Appendix R

Stormwater Design Memorandum

DESIGN ADVICE MEMO

CIVIL

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Memo No	**C01**	
Job Name	**Papanui Pak'nSave**	
Job No	**171259/C/1**	
Date	**4 April 2019**	
To	**Aurecon**	
Email	**Michelle.Ruske@aurecongroup.com**	
Attention	**Michelle Ruske**	
Copies to	Client	**Foodstuffs: Rebecca Parish**
	LA	**Rough & Milne : Sophie Strachan**
	Architect	**McCoy & Wixon : Niko Young**
Signature	**Keegan Brogden**	

Preliminary Pavement Catchments and First Flush Treatment for Papanui Pak'nSave

1. General

This memo summarises preliminary pavement catchments and stormwater first flush treatment methods for the proposed Papanui Pak'nSave development. Refer to the attached Sketch SK C39

2. Stormwater Outfalls

There are two stormwater outfalls serving the site. Both head towards Main North Road, east of the proposed development.

One outfall is an existing 750Ø pipe south of the proposed development.

The second will be a new 750Ø pipe proposed to replace the existing boxed Lydia Drain. Both pipes (will) have relatively shallow inverts approximately 1.5m below existing ground level at the east site boundary.

3. Catchments

The preliminary stormwater catchments on C39 were determined by assessing proposed future finished levels, available pipe outfall locations and depths, and appropriate areas for proposed treatment devices.

The design intention for catchment areas was to maximise hardstand stormwater treatment area directed to infiltration basins and proprietary raingardens, and if not achievable to proprietary filter systems.

All catchments are approximate & will be refined during developed design.

4. Proposed Stormwater Treatment Methods

There are three proposed methods for stormwater treatment where possible. In order of preference these are:

a. Infiltration basins
b. Proprietary raingardens (Stormwater 360 Filterra)
c. Proprietary filter system (Stormwater 360 Stormfilters)

The design intent for treatment devices is that they have downstream hydraulic driving head higher than the top of the outlet pipes. That is, assuming the 750Ø pipes outlet pipes are running full.

a. Infiltration Basins

Two infiltration basin systems are proposed, Basin 1A & 1B (combined) & Basin 2, both designed to treat 25mm min first flush volume. The basins will be vegetated and have an engineered high permeability base. Cleaned stormwater will be collected by underdrains and discharge to the northern 750Ø outlet. Water quantities greater than first flush volume will discharge directly into the northern 750mmØ pipe outlet. Final storage volumes and catchments will be refined at during developed design.

Basin 1A & Basin 1B are connected by pipe, for a combined 40m^3 first flush storage volume. Catchment B (1600m^2) contributes to this basin system. For 25mm first flush volume the maximum area is 1600m^2.

Basin 2 contains max 50m^3 first flush storage volume. Area E (1870m^3) is currently proposed to discharge to Basin 2. For 25mm first flush volume the maximum contributing area is 2000m^2 so this basin & catchment will be refined during developed design to provide a practical balance between piperuns, and final the final basin footprint area

b. Proprietary Raingardens

For this site, raingardens are preferred over filtration type treatment systems due to their greater ability to trap metal contaminants.

Where available landscape space is too small for stormwater basins and proposed finished levels allow, proprietary raingardens, ("Stormwater 360 Filterra"), are proposed for stormwater treatment for rain events up to 5mm/hr.

Two catchments are proposed to be treated by Filterra's, Area F (3300m^2) & Area G (1030m^2):

- Two Filterra units end to end are proposed for Area F, both located in the centre of the main carpark area within a narrow garden beside a footpath.
- A single Filterra unit located near the future sign foundation is proposed to treat stormwater runoff from the south vehicle entry and pumped stormwater originating from the basement ramp.

Both Filterra locations discharge to the southern 750Ø outlet pipe from the site.

c. Proprietary Filter Systems

For Area C (1900m^2) there is no landscape space available but proposed raised ground levels will allow a proprietary stormwater filter system ("Stormwater 360 Stormfilter") to be used to treat stormwater.

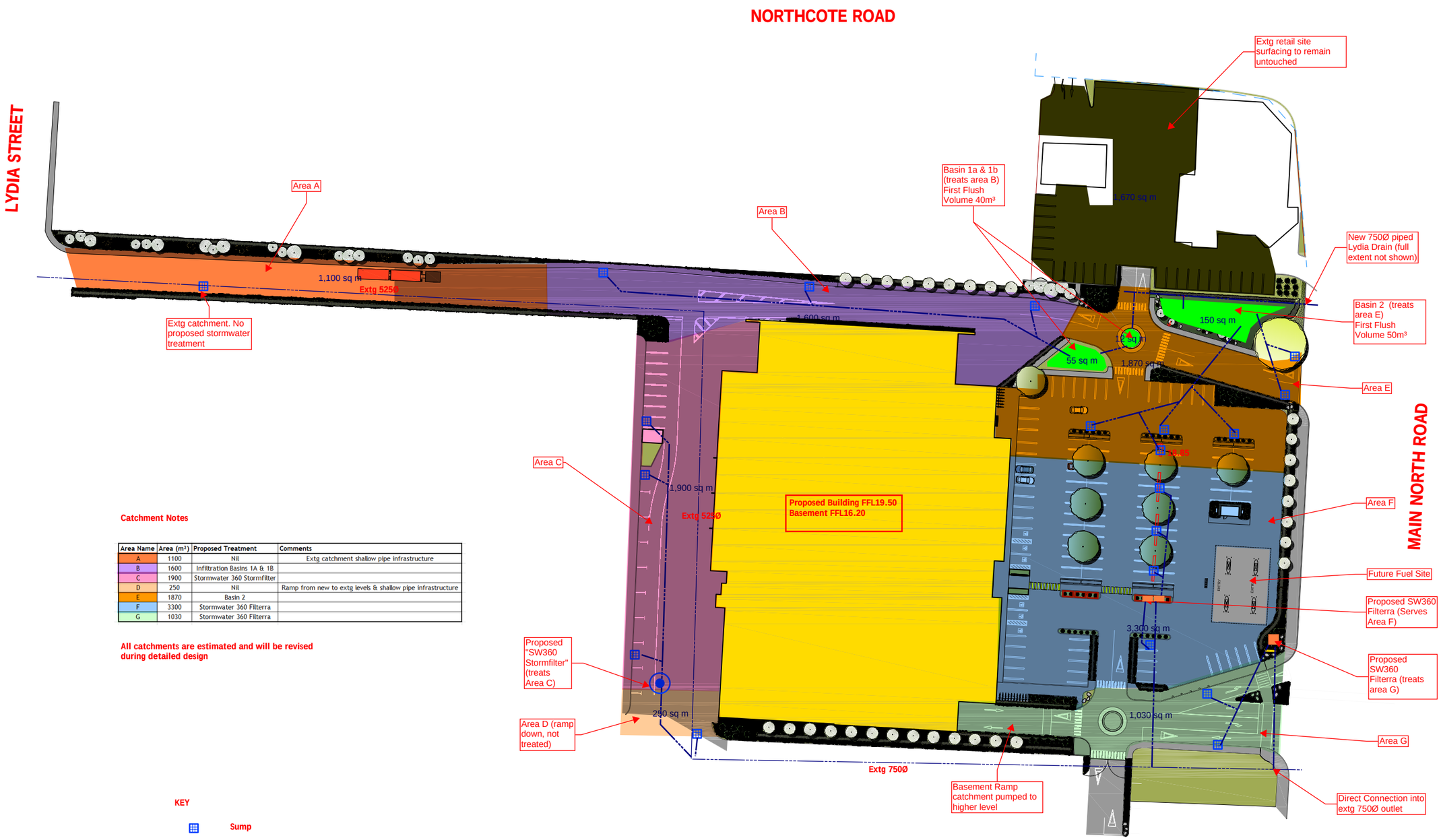
5. Untreated Hardstand Areas

Areas A,D, and an existing retail site are not proposed to receive first flush treatment.

Area A, (1100m^2) is an existing driveway that will receive minimal changes to levels due to the proposed development. There is an existing sump collecting this catchment and the receiving existing 525mmØ pipework is too shallow to intercept the sump to provide a stormwater treatment device.

Area D, (250m^2) is ramping from existing to higher proposed levels in the yard area behind the new supermarket. The depth to the invert of the receiving 750Ø that terminates in the area is too shallow for this catchment to be treated. An oil/grit interceptor providing a coarse level of treatment may be possible for this catchment prior to discharge to the council infrastructure.

An existing retail site (1670m^2) currently discharges directly into Lydia Drain without treatment. No changes to the levels at this site are proposed and the depth to the outlet does not allow for a treatment device to be installed.



Catchment Notes

Area Name	Area (m²)	Proposed Treatment	Comments
A	1100	Nil	Extg catchment shallow pipe infrastructure
B	1600	Infiltration Basins 1A & 1B	
C	1900	Stormwater 360 Stormfilter	
D	250	Nil	Ramp from new to extg levels & shallow pipe infrastructure
E	1870	Basin 2	
F	3300	Stormwater 360 Filterra	
G	1030	Stormwater 360 Filterra	

All catchments are estimated and will be revised during detailed design

KEY

- Sump
- Vee channel
- Proposed new SW Pipework
- Extg SW Pipework
- Proposed "Stormwater 360 Filterra"
- Proposed "Stormwater 360 Stormfilter"
- Proposed Infiltration Basin

Powell Fenwick

Project name : Papanui Pak'nSave
Job no. : 171259/C/2
Sketch title : Preliminary Pavement Catchments & Proposed Stormwater Treatment

Date : 04 Apr 2019
Scale : 1:1000 @ A3
Drawn : KGB
Sketch : SK C39

Appendix S

Lydia Street Drain Piping and Easement Plan

(03)Headwall built into extg boxdrain. Top of wall RL19.95
Extg Boxdrain INV 18.89
New headwall 525Ø INV 18.80

New MH(A)
Extg GL =19.95
Proposed LL 19.35
New 525mmØ in = 18.75INV
New 525mmØ out = 18.50INV

New MH(B)
Extg GL =19.30
Proposed LL 19.35
New 525mmØ in = 18.35INV
New 750mmØ out = 18.10INV

New MH(C)
Extg GL =19.30
Proposed LL 19.35
New 750mmØ in = 17.90INV
New 750mmØ out = 17.85INV

(04) Locate new pipe (750Ø @ 1:330) away from boundary to accommodate 4m wide easement over drain and large trees proposed on boundary.
An easement allowing drainage from the residential sites and individual pipe connections will be provided

New MH(D)
Extg GL =19.30
Proposed LL 19.35
New 750mmØ in = 17.60INV
New 750mmØ out = 17.52INV

New MH(E)
Extg GL =18.88
Proposed LL 19.10
New 750mmØ in = 17.50INV
New 750mmØ out = 17.46INV

Extg MH(F)
Extg LL =18.40 (estimated)
Extg 900Ø 16.91INV estimated)
Extg 375Ø 17.24INV (estimated)
New 750mmØ in (to replace 375Ø) = 17.25INV

Proposed boardwalk/pedestrian bridge over headwall (or extend extg headwall and build up ground for std footpath on grade)

525Ø@1:20 connection between headwall & MH(A)

525Ø@1:50

Extg box drain to remain
80 m

750Ø @1:330
66 m

750Ø @1:330
83 m

750Ø @1:330
68 m

Removed Drain Length
225 m

750Ø@1:330

Proposed Sewer & Potable water tanks (in basement)

Proposed stormwater attenuation tank

Replace extg 375mmØ with new 750mmØ at extg inverts. Relocate extg double sump & raise affected services as required

Extg INV of extg 375mmØ is 17.24INV

New connection into extg MH(F) in street INV17.25

Extg headwall to be removed

LYDIA STREET

NORTHCOTE ROAD

Existing car park layout

General Retail 774m²

Existing car park layout

PROPOSED
PAK'nSAVE
SUPERMARKET
6,293 m²

fuel service shed
fuel site canopy
fuel sign
PAK'nSAVE pylon sign

Key

Proposed Boardwalk

Proposed Asphalt or Concrete Footpath

Proposed New Pipework

Minimum Piping Option: Removes 225 m (approx) of extg drain
Total Extg Open Drain Length in Foodstuffs Site 305m
(approx 75% of extg box drain in Foodstuffs' site removed)

Powell Fenwick

Project name : Papanui Pak'nSave
Job no. : 171259/C/2
Sketch title : Piped Option to Lydia St Drain

Date : 24 Apr 2019
Scale : 1:1000 @ A3
Drawn : KGB
Sketch : C42A

Pipe Lengths

1,000 mm | 7,000 mm | 66,000 mm | 83,000 mm | 4,000 mm | 68,000 mm

MAIN NORTH RD

Top of extg box drain

Proposed concrete cover or class z pipe where cover is less than 600mm and pipe is in trafficked area

Extg box drain invert

525Ø @ 1:20

525Ø @ 1:50

600 mm

750Ø @1:330

750Ø @1:330

750Ø @ 1:330

600 mm

750Ø @1:330

Proposed concrete cover or class z pipe where cover is less than 600mm and pipe is in trafficked area

Boundary

Estimated locations 4 x Orion & one x Chorus buried service

Extg 375mm and headwall to be removed

Extg 900mmØ INV16.91 (estimated)

New Headwall | New MH (A) | New MH (B) | New MH (C) | New MH (D) | New MH (E) | Extg MH (F)

RL18.40

Datum RL RL16.00 | Datum RL RL16.00

Pipe Grade | Pipe Diameter/ Type | Extg GL | Finished Surface Level | Depth to Invert (Finished Level -INV) | Pipe Invert | Min Easement width Req

1:120 | 1:20 | 1:50 | 1:330 | 1:330 | 1:330 | 1:330

750mmØ RCRRJ | 525Ø RCRRJ | 525Ø RCRRJ | 750mmØ RCRRJ | 750mmØ RCRRJ | 750mmØ RCRRJ | 750mmØ RCRRJ

INV18.89 | INV18.80 | INV18.79 | INV18.50 | INV18.35 | INV18.10 | INV17.90 | INV17.85 | INV17.60 | INV17.51 | INV17.50 | INV17.46 | INV17.25

Possible services clashes outside boundary:
-Enable: (not affected)
-Chorus: 50mmØ crosses
-Orion: approx 4 cables will likely clash
-CCC: (sewer & water not affected)

Easement Width =2 x depth to invert +OD (where OD = 860mm for 750Ø & 620mm for 525Ø)

Lydia Drain Pipe Proposed Long Section (Scale V 1:50 H 1:1000)

Powell Fenwick

Project name : Papanui Pak'nSave	**Date : 24 Apr 2019**
Job no. : 171259/C/2	**Scale : 1.1000 hor and 1:50 vert at A3**
Sketch title :Lidia Street Drain Proposed Pipe route - Pipe Long Section	**Drawn : KGB**
	Sketch : C42B

C:\Users\clairec\Desktop\A3 Calcsheet 14.10.2016

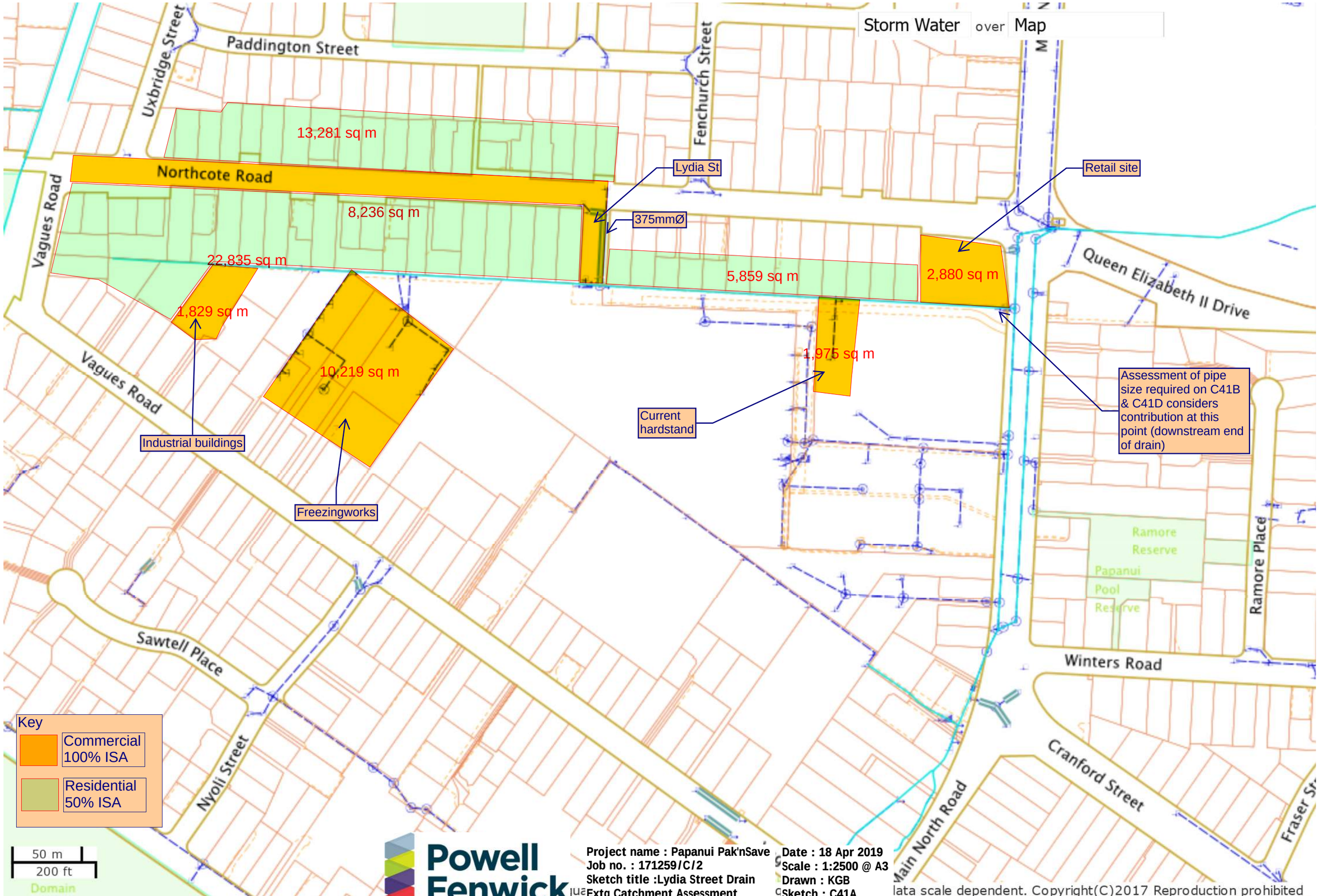

Storm Water over Map
Uxbridge Street
Paddington Street
Fenchurch Street
Vagues Road
Northcote Road
13,281 sq m
8,236 sq m
22,835 sq m
1,829 sq m
10,219 sq m
Lydia St
375mmØ
5,859 sq m
1,975 sq m
2,880 sq m
Retail site
Queen Elizabeth II Drive
Assessment of pipe size required on C41B & C41D considers contribution at this point (downstream end of drain)
Current hardstand
Industrial buildings
Freezingworks
Ramore Reserve
Papanui Pool Reserve
Ramore Place
Winters Road
Cranford Street
Main North Road
Fraser St
Sawtell Place
Nyoli Street
Key
Commercial 100% ISA
Residential 50% ISA
50 m
200 ft
Domain
Powell Fenwick
Project name : Papanui Pak'nSave
Job no. : 171259/C/2
Sketch title :Lydia Street Drain
Extg Catchment Assessment
Date : 18 Apr 2019
Scale : 1:2500 @ A3
Drawn : KGB
Sketch : C41A
lata scale dependent. Copyright(C)2017 Reproduction prohibited

Table	1	Catchment Discharging to Lidia Street Drain			
	Areas				
	Residential	Commercial			
	13281	8236			
	22835	1829			
	5859	10219			
		1975			
		2880			
Totals	41975	25139	67114	Total area	(m²)
C	0.5	1	0.69	Catchment Runoff coefficient	

Total Contributing area of Lidia Drain at Main North Road Boundary

Christchurch Rainfall Intensities (Spreadsheet includes 16%)

Table	2	CCC Intensities mm/hr (includes 16% climate change allowance)									mm/hr
Return	Duration										
Period	10min	20min	30min	1hr	2hr	6hr	12hr	18hr	24hr	30hr	
5yr	41.0	28.9	23.6	16.7	11.8	6.8	4.8	3.9	3.4	2.9	
10yr	49.4	34.9	28.4	20.1	14.2	8.2	5.8	4.7	4.1	3.5	
20yr	58.1	41.0	33.4	23.6	16.6	9.6	6.8	5.5	4.8	4.1	
50yr	70.3	49.6	40.5	28.6	20.2	11.6	8.2	6.7	5.8	4.9	

Table	3	Flow due to catchment									l/sec
Return	Duration										
Period	10min	20min	30min	1hr	2hr	6hr	12hr	18hr	24hr	30hr	
5yr	525.3	370.3	302.4	214.0	151.2	86.6	61.1	49.8	43.2	36.9	
10yr	633.0	447.2	363.9	257.5	181.9	104.4	73.7	60.1	52.0	44.5	
20yr	744.4	525.3	428.0	302.4	212.7	122.7	86.6	70.6	61.1	52.3	
50yr	900.7	635.5	518.9	366.4	258.8	148.6	104.9	85.6	74.1	63.3	

Design Storm 10yr 10 minute

For infrastructure design design storm is:

The primary system must cater for the more frequent rainfall events including the 20% AEP storm. The secondary system must convey over-design events without inundation hazard to house floors and building platforms at least to the 2% AEP storm, including occasions when there are blockages in the primary drainage system.

Have not calculated time of concentration but likely to be less than 10mins & certainly not less than 20

Time of concentration assessment

Powell Fenwick

Project name : Papanui Pak'nSave
Job no. : 171259/C/2
Sketch title :Lidia Street Drain
Demand on new pipeline

Date : 18 Apr 2019
Scale : NA @ A3
Drawn : KGB
Sketch : C41B

NOTES :

1. THIS SURVEY HAS NOT INCLUDED SITE MARKING OF THE BOUNDARY POSITIONS UNLESS OTHERWISE INDICATED.

2. SOME UNDERGROUND DRAINAGE INFORMATION IS SHOWN ON THIS PLAN AND HAS BEEN SOURCED FROM COUNCIL DRAINAGE RECORDS. THE ACCURACY OF THIS INFORMATION IS NOT GUARANTEED AND THE LOCATION OF THE PIPEWORK REQUIRES ONSITE VERIFICATION.

3. THE SITE DATUM FOR THIS SURVEY IS:

   IRON SPIKE FLUSH IN SEAL
   REDUCED LEVEL: 18.86m
   ORIGIN OF LEVELS: BM133 (EKRJ)
   REDUCED LEVEL: 20.52m
   DATUM: CDD MARCH 2016

4. "SPOT HEIGHT" POSITIONS ARE SHOWN IN THE FOLLOWING FORMAT X AND ARE EXPRESSED IN METRES IN TERMS OF THE SITE DATUM FOR THE SURVEY. THE HEIGHTS OF THESE POSITIONS HAVE AN ACCURACY RELATIVE TO THE SITE DATUM AS FOLLOWS:

   × HARD SURFACES eg CONCRETE, ASPHALT +/- 0.030m @ 95% CONFIDENCE LEVEL.
   × SOFT SURFACES eg GRASS +/- 0.050m @ 95% CONFIDENCE LEVEL.

5. CADASTRAL BOUNDARIES BEARINGS AND DISTANCES HAVE BEEN SOURCED FROM DP's 21207 & 479583 & SO's 19085 & 19672.

6. HEIGHTS SHOWN ON THE KERB LINES ARE ON TOP OF KERB.

7. HEIGHTS SHOWN FOR MANHOLES & SUMPS ARE ON TOP OF THOSE FEATURES.

LEGEND

SEWER LINE
STORM WATER LINE
WATER SUPPLY LINE

Powell Fenwick

Project name : Papanui Pak'nSave
Job no. : 171259/C/2
Sketch title : Extg Lydia Drain - Foodstuffs Site Relevant Inverts
Date : 18 Apr 2019
Scale : 1:1000 @ A3
Drawn : KGB
Sketch : C41C

SURVUS CONSULTANTS
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F 03 352 5527 ASHBURTON 03 307 7021
TOLL FREE 0508 787 887 DARFIELD 03 318 8151

REV	DATE	REVISION DETAILS	
A	21/05/18	SITE SURVEY	S SMITH

DESIGNED | VERIFIED

APPROVED
DATE

PROJECT
FOODSTUFFS S.I. LTD - 171 MAIN NORTH ROAD

TITLE
SITE SURVEY
SHEET 1 OF 2

INFORMATION ONLY

PROJECT NO 13836

SCALE 1:500 (A1) | SIZE A1

DRAWING NO SS-01 | REV A

				Pipe slope 1:		330		
				Pipe diameter =		762		
					n =	0.013		
					s =	0.003		
Alpha	Water Depth	Wetted Perimeter	Segment Area	Triangle Area	Wetted Area	R	V m/s	Q l/s
5	1	66	12668	12603	64	1	0.04	0.0
10	6	133	25335	24824	511	4	0.10	0.1
15	13	199	38003	36290	1713	9	0.18	0.3
20	23	266	50671	46654	4017	15	0.26	1.0
25	36	332	63338	55600	7739	23	0.35	2.7
30	51	399	76006	62857	13150	33	0.44	5.7
35	69	465	88674	68203	20470	44	0.53	10.8
40	89	532	101341	71478	29864	56	0.62	18.5
45	112	598	114009	72581	41429	69	0.71	29.6
50	136	665	126677	71478	55199	83	0.81	44.5
55	162	731	139345	68203	71141	97	0.90	63.7
60	191	798	152012	62857	89156	112	0.98	87.6
65	220	864	164680	55600	109080	126	1.07	116.2
70	251	931	177348	46654	130694	140	1.14	149.5
75	282	997	190015	36290	153725	154	1.22	187.1
80	315	1064	202683	24824	177859	167	1.28	228.5
85	348	1130	215351	12603	202747	179	1.35	273.0
90	381	1197	228018	0	228018	191	1.40	319.7
95	414	1263	240686	-12603	253290	200	1.45	367.4
100	447	1330	253354	-24824	278178	209	1.49	415.1
105	480	1396	266021	-36290	302312	216	1.53	461.5
110	511	1463	278689	-46654	325343	222	1.55	505.7
115	542	1529	291357	-55600	346957	227	1.58	546.5
120	572	1596	304024	-62857	366881	230	1.59	583.0
125	600	1662	316692	-68203	384896	232	1.60	614.5
130	626	1729	329360	-71478	400838	232	1.60	640.6
135	650	1795	342028	-72581	414608	231	1.59	660.8
140	673	1862	354695	-71478	426173	229	1.58	675.3
145	693	1928	367363	-68203	435566	226	1.57	684.1
150	711	1995	380031	-62857	442887	222	1.55	687.6
155	726	2061	392698	-55600	448298	217	1.53	686.5
160	739	2128	405366	-46654	452020	212	1.51	681.4
165	749	2194	418034	-36290	454324	207	1.48	673.3
170	756	2261	430701	-24824	455525	201	1.46	662.9
175	761	2327	443369	-12603	455973	196	1.43	651.3
180	762	2394	456037	0	456037	191	1.40	639.3
						goal seek	G3	
						Grade	330	

Pipe Grade

Internal Diameter Pipe

Concrete Friction Coefficient

Max Capacity (L/sec)

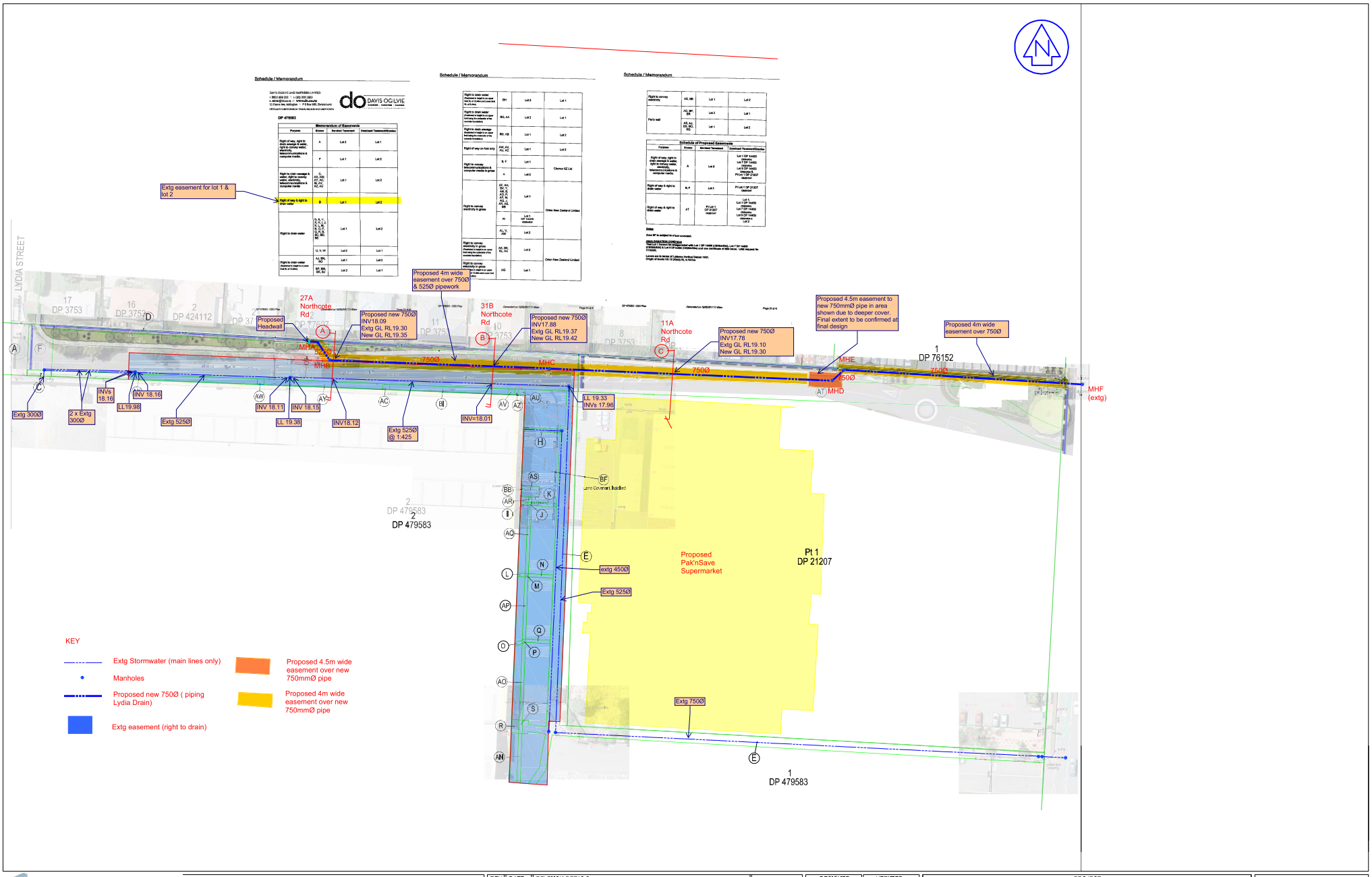
Pipe Full Capacity (L/sec)

-Flow capacity required 633 L/sec
-Capacity achieved (pipe full) 639L/sec
-Achieved > Required so OK

Powell Fenwick

Project name : Papanui Pak'nSave
Job no. : 171259/C/2
Sketch title :Lidia Street Drain
Proposed New pipe capacity

Date : 18 Apr 2019
Scale : NA @ A3
Drawn : KGB
Sketch : C41D



Powell Fenwick

Project name : Papanui Pak'nSave
Job no. : 171259/C/1
Sketch title : Proposed Drainage Easement over new 750Ø

Date : 03 May 2019
Scale : 1:500 @ A1
Drawn : KGB
Sketch : C45A

REV	DATE	REVISION DETAILS	
A	28/05/18	EASEMENTS	S SMITH

DESIGNED | VERIFIED | APPROVED | DATE

PROJECT: FOODSTUFFS S.I. LTD - 171 MAIN NORTH ROAD

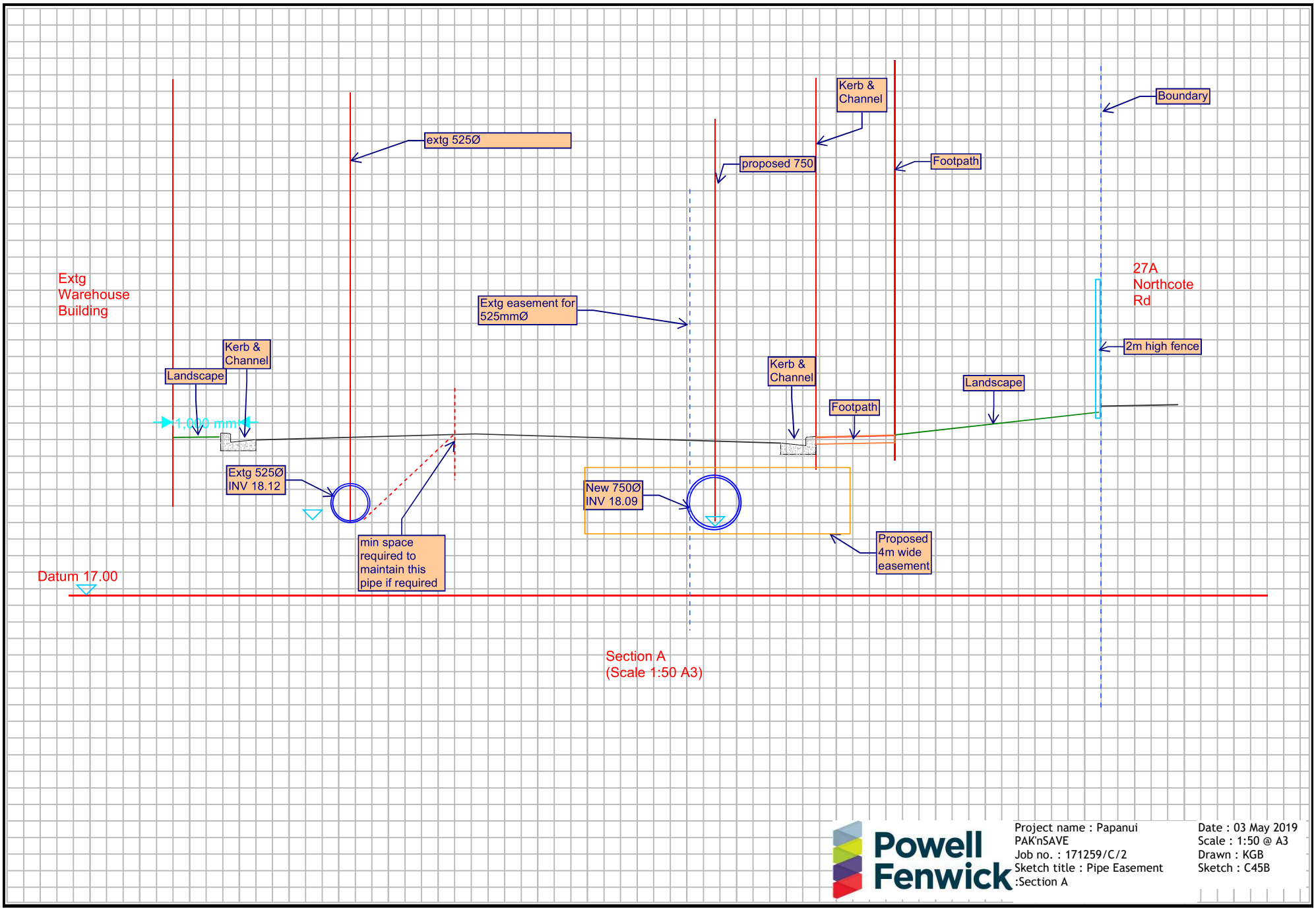
TITLE: SUBJECT EASEMENTS — SHEET 2 OF 2

INFORMATION ONLY

PROJECT NO 13836

SCALE 1:500 (A1) | SIZE A1

DRAWING NO SS-01 | REV A



Powell Fenwick

Project name : Papanui
PAK'nSAVE
Job no. : 171259/C/2
Sketch title : Pipe Easement
:Section A

Date : 03 May 2019
Scale : 1:50 @ A3
Drawn : KGB
Sketch : C45B

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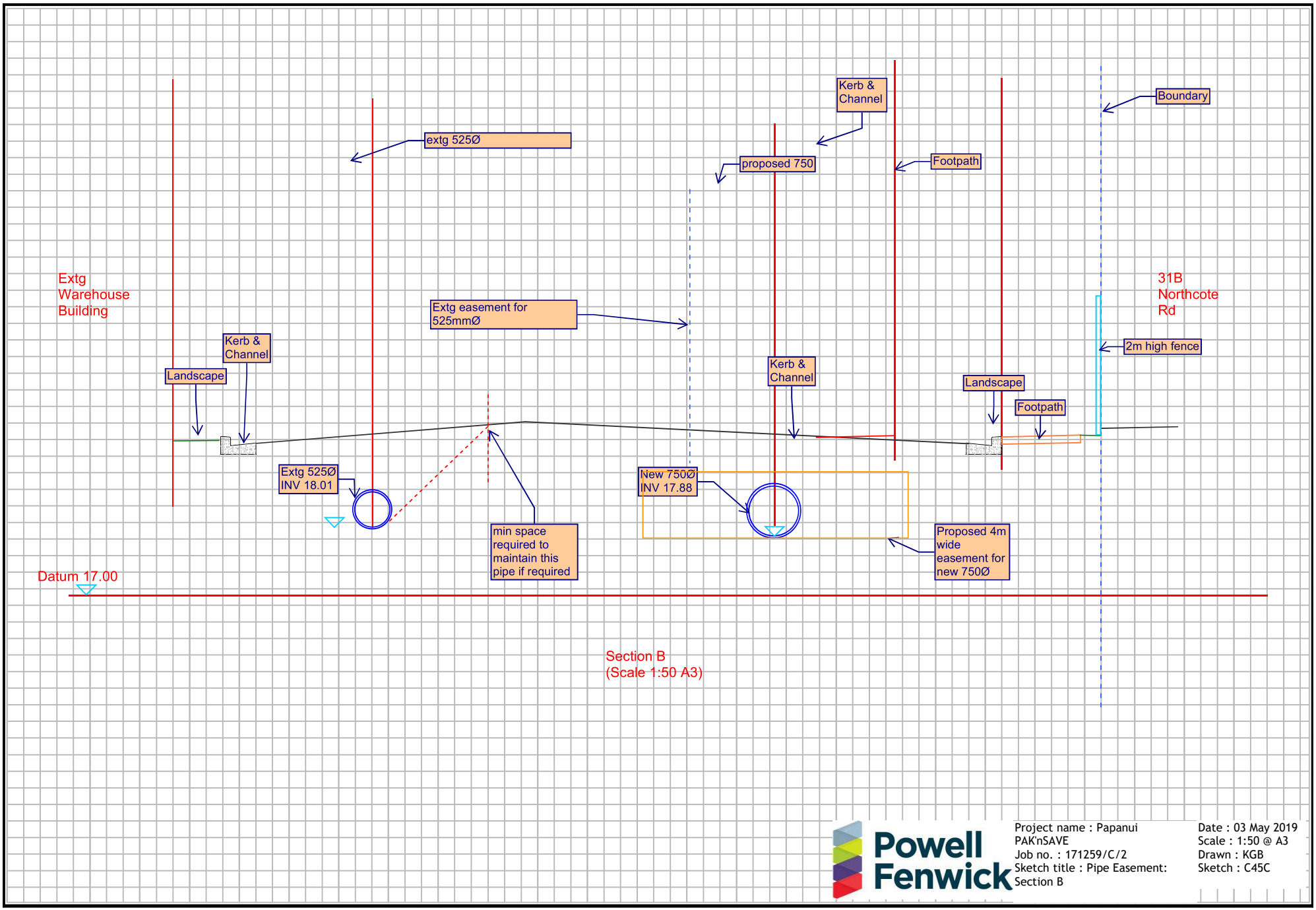

Section B
(Scale 1:50 A3)

Powell Fenwick

Project name : Papanui
PAK'nSAVE
Job no. : 171259/C/2
Sketch title : Pipe Easement: Section B

Date : 03 May 2019
Scale : 1:50 @ A3
Drawn : KGB
Sketch : C45C

C:\Users\clairec\Desktop\A3 Calcsheet 14.10.2016