

APPENDIX H

DRAFT CONDITIONS

APPENDIX H – DRAFT CONDITIONS

General Conditions

- I The Land Transfer Plan to give effect to this resource consent must be in accordance with the approved plans prepared by McCracken Surveys / Cheal as follows:
 - (a) Scheme Plan – Proposed Subdivision of Lots 1 and 2 DPS 12627 635 Whatawhata Road, Dinsdale, October 2018, Reference: 13246 – Sheet 1.
 - (b) Scheme Plan – Proposed Subdivision of Lots 1 and 2 DPS 12627 635 Whatawhata Road, Dinsdale, September 2019, Reference: 13246 – Sheet 2.
 - (c) Scheme Plan – Proposed Subdivision of Lots 1 and 2 DPS 12627 635 Whatawhata Road, Dinsdale, October 2018, Reference: 13246 – Sheet 3.
 - (d) Scheme Plan – Proposed Subdivision of Lots 1 and 2 DPS 12627 635 Whatawhata Road, Dinsdale, October 2018, Reference: 13246 – Sheet 4.
 - (e) Scheme Plan – Proposed Subdivision of Lots 1 and 2 DPS 12627 635 Whatawhata Road, Dinsdale, October 2018, Reference: 13246 – Sheet 5.
 - (f) Scheme Plan – Proposed Subdivision of Lots 1 and 2 DPS 12627 635 Whatawhata Road, Dinsdale, October 2018, Reference: 13246 – Sheet 6.
 - (g) Scheme Plan – Proposed Subdivision of Lots 1 and 2 DPS 12627 635 Whatawhata Road, Dinsdale, October 2018, Reference: 13246 – Sheet 7.
 - (h) Restricted Building Area Plan – Proposed Subdivision of Lots 1 and 2 DPS 12627 635 Whatawhata Road, Dinsdale, September 2019, Reference: 13246 – Sheet 1.
 - (i) Covenant Vegetative Area Plan – Visual Mitigation - 635 Whatawhata Road, Dinsdale, September 2019, Reference: 13246 – Sheet 1.

A copy of the approved plans (a) to (i) above are attached as Appendix I to this consent.
- 2 Pursuant to Section 36 of the Resource Management Act 1991 the Consent Holder must pay the actual and reasonable costs incurred by the Waikato District Council when monitoring the conditions of this consent.
- 3 Waikato District Council's processing fees are to be paid in accordance with the Council's processing fees and charges prior to the signing of the s224 certificate.
- 4 Prior to commencing any engineering design or construction works, the Consent Holder shall appoint an appropriately qualified and competent Developer's Representative/s, acceptable to the Waikato District Council's Land Development Engineer in accordance with the requirements of the Regional Infrastructure Technical Specifications.

- 5 The Consent Holder shall notify Waikato District Council's Land Development Engineer, in writing, of their intention to commence works, a minimum of 10 working days prior to commencement of works. Notification shall include the following details:
- (a) Name/s and telephone number/s of the Developers Representative/s.
 - (b) Site Address to which the consent relates.
 - (c) The Waikato District Council subdivision reference number
 - (d) Work to be undertaken.
 - (e) Expected duration of the works.

Advice Note: The preferred means of notification is via email to subdivisions@waidc.govt.nz

- 6 Prior to s223 and s224 approval, all buildings must comply with the permitted activity rules relating to building coverage, setbacks, daylight angles relative to the new boundaries and number of dwellings, with the following exceptions:
- (a) Building coverage on Lot 8 shall not exceed 725m²;
 - (b) Existing dwelling on Lot 10 shall be setback a minimum of 9m from the boundary of Lot 8;
 - (c) Consented shed approved under land use consent referenced LUC0192/19 (attached as Appendix 2 to this consent decision) on Lot 10 shall be setback a minimum of 5m from the boundary of Lot 8;
 - (d) Consented shed approved under land use consent referenced LUC0192/19 on Lot 10 shall be setback a minimum of 14m from the eastern boundary of Lot 10;
 - (e) Existing storage building/utility shed on Lot 10 shall be setback a minimum of 13m from the eastern boundary of Lot 10; and
 - (f) Existing woodshed on Lot 10 shall be setback a minimum of 0.5m from the eastern boundary of Lot 10.

Prior to application for approval of the survey plan (s223), the Consent Holder shall comply with the following conditions:

Design Plans

- 7 Prior to commencing any construction works on the property, the Consent Holder must submit for the approval of the Waikato District Council's Land Development Engineer, engineering design details and plans, prepared by a suitably qualified and experienced Engineer, including but not limited to the following:
- (a) 10m wide Right of Way "A", "B", "C", "D" and "E" to a sealed standard in accordance with the requirements of Part 3 - Appendices A, Traffic, of the Operative Waikato District Plan (Waikato Section), including long and cross sections of right-of-ways, including flood levels, and locations and details of passing bays;
 - (b) All physical works including the Right of Way design must take into account the requirements and recommendations contained in section 3 and 4 of the Stormwater Management Plan (attached as appendix 3 to this consent decision) from Cheal Consultants Limited – Ref M13246AP2 – Final Dated 20 December 2019 and attached appendices, and be in accordance with Part 3, Appendices B5 of the of the Operative Waikato District Plan (Waikato Section);
 - (c) Right of Way design must take into account the requirements for hard surfaces contained within Section 6 of the Landscape Visual Assessment prepared by Boffa Miskell dated 26 September 2019. These requirements are reproduced below.
 - *Providing all right of ways with flush kerb with either rip rap, grass or planted swales for stormwater management. Raised kerb and channels shall be avoided.*
 - *Providing asphaltic concrete, dark coloured concrete or exposed aggregate concrete surfaces.*
 - (d) Vehicle entrances off the proposed Right-of-Way's to Lots 1, 2, 4, 5, 6, and 7 including stormwater controls;
 - (e) Identification of any overland flow paths; and
 - (f) Identification of any additional easements for infrastructure such as existing water supplies or overland flowpaths not shown on the approved scheme plans.

The design details and plans must be in accordance with the Regional Infrastructure Technical Specifications (RITS).

Easements

- 8 Easements for Right of Way and Right to Drain Water shall be set out on the Land Transfer Plan and included in a memorandum.
- 9 Any additional easements, including overland flowpaths, identified in the approved engineering plans required by this consent must be set out on the Land Transfer Plan and included in a memorandum. Easements must be as required by the Regional Infrastructure Technical Specifications and the Waikato District Council's Easement Policy.

- Planting
- 10 Covenant Areas, in accordance with the approved Covenant Vegetative Area Plan referred to in condition 1(i) showing visual mitigation planting shall be set out on the Land Transfer Plan.

- Landscape Management Plan
- 11 A Landscape Management Plan (LMP) prepared by a suitably qualified and experienced Landscape Architect shall be submitted to Council's Monitoring Team for approval. The objective of the LMP is to mitigate landscape visual and rural character effects within and beyond the site.

The LMP must include, as a minimum, all of the measures recommended in section 6 (recommendations) of the Landscape Visual Assessment (LVA) prepared by Boffa Miskell dated 26 September 2019, relating to the following matters.

- i. Identification of locations of the planting schedule as listed as Table 1 in the above referenced LVA;
- ii. Requirements for Buildings & Structures & Form;
- iii. Requirements for Materials and Colours;
- iv. Requirements for Earthworks;
- v. Requirements for Hard Surfaces;
- vi. Requirements for Fencing;
- vii. Requirements for Lighting & Utilities.

Advice note: The purpose of the Landscape Management Plan is to have a standalone document which a consent notice required by this consent can refer to, for current and future owners of the Lots 1 – 7 and 10.

Prior to the application for s224 approval the Consent Holder shall comply with the following Conditions:

- Power Supply
- 12 Written Confirmation must be provided from a network utility operator for power supply confirming that connections and reticulations have been placed to the boundary of Lots 1 – 7.

- Telecommunications
- 13 Written Confirmation shall be provided from a network utility operator for telecommunications confirming that connections and reticulations have been placed to the boundaries of Lot 1 – 7.

- Planting
- 14 Mitigation planting shall be undertaken in accordance with the approved Landscape Management Plan required by Condition 11 of this consent and the Covenant Vegetative Area Plan approved under Condition 1 (i) of this consent. Confirmation of the planting undertaken in accordance with these plans shall be provided to Council by way of a compliance assessment undertaken by a suitably qualified and experienced Landscape Architect

Physical Works

- 15 The Consent Holder must undertake engineering works in accordance with the engineering design plans approved under Condition 7 of this consent.

Erosion and Sediment Controls

- 16 Prior to, and during physical works on the property, the consent holder shall install and maintain erosion and sediment control measures in accordance with the Waikato Regional Council's Erosion and Sediment Control Guidelines for Soil Disturbing Activities: January 2009.

NZTA Conditions

- 17 A copy of the required authorisation as agreed by the applicant from New Zealand Transport Agency pursuant to Section 91 of the Government Roading Powers Act 1989 (GRPA) shall be provided to Waikato District Council.

Advice note: The consent holder should seek this authorisation from the Transport Agency enclosing a copy of the following:

- (a) A copy of the resource consent decision and all approved plans.
- (b) The underlying records of titles
- (c) The LT plan including the number
- (d) The number of the allocated titles.

- 18 Confirmation shall be provided to Waikato District Councils Consent Team, that New Zealand Transport Agency is satisfied that the property is screened to mitigate the risk of internal headlight glare causing distraction to State Highway 23 users.

Advice Note: As agreed by the applicant, a screening design shall be submitted to and approved by the New Zealand Transport Agency prior to installation.

- 19 Confirmation shall be provided to Waikato District Council Consent Team, that New Zealand Transport Agency is satisfied that the existing boulders that currently surround the (Westlands) sign shall be removed from State Highway 23 legal road and the signage posts shall be replaced with frangible posts.

Advice note: As agreed by the applicant, any alterations to the sign including wording or design, will require further approval from the New Zealand Transport Agency.

As-Built Information and Certification

- 20 A 'Contractors Certificate – Construction', for each separate work undertaken by each individual contractor as part of the consented subdivision, must be provided for certification by the Land Development Engineer, Waikato District Council.

Advice Note: An acceptable format for certification upon completion of works can be found in the NZS4404-2010 Schedule 1B (Contractor's certificate upon completion of land development/subdivision).

- 21 A 'Certificate of Completion of Development Works' prepared and signed by the Developer's Representative or a suitably qualified professional, must be provided for certification by the Land Development Engineer, Waikato District Council, to confirm that all works have been carried out in accordance with the approved plans as required by condition 7 of this consent and appropriate standards contained within the Operative District Plan (Waikato Section) and the Rregional Infrastructure Technical Specifications (RITS).

Advice Note: An acceptable format for a 'Certificate of Completion of Development Works' can be found NZS4404-2010 Schedule 1C (Certification upon completion of land development/subdivision).

Consent Notices – General

- 22 The following conditions must be complied with on an ongoing basis and shall therefore be the subject of a consent notice registered against the relevant title(s) in accordance with Section 221 of the Resource Management Act 1991:

- (a) A design report prepared by a suitably qualified and experienced acoustics specialist must be submitted to the Waikato District Councils Consent Team demonstrating compliance with the following requirements for all buildings and structures on Lots 1, 2, 3, 4, 5, 6, 7 and 10.

Form:

- Design roofs that integrate buildings into the landscape and use a sheltering form with deep overhangs of more than 1.0m.
- Roofing: Roof materials shall be coloured in recessive colours no greater than a reflectance value of 20%. Grass or green roofing consistent with the surrounding vegetation patterns and colours is acceptable.
- Use building modulation to break the length of a building facade by changing direction, stepping in and out of the main facade, balconies, eaves, pergolas and other structures.
- Recess large areas of glazing below wide eaves and dividing glazing with walls, pergolas and the like.
- Use of dark tinted glass, but not mirror glazing, is required.
- Use window joinery, doors and balustrades that have a reflectance value of less than 30% and are dark or naturally coloured.
- Design buildings that use natural materials including natural stone, timber and concrete and cladding that has a reflectance value of less than 30% for walls and 25% for roofs.
- Ancillary Buildings: Garages, boat storage, and other ancillary buildings associated with the house shall be contained within the house site and shall be a comparable quality to that of the main building on the site.

Materials and Colour:

- Select materials that respond to the natural landscape and native vegetation immediately surrounding the subject site.
- Select colour palettes that have a reflectance value of less than 20% for roofs and 30% for walls (Refer to the Resene British Standard 5252 Range as a guide only. All colours and materials must be approved at building consent).
- Use natural material finishes such as stone and timber which will weather naturally.
- Apply dark oxide colouring to concrete materials to reduce reflectivity of the material.
- Timber cladding and other natural elements (stone) naturally weathered or stained dark.
- Painted timber, blockwork or other materials may be used and must contribute to receding the building into the landscape.
- The reflectance value of surfaces, including joinery, gutters, downpipes, cladding and roofing materials shall be no greater than 30% for walls and 25% for roofs.

- (b) All earthworks, hard surfaces, fencing, lighting and utilities on Lots 1, 2, 3, 4, 5, 6, 7 and 10 shall be in accordance with all of the following requirements.

Earthworks:

- No earthworks or grading other than the minimum required for driveways or underground services is permitted outside the house site area.
- Re-contouring all embankments surrounding driveways and building platforms into the natural landform to avoid visually exposed cut banks greater than 1.5m in height.
- All cut embankments, between 0.5m and 1.5m in height, shall be planted against to visually screen the exposed soil. Planting shall be organic in shape and form and avoid emphasising straight unnatural lines within the landscape.

Hard Surfaces:

- Providing all driveways with flush kerb with either rip rap, grass or planted swales for stormwater management. Raised kerb and channels shall be avoided.
- Providing asphaltic concrete, dark coloured concrete or exposed aggregate concrete driveway surfaces.
- Impervious outdoor areas, including patio, outdoor entertainment areas and turning areas (within the driveway), all located within the Building Areas.

Fencing:

- Using post and 3 - 5 timber rail or post and wire fencing and vegetation to demarcate boundaries of properties to reflect the rural character of the wider area. Urban style post and panel and solid wall style fencing shall be avoided.
- Providing front gate fencing that is visually permeable including post and rail, stone pillars, brick or wrought iron.

Lighting and Utilities

- All exterior lighting shall be contained within the Building Areas and shall be down lights only.
- All utilities and services shall be located below ground. No above ground wiring will be permitted. Aerials, satellite dishes and other utilities shall be maintained within the 6.0m building height plane.
- Downward facing bollard lighting is acceptable along the accessway corridor and to demarcate driveway entrances.
- Street lighting shall be avoided.
- Illuminated signage shall be avoided.

- (c) All planting on Lots 1, 2, 3, 4, 5, 6, 7 and 10 subject to the approved Covenant Vegetative Area Plan referenced in condition 1(i) of this consent decision shall be maintained in accordance with the approved Landscape Management Plan, required by condition 11 of this consent. As a minimum, vegetation cover shall be managed in perpetuity and shall be allowed to grow to a natural height and form.
- (d) Any earthworks, minimum floor levels, foundation design, wastewater and stormwater management for a building consent application on Lot 1, 2, 4, 5, 6, 7 and 10 shall be undertaken in accordance with the restrictions and recommendations of the following reports:
 - (i) Section 6 and 7 of the Preliminary Geotechnical Investigation Report for Proposed Residential Development 635 Whatawhata Road, from CMW Geosciences Ref: HAM2018-0112AB Rev 2, Dated 15 August 2019.
 - (ii) Section 3 and 4 Stormwater Management Plan from Cheal Consultants Limited – Ref M13246AP2 – Final Dated 20 December 2019”.
 - (iii) Floodplain Analysis, 635 Whatawhata Road, Hamilton from Dr Steven Joynes, Version 4 dated October 2019.

Unless alternative reports, prepared by suitably qualified and experienced Professional Engineers, are approved in writing by the Waikato District Councils Land Development Engineering Team.

- (e) Stormwater management for a building consent application on Lots 1, 2, 4, 5, 6, 7 and 10 shall ensure to the satisfaction of the Waikato District Council Building Team; that the stormwater management system must be capable of providing a means of managing and disposing of stormwater in accordance with Section 4, Stormwater of the Regional Infrastructure Technical Specifications (RITS).
- (f) A minimum of 45,000L of water storage shall be located on Lots 1 - 10 within 90m of each dwelling in accordance with the New Zealand Fire Service Water Supplies Code of Practice.

Consent notices shall be prepared by Waikato District Council’s Solicitor. Please request your consent notice be prepared prior to requesting 224 approval.

Consent Notices – NZTA

23

The following conditions relating to potential reverse sensitivity effects resulting from the normal operation of State Highway 23 must be complied with on an ongoing basis and shall therefore be the subject of a consent notice registered against the relevant title(s) in accordance with Section 221 of the Resource Management Act 1991:

- 1) Any new dwelling or other new noise sensitive location* on Lot 8, 9 and 10 or partly within 100m of the edge of State Highway 23 carriageway must be designed, constructed and maintained to achieve:
 - (a) Road-traffic vibration levels complying with class C of NS 8176E: 2005; and
 - (b) An indoor design noise level of 40 dB $L_{Aeq(24hr)}$ inside all habitable spaces.
- 2) If windows must be closed to achieve the design noise levels in condition 1(b), the building must be designed, constructed and maintained with ventilation and cooling system. For habitable spaces the system must achieve the following:
 - (a) Ventilation must be provided to meet clause G4 of the New Zealand Building Code. At the same time, the sound of the system must not exceed 30 dB $L_{Aeq(30s)}$ when measured 1m away from any grille or diffuser.
 - (b) The occupant must be able to control the ventilation rate in increments up to a high air flow setting that provides at least 6 air changes per hour. At the same time, the sound of the system must not exceed 35 dB $L_{Aeq(30s)}$ when measured 1m away from any grille or diffuser.
 - (c) The system must provide cooling that is controllable by the occupant and can maintain the temperature at no greater than 25°C. At the same time, the sound of the system must not exceed 35 dB $L_{Aeq(30s)}$ when measured 1m away from any grille or diffuser.
- 3) A design report prepared by a suitably qualified and experienced acoustics specialist must be submitted to the Waikato District Council Building Consent Team demonstrating compliance with consent notice conditions 1 and 2 prior to construction or alteration of a dwelling or noise sensitive location. The design must take into account the future permitted use of the state highway; for existing roads this is achieved by the addition of 3 dB to existing measured or predicted noise levels.

*Noise sensitive locations means buildings or parts of buildings used for, or intended to be used for the following purposes: residential activity (including visitor accommodation and retirement accommodation); education; healthcare; and/or places of worship/marae.

Consent notices shall be prepared by Waikato District Council's Solicitor. Please request your consent notice be prepared prior to requesting 224 approval.

Your Ref

In reply please quote
LUC0192/19If calling, please ask for
Josh Caddigan

14 December 2018

Postal Address
Private Bag 544, Ngaruawahia 3742
New Zealand

0800 492 452
www.waikatodistrict.govt.nz

McCracken Surveys Limited
PO Box 19182
Hamilton 3244

Email: phillip@mccrackensurvey.co.nz

Digitally Delivered

Dear Sir/Madam

DECISION ON APPLICATION FOR RESOURCE CONSENT UNDER THE RESOURCE MANAGEMENT ACT 1991

Application number(s):	LUC0192/19
Applicant	G & S Singleton Heritage Limited
Address:	635 State Highway 23 WHATAWHATA
Legal Description	LOT 1 DPS 12627 BLK 1 HAMILTON SD
Proposal:	Construct a 192m ² Kiwi Span single pitch storage shed that infringes on the 25m boundary setback and exceeds permitted site coverage for the Rural Zone.

I wish to advise you of Council's decision to **grant** your application for resource consent under the Resource Management Act 1991 (RMA). Please see below for the details of the decision and conditions of consent.

The following information provides you with some guidance on your rights and what to do next. It is recommended that you seek independent advice if you are in any doubt as to the processes to be followed:

Objections

If you disagree with any part of this decision or any conditions of this consent, you may lodge an objection in writing to Council within **15 working days** of the receipt of this letter. Your objection must be in accordance with section 357 of the RMA and must include the reasons for your objection.

If you decide to lodge an objection to this consent, please note that you cannot lodge a section 223/224 application for subdivision.

Compliance with conditions

Your resource consent permits the land use to be established at the site as long as the activity complies with the stated conditions on an ongoing basis. It is important that you fully understand and comply with all the conditions of your consent.

Please notify Council's monitoring team prior to the commencement of activities associated with this consent. The role of Council's monitoring team is to monitor compliance with the conditions of consent and may involve site visits.

Council's monitoring team can be contacted at monitoring@wairarapa.govt.nz or 07 824 8633. Please reference the consent number and address of the property when emailing or calling.

Lapsing of Consent/s

This resource consent lapses 5 years after the commencement of the consent, unless the consent is given effect to by the end of that period.

The commencement date of a resource consent is determined by section 116 of the Resource Management Act 1991.

Yours faithfully

A handwritten signature in blue ink, appearing to read 'J Thomas'.

Jessica Thomas

CONSENTS ADMINISTRATION

Cc: G & S Singleton Heritage Limited

Email: graham@pfseng.co.nz

Resource Consent

(Resource Management Act 1991)



www.waikatodistrict.govt.nz

DECISION ON APPLICATION: LUC0192/19

Pursuant to Sections 34A(1), Section 104, 104B, and 108 of the Resource Management Act 1991, the Waikato District Council, under delegated authority, grants Land Use Consent for a Discretionary Activity to:

Activity: Construct a 192m² Kiwi Span single pitch storage shed that infringes on the 25m boundary setback and exceeds permitted site coverage for the Rural Zone.

Applicant: G & S Singleton Heritage Limited

Location Address: 635 State Highway 23 WHATAWHATA

Legal Description: LOT 1 DPS 12627 BLK 1 HAMILTON SD comprised in Record of Title 2190167

This consent is subject to the conditions detailed in the attached Schedule 1.

The reasons for this decision are detailed in the attached Schedule 2.

A handwritten signature in blue ink, appearing to read "J. W. Yip". The signature is written over a horizontal line.

CONSENTS TEAM LEADER

Dated: 14 December 2018

Schedule I

Conditions of Consent

Resource Consent No: LUC0192/19

General Conditions

- 1 The development shall be undertaken in general accordance with the information and plans submitted by the Consent Holder in support of application number LUC0192/19 and officially received by Council on the 20th of November 2018 and further information received except as amended by the conditions below. Copies of the approved plans reference below are attached. In the case of inconsistency between the application and the conditions of this consent, the conditions of consent shall prevail
 - a) Site Plan, Kiwispan NZ
 - b) Land Use Plan, Reference I3246, Dated Nov 2018, Sheet 1
 - c) Elevations, Kiwispan NZ, dated 10/08/2018
- 2 Pursuant to Section 36 of the Resource Management Act 1991 the Consent Holder shall pay the actual and reasonable costs incurred by the Waikato District Council when monitoring the conditions of this consent.
- 3 The total site coverage of Lot 1 DPS 12627 shall not exceed 1950m²
- 4 The shed shall be located no closer than 14 metres from the eastern boundary.
- 5 The use of the shed shall be restricted to activities permitted under the Operative District Plan associated with and ancillary to the permitted use of the site.
- 6 The shipping container located within the proposed building platform shall be relocated to another location clear of the Title area prior to first use of the proposed shed.

Prior to Construction

- 7 The Consent Holder shall notify the Waikato District Council Monitoring Department at least 2 working days prior to the commencement of activities associated with this consent.

Advice note

To notify Waikato District Council Monitoring Department, email monitoring@waide.govt.nz with the consent number, address of property and date for when the works will commence.

Advisory Notes

1 Lapse Date

This Resource Consent for land use lapses five years after the commencement of the consent, unless:

(a) the Consent is given effect to prior to that date.

or

(b) an application is made to the consent authority to extend the period after which the consent lapses, and the consent authority decides to grant an extension after taking into account

(i) whether substantial progress or effort has been, and continues to be, made towards giving effect to the consent; and

(ii) whether the applicant has obtained approval from persons who may be adversely affected by the granting of an extension; and

(iii) the effect of the extension on the policies and objectives of any plan or proposed plan.

2 Other consents/permits may be required

To avoid doubt; except as otherwise allowed by this resource consent, all land uses must comply all remaining standards and terms of the relevant Waikato District Plan. The proposal must also comply with the Building Act 2004, Hamilton City Council Infrastructure Technical Specifications and Waikato Regional Plans. All necessary consents and permits shall be obtained prior to development.

3 Archaeological sites may be affected by the proposal

It is possible that archaeological sites may be affected by the proposed work. Evidence of archaeological sites may include burnt and fire cracked stones, charcoal, rubbish heaps including shell, bone and/or glass and crockery, ditches, banks, pits, old building foundations, artefacts of Maori and European origin or human burials.

The applicant is advised to immediately stop work and contact Heritage New Zealand Pouhere Taonga if the presence of an archaeological site is suspected. Work affecting archaeological sites is subject to a consenting process under the Heritage New Zealand Pouhere Taonga Act 2014. If any activity associated with this proposal, such as earthworks, fencing or landscaping, may modify or destroy any archaeological site(s), an authority (consent) from Heritage New Zealand Pouhere Taonga must be obtained for the work to proceed lawfully. The Heritage New Zealand Pouhere Taonga Act 2014 contains penalties for unauthorised site damage.

In addition to contacting Heritage New Zealand Pouhere Taonga, it is requested that you also contact Council's Monitoring Department at monitoring@waidec.govt.nz with the consent number, address of property and date of when works ceased.

4 Enforcement Action

Failure to comply with the conditions of consent may result in Council taking legal action under the provisions of Part 12 of the Resource Management Act (1991).

Schedule 2

Reasons for Decision

Resource Consent No: LUC0192/19

- I The actual and potential effects created by the proposal are acceptable because:
 - Storage sheds are common structures in the Rural Zone and will not adversely affect rural character and amenity.
 - The setback boundary infringement created by the proposal has been given written approval by the affected neighbour.
 - The visual effects created by the proposal will be indiscernible from neighbouring properties due to the building being located over 80m from the road, being unable to be seen from the road due to site topography and being screened by mature vegetation. The addition of the shed will not create an obvious addition to site coverage, given the existing site coverage breach.
- 2 The proposal is consistent with the objectives and policies of both the operative and proposed District Planning documents.
- 3 The proposal is consistent with the operative Waikato Regional Policy Statement and all other relevant matters.
- 4 Overall the proposal meets the purpose (section 5) and principles (sections 6-8) of the Resource Management Act 1991.

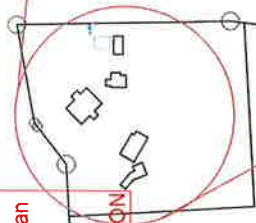
RESOURCE CONSENT

No. LUC0192/19

Approved by: Josh Caddigan

Date: 11/12/2018

NOT FOR CONSTRUCTION



Water runoff to be piped into 10,000 Lit Water tank.
Overflow to be piped into existing Swail.
[As per Stormwater Report Design]

KEY:



: Proposed 12m x 16m Kiwispan Shed



: Boundary



: Boundary



: Rural Zone 25m Boundary Setback

Revision History			Date
RevID	Chg	Change Name	

RM Developments Ltd



Kiwispān NZ Walkato

2/21 Ralside Place
Dinsdale
Hamilton
3204

Graham Singleton

Lot 1 - DPS 12627 & Lot 2 12627
635 Whatawhata rd
Whatawhata, 3285

Drawing Name

Site Plan

Drawing Status

Complete

Modified by

P Tagaloo

Date

Checked by

P Tagaloo

Date

Drawing Scale

1:5000, 1:100

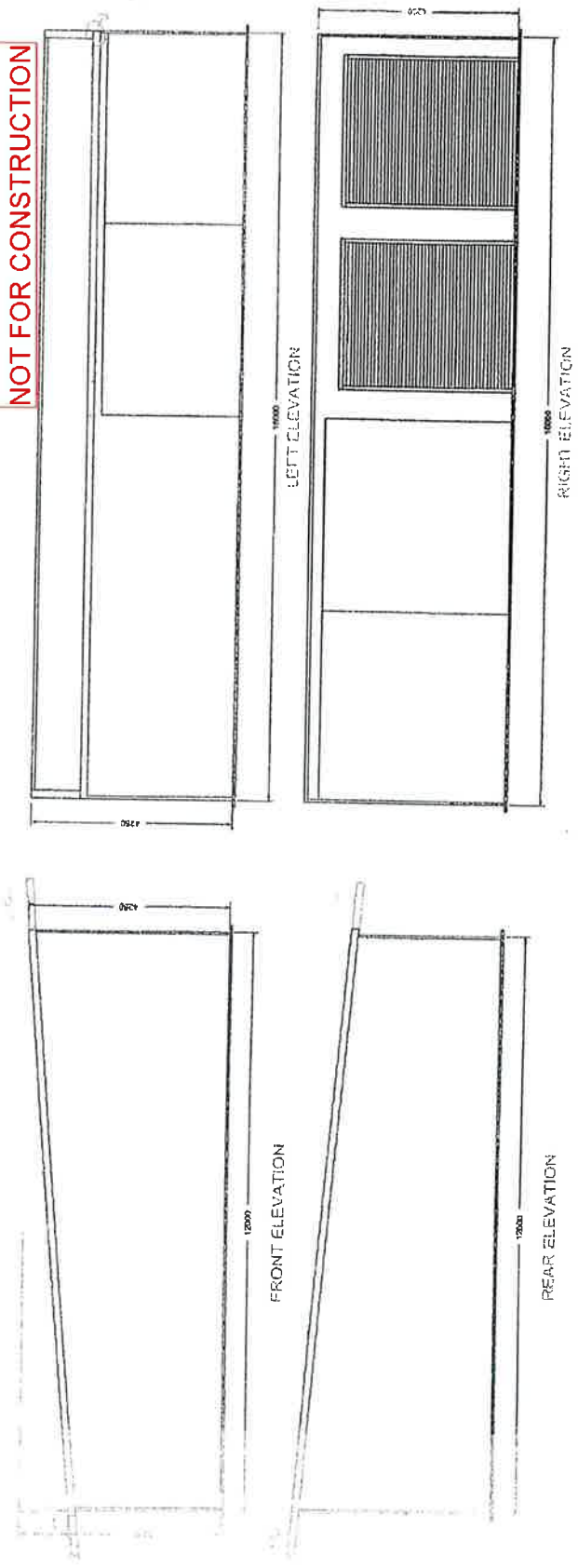
Layout ID

Revision

#LayID

#RevID

8/10/18
Study
RESOURCE CONSENT
 No. LUC0192/19
 Approved by: Josh Caddigan
 Date: 11/12/2018



NOT FOR CONSTRUCTION

PWA Development Ltd One Zia Gardens place Dunstable Hamilton Ph: (07) 055 5556 Email: info@pwa.co.nz		Elevations (All) Customer Name: Graham Ferguson Site Address: 635 Waiwera rd, Waiwera		Job Number: S-27180010142427 Date: 11/09/2016 Page Number:
Scale: 1:82 Original Size: A3				

G & S Singleton Heritage Ltd

635 Whatawhata Rd, DINSDALE

Stormwater Management Plan

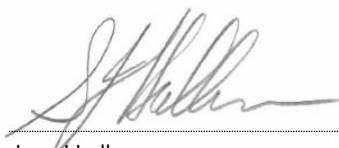
*M13246AP2
20 December 2019*

G & S Singleton Heritage Ltd

635 Whatawhata Rd, DINSDALE

Stormwater Management Plan

Prepared by:



Joe Hallam
Design Engineer

**Reviewed and Approved
for Release by:**



Phil Rielly
Director
Chartered Professional Engineer

Date: 20 December 2019
Reference: M13246AP2
Status: Final
Revision: NA
Previous Revision Date: NA

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Appendices –

1. Scheme plan showing flood extents
2. Golovin Flood report including Beca peer review and Golovin response
3. Road Flooding assessment
4. Extract from Australian Rainfall and Runoff
5. Reply to Beca Review 2

1. INTRODUCTION

G & S Singleton Heritage Ltd has applied to Waikato District Council (WDC) for subdivision consent. WDC have requested a Stormwater Management Plan be provided by the applicant. This plan describes the effects on stormwater quantity and quality arising from the residential development and proposes solutions for mitigating these effects.

The subdivision proposal allows for the creation of 10 new residential lots from an existing parcel that measures 45.6686ha. The underlying lot was previously a golf course and retains some features associated with that use. In particular, there are a number of ponds within the site and three of the lots have existing buildings. In general, the site is mainly grassed, with narrow belts of trees that formerly defined the bounds between holes.

The site is located at the head of a minor valley system that falls toward the North. The site itself occupies the eastern side of the valley, with a western aspect as the land rises to the east. On its north side, the site is bounded by State Highway 23, also known as Whatawhata Road. On all other sides, the abutting land is in mainly pastoral use with some low density residential.

Existing stormwater drainage is provided by open drains, with a main drain that runs north along the west boundary of the site to a 1.5m x 1.5m box culvert under SH23. Another open drain crosses the site from the eastern boundary approximately 70m north of Lot 1, discharging to the main northbound drain.

The site is exposed to external runoff from the abutting land. The combined catchments (both internal and external) amount to 256ha.

2. EFFECTS OF DEVELOPMENT

Typically, the main effect of introducing residential use within rural areas is increased runoff due to expansion of impervious areas. As well as the increased runoff, there is an increased risk of contaminants being introduced into the water cycle. In this development, however, the increase of the area of impervious surface is very small relative to the overall site, which will largely remain in a pastoral state on completion of the development.

Key effects are summarised below;

- a) Roofs - Of the 10 new lots to be created, 3 already have substantial buildings located on them. It is proposed to install roof water tanks to provide for domestic water use, which can be designed to provide attenuation of excess runoff. However, other impervious areas around dwellings, such as driveways and patios, may not be easily captured by rainwater tanks.
- b) Roads – existing roadways within the site are predominantly gravel, and it is anticipated that they will remain so as part of maintaining the rural character of the development.

Additional roading to provide access to most lots will be gravel formations. This amounts to approximately 3000m² of extra gravel formation. Gravel formations are relatively pervious (For Rational Method using NZBC:E1 Table 1, runoff coefficient $c = 0.50$). Using this method of assessment, the approximate net increase resulting from forming the gravel driveways is $3000 \times 0.5 = 1250\text{m}^2$, or 0.66% of the total site area. An increase of this magnitude is considered insignificant in terms of runoff.

Road runoff will discharge on to the extensive grassed reserved areas on either side of the formation as is the current situation.

- c) In the absence of any significant increase in runoff resulting from the development, the other effects to be considered are;
 - i. The potential hazards to the proposed residential uses, specifically inundation (of dwellings, wastewater disposal fields and access formation). Effects and mitigation methods are discussed in Sections 3 & 4 below.
 - ii. Erosion of earth worked slopes. Potential effects and methods of mitigation are discussed in Section 4 below
 - iii. Introduction of contaminants into downstream waterways. This will most likely occur from road formations. Water quality measures are discussed in Section 4 below.
- d) In summary, the effects of increased stormwater runoff are less than minor, while other issues relating to hazards or runoff water quality are addressed in Section 4 of this plan.

3. FLOOD RISKS

Given the extensive flat area and considerable external catchments, potential inundation risks arise which are discussed in this report. In particular, ensuring future dwellings and wastewater disposal fields are above any inundation by flood water in the valley bottom is critical to the success of the development.

Golovin have completed a flood analysis for the site and surrounding catchments. The analysis (attached at Appendix 2) determines flood levels for both 20year and 100year storm events, relative to proposed building sites and wastewater disposal fields. Note the report incorporates amendments resulting from a recent peer review.

Whilst the culvert performance has been analysed for the updated rainfall depths, there has been no assessment of the effects at the culvert outlet. That is because, in the context of this development comprising low impact stormwater management techniques, effectively any increase in predicted flow through the culvert is due only to the updated rainfall figures incorporating climate change factors, rather than as a result of the development effects.

- a) Tables 4.1 and 4.2 of the Golovin report summarise the critical flood levels pertinent to individual dwellings and wastewater disposal fields respectively.
- b) Figure 4.2 of the Golovin report shows the expected extent of flooding during a 100year storm which can be expected to inundate the existing main access road in two locations. Similarly, the proposed access corridor to Lot 7 will be affected.

Clause 3.3.14.1 k) of the Waikato RITS sets the maximum depth of “secondary flow” paths at 150mm. Clauses 3.3.14.10 and 4.2.3.4 further explain the definition of secondary flow. While it is not intended that the roadway be considered as a secondary flow path, the performance criteria are relevant to assessing the safety and functionality of the internal roading network during a severe rainstorm.

When considering the criteria as a whole, it is clearly envisaged that flows less than 150mm deep are considered acceptable. However, a road that floods frequently (e.g. annually or more frequent) would be somewhat of a nuisance to residents, and therefore it is recommended that primary flows (as defined in the RITS), be diverted in culverts under roads so as to keep the vehicle path free of water during the more frequent events up to a 10% AEP storm.

Additional analysis was done by Golovin to establish water flow depths and velocities for various Annual Exceedance Probability (AEP) rainfall events ranging from 100%AEP (1year Average Recurrence Interval or ARI) up to the 1%AEP (100year ARI) events which the report covers. The results for the critical areas are tabulated at Appendix 3.

The table shows minor flooding for Primary storm events of 10%AEP while for the most extreme of events, significant flood depths are predicted. Therefore, lifting of the road levels in the affected areas is necessary to meet the RITS criteria. Minor raising of road levels will have a less than minor effect on change to flow depths and velocities as modelled, especially in large storm events when the road levels will remain inundated as per the Golovin model.

At the time of detailed design, as well as considering depth and velocity individually, the product of the depth and velocity should also be assessed. This criterion provides a useful guide to safety for both humans and vehicles. This assessment is standard along much of the east coast of Australia, (refer to Ch 7.2 Book 6 Australian Rainfall and Runoff). Tables 6.7.3 and 6.7.4 of that publication provide respectively classifications of hazard levels and appropriate flow limits in terms of depth, velocity and depth times velocity. We conclude that H1 in Table 6.7.3 is appropriate for this development which requires a maximum depth x velocity of $0.30\text{m}^2/\text{s}$ for depths $<0.3\text{m}$.

In summary, it is recommended that where the existing road grade is to be lifted and a culvert installed, the design should ensure the overtopping flow ($>10\%$ AEP) shall comply with at least one of the above criteria. (either 150mm maximum depth or $0.30\text{m}^2/\text{s}$ depth x velocity)

- c) The peer review of the draft Golovin report sought clarification on potential surface flows from upstream catchment potentially affecting building floor levels. From examination of contour plans, Lots 1, 2, 4 -7 & 10 are all potentially exposed to runoff from higher land. Measures to prevent any adverse effects are discussed in Section 4.

4. STORMWATER MANAGEMENT APPROACH

This section outlines the proposed stormwater management approach to mitigate against the risks identified earlier in this report. The following points should be the basis for all earthworks and road grading designs.

Building immunity

- i. Recommended building floor levels are set 500mm higher than the highest water elevations (SH23 culvert 50% blocked). The recommended levels are incorporated in the Golovin report.
- ii. The potential for higher land to flood a building site can be addressed when building platform earthworks are designed. Proposed measures include;
 - 1. Diversion drains (especially above cut batters).
 - 2. Ensuring platform levels are at least 500mm above any adjacent flow path.
- b. Wastewater fields
 - i. These should be set above the relevant 20year flood levels as defined in Table 4.2 of the Golovin report.
- c. Road runoff
 - Water volumes
 - i. As mentioned earlier, with gravel roads it is unlikely that stormwater runoff volumes will increase to the extent that specific management measures would be necessary.

Water Quality

- ii. With roads to be gravelled allowing for rainfall losses to soakage through the pavement, the amount of TSS (Total suspended solids) and TPH (Total Petroleum Hydrocarbons) in residual surface runoff is not expected to be significant. Any road runoff will generally discharge to open space, which will be maintained as a combination of mown lawn and other vegetation, with a reasonably long travel time before entering the main outlet channel. The combined effect will provide for a significant amount of water quality improvement via overland flow filtration.
- d. Access security
 - i. Where inundation is predicted during severe storms, road levels will be lifted sufficiently to ensure that, during a 1%AEP event, surface flows on the access are limited to either a maximum depth of 150mm or a maximum flow/depth product of 0.30m²/s at a maximum depth of 0.30m
- e. Erosion of Earthworks Slopes – to be addressed with detailed design
 - i. Batter slopes for building platforms will be constructed in accordance with the Geotech Report recommendations. On completion, topsoil will be spread, and grass sown to stabilise the surface.
 - ii. Where analysis suggests earth worked slopes will be exposed to significant localised surface flows, diversion drains will be provided along the tops.

5. SUMMARY

The proposed development is rural in character, featuring very low density housing and extensive open space.

Existing infrastructure will be utilised extensively, with minimal new works mainly to create building platforms with attached wastewater effluent disposal fields. The increase of impervious area within the development will be insignificant in terms of increased runoff.

Some regrading of existing roads will be necessary to ensure reasonable and safe access during severe storms. The proposed access to Lot 7 will especially need to be raised relative the surrounding land where it crosses the main drain floodplain.

In summary, the effects of the development on surface water are less than minor while the risks of flooding to housing and infrastructure can be mitigated to ensure a less than minor effect.

6. BECA REVIEWS

Two Beca reviews received have informed this management plan. The second and final Beca review dated 8 November 2019 sought additional comment on nine (9) specific matters. The review prompted further reporting by Golovin author of the flood plain analysis report dated August 2019. The result of the additional analysis is contained in Appendix 5. This analysis replies to six (6) of the nine outstanding Beca queries. The remaining three (3) Beca queries were supplied by Cheal essentially requiring a planning reply rather than technical flood analysis. The additional Golovin flood plain analysis memo and planning replies were provided to Council on 5 December 2019. Council confirmed by email on 20 December 2019 that Beca has accepted the additional information provided thus satisfying all flood and stormwater matters.

7. DISCLAIMER

This Report has been prepared solely for the use of our client with respect to the particular brief given to Cheal Consultants Limited. No liability is accepted in respect of its use for any other purpose or by any other person or entity.

PHILIP BARRETT
CHEAL CONSULTANTS LIMITED
20 December 2019

Appendix 1

M13246 Rev 1 - Scheme
plan showing 100year flood
extents



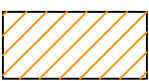
M13246

Proposed Easements

Purpose	Shown	Burdened Land	Benefitted Land
Right of way & Right to convey Water, Electricity, Gas, Computer Media & Telecommunications & right to Drain Water & Sewage.	A	Lot 10 hereon	Lots 1 to 7 hereon
	B	Lot 10 hereon	Lots 3 to 7 hereon
	C	Lot 10 hereon	Lots 5 to 7 hereon
	D	Lot 10 hereon	Lot 6 hereon
	E	Lot 10 hereon	Lots 3 hereon
Right to convey Water	F	Lot 2 hereon	Lot 10 hereon
Right to convey Electricity	G	Lot 8 hereon	Lots 9 & 10 hereon

Key

P - Pond



Area within which buildings/structure dwellings can be constructed.



100-year Flooding Level



50% Culvert Blockage

Contours - Waikato Regional LIDAR Service 2007 (WRLS 2007). LIDAR data sourced from Environment Waikato . COPYRIGHT RESERVED.

Contour Interval
Major Contour = 5m
Minor Contour = 0.5m

Aerial Photo is collected in February 2018.

Note: The Building Envelope within the land shown is all the land excluding the building setbacks specified in the Waikato District Plan.

Note: Areas & dimensions are subject to survey.

Zone: Rural Zone
Total Area: 45.6686 Ha.
Comprised in: SA10B/683 & SA10B/682
Registered Owner(s): G. & S. Singleton Heritage Ltd.

I, David Vernon McCracken, Registered Professional Surveyor, do hereby certify that this plan has been prepared by me for a Resource Consent under the provisions of the Resource Management Act 1991 and should not be used for any other purpose.

Registered Professional Surveyor _____ Date _____

Amendments

No	Activity	Date
1	Amend 100-year Flooding Line & 50% Culvert Blockage Extent	02/10/2019

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cheal



Proposed Subdivision of Lots 1 & 2 DPS 12627
635 Whatawhata Road, Dinsdale.

Prepared for:	G. & S. Singleton Heritage Ltd.	Sheet	1
Drawn	HC	Checked	Scales
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			File Ref M13246

Appendix 2

Golovin Flood Report
including Beca Peer
Review and Golovin
Response

GOLOVIN

FLOODPLAIN ANALYSIS

635 Whatawhata Road, Hamilton

October 2019

Graham and Sharon Singleton



Prepared by Dr Steven Joynes

FLOOD LEVEL ANALYSIS

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Person assigned to manage the Project & Report

Name Dr Steven Joynes

Organisation **GOLOVIN**

Distribution List

Name	Project Designation	Organisation
Dr Steven Joynes	Modeller	Golovin
Philip Barrett	Senior planner	Cheal Consultants Ltd

Revisions

Version	Date	Comment
1	May 2017	Original
2	October 2018	Typographical amendments
3	August 2019	Addendum added concerning culvert blockage
4	This report	Responding to Beca review and using the WRC Stormwater Run-off Guidelines

A handwritten signature in blue ink, appearing to read 'S. Joynes', with a long horizontal stroke extending to the left.

Prepared by

Dr Steven Joynes

1 INTRODUCTION

1.1 Statement of Issues

The client wishes build a number of dwellings on the former golf course. The land is prone to flooding due to its location and has a history of low-level ponding. The land is part of the catchment of Ohote Stream that is the eventual tributary of the Waipa River. It legal description is LOTS 1 2 DPS 12627 BLK I HAMILTON SD and measures just over 45 ha.

The flood levels need to be understood because the property has a number of potential house sites available. This report will determine minimum floor levels and the minimum level for the wastewater fields.

Figure 1.1 shows the property boundary. It also shows the main drainage route on the western boundary and the outlet location underneath the State Highway. Figure 1.2 shows the Lot locations.

Figure 1.1 – Property location

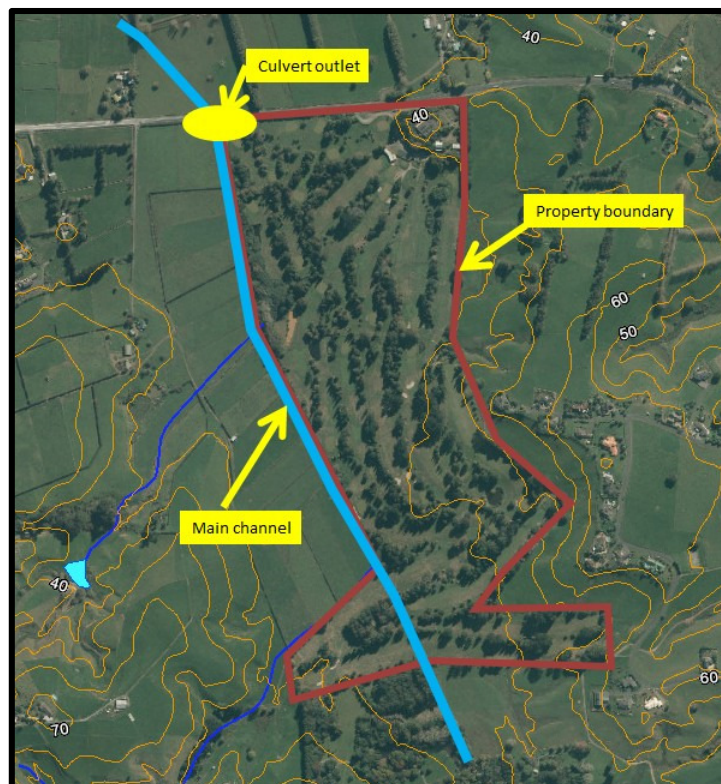


Figure 1.2 – Location of Lots



1.2 Proposed Strategy

The large catchment creates a reasonable sized floodplain. The hydrology will be calculated using the methodology required by the Waikato Regional Council and Waikato District Council. A hydraulic model will be used to calculate the floodplain levels based on LiDAR contours available and some site specific measurements at the proposed building Lots. The 100-year storm will be analysed to establish finished floor levels and the 20-year storm for the wastewater fields.

1.3 Target audience

The quality, quantity and tenure of the report should consider the following audience.

- a) Waikato Regional Council engineering staff,
- b) Waikato District Council engineering staff.

1.4 Previous Study

There is no known flood study of the catchment prior to this work.

1.5 Previous flooding

The severe storm in April 2017 flooded the lower parts of the property at the culvert. Video evidence showed the peak flood level reached RL23m, about 1m above the invert of the culvert. The extent of flooding suggested no greater flood level than RL23.2m in the flooded area upstream of the culvert. The Waingaro rainfall gauge suggested a 20-year return period for a 12 hour storm. Therefore a 100-year flood level would be in the vicinity of RL24m and not overtop the road.

1.6 Sources of data

Table 1.1 – Source of Data

Attribute	Organisation
Catchment plans & contours	Waikato Regional Council Maps
Cross-section extraction	LiDAR plots from McCracken Surveys Ltd
Flow & WL data	none

1.7 Reference Technical Documents

- Waikato Regional Council – TR2018/02 – Waikato Stormwater Runoff Modelling Guidelines.
- WLASS - Regional Infrastructure Technical Specification (RITS).
- Open Channel Hydraulics, V T Chow (1959)
- Australian Rainfall & Runoff, Book 6 (2019)

2 HYDROLOGY

2.1 Methodology

The analysis is both conveyance and storage driven due to the impedance of the culvert at the outlet. Therefore it is important to do a dynamic analysis of the system, not a steady-state peak flow analysis. The analysis was done using the following steps:

1. Delineate the catchment.
2. Use HEC-HMS to generate flow hydrographs.
3. Input in the HEC-RAS model.

2.2 Rainfall Data

The rainfall depth is determined from HIRDS. The 24 hour storm needs to be analysed. Figure 2.1 shows the 100-year rain depth is 177mm. This is slightly higher than the previous Hamilton City Council IFS value of 169.9mm. The 20-year rain depth is 132mm. These are the climate change values.

Figure 2.1 – HIRDS output

Rainfall depths (mm) :: RCP8.5 for the period 2081-2100									
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h
1.58	0.633	12.0	16.3	19.3	25.5	32.8	46.5	56.4	67.8
2	0.500	13.2	17.9	21.2	28.1	36.2	51.2	62.2	74.3
5	0.200	17.4	23.6	28.0	37.0	47.6	67.2	81.6	97.1
10	0.100	20.7	28.0	33.1	43.7	56.2	79.3	96.0	114
20	0.050	24.1	32.5	38.5	50.8	65.2	92.0	111	132
30	0.033	26.2	35.4	41.8	55.1	70.7	99.7	120	143
40	0.025	27.7	37.4	44.2	58.2	74.6	105	127	151
50	0.020	28.9	39.0	46.2	60.8	77.9	110	132	157
60	0.017	29.9	40.4	47.7	62.8	80.5	114	137	162
80	0.012	31.6	42.6	50.4	66.2	84.8	119	144	170
100	0.010	32.8	44.3	52.3	68.8	88.1	124	150	177
250	0.004	38.2	51.5	60.8	79.8	102	143	173	204

2.3 Future development

Examining the proposed Waikato District Plan sheet “Hamilton Environs 26” there appears to be no significant developments that will alter the run-off characteristic of the catchment.

2.4 Catchment Size

The catchment has been broken into four subcatchments which allows for the gradual input of flows. The areas are given in Figure 2.2.

Figure 2.2 – Catchment boundaries and areas



Table 2.1 gives data and calculation of the subcatchment time of concentrations using the Ramser-Kirpich method as per Section 7.3 of TR2018/02.

Table 2.1 – Time of concentrations

	North-west	North-east	South-west	South-east
Length (m)	1343	832	1225	1080
H (m)	47	37	57	57
Slope %	3.5	4.4	4.7	5.3
Tc	18	11	15	13

2.5 Curve Number

Curve numbers are based on S-Maponline provided by Manaaka Whenua (Landcare Research). Figure 2.3 shows the soil drainage characteristics within the four catchments. The lower floodplain area is poorly drained while the upper reaches are imperfect or well-drained.

Figure 2.3 – HEC-HMS Model

Corresponding to Section 5.3 of TR2018/02, the soil types used in this analysis are:

Group B for well-drained soil,

Group C for imperfect,

Group D for poorly drained.

The percent area of each soil type was then calculated and a final curve number was calculated based on Table 5.2 of TR2018/02. Table 2.2 shows the details.

Table 2.2 – Curve number derivation

	Catchment			
	NW	NE	SW	SE
Soil make-up				
Group B	40%	20%	50%	30%
Group C	20%	0%	50%	65%
Group D	40%	80%	0%	5%
Curve number category (Table 5.1, TR2018/02) using fair hydrological condition				
Group B	69	69	69	69
Group C	79	79	79	79
Group D	84	84	84	84
Curve number	77	81	74	76
Ia (Table 5.1, TR2018/02)	3.8	3.0	4.5	4.0

2.6 HEC-HMS modelling

A HEC-HMS model was built to generate hydrographs. Figure 2.4 shows the simple layout and the rainfall hyetograph required according to Section 4.1 TR2018/02. Figure 2.5 shows the run-off hydrograph for the north-west subcatchment. Finally Figure 2.6 shows the peak flow summaries from HEC-HMS for the two storm return periods.

Figure 2.4 – HEC-HMS Model

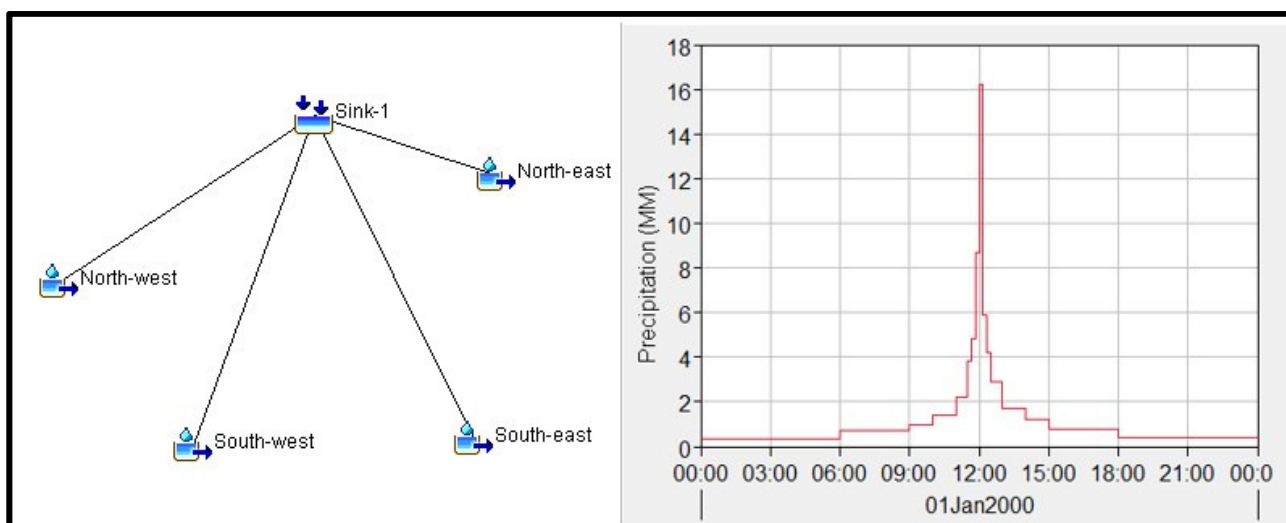


Figure 2.5 – Flow hydrograph, 100-year storm for north-west subcatchment

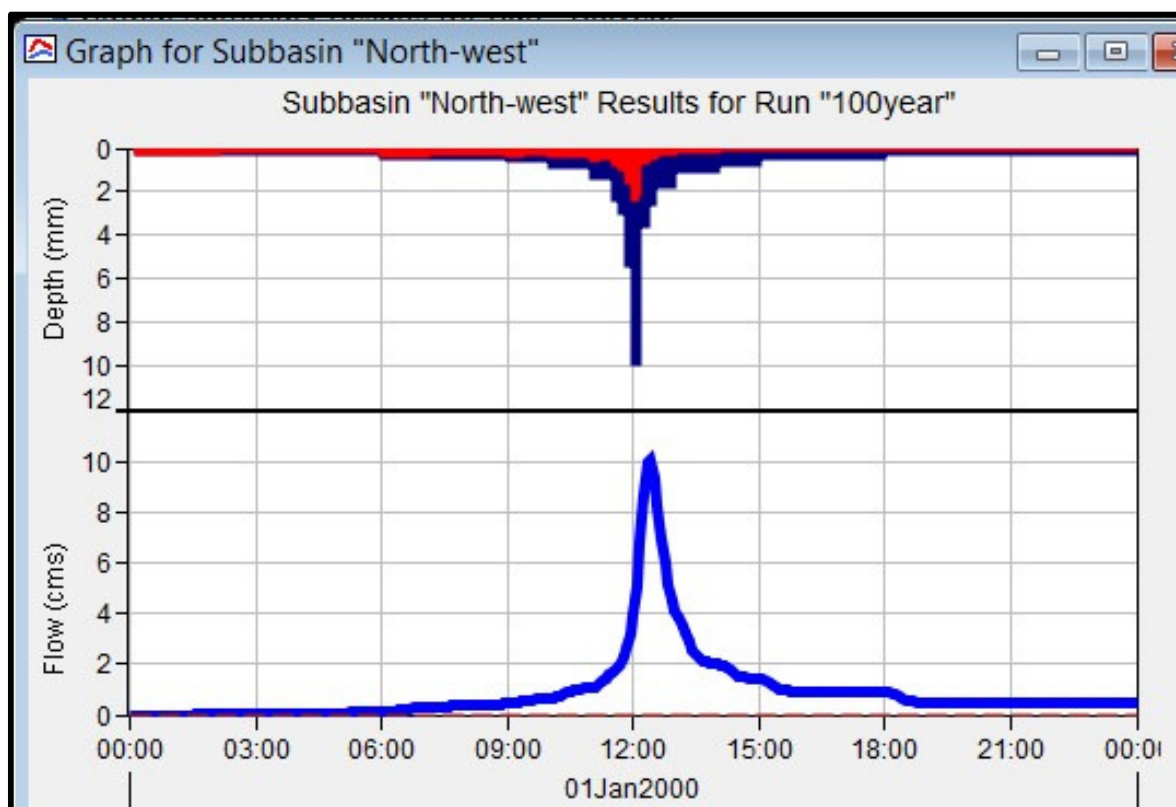
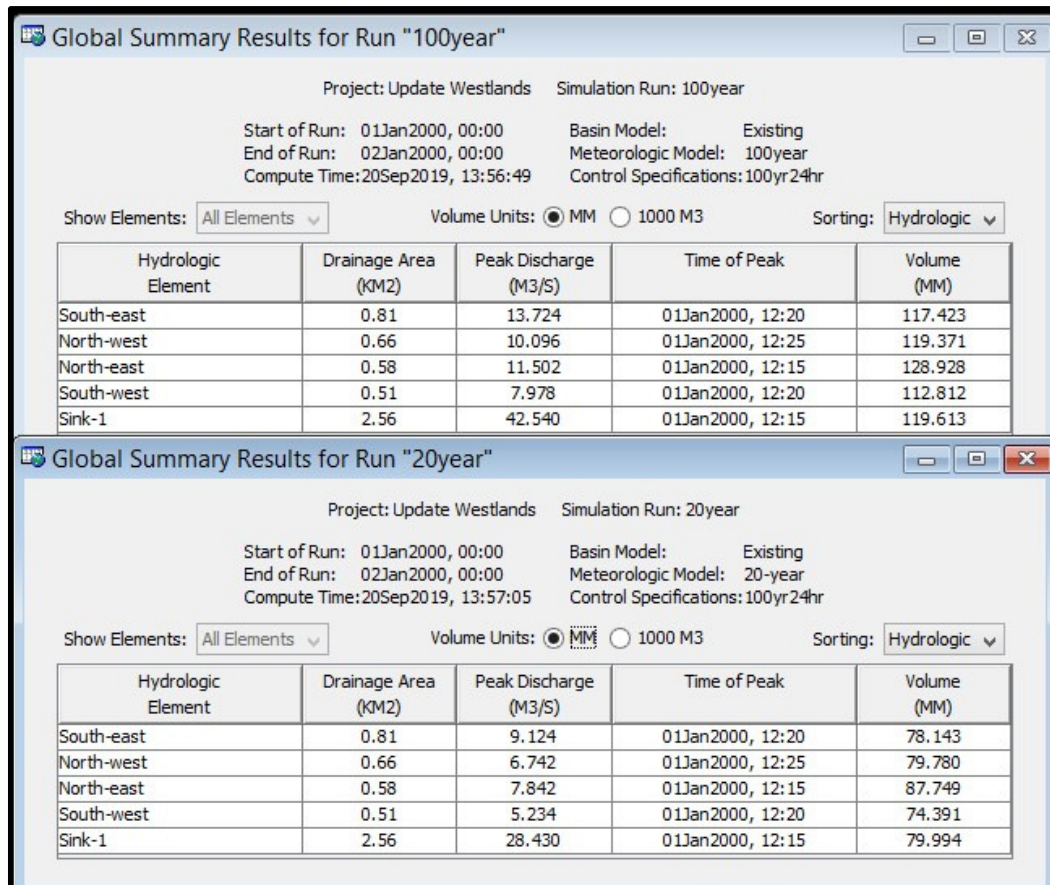


Figure 2.6 – Peak flow summaries for 20- and 100-year storms



3 HYDRAULIC ANALYSIS

3.1 Model Layout

HEC-RAS software was used to generate flood levels. The 1D model setup is shown in Figure 3.1. The cross-sections have been extrapolated from the LiDAR 0.5m contours. The cross-sections were specific chosen to reflect restrictions in flows between contours and the structures. However cross-sections were also interpolated at minimum of 25m. A 1m deep 1m wide drain was added for the whole length. The culvert under the State Highway is 1.5m square at an invert of RL22m. The floodplain bed roughness has been set to Manning's $n = 0.05$, a compromise between a good flowing main channel, shrubs on the edge of the stream and open grass paddocks. The reference is Open Channel Hydraulics, Ven Te Chow (1959).

Figure 3.1 – HEC-RAS model set up

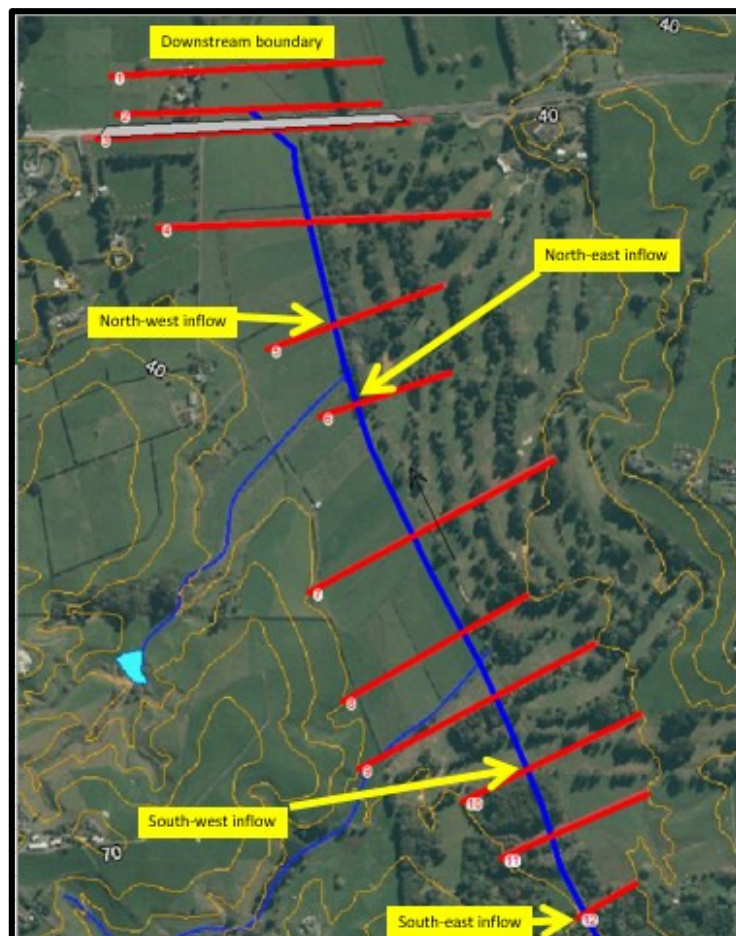
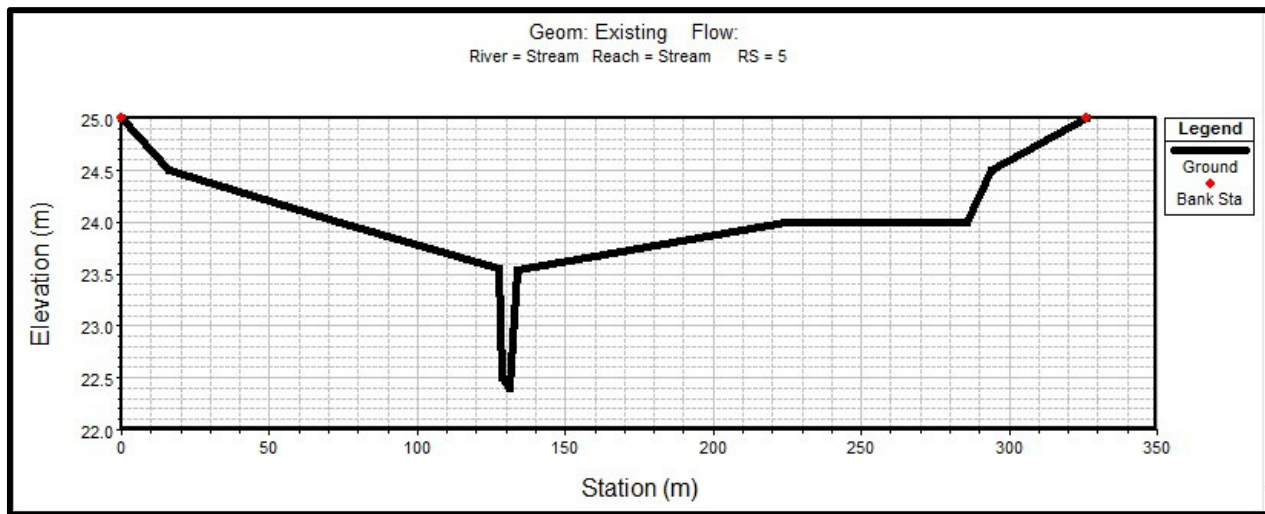


Figure 3.2 shows the cross-section at RS5 at the point of inflow for the north-west subcatchment.

Figure 3.2 – Cross-section RS5



3.2 Downstream boundary control

The downstream boundary (RS1) is a wide open floodplain with unrestricted flows. Instead of using a fixed boundary a normal flow boundary was used. This had a grade of 0.007 based on a bed drop of 0.5m over 72m. In fact the State Highway impedes the catchment flow and protects the downstream paddocks from flooding.

3.3 Floodplain hydraulic profile

Figure 3.3 shows the hydraulic grade-line for the whole reach. There is a uniform flow until RS6 where the effect of the culvert creates a flat hydraulic grade. The 100-year peak level at the culvert is RL24.6m.

Figure 3.4 shows the flow and water level hydrographs of RS5 and RS3. RS5 was chosen because it represents the highest flows where all subcatchments are contributing. RS3 is just upstream of the culvert. It is shown that the culvert reduces the floodplain flow (green-dashed line) from about 21m³/s to 6m³/s. The duration of the flows are affected as well with the culvert discharging over a good 12 hours compared to just 1-2 hours upstream. All this is expected due to the attenuation of the floodwaters.

Figure 3.3 – Hydraulic grade-line for the 100- and 20-year flows

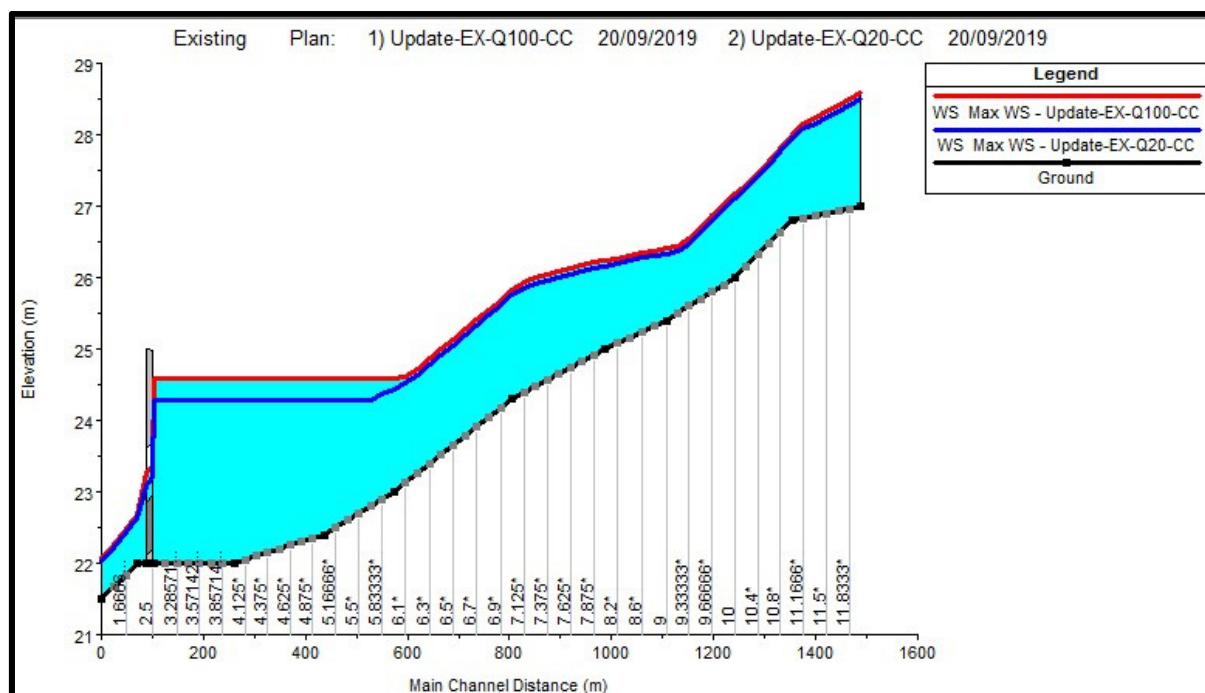
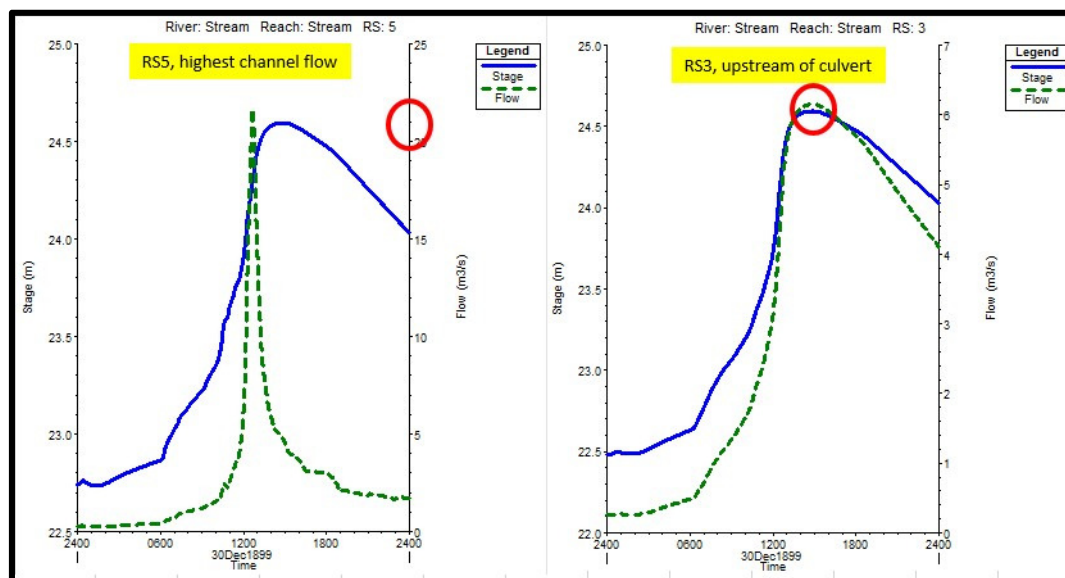


Figure 3.4 – Hydrographs to show attenuation of peak flows



3.4 Effect of a rougher floodplain

The bed roughness was increased from 0.05 to 0.1. The increase in flow depth for the 100-year storm was 100mm or less. down to RS6. Downstream of RS6 it made no difference to the water level.

4 CULVERT BLOCKAGE

This section relates to an earlier Section 32 request from Waikato District Council. It reads

Steven to consider

3(b) above - Specifically we need to understand the flooding effect of the culvert under the road being blocked, however unlikely, on the proposed building platforms. What would the wastewater field levels look like now and any change should the culvert block.

There are 3 items within this statement

1. Effect of culvert blockage
2. New building platforms and/or locations
3. The wastewater fields locations based on flood levels

4.1 Effect of culvert blockage

The RITS have no criteria of blockage when examining flood risk. The two references to determine blockage are The Auckland Council's *COP for Land and Subdivision – Stormwater Chapter 4, Version 2.0*. It states

- g) A secondary flow path shall be kept unobstructed at all times. The secondary flow path design shall assume the total blockage of the culvert in cases where it is less than 1500mm in diameter, and 50% blockage of the culvert where it is greater than or equal to 1500mm in diameter.

The Australian Rainfall and Run-off (ARR Project11, Book 6, Chapter 6 Blockage of hydraulic structures, 2019) has a more detailed analysis based on a number of risk factors. The risk is Low based on a low-low-low criteria for

Debris Availability

Well maintained rural lands and paddocks with minimal outbuildings or stored materials in the source area.

1. Streams with moderate to flat slopes and stable bed and banks.
2. Arid areas where vegetation is deep rooted and soils are resistant to scour.
3. Urban areas that are well maintained with limited debris present in the source area

Debris Mobility

1. Low rainfall intensities and large, flat source areas.
2. Receiving streams infrequently overtops their banks.
3. Main debris source areas well away from streams

Debris Transportability

1. Flat bed slopes ($< 1\%$).and/or low stream velocity ($V < 1\text{m/sec}$)
2. Shallow depth relative to vertical debris dimension ($D < 0.5L_{10}$)
3. Narrow stream relative to horizontal debris dimension ($W < L_{10}$)
4. Stream meanders with frequent constrictions/snag points.
5. Low temporal variability in maximum stream flows

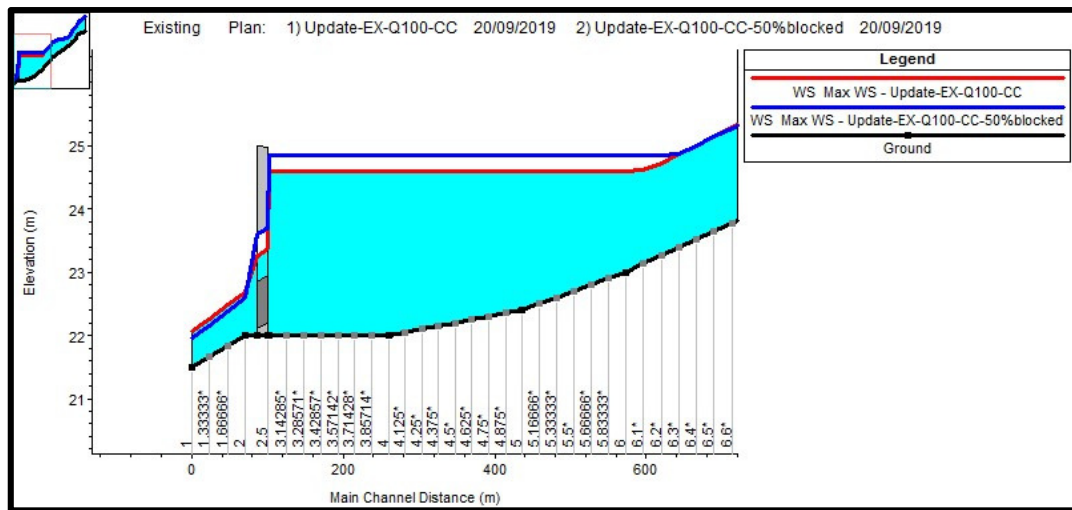
The analysis indicates that for a 100-year event the blockage for the inlet and sediment is 0%.

Therefore taking the worst-case of the two methods the 1.5m square culvert is an equivalent 1.7m barrel and the Auckland method might suggest 50% blockage.

The hydraulic model was re-run with the 100-year storm and the bottom 0.75m of the culvert blocked.

Figure 4.1 shows the hydraulic profiles along the reach comparing the non-blocked and 50% blocked. The 50% blockage effects cross-sections just upstream of RS6. The increase in water level at the culvert is 0.2m. The flow is decreased from $6.2\text{m}^3/\text{s}$ to $3.6\text{m}^3/\text{s}$.

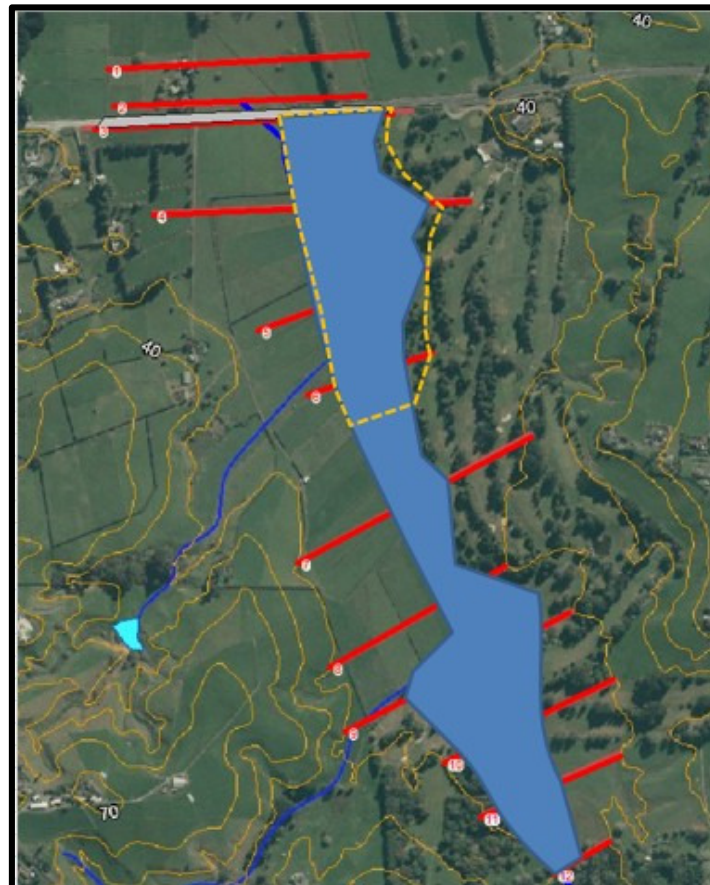
Figure 4.1 – Hydraulic grade-line comparing a 50% blockage



4.2 Floodplain

Figure 4.2 shows the floodplain for the 100-year event and the impact of the 50% blockage shown with a dashed line. The extra aerial extent is perhaps no greater than 10%.

Figure 4.2 – Change in floodplain width for 50% blockage near the culvert



4.3 Minimum finished floor levels

Table 4.1 gives the minimum finished floor. Based on the estimated ground levels the new dwellings are above the freeboard requirement of 500mm even when the culvert is 50% blocked.

Table 4.1 – Minimum finished floor levels

Lot number	Model RS	Estimated flood level RL(m)		Minimum finished floor level RL(m)	Surveyed ground level RL(m)
		No blockage	50% blockage		
1	6	24.6	24.8	25.1	25.5
2	7	25.8	25.8	26.3	29.0
3	8	26.2	26.2	26.7	32.0
4	7	25.8	25.8	26.3	30.0
5	9	26.4	26.4	26.9	28.0
6	11	28.0	28.0	28.5	34.0
7	9	26.4	26.4	26.9	28.9
8	4	24.6	24.8	25.1	40.0
9	4	24.6	24.8	25.1	28.0
10	8 & 9	26.3	26.3	26.8	28.5

4.4 Wastewater field data

The wastewater field for each Lot must be above the 20-year flood-line. Assuming the wastewater fields are adjacent to the building within the Lot then Table 4.2 gives the minimum level required

Table 4.2 – 20-year flood levels for wastewater fields

Lot number	Model RS	20-year flood level RL(m)
1	6	24.4
2	7	25.8
3	8	26.2
4	7	25.8
5	9	26.3
6	11	28.0
7	9	26.3
8	4	24.3
9	4	24.3
10	8 & 9	26.3

5 SUMMARY

Flood modelling has been undertaken to calculate the 100-year flood levels for the whole property along the drainage channel to establish the minimum floor levels. The 20-year flood was analysed for the wastewater fields.

Utilising HEC-HMS, four hydrographs were generated and input into a 1D hydraulic model. The model included the state highway culvert which attenuated the flows from 21m³/s to 6m³/s.

Table 4.1 provides details of finished floor levels for each of the proposed building sites and Table 4.2 shows the minimum level for the wastewater fields.

Westlands Subdivision Response to Beca Review

Item No.	Comment (WDC/Beca)	Response from Dr Steven Joynes
1	We note that Waikato Regional Council's Runoff Modelling Guide (2018) was not used for the hydrology. Please comment on the difference this could make to the flood results and if WRC are satisfied with the method used. We note WDC's preference is to remain consistent with WRC and their method is more recent than HCC's method.	I have updated the work for the new methodology
2	What consideration was made for post development impacts on flood levels? Including external future catchment development contributing to flooding (or document why this is not relevant), from the change in land-use (impervious surfaces, site compaction etc) of the site itself and allowance for climate change increases. We note this may impact on setting floor levels, or alternatively it would show the proposed developments insensitivity to these issues. Either way it needs to be documented.	See Sections 2.2 and 2.3
3	The report notes that flood levels were compared to a video of historic flooding (referenced on page 2) and that this supports the model validation. Please include screen captures of the video in the report commentary to help support this statement.	I don't have video any more. Need to talk to owner. The report cover shows the flooding upstream of the culvert.
4	Section 1.7 references Hamilton City Infrastructure Specifications? Do you mean the RITS? HCC's ITS is no longer valid and HIRDS should be used for rainfall data. Please update for this.	This has been remedied
5	Later Figures in the report note 10yr ARI data. If the 10yr ARI is intended to be reported on (and we note this event is not relevant for setting of floor levels as is	This has been remedied

	the stated as the purpose of the model), then please include 10yr ARI rainfall, flows, HGL information etc. If not, then delete.	
6	A map displaying roads/accessways would be helpful, as would a topographical map to give more context to the above levels, and subsequently the rest of the report. That is, we suggest the survey plans are included as an Appendix.	In Stormwater Management Plan by Cheals
7	The Tc's have been rounded up to 20mins. It would be more appropriate to take a more conservative Tc than what rounding up gives. Increasing the Tc will reduce the peak flow rates. Please clarify or show that this would not have a significant impact on flood levels.	This has been remedied. Actual Tc's used.
8	Please expand on the hydrology section to include parameters used (losses, % impervious, CN etc).	This has been remedied, see Section 2.5.
9	We assume this is 1D model only? Please clarify in the report.	Yes
10	Was any topographic survey used for the stream sections, culvert and to check consistency of the LiDAR? We assume so but this should be noted in the report (similar for confirmation of the downstream culvert size).	No survey as such as the flow is predominantly out of channel. The stream dimensions were measured on site.
11	The model does not contain many cross sections. Was the interpolation function in RAS used in the model but not stated in the report?	Yes
12	Floodplain bed –please clarify whether the Manning's roughness for the "floodplain" bed is applied to the whole section (i.e. the channel). It appears that the floodplains to the east have more trees than the west. Please comment on the implications on roughness of this. Also how were the channel roughness values selected (i.e what references were used etc)? How sensitive are flood levels to underestimating roughness? A sensitivity run would show this.	Used a Manning's n of 0.05 throughout the cross-section. If the stream was modelled differently it would, technically, be smoother so this method is conservative. Given the bottom end is flooded it would not make a difference given the scale. Also see Section 3.4

13	Section 3.2 first paragraph –wording is unclear. Please revise	This has been remedied
14	The downstream boundary location is not show on map. Please show and clarify this is sufficiently far enough downstream i.e. there are no further controls downstream that could influence the culvert performance.	This has been remedied. Site inspection shows that downstream controls will be irrelevant. A Normal slope is fine and is shown by the HGL to fine due to the upstream flood levels.
15	Downstream boundary slope is set at 0.1%. Please clarify how this was calculated and applied to the model. Figure 3.3 shows what appears to be a much steeper slope of 0.42. Downstream contours used to calculate a slope over 540m found it to be 0.007 (0.7%).	This has been remedied. See Section 3.2.
16	Figure 3.4/3.5 please update. The legend/labels to state 10yr and 100yr flows/HGL are shown but are not in the figure. Figure 3.4 are not HGL plots.	These have been remedied
17	Cross sections. Please confirm these all extend beyond the flood extents	Yes
18	Upstream overland flows need to be considered in setting floor levels. Alternatively, it needs to be shown that this does not dominate in setting flood levels. Presumably this would be addressed in the Stormwater Management Plan (i.e. not need modelling).	In Stormwater Management plan by Cheals
19	Freeboards noted are 500mm and will comply provided the above issues do not increase flood levels and freeboard is taken from flood level to underside of slab/floor joist. This will need to be shown on any plans submitted for approval.	FFLs have been adjusted accordingly in Table 4.1
20	Addendum –wastewater fields locations based on flood levels has not been addressed, although this is not a flood issue so is just noted here for WDC to act on as required. Presumably this has been addressed by the applicant separately.	In Table 4.2.
21	Figure 5.2 –Show legend	Deleted

22	Table 5.1 mentions new lots. Please include an image to show location of these new lots relative to floodplain and other proposed lots.	Deleted
23	Paragraph below Table 5.1 is a incomplete.	Deleted
24	Reference to AR&R Project 11 Stage 3 2015 was made. The most up to date AR&R guidelines are Book 6, Chapter 6, released in 2019. Please review and update reference.	This has been remedied
25	We expect the SMP will cover checking the impacts of development on neighbouring properties and compliance with the Waikato Regional Plan, amongst other issue. A comment only, no action/response required.	Okay, not in my report

Appendix 3

Road Flooding Assessment

Section No	Scenario	Q Total	Min Ch El	W.S. Elev	Typical G L	Vel Chnl	Depth		V x D	
Fig 4.2 Golovin Report		(m ³ /s)	(m)	(m)	(m)	(m/s)	main (m)	channel (m)	main (m ² /s)	channel (m ² /s)
		Topo levels are generally around 26.8					ideally less than 0.3m ² /s at a depth			
10	Update-EX-Q100-CC	13.54	26	27.18	26.8	0.47	0.38	1.18	0.2	0.55
10	Update-EX-Q20-CC	8.96	26	27.1	26.8	0.44	0.30	1.10	0.1	0.48
10	Update-EX-Q100-CC-50%blocked	13.54	26	27.18	26.8	0.47	0.38	1.18	0.2	0.55
10	Update-EX-Q100-CC-rougher	13.33	26	27.3	26.8	0.29	0.50	1.30	0.1	0.38
10	Update-EX-Q10-CC	7.2	26	27.07	26.8	0.43	0.27	1.07	0.1	0.46
10	Update-EX-Q1-CC	3.02	26	26.96	26.8	0.4	0.16	0.96	0.1	0.38
10	Update-EX-Q5-CC	5.63	26	27.04	26.8	0.4	0.24	1.04	0.1	0.42
		Area of Lot 7 access , topo levels are generally under 26.0								
9	Update-EX-Q100-CC	20.77	25.4	26.41	26	0.32	0.41	1.01	0.1	0.32
9	Update-EX-Q20-CC	13.51	25.4	26.32	26	0.27	0.32	0.92	0.1	0.25
9	Update-EX-Q100-CC-50%blocked	20.77	25.4	26.41	26	0.32	0.41	1.01	0.1	0.32
9	Update-EX-Q100-CC-rougher	19.3	25.4	26.55	26	0.21	0.55	1.15	0.1	0.24
9	Update-EX-Q10-CC	10.65	25.4	26.28	26	0.21	0.28	0.88	0.1	0.18
9	Update-EX-Q1-CC	4.49	25.4	26.14	26	0.19	0.14	0.74	0.0	0.14
9	Update-EX-Q5-CC	8.98	25.4	26.25	26	0.24	0.25	0.85	0.1	0.20
		Topo levels are generally around 26.0								
8	Update-EX-Q100-CC	19.74	25	26.24	26	0.31	0.24	1.24	0.1	0.38
8	Update-EX-Q20-CC	13.08	25	26.16	26	0.29	0.16	1.16	0.0	0.34
8	Update-EX-Q100-CC-50%blocked	19.74	25	26.24	26	0.31	0.24	1.24	0.1	0.38
8	Update-EX-Q100-CC-rougher	18.14	25	26.37	26	0.2	0.37	1.37	0.1	0.27
8	Update-EX-Q10-CC	10.38	25	26.13	26	0.26	0.13	1.13	0.0	0.29
8	Update-EX-Q1-CC	3.91	25	25.99	26	0.32	-0.01	0.99	0.0	0.32
8	Update-EX-Q5-CC	8.75	25	26.11	26	0.24	0.11	1.11	0.0	0.27
		Topo levels are generally around 24.0								
5	Update-EX-Q100-CC	4.73	22.4	24.59	24	0.02	0.59	2.19	0.0	0.04
5	Update-EX-Q20-CC	3.84	22.4	24.28	24	0.04	0.28	1.88	0.0	0.08
5	Update-EX-Q100-CC-50%blocked	2.71	22.4	24.84	24	0.01	0.84	2.44	0.0	0.02
5	Update-EX-Q100-CC-rougher	4.77	22.4	24.59	24	0.03	0.59	2.19	0.0	0.07
5	Update-EX-Q10-CC	3.55	22.4	24.15	24	0.05	0.15	1.75	0.0	0.09
5	Update-EX-Q1-CC	4.38	22.4	23.78	24	0.29	-0.22	1.38	-0.1	0.40
5	Update-EX-Q5-CC	3.39	22.4	24.05	24	0.07	0.05	1.65	0.0	0.12

Topo levels are generally around 23.9

4 Update-EX-Q100-CC	6.15	22	24.59	23.9	0.02	0.69	2.59	0.0	0.05
4 Update-EX-Q20-CC	5	22	24.28	23.9	0.03	0.38	2.28	0.0	0.07
4 Update-EX-Q100-CC-50%blocked	3.63	22	24.84	23.9	0.01	0.94	2.84	0.0	0.03
4 Update-EX-Q100-CC-rougher	6.15	22	24.59	23.9	0.02	0.69	2.59	0.0	0.05
4 Update-EX-Q10-CC	4.53	22	24.15	23.9	0.02	0.25	2.15	0.0	0.04
4 Update-EX-Q1-CC	3.05	22	23.69	23.9	0.07	-0.21	1.69	0.0	0.12
4 Update-EX-Q5-CC	4.15	22	24.04	23.9	0.04	0.14	2.04	0.0	0.08

Appendix 4

Extract from Australian
Rainfall and Runoff

Table 6.7.3. Combined Hazard Curves - Vulnerability Thresholds (Smith et al., 2014)

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

Table 6.7.4. Combined Hazard Curves - Vulnerability Thresholds Classification Limits (Smith et al., 2014)

Hazard Vulnerability Classification	Classification Limit (D and V in combination)	Limiting Still Water Depth (D)	Limiting Velocity (V)
H1	$D \times V \leq 0.3$	0.3	2.0
H2	$D \times V \leq 0.6$	0.5	2.0
H3	$D \times V \leq 0.6$	1.2	2.0
H4	$D \times V \leq 1.0$	2.0	2.0
H5	$D \times V \leq 4.0$	4.0	4.0
H6	$D \times V > 4.0$	-	-

Appendix 5

Reply to Beca Review 2

Response to Stormwater Management Plane Issues

Westlands Subdivision

A meeting was held on Monday 25th November 2019 to discuss the nine issues raised by the Beca Review. This is a summary of the extra work undertaken by Golovin.

ITEM 1

- *Impact of the extra imperviousness of the development.*

The development is in the north-east subcatchment. The Cn value is 77 and Initial abstraction 3.8mm. However when the development imperviousness was included the Cn value is 77.3 and the initial abstraction 3.7mm. This is based on the following assumptions.

- Each house footprint is 300m² (total of 3,000m²)
- Each driveway away is 100m² (total of 1,000m²)
- The road-way is 1.3km long and 4m wide.

The total estimated area of imperviousness is 9,200m² and the total catchment is 0.66km².

HEC-HMS was re-run to generate a new hydrograph for north-east and input into HEC-RAS. The peak flow increased from 10.10 to 10.15m³/s. The volume increase was from 78,790m³ to 79,250m³ (460m³).

The new flood level at the downstream ponding area upstream of the culvert did not change compared to the un-developed scenario reported earlier. Figure 1 shows a screenshot from HEC-RAS for the lower ponding area. At RS5 the flood level is RL24.84m for both. The scenario is for a 50% blocked culvert with climate change rain.

Another scenario was run with the existing land-use and historical rain depth. The 24-hour rain depth is 145mm. For this scenario the flood level dropped by 0.46m at RS5.

In conclusion the impact of climate change will affect the flood levels by about 0.5m at the ponding area while the development will have no impact.

Figure 1 – Comparison of flood levels in lower area, existing and proposed land-use

Reach	River Sta	Profile	Plan	Q Total (m ³ /s)	Min Ch El (m)	W.S. Elev (m)
Stream	6	Max WS	Update-EX-Q100-CC-50%blocked	1.87	23.00	24.84
Stream	6	Max WS	Update-Q100DEV-B	1.90	23.00	24.84
Stream	5	Max WS	Update-EX-Q100-CC-50%blocked	2.71	22.40	24.84
Stream	5	Max WS	Update-Q100DEV-B	2.71	22.40	24.84
Stream	4	Max WS	Update-EX-Q100-CC-50%blocked	3.63	22.00	24.84
Stream	4	Max WS	Update-Q100DEV-B	3.63	22.00	24.84
Stream	3	Max WS	Update-EX-Q100-CC-50%blocked	3.63	22.00	24.84
Stream	3	Max WS	Update-Q100DEV-B	3.63	22.00	24.84
Stream	2.5			Culvert		

ITEM 2

• Rainwater tank attenuation

The volume generated due to the development for the 100-year storm is 460m³. The house contribution is 150m³, the driveway contribution is 50m³ and the roadway is 260m³. Itemised this is 15m³ per house, 5m³ per driveway and 0.2m³/m run for the roadway.

Although the extra run-off generated will not affect flood levels in the WRC drain as shown in Item 1, there is a case for 15m³ (above ground) and 5m³ (below ground) detention tanks for each new house. If the 10-year storm is the design criteria is required the volumes will be generally 10% less. It is however understood that the owner wants to create a sustainable development and water tanks will be used for retention anyway.

ITEM 3

- *Road run-off treatment*

The estimated extra run-off from the roadway is 0.2m³ per m length over a 24-hour period. It is understood that plantings on the drain side of the roadway will be undertaken to absorb this extra volume and encourage soakage and improve water quality. Agreed that it can be finalised at Engineering Approval stage.

ITEM 4

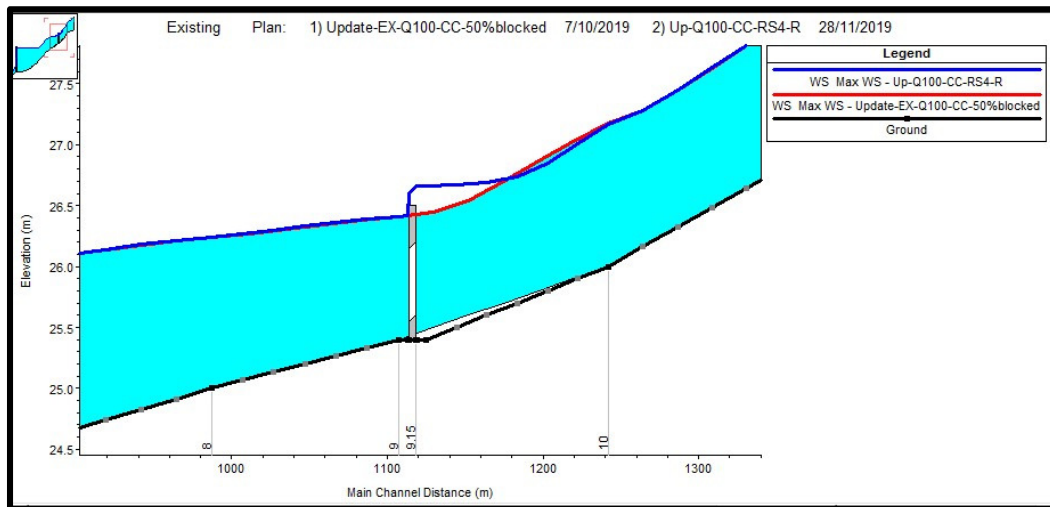
- *The effect of the ROW. Does it flood in the 100-year event? If it needs to be built up what impact does it have on the floodplain?*

There are two locations where the roadway is within the 100-year floodplain. It is Waikato District Council desire that the roadway be at or above this level.

At the northern end in Lot 10 the general cross-section is RS4. The 100-year level is RL25m. Based on LiDAR the typical ground level is RL24m. Therefore it would seem that the roadway needs to be built up to RL25m. This creates a 1m barrier for the flood to spread. To assess the effect of this barrier RS4 was amended. This was by reducing the width by 30m and creating a vertical wall in the HEC-RAS model. This caused the 100-year, climate change, 50% blocked culvert, water level to rise by 30mm. This suggests the finished floor level for Lot 1 should be raised by 30mm.

For Lot 7 the driveway cuts across overland flows. The ground level is about RL26m and the flood level is RL26.4m. This suggests a 400mm raising of the driveway. This may have an impact for the neighbours at Lot 39 DPS 76270 and Lot 1 12807. RS9 was adjusted by inserting a nominal 600mm culvert and driveway at RL26.5m. Figure 2 shows the change in HGL. Although the water level rises to get over the driveway the influence at RS10 diminishes to zero. This location is the neighbouring upstream boundary.

Figure 2 – Lot 7 raised driveway HGL



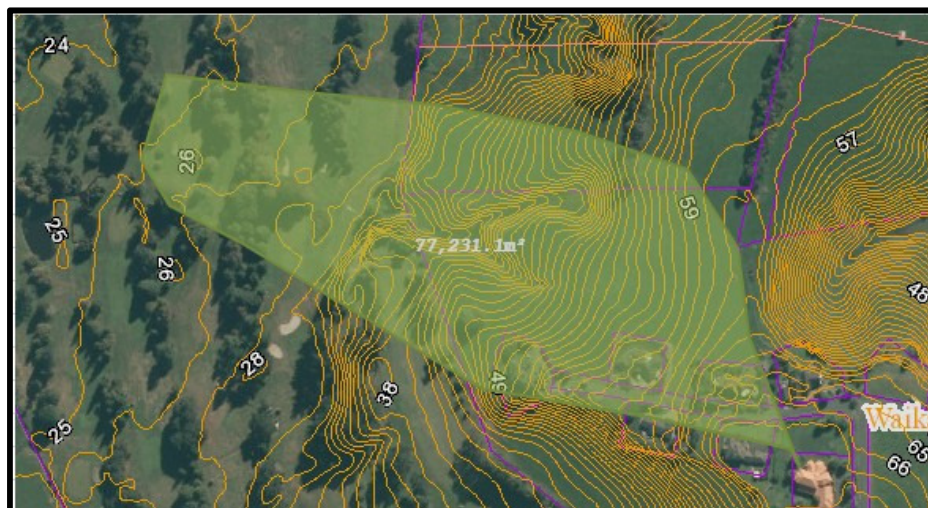
In conclusion, raising the roadway in Lot 10 requires the FFL of Lot 1 to be raised by 30mm. Within Lot 7 a culvert needs to be under the driveway to drain the area but its design and raised driveway does should not affect neighbouring properties.

ITEM 5

- *Impact for each of the proposed house locations by the overland flowpath. Do the FFLs need to be raised above “normal” ground levels?*

The catchments for Lots 1 and 7 were analysed. The lot 1 catchment is the largest example for houses in Lots 2, 3, 4, 5 and 10. While Lot 7 has a catchment size based on the adjacent drain. These are shown in Figures 3 and 4.

Figure 3 – Lot 1 subcatchment



A topographic map of a hillside with yellow contour lines. A green shaded area is overlaid on the map, with a label '248 123.8m²' in the center. The map shows various elevation points and contour lines, with some areas shaded in green and others in yellow. The map is oriented with North at the top.

Figure 5 shows the calculations. For Lot 7 we have to account for the drain on the northern side. The estimated capacity is about $1\text{ m}^3/\text{s}$. This means the overland flow for Lot 7 is $0.421\text{ m}^3/\text{s}$. By adjusting the flow width the FOS for the 100mm depth can be adjusted.

At Lot 1 if the flow width is 24m or more the depth of flow is less than 100mm. For Lot 7 it is 23m. Close examination of the ground profiles there is no concentration of flows but general sheet flow. The widths of the Lots are about 40-50m and therefore the flow depths will be less than 100mm and the allowance for OLFP is within the normal building regulations for ground clearance.

Figure 5 – OLFP Check

		Lot Number	
		1	7
Area	ha	7.72	24.6
Distance	m	572	926
Top	RL(m)	70	70
Bottom	RL(m)	25	28
Grade		0.08	0.05
%		7.9	4.5
n		0.045	0.045
tc	minutes	24	32
C		0.2	0.2
intensity	mm/hr	104	104
Q	m3/s	0.446	0.421
Overland flow			
		Lot Number	
		5	18
Garden slope	1 in	500	500
Garden slope		0.002	0.002
OLFP width	m	24	23
OLFP depth	m	0.1	0.1
Wetted perimeter		24.20	23.20
Area	m2	2.4	2.3
Velocity	m/s	0.190	0.190
Hyd Rad		0.099	0.099
n		0.05	0.05
Qmax		0.456	0.437
Target		0.446	0.421
FOS		1.0	1.0

ITEM 6

Done by Cheal.

ITEM 7

Summary of issues raised earlier.

To summarise:

There is no impact on upstream properties – see item 4

The roadway has to be raised and their hazards has been discussed in item 4.

ITEM 8

Done by Cheal.

ITEM 9

Done by Cheal.

Dr Steven Joynes

M: 021 834 139

E: steven@golovin.co.nz

28th November 2019

Philip Barrett

From: Philip Barrett
Sent: Thursday, 5 December 2019 2:52 pm
To: 'Cameron Aplin'; malcolm.brown@waidc.govt.nz
Cc: Sharon Singleton; 'Graham Singleton'
Subject: G & S Singleton -Extra Flood Hazard Analysis and Waikato Regional Council Consultation Reply
Attachments: IMG_0160.JPG; IMG_0162.JPG; IMG_0161.JPG; SWMP Issues Memo.pdf

Dear Cameron,

Following our meeting last week, Tuesday 26 November, we took away the following understanding in terms of replying to Beca second round of review comments dated 8 November 2019 items 1 – 9 inclusive.

Item 1

Undertake further flood modelling which includes climate change and impervious cover change. Check effect on flood levels.

number of scenarios are:

Existing rainfall vs. Existing land-use

Climate change rainfall vs. existing land-use

Existing rainfall vs. changed land-use

Climate change rainfall vs changed land-use

This will establish impact of land-use change relative to climate change. Depth increase in flooding is more critical than volumes generated.

Item 2

Will get clues from item 1 and expect to write a short narrative. No analysis of rain tanks sizes expected - just guidance for WDC engineers. Water tanks will be required irrespective of flood minor effect outcome because no Council water infrastructure is located at or near the development site.

Item 3

Short narrative about potential storm water attenuation methods for the ROWs.

Item 4

Check that the ROW / Access road is at or above 100-year level. Steven suggest it is the climate change option. Will draw profiles and check "blockage" of road on flood levels if necessary.

Suggest culvert sizes if necessary either 10-year size if road raising is minimal or 100-year if more pronounced.

Item 5

Potentially OLFP (over land flow paths) past each new house causing flooding. I can use my flood levels as downstream control if necessary.

Will calculate flows to each property and estimate flow depth and provide advice of OLFP channel if necessary. Agreed.

With regard to items 1 -5 and 7 above please see Golovin report attached.

Item 6

Provide a narrative on the state of the drain with photos and cross-sections: On Wednesday 4 December a meeting was held onsite with Regional Council officers Russell Powell, Steve Edwards & Debra Hayer and WaiDC engineer Malcolm Brown. Steve Edwards noted the western Regional drain was cleaned about 3.5 to 4 years ago and is not due for clearance for another 10 years plus. The attached photos show a deep drain with well vegetated verges

with approximately 30mm of water at base. The average stream cross section is - Vertical 1.6m x Width 1.5m X Base 0.4m .

Item 7

Almost a summary of previous items. Just needs summarising (see Golovin report). I recall an agreement at the meeting that offsite upstream and downstream flood assessment is not required.

Item 8

The Regional Council commented that the policy document Land Drainage Management Plan 29 August 2019 seeks to ensure that all lots less than 5ha has adequate connection to a Regional maintained drain with easements in place. This is regional policy only. The applicant prefers not to have any lateral drains over the site and in particular over Lot 10 that contains the Regional drain. Drains would be an anathema to the long term park vision of the site. These drains would sever the site and contain standing water for much of the year. It is highly debatable if drains from each lot to the western drain are indeed necessary since most small lots drain to residual Lot 10. The water then drains to: ground; pond system; or internal drain that eventually makes its way to the western drain via Lot 10. Lot 7 has direct access to the northern boundary Regional drain.

The flood and SW evidence to date suggests there are no SW / flood effects on adjoining properties and where the ROW is raised above the 100 year flood level. Dwelling platforms are all above the 100 year flood (50% culvert blockage) level and dwellings will be subject to FFL's. Russell was concerned that long term owners of the small allotments may complain that drainage is poor. This can only result from their own earthworks or earthworks within Lot 10 that disrupts overland flows to cause nuisance. The most elegant solution discussed was that Lot 10 be subject to a consent notice. This CN will require Lot 10 to maintain overland flow paths to the regional drain. Should a small lot owner undertake their own on site works that causes themselves a nuisance that is a matter to be resolved by the land owner.

The other issue raised by Russell was the need for an easement over the western drain within Lot 10. However, according to the Regional Land Drainage Management Plan, easements are not required for lots in excess of 5ha. In any case an easement would be pointless given the historical golf course plantings along the boundary, digger access is constrained. Lot 7 northern boundary includes the regional drain. An easement is sought by Russell over Lot 7. Again, the easement is impracticable given the presence of golf course mature trees along the drain edge access, is constrained. Access is available on the adjoining land. No easement is proposed over Lot 7.

Item 9

Healthy Rivers narrative: WRC Plan Change 1 only applies to farming activity. Already addressed in the application where it is stated the site is not returning to a productive farm so that nitrogen loading is no longer an issue; The site will not therefore contain livestock (no requirement to exclude livestock from waterways). Moreover, onsite planting undertaken by the applicant exceeds 70,000 plus trees and shrubs and improved wetlands that will have positive effects on water quality.

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