RESOURCE CONSENT DESIGN REPORT

53 SMALL ROAD, SILVERDALE

EAST COAST HEIGHTS LIMITED

MARCH 2025

REPORT 1927-1

ASPIRE CONSULTING ENGINEERS
PO BOX 581, OREWA, 0946 | PH. 09 426 6552

Revision History

Revision Nº	Prepared By	Description	Date

Document Acceptance

Action	Name	Signed	Date
Prepared by	M. Jones		14/03/2025
Reviewed by	P Fairgray		14/03/2025
Approved by	P Fairgray		14/03/2025

ASPIRE CONSULTING ENGINEERS LIMITED
Po Box 581, OREWA 0946
Ph: 09 426 6552

Limitations

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1.0 Introduction and Proposal:

Aspire Consulting Engineers Limited have been engaged by East Coast Heights Limited to prepare an engineering design report for the proposed 17-lot residential subdivision at the above site to accompany an application for Resource Consent addressing the key infrastructure requirements with respect to the following:

- Roading Access
- Earthworks
- Three Waters
- Utility Services

The site is located on the eastern side of Small Road, Silverdale, and comprises a long rectangular shaped superlot with an area of 0.4619Ha created the underlying subdivision of Lot 2 DP590220 under consent number SUB60426899. The legal description is Lot 1 DP590220. The site is a greenfield property which previously was farmland.

The proposal is to create a 17-lot residential subdivision. Please refer to site plan in figure-1 below:

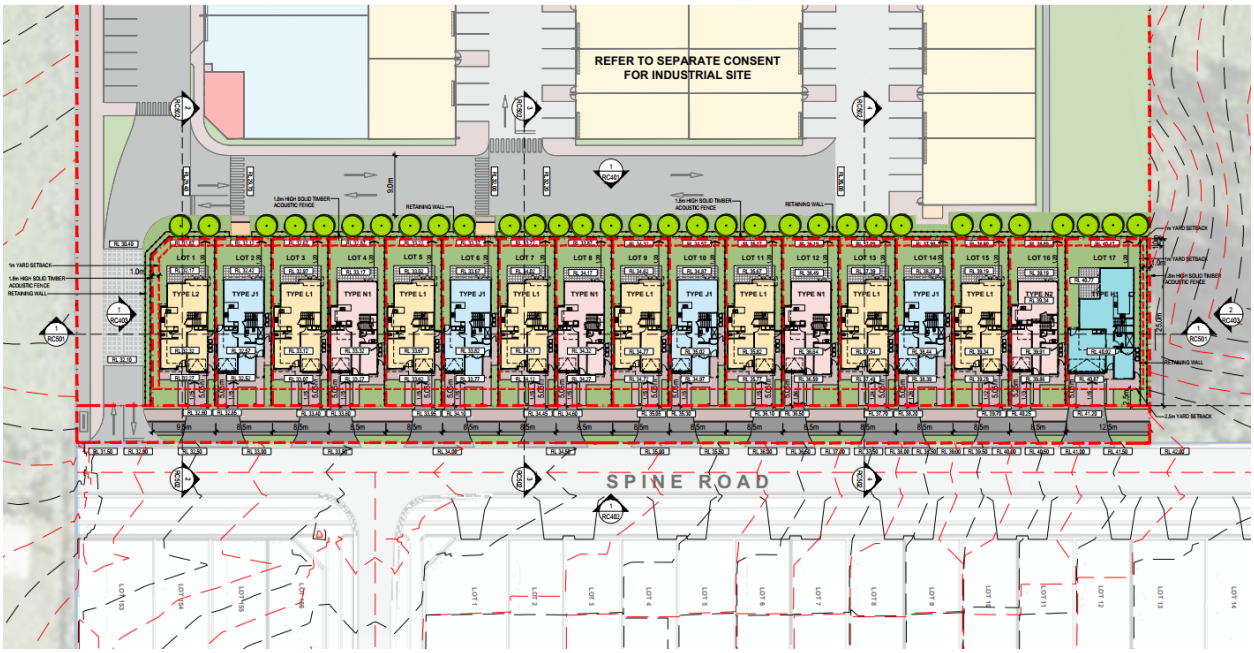

Fig-1: WMZ Architects site plan

The proposed residential lots range in area from 212m² to 312m². Lot 18 of 884m² will be vested to Auckland Council to create the berm of Bronzewater Drive on the eastern boundary.

2.0 Roading Access:

It is proposed gain access to the lots from Bronzewater Drive on the eastern boundary.

Bronzewater Drive will be formed and vested as part of the neighbouring development (SUB60394717). The road formation is currently under construction under approved engineering plans (EPA) number ENG60430287.

For this development it is proposed to provide 1.5m wide concrete footpath and a 2.0m wide concrete cycleway along berm fronting Bronzewater Drive for pedestrian access. Vehicle crossings will the formed to each lot in accordance with Auckland Transport standard detail VX0103 revision D.

Please refer to drawings 1927-RC-RD301 to RD303 in appendix A for roading and access details.

3.0 Earthworks:

Bulk earthworks are currently underway on 53 Small Road under land use consent (LUC60423965). These earthworks will create a uniform gradient over the 17 lots generally falling to the south west. The earthworks for this development will only require minor shaping to form building platforms.

Preliminary cut and fill earthworks modelling have been completed for the development with cut volume of approximately 500m^3 and fill volume of approximately 1710m^3 over an area of approximately 3768m^2. Based on a fill compaction factor of 1.1, approximately 1380m^3 of imported fill will be needed. This fill can be sourced from the development on the western boundary, no truck movements off the site will be required.

Erosion and sediment control measure should be implemented in accordance with Auckland Council GD05. For this small site we anticipate a sediment laden bund into a decanting earth bund (DEB) and a clean water diversion bund on the eastern boundary. The K&C on Bronzewater Drive will act at the clean water diversion.

The fill baters on the western and southern boundaries and the batters between the lots greater than 300mm in height will be supported with specifically designed retaining walls. These walls can be constructed under a separate building consent as part of the civil works or as part of the building consents for the proposed houses.

Please refer to drawings 1927-RC-EW201 to EW207 in appendix A for earthworks details.

4.0 Stormwater:

The neighbouring development (under SUB60394717 and EPA under ENG60430287) will comprise a piped public stormwater network discharging into a proposed stormwater wetland located in the southwest corner of this development. It is proposed to extend the stormwater network along the front yards of Lots 1 to 17. A 100mm diameter uPVC SN16 connection will be provided to all the new lots.

Preliminary calculations indicate a 225mm diameter RCRRJ pipe laid at 2% will adequately cater for the proposed subdivision development. The size and gradient of the stormwater pipes will be determined at EPA stage.

Please refer to drawings 1927-RC-SW401 to 402 in appendix A for the piped stormwater layout.

The proposed 17 residential lots will require on site detention and retention in accordance with SMAF-1 and the 2&10-year ARI storm events. This mitigation can be provided in on site detention tanks. The detention volume should be detained on each lot with a slow-release restricted outlet. The retention volume should be collected from rainwater harvesting from the roof and used on site for non-potable water reuse.

The lots range in size from 212.5m² to 312.5m². The calculated SMAF-1, 2 & 10-year ARI mitigation volumes are tabulated below:

Catchment	Area (m²)	SMAF-1 Retention (m³)	SMAF-1 Detention (m³)	2-year ARI Detention (m³)	10-year ARI Detention (m³)	Total Mitigation Volume (m³)
Lot 1	234.7	0.63	2.39	1.7	1.2	3.53
Lots 2-16	212.5	0.64	2.43	1.7	1.2	3.54
Lot 17	312.5	0.88	3.35	2.3	1.7	4.88

The detention component of SMAF-1 is contained within the 2&10-year ARI detention volume. The larger volume will govern as the required detention volume.

In practical terms due to the small volume of retention required we recommend reuse by garden irrigation or the retention volume be taken up as detention. However, Healthy Waters require re-use for 3 days volume. A typical house will generate from toilet and laundry approximately 225 litres/day of non-potable water. This equates to approximately 675 litres/day.

For Lots 1 to 16 provide a detention volume of 2.85m³ and a retention volume of 0.75m³, equating to a total mitigation volume of 3.6m³. For Lot 17 provide a detention volume of 4.0m³ and a retention volume of 0.9m³, equating to a total mitigation volume of 4.9m³. Please refer to the SMAF and detention calculations attached in appendix B. This will be required by a consent notice on the title.

5.0 Wastewater:

The neighbouring development (under SUB60394717 and EPA under ENG60430287) will comprise a piped public wastewater network discharging into the newly vested Wastewater pump station on Small Road. It is proposed to extend the wastewater network along the front yards of Lots 1 to 17.

The piped wastewater system will comprise 150mm diameter uPVC SN16 pipe laid on grade with pre-cast concrete manholes. A 100mm diameter uPVC SN16 connection will be provided to each new residential lot. Please refer to drawings 1927-RC-WW501 to 502 in Appendix A for the piped wastewater layout.

We have undertaken wastewater flow calculations in accordance with WSL CoP table 5.1.1. Please refer to the summary of wastewater flows tabulated in figure 2 below:

Zone	CATCHMENT (m^2)	Gross Floor Area (GFA)	NO OF DWELLINGS	NO OF DWELLINGS	CATCHMENT POPULATION (assumes 3	ADWF (L/day)	PWWF (L/day)	ADWF (L/sec)	PWWF (L/sec)
Residential Lots			17		51	9180	61506	0.11	0.71
TOTAL			**17**			9180	61506	**0.11**	**0.71**

Figure 2: extract of wastewater flow calculations

The total wastewater flow (PWWF) for all 17 residential lots is 0.71 litres/sec. The wastewater calculations attached demonstrate that a 150mm diameter uPVC pipe laid at a gradient of 1% has a capacity of 15.5 litres/sec. Please refer to wastewater flow calculations in appendix C.

6.0 Water Supply:

The neighbouring development (under SUB60394717 and EPA under ENG60430287) will comprise a public water supply network. A 180mmOD (150mmNB) watermain will be installed along the western berm of Bronzewater Drive.

Water meters can be installed for all 17 residential lots onto this new water supply main located in the road berm at building consent stage.

There are two new fire hydrants in the Bronzewater Drive berm within 135m of this development to provide firefighting requirements.

Please refer to drawing 1927-RC-WS601 in Appendix A for the water supply layout.

7.0 Utilities:

It is proposed to provide power and telecommunications services to the development in a combined services trench, which will also include the water supply. The utilities will extend from the newly installed combined services in the Bronzewater Drive berm.

ATTACHMENTS:

APPENDIX A: RESOURCE CONSENT DESIGN DRAWINGS
APPENDIX B: SMAF-1 & DETENTION CALCULATIONS
APPENDIX C: WASTEWATER FLOW CALCULATIONS

APPENDIX A: RESOURCE CONSENT DESIGN DRAWINGS

APPENDIX B: SMAF-1 & DETENTION CALCULATIONS

GD01 Design Sheet - retention and detention volume calculator

For use with GD01 - Stormwater Guidelines for the Auckland Region

Date: 14/03/2025

Address: 53 Small Road, Silverdale (Residential Lots)

Project: East Coast Heights (Lot 1)

Reviewer: M. Jones

Input
Calculation
Results

INITIAL PARAMETERS

Total site area	235	m^2	
Pre-construction site areas			
Existing Impervious area	0.00	m^2	
Existing Pervious area	234.7	m^2	
% Imperviousness	0.00%	%	
Post-construction site areas			
New / redeveloped impervious area	126	m^2	[1]
Existing impervious area remaining untouched	0	m^2	
post-development pervious area	108.7	m^2	
% New/redeveloped imperviousness	53.7%	%	
Total new and redeveloped imperviousness > 50%	Yes		
Area for hydrology mitigation	**Total Site Area**	m^2	

CONTROL DATA

Rainfall depth	37.0	mm	[2]
Hydrological soil group	Group_C	74	[3]
Impervious SCS curve number (CN)	98		

SUMMARY

	Total Impervious	Total Pervious	% total impervious	% total pervious	
Pre-development condition	N/A	235	0%	100%	[4]
Post-development condition	126	109	54%	46%	

Post-development runoff volume	5.01	m^3	
Pre-development runoff volume	1.98	m^3	
Hydrology mitigation volume	**3.02**	m^3	
Retention volume	0.63	m^3	[5]
Detention volume	2.39	m^3	[6]

Notes:

[1] if development is <50m^2 then no mitigation required

[1a] Where new/redeveloped impervious area <50% of total site area, hydrology mitigation is required for new/redeveloped impervious area only

[1b] Where new/redeveloped impervious area >50% of total site area, hydrology mitigation is required for the total site area

[2] Select rainfall based on 24-hour 90th/95th percentile rainfall event

[3] CN of 98 for impervious areas. Refer to Table 1 above right (or TP108 Table 3.3) for CN to pervious areas.

[4] Pre-developed condition is defined as site condition prior to any development and therefore by definition 100% pervious; if unknown assume site was pasture

[5] Retention vol. = 5 mm over for the impervious area that requires hydrology mitigation as per note [1a] and [1b], taking into account that retention is not required any pervious areas.

[5a] If soil infiltration < 2mm/hr AND there's no option of re-use either, then the retention volume can be taken up by the equivalent volume as additional detention

[6] If retention vol > difference between post- and pre- dev. runoff, then required detention is zero (not negative)

	Pre-development (perv.)			Post development (Imperv.)		Post development (Perv.)	
	Value	Unit		Value	Unit	Value	Unit
CN	74	-	CN	98.00	-	74	-
Pre -soil storage	89.24	mm	Post- soil storage	5.18	mm	89.24	mm
Initial abstraction	5.00	-	Initial abstraction	0.00	-	5	-
Pre runoff depth	8.45	mm	Post runoff depth	32.45	mm	8.45	mm

GD01 Design Sheet - retention and detention volume calculator

For use with GD01 - Stormwater Guidelines for the Auckland Region

Date: 14/03/2025

Address: 53 Small Road, Silverdale (Residential Lots)

Project: East Coast Heights (Lots 2-16)

Reviewer: M. Jones

Input
Calculation
Results

INITIAL PARAMETERS

Total site area	213	m^2	
Pre-construction site areas			
Existing Impervious area	0.00	m^2	
Existing Pervious area	212.5	m^2	
% Imperviousness	0.00%	%	
Post-construction site areas			
New / redeveloped impervious area	128	m^2	[1]
Existing impervious area remaining untouched	0	m^2	
post-development pervious area	84.5	m^2	
% New/redeveloped imperviousness	60.2%	%	
Total new and redeveloped imperviousness > 50%	Yes		
Area for hydrology mitigation	**Total Site Area**	m^2	

CONTROL DATA

Rainfall depth	37.0	mm	[2]
Hydrological soil group	Group_C	74	[3]
Impervious SCS curve number (CN)	98		

SUMMARY

	Total Impervious	Total Pervious	% total impervious	% total pervious	
Pre-development condition	N/A	213	0%	100%	[4]
Post-development condition	128	85	60%	40%	

Post-development runoff volume	4.87	m^3	
Pre-development runoff volume	1.79	m^3	
Hydrology mitigation volume	**3.07**	m^3	
Retention volume	0.64	m^3	[5]
Detention volume	2.43	m^3	[6]

Notes:

[1] if development is <50m^2 then no mitigation required

[1a] Where new/redeveloped impervious area <50% of total site area, hydrology mitigation is required for new/redeveloped impervious area only

[1b] Where new/redeveloped impervious area >50% of total site area, hydrology mitigation is required for the total site area

[2] Select rainfall based on 24-hour 90th/95th percentile rainfall event

[3] CN of 98 for impervious areas. Refer to Table 1 above right (or TP108 Table 3.3) for CN to pervious areas.

[4] Pre-developed condition is defined as site condition prior to any development and therefore by definition 100% pervious; if unknown assume site was pasture

[5] Retention vol. = 5 mm over for the impervious area that requires hydrology mitigation as per note [1a] and [1b], taking into account that retention is not required any pervious areas.

[5a] If soil infiltration < 2mm/hr AND there's no option of re-use either, then the retention volume can be taken up by the equivalent volume as additional detention

[6] If retention vol > difference between post- and pre- dev. runoff, then required detention is zero (not negative)

	Pre-development (perv.)			Post development (Imperv.)		Post development (Perv.)	
	Value	Unit		Value	Unit	Value	Unit
CN	74	-	CN	98.00	-	74	-
Pre -soil storage	89.24	mm	Post- soil storage	5.18	mm	89.24	mm
Initial abstraction	5.00	-	Initial abstraction	0.00	-	5	-
Pre runoff depth	8.45	mm	Post runoff depth	32.45	mm	8.45	mm

GD01 Design Sheet - retention and detention volume calculator

For use with GD01 - Stormwater Guidelines for the Auckland Region

Date: 14/03/2025

Address: 53 Small Road, Silverdale (Residential Lots)

Project: East Coast Heights (Lot 17)

Reviewer: M. Jones

Input
Calculation
Results

INITIAL PARAMETERS

Total site area	313	m^2	
Pre-construction site areas			
Existing Impervious area	0.00	m^2	
Existing Pervious area	312.5	m^2	
% Imperviousness	0.00%	%	
Post-construction site areas			
New / redeveloped impervious area	176	m^2	[1]
Existing impervious area remaining untouched	0	m^2	
post-development pervious area	136.5	m^2	
% New/redeveloped imperviousness	56.3%	%	
Total new and redeveloped imperviousness > 50%	Yes		
Area for hydrology mitigation	**Total Site Area**	m^2	

CONTROL DATA

Rainfall depth	37.0	mm	[2]
Hydrological soil group	Group_C	74	[3]
Impervious SCS curve number (CN)	98		

SUMMARY

	Total Impervious	Total Pervious	% total impervious	% total pervious	
Pre-development condition	N/A	313	0%	100%	[4]
Post-development condition	176	137	56%	44%	

Post-development runoff volume	6.86	m^3	
Pre-development runoff volume	2.64	m^3	
Hydrology mitigation volume	**4.23**	m^3	
Retention volume	0.88	m^3	[5]
Detention volume	3.35	m^3	[6]

Notes:

[1] if development is <50m^2 then no mitigation required

[1a] Where new/redeveloped impervious area <50% of total site area, hydrology mitigation is required for new/redeveloped impervious area only

[1b] Where new/redeveloped impervious area >50% of total site area, hydrology mitigation is required for the total site area

[2] Select rainfall based on 24-hour 90th/95th percentile rainfall event

[3] CN of 98 for impervious areas. Refer to Table 1 above right (or TP108 Table 3.3) for CN to pervious areas.

[4] Pre-developed condition is defined as site condition prior to any development and therefore by definition 100% pervious; if unknown assume site was pasture

[5] Retention vol. = 5 mm over for the impervious area that requires hydrology mitigation as per note [1a] and [1b], taking into account that retention is not required any pervious areas.

[5a] If soil infiltration < 2mm/hr AND there's no option of re-use either, then the retention volume can be taken up by the equivalent volume as additional detention

[6] If retention vol > difference between post- and pre- dev. runoff, then required detention is zero (not negative)

	Pre-development (perv.)			Post development (Imperv.)		Post development (Perv.)	
	Value	Unit		Value	Unit	Value	Unit
CN	74	-	CN	98.00	-	74	-
Pre -soil storage	89.24	mm	Post- soil storage	5.18	mm	89.24	mm
Initial abstraction	5.00	-	Initial abstraction	0.00	-	5	-
Pre runoff depth	8.45	mm	Post runoff depth	32.45	mm	8.45	mm

STORMWATER DETENTION DESIGN - 2 & 10 YEAR ARI STORM WITH DOUBLE OUTLET

PROJECT NAME:	East Coast Heights Limited
PROJECT NUMBER:	1927
SITE ADDRESS:	53 Small Road, Silverdale
DESCRIPTION:	Lot 1 (234.7m²)
CALCULATION BY:	MJ
DATE:	12/03/25

ASPIRE Consulting Engineers Limited

DATA

Time of Concentration 10 min. (10,15,20,30,60)

	Area (m²)	C	CA (m²)
Site Area	234.7		
1. EXISTING SITE COVERAGE			
Existing Roof	0	0.95	0.0
Existing Paved	0	0.95	0.0
Existing Garden	234.7	0.3	70.4
TOTAL Existing Area	**234.7**		**70.4**
2. PROPOSED DEVELOPMENT			
Additional/Reduced Roof	126	0.95	119.7
Additional/Reduced Paved	0	0.95	0.0
Additional/Reduced Lawn/Garden	-126	0.3	-37.8
TOTAL Addition Area (should be zero)	**0**		**81.9**
3. REMAINING UNDRAINED AREA	(Not routed thru detention tank after development)		
Undrained Roof Area (Normally Zero)	0	0.95	0.0
Undrained Paved Area (Normally Zero)	0	0.95	0.0
Undrained Lawn/Garden Area	0	0.3	0.0
TOTAL Extg Not to Pond Area	**0**		**0.0**

CONTROL DATA

Existing `C'	0.30		(`CA'extg/Site Area)
Developed `CA' to OSD tank	152	(m²)	(`CA'extg+`CA'adds-`CA'undr)
Additional Area	0	(m²)	(`A'add)

RUNOFF DATA	**2 year**		**10 year**	
Intensity I	66.6	mm/hr	113.9	mm/hr
Allowable Qmax whole site	1.30		2.23	
Lost Flows	0.00		0.00	
Allowable Qmax from pond =	1.3	l/s	0.9	l/s
Note: actual 10 yr ARI Qmax = 2 yr Qmax + 10 yr Qmax =			2.23	l/s
Allowable Qave from pond =	0.8	l/s	0.6	l/s (Qmax * 0.65)

STORAGE (2 year)

time (min)	depth (mm)	inflow (l)	outflow (l)	difference (l)	
10	11.1	1691	508	1182	inflow=`CA'dev*depth
15	14.7	2239	763	1476	outflow=Qave*time
20	17.0	2589	1017	1572	diff=inflow-outflow
30	21.0	3191	1525	1666	
60	29.5	4493	3050	1443	
120	40.0	6092	6101	-9	

STORAGE (2 + 10 year)

time (min)	depth (mm)	inflow (l)	V1time (mins.)	outflow (l)	Storage (l)
10	19.0	2891	6.99	700	2192
15	25.2	3831	8.14	1198	2633
20	29.1	4432	9.75	1667	2765
30	35.9	5460	12.70	2624	2837
60	50.6	7707	21.46	5497	2210
120	68.2	10388	46.63	10759	-371

2 & 10 ARI STORMWATER DETENTION REQUIREMENT

2 Year Detention Volume	**1.7**	***m³***
2 Year Max Discharge	**1.3**	***l/s***
10 Year Detention Volume	**1.2**	***m³***
10 Year Max Discharge	**0.9**	***l/s***

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STORMWATER DETENTION DESIGN - 2 & 10 YEAR ARI STORM WITH DOUBLE OUTLET

PROJECT NAME:	East Coast Heights Limited
PROJECT NUMBER:	1927
SITE ADDRESS:	53 Small Road, Silverdale
DESCRIPTION:	Lots 2-16 (212.5m²)
CALCULATION BY:	MJ
DATE:	12/03/25

ASPIRE Consulting Engineers Limited

DATA

Time of Concentration 10 min. (10,15,20,30,60)

	Area (m²)	C	CA (m²)
Site Area	212.5		
1. EXISTING SITE COVERAGE			
Existing Roof	0	0.95	0.0
Existing Paved	0	0.95	0.0
Existing Garden	212.5	0.3	63.8
TOTAL Existing Area	**212.5**		**63.8**
2. PROPOSED DEVELOPMENT			
Additional/Reduced Roof	128	0.95	121.6
Additional/Reduced Paved	0	0.95	0.0
Additional/Reduced Lawn/Garden	-128	0.3	-38.4
TOTAL Addition Area (should be zero)	**0**		**83.2**
3. REMAINING UNDRAINED AREA	(Not routed thru detention tank after development)		
Undrained Roof Area (Normally Zero)	0	0.95	0.0
Undrained Paved Area (Normally Zero)	0	0.95	0.0
Undrained Lawn/Garden Area	0	0.3	0.0
TOTAL Extg Not to Pond Area	**0**		**0.0**

CONTROL DATA

Existing `C'	0.30		(`CA'extg/Site Area)
Developed `CA' to OSD tank	147	(m²)	(`CA'extg+`CA'adds-`CA'undr)
Additional Area	0	(m²)	(`A'add)

RUNOFF DATA	**2 year**		**10 year**	
Intensity I	66.6	mm/hr	113.9	mm/hr
Allowable Qmax whole site	1.18		2.02	
Lost Flows	0.00		0.00	
Allowable Qmax from pond =	1.2	l/s	0.8	l/s
Note: actual 10 yr ARI Qmax = 2 yr Qmax + 10 yr Qmax =			2.02	l/s
Allowable Qave from pond =	0.8	l/s	0.5	l/s (Qmax * 0.65)

STORAGE (2 year)

time (min)	depth (mm)	inflow (l)	outflow (l)	difference (l)	
10	11.1	1631	460	1171	inflow=`CA'dev*depth
15	14.7	2160	690	1470	outflow=Qave*time
20	17.0	2498	921	1578	diff=inflow-outflow
30	21.0	3079	1381	1698	
60	29.5	4335	2762	1573	
120	40.0	5878	5524	354	

STORAGE (2 + 10 year)

time (min)	depth (mm)	inflow (l)	V1time (mins.)	outflow (l)	Storage (l)
10	19.0	2790	7.29	616	2173
15	25.2	3696	8.47	1066	2630
20	29.1	4276	10.12	1489	2788
30	35.9	5268	13.10	2352	2916
60	50.6	7436	21.79	4958	2478
120	68.2	10022	45.29	9818	204

2 & 10 ARI STORMWATER DETENTION REQUIREMENT

2 Year Detention Volume	**1.7**	***m^3***
2 Year Max Discharge	**1.2**	***l/s***
10 Year Detention Volume	**1.2**	***m^3***
10 Year Max Discharge	**0.8**	***l/s***

ASPIRE Consulting Engineers Limited
Ph: 09 426 6552

STORMWATER DETENTION DESIGN - 2 & 10 YEAR ARI STORM WITH DOUBLE OUTLET

PROJECT NAME:	East Coast Heights Limited
PROJECT NUMBER:	1927
SITE ADDRESS:	53 Small Road, Silverdale
DESCRIPTION:	Lot 17 (312.5m²)
CALCULATION BY:	MJ
DATE:	12/03/25

ASPIRE Consulting Engineers Limited

DATA

Time of Concentration 10 min. (10,15,20,30,60)

	Area (m²)	C	CA (m²)
Site Area	312.5		
1. EXISTING SITE COVERAGE			
Existing Roof	0	0.95	0.0
Existing Paved	0	0.95	0.0
Existing Garden	312.5	0.3	93.8
TOTAL Existing Area	**312.5**		**93.8**
2. PROPOSED DEVELOPMENT			
Additional/Reduced Roof	176	0.95	167.2
Additional/Reduced Paved	0	0.95	0.0
Additional/Reduced Lawn/Garden	-176	0.3	-52.8
TOTAL Addition Area (should be zero)	**0**		**114.4**
3. REMAINING UNDRAINED AREA	(Not routed thru detention tank after development)		
Undrained Roof Area (Normally Zero)	0	0.95	0.0
Undrained Paved Area (Normally Zero)	0	0.95	0.0
Undrained Lawn/Garden Area	0	0.3	0.0
TOTAL Extg Not to Pond Area	**0**		**0.0**

CONTROL DATA

Existing `C'	0.30		(`CA'extg/Site Area)
Developed `CA' to OSD tank	208	(m²)	(`CA'extg+`CA'adds-`CA'undr)
Additional Area	0	(m²)	(`A'add)

RUNOFF DATA	**2 year**		**10 year**	
Intensity I	66.6	mm/hr	113.9	mm/hr
Allowable Qmax whole site	1.74		2.97	
Lost Flows	0.00		0.00	
Allowable Qmax from pond =	1.7	l/s	1.2	l/s
Note: actual 10 yr ARI Qmax = 2 yr Qmax + 10 yr Qmax =			2.97	l/s
Allowable Qave from pond =	1.1	l/s	0.8	l/s (Qmax * 0.65)

STORAGE (2 year)

time (min)	depth (mm)	inflow (l)	outflow (l)	difference (l)	
10	11.1	2310	677	1634	inflow=`CA'dev*depth
15	14.7	3060	1015	2044	outflow=Qave*time
20	17.0	3539	1354	2185	diff=inflow-outflow
30	21.0	4361	2031	2330	
60	29.5	6140	4062	2079	
120	40.0	8326	8123	203	

STORAGE (2 + 10 year)

time (min)	depth (mm)	inflow (l)	V1time (mins.)	outflow (l)	Storage (l)
10	19.0	3951	7.12	921	3031
15	25.2	5235	8.28	1583	3652
20	29.1	6057	9.91	2207	3850
30	35.9	7462	12.87	3479	3983
60	50.6	10532	21.60	7307	3225
120	68.2	14196	46.04	14375	-179

2 & 10 ARI STORMWATER DETENTION REQUIREMENT

2 Year Detention Volume	**2.3**	***m^3***
2 Year Max Discharge	**1.7**	***l/s***
10 Year Detention Volume	**1.7**	***m^3***
10 Year Max Discharge	**1.2**	***l/s***

ASPIRE Consulting Engineers Limited
Ph: 09 426 6552

APPENDIX C: WASTEWATER FLOW CALCULATIONS

Aspire Consulting Engineers
Wastewater Flow

Job Number:	**1927**
Client:	**East Coast Heights Limited**
Site Details:	**53 Small Road, Silverdale**
Date:	**12/03/2025**

1. Use WSL Code of Practice for Subdivision and Development - Part 5 Wastewater

2. Flow Rates from WSL CoP Table 5.1.1 and 5.1.4

ADWF

Urban	180	L/p/day	Table 5.1.1
General Business (GB)	4.33	L/m²/day	Table 5.1.4 Light water users, or up to 2 storeys
			Note: m² only relates to GFA, assume 40% of total area
General Business (WR)	15	L/m²/day	Table 5.1.3 Wet retail

Peaking Factor	6.7

3. Calculate ADWF and PWWF for Proposed Residential Development

Zone	CATCHMENT (m²)	Gross Floor Area (GFA)	NO OF DWELLINGS	NO OF DWELLINGS	CATCHMENT POPULATION (assumes 3	ADWF (L/day)	PWWF (L/day)	ADWF (L/sec)	PWWF (L/sec)
Residential Lots			17		51	9180	61506	0.11	0.71
TOTAL			**17**			9180	61506	**0.11**	**0.71**

Wastewater Pipe Check

Job Number: 1927
Client: East Coast Heights Limited
Site Details: 53 Small Road, Silverdale
Date: 12/03/2025

Post Development Flow Volume (Refer Sheet 1)

Q_{PWWF} = **0.71** l/s

PIPE CAPACITY FORMULA (Full Flow)

Colebrook-White $V=-2\sqrt{(2gDS)}\log(ks/3.7D+2.51\upsilon/(D\sqrt{(2gDS)}))$

υ= 1.141 $x10^6$ kinematic viscosity of fluid (water at 15 degrees)

k_s= 1.5 mm (effective roughness)

D= diameter

S= hydraulic gradient

R= d/4 (circ. pipes)

Q= VA

Capacity Check on 150mm diameter uPVC

Pipe Grade S(%)	Pipe Dia D (m)	Pipe Vel'y (m/s)	PIPE CAP'Y (l/s)
1.0	150	0.88	**15.5**

Therefore pipe has adequate capacity to cater for development

ASPIRE Consulting Engineers Limited
Ph: 09 426 6552