CLIENT

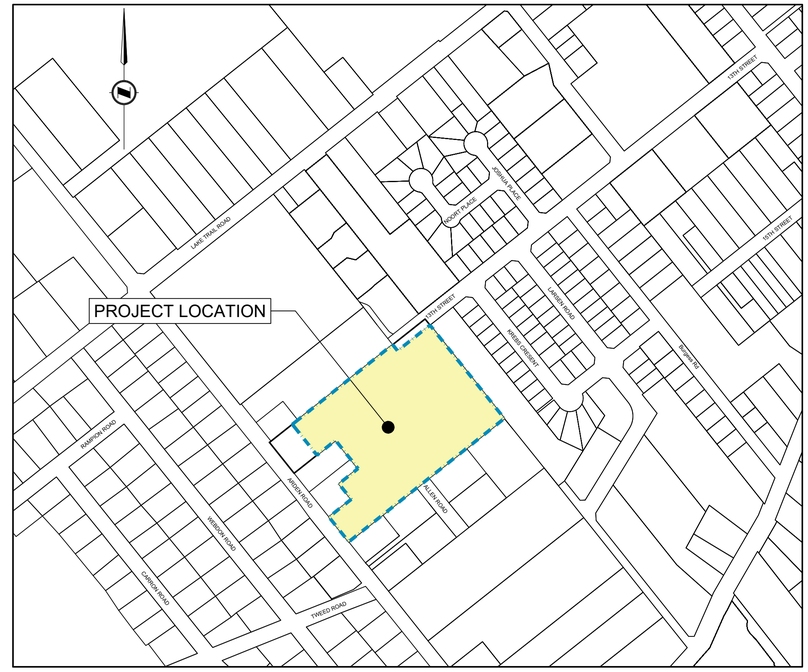
SIMBA INVESTMENTS LTD.

PROJECT NAME

ARDEN GARDENS - PHASE ONE

DESCRIPTION

MULTIFAMLITY RESIDENTIAL DEVELOPMENT
CIVIL SERVICING
LOT 1, PLAN 2963, LOT 2, PLAN 2963, LOT A, PLAN 20420,
DISTRICT LOT 96, COMOX DISTRICT



LOCATION PLAN
NTS

McELHANNEY PROJECT 2211-47572-00

CITY PROJECT ----

STATUS ISSUED FOR DEVELOPMENT PERMIT

McElhanney

1211 Ryan Road
Courtenay BC
Canada V9N 3R6
T 250 338 5495

DRAWING LIST

SHEET #	NAME	REVISIONS						
		PA	PB	PC	0	1	2	3
C1-001	GENERAL NOTES AND LEGEND							
C1-100	EXISTING SITE PLAN AND REMOVALS							
C1-101	OVERALL SITE PLAN AND TRUCK MOVEMENTS							
C1-102	PRELIMINARY SERVICING PLAN							
C1-103	PRELIMINARY GRADING PLAN							
C1-500	SUGGESTED EROSION AND SEDIMENT CONTROL PLAN							

GENERAL

1. ALL MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO SUBDIVISION AND DEVELOPMENT BYLAW 2919, INCLUDING AMENDMENTS AND APPENDICES.
2. THE CONTRACTOR SHALL MAINTAIN AN UP TO DATE SET OF "AS-CONSTRUCTED" REDLINE DRAWINGS FOR THE PROJECT. THESE SHALL BE MADE AVAILABLE TO THE ENGINEER PRIOR TO ISSUING OF SUBSTANTIAL PERFORMANCE FOR THE PROJECT.
3. THE CONTRACTOR IS REQUIRED TO SUBMIT ALL NECESSARY PROJECT INFORMATION TO THE CITY ENGINEERING DEPARTMENT / PUBLIC WORKS DEPARTMENT 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
4. THE CONTRACTOR SHALL OBTAIN SERVICE RECORD CARDS FROM THE CITY PRIOR TO CONSTRUCTION.
5. A PRE-CONSTRUCTION MEETING WITH CITY STAFF IS TO BE HELD PRIOR TO COMMENCEMENT OF CONSTRUCTION OF OFF-SITE WORKS.
6. ANY EXISTING CITY INFRASTRUCTURE NOT REQUIRED AS A RESULT OF THIS PROJECT IS TO BE RETURNED TO THE PUBLIC WORKS YARD. TWO WEEKS NOTICE OF DELIVERY IS REQUIRED.
7. THE CONTRACTOR SHALL INFORM THE ENGINEER OF ANY DISCREPANCIES WITHIN THESE PLANS PRIOR TO CONSTRUCTION.
8. ALL DISTURBED AREAS, STRUCTURES (RETAINING WALLS, FENCES), VEGETATION, HABITAT, ETC. ON PUBLIC OR PRIVATE PROPERTY ARE TO BE RESTORED TO EQUAL OR BETTER CONDITION THAN EXISTING, AND TO THE SATISFACTION OF THE PROPERTY OWNER AND CITY OF COURTENAY.
9. THE CONTRACTOR IS TO ARRANGE WORKS ON OR AROUND EXISTING UTILITY POLES AND GUY WIRES. UPON AWARD OF THE CONTRACT, THE CONTRACTOR MUST CONTACT BC HYDRO, TELUS, FORTIS BC AND SHAW CABLE WITH A CONSTRUCTION SCHEDULE. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY RELOCATIONS AND TEMPORARY MEASURES REQUIRED TO INSTALL WORKS.
10. BOULEVARDS MUST BE GRADED IN ACCORDANCE WITH THE CITY OF COURTENAY SUBDIVISION AND DEVELOPMENT SERVICING BYLAW 2919.
11. ALL REQUESTS FOR FIELD CHANGES ARE TO BE MADE TO THE PROJECT ENGINEER FOR REVIEW AND APPROVAL, PRIOR TO IMPLEMENTING THE DESIGN CHANGE.

TRAFFIC CONTROL / SITE SAFETY

1. THE CONTRACTOR SHALL ASSUME "PRIME CONTRACTOR" STATUS AND WILL BE RESPONSIBLE FOR ALL WORK PLACE SAFETY RESPONSIBILITIES FOR WORKERS IN ACCORDANCE WITH WORKSAFE BC AND OHS REGULATIONS.
2. THE CONTRACTOR SHALL PROVIDE A TRAFFIC CONTROL PLAN FOR REVIEW BY THE CITY OF COURTENAY AND THE PROJECT ENGINEER PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. THE CONTRACTOR SHALL DELIVER WRITTEN NOTICE OF CONSTRUCTION TO ALL RESIDENTS AND BUSINESSES WITHIN 1 BLOCK OF THE PROJECT.
4. THE CONTRACTOR SHALL NOTIFY ALL EMERGENCY SERVICE AGENCIES, THE CITY OF COURTENAY, MoTI, SCHOOL BUS, GARBAGE CONTRACTORS AND BC TRANSIT OF THE SUBSEQUENT WORK ZONE AREA, SPEED REDUCTIONS, OR DETOURS WHICH MAY AFFECT TRAFFIC FLOW.
5. THE CONTRACTOR SHALL MAINTAIN VEHICLE AND PEDESTRIAN ACCESS TO ALL RESIDENCES AND BUSINESSES AT ALL TIMES.
6. THE CONTRACTOR SHALL VERIFY THAT SITE SAFETY FOR VEHICLE OPERATORS AND PEDESTRIANS IS MAINTAINED FROM THE END OF EACH WORK DAY, THROUGH THE NIGHT, AND UNTIL THE START OF THE NEXT WORK DAY BY USING FLASHING BEACONS, BARRICADES, SIGNS, DELINEATORS ETC., IN ACCORDANCE WITH CURRENT EDITION OF THE "*TRAFFIC CONTROL MANUAL FOR WORK ON ROADWAYS*" PUBLISHED BY MoTI.
7. THE CONTRACTOR IS TO ERECT ALL APPROPRIATE CONSTRUCTION ZONE SIGNS AND USE CERTIFIED FLAG PERSONNEL TO MAINTAIN SAFE AND EFFICIENT TRAFFIC FLOW ON ROADS ADJACENT THE WORK SITE.
8. ALL TRAFFIC SIGNS ARE TO BE AS PER THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA (CURRENT EDITION).

PERMITS

1. THE CONTRACTOR SHALL OBTAIN A PERMIT FROM THE CITY OF COURTENAY PUBLIC WORKS DIVISION TO CONSTRUCT WORKS WITHIN A MUNICIPAL ROAD ALLOWANCE, STATUTORY RIGHT-OF-WAY AND/OR MUNICIPAL PROPERTY.
2. THE CONTRACTOR IS REQUIRED TO SUBMIT ALL NECESSARY PERMITS (ROAD EXCAVATION AND E48 PROJECT INFORMATION) TO THE CITY OF COURTENAY PRIOR TO SCHEDULING A PRECONSTRUCTION MEETING.
3. A TREE CUTTING PERMIT IS REQUIRED FROM THE CITY OF COURTENAY PRIOR TO THE REMOVAL OF ANY TREES.
4. A PERMIT IS REQUIRED FROM FORTIS BC GAS WHEN THE SITE WORK OR ACTIVITY INVOLVES:
   - 4.1. WORKING WITHIN TWO (2) METRES OR CROSSING OVER/UNDER AN INTERMEDIATE PRESSURE (IP) GAS PIPELINE (701-2070 kPa / 101.6 - 300 psi)
   - 4.2. CROSSING A TRANSMISSION PRESSURE (TP) GAS PIPELINE (ABOVE 2070 kPa / 300 psi) OR WORKING WITHIN A RIGHT-OF-WAY.

EXCAVATING, TRENCHING AND BACKFILLING

1. ALL DISTURBED AREAS ON PUBLIC OR PRIVATE PROPERTY ARE TO BE RESTORED TO EQUAL OR BETTER CONDITION THAN EXISTING AND TO THE SATISFACTION OF THE MUNICIPAL WORKS INSPECTOR AND PROPERTY OWNER.
2. TRENCHES AND ASPHALT REMOVAL AREAS WITHIN EXISTING HARD SURFACE ROADS, ACCESSES, OR TRAILS ARE TO BE REINSTATED ON A TEMPORARY BASIS, WITH EITHER HOT OR COLD MIX ASPHALT UNTIL THE FINAL ASPHALT IS INSTALLED
3. INFORMATION ON EXISTING UTILITIES MAY NOT BE COMPLETE NOR ACCURATE. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXPOSE LOCATIONS OF ALL EXISTING UTILITIES AND ADVISE THE ENGINEER OF ANY POTENTIAL CONFLICTS.
4. THE CONTRACTOR IS TO ARRANGE FOR OBSERVATION OF ALL KEY UNDERGROUND ASPECTS OF THE WORK BY THE PROJECT ENGINEER PRIOR TO BACKFILL. ALL REQUESTS FOR FIELD CHANGES ARE TO BE MADE TO THE ENGINEER AND CITY FOR REVIEW AND APPROVAL, PRIOR TO IMPLEMENTING THE CHANGE.
5. THE CONTRACTOR IS TO CALL "BC ONE CALL" TO LOCATE EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION.
6. ALL TRENCH BACKFILL IS TO BE IMPORT PIT-RUN OR AS APPROVED BY A GEOTECHNICAL ENGINEER. ALL BEDDING IS TO BE GRANULAR PIPE BEDDING AS PER MMCD SECTION 31 05 17.
7. ALL WATER, SANITARY SEWER AND STORM DRAINAGE TRENCHING IS TO BE AS PER MMCD DWG. G4 UNLESS OTHERWISE NOTED.
8. ALL GRANULAR AGGREGATE MATERIALS ARE TO BE COMPACTED TO 95% MODIFIED PROCTOR DENSITY (ASTM D1557) IN ANY AREAS THAT WILL SUPPORT BUILDINGS, SLABS, ROADS OR PAVEMENT.

ROAD WORKS

1. ALL PIT-RUN GRAVEL SHALL BE IN ACCORDANCE WITH MMCD SECTION 31 05 17 - 2.3
2. ALL GRANULAR BASE SHALL BE IN ACCORDANCE WITH MMCD SECTION 31 05 17 - 2.10
3. ALL HOT MIX ASPHALT SHALL BE IN ACCORDANCE WITH MMCD SECTION 32 12 16
4. ALL CONCRETE SHALL BE IN ACCORDANCE WITH MMCD SECTION 03 30 53
5. ALL ROLLOVER CURB AND BARRIER CURB SHALL BE AS PER MMCD DWG. C4.
6. ALL PAINT LINES AND SIGNS ARE TO BE IN ACCORDANCE WITH "*MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA*".
7. 4m OF BARRIER CURB WITH 1m TRANSITIONS IS REQUIRED IN FRONT OF ALL LPT'S.

RESTORATION

1. PAVEMENT AREAS: GRIND EDGE OF TRENCH MIN. 500mm BACK OF TRENCH WALL AND 300mm FROM ANY BROKEN OR DAMAGED EDGES. RESTORE ROAD AS PER MMCD STANDARD DRAWING G5 WITH 200mm MIN. LAP-JOINT.
2. BOULEVARD AREAS: RESTORE ALL TOPSOIL, TURF, LANDSCAPING, RETAINING WALLS, DRIVEWAYS, ETC. TO A CONDITION EQUAL TO OR BETTER THAN EXISTED PRIOR TO CONSTRUCTION (UNLESS OTHERWISE SPECIFIED).
3. RESTORE DISTURBED SOFTSCAPE AREAS WITH 300mm OF TOPSOIL AND HYDROSEED GRASS MIX PER MMCD 32 92 19.
4. EXISTING ASPHALT EDGE (AT TIE-IN) IS TO BE SAW CUT IN LONG STRAIGHT LINES PRIOR TO PAVING.

SANITARY SEWERS AND STORM DRAINS

1. PIPE LENGTHS AND SLOPES SHOWN ARE MEASURED FROM CENTRE TO CENTRE OF MANHOLES.
2. ALL 100Ø AND 150Ø SANITARY AND STORM DRAINAGE PIPES SHALL BE PVC SDR28.
3. ALL 200Ø AND 250Ø STORM DRAINAGE PIPES SHALL BE PVC SDR35.
4. ALL 300Ø AND LARGER STORM DRAINAGE PIPES SHALL BE CONCENTRIC RIBBED PVC (SHOWN RPVC ON THESE DRAWINGS) UNLESS OTHERWISE NOTED.
5. SANITARY AND STORM SERVICES TO BUILDINGS ARE TO BE INSTALLED AT A MINIMUM 2% GRADE.
6. THE CONTRACTOR SHALL FOLLOW THE MANUFACTURER'S SPECIFICATIONS WHILE INSTALLING PIPE JOINT DEFLECTIONS; HOWEVER, JOINT DEFLECTIONS ARE NOT TO EXCEED 50% OF THE RECOMMENDED MAXIMUM. PIPE CURVES (BENDING OF BARREL) ARE NOT PERMITTED.
7. USE STANDARD WYE FITTINGS FOR CONNECTIONS TO NEW PVC, RPVC AND HDPE MAINS. ALL WYE CONNECTIONS MUST BE A MINIMUM OF 1.0m DOWNSTREAM FROM MANHOLES.
8. STRAP ON SADDLES AND INSERTABLE TEES ARE PERMITTED FOR CONNECTIONS TO EXISTING PVC AND HDPE MAINS.
9. CORED TEES ARE REQUIRED FOR CONNECTIONS TO NEW OR EXISTING CONCRETE MAINS.
10. THE SERVICING CONNECTION CENTRELINE MUST NOT BE BELOW THE SEWER MAIN CENTRELINE.
11. NO SERVICES SHALL BE DIRECTLY CONNECTED TO MANHOLES.
12. ALL STORM AND SANITARY PIPE (MAINS AND SERVICES) SHALL BE THOROUGHLY FLUSHED AND VIDEO INSPECTED FOLLOWING INSTALLATION. IT IS THE RESPONSIBILITY OF THE CONSULTANT TO REVIEW THE TEST RESULTS AND FORWARD THE SUBMISSION TO THE CITY. COMPLETE WITH RECOMMENDED WORKS OR REPAIRS THAT MAY BE REQUIRED. THE CITY REQUIRES 48 HOURS FROM THE DATE OF SUBMISSION TO REVIEW THE VIDEO AND THE CONSULTANT'S RECOMMENDATIONS. VIDEO INSPECTIONS ARE TO BE COMPLETED, REVIEWED BY THE CONSULTANT AND ACCEPTED PRIOR TO ROAD PAVING.
13. ALL MANHOLES ARE TO BE STANDARD 1050Ø AS PER MMCD PLATINUM EDITION DRAWING S1 UNLESS OTHERWISE NOTED.
14. TWIN CATCH BASINS ARE TO BE INTERCONNECTED WITH 200Ø PVC LEAD.
15. ALL SANITARY INSPECTION CHAMBERS TO BE CONTAINED IN A BROOKS SERIES 37 SERVICE BOX RATED FOR H-20 LOADING, OR AS SHOWN ON CoC CSSD S7, S8, AND S9.
16. ALL LERON PLUGS ARE TO BE REMOVED FROM INSPECTION CHAMBERS BY THE CONTRACTOR.
17. ALL SANITARY MAINS AND SERVICES ARE TO BE LEAKAGE TESTED USING EITHER AN EXFILTRATION TEST OR LOW PRESSURE TEST PER MMCD 33 30 01.

WATER WORKS

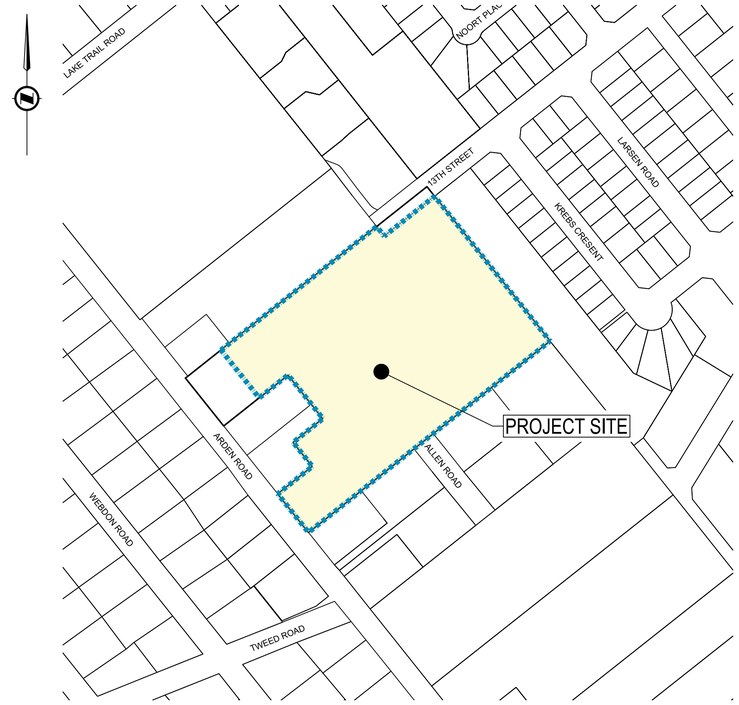
1. ALL WATER PIPES ARE TO BE INSTALLED WITH MINIMUM 1.3m COVER.
2. ALL WATER PIPES ARE TO BE C900 DR18 PVC.
3. THE CONTRACTOR SHALL FOLLOW THE MANUFACTURER'S SPECIFICATIONS WHILE INSTALLING PIPE JOINT DEFLECTIONS; HOWEVER, JOINT DEFLECTIONS ARE NOT TO EXCEED 50% OF THE RECOMMENDED MAXIMUM. PIPE CURVES (BENDING OF BARREL) ARE NOT PERMITTED.
4. ALL WATER FITTINGS ARE TO BE RESTRAINED AS PER MMCD GUIDELINES (STD DWG W1) AND AS NOTED ON THESE DRAWINGS. ALL HORIZONTAL AND VERTICAL BENDS ARE TO BE MECHANICALLY RESTRAINED AS PER THE MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.
5. METER SETTERS SHALL BE PER CoC BYLAW 2919 APPROVED PRODUCTS LIST. ALL WATER METER SERVICE BOX LIDS MUST BE SET AT FINISHED GRADE.
6. ALL FIRE HYDRANTS ARE TO BE PER CoC BYLAW 2919 APPROVED PRODUCTS LIST. THE CONTRACTOR SHALL MAINTAIN 0.50m MINIMUM VERTICAL CLEARANCE BETWEEN THE WATER MAIN AND SEWERS AT ALL CROSSINGS. IN THE EVENT THAT THIS CANNOT BE ACHIEVED, ALL WATER PIPE JOINTS WITHIN 3.0m OF THE CROSSING ARE TO BE SECURED WITH SHRINK WRAP, PETROLATUM TAPE AND GEL OR EQUIVALENT.
7. CONNECTION OF PROPOSED WATER SERVICE TO EXISTING MAIN IS TO FOLLOW PRESSURE TESTING AND BACTERIOLOGICAL TESTING. THE PROJECT ENGINEER SHALL WITNESS CHLORINATION AND FLUSHING. ALL REPORTS ARE TO BE SUBMITTED TO THE CITY OF COURTENAY PRIOR TO SCHEDULING TIE-IN.
8. TWO WEEKS NOTICE TO PUBLIC WORKS DIVISION IS REQUIRED PRIOR TO CONNECTION TO EXISTING INFRASTRUCTURE.
9. SUBMISSION OF BACTERIAL TEST REPORTS INDICATING NO CONTAMINATION BY FECAL OR TOTAL COLIFORM IS REQUIRED TO THE CITY OF COURTENAY PRIOR TO CONNECTION TO THE EXISTING WATER SYSTEM.
10. THE CONTRACTOR SHALL MAKE HIMSELF AWARE OF ALL APPLICABLE AWWA STANDARDS AND PROCEDURES FOR DISINFECTION OF WATER WORKS. THESE PROCEDURES WILL BE STRICTLY ENFORCED. THE CONTRACTOR SHALL HAVE A REFERENCE COPY OF AWWA PROCEDURES AVAILABLE ON SITE AT ALL TIMES.
11. ALL NEW WATER PIPES SHALL BE TESTED, DISINFECTED AND FLUSHED IN ACCORDANCE WITH MMCD, SECTION 33 11 01, 3.17 - 3.21. ALL REPORTS ARE TO BE PROVIDED TO THE CITY OF COURTENAY. ALL HEAVILY CHLORINATED WATER (USED FOR DISINFECTION PURPOSES) SHALL BE DISPOSED OF ONSITE WITHIN GRAVEL AREAS. DISCHARGE OF CHLORINATED WATER INTO THE CITY'S SANITARY SEWER SYSTEM IS NOT PERMITTED UNLESS APPROVED BY THE CITY ENGINEER. DE-CHLORINATION PUCKS/DIFFUSER OR EQUIVALENT ARE TO BE UTILIZED PRIOR TO / AT TIME OF DISPOSAL.
12. MUNICIPAL WATER MAIN CONNECTION SHALL BE COMPLETED BY THE CITY OF COURTENAY, INCLUDING ALL RESTORATION WORK.
13. DOMESTIC WATER SERVICE AND WATER METER WITHIN ROAD RIGHT-OF-WAY TO BE SUPPLIED AND INSTALLED BY CITY FORCES.
14. CITY PUBLIC WORKS STAFF SHALL OPERATE ALL EXISTING WATER VALVES AND FLUSH NEW SYSTEM FOLLOWING TIE-IN COMPLETION.
15. NOTIFY CITY FOREMAN PRIOR TO FLUSHING AND CHLORINATING WATER MAINS.

ENVIRONMENTAL PROTECTION

1. THE CONTRACTOR SHALL ENSURE THAT ALL ENVIRONMENTAL PROTECTIONS TO ELIMINATE DOWNSTREAM SILT ARE IN PLACE PRIOR TO THE START OF CONSTRUCTION AND REMAIN FOR THE DURATION OF THE CONTRACT. THE CONTRACTOR SHALL OBTAIN A COPY OF, AND FOLLOW THE PROCEDURES CONTAINED IN THE "LAND DEVELOPMENT GUIDELINES FOR THE PROTECTION OF AQUATIC HABITAT". THE CONTRACTOR IS TO PROVIDE AN "EROSION AND SEDIMENT CONTROL PLAN", FOR REVIEW BY THE ENGINEER.

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	DEVELOPMENT BOUNDARY	
60	GROUND CONTOUR	60
	TOP OF SLOPE	
	BOTTOM OF SLOPE	
	DITCH	
	SWALE	
	FENCE (WOOD)	
	FENCE (CHAIN LINK)	
	VEGETATION BOUNDARY	
	SIGN	
	EDGE OF PAVEMENT (WITHOUT CURB)	
S	SANITARY SEWER	S
FM	SANITARY FORCE MAIN	FM
	SANITARY MANHOLE	
IC	INSPECTION CHAMBER	IC
CO	CLEANOUT	CO
D	STORM SEWER	D
	STORM MANHOLE	
	CATCH BASIN	
	LAWN BASIN	
	CATCH BASIN LEAD	
IC	INSPECTION CHAMBER	IC
CO	CLEANOUT	CO
W	WATER MAIN	W
	WATER VALVE	
	HYDRANT ASSEMBLY	
	PERMANENT BLOW-OFF	
	TEMPORARY BLOW-OFF	
	REDUCER	
	AIR VALVE	
M	WATER METER	
	CURB STOP VALVE	
	WATER MANHOLE	
	SERVICE POINT (ALL SERVICES)	
	SERVICE POINT (SANITARY & STORM)	
	SERVICE POINT (WATER ONLY)	
	UTILITY POLE	
	UTILITY POLE WITH TRANSFORMER	
	UTILITY POLE WITH LIGHT	
	STREET LIGHT (DAVIT POLE)	
	JUNCTION BOX	
	TRANSFORMER (LPT)	
L	STREET LIGHT DUCT	L
E	HYDRO DUCT	E
C	CABLE DUCT	C
T	TELUS DUCT	T
G	GAS DUCT	G
E	OVERHEAD HYDRO	E
	SURVEY CONTROL POINT	
	PLAN / PROFILE SHEET REFERENCE	103



LOCATION PLAN
NTS

PRELIMINARY
NOT FOR
CONSTRUCTION

BC 1 CALL 1-800-474-6886

City Project Number

City Drawing Number
-

Rev	Date	Description	Drawn	Design	App'd
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PC	2021/07/09	ISSUED FOR DEVELOPMENT PERMIT	AP	RS/AP	NP
PB	2021/06/15	ISSUED FOR 95% REVIEW	AP	RS/AP	NP
PA	2021/04/30	ISSUED FOR 75% REVIEW	RS	RS	NP

NOT TO SCALE (NTS)

ORIGINAL DWG SIZE: A1 (594 x 841mm)

McElhanney
1211 Ryan Road
Courtenay BC
Canada V9N 3R6
Tel 250 338 5495

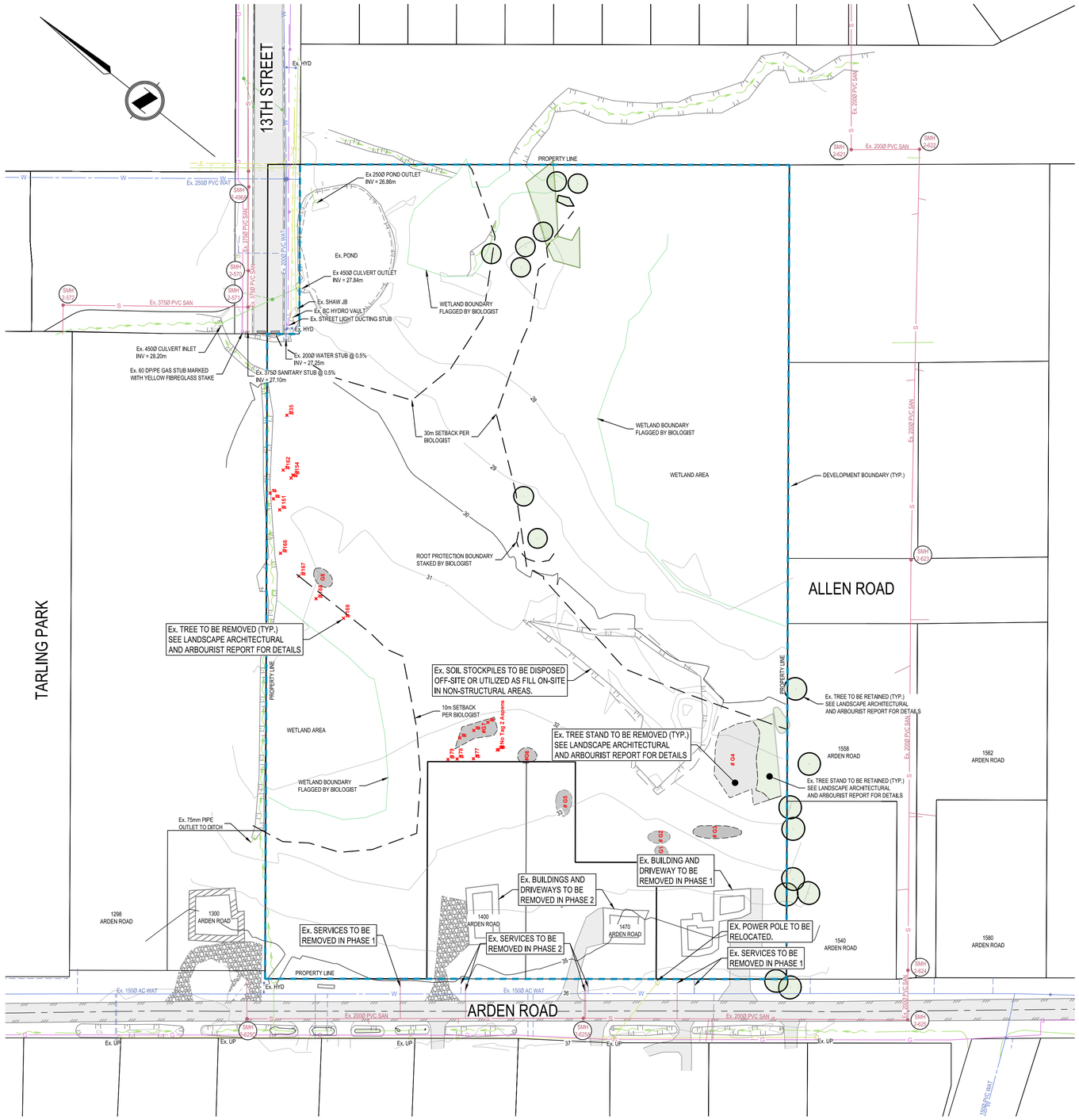
PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — A.L. PARKER — 43225
2021-07-14
Approved Sealed

SIMBA INVESTMENTS LTD.
COURTENAY, B.C.

ARDEN GARDENS - PHASE ONE
GENERAL NOTES
AND LEGEND
LOT 1, PLAN 2963, LOT 2, PLAN 2963, LOT A, PLAN 20420, DISTRICT LOT 96, COMOX DISTRICT
COURTENAY, B.C.

Drawing No.
C0-001

Project Number	Rev.
2211-47572-00	PC



NOTES:

1. CONTOURS ARE EXISTING CONTOURS SHOWN AT 1.0m INTERVALS.
2. REFER TO TREE REMOVAL PERMIT 4530-20-2006 ISSUED SEPTEMBER 15, 2020.

PRELIMINARY
NOT FOR
CONSTRUCTION

Rev	Date	Description	Drawn	Design	App'd
PC	2021/07/09	ISSUED FOR DEVELOPMENT PERMIT	AP	RS/AP	NP
PB	2021/06/15	ISSUED FOR 95% REVIEW	AP	RS/AP	NP
PA	2021/04/30	ISSUED FOR 75% REVIEW	RS	RS	NP
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ORIGINAL DWG SIZE: A1 (594 x 841mm)

McElhanney
1211 Ryan Road
Courtenay BC
Canada V9N 3R6
T 250 338 5495

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
M.L. PARKER
48529
2021-07-14
Approved Sealed

SIMBA INVESTMENTS LTD.
COURTENAY, B.C.

ARDEN GARDENS - PHASE ONE EXISTING SITE PLAN AND REMOVALS

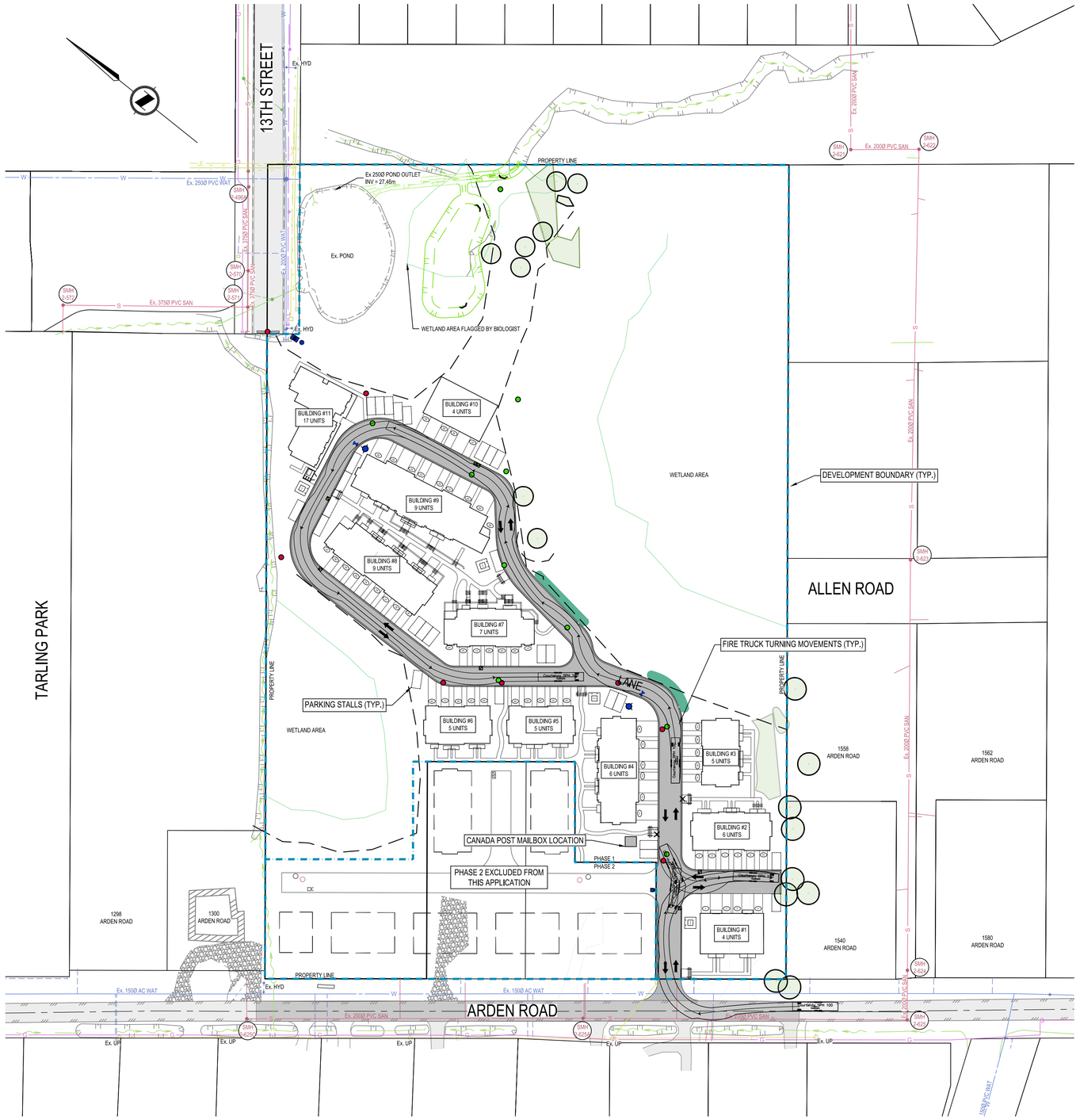
LOT 1, PLAN 2963, LOT 2, PLAN 2963, LOT A, PLAN 20420, DISTRICT LOT 96, COMOX DISTRICT
COURTENAY, B.C.

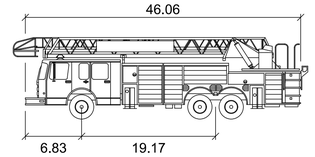
City Project Number: ----
City Drawing Number: -
Drawing No.: C0-100
Project Number: 2211-47572-00
Rev.: PC

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

DATE: 2021-07-14 12:36 FILE: G:\221 Engineering\47500 - 47599\47572 Simba Arden MP\100 Drawings\10.1 Engineering\10.2.1 Sheets\47572-00_100 - EXISTING SITE PLAN.dwg

McElhanney ISO A1 - 2017-05-29





Courtenay SPH 100

	feet
Width	: 8.50
Track	: 9.48
Lock to Lock Time	: 6.0
Steering Angle	: 36.7

PRELIMINARY
NOT FOR
CONSTRUCTION

Rev	Date	Description	Drawn	Design	App'd
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PA	2021/04/30	ISSUED FOR 75% REVIEW	RS	RS	NP

0 1:750 30

ORIGINAL DWG SIZE: A1 (594 x 841mm)

McElhanney
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PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
ALL PARKER
36929
2021-07-14
Approved Sealed

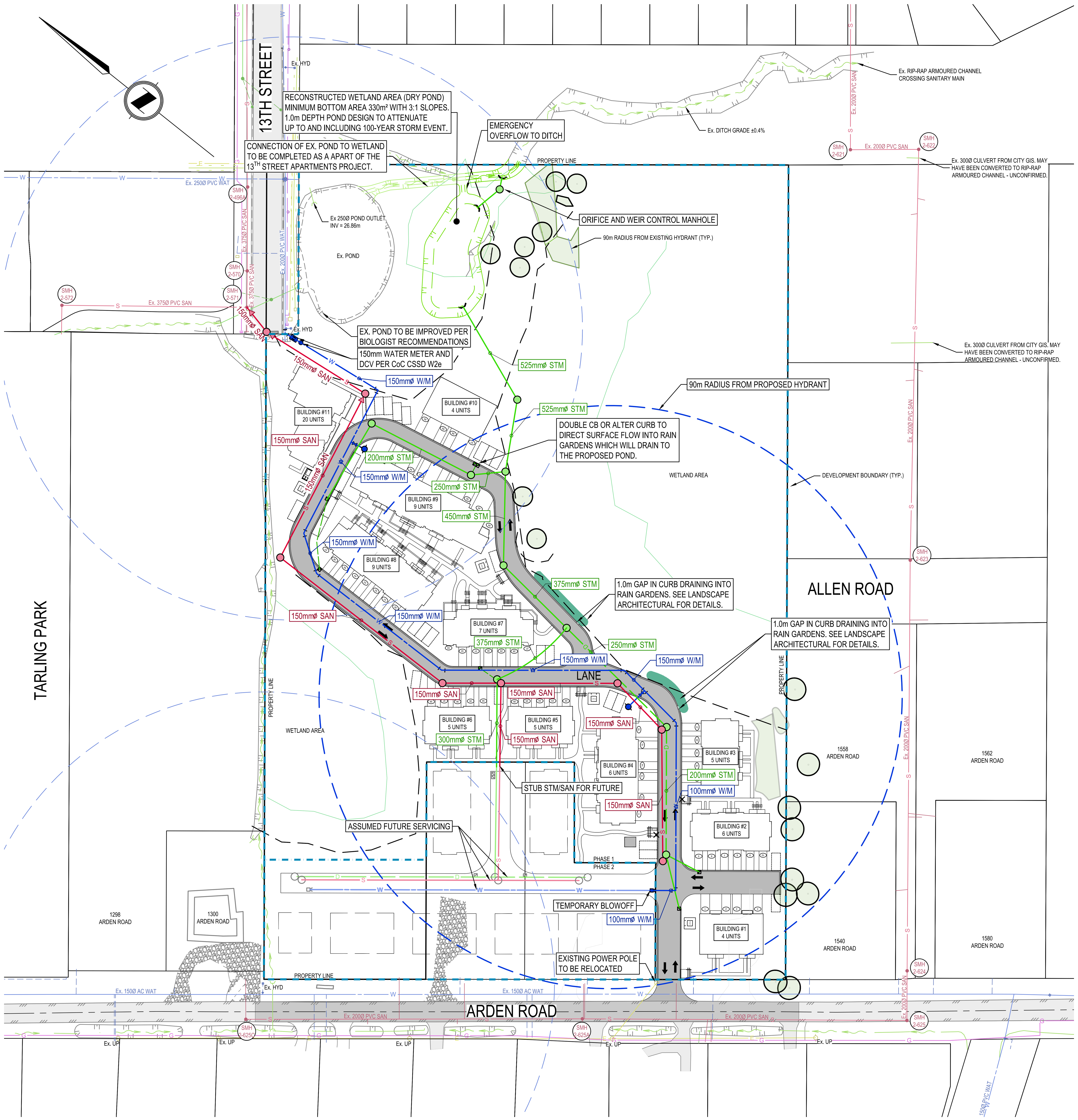
SIMBA INVESTMENTS LTD.
COURTENAY, B.C.

ARDEN GARDENS - PHASE ONE
OVERALL SITE PLAN
AND TRUCK MOVEMENTS
LOT 1, PLAN 2963, LOT 2, PLAN 2963, LOT A, PLAN 20420, DISTRICT LOT 96, COMOX DISTRICT
COURTENAY, B.C.

City Project Number	----
City Drawing Number	-
Drawing No.	C0-101
Project Number	2211-47572-00
Rev.	PC

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

DATE: 2021-07-14, 12:26 FILE: G:\2211 Engineering\47500 - 47599\47572 Simba Arden MP100.0 Drawings\10.1 Engineering\10.2.1 Sheets\47572-00_101 OVERALL SITE PLAN.dwg



MINIMUM WATER MAIN RESTRAINED LENGTH TABLE

PIPE SIZE	90° BEND	45° BEND	22.5° BEND	11.25° BEND	TEE	VALVE / DEAD END
100Ø	3.4	1.5	0.6	0.3	BRANCH ONLY	9.5
150Ø	4.6	2.2	1.0	0.6	BRANCH ONLY	15.0

* PER UNI-FLANGE RECOMMENDED RESTRAINED LENGTHS OF PVC PIPE TABLE

NOTES:

1. CONTOURS ARE EXISTING CONTOURS SHOWN AT 1.0m INTERVALS.
2. REFER TO TREE REMOVAL PERMIT 4530-20-2006 ISSUED SEPTEMBER 15, 2020.

PRELIMINARY NOT FOR CONSTRUCTION

Rev	Date	Description	Drawn	Design	App'd
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0 1:750 30

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PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA
2021-07-14
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SIMBA INVESTMENTS LTD.
COURTENAY, B.C.

ARDEN GARDENS - PHASE ONE
PRELIMINARY SERVICING PLAN

LOT 1, PLAN 2963, LOT 2, PLAN 2963, LOT A, PLAN 20420, DISTRICT LOT 96, COMOX DISTRICT
COURTENAY, B.C.

City Project Number: ----
City Drawing Number: -
Drawing No.: C0-102
Project Number: 2211-47572-00
Rev.: PC

DATE: 2021-07-14, 12:36 FILE: G:\2211 Engineering\47500 - 47599\47572 Simba Arden MF\10.0 Drawings\10.1 Engineering\10.2.1 Sheets\47572-00_102 - SITE SERVICING PLAN.dwg

McElhanney ISO A1 - 2017-05-29

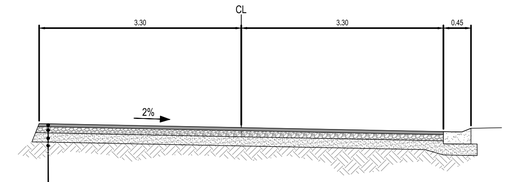
DESTROY ALL PRINTS BEARING PREVIOUS REVISION

LEGEND

- EXISTING GROUND CONTOUR — 60
- EXISTING GROUND SPOT ELEVATION + 31.54
- PROPOSED SPOT ELEVATION + 32.83
- 100 YEAR OVERLAND FLOOD ROUTE
- 100 YEAR IN-PIPE FLOW ROUTE

NOTES:

1. FOR GENERAL NOTES, LEGEND, AND KEY PLANS SEE DWG C0-001 - GENERAL NOTES.
2. FOR EXITSING BASE PLAN SEE DWG C0-100 - EXISTING SITE PLAN.
3. THIS DRAWING WAS PREPARED IN ACCORDANCE WITH A TOPOGRAPHIC SURVEY CONDUCTED BY _____ DATED XXXX, XX, XXXX.
4. CONTOURS SHOWN AT 1.0m INTERVALS.
5. 300mm DEPTH GROWING MEDIUM IN ALL LANDSCAPE AREAS.



A - ROAD CROSS SECTION (TYP.)
SCALE H 1:50

PRELIMINARY
NOT FOR
CONSTRUCTION

Rev	Date	Description	Drawn	Design	App'd
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PC	2021/07/09	ISSUED FOR DEVELOPMENT PERMIT	AP	RS/AP	NP
PB	2021/06/15	ISSUED FO 75% DESIGN REVIEW	AP	AP/RS	NP
PA	2021/04/30	ISSUED FOR COORDINATION	RS	RS	RS

0 1:750 30

ORIGINAL DWG SIZE: A1 (594 x 841mm)

McElhanney
1211 Ryan Road
Courtenay BC
Canada V9N 3R6
T 250 338 5495

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — M.L. PERRIER — # 46929
2021-07-14
Approved Sealed

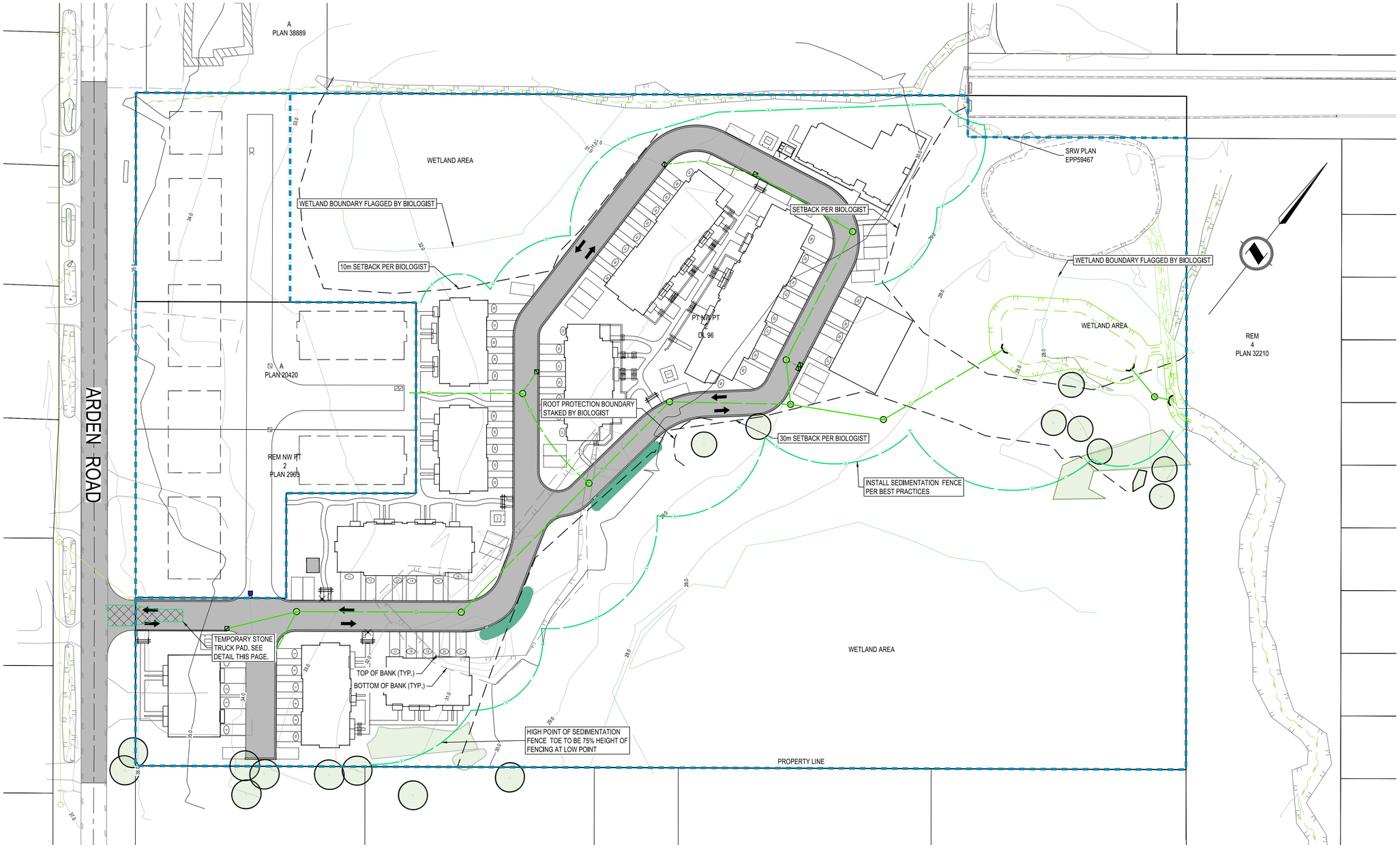
SIMBA INVESTMENTS LTD.
COURTENAY, B.C.

ARDEN GARDENS - PHASE ONE PRELIMINARY GRADING PLAN

LOT 1, PLAN 2963, LOT 2, PLAN 2963, LOT A, PLAN 20420, DISTRICT LOT 96, COMOX DISTRICT
COURTENAY, B.C.

City Project Number: ----
City Drawing Number: -
Drawing No.: C0-103
Project Number: 2211-47572-00
Rev.: PC

DESTROY ALL PRINTS BEARING PREVIOUS REVISION



GENERAL SILTATION CONTROL NOTES:

1.1 THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE SITE EROSION AND SEDIMENT CONTROL (ESC) AS NECESSARY TO PREVENT THE RELEASE OF SEDIMENT OR SEDIMENT LADEN WATERS FROM ENTERING THE CITY DRAINAGE SYSTEMS DURING CLEARING AND GRUBBING, AND CIVIL CONSTRUCTION STAGES OF THE SUBDIVISION. EROSION AND SEDIMENT CONTROL DURING THE SUBSEQUENT PROJECT'S MAINTENANCE PERIOD STAGE SHALL BE THE RESPONSIBILITY OF THE DEVELOPER.

1.2 THE CONTRACTOR SHALL DESIGNATE AN ESC MONITOR TO BE RESPONSIBLE FOR THE INSPECTION AND DIRECTION OF REQUIRED MAINTENANCE OF THE IMPLEMENTED ESC MEASURES.

1.3 THE ESC MONITOR SHALL BE RESPONSIBLE TO VISUALLY MONITOR ANY RECEIVING WATERS, INCLUDING WATERCOURSES, DITCHES, SWALES OR BODIES OF WATER UP TO 50 METRES OUTSIDE OF THE CONSTRUCTION AREA;

1.4 THE ESC MONITOR SHALL INSPECT AND MONITOR THE SITE AT LEAST ONCE EVERY 7 DAYS (OR AS CONSTRUCTION ACTIVITIES / WEATHER DICTATES), AND WITHIN 24 HOURS FOLLOWING A SIGNIFICANT RAINFALL EVENT.

1.5 THE ESC MONITOR SHALL COORDINATE HIS OR HER SITE VISITS WITH THE CONTRACTOR, AND THE ENGINEER OF RECORD'S FIELD INSPECTOR, WHERE POSSIBLE, AND SHALL PROVIDE INSTRUCTIONS TO RECTIFY CURRENT OR ANTICIPATED DEFICIENCIES THAT MAY RESULT IN NON-CONFORMANCE WITH THE ESC PLAN.

1.6 THE EROSION AND SEDIMENT CONTROL (ESC) PLANS ARE DEEMED TO BE A MINIMUM LEVEL OF ESC FOR THIS PROJECT.

1.7 THE GENERAL CONTRACTOR IS TO ENSURE THAT APPROPRIATE ESC MEASURES ARE IN PLACE AND OPERATIONAL ALSO ON WEEKENDS, HOLIDAYS, AFTER CONSTRUCTION ACTIVITIES AND UNTIL THE DATE OF PROJECT COMPLETION.

1.8 ALL SURFACE RUN-OFF DURING CONSTRUCTION IS TO BE DIRECTED TO INTERCEPTOR DITCH/SWALES SHOWN ON THE ESC PLAN (OR IN ADDITION TO IT).

1.9 ALL WORK SHALL BE UNDERTAKEN IN ACCORDANCE WITH ENVIRONMENTAL DEVELOPMENT PERMIT AND PHASE 5 EDP (PENDING).

CIVIL CONSTRUCTION:

2.1 THE GENERAL CONTRACTOR WILL BE RESPONSIBLE TO PROVIDE A COPY OF THE ESC PLAN TO THE CIVIL CONTRACTOR.

2.2 CIVIL CONTRACTOR TO ENSURE THAT A WATERPROOF COPY OF THE ESC PLAN IS POSTED ON SITE, IN A LOCATION VISIBLE FROM OUTSIDE THE CONSTRUCTION ZONE.

2.3 ALL ACCESS TO AND FROM SITE TO BE RESTRICTED TO SPECIFIED ENTRY-EXIT POINTS.

2.4 ALL ONSITE STOCK PILES TO BE FULLY COVERED WITH 5 MIL POLYETHYLENE ADEQUATELY WEIGHTED DOWN WITH SILT FENCE SURROUND AT TOE OF SLOPE (UNLESS OTHERWISE APPROVED BY THE ESC MONITOR).

2.5 CATCH/LAWN BASINS COMPLETE WITH PROTECTIVE MEASURES ARE TO BE INSTALLED BY THE CONTRACTOR AT THE FIRST OPPORTUNITY. TEMP SILT PONDS TO BE COMPLETED IMMEDIATELY FOLLOWING CATCH/LAWN BASIN INSTALLATION, AND SILT PONDS TIED IN ACCORDING TO THE ESC PLAN.

2.6 CONTRACTOR TO COORDINATE THE ELIMINATION OF TEMPORARY ESC OPERATIONS WITH THE ESC MONITOR. ADDITIONAL PROTECTIVE MEASURES MAY NEED TO BE INSTALLED AT THE DIRECTION OF THE ESC MONITOR.

2.7 AT FINAL SITE INSPECTION, PRIOR TO THE START OF THE MAINTENANCE PERIOD, CITY STAFF SHALL INSPECT & APPROVE ESC MEASURES.

2.8 THE DEVELOPER IS RESPONSIBLE FOR THE MAINTENANCE OF ESC MEASURES UNTIL 1 YEAR MAINTENANCE PERIOD HAS EXPIRED FOR THE PROJECT.

MAINTENANCE FOR ALL STAGES OF CONSTRUCTION (AS APPLICABLE):

3.1 ALL CATCH BASIN FILTERS ARE TO BE INSPECTED WEEKLY AND FOLLOWING STORM EVENTS.

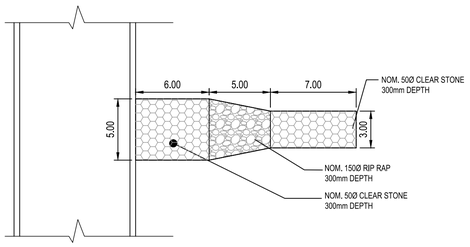
3.2 ACCUMULATED SEDIMENT DEPOSITS AT POND INLETS AND BEHIND CHECK DAMS ARE TO BE REMOVED AT 50% CAPACITY.

3.3 SWEEPING OF EXISTING OFFSITE ACCESS ROADS IS REQUIRED WHEN HAULING MATERIALS FROM THE SITE, AT THE FREQUENCY DETERMINED BY THE ESC MONITOR WHICH SHALL BE DEPENDENT ON WEATHER CONDITIONS.

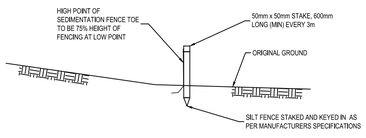
3.4 CONTRACTOR MUST SWEEP AND CLEAN PAVED ON-SITE ROAD SURFACES OF ACCUMULATED SEDIMENTS AT THE END OF EACH WORK DAY. NO SOIL, SAND OR OTHER MATERIAL WITH A HIGH SEDIMENT CONTENT SHALL BE DEPOSITED OR PILED OUTSIDE THE PROPERTY BOUNDARIES, PARTICULARLY ON PAVED ROAD SURFACES. FLUSHING OF ROADWAYS PROHIBITED.

3.5 SILT FENCES AND BARRIERS TO BE INSPECTED AND REPAIRED PRIOR TO EXPECTED RAIN EVENTS AND FOLLOWING ALL SIGNIFICANT RAINFALL EVENTS OR PERIODS OF EXTENDED RAIN.

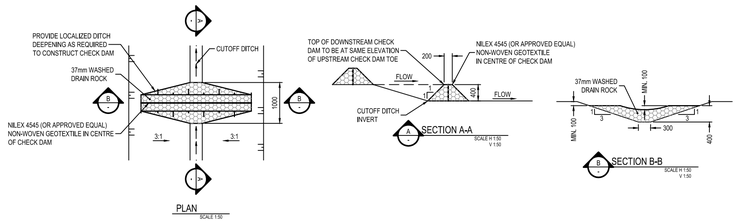
3.6 ALL SEDIMENT REMOVED FROM ESC CONTROL FACILITIES TO BE DISPOSED OF IN A MANNER AS TO NOT COMPOUND OR COMPROMISE THE SEDIMENT LOADING OF OTHER CONTROL MEASURES.



TEMPORARY STONE PAD ENTRANCE
SCALE N.T.S.



TYPICAL SEDIMENTATION FENCE DETAIL
SCALE N.T.S.



CHECK DAM DETAIL (TYP.)
SCALE N.T.S.

PRELIMINARY
NOT FOR
CONSTRUCTION

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PC	2021/07/09	ISSUED FOR DEVELOPMENT PERMIT	AP	RS/AP	NP
PB	2021/06/15	ISSUED FOR 95% REVIEW	AP	RS/AP	NP
PA	2021/04/30	ISSUED FOR 75% REVIEW	RS	RS	NP
Rev	Date	Description	Drawn	Design	App'd

0 1:500 25

ORIGINAL DWG SIZE: A1 (594 x 841mm)

McElhanney

1211 Ryan Road
Courtenay BC
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PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
M.L. PARKER
48529
2021-07-14
Approved Sealed

SIMBA INVESTMENTS LTD.
COURTENAY, B.C.

ARDEN GARDENS - PHASE ONE SUGGESTED EROSION AND SEDIMENT CONTROL PLAN

LOT 1, PLAN 2963, LOT 2, PLAN 2963, LOT A, PLAN 20420, DISTRICT LOT 96, COMOX DISTRICT
COURTENAY, B.C.

City Project Number

City Drawing Number
-

Drawing No.
C0-500

Project Number
2211-47572-00

Rev.
PC

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

2.1. Sanitary Sewer Load

The sewer loads used for this analysis were calculated by McElhanney Ltd. (July 5, 2019) in the development site servicing report as summarized in **Table 2.1**.

Table 2.1: Development Sanitary Sewer Load

Total Peak Wet Weather Flow	3.48 L/s

The model assumed a growth of 300 capita on junction 2-571 for the 2039 future scenario. The population of the development is 166 capita (provided by McElhanney). The model growth on junction 2-571 was thus reduced to 134 capita in order to keep a 300 capita population growth in the model for the 2039 future scenario.

2.2. Sanitary Sewer Capacity Analysis

This section summarizes the City sanitary sewer collection system capacity analysis under the existing and future conditions. The extent of the analysis was limited to the downstream pipes from the development to the City outfall, as shown in red on **Figure 2.2.**

Figure 2.2: Pipe Capacity Analysis Extent – Existing Scenario

Simulation results from the model were compared between existing and future scenarios with and without the development. Only the pipes downstream of the proposed development's discharge location were included in the comparison below, as these are the only pipes affected by the proposed development's discharge.

2.2.1. Gravity Main Likelihood of Failure Analysis

The criteria outlined in **Table 2.2** and **Table 2.3** were used to assess the capacity of gravity mains downstream of the development and to assign a likelihood of failure (LoF) rating. The LoF methodology below is based on q/Q results (max flow/full pipe flow) rather than d/D results (depth/Diameter). The q/Q methodology provides a better picture of the hydraulic condition of each gravity main and how the LoF is impacted by downstream conditions.

Table 2.2: Likelihood of Failure Criteria Scoring (Gravity Main)

Criteria	Score
Hydraulic Capacity (q/Q*)	
q/Q < 0.7	A
0.7 ≤ q/Q < 1.0	B
q/Q ≥ 1.0	C
Hydraulic Grade Line (HGL)	
HGL < Crown	A
Crown ≤ HGL < Rim Elevation	B
HGL > Ground Elevation	C
Velocity (v)	
v < 0.6 m/s	Fail
v >= 0.6 m/s	Pass

***q/Q = peak flow / full pipe flow.**

Table 2.3: Likelihood of Failure Ratings (Gravity Main)

LoF Rating	Capacity	HGL	Velocity	Description
1	A	A	Pass	Gravity main performing as designed
2	A	A	Fail	Adequate capacity, low velocity indicates potential sedimentation
3	A	B or C	Pass or Fail*	Adequate capacity, backwater caused by downstream conditions
	B	A, B or C	Pass or Fail*	Marginal capacity
	C	A	Pass or Fail*	
4	C	B	Pass or Fail*	Capacity exceeded and surcharging likely
5	C	C	Pass or Fail*	Capacity exceeded and flooding likely

***LoF ratings from 3-5 are independent of velocity criteria.**

In general, ratings of '1', '2', and '3' will not trigger an upgrade as there is capacity available in the gravity main to convey flows.

Only gravity mains receiving an LoF rating of '4' and '5' were considered deficient and were investigated for upgrade recommendations. A gravity main receiving a '4' rating requires an

upgrade as the hydraulic capacity has been exceeded and is likely causing surcharging to occur. A gravity main receiving a '5' rating indicates that surcharging to the manhole rim is likely, increasing the priority of the upgrade.

Table 2.4 summarizes the existing and future gravity main LoF results under each scenario.

Table 2.4: Gravity Main LoF Results
(Number of Gravity Mains Downstream Proposed Development)

LoF Rating	2019 Peak Wet Weather Flow Without Development	2019 Peak Wet Weather Flow With Development	2039 Peak Wet Weather Flow With Development*
1	23	26	40
2	10	7	0
3	28	27	26
4	**5**	**5**	**0**
5	**1**	**2 (+1)**	**0**

The future scenario is analyzed with the Arden Central Trunk Main 20-year Horizon Improvement Plan as per GeoAdvice Report *City of Courtenay Sanitary Sewer Collection System Model Development, Calibration, and Capacity Analysis.

The table above shows that the development creates one (1) additional hydraulic deficiency under the existing 2019 scenario, and that there are no deficiencies under the future 2039 scenario.

Three (3) gravity mains upgrades are required to address the existing deficiencies under the existing scenario and are summarized in **Table 2.5**.

Table 2.5: Gravity Mains Required Upgrades

Pipe ID	Existing Diameter	Proposed Diameter	Length	Location
SMAIN-2-0123	200 mm	300 mm	78.2 m	Willemar Avenue
SMAIN-2-0122	200 mm	300 mm	72.2 m	Willemar Avenue
SMAIN-2-0121	200 mm	300 mm	39.5 m	Willemar Avenue

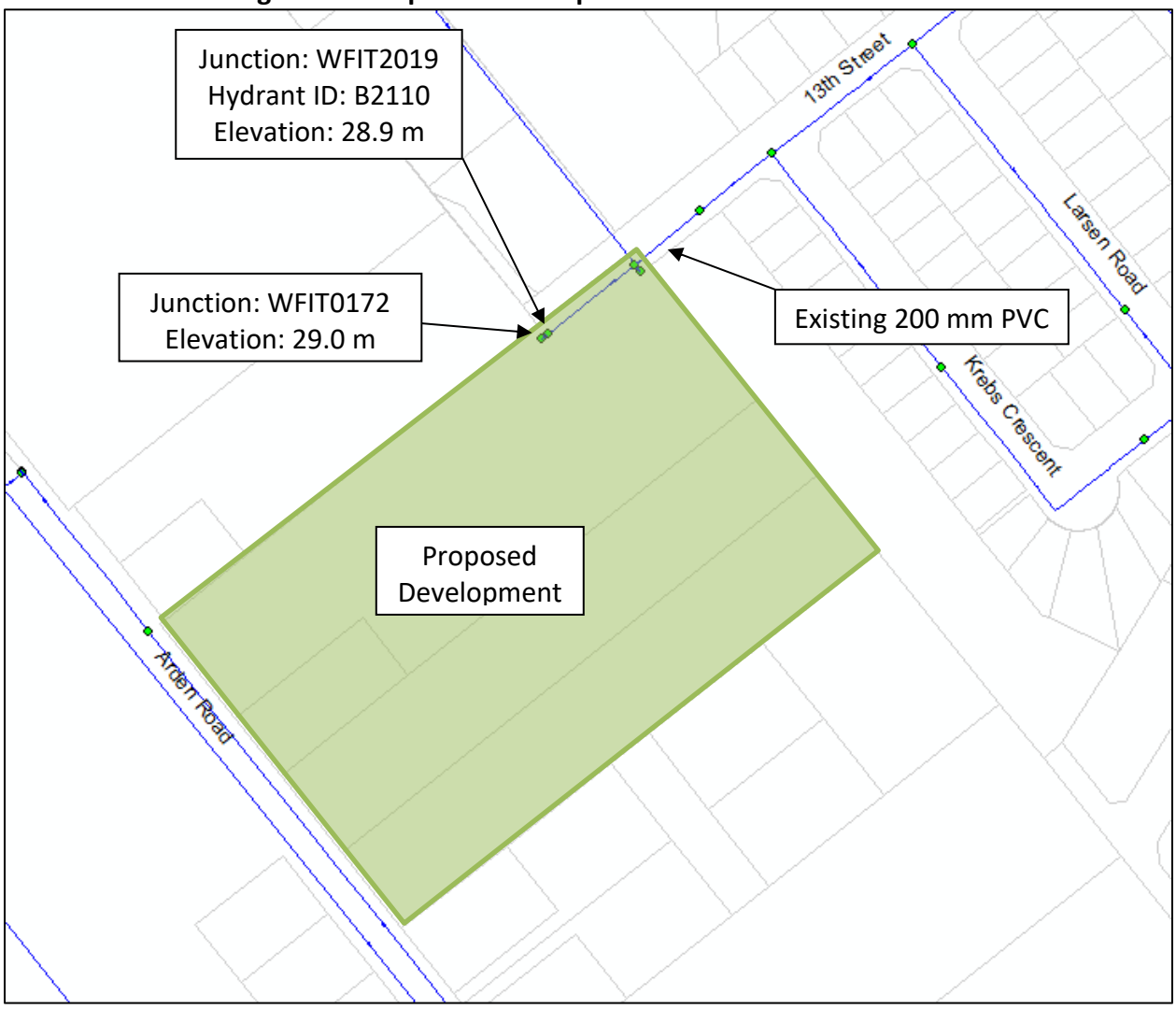
The deficiencies in the existing 2019 scenario will also be addressed through the Arden Central Trunk Main (length = 225 m) 20-Year Horizon Improvement Plan as discussed in the GeoAdvice Report "*City of Courtenay Sanitary Sewer Collection System Model Development, Calibration, and Capacity Analysis*" (January 2020). Consequently, the proposed upgrades in **Table 2.5** are required until the Arden Central Trunk Main is built.

Refer to **Appendix A** for d/D and surcharge depth results of the downstream pipes from the proposed development to the City outfall.

3. Water Distribution System Analysis

The proposed development will be serviced from the 200 mm PVC water main on 13th Street, located in pressure zone 87 of the City water distribution network, as shown in **Figure 3.1**.

Figure 3.1 Proposed Development Site – Water Network



3.1. Water Demands

3.1.1. Consumer Demand

Unit water demand rates used for this analysis were taken from the City's *Subdivision and Development Servicing Bylaw 2919 (March 5, 2018)* and are summarized in **Table 3.1** below.

Table 3.1: Unit Residential Demand Rates

Scenario	Demand Rate
Average Day Demand (ADD)	635 L/cap/day
Max Day Demand (MDD)	2,100 L/cap/day
Peak Hour Demand (PHD)	3,000 L/cap/day

The estimated development equivalent population is summarized in **Table 3.2**.

Table 3.2: Development Residential Population

Land Use	Population*
Residential	166 capita

***Values provided by McElhanney**

Table 3.3 summarizes the total development demand for each scenario.

Table 3.3: Development Water Demands

Scenario	Demand
Max Day Demand (MDD)	4.03 L/s
Peak Hour Demand (PHD)	5.76 L/s

The development demand was allocated to model junction ID WFIT0172.

3.1.2. Fire Flow Demand

The required fire flow of the proposed development was assumed to be 90 L/s by McElhanney based on MMCD Design Guidelines 2014. The existing fire flow requirement at the proposed development location is 114 L/s. Using the more conservative flow, the required fire flow of the development is thus 114 L/s. The required fire flow was allocated to model junction ID WFIT2019.

3.2. Hydraulic Capacity Performance and Design Criteria

Based on the MMCD Design Guide Manual, the criteria outlined in **Table 3.4** were used to assess the hydraulic impact of the proposed development on the City water distribution system.

Table 3.4: Hydraulic Performance and Design Criteria

Criteria	Analysis Scenario	Parameter Value
Minimum Static Pressure	PHD	44 psi
Minimum Residual Pressure	MDD+FF	22 psi

3.3. Hydraulic Capacity Analysis

Hydraulic and fire flow simulations were run with and without the proposed development, for the existing and future scenarios.

3.3.1. Development Pressure Analysis

The table below summarizes the pressure results at the development under existing and future conditions.

Table 3.5: Development Pressure Modeling Results (WFIT0172)

Scenario	Without Development		With Development	
	MDD	PHD	MDD	PHD
Existing	71.6 psi	68.1 psi	71.3 psi	67.6 psi
Future	74.6 psi	72.2 psi	74.4 psi	71.8 psi

The results of the pressure analysis show that the proposed development pressures are not deficient under the existing and future scenarios.

3.3.2. Development Fire Flow Analysis

Fire flow modeling results are summarized in **Table 3.6**.

Table 3.6: Development Fire Flow Modeling Results (WFIT2019)

Scenario	Required Fire Flow Development	Available Flow @ 22 psi
Existing	114 L/s	270 L/s
Future	114 L/s	291 L/s

As shown in the **Table 3.6**, the available fire flow at 22 psi is higher than the required development fire flow under the existing and future scenarios.

3.3.3. Pressure Zone Impact Analysis

In order to assess the impact of the proposed development on the rest of the City water distribution system, simulation results from the model in pressure zone 87 were compared between the existing scenario with and without the proposed development.

Table 3.7 summarizes the impact analysis in pressure zone 87 under existing conditions.

Table 3.7: Pressure Zone Impact Analysis Summary – Pressure Zone 87

Criteria	Scenario	Existing	
		Without Development	With Development
# of Low-Pressure Deficiencies	PHD	N/A	+ 0
PHD Average Pressure	PHD	76 psi	76 psi
# of Fire Flow Deficiencies	MDD+FF	N/A	+ 0
Average Available Fire Flow	MDD+FF	233 L/s	233 L/s

Under the existing PHD and MDD+FF scenarios, the development does not cause any new pressure and fire flow deficiencies, nor does it impact the average zone pressure or available fire flow.

Overall, the development will not have a “negative” hydraulic impact on the City water distribution system.

4. Conclusions and Recommendations

4.1. Sanitary Sewer Collection Analysis

Hydraulic simulations were run for existing and future scenarios with and without the proposed 1360-1480 Arden Road development. The results presented in this technical memorandum show that the development creates one (1) additional hydraulic deficiency in the existing scenario. There are no deficient gravity mains downstream of the proposed development under the future 2039 scenario.

In order to address the gravity main deficiencies under the existing scenario (considering existing infrastructure only), three (3) gravity main upgrades (length = 190 m) are required on Willemar Avenue. Alternatively, the deficiencies in the existing 2019 scenario could also be addressed by accelerating the Arden Central Trunk Main 20-Year Horizon Improvement Plan as discussed in the GeoAdvice Report "City of Courtenay Sanitary Sewer Collection System Model Development, Calibration, and Capacity Analysis" (January 2020) (length = 225 m).

For the purposes of this analysis, it was assumed that there is no limit to the available capacity of the WWTP. No analysis was completed to determine the impact of the development on the WWTP.

4.2. Water Distribution System Analysis

Hydraulic simulations were run with and without the proposed 1360-1480 Arden Road development. The results presented in this technical memorandum show that the proposed development creates no hydraulic or fire flow deficiencies under the existing and future scenarios. Furthermore, the available fire flow at 22 psi is higher than the required development fire flow under the existing and future scenarios.

A hydrant test should be conducted at the development connection location to verify the modeling results presented in this memorandum.

The required fire flow should be validated using the FUS document Water Supply for Public Fire Protection (1999) when architectural plans for the development are finalized.

The results presented in this memo are based on the analysis of steady state simulations. The predicted available fire flows, as calculated by the hydraulic model, represent the flow available in the water main while maintaining a residual pressure of 22 psi at the hydrant. No extended period simulations were completed in this analysis to assess the water quality or to assess the hydraulic impact on storage and pumping.

Finally, the modeling results presented in this memo are subject to the ability of the Comox Valley Regional District supply system to provide the requested capacities. For the purposes of

this analysis, it was assumed that there is no limit to the flow available from the supply system. No analysis was completed to determine the impact of the development on the supply system.

Submission

Prepared by:

F de Schoutheete

Ferdinand de Schoutheete
Hydraulic Modeler

Reviewed and Approved by:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. de SCHAETZEN
#30058

May 12, 2020

Werner de Schaetzen

Werner de Schaetzen, Ph.D., P.Eng.
Senior Modeling Review

Confidentiality and Copyright

Statement of Qualifications and Limitations

This document represents GeoAdvice Engineering Inc. best professional judgment based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by a member of the engineering profession currently practicing under similar conditions. No warranty, express or implied is made.

Appendix A Sewer Hydraulic Modeling Results

Pipe Capacity Modeling Results – Existing 2019 Scenario

ID	From ID	To ID	Road/Area	d/D		Outlet Surcharge (m)	
				Existing No Dev	Existing with Dev	Existing No Dev	Existing with Dev
SMAIN-2-0379	2-571	2-570	13th Street	0.04	0.12	0.00	0.00
SMAIN-2-0378	2-570	2-496A	13th Street	0.07	0.15	0.00	0.00
SMAIN-2-0377	2-496A	2-496	13th Street	0.08	0.18	0.00	0.00
SMAIN-2-0129	2-496	2-495	13th Street	0.13	0.25	0.00	0.00
SMAIN-2-0128	2-495	2-494	13th Street	0.15	0.26	0.00	0.00
SMAIN-2-0030	2-494	2-493	13th Street	0.18	0.27	0.00	0.00
SMAIN-2-0387	2-494	SFIT0108	Larsen Road	0.09	0.16	0.00	0.00
SMAIN-2-0029	2-493	2-492	13th Street	0.33	0.40	0.00	0.00
SMAIN-2-0171	SFIT0108	2-604	Larsen Road	0.06	0.11	0.00	0.00
SMAIN-2-0127	2-492	2-491	13th Street	0.58	0.66	0.00	0.00
SMAIN-2-0170	2-604	2-603	Larsen Road	0.11	0.17	0.00	0.00
SMAIN-2-0126	2-491	2-851	13th Street	0.73	0.82	0.00	0.00
SMAIN-2-0169	2-603	2-601	Larsen Road	0.11	0.17	0.00	0.00
SMAIN-2-0352	2-851	2-490	13th Street	0.61	0.68	0.00	0.00
SMAIN-2-0168	2-601	2-600	15th Street	0.23	0.27	0.00	0.00
SMAIN-2-0028	2-490	2-029	13th Street	0.47	0.52	0.00	0.00
SMAIN-2-0166	2-600	2-463	Burgess Road	0.32	0.38	0.00	0.00
SMAIN-2-0023	2-029	2-028	Willemar Avenue	0.42	0.72	0.00	0.56
SMAIN-2-0164	2-463	2-462	15th Street	0.43	0.50	0.00	0.00
SMAIN-2-0125	**2-028**	**2-027**	**Willemar Avenue**	**0.83**	**1.00**	**0.27**	**2.15**
SMAIN-2-0163	2-462	2-461	15th Street	0.45	0.51	0.00	0.00
SMAIN-2-0124	**2-027**	**2-026**	**Willemar Avenue**	**1.00**	**1.00**	**2.40**	**2.40**
SMAIN-2-0162	2-461	2-460	15th Street	0.36	0.41	0.00	0.00

ID	From ID	To ID	Road/Area	d/D		Outlet Surcharge (m)	
				Existing No Dev	Existing with Dev	Existing No Dev	Existing with Dev
SMAIN-2-0123	**2-026**	**2-025**	**Willemar Avenue**	**1.00**	**1.00**	**0.02**	**2.63**
SMAIN-2-0161	2-460	2-026	15th Street	0.66	0.68	2.40	2.40
SMAIN-2-0122	2-025	2-024	Willemar Avenue	0.80	0.90	0.00	0.00
SMAIN-2-0121	2-024	2-023	Willemar Avenue	0.83	0.98	0.00	0.00
SMAIN-2-0120	2-023	2-022	Willemar Avenue	0.65	0.72	0.00	0.00
SMAIN-2-0118	2-022	2-846	Willemar Avenue	0.61	0.67	0.00	0.00
SMAIN-2-0117	2-846	2-021	Willemar Avenue	0.68	0.75	0.00	0.00
SMAIN-2-0116	2-021	2-845	Willemar Avenue	0.69	0.80	0.00	0.00
SMAIN-2-0115	2-845	2-020	Willemar Avenue	0.79	0.91	0.00	0.00
SMAIN-2-0114	2-020	2-019	Willemar Avenue	0.76	0.83	0.00	0.00
SMAIN-2-0083	2-019	2-018A	Willemar Avenue	0.47	0.50	0.00	0.00
SMAIN-2-0082	2-018A	2-017A	Willemar Avenue	0.30	0.32	0.00	0.00
SMAIN-2-0081	2-017A	2-016D	Willemar Avenue	0.29	0.30	0.00	0.00
SMAIN-2-0080	2-016D	2-016C	21st Street	0.28	0.29	0.00	0.00
SMAIN-2-0079	2-016C	2-015A	21st Street	0.30	0.31	0.00	0.00
SMAIN-2-0078	2-015A	2-014A	21st Street	0.31	0.32	0.00	0.00
SMAIN-2-0077	2-014A	2-013A	21st Street	0.34	0.33	0.00	0.00
SMAIN-2-0076	2-013A	2-012A	21st Street	0.46	0.42	0.00	0.00
SMAIN-2-0075	2-012A	2-011A	Dogwood Park SROW	0.49	0.45	0.00	0.00
SMAIN-2-0038	2-011A	2-010B	Dogwood Park SROW	0.35	0.32	0.00	0.00
SMAIN-2-0039	2-010B	2-010A	Dogwood Park SROW	0.39	0.35	0.00	0.00
SMAIN-2-0040	2-010A	2-010	Dogwood Park SROW	0.40	0.36	0.00	0.00
SMAIN-2-0041	2-010	2-009	Dogwood Park SROW	0.38	0.35	0.00	0.00
SMAIN-2-0042	2-009	2-008	Dogwood Drive	0.35	0.32	0.00	0.00
SMAIN-2-0043	2-008	2-007A	Dogwood Drive	0.44	0.40	0.00	0.00

ID	From ID	To ID	Road/Area	d/D		Outlet Surcharge (m)	
				Existing No Dev	Existing with Dev	Existing No Dev	Existing with Dev
SMAIN-2-0044	2-007A	2-007	Dogwood Drive	0.44	0.41	0.00	0.00
SMAIN-2-0045	2-007	2-006	Dogwood Drive	0.42	0.39	0.00	0.00
SMAIN-2-0046	2-006	2-005	Dogwood Drive	0.38	0.35	0.00	0.00
SMAIN-2-0047	2-005	2-004	Dogwood Drive	0.49	0.45	0.00	0.00
SMAIN-2-0048	2-004	2-003	Fitzgerald Avenue	0.52	0.48	0.00	0.00
SMAIN-2-0049	2-003	2-002	21st Street	0.41	0.38	0.00	0.00
SMAIN-2-0050	2-002	2-001	21st Street	0.41	0.38	0.00	0.00
SMAIN-2-0037	2-001	2-000B	Cliffe Avenue	0.48	0.44	0.00	0.00
SMAIN-2-0036	2-000B	2-000A	Cliffe Avenue	0.48	0.44	0.00	0.00
SMAIN-2-0336	2-000A	2-849	20th Street	0.46	0.41	0.00	0.00
SMAIN-3-0451	2-849	1-005	20th Street	0.45	0.41	0.00	0.00
SMAIN-3-0449	1-005	3-805	20th Street	0.47	0.45	0.00	0.00
SMAIN-3-0438	3-805	3-797	20th Street	0.51	0.49	0.00	0.00
SMAIN-3-0392	3-797	1-004	20th Street	0.35	0.34	0.00	0.00
SMAIN-4-0762.1	1-004	1-003	20th Street	0.37	0.36	0.00	0.00
SMAIN-4-0762	1-003	1-002	20th Street	0.79	0.78	0.00	0.00
SMAIN-4-0762.2	1-003	1-002	20th Street	0.50	0.49	0.00	0.00
SMAIN-4-0762.3	1-002	1-001	20th Street	0.31	0.31	0.00	0.00
SMAIN-4-0762.4	1-001	CVRD_RLS	20th Street	0.45	0.46	0.00	0.00

Pipe Capacity Modeling Results – Future 2039 Scenario

ID	From ID	To ID	Road/Area	d/D	Outlet Surcharge (m)
				With Dev	With Dev
SMAIN-2-0379	2-571	2-570	13th Street	0.23	0
SMAIN-2-0378	2-570	2-496A	13th Street	0.27	0
SMAIN-2-0377	2-496A	2-496	13th Street	0.34	0
SMAIN-2-0129	2-496	2-495	13th Street	0.44	0
SMAIN-2-0128	2-495	2-494	13th Street	0.46	0
SMAIN-2-0387	2-494	SFIT0108	Larsen Road	0.40	0
SMAIN-2-0169	2-603	2-601	Larsen Road	0.38	0
FUT-SMAIN-027	2-601	2-838	Larsen Road	0.44	0
SMAIN-2-0095	2-838	2-837	Larsen Road	0.43	0
SMAIN-2-0094	2-837	2-836	Larsen Road	0.29	0
SMAIN-2-0093	2-836	2-835	Larsen Road	0.28	0
SMAIN-2-0092	2-835	2-834	Larsen Road	0.26	0
SMAIN-2-0091	2-834	2-420	Larsen Road	0.25	0
SMAIN-2-0090	2-420	2-424	Larsen Road	0.22	0
SMAIN-2-0089	2-424	2-423	20th Street	0.31	0
SMAIN-2-0088	2-423	2-422	20th Street	0.32	0
SMAIN-2-0085	2-422	2-421	20th Street	0.32	0
SMAIN-2-0084	2-421	2-018A	20th Street	0.31	0
SMAIN-2-0082	2-018A	2-017A	Willemar Avenue	0.36	0
SMAIN-2-0081	2-017A	2-016D	Willemar Avenue	0.34	0
SMAIN-2-0080	2-016D	2-016C	21st Street	0.34	0
SMAIN-2-0079	2-016C	2-015A	21st Street	0.36	0
SMAIN-2-0078	2-015A	2-014A	21st Street	0.36	0

ID	From ID	To ID	Road/Area	d/D	Outlet Surcharge (m)
				With Dev	With Dev
SMAIN-2-0077	2-014A	2-013A	21st Street	0.37	0
SMAIN-2-0076	2-013A	2-012A	21st Street	0.41	0
SMAIN-2-0075	2-012A	2-011A	Dogwood Park SROW	0.39	0
SMAIN-2-0038	2-011A	2-010B	Dogwood Park SROW	0.29	0
SMAIN-2-0039	2-010B	2-010A	Dogwood Park SROW	0.31	0
SMAIN-2-0040	2-010A	2-010	Dogwood Park SROW	0.32	0
SMAIN-2-0041	2-010	2-009	Dogwood Park SROW	0.31	0
SMAIN-2-0042	2-009	2-008	Dogwood Drive	0.28	0
SMAIN-2-0043	2-008	2-007A	Dogwood Drive	0.36	0
SMAIN-2-0044	2-007A	2-007	Dogwood Drive	0.37	0
SMAIN-2-0045	2-007	2-006	Dogwood Drive	0.35	0
SMAIN-2-0046	2-006	2-005	Dogwood Drive	0.32	0
SMAIN-2-0047	2-005	2-004	Dogwood Drive	0.41	0
SMAIN-2-0048	2-004	2-003	Fitzgerald Avenue	0.53	0
SMAIN-2-0049	2-003	2-002	21st Street	0.42	0
SMAIN-2-0050	2-002	2-001	21st Street	0.42	0
SMAIN-2-0037	2-001	2-000B	Cliffe Avenue	0.49	0
SMAIN-2-0036	2-000B	2-000A	Cliffe Avenue	0.49	0
SMAIN-2-0336	2-000A	2-849	20th Street	0.44	0
SMAIN-3-0451	2-849	1-005	20th Street	0.43	0
SMAIN-3-0449	1-005	3-805	20th Street	0.33	0
SMAIN-3-0438	3-805	3-797	20th Street	0.43	0
SMAIN-3-0392	3-797	1-004	20th Street	0.34	0
SMAIN-4-0762.1	1-004	1-003	20th Street	0.37	0

ID	From ID	To ID	Road/Area	d/D	Outlet Surcharge (m)
				With Dev	With Dev
SMAIN-4-0762	1-003	1-002	20th Street	0.79	0
SMAIN-4-0762.2	1-003	1-002	20th Street	0.50	0
SMAIN-4-0762.3	1-002	1-001	20th Street	0.31	0
SMAIN-4-0762.4	1-001	CVRD_RLS	20th Street	0.46	0
SMAIN-2-0170	2-604	2-603	Larsen Road	0.40	0
SMAIN-2-0171	SFIT0108	2-604	Larsen Road	0.28	0
SMAIN-2-0037	2-001	2-000B	Cliffe Avenue	0.49	0
SMAIN-2-0036	2-000B	2-000A	Cliffe Avenue	0.49	0
SMAIN-2-0336	2-000A	2-849	20th Street	0.44	0
SMAIN-3-0451	2-849	1-005	20th Street	0.43	0
SMAIN-3-0449	1-005	3-805	20th Street	0.33	0
SMAIN-3-0438	3-805	3-797	20th Street	0.43	0
SMAIN-3-0392	3-797	1-004	20th Street	0.34	0
SMAIN-4-0762.1	1-004	1-003	20th Street	0.37	0
SMAIN-4-0762	1-003	1-002	20th Street	0.79	0
SMAIN-4-0762.2	1-003	1-002	20th Street	0.50	0
SMAIN-4-0762.3	1-002	1-001	20th Street	0.31	0
SMAIN-4-0762.4	1-001	CVRD_RLS	20th Street	0.46	0
SMAIN-4-0762.3	1-002	1-001	20th Street	0.31	0
SMAIN-4-0762.4	1-001	CVRD_RLS	20th Street	0.46	0

APPENDIX D

Municipal Sanitary Service Calculations

Project Number	*2211-47572-00*	**Per Capita Flow**	*360*	L/cap/day
Project Name	*Arden Gardens*	**Average Population**	*2.18*	cap/unit
Designed By	*R.Shambrook*	**ADWF**	*0.0091*	L/s/unit
Updated	*6/30/2021*	**Infiltration**	*0.06*	L/s/ha
		Peaking Factor	*3.2/(P^0.105)*	To a maximum PF of 3.2
				P = Population in thousands
				Any population under a thousand is rounded up to 1.

McElhanney

Manhole		Sanitary Flow Calculation									Pipe Calculation								
Up	Down	Incrimental Contributing Units	Total Contributing Units	Incrimental Flow (L/s)	Total Flow (L/s)	Peaking Factor	Incrimental Contributing Area (ha)	Total Contributing Area (ha)	Infiltration (L/s)	Design Flow PWWF (L/s)	Nominal Diameter (mm)	Slope (%)	Mannings n	Partial Flow Ratio	Velocity Ratio	Design Flow Velocity (m/s)	Pipe Full Velocity (m/s)	Pipe Capacity (L/s)	Percent Capacity
Development	2-571	111	111	1.01	1.01	3.20	1.92	1.92	0.12	3.34	150	1.10%	0.011	0.177	0.753	0.80	1.07	19	17.70%

Note: This calculation includes Phase One and Phase 2 estimated sanitary loading.

APPENDIX E

AWWA M22 Domestic Water Servicing Calculations

DOMESTIC DEMAND METHOD FOR SIZING DOMESTIC SERVICES (AWWA M22)

SERVICE CONNECTION SIZING CALCULATION - BUILDING AND IRRIGATION DEMAND

INPUTS

Development Q =	**108.2**	**gpm**
L =	**30**	**feet**
C =	**130**	
Material=	**PVC C900**	
Assumed P_{min} Main	**71.8**	**psi**
P_{min} @ PL	**60**	**psi**

SIZING CALCULATIONS

Variables	**Selected Pipe Size**
D, in nominal pipe, *in*	6" PVC C900
D, in meter, *in*	6
Meter *k*	24
D, in DCV, *in*	6
DCV *k*	6.9
DCV p min, *psi*	4
D, in actual pipe, *in*	6.09
Entrance *k*	0
Fittings *k (sum)*	1.75
Available head, *ft*	15.41
Calculated Parameters	
Pipe loss, *ft*	0.03
Entrance loss, *ft*	0.00
Meter loss, *ft*	0.57
DCV, loss, *ft*	9.40
Fittings loss, *ft*	0.04
Total loss, *ft*	10.04
Remaining loss, *ft*	5.37
Velocity, *ft/s*	1.19
Velocity, m*/s*	0.36

Selected Service Size:	**150 mm**	
Velocity Check:	**0.36 m/s**	< 2 m/s, ok

2021-07-14

APPENDIX F

City of Courtenay 2020-2024 Sewer Fund Financial Plan

THE CORPORATION OF THE CITY OF COURTENAY

STAFF REPORT

To: Council **File No.:** 1705-20/1715-20

From: Chief Administrative Officer **Date:** December 11, 2019

Subject: 2020–2024 Sewer Fund Financial Plan

PURPOSE:

The purpose of this report is for Council to consider the 2020–2024 Sewer Fund Financial Plan and the proposed sewer user fee increase for 2020.

POLICY ANALYSIS:

Section 165 of the *Community Charter* requires a municipality to have a five year financial plan adopted annually and Section 194 permits the levying of a fee to recover the cost for the delivery of a service.

The 2020–2024 Sewer budget is a component of the annual City of Courtenay five year financial plan. A proposed increase of 1.27% for the 2020 user fee has been incorporated into the 2020 – 2024 Sewer Fund Financial Plan with no change to the frontage rate.

EXECUTIVE SUMMARY:

The five year sewer fund financial plan is prepared annually and user fees are established to cover the projected cost of service delivery for the upcoming year. Funded entirely from sewer user fees and frontage fees, the sewer service receives no funding from general property taxation.

The City of Courtenay owns and operates a Class 3 Sewer collection system that collects and conveys effluent within the City to the Regional Courtenay Lift Station and from there it is pumped via force-mains to the sewage treatment plant. The Courtenay Lift Station and the Sewage Treatment Plant are part of the Comox Valley Regional Sewer Service, which is administered by the Comox Valley Regional District (CVRD).

Each component plays a vital role in providing sewer services to the residents of Courtenay and its regional partners. The CVRD, through the Sewage Commission has planned capital conveyance upgrades and treatment plant expansion in order to provide funding to ensure the sustainability, capacity and integrity of their portion of the system infrastructure. The CVRD annually requisitions the City for the cost of the City's share of the regional sewer service.

The City must also provide funding for its investment in the City's sewer collection service capital and operational needs. The cost of sewer service delivery is funded through a combination of user fees and frontage and parcel taxes. A 1.27% increase for the user fee is recommended for 2020, increasing the

rate from $340.38 to $344.71 and frontage fee remaining constant at $10.24 per meter. The annual increase to a single family residence is $4.33.

CAO RECOMMENDATIONS:
That based on the December 11, 2019 staff report "2020–2024 Sewer Fund Financial Plan", Council approve OPTION 1, and proceed with the proposed 2020-2024 Sewer Fund Financial Plan; and, that sewer user fee revenue be increased by 1.27% for 2020.

Respectfully submitted,

David Allen, BES, CLGEM, SCLGM
Chief Administrative Officer

BACKGROUND:

Consideration and approval of a five year financial plan is an annual requirement under the *Community Charter*. The recommended financial plan for the sewer fund provides detail for 2020, as well as projections for the four years following.

The sewer utility service is self-funding and receives no funding from the general property taxation levy.

DISCUSSION:
The sanitary sewer utility service provided to City property owners is a combination of the City and Comox Valley Regional Sewer Service infrastructure. Administered by the CVRD, the regional sewer service infrastructure includes sewer pumping stations, sewer force mains (including the force main on Comox Road) and a wastewater treatment plant with an outfall for treated effluent. It was constructed in the early 1980's and designed with a 25 year life-cycle. As a result of the 2011 CVRD sanitary sewer master plan, a 10-year capital plan was developed and approved by members of the CVRD Sewer commission in 2012. However, at the Service Participants request in 2018, the CVRD has embarked on a Liquid Waste Management Plan (LWMP). This Statutory Plan will outline future capital expenditures necessary for the sustainability of the Service. This Plan is expected to be completed in the spring of 2020.

City infrastructure includes lift stations, sewer trunk mains, a collection system and sewer connections within the boundaries of the municipality. This infrastructure varies in age depending on its location within the City. Infrastructure on the west side of the City varies from relatively new to over 60 years, whereas infrastructure on the east side of the river is generally newer and less than 25 years old.

The largest cost component of this financial plan is the cost of the regional sewer service shared

proportionately between the service participants, the City of Courtenay, the Town of Comox and HMCS Quadra based on their respective sewer flows.

The 2020-2024 Sewer Fund Financial Plan is a collaborative effort of all the departments following the City's Asset Management Bylaw and the CAO Asset Management Working Group Directive.

City of Courtenay 2020 – 2024 Sewer Fund Financial Plan

The proposed 2020-2024 Sewer Fund Financial Plan is detailed in the following attachments:

Attachment 1: Sewer Operating Fund Overview
Attachment 2: Sewer Capital Fund Overview
Attachment 3: Sewer Surplus, Reserves and DCC

The sewer fund financial plan includes for 2020 $8,379,400 in projected sewer revenues and the following expenditures: $6,447,400 operating expenses, $250,000 amortization, $176,600 debt payment, $917,500 transfer to the capital fund, $381,000 transfer to reserves and a surplus of $206,900.

Sewer Operating Fund

Sewer Operating Expenses

The sewer operating expenses are presented by activities in Table 1. The overall increase in operating costs between 2019 and 2020 budget is $481,000 or 8.1%.

Table 1: Sewer Operating Expenses 2019 – 2020 budget

Activity	Values 2019 BUDGET	Unaudited 2019 Actual Year-to-date Nov28.19	2020 BUDGET	Variance 2020 Budget 2019 Budget
CVRD Sewer Requisition	4,124,400	4,145,491	**4,494,200**	369,800
Sewer Administration	268,600	191,072	**315,500**	46,900
Sewer Engineering Servic	48,500	8,501	**73,000**	24,500
Sewer Training	11,000	15,659	**11,000**	-
Sewer Operations	372,400	328,971	**352,100**	(20,300)
Sewer Lift Station Mainten	210,300	194,696	**217,200**	6,900
Sewer Inflow & Infiltration	46,500	49,513	**46,500**	-
Sewer Fleet	9,900	(28,147)	**41,700**	31,800
Sewer Work in Progress	47,800	38,997	**40,000**	(7,800)
Interfund Allocation	827,000	626,277	**856,200**	29,200
Grand Total	**5,966,400**	**5,571,031**	**6,447,400**	**481,000**

Comox Valley Sewer Service

The Comox Valley Regional District 2019-2023 Financial Plan included a 6% increase for the Regional Sewer Service Requisition for the 2020 proposed budget. As the CVRD 2020-2024 Financial Plan is not

finalized at the moment, staff recommends to include a contingency of $100,000 for 2020 as the proportion of the sewer flows for Courtenay has increased in 2019, which could impact the City's share of the requisition.

The sewer service requisition is the largest expense in the Sewer Operating Fund and represents 70% of the total expenses. Table 2 presents the increase in Courtenay's share of the sewer service requisition since 2018 to the proposed budget for 2024.

Table 2: Comox Valley Sewer Service Requisition, Courtenay's Share 2018 – 2024

Comox Valley Sewer Service Requisition Courtenay share	$	% increase
2018 Actual	3,890,928	6.0%
2019 Actual	4,145,491	6.5%
2020 Estimation	4,494,200	8.4%
2021 Proposed budget	4,494,200	0.0%
2022 Proposed budget	4,949,300	10.1%
2023 Proposed budget	4,949,300	0.0%
2024 Proposed budget	4,949,300	0.0%

Sewer Administration

Sewer Administration costs include wages and benefits for staff working in sewer utility operations, and a portion of the salaries, wages and benefits of Public Works management staff and Engineering team. The increase is mostly due to a change in the allocation of the Engineering team expenses no longer transferred to capital projects.

Sewer Engineering Services

An additional $45,000 is included in 2020 to complete a sewer rates review. This review will be conducted simultaneously with the water rates review as recommended in the Water Smart Action Plan presented to Council on October 28, 2019. This increase is partially offset by a reduction of $20,000 for the sewer master plan undertaken in 2018 and nearing completion.

Sewer Operations

The sewer operations are expected to remain stable for 2020. A reduction of $40,000 is included for the smoke testing program already included in the Sewer Inflow & Infiltration budget. An increase of $5,000 is also required for SCADA data collection and $15,000 for an increase in vehicle and equipment hourly usage to support sewer operations.

Sewer Fleet

An increase of $31,800 is included for the sewer fleet maintenance expenses and allocation based on prior year usage.

Internal Allocations

Internal allocations is a percentage of the General Fund, Public Works and fleet expenses transferred to the Sewer Fund. The intent is to transfer a reasonable amount for General Government and Public

Works expenditures (personnel, utilities, materials, insurance, contracted services and fleet costs) as recognition of the administrative costs necessary to provide the service.

The sewer allocation is set to 11.5% of the General Government Services and to 17% of the Public Works Administrative expenses based on prior year estimate. The allocation percentage is usually reviewed every couple years and will be analyzed again before the 2021 budget. The variance represents the general increase in the General Government and Public Works expenses.

Sewer Revenues

Revenues collected through sewer user and frontage fees are used to cover the costs of the operating and capital expenditures. Staff recommend maintaining the current frontage fee at $10.24 per meter, which is expected to generate $2,224,800 for 2020. An increase of 1.27% of the sewer user fee is proposed for 2020 and 2.5% for the next four years to fund the service. The sewer user fees are expected to generate $5,260,800 for 2020.

Once the sewer master plan is finalized in early 2020, it will result in a draft 20 year capital plan, which will also support the sewer rate review planned for 2020. Once these two pieces of information are available, frontage and sewer user fees will be further analyzed and recommendations will be presented to adjust the sewer revenue requirements in future year financial plans.

The change in the user fees since 2017 is detailed in Table 3.

Table 3: Sewer user and frontage fees 2017-2020

	Sewer User Fee			Sewer Frontage Fee	
Annual	One-time	Change	Change %	per meter	Change
2017	$294.70	$26.79	10.00%	$10.24	$ -
2018	$324.17	$29.47	10.00%	$10.24	$ -
2019	$340.38	$16.21	5.00%	$10.24	$ -
2020	$344.71	$4.33	1.27%	$10.24	$ -

Sewer Capital Fund

The projects included in the 2020 Sewer Capital Budget are presented in Table 4 below. The source of funding and the projects scheduled for the four following years are detailed in Attachment 2.

Table 4: Sewer Capital Projects - 2020 budget

Category	Project description	2020 Proposed Budget
New	Sewer - Greenwood Trunk Construction	4,100,000
	Sewer System Options Analysis	200,000
New Total		**4,300,000**
Renewal	Comox Road, Lewis Park, River Crossing Sanitary Main Replacement	194,900
	Sewer - 1st Street Lift Station Replacement	341,100
	Braidwood Road - Road & Utility - Sewer Component	31,500
	Sewer - Mansfield Drive Forcemain	50,000
	Veterans Memorial Parkway Sewer Sleeve	50,000
Renewal Total		**667,500**
Grand Total		**4,967,500**

Debt Servicing Costs

The Sewer Operating Fund also includes the debt servicing costs. For 2020, the interest payment is expected to be $101,400, of which $43,100 relates to the new borrowing for the Greenwood Trunk Connection project. A principal payment of $75,200 on existing debt is also included for a total debt servicing costs for 2020 of $176,600. The projected debt servicing costs for 2021 to 2024 are detailed in Attachment 2.

Sewer Surplus and Reserves

Table 5 shows the sewer surplus, reserves and Development Cost Charges (DCC) estimated closing balances for 2019 and 2020. The five year schedule is presented in Attachment 3.

Table 5: Estimated sewer surplus and surplus balance

SEWER **Surplus, Reserves and DCC Summary** Estimated Closing Balance	Unaudited Actual **2019**	Budget **2020**
Sewer Fund Surplus		
Prior Year Surplus (unallocated)	1,273,500	1,480,400
Surplus Reserve For Future Expenditure (Unspent Capital 2019)	567,500	-
	1,841,000	1,480,400
Sewer Capital Reserves		
Sewer Reserve	514,000	514,000
Asset Management Reserve	1,920,200	1,620,200
Sewer Machinery and Equipment	486,800	561,800
	2,921,000	2,696,000
Total Sewer Surplus and Reserves	**4,762,000**	**4,176,400**
Sewer Development Cost Charges (DCC)		
Sewer DCC Bylaw #1638/2755	34,300	34,300
Sewer DCC Bylaw #2426/2755	876,900	426,900
Total Sewer DCC	**911,200**	**461,200**

Operating Surplus

The 2020 sewer budget is expected to generate a surplus of $206,900, which is then used in the proposed 2021 budget. A large portion of the prior year surplus is also used in the following years, mainly to fund the capital projects.

The estimated reserve for future expenditures of $567,500 represents unspent monies collected in 2019 to fund 2019 capital projects carried forward and to be used in 2020.

Capital Reserves

The Asset Management reserve will provide $600,000 in 2020 to fund a portion of the Greenwood Trunk Connection project.

A contribution of $300,000 to the Asset Management Reserve and $75,000 to the Machinery and Equipment Reserve has been included for 2020 and is consistent with previous financial plans.

Development Cost Charges (DCC)

DCC are presented as deferred revenues in the financial statements and are not included with the reserves.

DCC monies will be used towards the Greenwood Trunk Connection project in 2020 in the amount of $450,000.

FINANCIAL IMPLICATIONS:

To cover the overall cost to deliver the sewer utility operating and capital activities, an increase of 1.27% is recommended for 2020. This will result in an annual increase of $4.33 in the single family user rate.

Debt

Three major projects are identified in the 2020 and 2021 proposed budget:

- Greenwood Trunk Connection at an estimate of $4.1M;
- Replacement of 1st Street lift station at an estimate of $2.3M;
- Comox Road, Lewis Park, River Crossing sanitary main replacement at an estimate of $1.4M.

Since anticipated revenues, existing reserves, and prior year surplus are not sufficient to cover the anticipated construction costs, long term borrowing is considered as the primary source of funding for the Greenwood Trunk Connection project in 2020 and 1st Street lift station replacement project in 2021. In order to obtain long term financing, the City must follow a lengthy statutory process that includes adoption of a municipal loan authorization bylaw, approval by the Ministry of Community Services, elector approval, and inclusion in our regional district security issuing bylaw. The entire process can take up to 8 months.

The borrowing process is underway for the $3.0 M required for the Greenwood Trunk Connection project in 2020. Staff anticipate starting the borrowing process for the 1st Street lift station in the summer of 2020 to secure funding for 2021.

ADMINISTRATIVE IMPLICATIONS:

The 2019 Sewer Rates bylaw was adopted on March 18, 2019. This involved the calculation of a blended rate for 2019, which was a pro rata of 2018 bylaw rate effective until March 18, 2019 and 2019 bylaw rate effective as of March 19, 2019. The 1.27% proposed sewer rate increase for 2020 maintains the current bylaw rate for 2020, therefore an amendment to user fee bylaw is not required for 2020.

Subsequent to Council endorsing the recommended increase for the 2020-2024 Sewer Fund Financial Plan and user fees, the sewer budget will be incorporated as part of the statutory component of the five year financial plan. Compilation of this financial plan will take a minimum of 50 hours of staff time.

ASSET MANAGEMENT IMPLICATIONS:

Much of the sewer network in west Courtenay was built during a three-year period in the early 1960s and is projected to reach its end-of-life in the early 2020s. Detailed Condition Assessment (CCTV inspections) work was completed in 2018-2019. This information has allowed the City's Asset Management Plan to identify priority Projects that align with Council's Strategic Plan and future development and growth. Additionally, the Sewer Master Plan will be finalized by early 2020. Together, these will result in a draft 20-year capital sewer plan.

STRATEGIC PRIORITIES REFERENCE:

We focus on organizational and governance excellence

● Communicate appropriately with our community in all decisions we make

● Responsibly provide services at levels which the people we serve are willing to pay

We proactively plan and invest in our natural and built environment

● Focus on asset management for sustainable service delivery

▲ Look for regional infrastructure solutions for shared services

● **AREA OF CONTROL:** The policy, works and programming matters that fall within Council's jurisdictional authority to act

▲ **AREA OF INFLUENCE:** Matters that fall within shared or agreed jurisdiction between Council and another government or party

■ AREA OF CONCERN: Matters of interest that are outside Council's jurisdictional authority to act

OFFICIAL COMMUNITY PLAN REFERENCE:

Section 6.3 Sanitary Sewer Treatment to follow policies to reduce infiltration, consider downstream capacity of existing sewer mains, and to provide an effluent network that is limited to areas within the City's municipal boundaries.

REGIONAL GROWTH STRATEGY REFERENCE:

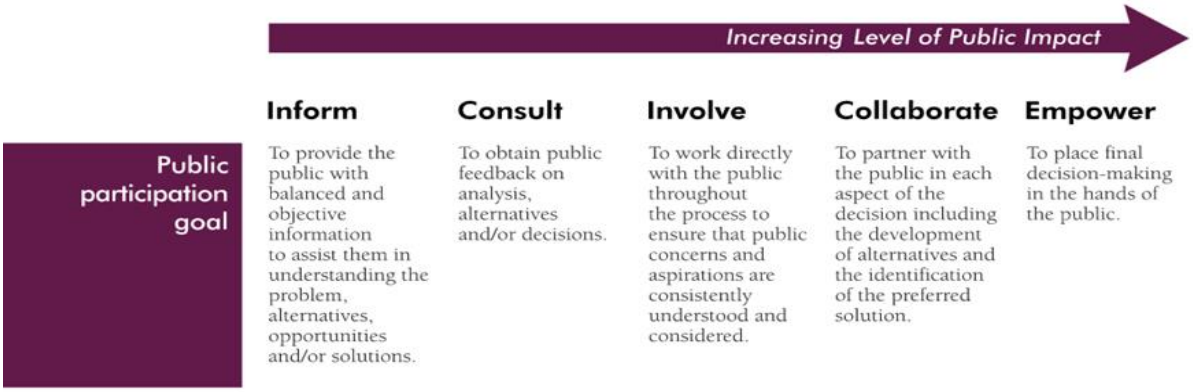
This budget is presented with the intent of encouraging sewer management approaches and the use of processes and technologies that provide the public with infrastructure that addresses public health

needs and concerns and provides equal service to all residents within the municipality and region (per Comox Valley Regional Growth Strategy Bylaw No. 120, 2010, Part 3.2.5, Objective 5-D Page 56).

PUBLIC ENGAGEMENT:

The *Community Charter* (sec. 166) requires that a council must undertake a process of public consultation regarding the proposed financial plan before it is adopted. The City will "**inform**" the public about the 2020-2024 Sewer Fund Financial Plan through special council meetings, media webcasts, and information posted on the City's website. In addition, the City will "**consult**" the public prior to final adoption of the 2020-2024 Financial Plan Bylaw.

http://c.ymcdn.com/sites/www.iap2.org/resource/resmgr/imported/IAP2%20Spectrum_vertical.pdf



OPTIONS:

Option 1:
That Council approve the 2020-2024 Sewer Fund Financial Plan; and, that sewer user fee revenue be increased by 1.27% for 2020. (**Recommended**)

Option 2:
That Council defer approval of the proposed 2020–2024 Sewer Fund Financial Plan for further discussion at a later Council meeting.

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Attachments:

- Attachment # 1 – Sewer Operating Fund Overview
- Attachment # 2 – Sewer Capital Fund Overview
- Attachment # 3 – Sewer Surplus, Reserves and DCC

Sewer Operating Fund Budget 2020-2024

Frontage rate $/m	$ 10.24	$ 10.24	$ 10.24	$ 10.24	$ 10.24	$ 10.24
Sewer Utility Rate - Single Family Unit	$ 340.38	$ 344.71	$ 353.33	$ 362.16	$ 371.21	$ 380.49
Proposed Increase %		1.27%	2.50%	2.50%	2.50%	2.50%

Expense Type	Activity	DESC	2019 BUDGET	2020 BUDGET	2021 BUDGET	2022 BUDGET	2023 BUDGET	2024 BUDGET
Revenue	Sewer Frontage	SEWER FRONTAGE TAX	(1,987,400)	**(2,224,800)**	(2,247,100)	(2,269,500)	(2,292,200)	(2,315,100)
		SEWER CONNECTION PARCEL TAX	(24,000)	**(15,800)**	(13,100)	(9,700)	(9,700)	(9,700)
	Sewer Frontage Total		**(2,011,400)**	**(2,240,600)**	**(2,260,200)**	**(2,279,200)**	**(2,301,900)**	**(2,324,800)**
	Sewer Utility Fees	SEWER USER CHARGES - COMMERCIAL	(631,300)	**(623,200)**	(639,100)	(655,400)	(672,200)	(689,400)
		SEWER USER CHARGES - RESIDENTIAL	(4,142,800)	**(4,337,100)**	(4,472,100)	(4,611,000)	(4,754,100)	(4,901,500)
		SEWER USER CHARGES - INSTITUTIONAL (CVRD)	(249,500)	**(300,500)**	(308,000)	(315,700)	(323,600)	(331,700)
	Sewer Utility Fees Total		**(5,023,600)**	**(5,260,800)**	**(5,419,200)**	**(5,582,100)**	**(5,749,900)**	**(5,922,600)**
	Sewer Other Revenues		(20,000)	**(20,000)**	(20,000)	(20,000)	(20,000)	(20,000)
	Misc. Revenue		(600)	**(500)**	(500)	(500)	(500)	(500)
	Interest Revenues		(200)	**-**	-	-	-	-
	Sewer Work in Progress		(50,000)	**(40,000)**	(40,000)	(40,000)	(40,000)	(40,000)
	Transfer from Reserve		(611,700)	**(567,500)**	-	-	-	-
	Transfer from Prior Year Surplus		-	**-**	(295,000)	(260,400)	(168,000)	(353,000)
	Equity in Capital Assets		(125,000)	**(250,000)**	(250,000)	(250,000)	(250,000)	(250,000)
Revenue Total			**(7,842,500)**	**(8,379,400)**	**(8,284,900)**	**(8,432,200)**	**(8,530,300)**	**(8,910,900)**
Expense	CVRD Sewer Requisition		4,124,400	**4,494,200**	4,494,200	4,949,300	4,949,300	4,949,300
	Sewer Administration		268,600	**315,500**	321,700	328,000	334,300	340,600
	Sewer Training		11,000	**11,000**	11,000	11,000	11,000	11,000
	Sewer Engineering Services		48,500	**73,000**	28,000	28,000	28,000	28,000
	Sewer Operations		372,400	**352,100**	355,200	358,400	361,700	361,700
	Sewer Lift Station Maintenance		210,300	**217,200**	220,500	223,800	227,200	227,200
	Sewer Inflow & Infiltration		46,500	**46,500**	46,500	46,500	46,500	46,500
	Sewer Fleet		9,900	**41,700**	42,100	42,200	42,500	42,500
	Sewer Work in Progress		47,800	**40,000**	40,000	40,000	40,000	40,000
	Interfund Allocation		827,000	**856,200**	858,600	880,900	887,000	904,300
	Transfer to Reserve	TRANSFER TO ASSET MGMT RESERVE	300,000	**300,000**	300,000	300,000	300,000	300,000
		TRANS TO M&E SEWER RESERVE	75,000	**75,000**	75,000	75,000	75,000	75,000
		TRANS TO M.F.A.RESERVE	600	**500**	500	500	500	500
		TRANS TO RES. FOR FUTURE EXP	611,700	**567,500**	-	-	-	-
		TRSF TO SEWER CAPITAL FUND	613,700	**350,000**	900,000	450,000	500,000	750,000
		CONTINGENCY RESERVE	12,800	**206,900**	-	-	-	-
		CARBON OFFSETS	5,500	**5,500**	5,500	5,500	5,500	5,500
	Transfer to Reserve Total		**1,619,300**	**1,505,400**	**1,281,000**	**831,000**	**881,000**	**1,131,000**
	Debt		131,800	**176,600**	336,100	443,100	471,800	578,800
	Debt Total		**131,800**	**176,600**	**336,100**	**443,100**	**471,800**	**578,800**
	Amortization		125,000	**250,000**	250,000	250,000	250,000	250,000
Expense Total			**7,842,500**	**8,379,400**	**8,284,900**	**8,432,200**	**8,530,300**	**8,910,900**

Fund	Sewer
Department	(All)
Area	(Multiple Items)
Total Funding	(All)

Category	Project description	2020 Proposed Budget	2020 Sewer Revenues	2020 Sewer Reserves	2020 Reserve for Future Expenditures	2020 DCC Reserve	2020 Debt	2021 Proposed Budget	2021 Sewer Revenues	2021 Sewer Reserves	2021 Debt
New	Sewer - Greenwood Trunk Construction	4,100,000	50,000	600,000		450,000	3,000,000				
	Sewer System Options Analysis	200,000	200,000								
New Total		**4,300,000**	**250,000**	**600,000**		**450,000**	**3,000,000**				
Renewal	Comox Road, Lewis Park, River Crossing Sanitary Main Replacement	194,900			194,900			1,400,000	100,000	1,300,000	
	Sewer - 1st Street Lift Station Replacement	341,100			341,100			2,300,000	300,000		2,000,000
	Braidwood Road - Road & Utility - Sewer Component	31,500			31,500						
	Sewer - Mansfield Drive Forcemain	50,000	50,000					750,000	500,000	250,000	
	Veterans Memorial Parkway Sewer Sleeve	50,000	50,000								
Renewal Total		**667,500**	**100,000**		**567,500**			**4,450,000**	**900,000**	**1,550,000**	**2,000,000**
Grand Total		**4,967,500**	**350,000**	**600,000**	**567,500**	**450,000**	**3,000,000**	**4,450,000**	**900,000**	**1,550,000**	**2,000,000**

Category	Project description	Values 2022 Proposed Budget	2022 Sewer Revenues	2022 Sewer Reserves	2023 Proposed Budget	2023 Sewer Revenues	2023 Debt	2024 Proposed Budget	2024 Sewer Revenues	2024 Sewer Reserves
Renewal	Sewer - Projects identified through Master Plan	500,000	250,000	250,000				1,000,000	750,000	250,000
	Braidwood Road - Road & Utility - Sewer Component				500,000	500,000				
	Sewer - Arden Central Trunk Main	200,000	200,000		2,000,000		2,000,000			
Renewal Total		**700,000**	**450,000**	**250,000**	**2,500,000**	**500,000**	**2,000,000**	**1,000,000**	**750,000**	**250,000**
Grand Total		**700,000**	**450,000**	**250,000**	**2,500,000**	**500,000**	**2,000,000**	**1,000,000**	**750,000**	**250,000**

Category	Project description	Values 2020 Proposed Budget	2021 Proposed Budget	2022 Proposed Budget	2023 Proposed Budget	2024 Proposed Budget
Debt Interest	Existing Debt Interest	58,300	58,300	58,300	58,300	58,300
	New Debt Interest Greenwood	43,100	86,100	86,100	86,100	86,100
	New Debt Interest 1 St Lift Station		28,700	57,400	57,400	57,400
	New Debt Interest Arden				28,700	57,400
Debt Interest Total		**101,400**	**173,100**	**201,800**	**230,500**	**259,200**
Debt Principal	Existing Debt Principal	75,200	75,200	75,200	75,200	75,200
	New Debt Principal Greenwood		87,800	87,800	87,800	87,800
	New Debt Principal 1 St Lift Station			78,300	78,300	78,300
	New Debt Principal Arden					78,300
Debt Principal Total		**75,200**	**163,000**	**241,300**	**241,300**	**319,600**
Grand Total		**176,600**	**336,100**	**443,100**	**471,800**	**578,800**

SEWER Surplus, Reserves and DCC Summary Estimated Closing Balance	Estimated Actual 2019	Budget 2020	Proposed Budget 2021	2022	2023	2024
Sewer Fund Surplus						
Prior Year Surplus (unallocated)	1,273,500	1,480,400	1,185,400	925,000	757,000	404,000
Surplus Reserve For Future Expenditure	567,500	-	-	-	-	-
	1,841,000	1,480,400	1,185,400	925,000	757,000	404,000
Sewer Capital Reserves						
Sewer Reserve	514,000	514,000	514,000	514,000	514,000	514,000
Asset Management Reserve	1,920,200	1,620,200	370,200	420,200	720,200	770,200
Sewer Machinery and Equipment	486,800	561,800	636,800	711,800	786,800	861,800
	2,921,000	2,696,000	1,521,000	1,646,000	2,021,000	2,146,000
Total Sewer Surplus and Reserves	**4,762,000**	**4,176,400**	**2,706,400**	**2,571,000**	**2,778,000**	**2,550,000**
Sewer Development Cost Charges (DCC)						
Sewer DCC Bylaw #1638/2755	34,300	34,300	34,300	34,300	34,300	34,300
Sewer DCC Bylaw #2426/2755	876,900	426,900	426,900	426,900	426,900	426,900
Total Sewer DCC	**911,200**	**461,200**	**461,200**	**461,200**	**461,200**	**461,200**

Purpose of Sewer Reserves

Prior Year Surplus : accumulated excess of revenues over expenses from prior years which has not been set aside for specific purposes

Reserve for Future Expenditure : revenues collected for 2019 capital projects unfinished and carried forward to 2020

Sewer Reserve , Bylaw #1382: established for funding capital expenditures or debt related to sewer utility only

Asset Management Reserve , Bylaw #2819: established to acquire tangible capital assets relating to the sewer fund or for refurbishing, renewing or replacing existing tangible capital assets for those assets within the sewer fund

Sewer Machinery and Equipment , Bylaw #1976: established to fund replacement of depreciated or obsolete machinery and equipment in the sewer fund

Sewer DCC 'North East Zone' , Bylaw #1638/2755: to be used for approved sewer projects

Sewer DCC, Bylaw #2426/2755: to be used for approved sewer projects