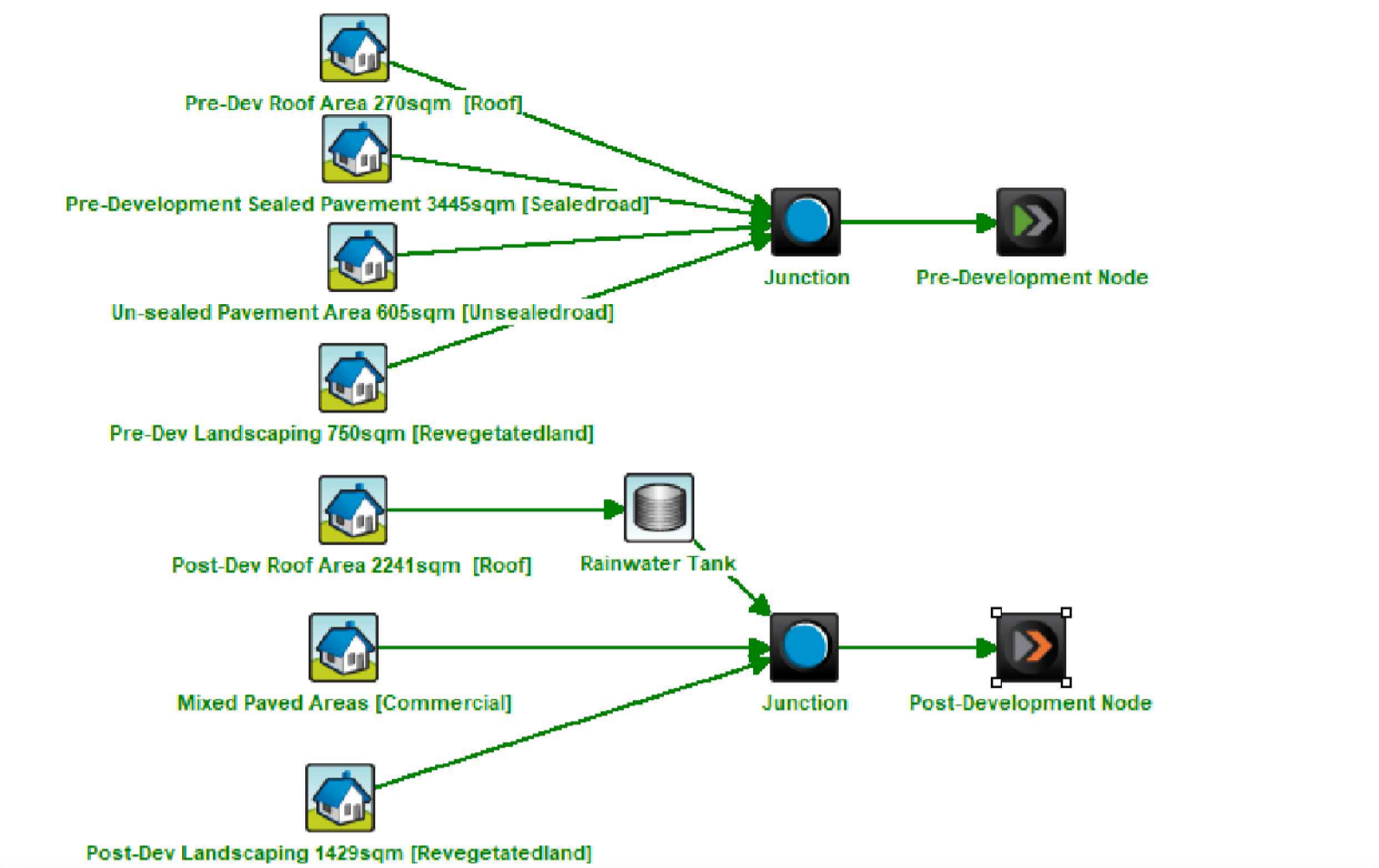


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LEGEND

- EXISTING SURFACE CONTOURS
- PROPOSED STORMWATER DRAINAGE PIPE & FLOW DIRECTION
- EXISTING SEWER MAIN ALIGNMENT & PIT
- EXISTING TELSTRA
- EXISTING POWER
- EXISTING WATER MAIN
- EXISTING GAS MAIN
- EXISTING DRAINAGE
- EXTENT OF WORKS
- PROPOSED PAVEMENT FALL
- PROPOSED JUNCTION PIT
- PROPOSED GRATED PIT
- PROPOSED PAVEMENT LEVEL
- MATCH EXISTING PAVEMENT LEVEL
- EXTENT OF PROPOSED PAVEMENT AREAS (REFER TO LANDSCAPE PLANS)
- EXTENT OF PROPOSED LANDSCAPED AREAS (REFER TO LANDSCAPE PLANS)
- EXTENT OF PROPOSED BUILDINGS



Treatment Train Effectiveness - Post-Development Node

	Sources		Residual Load		% Reduction	
	Pre	Post	Pre	Post	Pre	Post
Flow (ML/yr)	2.46	2.24	2.46	1.4	0	37.5
Total Suspended Solids (kg/yr)	1020	181	1020	157	0	13.3
Total Phosphorus (kg/yr)	1.32	0.438	1.32	0.31	0	29.2
Total Nitrogen (kg/yr)	5.7	4.66	5.7	2.8	0	39.9
Gross Pollutants (kg/yr)	91.8	79.2	91.8	30.5	0	61.5

Include Pre-Development

MUSIC MODEL RESULTS

STORMWATER POLLUTANTS FROM SITE IN POST DEVELOPMENT CONDITIONS IS TREATED TO MEET BEST PRACTICE IN COMPARISON TO PRE DEVELOPMENT CONDITIONS.

STORMWATER POLLUTANT	SOURCES (PRE)	RESIDUAL LOAD (POST)	% REDUCTION
TOTAL SUSPENDED SOLIDS (kg/yr)	1020	157	84.6
TOTAL PHOSPHORUS (kg/yr)	1.32	0.31	76.5
TOTAL NITROGEN (kg/yr)	5.7	2.8	50.9

DETENTION COMPUTATIONS

PRE-DEVELOPMENT
 AREA IMPERVIOUS: 3715m² ; C_w = 0.90
 AREA SEMI-PERVIOUS: 605m² ; C_w = 0.70
 AREA PERVIOUS: 750m² ; C_w = 0.17
 AREA TOTAL: 5070m² ; C_w = 0.77

POST-DEVELOPMENT
 AREA IMPERVIOUS: 3641m² ; C_w = 0.90
 AREA SEMI-PERVIOUS: 0m² ; C_w = 0.70
 AREA PERVIOUS: 1429m² ; C_w = 0.17
 AREA TOTAL: 5070m² ; C_w = 0.69

NET IMPERVIOUS AREA IS DECREASED FOR POST DEVELOPMENT CONDITIONS (ie. C_w POST-DEV = 0.69 - C_w PRE-DEV = 0.77). THEREFORE, ON-SITE DETENTION IS NOT REQUIRED.

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PRELIMINARY DRAWING
 NOT TO BE USED FOR CONSTRUCTION

PROPOSED STORMWATER MANAGEMENT LAYOUT PLAN - MULTI-PURPOSE CENTRE
 SCALE 1:200

ISSUE	ISSUED FOR	DATE	DRAWN	APPROVED	ISSUE	ISSUED FOR	DATE	DRAWN	APPROVED
01	PRELIMINARY	09/06/2021	L.P.	R.D.					
02	APPROVAL	30/06/2021	L.P.						

DESIGNED: L. PAGE
 DRAWN: L. PAGE
 SURVEY: SWANSON SURVEYING PT LTD
 CHECKED: R. DUNN
 DATE: 10/06/2021

DATE: JUNE 2021
 SCALE: A1: 1:200, A3: 1:400
 SHEET SIZE: A1 / A3
 APPROVED:

Cardno TGM
 ABN 11 125 568 461
 1315 Sturt Street, Ballarat, VIC Australia (PO Box 563W, Ballarat West) 3350
 Phone +61 3 5330 9888 Fax +61 3 5333 3815
 Email: victoria@cardno.com.au Web: www.cardno.com

CLIENT: GALLAGHER JEFFS
 1/606 ST KILDA ROAD
 MELBOURNE VIC 3004

PROJECT: SPC MULTI-PURPOSE CENTRE
 1431 STURT STREET,
 NEWINGTON 3350

CIVIL DRAWING

DRAWING TITLE: **PROPOSED STORMWATER MANAGEMENT PLAN - MULTI-PURPOSE CENTRE**

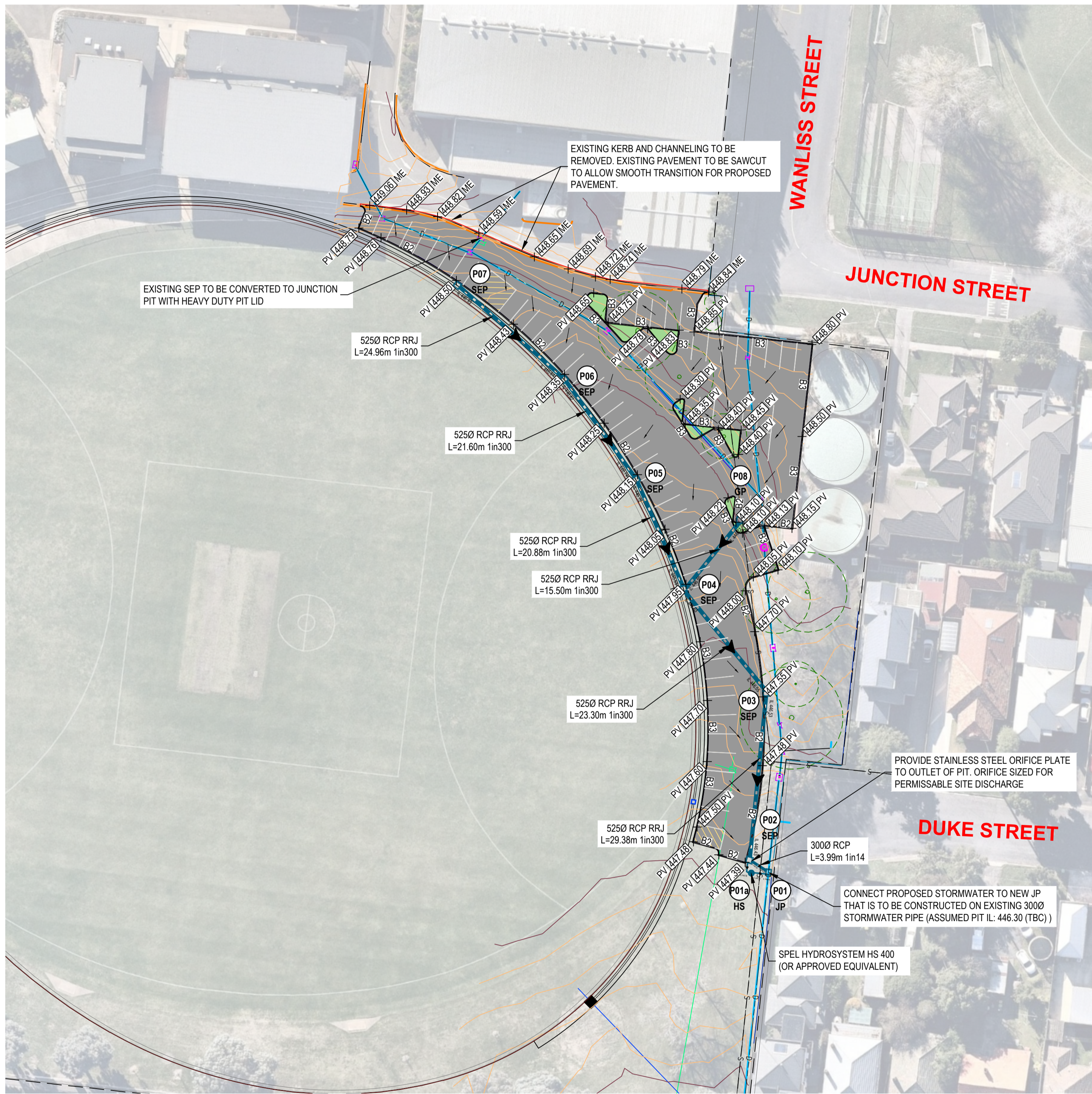
REF. No: 21503-02

SHEET: SW01 OF 02

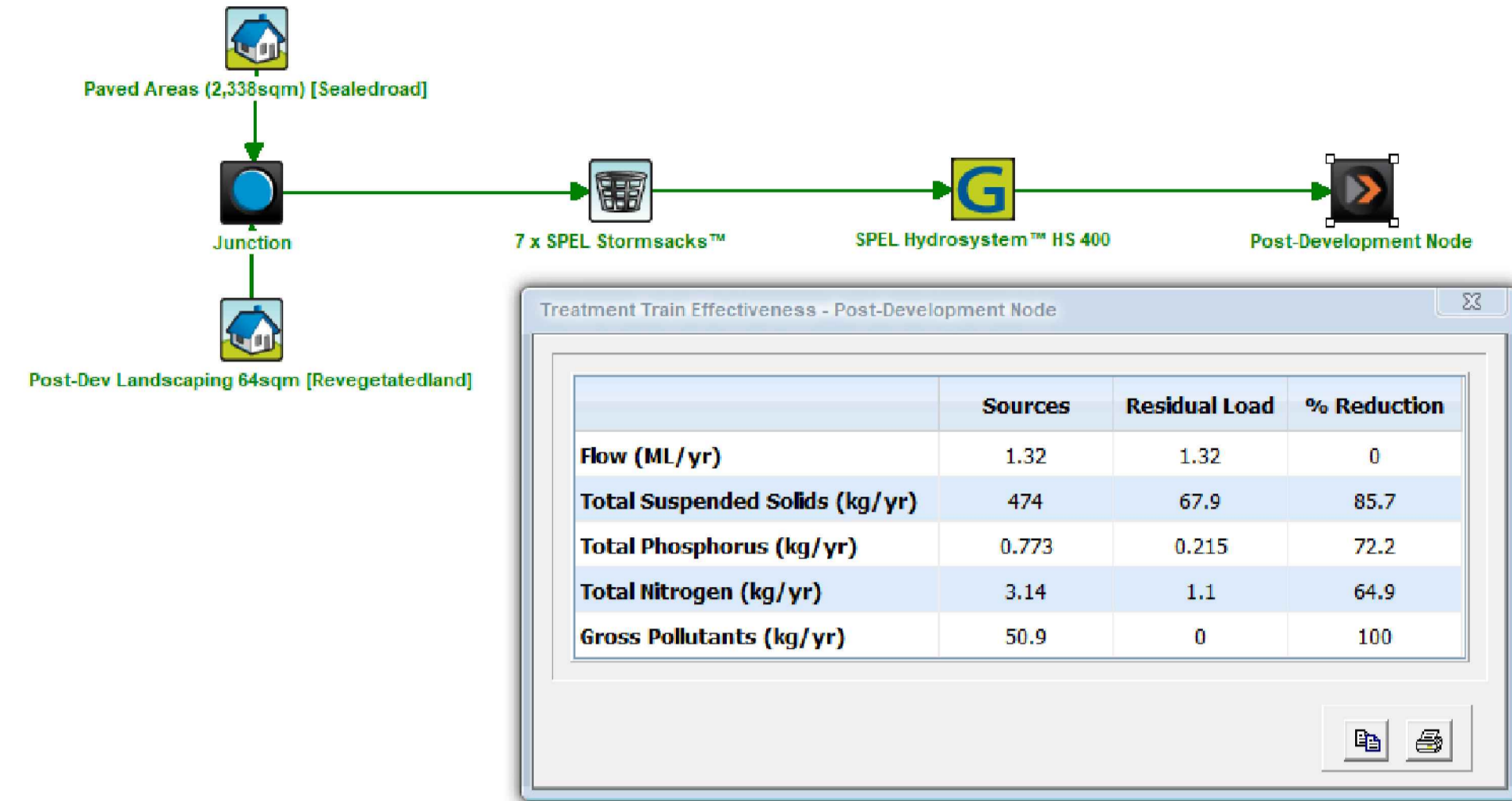
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LEGEND

- EXISTING SURFACE CONTOURS
- PROPOSED STORMWATER DRAINAGE PIPE & FLOW DIRECTION
- EXISTING SEWER MAIN ALIGNMENT & PIT
- EXISTING DRAINAGE
- PROPOSED PAVEMENT FALL
- PROPOSED JUNCTION PIT
- PROPOSED GRATED PIT
- PROPOSED SIDE ENTRY PIT
- 447.39 PV PROPOSED PAVEMENT LEVEL
- 448.59 ME MATCH EXISTING PAVEMENT LEVEL
- EXTENT OF PROPOSED PAVEMENT AREA
- EXTENT OF PROPOSED LANDSCAPED AREA



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MUSIC MODEL RESULTS

STORMWATER POLLUTANTS FROM SITE IN POST DEVELOPMENT CONDITIONS IS TREATED TO MEET BEST PRACTICE

STORMWATER POLLUTANT	SOURCES (POST)	RESIDUAL LOAD (POST)	% REDUCTION
TOTAL SUSPENDED SOLIDS (kg/yr)	472	67.9	85.7
TOTAL PHOSPHORUS (kg/yr)	0.773	0.215	72.2
TOTAL NITROGEN (kg/yr)	3.14	1.1	64.9

SITE STORMWATER DETENTION

VOLUME CALCULATION FOR BELOW GROUND PIPE STORAGE

TOTAL SITE AREA	2402	SEMI-PERVIOUS AREA	0
TOTAL IMPERVIOUS AREA	2338		
TOTAL PERVIOUS AREA	45		
Cp(Pre-development)	0.30		
Cw	0.88		
tc(Catchment)(mins)	19	Op	11.59968
ts(mins)	11	Ca	68.05133
ts	19	tc	19
ts	11	ts	11
ts	11.6	PSD	13.43
ts	68.1	Qp/PSD	0.884
PSD	13.43	Big Formula	0.883
Vs (m³)	30.56	Difference	0.000

NOTE: Max ts = 1.25 x tc

td(min)	I(mm/hr)	Qa(l/sec)	Vs(m³)	Valid Vs
5	105.73	124	16.10	16.10
7	92.60	109	19.30	19.30
10	79.40	93	22.94	22.94
12	72.97	86	24.82	24.82
14	67.73	80	26.39	26.39
16	63.35	74	27.70	27.70
18	59.62	70	28.81	28.81
20	56.39	66	29.76	29.76
22	53.57	63	30.56	30.56
24	51.07	60	31.25	
26	48.85	57	31.83	
28	46.84	55	32.32	
30	45.03	53	32.74	
32	43.39	51	33.09	
34	41.88	49	33.38	
36	40.50	48	33.61	
38	39.22	46	33.79	
40	38.04	45	33.93	
42	36.94	43	34.03	
44	35.92	42	34.10	
46	34.97	41	34.14	
48	34.07	40	34.13	
50	33.23	39	34.10	
55	31.34	37	33.93	
60	29.69	35	33.62	
75	25.81	30	32.08	
90	22.98	27	29.88	
120	19.10	22	24.31	
180	14.88	17	10.77	

Note: 1 This spreadsheet has been designed specifically for the Ballarat on site detention system policy handbook
 2 This spreadsheet is operated at the responsibility of the user

K:\AA - Great Plains Jobs\21503 (Multi-purpose Centre St Pats College Ballarat)\02 (Civil)\Computations\SI Pats Carpark Storage Volumes

DETENTION COMPUTATIONS

PRE-DEVELOPMENT	POST-DEVELOPMENT
AREA IMPERVIOUS: 76m² :C _W = 0.90	AREA IMPERVIOUS: 2,338m² :C _W = 0.90
AREA SEMI-PERVIOUS: 496m² :C _W = 0.70	AREA SEMI-PERVIOUS: 0m² :C _W = 0.70
AREA PERVIOUS: 1,828m² :C _W = 0.17	AREA PERVIOUS: 64m² :C _W = 0.17
AREA TOTAL: 2,402m² :C _W = 0.30	AREA TOTAL: 2,402m² :C _W = 0.88

NET IMPERVIOUS AREA IS INCREASED FOR POST DEVELOPMENT CONDITIONS (ie. C_W POST-DEV = 0.88 - C_W PRE-DEV = 0.30). THEREFORE, ON-SITE DETENTION IS REQUIRED.

STORMWATER DETENTION VOLUME	m³
BELOW GROUND STORAGE IN PITS & PIPES	32.75
TOTAL DETENTION STORAGE	32.75
REQUIRED DETENTION STORAGE	30.56

NOTE:
 ALL EXISTING JUNCTION PITS LOCATED WITHIN PROPOSED PAVEMENT AREA TO HAVE PIT LIDS REPLACED WITH HEAVY DUTY TRAFFICABLE PIT LID & TOP OF PIT LEVEL SHALL MATCH PROPOSED FINISHED SURFACE LEVEL.

NOTE:
 ALL GRATED AND SIDE ENTRY PITS TO BE FITTED WITH SPEL STORMSACK (OR APPROVED EQUIVALENT).

NOTE:
 THE STORMWATER DETENTION SYSTEM HAS BEEN DESIGNED TO CONTAIN THE 1 IN 10 YEAR ARI EVENT & DISCHARGE AT THE 1 IN 10 YEAR PRE-DEVELOPMENT RATE.

NOTE:
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FOR APPROVAL

PROPOSED STORMWATER MANAGEMENT LAYOUT PLAN - CARPARK

SCALE 1:500

ISSUE	ISSUED FOR	DATE	DRAWN	APPROVED	ISSUE	ISSUED FOR	DATE	DRAWN	APPROVED	DESIGNED:	L. PAGE	DATE:	JUNE 2021
01	PRELIMINARY	09/06/2021	L.P.							DRAWN:	L. PAGE	SCALE:	A1: 1:500, A3: 1:1000
02	APPROVAL	30/06/2021	L.P.	R.D.						SURVEY:	ACTIVE SURVEYING	SHEET SIZE:	A1 / A3
										CHECKED:	R. DUNN	APPROVED:	
										DATE:	30/06/2021	DATE:	

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PROJECT:
SPC MULTI-PURPOSE CENTRE
 1431 STURT STREET,
 NEWINGTON 3350

CIVIL DRAWING

DRAWING TITLE:
PROPOSED STORMWATER MANAGEMENT PLAN - CARPARK

REF. No.: 21503-02 SHEET: SW02 OF 02 REV: 02