Mr Paul Jackson

Proposed 3 Dwellings
61 Haxey Lane
Haxey

Drainage Assessment

Prepared by EWE Associates Ltd
Draft Rev0 May 2020

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CLIENT DETAILS

Mr Paul Jackson,
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CONTRACT

This report describes work commissioned by Mr Paul Jackson following written instruction during April 2020. Lea Favill of EWE Associates Ltd carried out the work.

Date: 11th May 2020

Prepared by: ……  ……. Lea Favill
Director

REVISION HISTORY

Draft Report Rev0 issued 11th May 2020
- 1No copy issued to Mr Paul Jackson

CONTENTS

APPENDICES:

LIST OF TABLES

1. INTRODUCTION

Terms of Reference

This report was commissioned by Mr Paul Jackson to consider the foul water and surface water system for the proposed residential development within the site off Haxey Lane, Haxey near Epworth.

The proposal involves the construction of 3 residential within a site which is currently unoccupied. The drainage issues are being considered as part of the planning application.

Approach to the Assessment

For the purposes of this study, the following have been considered: -

- Site level information and proposed finished levels of the building and external works.
- Catchment area draining to the existing surface water systems adjacent to the southern, eastern and western boundaries of the site.
- Existing infiltration characteristics of subsoils.
- Onsite constriction.
- Options available to developer.
- NPPF guidelines with regards to the control of runoff.
- PPG3 pollution prevention guidelines.
- Future adoption and public sewer system.
- Flood risk to adjacent land users.

Design Constraints

For the purposes of this study, the following constraints have been applied: -

- The design is based on the proposed layout provided by the client's representative. At this stage no modifications to the layout are proposed.
- The proposal is for the construction of 3 private dwellings. As such any SUDs features or attenuation structures will be maintained by the individual owner/maintenance company.
- SUDs features are to be recommended where practically possible.
- The area is underlain with clays and silty sands with ground water at a shallow depth. It was concluded that the subsoils are of a low permeability and as such infiltration drainage is not a practical solution for this site.
- There is a small open to the east of the site which flows south parallel with the site. To the south east of the site the watercourse turns west and runs

parallel with the southern boundary of the site where to the south west of the site it enters a small culvert. The culvert conveys flows through a residential property before discharging into a larger open watercourse to the west of the site. It is understood that this watercourse is the responsibility of the local drainage board.

- It is understood that there is a history of flooding de to a blockage of the small culvert under the residential property.
- Therefore, a piped discharge into the western drain is to be provided in order to avoid the flood risk from the existing culvert.
- A peak discharge rate of 1l/s into the western watercourse has been adopted for this assessment which is a practical minimum.
- It is assumed that the minimum design standard is 1 in 100 years plus climate change (30%).
- Due to the existing residential development adjacent to the site no above ground flooding will be acceptable up to and including 1 in 100 years plus climate change (30%) storm.

2. DESIGN OF PROPOSED SURFACE WATER DRAINAGE SYSTEM

Catchment Area

The catchment area was calculated from proposed layout drawing provide by Mr Paul Jackson. The total impermeable area to be drained has been estimated at 670m² (0.067 hectares).

Drainage Strategy

The proposed drainage strategy is as follows and is illustrated on the drainage layout drawing provided at Appendix B of this report.

- Roof drainage from building. Soakaways are not a practical solution due to limited infiltration. As such, it is proposed that catch pit manholes are used to collect silts and grits from the roofs as a form of pre-treatment.
- Access drives/parking area drainage. The pavement drainage will be directed to a shallow crate tank within open spaces and driveways.

Adoption & Maintenance

It is considered that the drainage systems will be maintained by a private management company and private owners.

Existing Drainage

The site is currently unoccupied and there are no roofed or paved areas which are positively drained. The total site area is 1894m² (0.189 ha).

There are existing open watercourses adjacent to the site.

Existing Runoff from Site to surface water sewer

The runoff from the existing unused site has been calculated using the ICPSUDs Method. The output from the spreadsheet is shown at Appendix A, the estimated runoff from the site is shown below in Table 2-1 for various return periods based on a total site area of 1894m² (0.189 hectares).

Table 2-1: ICPSUDs Method calculation for existing runoff

Return Period	Flow in litres per second (l/s)
Qbar	0.7
1 in 1 year	0.6
1 in 30 year	1.3
1 in 100 year	1.7

The site will discharge into the western open watercourse via a new 150mm diameter sewer under Haxey Lane. The open watercourse inline with the site is approximately 1.2m deep.

Therefore, the peak discharge from the site has been limited to a practical minimum of 1l/s.

Proposed Drainage Strategy

For the purpose of this assessment the peak discharge rate from the site of 1 l/s has been adopted based on the above calculations. An assessment of the required balance volume has been made using the estimated post development impermeable area of 0.067 hectares. Using WinDes Source Control software developed by Microdrainage the required attenuation has been calculated for the 1 in 100 year plus climate change (30%) event.

Reference should be made to Appendix B where the drainage strategy drawing is provided and Appendix C where the calculation sheets are provided. The attenuation size has been tabulated below in Table 2-2 for the 1 in 100 year plus climate change return period.

It is estimated that during the 1 in 100 year plus climate change (30%) event that 38m³ of storage will be required. Therefore, 3 small crate tanks each 27.5m² by 0.4m deep within the open spaces and driveways of the site will be provided which will store the rainfall events up to the and including the 1 in 100 year plus climate change event. The drainage strategy drawing provided at Appendix C shows the surface water drainage strategy for the site which includes a crate tank.

Table 2-2: WinDes 1 in 100 year+CC Storage Volume

Return Period	Required Attenuation	WinDes Calculated Volume (m³)
1 in 100 year + CC	3No. Crate tank 27.5m² by 0.4m deep with limited cover	38

3. DESIGN OF PROPOSED FOUL WATER DRAIANGE SYSTEM

Existing Drainage

There is an existing 225mm diameter foul sewer within the adjacent Haxey Lane which is 2.25m deep in line with the site entrance. The sewer plan is provided at Appendix D of this report.

Proposed Drainage

It is proposed that a connection from the site to the sewer is made via a 150mm diameter pipe. It is considered that the whole site can gravitate to the sewer with only minor land raising required adjacent to the proposed dwellings.

Appendix A: - ICPSUDs Runoff Calculation

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 28/05/2018 14:57 File	Designed By Windows7 Checked By	
Micro Drainage	Source Control W.12.4	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.350
Area (ha)	0.704	Urban	0.000
SAAR (mm)	580	Region Number	Region 4

Results	l/s
QBAR Rural	1.4
QBAR Urban	1.4
Q1 year	1.2
Q1 year	1.2
Q30 years	2.8
Q100 years	3.7

Appendix B: - Drainage Drawing

Appendix C: - 1 in 100 year+CC WinDes Calculation Sheets

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 15/08/2018 17:45	Designed By Windows7	
File 100yr+CC40% stora...	Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	3.875	0.255	1.5	86.8	O K
30 min Summer	3.913	0.293	1.5	99.7	O K
60 min Summer	3.955	0.335	1.5	113.8	O K
120 min Summer	3.997	0.377	1.6	128.3	O K
180 min Summer	4.021	0.401	1.6	136.3	O K
240 min Summer	4.036	0.416	1.6	141.3	O K
360 min Summer	4.055	0.435	1.7	146.7	O K
480 min Summer	4.062	0.442	1.7	148.8	O K
600 min Summer	4.063	0.443	1.7	148.9	O K
720 min Summer	4.060	0.440	1.7	148.2	O K
960 min Summer	4.050	0.430	1.7	145.5	O K
1440 min Summer	4.031	0.411	1.6	139.6	O K
2160 min Summer	4.003	0.383	1.6	130.1	O K
2880 min Summer	3.975	0.355	1.5	120.8	O K
4320 min Summer	3.920	0.300	1.5	102.0	O K
5760 min Summer	3.871	0.251	1.5	85.3	O K
7200 min Summer	3.823	0.203	1.5	69.0	O K
8640 min Summer	3.775	0.155	1.5	52.8	O K
10080 min Summer	3.744	0.124	1.5	42.3	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	198.509	27
30 min Summer	114.695	41
60 min Summer	66.269	70
120 min Summer	38.289	128
180 min Summer	27.779	188
240 min Summer	22.123	246
360 min Summer	16.050	364
480 min Summer	12.782	482
600 min Summer	10.713	600
720 min Summer	9.273	660
960 min Summer	7.339	770
1440 min Summer	5.277	1030
2160 min Summer	3.794	1448
2880 min Summer	3.003	1852
4320 min Summer	2.135	2680
5760 min Summer	1.676	3464
7200 min Summer	1.389	4248
8640 min Summer	1.191	4840
10080 min Summer	1.047	5440

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 15/08/2018 17:45 File 100yr+CC40% stora...	Designed By Windows7 Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	3.906	0.286	1.5	97.3	O K
30 min Winter	3.949	0.329	1.5	111.9	O K
60 min Winter	3.996	0.376	1.6	127.7	O K
120 min Winter	4.046	0.426	1.7	144.3	O K
180 min Winter	4.081	0.461	1.7	153.5	O K
240 min Winter	4.108	0.488	1.8	159.4	O K
360 min Winter	4.151	0.531	1.8	166.0	O K
480 min Winter	4.182	0.562	1.9	168.8	O K
600 min Winter	4.195	0.575	1.9	169.5	O K
720 min Winter	4.185	0.565	1.9	169.0	O K
960 min Winter	4.144	0.524	1.8	165.1	O K
1440 min Winter	4.101	0.481	1.8	158.0	O K
2160 min Winter	4.049	0.429	1.7	145.1	O K
2880 min Winter	4.008	0.388	1.6	131.8	O K
4320 min Winter	3.928	0.308	1.5	104.8	O K
5760 min Winter	3.853	0.233	1.5	79.2	O K
7200 min Winter	3.768	0.148	1.5	50.2	O K
8640 min Winter	3.728	0.108	1.5	36.8	O K
10080 min Winter	3.713	0.093	1.4	31.5	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Winter	198.509	26
30 min Winter	114.695	41
60 min Winter	66.269	70
120 min Winter	38.289	126
180 min Winter	27.779	184
240 min Winter	22.123	242
360 min Winter	16.050	356
480 min Winter	12.782	470
600 min Winter	10.713	578
720 min Winter	9.273	684
960 min Winter	7.339	798
1440 min Winter	5.277	1096
2160 min Winter	3.794	1560
2880 min Winter	3.003	2016
4320 min Winter	2.135	2892
5760 min Winter	1.676	3704
7200 min Winter	1.389	4256
8640 min Winter	1.191	4752
10080 min Winter	1.047	5352

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		
Date 15/08/2018 17:45 File 100yr+CC40% stora...	Designed By Windows7 Checked By	
Micro Drainage	Source Control W.12.4	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	477350 398900 SK 77350 98900
C (1km)	-0.024
D1 (1km)	0.319
D2 (1km)	0.297
D3 (1km)	0.269
E (1km)	0.297
F (1km)	2.491
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.237

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.079	4-8	0.079	8-12	0.079

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 15/08/2018 17:45	Designed By Windows7	
File 100yr+CC40% stora...	Checked By	
Micro Drainage	Source Control W.12.4	

Model Details

Storage is Online Cover Level (m) 4.700

Tank or Pond Structure

Invert Level (m) 3.620

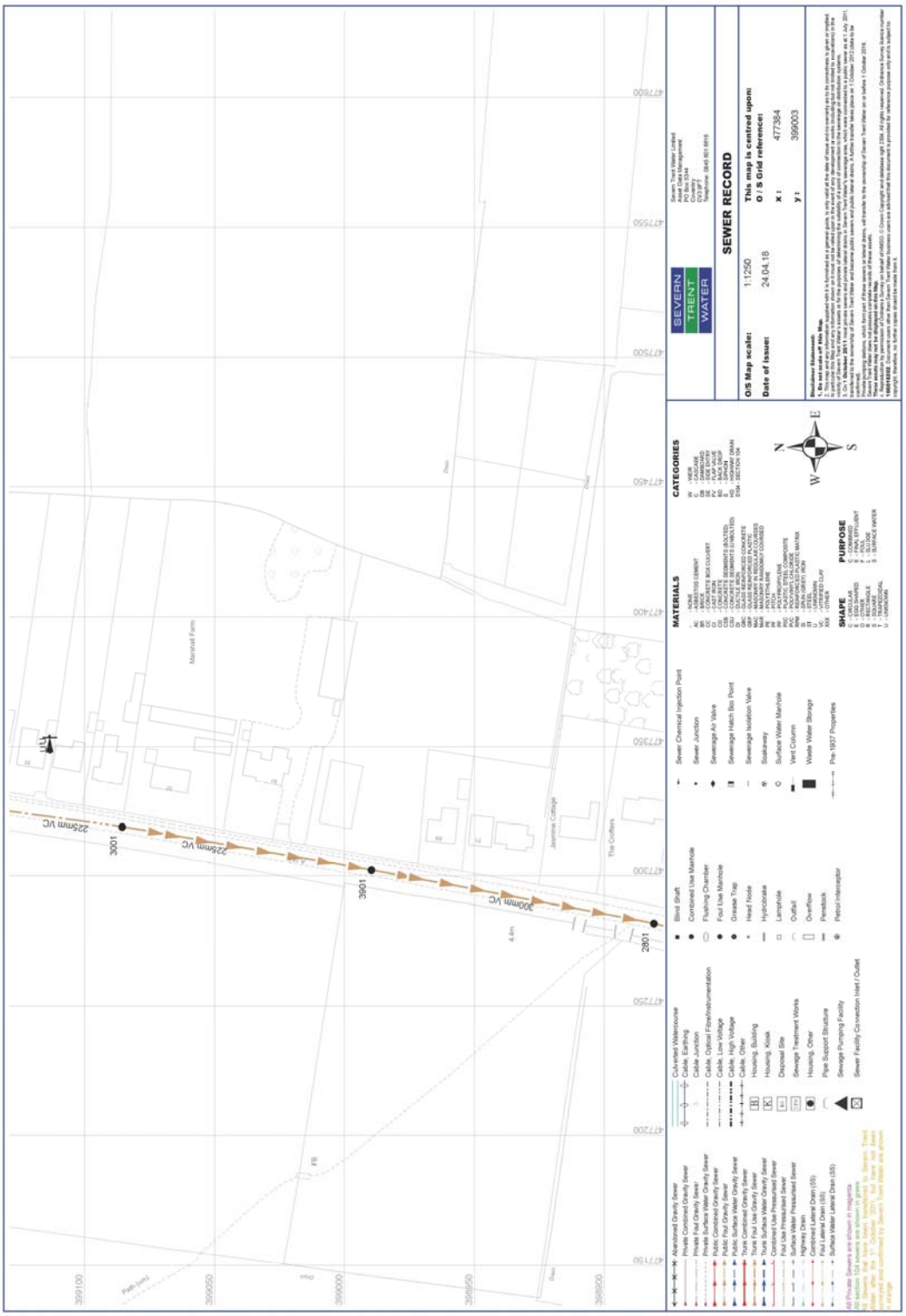
Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	340.0	1.400	0.0	2.800	0.0	4.200	0.0
0.200	340.0	1.600	0.0	3.000	0.0	4.400	0.0
0.400	340.0	1.800	0.0	3.200	0.0	4.600	0.0
0.600	0.0	2.000	0.0	3.400	0.0	4.800	0.0
0.800	0.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	0.0	2.400	0.0	3.800	0.0		
1.200	0.0	2.600	0.0	4.000	0.0		

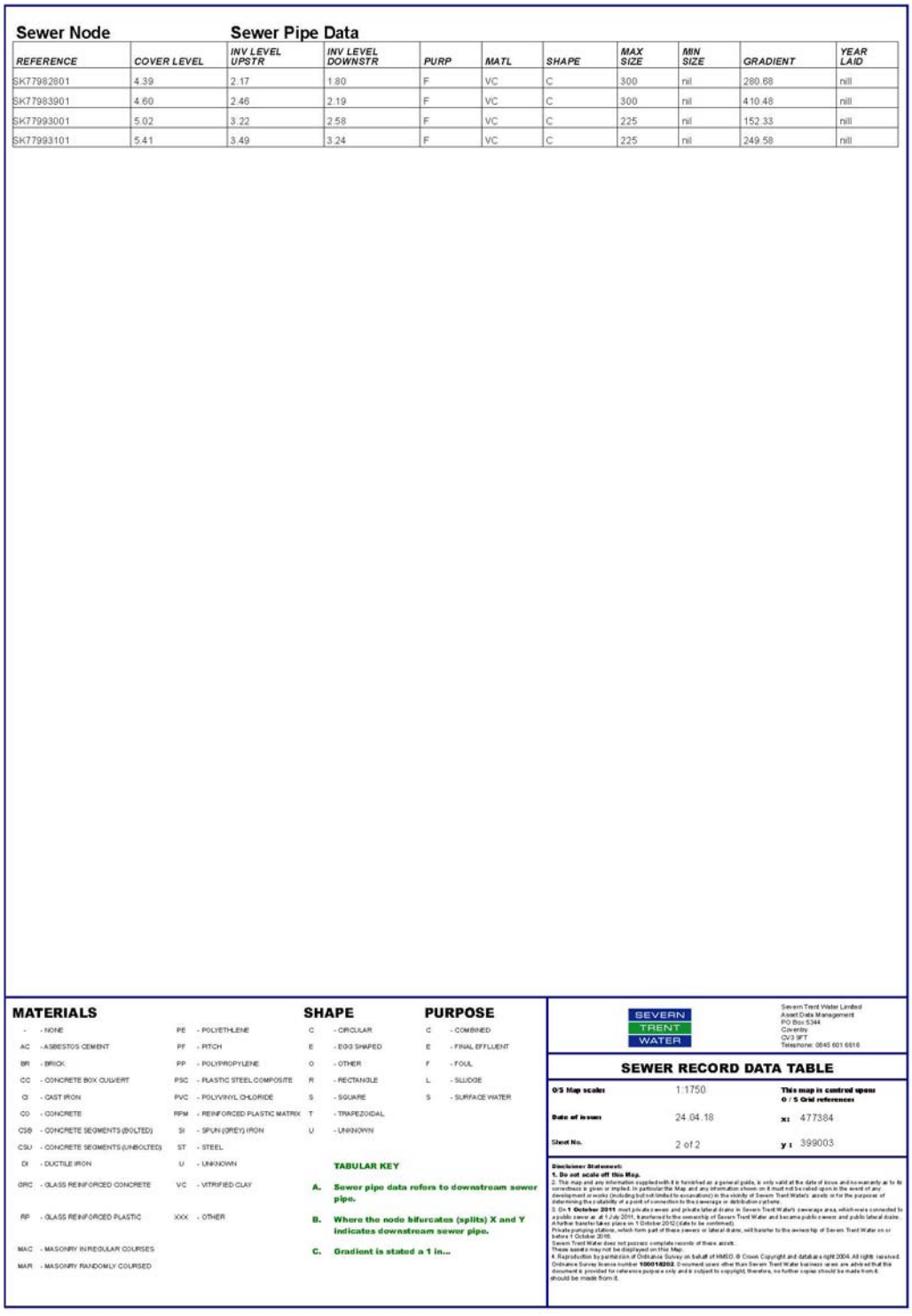
Hydro-Brake® Outflow Control

Design Head (m) 0.650 Hydro-Brake® Type Md4 Invert Level (m) 3.620
Design Flow (l/s) 2.0 Diameter (mm) 57

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	1.200	2.8	3.000	4.4	7.000	6.7
0.200	1.3	1.400	3.0	3.500	4.7	7.500	6.9
0.300	1.4	1.600	3.2	4.000	5.0	8.000	7.1
0.400	1.6	1.800	3.4	4.500	5.4	8.500	7.4
0.500	1.8	2.000	3.6	5.000	5.6	9.000	7.6
0.600	2.0	2.200	3.7	5.500	5.9	9.500	7.8
0.800	2.3	2.400	3.9	6.000	6.2		
1.000	2.5	2.600	4.1	6.500	6.4		

Appendix D: - Sewer Plan





Sewer Node **Sewer Pipe Data**

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK77982801	4.39	2.17	1.80	F	VC	C	300	nil	280.68	nill
SK77983901	4.60	2.46	2.19	F	VC	C	300	nil	410.48	nill
SK77993001	5.02	3.22	2.58	F	VC	C	225	nil	152.33	nill
SK77993101	5.41	3.49	3.24	F	VC	C	225	nil	249.58	nill