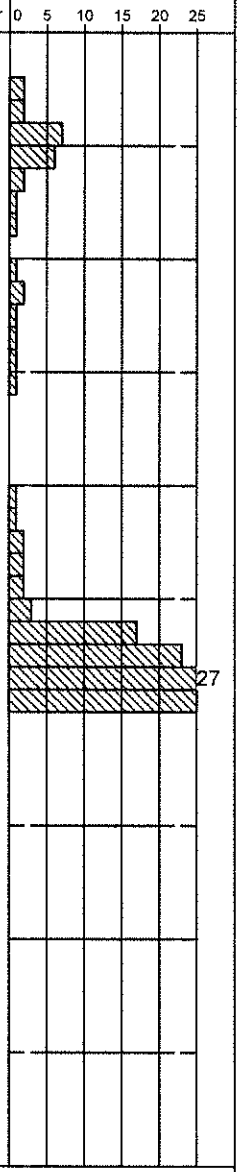
DYNAMIC PROBE RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project	PROBE NO.	SV02 (DP02)
		SHEET	Sheet 1 of 1
CO-ORDINATES	667,635.84 E 833,687.59 N	DATE DRILLED	04/05/2023
GROUND LEVEL (mOD)		DATE LOGGED	04/05/2023
CLIENT	Monaghan Co.Co.	HAMMER MASS (kg)	50
ENGINEER	DBFL	INCREMENT SIZE (mm)	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0						0.00	0
						0.10	0
						0.20	2
						0.30	2
						0.40	7
						0.50	6
						0.60	2
						0.70	1
						0.80	1
						0.90	0
1.0						1.00	1
						1.10	2
						1.20	1
						1.30	1
						1.40	1
						1.50	1
						1.60	0
						1.70	0
						1.80	0
						1.90	0
2.0						2.00	1
						2.10	1
						2.20	2
						2.30	2
						2.40	2
						2.50	3
						2.60	17
						2.70	23
						2.80	27
						2.90	25
3.0	End of Probe at 3.00 m						
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24665 - BRIDGE & ROAD SITE.GPJ IGSL.GDT 24/7/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24665

CONTRACT	Monaghan Active Travel - Road & Bridge project	PROBE NO.	SV03 (DP03)
		SHEET	Sheet 1 of 1
CO-ORDINATES	667,659.58 E 833,705.59 N	DATE DRILLED	04/05/2023
GROUND LEVEL (mOD)		DATE LOGGED	04/05/2023
CLIENT	Monaghan Co.Co.	HAMMER MASS (kg)	50
ENGINEER	DBFL	INCREMENT SIZE (mm)	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0						0.00	0
						0.10	2
						0.20	0
						0.30	0
						0.40	2
						0.50	6
						0.60	3
						0.70	2
						0.80	7
						0.90	3
1.0						1.00	9
						1.10	3
						1.20	2
						1.30	1
						1.40	3
						1.50	1
						1.60	0
						1.70	1
						1.80	2
						1.90	0
2.0						2.00	14
						2.10	12
						2.20	12
						2.30	16
						2.40	22
						2.50	19
						2.60	19
						2.70	21
						2.80	24
						2.90	25
3.0	End of Probe at 3.00 m						
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24665 - BRIDGE & ROAD SITE.GPJ IGSL.GDT 24/7/23

Appendix VIIIa Geotechnical Laboratory Data

IGSL Ltd
Materials Laboratory
Unit J5, M7 Business Park
Newhall, Naas
Co. Kildare
045 846176

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

Tested in accordance with BS1377:Part 2:1990, clauses 3.2, 4.3, 4.4 & 5.3**

Report No. **R146534** Contract No. 24665/2 Contract Name: Monaghan Town Active Travel Development Site - Road & Bridge Site

Customer CORA

Samples Received: 13/06/23 Date Tested: 13/06/23

BH/TP*	Sample No.	Depth* (m)	Lab. Ref	Sample Type*	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
BH01	AA197908	1.0	A23/17668	B	18	39	16	23	65	WS	4.4	C I	Brown sandy gravelly CLAY
BH01	AA197910	3.0	A23/1769	B	18	28	NP	NP	71	WS	4.4		Brown very sandy gravelly SILT
BH02	AA192929	3.0	A23/1770	B	13	32	NP	NP	33	WS	4.4		Grey/brown slightly sandy, gravelly, SILT
TP01R	AA205157	2.5	A23/1772	B	26	36	NP	NP	56	WS	4.4		Grey/brown sandy gravelly SILT
TP03R	AA205163	2.3	A23/1773	B	17	32	13	19	54	WS	4.4	C L	Brown sandy gravelly CLAY
TP04R	AA205165	1.7	A23/1774	B	12	42	17	25	54	WS	4.4	C I	Brown sandy gravelly CLAY
TP05R	AA205168	1.5	A23/1775	B	20	55	NP	NP	47	WS	4.4		Greybrown sandy gravelly SILT
TP06R	AA205171	0.7	A23/1776	B	19	35	NP	NP	37	WS	4.4		Brown sandy gravelly SILT
TP08R	AA205180	0.7	A23/1778	B	25	35	16	19	79	WS	4.4	C L	Brown sandy gravelly CLAY
TP09R	AA205182	0.6	A23/1779	B	16	38	14	24	61	WS	4.4	C I	Grey/brown sandy gravelly CLAY

Preparation: WS - Wet sieved
AR - As received
NP - Non plastic

Liquid Limit Clause: 4.3 Cone Penetrometer definitive method
4.4 Cone Penetrometer one point method

Sample Type: B - Bulk Disturbed
U - Undisturbed

Remarks:
Results relate only to the specimen tested,in as received condition unless otherwise noted.
NOTE: **These clauses have been superceded by EN 17892-1 and EN17892-12.
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Persons authorized to approve reports
H Byrne (Laboratory Manager)

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TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**

(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	95	
28	90	
20	81	
14	75	
10	71	
6.3	64	
5	61	
3.35	57	
2	52	
1.18	48	SAND
0.6	42	
0.425	40	
0.3	36	
0.15	30	
0.063	21	SILT/CLAY
0.038	16	
0.027	14	
0.018	12	
0.010	11	
0.007	10	
0.005	8	
0.002	6	

Contract No. 24665/2 Report No. R146536

Contract Name : Monaghan Town Active Travel Development Site - Road & Bridges

BH/TP No. BH02

Sample No.* AA192929 Lab. Sample No. A23/1770

Sample Type: B

Depth* (m) 3.00 Customer: CORA

Date Received 13/06/2023 Date Testing started 13/06/2023

Description: Grey/brown slightly sandy, gravelly, SILT

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.

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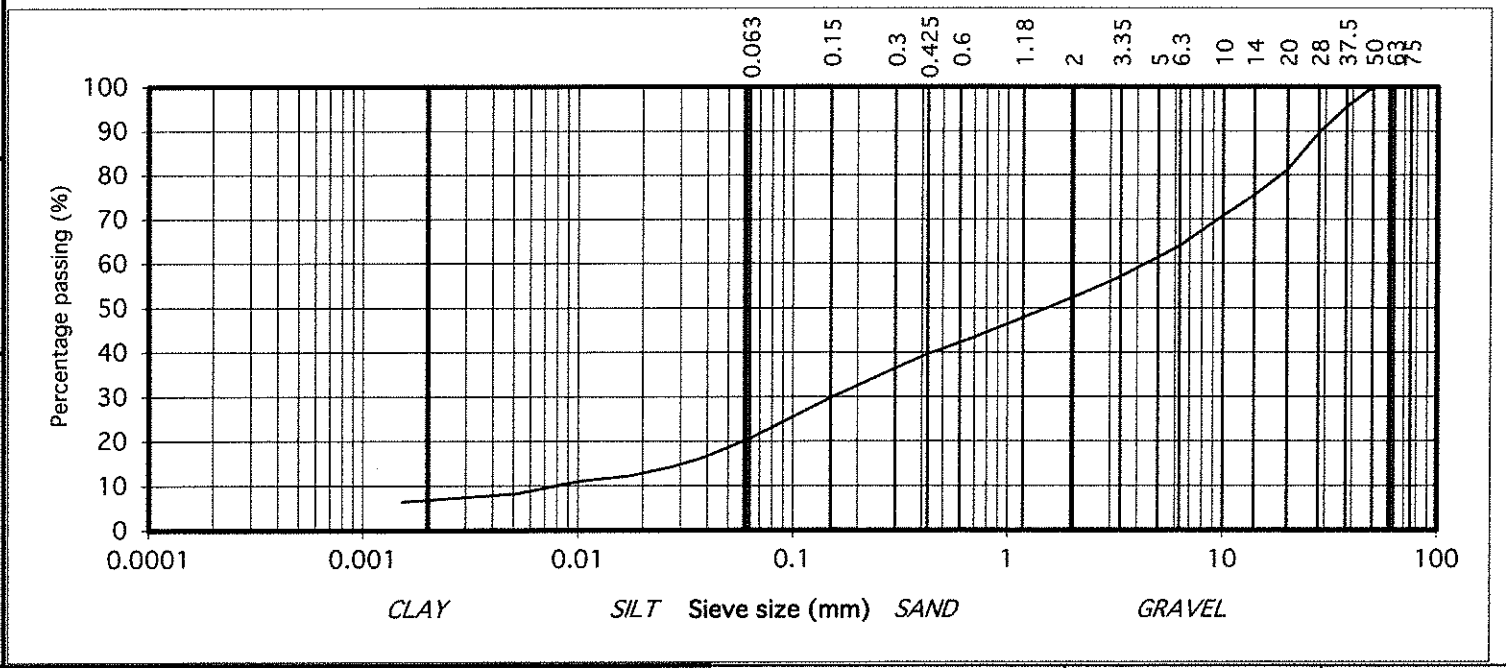

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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**

(note: Sedimentation stage not accredited)

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	77	COBBLES
63	77	
50	77	GRAVEL
37.5	55	
28	30	
20	19	
14	11	
10	7	
6.3	5	
5	4	
3.35	3	
2	3	
1.18	2	SAND
0.6	2	
0.425	1	
0.3	1	
0.15	1	
0.063	1	SILT/CLAY

Contract No. 24665/2 Report No. R146537

Contract Name : Monaghan Town Active Travel Development Site - Road & Bridges

BH/TP No. BH02

Sample No.* AA192930 Lab. Sample No. A23/1771

Sample Type: B

Depth* (m) 4.00 Customer: CORA

Date Received 13/06/2023 Date Testing started 13/06/2023

Description: Brown slightly clayey/silty, slightly sandy, GRAVEL with many cobbles

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

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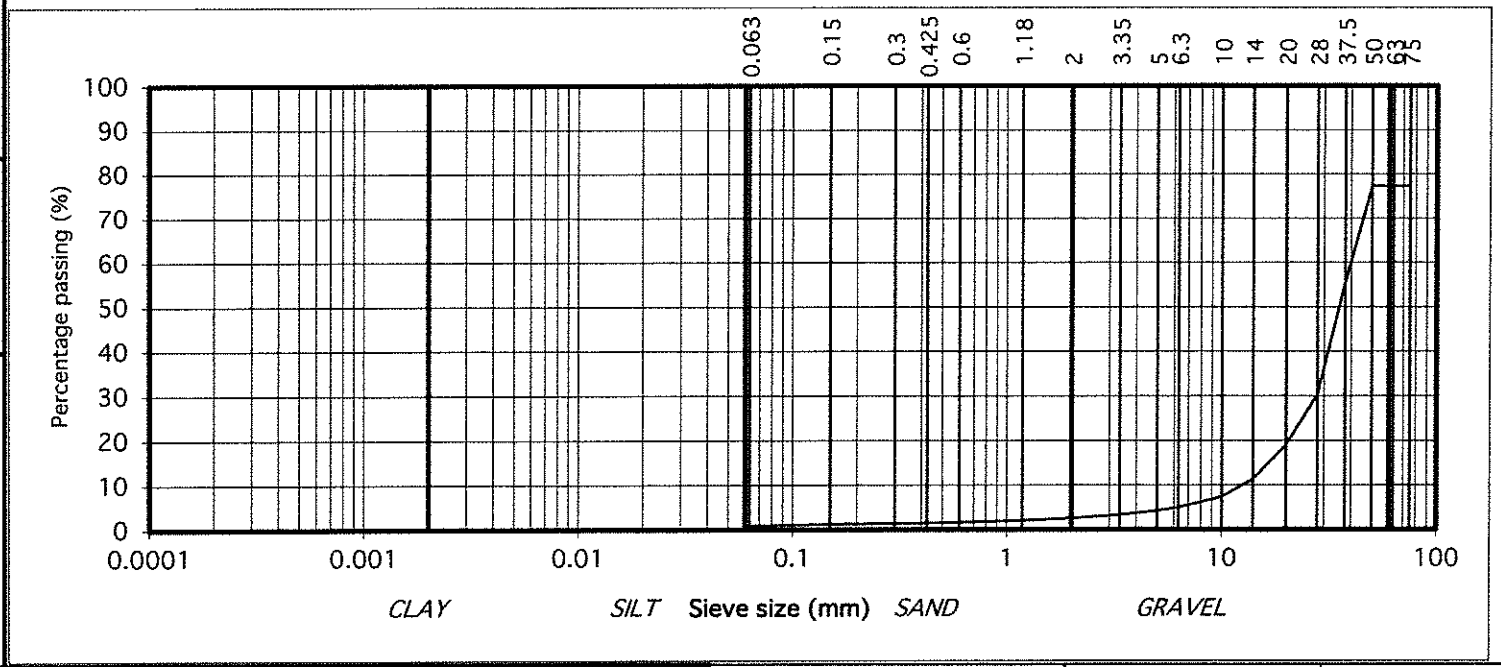

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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**

(note: Sedimentation stage not accredited)

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	91	GRAVEL
37.5	91	
28	88	
20	86	
14	85	
10	83	
6.3	80	
5	79	
3.35	76	
2	73	
1.18	69	SAND
0.6	65	
0.425	63	
0.3	60	
0.15	53	
0.063	45	SILT/CLAY
0.038	36	
0.027	33	
0.017	28	
0.010	24	
0.007	21	
0.005	18	
0.002	13	

Contract No. 24665/2 Report No. R146535

Contract Name : Monaghan Town Active Travel Development Site - Road & Bridges

BH/TP No. TP07R

Sample No.* AA205170 Lab. Sample No. A23/1777

Sample Type: B

Depth* (m) 1.90 Customer: CORA

Date Received 13/06/2023 Date Testing started 13/06/2023

Description: Brown slightly sandy, slightly gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.

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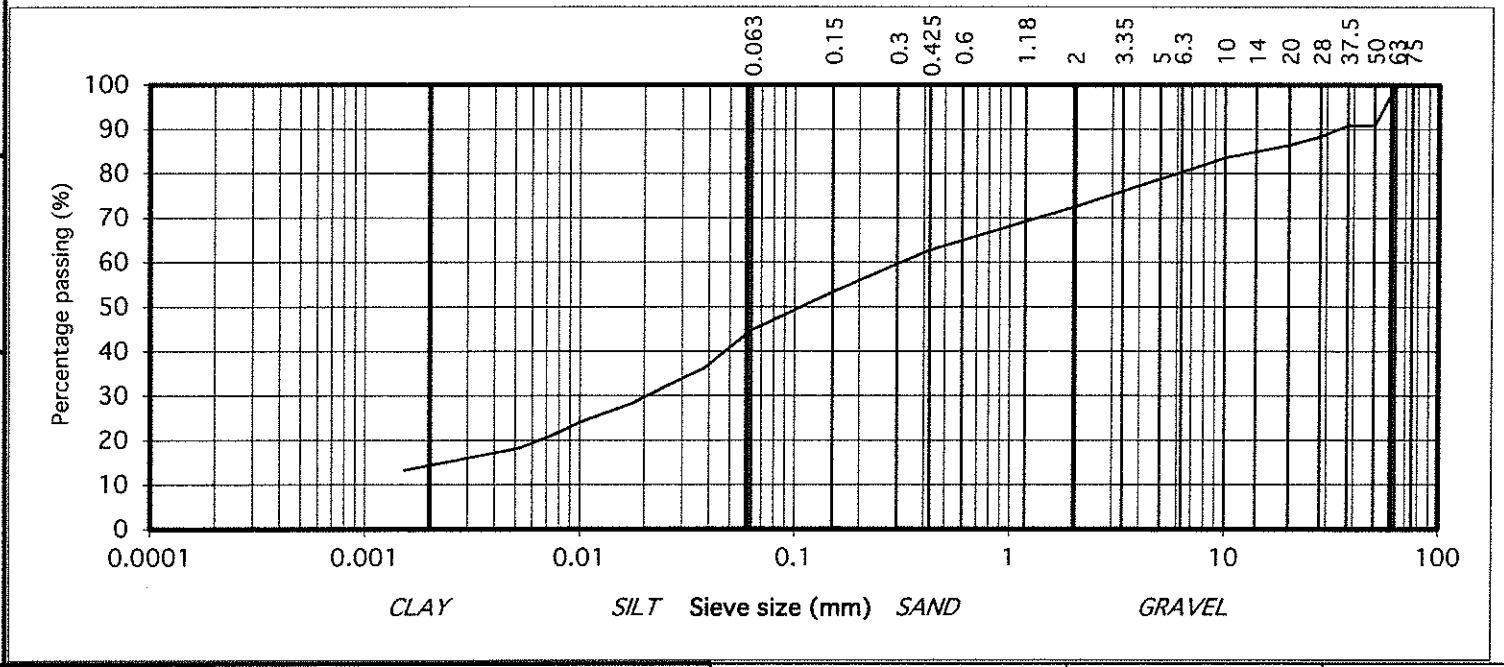

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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

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Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

Report No.	**R146540**
Contract No.	24665/2
Contract Name:	Monaghan Town Active Travel Development - Roads & Bridges
Customer:	CORA
BH/TP*	TP04R
Sample No.*	AA205165
Depth* (m)	1.70
Sample Type:	B
Lab Sample No.	A23/1772
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	13/06/23
Date Tested:	15/06/23
Sample Cert:	Not Provided
Moisture Content (%):	16
% Particles > 20mm (By dry mass):	17
MCV:	5.4
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown sandy gravelly CLAY

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Unit J5,M7 Business Park
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Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1337

Report No.	**R205171**
Contract No.	24665/2
Contract Name:	Monaghan Town Active Travel Development - Roads & Bridges
Customer:	CORA
BH/TP*	TP06R
Sample No.*	AA205171
Depth* (m)	0.70
Sample Type:	B
Lab Sample No.	A23/1776
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	13/06/23
Date Tested:	17/06/23
Sample Cert:	Not Provided
Moisture Content (%):	20
% Particles > 20mm (By dry mass):	45
MCV:	4.6
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown sandy gravelly SILT

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Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1337

Report No.	**R146542**
Contract No.	24665/2
Contract Name:	Monaghan Town Active Travel Development - Roads & Bridges
Customer:	CORA
BH/TP*	TP08R
Sample No.*	AA205180
Depth* (m)	0.70
Sample Type:	B
Lab Sample No.	A23/1778
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	13/06/23
Date Tested:	15/06/23
Sample Cert:	Not Provided
Moisture Content (%):	23
% Particles > 20mm (By dry mass):	10
MCV:	5.7
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown sandy gravelly CLAY

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Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

Report No.	**R146543**
Contract No.	24665/2
Contract Name:	Monaghan Town Active Travel Development - Roads & Bridges
Customer:	CORA
BH/TP*	TP09R
Sample No.*	AA205182
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A23/1779
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	13/06/23
Date Tested:	16/06/23
Sample Cert:	Not provided
Moisture Content (%):	17
% Particles > 20mm (By dry mass):	23
MCV:	6.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Grey brown sandy gravelly CLAY

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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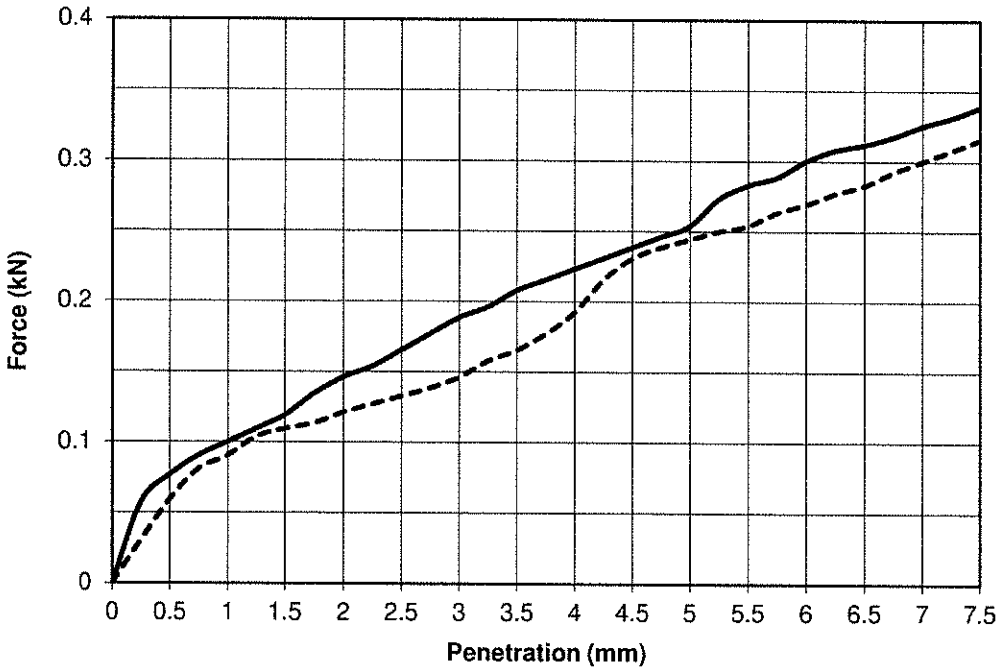
IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

Report No.	R146544	Contract	Monaghan Town Active Travel Development Site - Road & Bridges
Contract No.	24665 / 2	Customer	CORA
Date received	13/06/23	Date Tested	15/06/23
BH/TP No.*	TP 04R	Sample No.*	AA205165 Type: B
Depth* (m)	1.70	Lab sample No.	A23/1772



Key: ———— Top ---------- Base

Description:	Brown sandy gravelly CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	16	Bulk Density (Mg/m^3):	2.14
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.85
% Material >20mm:	15		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.3**	**1.2**
Moisture Content %	16	16

Results relate only to the specimen tested, in as received condition unless otherwise noted

Opinions and interpretations are outside the scope of accreditation.

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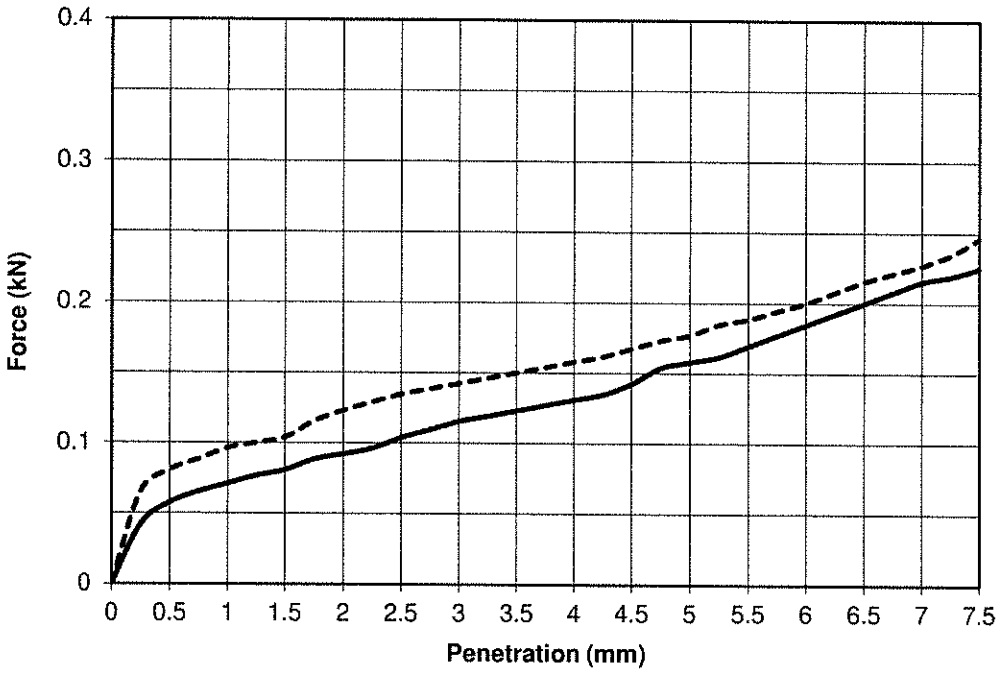
IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

Report No.	R146545	Contract	Monaghan Town Active Travel Development Site - Road & Bridges
Contract No.	24665 / 2	Customer	CORA
Date received	13/06/23	Date Tested	16/06/23
BH/TP No.*	TP06R	Sample No.*	AA205171 Type: B
Depth* (m)	0.70	Lab sample No.	A23/1776



Key: ———— Top ---------- Base

Description:	Brown sandy gravelly SILT		
Initial Condition:	Unsoaked		
Moisture Content (%):	20	Bulk Density (Mg/m^3):	2.04
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.70
% Material >20mm:	37		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**0.8**	**1.0**
Moisture Content %	20	20

Results relate only to the specimen tested, in as received condition unless otherwise noted

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IGSL Ltd Materials Laboratory	Approved by	Date	Page No.
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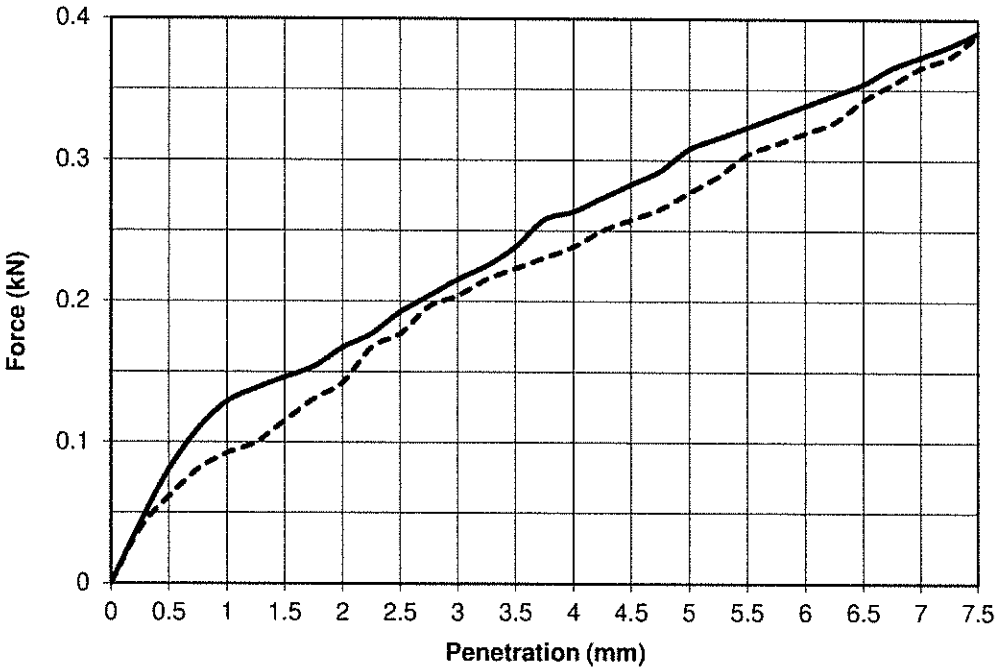
IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1337

Report No.	R146546	Contract	Monaghan Town Active Travel Development Site - Road & Bridges
Contract No.	24665 / 2	Customer	CORA
Date received	13/06/23	Date Tested	15/06/23
BH/TP No.*	TP08R	Sample No.*	AA205180 Type: B
Depth* (m)	0.70	Lab sample No.	A23/1778



Key: ———— Top ---------- Base

Description:	Brown sandy gravelly CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	23	Bulk Density (Mg/m^3):	1.98
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.61
% Material >20mm:	8.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.5**	**1.4**
Moisture Content %	23	23

Results relate only to the specimen tested, in as received condition unless otherwise noted

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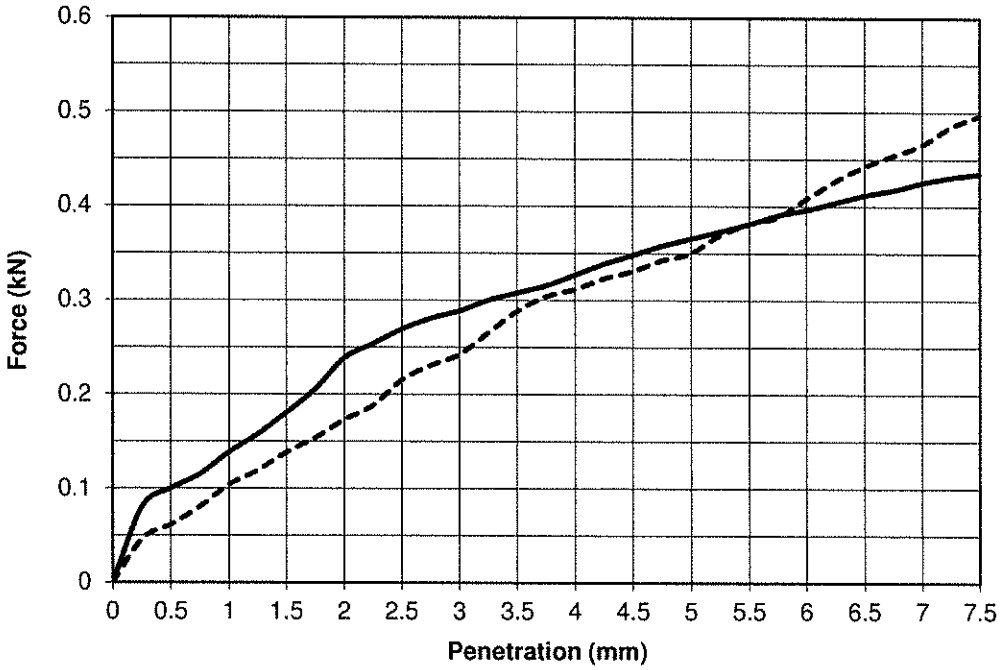
IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7	ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1331

Report No.	R146547	Contract	Monaghan Town Active Travel Development Site - Road & Bridges
Contract No.	24665 / 2	Customer	CORA
Date received	13/06/23	Date Tested	16/06/23
BH/TP No.*	TP09R	Sample No.*	AA205182 Type: B
Depth* (m)	0.60	Lab sample No.	A23/1779



Key: ———— Top ---------- Base

Description:	Grey/brown sandy gravelly CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	17	Bulk Density (Mg/m^3):	2.07
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.77
% Material >20mm:	19		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**2.0**	**1.8**
Moisture Content %	17	17

Results relate only to the specimen tested, in as received condition unless otherwise noted

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IGSL Ltd Materials Laboratory	Approved by	Date	Page No.
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IGSL Ltd Materials Laboratory M7 Business Park Naas Co. Kildare	Test Report Dry Density/Moisture Content Relationship Tested in accordance with BS1377:Part 4:1990	ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

Report No. R146548 Contract No. 24665/2

Contract Name: Monaghan Town Active Travel Development - Road & Bridges

Location*: TP04R

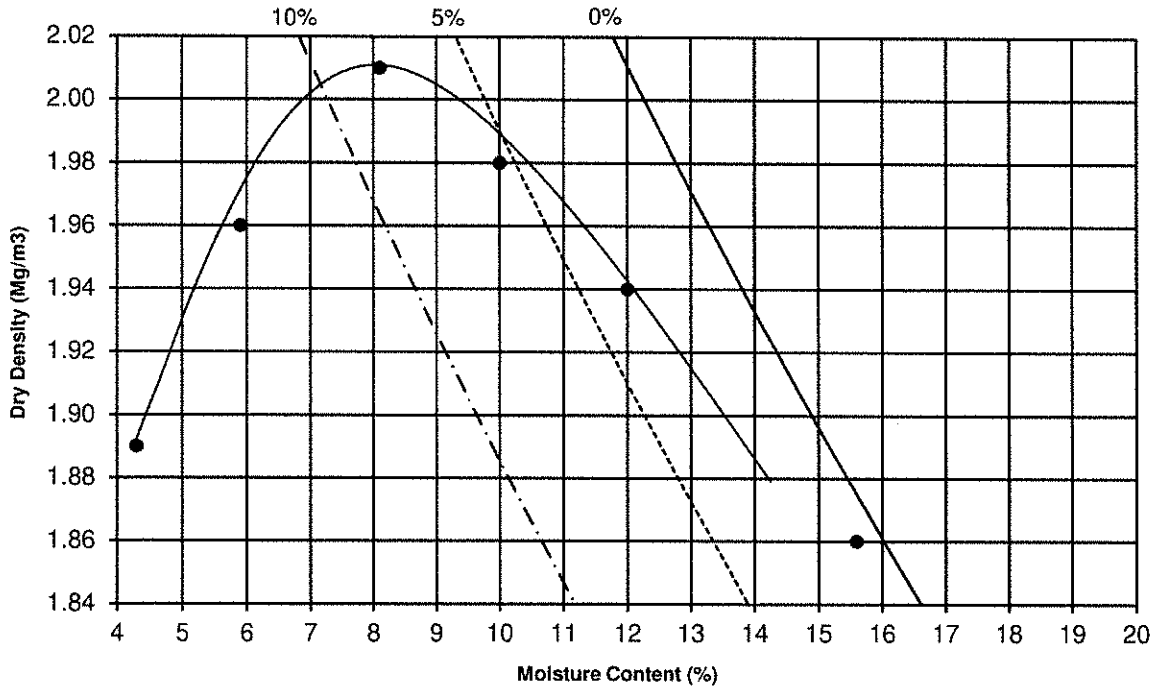
Sample No*. AA205165 Depth* (m) 1.7 Material Type B

Lab sample no. A23/1774 Customer: CORA

Date Received: 13/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 15/06/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.86	2.01	1.98	1.94	1.89	1.96	
Moisture Content (%)	16	8.1	10	12	4.3	5.9	



Maximum Dry Density (Mg/m^3): 2.01 Optimum Moisture Content (%): 8.1

Description: Brown sandy gravelly CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 15

Results relate only to the specimen tested, in as received condition unless otherwise noted.
Opinions and interpretations are outside the scope of accreditation.
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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 139T

Report No. R146549 Contract No. 24665/2

Contract Name: Monaghan Town Active Travel Development - Road & Bridges

Location*: TP06R

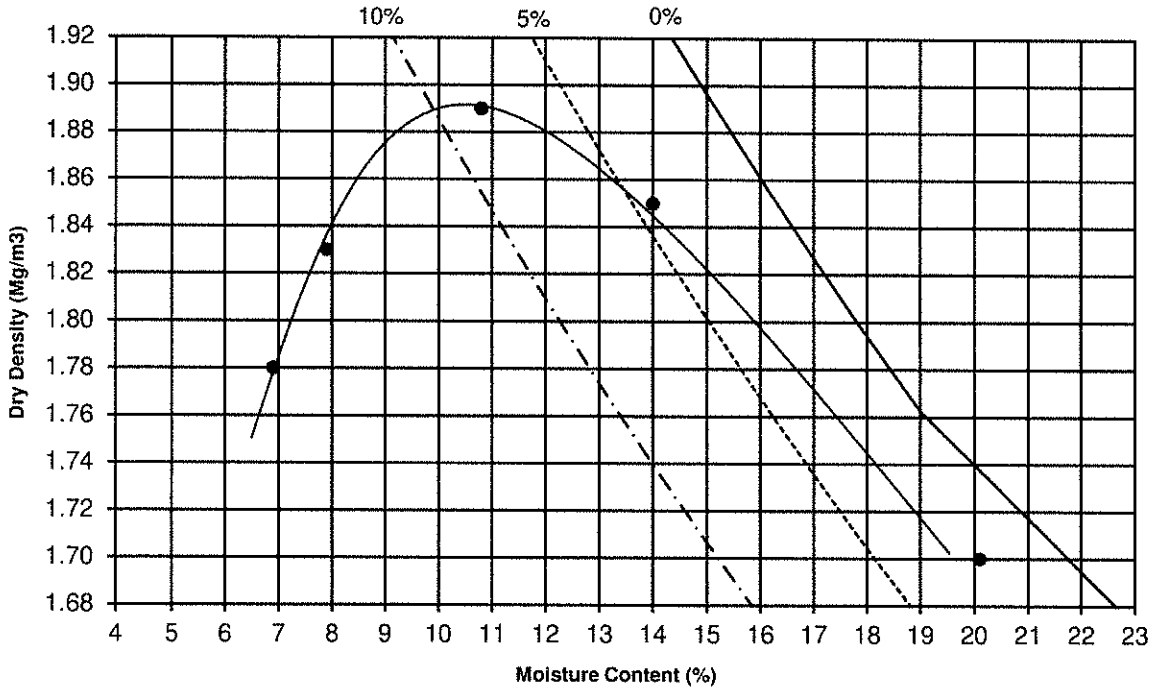
Sample No*. AA205171 Depth* (m) 0.7 Material Type B

Lab sample no. A23/1776 Customer: CORA

Date Received: 13/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 16/06/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.70	1.78	1.85	1.89	1.83		
Moisture Content (%)	20	6.9	14	11	7.9	0	



Maximum Dry Density (Mg/m^3): 1.89 Optimum Moisture Content (%): 11

Description: Brown sandy gravelly SILT

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 37

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

Report No. R146560 Contract No. 24665/2

Contract Name: Monaghan Town Active Travel Development - Road & Bridges

Location*: TP08R

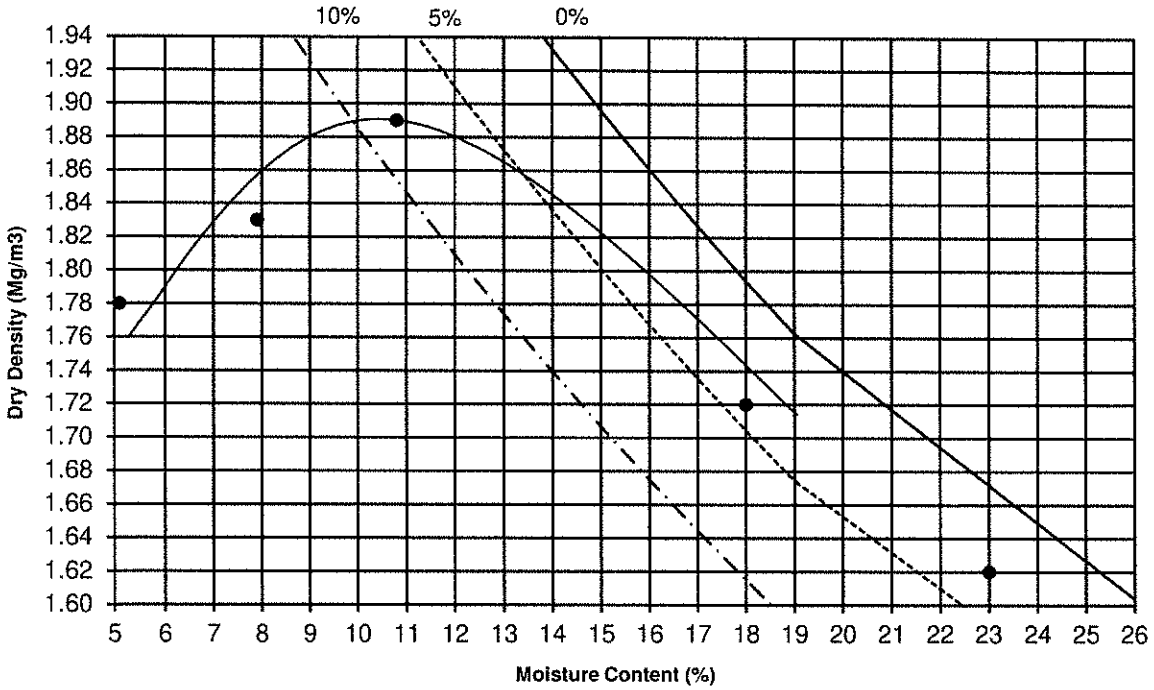
Sample No*. AA205180 Depth* (m) 0.7 Material Type B

Lab sample no. A23/1778 Customer: CORA

Date Received: 13/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 15/06/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.62	1.72	1.78	1.89	1.83		
Moisture Content (%)	23	18	5.1	11	7.9	0	



Maximum Dry Density (Mg/m^3): 1.80 Optimum Moisture Content (%): 11

Description: Brown sandy gravelly CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 37

Results relate only to the specimen tested, in as received condition unless otherwise noted.
Opinions and interpretations are outside the scope of accreditation.
* denotes Customer supplied information

Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

IGSL Materials Laboratory	Approved by	Date	Page
		18/07/23	1 of 1

IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

Report No. R146551 Contract No. 24665/2

Contract Name: Monaghan Town Active Travel Development - Road & Bridges

Location*: TP09R

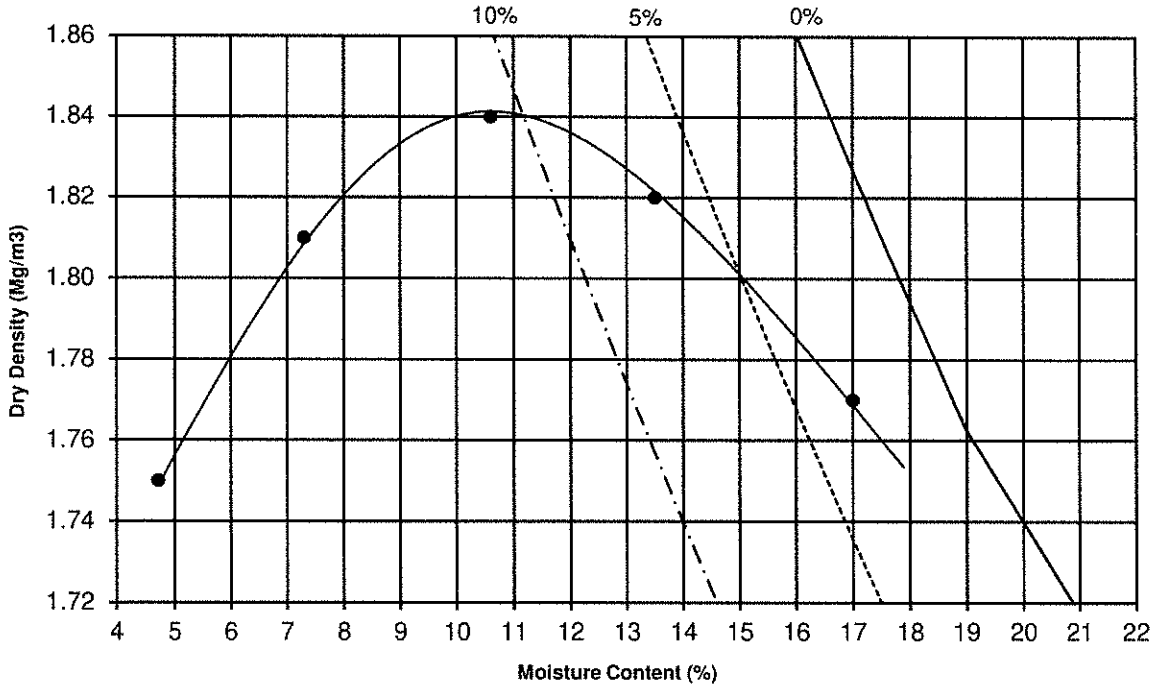
Sample No*. AA205182 Depth* (m) 0.6 Material Type B

Lab sample no. A23/1779 Customer: CORA

Date Received: 13/06/2023 Test Method: 2.5 Kg Rammer

Date Tested: 16/06/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.77	1.82	1.84	1.81	1.75		
Moisture Content (%)	17	14	11	7.3	4.7	0	



Maximum Dry Density (Mg/m^3): 1.84 Optimum Moisture Content (%): 11

Description: Grey/brown sandy gravelly CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 19

Results relate only to the specimen tested, in as received condition unless otherwise noted.
Opinions and interpretations are outside the scope of accreditation.
* denotes Customer supplied information

Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

IGSL Materials Laboratory	Approved by	Date	Page
		18/07/23	1 of 1

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Monaghan town (Active Travel) - E
Contract no. 24665

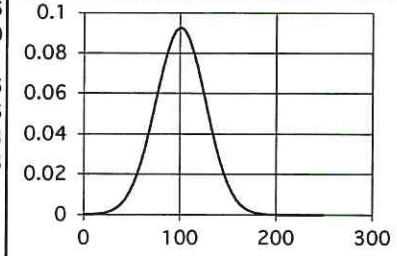
Sample Type: Core
Date of test: 08/06/2023

RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type	Orienation
RC01R	8.2	78	26.4	1.222	4.34	5.30	106	d	//
	8.7	78	15.0	1.222	2.47	3.01	60	d	//
	10.4	78	33.8	1.222	5.55	6.78	136	d	//
RC02R	8.7	78	23.2	1.222	3.81	4.65	93	d	//
	9.4	78	22.6	1.222	3.72	4.54	91	d	//
	10.3	78	29.5	1.222	4.85	5.92	118	d	//
								d	//
								d	//
								d	//
								d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	6	6
Minimum	3.01	60
Average	5.03	101
Maximum	6.78	136
Standard Dev.	1.29	26
Upper 95% Confidence Limit	7.57	151.43
Lower 95% Confidence Limit	2.50	49.95

Comments:
*UCS taken as k x Point Load Is(50): k= 20

*UCS Normal Distribution Curve



Abbreviations	
i	irregular
a	axial
b	block
d	diametral

approx. orientation to planes of weakness/bedding

U	unknown
P	perpendicular
//	parallel

Appendix VIIIb Chemical / Environmental Laboratory Data

UKAS TESTING
2183

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-19442-1
Initial Date of Issue:	19-Jun-2023
Re-Issue Details:	
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	24665 / 2 Monaghan Town Active Travel Development Site
Quotation No.:	Q20-19951
Order No.:	
No. of Samples:	13
Turnaround (Wkdays):	7
Date Approved:	19-Jun-2023
Approved By:	

Details:	Stuart Henderson, Technical Manager

Date Received:	08-Jun-2023
Date Instructed:	08-Jun-2023
Results Due:	16-Jun-2023

Results - Leachate

Project: 24665 / 2 Monaghan Town Active Travel Development

Site:

Client: IGSL					Chemtest Job No.:	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442
Quotation No.: Q20-19951					Chemtest Sample ID.:	1653336	1653338	1653339	1653341	1653342	1653344	1653345	1653348
					Client Sample ID.:	AA197907	AA192927	AA205155	AA205160	AA205162	AA205164	AA205167	AA205182
					Sample Location:	BH01	BH02	TP01R	TP02R	TP03R	TP04R	TP05R	TP09R
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	0.60	2.00	1.40	0.70	0.50	0.60
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**								
pH	U	1010	10:1		N/A	8.6	8.8	8.1	8.4	8.2	8.6	8.8	8.9
Ammonium	U	1220	10:1	mg/l	0.050	0.18	0.11	0.18	0.12	0.26	0.12	0.13	0.24
Ammonium	N	1220	10:1	mg/kg	0.10	2.2	1.5	1.9	1.3	2.8	1.5	1.8	3.5
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	0.12	0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: 24665 / 2 Monaghan Town Active Travel Development

Site

Client: IGSL				Chemtest Job No.:	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442
Quotation No.: Q20-19951				Chemtest Sample ID.:	1653336	1653337	1653338	1653339	1653340	1653341	1653342	1653343	1653344
				Client Sample ID.:	AA197907	AA197908	AA192927	AA205155	AA205157	AA205160	AA205162	AA205163	AA205164
				Sample Location:	BH01	BH01	BH02	TP01R	TP01R	TP02R	TP03R	TP03R	TP04R
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.00	1.00	0.60	2.50	2.00	1.40	2.30	0.70
				Asbestos Lab:	DURHAM		DURHAM	DURHAM		DURHAM	DURHAM		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-		-	-		-	-		-
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected
Moisture	N	2030	%	0.020	12	15	8.7	17	18	18	17	11	14
pH (2.5:1)	N	2010		4.0		[A] 8.2						[A] 8.1	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40		[A] < 0.40	[A] 2.8		[A] 1.9	[A] 1.9		[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010						[A] < 0.010	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010						[A] < 0.010	
Total Sulphur	U	2175	%	0.010		[A] 0.13						[A] 0.22	
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 5.6		[A] 57	[A] 5.6		[A] 130	[A] 29		[A] 3.1
Chloride (Water Soluble)	U	2220	g/l	0.010		[A] < 0.010						[A] 0.016	
Nitrate (Water Soluble)	N	2220	g/l	0.010		< 0.010						0.082	
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50		[A] 6.5	[A] 150		[A] < 0.50	[A] < 0.50		[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 14		[A] 9.8	[A] 5.6		[A] 5.8	[A] 9.6		[A] 18
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01						< 0.01	
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.12	[A] 0.064	[A] 0.057	[A] 0.064		[A] 0.072	[A] 0.032	[A] 0.069	[A] 0.073
Arsenic	U	2455	mg/kg	0.5	4.6		3.6	3.9		5.1	3.5		4.0
Barium	U	2455	mg/kg	0	60		42	61		60	28		45
Cadmium	U	2455	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10	< 0.10		< 0.10
Chromium	U	2455	mg/kg	0.5	21		19	15		21	12		21
Molybdenum	U	2455	mg/kg	0.5	< 0.5		< 0.5	< 0.5		< 0.5	< 0.5		< 0.5
Antimony	N	2455	mg/kg	2.0	< 2.0		< 2.0	< 2.0		< 2.0	< 2.0		< 2.0
Copper	U	2455	mg/kg	0.50	16		21	13		22	10		23
Mercury	U	2455	mg/kg	0.05	< 0.05		0.06	0.09		0.25	0.06		0.07
Nickel	U	2455	mg/kg	0.50	34		34	24		31	19		39
Lead	U	2455	mg/kg	0.50	15		36	29		54	20		47
Selenium	U	2455	mg/kg	0.25	< 0.25		< 0.25	< 0.25		< 0.25	< 0.25		< 0.25
Zinc	U	2455	mg/kg	0.50	42		50	64		75	44		56
Chromium (Trivalent)	N	2490	mg/kg	1.0	21		19	15		21	12		21
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50	< 0.50		< 0.50	< 0.50		< 0.50
Organic Matter	U	2625	%	0.40				[A] 9.1	[A] 2.0			[A] 1.3	
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10		< 10	55		46	< 10		< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] 43		[A] 46	[A] < 1.0		[A] < 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0		[A] 4.6	[A] 12		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0

Results - Soil

Project: 24665 / 2 Monaghan Town Active Travel Development
Site:

Client: IGSL					Chemtest Job No.:	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442
Quotation No.: Q20-19951					Chemtest Sample ID.:	1653336	1653337	1653338	1653339	1653340	1653341	1653342	1653343	1653344
					Client Sample ID.:	AA197907	AA197908	AA192927	AA205155	AA205157	AA205160	AA205162	AA205163	AA205164
					Sample Location:	BH01	BH01	BH02	TP01R	TP01R	TP02R	TP03R	TP03R	TP04R
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	1.00	0.60	2.50	2.00	1.40	2.30	0.70
					Asbestos Lab:	DURHAM		DURHAM	DURHAM		DURHAM	DURHAM		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0		[A] < 5.0	[A] 55		[A] 46	[A] < 5.0			[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] 25		[A] 120	[A] < 1.0			[A] < 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0		[A] 41	[A] 180		[A] 450	[A] 75			[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0		[A] 41	[A] 200		[A] 570	[A] 75			[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10		[A] 46	[A] 260		[A] 610	[A] 75			[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0			[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.13	[A] 0.71		[A] < 0.010	[A] < 0.010			[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.12	[A] 1.3		[A] < 0.010	[A] < 0.010			[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.11	[A] 0.13		[A] < 0.010	[A] < 0.010			[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.11	[A] 0.69		[A] < 0.010	[A] < 0.010			[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.49	[A] 5.6		[A] < 0.010	[A] 0.16			[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.31	[A] 1.9		[A] < 0.010	[A] < 0.010			[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 1.6	[A] 14		[A] < 0.010	[A] 0.29			[A] < 0.010
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 1.5	[A] 12		[A] < 0.010	[A] 0.29			[A] < 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.96	[A] 7.6		[A] < 0.010	[A] < 0.010			[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.97	[A] 7.7		[A] < 0.010	[A] < 0.010			[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 1.1	[A] 10		[A] < 0.010	[A] < 0.010			[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.41	[A] 4.1		[A] < 0.010	[A] < 0.010			[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.91	[A] 7.8		[A] < 0.010	[A] < 0.010			[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.54	[A] 5.9		[A] < 0.010	[A] < 0.010			[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010	[A] 1.1		[A] < 0.010	[A] < 0.010			[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010		[A] 0.50	[A] 4.6		[A] < 0.010	[A] < 0.010			[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010			[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20		[A] 9.8	[A] 85		[A] < 0.20	[A] 0.74			[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010			[A] < 0.0010

Results - Soil

Project: 4665 / 2 Monaghan Town Active Travel Development

Site:

Client: IGSL					Chemtest Job No.:	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442	23-19442
Quotation No.: Q20-19951					Chemtest Sample ID.:	1653336	1653337	1653338	1653339	1653340	1653341	1653342	1653343	1653344
					Client Sample ID.:	AA197907	AA197908	AA192927	AA205155	AA205157	AA205160	AA205162	AA205163	AA205164
					Sample Location:	BH01	BH01	BH02	TP01R	TP01R	TP02R	TP03R	TP03R	TP04R
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	1.00	0.60	2.50	2.00	1.40	2.30	0.70
					Asbestos Lab:	DURHAM		DURHAM	DURHAM		DURHAM	DURHAM		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10		< 0.10	< 0.10		< 0.10	< 0.10		< 0.10

Results - Soil

Project: 24665 / 2 Monaghan Town Active Travel Development
Site:

Client: IGSL				Chemtest Job No.:	23-19442	23-19442	23-19442	23-19442
Quotation No.: Q20-19951				Chemtest Sample ID.:	1653345	1653346	1653347	1653348
				Client Sample ID.:	AA205167	AA205168	AA205169	AA205182
				Sample Location:	TP05R	TP05R	TP07R	TP09R
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.50	0.90	0.60
				Asbestos Lab:	DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type	U	2192		N/A	-			-
Asbestos Identification	U	2192		N/A	No Asbestos Detected			No Asbestos Detected
Moisture	N	2030	%	0.020	13	14	15	14
pH (2.5:1)	N	2010		4.0		[A] 8.3	[A] 8.1	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40			[A] 0.47
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010	[A] < 0.010	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010	[A] < 0.010	
Total Sulphur	U	2175	%	0.010		[A] 0.093	[A] 0.037	
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 2.4			[A] 3.3
Chloride (Water Soluble)	U	2220	g/l	0.010		[A] < 0.010	[A] < 0.010	
Nitrate (Water Soluble)	N	2220	g/l	0.010		0.013	0.012	
Cyanide (Total)	U	2300	mg/kg	0.50	[A] 1.3			[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 7.7			[A] 14
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01	< 0.01	
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.058	[A] 0.036	[A] 0.095	[A] 0.064
Arsenic	U	2455	mg/kg	0.5	3.3			5.8
Barium	U	2455	mg/kg	0	54			60
Cadmium	U	2455	mg/kg	0.10	< 0.10			< 0.10
Chromium	U	2455	mg/kg	0.5	14			19
Molybdenum	U	2455	mg/kg	0.5	< 0.5			< 0.5
Antimony	N	2455	mg/kg	2.0	< 2.0			< 2.0
Copper	U	2455	mg/kg	0.50	13			22
Mercury	U	2455	mg/kg	0.05	0.09			0.32
Nickel	U	2455	mg/kg	0.50	21			31
Lead	U	2455	mg/kg	0.50	26			56
Selenium	U	2455	mg/kg	0.25	< 0.25			< 0.25
Zinc	U	2455	mg/kg	0.50	60			86
Chromium (Trivalent)	N	2490	mg/kg	1.0	14			19
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50			< 0.50
Organic Matter	U	2625	%	0.40				
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10			< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0

Results - Soil

Project: 24665 / 2 Monaghan Town Active Travel Development

Site:

Client: IGSL				**Chemtest Job No.:**	23-19442	23-19442	23-19442	23-19442
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1653345	1653346	1653347	1653348
				Client Sample ID.:	AA205167	AA205168	AA205169	AA205182
				Sample Location:	TP05R	TP05R	TP07R	TP09R
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.50	0.90	0.60
				Asbestos Lab:	DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0			[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] 26			[A] < 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] 280			[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] 310			[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] 310			[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] 0.37			[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] 0.84			[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] 0.10			[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] 0.42			[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] 3.5			[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] 2.0			[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] 14			[A] < 0.010
Pyrene	N	2800	mg/kg	0.010	[A] 11			[A] < 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] 7.2			[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] 6.1			[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] 7.8			[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] 3.1			[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] 6.6			[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] 4.0			[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] 0.85			[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] 3.0			[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] 71			[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010

Results - Soil

Project: 24665 / 2 Monaghan Town Active Travel Development
Site:

Client: IGSL				Chemtest Job No.:	23-19442	23-19442	23-19442	23-19442
Quotation No.: Q20-19951				Chemtest Sample ID.:	1653345	1653346	1653347	1653348
				Client Sample ID.:	AA205167	AA205168	AA205169	AA205182
				Sample Location:	TP05R	TP05R	TP07R	TP09R
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.50	0.90	0.60
				Asbestos Lab:	DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10			< 0.10

Results - Single Stage WAC

Project: 24665 / 2 Monaghan Town Active Travel Development Site

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19442						
Chemtest Sample ID:	1653336						
Sample Ref:							
Sample ID:	AA197907				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample Location:	BH01						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 2.0	3	5	6
Loss On Ignition	2610	U	%	7.8	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0050	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0003	0.0030	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0050	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0007	0.0073	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0050	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0010	0.0099	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.025	4	50	200
Chloride	1220	U	1.1	11	800	15000	25000
Fluoride	1220	U	0.092	< 1.0	10	150	500
Sulphate	1220	U	3.1	31	1000	20000	50000
Total Dissolved Solids	1020	N	52	520	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.4	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 2 Monaghan Town Active Travel Development Site

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19442						
Chemtest Sample ID:	1653338						
Sample Ref:							
Sample ID:	AA192927				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample Location:	BH02						
Top Depth(m):	1.00						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 3.5	3	5	6
Loss On Ignition	2610	U	%	4.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 670	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 9.8	100	--	--
pH	2010	U		8.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0020	0.020	0.5	2	25
Barium	1455	U	0.006	0.061	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0019	0.019	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0027	0.027	0.5	10	30
Nickel	1455	U	0.0006	0.0063	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	0.0007	0.0067	0.06	0.7	5
Selenium	1455	U	0.0010	0.010	0.1	0.5	7
Zinc	1455	U	0.005	0.052	4	50	200
Chloride	1220	U	1.4	14	800	15000	25000
Fluoride	1220	U	0.083	< 1.0	10	150	500
Sulphate	1220	U	20	200	1000	20000	50000
Total Dissolved Solids	1020	N	62	620	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.7

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 2 Monaghan Town Active Travel Development Site

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19442						
Chemtest Sample ID:	1653339						
Sample Ref:							
Sample ID:	AA205155						
Sample Location:	TP01R						
Top Depth(m):	0.60						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 5.3	3	5	6
Loss On Ignition	2610	U	%	9.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 800	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 85	100	--	--
pH	2010	U		7.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.018	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0061	0.5	2	25
Barium	1455	U	0.027	0.27	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0035	0.035	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0017	0.017	0.5	10	30
Nickel	1455	U	0.0010	0.010	0.4	10	40
Lead	1455	U	0.0006	0.0056	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0005	0.0050	0.1	0.5	7
Zinc	1455	U	0.007	0.071	4	50	200
Chloride	1220	U	8.0	80	800	15000	25000
Fluoride	1220	U	0.094	< 1.0	10	150	500
Sulphate	1220	U	110	1100	1000	20000	50000
Total Dissolved Solids	1020	N	220	2200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.5	85	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	17

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 2 Monaghan Town Active Travel Development Site

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19442						
Chemtest Sample ID:	1653341						
Sample Ref:							
Sample ID:	AA205160						
Sample Location:	TP02R						
Top Depth(m):	2.00						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 1.2	3	5	6
Loss On Ignition	2610	U	%	4.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 220	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.015	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0019	0.019	0.5	2	25
Barium	1455	U	0.009	0.087	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0010	0.0098	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0014	0.014	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0050	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.003	0.030	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.080	< 1.0	10	150	500
Sulphate	1220	U	37	370	1000	20000	50000
Total Dissolved Solids	1020	N	91	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.0	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	18

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 2 Monaghan Town Active Travel Development Site

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19442						
Chemtest Sample ID:	1653342						
Sample Ref:							
Sample ID:	AA205162						
Sample Location:	TP03R						
Top Depth(m):	1.40						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 2.2	3	5	6
Loss On Ignition	2610	U	%	6.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 140	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 0.74	100	--	--
pH	2010	U		7.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.013	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0050	0.5	2	25
Barium	1455	U	0.008	0.085	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0010	0.0097	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0010	0.011	0.5	10	30
Nickel	1455	U	0.0006	0.0062	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.004	0.044	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.088	< 1.0	10	150	500
Sulphate	1220	U	13	130	1000	20000	50000
Total Dissolved Solids	1020	N	59	590	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	17

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 2 Monaghan Town Active Travel Development Site;

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19442						
Chemtest Sample ID:	1653344						
Sample Ref:							
Sample ID:	AA205164						
Sample Location:	TP04R						
Top Depth(m):	0.70						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 2.6	3	5	6
Loss On Ignition	2610	U	%	6.4	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.021	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0020	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0050	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0007	0.0070	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0050	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0005	0.0054	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.025	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.14	1.4	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	33	320	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.2	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24665 / 2 Monaghan Town Active Travel Development Site

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-19442						
Chemtest Sample ID:	1653345						
Sample Ref:							
Sample ID:	AA205167						
Sample Location:	TP05R						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 3.2	3	5	6
Loss On Ignition	2610	U	%	3.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] 240	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] 71	100	--	--
pH	2010	U		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.019	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0051	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0017	0.017	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0013	0.013	0.5	10	30
Nickel	1455	U	0.0005	0.0053	0.4	10	40
Lead	1455	U	0.0009	0.0088	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.005	0.052	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.12	1.2	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	42	420	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.4	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	13

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1653336		AA197907	BH01		A	Amber Glass 250ml
1653336		AA197907	BH01		A	Plastic Tub 500g
1653337		AA197908	BH01		A	Amber Glass 250ml
1653337		AA197908	BH01		A	Plastic Tub 500g
1653338		AA192927	BH02		A	Amber Glass 250ml
1653338		AA192927	BH02		A	Plastic Tub 500g
1653339		AA205155	TP01R		A	Amber Glass 250ml
1653339		AA205155	TP01R		A	Plastic Tub 500g
1653340		AA205157	TP01R		A	Amber Glass 250ml
1653340		AA205157	TP01R		A	Plastic Tub 500g
1653341		AA205160	TP02R		A	Amber Glass 250ml
1653341		AA205160	TP02R		A	Plastic Tub 500g
1653342		AA205162	TP03R		A	Amber Glass 250ml
1653342		AA205162	TP03R		A	Plastic Tub 500g
1653343		AA205163	TP03R		A	Amber Glass 250ml
1653343		AA205163	TP03R		A	Plastic Tub 500g
1653344		AA205164	TP04R		A	Amber Glass 250ml
1653344		AA205164	TP04R		A	Plastic Tub 500g
1653345		AA205167	TP05R		A	Amber Glass 250ml
1653345		AA205167	TP05R		A	Plastic Tub 500g
1653346		AA205168	TP05R		A	Amber Glass 250ml
1653346		AA205168	TP05R		A	Plastic Tub 500g

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1653347		AA205169	TP07R		A	Amber Glass 250ml
1653347		AA205169	TP07R		A	Plastic Tub 500g
1653348		AA205182	TP09R		A	Amber Glass 250ml
1653348		AA205182	TP09R		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.

Test Methods

SOP	Title	Parameters included	Method summary
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

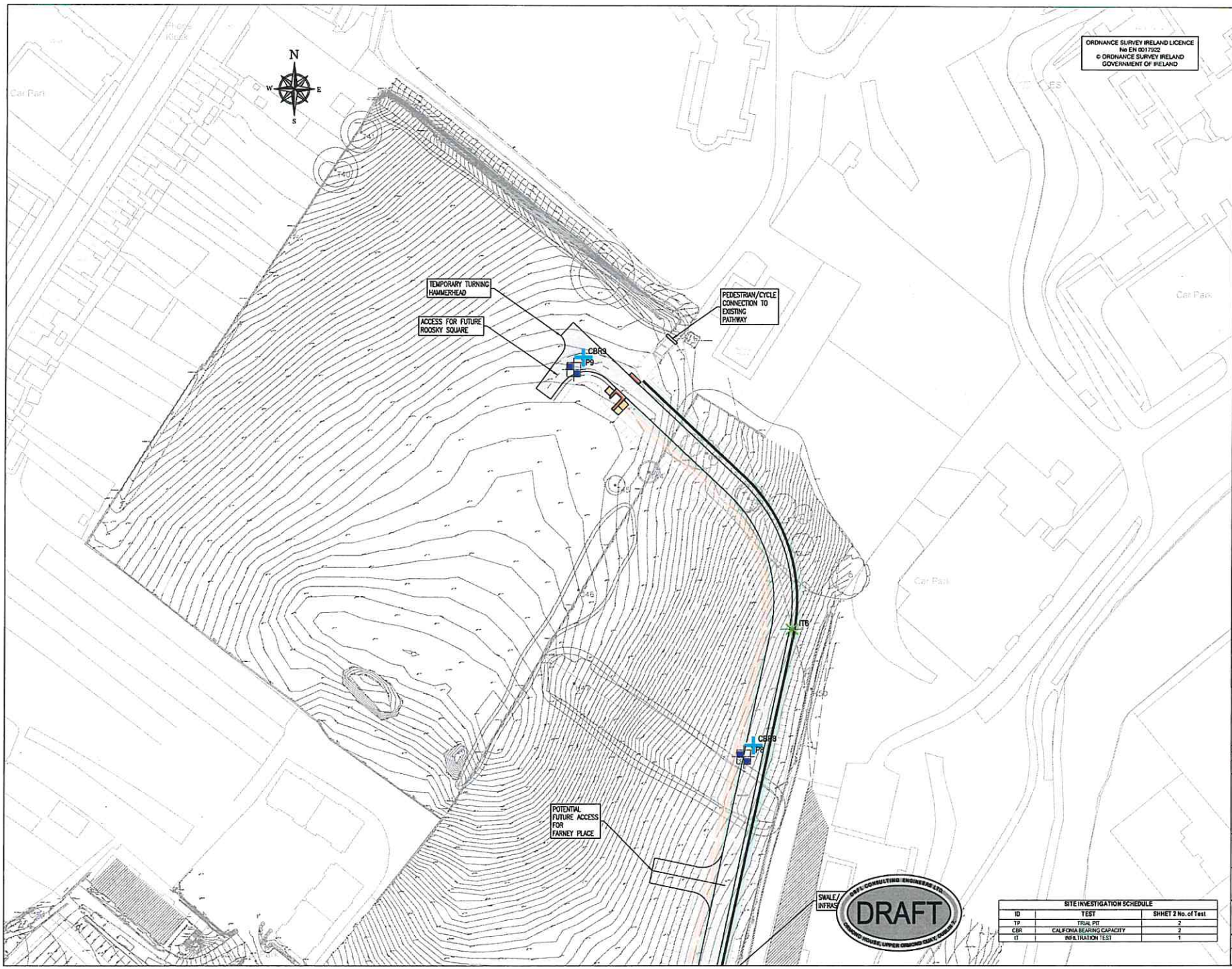
A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix IX Site Plans



ON ORIGINAL

NOTES:

1. ALL DRAWINGS TO BE CHECKED BY CONTRACTOR ON SITE AND ENGINEER INFORMED OF DISCREPENCIES BEFORE WORK COMMENCES.
2. ALL DIMENSIONS AND LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
3. ALL LEVELS ARE IN METERS AND ARE RELATED TO ORDNANCE DATUM. CO-ORDINATES RELATE TO ITM.
4. CONTRACTOR TO UNDERTAKE INVESTIGATION IN THE VICINITY OF PROPOSED TEST LOCATIONS TO MINIMISE THE POTENTIAL FOR ENCOUNTERING EXISTING SERVICES DURING EXCAVATION (INCLUDING BUT NOT LIMITED TO USE OF CAT TYPE CABLE DETECTION DEVICE) AND OBTAIN AND REVIEW RELEVANT UTILITY OPERATOR RECORD DRAWINGS.
5. CBRs TO BE PLATE BEARING TESTS UNDERTAKEN AT SUBSOIL LEVEL. (I.E. TOPSOIL REMOVED FROM SURFACE.)
6. TRIAL PITS UP TO 3m DEPTH.
7. CONTRACTOR TO BACKFILL ALL EXCAVATIONS ON COMPLETION OF INVESTIGATIONS.
8. THIS DRAWING IS BASED ON TOPO SURVEY BY MURPHY SURVEYS DATED 13/10/2016
9. CONTRACTOR TO CONFIRM GROUND LEVEL AND COORDINATES FOR AS BUILT LOCATIONS OF SI

LEGEND:

- TP1 — Trial Pit
- BH1 — Borehole
- IT1 — Infiltration Test
- CBR1 — CBR
- BH STP1 — Borehole with Standpipe
- ST1 — Slit Trench
- VST1 — Vane Shear Test

KEY PLAN

rev	date	description	by	chkd

STATUS CODES

purpose	acceptance
P1 - INFORMATION	5 - ISSUED

DBFL Consulting Engineers
Civil, Structural & Transportation Engineering
www.dbfl.ie

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PHONE +353 1 633 9000
CORK OFFICE: 14 South Mall, Cork, T12 C701
PHONE +353 21 2304000
WATERFORD OFFICE: Suite 1A The Atrium, Maritana Gate, Canada Street, Waterford, X91 W8XD
PHONE +353 51 309 500

project ref:
MONAGHAN TOWN ACTIVE TRAVEL

drawing title:
SITE INVESTIGATION PLAN SHEET 2

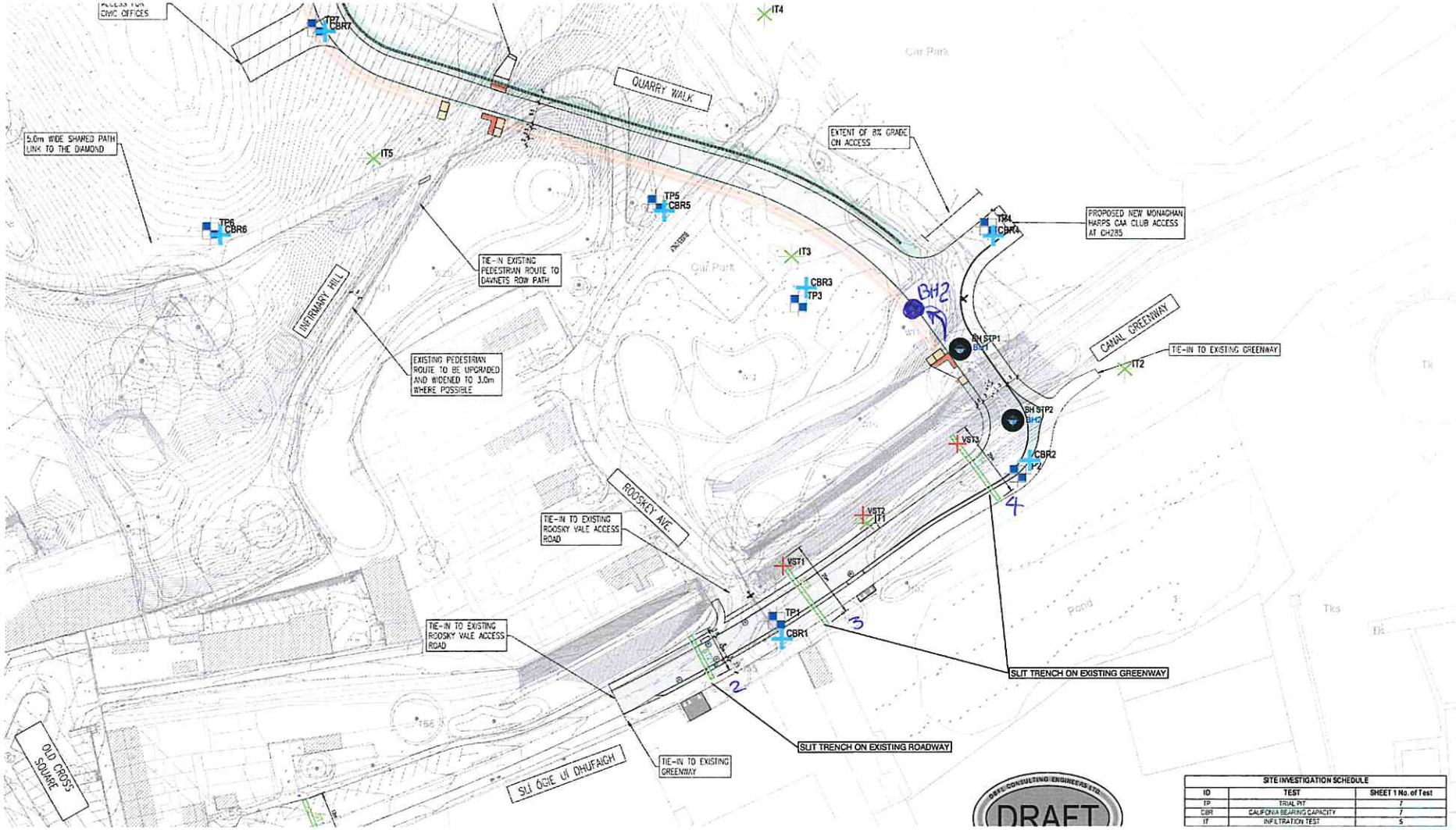
client:
MONAGHAN COUNTY COUNCIL

designed by	author	scale	sheet size
KB/M	KB/M	1:500	A1

drawing no.: 220084-RY-04-Z00-L00-SK-DBFL-CE-7002 | revision: 0

SITE INVESTIGATION SCHEDULE

ID	TEST	SHEET 2 No. of Test
TP	TRIAL PIT	2
CBR	CALIFONIA BEARING CAPACITY	2
IT	INFILTRATION TEST	1

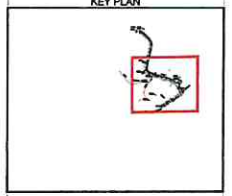


5. CBRs TO BE PLATE BEARING TESTS UNDERTAKEN AT SUBSOIL LEVEL (I.E. TOPSOIL REMOVED FROM SURFACE.)
6. TRIAL PITS UP TO 3m DEPTH.
7. CONTRACTOR TO BACKFILL ALL EXCAVATIONS ON COMPLETION OF INVESTIGATIONS.
8. THIS DRAWING IS BASED ON TOPO SURVEY BY MURPHY SURVEYS DATED 13/10/2016
9. CONTRACTOR TO CONFIRM GROUND LEVEL AND COORDINATES FOR AS BUILT LOCATIONS OF SI

LEGEND:

- TP1 — Trial Pit
- BH1 — Borehole
- IT1 — Infiltration Test
- CBR1 — CBR
- BH STP1 — Borehole with Standpipe
- ST1 — Slit Trench
- VST1 — Vane Shear Test

KEY PLAN



SITE INVESTIGATION SCHEDULE		
ID	TEST	SHEET 1 No. of Test
TP	TRIAL PIT	7
CBR	CALIFORNIA BEARING CAPACITY	7
IT	INFILTRATION TEST	5

STATUS CODES
P1 - INFORMATION
S - ISSUED

DBFL Consulting Engineers

MONAGHAN TOWN ACTIVE TRAVEL

SITE INVESTIGATION PLAN SHEET 1


Monaghan
Harps GAA Club
Gatehouse Monaghan,
Adult Education Centre
Temporarily closed
Sli Óg le hIDhufaigh
Ulster Canal
Ulster Canal Greenway
Ulster Canal Greenway
Ulster Canal Greenway
KellysPitstop Monaghan
Ulster Canal Greenway
Google

APPENDIX B – SCREENING CRITERIA

Monaghan Dublin Street - McAdam
Residential Tier 1 Screened Chemical Analysis Results: Soil

				Sample ID	TP01	TP01	TP02	TP02	TP03	TP03	TP04	TP04	TP06	TP07	TP07	TP07	TP05	TP05	TP08	TP09	TP010	BH01	BH02	BH02	BH03	BH03
				Depth (m)	0.25	1.00	0.50	2.00	0.25	0.50	0.25	0.50	0.50	0.25	1.00	1.50	0.50	1.00	0.50	0.50	0.50	0.50	0.50	1.00	0.50	1.00
				Stratum (see report for further details)	Made Ground	Silt	Made Ground	Made Ground	Topsoil	Made Ground	Made Ground	Silt	Made Ground	Made Ground	Made Ground	Made Ground	Clay	Made Ground	Made Ground	Made Ground	Clay	Clay	Clay	Clay	Made Ground	Clay
				Sample Date	09/08/2024	09/08/2024	09/08/2024	09/08/2024	08/08/2024	08/08/2024	08/08/2024	08/08/2024	08/08/2024	08/08/2024	08/08/2024	08/08/2024	13/08/2024	13/08/2024	13/08/2024	13/08/2024	13/08/2024	30/07/2024	31/07/2024	31/07/2024	29/07/2024	29/07/2024
Analyte		Units	GAC Source	GAC																						
Preparation	Moisture Content	%	-	-	19	18	11	11	6.6	14	18	16	9.2	9.3	9.4	11	9.1	14	15	24	17	17	10	9.8	11	13
Inorganics	Asbestos	-	HSE	Presence	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	Amosite fibres	NAD	Chrysotile fibres	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
	pH	pH units	-	-	7.8	7.8	8.5	8.5	8.6	8.4	7.9	8	8.6	8.1	8.3	8.6	8.7	10	8.2	8	9.7	7.7	8.8	8.6	8.3	8.9
	Total Cyanide	mg/kg	SAC	500	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	0.1	< 0.1	0.4	0.2	0.1	0.4	0.1	0.2	0.3	1.5	0.3	< 0.1	< 0.1	0.1	< 0.1
	Free Cyanide	mg/kg	SAC	30	0.4	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	0.1	< 0.1	0.2	0.1	< 0.1	0.2	0.1	0.2	0.4	0.3	0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Thiocyanate as SCN	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Thiocyanate	mg/kg	-	-	1.1	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	0.9	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	1.8	< 0.6	0.6	2.5	2.1	3.7	< 0.6	< 0.6	< 0.6	< 0.6
	Total Sulphate as SO4	%	-	-	0.07	0.04	0.05	0.04	0.02	0.04	0.05	0.02	0.04	0.06	0.06	0.04	0.07	0.08	0.06	0.1	0.12	0.04	0.06	0.05	0.05	0.05
	Sulphide	mg/kg	-	-	< 10	< 10	< 10	20	< 10	16	< 10	< 10	24	12	10	< 10	16	24	< 10	20	24	< 10	24	36	44	40
	Total Chloride	mg/kg	-	-	33.2	36.9	26.1	23.7	22.1	24.9	18.8	26	57.3	17.7	36.8	29.1	30.8	60.7	29	26.4	32.7	20.2	32.6	46.5	27.5	34.3
	Organic Matter (automated)	%	-	-	3.1	1.7	0.4	0.9	0.5	1.2	2.7	0.9	0.6	1.4	1.5	0.5	1.8	1.1	1.7	4.5	6.3	< 0.1	0.2	< 0.1	3.4	0.5
	Alkali Reserve	g/100g NaOH	-	-	< 1.0	< 1.0	1.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.8	18	12	< 1.0
	Acid Neutralisation Capacity (pH4)	moles/kg	-	-	< 1.0	1.7	3.2	2.6	< 1.0	2.6	< 1.0	< 1.0	4.2	< 1.0	3.5	3.8	< 1.0	1.6	1.6	1.6	1.8	< 1.0	< 1.0	< 1.0	4	< 1.0
	Water Soluble Nitrate (2:1) as NO3	mg/kg	-	-	8.6	13	2.5	2.8	3.6	5.1	8.3	3.9	7.1	2.8	4.3	2.4	24	79	25	13	66	17	20	12	1.2	3.9
Metals	Antimony	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Arsenic	mg/kg	S4UL	37	7.7	7.1	5.5	5.5	6.7	6.1	13	7.2	4.6	9.7	5.9	5.4	11	9.5	8.2	7.2	35	5.6	3.4	3.7	3.9	4.5
	Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Beryllium	mg/kg	S4UL	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Boron (water soluble)	mg/kg	S4UL	290	0.6	< 0.2	0.3	0.2	< 0.2	0.3	0.4	0.2	0.2	0.2	0.3	0.2	0.6	0.3	0.5	1	0.6	< 0.2	< 0.2	0.2	0.4	0.3
	Cadmium	mg/kg	S4UL	11	0.5	0.4	0.2	0.2	< 0.1	0.3	0.4	0.3	0.3	0.9	0.4	0.3	0.2	0.6	0.4	0.5	0.7	0.3	0.2	0.2	0.2	0.2
	Chromium (hexavalent)	mg/kg	S4UL	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Chromium (III)	mg/kg	S4UL	910	24	32	23	24	50	30	28	24	16	28	25	33	35	32	28	24	43	56	19	17	29	33
	Chromium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Copper	mg/kg	S4UL	2400	20	25	19	20	33	23	38	25	15	36	27	26	41	25	38	41	130	56	13	12	26	28
	Lead	mg/kg	C4SL	200	55	14	16	22	15	17	64	16	11	180	65	39	520	29	110	41	300	28	11	9	11	27
	Mercury	mg/kg	S4UL	40	0.16	< 0.05	0.16	0.16	< 0.05	0.06	0.3	0.08	< 0.05	0.42	0.15	< 0.05	0.13	0.1	0.27	0.28	0.68	0.11	< 0.05	< 0.05	< 0.05	< 0.05
	Molybdenum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Nickel	mg/kg	S4UL	180	28	43	33	34	62	38	33	35	23	36	29	39	45	40	35	27	66	53	23	20	38	43
	Selenium	mg/kg	S4UL	250	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Vanadium	mg/kg	S4UL	410	26	29	22	23	34	27	33	24	15	31	28	36	26	33	29	26	70	39	18	16	26	28
	Zinc	mg/kg	S4UL	3700	71	55	46	55	70	64	89	61	41	250	99	65	120	83	100	85	330	94	69	46	58	61
PAH	Naphthalene	mg/kg	S4UL	2.3	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Acenaphthylene	mg/kg	S4UL	170	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.16	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Acenaphthene	mg/kg	S4UL	210	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Fluorene	mg/kg	S4UL	170	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.15	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Phenanthrene	mg/kg	S4UL	95	0.1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.08	0.06	< 0.03	0.11	< 0.03	0.76	< 0.03	0.08	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Anthracene	mg/kg	S4UL	2400	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.2	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Fluoranthene	mg/kg	S4UL	280	0.23	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.18	0.17	0.05	0.2	< 0.03	0.53	0.05	0.23	0.06	< 0.03	< 0.03	< 0.03	< 0.03
	Pyrene	mg/kg	S4UL	620	0.2	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.15	0.15	0.04	0.16	< 0.03	0.39	0.04	0.19	0.05	< 0.03	< 0.03	< 0.03	< 0.03
	Benzo(a)anthracene	mg/kg	S4UL	7.2	0.08	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.07	0.07	< 0.03	0.07	< 0.03	0.1	< 0.03	0.1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Chrysene	mg/kg	S4UL	15	0.09	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.07	0.08	< 0.03	0.09	< 0.03	0.09	< 0.03	0.11	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Benzo(b)fluoranthene	mg/kg	S4UL	2.6	0.09	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.08	0.08	< 0.03	0.08	< 0.03	0.05	< 0.03	0.11	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Benzo(k)fluoranthene	mg/kg	S4UL	77	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03	0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03	0.05	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Benzo(a)pyrene	mg/kg	S4UL	2.2	0.06	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.06	0.06	< 0.03	0.05	< 0.03	0.04	< 0.03	0.07	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Indeno(123-cd)pyrene	mg/kg	S4UL	27	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Dibenzo(ah)anthracene	mg/kg	S4UL	0.24	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Benzo(ghi)perylene	mg/kg	S4UL	320	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04	0.04	< 0.03	0.03	< 0.03	< 0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	PAH - USEPA 16, Total	mg/kg	-	-	0.84	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.77	0.77	< 0.10	0.84	< 0.10	2.4	< 0.10	1	0.11	< 0.10	< 0.10	< 0.10	< 0.10
Monoaromatics & Oxygenates	Benzene	mg/kg	S4UL	0.087	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Toluene	mg/kg	S4UL	130	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Ethylbenzene	mg/kg	S4UL	47	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	p & m-xylene	mg/kg	S4UL	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	o-xylene	mg/kg	S4UL	60	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	MTBE (Methyl Tertiary Butyl Ether)	mg/kg	EIC	49	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenols	Total Phenols	mg/kg	S4UL	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Phenol - Monohydric	mg/kg	-	-	0.4	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.5	0.6	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Petroleum Hydrocarbons	Aliphatic TPH >C5-C6	mg/kg	S4UL	42	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Aliphatic TPH >C6-C8	mg/kg	S4UL	100	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Aliphatic TPH >C8-C10	mg/kg	S4UL	27	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Aliphatic TPH >C10-C12	mg/kg	S4UL	130	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50
	Aliphatic TPH >C12-C16	mg/kg	S4UL	1100	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20
	Aliphatic TPH >C16-C21	mg/kg	S4UL	65000	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50	< 1.50
	Aliphatic TPH >C21-C35	mg/kg	S4UL	65000	< 3.40	< 3.40	< 3.40	4.75	< 3.40	8.8	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	4.61	< 3.40	< 3.40	11.44	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40
	Aliphatic >EC35-EC40: EH_2D_AL	mg/kg	-	-	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	4.32	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40
	Aliphatic >EC40-EC44: EH_2D_AL	mg/kg	-	-	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40	< 3.40
	Aliphatic TPH >C35-C44	mg/kg	S4UL	65000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aliphatic C5-C44: EH_2D+HS_1D_AL	mg/kg	LOD	10	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	15.76	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00
	Aliphatic TPH >C5-C35	mg/kg	S4UL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aromatic TPH >C5-C7	mg/kg	S4UL	70	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Aromatic TPH >C7-C8	mg/kg	S4UL	130	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Aromatic TPH >C8-C10	mg/kg	S4UL	34	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Aromatic TPH >C10-C12	mg/kg	S4UL	74	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
	Aromatic TPH >C12-C16	mg/kg	S4UL	140	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.8	< 0.50	< 0.50	1.73	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
	Aromatic TPH >C16-C21	mg/kg	S4UL	260	1.46	1.25	0.93	0.92	< 0.60	1.15	1.01	1.05	0.99	1.79	< 0.60	< 0.60	0.98	< 0.60	2.76	< 0.60	1.52	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60
	Aromatic TPH >C21-C35	mg/kg	S4UL	1100	3.58	1.97	4.57	2.31	1.59	3.85	< 1.40	< 1.40	< 1.40	2.14	2.82	1.97	5.39	2.09	2.96	1.95	31.53	6.29	< 1.40	< 1.40	< 1.40	< 1.40
	Aromatic >EC35-EC40: EH_2D_AR	mg/kg	-	-	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40
	Aromatic >EC40-EC44: EH_2D_AR	mg/kg	-	-	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40
	Aromatic TPH >C35-C44	mg/kg	S4UL	1100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aromatic C5-C44: EH_2D+HS_1D_AR	mg/kg	-	-	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	33.04	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00
	TPH Ali/Aro C5-C44: EH_2D+HS_1D_Total	mg/kg	-	-	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	48.8	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00
	Aromatic TPH >C5-C35	mg/kg	S4UL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

-	Not Tested
<LOD	Results below Limit of Detection
>GAC	Results above Generic Assessment Criteria
NAD	No Asbestos Detected

Monaghan Dublin Street - McAdam

Screened Chemical Analysis Results: Leachate vs Surface Water Criteria

				Sample ID	TP01	TP02	TP02	TP03	TP04	TP06	TP07	TP07	TP05	BH03
				Depth (m)	0.25	0.50	2.00	0.50	0.25	0.50	1.00	1.50	0.50	0.50
				Stratum (see report for further details)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
				Sample Date	09/08/2024	09/08/2024	09/08/2024	08/08/2024	08/08/2024	08/08/2024	08/08/2024	08/08/2024	13/08/2024	29/07/2024
Analyte		**Units**	**WQS**	**Source**										
Inorganics	pH	pH Units	-	-	7.7	7.3	7.4	7.3	7.3	7.1	7.2	7.2	7.1	6.7
	Electrical Conductivity	µS/cm	-	-	24.6	66.4	51.5	39.5	28.3	56.9	42.9	48.3	74	48.2
	Total Cyanide	µg/l	10.00	EQS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
	Free Cyanide	µg/l	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
	Thiocyanate as SCN	µg/l	-	-	23	24	33	26	30	32	26	31	< 20	< 20
	Sulphate as SO4	mg/l	400.00	EQS	2.1	8.8	3.3	3.9	1.7	2.3	2.3	2.8	15	2.3
	Total Sulphur	µg/l	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.04	0.06	< 0.01
	Sulphide	µg/l	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	Ammonium as NH4	µg/l	0.26	EQS	-	-	-	-	-	-	-	-	-	-
	Ammoniacal Nitrogen as N	mg/l	-	-	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	2
	Dissolved Organic Carbon (DOC)	mg/l	-	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	Phenol - Monohydric Low Level	mg/l	-	-	< 0.0015	0.0024	0.0024	0.0021	0.0021	< 0.0015	< 0.0015	0.0021	< 0.0015	< 0.0015
	Total Hardness as CaCO3	mg/l	-	-	8.12	22.4	19.8	20.6	7.14	23.9	16.3	18.9	26.9	21.8
	Calcium (dissolved)	µg/l	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Metals	Dissolved Arsenic	µg/l	50.00	EQS	0.25	< 0.16	0.21	0.25	1.4	0.43	0.73	0.63	0.75	0.24
	Dissolved Boron	µg/l	2000.00	EQS	0.013	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012
	Dissolved Cadmium	µg/l	0.08	EQS	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Chromium (hexavalent)	µg/l	3.4	EQS	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
	Chromium (III - dissolved)	µg/l	4.7	EQS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Chromium (dissolved)	µg/l	-	-	-	-	-	-	-	-	-	-	-	-
	Copper (dissolved)	µg/l	1.00	EQS	0.9	0.6	0.6	0.7	2.2	0.9	1.1	0.9	2.2	0.8
	Lead (dissolved)	µg/l	1.20	EQS	0.19	< 0.09	< 0.09	< 0.09	3.5	< 0.09	0.38	0.1	0.23	< 0.09
	Mercury (dissolved)	µg/l	0.07	EQS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Nickel (dissolved)	µg/l	4.00	EQS	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Selenium (dissolved)	µg/l	-	-	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
	Vanadium (dissolved)	µg/l	20.00	EQS	< 0.6	< 0.6	< 0.6	< 0.6	2	< 0.6	1	< 0.6	< 0.6	< 0.6
	Zinc (dissolved)	µg/l	11.90	EQS	2.6	< 1.3	< 1.3	< 1.3	2.7	< 1.3	2.2	< 1.3	2.4	< 1.3
PAH	Naphthalene	ug/l	2.000	EQS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	Acenaphthylene	ug/l	0.01	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Acenaphthene	ug/l	0.01	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Fluorene	ug/l	0.01	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Phenanthrene	ug/l	0.01	LOD	0.02	< 0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	< 0.01
	Anthracene	ug/l	0.100	EQS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Fluoranthene	ug/l	0.0063	EQS	0.03	0.01	0.03	0.01	0.02	0.02	< 0.01	0.02	0.02	0.01
	Pyrene	ug/l	0.010	LOD	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(a)anthracene	ug/l	0.010	LOD	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Chrysene	ug/l	0.010	LOD	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(b)fluoranthene	ug/l	0.010	LOD	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(k)fluoranthene	ug/l	0.010	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(a)pyrene	ug/l	0.00017	EQS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Indeno(1,2,3-cd)pyrene	ug/l	0.010	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Dibenz(a,h)anthracene	ug/l	0.010	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(ghi)perylene	ug/l	0.010	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	PAH Total	ug/l	-	-	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Monoaromatics & Oxygenates	Benzene	µg/l	10.0	EQS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Toluene	µg/l	74.0	EQS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Ethylbenzene	µg/l	20.0	EQS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	p & m-xylene	µg/l	30.0	EQS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	o-xylene	µg/l	3.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	MTBE (Methyl Tertiary Butyl Ether)	µg/l	10.0	EQS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenols	Total Phenols	µg/l	0.0077	EQS	-	-	-	-	-	-	-	-	-	-
Petroleum Hydrocarbons	Aliphatic TPH >C5-C6	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C6-C8	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C8-C10	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C10-C12	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C12-C16	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C16-C21	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C21-C35	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C35-C40	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aliphatic TPH >C35-C44	µg/l	10.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Aliphatic TPH >C40-C44	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aliphatic TPH >C5-C35	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aliphatic C10-C44: EH_CU_1D_AL	µg/l	1.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Aliphatic TPH >C5-C44	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aromatic TPH >C5-C7	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C7-C8	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C8-C10	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C10-C12	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C12-C16	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C16-C21	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C21-C35	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C35-C40	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aromatic TPH >C35-C44	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C40-C44	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aromatic TPH >C10-C44	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C5-C44	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aromatic TPH >C6-C35	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Ali/Aro C10-C44: EH_CU_1D_Total	µg/l	10.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

-	Not Tested
<LOD	Results below Limit of Detection
>Tier 1 Value	Results above Tier 1 Assessment Criteria

Monaghan Dublin Street - McAdam
Screened Chemical Analysis Results: Leachate vs Groundater Criteria

GDG
GAVIN & DOHERTY
GEOSOLUTIONS

				Sample ID	TP01	TP02	TP02	TP03	TP04	TP06	TP07	TP07	TP05	BH03
				Depth (m)	0.25	0.50	2.00	0.50	0.25	0.50	1.00	1.50	0.50	0.50
				Stratum (see report for further details)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
				Sample Date	09/08/2024	09/08/2024	09/08/2024	08/08/2024	08/08/2024	08/08/2024	08/08/2024	08/08/2024	13/08/2024	29/07/2024
Analyte		**Units**	**WQS**	**Source**										
Inorganics	pH	pH Units	-	-	7.7	7.3	7.4	7.3	7.3	7.1	7.2	7.2	7.1	6.7
	Electrical Conductivity	µS/cm	-	-	24.6	66.4	51.5	39.5	28.3	56.9	42.9	48.3	74	48.2
	Total Cyanide	µg/l	10	LOD	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
	Free Cyanide	µg/l	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
	Thiocyanate as SCN	µg/l	-	-	23	24	33	26	30	32	26	31	< 20	< 20
	Sulphate as SO4	mg/l	250.00	RPV	2.1	8.8	3.3	3.9	1.7	2.3	2.3	2.8	15	2.3
	Total Sulphur	µg/l	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.04	0.06	< 0.01
	Sulphide	µg/l	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	Ammonium as NH4	µg/l	500	RPV	-	-	-	-	-	-	-	-	-	-
	Ammoniacal Nitrogen as N	mg/l	-	-	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	2
	Dissolved Organic Carbon (DOC)	mg/l	-	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	Phenol - Monohydric Low Level	mg/l	-	-	< 0.0015	0.0024	0.0024	0.0021	0.0021	< 0.0015	< 0.0015	0.0021	< 0.0015	< 0.0015
	Total Hardness as CaCO3	mg/l	-	-	8.12	22.4	19.8	20.6	7.14	23.9	16.3	18.9	26.9	21.8
	Calcium (dissolved)	µg/l	-	-	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Metals	Dissolved Arsenic	µg/l	10.00	RPV	0.25	< 0.16	0.21	0.25	1.4	0.43	0.73	0.63	0.75	0.24
	Dissolved Boron	µg/l	1000.00	RPV	0.013	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012
	Dissolved Cadmium	µg/l	5.00	RPV	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Chromium (hexavalent)	µg/l	5	LOD	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
	Chromium (III)	µg/l	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Chromium (dissolved)	µg/l	-	-	-	-	-	-	-	-	-	-	-	-
	Copper (dissolved)	µg/l	2000	DWS	0.9	0.6	0.6	0.7	2.2	0.9	1.1	0.9	2.2	0.8
	Lead (dissolved)	µg/l	10.00	RPV	0.19	< 0.09	< 0.09	< 0.09	3.5	< 0.09	0.38	0.1	0.23	< 0.09
	Mercury (dissolved)	µg/l	1.00	RPV	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Nickel (dissolved)	µg/l	20.00	RPV	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Selenium (dissolved)	µg/l	10.00	RPV	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
	Vanadium (dissolved)	µg/l	-	-	< 0.6	< 0.6	< 0.6	< 0.6	2	< 0.6	1	< 0.6	< 0.6	< 0.6
	Zinc (dissolved)	µg/l	5000.00	RPV	2.6	< 1.3	< 1.3	< 1.3	2.7	< 1.3	2.2	< 1.3	2.4	< 1.3
PAH	Naphthalene	ug/l	0.01	LOD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	Acenaphthylene	ug/l	0.01	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Acenaphthene	ug/l	0.01	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Fluorene	ug/l	0.01	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Phenanthrene	ug/l	0.01	LOD	0.02	< 0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	< 0.01
	Anthracene	ug/l	0.01	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Fluoranthene	ug/l	0.01	LOD	0.03	0.01	0.03	0.01	0.02	0.02	< 0.01	0.02	0.02	0.01
	Pyrene	ug/l	0.01	LOD	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(a)anthracene	ug/l	0.01	LOD	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Chrysene	ug/l	0.01	LOD	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(b)fluoranthene	ug/l	Sum of 4	Sum of 4	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(k)fluoranthene	ug/l	Sum of 4	Sum of 4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(a)pyrene	ug/l	0.01	RPV	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Indeno(1,2,3-cd)pyrene	ug/l	Sum of 4	Sum of 4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Dibenz(a,h)anthracene	ug/l	0.001	LOD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(ghi)perylene	ug/l	Sum of 4	Sum of 4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Sum of Four	ug/l	0.1	RPV	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Monoaromatics & Oxygenates	Benzene	µg/l	1.0	RPV	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Toluene	µg/l	700.0	RPV	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Ethylbenzene	µg/l	300.0	RPV	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	p & m-xylene	µg/l	500.0	RPV	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	o-xylene	µg/l	3.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	MTBE (Methyl Tertiary Butyl Ether)	µg/l	10.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenols	Total Phenols	µg/l	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum Hydrocarbons	Aliphatic TPH >C5-C6	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C6-C8	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C8-C10	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C10-C12	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C12-C16	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C16-C21	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C21-C35	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C35-C40	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aliphatic TPH >C35-C44	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aliphatic TPH >C40-C44	µg/l	10.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Aliphatic TPH >C5-C35	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aliphatic C10-C44: EH_CU_1D_AL	µg/l	1.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Aliphatic TPH >C5-C44	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aromatic TPH >C5-C7	µg/l	1.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aromatic TPH >C7-C8	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C8-C10	µg/l	1.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C10-C12	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C12-C16	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C16-C21	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C21-C35	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C35-C40	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C35-C44	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aromatic TPH >C40-C44	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C10-C44	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C5-C44	µg/l	10.0	LOD	-	-	-	-	-	-	-	-	-	-
	Aromatic TPH >C6-C35	µg/l	10.0	LOD	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Ali/Aro C10-C44: EH_CU_1D_Total	µg/l	10.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

-	Not Tested
<LOD	Results below Limit of Detection
>Tier 1 Value	Results above Tier 1 Assessment Criteria

Monaghan Dublin Street - McAdam
Screened Chemical Analysis Results: Water Samples vs Surface Water Criteria

					Sample ID	SW1	SWS1	SW2	SWS2	SW3	SWS3	SW4	SWS4
					Depth (m)	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
					Stratum (see report for further details)								
					Sample Date	29/07/2024	12/08/2024	29/07/2024	12/08/2024	29/07/2024	12/08/2024	29/07/2024	12/08/2024
	Analyte	Units	WQS	Source									
Inorganics	pH	pH Units	-	-	7.1	6.5	7.1	6.7	7.1	6.8	7.4	6.9
	Electrical Conductivity	µS/cm	-	-	282	232	439	381	467	347	641	625
	Total Cyanide	mg/l	0.01	EQS	< 0.0400	0.0011	< 0.0400	0.0011	< 0.0400	0.0018	< 0.0400	0.003
	Free Cyanide	mg/l	-	-	< 0.0200	0.0007	< 0.0200	0.0007	< 0.0200	0.0012	< 0.0200	0.0014
	Thiocyanate as SCN	µg/l	-	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
	Sulphate as SO4	mg/l	400.00	EQS	3.1	7.3	15	18	15	17	33	27
	Total Sulphur	mg/l	-	-	< 10	< 10	< 10	< 10	61	< 10	11	12
	Sulphide	µg/l	-	-	0.02	0.03	0.01	0.01	0.01	0.11	0.03	0.01
	Ammonium as NH4	µg/l	0.26	EQS	-	-	-	-	-	-	-	-
	Ammoniacal Nitrogen as N	mg/l	-	-	0.051	0.33	2.7	1.2	1.9	1.6	0.66	3.4
	Dissolved Organic Carbon (DOC)	mg/l	-	-	5.5	6.4	7.1	6.6	7.3	5.8	8.8	9.3
	Phenol - Monohydric Low Level	mg/l	-	-	< 0.1000	0.0022	< 0.1000	< 0.0015	< 0.1000	0.0026	< 0.1000	0.0046
	Total Hardness as CaCO3	mg/l	-	-	125	111	156	149	163	130	187	176
	Calcium (dissolved)	mg/l	-	-	46	40	53	50	55	43	61	57
Metals	Dissolved Arsenic	µg/l	50.00	EQS	0.84	0.53	1.3	0.77	1.2	0.85	0.77	1
	Dissolved Boron	mg/l	2.00	EQS	0.076	0.02	0.049	0.031	0.051	0.024	0.045	0.04
	Dissolved Cadmium	µg/l	0.08	EQS	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
	Chromium (hexavalent)	µg/l	3.4	EQS	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
	Chromium (III - dissolved)	µg/l	4.7	EQS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Chromium (dissolved)	µg/l	-	-	-	-	-	-	-	-	-	-
	Copper (dissolved)	µg/l	1.00	EQS	0.4	1.2	0.8	2.1	0.7	1.9	3.7	2.7
	Lead (dissolved)	µg/l	1.20	EQS	0.32	0.5	0.28	0.28	0.33	0.56	< 0.09	0.3
	Mercury (dissolved)	µg/l	0.07	EQS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Nickel (dissolved)	µg/l	4.00	EQS	1.1	0.9	1.9	1.4	1.5	1.4	2.6	2.2
	Selenium (dissolved)	µg/l	-	-	< 0.25	0.35	< 0.25	0.34	< 0.25	< 0.25	< 0.25	0.33
	Vanadium (dissolved)	µg/l	20.00	EQS	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
	Zinc (dissolved)	µg/l	79.00	EQS	120	61	79	65	46	11	62	90
PAH	Naphthalene	ug/l	2.00	EQS	< 0.50	< 0.50	< 0.50	1.1	< 0.50	1.7	< 0.50	0.07
	Acenaphthylene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	0.28	< 0.10	< 0.10	0.15	< 0.01
	Acenaphthene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	2.2	< 0.10	0.96	< 0.10	0.01
	Fluorene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	0.76	< 0.10	0.42	0.17	0.01
	Phenanthrene	ug/l	0.01	LOD	0.19	0.17	0.19	2.4	0.15	0.68	0.71	0.01
	Anthracene	ug/l	0.10	EQS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.01
	Fluoranthene	ug/l	0.0063	EQS	< 0.10	< 0.10	< 0.10	0.58	< 0.10	0.44	0.87	< 0.01
	Pyrene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	1.8	< 0.10	0.51	2.8	< 0.01
	Benzo(a)anthracene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	0.17	< 0.10	0.2	< 0.10	< 0.01
	Chrysene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	0.13	< 0.10	0.16	3.4	< 0.01
	Benzo(b)fluoranthene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	0.28	< 0.10	0.3	0.9	< 0.01
	Benzo(k)fluoranthene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	0.11	< 0.10	0.15	< 0.10	< 0.01
	Benzo(a)pyrene	ug/l	0.00017	EQS	< 0.10	< 0.10	< 0.10	0.22	< 0.10	0.27	0.81	< 0.01
	Indeno(1,2,3-cd)pyrene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	0.16	< 0.10	0.18	< 0.10	< 0.01
	Dibenz(a,h)anthracene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.16	< 0.10	< 0.01
	Benzo(ghi)perylene	ug/l	0.01	LOD	< 0.10	< 0.10	< 0.10	0.2	< 0.10	0.28	< 0.10	< 0.01
	PAH Total	ug/l	-	-	< 2.00	< 2.00	< 2.00	10	< 2.00	6.6	9.8	< 0.20
Monoaromatics & Oxygenates	Benzene	µg/l	10.0	EQS	< 1.0	< 1.0	< 10.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Toluene	µg/l	74.0	EQS	< 1.0	< 1.0	< 10.0	20	< 1.0	< 1.0	< 1.0	< 1.0
	Ethylbenzene	µg/l	20.0	EQS	< 1.0	< 1.0	< 10.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	p & m-xylene	µg/l	30.0	EQS	< 1.0	< 1.0	< 10.0	11	< 1.0	< 1.0	< 1.0	< 1.0
	o-xylene	µg/l	3.0	LOD	-	-	-	-	-	-	-	-
	MTBE (Methyl Tertiary Butyl Ether)	µg/l	10.0	EQS	< 1.0	< 1.0	< 10.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenols	Total Phenols	µg/l	0.0077	EQS	-	-	-	-	-	-	-	-
Petroleum Hydrocarbons	Aliphatic TPH >C5-C6	µg/l	15000.0	EQS	< 0.1	< 0.1	< 1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C6-C8	µg/l	15000.0	EQS	< 0.1	< 0.1	< 1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C8-C10	µg/l	300.0	EQS	< 0.1	< 0.1	< 1.0	26	< 0.1	< 0.1	< 0.1	< 0.1
	Aliphatic TPH >C10-C12	µg/l	300.0	EQS	< 1.0	< 1.0	< 1.0	780	11	52	< 1.0	< 1.0
	Aliphatic TPH >C12-C16	µg/l	300.0	EQS	170	< 1.0	81	5100	130	280	< 1.0	< 1.0
	Aliphatic TPH >C16-C21	µg/l	1.0	LOD	530	< 1.0	75	4900	240	400	< 1.0	< 1.0
	Aliphatic TPH >C21-C35	µg/l	1.0	LOD	170	< 1.0	21	1500	680	160	< 1.0	< 1.0
	Aliphatic TPH >C35-C40	µg/l	1.0	LOD	-	-	-	-	-	-	-	-
	Aliphatic TPH >C35-C44	µg/l	1.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	74	< 1.0	< 1.0	< 1.0
	Aliphatic TPH >C40-C44	µg/l	1.0	LOD	-	-	-	-	-	-	-	-
	Aliphatic TPH >C5-C35	µg/l	1.0	LOD	-	-	-	-	-	-	-	-
	Aliphatic C10-C44: EH_CU_1D_AL	µg/l	1.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Aliphatic TPH >C5-C44	µg/l	1.0	LOD	-	-	-	-	-	-	-	-
	Aromatic TPH >C5-C7	µg/l	10.0	EQS	< 0.1	< 0.1	< 1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C7-C8	µg/l	700.0	EQS	< 0.1	< 0.1	< 1.0	20	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C8-C10	µg/l	300.0	EQS	< 0.1	< 0.1	< 1.0	48	< 0.1	< 0.1	< 0.1	< 0.1
	Aromatic TPH >C10-C12	µg/l	90.0	EQS	1.3	< 1.0	< 1.0	590	< 1.0	< 1.0	< 1.0	< 1.0
	Aromatic TPH >C12-C16	µg/l	90.0	EQS	34	< 1.0	< 1.0	2900	< 1.0	< 1.0	< 1.0	< 1.0
	Aromatic TPH >C16-C21	µg/l	90.0	EQS	210	< 1.0	< 1.0	2400	< 1.0	< 1.0	< 1.0	< 1.0
	Aromatic TPH >C21-C35	µg/l	90.0	EQS	79	< 1.0	< 1.0	640	< 1.0	< 1.0	< 1.0	< 1.0
	Aromatic TPH >C35-C40	µg/l	1.0	LOD	-	-	-	-	-	-	-	-
	Aromatic TPH >C35-C44	µg/l	1.0	LOD	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Aromatic TPH >C40-C44	µg/l	1.0	LOD	-	-	-	-	-	-	-	-
	Aromatic TPH >C10-C44	µg/l	1.0	LOD	1200	< 1.0	< 1.0	6600	< 1.0	< 1.0	< 1.0	< 1.0
	Aromatic TPH >C5-C44	µg/l	10.0	LOD	-	-	-	-	-	-	-	-
	Aromatic TPH >C6-C35	µg/l	10.0	LOD	-	-	-	-	-	-	-	-
	Ali/Aro C10-C44: EH_CU_1D_Total	µg/l	1.0	LOD	1200	< 1.0	180	19000	1100	990	< 1.0	< 1.0

-	Not Tested
<LOD	Results below Limit of Detection
>Tier 1 Value	Results above Tier 1 Assessment Criteria

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8 Hydrology

8.1 Hydrology Figures

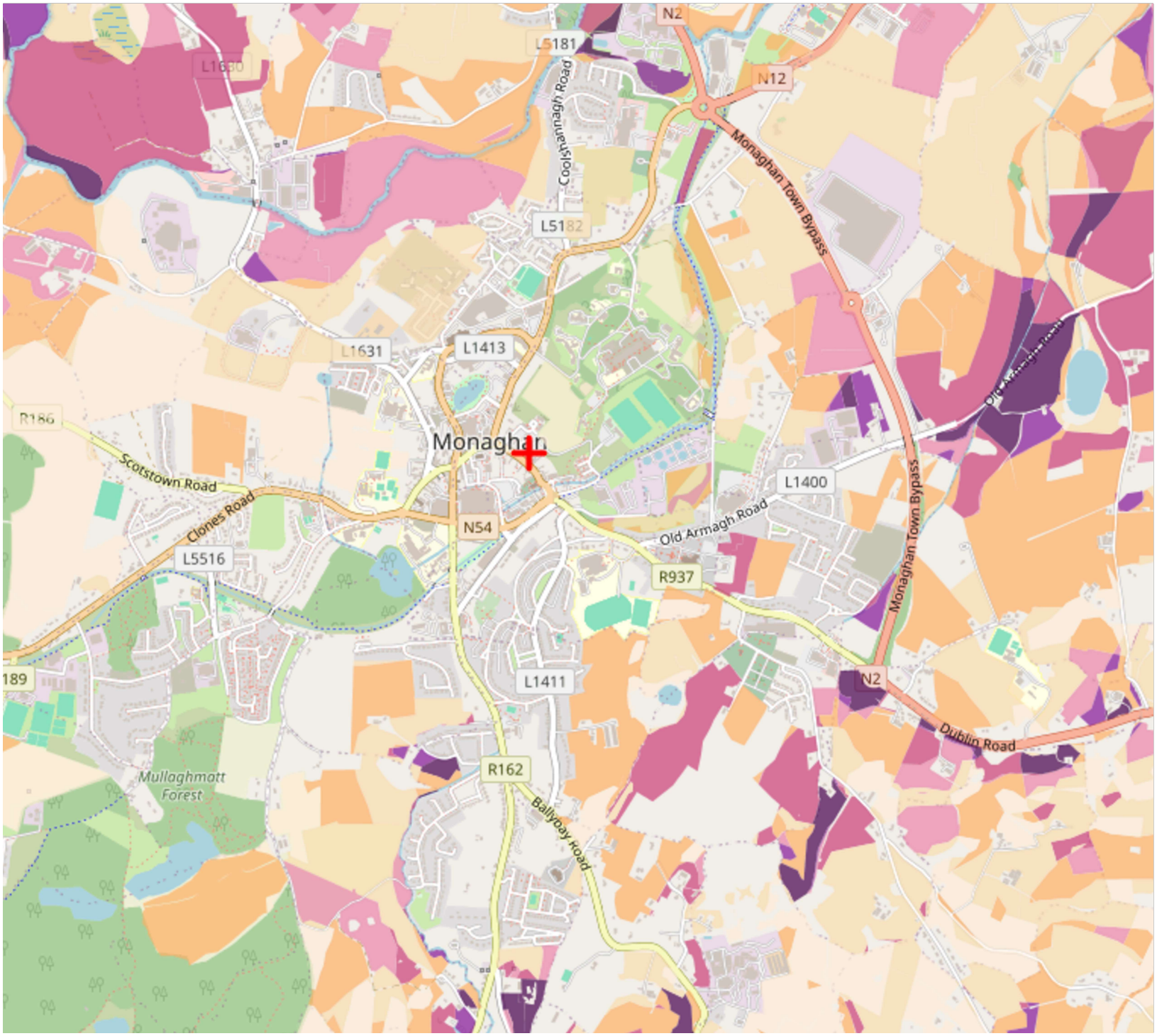
8.2 Flood Risk Assessment

8.3 Drainage Assessment

8.4 Inland Fisheries Shambles Scoping Response

8.5 Q Values Summary Table

8.6 Bathing Water Status



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Project: Regeneration Scheme, Monaghan

Drawing: Pollution Impact Potential Nitrate (PIP-N)

Dwg by:

Scale: not to scale

Drawing No.

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- PIP Rank 1
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- PIP Rank 7

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Project: Regeneration Scheme, Monaghan

Drawing: Pollution Impact Potential Phosphorus (PIP-P)

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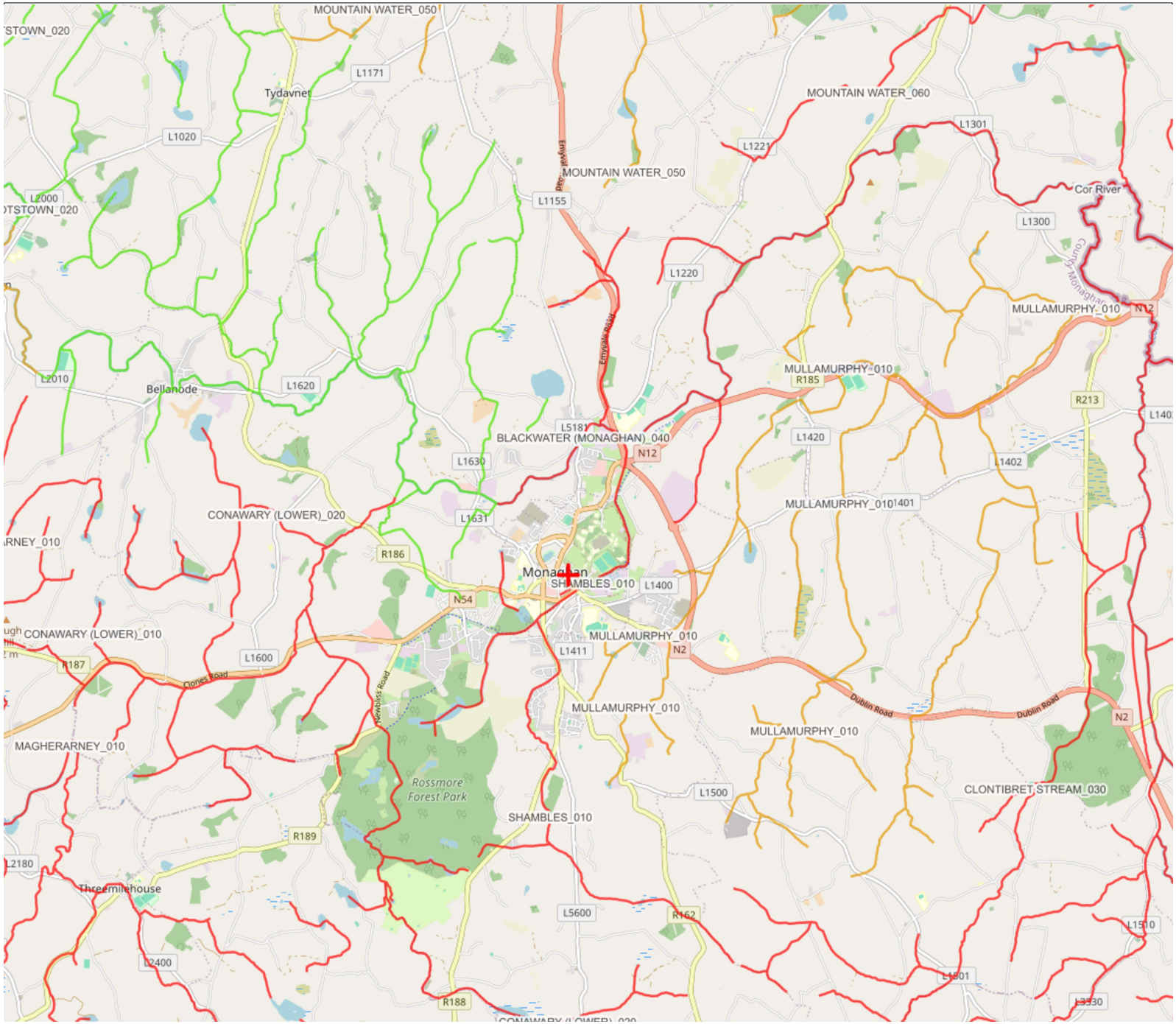

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Project: Regeneration Scheme, Monaghan

Drawing: WFD 3rd Cycle - River Risk Status

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- Review
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McAdam
ENHANCING LOCAL COMMUNITIES

Client: Monaghan County Council

Comhairle Contae Mhuineacháin
Monaghan County Council

Project : E2442 – Dublin Street North

Flood Risk Assessment – Desktop Study

PREPARED BY	CHECKED BY	APPROVED BY	ISSUE	DATE
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Contents

1 Introduction

1.1 Report Brief

This desktop Flood Risk Assessment (FRA) has been commissioned by Monaghan County Council to inform the design of the Dublin Street North Regeneration Project in Monaghan Town, and to support the planning application for the scheme.

The scheme design includes the provision of a new street, 'Russell Row' and high-quality public realm in the Backlands area of Dublin St. as well as public realm design at Dublin St, Old Cross Square and the Diamond Centre Car Park.

The site location plan indicates the full extent of the proposed development. The current site comprises mixed commercial and residential developments, hard standing, soft landscaping areas. There are also several vacant shops and the back land areas are underutilised. The site area is circa 21,200 m2 in size and accessible from Dublin Street and Old Cross Square.

Prior to undertaking the Flood Risk Assessment, a desktop study was undertaken, and the following documents obtained which are referenced throughout this report:

- Civils General Arrangement drawings
- Topographical Survey
- GPR Survey issued by APEX Surveys
- Desktop Ground Investigation Specification by GDG
- Geological Survey Ireland mapping
- Office of Public Works (OPW) maps

1.2 Purpose of Desktop Study FRA

The purpose of this desktop FRA is to review and comment on the adequacy of available flood risk information, identify the risk of flooding from all different sources for the proposed development considering all the available information taken from the gov.ie Office of Public Works (OPW) maps, Monaghan Development Plan 2019-2025 and the Strategic Flood Risk Assessment (SFRA) for the Monaghan Development Plan 2019-2025 published by Monaghan County Council (MCC) in 2019. Geological Survey Ireland mapping has also been consulted to identify bedrock geology and groundwater vulnerability classes for the site due to the absence of site investigation.

Where available information is identified as inadequate, this FRA will outline what further analysis is required. At the end of this document the recommended mitigation measures will be discussed to ensure that the proposed development complies with the relevant planning objectives and guidance.

1.3 Method of Assessment

The method of assessment used complies with the Source-Pathway-Receptor model and provides a spatial assessment of flood risk to people, property, and the environment at the site. Consideration has been given to the source and extent of all potential flood mechanisms at the site, including coastal, fluvial, pluvial, and urban drainage flooding.

1.4 Relevant Guidance

This FRA has been undertaken in consideration with *'The Planning System and Flood Risk Management – Guidelines for Planning Authorities*' DoEHLG November 2009, which is the latest relevant guidance document. The FRA follows the structure of the Sequential Test as set out in that document (extract below)

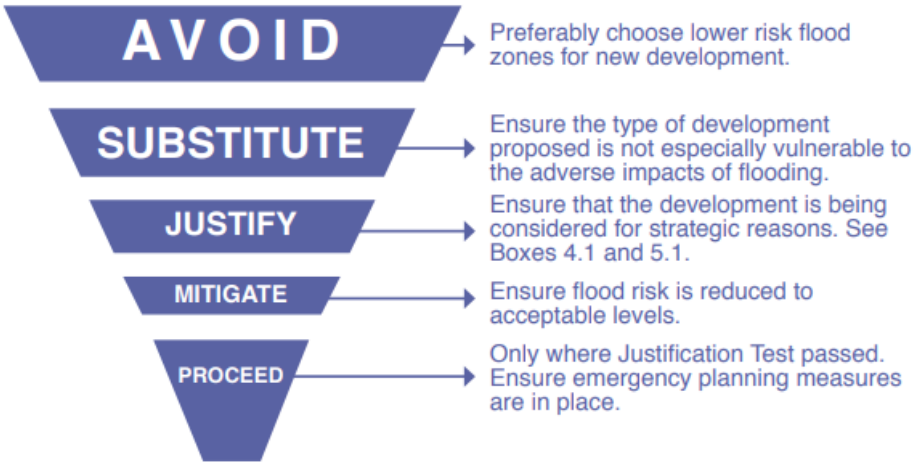


Fig. 3.1: Sequential approach principles in flood risk management

The guidance has been issued to ensure that flood risk is a key consideration for developers, planning & regional authorities and the public in preparing and submitting development proposals.

The principles of the guidance are as follows:

- Avoid the risk, where possible
- Substitute less vulnerable users, where avoidance is not possible, and
- Mitigate and manage the risk, where avoidance and substitution are not possible.

A staged approach is recommended within the guidance document in relation to identifying and assessing flood risk. The three stages of appraisal and assessment are as follows:

- Stage 1 Flood risk identification
- Stage 2 Initial flood risk assessment
- Stage 3 Detailed flood risk assessment

The following policies were also consulted when preparing this document:

- Monaghan County Development Plan 2019-2025 – Strategic Flood Risk Assessment (SFRA) for County Monaghan
- National Planning Framework

1.5 Flood Risk

Flood risk can be quantified by relating the probability of the flood event occurring to the consequence of the flood. Probability, in flood event terms, is gauged by potential annual occurrence/return period and flood consequence is dependent on the nature of the flood hazard and the vulnerability of the inundated area. The source-pathway-receptor model considers the components of flood risk.

The source is the hazard with the potential to cause harm through flooding (e.g. rainfall, high sea levels). The pathway is the mechanism by which the source can affect the receptor (e.g. inadequate drainage, overtopping of coastal defences) and finally, the receptor is anything which is affected by the flood event (e.g. people, infrastructure, property).

1.6 Causes of Flooding

The Planning System and Flood Risk Management Guidelines requires a Flood Risk Assessment to consider all potential causes of flooding, including the following:

- Coastal flooding
- Inland flooding
    - Overland flow
    - River flooding
    - Flooding from artificial drainage systems
    - Groundwater flooding
    - Estuarial flooding
- Failure of infrastructure

1.7 Floodplains

A river flood plain is a low-lying area which receives excess flood water when the flow within the watercourse exceeds the capacity of the channel. A coastal flood plain is an area which, during high tide or increased sea levels, becomes inundated with sea water.

1.8 Assessing Flood Risk

In the context of the '*Planning System and Flood Risk Management Guidelines, DoEHLG, 2009*' and the Monaghan County Development Plan 2019-2025 SFRA, three flood zones are designated in the consideration of flood risk to a particular site. The three flood zones are described in Table 1-1 below.

Flood Zone	Description
Flood 'Zone A'	where the probability of flooding from watercourses is the highest (greater than 1% or 1 in 100 year for watercourse flooding or 0.5% or 1 in 200 for coastal flooding).
Flood 'Zone B'	where the probability of flooding from watercourses is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100 year for watercourse flooding, and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
Flood 'Zone C'	where the probability of flooding from watercourses and the sea is low or negligible (less than 0.1% or 1 in 1000 year for both watercourse and coastal flooding). Flood Zone 'C' covers all areas which are not in Zones 'A' or 'B'.

Table 1-1 - Flood Zone Description

The planning implications for each of the flood zones are:

Zone A - High probability of flooding.

Most types of development would be considered inappropriate in this zone. Development in this zone should be avoided and/or only considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the Justification Test has been applied.

Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation, would be considered appropriate in this zone.

Zone B - Moderate probability of flooding.

Highly vulnerable development, such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses and primary strategic transport and utilities infrastructure, would generally be considered inappropriate in this zone, unless the requirements of the Justification Test can be met.

Less vulnerable development, such as retail, commercial and industrial uses, sites used for short-let for caravans and camping and secondary strategic transport and utilities infrastructure, and water-compatible development might be considered appropriate in this zone.

In general, however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone C and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to and from the development can or will adequately be managed.

Zone C - Low probability of flooding.

Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

1.9 Available Hydraulic Model Status

Flood mapping for watercourses adjacent to and within the site has been produced as part of the OPW's National Indicative Fluvial Mapping (NIFM) dataset. The OPW has created NIFM for a range of present-day and climate change scenarios for all catchments greater than 5 km² in areas where detailed Catchment Flood Risk Assessment and Management (CFRAM) flood maps were not developed in collaboration with the Local Authorities. However, for the development site and adjacent catchments, the CFRAM maps are available to assess the flood extents at the site and in the surrounding areas.

2 Existing Site Description and Proposed Site Development

2.1 Site Location

The proposed development site covers an area of approximately 21,200 m^2 and is situated in the county town of County Monaghan in the Republic of Ireland

The ITM Reference for the approximate centre of the site is 667400 (Easting) 833700 (Northing).

The development under study is located to the northeast of the town centre, extending from The Diamond to the northwest, south-eastwards along Dublin Street, and is defined to the southeast by Old Cross Square. Access from Dublin is facilitated via the M1 and N2, approximately 130km northbound and access from Belfast is via M1 and N2, approximately 91km to the southwest

An indication of the site location is presented in Figure 2.1 below.

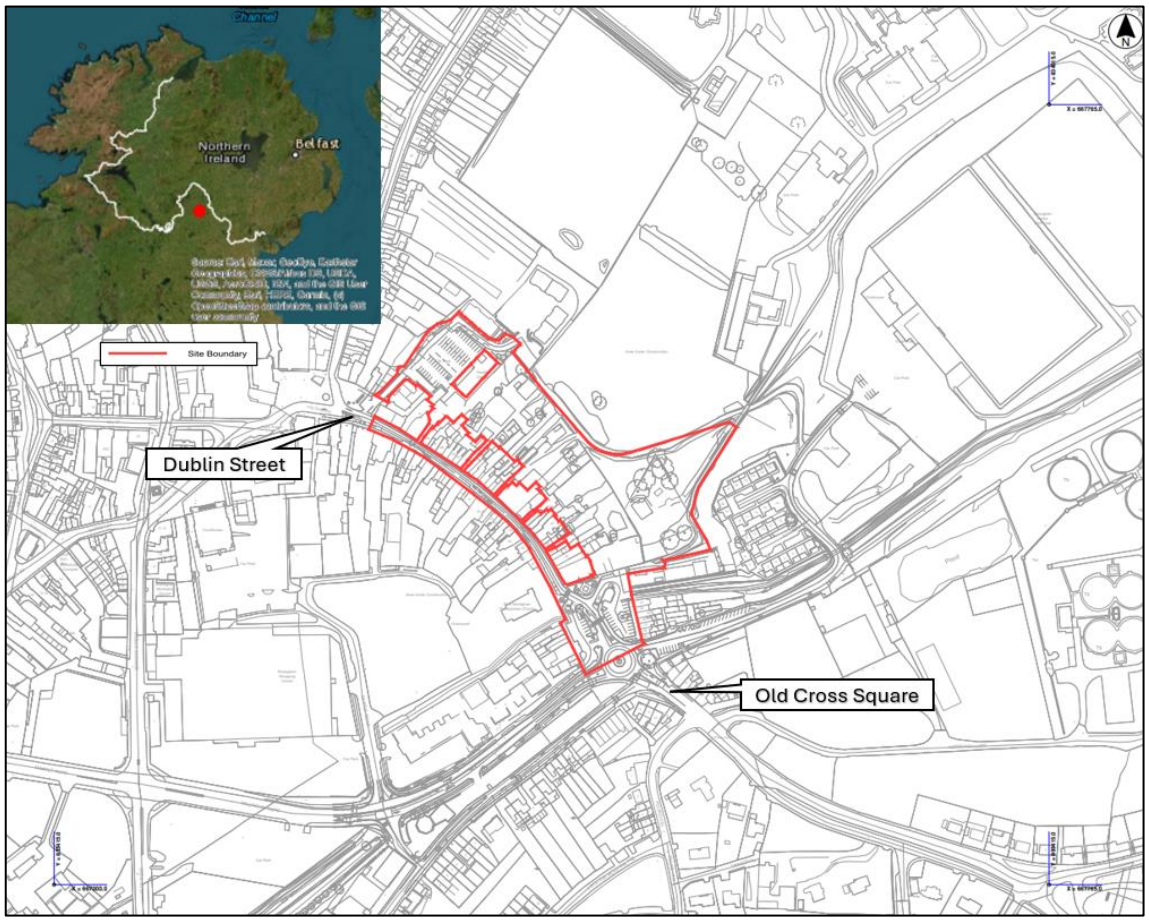


Figure 2.1: Project Dublin Street North Location Map

2.2 Existing Site Description

The site comprises mixed commercial and residential land. This consists of professional services including solicitor's offices, commercial uses including retail units, laundry, clothing, footwear, salon, public house, restaurant, auto repair shop and Guest House. A number of the shops extended the retail use to the full width of the property which does not allow separate access to the upper levels and which has led to vacancy at upper levels. There are also several vacant shops along the street.

2.3 Topography

The topographical survey on the site shows that the levels on the site varying between 68m Above Ordnance Datum (AOD) (in the east) and 59mAOD (in the south). The base level of the region and the site are the Ulster Canal and the River Shambles, which on the site are at levels of around 59mAOD.

2.4 Existing Drainage

According to the GPR survey, there is a 150mm diameter storm sewer running from the northwest of the development site toward Dublin Street, which is assumed to collect stormwater from the access road, as well as commercial and residential areas. The existing services survey also indicates the presence of 150mm diameter sewers at the south of the site, near the Old Cross Square roundabout, which likely collect surface water runoff from the southern portion of the site.

Additionally, a public 225mm foul water sewer runs beneath Dublin Street Road, with outfalls from the existing site connected to it, based on information from the GPR survey and Uisce Éireann asset maps.

2.5 Proposed Site Development Plans

The development plans for the site include;

- Creation of new shared surface, 'Russell Row' to the rear of properties fronting Dublin Street
- New Car park / event space at Russell Row
- Public realm improvements along Dublin Street to include resurfacing, new pedestrian pavements (including widening),.
- Public realm improvements to include the creation of urban civic spaces, pedestrian pavements, steps, cycle routes, street furniture
- Creation of new public 'Community Garden' area.
- Creation of future development plots
- Reinforcement of existing vegetation and new soft landscaping throughout.

The drainage design has been developed to facilitate the scheme design proposals and includes, new surface water and foul drainage infrastructure, sustainable drainage solutions such as raingardens, attenuation tanks (with associated flow control) and permeable paving areas, and re-positioning of existing drainage infrastructure (gullies and manholes) to tie in with the design proposals.

A proposed Site Layout Plan can be seen in Appendix B.

2.6 Vulnerability Classification

The table below summarises the Vulnerability Classes defined in the Guidelines and provides a sample of the most common type of development applicable to each.

Vulnerability	Type of Development
Highly Vulnerable Development	Includes Garda, ambulance and fire stations, hospitals, schools, residential dwellings, residential institutions, essential infrastructure, such as primary transport and utilities distribution and SEVESO and IPPC sites, etc
Less Vulnerable Development	Includes retail, leisure, warehousing, commercial, industrial and non-residential institutions, etc.
Water Compatible Development	Includes Flood Control Infrastructure, docks, marinas, wharves, navigation facilities, water-based recreation facilities, amenity open spaces and outdoor sport and recreation facilities

Table 2-1 - Vulnerability Classifications

Based on the table above, it can be said that the development under study is classified as 'Less Vulnerable Developments', due to the fact that the scheme will serve to create residential and commercial development on the two Development Plots created by the works.

3 AVAILABLE FLOOD RISK INFORMATION

Several available sources of flood risk information as summarised briefly in Section 1 of this report, were considered and used to build an understanding of the potential risk of flooding to the site. This section highlights key findings from this information.

3.1 Monaghan County Council

3.1.1 Monaghan Development Plan 2019-2025

The Monaghan County Development Plan 2019 – 2025 has been assessed from a flooding and drainage perspective and the following Flood Risk Management and Surface Water Drainage policies have been considered for the preparation of the FRA:

• FMP 2: To restrict development in areas susceptible to flooding except where; a) The proposed development can be justified on strategic grounds. b) The flood risk can be managed to an acceptable degree and without increasing flood risk beyond the site itself. c) Appropriate and detailed mitigation measures can be implemented to remove/minimise flood effects.

• FMP 3: Development proposals on land identified as being at risk of flooding shall be accompanied by a site-specific Flood Risk Assessment (FRA) carried out in accordance with the methodology set out in The Planning System and Flood Risk Management – Guidelines for Planning Authorities, 2009.

• FMP 4: All applications in areas prone to flooding shall be subject to the justification test set out in the Flood Risk Management Guidelines. Compensatory flood storage provision or the provision of flood defences will not override the need for completion of the justification test.

• FMP 5: To protect the capacity of rivers, streams, riparian corridors, flood plains and wetlands from inappropriate development which will contribute to increased flood risk. Development on or within a floodplain will not be permitted.

• SDP 1: To require best practice in the design, construction and operation of expanding and new developments to ensure minimum effects on the aquatic environment. Sustainable Urban Drainage Systems designed to ensure both water quality protection and flood minimisation should be included in developments for commercial, industrial, residential, intensive agricultural, public and institutional premises with significant roof or hard surface areas and multiple residential developments.

• SDP 2: To ensure that new development is adequately serviced with surface water drainage infrastructure and promote the use of Sustainable Drainage Systems as appropriate to minimise the effect of a development on flooding and pollution of existing waterways.

• SDP 3: To require that planning applications are accompanied by a comprehensive SUDs assessment that addresses run-off quantity, run-off quality and its impact on the existing habitat and water quality.

• SDP 4: To ensure that all storm water discharges shall be restricted onsite attenuation and or other measures to the pre-development levels (green field) in all new developments. All attenuated storage volumes must take into consideration climate change.

3.1.2 SFRA Flood Zone Mapping

Flood Zone mapping was produced for County Monaghan as part of the Monaghan County Council SFRA. As shown in Figure 3.1, the proposed Regeneration Plan area is located in Flood Zone C with no risk of flooding. The full map is included in Appendix A.

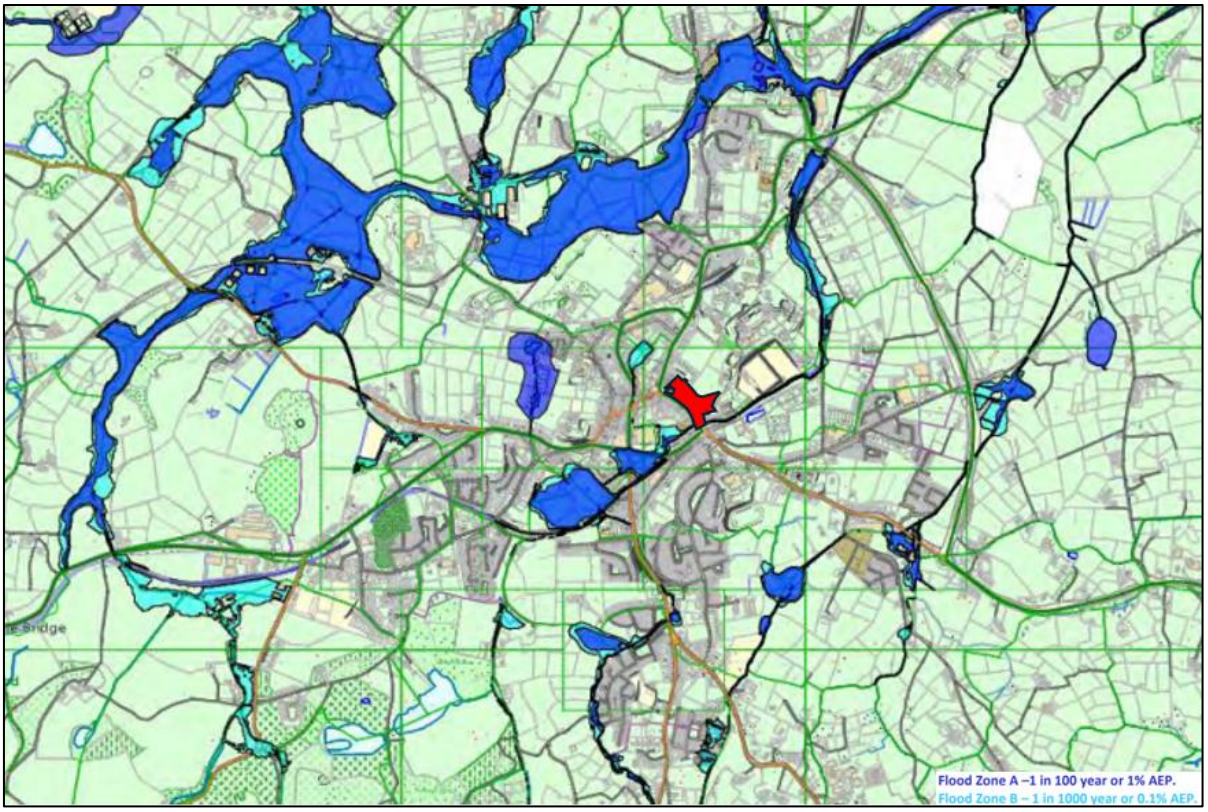


Figure 3.1: Monaghan Town SFRA Flood Zone Mapping

3.2 Office of Public Works (OPW)

According to OPW 'Past Flood Events' Flood Info.ie mapping, there is no past flood event in the area of project Dublin Street North, some records of the near historic flood events below:

• Flooding at Monaghan on 05/12/2015 ID- 13380.

• Shambles River Monaghan Town 24th October 2011 ID-11694.

• Recurring flooding at Monaghan ID-3207. River overflows its banks after heavy rain every year. Road is liable to flood, and properties are affected.

The nearest past flood event from the project site is event ID- 13380 and is located 380m away from the proposed development.

Figure 3.2 below shows the location of the past flood events in the vicinity of the proposed development.

Figure 3.2: OPW Past Flood Events Map

4 Flood Risk Identification

4.1 Initial Assessment

In accordance with the planning guidelines, a Stage 1 Flood risk identification is required to be undertaken to identify any flooding or surface water management issued related to the proposed development site that may warrant further investigation. Initially, the following possible flood mechanisms for the proposed site have been identified:

Table 4.1: Initial Assessment of Potential Flooding Mechanisms

Source / Pathway	Relevant	Comments / Reasoning
Tidal / Coastal	No	N/A. Site is c. 50km from the coast.
Fluvial	No	OPW and Monaghan County Council SFRA indicate that there is no fluvial flooding within the site.
Pluvial/Surface water flooding	Possible	There is no evidence of surface water flooding at the site.
Pluvial (urban drainage)	Possible	There is no evidence of surcharging/flooding from urban drainage systems on roads or lands within the sire boundary or directly adjacent to the site.
Surface water discharge	Possible	Any development has the potential to increase the impermeable area at a site causing an increase in the rate and volume of surface water runoff from the site.
Groundwater flooding	No	OPW website has no risk of groundwater flooding in this area. Monaghan County SFRA mapping also verify that the site has no risk of groundwater flooding.
Blockage	No	No known river culverts in the area.

4.2 Fluvial Flooding

CFRAM mapping for the present day extracted by floodinfo.ie website, and can be seen in Figure 4.1, shows that the site itself is in an area with no risk of present-day fluvial flooding

It is noted that the southern part of the site, close to the Old Cross Square roundabout, is in very close proximity to the river flood extent. However, the site remains unaffected, as the existing levels are above the maximum flood levels, as identified below.

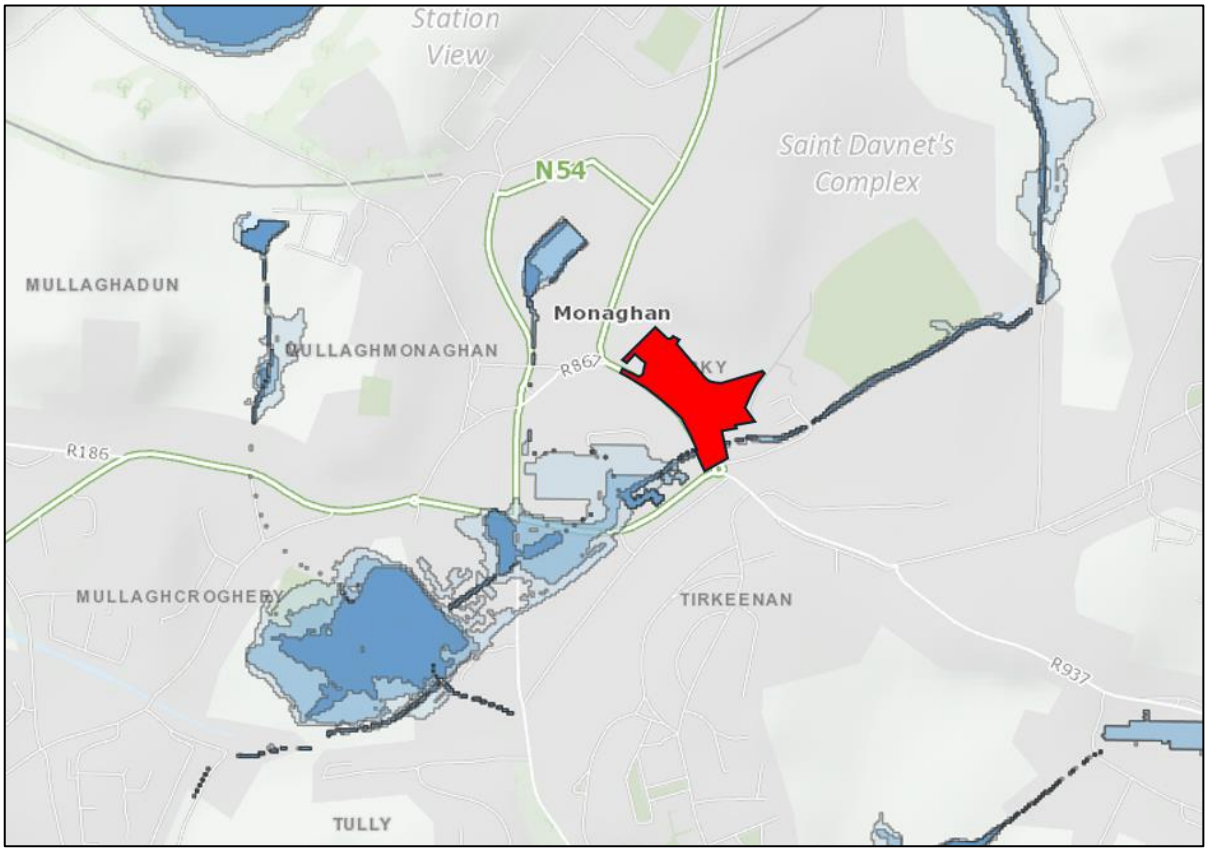


Figure 4.1: CFRAM River Flood Extents – Present Day

The CFRAM River Flood Extents for Mid and High-End Future Scenarios, with an allowance for climate change, confirm that the proposed development is not at risk of fluvial flooding. The relevant map is presented in Figure 4.2.

The same map also indicates that flooding, influenced by the Ulster Canal, extends to adjacent sites with a probability of river flooding between a 1 in 100-year event and a 1 in 1000-year event.

The closest river nodes to the proposed development, located southwest and southeast, are:

- **0639M00184**: Maximum water levels are 53.18m for the 1% AEP and 54.14m for the 0.1% AEP.
- **0639M00223**: Maximum water levels are 53.35m for the 1% AEP and 54.67m for the 0.1% AEP.

However, as discussed in Section 2.3, the existing ground levels are above the maximum flood levels indicated for the closest river nodes, ensuring that the proposed development will remain safe from river flooding.

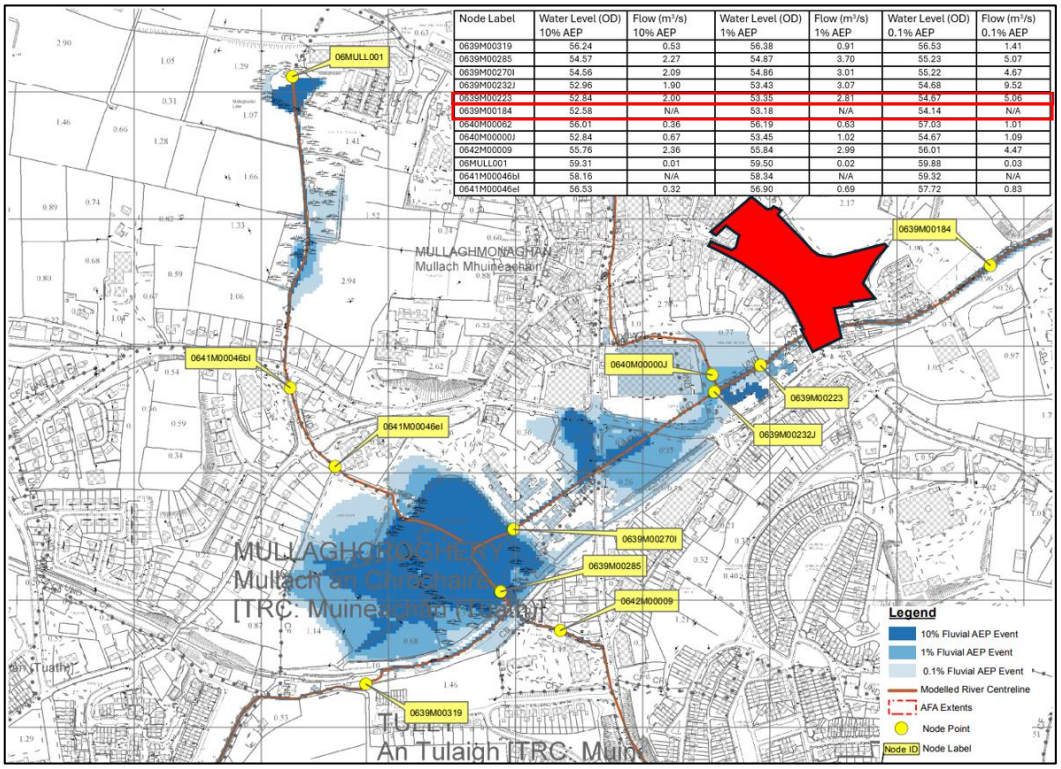


Figure 4.2: CFRAM Fluvial Flood Extents Map

4.3 Surface Water Flood Risk

Based on the SFRA of the Monaghan Local Area Plan, no risk of surface water flooding has been recorded at the site.

As indicated in Figure 4.3 below, the impermeable area of the proposed site will not increase as a result of the development proposals. Therefore, the volume of runoff will not increase compared to the existing site.

Figure 4.3- Existing and Proposed Permeable and Impermeable areas

Any potential residual impact of surface water on the development will be mitigated by implementing a resilient surface water drainage network, including SuDS, as detailed in Section 5.

4.4 Groundwater Flooding

Groundwater flooding is characterised by below ground flooding where elevated groundwater within permeable deposits may cause flooding of below ground structures. However, there are no basement structures proposed in the scheme.

Above groundwater flooding is characterised when groundwater elevations exceed ground levels, and under this case, the flooding will be treated as surface water.

There is no evidence of groundwater flooding within Monaghan's Local Area Plan or OPW interactive map viewer.

Ground Investigation Specification issued by GDG and Geological Survey Ireland (GSI) data indicate that the site is underlain by Ballysteen Formation (Limestone), described as dark muddy limestone , shale.

GSI mapping also indicates a low permeability of underlain soils (Refer to Figure 4.4). However this will be confirmed once site investigation is completed.

As shown in figure 4.5 below the groundwater vulnerability at the proposed site is moderate to high. This specific map indicates the groundwater vulnerability to an area when the groundwater table may be high and does not reflect the risk of groundwater flooding of the area.

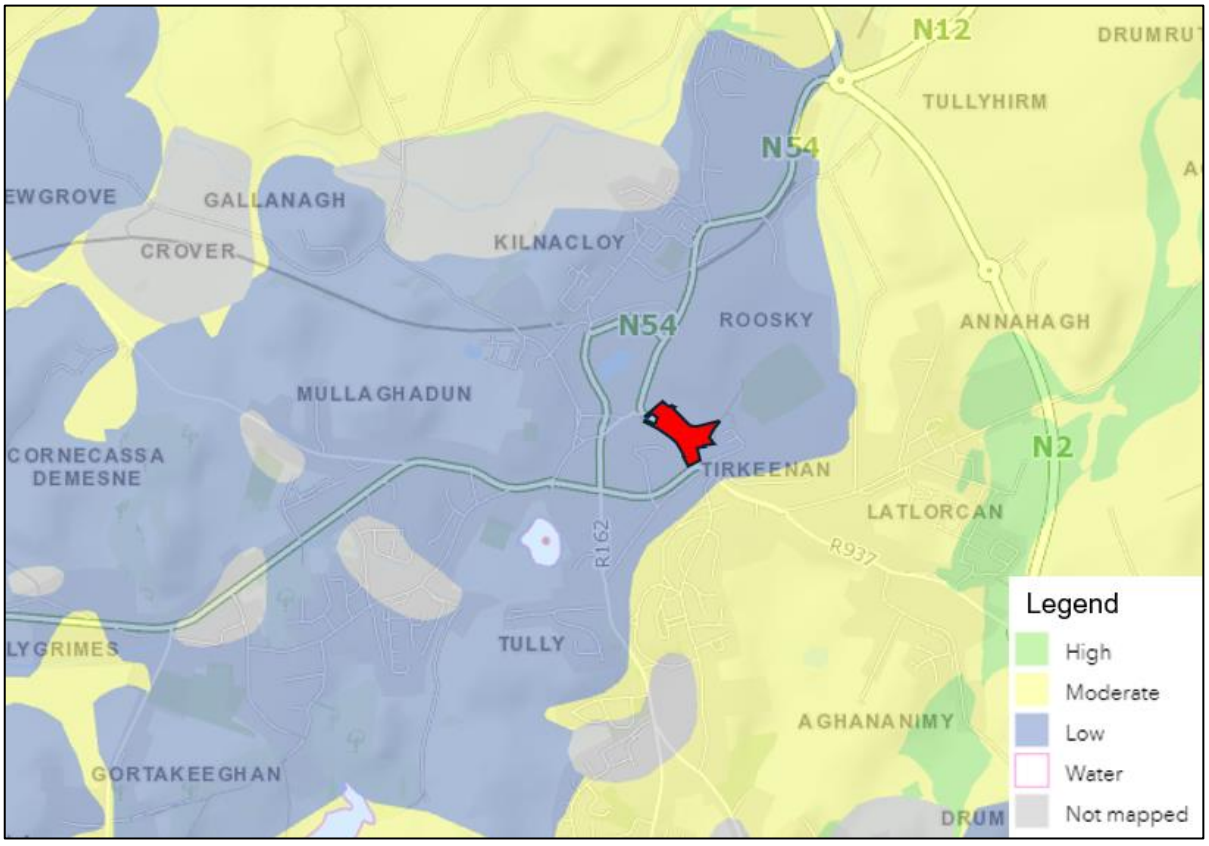


Figure 4.4: GSI Groundwater Subsoil Permeability Map

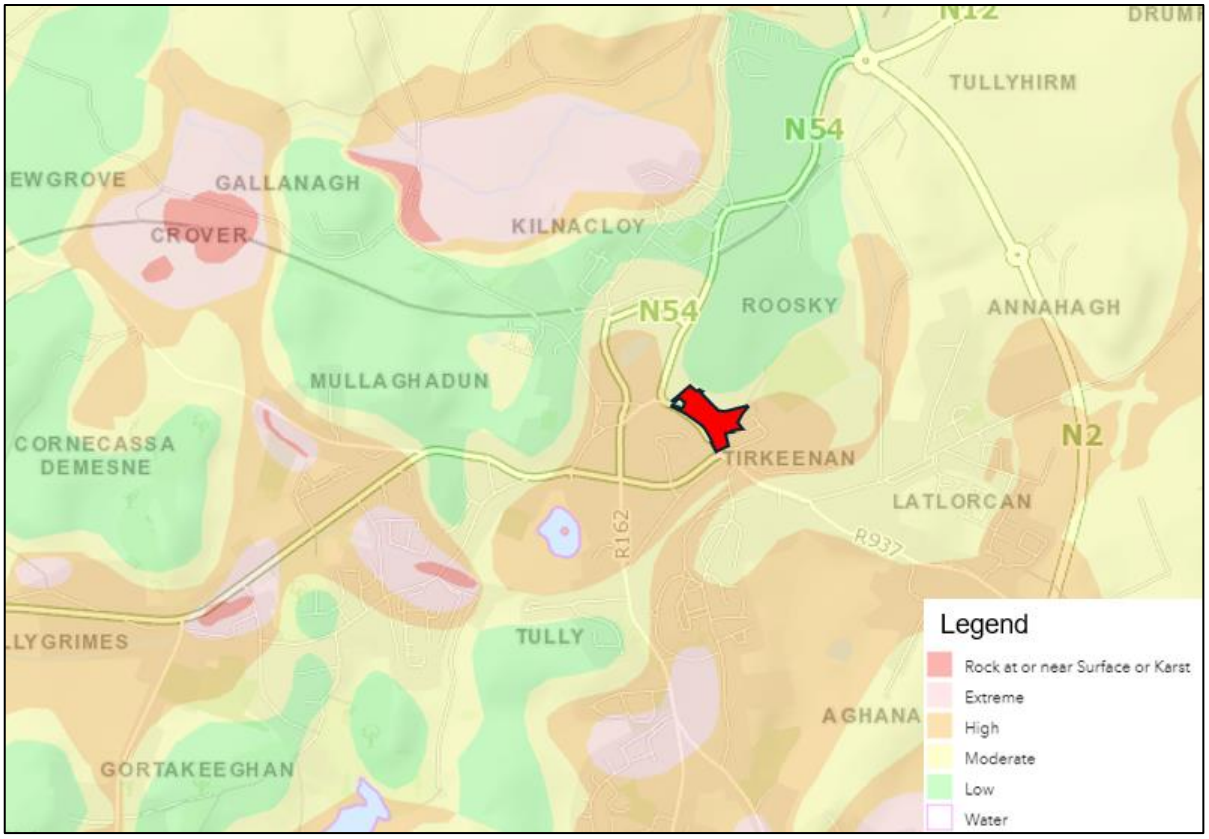


Figure 4.5: GSI Groundwater Vulnerability Map

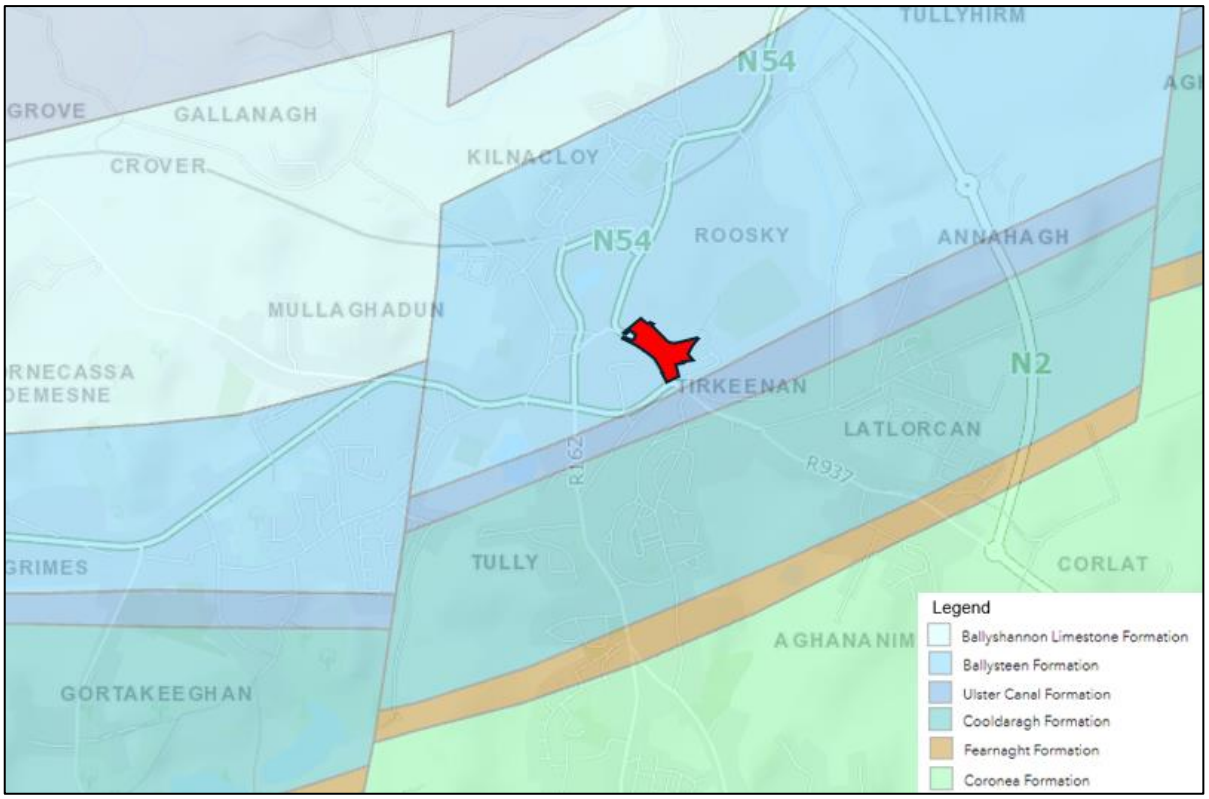


Figure 4.6: GSI Bedrock Geology Map

5 Mitigation Measures

The following mitigation measures have been considered in accordance with the policies of the Monaghan County Development Plan, as outlined in Section 3 of this document.

5.1 Residual Risk

The site has low risk of flooding from surface water and very low to negligible risk from all other sources.

5.2 Flood Protection Measures

5.2.1 Effect of Development and Design Levels

An assessment of the proposed and existing levels has been undertaken and the proposed levels have been designed as such so the water is directed away from the existing buildings, towards the roads and soft areas. The changes to existing ground levels are minimal and hence there will be no impact on flood risk elsewhere in line with SFRA and OPW Guidelines.

The development is also characterised as water compactible in terms of vulnerability classification and therefore there are no minimum FFLS/FGLs to be applied.

5.2.2 Surface Water

Surface water runoff from the proposed development has been assessed with consideration for the existing site characteristics, using flow route analysis to determine the natural behaviour of the site prior to development. The existing flow path analysis, illustrated in Figure 5.1 below, indicates that during exceedance events or in the event of system blockages, flow will be directed toward Dublin Street Road in the northern portion of the site, while parts of the southern portion will direct flow toward the soft areas to the east.

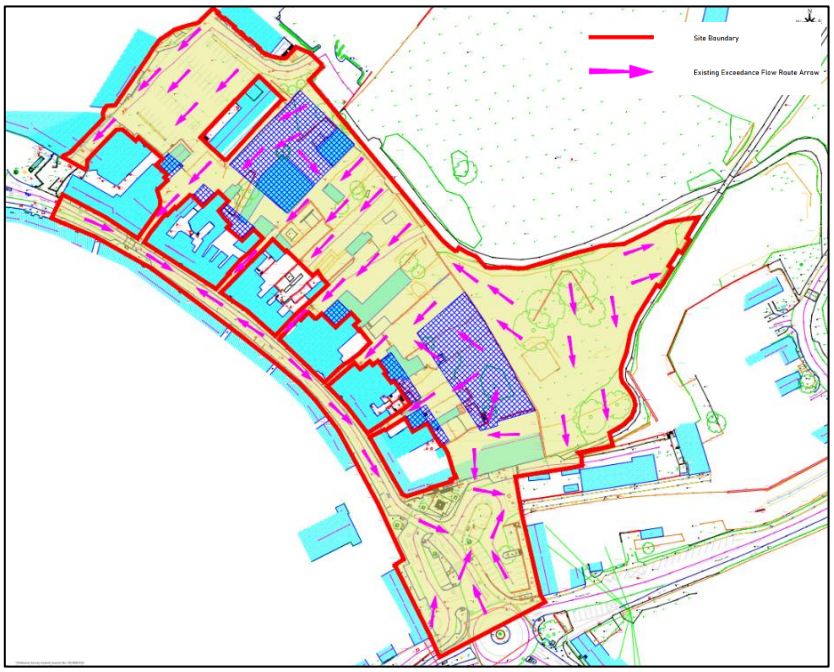


Figure 5.1: Existing Flow Route Analysis for proposed development site.

In line with Monaghan County Council requirements, the surface water drainage strategy has been developed to collect runoff from impermeable public realm areas via gullies, which will channel water to the proposed below-ground drainage network before connecting to the existing stormwater sewer that discharges into the watercourse south of the site. Therefore, the existing connection will be utilised, and the proposed development will not impact the current situation, as the impermeable area will not increase. Additionally, the inclusion of SuDS features will further enhance the management of surface water runoff.

SuDS features, including rain gardens, tree pits with overflow pipes directed to onsite drainage, and permeable paving cells in parking spaces, have been included to manage runoff from the proposed impermeable surfaces. Outfalls from SuDS features will be established at levels that allow them to function primarily as overflows, accommodating excess runoff not managed through infiltration.

A petrol interceptor is also proposed to treat surface water runoff before it discharges into the existing watercourse.

Detailed drawings of the proposed surface water drainage strategy can be found in Appendix C (Drawing Ref Nos. DSN-MCA-ZZ-XX-DR-CE-2001-2004).

6 Conclusion

This flood risk assessment demonstrates that the proposed development will not be at risk of flooding, based on data from all available sources.

The regeneration plan for the Dublin Street North development will improve the existing runoff volume by incorporating soft landscaping areas and implementing SuDS features such as rain gardens, tree pits, and permeable paving cells within parking spaces to enhance the management of surface water runoff from the proposed hard surfaces.

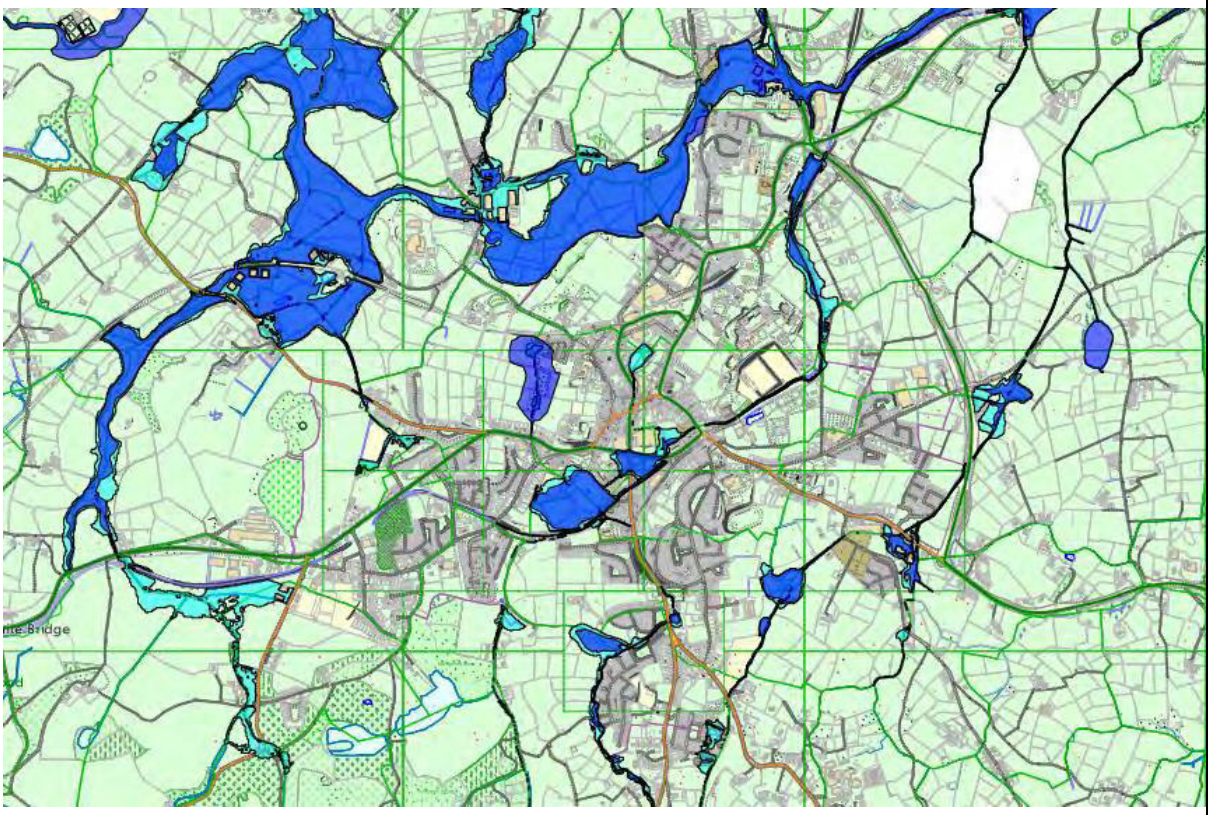
Finally, by adopting the recommended mitigation measures, the post-development site will be safe and will reduce any residual risk both on and off-site.

.

Appendices

Appendix A – Flood Zone Mapping

Map 15: Monaghan Town	
Zoning within Flood Zone A and/or B?	Yes
Area for Further Assessment under CFRAM programme?	North Western Neagh Bann UoM6



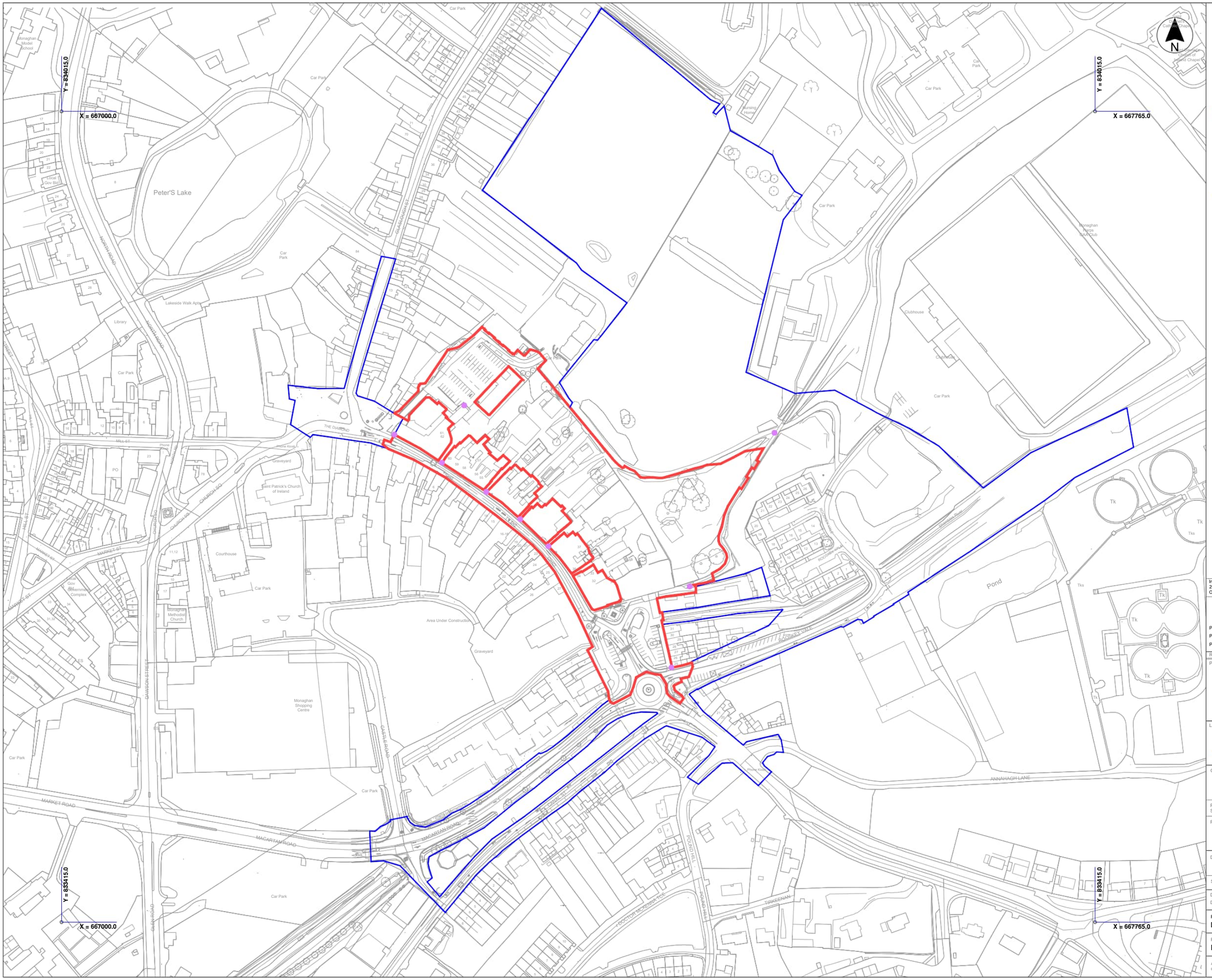
©Ordnance Survey Ireland, Licence No. 2010/03 CCMA/Monaghan County Council.

The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Note that Flood Zone mapping is only reproduced within the settlement development boundary.

Flood Zone A –1 in 100 year or 1% AEP.
Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone mapping data source	CFRAM Flood Risk Review (PRFA)
Historical Flooding	Recurring flood events due to fluvial flooding. Flooding events were recorded to have occurred in Oct. 2011, July 2011, Nov. 2009, Dec 2009, Aug. 2008, Feb, 1990
Comment	Monaghan Town is one of four AFAs in County Monaghan. To consider and apply the recommendations as set out in the FRMP for Monaghan.
Conclusion	Implement Flood Risk Management policies of CDP.

Appendix B – Proposed Site Layout



NOTES

1. All measurements shown are in metres, and all levels are to ordnance datum unless otherwise indicated
2. All Coordinates are to Irish Transverse Mercator (ITM), unless otherwise noted.

LEGEND

Site Boundary
Centered on coordinates;
Irish Grid (ITM)
X=667386
Y=833713
OS Grid Reference = H 64721 33697
Area = 25,087m² = 2.51Ha

Site Notice Location

Adjacent Lands owned by the Applicant

Rev	Date	Description	App
P03	10.02.25	Red line amended to cover facades	DSA
P02	05.02.25	Added Adjacent lands owned by client	IA
P01	04.02.25	First Issue for planning	DSA

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Client
Comhairle Contae Mhuineacháin
Monaghan County Council

Project Status: STAGE 3 - PLANNING

Project: NORTH DUBLIN STREET & BACK-LANDS REGENERATION PROJECT

Drawing: SITE LOCATION PLAN

Scale: 1:1250 @ A1

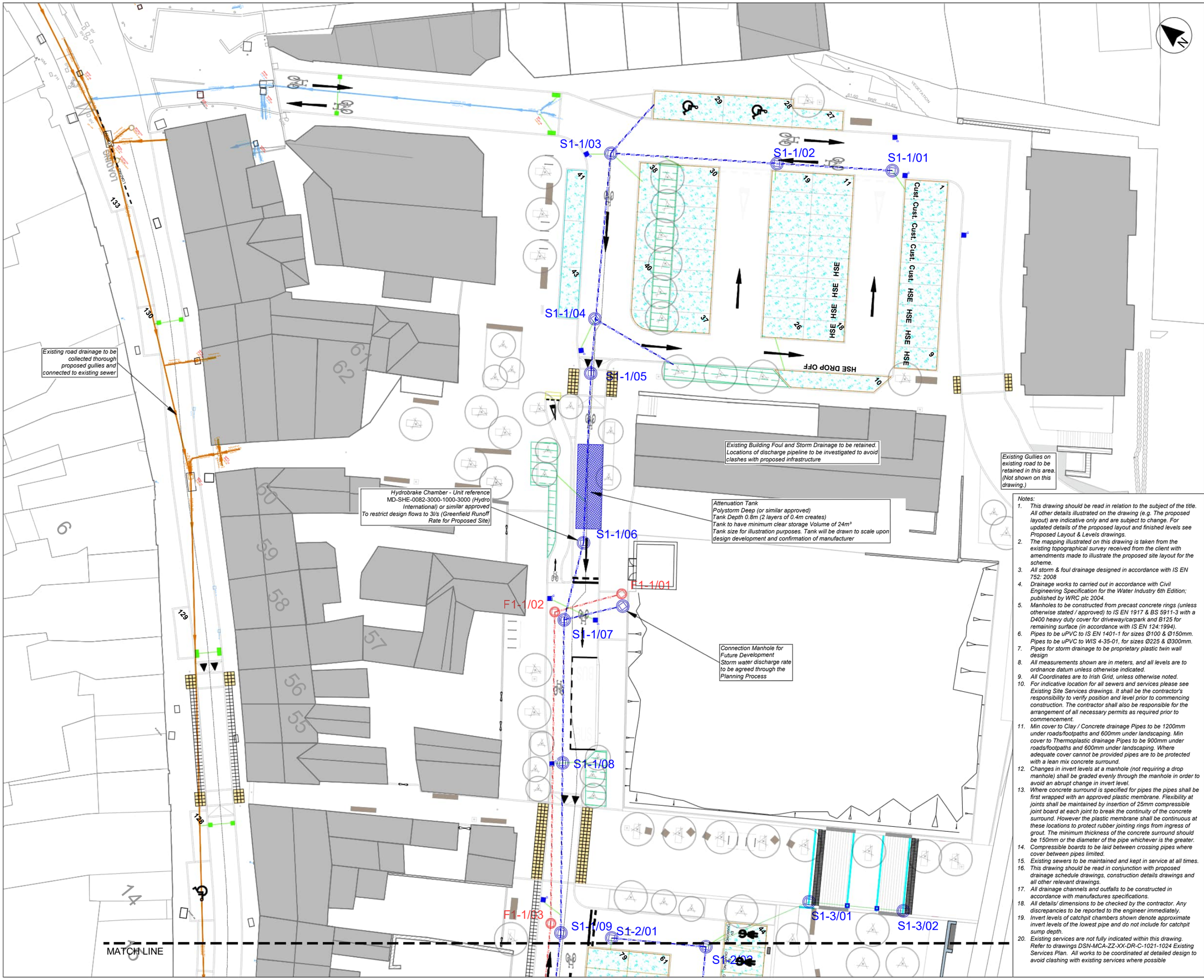
Drawn	Checked	Approved
DSA	KOS	KOS
Date 04.02.25	Date 04.02.25	Date 04.02.25

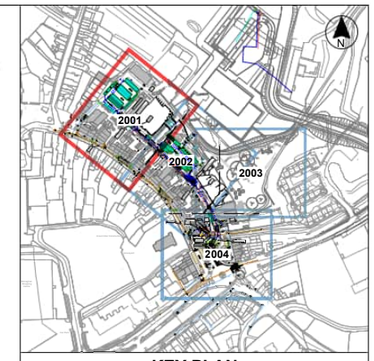
Project	Organisation	Zone	Level	Type	Role	Number	Revision
DSN	MCA	ZZ	XX	DR	CE	1005	P03

Project Number: E2442

Status code & Description: S2 For Information

Appendix C – Drainage Drawings





KEY PLAN
SCALE 1:4000

LEGEND

- PROPOSED STORM SEWER
- PROPOSED FOUL SEWER
- PROPOSED TRAPPED GULLY LOCATIONS ARE INDICATIVE ONLY AND WILL BE SUBJECT TO FURTHER DEVELOPMENT AT DETAILED DESIGN STAGE
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- Fxxx PROPOSED FOUL MANHOLE
- Sxxx PROPOSED STORM MANHOLE
- ATTENUATION TANK / PETROL INTERCEPTOR (REFER TO NOTES)
- PERMEABLE PAVEMENT
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- EXISTING STORM DRAINAGE
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- EXISTING STORM SEWER TO BE REMOVED

Notes:
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Rev	Date	Description	App
P02	10.02.25	Updated for planning issue	DSA
P01	07.02.25	First Issue for planning	PMcM

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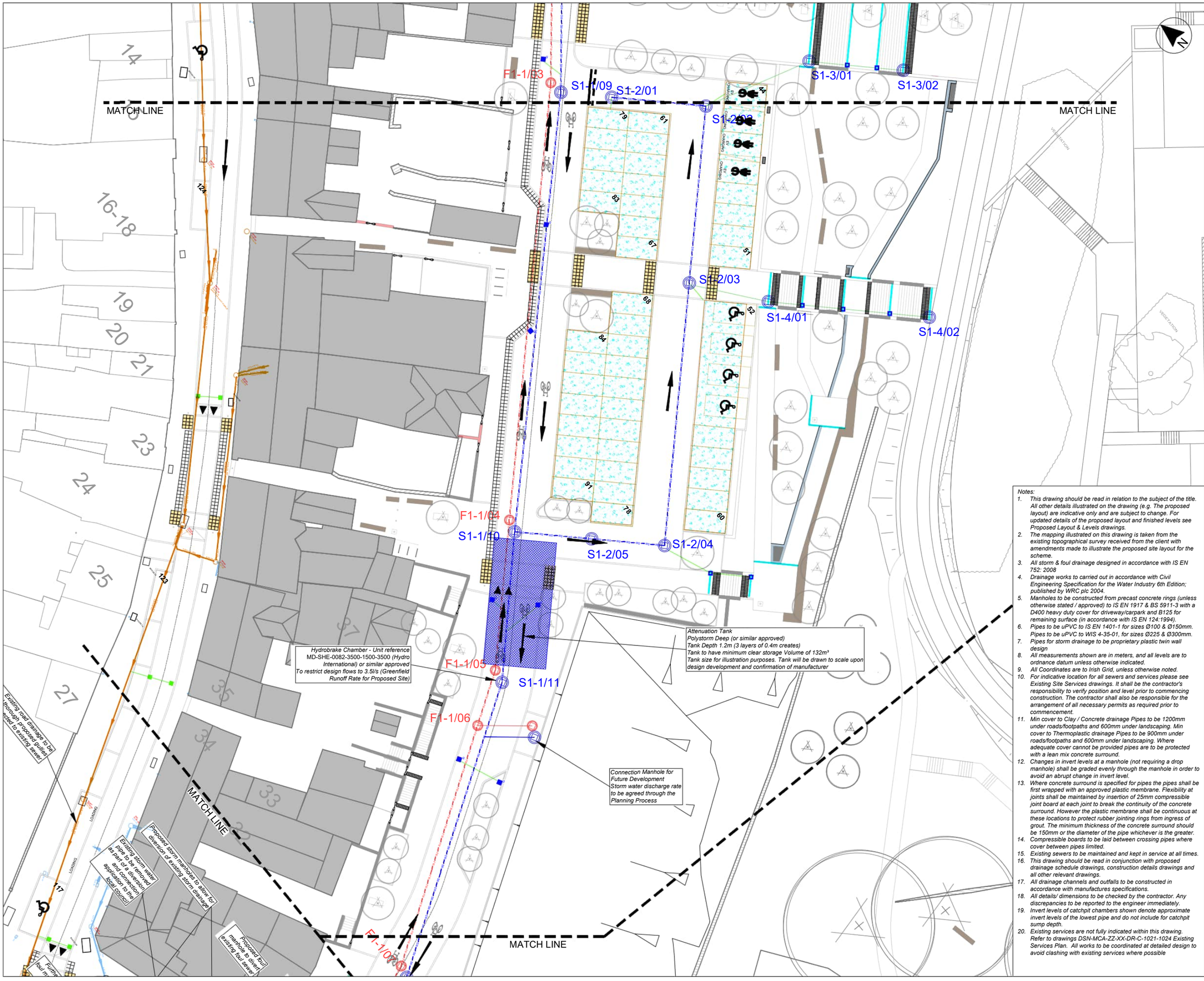
Client: Comhairle Contae Mhuineacháin, Monaghan County Council

Project Status	STAGE 3 - PLANNING
Project	DUBLIN ROAD NORTH
Drawing	PROPOSED DRAINAGE PLANS SHEET 1
Scale	1:200 @ A1

Drawn	Checked	Approved
PMcM	PA	KOS
Date 07.02.25	Date 07.02.25	Date 07.02.25

Project	Organisation	Zone	Level	Type	Role	Number	Revision
DSN	MCA	ZZ	XX	DR	CE	2001	P01

Project Number: E2442
Status code & Description: S2 For Information



KEY PLAN

SCALE 1:4000

LEGEND

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- PROPOSED FOUL SEWER
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Rev	Date	Description	App
P02	10.02.25	Updated for planning issue	DSA
P01	07.02.25	First Issue for planning	PMcM

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Client: Comhairle Contae Mhuineacháin, Monaghan County Council

Project Status: STAGE 3 - PLANNING

Project: DUBLIN ROAD NORTH

Drawing: PROPOSED DRAINAGE PLANS SHEET 2

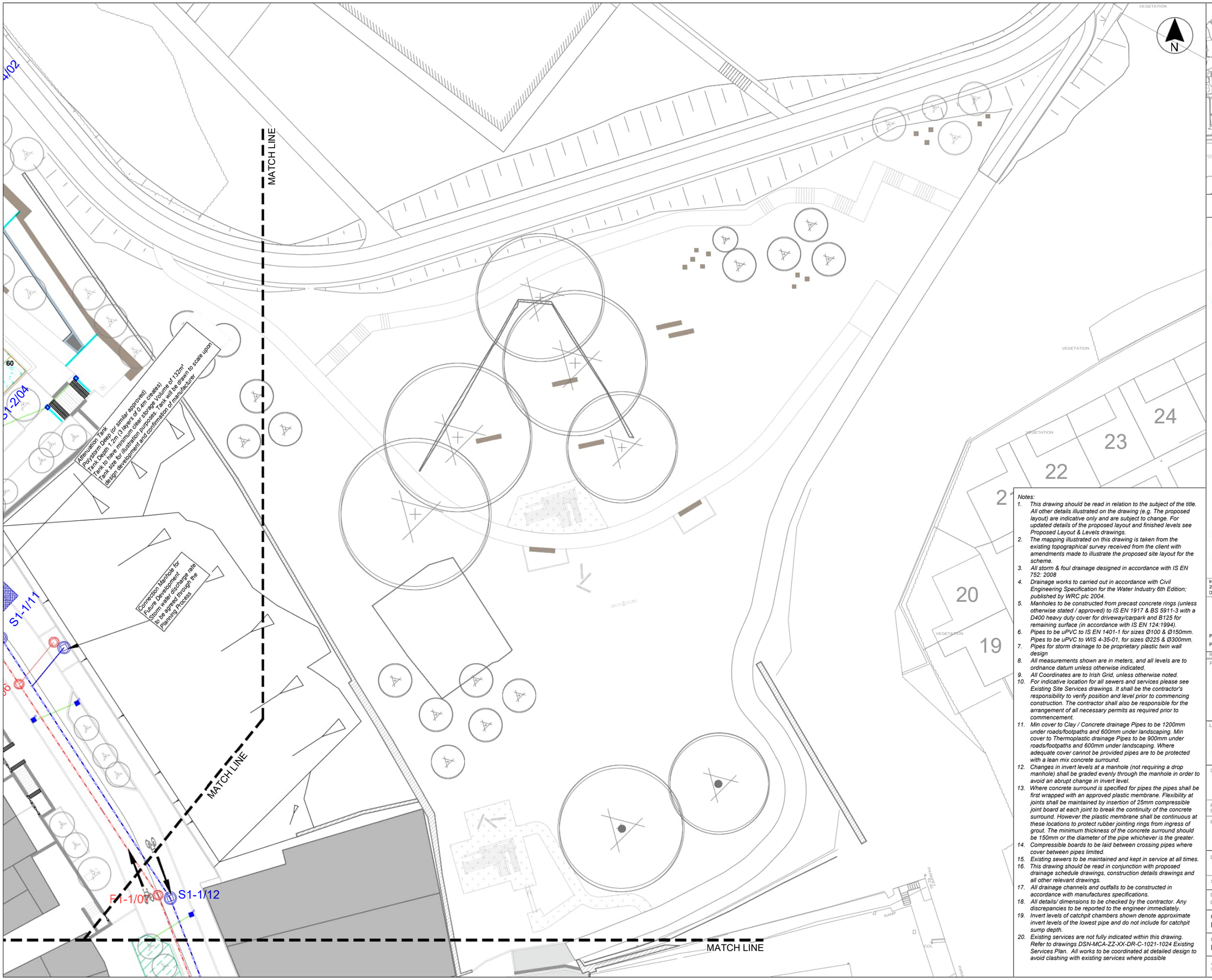
Scale: 1:500 @ A1

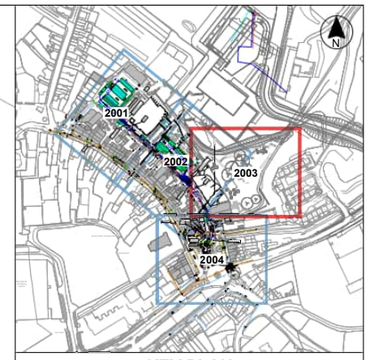
Drawn	Checked	Approved
PMcM	PA	KOS
Date 07.02.25	Date 07.02.25	Date 07.02.25

Project - Organisation - Zone - Level - Type - Role - Number - Revision
DSN - MCA - ZZ - XX - DR - CE - 2002 - P01

Project Number: E2442

Status code & Description: S2 For Information





KEY PLAN
SCALE 1:4000

LEGEND

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Rev	Date	Description	App
P02	10.02.25	Updated for planning issue	DSA
P01	07.02.25	First Issue for planning	PMcM

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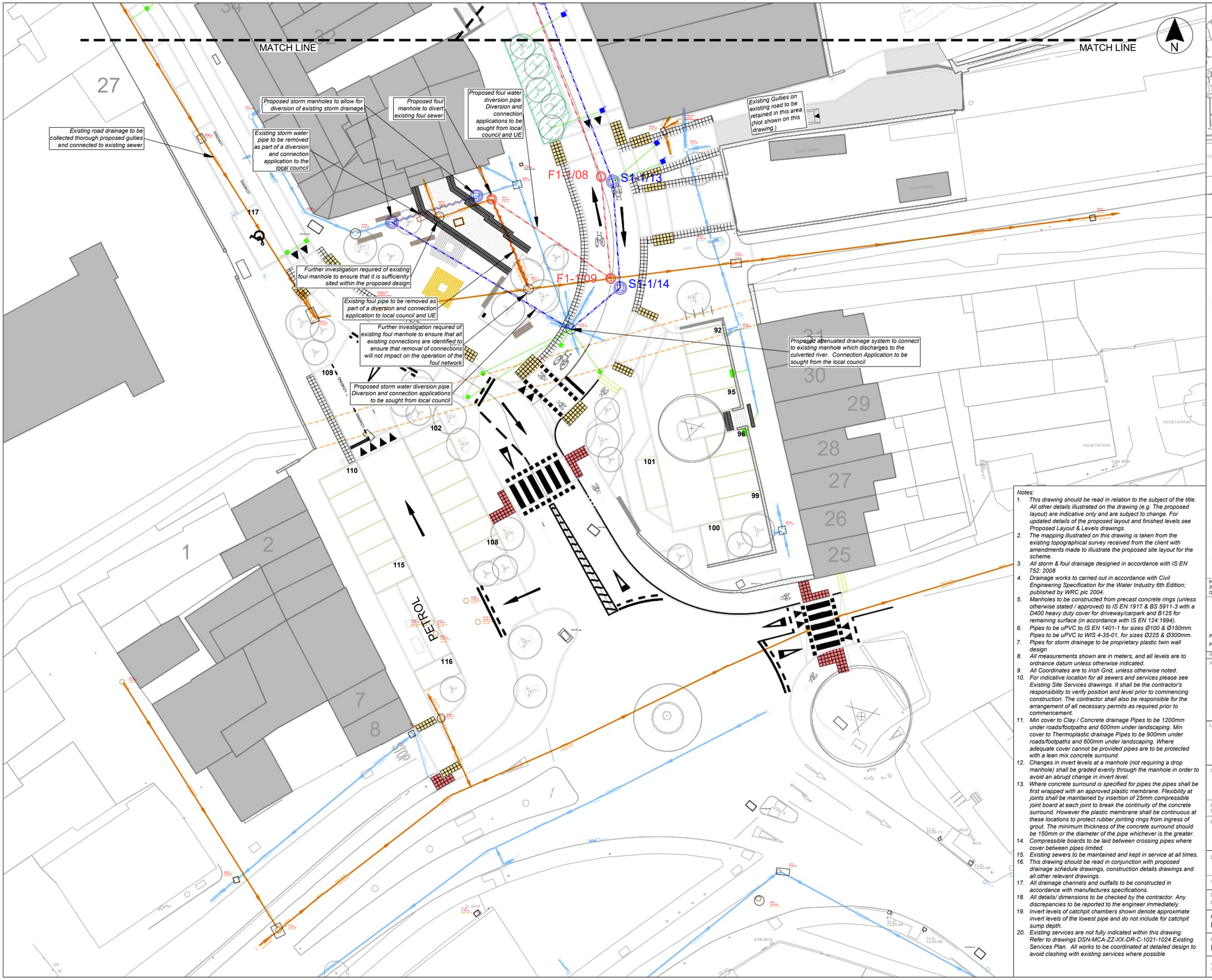
Client
Comhairle Contae Mhuineacháin
Monaghan County Council

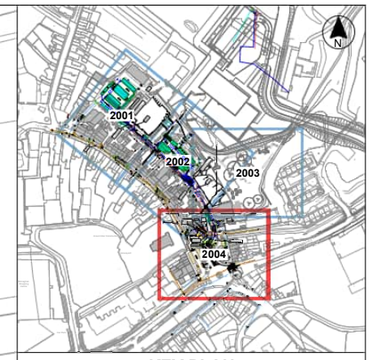
Project Status	STAGE 3 - PLANNING
Project	DUBLIN ROAD NORTH
Drawing	PROPOSED DRAINAGE PLANS SHEET 3
Scale	1:500 @ A1

Drawn	PMcM	Checked	PA	Approved	KOS
Date	07.02.25	Date	07.02.25	Date	07.02.25

Project	Organisation	Zone	Level	Type	Role	Number	Revision
DSN	MCA	ZZ	XX	DR	CE	2003	P01

Project Number	E2442
Status code & Description	S2 For Information





KEY PLAN
SCALE 1:4000

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Rev	Date	Description	App
P02	10.02.25	Updated for planning issue	DSA
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Client: Comhairle Contae Mhuineacháin Monaghan County Council

Project Status: STAGE 3 - PLANNING

Project: DUBLIN ROAD NORTH

Drawing: PROPOSED DRAINAGE PLANS SHEET 4

Scale: 1:500 @ A1

Drawn	PMcM	Checked	PA	Approved	KOS
Date	07.02.25	Date	07.02.25	Date	07.02.25

Project - Organisation - Zone - Level - Type - Role - Number - Revision
DSN - MCA - ZZ - XX - DR - CE - 2004 - P02

Project Number: E2442

Status code & Description: S2 For Information

McAdam
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McAdam
ENHANCING LOCAL COMMUNITIES

Client : Monaghan County Council

Project : E2442 – Dublin Street North

Drainage Assessment

PREPARED BY	CHECKED BY	APPROVED BY	ISSUE	DATE
P McMath	P Alcorn	P Alcorn	1	12/11/2024
K O'Sullivan	P Alcorn	P Alcorn	2	07/02/2025
D. Anderson	P Alcorn	P Alcorn	3	24/02/2025

Contents

1 Introduction

1.1 Report Brief and Scope

This report is in relation to the proposed regeneration of land at Dublin Street Backlands, including Dublin St, Backlands to the north of Dublin Street, The Diamond Centre car park and Old Cross Square, Monaghan.

This Drainage Strategy has been completed in relation to the current proposed works as illustrated within the planning application.

The development will further consist of:

- Creation of new shared surface, 'Russell Row' to the rear of properties fronting Dublin Street
- New Car park / event space at Russell Row
- Public realm improvements along Dublin Street to include resurfacing, new pedestrian pavements (including widening),.
- Public realm improvements to include the creation of urban civic spaces, pedestrian pavements, steps, cycle routes, street furniture
- Creation of new public 'Community Garden' area.
- Creation of future development plots
- Reinforcement of existing vegetation and new soft landscaping throughout.

The drainage strategy and drainage design proposals have been developed to facilitate the full extent of the proposed scheme design.

This drainage strategy report will review the proposed development with regards to drainage infrastructure requirements with the following considerations.

- Site Topography
- Storm Drainage design
- Foul Drainage Design
- Potential Future development

2 Site Location, Description and Proposed Development

2.1 Site Location and Context

Monaghan Town is strategically located at the intersection of the N2 Dublin- Derry/ Letterkenny and N54 Belfast- Galway National Routes, linking Dublin to the North-West and Belfast to the Midlands. The town also acts as a key east-west corridor which links Dundalk and Newry to Sligo. Monaghan resides in the Northwestern Regional Assembly Sub Region and has been identified as a Key Town in the Regional and Economic Strategy for this area. Monaghan Town plays a primary role in supporting the economic needs of its large rural hinterland in regard to performing employment, retailing and administrative functions.

The proposed development will assist the regeneration of Dublin Street and back lands to the north, the Diamond Centre Car Park and Old Cross Square

A Site Location and Boundary Map is presented in Figure 1 below.

Figure 1 – Site Location and Boundary

2.2 Existing Site Description

The site is bounded by Dublin Street to the West and N54 Broad Road to the south. The greenfield area to the east of the site is proposed to be developed by Monaghan County Council as their proposed Civic Offices development. The site generally falls from East to West from approximately 66.0m AOD on the edge of the agricultural fields to approximately 58m AOD on Dublin Street.

The Existing Topographical Survey has been presented as Appendix A.

2.3 Proposed Site Development Plans

The development proposals assessed in this Drainage Assessment include the following:

- Construction of a new street at the rear of the existing buildings on Dublin Street.
- Construction of a new car park.
- Access improvements to existing car park.

Public Realm improvements along Dublin St show realignment of kerblines and associated relocation of road gullies. There are no other changes to the drainage network on Dublin St.

A Proposed Site Layout Plan has been presented as Appendix B.

2.4 Potential Future development Plans

In addition to this proposed development Monaghan County Council intent to use this project to rejuvenate developments in the area. These developments may include residential and light industrial units. It if further noted all proposals for these potential developments will be subject to their own separate planning applications.

3 Proposed Storm Water Drainage Strategy

3.1 Introduction

In order to assess the drainage requirements a review of pre-development and post development runoff is required.

3.2 Pre-Development Runoff

The existing site is a mixture between brownfield and greenfield nature, comprising the rear gardens, and derelict spaces to the rear of the properties along Dublin St. It is the intention to maintain brownfield runoff rates / infrastructure where possible. Where within Greenfield areas, the discharge figure for the development has been limited to the 'greenfield' run-off rate of 2l/s/ha (litres/second/hectare) as the Greater Dublin Regional Code of Practice for Drainage Works Version 6.0.

Adjoining the site, there are two development plot area for potential future development. Provision has been allowed for in this scheme for the storm water from these plots to connect to the proposed drainage network. They have been designed at the equivalent greenfield runoff rate for the specific area. It will be the future developers' design criteria to maintain these flows withing specific drainage designs & associated planning applications.

The current area, which is part of this development, to the North of Old Cross is currently draining unattenuated into the existing discharge manhole. Based on a 50mm rainfall event, on an area of 346m², the discharge flow is 4.57l/s. As this is not a change from existing, this discharge flow has been included in the overall flow control for the proposed area.

3.3 Post-Development Runoff

The proposed site development consists of a combination of hardstanding (vehicular pavements, car park, footpaths, access and soft landscaping areas and subsequently will result in an increase of impermeable surfacing.

Table 6-3 of the Urban Storm Drainage Critical Manual (Volume 1 January 2016) presents the percentage imperviousness from different land uses or surface characteristics for the purpose of calculating runoff rates. For the Hardstanding areas the runoff coefficient is 100% for paved areas. For the Landscape areas the closest category within the table would be Parks / Cemeteries which illustrate the runoff coefficient as 10%.

In order to provide a robust design solution, the drainage calculations detailed within this report have been based on all landscaped areas as 20% runoff coefficient.

The storm sewer network has been modelled and the unrestricted discharge figures for the 1 in 1, 1 in 30 and 1 in 100 year Return Periods including 10% allowance for climate change are summarised in Table 1 below. A copy of the unrestricted discharge drainage calculations is provided in Appendix C for the site.

Return Period	Redevelopment Discharge Q (l/s) (Unrestricted)
1 in 1 +10%	79.3
1 in 30 +10%	195.3
1 in 100 +10%	250.6

Table 1: Post development discharge - Unrestricted

3.4 Comparison of Pre and Post Development Storm Water Discharges

With the addition of impermeable surfaces the post development discharge exceeds the pre development discharge for all returns, a restricted discharge to the equivalent 'Greenfield' runoff rate with storm water attenuation will be required.

Along Dublin Street and the nearby side streets, the gullies are to be rationalised and replaced in this area, to discharge as existing, so there will be no change in flow in this area, hence it is not considered in the calculations.

3.5 Proposed Site Storm Drainage and discharge

It is proposed to maintain the existing pre-development 'Greenfield' run-off rate of 2l/s/ha as outlined in Greater Dublin Regional Code of Practice for Drainage Works Version 6.0 and ensure the overall volumes are not exceeded over the lifespan of the development. As noted previously, when the proposed area greenfield runoff is added to the 2 proposed future development areas and the existing unrestricted flow, the total proposed discharge flow is 6.5l/s

In order to achieve the restricted 'Greenfield' run-off rate: permeable pavements, rain gardens, attenuation tanks and discharge flow controls limiting the storm water discharge from the development are included within the drainage design. The attenuation tanks are situated at each car park with flow controls , with the final discharge location at the Dublin Street roundabout.

A proposed storm network has been developed with consideration of the site proposals noted above. The proposed storm sewers will collect the storm water via the SuDS proposals as listed above, as well as road gullies and land drains and convey the flows through a dedicated gravity storm sewer following the falls of the proposed road network (where achievable) discharging the collected flows to the watercourse to the Southeast of the site. The proposed drainage layout is provided in Appendix D.

The storm sewer network has been modelled and the restricted discharge figures for the 1 in 1, 1 in 30 and 1 in 100 year Return Periods including 10% allowance for climate change are summarised in Table 3 below.

The modelling has resulted in several cascading SuDS proposals, with associated flow control restricting the discharge to 6.5l/s. A copy of the post development calculation inclusive of restricted flow / attenuation is provided in Appendix E.

Return Period	Redevelopment Discharge Q (l/s) (Restricted)
1 in 1 +10%	5.5
1 in 30 +10%	5.7
1 in 100 +10%	6.5

Table 3: Post development discharge – Restricted

3.6 Surface Water (Pluvial) Flood Risk

The proposed scheme design layout & levels along with the storm drainage design inclusive of new storm sewer networks, restricted runoff rates and attenuation have been designed within the below criteria.

- The drainage can be surcharged with no flooding with a freeboard of 300mm and a 10% Climate Change for 1 in 1 year; 1 in 30 year, and a 1 in 100 year storm event.

Based on the design strategy & proposed drainage infrastructure proposed flood risk will not be increased within or beyond the site boundary as a result of the proposed development.

4 Proposed Foul Water Drainage Strategy

There is no foul run-off generated directly by the works envisaged by the scheme design as set out in the Application for Development.

The scheme design does create two Development Plots which will be developed in the future as a mix of commercial / residential properties. In order to cater for the future foul flow generated by the Development Plots, a foul drainage sewer has been provided along Russell Row, with spur connections to the Development Plots.

The proposed foul drainage includes connections at each potential future development site which will convey flows through the proposed gravity pipework system. All foul drainage proposals will be designed strictly in accordance with Uisce Éireann standards, and all required UE approvals will be in place prior to construction.

A copy of the proposed drainage layout can be found in Appendix D.

5 Conclusion

This Drainage Assessment (DA) has been completed with a review of the existing & proposed development site to illustrate the infrastructure proposed.

The site is located adjacent to the National Primary Road (N14) and is within the defined settlement framework boundary of Lifford.

The site is of 'Brownfield' nature, irregular in shape and consists of backlands areas to residential and commercial properties on Dublin St. The development area is located to the northeast of the town centre, extending from The Diamond to the northwest, south-eastwards along Dublin Street, and is defined to the southeast by Old Cross Square. Access from Dublin is facilitated via the M1 and N2, approximately 130km northbound and access from Belfast is via M1 and N2, approximately 91km to the southwest. The levels on the site vary between 68m Above Ordnance Datum (AOD) (in the east) and 59mAOD (in the south). The base level of the region and the site are the Ulster Canal and the River Shambles, which on the site are at levels of around 59mAOD. A desktop FRA has been completed by McAdam Design & issued along with this planning application.

Calculations are presented that show the proposed storm drainage network for the development will not exceed current 'Brownfield' run-off rates to the discharging sewer with the inclusion of appropriately sized storm water attenuation and associated flow control.

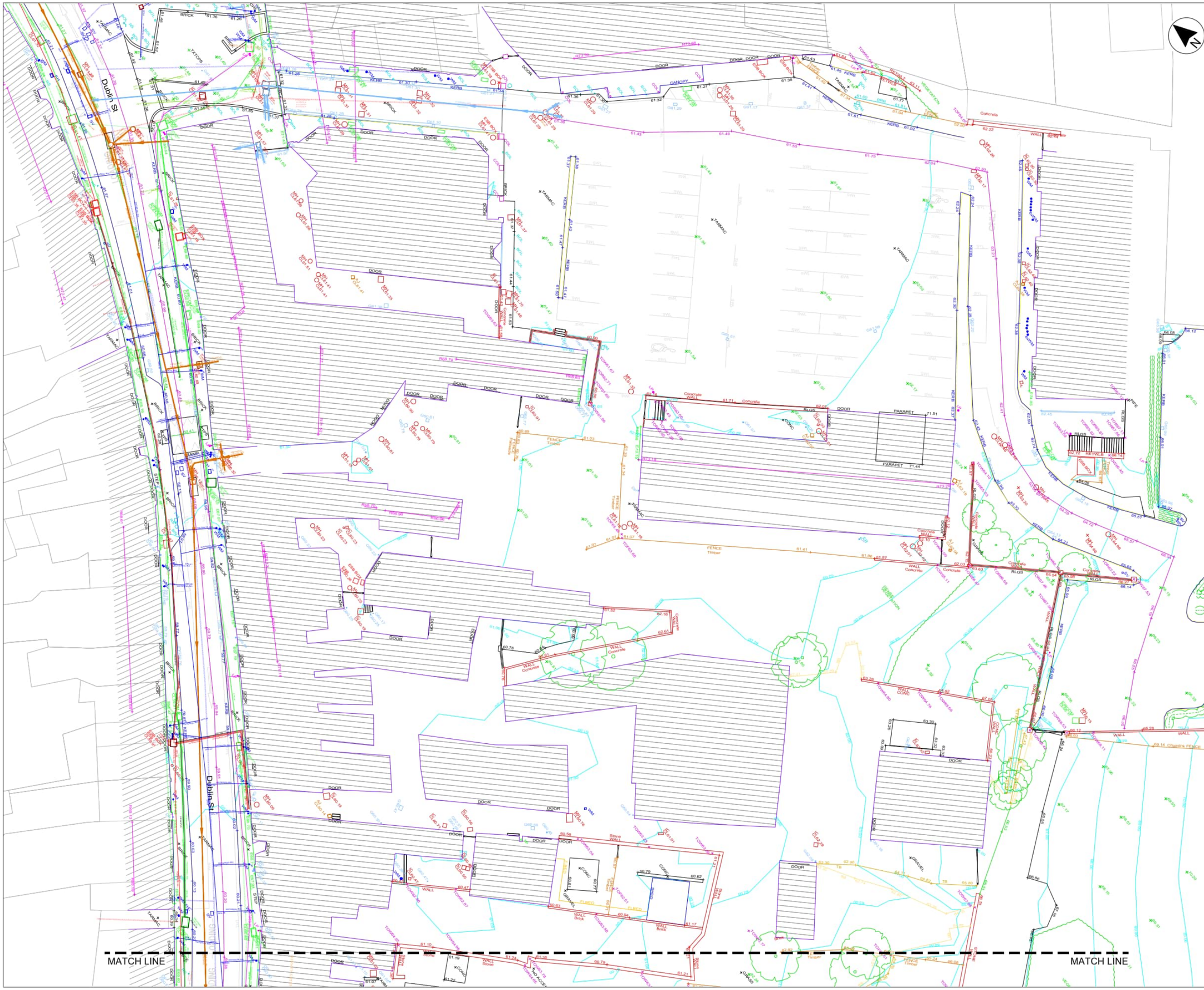
With consideration of the drainage strategy and the surface water mitigation measures for the scheme illustrated above, flood risk from pluvial flooding will be managed at the development and will not increase the runoff elsewhere. Proposed levels have been developed to ensure that no properties will be subject to flooding in the event that a local drainage system failure should occur.

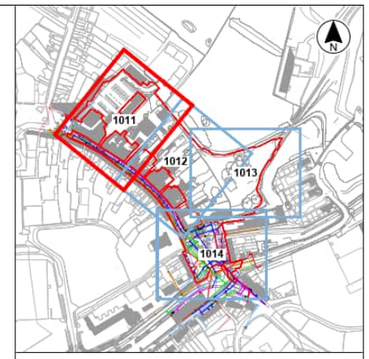
In addition, foul sewerage is proposed to discharge to Irish Water infrastructure if potential future developments occupy the site. These will be further illustrated in separate dedicated planning applications as necessary.

A copy of the Proposed Drainage Layout is provided in Appendix D.

Appendices

Appendix A – Existing Site Topographical Survey





KEY PLAN
SCALE 1:4000

LEGEND:

SITE BOUNDARY

LINEWORK:

EMBANKEMENT TOP	101.50
BREAKLINE	101.50
BUILDING	101.50
KERB BOTTOM	101.50
WALL	101.50
PATH/CHANGE SURFACE	101.50

LEVELS :

BED LEVEL	+ BED101.50
EAVE LEVEL	+ E101.50
FLOOR LEVEL	+ FL101.50
INVERT LEVEL	+ IL101.50
ROAD LEVEL	+ 101.50
RIDGE LEVEL	+ R101.50
SOFFIT LEVEL	+ SL101.50
SPOT LEVEL	+ 101.50
TOP OF FENCE LEVEL	+ TOF101.50
TOP OF WALL LEVEL	+ TOW101.50
WATER LEVEL	+ WL101.50

STREET FURNITURE :

BOLLARDS	BD *
BORE HOLE	BH +
BUS STOP	BS *
CRASH BARRIER	CB
ELECTRICITY POLE	EP *
EARTHING ROD	ER +
GATE	
MARKER POST	MKR +
POST	POST *
POST BOX	POST BOX +
ROADSIGN	RS * RS +
SIGN POST	SIGN +
TELEPHONE BOX	TB
TELEPHONE POLE	TP *

SERVICES :

AIR VALVE	AV +
CABLE TV IC	CATV
COVER LEVEL	CL
EIRCOM COVER	EIRCOM
EIRCOM JUNCTION BOX	EIRCOM BOX
ELECTRICAL CABLE PIT	ECP °
ESAT COVER	ESAT
ESB COVER	ESB
ESB JUNCTION BOX	ESB BOX
FIRE HYDRANT	FH +
GAS VALVE	GV
INSPECTION COVER	IC
MANHOLE	MH
SLUICE VALVE	SV *
STOPCOCK	ST *
SERVICE BOX (UNKNOWN)	BOX
TRAFFIC COVER	TLIC

WATER:

WATER MAIN (RECORDS)
WATER MAIN (GPR)
SLUICE VALVE
VALVE
FIRE HYDRANT
WATER METER

ELECTRIC:

ELECTRIC DUCT (RECORDS)
ELECTRIC DUCT (GPR)
ELECTRIC OVERHEAD
STREET LIGHTING DUCT
LAMP POST
TRAFFIC LIGHTS DUCT
TRAFFIC LIGHTS DUCT BOX
TRAFFIC LIGHT MINI PILLAR
TRAFFIC LIGHT POLE
ESB MINI PILLAR
ESB DRAW PIT

TELECOMS:

TELECOMS (RECORDS)
TELECOMS (GPR)
TELECOM OVERHEAD
TELECOMS MINI PILLAR
EIRCOM DUCT BOX
WATER MAIN (GPR)

UNKNOWN:

ANOMALY

DRAINAGE:

STORM SEWER
FOUL/COMBINED SEWER
STORM GULLY
DOWN PIPE

Rev	Date	Description	App
P01	04.02.25	First Issue for planning	DSA

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Client: Comhairle Contae Mhuineacháin Monaghan County Council

Project Status: STAGE 3 - PLANNING

Project: NORTH DUBLIN STREET & BACK-LANDS REGENERATION PROJECT

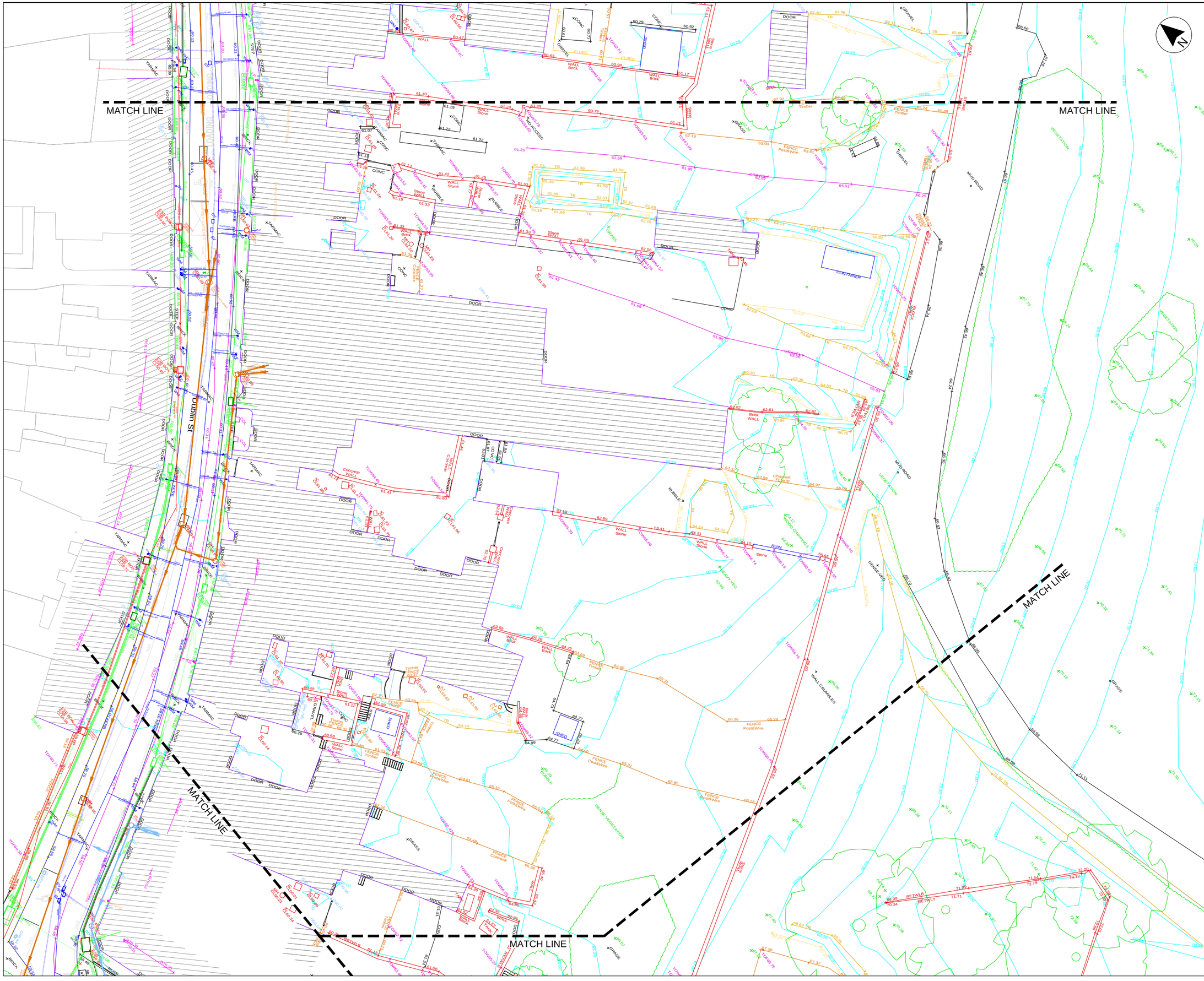
Drawing: EXISTING SITE LAYOUT SHEET 1

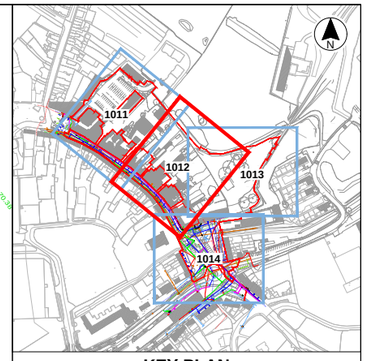
Scale: 1:200 @ A1

Drawn	DSA	Checked	KOS	Approved	KOS
Date	04.02.25	Date	04.02.25	Date	04.02.25

Project	- Organisation -	Zone -	Level -	Type -	Role -	Number	- Revision
DSN	- MCA	- ZZ -	XX -	DR -	CE -	1011	- P01

Project Number	Status code & Description	
E2442	S2	For Information





KEY PLAN
SCALE 1:4000

LEGEND:

SITE BOUNDARY

LINEWORK:

EMBANKEMENT TOP 101.50
BREAKLINE 101.50
BUILDING 101.50
KERB BOTTOM 101.50
WALL 101.50
PATH/CHANGE SURFACE 101.50

LEVELS :

BED LEVEL + BED101.50
EAVE LEVEL + E101.50
FLOOR LEVEL + FL101.50
INVERT LEVEL + IL101.50
ROAD LEVEL + 101.50
RIDGE LEVEL + R101.50
SOFFIT LEVEL + SL101.50
SPOT LEVEL + 101.50
TOP OF FENCE LEVEL + TOF101.50
TOP OF WALL LEVEL + TOW101.50
WATER LEVEL + WL101.50

STREET FURNITURE :

BOLLARDS BD *
BORE HOLE BH +
BUS STOP BS *
CRASH BARRIER CB
ELECTRICITY POLE EP *
EARTHING ROD ER +
GATE
MARKER POST MKR +
POST POST *
POST BOX POST BOX +
ROADSIGN RS * RS
SIGN POST SIGN
TELEPHONE BOX TB
TELEPHONE POLE TP *

SERVICES :

AIR VALVE AV +
CABLE TV IC CATV
COVER LEVEL CL
EIRCOM COVER EIRCOM
EIRCOM JUNCTION BOX EIRCOM BOX
ELECTRICAL CABLE PIT ECP
ESAT COVER ESAT
ESB COVER ESB
ESB JUNCTION BOX ESB BOX
FIRE HYDRANT FH *
GAS VALVE GV
INSPECTION COVER IC
MANHOLE MH
SLUICE VALVE SV *
STOPCOCK ST *
SERVICE BOX (UNKNOWN) BOX
TRAFFIC COVER TLIC

WATER:

WATER MAIN (RECORDS)
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ELECTRIC:

ELECTRIC DUCT (RECORDS)
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STREET LIGHTING DUCT
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Monaghan County Council

Project Status	STAGE 3 - PLANNING
Project	NORTH DUBLIN STREET & BACK-LANDS REGENERATION PROJECT
Drawing	EXISTING SITE LAYOUT SHEET 2
Scale	1:200 @ A1

Drawn	DSA	Checked	KOS	Approved	KOS
Date	04.02.25	Date	04.02.25	Date	04.02.25

Project	Organisation	Zone	Level	Type	Role	Number	Revision
DSN	MCA	ZZ	XX	DR	CE	1012	P01

Project Number	Status code & Description	
E2442	S2	For Information

All dimensions are in metres. Figured dimensions to be taken in preference to scaled
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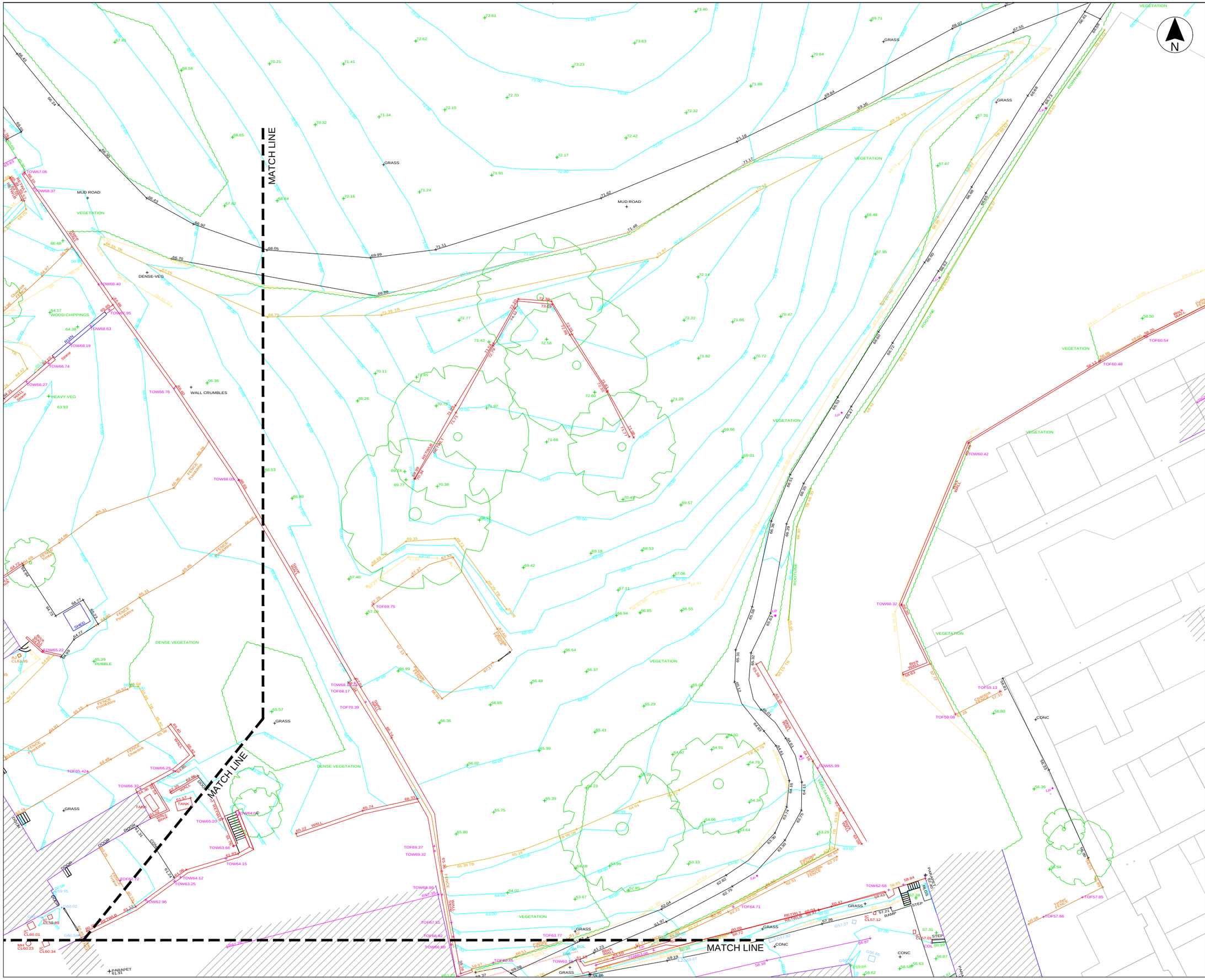

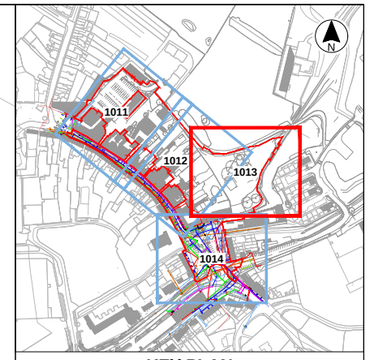

KEY PLAN

SCALE 1:4000

LEGEND:

SITE BOUNDARY

LINEWORK:

- EMBANKEMENT TOP +101.50
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- BUILDING +101.50
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STREET FURNITURE :

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- GATE
- MARKER POST MKR +
- POST POST *
- POST BOX POST BOX +
- ROADSIGN RS * RS
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Project Status	STAGE 3 - PLANNING
Project	NORTH DUBLIN STREET & BACK-LANDS REGENERATION PROJECT
Drawing	EXISTING SITE LAYOUT SHEET 3
Scale	1:200 @ A1

Drawn	DSA	Checked	KOS	Approved	KOS
Date	04.02.25	Date	04.02.25	Date	04.02.25

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DSN	MCA	ZZ	XX	DR	CE	1013	P01

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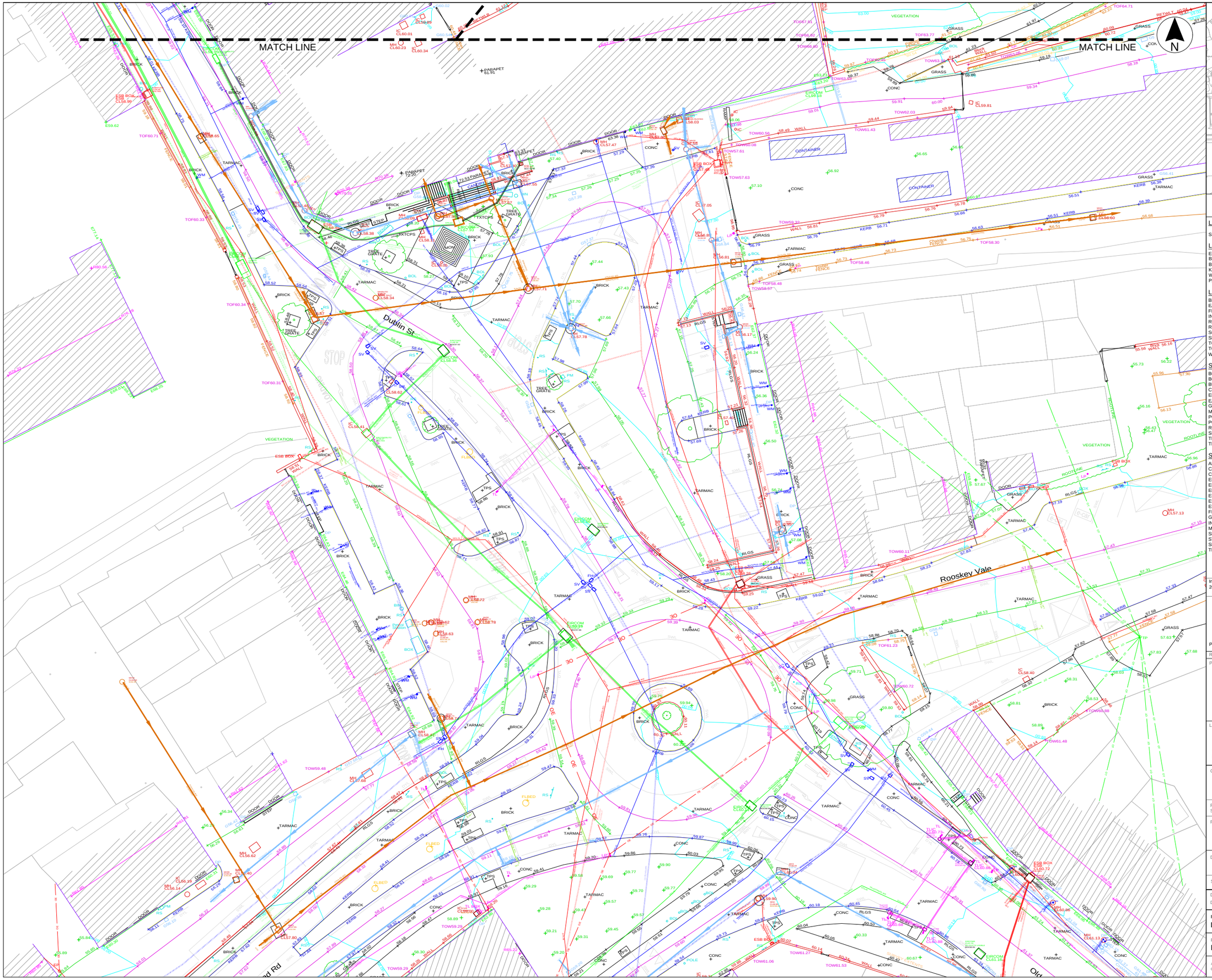

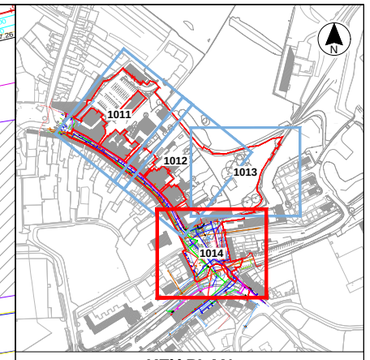

KEY PLAN
SCALE 1:4000

LEGEND:

SITE BOUNDARY

LINEWORK:

EMBANKEMENT TOP	+101.50
BREAKLINE	+101.50
BUILDING	+101.50
KERB BOTTOM	+101.50
WALL	+101.50
PATH/CHANGE SURFACE	+101.50

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SOFFIT LEVEL	+ SL101.50
SPOT LEVEL	+ 101.50
TOP OF FENCE LEVEL	+ TOF101.50
TOP OF WALL LEVEL	+ TOW101.50
WATER LEVEL	+ WL101.50

STREET FURNITURE :

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BORE HOLE	BH +
BUS STOP	BS *
CRASH BARRIER	CB
ELECTRICITY POLE	EP *
EARTHING ROD	ER +
GATE	
MARKER POST	MKR +
POST	POST *
POST BOX	POST BOX +
ROADSIGN	RS * RS
SIGN POST	SIGN *
TELEPHONE BOX	TB
TELEPHONE POLE	TP *

SERVICES :

AIR VALVE	AV +
CABLE TV IC	CATV
COVER LEVEL	CL
EIRCOM COVER	EIRCOM
EIRCOM JUNCTION BOX	EIRCOM BOX
ELECTRICAL CABLE PIT	ECP
ESAT COVER	ESAT
ESB COVER	ESB
ESB JUNCTION BOX	ESB BOX
FIRE HYDRANT	FH *
GAS VALVE	GV
INSPECTION COVER	IC
MANHOLE	MH
SLUICE VALVE	SV *
STOPCOCK	ST *
SERVICE BOX (UNKNOWN)	BOX
TRAFFIC COVER	TLIC

WATER:

WATER MAIN (RECORDS)
WATER MAIN (GPR)
SLUICE VALVE
VALVE
FIRE HYDRANT
WATER METER

ELECTRIC:

ELECTRIC DUCT (RECORDS)
ELECTRIC DUCT (GPR)
ELECTRIC OVERHEAD
STREET LIGHTING DUCT
LAMP POST
TRAFFIC LIGHTS DUCT
TRAFFIC LIGHTS DUCT BOX
TRAFFIC LIGHT MINI PILLAR
TRAFFIC LIGHT POLE
ESB MINI PILLAR
ESB DRAW PIT

TELECOMS:

TELECOMS (RECORDS)
TELECOMS (GPR)
TELECOM OVERHEAD
TELECOMS MINI PILLAR
EIRCOM DUCT BOX
WATER MAIN (GPR)

UNKNOWN:

ANOMALY

DRAINAGE:

STORM SEWER
FOUL/COMBINED SEWER
STORM GULLY
DOWN PIPE

Rev	Date	Description	App
P01	04.02.25	First Issue for planning	DSA

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Client: Comhairle Contae Mhuineacháin Monaghan County Council

Project Status	STAGE 3 - PLANNING
Project	NORTH DUBLIN STREET & BACK-LANDS REGENERATION PROJECT
Drawing	EXISTING SITE LAYOUT SHEET 4
Scale	1:200 @ A1

Drawn	DSA	Checked	KOS	Approved	KOS
Date	04.02.25	Date	04.02.25	Date	04.02.25

Project	- Organisation	- Zone	- Level	- Type	- Role	- Number	- Revision
DSN	- MCA	- ZZ	- XX	- DR	- CE	- 1014	- P01

Project Number	Status code & Description
E2442	S2 For Information

All dimensions are in metres. Figured dimensions to be taken in preference to scaled d D d M d D d

Appendix B – Proposed Site Layout

SE1-1:200

Note:
Information outside of redline boundary shown for context only.

MATCH LINE

MATCH LINE

LEGEND

GENERAL

- **Site Boundary**
- **Embankments**
- **Proposed Development Area**

HARD LANDSCAPE

- **P1: Silver Grey Natural Stone paving** Natural stone paving in silver grey tones to footpaths and alleyways.
- **P2: Mid Grey Natural Stone paving** Natural stone paving in mid grey tones to carriageways.
- **P3: Precast Paving Units** Granite Aggregate precast paving units to footways.
- **P4: Block Paving** 'Aquaflow' Block paving to car parking spaces.
- **P5: Precast Paving Units** Granite Aggregate precast paving units to central gardens
- **P6: Cycle path**
- **P7 Asphalt**
- **P8: Feature bands** Feature bands in natural stone with a flamed finish
- **P9 Tactile paving to uncontrolled ped. crossings**
- **P10: Corduroy tactile paving to cycle lanes**
- **P11: Corduroy tactile paving to steps**
- **P12: Tactile guidance paving to pedestrian areas**
- **P13: Tactile guidance paving to controlled crossings**
- **P14: Feature paving inlay**
- **P15: Mid Grey Self Binding Gravel to Park Footpaths**
- **P16: Play Bark Surface**
- **Fe1: Fencing to future development plots**
- **Fe2: Proposed 1.2m high railings to reform boundary**
- **Fe3: Proposed sections of timber post and rail fencing**
- **Fe4: Proposed sections of 1.8m vertical timber board fencing**
- **W1:Retaining wall**

STEPS

- **S1:Natural stone steps to Old Cross Square** with associated stainless steel handrails
- **S2:Natural stone steps** with associated stainless steel handrails

SOFT LANDSCAPE

- **S1: Shrub Mix 1** A mix of groundcover, ornamental grasses, perennials and shrubs.
- **S2: Shrub Mix 2** A mix of groundcover, ornamental grasses, perennials and shrubs.
- **S3: Rain Garden Mix 2** A mix of groundcover, ornamental grasses, perennials and shrubs.
- **S4: Perenial Wild flower Meadow** Seed mix
- **S5: Amenity Grass** Seed mix
- **T1 Proposed Semi-Mature tree in hard** Semi-Mature tree planting in hard landscape. To include tree grille and proprietary tree pit.
- **T2: Proposed Semi-Mature tree in soft** Semi-Mature tree planting in soft landscape.
- **Retained Existing trees** Semi-Mature tree planting in soft landscape.

STREET FURNITURE

- **F1: Raised Planter** Raised planter with integrated seating. To include groundcover, perennial and shrub planting species.
- **F2: Linear Raised Planter** Linear / rectangular raised planter with integrated seating. To include groundcover, perennial and shrub planting species.
- **F3: Bench** Linear bench with timber top, backrest and armrests.
- **F4: Individual Seats** Clusters of individual seats.
- **F5: Cycle Stands** Stainless Steel 'Sheffield' type cycle stands
- **F6: Litter Bin** Locations for litter bins.
- **F7: Catenary lighting**
- **F8: Proposed lighting columns**
- **F9: Proposed power points**
- **F10: Proposed location for EV charging point**
- **F11: Proposed bollard to foot path edge**
- **F12: Solar Bench**
- **F13: Bike repair station**
- **F14: Information Plaque**
- **F15: Water feature to Central Garden**
- **F16: Existing Monument to Old Cross Square**
- **F17: Play equiptment to park**

NOTES

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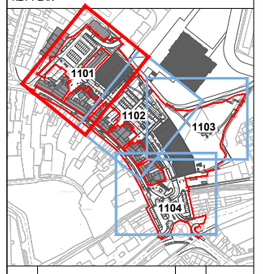
CDM INFORMATION

1.

KEY PLAN



Issue	Revision	Initial	Date
06	Planning boundary updated. Issued for Planning	nt	10.02.25
05	Planning Issue	nt	29.01.25
04	Planning Issue	nt	29.11.24
03	Planning Issue	nt	16.09.24
02	Draft Planning. Issued for information	nt	09.08.24
01	Issued for information	nt	23.04.24

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Client
Monaghan County Council

Project
Dublin Street North

Monaghan

Drawing Title
SITE LAYOUT

SHEET 01

Scale Bar 2m 4m 6m 8m 10m

North

Scale: **1:200@A1** Date: **MARCH 2024**

By: **NT** Status: **PLANNING**

Checked: **BP** Approved: **BP**

Drawing Number **DBL-OPE-00-XX-DR-L-901301** Rev **06**

Computer File: P:\2022\221769_Dublin St Nth\CAD\AUTOCAD\SHEETS

SE2-1:200

MATCH LINE

MATCH LINE

MATCH LINE

MATCH LINE

MATCH LINE

Note:
Information outside of redline boundary shown for context only.

LEGEND

GENERAL

- **Site Boundary**
- **Embankments**
- **Proposed Development Area**

HARD LANDSCAPE

- **P1: Silver Grey Natural Stone paving** Natural stone paving in silver grey tones to footpaths and alleyways.
- **P2: Mid Grey Natural Stone paving** Natural stone paving in mid grey tones to carriageways.
- **P3: Precast Paving Units** Granite Aggregate precast paving units to footways.
- **P4: Block Paving** 'Aquaflow' Block paving to car parking spaces.
- **P5: Precast Paving Units** Granite Aggregate precast paving units to central gardens
- **P6: Cycle path**
- **P7 Asphalt**
- **P8: Feature bands** Feature bands in natural stone with a flamed finish
- **P9 Tactile paving to uncontrolled ped. crossings**
- **P10: Corduroy tactile paving to cycle lanes**
- **P11: Corduroy tactile paving to steps**
- **P12: Tactile guidance paving to pedestrian areas**
- **P13: Tactile guidance paving to controlled crossings**
- **P14: Feature paving inlay**
- **P15: Mid Grey Self Binding Gravel to Park Footpaths**
- **P16: Play Bark Surface**
- **Fe1: Fencing to future development plots**
- **Fe2: Proposed 1.2m high railings to reform boundary**
- **Fe3: Proposed sections of timber post and rail fencing**
- **Fe4: Proposed sections of 1.8m vertical timber board fencing**
- **W1:Retaining wall**

STEPS

- **S1:Natural stone steps to Old Cross Square** with associated stainless steel handrails
- **S2:Natural stone steps** with associated stainless steel handrails

SOFT LANDSCAPE

- **S1: Shrub Mix 1** A mix of groundcover, ornamental grasses, perennials and shrubs.
- **S2: Shrub Mix 2** A mix of groundcover, ornamental grasses, perennials and shrubs.
- **S3: Rain Garden Mix 2** A mix of groundcover, ornamental grasses, perennials and shrubs.
- **S4: Perenial Wild flower Meadow** Seed mix
- **S5: Amenity Grass** Seed mix
- **T1 Proposed Semi-Mature tree in hard** Semi-Mature tree planting in hard landscape. To include tree grille and proprietary tree pit.
- **T2: Proposed Semi-Mature tree in soft** Semi-Mature tree planting in soft landscape.
- **Retained Existing trees** Semi-Mature tree planting in soft landscape.

STREET FURNITURE

- **F1: Raised Planter** Raised planter with integrated seating. To include groundcover, perennial and shrub planting species.
- **F2: Linear Raised Planter** Linear / rectangular raised planter with integrated seating. To include groundcover, perennial and shrub planting species.
- **F3: Bench** Linear bench with timber top, backrest and armrests.
- **F4: Individual Seats** Clusters of individual seats.
- **F5: Cycle Stands** Stainless Steel 'Sheffield' type cycle stands
- **F6: Litter Bin** Locations for litter bins.
- **F7: Catenary lighting**
- **F8: Proposed lighting columns**
- **F9: Proposed power points**
- **F10: Proposed location for EV charging point**
- **F11: Proposed bollard to foot path edge**
- **F12: Solar Bench**
- **F13: Bike repair station**
- **F14: Information Plaque**
- **F15: Water feature to Central Garden**
- **F16: Existing Monument to Old Cross Square**
- **F17: Play equiptment to park**

NOTES

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CDM INFORMATION

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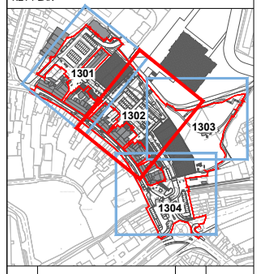

Issue	Revision	Initial	Date
06	Planning boundary updated. Issued for Planning	nt	10.02.25
05	Planning Issue	nt	29.01.25
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03	Planning Issue	nt	16.09.24
02	Draft Planning. Issued for information	nt	09.08.24
01	Issued for information	nt	23.04.24

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Registered address: 3rd Floor, | Quartermile Two | 2 Lister Square | Edinburgh | EH3 9GL

Client
Monaghan County Council

Project
Dublin Street North

Monaghan

Drawing Title
SITE LAYOUT

SHEET 02

Scale Bar 2m 4m 6m 8m 10m

North

Scale:	1:200@A1	Date:	MARCH 2024
By:	NT	Status:	PLANNING
Checked:	BP	Approved:	BP

Drawing Number
DBL-OPE-00-XX-DR-L-901302

Rev
06

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SE3-1:200

MATCH LINE

MATCH LINE

Old Infirmary footprint

Note:
Information outside of redline boundary shown for context only.

LEGEND

GENERAL

Site Boundary

Embankments

Proposed Development Area

HARD LANDSCAPE

P1: Silver Grey Natural Stone paving
Natural stone paving in silver grey tones to footpaths and alleyways.

P2: Mid Grey Natural Stone paving
Natural stone paving in mid grey tones to carriageways.

P3: Precast Paving Units
Granite Aggregate precast paving units to footways.

P4: Block Paving
'Aquaflow' Block paving to car parking spaces.

P5: Precast Paving Units
Granite Aggregate precast paving units to central gardens

P6: Cycle path

P7 Asphalt

P8: Feature bands
Feature bands in natural stone with a flamed finish

P9 Tactile paving to uncontrolled ped. crossings

P10: Corduroy tactile paving to cycle lanes

P11: Corduroy tactile paving to steps

P12: Tactile guidance paving to pedestrian areas

P13: Tactile guidance paving to controlled crossings

P14: Feature paving inlay

P15: Mid Grey Self Binding Gravel to Park Footpaths

P16: Play Bark Surface

Fe1: Fencing to future development plots

Fe2: Proposed 1.2m high railings to reform boundary

Fe3: Proposed sections of timber post and rail fencing

Fe4: Proposed sections of 1.8m vertical timber board fencing

W1:Retaining wall

STEPS

S1:Natural stone steps to Old Cross Square
with associated stainless steel handrails

S2:Natural stone steps
with associated stainless steel handrails

SOFT LANDSCAPE

S1: Shrub Mix 1
A mix of groundcover, ornamental grasses, perennials and shrubs.

S2: Shrub Mix 2
A mix of groundcover, ornamental grasses, perennials and shrubs.

S3: Rain Garden Mix 2
A mix of groundcover, ornamental grasses, perennials and shrubs.

S4: Perenial Wild flower Meadow
Seed mix

S5: Amenity Grass
Seed mix

T1 Proposed Semi-Mature tree in hard
Semi-Mature tree planting in hard landscape. To include tree grille and proprietary tree pit.

T2: Proposed Semi-Mature tree in soft
Semi-Mature tree planting in soft landscape.

Retained Existing trees
Semi-Mature tree planting in soft landscape.

STREET FURNITURE

F1: Raised Planter
Raised planter with integrated seating. To include groundcover, perennial and shrub planting species.

F2: Linear Raised Planter
Linear / rectangular raised planter with integrated seating. To include groundcover, perennial and shrub planting species.

F3: Bench
Linear bench with timber top, backrest and armrests.

F4: Individual Seats
Clusters of individual seats.

F5: Cycle Stands
Stainless Steel 'Sheffield' type cycle stands

F6: Litter Bin
Locations for litter bins.

F7: Catenary lighting

F8: Proposed lighting columns

F9: Proposed power points

F10: Proposed location for EV charging point

F11: Proposed bollard to foot path edge

F12: Solar Bench

F13: Bike repair station

F14: Information Plaque

F15: Water feature to Central Garden

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F17: Play equiptment to park

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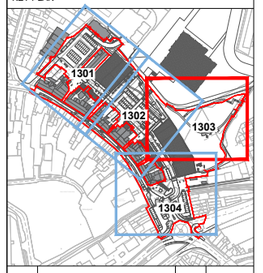

Issue	Revision	Initial	Date
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Client
Monaghan County Council

Project
Dublin Street North

Monaghan

Drawing Title
SITE LAYOUT

SHEET 03

Scale Bar 2m 4m 6m 8m 10m

North

Scale: **1:200@A1** Date: **MARCH 2024**

By: **NT** Status: **PLANNING**

Checked: **BP** Approved: **BP**

Drawing Number **DBL-OPE-00-XX-DR-L-901303** Rev **06**

Computer File: P:\2022\221769_Dublin St NI\CAD\AUTOCAD\SHEETS

SE4-1:200

MATCH LINE

MATCH LINE

Note:
Information outside of redline boundary shown for context only.

LEGEND

GENERAL
- **Site Boundary**
- **Embankments**
- **Proposed Development Area**

HARD LANDSCAPE
- **P1: Silver Grey Natural Stone paving** Natural stone paving in silver grey tones to footpaths and alleyways.
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STEPS
- **S1:Natural stone steps to Old Cross Square** with associated stainless steel handrails
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SOFT LANDSCAPE
- **S1: Shrub Mix 1** A mix of groundcover, ornamental grasses, perennials and shrubs.
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STREET FURNITURE
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- **F5: Cycle Stands** Stainless Steel 'Sheffield' type cycle stands
- **F6: Litter Bin** Locations for litter bins.
- **F7: Catenary lighting**
- **F8: Proposed lighting columns**
- **F9: Proposed power points**
- **F10: Proposed location for EV charging point**
- **F11: Proposed bollard to foot path edge**
- **F12: Solar Bench**
- **F13: Bike repair station**
- **F14: Information Plaque**
- **F15: Water feature to Central Garden**
- **F16: Existing Monument to Old Cross Square**
- **F17: Play equiptment to park**

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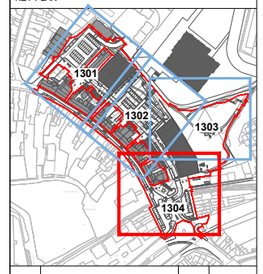
CDM INFORMATION

1.

KEY PLAN



Issue	Revision	Initial	Date
06	Planning boundary updated. Issued for Planning	nt	10.02.25
05	Planning Issue	nt	29.01.25
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Registered address: 2nd Floor | Quartermile Two | 2 Lister Square | Edinburgh | EH3 9GL

Client
Monaghan County Council

Project
Dublin Street North

Monaghan

Drawing Title
SITE LAYOUT

SHEET 04

Scale Bar 2m 4m 6m 8m 10m

North

Scale: **1:200@A1** Date: **MARCH 2024**

By: **NT** Status: **PLANNING**

Checked: **BP** Approved: **BP**

Drawing Number **DBL-OPE-00-XX-DR-L-901304** Rev **06**

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Appendix C – Proposed Storm Design - Un-Restricted Runoff Calculations

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	13.800	0.460	30.0	0.072	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	14.800	0.148	100.0	0.068	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	13.800	0.138	100.0	0.080	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	6.000	0.060	100.0	0.025	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	20.571	0.206	99.9	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	9.417	0.094	100.2	0.015	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	16.932	0.169	100.2	0.043	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	20.134	0.101	199.3	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	52.378	0.524	100.0	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	11.200	0.112	100.0	0.031	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	13.300	0.443	30.0	0.020	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	21.000	0.210	100.0	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	9.600	0.480	20.0	0.011	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	31.200	0.312	100.0	0.008	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.003	8.700	0.087	100.0	0.040	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.004	9.000	0.090	100.0	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.08	60.666	0.072	0.0	0.0	0.0	2.88	203.7	9.7
1.001	50.00	5.24	60.202	0.140	0.0	0.0	0.0	1.57	111.1	19.0
1.002	50.00	5.38	60.054	0.220	0.0	0.0	0.0	1.57	111.1	29.8
1.003	50.00	5.45	59.916	0.245	0.0	0.0	0.0	1.57	111.1	33.2
1.004	50.00	5.66	59.856	0.279	0.0	0.0	0.0	1.57	111.2	37.8
1.005	50.00	5.76	59.650	0.294	0.0	0.0	0.0	1.57	111.0	39.8
1.006	50.00	5.94	59.556	0.337	0.0	0.0	0.0	1.57	111.0	45.6
1.007	50.00	6.25	59.387	0.361	0.0	0.0	0.0	1.11	78.5	48.9
1.008	50.00	6.80	59.286	0.396	0.0	0.0	0.0	1.57	111.2	53.6
2.000	50.00	5.12	59.100	0.031	0.0	0.0	0.0	1.57	111.1	4.2
3.000	50.00	5.08	60.731	0.020	0.0	0.0	0.0	2.88	203.7	2.7
2.001	50.00	5.34	58.988	0.092	0.0	0.0	0.0	1.57	111.1	12.5
4.000	50.00	5.05	60.840	0.011	0.0	0.0	0.0	3.53	249.6	1.5
2.002	50.00	5.67	58.778	0.111	0.0	0.0	0.0	1.57	111.1	15.0
2.003	50.00	5.76	58.466	0.151	0.0	0.0	0.0	1.57	111.1	20.4
2.004	50.00	5.86	58.379	0.186	0.0	0.0	0.0	1.57	111.1	25.2

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.009	17.900	0.095	188.4	0.128	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.010	36.768	1.671	22.0	0.092	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.011	23.200	0.913	25.4	0.023	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.012	12.619	0.158	79.9	0.035	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.013	7.642	0.831	9.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.009	50.00	7.03	58.214	0.710	0.0	0.0	0.0	1.32	145.4	96.1
1.010	50.00	7.19	58.119	0.802	0.0	0.0	0.0	3.88	428.3	108.6
1.011	50.00	7.29	56.448	0.825	0.0	0.0	0.0	3.61	398.4	111.7
1.012	50.00	7.39	55.460	0.860	0.0	0.0	0.0	2.28	362.1	116.5
1.013	50.00	7.40	55.302	0.860	0.0	0.0	0.0	6.73	1070.8	116.5

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1-1/01	61.866	1.200	Open Manhole	1200	1.000	60.666	300				
S1-1/02	61.402	1.200	Open Manhole	1200	1.001	60.202	300	1.000	60.206	300	4
S1-1/03	61.296	1.242	Open Manhole	1200	1.002	60.054	300	1.001	60.054	300	
S1-1/04	61.266	1.350	Open Manhole	1200	1.003	59.916	300	1.002	59.916	300	
S1-1/05	61.349	1.493	Open Manhole	1200	1.004	59.856	300	1.003	59.856	300	
S1-1/06	61.083	1.433	Open Manhole	1200	1.005	59.650	300	1.004	59.650	300	
S1-1/07	60.999	1.443	Open Manhole	1200	1.006	59.556	300	1.005	59.556	300	
S1-1/08	60.870	1.483	Open Manhole	1200	1.007	59.387	300	1.006	59.387	300	
S1-1/09	61.184	1.898	Open Manhole	1200	1.008	59.286	300	1.007	59.286	300	
S1-2/01	61.100	2.000	Open Manhole	1200	2.000	59.100	300				
S1-3/01	61.931	1.200	Open Manhole	1200	3.000	60.731	300				
S1-2/02	61.500	2.512	Open Manhole	1200	2.001	58.988	300	2.000	58.988	300	
								3.000	60.288	300	1300
S1-4/01	62.040	1.200	Open Manhole	1200	4.000	60.840	300				
S1-2/03	61.700	2.922	Open Manhole	1200	2.002	58.778	300	2.001	58.778	300	
								4.000	60.360	300	1582
S1-2/04	62.072	3.606	Open Manhole	1200	2.003	58.466	300	2.002	58.466	300	
S1-2/05	61.826	3.447	Open Manhole	1200	2.004	58.379	300	2.003	58.379	300	
S1-1/10	61.489	3.275	Open Manhole	1350	1.009	58.214	375	1.008	58.762	300	473
								2.004	58.289	300	
S1-1/11	60.593	2.474	Open Manhole	1350	1.010	58.119	375	1.009	58.119	375	
S1-1/12	58.739	2.291	Open Manhole	1350	1.011	56.448	375	1.010	56.448	375	
S1-1/13	57.816	2.356	Open Manhole	1350	1.012	55.460	450	1.011	55.535	375	
S1-1/14	57.931	2.629	Open Manhole	1350	1.013	55.302	450	1.012	55.302	450	
	57.931	3.460	Open Manhole	300		OUTFALL		1.013	54.471	450	

No coordinates have been specified, layout information cannot be produced.

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	S1-1/01	61.866	60.666	0.900	Open Manhole	1200
1.001	o	300	S1-1/02	61.402	60.202	0.900	Open Manhole	1200
1.002	o	300	S1-1/03	61.296	60.054	0.942	Open Manhole	1200
1.003	o	300	S1-1/04	61.266	59.916	1.050	Open Manhole	1200
1.004	o	300	S1-1/05	61.349	59.856	1.193	Open Manhole	1200
1.005	o	300	S1-1/06	61.083	59.650	1.133	Open Manhole	1200
1.006	o	300	S1-1/07	60.999	59.556	1.143	Open Manhole	1200
1.007	o	300	S1-1/08	60.870	59.387	1.183	Open Manhole	1200
1.008	o	300	S1-1/09	61.184	59.286	1.598	Open Manhole	1200
2.000	o	300	S1-2/01	61.100	59.100	1.700	Open Manhole	1200
3.000	o	300	S1-3/01	61.931	60.731	0.900	Open Manhole	1200
2.001	o	300	S1-2/02	61.500	58.988	2.212	Open Manhole	1200
4.000	o	300	S1-4/01	62.040	60.840	0.900	Open Manhole	1200
2.002	o	300	S1-2/03	61.700	58.778	2.622	Open Manhole	1200
2.003	o	300	S1-2/04	62.072	58.466	3.306	Open Manhole	1200
2.004	o	300	S1-2/05	61.826	58.379	3.147	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	13.800	30.0	S1-1/02	61.402	60.206	0.896	Open Manhole	1200
1.001	14.800	100.0	S1-1/03	61.296	60.054	0.942	Open Manhole	1200
1.002	13.800	100.0	S1-1/04	61.266	59.916	1.050	Open Manhole	1200
1.003	6.000	100.0	S1-1/05	61.349	59.856	1.193	Open Manhole	1200
1.004	20.571	99.9	S1-1/06	61.083	59.650	1.133	Open Manhole	1200
1.005	9.417	100.2	S1-1/07	60.999	59.556	1.143	Open Manhole	1200
1.006	16.932	100.2	S1-1/08	60.870	59.387	1.183	Open Manhole	1200
1.007	20.134	199.3	S1-1/09	61.184	59.286	1.598	Open Manhole	1200
1.008	52.378	100.0	S1-1/10	61.489	58.762	2.427	Open Manhole	1350
2.000	11.200	100.0	S1-2/02	61.500	58.988	2.212	Open Manhole	1200
3.000	13.300	30.0	S1-2/02	61.500	60.288	0.912	Open Manhole	1200
2.001	21.000	100.0	S1-2/03	61.700	58.778	2.622	Open Manhole	1200
4.000	9.600	20.0	S1-2/03	61.700	60.360	1.040	Open Manhole	1200
2.002	31.200	100.0	S1-2/04	62.072	58.466	3.306	Open Manhole	1200
2.003	8.700	100.0	S1-2/05	61.826	58.379	3.147	Open Manhole	1200
2.004	9.000	100.0	S1-1/10	61.489	58.289	2.900	Open Manhole	1350

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.009	o	375	S1-1/10	61.489	58.214	2.900	Open Manhole	1350
1.010	o	375	S1-1/11	60.593	58.119	2.099	Open Manhole	1350
1.011	o	375	S1-1/12	58.739	56.448	1.916	Open Manhole	1350
1.012	o	450	S1-1/13	57.816	55.460	1.906	Open Manhole	1350
1.013	o	450	S1-1/14	57.931	55.302	2.179	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.009	17.900	188.4	S1-1/11	60.593	58.119	2.099	Open Manhole	1350
1.010	36.768	22.0	S1-1/12	58.739	56.448	1.916	Open Manhole	1350
1.011	23.200	25.4	S1-1/13	57.816	55.535	1.906	Open Manhole	1350
1.012	12.619	79.9	S1-1/14	57.931	55.302	2.179	Open Manhole	1350
1.013	7.642	9.2		57.931	54.471	3.010	Open Manhole	300

Storage Structures for Storm

Porous Car Park Manhole: S1-1/01, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	22.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	30.6	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	61.800	Membrane Depth (mm)	0

Porous Car Park Manhole: S1-1/02, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	55.6	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	60.528	Membrane Depth (mm)	0

Porous Car Park Manhole: S1-1/03, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.2
Max Percolation (l/s)	56.7	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	60.380	Membrane Depth (mm)	0

Cellular Storage Manhole: S1-1/06, DS/PN: 1.005

Invert Level (m)	59.650	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.0	0.0	0.801	0.0	0.0
0.800	30.0	0.0			

Porous Car Park Manhole: S1-2/02, DS/PN: 2.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	17.0
Max Percolation (l/s)	47.2	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	60.500	Membrane Depth (mm)	0

Porous Car Park Manhole: S1-2/03, DS/PN: 2.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	22.0
Max Percolation (l/s)	30.6	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	60.700	Membrane Depth (mm)	0

Porous Car Park Manhole: S1-1/10, DS/PN: 1.009

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	27.0
Max Percolation (l/s)	150.0	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	59.500	Membrane Depth (mm)	0

Cellular Storage Manhole: S1-1/11, DS/PN: 1.010

Invert Level (m)	58.119	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	110.0	0.0	1.201	0.0	0.0
1.200	110.0	0.0			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.331
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1-1/01	15 Winter	1	+10%					60.715
1.001	S1-1/02	15 Winter	1	+10%	100/15 Summer				60.294
1.002	S1-1/03	15 Winter	1	+10%	30/15 Winter				60.169
1.003	S1-1/04	15 Winter	1	+10%	30/15 Summer				60.069
1.004	S1-1/05	15 Winter	1	+10%	100/15 Summer				59.982
1.005	S1-1/06	15 Winter	1	+10%	30/15 Winter				59.789
1.006	S1-1/07	15 Winter	1	+10%	30/15 Winter				59.688
1.007	S1-1/08	15 Winter	1	+10%	30/15 Summer				59.553
1.008	S1-1/09	15 Winter	1	+10%					59.420
2.000	S1-2/01	15 Winter	1	+10%					59.145
3.000	S1-3/01	15 Winter	1	+10%					60.756
2.001	S1-2/02	15 Winter	1	+10%					59.060
4.000	S1-4/01	15 Winter	1	+10%					60.853
2.002	S1-2/03	15 Winter	1	+10%	100/15 Summer				58.852
2.003	S1-2/04	15 Winter	1	+10%	30/15 Summer				58.569
2.004	S1-2/05	15 Winter	1	+10%	30/15 Summer				58.493
1.009	S1-1/10	15 Winter	1	+10%	30/15 Summer				58.424

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1-1/01	-0.251	0.000	0.06		6	10.4	OK	
1.001	S1-1/02	-0.208	0.000	0.20		7	18.7	OK	
1.002	S1-1/03	-0.185	0.000	0.31		7	28.7	OK	
1.003	S1-1/04	-0.147	0.000	0.52			31.8	OK	
1.004	S1-1/05	-0.174	0.000	0.37			35.8	OK	
1.005	S1-1/06	-0.161	0.000	0.44		8	33.8	OK	
1.006	S1-1/07	-0.168	0.000	0.40			37.9	OK	
1.007	S1-1/08	-0.134	0.000	0.58			39.8	OK	
1.008	S1-1/09	-0.166	0.000	0.41			42.9	OK	
2.000	S1-2/01	-0.255	0.000	0.05			4.5	OK	
3.000	S1-3/01	-0.275	0.000	0.02			2.9	OK	
2.001	S1-2/02	-0.228	0.000	0.13		8	12.4	OK	
4.000	S1-4/01	-0.287	0.000	0.01			1.6	OK	
2.002	S1-2/03	-0.226	0.000	0.14		7	14.0	OK	
2.003	S1-2/04	-0.197	0.000	0.26			18.9	OK	
2.004	S1-2/05	-0.186	0.000	0.31			23.0	OK	
1.009	S1-1/10	-0.165	0.000	0.59		6	71.2	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.010	S1-1/11	30 Winter	1	+10%					58.231
1.011	S1-1/12	30 Winter	1	+10%					56.568
1.012	S1-1/13	30 Winter	1	+10%	100/15 Summer				55.645
1.013	S1-1/14	30 Winter	1	+10%					55.419

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.010	S1-1/11	-0.263	0.000	0.19		13	74.9	OK	
1.011	S1-1/12	-0.255	0.000	0.22			76.5	OK	
1.012	S1-1/13	-0.265	0.000	0.35			79.1	OK	
1.013	S1-1/14	-0.332	0.000	0.15			79.3	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.331
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1-1/01	15 Winter	30	+10%					60.740
1.001	S1-1/02	15 Winter	30	+10%	100/15 Summer				60.405
1.002	S1-1/03	15 Winter	30	+10%	30/15 Winter				60.364
1.003	S1-1/04	15 Winter	30	+10%	30/15 Summer				60.238
1.004	S1-1/05	15 Winter	30	+10%	100/15 Summer				60.090
1.005	S1-1/06	15 Winter	30	+10%	30/15 Winter				59.959
1.006	S1-1/07	15 Winter	30	+10%	30/15 Winter				59.865
1.007	S1-1/08	15 Winter	30	+10%	30/15 Summer				59.736
1.008	S1-1/09	15 Winter	30	+10%					59.508
2.000	S1-2/01	15 Winter	30	+10%					59.169
3.000	S1-3/01	15 Winter	30	+10%					60.769
2.001	S1-2/02	15 Winter	30	+10%					59.104
4.000	S1-4/01	15 Winter	30	+10%					60.870
2.002	S1-2/03	15 Winter	30	+10%	100/15 Summer				58.929
2.003	S1-2/04	15 Winter	30	+10%	30/15 Summer				58.890
2.004	S1-2/05	15 Winter	30	+10%	30/15 Summer				58.797
1.009	S1-1/10	15 Winter	30	+10%	30/15 Summer				58.691

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1-1/01	-0.226	0.000	0.14		6	23.3	OK	
1.001	S1-1/02	-0.097	0.000	0.47		4	44.1	OK	
1.002	S1-1/03	0.010	0.000	0.74		4	68.4	SURCHARGED	
1.003	S1-1/04	0.022	0.000	1.25			76.7	SURCHARGED	
1.004	S1-1/05	-0.066	0.000	0.89			86.7	OK	
1.005	S1-1/06	0.009	0.000	0.94		6	72.4	SURCHARGED	
1.006	S1-1/07	0.009	0.000	0.86			81.2	SURCHARGED	
1.007	S1-1/08	0.049	0.000	1.25			85.6	SURCHARGED	
1.008	S1-1/09	-0.078	0.000	0.89			93.3	OK	
2.000	S1-2/01	-0.231	0.000	0.12			10.0	OK	
3.000	S1-3/01	-0.262	0.000	0.04			6.5	OK	
2.001	S1-2/02	-0.184	0.000	0.31		5	30.5	OK	
4.000	S1-4/01	-0.270	0.000	0.02			3.5	OK	
2.002	S1-2/03	-0.149	0.000	0.35		3	35.4	OK	
2.003	S1-2/04	0.124	0.000	0.57			42.1	SURCHARGED	
2.004	S1-2/05	0.118	0.000	0.68			50.8	SURCHARGED	
1.009	S1-1/10	0.102	0.000	1.45		7	173.8	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.010	S1-1/11	15 Winter	30	+10%					58.303
1.011	S1-1/12	15 Winter	30	+10%					56.649
1.012	S1-1/13	15 Winter	30	+10%	100/15 Summer				55.788
1.013	S1-1/14	15 Winter	30	+10%					55.494

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.010	S1-1/11	-0.191	0.000	0.48		9	185.8	OK	
1.011	S1-1/12	-0.174	0.000	0.56			189.8	OK	
1.012	S1-1/13	-0.121	0.000	0.87			195.5	OK	
1.013	S1-1/14	-0.258	0.000	0.38			195.3	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.331
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1-1/01	15 Winter	100	+10%					60.752
1.001	S1-1/02	15 Winter	100	+10%	100/15 Summer				60.560
1.002	S1-1/03	15 Winter	100	+10%	30/15 Winter				60.450
1.003	S1-1/04	15 Winter	100	+10%	30/15 Summer				60.350
1.004	S1-1/05	15 Winter	100	+10%	100/15 Summer				60.241
1.005	S1-1/06	15 Winter	100	+10%	30/15 Winter				60.069
1.006	S1-1/07	15 Winter	100	+10%	30/15 Winter				59.959
1.007	S1-1/08	15 Winter	100	+10%	30/15 Summer				59.788
1.008	S1-1/09	15 Winter	100	+10%					59.568
2.000	S1-2/01	15 Winter	100	+10%					59.192
3.000	S1-3/01	15 Winter	100	+10%					60.774
2.001	S1-2/02	15 Winter	100	+10%					59.174
4.000	S1-4/01	15 Winter	100	+10%					60.873
2.002	S1-2/03	15 Winter	100	+10%	100/15 Summer				59.129
2.003	S1-2/04	15 Winter	100	+10%	30/15 Summer				58.998
2.004	S1-2/05	15 Winter	100	+10%	30/15 Summer				58.898
1.009	S1-1/10	15 Winter	100	+10%	30/15 Summer				58.792

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

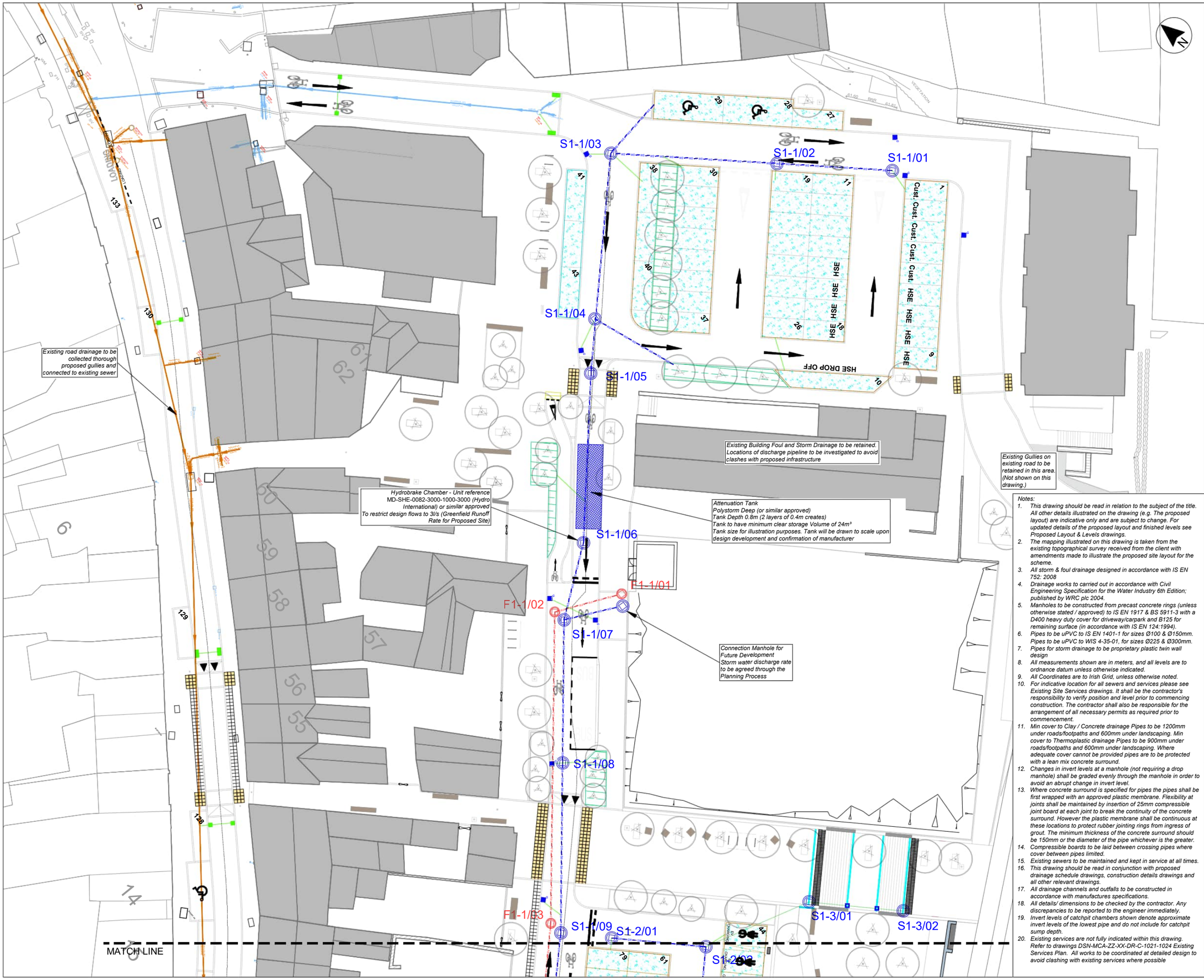
PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1-1/01	-0.214	0.000	0.18		6	30.3	OK	
1.001	S1-1/02	0.058	0.000	0.60		3	55.5	SURCHARGED	
1.002	S1-1/03	0.096	0.000	0.87		5	80.3	SURCHARGED	
1.003	S1-1/04	0.134	0.000	1.45			89.2	SURCHARGED	
1.004	S1-1/05	0.085	0.000	1.04			101.0	SURCHARGED	
1.005	S1-1/06	0.119	0.000	1.11		8	85.2	SURCHARGED	
1.006	S1-1/07	0.103	0.000	0.99			93.8	SURCHARGED	
1.007	S1-1/08	0.101	0.000	1.44			98.6	SURCHARGED	
1.008	S1-1/09	-0.018	0.000	1.00			105.0	OK	
2.000	S1-2/01	-0.208	0.000	0.16			13.0	OK	
3.000	S1-3/01	-0.257	0.000	0.05			8.4	OK	
2.001	S1-2/02	-0.114	0.000	0.41		3	39.7	OK	
4.000	S1-4/01	-0.267	0.000	0.03			4.6	OK	
2.002	S1-2/03	0.051	0.000	0.39		4	39.8	SURCHARGED	
2.003	S1-2/04	0.232	0.000	0.71			52.5	SURCHARGED	
2.004	S1-2/05	0.219	0.000	0.86			64.4	SURCHARGED	
1.009	S1-1/10	0.203	0.000	1.80		9	215.4	SURCHARGED	

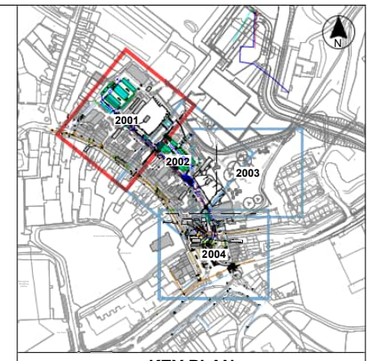
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.010	S1-1/11	15 Winter	100	+10%					58.331
1.011	S1-1/12	15 Winter	100	+10%					56.682
1.012	S1-1/13	15 Winter	100	+10%	100/15 Summer				55.932
1.013	S1-1/14	15 Winter	100	+10%					55.525

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.010	S1-1/11	-0.163	0.000	0.61		11	235.5	OK	
1.011	S1-1/12	-0.140	0.000	0.71			240.8	OK	
1.012	S1-1/13	0.022	0.000	1.11			248.2	SURCHARGED	
1.013	S1-1/14	-0.226	0.000	0.49			250.6	OK	

Appendix D – Proposed Drainage Layout





KEY PLAN
SCALE 1:4000

LEGEND

- PROPOSED STORM SEWER
- PROPOSED FOUL SEWER
- PROPOSED TRAPPED GULLY LOCATIONS ARE INDICATIVE ONLY AND WILL BE SUBJECT TO FURTHER DEVELOPMENT AT DETAILED DESIGN STAGE
- PROPOSED CHANNEL DRAINAGE
- Fxxx PROPOSED FOUL MANHOLE
- Sxxx PROPOSED STORM MANHOLE
- ATTENUATION TANK / PETROL INTERCEPTOR (REFER TO NOTES)
- PERMEABLE PAVEMENT
- RAIN GARDEN
- EXISTING FOUL DRAINAGE
- EXISTING STORM DRAINAGE
- PROPOSED GULLIES TO REPLACE EXISTING DRAINS AND CONNECT TO EXISTING SEWER. LOCATIONS ARE INDICATIVE ONLY AND WILL BE SUBJECT TO FURTHER DEVELOPMENT AT DETAILED DESIGN STAGE
- EXISTING FOUL SEWER TO BE REMOVED
- EXISTING STORM SEWER TO BE REMOVED

Notes:

1. This drawing should be read in relation to the subject of the title. All other details illustrated on the drawing (e.g. The proposed layout) are indicative only and are subject to change. For updated details of the proposed layout and finished levels see Proposed Layout & Levels drawings.
2. The mapping illustrated on this drawing is taken from the existing topographical survey received from the client with amendments made to illustrate the proposed site layout for the scheme.
3. All storm & foul drainage designed in accordance with IS EN 752: 2008
4. Drainage works to carried out in accordance with Civil Engineering Specification for the Water Industry 6th Edition; published by WRC plc 2004.
5. Manholes to be constructed from precast concrete rings (unless otherwise stated / approved) to IS EN 1917 & BS 5911-3 with a D400 heavy duty cover for driveway/carpark and B125 for remaining surface (in accordance with IS EN 124:1994).
6. Pipes to be uPVC to IS EN 1401-1 for sizes Ø100 & Ø150mm. Pipes to be uPVC to WIS 4-35-01, for sizes Ø225 & Ø300mm.
7. Pipes for storm drainage to be proprietary plastic twin wall design
8. All measurements shown are in meters, and all levels are to ordnance datum unless otherwise indicated.
9. All Coordinates are to Irish Grid, unless otherwise noted.
10. For indicative location for all sewers and services please see Existing Site Services drawings. It shall be the contractor's responsibility to verify position and level prior to commencing construction. The contractor shall also be responsible for the arrangement of all necessary permits as required prior to commencement.
11. Min cover to Clay / Concrete drainage Pipes to be 1200mm under roads/footpaths and 600mm under landscaping. Min cover to Thermoplastic drainage Pipes to be 900mm under roads/footpaths and 600mm under landscaping. Where adequate cover cannot be provided pipes are to be protected with a lean mix concrete surround.
12. Changes in invert levels at a manhole (not requiring a drop manhole) shall be graded evenly through the manhole in order to avoid an abrupt change in invert level.
13. Where concrete surround is specified for pipes the pipes shall be first wrapped with an approved plastic membrane. Flexibility at joints shall be maintained by insertion of 25mm compressible joint board at each joint to break the continuity of the concrete surround. However the plastic membrane shall be continuous at these locations to protect rubber jointing rings from ingress of grout. The minimum thickness of the concrete surround should be 150mm or the diameter of the pipe whichever is the greater.
14. Compressible boards to be laid between crossing pipes where cover between pipes limited.
15. Existing sewers to be maintained and kept in service at all times.
16. This drawing should be read in conjunction with proposed drainage schedule drawings, construction details drawings and all other relevant drawings.
17. All drainage channels and outfalls to be constructed in accordance with manufactures specifications.
18. All details/ dimensions to be checked by the contractor. Any discrepancies to be reported to the engineer immediately.
19. Invert levels of catchpit chambers shown denote approximate invert levels of the lowest pipe and do not include for catchpit sump depth.
20. Existing services are not fully indicated within this drawing. Refer to drawings DSN-MCA-ZZ-XX-DR-C-1021-1024 Existing Services Plan. All works to be coordinated at detailed design to avoid clashing with existing services where possible

Rev	Date	Description	App
P02	10.02.25	Updated for planning issue	DSA
P01	07.02.25	First Issue for planning	PMcM

Project Manager, Civil & Structural Engineers
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Client
Comhairle Contae Mhuineacháin Monaghan County Council

Project Status	STAGE 3 - PLANNING
Project	DUBLIN ROAD NORTH
Drawing	PROPOSED DRAINAGE PLANS SHEET 1
Scale	1:200 @ A1

Drawn	Checked	Approved
PMcM	PA	KOS
Date 07.02.25	Date 07.02.25	Date 07.02.25

Project	Organisation	Zone	Level	Type	Role	Number	Revision
DSN	MCA	ZZ	XX	DR	CE	2001	P01

Project Number	Status code & Description
E2442	S2 For Information

MATCH LINE

MATCH LINE

MATCH LINE

MATCH LINE

F1-1/03
S1-1/09
S1-2/01
S1-2/02
S1-3/01
S1-3/02
S1-2/03
S1-4/01
S1-4/02
F1-1/04
S1-1/10
S1-2/04
S1-2/05
F1-1/05
S1-1/11
F1-1/06
F1-1/07

Hydrobrake Chamber - Unit reference MD-SHE-0082-3500-1500-3500 (Hydro International) or similar approved To restrict design flows to 3.5l/s (Greenfield Runoff Rate for Proposed Site)

Attenuation Tank
Polystorm Deep (or similar approved)
Tank Depth 1.2m (3 layers of 0.4m creates)
Tank to have minimum clear storage Volume of 132m³
Tank size for illustration purposes. Tank will be drawn to scale upon design development and confirmation of manufacturer

Connection Manhole for Future Development Storm water discharge rate to be agreed through the Planning Process

Existing road drainage to be intercepted by proposed gullies and connected to existing sewer

Existing storm water pipe to be removed as part of a diversion and connection application to the local council

Proposed storm manholes to allow for diversion of existing storm drainage

Proposed foul manhole to divert existing foul sewer

Notes:
1. This drawing should be read in relation to the subject of the title. All other details illustrated on the drawing (e.g. The proposed layout) are indicative only and are subject to change. For updated details of the proposed layout and finished levels see Proposed Layout & Levels drawings.
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7. Pipes for storm drainage to be proprietary plastic twin wall design
8. All measurements shown are in meters, and all levels are to ordnance datum unless otherwise indicated.
9. All Coordinates are to Irish Grid, unless otherwise noted.
10. For indicative location for all sewers and services please see Existing Site Services drawings. It shall be the contractor's responsibility to verify position and level prior to commencing construction. The contractor shall also be responsible for the arrangement of all necessary permits as required prior to commencement.
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14. Compressible boards to be laid between crossing pipes where cover between pipes limited.
15. Existing sewers to be maintained and kept in service at all times.
16. This drawing should be read in conjunction with proposed drainage schedule drawings, construction details drawings and all other relevant drawings.
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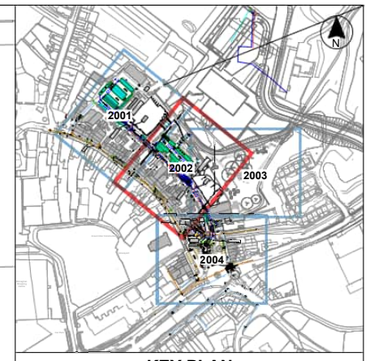
18. All details/ dimensions to be checked by the contractor. Any discrepancies to be reported to the engineer immediately.
19. Invert levels of catchpit chambers shown denote approximate invert levels of the lowest pipe and do not include for catchpit sump depth.
20. Existing services are not fully indicated within this drawing. Refer to drawings DSN-MCA-ZZ-XX-DR-C-1021-1024 Existing Services Plan. All works to be coordinated at detailed design to avoid clashing with existing services where possible



KEY PLAN
SCALE 1:4000

LEGEND

- PROPOSED STORM SEWER
- PROPOSED FOUL SEWER
- PROPOSED TRAPPED GULLY LOCATIONS ARE INDICATIVE ONLY AND WILL BE SUBJECT TO FURTHER DEVELOPMENT AT DETAILED DESIGN STAGE
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Rev	Date	Description	App
P02	10.02.25	Updated for planning issue	DSA
P01	07.02.25	First Issue for planning	PMcM

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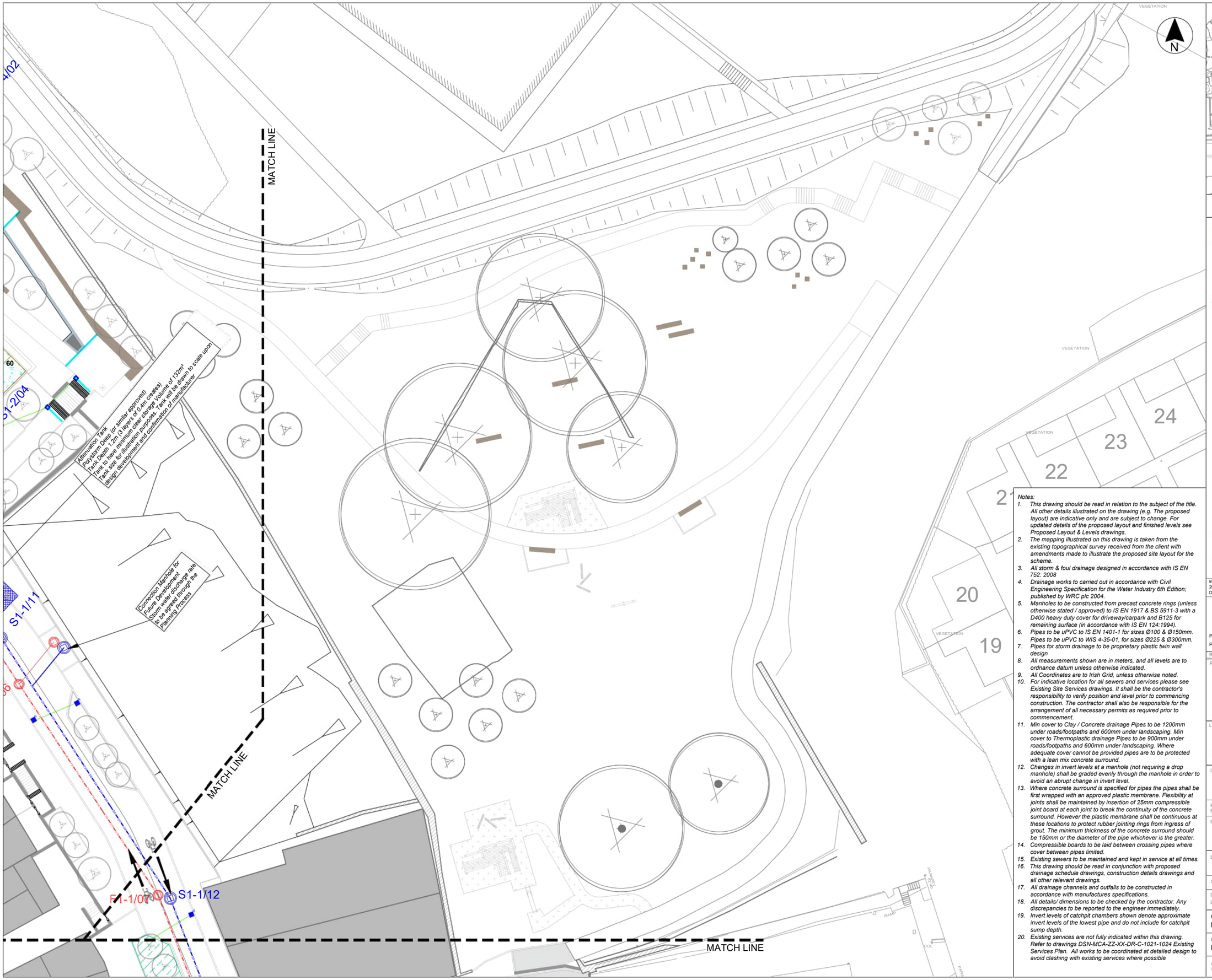
Client
Comhairle Contae Mhuineacháin
Monaghan County Council

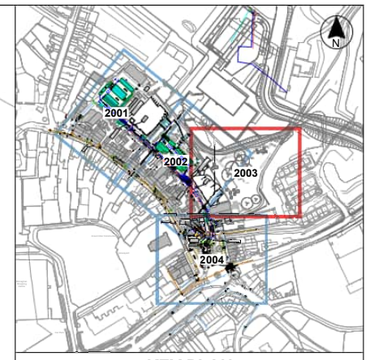
Project Status	STAGE 3 - PLANNING
Project	DUBLIN ROAD NORTH
Drawing	PROPOSED DRAINAGE PLANS SHEET 2
Scale	1:500 @ A1

Drawn	PMcM	Checked	PA	Approved	KOS
Date	07.02.25	Date	07.02.25	Date	07.02.25

Project	- Organisation	- Zone	- Level	- Type	- Role	- Number	- Revision
DSN	- MCA	- ZZ	- XX	- DR	- CE	- 2002	- P01

Project Number	Status code & Description	
E2442	S2	For Information





KEY PLAN
SCALE 1:4000

LEGEND

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- PROPOSED GULLIES TO REPLACE EXISTING DRAINS AND CONNECT TO EXISTING SEWER. LOCATIONS ARE INDICATIVE ONLY AND WILL BE SUBJECT TO FURTHER DEVELOPMENT AT DETAILED DESIGN STAGE
- EXISTING FOUL SEWER TO BE REMOVED
- EXISTING STORM SEWER TO BE REMOVED

Notes:

1. *This drawing should be read in relation to the subject of the title. All other details illustrated on the drawing (e.g. The proposed layout) are indicative only and are subject to change. For updated details of the proposed layout and finished levels see Proposed Layout & Levels drawings.*
2. *The mapping illustrated on this drawing is taken from the existing topographical survey received from the client with amendments made to illustrate the proposed site layout for the scheme.*
3. *All storm & foul drainage designed in accordance with IS EN 752: 2008*
4. *Drainage works to carried out in accordance with Civil Engineering Specification for the Water Industry 6th Edition; published by WRC plc 2004.*
5. *Manholes to be constructed from precast concrete rings (unless otherwise stated / approved) to IS EN 1917 & BS 5911-3 with a D400 heavy duty cover for driveway/carpark and B125 for remaining surface (in accordance with IS EN 124:1994).*
6. *Pipes to be uPVC to IS EN 1401-1 for sizes Ø100 & Ø150mm. Pipes to be uPVC to WIS 4-35-01, for sizes Ø225 & Ø300mm.*
7. *Pipes for storm drainage to be proprietary plastic twin wall design*
8. *All measurements shown are in meters, and all levels are to ordnance datum unless otherwise indicated.*
9. *All Coordinates are to Irish Grid, unless otherwise noted.*
10. *For indicative location for all sewers and services please see Existing Site Services drawings. It shall be the contractor's responsibility to verify position and level prior to commencing construction. The contractor shall also be responsible for the arrangement of all necessary permits as required prior to commencement.*
11. *Min cover to Clay / Concrete drainage Pipes to be 1200mm under roads/footpaths and 600mm under landscaping. Min cover to Thermoplastic drainage Pipes to be 900mm under roads/footpaths and 600mm under landscaping. Where adequate cover cannot be provided pipes are to be protected with a lean mix concrete surround.*
12. *Changes in invert levels at a manhole (not requiring a drop manhole) shall be graded evenly through the manhole in order to avoid an abrupt change in invert level.*
13. *Where concrete surround is specified for pipes the pipes shall be first wrapped with an approved plastic membrane. Flexibility at joints shall be maintained by insertion of 25mm compressible joint board at each joint to break the continuity of the concrete surround. However the plastic membrane shall be continuous at these locations to protect rubber jointing rings from ingress of grout. The minimum thickness of the concrete surround should be 150mm or the diameter of the pipe whichever is the greater.*
14. *Compressible boards to be laid between crossing pipes where cover between pipes limited.*
15. *Existing sewers to be maintained and kept in service at all times.*
16. *This drawing should be read in conjunction with proposed drainage schedule drawings, construction details drawings and all other relevant drawings.*
17. *All drainage channels and outfalls to be constructed in accordance with manufactures specifications.*
18. *All details/ dimensions to be checked by the contractor. Any discrepancies to be reported to the engineer immediately.*
19. *Invert levels of catchpit chambers shown denote approximate invert levels of the lowest pipe and do not include for catchpit sump depth.*
20. *Existing services are not fully indicated within this drawing. Refer to drawings DSN-MCA-ZZ-XX-DR-C-1021-1024 Existing Services Plan. All works to be coordinated at detailed design to avoid clashing with existing services where possible*

Rev	Date	Description	App
P02	10.02.25	Updated for planning issue	DSA
P01	07.02.25	First Issue for planning	PMcM

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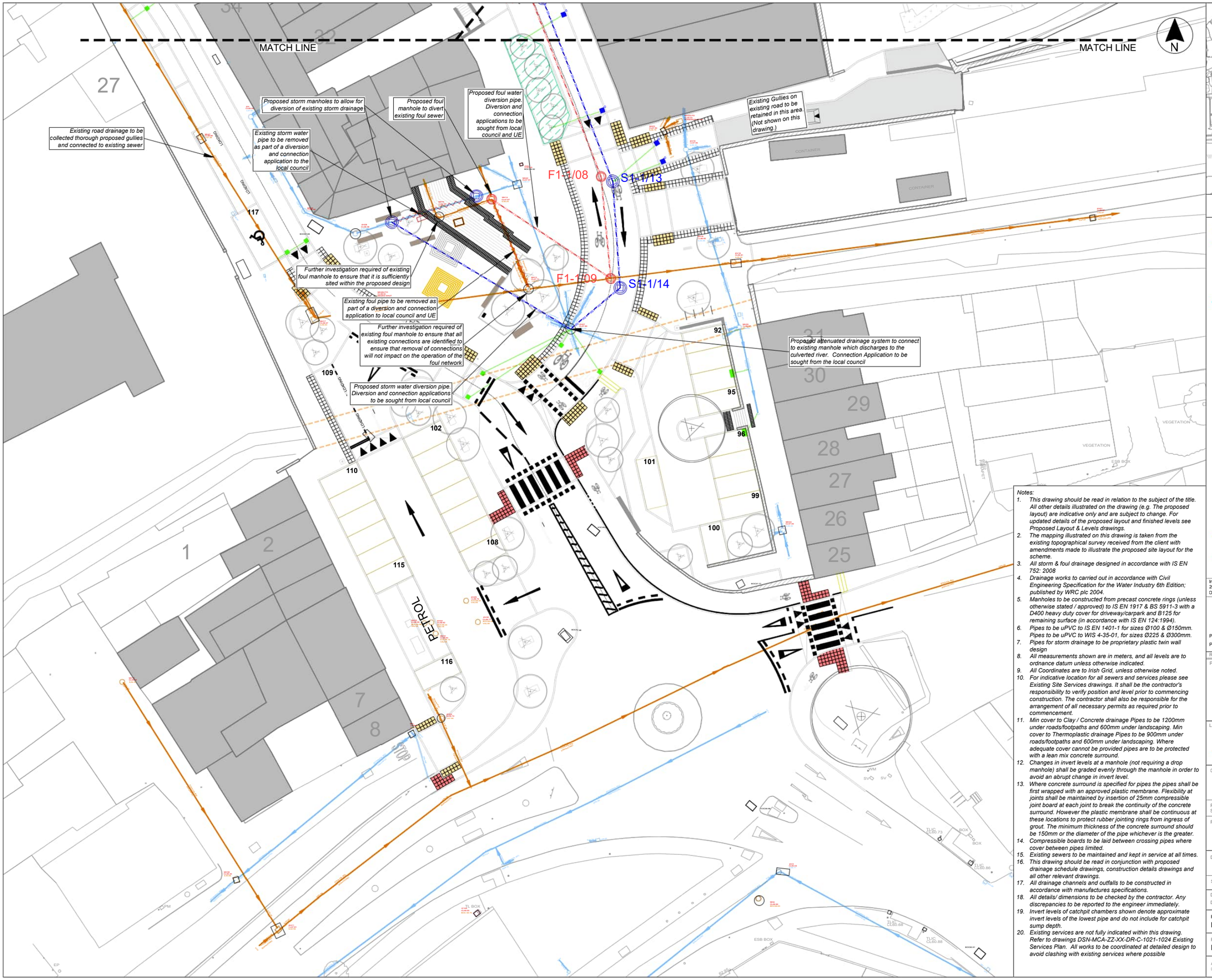
Client
Comhairle Contae Mhuineacháin
Monaghan County Council

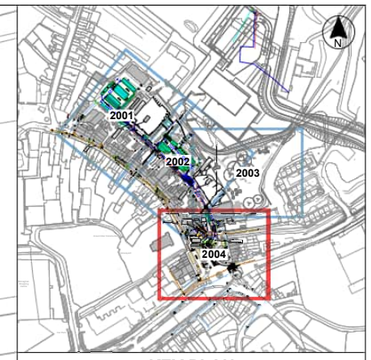
Project Status	STAGE 3 - PLANNING
Project	DUBLIN ROAD NORTH
Drawing	PROPOSED DRAINAGE PLANS SHEET 3
Scale	1:500 @ A1

Drawn	PMcM	Checked	PA	Approved	KOS
Date	07.02.25	Date	07.02.25	Date	07.02.25

Project	- Organisation	- Zone	- Level	- Type	- Role	- Number	- Revision
DSN	- MCA	- ZZ	- XX	- DR	- CE	- 2003	- P01

Project Number	E2442
Status code & Description	S2 For Information





KEY PLAN
SCALE 1:4000

LEGEND

- PROPOSED STORM SEWER
- PROPOSED FOUL SEWER
- PROPOSED TRAPPED GULLY LOCATIONS ARE INDICATIVE ONLY AND WILL BE SUBJECT TO FURTHER DEVELOPMENT AT DETAILED DESIGN STAGE
- PROPOSED CHANNEL DRAINAGE
- Fxxx PROPOSED FOUL MANHOLE
- Sxxx PROPOSED STORM MANHOLE
- ATTENUATION TANK / PETROL INTERCEPTOR (REFER TO NOTES)
- PERMEABLE PAVEMENT
- RAIN GARDEN
- EXISTING FOUL DRAINAGE
- EXISTING STORM DRAINAGE
- PROPOSED GULLIES TO REPLACE EXISTING DRAINS AND CONNECT TO EXISTING SEWER. LOCATIONS ARE INDICATIVE ONLY AND WILL BE SUBJECT TO FURTHER DEVELOPMENT AT DETAILED DESIGN STAGE
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Client
Comhairle Contae Mhuineacháin
Monaghan County Council

Project Status	STAGE 3 - PLANNING
Project	DUBLIN ROAD NORTH
Drawing	PROPOSED DRAINAGE PLANS SHEET 4
Scale	1:500 @ A1

Drawn	PMcM	Checked	PA	Approved	KOS
Date	07.02.25	Date	07.02.25	Date	07.02.25

Project	- Organisation	- Zone	- Level	- Type	- Role	- Number	- Revision
DSN	- MCA	- ZZ	- XX	- DR	- CE	- 2004	- P02

Project Number	Status code & Description	
E2442	S2	For Information

Appendix E – Proposed Storm Design - Restricted Runoff Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.200	Add Flow / Climate Change (%)	0
Ratio R	0.331	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.566	4-8	0.294

Total Area Contributing (ha) = 0.860

Total Pipe Volume (m³) = 31.037

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	13.800	0.460	30.0	0.072	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	14.800	0.148	100.0	0.068	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	13.800	0.138	100.0	0.080	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	6.000	0.060	100.0	0.025	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	20.571	0.206	99.9	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	9.417	0.094	100.2	0.015	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	16.932	0.169	100.2	0.043	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.08	60.666	0.072	0.0	0.0	0.0	2.88	203.7	9.7
1.001	50.00	5.24	60.202	0.140	0.0	0.0	0.0	1.57	111.1	19.0
1.002	50.00	5.38	60.054	0.220	0.0	0.0	0.0	1.57	111.1	29.8
1.003	50.00	5.45	59.916	0.245	0.0	0.0	0.0	1.57	111.1	33.2
1.004	50.00	5.66	59.856	0.279	0.0	0.0	0.0	1.57	111.2	37.8
1.005	50.00	5.76	59.650	0.294	0.0	0.0	0.0	1.57	111.0	39.8
1.006	50.00	5.94	59.556	0.337	0.0	0.0	0.0	1.57	111.0	45.6

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.007	20.134	0.101	199.3	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	52.378	0.524	100.0	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	11.200	0.112	100.0	0.031	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	13.300	0.443	30.0	0.020	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	21.000	0.210	100.0	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	9.600	0.480	20.0	0.011	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	31.200	0.312	100.0	0.008	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.003	8.700	0.087	100.0	0.040	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.004	9.000	0.090	100.0	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.009	17.900	0.095	188.4	0.128	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.010	36.768	1.671	22.0	0.092	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.011	23.200	0.913	25.4	0.023	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.012	12.619	0.158	79.9	0.035	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.013	7.642	0.831	9.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.007	50.00	6.25	59.387	0.361	0.0	0.0	0.0	1.11	78.5	48.9
1.008	50.00	6.80	59.286	0.396	0.0	0.0	0.0	1.57	111.2	53.6
2.000	50.00	5.12	59.100	0.031	0.0	0.0	0.0	1.57	111.1	4.2
3.000	50.00	5.08	60.731	0.020	0.0	0.0	0.0	2.88	203.7	2.7
2.001	50.00	5.34	58.988	0.092	0.0	0.0	0.0	1.57	111.1	12.5
4.000	50.00	5.05	60.840	0.011	0.0	0.0	0.0	3.53	249.6	1.5
2.002	50.00	5.67	58.778	0.111	0.0	0.0	0.0	1.57	111.1	15.0
2.003	50.00	5.76	58.466	0.151	0.0	0.0	0.0	1.57	111.1	20.4
2.004	50.00	5.86	58.379	0.186	0.0	0.0	0.0	1.57	111.1	25.2
1.009	50.00	7.03	58.214	0.710	0.0	0.0	0.0	1.32	145.4	96.1
1.010	50.00	7.19	58.119	0.802	0.0	0.0	0.0	3.88	428.3	108.6
1.011	50.00	7.29	56.448	0.825	0.0	0.0	0.0	3.61	398.4	111.7
1.012	50.00	7.39	55.460	0.860	0.0	0.0	0.0	2.28	362.1	116.5
1.013	50.00	7.40	55.302	0.860	0.0	0.0	0.0	6.73	1070.8	116.5

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1-1/01	61.866	1.200	Open Manhole	1200	1.000	60.666	300				
S1-1/02	61.402	1.200	Open Manhole	1200	1.001	60.202	300	1.000	60.206	300	4
S1-1/03	61.296	1.242	Open Manhole	1200	1.002	60.054	300	1.001	60.054	300	
S1-1/04	61.266	1.350	Open Manhole	1200	1.003	59.916	300	1.002	59.916	300	
S1-1/05	61.349	1.493	Open Manhole	1200	1.004	59.856	300	1.003	59.856	300	
S1-1/06	61.083	1.433	Open Manhole	1200	1.005	59.650	300	1.004	59.650	300	
S1-1/07	60.999	1.443	Open Manhole	1200	1.006	59.556	300	1.005	59.556	300	
S1-1/08	60.870	1.483	Open Manhole	1200	1.007	59.387	300	1.006	59.387	300	
S1-1/09	61.184	1.898	Open Manhole	1200	1.008	59.286	300	1.007	59.286	300	
S1-2/01	61.100	2.000	Open Manhole	1200	2.000	59.100	300				
S1-3/01	61.931	1.200	Open Manhole	1200	3.000	60.731	300				
S1-2/02	61.500	2.512	Open Manhole	1200	2.001	58.988	300	2.000	58.988	300	
								3.000	60.288	300	1300
S1-4/01	62.040	1.200	Open Manhole	1200	4.000	60.840	300				
S1-2/03	61.700	2.922	Open Manhole	1200	2.002	58.778	300	2.001	58.778	300	
								4.000	60.360	300	1582
S1-2/04	62.072	3.606	Open Manhole	1200	2.003	58.466	300	2.002	58.466	300	
S1-2/05	61.826	3.447	Open Manhole	1200	2.004	58.379	300	2.003	58.379	300	
S1-1/10	61.489	3.275	Open Manhole	1350	1.009	58.214	375	1.008	58.762	300	473
								2.004	58.289	300	
S1-1/11	60.593	2.474	Open Manhole	1350	1.010	58.119	375	1.009	58.119	375	
S1-1/12	58.739	2.291	Open Manhole	1350	1.011	56.448	375	1.010	56.448	375	
S1-1/13	57.816	2.356	Open Manhole	1350	1.012	55.460	450	1.011	55.535	375	
S1-1/14	57.931	2.629	Open Manhole	1350	1.013	55.302	450	1.012	55.302	450	
	57.931	3.460	Open Manhole	300		OUTFALL		1.013	54.471	450	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	S1-1/01	61.866	60.666	0.900	Open Manhole	1200
1.001	o	300	S1-1/02	61.402	60.202	0.900	Open Manhole	1200
1.002	o	300	S1-1/03	61.296	60.054	0.942	Open Manhole	1200
1.003	o	300	S1-1/04	61.266	59.916	1.050	Open Manhole	1200
1.004	o	300	S1-1/05	61.349	59.856	1.193	Open Manhole	1200
1.005	o	300	S1-1/06	61.083	59.650	1.133	Open Manhole	1200
1.006	o	300	S1-1/07	60.999	59.556	1.143	Open Manhole	1200
1.007	o	300	S1-1/08	60.870	59.387	1.183	Open Manhole	1200
1.008	o	300	S1-1/09	61.184	59.286	1.598	Open Manhole	1200
2.000	o	300	S1-2/01	61.100	59.100	1.700	Open Manhole	1200
3.000	o	300	S1-3/01	61.931	60.731	0.900	Open Manhole	1200
2.001	o	300	S1-2/02	61.500	58.988	2.212	Open Manhole	1200
4.000	o	300	S1-4/01	62.040	60.840	0.900	Open Manhole	1200
2.002	o	300	S1-2/03	61.700	58.778	2.622	Open Manhole	1200
2.003	o	300	S1-2/04	62.072	58.466	3.306	Open Manhole	1200
2.004	o	300	S1-2/05	61.826	58.379	3.147	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	13.800	30.0	S1-1/02	61.402	60.206	0.896	Open Manhole	1200
1.001	14.800	100.0	S1-1/03	61.296	60.054	0.942	Open Manhole	1200
1.002	13.800	100.0	S1-1/04	61.266	59.916	1.050	Open Manhole	1200
1.003	6.000	100.0	S1-1/05	61.349	59.856	1.193	Open Manhole	1200
1.004	20.571	99.9	S1-1/06	61.083	59.650	1.133	Open Manhole	1200
1.005	9.417	100.2	S1-1/07	60.999	59.556	1.143	Open Manhole	1200
1.006	16.932	100.2	S1-1/08	60.870	59.387	1.183	Open Manhole	1200
1.007	20.134	199.3	S1-1/09	61.184	59.286	1.598	Open Manhole	1200
1.008	52.378	100.0	S1-1/10	61.489	58.762	2.427	Open Manhole	1350
2.000	11.200	100.0	S1-2/02	61.500	58.988	2.212	Open Manhole	1200
3.000	13.300	30.0	S1-2/02	61.500	60.288	0.912	Open Manhole	1200
2.001	21.000	100.0	S1-2/03	61.700	58.778	2.622	Open Manhole	1200
4.000	9.600	20.0	S1-2/03	61.700	60.360	1.040	Open Manhole	1200
2.002	31.200	100.0	S1-2/04	62.072	58.466	3.306	Open Manhole	1200
2.003	8.700	100.0	S1-2/05	61.826	58.379	3.147	Open Manhole	1200
2.004	9.000	100.0	S1-1/10	61.489	58.289	2.900	Open Manhole	1350

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.009	o	375	S1-1/10	61.489	58.214	2.900	Open Manhole	1350
1.010	o	375	S1-1/11	60.593	58.119	2.099	Open Manhole	1350
1.011	o	375	S1-1/12	58.739	56.448	1.916	Open Manhole	1350
1.012	o	450	S1-1/13	57.816	55.460	1.906	Open Manhole	1350
1.013	o	450	S1-1/14	57.931	55.302	2.179	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.009	17.900	188.4	S1-1/11	60.593	58.119	2.099	Open Manhole	1350
1.010	36.768	22.0	S1-1/12	58.739	56.448	1.916	Open Manhole	1350
1.011	23.200	25.4	S1-1/13	57.816	55.535	1.906	Open Manhole	1350
1.012	12.619	79.9	S1-1/14	57.931	55.302	2.179	Open Manhole	1350
1.013	7.642	9.2		57.931	54.471	3.010	Open Manhole	300

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.013		57.931	54.471	0.000	300	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.331
Return Period (years)	2	Profile Type	Summer
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

Synthetic Rainfall Details

Storm Duration (mins) 30

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S1-1/06, DS/PN: 1.005, Volume (m³): 3.0

Unit Reference	MD-SHE-0082-3000-1000-3000
Design Head (m)	1.000
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	82
Invert Level (m)	59.650
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	3.0
Flush-Flo™	0.297	3.0
Kick-Flo®	0.623	2.4
Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	3.3	3.000	5.0	7.000	7.4
0.200	2.9	1.400	3.5	3.500	5.4	7.500	7.7
0.300	3.0	1.600	3.7	4.000	5.7	8.000	7.9
0.400	2.9	1.800	3.9	4.500	6.0	8.500	8.2
0.500	2.8	2.000	4.1	5.000	6.3	9.000	8.4
0.600	2.5	2.200	4.3	5.500	6.6	9.500	8.6
0.800	2.7	2.400	4.5	6.000	6.9		
1.000	3.0	2.600	4.7	6.500	7.2		

Hydro-Brake® Optimum Manhole: S1-1/11, DS/PN: 1.010, Volume (m³): 5.4

Unit Reference	MD-SHE-0082-3500-1500-3500
Design Head (m)	1.500
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	82
Invert Level (m)	58.119
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Hydro-Brake® Optimum Manhole: S1-1/11, DS/PN: 1.010, Volume (m³): 5.4

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	3.5
Flush-Flo™	0.359	3.1
Kick-Flo®	0.730	2.5
Mean Flow over Head Range	-	2.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	3.2	3.000	4.8	7.000	7.2
0.200	2.9	1.400	3.4	3.500	5.2	7.500	7.4
0.300	3.1	1.600	3.6	4.000	5.5	8.000	7.7
0.400	3.1	1.800	3.8	4.500	5.8	8.500	7.9
0.500	3.1	2.000	4.0	5.000	6.1	9.000	8.1
0.600	2.9	2.200	4.2	5.500	6.4	9.500	8.3
0.800	2.6	2.400	4.3	6.000	6.7		
1.000	2.9	2.600	4.5	6.500	6.9		

Hydro-Brake® Optimum Manhole: S1-1/13, DS/PN: 1.012, Volume (m³): 5.8

Unit Reference	MD-SHE-0103-6000-1800-6000
Design Head (m)	1.800
Design Flow (l/s)	6.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	103
Invert Level (m)	55.460
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	6.0
Flush-Flo™	0.453	5.5
Kick-Flo®	0.920	4.4
Mean Flow over Head Range	-	5.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.5	0.300	5.3	0.500	5.5	0.800	5.0
0.200	4.9	0.400	5.5	0.600	5.4	1.000	4.6

Hydro-Brake® Optimum Manhole: S1-1/13, DS/PN: 1.012, Volume (m³): 5.8

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.200	5.0	2.400	6.9	5.000	9.7	8.000	12.1
1.400	5.3	2.600	7.1	5.500	10.2	8.500	12.5
1.600	5.7	3.000	7.6	6.000	10.6	9.000	12.8
1.800	6.0	3.500	8.2	6.500	11.0	9.500	13.2
2.000	6.3	4.000	8.7	7.000	11.4		
2.200	6.6	4.500	9.2	7.500	11.8		

Storage Structures for Storm

Porous Car Park Manhole: S1-1/01, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	22.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	30.6	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	61.800	Membrane Depth (mm)	0

Porous Car Park Manhole: S1-1/02, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	55.6	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	60.528	Membrane Depth (mm)	0

Porous Car Park Manhole: S1-1/03, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.2
Max Percolation (l/s)	56.7	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	60.380	Membrane Depth (mm)	0

Cellular Storage Manhole: S1-1/06, DS/PN: 1.005

Invert Level (m)	59.650	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.0	0.0	0.801	0.0	0.0
0.800	30.0	0.0			

Porous Car Park Manhole: S1-2/02, DS/PN: 2.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	17.0
Max Percolation (l/s)	47.2	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	60.500	Membrane Depth (mm)	0

Porous Car Park Manhole: S1-2/03, DS/PN: 2.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	22.0
Max Percolation (l/s)	30.6	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	60.700	Membrane Depth (mm)	0

Porous Car Park Manhole: S1-1/10, DS/PN: 1.009

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	27.0
Max Percolation (l/s)	150.0	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	59.500	Membrane Depth (mm)	0

Cellular Storage Manhole: S1-1/11, DS/PN: 1.010

Invert Level (m)	58.119	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	110.0	0.0	1.201	0.0	0.0
1.200	110.0	0.0			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.331
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S1-1/01	15 Winter	1	+10%	100/120 Winter			
1.001	S1-1/02	180 Winter	1	+10%	30/15 Summer			
1.002	S1-1/03	180 Winter	1	+10%	1/120 Winter			
1.003	S1-1/04	180 Winter	1	+10%	1/60 Summer			
1.004	S1-1/05	180 Winter	1	+10%	1/30 Winter			
1.005	S1-1/06	180 Winter	1	+10%	1/15 Summer			
1.006	S1-1/07	15 Winter	1	+10%	30/240 Winter			
1.007	S1-1/08	15 Winter	1	+10%	30/180 Winter			
1.008	S1-1/09	15 Winter	1	+10%	30/120 Winter			
2.000	S1-2/01	15 Winter	1	+10%	30/120 Winter			
3.000	S1-3/01	15 Winter	1	+10%				
2.001	S1-2/02	600 Winter	1	+10%	30/120 Winter			
4.000	S1-4/01	15 Winter	1	+10%				
2.002	S1-2/03	600 Winter	1	+10%	1/600 Winter			
2.003	S1-2/04	600 Winter	1	+10%	1/180 Winter			
2.004	S1-2/05	600 Winter	1	+10%	1/120 Winter			
1.009	S1-1/10	600 Winter	1	+10%	1/60 Winter			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1-1/01	60.715	-0.251	0.000	0.06		10.4	OK	
1.001	S1-1/02	60.368	-0.134	0.000	0.06		5.5	OK	
1.002	S1-1/03	60.367	0.013	0.000	0.09		8.7	SURCHARGED	
1.003	S1-1/04	60.366	0.150	0.000	0.14		8.9	SURCHARGED	
1.004	S1-1/05	60.365	0.209	0.000	0.10		9.5	SURCHARGED	
1.005	S1-1/06	60.362	0.412	0.000	0.04		3.0	SURCHARGED	
1.006	S1-1/07	59.615	-0.241	0.000	0.08		7.9	OK	
1.007	S1-1/08	59.467	-0.220	0.000	0.16		10.6	OK	
1.008	S1-1/09	59.361	-0.225	0.000	0.14		14.8	OK	
2.000	S1-2/01	59.145	-0.255	0.000	0.05		4.5	OK	
3.000	S1-3/01	60.756	-0.275	0.000	0.02		2.9	OK	
2.001	S1-2/02	59.096	-0.192	0.000	0.02		1.6	OK	
4.000	S1-4/01	60.853	-0.287	0.000	0.01		1.6	OK	
2.002	S1-2/03	59.096	0.018	0.000	0.02		2.0	SURCHARGED	
2.003	S1-2/04	59.096	0.330	0.000	0.04		2.7	SURCHARGED	
2.004	S1-2/05	59.095	0.416	0.000	0.04		3.3	SURCHARGED	
1.009	S1-1/10	59.095	0.506	0.000	0.09		10.3	SURCHARGED	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.010	S1-1/11	600 Winter	1	+10%	1/60 Summer				59.093
1.011	S1-1/12	30 Winter	1	+10%	30/15 Winter				56.475
1.012	S1-1/13	30 Winter	1	+10%	1/15 Winter				56.014
1.013	S1-1/14	60 Summer	1	+10%					55.324

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.010	S1-1/11	0.599	0.000	0.01		3.1	SURCHARGED	
1.011	S1-1/12	-0.348	0.000	0.02		5.2	OK	
1.012	S1-1/13	0.105	0.000	0.02		5.5	SURCHARGED	
1.013	S1-1/14	-0.427	0.000	0.01		5.5	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.331
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S1-1/01	240 Winter	30	+10%	100/120 Winter			
1.001	S1-1/02	240 Winter	30	+10%	30/15 Summer			
1.002	S1-1/03	240 Winter	30	+10%	1/120 Winter			
1.003	S1-1/04	240 Winter	30	+10%	1/60 Summer			
1.004	S1-1/05	240 Winter	30	+10%	1/30 Winter			
1.005	S1-1/06	240 Winter	30	+10%	1/15 Summer			
1.006	S1-1/07	960 Winter	30	+10%	30/240 Winter			
1.007	S1-1/08	960 Winter	30	+10%	30/180 Winter			
1.008	S1-1/09	960 Winter	30	+10%	30/120 Winter			
2.000	S1-2/01	960 Winter	30	+10%	30/120 Winter			
3.000	S1-3/01	15 Winter	30	+10%				
2.001	S1-2/02	960 Winter	30	+10%	30/120 Winter			
4.000	S1-4/01	15 Winter	30	+10%				
2.002	S1-2/03	960 Winter	30	+10%	1/600 Winter			
2.003	S1-2/04	960 Winter	30	+10%	1/180 Winter			
2.004	S1-2/05	960 Winter	30	+10%	1/120 Winter			
1.009	S1-1/10	960 Winter	30	+10%	1/60 Winter			

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1-1/01	60.831	-0.135	0.000	0.03		4.8	OK	
1.001	S1-1/02	60.831	0.329	0.000	0.09		8.6	SURCHARGED	
1.002	S1-1/03	60.830	0.476	0.000	0.12		10.6	SURCHARGED	
1.003	S1-1/04	60.836	0.620	0.000	0.19		11.5	SURCHARGED	
1.004	S1-1/05	60.839	0.683	0.000	0.13		12.7	SURCHARGED	
1.005	S1-1/06	60.839	0.889	0.000	0.04		3.2	FLOOD RISK	
1.006	S1-1/07	60.177	0.321	0.000	0.04		3.8	SURCHARGED	
1.007	S1-1/08	60.174	0.487	0.000	0.06		4.4	SURCHARGED	
1.008	S1-1/09	60.171	0.585	0.000	0.05		5.2	SURCHARGED	
2.000	S1-2/01	60.168	0.768	0.000	0.01		0.7	SURCHARGED	
3.000	S1-3/01	60.769	-0.262	0.000	0.04		6.5	OK	
2.001	S1-2/02	60.167	0.879	0.000	0.02		2.1	SURCHARGED	
4.000	S1-4/01	60.870	-0.270	0.000	0.02		3.5	OK	
2.002	S1-2/03	60.167	1.089	0.000	0.02		2.2	SURCHARGED	
2.003	S1-2/04	60.167	1.401	0.000	0.04		2.9	SURCHARGED	
2.004	S1-2/05	60.167	1.488	0.000	0.05		3.6	SURCHARGED	
1.009	S1-1/10	60.167	1.578	0.000	0.09		10.9	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.010	S1-1/11	960 Winter	30	+10%	1/60 Summer				60.212
1.011	S1-1/12	60 Winter	30	+10%	30/15 Winter				57.094
1.012	S1-1/13	60 Winter	30	+10%	1/15 Winter				57.092
1.013	S1-1/14	60 Winter	30	+10%					55.325

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.010	S1-1/11	1.718	0.000	0.01		4.0	SURCHARGED	
1.011	S1-1/12	0.272	0.000	0.02		7.0	SURCHARGED	
1.012	S1-1/13	1.182	0.000	0.03		5.7	SURCHARGED	
1.013	S1-1/14	-0.426	0.000	0.01		5.7	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.331
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S1-1/01	240 Winter	100	+10%	100/120 Winter			
1.001	S1-1/02	240 Winter	100	+10%	30/15 Summer			
1.002	S1-1/03	240 Winter	100	+10%	1/120 Winter			
1.003	S1-1/04	240 Winter	100	+10%	1/60 Summer			
1.004	S1-1/05	240 Winter	100	+10%	1/30 Winter			
1.005	S1-1/06	240 Winter	100	+10%	1/15 Summer			
1.006	S1-1/07	1440 Winter	100	+10%	30/240 Winter			
1.007	S1-1/08	1440 Winter	100	+10%	30/180 Winter			
1.008	S1-1/09	1440 Winter	100	+10%	30/120 Winter			
2.000	S1-2/01	1440 Winter	100	+10%	30/120 Winter			
3.000	S1-3/01	15 Winter	100	+10%				
2.001	S1-2/02	1440 Winter	100	+10%	30/120 Winter			
4.000	S1-4/01	15 Winter	100	+10%				
2.002	S1-2/03	1440 Winter	100	+10%	1/600 Winter			
2.003	S1-2/04	1440 Winter	100	+10%	1/180 Winter			
2.004	S1-2/05	1440 Winter	100	+10%	1/120 Winter			
1.009	S1-1/10	1440 Winter	100	+10%	1/60 Winter			

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1-1/01	61.048	0.082	0.000	0.04		6.1	SURCHARGED	
1.001	S1-1/02	61.048	0.546	0.000	0.10		9.6	SURCHARGED	
1.002	S1-1/03	61.047	0.693	0.000	0.12		11.2	FLOOD RISK	
1.003	S1-1/04	61.053	0.837	0.000	0.20		12.3	FLOOD RISK	
1.004	S1-1/05	61.055	0.899	0.000	0.14		13.9	FLOOD RISK	
1.005	S1-1/06	61.055	1.105	0.000	0.04		3.2	FLOOD RISK	
1.006	S1-1/07	60.531	0.675	0.000	0.04		3.7	SURCHARGED	
1.007	S1-1/08	60.529	0.842	0.000	0.06		4.2	SURCHARGED	
1.008	S1-1/09	60.526	0.940	0.000	0.05		4.9	SURCHARGED	
2.000	S1-2/01	60.526	1.126	0.000	0.01		0.6	SURCHARGED	
3.000	S1-3/01	60.774	-0.257	0.000	0.05		8.4	OK	
2.001	S1-2/02	60.526	1.238	0.000	0.02		1.8	SURCHARGED	
4.000	S1-4/01	60.873	-0.267	0.000	0.03		4.6	OK	
2.002	S1-2/03	60.524	1.446	0.000	0.02		2.2	SURCHARGED	
2.003	S1-2/04	60.523	1.757	0.000	0.04		3.0	SURCHARGED	
2.004	S1-2/05	60.523	1.844	0.000	0.05		3.7	SURCHARGED	
1.009	S1-1/10	60.523	1.934	0.000	0.08		10.2	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.010	S1-1/11	1440 Winter	100	+10%	1/60 Summer				60.559
1.011	S1-1/12	60 Winter	100	+10%	30/15 Winter				57.614
1.012	S1-1/13	60 Winter	100	+10%	1/15 Winter				57.611
1.013	S1-1/14	60 Winter	100	+10%					55.329

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.010	S1-1/11	2.065	0.000	0.01		4.3	FLOOD RISK	
1.011	S1-1/12	0.791	0.000	0.02		7.5	SURCHARGED	
1.012	S1-1/13	1.701	0.000	0.03		6.5	FLOOD RISK	
1.013	S1-1/14	-0.423	0.000	0.01		6.5	OK	

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Iascach Intíre Éireann
Inland Fisheries Ireland

An Bord Pleanala,
64 Marlborough Street,
Dublin 1.

Email: bord@pleanala.ie

26th July, 2024

Re: Dublin Street and lands to the northeast of Dublin Street, Old Cross Square, Monaghan Town, townlands of Roosky and Tirkeenan, Co. Monaghan.
The proposed development will assist the regeneration of Dublin Street and back lands to the north, the Diamond Centre Car Park and Old Cross Square.
Case No: ABP-319743-24

Dear Sir/Madam,

We refer to your recent correspondence regarding request for written opinion from Board Pleanala on the information to be contained in an environmental Impact assessment (EIA) to be prepared in respect of the above-mentioned development.

Inland Fisheries Ireland (IFI) is a statutory agency responsible for inland fisheries in Ireland. Under section 7(1) of the Inland Fisheries Act 2010 (No. 10 of 2010) *the principal function of IFI is the protection, management and conservation of the inland fisheries resource*.

The Shambles River, which is a tributary of the Monaghan Blackwater River, flows under Old Cross Square in the Regeneration Area. The Shambles River contains fisheries habitat and supports stock of coarse fish and pike.
The WFD Ecological status of the waterbody at this location, Shambles_010, is Poor and At Risk of not achieving Good status.
The Monaghan Blackwater River is valuable from a fisheries perspective as it supports stocks of trout and lamprey among other species.
The Ecological status of the waterbody at this location, Blackwater (Monaghan)_040, is Poor and At Risk of not achieving Good status.

Issues to be addressed in the EIA with regard to the fisheries environment relate largely to surface water management in the project area both during and following construction works.

- Surface water management during construction phase

All construction work should be in accordance with a Construction Environmental Management Plan which ensures that good construction practices are adopted throughout the construction period and contains mitigation measures to deal with potential adverse impacts on the environment identified in advance of the scheme.
Potential issues that may arise on site and associated mitigation measures are addressed in IFI's document ***Guidelines on protection of fisheries during construction works in and adjacent to waters***, which are available on IFI's website.

Ground preparation and associated construction works, including large-scale topographic alteration and the creation of roads and buildings have significant potential to cause the release of sediments and pollutants into surrounding watercourses. Pollution of the adjacent freshwaters from poor on-site construction practices could have a significantly negative impact on water quality and the aquatic fauna and flora.

Iascach Intíre Éireann
Inland Fisheries Ireland

Construction works should be planned in a manner which prevents extensive tracts of soils being exposed at any time and which ensures a more progressive clearance of greenfield lands, We recommend an undisturbed filter strip (minimum 10m) is left along the watercourse. Protective silt fencing should be erected to safeguard the stream in advance of any construction work, no ground clearance, earth moving, stock –piling or machinery movement should occur within this protected area.

In the preparation of a CEMP, particular account must be taken in relation to bio security. To prevent the spread of hazardous invasive species and pathogens, high pressure steam cleaning of all items of plant and equipment to be used at and adjacent to waters must be undertaken prior to use. All PPE must be disinfected prior to use.

- Storm water management

We recommend that storm water management should be designed in accordance with the recently published Department of Housing, Local Government and Heritage guidance document ***Nature-based solutions for the management of rainwater and surface water run-off in urban areas.*** The document identifies the need for a significant change in the way to plan, design, build and maintain urban areas through the replacement of impermeable surfacing with nature-based planted areas designed to absorb, retain, store and treat urban runoff prior to discharge back to the environment.

Thank you for consulting with us regarding this matter.

Yours faithfully,

Michaela Kirrane

Michaela Kirrane
Senior Fisheries Environmental Officer – IFI, Dublin

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EPA RIVER QUALITY SURVEYS: BIOLOGICAL

Biotic indices ("Q Values") reflect average water quality at any location as follows:

Q Value*	WFD Status	Pollution Status	Condition **
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2,	Bad	Seriously polluted	Unsatisfactory

* These Values are based primarily on the relative proportions of pollution sensitive to tolerant macroinvertebrates (the young stages of insects primarily but also snails, worms, shrimps etc.) resident at a river site. The intermediate values (Q1-2, 2-3, 3-4 etc.) denote transitional conditions. The scheme mainly reflects the effects of organic pollution (i.e. de-oxygenation and eutrophication) but where a toxic effect is apparent or suspected the suffix '0' is added to the biotic index (e.g. Q1/0, 2/0 or 3/0). An asterisk after the Q value (e.g. Q3*) indicates something worthy of special attention, typically heavy siltation of the substratum.

** "Condition" refers to the likelihood of interference with beneficial or potential beneficial uses.

Also presented is a description of the exact location surveyed with relevant OS Grid Reference, WFD river water body code and relevant Local Authority.

Hydrometric Area 03

Name	Code
BLACKWATER (MONAGHAN)	03B01
CLONTIBRET STREAM	03C01
CONAWARY (LOWER)	03C02
MOUNTAIN WATER	03M01
SCOTSTOWN	03S02
SHAMBLES	03S01
SIX MILE LAKE STREAM	03S03

BLACKWATER (MONAGHAN) 03B01

Date Surveyed (last survey year only): 07/06/22, 08/06/22

Biological Quality Rating (Q Values)

Station Code	1973	1977	1981	1983	1985	1989	1993	1996	1998	2001	2004	2007	2010	2013	2017	2019	2022
RS03B010050						3											
RS03B010090						3-4											
RS03B010100	4-5	4-5	4-5	3-4	3-4												
RS03B010130						3-4	4	4	4	3	3	4	4	4	4	4	4
RS03B010200	3-4	3-4	4	3-4	3-4												
RS03B010300	4	3-4	4	4	3-4	3-4	4	4	4	4	4	3-4	3-4	4	4	4	4
RS03B010400	4	3-4	4	3-4	3-4	3-4											
RS03B010500	4	3-4	4	3-4	3-4												
RS03B010510						3	3	3-4	3	3	3-4	3-4	3-4	4	4	4	4
RS03B010580						3											
RS03B010600	3	2	3	2-3	3	2-3	3										
RS03B010650						2-3		2-3	3	3/0	3	3	3	3-4	3-4	4	3-4
RS03B010700	3	3	2-3	2-3	2-3	2-3	3										
RS03B010800	3-4	3-4	3	3	3	3	3	2-3	3	3	3	3	3	3-4	3-4	3-4	3-4

Most Recent Assessment:

The Blackwater (Monaghan) has remained in good condition in its upper and middle reaches (0130, 0300 and 0510); however the invasive plant, Giant Hogweed was recorded at all 3 sites.
Site 0650 (Faulkland Br (Upr)) declined to from good to moderate condition; there was a lot of algae in the channel at the time of survey and the river banks at the site are severely damaged by livestock. Site 0800 remains in moderate condition.

Station Details

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS03B010050	BLACKWATER (MONAGHAN) - Br E of Knockatallen*	IE_NB_03B010130	257528	338745	Monaghan County Council
RS03B010090	BLACKWATER (MONAGHAN) - Br N of Gola*	IE_NB_03B010130	258735	337345	Monaghan County Council
RS03B010100	BLACKWATER (MONAGHAN) - Br 1 km u/s Scotstown*	IE_NB_03B010130	260205	337086	Monaghan County Council
RS03B010130	1.5km d/s Scotstown Br.	IE_NB_03B010130	261394	335942	Monaghan County Council
RS03B010200	BLACKWATER (MONAGHAN) - Br in Ballinode	IE_NB_03B010300	262919	335810	Monaghan County Council
RS03B010300	1st Br d/s Ballinode	IE_NB_03B010300	263807	335774	Monaghan County Council
RS03B010400	BLACKWATER (MONAGHAN) - Br at Crosses	IE_NB_03B010510	265562	335745	Monaghan County Council
RS03B010500	BLACKWATER (MONAGHAN) - Br nr Milltown	IE_NB_03B010510	266383	334653	Monaghan County Council
RS03B010510	250m d/s Br nr Milltown	IE_NB_03B010510	266597	334547	Monaghan County Council
RS03B010580	BLACKWATER (MONAGHAN) - Br NE of Blackwater Vale	IE_NB_03B010800	267505	335228	Monaghan County Council
RS03B010600	BLACKWATER (MONAGHAN) - Br on Monaghan-Aughnacloy Rd	IE_NB_03B010800	267515	335243	Monaghan County Council
RS03B010650	Faulkland Br (Upr)	IE_NB_03B010800	269181	337024	Monaghan County Council
RS03B010700	BLACKWATER (MONAGHAN) - Faulkland Br	IE_NB_03B010800	270280	337836	Monaghan County Council
RS03B010800	Newmills Br	IE_NB_03B010800	271895	338765	Monaghan County Council

CLONTIBRET STREAM 03C01

Date Surveyed (last survey year only): 07/06/22

Biological Quality Rating (Q Values)

Station Code	1989	1990	1993	1996	1998	2001	2004	2007	2010	2013	2017	2019	2022
RS03C010600	3		3	3	3	3	3	3	2-3	3	3	3-4	3-4
RS03C010900	1	2-3	3	3	3								
RS03C011100	2-3	3				3	3		3	3	2-3	3	3-4
RS03C011200			3	3	3								
RS03C011400	3		3-4	4	3	3	3	3	3	3	3	3	3-4*

Most Recent Assessment:

The Clontibret Stream was sampled at 3 sites in 2022; 0600, 1100 and 1400. Site 0600 remained in moderate ecological condition. Both 1100 and 1400 whilst still in unsatisfactory condition improved from poor to moderate. Siltation is an issue at site 1400 (Br E of Killyneill X-Roads).

Station Details

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS03C010600	Br in Clontibret	UKGBNI1NB030308202	275743	328905	Monaghan County Council
RS03C010900	CLONTIBRET STREAM - 3rd Br d/s Clontibret	UKGBNI1NB030308202	275528	329912	Monaghan County Council
RS03C011100	CLONTIBRET STREAM - Br SW of Clerran	UKGBNI1NB030308202	274430	331645	Monaghan County Council

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS03C011200	CLONTIBRET STREAM - Br NE of Castleshane Ho	IE_NB_03C011200	274019	332227	Monaghan County Council
RS03C011400	Br E of Killyneill X-Roads	IE_NB_03C011400	273822	335680	Monaghan County Council

CONAWARY (LOWER) 03C02

Date Surveyed (last survey year only): 08/06/22

Biological Quality Rating (Q Values)

Station Code	1989	1990	1993	1996	1998	2001	2004	2007	2010	2013	2017	2019	2022
RS03C021100	3		3	3	3	3	3		3	3	3	2-3	3
RS03C021200	2	3	3										
RS03C021300	2-3			3	3	3	3	3	3	3	3	3	3

Most Recent Assessment:

The Conawary Lower was sampled at two sites in 2022; 1100 (White Br.) and 1300 (Br. u/s Blackwater R. confluence). A modest improvement was noted in site 1100, however it remains in poor ecological condition. There was no change in site 1400 which also remains in poor ecological condition.

Station Details

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS03C021100	CONAWARY (LOWER) - White Br	IE_NB_03C021100	263980	332564	Monaghan County Council
RS03C021200	CONAWARY (LOWER) - 2nd Br u/s Blackwater R	IE_NB_03C021300	265068	334277	Monaghan County Council
RS03C021300	Br u/s Blackwater R confl	IE_NB_03C021300	265441	334582	Monaghan County Council

MOUNTAIN WATER 03M01

Date Surveyed (last survey year only): 09/06/22, 13/06/22

Biological Quality Rating (Q Values)

Station Code	1973	1977	1981	1983	1985	1989	1993	1994	1996	1998	2001	2004	2007	2010	2013	2017	2019	2020	2021	2022
RS03M010100	5	5	5	5	5	5	4-5	5	4-5	4-5	4-5	4-5	4	4	4-5	4-5	5	4-5	4-5	4-5
RS03M010150								3-4												
RS03M010200	5	4-5	4-5	5	5	5	1/0	3-4	4-5	4-5	4-5	4	4	4	4-5	4	4-5			4-5
RS03M010260						5	2/0	3-4												
RS03M010300			5	5	5															
RS03M010400	4-5	4	4-5	4-5	4-5	4-5	2/0	3-4	4	4-5	4	3-4	3-4	3-4	4	4-5	5	4-5	4-5	4-5
RS03M010500	4	2	3-4	3	3	3	3/0	3	3-4	3	3	3	3	3	3	3	4			4
RS03M010550						3														
RS03M010600	4	3	2-3	3	3	3														
RS03M010650			4	4-5	3	3	3/0	3	3	3	3	3		3-4	3	3-4	4			3-4

Most Recent Assessment:

The Mountain Water river was surveyed at six sites in June 2022. The three sites in the upper reaches; 0100, 0200 and 0400 all remained as sites in high ecological condition (Q 4-5). Site 0500 remains in good condition but there was a lot of algae present at the time of survey. Site 0650 (Br. N of Glaslough) had deteriorated from good to moderate condition as there was a notable drop in the numbers of sensitive macroinvertebrate species.

Station Details

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS03M010100	Coyle's Br.	UKGBNI1NB030308254	259739	346174	Monaghan County Council
RS03M010150	MOUNTAIN WATER - 1km d/s St 0100	IE_NB_03M010200	260962	344924	Monaghan County Council
RS03M010200	Br NE of Golan	IE_NB_03M010200	262658	343972	Monaghan County Council
RS03M010260	MOUNTAIN WATER - Br NNE of Derrylin	IE_NB_03M010400	264363	343152	Monaghan County Council
RS03M010300	MOUNTAIN WATER - Br N of Rarutagh	IE_NB_03M010400	265476	342987	Monaghan County Council
RS03M010400	1st Br. u/s Emyvale	IE_NB_03M010400	267070	343349	Monaghan County Council
RS03M010500	Br. 1.1km d/s Emyvale	IE_NB_03M010500	268458	343141	Monaghan County Council
RS03M010550	MOUNTAIN WATER - Br NNE of Dundonagh	IE_NB_03M010650	269301	342054	Monaghan County Council
RS03M010600	MOUNTAIN WATER - Br at Glannan	IE_NB_03M010650	270539	342363	Monaghan County Council
RS03M010650	MOUNTAIN WATER - Br N of Glaslough	IE_NB_03M010650	272001	342191	Monaghan County Council

SCOTSTOWN 03S02

Date Surveyed (last survey year only): 13/06/22

Biological Quality Rating (Q Values)

Station Code	1989	1993	1996	1998	2001	2004	2007	2010	2013	2017	2018	2019	2022
RS03S020200	5	5	5	4-5	4-5	4-5	4-5	4-5	4-5	4	4-5	4-5	4-5
RS03S020400	5	4-5	4-5	4	4-5	4		4	4-5	4-5		4-5	4-5
RS03S020500	4-5	4-5	4-5	4-5	4	4	4	4	4-5	4-5		4-5	4-5

Most Recent Assessment:

All 3 sites (0200, 0400 and 0500) on the Scotstown River remained in high ecological condition (Q4-5) in 2022.

Station Details

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS03S020200	Br S of Knockballyroney	UKGBNI1NB030308255	258846	341373	Monaghan County Council
RS03S020400	SCOTSTOWN - Br at Mill S of Dromscor	UKGBNI1NB030308255	260056	339707	Monaghan County Council
RS03S020500	Br u/s Scotstown Br	IE_NB_03S020500	261108	337606	Monaghan County Council

SHAMBLES 03S01

Date Surveyed (last survey year only): 08/06/22

Biological Quality Rating (Q Values)

Station Code	2007	2010	2013	2017	2019	2022
RS03S010500	2-3	2-3	2-3	2-3	2-3	2-3*

Most Recent Assessment:

Poor ecological conditions were still evident in the urban site (0500) of the Shambles River in 2022.

Station Details

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS03S010500	Culvert u/s of N2 Roundabout, Armagh Road.	IE_NB_03S010500	268023	334968	Monaghan County Council

SIX MILE LAKE STREAM 03S03

Date Surveyed (last survey year only): 31/12/89

Biological Quality Rating (Q Values)

Station Code	1989
RS03S030400	3-4
RS03S030700	3-4

Most Recent Assessment:

Station Details

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS03S030400	SIX MILE LAKE STREAM - Br E of Dromore	IE_NB_03C011200	273420	327670	Monaghan County Council
RS03S030700	SIX MILE LAKE STREAM - Br u/s Clontibret Stream	IE_NB_03C011200	274759	329468	Monaghan County Council

Environmental Protection Agency

Table of Classification of Identified Bathing Waters for 2020 to 2023

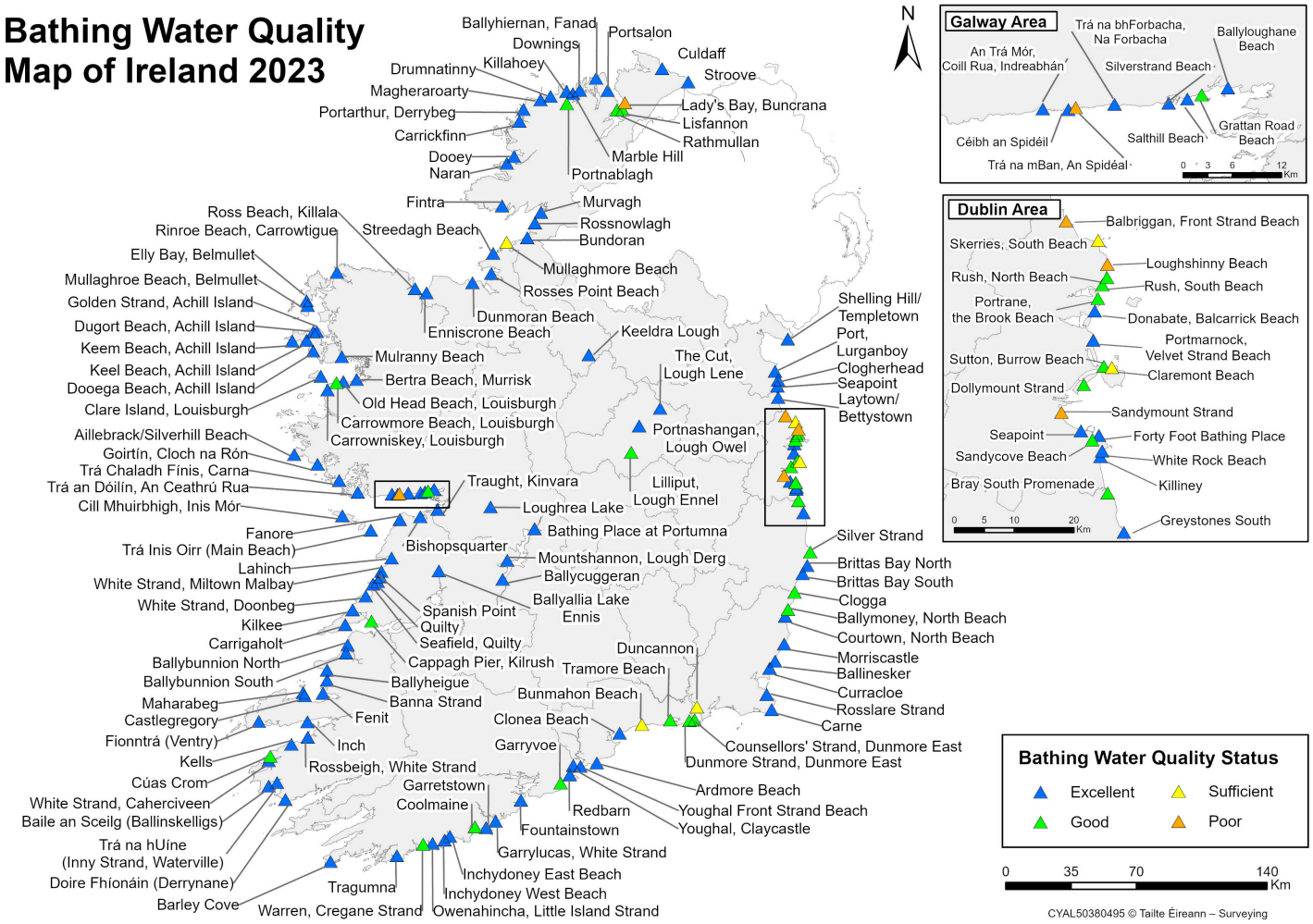
The table below lists the classifications for all 148 Identified Bathing Waters in 2023. The classifications are for the period 2020 to 2023.

Local authority	Identified Bathing Water	2020	2021	2022	2023
Clare County Council	Ballyallia Lake, Ennis	Excellent	Excellent	Excellent	Excellent
	Ballycuggeran	Excellent	Excellent	Excellent	Excellent
	Bishopsquarter	Excellent	Excellent	Excellent	Excellent
	Cappagh Pier, Kilrush	Excellent	Excellent	Good	Good
	Carrigaholt	New	Excellent	Excellent	Excellent
	Fanore	Excellent	Excellent	Excellent	Excellent
	Kilkee	Excellent	Excellent	Excellent	Excellent
	Lahinch	Excellent	Excellent	Excellent	Excellent
	Mountshannon, Lough Derg	Excellent	Excellent	Excellent	Excellent
	Quilty	New	Excellent	Excellent	Excellent
	Seafield, Quilty	Excellent	Excellent	Excellent	Excellent
	Spanish Point	Excellent	Excellent	Excellent	Excellent
	White Strand, Doonbeg	Excellent	Excellent	Excellent	Excellent
	White Strand, Miltown Malbay	Excellent	Excellent	Excellent	Excellent
Cork County Council	Barley Cove	Excellent	Excellent	Excellent	Excellent
	Coolmaine	Good	Good	Good	Good
	Fountainstown	Excellent	Excellent	Excellent	Excellent
	Garretstown	Excellent	Excellent	Excellent	Excellent
	Garrylucas, White Strand	Excellent	Excellent	Excellent	Excellent
	Garryvoe	Sufficient	Sufficient	Good	Good
	Inchydoney East Beach	Excellent	Excellent	Excellent	Excellent
	Inchydoney West Beach	Excellent	Excellent	Excellent	Excellent
	Owenahincha, Little Island Strand	Excellent	Excellent	Excellent	Excellent
	Redbarn	Excellent	Excellent	Excellent	Excellent
	Tragumna	Excellent	Excellent	Excellent	Excellent
	Warren, Cregane Strand	Excellent	Good	Good	Good
	Youghal Claycastle	Excellent	Excellent	Excellent	Excellent
	Youghal, Front Strand Beach	Good	Excellent	Excellent	Excellent
Donegal County Council	Ballyhiernan, Fanad	Excellent	Excellent	Excellent	Excellent
	Bundoran	Excellent	Excellent	Excellent	Excellent
	Carrickfinn	Excellent	Excellent	Excellent	Excellent
	Culdaff	Excellent	Excellent	Excellent	Excellent
	Dooey	Excellent	Excellent	Excellent	Excellent
	Downings	Excellent	Excellent	Excellent	Excellent
	Drumnatinny	Excellent	Excellent	Excellent	Excellent
	Fintra	Excellent	Excellent	Excellent	Excellent
	Killahoey	Excellent	Excellent	Excellent	Excellent

Local Authority	Identified Bathing Water	2020	2021	2022	2023
Donegal County Council continued	Lady's Bay, Buncrana	Sufficient	Poor	Poor	Poor
	Lisfannon	Good	Good	Good	Good
	Magheraroarty	Excellent	Excellent	Excellent	Excellent
	Marble Hill	Excellent	Excellent	Excellent	Excellent
	Murvagh	Excellent	Excellent	Excellent	Excellent
	Naran	Excellent	Excellent	Excellent	Excellent
	Portarthur, Derrybeg	Good	Good	Good	Excellent
	Portnablagh	Good	Excellent	Good	Good
	Portsalon	Excellent	Excellent	Excellent	Excellent
	Rathmullan	Good	Good	Good	Good
	Rossnowlagh	Excellent	Excellent	Excellent	Excellent
	Stroove	Excellent	Excellent	Excellent	Excellent
Dublin City Council	Dollymount Strand	Good	Good	Good	Good
	Sandymount Strand	Sufficient	Sufficient	Sufficient	Poor
Dun Laoghaire-Rathdown County Council	Forty Foot Bathing Place	Excellent	Excellent	Excellent	Excellent
	Killiney	Excellent	Excellent	Excellent	Excellent
	Sandycove Beach	Good	Excellent	Good	Good
	Seapoint	Excellent	Excellent	Excellent	Excellent
	White Rock Beach	Excellent	Excellent	Excellent	Excellent
Fingal County Council	Balbriggan, Front Strand Beach	Poor	Poor	Poor	Poor
	Claremont Beach	Sufficient	Sufficient	Sufficient	Sufficient
	Donabate, Balcarrick Beach	Excellent	Excellent	Excellent	Excellent
	Loughshinny Beach	Sufficient	Sufficient	Sufficient	Poor
	Portmarnock, Velvet Strand Beach	Excellent	Excellent	Excellent	Excellent
	Portrane, the Brook Beach	Good	Good	Excellent	Good
	Rush North Beach	Good	Excellent	Excellent	Good
	Rush, South Beach	Excellent	Excellent	Excellent	Good
	Skerries, South Beach	Good	Good	Sufficient	Sufficient
	Sutton, Burrow Beach	Excellent	Good	Good	Good
Galway City Council	Ballyloughane Beach	Sufficient	Good	Good	Excellent
	Grattan Road Beach	Sufficient	Sufficient	Good	Good
	Salthill Beach	Excellent	Excellent	Excellent	Excellent
	Silverstrand Beach	Excellent	Excellent	Excellent	Excellent
Galway County Council	Aillebrack/Silverhill Beach	n/a	New	New	Excellent
	An Trá Mór, Coill Rua, Indreabhán	Excellent	Excellent	Excellent	Excellent
	Bathing Place at Portumna	Excellent	Excellent	Excellent	Excellent
	Céibh an Spidéil	Excellent	Excellent	Excellent	Excellent
	Cill Mhuirbhigh, Inis Mór	Excellent	Excellent	Excellent	Excellent
	Goirtín, Cloch na Rón	Excellent	Excellent	Excellent	Excellent
	Loughrea Lake	Excellent	Excellent	Excellent	Excellent
	Trá an Dóilín, An Ceathrú Rua	Excellent	Excellent	Excellent	Excellent
	Trá Chaladh Fínis, Carna	Excellent	Excellent	Excellent	Excellent
	Trá Inis Oírr (Main Beach)	Excellent	Excellent	Excellent	Excellent

Local Authority	Identified Bathing Water	2020	2021	2022	2023
Galway County Council continued	Trá na bhForbacha, Na Forbacha	Good	Good	Excellent	Excellent
	Trá na mBan, An Spidéal	Sufficient	Sufficient	Poor	Poor
	Traught, Kinvara	Excellent	Good	Excellent	Excellent
Kerry County Council	Baile an Sceilg (Ballinskelligs)	Excellent	Excellent	Excellent	Excellent
	Ballybunnion North	Good	Excellent	Excellent	Excellent
	Ballybunnion South	Excellent	Excellent	Excellent	Excellent
	Ballyheigue	Excellent	Excellent	Excellent	Excellent
	Banna Strand	Excellent	Excellent	Excellent	Excellent
	Castlegregory	Excellent	Excellent	Excellent	Excellent
	Cúas Crom	Poor	Sufficient	Good	Good
	Doire Fhíonáin (Derrynane)	Excellent	Excellent	Excellent	Excellent
	Fenit	Excellent	Excellent	Excellent	Excellent
	Fionntrá (Ventry)	Excellent	Excellent	Excellent	Excellent
	Inch	Excellent	Excellent	Excellent	Excellent
	Kells	Excellent	Excellent	Excellent	Excellent
	Maharabeg	Excellent	Excellent	Excellent	Excellent
	Rossbeigh, White Strand	Excellent	Excellent	Excellent	Excellent
	Trá na hUíne (Inny Strand, Waterville)	Good	Excellent	Excellent	Excellent
	White Strand, Caherciveen	Excellent	Excellent	Excellent	Excellent
Leitrim County Council	Keeldra Lough	Excellent	Excellent	Excellent	Excellent
Louth County Council	Clogherhead	Excellent	Excellent	Excellent	Excellent
	Port, Lurganboy	Excellent	Excellent	Excellent	Excellent
	Seapoint	Excellent	Excellent	Excellent	Excellent
	Shelling Hill/Templetown	Excellent	Excellent	Excellent	Excellent
Mayo County Council	Bertra Beach, Murrisk	Good	Good	Excellent	Excellent
	Carrowmore Beach, Louisburgh	Excellent	Good	Good	Good
	Carrowniskey, Louisburgh	Good	Excellent	Excellent	Excellent
	Clare Island, Louisburgh	Excellent	Good	Excellent	Excellent
	Dooega Beach, Achill Island	Excellent	Excellent	Excellent	Excellent
	Dugort Beach, Achill Island	Excellent	Excellent	Excellent	Excellent
	Elly Bay, Belmullet	Excellent	Excellent	Excellent	Excellent
	Golden Strand, Achill Island	Excellent	Excellent	Excellent	Excellent
	Keel Beach, Achill Island	Excellent	Excellent	Excellent	Excellent
	Keem Beach, Achill Island	Excellent	Excellent	Excellent	Excellent
	Mullaghroe Beach, Belmullet	Excellent	Excellent	Excellent	Excellent
	Mulranny Beach	Excellent	Excellent	Excellent	Excellent
	Old Head Beach, Louisburgh	Good	Good	Excellent	Excellent
	Rinroe Beach, Carrowtigue	Excellent	Excellent	Excellent	Excellent
	Ross Beach, Killala	Excellent	Excellent	Excellent	Excellent
Meath County Council	Laytown/Bettystown	Excellent	Excellent	Excellent	Excellent
Sligo County Council	Dunmoran Beach	Excellent	Good	Excellent	Excellent
	Enniscrone Beach	Good	Sufficient	Good	Excellent
	Mullaghmore Beach	Sufficient	Sufficient	Sufficient	Sufficient
	Rosses Point Beach	Excellent	Excellent	Excellent	Excellent

Local Authority	Identified Bathing Water	2020	2021	2022	2023
Sligo County Council continued	Streedagh Beach	Excellent	Excellent	Excellent	Excellent
Waterford City and County Council	Ardmore Beach	Excellent	Excellent	Excellent	Excellent
	Bunmahon Beach	Good	Good	Sufficient	Sufficient
	Clonea Beach	Excellent	Excellent	Excellent	Excellent
	Counsellors' Strand, Dunmore East	Excellent	Excellent	Good	Good
	Dunmore Strand, Dunmore East	Excellent	Excellent	Excellent	Good
	Tramore Beach	Excellent	Excellent	Excellent	Good
Westmeath County Council	Lilliput, Lough Ennell	Poor	Changes	Good	Good
	Portnashangan, Lough Owel	Excellent	Excellent	Excellent	Excellent
	The Cut, Lough Lene	Excellent	Excellent	Excellent	Excellent
Wexford County Council	Ballinesker	Excellent	Excellent	Excellent	Excellent
	Ballymoney, North Beach	Good	Excellent	Excellent	Good
	Carne	Excellent	Excellent	Excellent	Excellent
	Courtown, North Beach	Excellent	Excellent	Excellent	Excellent
	Curracloe	Excellent	Excellent	Excellent	Excellent
	Duncannon	Sufficient	Sufficient	Sufficient	Sufficient
	Morriscastle	Excellent	Excellent	Excellent	Excellent
	Rosslare Strand	Excellent	Excellent	Excellent	Excellent
Wicklow County Council	Bray South Promenade	Excellent	Good	Good	Good
	Brittas Bay North	Excellent	Excellent	Excellent	Excellent
	Brittas Bay South	Excellent	Excellent	Excellent	Excellent
	Clogga	Excellent	Excellent	Good	Good
	Greystones South	Excellent	Excellent	Excellent	Excellent
	Silver Strand	Good	Excellent	Excellent	Good


Bathing Water Quality
Map of Ireland 2023
N
Galway Area
Trá na bhForbacha, Na Forbacha
Ballyloughane Beach
An Trá Mór, Coill Rua, Indreabhán
Silverstrand Beach
Grattan Road Beach
Salthill Beach
Céibh an Spidéil
Trá na mBan, An Spidéal
0 3 6 12 Km
Dublin Area
Balbriggan, Front Strand Beach
Skerries, South Beach
Loughshinny Beach
Rush, North Beach
Rush, South Beach
Portrane, the Brook Beach
Donabate, Balcarrick Beach
Portmarnock, Velvet Strand Beach
Sutton, Burrow Beach
Claremont Beach
Dollymount Strand
Sandymount Strand
Seapoint
Forty Foot Bathing Place
Sandycove Beach
White Rock Beach
Killiney
Bray South Promenade
Greystones South
0 5 10 20 Km
Ballyhiernan, Fanad
Downings
Portsalon
Killahoey
Culdaff
Drumnatinny
Stroove
Magheraroarty
Lady's Bay, Buncrana
Portarthur, Derrybeg
Lisfannon
Carrickfinn
Rathmullan
Dooey
Marble Hill
Naran
Portnablagh
Fintra
Murvagh
Ross Beach, Killala
Rossnowlagh
Rinroe Beach, Carrowtigue
Streedagh Beach
Bundoran
Elly Bay, Belmullet
Mullaghmore Beach
Mullaghroe Beach, Belmullet
Rosses Point Beach
Golden Strand, Achill Island
Dugort Beach, Achill Island
Dunmoran Beach
Keem Beach, Achill Island
Enniscrone Beach
Keeldra Lough
Keel Beach, Achill Island
Mulranny Beach
Dooega Beach, Achill Island
Bertra Beach, Murrisk
The Cut, Lough Lene
Clare Island, Louisburgh
Old Head Beach, Louisburgh
Carrowmore Beach, Louisburgh
Aillebrack/Silverhill Beach
Carrowniskey, Louisburgh
Portnashangan, Lough Owel
Goirtín, Cloch na Rón
Trá Chaladh Fínis, Carna
Traught, Kinvara
Trá an Dóilín, An Ceathrú Rua
Lilliput, Lough Ennel
Cill Mhuirbhigh, Inis Mór
Loughrea Lake
Fanore
Bathing Place at Portumna
Trá Inis Oirr (Main Beach)
Bishopsquarter
Lahinch
Mountshannon, Lough Derg
White Strand, Miltown Malbay
Ballycuggeran
White Strand, Doonbeg
Ballyallia Lake
Spanish Point
Ennis
Kilkee
Quilty
Carrigaholt
Seafield, Quilty
Ballybunnion North
Cappagh Pier, Kilrush
Duncannon
Ballybunnion South
Tramore Beach
Ballyheigue
Maharabeg
Banna Strand
Bunmahon Beach
Castlegregory
Fenit
Clonea Beach
Fionntrá (Ventry)
Inch
Garryvoe
Kells
Rossbeigh, White Strand
Cúas Crom
Garretstown
Ardmore Beach
White Strand, Caherciveen
Coolmaine
Redbarn
Baile an Sceilg (Ballinskelligs)
Youghal Front Strand Beach
Fountainstown
Youghal, Claycastle
Trá na hUíne (Inny Strand, Waterville)
Garrylucas, White Strand
Doire Fhíonáin (Derrynane)
Inchydoney East Beach
Tragumna
Inchydoney West Beach
Barley Cove
Warren, Cregane Strand
Owenahincha, Little Island Strand
Shelling Hill/ Templetown
Port, Lurganboy
Clogherhead
Seapoint
Laytown/ Bettystown
Silver Strand
Brittas Bay North
Brittas Bay South
Clogga
Ballymoney, North Beach
Courtown, North Beach
Morriscastle
Ballinesker
Curracloe
Rosslare Strand
Carne
Counsellors' Strand, Dunmore East
Dunmore Strand, Dunmore East
Bathing Water Quality Status
Excellent
Sufficient
Good
Poor
0 35 70 140 Km
CYAL50380495 © Tailte Éireann – Surveying

9 Biodiversity

LAYDE CONSULTING

Preliminary Ecological Appraisal

Proposed Regeneration Scheme, Dublin Street North, Monaghan

Client: Carlin Planning Ltd

Project Reference: P676-1

Issue Date: December 2024

Specialist Environmental Consultancy Services

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EXECUTIVE SUMMARY

Layde Consulting was appointed by Carlin Planning Ltd to undertake a Preliminary Ecological Appraisal (PEA) for a proposed Regeneration Scheme within Monaghan town, extending to lands at the rear of Dublin Street North. This report summarises the key findings in relation to local ecology, and protected national and international designations within close proximity to the site, along with further recommendations should these be required.

A desk study search of the National Parks and Wildlife Serve (NPWS) GIS database was undertaken in order to identify Natura 2000 designations, proposed or designated Natural Heritage Areas (pNHA's & NHA's). The search criteria incorporated an area of 15km radius of the site, and the search results indicated that the site is not located within any Natura 2000 designation. The closest Natura 2000 designation was identified to be more than 10km away from the site (Slieve Beagh SPA), although the site development proposals do not have any source-pathway-receptor linkages to any of the identified SPA or SAC designations, and are unlikely to support any qualifying interests in terms of breeding bird species. In addition to the Natura 2000 sites, a review was undertaken of the NPWS databases for other protected designations within close proximity to the site, in particular Proposed Natural Heritage Areas. The closest protected designation to the site is Wright's Wood pNHA which is located approximately 1.75km to the west, however no feasible source-pathway-receptor linkages were identified between the site proposals and any of the pNHA designations.

It is noted that the Lough Neagh & Lough Beg RAMSAR and SPA sites are located approximately 33km and 38km northeast of the site respectively. Although highly unlikely to affect these designations, there remains a hydraulic link between the site development area and the designations via the River Shambles to the Cor River, and then subsequently to the Annaghroe Blackwater and into Lough Neagh. Therefore, as a precautionary approach, it is recommended that an Appropriate Assessment (AA) screening exercise is carried out. Should the effects of the development, either during the construction or operational phase, not be screened out, then a Natura Impact Statement (NIS) may be required to inform any future Appropriate Assessments.

Augmented by national records, site walkovers and habitat mapping, the results indicate that other than bat species there were no protected species identified within the site or surrounding area. As the site development proposals include the demolition of buildings, the removal of vegetation and felling of old trees, then this report recommends that further bat activity surveys are required in terms of identifying potential for bat roosts, and to assess the presence of bat species within the site.

No other mammal activity was noted other than rabbit and fox activity.

No freshwater fish were observed along the River Shambles corridor at either Old Cross Square, upstream at the junction where the Ulster Canal Greenway commences, or at Castle Road bridge section. In terms of national records, no records were noted for protected fish species, and the current water quality status is considered to be poor. Therefore, no further surveys have been recommended for freshwater fish.

A number of Invasive Species were identified within the site development area, therefore it is recommended to carry out an Invasive Species Survey, and to develop an Invasive Species Management Plan as part of the supporting works for the Ecological Impact Assessment process. Ideally invasive species surveys should be carried out during the plant growing season (April to September) when species and extent of growth is more readily identifiable.

It is recommended that all clearance of vegetation or tree felling work is undertaken outside of the breeding bird season (generally considered to extend between March and August inclusive). As an informative, if works are to be undertaken during the bird breeding season, then breeding bird checks may be necessary prior to commencement of works where clearing or removal of trees and vegetation cover is required. If nests are identified and deemed to be active, a temporary pause of works, or a watching brief to identify species and monitor for any signs of disturbance during works, may be required. This may also require a buffer area to be implemented during the breeding season. Some bird species are afforded extra protection under the Irish Wildlife Act, and dependent on their sensitivity to construction activities, may require an increased buffer area to minimise disturbance during this period. All works involving breeding bird and nesting checks should be carried out under the supervision of a qualified ecologist or ornithologist.

In summary, on the basis of the desk study and site walkover investigations carried out to date, it is recommended to undertake the following assessments in order to further inform an Ecological Impact Assessment, and to develop suitable mitigation measures as required:

- Invasive Species Survey
- Invasive Species Management Plan
- Bat Roost & Activity Surveys (where trees, buildings or linear structures are to be removed)
- Appropriate Assessment Screening & Natura Impact Statement (NIS), as required

1.0 INTRODUCTION

1.1 Report Brief & Scope

Layde Consulting was appointed by Carlin Planning Ltd to undertake a Preliminary Ecological Appraisal (PEA) for a proposed Regeneration Scheme within Monaghan town, extending to lands at the rear of Dublin Street North. This report summarises the key findings in relation to local ecology, and protected national and international designations within close proximity to the site.

This report was carried out in accordance with the CIEEM Guidelines for Preliminary Ecological Appraisal[1], whereby a Preliminary Ecological Appraisal (PEA) is the rapid assessment of any ecological features present, or potentially present, within a site and its surrounding area, and involves desk study assessments in conjunction with site walkovers and habitat mappings. The key objectives of the Preliminary Ecological Appraisal (herein termed 'PEA') were to identify:

- the presence of any legally protected habitats listed within European legislation;
- the presence of habitats which might offer suitable niche requirements for legally protected fauna; and,
- any requirement of further ecological survey work to inform the development process or subsequent options appraisal process of the upgrade scheme.

This appraisal is based on a review of the development proposals provided by the client, desk study data (third party information) and a survey of the development area including adjoining lands where applicable.

1.2 Limitations

Weather conditions throughout the survey walkover periods were generally dry and mild, which is generally considered to be suitable for carrying out field work and site walkovers. It should be noted that some of the proposed development area had restricted access due to private land/residential ownership. However, these restrictions were not deemed to have a significant impact on the survey results. It was not the purpose of the survey to carry out a targeted search for the presence of protected species or their resting places, and it should be noted that species identification and activity is subject to change both in terms of spatial and temporal extents.

The results of the survey were designed to inform the requirement for further species specific surveys and should be treated as such. It should be noted that this PEA does not include specific details relating to the positions of Invasive Species, as an Invasive Species Survey and Management Plan has been undertaken separately to this report.

This report pertains to the desk-based assessments, site walkovers and review of published information in relation to the site only. Recommendations included within this report are the professional opinion of an experienced ecologist, based on their personal interpretation of legislation and planning policy, and are therefore the view of Layde Consulting and have been prepared in accordance with the British Standard for Biodiversity Code of Practice for Planning and Development (BS42020:2013) and the relevant CIEEM Guidelines.

[1] CIEEM "Guidelines for Ecological Appraisal, Second Edition", (2017)

1.3 Site Overview & Development Proposals

The proposed development area (herein termed the 'site') incorporates lands to the rear of Dublin Street North, Monaghan (see Figure 1), and comprises of a mix of urbanised areas, external residential amenity areas, commercial land, and derelict lands comprising of scrub and treelines along St. Davnet's Row and the Old Infirmary. Under the development proposals it is intended to regenerate the site by demolishing the existing buildings within the site, and constructing a new public access road, car parking and event space, and also enabling the provision of future development plots for commercial and residential uses. As a result, the development proposals also include the removal of vegetation and ground cover, as required, and grading cut/fill works. The proposals also include all necessary infrastructure provisions such as drainage and utilities, paving, surfacing and landscaping.

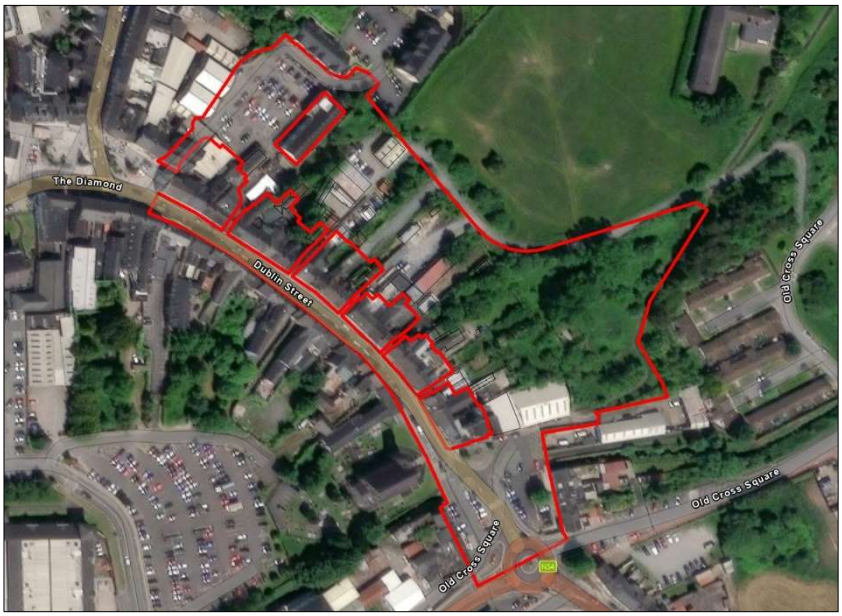

Figure 1- Proposed development area, lands to the rear of Dublin Street North

1.4 Statement of Authority

This report has been prepared by John Laverty, Principal Environmental Scientist at Layde Consulting who holds a BSc (Hons) degree in Environmental Science and is a Full member of the Institute of Environmental Sciences. John has over 20 years of experience in the preparation of ecological impact assessments, and has worked with a range of private and PLC companies and on an extensive number of development and infrastructure projects.

2.0 LEGISLATION AND POLICY CONTEXT

2.1 Habitats Directive

The Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna) forms the main legislative body for the protection and conservation of biodiversity within the European Union (EU), and lists habitats and species that must be protected within Special Areas of Conservation (SAC) on Annexes I and II respectively. The Habitats Directive additionally identifies plant and animal species on Annex IV which are subject to strict protection anywhere they occur. The habitats directive has subsequently been transposed and disaggregated to national regulations, including the following regulations and Statutory Instruments for Ireland:

2.2 Wildlife Acts

The Wildlife Acts 1976 to 2021 is a collective citation for the following:

- Wildlife Act 1976 (no. 39 of 1976)
- Wildlife (Amendment) Act 2000 (no. 38 of 2000)
- Wildlife (Amendment) Act 2010 (no. 19 of 2010)
- Wildlife (Amendment) Act 2012 (no. 29 of 2012)
- Heritage Act 2018 (no. 15 of 2018), Part 3
- Planning, Heritage and Broadcasting (Amendment) Act 2021 (no.11 of 2021), Chapter 3

2.3 Birds and Natural Habitats Regulations

The European Communities Council Directive on the Conservation of Wild Birds 79/409/EEC was transposed to the Birds and Natural Habitats Regulations 2011 (S. I. No. 477 of 2011), and amended under the 2011 Regulations to:

- S.I. No. 290 of 2013
- S.I. No. 499 of 2013
- S.I. No. 355 of 2015
- Planning, Heritage and Broadcasting (Amendment) Act 2021 (no.11 of 2021), Chapter 4
- S.I. No. 293 of 2021

2.4 Designation of European Sites

A key measure to protect nature and biodiversity in the EU is the establishment of a network of nature protection areas under the Habitats Directive and the Birds Directive. The areas designated under these two pieces of legislation are known collectively as Natura 2000 sites, also referred to as European Sites under national legislation.

The 2011 Regulations seek to conserve species of wild birds and require the designation of a network of habitats for birds, based on scientific criteria, and are known as Special Protected Areas (SPAs). The 2011 Regulations, also require the designation of Special Areas of Conservation (SACs) for the protection of certain habitats and species of plants and animals (other than birds).

2.5 Other Protections & Designations

EU countries must also establish systems of strict protection for animal and plant species which are particularly threatened, and which are listed in Annex IV of the Habitats Directive. Article 12 and 13 of the Habitats Directive relates to the establishment of a system of strict protection for certain animal and plant species, while Article 16 provides for derogations from these provisions under limited circumstances. Article 12, 13 and 16 of the Habitats Directive are transposed into Irish law by Regulation 51, 52 and 54 of the Birds and Habitats Regulations of 2011, respectively. The animal species listed in Annex IV, which occur in Ireland, are:

- otters
- all bat species
- all cetaceans (whales and dolphins)
- the natterjack toad
- the leatherback Turtle
- kemp's ridley turtle
- loggerhead turtle
- hawksbill turtle
- the Kerry slug

The plant species listed in Annex IV, which occur in Ireland, are:

- Slender Naiad
- Yellow Marsh Saxifrage
- Killarney Fern

Each of these species is strictly protected in Ireland and a person who deliberately captures, kills or disturbs a specimen in the wild, or who damages or destroys a breeding site or resting place of such an animal, is guilty of an offence. As an Annex IV species may be found throughout the country, the protection of these species is not restricted in geographical terms and is not necessarily associated with areas subject to a specific nature designation. Under the Wildlife Act (1976) and Wildlife (Amendment) Acts (2000 & 2010), the following species are also afforded local protection:

- Red squirrel
- Badger
- Natterjack Toad
- Deer species
- Hedgehog
- Pine marten
- Hare species

2.6 Species Specific Legislation

2.6.1 Bats (all species)

All bats and their roosting sites are legally protected under the EU Habitats Directive as transposed by the Habitats Regulations. With the exception of Lesser Horseshoe bat (*Rhinolophus hipposideros*), which is an Annex II species, the remainder are classified as Annex IV species. They are also protected under the Wildlife Act (as amended). Across Europe, bats are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. Article 12 and 13 of the Habitats Directive relates to the establishment of a system of strict protection for certain animal and plant species, while Article 16 provides for derogations from these provisions under limited circumstances.

Article 12, 13 and 16 of the Habitats Directive are transposed into Irish law by Regulation 51, 52 and 54 of the Birds and Habitats Regulations of 2011, respectively. All bats are strictly protected in Ireland and a person who deliberately captures, kills or disturbs a specimen in the wild, or who damages or destroys a breeding site or resting place of such an animal, is guilty of an offence.
As an Annex IV species may be found throughout the country, the protection of these species is not restricted in geographical terms and is not necessarily associated with areas subject to a specific nature designation. Under the Regulations it is an offence:

- Deliberately to capture, injure or kill a wild animal of a European protected species;
- Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
- Deliberately disturb such an animal in such a way as to be likely to;
  - affect the local distribution or abundance of the species to which it belongs;
  - impair its ability to survive, breed or reproduce, or rear or care for its young; or
  - impair its ability to hibernate or migrate;
- Deliberately obstruct access to a breeding site or resting place of such an animal; or
- To damage or destroy a breeding site or resting place of such an animal.

It is notable that there is no provision within the legislation to issue licences to kill bats for the purpose of development.

2.6.2 Breeding Nesting Birds

All wild birds are protected, particularly during the bird breeding season while nesting under the Irish Wildlife Act 1976 (as amended), the EU Habitats Directive of the Bern convention via the European Communities (Birds and Natural Habitats Regulations 2011 (S. I. No. 477 of 2011). It is an offence to intentionally or recklessly:

- kill, injure or take any wild bird; or
- take, damage or destroy the nest of any wild bird while that nest is in use or being built; or
- at any other time take, damage or destroy the nest of any wild bird included in Schedule A1; or
- take or destroy an egg of any wild bird; or
- disturb any wild bird while it is building a nest or is in, on or near a nest containing eggs or young; or
- disturb dependent young of such a bird.

Additionally, any person who knowingly causes or permits to be done an act which is made unlawful by any of these provisions shall also be guilty of an offence.

2.6.3 Wild Birds

Most bird species return to the same general nesting location each year and build a new nest. However, some species return to the same nest sites year after year, re-using old nests. For these species it is an offence to damage or destroy their nests at any time of the year, even when they are not in use. All wild birds are also subject to conservation measures under the Birds Directive (2009/147/EC). This requires European Member States to take conservation measures to maintain populations of all naturally occurring wild birds.

Additionally, some bird species, which are particularly rare or vulnerable, are listed on Annex I of the Directive. These species are subject to special conservation measures and have additional legal protection as features of designated sites, such as Special Protection Areas (SPAs). Local and national biodiversity action plans consider priority species within the local area of conservation concern.

2.6.4 Red Squirrel (*Sciurus vulgaris*)

Red squirrels (*Sciurus vulgaris*) and their dreys are protected under the Irish Wildlife Act 1976 (as amended) and are listed under Annex III of the Bern Convention for Conservation of European Wildlife and Natural Habitats. Under this It is an offence to:

- intentionally or recklessly kill, injure or take
- intentionally or recklessly: damage or destroy, or obstruct access to, any structure or place which red squirrels use for shelter or protection;
- damage or destroy anything which conceals or protects any such structure; disturb a red squirrel while it is occupying a structure or place which it uses for shelter or protection.

There is no provision within the legislation to issue licences to kill red squirrels for the purpose of development.

2.6.5 Badgers (*Meles meles*)

Badgers (*Meles meles*) are legally protected under the Irish Wildlife Act 1976 (as amended) and Annex IV of the EU Habitats Directive Appendix III of the Bern convention as a species in need of protection. Under the Order it is an offence to:

- intentionally or recklessly kill, injure or take a badger; or
- intentionally or recklessly damage or destroy, or obstruct access to, any structure or place (normally a sett) that badgers use for shelter or protection; or
- intentionally or recklessly damage or destroy anything which conceals or protects any such structure; or
- intentionally or recklessly disturb a badger while it is occupying a structure or place which it uses for shelter or protection.

In addition, any person who knowingly causes or permits to be done an act which is made unlawful by any of these provisions shall also be guilty of an offence. Again, there is no provision within the legislation to issue licences to kill badgers for the purpose of development.

2.6.6 Otter (*Lutra lutra*)

Otters (*Lutra lutra*) are protected under the Irish Wildlife Act 1976 (as amended) and are listed on Annex II and Annex IV of the EU Habitats Directive. Under the Habitats Regulations it is an offence:

- Deliberately capture, injure or kill a wild animal of a European protected species;
- Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
- Deliberately to disturb such an animal in such a way as to be likely to;
  - affect the local distribution or abundance of the species to which it belongs;
  - impair its ability to survive, breed or reproduce, or rear or care for its young; or
  - impair its ability to hibernate or migrate;
- Deliberately to obstruct access to a breeding site or resting place of such an animal; or
- To damage or destroy a breeding site or resting place of such an animal.

There is no provision within the legislation to issue licences to kill otters for the purpose of development.

2.6.7 Natterjack Toad

Natterjack Toad are protected in Ireland under Ounder Appendix II of the Convention on the Conservation of European Wildlife and Natural Habitats (The Bern Convention). Among the list of offences in relation to the Order, it is an offence regarding:

- The deliberate capture and keeping and deliberate killing of protected species;
- the deliberate damage to or destruction of breeding or resting sites;
- the deliberate disturbance of wild fauna, particularly during the period of breeding, rearing and hibernation, insofar as disturbance would be significant in relation to the objectives of the Convention;
- the deliberate destruction or taking of eggs from the wild or keeping these eggs;

In addition, any person who knowingly causes or permits to be done an act which is made unlawful by any of these provisions shall also be guilty of an offence. There is no provision within the legislation to issue licences to kill a Natterjack Toad for the purpose of development.

2.6.8 Common or viviparous lizard (*Zootoca vivipara*)

Common lizards (*Zootoca vivipara*) are afforded protection under Appendix III of the Convention on the Conservation of European Wildlife and Natural Habitats (The Bern Convention). Under the Order it is an offence to:

- intentionally or recklessly kill, injure or take a lizard, or
- intentionally or recklessly damage or destroy, or obstruct access to, any structure or place that lizards use for shelter or protection.

2.6.9 Lepidoptera

The marsh fritillary butterfly (*Euphydryas aurinia*) is a protected species listed on Annex II and Annex IV of the EU Habitats Directive, whereby it is an offence It is an offence to:

- intentionally or recklessly kill, injure or take the marsh fritillary butterfly; or
- intentionally or recklessly damage or destroy, or obstruct access to, any structure or place that the marsh fritillary uses for shelter or protection

Cryptic Wood white Butterfly is also listed on Schedules 5 of the 1982 Wildlife and Countryside Act.

2.6.10 Flora

All wild plants are given some measure of protection in the Republic of Ireland, The current list of plant species protected by Section 21 of the Wildlife Act, 1976 is set out in the Flora (Protection) Order, 2015. The order has the effect that, unless you have a licence, you may not:

- intentionally pick, uproot or destroy any wild plants listed in the schedule, or even collect their flowers and seeds;
- sell these plants or their seeds if taken from the wild;
- uproot any wild plants intentionally, except on your own land or with permission.

3.0 METHODOLOGY

3.1 Desk Based Assessment

A desk-based review of biological records was carried out based on the standard best practice methodology provided by the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidance for Preliminary Ecological Appraisal (CIEEM, 2017). The study aimed to gather information on the potential value of the site and the wider study area specifically in terms of statutory and non-statutory conservation designations, protected habitats and protected species.

Data regarding statutory and non-statutory designated sites, plus any records of protected or notable species and habitats was requested from the local ecological records centre and online resources, details of which are provided in Table 1 below. The study area extended up to 1km from the site in order to account for regional records and spatial trends, and included a review of NPWS and EPA GIS datasets, and species records from relevant working groups.

Table 1 - Summary of desk study resources and source information

Source	Detail or Link
National Parks & Wildlife Service	GIS datasets & National Records database
National Biodiversity Data Centre	Heritage Council Mapping Centre & Databases

3.2 Field Surveys & Habitat Mapping

Field survey methodologies and habitat mapping was carried out in accordance with CIEEM guidelines[2], and habitat identification and classification was completed in accordance with the Fossitt's Guide[3] (2000). The field walkover and surveys were carried out from the 18th July – 12th September 2023, 25th January 2024, and from the 16th – 28th August 2024. Field mapping and target notes were recorded using a Trimble sub-metre GPS Catalyst receiver (60cm accuracy). The survey area was provided by the client in the form of DWG vectors and imported to GIS format. Searches comprised the following methods, along with review of collated field target notes.

Badger

Areas of suitable badger habitat such as broadleaved woodland areas, copses and scrub, were identified within the survey area as these tend to be favoured by the species (although they have also been known to occupy areas of forestry plantation etc). Any incidental field signs of badger and any indicative evidence were noted, and include:

- setts (including main, subsidiary and outlier setts);
- latrines (dung pits used as territorial markers);
- prints;
- foraging signs (snuffle holes); and,
- guard hairs snagged on wire fencing.

Any of the above signs (with the exception of foraging signs) can be taken as diagnostic evidence of the presence of badger.

Otter

All waterbodies, watercourses and minor ditches within the survey area, where access was permitted and where it was safe to do so, were assessed for their potential to support otters. Any incidental recordings of otter field signs were noted, which includes:

- resting sites (e.g. holts and couches);
- spraints;
- prints and feeding remains.

Pine Marten

Pine marten are recognised as difficult to survey for, as their scats (the most obvious field signs) are similar to those of a fox when seen in the field. As such the surveys focussed on assessing the habitat suitability. This typically includes mature woodland, including coniferous plantations, although pine marten will forage in open habitats as well. In particular, the survey searched for areas which might hold suitable potential for denning sites including hollow trees, root plates, boulder piles or rocky outcrops. Pine marten signs are described in Harris and Yalden (2008)[4].

Red Squirrel

Any incidental recordings of red squirrel field signs were noted including:

- dreys (tree-top resting sites); and,
- feeding remains (chewed pine cones, particularly at traditional feeding stations such as on top of tree stumps).

It should be noted that it is not possible to distinguish red squirrel dreys and feeding remains from those of grey squirrels. The most reliable method of confirming the species presence is the sighting of an actual animal. Therefore, given the relatively low likelihood of seeing a red squirrel during the survey, the main aim of the survey was to identify whether squirrels (regardless of species) were likely to be present.

[2] CIEEM "*Guidelines for Ecological Appraisal, Second Edition*", (2017)
[3] Julie A. Fossitt, "*A Guide to habitats in Ireland*", 2000, The Heritage Council
[4] Harris, S. and Yalden, D. W. (2008). Mammals of the British Isles: Handbook. The Mammal Society.

Reptiles and Amphibians
Areas of suitable habitat for reptiles and amphibians were identified within the survey area. The habitat requirements of common lizard (*Zootoca vivipara*), are relatively broad but in general they require areas of dense vegetation such as grassland, heath, scrub and woodland edge for foraging and shelter. Reptiles also require more open, preferably south facing areas in which to bask (Gent and Gibson, 2012)[5], and suitable refugia habitat such as wood and rock piles in which to shelter and more importantly to hibernate during the winter.

Bats (all species)
Target notes were maintained throughout the assessment area for habitats and features which would be suitable to support bat roosting, foraging and commuting places. It should be noted that this report however does not provide a specific detailed bat assessment or Preliminary Bat Roost Survey, but rather highlights areas or habitat features which should be investigated further as required.

Breeding Birds
Target notes were maintained throughout the assessment area as to the presence or suitability of habitats and features within the site which may support breeding bird species, and a record of incidental bird sightings was maintained during the site visit.

4.0 RESULTS - DESK BASED ASSESSMENT

4.1 Natura 2000 Sites & Designations

A search of the National Parks and Wildlife Serve (NPWS) GIS database was undertaken in order to identify any Natura 2000 designations, or proposed or designated Natural Heritage Areas (pNHA's & NHA's). The search criteria incorporated an area 15km radius of the site, and a summary of the findings are presented below in Table 2, with the results illustrated in Figure 2.

Table 2. Identified Natura 2000 & designations within 15km of the site.

Designation	Site ID	Site Name	Setback Distance
pNHA	001612	Wright's Wood	1.75km west
pNHA	001602	Drumreaske Lough	3km northwest
pNHA	001784	Rosefield Lake And Woodland	3.9km west
pNHA	001611	Ulster Canal (Aghalisk)	3.6km west
pNHA	001783	Corcreeghy Lake And Woodland	5km southwest
pNHA	001785	Mullaghmore Lake (South)	6.4km northwest
pNHA	001837	Mullaglassan Lough	9.9km west
pNHA	001838	Kilcorran Lough	11km west
pNHA	001839	Kilcorran Lough	12.1km west
pNHA	001840	Lislannan Bog	12.8km west
pNHA	001781	Lisarilly Bog	11.2km southwest
pNHA	001606	Rafinny Lough	9km southwest
pNHA	000001	Dromore Lakes	13.4km south
pNHA	001268	Cordoo Lough	10.9km southeast
pNHA	001666	Tassan Lough	13.9km southeast
pNHA	000559	Glaslough Lake	8.2km northeast
pNHA	000562	Monmurray Grassland	11.5km northeast
pNHA	000558	Emy Lough	9.7km north
SPA	004167	Slieve Beagh SPA	10.4km northwest
NHA	001603	Eshbrack Bog NHA	12.6km northwest
SAC	UK0016622	Slieve Beagh SAC	15.3km Northwest
SAC	UK0016621	Magheraveely Marl Loughs SAC	12.3km West

[5] Gent, T. and Gibson, S. (2012) "*Herpetofauna Workers' Manual",* Joint Nature Conservation Committee

Designation	Site ID	Site Name	Setback Distance
SPA	UK9020302	Slieve Beagh-Mullaghfad-Lisnaskea SPA	14.8km Northwest

The search results indicated that the site is not located within any Natura 2000 designation. The closest Natura 2000 designation was identified to be more than 10km away from the site (Slieve Beagh SPA), although the site development proposals do not have any source-pathway-receptor linkages to the SPA designation, and are unlikely to support any qualifying interests in terms of breeding bird species.

In addition to Natura 2000 sites, a review was undertaken of the NPWS databases for other protected designations within close proximity to the site, in particular Proposed Natural Heritage Areas. Proposed NHAs (pNHAs) were published on a non-statutory basis in 1995 although have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats. Some of the pNHAs are very small, such as a roosting place for rare bats, while others are much larger, such as a woodland or lake for example. Although not currently designated under statutory basis, it should be noted that designations for pNHAs may proceed on a phased basis over the coming years. As such, each identified pNHAs located within close proximity to the site has also been taken into consideration within this report.

The closest protected designation to the site is Wright's Wood pNHA which is located approximately 1.75km to the west, however there were no identified feasible source-pathway-receptor linkages between the site proposals and any of the pNHA designations.

It is noted that the Lough Neagh & Lough Beg RAMSAR site is located approximately 33km northeast of the site, and Lough Neagh & Lough Beg SPA is located approximately 39km NE. Although highly unlikely to affect these designations, there remains a hydraulic link between the site development area and the designations via the River Shambles to the Cor River, and then subsequently to the Annaghroe Blackwater and into Lough Neagh.

4.2 National Biodiversity Data Centre

A search was undertaken of the Heritage Council Mapping Centre and National Biodiversity Data Centre, inclusive of the site area and immediate surrounding lands (1km square grid, map tile H6733 & H6734). The detailed results are presented in Appendix 1, and summarised below:

Two records were identified for Smoot Newt (*Lissotriton vulgaris*), however these records were last updated in 2010, with no records being recorded of Smooth Newt since. In terms of mammals, one record was noted for Eastern Grey Squirrel (*Sciurus carolinensis*) in 2007, and a single record for West European Hedgehog (*Erinaceus europaeus*) in 2023. Red Squirrel (*Sciurus vulgaris*) was recorded within lands to the north in 2018, and an otter (road kill survey) was last recorded in 2008. 42No. bird species were recorded through the 1km square grid, along with insect species, which due to the numerous records are referred to Appendix 1 for more detailed review. 13No. flowering plant species were noted, which includes Japanese Knotweed (*Fallopia japonica*) recorded in 2019. The search results indicated that the site and wider area may be suitable for the following bat species:

Moderate suitability for:
Pipistrellus pygmaeu
Plecotus auritus
Pipistrellus pipistrellus
Nyctalus leisleri
Myotis daubentonii
Myotis nattereri

Low to moderate suitability for:
Pipistrellus nathusi
Myotis mystacinus

5.0 HABITAT SURVEYS

A series of site walkovers and habitat surveys were carried out from the 18th July – 12th September 2023, 25th January 2024, and from the 16th – 28th August 2024, in order to identify evidence of notable species or habitat features, and to provide an overview of the habitat mosaics present within the site area. Habitat mapping was also augmented by the National Biodiversity Data Centre records and habitat mapping feature using the Fossitts guide for mosaics. The Habitat classification map (full overview) is presented in Figure 3, and a detailed description of the habitat classifications are discussed in the following subsections.

5.1 WS1 Scrub

Lands to the rear of properties along Dublin Street North and throughout the northwest area of the site comprise of portions of derelict or fallow ground which have subsequently colonised as scrub. Large areas of scrub were also identified within the eastern part of the site (Figure 4). Identified species included dense stands of Bramble (*Rubus fruticosus* agg.), Nettle (*Urtica dioica*), willow (*Salix* spp. to include *Salix cinerea & caprea*), creeping thistle (*Cirsium*), Hawthorn (*Crataegus monogyna*), Meadow Buttercup (*Ranunculus acris*), Ash (*Fraxinus* spp.), Rosebay willowherb (*Epilobium angustifolium*), Dog rose (*Rosa canina*), Red clover (*Trifolium pratense*), Bush vetch (*Vicia sepium*), Elder (*Sambucus nigra*), Common plantain (*Plantago major*), Grass-like starwort (*Stellaria graminea*), Bittersweet Nightshades (*Solanum dulcamara*), Sycamore (*Acer pseudoplatanus*), Hedge bindweed (*Calystegia sepium*), Fringed willowherb (*Epilobium ciliatum*), Bitter dock (*Rumex obtusifolius*), White clover (*Trifolium repens*), Woodland Figwort (*Scrophularia nodosa*), creeping buttercup (*Ranunculus repens*), Cleavers (*Galium aparine*), Cow parsley (*Anthriscus sylvestris*), Ragwort (*Jacobaea vulgaris*), and large stands of Butterfly-bush (*Buddleja davidii*). Stands of Japanese Knowtweed were also recorded within areas identified as scrub (as disused in later chapters of this report).

Figure 4. Dense scrub (WS1) within eastern parts of the site.

Partial tree clearing has been undertaken within lands to the rear of property No.56b & No.59d along the northwestern site boundary, however this area has since recolonised primarily with Bramble (*Rubus fruticosus* agg.), Nettle (*Urtica dioica*), Butterfly-bush (*Buddleja davidii),* ivy spp. and small saplings (Figure 5).

Figure 5. Colonising scrub within partially cleared lands adjacent to No.59d

5.2 ED2 Spoil & Bare Ground

Spoil and bare ground was noted throughout the site, particularly within areas of derelict or recently cleared ground to the rear of properties along Dublin Street North, and along the extent of St. Davnet's Row bounding the north of the site. Areas of private land have also been infilled with aggregate (Figure 6) and are regularly used for car parking and access roads. Plant species were more limited in density (covering less than 50% of ground), and included Bramble (*Rubus fruticosus* agg.), Nettle (*Urtica dioica*), willowherbs (*Epilobium* spp.), Common plantain (*Plantago major*), Ragwort (*Jacobaea vulgaris*), Dandelion (*Taraxacum* spp.) and Red clover (*Trifolium pratense).*

Figure 6. Example of spoil & bare ground to rear of building No.43a / 42d.

5.3 ED3 Recolonising Bare Ground

Recolonising ground was recorded within isolated areas to the rear of Dublin Street North, for example lands adjacent to spoil/bare ground illustrated above in Figure 6, and also within areas worn by human activity such as pathways, areas of refuge within the mixed broadleaved woodland, and ground to the front of the pumping station compound area within the southeastern portion of

the site. Plant species were found to be similar to those found within ED2 classification, and included Bramble (*Rubus fruticosus* agg.), Nettle (*Urtica dioica*), willowherbs (*Epilobium* spp.), Common plantain (*Plantago major*), Butterfly-bush (*Buddleja davidii*), Ragwort (*Jacobaea vulgaris*), Dandelion (*Taraxacum* spp.) Red clover (*Trifolium pratense),* Pineappleweed (*Matricaria discoidea*) and creeping buttercup (Ranunculs repens).

5.4 WD1 (Mixed) Broadleaved Woodland

Mixed broadleaved woodland (Figure 7) was mapped within the southeastern portion of the site, with the mature tree canopy being retained as part of the open greenspace amenity area for the development, and also within lands to the rear of building No.38c which have been allowed to establish with ash to above 5m in height. Recorded large mature trees within the southeastern portion of the site include Ash, Beech and sycamore, with an understorey comprising of Beech, *Salix* spp., Elderflower (*Sambucus nigra*), Hawthorn (*Crataegus monogyna*), Cow parsley (*Anthriscus sylvestris*), Butterfly-bush (*Buddleja davidii*), white clover (*Trifolium repens*) and grass spp. Small areas of bare exposed ground (classified as ED2/3) were also mapped at the base of mature trees, due to regular human activities trampling the ground surface (Figure 8).

Figure 7. Mixed broadleaved woodland (WD1)

Figure 8. Woodland with exposed ground at the base due to human activity

5.5 WD2 – Mixed conifer and broadleaved woodland

Although not inside the site area, lands comprising of mixed conifer spp. and broadleaved woodland were recorded along the eastern boundary adjacent to the public footpath (Figure 9). Species include Sitka Spruce (*Picea sitchensis*) and Larch (*Larix* spp.) along the western part of the classified area, and ash and sycamore to the east. The conifer trees are mature in nature and heavily overgrown with common ivy (*Hedera helix*).

Figure 9. Mixed conifer / broadleaved woodland east of the site.

5.6 WD5 Scattered Trees & Parklands

A small portion of land within the southeast of the site comprises of species poor amenity grassland with occasional scattered trees, which form a prominent visual feature. In particular, two large ash trees are present (Figures 10 and 11), although the tree canopies are not linked. The trees are of poor health, and under the planning proposals it is intended to fell these to accommodate the development.

Figure 10. One of two prominent tree features within grass amenity area

Figure 11. Second Ash tree within scattered trees & parkland habitat

5.7 WS3 Ornamental non-native Shrub

Ornamental non-native shrubs were recorded throughout the site, and included large dense stands of Common snowberry (*Symphoricarpos albus*) mixed with Bramble (*Rubus fruticosus* agg.), Rosebay willowherb (*Epilobium angustifolium*), Hedge bindweed (*Calystegia sepium*), and Bush vetch (*Vicia sepium*). Stands of Common snowberry (likely a remnant of the Old Infirmary gardens) have been cut through as a pathway linking the WS3 habitat to the mixed broadleaved woodland area (see Figure 12).

Species also included Wall Cotoneaster (*Cotoneaster horizontalis*), Boxleaf Honeysuckle (*Lonicera ligustrina var.*), Beech (*Fagus* spp.), Kenilworth ivy (*Cymbalaria muralis*), Common osier (*Salix viminalis*), Meadow pea (*Lathyrus pratensis*), Goose grey / Silverweed (*Argentina anserina*), St. John's wort (*Hypericum androsaemum*), Elder (*Sambucus nigra*), Cherry Laurel (*Prunus laurocerasus*) and Silver Birch (*Betula pendula*). Species within lands to the rear of building No.34a comprised of creeping buttercup (Ranunculs repens), Hedge bindweed (*Calystegia sepium),* Hawthorn (*Crataegus monogyna*), Bitter dock (*Rumex obtusifolius*), Euonymus (*Euonymus japonicus*), Leyland cypress (*Cupressus leylandii*), Herb Robert (*Geranium robertianum*), Variegated Holy (*Ilex Aquifolium*), creeping thistle (*Cirsium arvense*), Boxleaf Honeysuckle (*Lonicera ligustrina var.*) and hornbeam (*Carpinus Betulaceae*).

Figure 12. Dense stands of snowberry, bindweed, and Boxleaf Honeysuckle

5.8 WL2 Treelines

A treeline of semi-mature ash (*Fraxinus excelsior*) and Willow (*Salix* spp.) greater than 5m in height was mapped on the eastern side of an pumping station compound area, and adjacent to the boundary wall of property No.32c. The treeline is effectively limited to a small belt of trees and overgrown scrub along the separating boundary wall structure. In addition, treeline comprising predominantly of Ash & Willow spp. was recorded to the north of the site (adjacent to building No.46d) on the adjacent side of the rear laneway.

Figure 13. Treeline adjacent to the site comprising of Ash & Willow spp.

5.9 BC1 Stone Walls and Other Stonework

Stone walls were recorded throughout the survey area, typically bounding lands to the rear of properties along Dublin Street North, and separating these properties from the eastern portion of the site which was recorded as scrub, woodland and scattered trees / parkland. Many of the stone wall structures were overgrown with Maidenhair spleenwort (*Alsplenium trichomanes*), common ivy (*Hedera helix*), Dog rose (*Rosa canina*) and grass spp. (*Aira* & *Catapodium* spp.), however in most cases the stone wall structures were clearly visible (see example in Figure 14). Therefore, many of the structures have been mapped as BC1 rather than WL1 (hedgerows) or WS1 (scrub).

Figure 14. Example of exposed stone wall structure (rear of No.46d)

5.10 GA2 - Amenity Grassland (improved)

Areas defined as improved amenity grassland were mapped to the rear of buildings 34a / 33c (Figure 15), 37g, and along the path border within the eastern portion of the site (Figure 16). Species composition for this habitat consisted primarily of perennial couch weed grass (*Elymus repens*), perennial ryegrass (*Lolium perenne*), annual Meadow grass (*Poa annua*), and also included clover (*Trifolium pratense & repens*), Dandelion (*Taraxacum* spp.), Bitter dock (*Rumex obtusifolius),* Willowherb *spp.,* etc.

Figure 15. Amenity grassland to rear of No.34a & 33c.

Figure 16. Amenity grassland along public footpath edge.

5.11 GA1 – Improved Agricultural Grassland

Although not within the site boundary, lands to the north of the site comprise of a large agricultural field which has been used for recent silage production, i.e. improved agricultural grassland (GA1). Species noted within the field and along the unmanaged boundary (Figure 17) included Rye-grasses (*Lolium* spp.), perennial couch weed grass (*Elymus repens*), annual Meadow grass (*Poa annua*), and also included stinging nettle (*Urtica dioica*), clover (*Trifolium pratense & repens*), Dandelion (*Taraxacum* spp.), Bitter dock (*Rumex obtusifolius),* Willowherb *spp,* and dead nettle (*Lamium maculatum*).

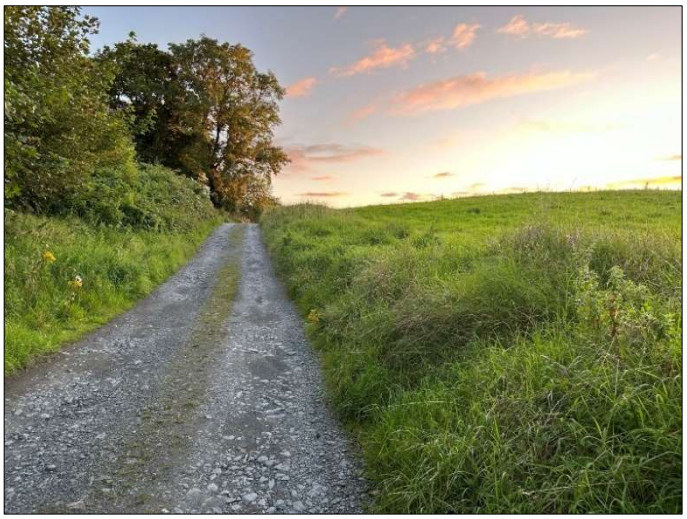

Figure 17. Improved agricultural grassland (right) of laneway.

5.12 BL3 Artificial Surfaces

The urbanised nature of a significant portion of the site inherently includes artificial surfaces, incorporating Dublin Street, Old Cross Square, The Diamond, and car parking areas. Artificial surfaces within the site also include the pedestrian pathway leading from Old Cross Square, building surfaces, access roads (a mix of concrete and asphalt etc), and garden patios and yards.

6.0 FAUNA

6.1 Bats (all species)

As indicated by national records and databases, the site has moderate potential for the presence of bats, in particular woodland areas and around derelict building structures, as well as tree lines and the rear laneway area to the rear of properties. The laneway and forest areas could potentially provide suitable foraging areas, and derelict buildings or mature trees may have the potential for roost features.

During site walkovers carried out in August 2023 and 2024, bats were observed flying along the laneway at dusk, and were observed originating from the neighbouring conifer / broadleaved woodland area to the east of the site adjacent to the public footpath.

6.2 Badger

No evidence of badger activity was found within the study area, ether in the form of foraging, latrines or sett structures. Therefore, no further surveys have been recommended for badger activity within the site area or wider area.

6.3 Red Squirrel

National records indicate the presence of grey squirrel was recorded in 2007, with no recording sightings noted since. Red Squirrel was last recorded in 2018 to the north of the site. During the site walkover, no direct evidence of squirrel activity was recorded, either for red or grey squirrel, and suitable habitats are limited to the mixed conifer / broadleaved woodland area to the east of the site. As no evidence was noted during a number of site visits throughout the year, and given the limited habitat suitability within the site, then no further surveys have been recommended.

6.4 Otters

A visual inspection and site walkover was carried out to identify otter activities within the survey area, and particularly along the river corridor of the River Shambles to the south of the site adjacent to Old Cross Square. No evidence of the presence of otter was noted, with national records indicating the last sighting was in 2008.

6.5 Other mammals

Throughout the survey area and during the site walkover, evidence of rabbit activity was noted and confirmed from visual activity of rabbits. In addition, a fox was recorded by visual observation within the fire damaged building at No.40b, inside the remains of the building structure. No other mammal activity was noted.

6.6 Amphibians

Piles of stone and stone walls have potential for use by reptiles for basking or as refugia. Favourable undisturbed habitat for foraging reptiles and amphibians is also present within the survey area and wider environment. However, national records do not indicate any sightings of amphibians, and no sightings were confirmed during the numerous site walkovers.

6.7 Freshwater Fish

No freshwater fish were observed along the River Shambles corridor at either Old Cross Square, upstream at the junction where the Ulster Canal Greenway commences, or at Castle Road bridge section. In terms of national records, no records were noted for fish species, and current water quality status is considered to be poor.

6.8 Nesting Birds

Grassland, treelines, hedgerows and scrub, all provide breeding opportunities for a range of birds. A number of bird species were observed during the site walkover, and included magpie (*Pica pica*), Blackbird (*Turdus merula*), woodpigeon (*Columba palumbus*), Common Starling (*Sturnus vulgaris*), and Song Thrush (*Turdus philomelos*). In addition to those recorded during site walkovers, national records also indicate a range of 42No. bird species within 1km of the site. It is also noted that the woodland habitats recorded within the survey area may also offer potential for breeding birds.

6.9 Invasive Species

A number of invasive species were noted during site walkovers and habitat mapping, including the following:

- Japanese Knotweed (*Fallopia japonica*) – considered to be a high impact invasive species, stands of Japanese Knotweed were noted on lands to the rear of building No.40b, and also on the northern side of the laneway near building No.54f (target notes #12 & #17);
- Wall Cotoneaster (*Cotoneaster horizontalis*) – a medium impact invasive species, Wall Cotoneaster was recorded at several places adjacent to the fenced pumping station compound area, within the eastern portion of the site (target note #4);
- Himalayan honeysuckle (*Leycesteria Formosa*) – a medium impact invasive species, Himalayan honeysuckle was recorded at two positions within the site. The first position was located adjacent to the public footpath (target note #23) and the second adjacent to the woodland area (target note #10);
- Cherry laurel (*Prunus laurocerasus*) – A high impact invasive species, Cherry laurel was recorded within lands to the rear of building No.42d (target note #15);

- Buddleia (*Buddleja davidii*) – a medium impact invasive species, Buddleia was noted throughout numerous positions within the site, forming small individual stands to larger grouped stands.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Layde Consulting was appointed by Carlin Planning Ltd to undertake a Preliminary Ecological Appraisal (PEA) for a proposed Regeneration Scheme within Monaghan town, extending to lands at the rear of Dublin Street North. This report summarises the key findings in relation to local ecology, and protected national and international designations within close proximity to the site, along with further recommendations should these be required.

Designations & Protected Sites

A desk study search of the National Parks and Wildlife Serve (NPWS) GIS database was undertaken in order to identify any Natura 2000 designations, proposed or designated Natural Heritage Areas (pNHA's & NHA's). The search criteria incorporated an area 15km radius of the site, and the search results indicated that the site is not located within any Natura 2000 designation. The closest Natura 2000 designation was identified to be more than 10km away from the site (Slieve Beagh SPA), although the site development proposals do not have any source-pathway-receptor linkages to the SPA designation, and are unlikely to support any qualifying interests in terms of breeding bird species.

In addition to Natura 2000 sites, a review was undertaken of the NPWS databases for other protected designations within close proximity to the site, in particular Proposed Natural Heritage Areas. The closest protected designation to the site is Wright's Wood pNHA which is located approximately 1.75km to the west, however again there are no potentially feasible source-pathway-receptor linkages between the site proposals and any of the pNHA designations.

It is noted that the Lough Neagh & Lough Beg RAMSAR site is located approximately 33km northeast of the site, and the Lough Neagh & Lough Beg SPA is located approximately 39km NE. Although highly unlikely to affect these designations, there remains a hydraulic link between the site development area and the designations via the River Shambles to the Cor River, and then subsequently to the Annaghroe Blackwater and into Lough Neagh. Therefore, as a precautionary approach, it is recommended that an Appropriate Assessment (AA) screening exercise is carried out. Should the effects not be screened out, then a Natura Impact Statement (NIS) may be required to inform any future Appropriate Assessment reports.

Bats

As indicated by national records and databases, the site has moderate potential for the presence of bats, in particular woodland areas and around derelict building structures, as well as tree lines along St. Davnet's Row to the rear of properties. The laneway and forest areas could potentially provide suitable foraging areas, and derelict buildings or mature trees may have the potential for roost features, as indicated during site walkovers.

Therefore, it is recommended to undertake surveys for any potential bat roost features within the site, and to carry out activity surveys for buildings which are proposed to be demolished, wherever considered necessary. In addition, surveys should be undertaken for the presence of bat roosts within any trees which are to be felled as part of the development proposals, prior to felling.

Badger
No evidence of badger activity was found within the study area, ether in the form or foraging, latrines or sett structures, and no national records exist indicating the presence of badgers within close proximity to the site. Therefore, no further surveys have been recommended for badger activity within the site area or wider landscape.

Red Squirrel
No direct or indirect evidence of squirrel activity was recorded during site visits. Given the low habitat suitability for red squirrel within the site, then no further surveys for red squirrel have been recommended.

Otter
A visual inspection and site walkover was carried out to identify the presence of otter activity within the survey area, and particularly along the Shambles River at bridge sections near the site. No evidence of otter activity was recorded during site visits, and no national records last indicate the presence of otter near to the site was in 2008. Therefore, no further surveys for the presence of otter have been recommended.

Invasive Species
Given the presence of Invasive Species within the site development area, it is therefore recommended to carry out an Invasive Species Survey, and to develop an Invasive Species Management Plan as part of the supporting works for the Ecological Impact Assessment process. Ideally invasive species surveys should be carried out during the plant growing season (April to September) when species and extent of growth is more readily identifiable.

Birds
It is recommended that all clearance of vegetation or tree felling work is undertaken outside of the breeding bird season (generally considered to extend between March and August inclusive). As an informative, if works are to be undertaken during the bird breeding season, then breeding bird checks may be required prior to where works require clearing or removal of trees and vegetation cover. If nests are identified and deemed to be active, a temporary pause of works, or a watching brief to identify species and monitor for any signs of disturbance during works, may be required. This may also require a buffer area to be implemented during the breeding season. Some bird species are afforded extra protection under the Irish Wildlife Act, and dependent on their sensitivity to construction activities, may require an increased buffer area to minimise disturbance during this period. All works involving breeding bird and nesting checks should be carried out under the supervision of a qualified ecologist or ornithologist.

Freshwater Fish
No further recommendations have been made with regards to freshwater fish species.

Summary
In summary, on the basis of the desk study and site walkover investigations carried out to date, it is recommended to undertake the following additional assessments in order to inform an Ecological Impact Assessment, and to develop suitable mitigation measures as required:

- Invasive Species Survey
- Invasive Species Management Plan
- Bat Roost & Activity Surveys (where trees, buildings or linear structures are to be removed)
- Appropriate Assessment Screening & Natura Impact Statement (NIS), as required

Report Prepared By:

John Laverty BSc (Hons) MIEnvSc
Principal Environmental Scientist

FIGURES

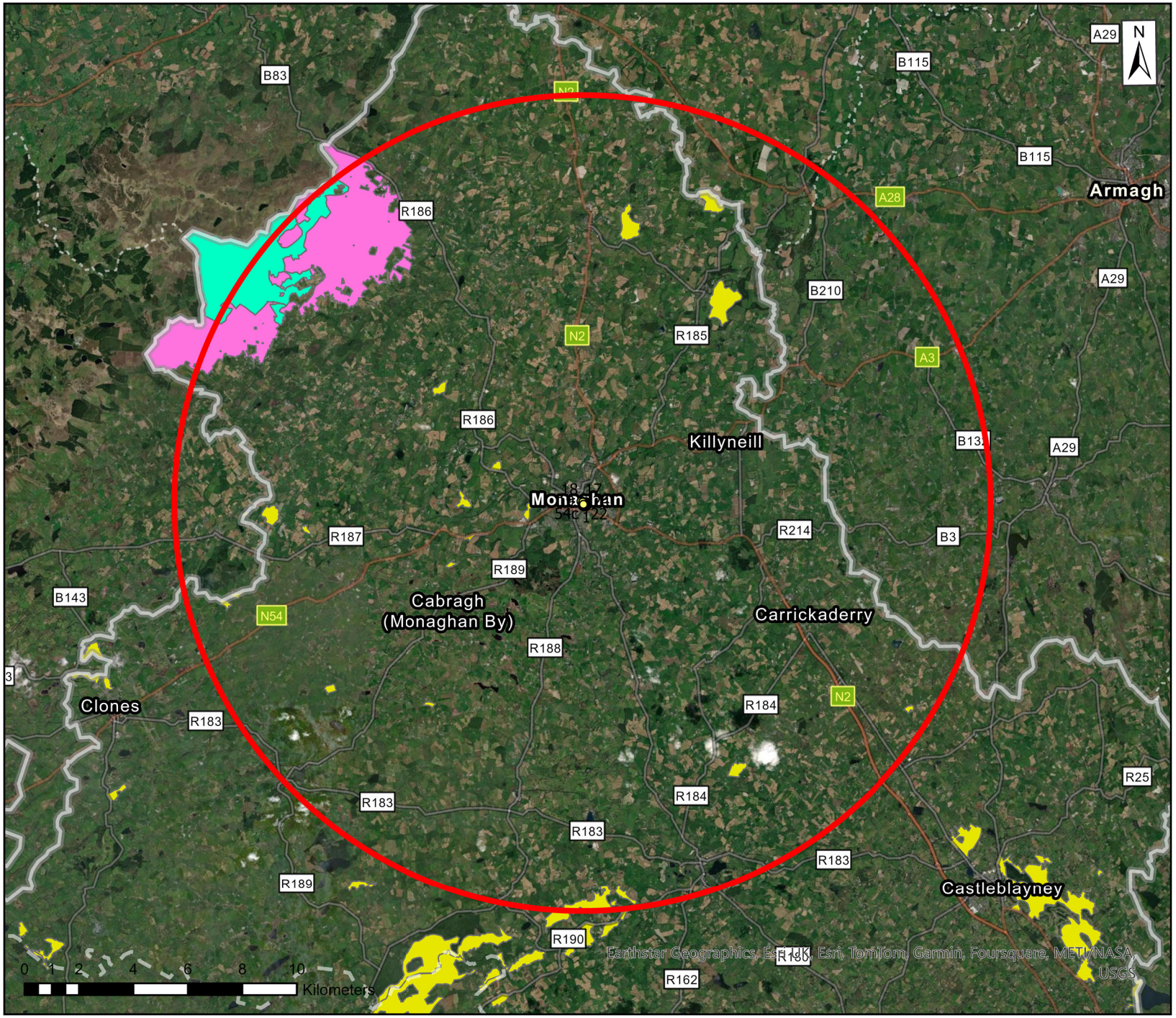

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Figure 2
Natura 2000 search results

Protected Designations

- 15km Search Radius
- pNHA
- NHA
- SPA
- SAC

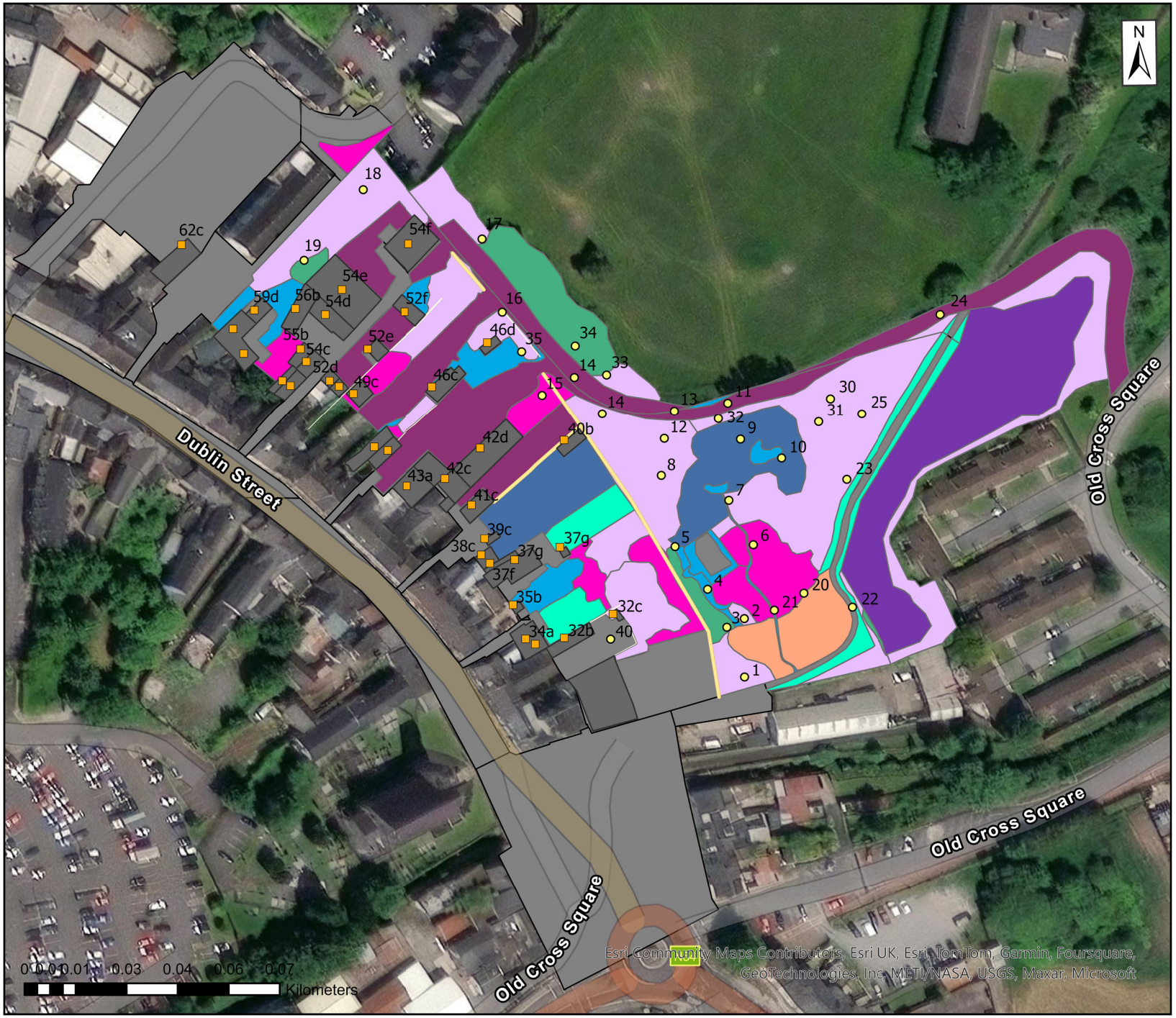

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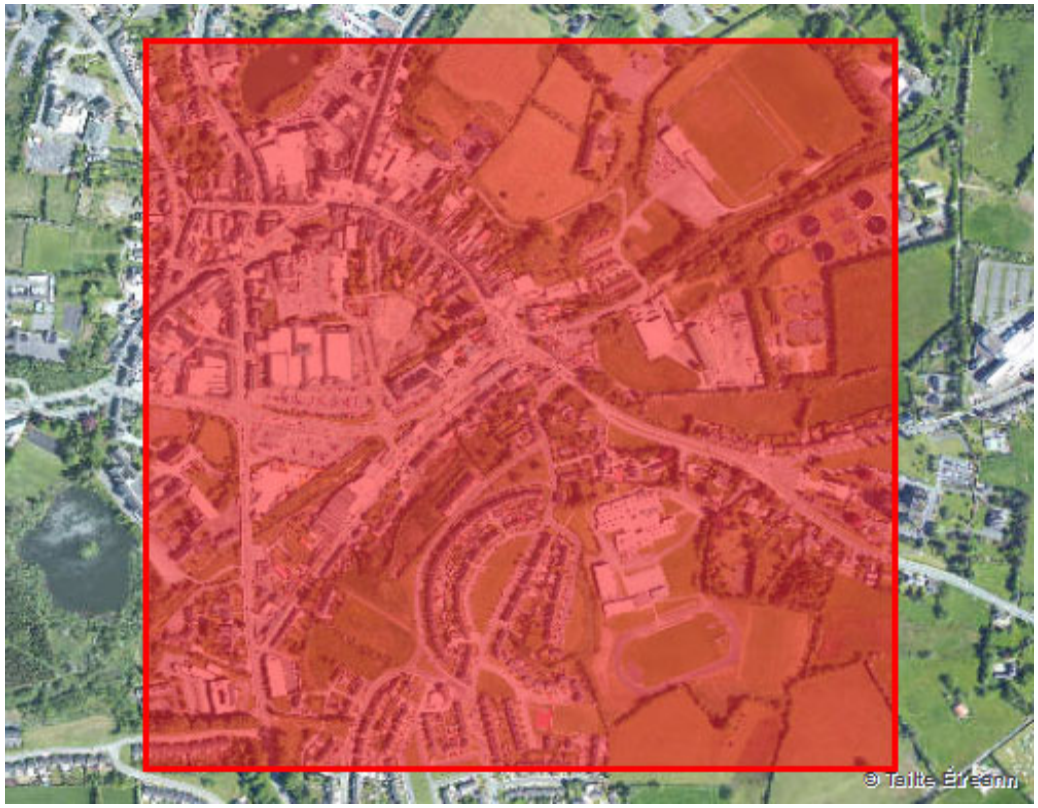
Figure 3 Habitat Classification Map

Key:

- Building Numbers
- BL1 - Stone walls and other stonework
- WL2 - Treelines
- WD5 - Scattered trees and parkland
- WS1 - Scrub
- WS3 - Ornamental - non-native shrub WS3
- GA2 - Amenity Grassland (improved)
- ED3 - Recolonising Bare Ground
- WD1 - (Mixed) broadleaved woodland
- ED2 - Spoil Bare Ground
- BL3 - Artifical surfaces
- WD2 - Mixed Conifer and Broadleaved Woodland
- GA1 - Improved Agricultural Grassland
- Target Notes

Appendix 1

Species list for H6733



Species group	Species name	Record count	Date of last record	Title of dataset	Designation
amphibian	Smooth Newt (Lissotriton vulgaris)	2	29/06/2010	Newt Survey 2010-2014	Protected Species: Wildlife Acts
bird	Barn Swallow (Hirundo rustica)	3	29/05/2023	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Black-billed Magpie (Pica pica)	5	25/05/2023	Birds of Ireland	
bird	Blackcap (Sylvia atricapilla)	3	25/05/2023	Birds of Ireland	
bird	Black-headed Gull (Larus ridibundus)	1	14/04/2012	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Blue Tit (Cyanistes caeruleus)	5	04/01/2018	Birds of Ireland	
bird	Chaffinch (Fringilla coelebs)	7	25/05/2023	Birds of Ireland	
bird	Coal Tit (Periparus ater)	4	18/05/2012	Birds of Ireland	
bird	Common Blackbird (Turdus merula)	6	04/01/2018	Birds of Ireland	
bird	Common Bullfinch (Pyrrhula pyrrhula)	2	11/02/2012	Birds of Ireland	
bird	Common Chiffchaff (Phylloscopus collybita)	2	18/05/2012	Birds of Ireland	
bird	Common Coot (Fulica atra)	2	18/05/2012	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber
bird	Common Moorhen (Gallinula chloropus)	8	04/01/2018	Birds of Ireland	

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
bird	Common Starling (Sturnus vulgaris)	7	29/05/2023	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Swift (Apus apus)	2	25/05/2023	Swifts of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Wood Pigeon (Columba palumbus)	4	18/05/2012	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
bird	Eurasian Collared Dove (Streptopelia decaocto)	5	25/05/2023	Birds of Ireland	
bird	Eurasian Jackdaw (Corvus monedula)	8	25/05/2023	Birds of Ireland	
bird	Eurasian Siskin (Carduelis spinus)	2	11/02/2012	Birds of Ireland	
bird	Eurasian Treecreeper (Certhia familiaris)	1	11/02/2012	Birds of Ireland	
bird	European Goldfinch (Carduelis carduelis)	3	14/04/2012	Birds of Ireland	
bird	European Greenfinch (Carduelis chloris)	2	11/02/2012	Birds of Ireland	
bird	European Robin (Erithacus rubecula)	8	25/05/2023	Birds of Ireland	
bird	Goldcrest (Regulus regulus)	4	25/05/2023	Birds of Ireland	
bird	Great Spotted Woodpecker (Dendrocopos major)	1	11/06/2022	Birds of Ireland	
bird	Great Tit (Parus major)	6	25/05/2023	Birds of Ireland	
bird	Grey Heron (Ardea cinerea)	1	11/02/2012	Birds of Ireland	
bird	Grey Wagtail (Motacilla cinerea)	1	10/10/2018	Birds of Ireland	
bird	Hedge Accentor (Prunella modularis)	4	18/05/2012	Birds of Ireland	
bird	Hooded Crow (Corvus cornix)	3	18/05/2012	Birds of Ireland	

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
bird	House Sparrow (Passer domesticus)	5	29/05/2023	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Lesser Redpoll (Carduelis cabaret)	1	10/12/2011	Birds of Ireland	
bird	Long-tailed Tit (Aegithalos caudatus)	1	14/04/2012	Birds of Ireland	
bird	Mallard (Anas platyrhynchos)	9	25/05/2023	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
bird	Mistle Thrush (Turdus viscivorus)	5	25/05/2023	Birds of Ireland	
bird	Mute Swan (Cygnus olor)	1	10/12/2011	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Pied Wagtail (Motacilla alba subsp.	6	18/05/2012	Birds of Ireland	
bird	Redwing (Turdus iliacus)	1	10/12/2011	Birds of Ireland	
bird	Rock Pigeon (Columba livia)	1	04/01/2018	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
bird	Rook (Corvus frugilegus)	7	06/01/2023	Birds of Ireland	
bird	Song Thrush (Turdus philomelos)	5	25/05/2023	Birds of Ireland	
bird	Willow Warbler (Phylloscopus trochilus)	3	25/05/2023	Birds of Ireland	
bird	Winter Wren (Troglodytes troglodytes)	4	18/05/2012	Birds of Ireland	
Flatworm (Turbellaria)	Arthurdendyus triangulatus	1	29/10/2012	New Zealand Flatworm (Arthurdendyus triangulatus) Database	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
flowering plant	Common Nettle (Urtica dioica)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Daisy (Bellis perennis)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Elder (Sambucus nigra)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Guelder-rose (Viburnum opulus)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Herb-Robert (Geranium robertianum)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Ivy (Hedera helix)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Japanese Knotweed (Fallopia japonica)	2	10/10/2018	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
flowering plant	Lime (Tilia platyphyllos x cordata = T. x europaea)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Meadow Buttercup (Ranunculus acris)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Red Clover (Trifolium pratense)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Silverweed (Potentilla anserina)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Taraxacum aggregate	2	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Water-plantain (Alisma plantago-aquatica)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
harvestman (Opiliones)	Leiobunum rotundum	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Mitopus morio	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Nelima gothica	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Nemastoma bimaculatum	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Oligolophus hanseni	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Paroligolophus agrestis	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
insect - beetle (Coleoptera)	7-spot Ladybird (Coccinella septempunctata)	1	29/05/2023	Ladybirds of Ireland	
insect - butterfly	Small Tortoiseshell (Aglais urticae)	1	05/09/2023	Butterflies of Ireland post 2021	

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
insect - butterfly	Speckled Wood (Pararge aegeria)	1	10/10/2018	Butterflies of Ireland pre-2022	
insect - hymenopteran	Common Carder Bee (Bombus (Thoracombus) pascuorum)	2	20/07/2023	Bees of Ireland	
insect - moth	Common Grass-veneer (Agriphila tristella)	1	12/08/1984	Moths Ireland	
insect - moth	Crinan Ear (Amphipoea crinanensis)	1	31/08/1911	Moths Ireland	
insect - moth	Straw Grass-veneer (Agriphila straminella)	1	10/08/1984	Moths Ireland	
millipede	Common Flat-backed Millipede (Polydesmus angustus)	1	02/10/1995	Millipedes of Ireland	
millipede	Eyed Flat-backed Millipede (Nanogona polydesmoides)	1	02/10/1995	Millipedes of Ireland	
millipede	Ophyiulus pilosus	1	02/10/1995	Millipedes of Ireland	
millipede	White-legged Snake Millipede (Tachypodoiulus niger)	1	02/10/1995	Millipedes of Ireland	
terrestrial mammal	Eastern Grey Squirrel (Sciurus carolinensis)	1	31/12/2007	The Irish Squirrel Survey 2007	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> EU Regulation No. 1143/2014 || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
terrestrial mammal	West European Hedgehog (Erinaceus europaeus)	1	23/03/2023	Hedgehogs of Ireland	Protected Species: Wildlife Acts

Species list for H6734

Grid H6734

Species group	Species name	Record count	Date last record	Title of dataset	Designation
bird	Barn Swallow (Hirundo rustica)	1	14/04/2012	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Bullfinch (Pyrrhula pyrrhula)	1	14/04/2012	Birds of Ireland	
bird	Common Buzzard (Buteo buteo)	1	18/05/2012	Birds of Ireland	
bird	Common Coot (Fulica atra)	1	06/01/2023	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern -
bird	Common Moorhen (Gallinula chloropus)	1	06/01/2023	Birds of Ireland	
bird	Common Swift (Apus apus)	1	29/05/2023	Swifts of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Eurasian Jackdaw (Corvus monedula)	3	06/01/2023	Birds of Ireland	
bird	European Greenfinch (Carduelis chloris)	1	14/04/2012	Birds of Ireland	
bird	Pied Wagtail (Motacilla alba subsp.	1	04/08/2017	Birds of Ireland	
bird	Rock Pigeon (Columba livia)	1	04/08/2017	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird

Grid H6734

Species group	Species name	Record count	Date last record	Title of dataset	Designation
bird	Rook (Corvus frugilegus)	1	04/08/2017	Birds of Ireland	
bird	Willow Warbler (Phylloscopus trochilus)	1	08/04/2023	Birds of Ireland	
flowering plant	Bluebell (Hyacinthoides non-scripta)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Japanese Knotweed (Fallopia japonica)	1	12/06/2019	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
flowering plant	Lesser Celandine (Ranunculus ficaria)	1	04/04/2017	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Primrose (Primula vulgaris)	1	26/04/2018	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
insect - butterfly	Peacock (Inachis io)	1	24/08/2019	Butterflies of Ireland pre-2022	
insect - hymenopteran	Bombus (Bombus) terrestris	1	04/04/2017	Bees of Ireland	
insect - moth	Angle Shades (Phlogophora meticulosa)	1	16/07/2023	Moths Ireland	
insect - moth	Buff Footman (Eilema depressa)	1	16/07/2023	Moths Ireland	
insect - moth	Burnished Brass (Diachrysia chrysitis)	1	16/07/2023	Moths Ireland	
insect - moth	Common Carpet (Epirrhoe alternata)	1	16/07/2023	Moths Ireland	
insect - moth	Dark Arches (Apamea monoglypha)	1	16/07/2023	Moths Ireland	
insect - moth	Death's-head Hawk-moth (Acherontia atropos)	1	23/10/2013	Moths Ireland	
insect - moth	Dotted Clay (Xestia baja)	1	16/07/2023	Moths Ireland	
insect - moth	Double Dart (Graphiphora augur)	1	16/07/2023	Moths Ireland	
insect - moth	Double-square Spot (Xestia triangulum)	1	16/07/2023	Moths Ireland	
insect - moth	Dun-bar (Cosmia trapezina)	1	16/07/2023	Moths Ireland	
insect - moth	Flame Shoulder (Ochropleura plecta)	1	16/07/2023	Moths Ireland	
insect - moth	Four-spotted Footman (Lithosia quadra)	1	16/07/2023	Moths Ireland	
insect - moth	Heart & Dart (Agrotis exclamationis)	2	16/07/2023	Moths Ireland	
insect - moth	Large Yellow Underwing (Noctua pronuba)	1	16/07/2023	Moths Ireland	
insect - moth	Light Arches (Apamea lithoxylaea)	1	16/07/2023	Moths Ireland	
insect - moth	Mesapamea secalis agg.	1	16/07/2023	Moths Ireland	
insect - moth	Old Lady (Mormo maura)	1	16/07/2023	Moths Ireland	
insect - moth	Rush Wainscot (Archanara algae)	1	16/07/2023	Moths Ireland	
insect - moth	Rustic (Hoplodrina blanda)	1	16/07/2023	Moths Ireland	
insect - moth	Silver Y (Autographa gamma)	1	16/07/2023	Moths Ireland	

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Species group	Species name	Record count	Date last record	Title of dataset	Designation
insect - moth	Smoky Wainscot (Mythimna impura)	1	16/07/2023	Moths Ireland	
insect - moth	Snout (Hypena proboscidalis)	1	16/07/2023	Moths Ireland	
insect - moth	Spectacle (Abrostola tripartita)	1	16/07/2023	Moths Ireland	
insect - true fly	Eristalis arbustorum	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Eristalis tenax	1	25/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Helophilus hybridus	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Helophilus pendulus	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Neoascia podagrica	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Platycheirus albimanus	1	25/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Platycheirus granditarsus	1	25/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Syrphus vitripennis	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
terrestrial mammal	Common Pipistrelle (Pipistrellus pipistrellus sensu stricto)	1	20/06/2012	National Bat Database of Ireland	
terrestrial mammal	Eastern Grey Squirrel (Sciurus carolinensis)	1	31/12/1981	Mammal Recording Scheme 1970-1985 (An Foras Forbartha)	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> EU Regulation No. 1143/2014 || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
terrestrial mammal	Eurasian Red Squirrel (Sciurus vulgaris)	1	05/10/2018	Mammals of Ireland 2016-2025	Protected Species: Wildlife
terrestrial mammal	European Otter (Lutra lutra)	1	10/08/2008	Road Kill Survey	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
terrestrial mammal	Lesser Noctule (Nyctalus leisleri)	2	20/06/2012	National Bat Database of Ireland	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts

Grid H6734

Species group	Species name	Record count	Date last record	Title of dataset	Designation
terrestrial mammal	Soprano Pipistrelle (Pipistrellus pygmaeus)	1	20/06/2012	National Bat Database of Ireland	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts

LAYDE CONSULTING

Invasive Species Survey

Proposed Regeneration Scheme, Dublin Street North, Monaghan

Client: Carlin Planning Ltd

Project Reference: P676-2

Issue Date: September 2024

Specialist Environmental Consultancy Services

Table of Contents

EXECUTIVE SUMMARY

Layde Consulting was appointed by Carlin Planning Ltd to undertake an Invasive Alien Species Survey for a proposed Regeneration Scheme within Monaghan town, extending to lands at the rear of Dublin Street North. This report presents the findings of the IAS survey, and outlines a number of recommendations which are aimed to reduce the spread of impact of IAS, and with respect to the planning proposals and various phases of the development.

In summary, the following Invasive Alien Species and non-native species were identified within or next to the site boundary:

- Japanese Knotweed (*Fallopia japonica*)
- Himalayan honeysuckle (*Leycesteria Formosa*)
- Buddleia (*Buddleja davidii*)
- Cherry laurel (*Prunus laurocerasus*)
- Sycamore (*Acer pseudoplatanus*)

Japanese Knotweed is the only species identified within the site that is regulated within either the third schedule of S.I.477/2011 or the European Union Regulation (No. 1143/2014), however all of the identified species are considered to be medium or high impact risk non-native species.

Therefore, it is recommended that an Invasive Species Management Plan (ISMP) should be developed for the site which will need to outline specific details regarding the management of biosecurity during the demolition and construction phases. The ISMP should also detail mitigation or removal strategies for each of the IAS's, along with any pre-demolition / construction requirements. The ISMP should be treated as a 'live' document throughout all phases of the development, and updated accordingly, as required.

The findings outlined within this report are considered to be applicable for up to one year from the survey period. Should site works be postponed for more than one year beyond the survey period, then a re-survey for IAS's should be undertaken.

1.0 INTRODUCTION

Layde Consulting was appointed by Carlin Planning Ltd to undertake an Invasive Alien Species Survey (herein referred to as 'IAS survey') for a proposed Regeneration Scheme within Monaghan town, extending to lands at the rear of Dublin Street North. This report presents the findings of the IAS survey, and outlines a number of recommendations which are aimed to reduce the spread of impact of IAS, and with respect to the planning proposals and various phases of the development.

1.1 Invasive Alien Species

The Convention on Biological Diversity defines invasive alien species (IAS) as "*a species that is established outside of its natural past or present distribution, whose introduction and/or spread threaten biological diversity*". Therefore, this IAS survey was undertaken in order to identify and map any non-native invasive plant species listed within Part 1 of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) and Amendment 2015 (S.I. No. 355/2015).

The European Union Regulation (No. 1143/2014) on Invasive Alien Species (IAS) lists 88 species whose potential adverse impacts are such that concerted action across Member States is required. Member States are required to provide for early detection and eradication of these species and must manage those species already widespread within their jurisdiction. The EU recently updated the list of invasive alien species of Union concern, including Chilean rhubarb (*Gunnera tinctoria*), Indian/Himalayan balsam (*Impatiens glandulifera*) and Giant hogweed (*Heracleum mantegazzianum*).

Hybrid knotweed species which have been recorded in Ireland are also covered by Part 1 of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) and Amendment 2015 (S.I. No. 355/2015).

Section 49 and 50 of Part 6 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) outlines the legal context for the prohibition of the introduction and dispersal of certain plant and animal species. Specifically, Section 49, paragraph 2 states that any person without the required licence "*who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow*" any plant species listed in Part 1 of the Third Schedule within the State shall be guilty of an offence.

Furthermore, under Section 50 paragraph 1, a person without the required licence "*shall be guilty of an offence if he or she has in his or her possession for sale, or for the purposes of breeding, reproduction or propagation, or offers or exposes for sale, transportation, distribution, introduction or release*" of any plant species listed in Part 1 of the Third Schedule or anything from which "*a plant referred to in Part 1 of the Third Schedule can be reproduced or propagated or "a vector material listed in Part 3 of the Third Schedule*". This vector material is defined as "*soil or spoil taken from places infested with Japanese knotweed (Fallopia japonica), Giant knotweed (Fallopia sachalinensis) or their hybrid Bohemian knotweed (Fallopia x bohemica)".*

Species listed under the Third Schedule list of the European Communities (Birds and Natural Habitats) Regulations 2011 [S.I.477/2011] are presented in Appendix 1 of this report.

In addition to the above, flowering plants regarded as Medium and High Impact Invasive Species as listed within the National Biodiversity Data Centre were also identified during site walkovers, and are included within this IAS survey report.

1.2 Limitations

As with many aspects of ecological habitat mapping and identification exercises, surveying of Invasive Alien Species (IAS's) are often subject to a number of limitations. In this case, as the site is not currently owned by the applicant and comprises of multiple landowners, then site access was limited to areas where permission could be granted. While every attempt was made to access all portions of land, in some instances access was specifically denied, or in some cases could not be granted as the relevant landowners could not be contacted prior to or during site visits.

Surveys were carried out throughout the year, with surveys also being carried out during optimal times of plant growth (i.e. May – September). However, portions of land could not be accessed due to excessive scrub and vegetation growth. It should be noted that IAS's are subject to spatial and temporal changes both in terms of spatial extent and presence, therefore species identified within this report may alter with time. As such, the findings outlined within this report are considered applicable for up to one year from the survey period. Should site works be postponed for more than one year beyond the survey period, then a re-survey for IAS's should be undertaken.

Field target notes were obtained using a Trimble sub-metre GPS Catalyst receiver (60cm accuracy), however, where tree or satellite coverage was impeded, then GPS accuracy extended up to 5m.

1.3 Site Overview & Development Proposals

The proposed development area (herein termed the 'site') incorporates lands to the rear of Dublin Street North, Monaghan (see Figure 1), and comprises of a mix of urbanised areas, external residential amenity areas, commercial land, and derelict lands comprising of scrub and treelines along St. Davnet's Row and the Old Infirmary. Under the development proposals it is intended to regenerate the site by demolishing the existing buildings within the site, and constructing a new public access road, car parking and event space, and also enabling the provision of future development plots for commercial and residential uses. As a result, the development proposals also include the removal of vegetation and ground cover, as required, and grading cut/fill works. The proposals also include all necessary infrastructure provisions such as drainage and utilities, paving, surfacing and landscaping.

Figure 1- Proposed development area, lands to the rear of Dublin Street North

1.4 Statement of Authority

This report has been prepared by John Laverty, Principal Environmental Scientist at Layde Consulting who holds a BSc (Hons) degree in Environmental Science and is a Full member of the Institute of Environmental Sciences. John has over 20 years of experience in the preparation of ecological impact assessments, and has worked with a range of private and PLC companies and on an extensive number of development and infrastructure projects.

2.0 METHODOLOGY

2.1 Desk Based Assessment

A desk-based review of national records and datasets was carried out in order to determine if any IAS's have been observed or recorded within the vicinity of the site. In particular, a review was undertaken for records held by the National Biodiversity Data Centre (NBDC) online database (last accessed 29/08/2024), and for grids H6733 & H6734. The detailed results of the search are provided in Appendix 2 of this report, and the records indicate that Japanese Knotweed was recorded on 10/10/2018 within the vicinity of the site (grid H6733) and on the 12/06/2019 in lands to the north of the site (within 1km^2). No other flowering plant IAS's were recorded.

2.2 Field Surveys & Mapping

Field surveys and site walkovers were carried out from the 18th July – 12th September 2023, 25th January 2024, and from the 16th – 28th August 2024. Field mapping and target notes were recorded using a Trimble sub-metre GPS Catalyst receiver (60cm accuracy), accepting the limitations outlined in Section 1.2. Site walkovers were undertaken for all lands, wherever access could be granted.

The site comprises of private lands to the rear of properties along Dublin Street North, and are subdivided into small plots of land ownership, most of which are bounded by stone or block wall structures. To the north of the site, St. Davnet's Row and the Old Infirmary links the entrance at Old Cross Square and the GAA playing fields to the access road between Dublin Street and building No.54f, traversing along the rear of properties along Dublin Street North. Lands within the southeastern portion of the site (i.e. the Old Infirmary) comprise of scrub, amenity and public lands bounded to the east by means of a public pedestrian pathway leading from Old Cross Square.

Site walkovers were undertaken at various times throughout the year in order to ascertain the presence of early and late flowering IAS's. Although access was limited within areas of dense scrub, particularly over portions of ground within the southeast of the site, visual inspection could be undertaken for most of the area. In addition to restrictions of access to some of the rear properties of Dublin Street, as previously discussed, surveys were unable to be carried out for small areas of land due to anti-social behaviour (i.e. lands around buildings No.40b).

The results of the field survey walkovers are discussed further within the following sections, however the IAS survey location map and target notes are presented in Figure 2 and should be referred to in relation to the findings.

3.0 RESULTS OF IAS SURVEY

As IAS's were identified throughout a significant portion of the site area, then each of the IAS's are discussed individually by species, rather than discussing the findings in terms of habitat mosaics or locations by feature. For ease of reference, each of the identified IAS's have been assigned a target note and impact classification, and are summarised below in Table 1. Both Table 1 and Figure 2 should be considered together when reviewing the findings. Any identified species listed within EU IAS Regulation [1143/2014] and the Third Schedule list of the European Communities (Birds and Natural Habitats) Regulations 2011 [S.I.477/2011] are summarised below. In addition, any flowering plants regarded as Medium or High impact non-native species as listed within the National Biodiversity Data Centre have also been included within the summary table.

Table 1. Summary of identified IAS's within the site.

Target ID	Species	Location (ITM)		Impact Level	Regulations
1	Buddleia	667461	833669	Medium	No specified regulation Follow Guidance on Management Principles
2	Buddleia	667461	833686	Medium	
4	Buddleia Wall Contoneaster	667451	833695	Medium Medium	
5	Buddleia	667441	833707	Medium	
9	Buddleia	667460	833739	Medium	
10	Himalayan Honeysuckle Buddleia	667472	833733	Medium Medium	
11	Buddleia	667456	833749	Medium	
12	Japanese Knotweed	667438	833739	High	Controlled under S.I.477/2011 3rd Schedule Part 1
14	Japanese Knotweed	667420	833746	High	
15	Buddleia Cherry Laurel	667402	833752	Medium High	No specified regulation Follow Guidance on Management Principles
16	Buddleia	667390	833776	Medium	
17	Japanese Knotweed	667384	833798	High	Controlled under S.I.477/2011 3rd Schedule Part 1
17	Buddleia	667332	833791	Medium	No specified regulation Follow Guidance on Management Principles
19	Buddleia	667470	833688	Medium	
21	Buddleia	667491	833727	Medium	
23	Himalayan Honeysuckle Buddleia	667519	833776	Medium Medium	
24	Buddleia	667496	833746	Medium	
25	Buddleia	667486	833751	Medium	
30	Buddleia	667483	833744	Medium	
31	Buddleia	667454	833745	Medium	
32	Buddleia	667421	833758	Medium	
33	Buddleia	667412	833766	Medium	
34	Buddleia	667396	833765	Medium	
35	Buddleia	667402	833752	Medium	
36	Buddleia	667455	833702	Medium	
37	Buddleia	667411	833757	Medium	
40	Buddleia	667422	833680	Medium	
41	Buddleia	667355	833742	Medium	
42	Buddleia	667347	833732	Medium	
44	Buddleia	667327	833762	Medium	
45	Buddleia	667429	833688	Medium	
-	Sycamore	Various locations		Medium	

3.1 Japanese Knotweed (*Fallopia japonica*)

Japanese Knotweed (*Fallopia japonica*) was identified at three locations within the site. The first stand is marked as target note 12 in Figure 2, and is located within an area of dense scrub within ~10m of St. Davnet's Row laneway corridor (photograph 1). The stand extends to approximately 2m in height and covers a ground area of approximately 6m^2.

Photograph 1. Japanese Knotweed (target note 12)

The second area of Japanese Knotweed (target note 14) is located approximately ~10m to the rear of the fire damaged building No.40b, adjacent the treeline and boundary stone wall (photograph 2). The stand is also located within 10m of the St. Davnet's Row laneway (inside the site boundary), and extends to approximately 1.7m in height covering a ground area of approximately 4m^2.

Photograph 2. Japanese Knotweed (target note 14)

The third stand of Japanese Knotweed was identified at target note 17. Although this area is outside the site boundary, it is located immediately adjacent to St. Davnet's Row laneway (photograph 3) which may be used for access during the demolition and construction phases of the development, and would thus have the potential to cause biosecurity issues.

Photograph 3. Japanese Knotweed (target note 17)

Japanese Knotweed is regulated under the third schedule of S.I.477/2011, and is considered to be a high impact risk in terms of Invasive Alien Species within Ireland. Therefore, Japanese Knotweed will need to be included within an Invasive Species Management Plan (ISMP), particularly for the demolition and construction phases of the development.

3.2 Himalayan honeysuckle (*Leycesteria Formosa*)

Himalayan honeysuckle (*Leycesteria Formosa*) was identified at two locations within the site. The first location (photograph 4) was identified along an area of scrub adjacent to the public pedestrian footpath within the east of the site (Target note 23, adjacent to the Old Infirmary area), with growth extending to 1.5m in height and ~1m^2 at ground level.

Photograph 4. Himalayan honeysuckle (target note 23) next to footpath

The second location of Himalayan honeysuckle was identified was at Target note 10, fringing the mixed broadleaved woodland area. Plant growth extended to approximately 1.4m in height, and covered a ground area of approximately 1m^2.

Although Himalayan honeysuckle is not regulated under the third schedule of S.I.477/2011, nor is it listed within the EU species of concern, however it is considered to pose a medium impact risk in terms of non-native species within Ireland. Therefore, Himalayan honeysuckle within the site will need to be included within an Invasive Species Management Plan (ISMP), again particularly for the demolition and construction phases of the development.

3.3 Cherry laurel (*Prunus laurocerasus*)

Cherry laurel (*Prunus laurocerasus*) was identified at the edge of St. Davnet's Row laneway and adjacent to the yard entrance of building No.46d (target note 35). Growth extended to ~4m in height (photograph 5) and has developed multi-stemmed growth incorporating an area of circa 2m^2 at ground level. Cherry laurel is not regulated under the third schedule of S.I.477/2011, nor is it listed within the EU species of concern, however it is considered to pose a high impact risk in terms of non-native species within Ireland. As such, the Cherry laurel will also need to be included within an Invasive Species Management Plan (ISMP).

Photograph 5. Cherry laurel (target note 35) to rear of No.46d

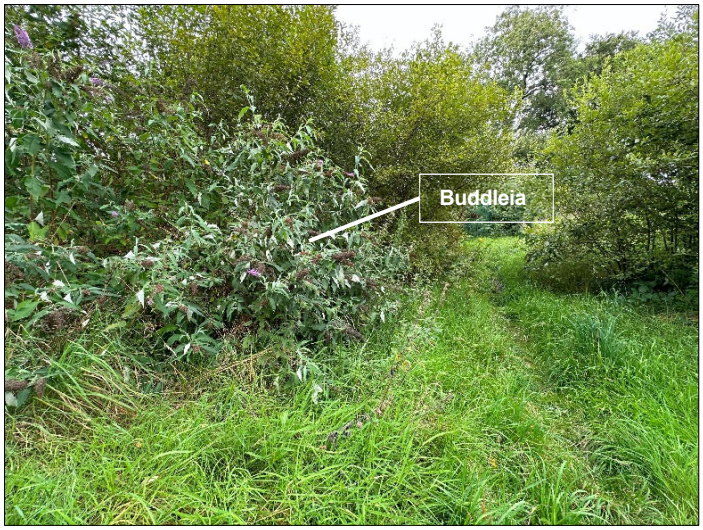
3.4 Buddleia (*Buddleja davidii*)

Buddleia (*Buddleja davidii*) has recorded in numerous locations throughout the site, as illustrated in Figure 2. Many of these locations have multiple Buddleia shrubs within ~5m of the target note position, ranging from small recently colonised shrubs to large mature examples. By way of such example, a large mature scrub was identified adjacent to the pedestrian footpath entrance at Old Cross Square (target note 1, photograph 6).

Examples of Buddleia were also identified within derelict areas such as the building remains at No.47a (target notes 41 & 42, photograph 7), and also within scrub land (target note 21, photograph 8). Buddleia is not regulated under the third schedule of S.I.477/2011, nor is it listed within the EU species of concern, however it is considered to pose a medium impact risk in terms of non-native species within Ireland. As such, Buddleia should need to be included within an Invasive Species Management Plan (ISMP).

Photograph 6. Mature Buddleia (target note 1) at pedestrian entrance

Photograph 7. Buddleia (target note 41 & 42) within derelict building 47a



Photograph 8. Buddleia (target note 21) within scrub land

3.5 Wall Cotoneaster (*Cotoneaster horizontalis*)

Wall cotoneaster (*Cotoneaster horizontalis*) was recorded at target note 4, to the rear of building 32c. The area comprises of dense scrub and ornamental shrubs which have likely spread from the rear amenity area of 32c, or from the original Old Infirmary gardens, although this area has also since become overgrown. Wall cotoneaster is not regulated under the third schedule of S.I.477/2011, nor is it listed within the EU species of concern, however it is considered to pose a medium impact risk in terms of non-native species within Ireland. As such, Wall cotoneaster should be included within an Invasive Species Management Plan (ISMP).

3.6 Sycamore (*Acer pseudoplatanus*)

Sycamore (*Acer pseudoplatanus*) was recorded at numerous positions within the site, either as semi-mature trees or saplings, such as next to the junction between St. Davnet's Row laneway and the pedestrian footpath at target note 24. Given the large number of locations, the presence of sycamore should be treated as commonly occurring. Sycamore is not regulated under the third schedule of S.I.477/2011, nor is it listed within the EU species of concern, however it is considered to pose a medium impact risk in terms of non-native species within Ireland. As such, Sycamore should need to be included within an Invasive Species Management Plan (ISMP).

4.0 CONCLUSIONS AND RECOMMENDATIONS

Layde Consulting was appointed by Carlin Planning Ltd to undertake an Invasive Alien Species Survey for a proposed Regeneration Scheme within Monaghan town, extending to lands at the rear of Dublin Street North. This report presents the findings of the IAS survey, and outlines a number of recommendations which are aimed to reduce the spread of impact of IAS, and with respect to the planning proposals and various phases of the development.

In summary, the following Invasive Alien Species and non-native species were identified within or next to the site boundary:

- Japanese Knotweed (*Fallopia japonica*)
- Himalayan honeysuckle (*Leycesteria Formosa*)
- Buddleia (*Buddleja davidii*)
- Cherry laurel (*Prunus laurocerasus*)
- Sycamore (*Acer pseudoplatanus*)

Japanese Knotweed is the only species identified within the site that is regulated within either the third schedule of S.I.477/2011 or the European Union Regulation (No. 1143/2014), however all of the identified species are considered to be medium or high impact risk non-native species.

Therefore, it is recommended that an Invasive Species Management Plan (ISMP) should be developed for the site which will need to outline specific details regarding the management of biosecurity during the demolition and construction phases. The ISMP should also detail mitigation or removal strategies for each of the IAS's, along with any pre-demolition / construction requirements. The ISMP should be treated as a 'live' document throughout all phases of the development, and updated accordingly, as required.

The findings outlined within this report are considered to be applicable for up to one year from the survey period. Should site works be postponed for more than one year beyond the survey period, then a re-survey for IAS's should be undertaken.

5.0 REFERENCES

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FIGURES

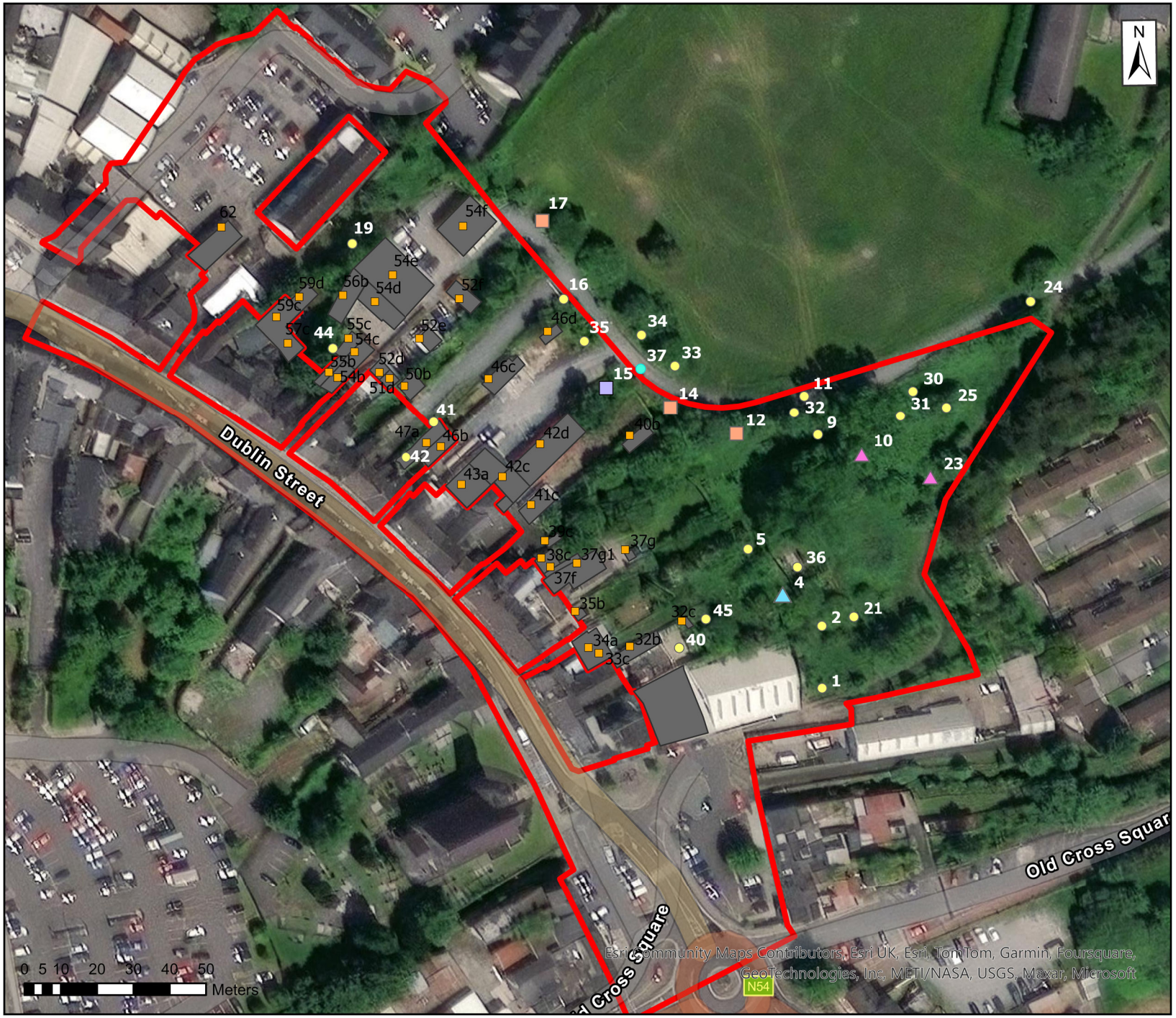

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Figure 2 Invasive Species Survey

Appendix 1

Non-native invasive plant species, as defined in Part 1 of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) and Amendment 2015 (S.I. No. 355/2015). Non-native species subject to restrictions under Regulations 49 and 50.

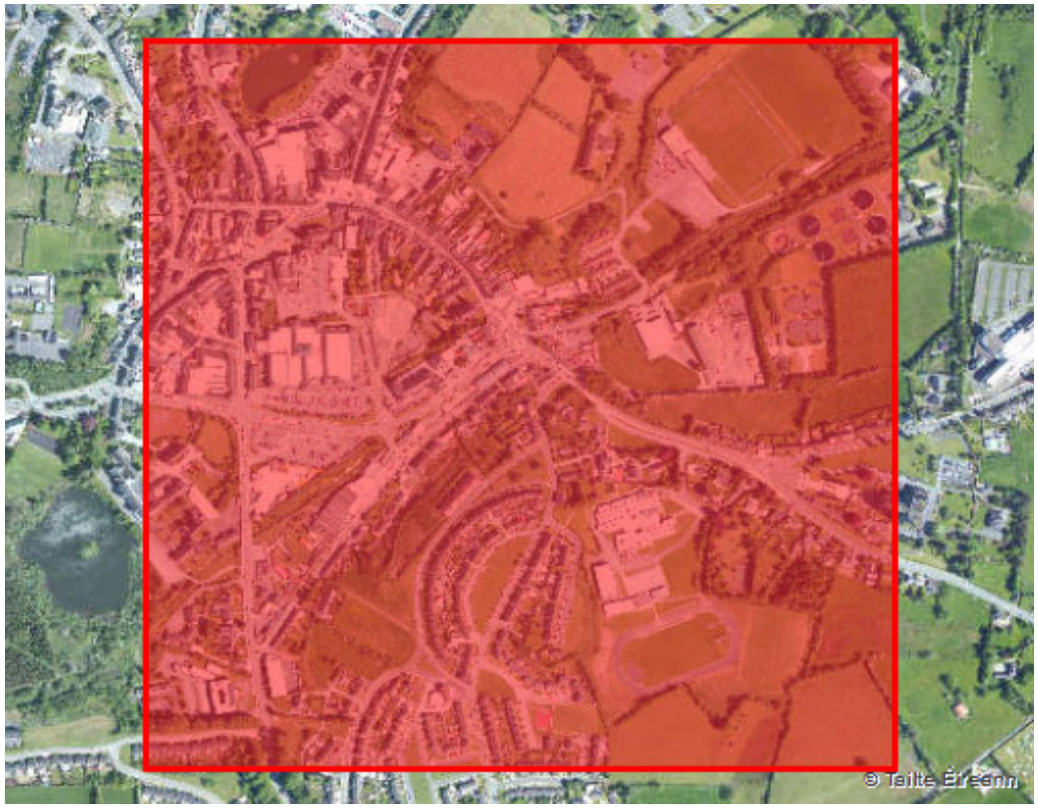
PLANTS:

Common name	Scientific name
American skunk-cabbage	*Lysichiton americanus*
A red alga	*Grateloupia doryphora*
Brazilian giant-rhubarb	*Gunnera manicata*
Broad-leaved rush	*Juncus planifolius*
Cape pondweed	*Aponogeton distachyos*
Cord-grasses	*Spartina* (all species and hybrids)
Curly waterweed	*Lagarosiphon major*
Dwarf eel-grass	*Zostera japonica*
Fanwort	*Cabomba caroliniana*
Floating pennywort	*Hydrocotyle ranunculoides*
Fringed water-lily	*Nymphoides peltata*
Giant hogweed	*Heracleum mantegazzianum*
Giant knotweed	*Fallopia sachalinensis*
Giant-rhubarb	*Gunnera tinctoria*
Giant salvinia	*Salvinia molesta*
Himalayan balsam	*Impatiens glandulifera*
Himalayan knotweed	*Persicaria wallichii*
Hottentot-fig	*Carpobrotus edulis*
Japanese knotweed	*Fallopia japonica*
Large-flowered waterweed	*Egeria densa*
Mile-a-minute weed	*Persicaria perfoliata*
New Zealand pigmyweed	*Crassula helmsii*
Parrots feather	*Myriophyllum aquaticum*
Rhododendron	*Rhododendron ponticum*
Salmonberry	*Rubus spectabilis*
Sea-buckthorn	*Hippophae rhamnoides*
Spanish bluebell	*Hyacinthoides hispanica*

Common name	Scientific name
Three-cornered leek	*Allium triquetrum*
Wakame	*Undaria pinnatifida*
Water chestnut	*Trapa natans*
Water fern	*Azolla filiculoides*
Water-primrose	*Ludwigia* (all species)
Waterweeds	*Elodea* (all species except Elodea canadensis)
Wireweed	*Sargassum muticum*

Appendix 2

Species list for H6733



Species group	Species name	Record count	Date of last record	Title of dataset	Designation
amphibian	Smooth Newt (Lissotriton vulgaris)	2	29/06/2010	Newt Survey 2010-2014	Protected Species: Wildlife Acts
bird	Barn Swallow (Hirundo rustica)	3	29/05/2023	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Black-billed Magpie (Pica pica)	5	25/05/2023	Birds of Ireland	
bird	Blackcap (Sylvia atricapilla)	3	25/05/2023	Birds of Ireland	
bird	Black-headed Gull (Larus ridibundus)	1	14/04/2012	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Blue Tit (Cyanistes caeruleus)	5	04/01/2018	Birds of Ireland	
bird	Chaffinch (Fringilla coelebs)	7	25/05/2023	Birds of Ireland	
bird	Coal Tit (Periparus ater)	4	18/05/2012	Birds of Ireland	
bird	Common Blackbird (Turdus merula)	6	04/01/2018	Birds of Ireland	
bird	Common Bullfinch (Pyrrhula pyrrhula)	2	11/02/2012	Birds of Ireland	
bird	Common Chiffchaff (Phylloscopus collybita)	2	18/05/2012	Birds of Ireland	
bird	Common Coot (Fulica atra)	2	18/05/2012	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber
bird	Common Moorhen (Gallinula chloropus)	8	04/01/2018	Birds of Ireland	

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
bird	Common Starling (Sturnus vulgaris)	7	29/05/2023	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Swift (Apus apus)	2	25/05/2023	Swifts of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Wood Pigeon (Columba palumbus)	4	18/05/2012	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
bird	Eurasian Collared Dove (Streptopelia decaocto)	5	25/05/2023	Birds of Ireland	
bird	Eurasian Jackdaw (Corvus monedula)	8	25/05/2023	Birds of Ireland	
bird	Eurasian Siskin (Carduelis spinus)	2	11/02/2012	Birds of Ireland	
bird	Eurasian Treecreeper (Certhia familiaris)	1	11/02/2012	Birds of Ireland	
bird	European Goldfinch (Carduelis carduelis)	3	14/04/2012	Birds of Ireland	
bird	European Greenfinch (Carduelis chloris)	2	11/02/2012	Birds of Ireland	
bird	European Robin (Erithacus rubecula)	8	25/05/2023	Birds of Ireland	
bird	Goldcrest (Regulus regulus)	4	25/05/2023	Birds of Ireland	
bird	Great Spotted Woodpecker (Dendrocopos major)	1	11/06/2022	Birds of Ireland	
bird	Great Tit (Parus major)	6	25/05/2023	Birds of Ireland	
bird	Grey Heron (Ardea cinerea)	1	11/02/2012	Birds of Ireland	
bird	Grey Wagtail (Motacilla cinerea)	1	10/10/2018	Birds of Ireland	
bird	Hedge Accentor (Prunella modularis)	4	18/05/2012	Birds of Ireland	
bird	Hooded Crow (Corvus cornix)	3	18/05/2012	Birds of Ireland	

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
bird	House Sparrow (Passer domesticus)	5	29/05/2023	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Lesser Redpoll (Carduelis cabaret)	1	10/12/2011	Birds of Ireland	
bird	Long-tailed Tit (Aegithalos caudatus)	1	14/04/2012	Birds of Ireland	
bird	Mallard (Anas platyrhynchos)	9	25/05/2023	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
bird	Mistle Thrush (Turdus viscivorus)	5	25/05/2023	Birds of Ireland	
bird	Mute Swan (Cygnus olor)	1	10/12/2011	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Pied Wagtail (Motacilla alba subsp.	6	18/05/2012	Birds of Ireland	
bird	Redwing (Turdus iliacus)	1	10/12/2011	Birds of Ireland	
bird	Rock Pigeon (Columba livia)	1	04/01/2018	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
bird	Rook (Corvus frugilegus)	7	06/01/2023	Birds of Ireland	
bird	Song Thrush (Turdus philomelos)	5	25/05/2023	Birds of Ireland	
bird	Willow Warbler (Phylloscopus trochilus)	3	25/05/2023	Birds of Ireland	
bird	Winter Wren (Troglodytes troglodytes)	4	18/05/2012	Birds of Ireland	
Flatworm (Turbellaria)	Arthurdendyus triangulatus	1	29/10/2012	New Zealand Flatworm (Arthurdendyus triangulatus) Database	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
flowering plant	Common Nettle (Urtica dioica)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Daisy (Bellis perennis)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Elder (Sambucus nigra)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Guelder-rose (Viburnum opulus)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Herb-Robert (Geranium robertianum)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Ivy (Hedera helix)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Japanese Knotweed (Fallopia japonica)	2	10/10/2018	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
flowering plant	Lime (Tilia platyphyllos x cordata = T. x europaea)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Meadow Buttercup (Ranunculus acris)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Red Clover (Trifolium pratense)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Silverweed (Potentilla anserina)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Taraxacum aggregate	2	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Water-plantain (Alisma plantago-aquatica)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
harvestman (Opiliones)	Leiobunum rotundum	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Mitopus morio	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Nelima gothica	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Nemastoma bimaculatum	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Oligolophus hanseni	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
harvestman (Opiliones)	Paroligolophus agrestis	1	02/10/1995	Harvestmen (Opiliones) of Ireland	
insect - beetle (Coleoptera)	7-spot Ladybird (Coccinella septempunctata)	1	29/05/2023	Ladybirds of Ireland	
insect - butterfly	Small Tortoiseshell (Aglais urticae)	1	05/09/2023	Butterflies of Ireland post 2021	

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
insect - butterfly	Speckled Wood (Pararge aegeria)	1	10/10/2018	Butterflies of Ireland pre-2022	
insect - hymenopteran	Common Carder Bee (Bombus (Thoracombus) pascuorum)	2	20/07/2023	Bees of Ireland	
insect - moth	Common Grass-veneer (Agriphila tristella)	1	12/08/1984	Moths Ireland	
insect - moth	Crinan Ear (Amphipoea crinanensis)	1	31/08/1911	Moths Ireland	
insect - moth	Straw Grass-veneer (Agriphila straminella)	1	10/08/1984	Moths Ireland	
millipede	Common Flat-backed Millipede (Polydesmus angustus)	1	02/10/1995	Millipedes of Ireland	
millipede	Eyed Flat-backed Millipede (Nanogona polydesmoides)	1	02/10/1995	Millipedes of Ireland	
millipede	Ophyiulus pilosus	1	02/10/1995	Millipedes of Ireland	
millipede	White-legged Snake Millipede (Tachypodoiulus niger)	1	02/10/1995	Millipedes of Ireland	
terrestrial mammal	Eastern Grey Squirrel (Sciurus carolinensis)	1	31/12/2007	The Irish Squirrel Survey 2007	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> EU Regulation No. 1143/2014 || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
terrestrial mammal	West European Hedgehog (Erinaceus europaeus)	1	23/03/2023	Hedgehogs of Ireland	Protected Species: Wildlife Acts

Species list for H6734

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Species group	Species name	Record count	Date last record	Title of dataset	Designation
bird	Barn Swallow (Hirundo rustica)	1	14/04/2012	Birds of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Bullfinch (Pyrrhula pyrrhula)	1	14/04/2012	Birds of Ireland	
bird	Common Buzzard (Buteo buteo)	1	18/05/2012	Birds of Ireland	
bird	Common Coot (Fulica atra)	1	06/01/2023	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern -
bird	Common Moorhen (Gallinula chloropus)	1	06/01/2023	Birds of Ireland	
bird	Common Swift (Apus apus)	1	29/05/2023	Swifts of Ireland	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Eurasian Jackdaw (Corvus monedula)	3	06/01/2023	Birds of Ireland	
bird	European Greenfinch (Carduelis chloris)	1	14/04/2012	Birds of Ireland	
bird	Pied Wagtail (Motacilla alba subsp.	1	04/08/2017	Birds of Ireland	
bird	Rock Pigeon (Columba livia)	1	04/08/2017	Birds of Ireland	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird

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Species group	Species name	Record count	Date last record	Title of dataset	Designation
bird	Rook (Corvus frugilegus)	1	04/08/2017	Birds of Ireland	
bird	Willow Warbler (Phylloscopus trochilus)	1	08/04/2023	Birds of Ireland	
flowering plant	Bluebell (Hyacinthoides non-scripta)	1	27/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Japanese Knotweed (Fallopia japonica)	1	12/06/2019	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
flowering plant	Lesser Celandine (Ranunculus ficaria)	1	04/04/2017	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
flowering plant	Primrose (Primula vulgaris)	1	26/04/2018	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	
insect - butterfly	Peacock (Inachis io)	1	24/08/2019	Butterflies of Ireland pre-2022	
insect - hymenopteran	Bombus (Bombus) terrestris	1	04/04/2017	Bees of Ireland	
insect - moth	Angle Shades (Phlogophora meticulosa)	1	16/07/2023	Moths Ireland	
insect - moth	Buff Footman (Eilema depressa)	1	16/07/2023	Moths Ireland	
insect - moth	Burnished Brass (Diachrysia chrysitis)	1	16/07/2023	Moths Ireland	
insect - moth	Common Carpet (Epirrhoe alternata)	1	16/07/2023	Moths Ireland	
insect - moth	Dark Arches (Apamea monoglypha)	1	16/07/2023	Moths Ireland	
insect - moth	Death's-head Hawk-moth (Acherontia atropos)	1	23/10/2013	Moths Ireland	
insect - moth	Dotted Clay (Xestia baja)	1	16/07/2023	Moths Ireland	
insect - moth	Double Dart (Graphiphora augur)	1	16/07/2023	Moths Ireland	
insect - moth	Double-square Spot (Xestia triangulum)	1	16/07/2023	Moths Ireland	
insect - moth	Dun-bar (Cosmia trapezina)	1	16/07/2023	Moths Ireland	
insect - moth	Flame Shoulder (Ochropleura plecta)	1	16/07/2023	Moths Ireland	
insect - moth	Four-spotted Footman (Lithosia quadra)	1	16/07/2023	Moths Ireland	
insect - moth	Heart & Dart (Agrotis exclamationis)	2	16/07/2023	Moths Ireland	
insect - moth	Large Yellow Underwing (Noctua pronuba)	1	16/07/2023	Moths Ireland	
insect - moth	Light Arches (Apamea lithoxylaea)	1	16/07/2023	Moths Ireland	
insect - moth	Mesapamea secalis agg.	1	16/07/2023	Moths Ireland	
insect - moth	Old Lady (Mormo maura)	1	16/07/2023	Moths Ireland	
insect - moth	Rush Wainscot (Archanara algae)	1	16/07/2023	Moths Ireland	
insect - moth	Rustic (Hoplodrina blanda)	1	16/07/2023	Moths Ireland	
insect - moth	Silver Y (Autographa gamma)	1	16/07/2023	Moths Ireland	

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Species group	Species name	Record count	Date last record	Title of dataset	Designation
insect - moth	Smoky Wainscot (Mythimna impura)	1	16/07/2023	Moths Ireland	
insect - moth	Snout (Hypena proboscidalis)	1	16/07/2023	Moths Ireland	
insect - moth	Spectacle (Abrostola tripartita)	1	16/07/2023	Moths Ireland	
insect - true fly	Eristalis arbustorum	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Eristalis tenax	1	25/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Helophilus hybridus	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Helophilus pendulus	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Neoascia podagrica	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Platycheirus albimanus	1	25/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Platycheirus granditarsus	1	25/09/1971	Hoverflies (Syrphidae) of Ireland	
insect - true fly	Syrphus vitripennis	1	24/09/1971	Hoverflies (Syrphidae) of Ireland	
terrestrial mammal	Common Pipistrelle (Pipistrellus pipistrellus sensu stricto)	1	20/06/2012	National Bat Database of Ireland	
terrestrial mammal	Eastern Grey Squirrel (Sciurus carolinensis)	1	31/12/1981	Mammal Recording Scheme 1970-1985 (An Foras Forbartha)	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> EU Regulation No. 1143/2014 || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
terrestrial mammal	Eurasian Red Squirrel (Sciurus vulgaris)	1	05/10/2018	Mammals of Ireland 2016-2025	Protected Species: Wildlife
terrestrial mammal	European Otter (Lutra lutra)	1	10/08/2008	Road Kill Survey	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
terrestrial mammal	Lesser Noctule (Nyctalus leisleri)	2	20/06/2012	National Bat Database of Ireland	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts

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Species group	Species name	Record count	Date last record	Title of dataset	Designation
terrestrial mammal	Soprano Pipistrelle (Pipistrellus pygmaeus)	1	20/06/2012	National Bat Database of Ireland	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts

LAYDE CONSULTING

Invasive Species Management Plan

Proposed Regeneration Scheme, Dublin Street North, Monaghan

Client: Carlin Planning Ltd

Project Reference: P676-3

Issue Date: September 2024

Specialist Environmental Consultancy Services

Table of Contents

1.0 INTRODUCTION

Layde Consulting was commissioned by Carlin Planning Ltd to prepare an Invasive Species Management Plan for a proposed Regeneration Scheme within Monaghan town, extending to lands at the rear of Dublin Street North. Following the results of a Preliminary Ecological Assessment (PEA) carried out for the site, non-native and invasive species where identified within the proposed development area. As a result, a detailed Invasive Species Survey was carried out between April 2023 to August 2024 for the project area, and the results of the survey have been used to develop this Invasive Species Management Plan (herein referred to as the 'ISMP').

The purpose of this document is to describe the options available for managing and preventing the spread of non-native invasive alien plant species (herein referred to as 'IAS') recorded within the site during the construction and operational phases of the development.

> This document is intended to be a working document and should be routinely updated by the appointed contractor in order to form a detailed ISMP which will contain site specific mitigation measures. The detailed ISMP should be updated prior to the commencement of site works and also for the operational phase (inclusive of maintenance works).

It is possible that the works carried out during the demolition and construction phases of the development may have the possibility of disturbing stands of non-native invasive plants and/or soils contaminated with non-native invasive plant material. Therefore, the aim of this plan is to avoid or prevent the spread of invasive species, and to prevent either direct or indirect impacts on any habitats, onsite or offsite of the development area.

1.1 Project Overview

The proposed development area (herein termed the 'site') incorporates lands to the rear of Dublin Street North, Monaghan (see Figure 1), and comprises of a mix of urbanised areas, external residential amenity areas, commercial land, and derelict lands comprising of scrub and treelines along St. Davnet's Row and the Old Infirmary area. Under the development proposals it is intended to regenerate the site by demolishing the existing buildings within the site, and constructing a new public access road, car parking and event space, and also enabling the provision of future development plots for commercial and residential uses. As a result, the development proposals also include the removal of vegetation and ground cover, as required, and grading cut/fill works. The proposals also include all necessary infrastructure provisions such as drainage and utilities, paving, surfacing and landscaping.

Figure 1- Proposed development area, lands to the rear of Dublin Street North

1.2 Demolition and Enabling Works

The development proposals intend to demolish all existing buildings inside the application area, some of which have been colonised with non-native plant species. In order to facilitate enabling and demolition works, ground clearance of vegetation will be required, which will likely include the removal / disturbance of non-native and IAS's. The demolition phase will also require the haulage of materials offsite for disposal, therefore works associated with the demolition and ground clearance / enabling works phase may have the potential to disturb and spread invasive alien species (IAS) within the site area.

1.3 Construction Phase of the Project

Construction works will involve the removal and clearance of ground level vegetation, and will require the excavation of soils and subsoil surfaces as part of the cut / fill grading processes. Spoil materials will be exported from site, with new materials being imported. Therefore, works associated with the construction phase also have the potential to disturb and spread invasive alien species (IAS) within the site area.

1.4 Operational Phase of the Project

Potential to spread or disturb invasive species within the development area during the operational phase will effectively be negligible, as all IAS's will either be eradicated or removed from site during the enabling works, demolition or construction phases.

1.5 Legislation & Guidance

The primary controlling legislation relating to the spread of invasive species within Ireland falls under the remit of the following documents:

Invasive Alien Species Regulation (Regulation (EU) 1143/2014) includes a set of measures to be taken across the EU in relation to invasive alien species. The core of the Regulation is the list of Invasive Alien Species of Union concern (Union List) which are subject to restrictions and measures set out in the Regulation. The IAS regulations set out restrictions on keeping, importing, selling, breeding, growing and releasing listed IAS into the environment. Within the document all Member States are required to:

- take action on pathways of unintentional introduction (i.e. prevention);
- take measures for the early detection and rapid eradication of these species; and
- manage species that are already widely spread in their territory.

The European Communities (Birds and Natural Habitats) Regulations 2011 (Statutory Instrument 477/2011) and Amendment 2015 (S.I. No. 355/2015) also contains specific provisions that govern the control of listed invasive species. Within the guidance it is an offence to release or allow to disperse or escape, to breed, propagate, import, transport, sell or advertise species listed on Schedule 3 of the regulations without a Licence. The two regulations that deal specifically with this scheduled list of species are:

- Regulation 49: Prohibition of introduction and dispersal of certain species; and,
- Regulation 50: Prohibition on dealing in and keeping certain species.

Under legislation the following is prohibited in connection with IAS:

- Dumping invasive species cuttings in the countryside;
- Planting or otherwise causing to grow in the wild (hence the landowner should be careful not to cause further spread);

- Disposing of invasive species at a landfill site without first informing the landfill site that the waste contains invasive species material (this action requires an appropriate licence); and,
- Moving soil which contains specific invasive species in the Republic of Ireland unless under a licence from National Parks and Wildlife Service (NPWS).

In addition to the legislative context, the principle of controlling IAS is contained with National Biodiversity Action Plan (NBAP) 2023-2030, which aims to reduce the risk of introduction and/or spread of new species.

2.0 METHODOLOGY

This ISMP, along with the mitigation measures outlined therein, takes into consideration the most relevant guidance documents which would be applicable to the IAS's identified within the site area. Although not limited to the following documents, this list provides the main guidance for managing and controlling the spread of IAS's, particularly for the IAS's identified within the development area:

- NRA "*Guidelines for the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*", National Roads Authority, Dublin (2010);
- The Management of Invasive Alien Plant Species on National Roads – Standard (TII 2020)
- Best Practice Management Guidelines for Japanese Knotweed (Invasive Species Ireland, 2015);
- Managing Japanese Knotweed on Development Sites (version 3, amended in 2013 and withdrawn in 2016): The Knotweed Code of Practice (Environment Agency, 2013);
- Irish Water (2016a). Guidance on the Management of Japanese knotweed. Irish Water. Dublin, Ireland.
- Managing Invasive Non-native Plants in or near Freshwater (Environment Agency, 2010);
- Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges (National Parks and Wildlife Service 2008);
- IFI Biosecurity Protocol for Field Survey Work IFI (2010)

3.0 RECORDED INVASIVE SPECIES WITHIN PROJECT AREA

This section presents a summary of the Invasives Species Survey carried out by Layde Consulting in August 2023. The summary aims to provide a concise description of IAS's identified within the project area, along with the site locations of each species. On this basis the control measures and options for managing each species is provided thereafter.

The Invasive Species Survey recorded the spatial presence of IAS's within the development area (**see Appendix 1 for IAS Survey map**). A summary of the identified IAS's and locations are presented below in Table 1.

Note: for the purpose of future management and recording keeping, each IAS has been assigned an Identification ID, which will ensure future references will remain consistent.

Table 1. Summary of IAS's identified within the project area.

Target ID	Species	Location (ITM)		Impact Level	Regulations
1	Buddleia	667461	833669	Medium	No specified regulation Follow Guidance on Management Principles
2	Buddleia	667461	833686	Medium	
4	Buddleia Wall Contoneaster	667451	833695	Medium Medium	
5	Buddleia	667441	833707	Medium	

Target ID	Species	Location (ITM)		Impact Level	Regulations
9	Buddleia	667460	833739	Medium	
10	Himalayan Honeysuckle Buddleia	667472	833733	Medium Medium	
11	Buddleia	667456	833749	Medium	
12	Japanese Knotweed	667438	833739	High	Controlled under S.I.477/2011 3rd Schedule Part 1
14	Japanese Knotweed	667420	833746	High	
15	Buddleia Cherry Laurel	667402	833752	Medium High	No specified regulation Follow Guidance on Management Principles
16	Buddleia	667390	833776	Medium	
17	Japanese Knotweed	667384	833798	High	Controlled under S.I.477/2011 3rd Schedule Part 1
17	Buddleia	667332	833791	Medium	No specified regulation Follow Guidance on Management Principles
19	Buddleia	667470	833688	Medium	
21	Buddleia	667491	833727	Medium	
23	Himalayan Honeysuckle Buddleia	667519	833776	Medium Medium	
24	Buddleia	667496	833746	Medium	
25	Buddleia	667486	833751	Medium	
30	Buddleia	667483	833744	Medium	
31	Buddleia	667454	833745	Medium	
32	Buddleia	667421	833758	Medium	
33	Buddleia	667412	833766	Medium	
34	Buddleia	667396	833765	Medium	
35	Buddleia	667402	833752	Medium	
36	Buddleia	667455	833702	Medium	
37	Buddleia	667411	833757	Medium	
40	Buddleia	667422	833680	Medium	
41	Buddleia	667355	833742	Medium	
42	Buddleia	667347	833732	Medium	
44	Buddleia	667327	833762	Medium	
45	Buddleia	667429	833688	Medium	
-	Sycamore	Various locations		Medium	

Note: Japanese Knotweed is controlled and regulated under the 3rd Schedule Part 1 of Statutory Instrument S.I.447/2011. The remaining IAS's and non-native plant species are not contained with the 3rd Schedule, however these species are considered to pose a medium to high risk under the right conditions of spreading, and are thus managed under relevant guidance documents and management practices.

Buddleia (*Buddleja davidii*), Cherry laurel (*Prunus laurocerasus*), Himalayan honeysuckle (*Leycesteria Formosa*), Wall cotoneaster (*Cotoneaster horizontalis*) and Sycamore (*Acer pseudoplatanus*) are not included in the 3rd Schedule. Therefore, their presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011).
However, the National Biodiversity Centre (NBDC) notes that under the right ecological conditions these species may have an impact on the conservation goals of a European site or impact on a water body achieving good/high ecological status under the Water Framework Directive (Directive 2000/60/EC).

4.0 PRE-CONSTRUCTION SURVEY

Given the potential timeframe lag between the planning and design stage of the project to the site preparation, demolition and construction phase, it is possible that the areas identified with IAS's may have changed spatially from the initial Invasives Species Survey, and new IAS may be found within the project area which was not previously identified within the Invasives Species Survey.

Therefore, it is recommended to undertake a pre-construction survey of invasive species prior to demolition and enabling works, and to update this ISMP accordingly. The details of the re-survey should provide an approximate area and density of plant species, and a record made of any changes to the findings of the initial Invasive Species Survey.

Should any species be found that is not included within this ISMP, then the plan should be updated to include control measures and appropriate management or mitigation, as required.

5.0 INVASIVE SPECIES MANAGEMENT PLAN - OBJECTIVES

The key objectives outlined within this ISMP are to:

- Review all identified IAS's located inside the project area, and to maintain records of all IAS's which are identified during the pre-construction / setup phases, and also during the construction, post-construction and operational phases of the development;
- To ensure that IAS's do not encroach within the site, and to prevent the spreading of IAS's from the site area either through the disturbance of soil / subsoil materials, or through contamination of soils to be removed offsite;
- To manage, control or remove all IAS's identified within the site. This may be carried out through a range of treatment processes (discussed later within this ISMP), and should adhere to all relevant good practice guides for managing IAS's and in accordance with regulations and Statutory Instruments etc;
- The ISMP aims to provide a document relating specifically to the site and project area, and should record all control measures, techniques and options used for managing IAS's during all phases of the development. The document should be considered as a live document and should be updated accordingly throughout the lifespan of the project.

6.0 PERSONNEL TRAINING & CONTROL TECHNIQUES

All personnel working onsite should be trained and made aware of the ISMP, and the presence of ISA's. This should be included for all induction training exercises for new personnel working at the site, and should be reviewed annually throughout the lifespan of the project, as required;

- Personnel are at all times to be mindful of the threat posed by the spread of invasive species and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material;
- All PPE must be cleaned thoroughly before entering the works area and exclusion zones. Similarly, all individuals must thoroughly inspect their clothing and PPE before leaving the site or works area, in order to ensure that seeds, rhizomes, or other plant fragments are not stuck or attached to their clothing;
- Designated wash-down areas should be provided within each works area and lined with appropriate geo-textile materials within each exclusion zone. As a minimum, wash buckets, sole picks and bristled brushes should be provided for each wash-down area. All footwear must be thoroughly cleaned before leaving the exclusion zone or works area;
- Wash-down materials from PPE equipment or machinery should be appropriately contained and removed offsite using the relevant measures outlined within this ISMP.

7.0 BIOSECURITY: PLANT EQUIPMENT

Plant equipment, including excavators, dump trucks, HGV's and all forms of static or mobile plant has the potential to carry contaminated soils and IAS materials offsite, or to other positions of the site particularly within exclusion zones. It is common for plant equipment to be brought temporarily to site for specific phases of works, and then to be subsequently taken to other sites or projects directly. Therefore, the following should be adhered to:

- All plant machinery which is to be used within an exclusion zone should be clean on arrival to the site and should be stored within a specified site compound or storage area when not in use. The storage area / site compound must be covered by geotextile materials, and any build up of debris should be stored and contained as required within this ISMP;
- Plant equipment used within an exclusion zone should be cleaned within a designated wash-down area before moving from one area of a site to another;
- The number of machines that enter exclusion zones or come into contact with contaminated material should be kept to a minimum;
- Machinery (especially HGVs) should be kept within a designated haulage route, marked by appropriate fencing and signage;
- All plant operating within an exclusion zone should be thoroughly washed within a designated geo-textile lined wash-down area before exiting the exclusion zone, paying particular attention to any part of the machinery or equipment that may have come into contact with an invasive species or contaminated clay e.g. tracks/tyres, buckets, machine arms, wheel arches etc;
- All equipment and machinery must be certified as clean by the Ecological Clerk of Works (ECoW) before they are removed from the exclusion zone; and
- Materials or debris generated within the wash-done area should be contained and managed in accordance with the techniques outlined within this ISMP.

8.0 BIOSECURITY: HANDLING / DISTURBANCE OF MATERIALS

8.1 Excavations, movement of material, disturbance and transportation

Invasive species can easily spread to new areas, particularly within disturbed grounds such as construction sites, and can spread by the re-growth of cut fragments or root material (rhizomes). Therefore, excavation works and ground clearance including site clearance of vegetation has potential to spread IAS's if not managed or handled in accordance with recommended guidance.

- When geotextile material is required to be excavated and removed from site, it should be treated and handled in exactly the same way as soils/subsoils contaminated with IAS's;
- If soil or geotextile materials are imported to the site for landscaping, infilling or laying of haulage routes etc, then the contractor should gain documentation from suppliers that the material is free from invasive species;
- Excavation and HGV loading areas should be defined and planned for in advance, with geo-textile materials laid throughout the loading area and haulage route, up to 2m buffer either side;
- Where contaminated material is being loaded or excavated, particular care must be taken in order to ensure that a spillage is avoided at all times;
- In the event that spillages of material occur, either through accidental release or as a result of excavation works, then spilled materials should be cleaned up immediately;
- Wherever possible, haulage and movement of materials should not occur within exclusion zones, unless absolutely necessary as part of the program of works required for the project;

- Only vehicles required for essential works, including site investigation works, will be brought on site and the number of visits minimised as much as practicable;
- Haulage routes and access tracks should be delineated and marked or fenced off, and exclusion fencing must be erected and clearly visible wherever required. All site personnel should be made aware of exclusion zones, and appropriate signage should be installed to the same effect;
- Wash-down areas with the use of power washing and suitable wheel wash facilities should be provided at all exit points from the site, and all plant should be washed thoroughly, with all mud and debris removed prior to leaving the site. Geo-textile material should be laid throughout the wash-down area, and all contaminated materials and debris should be collected and treated for disposal;
- Tracked machines have a high potential for spreading IAS's and contaminated soil materials, therefore particular attention should be paid to thoroughly washing down tracked machines before moving offsite. The cleaned machines should be inspected by a suitably qualified ECoW or trained personnel prior to leaving site.

8.2 Disposal of Materials Offsite

Ideally, treatment of IAS's should be undertaken onsite where practically possible in order to prevent the unintentional spread of invasive species. However, where the above treatment options are not possible because of constraints within the site to either treat or contain excavated material, or where there is a lack of space or depth needed to implement suitable control measures, or where time constraints do not permit the effective treatment measures to be carried out prior to works, then the removal of excavated material may be the only option. Therefore, the following should be adhered to:

- Where it is necessary to dispose of materials offsite, then it should be noted that the movement of invasive plant material requires a licence from the National Parks and Wildlife Service (NPWS) under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). Therefore, prior to commencing site setup, clearance or construction works, a licence must be obtained from the NPWS in advance.

- Invasive species collected within the site must be disposed of at licensed waste facilities or composting sites, appropriately buried, or incinerated having regard to relevant legislation. Where there are small amounts of IAS material (such as small volumes of Knotweed or Himalayan Balsam, including flower heads, seeds, stems, root material or leaves etc) to be removed it may be possible to double bag the material and send it to a licenced waste facility for disposal. Where the amount of material is larger in volume, it will be necessary to haul it from site to a suitably licenced waste facility;

- It should be noted that some invasive species plant material or soil containing residual herbicides may be classified as either 'hazardous waste' or 'non-hazardous waste' under the terms of the Waste Management Acts, and both categories may require special disposal procedures or permissions. Advice should be sought from a suitably qualified waste expert regarding the classification of waste and the suitability of different disposal measures;

- As discussed in sections below, soil and subsoil materials may be screened for rhizomes and root material, however all soils excavated within affected areas should be treated as contaminated. Any soil or screened materials to be removed offsite should be taken to a licensed faciality for disposal;

- Before commencing site works, the operators or contractor should be in receipt of all necessary licenses required to transport contaminated materials offsite, and waste transfer documentation retained for future inspection. A record of all materials should be kept for offsite disposal, to include as a minimum the volumes of materials, nature and waste classifications, haulage details and which licensed facility the materials were taken to. In addition, a record should be kept for any documentation needed in accordance with waste handling, transfer and disposal licenses.

9.0 EXCLUSION ZONES

Exclusion zones should be set up around areas affected by IAS's as listed under Invasive Alien Species Regulation (Regulation (EU) 1143/2014) or The European Communities (Birds and Natural Habitats) Regulations 2011 (Statutory Instrument 477/2011) and Amendment 2015 (S.I. No. 355/2015), inclusive of any amemdments, in order to avoid the unintentional spreading of IAS's within the site area, or offsite where excavated materials are to be removed. Where exclusion zones are required, then the following should be adhered to:

- Exclusion zones must be clearly marked or fenced off, and made easily identifiable to site personnel in order to prevent accidental incursion into the affected area;
- The extent of the exclusion zone should be based on the extent of the affected area where IAS's have been recorded, but should also take into consideration the extent of rhizome or roto system associated with the species. This may be up to 7m beyond the extent of the stands, or greater depending on the species identified;
- Entry and exit points to the exclusion zones should be clearly identifiable, and all site personnel should be notified as to where these points are located;
- Exclusion zones must also be set up to in order keep machinery and personnel away from any stored contaminated clay or plant material;
- Only vehicles required for essential works will allowed within an exclusion zone, and the number of visits minimised as much as practicable;
- Any personnel or machinery accessing a designated exclusion zone must be subject to strict biosecurity protocols, as outlined within SECTION 6 – 8 of this ISMP;
- Exclusion zones should remain fenced off and implemented for the entire duration of the project, until the IAS's have been effectively treated or removed;
- Site hygiene signage, specific to the management of the invasive species identified within the site, will be erected and made clear to all site personnel; and
- All site personnel should be appropriately trained as per SECTION 6 of this ISMP.

10.0 USE OF HERBICIDES OR CHEMICAL TREATMENT PRODUCTS

- If herbicide is to be applied as a treatment option, it likely that application of the herbicide may be required for more than one year, and up to five years depending on the species being applied to, in order to ensure that plant control measures have been effective. The length of treatment may also vary depending on the type of herbicide used, i.e. highly persistent herbicides may eradicate a plant within one to two years, whereas non-persistent herbicides (such as glyphosate) may take over a period of at least three years to ensure the successful eradication of the plants;
- A range of herbicides are available for the chemical control of IAS's, and includes herbicides such as Glyphosate, 2,4-D Amine. Glyphosate is non-persistent and can be used near water but it is not selective (i.e. it is a broad spectrum chemical and will impact all plant species), whereas 2,4-D Amine can be persistent for up to one month, and can also be used near water but is more selective on certain plants.

- The selection of chemicals by the contractor and supervising ecologist will depend on seasonal factors, site conditions, proximity to water, surrounding habitats etc;
- In order to ensure that the use of herbicides does not contravene legislation, the contractor must comply with Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges from the National Parks and Wildlife Service dealing with the application on to non-target areas. In addition, a qualified and experienced contractor will be employed to carry out all treatment works;
- If chemical or herbicide treatment is to be carried out, then it is recommended that the appointed contractor prepares a site-specific treatment plan in accordance with the relevant guidelines before commencing works;
- Should treatment be carried out within close proximity to water, or where there is a risk of contaminating watercourses, then the choice of herbicide should be limited to formulations of Glyphosate and 2,4-D amine that are approved for use near water, or similar approved herbicides. It is recommended that chemical control via the application of herbicides is not carried out within 5m of any existing surface water feature, including local drainage infrastructures. If herbicide application is necessary within this area, then only herbicides which are approved for use near water should be used;
- Herbicides should be applied during peak growing periods (typically from May – September), however local climate conditions such as temperature and rainfall can determine the effectiveness of treatment applications. Treatment outside the peak growing season is often ineffective, as plants are dormant during winter periods and do not take in the herbicide treatment;
- In the case of Knotweed, depending on weather and temperatures in the days following the initial treatment, and to ensure optimal uptake of herbicide into the rhizome system, a second similar treatment may be required (usually within ten days), before the internal vascular system is no longer capable of translocating the herbicide to the root system;
- A systemic herbicide (e.g. Picloram) and/or a bioactive formulation such as glyphosate based Round-Up Proactive may be sprayed on foliage during dry weather or injected directly into the stems of IAS's. Strong systemic herbicides are most effective at targeting the persistent roots, however it should be noted that they may also persist in the soil and/or kill surrounding vegetation;
- Foliar treatment (spraying) is usually applied with a sprayer such as a knapsack sprayer or a larger spray system. It is important to use a treatment dye to identify clearly all areas treated. Foliar treatment is an efficient way to treat large areas of invasive plants, or to spot-treat individual plants that are difficult to remove mechanically (such as Japanese Knotweed). While the upper surface of the leaves will be easier to treat, it is also important to treat the leaf under surface as Knotweed possesses many stomata openings on the leaf under surface;
- Injecting herbicides directly into the stem of the plant is a common method for controlling and eradicating IAS's, however this method is more suitable for smaller stands given that it is labour intensive. This form of treatment typically requires a higher concentration of the active ingredient than is used in foliar applications, and involves the use of a specialist herbicide injection tool whereby the injection tool injects the herbicide directly into the plant;
- Following application of herbicide treatment during the first season, annual spot-checks should be conducted during the early growing season in order to identify any re-growth of the plant;
- Regrowth may occur in subsequent years, and if this is the case then further herbicide treatments should be undertaken each year until no regrowth occurs;
- Manufacturers guidance and current regulations on the use of chemical or herbicide treatment should be strictly adhered to at all times.

11.0 SPECIFIC GUIDANCE: JAPANESE KNOTWEED

The section relates to the specific handling and management options for Japanese Knotweed [*Fallopia japonica*] and should be read in junction with the relevant regulations and Statutory Instruments. The information contained within this report is relevant to current guidance and legislation, however should guidance and legislation be changed or updated then the ISMP should be revised accordingly. Based on current guidance and legislation, the following management options are available under license:

Option No.1: None eradication methods:

- Exclusion zones and buffer areas

Option No.2: Control or eradicate Japanese Knotweed through:

- Stockpile and treatment processes
- Chemical control and herbicide applications
- Excavation of materials and burial onsite
- Excavation of materials for offsite disposal

11.1 Option 1: Exclusion Zones and Buffer Areas

The option of installing exclusion zones and buffer areas has been considered under SECTION 9 of this ISMP and is applicable where Option No.2 for the control or eradication of Japanese Knotweed is not possible.

11.2 Option 2: Eradication of Japanese Knotweed

11.2.1 Stockpile and treatment

This option will require sufficient time to undertake the construction of the stockpile area, geotextile lining, and time required for the treatment process to be effective. Plant material, such as cut stems and foliage, excavated rhizomes or crowns, are emplaced within the stockpile area and treated using herbicides or chemical treatment processes. This process can take several years to ensure plant material is dead, and that no regrowth occurs. Should this option be appraised, then the following should be implemented:

- The stockpile area should be constructed using a heavy-duty root barrier membrane and geotextile liner laid out at the stockpile area, and all infested material should be placed on top of it creating a low flat-topped berm;

- The stockpile area should have a buffer created around the edges of the root barrier, in order to provide a buffer for avoiding spillage of contaminated material onto unprotected soils. No material should be placed within the buffer zone;

- The root barrier membrane should be protected from damage by vehicles using a geotextile liner comprising of a sand layer emplaced directly above and below the root barrier membrane, and surfaced with a layer of cleaned hard core or other suitable material;

- Soils infested with Japanese Knotweed will be excavated to a depth of at least c. 5-7m (or to a depth where no Japanese Knotweed root systems are visible) and stockpiled at a non-environmentally sensitive area of open space, on lands within the ownership of the applicant;

- The stockpile area will be fenced off and sign-posted as SECTION 9 of this ISMP. Stockpiled materials should be treated using a herbicide either by stem injection, or foliar application for a period of at least three years (and may require reapplications of up to 5 years), as described in SECTION 10 of this ISMP;

- In order to encourage regrowth of knotweed during the herbicide treatment process, it is recommended turn stockpiled material. The effectiveness of herbicide treatment of Japanese Knotweed is increased during plant regrowth;

- An ECoW's should oversee the stockpile treatment process, and all site personnel should be trained to understand the role and authority of the clerk of works. After construction works are complete, follow up surveys will be conducted to survey for regrowth. If regrowth is observed, then additional treatment will be conducted;

- All excavation and handling of materials, along with biosecurity controls, should adhere strictly to SECTIONS 7 & 8 of this ISMP as required.

11.2.2 Chemical control and herbicide applications

Chemical treatment involves the application of a herbicide to invasive species such as Japanese Knotweed stands without any excavation or removal of the plant material, and is considered to be a viable option for when the excavation of IAS's cannot be carried out, or when sufficient time is available between the application phase and the when construction works are to be carried out. If chemical or herbicide treatment is to be used, then the following points should be considered:

- Should herbicides be required as the treatment option, then the measures outlined within SECTION 10 of this ISMP should be adhered to;

- Herbicides should be applied during peak growing periods (typically from May – September), however local climate conditions such as temperature and rainfall can determine the effectiveness of treatment applications. Treatment outside the peak growing season is often ineffective, as plants are dormant during winter periods and do not take in the herbicide treatment;

- For the effective treatment of Knotweed, depending on weather and temperatures in the days following the initial treatment, and to ensure optimal uptake of herbicide into the rhizome system, a second similar treatment may be required (usually within ten days), before the internal vascular system is no longer capable of translocating the herbicide to the root system;

- A systemic herbicide and/or a bioactive formulation such as glyphosate based product may be sprayed on foliage during dry weather or injected directly into the stems of IAS's. Strong systemic herbicides are considered to be the most effective at targeting persistent roots such as Japanese Knotweed;

- Foliar treatment is an efficient way to treat large areas of Knotweed, or to spot-treat individual plants that are difficult to remove mechanically. While the upper surface of the leaves will be easier to treat, it is also important to treat the leaf undersurface as Knotweed possesses many stomata openings on the leaf under surface;

- Injecting herbicides directly into the stem of the plant is a common method for controlling and eradicating Knotweed, however this method is more suitable for smaller stands given that it is labour intensive. This form of treatment typically requires a higher concentration

of the active ingredient than is used in foliar applications, and involves the use of a specialist herbicide injection tool whereby the injection tool injects the herbicide directly into the plant approximately 20-30cms from the base of each cane (between the 1st and 2nd nodule);

- Following application of herbicide treatment during the first season, annual spot-checks should be conducted during the early growing season in order to identify any re-growth of the plant. In the case of Japanese Knotweed, it is likely that retreatment will be required for at least 3 years, but can occur up to 5 years from the initial treatment;

- Regrowth may occur in subsequent years, and if this is the case then further herbicide treatments should be undertaken each year until no regrowth occurs;

- Manufacturers guidance and current regulations on the use of chemical or herbicide treatment should be strictly adhered to at all times.

11.2.3 Excavation and Burial Methods

Excavation and burial methods can be employed, particularly where time constraints of the project do not enable the effective treatment of plants using chemical or herbicide processes. However, the following should be considered when using the excavation and burial methods:

- In order to excavate Japanese Knotweed, the lateral extent of the rhizome system should be taken into consideration and may require up to 7m radius of the plant to be excavated;

- In addition, excavations should be carried out to a depth of at least ~5m (or to a depth where no Japanese Knotweed root systems are visible), and then buried at a designated area within the proposed development site boundary at a minimum depth of 5m. Therefore, sufficient space should be accounted for in order to appraise the excavation and burial method as a viable control option;

- Buried plant materials and contaminated soils should be covered with a root barrier membrane layer before infilling it completely to c. 5m deep with inert fill or topsoil;

- Buried materials should be recorded and mapped in order to prevent future excavations from allowing regrowth to occur. Japanese Knotweed is capable of surviving while buried for many years, and can regrow if disturbed and brought to the surface;

- Burial of plant material and contaminated soils should not be carried out near services (i.e. utilities, pipelines, cabling etc), as disturbance may occur from future works associated with maintaining or improving infrastructure;

- Future owners of the land should be provided the treatment records, including areas of excavation and burial, and should be advised of the potential for regrowth if disturbed.

11.2.4 Excavation of materials for offsite disposal

Should insufficient space or depth of subsoils not be available, then excavation of plant material for offsite disposal may be considered. If this is the case, then points outlined within SECTION 8.2 of this ISMP should be adhered to.

12.0 SPECIFIC GUIDANCE: CHERRY LAUREL

Although Cherry Laurel is not contained within the 3rd Schedule Part 1 of S.I.477/2011, however this section relates to the specific handling and management options for Cherry Laurel [*Prunus laurocerasus*] and should be read in junction with the relevant regulations and guidance. Should guidance or legislation be changed or updated, then the ISMP should be revised accordingly. Based on good practices for the management or control of Cherry Laurel, the following should be adhered to:

- All biosecurity measures outlined within this ISMP should be strictly adhered to at all times;
- If plant material is to be removed offsite for disposal, then the protocol outlined within SECTION 8.2 of this ISMP should be followed;
- Preliminary clearance should comprise of the removal and treatment of the Cherry Laurel. Normally this would begin in the densest areas of infestation and work towards the areas of lower density;
- Where possible, young seedlings should be pulled from the ground by hand while ensuring the root structure is attached. If this is not possible then younger single stemmed seedlings should be cut and treated in the same manner as larger stems;
- Large stems may require cutting by chainsaw or mechanical means and should be cut as close to the ground as possible. Bulk cut materials can then be chipped or removed to allow follow up work and prevent regrowth;
- Plants which have been previously cut back and are multi-stemmed should be cut to stump level, and remaining plant material should be treated with a glyphosate herbicide chemical (e.g. Roundup Biactive XL);
- Herbicide chemicals should be applied directly to the cut surface immediately after cutting, or for larger stems then stumps can be drilled and the herbicide applied directly into the drilled hole. In order for the herbicide to remain effective, chemical treatment should only be undertaken during periods of dry weather, where possible for at least 12 hours after and during frost free conditions;
- Should larger areas of Cherry Laurel need to be treated, then herbicides should be sprayed over the area immediately following cutting of plant materials, and tracer dyes should be used in order to determine full coverage has been achieved;
- Follow up treatment may be required in order to treat further growth, but also to treat/remove the growth of any seedlings (which may be numerous in the case of Cherry Laurel). This can be carried out by spraying of herbicide treatment, or through hand pulling of individual plants if small enough;
- An alternative option to the above is to excavate the Cherry Laurel entirely, inclusive of root systems, and to treat the remaining area with glyphosate herbicides. However, follow up treatment and monitoring may be required in order to ensure that all plant material has successfully been eradicated.

13.0 SPECIFIC GUIDANCE: HIMALAYAN HONEYSUCKLE

Himalayan honeysuckle (*Leycesteria Formosa*) is not contained within the 3rd Schedule Part 1 of S.I.477/2011, however this section relates to the specific handling and management options for Himalayan honeysuckle, and should be read in junction with the relevant regulations and guidance. Should guidance or legislation be changed or updated, then the ISMP should be revised accordingly. Based on good practices for the management or control of Buddleia, the following should be adhered to:

- All biosecurity measures outlined within this ISMP should be strictly adhered to at all times;
- If plant material is to be removed offsite for disposal, then the protocol outlined within SECTION 8.2 of this ISMP should be followed;
- Himalayan honeysuckle can safely be removed from site following the same methods used for clearing any trees or large shrubs, as it does not possess a rhizomatic root system;
- Care should be taken to remove the plants before seeds develop, and not to spread any remaining seeds on the plant;
- The use of herbicide treatment on Himalayan honeysuckle is generally not required, however for larger infestations or where plants cannot be removed mechanically, then treatment of Himalayan honeysuckle can be undertaken using herbicides. Should herbicides be used, then the guidance outlined within Section 10 of this ISMP should be adhered to;
- Follow up treatment may be required in order to treat further growth, but also to treat/remove the growth of any seedlings which may have developed. This can be carried out by spraying herbicide treatment, or through hand pulling of individual plants if small enough;
- An alternative option to the above is to excavate the Himalayan honeysuckle plants entirely, inclusive of root systems, and to treat the remaining area with glyphosate herbicides. However, follow up treatment and monitoring may be required in order to ensure that all plant material has successfully been eradicated.

14.0 SPECIFIC GUIDANCE: BUDDLEIA

Buddleia (*Buddleja davidii)* is not contained within the 3rd Schedule Part 1 of S.I.477/2011, however this section relates to the specific handling and management options for Buddleia, and should be read in junction with the relevant regulations and guidance. Should guidance or legislation be changed or updated, then the ISMP should be revised accordingly. Based on good practices for the management or control of Buddleia, the following should be adhered to:

- All biosecurity measures outlined within this ISMP should be strictly adhered to at all times;
- If plant material is to be removed offsite for disposal, then the protocol outlined within SECTION 8.2 of this ISMP should be followed;
- Buddleia can safely be removed from site following the same methods used for clearing any trees or large shrubs, as it does not possess a rhizomatic root system;

- Care should be taken to remove the plants before seeds develop, and not to spread any remaining seeds on the plant, as Buddleia produce larger number of seeds which can easily be dispersed by wind action;

- The use of herbicide treatment on Buddleia is generally not required, however for larger infestations or where plants cannot be removed mechanically, then treatment of Buddleia can be undertaken using herbicides. Should herbicides be used, then the guidance outlined within Section 10 of this ISMP should be adhered to;

- Follow up treatment may be required in order to treat further growth, but also to treat/remove the growth of any seedlings which may have developed. This can be carried out by spraying herbicide treatment, or through hand pulling of individual plants if small enough;

- An alternative option to the above is to excavate the Buddleia plants entirely, inclusive of root systems, and to treat the remaining area with glyphosate herbicides. However, follow up treatment and monitoring may be required in order to ensure that all plant material has successfully been eradicated.

15.0 SPECIFIC GUIDANCE: WALL CONTONEASTER

Wall cotoneaster (*Cotoneaster horizontalis*) is not contained within the 3rd Schedule Part 1 of S.I.477/2011, however this section relates to the specific handling and management options for Wall cotoneaster, and should be read in junction with the relevant regulations and guidance. Should guidance or legislation be changed or updated, then the ISMP should be revised accordingly. Based on good practices for the management or control of Wall cotoneaster, the following should be adhered to:

- All biosecurity measures outlined within this ISMP should be strictly adhered to at all times;

- If plant material is to be removed offsite for disposal, then the protocol outlined within SECTION 8.2 of this ISMP should be followed;

- Cotoneaster root systems are extensive, thus enabling regrowth if the plant is cut back hard and the aerial parts are removed completely. However, Cotoneaster root systems should be removed completely in order to ensure that regrowth of the plant is prevented;

- Although wall Cotoneaster are known to be shallow rooting, the sturdy, widespread roots can be hard to take out of the ground manually – as such caution should be applied to ensure that root systems are removed entirely. Smaller plants can be removed more easily through manual pulling and loosening of soil around roots, although care should be taken to ensure root systems are removed entirely;

- Care should be taken in order to remove the plants before seeds develop, and not to spread any remaining seeds on the plant;

- In the event that mechanically removal is not possible, for example where a wall is to be retained without damage, then herbicide treatment can be used. Should herbicides be used, then the guidance outlined within Section 10 of this ISMP should be adhered to;

- Follow up treatment may be required in order to treat further growth, but also to treat/remove the growth of any seedlings which may have developed. This can be carried out by spraying herbicide treatment, or through hand pulling of plants, if small enough;

- Where herbicide treatment is to be used, then the bark of the plant stem should be scraped back 2 - 3 inches close to the rooting point at ground level in order to expose the cambium. Neat herbicide (such as 100% glyphosate) should be applied to the exposed area;

- In order to be most effective, herbicide treatment of Wall Cotoneaster should be applied during the most active growing season, ideally from mid-March to the end of October;

- Plant die-back should occur within the first 6 weeks, however follow up treatment may be required. Therefore, inspection of plants should be carried out after 6 weeks where herbicide treatment has been applied, and any reapplication of herbicide treatment should be undertaken as soon as possible thereafter.

16.0 SPECIFIC GUIDANCE: SYCAMORE

Sycamore (*Acer pseudoplatanus)* is not contained within the 3rd Schedule Part 1 of S.I.477/2011, however this section relates to the specific handling and management options for Sycamore, and should be read in junction with the relevant regulations and guidance. Should guidance or legislation be changed or updated, then the ISMP should be revised accordingly. Based on good practices for the management or control of Sycamore, the following should be adhered to:

- All biosecurity measures outlined within this ISMP should be strictly adhered to at all times;

- If plant material is to be removed offsite for disposal, then the protocol outlined within SECTION 8.2 of this ISMP should be followed;

- Sycamore can safely be removed from site following the same methods used for clearing any trees or large shrubs, as it does not possess a rhizomatic root system;

- Care should be taken to remove the trees before seeds develop, and not to spread any remaining seeds on the plant which can be dispersed by wind action;

- The use of herbicide treatment on Sycamore is generally not required if the stumps are to be excavated and removed, however, where the trees cannot be removed mechanically then treatment of Sycamore can be undertaken using herbicides. Should herbicides be used, then the guidance outlined within Section 10 of this ISMP should be adhered to;

- Herbicide chemicals should be applied directly to the cut surface immediately after cutting, or for larger stems then stumps can be drilled and the herbicide applied directly into the drilled hole. In order for the herbicide to remain effective, chemical treatment should only be undertaken during periods of dry weather, where possible for at least 12 hours after and during frost free conditions;

- Plants which have been previously cut back and are multi-stemmed should be cut to stump level, and remaining plant material should be treated with a glyphosate herbicide chemical (e.g. Roundup Biactive XL);

- Follow up treatment may be required in order to treat further growth, but also to treat/remove the growth of any seedlings which may have developed. This can be carried out by spraying herbicide treatment, or through hand pulling of individual plants if small enough.

17.0 POST- CONSTRUCTION & OPERATIONAL PHASE

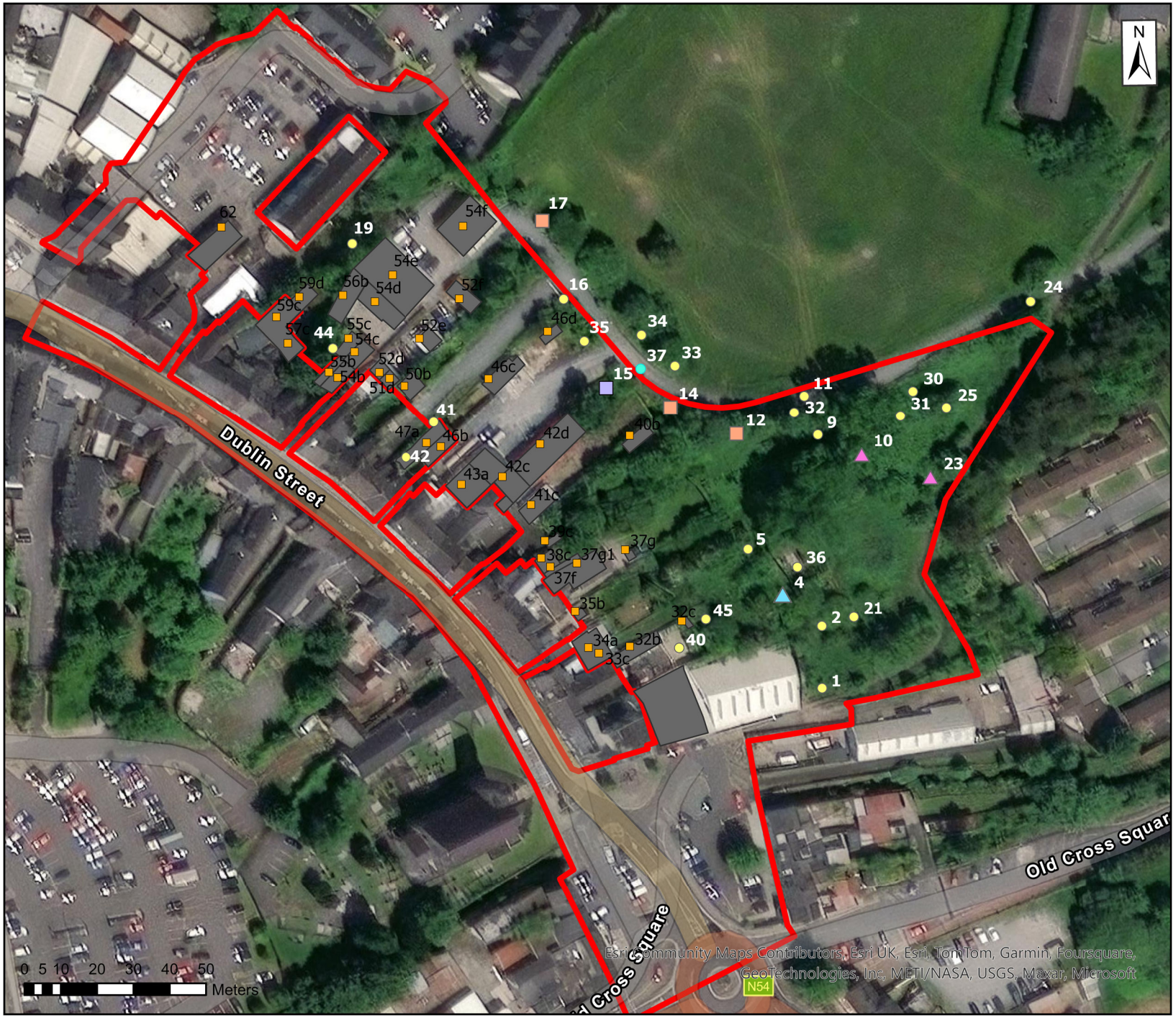
Given the potential for IAS's to regrow or re-stablish themselves on the site, it is recommended to carry out a post-construction Invasive Species Survey within one year of completion, and to update the ISMP accordingly. Records for any treatment should be maintained for the duration of the project, and follow up treatment should be carried out, where applicable, until no further regrowth of the IAS has occurred.

18.0 UPDATING OF INVASIVE SPECIES MANAGEMENT PLAN

In accordance with the NIS report if there are delays in the progression of the project, and in the event that no works have taken place within 1 year of the surveys, then a resurvey of IAS's and non-native species will need to be undertaken. Should any revisions be made to the preliminary ecological assessment or follow up documents regarding invasive species, then the ISMP should be updated accordingly to reflect these changes. This includes mapping and delineation of IAS's, and also the appropriate management techniques for each respective species.

Once a contractor has been appointed for works, the ISMP should be updated to contain their contact details, schedule of works, methodologies to be used throughout all phases of the development, and the management techniques chosen with regards to IAS's found within the development area. The ISMP should be updated to include a more detailed management strategy for IAS's, and an ECoW's should be appointed to oversee the pre-construction enabling and demolition works, and also for the construction phase of the project.

APPENDICES:
Appendix 1



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Invasive Species Survey Map

Species Key:

- Buddleia
- Cherry Laurel
- Himalayan Honeysuckle
- Japanese Knotweed
- Wall Cotoneaster

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APPENDIX 9.4
ECOLOGICAL SURVEYS FOR BATS

Proposed Regeneration Scheme, Dublin Street North, Monaghan

Client: Carlin Planning Ltd

Project Reference: P676

Issue Date: January 2024

Specialist Environmental Consultancy Services

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SUMMARY

Layde Consulting was appointed by Carlin Planning Ltd to undertake a series of bat activity surveys and potential roost assessments for a proposed Regeneration Scheme within Monaghan town, extending to lands at the rear of Dublin Street North. The proposed development intends to demolish the existing building structures within the site, which comprise of a range of modern buildings, abandoned / disused structures and older buildings which may have potential to be used for bat roosts.

A series of internal and external inspections were undertaken for each building structure, where access was granted or achievable. In addition, a series of bat activity surveys were undertaken during the survey season of 2023 and 2024 wherever possible, in order to determine the presence and species of bats using the site or building structures. Limitations which prevented surveys being undertaken included antisocial behaviour (encountered relatively frequently at the site), and restrictions of access to lands, either as a result of the landowner being uncontactable or denying access to their property.

The results of all external and internal building inspections indicated no presence of bat activity within any of the structures. The results of bat activity surveys also demonstrated no emergence of bats from any of the building structures, although bat activity was noted during each of the surveys over adjoining lands or forested areas. Two species were identified, namely Common Pipistrelle (*Pipistrelle Pipistrellus*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*).

Although it is intended to retain the habitats and trees within the Old Infirmary Hill area, 2No. Ash trees have been scheduled for felling due to excessive basal rot and deadwood. Therefore, ground level bat roost potential surveys were undertaken for trees within the development area, in particular for the Ash trees which are scheduled for felling. Bat activity surveys were also carried out for each tree with no bats being recorded emerging from either tree, although bat activity was observed in the wider area and adjoining forested areas.

A series of transect surveys were also undertaken during the 2023 and 2024 survey seasons, with transects being limited to the public footpath between Old Cross Square and the intersection of St. Davnet's Row, and also along St. Davnet's Row eastwards towards The Diamond. The results of the transect surveys identified Common Pipistrelle and Soprano Pipistrelle along most of the transect route, with the greatest concentration of bat activity being found along the street lit public footpath between Old Cross Square and the intersection at St. Davnet's Row.

Bats were clearly seen foraging around each of the street lights where insects are likely most abundant. In addition, commuting bats were observed coming from the mixed broadleaved and coniferous forested are to the east of the public footpath, and returning, indicating the possibility of potential bat roosts within the neighbouring forested area or buildings. Bat activity was also noted along St. Davnet's Row, where bats were observed to be foraging and commuting along the laneway at relatively low level, particularly within the northwest portion of the laneway. It was noted that a portion of the site is subject to artificial light, either from street lighting along the public footpath area to the east of the site, or from flood lighting within properties to the rear of Dublin Street.

Based on the outcome of the ecological bat surveys carried out as part of this assessment, a number of further recommendations have been stated within this report, which should be adhered to prior to the commencement of the demolition and construction phases of the development.