Before the Independent Hearings Panel
At Central Otago District Council

Under the	Resource Management Act 1991 (**RMA** or **Act**)
In the matter of	an application for subdivision and land use consent to establish another 44 residential allotments in the rural resource area at 112 & 144 Ripponvale Road, Cromwell (RC250155 and RC220396v3)
And	**New Zealand Cherry Corp (Leyser) LP**
	Applicant

Evidence of Mr Jacob (Jake) Paul Woodward – Planning

23 July 2026

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Introduction

1 My full name is Jacob (Jake) Paul Woodward.

2 I am an independent resource management planning consultant and an associate member of the New Zealand Planning Institute. I have over 14 years resource management experience, with the previous nine years working as a consultant in the Central Otago and Southern Lakes Districts. Prior to this, I worked at both Auckland Council and Queenstown Lakes District Council in various resource management planning roles.

3 I hold a Bachelor of Social Sciences Majoring in Environmental Planning and a Post Graduate Diploma in Environmental Planning, both obtained from the University of Waikato.

4 Throughout my professional career, I have been involved in a range of resource consenting matters, particularly as it relates to subdivision in the Rural Resource Area of Central Otago. I have made numerous appearances in front of various district Councils both as the Council reporting officer and as an independent planning witness.

5 My primary area of work is that of the Central Otago District, where I reside, of which I have been operating for the best part of nine years. I have been providing resource management advice to a wide range of Clients across various sectors, including extensive rural subdivisions, commercial developments on rurally zoned land, and plan changes. I most recently assisted a range of Clients with submissions and planning evidence on Plan Change 19 of the Central Otago District Plan, re-zoning a number of rurally zoned properties to residential. As such, I have an indepth understand of the general growth and planning landscape that is shaping the District presently. I am also currently providing planning evidence and advice for a large scale residential and commercial development under the Fast Track Approvals Act.

6 My day to day projects includes extensive rural subdivision applications ranging from small two-Lot rural lifestyle developments, including many along Ripponvale Road itself, to more comprehensive subdivision propsoals including the consenting for the first stage of Prospector's Park (180-Lots in Cromwell).

7 More generally, I present planning evidence on a regular basis (currently monthly) to the Central Otago District Council, predominantly where those subdivisions are non-complying.

8 I have been assisting the Applicant with resource management and planning related advice in relation to the subject Site since 2022. While I was not involved in the Plan Change 14 proceedings, I prepared and secured resource consent for nine-Lots within the wider Shannon Farm subdivision[1] in November 2025. I have aslo secured resource consents for new dwelings and showhomes for a number of Clients, within the first stage of Shannon Farm. I prepared the Assessment of Effects (**AEE**) as it relates to this application for 44 Lots. I am very familiar with the subject Site and surrounding Ripponvale Road area, and accompanied both the s42A officer[2] and Council's Landscape Peer Reviewer[3] on their respective Site visits.

9 I have prepared this brief of evidence in relation to an application by New Zealand Cherry Corp (Leyser) LP (**Applicant**) to the Central Otago District Council (**CODC** or **Council**) for subdivision consent and land use consent (RC250155, **Application**) to establish an additional 44 residential allotments in the Rural Resource Area (5) at 112 & 144 Ripponvale Road, Cromwell (**Site**).

10 A concurrent application under s 127 of the RMA seeks to vary RC220396, as previously varied, to update the approved subdivision scheme plan, staging and associated conditions so that the proposed intensified layout can be implemented as part of the wider Shannon Farm subdivision.

Code of conduct

11 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in Part 9 of the Environment Court Practice Note 2023. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Scope of evidence

12 My evidence will address the following:

(a) Description of the Site;

[1] RC250169 and RC220396V4.

[2] Mr Oli Monthule-McIntosh.

[3] Ms Megan Harshey.

(b) Description of the proposal and the statutory framework that applies;

(c) Assessment of effects;

(d) The Section 42A Report (**s42A**) prepared by **Mr Oli Monthule-McIntosh**;

(e) The relevant policy framework;

(f) The submission received;

(g) Part 2 of the RMA.

(h) The proposed conditions as attached to the s42A Report.

13 Throughout my evidence, I have relied on the following evidence:

(a) Landowners' evidence from **Mr Paul Croft;**

(b) Landscape evidence of **Mr Tony Milne**;

(c) Engineering Design evidence of **Mr Roy Buchanan**;

(d) Transport evidence of **Mr Andy Carr**; and

(e) Economics evidence of **Mr Fraser Colegrave**.

Executive summary

14 This application seeks a suite of resource consents to vary the approved Shannon Farm subdivision development by increasing the residential yield from 160 to 204 allotments through the reconfiguration of later stages of the development.

15 The proposed changes are driven by a better understanding of market demand since Plan Change 14 was approved. As outlined in the economic evidence of Mr Colegrave, and supported by the market evidence of Mr Croft, demand within the Cromwell market has increasingly favoured smaller rural lifestyle allotments in the order of 1,500m² to 3,000m², rather than the larger allotments originally contemplated through the Shannon Farm Structure Plan. This trend is reflected in the strong sales performance of, and purchaser feedback through, the earlier stages of Shannon Farm and broader demographic and population growth within the Cromwell area. The proposal therefore seeks to better align the remaining stages of the development with current market demand, while continuing to operate within the established Structure Plan framework and utilising the significant infrastructure investment already committed through Plan Change 14.

16 In my opinion, while the proposal departs from certain subdivision standards established through PC 14, it does not alter the fundamental planning framework or strategic purpose of the RRA (5). Rather, it represents an appropriate refinement of an already approved master-planned development that responds to contemporary market demand while continuing to achieve the environmental outcomes anticipated by the District Plan.

17 I generally agree with the section 42A Report that the proposal can be appropriately serviced and that effects relating to infrastructure, transportation, productive land, ecology, heritage, natural hazards and reverse sensitivity are no more than minor. My principal areas of disagreement relate to the assessment of landscape, rural character and the interpretation of Objective 4.3.10 and Policy 4.4.18 of the Rural RRA (5). In my opinion, the section 42A Report places undue emphasis on the proposal's departure from the approved subdivision pattern, rather than considering whether the proposal continues to achieve the environmental outcomes sought by those provisions.

18 Having regard to the landscape evidence of Mr Milne, I am satisfied that the proposal maintains the values of the Significant Amenity Landscape and the legibility of the landform that the Structure Plan intended to maintain. The proposal retains the No Build Area, preserves the strategic landscape framework, and ensures that additional development remains visually associated with the existing Shannon Farm development. While the proposal introduces additional allotments within RLA6, I do not consider that this results in adverse landscape or rural character effects of the significance suggested in the section 42A Report. I consider that the assessment of the landscape effects loses sight on the outcome that Objective 4.3.10 is trying to achieve.

19 I also rely on the evidence of Mr Colegrave and Mr Croft, which demonstrates that market conditions have evolved considerably since Plan Change 14 was approved. There is now strong and sustained demand for smaller rural lifestyle allotments, and the proposal responds directly to that demand while making more efficient use of land and infrastructure already established through Shannon Farm. In my opinion, these are significant positive planning outcomes that should be afforded substantial weight.

20 I further consider that the proposal is appropriately informed by the National Policy Statement on Urban Development. In my opinion, Cromwell is a Tier 3 urban environment for the purposes of the NPS-UD, and the proposal is consistent with its enabling direction by increasing housing choice, providing additional development capacity, responding to changing

community needs, and making efficient use of existing infrastructure within a strategically planned growth area.

21 Overall, I conclude that although the proposal is not fully consistent with each and every aspect of the Rural Resource Area (5) provisions, it continues to achieve the principal environmental outcomes sought by the District Plan when read as a whole. It maintains the strategic intent of PC14 while appropriately responding to market demand and the broader statutory direction provided by the NPS-UD. For these reasons, I consider the proposal represents a positive planning outcome, promotes the sustainable management purpose of the Resource Management Act 1991, and that resource consent should be granted, subject to appropriate conditions.

Description of the site

22 Since the lodgement of the Application[4], the legal description of the Site has changed, as a result of the completion of the first few stages of the Shannon Farm Subdivision (completed under RC220396 and associated variations). The Site in which this resource consent relates to is legally defined as Lot 1000 DP 615998. A copy of the updated Record of Title is attached in **Appendix [A].**

23 A full description of the Site and surrounding environment is as detailed in the AEE, and I simply note that that description of the Site and surrounds remain unchanged.

Description of the proposal and the statutory framework

24 As detailed in the AEE and the s42A Report, this proposal includes:

(a) An additional **44 Lots**, bringing the "total" number of residential Lots within the Shannon Farm development to **204 Lots.** This will be achieved by intensifying the later stages of the Shannon Farm subdivision by reducing and reconfiguring some allotments within areas already consented for subdivision (yielding an additional 28 Lots) and adding 16 "new" Lots as follows:

(i) RLA 3: an additional 6 allotments, ranging from 1,770m² to 3,530m² (average 2,385m²).

(ii) RLA 4: an additional 22 allotments, ranging from 1,895m² to 6,895m² (average 3,115m²).

[4] June 2025.

(iii) RLA 6: an additional 16 allotments (created from one original allotment), ranging from 2,290m² to 5,150m² (average 3,400m²). The balance of RLA 6 (approximately 36ha) is proposed to be retained as open pasture and amalgamated with Lot 166 (via proposed Lot 600).

(b) Additional[5] earthworks of up to **293,679.36m³** over an area of **132,553m²**. Cuts will be up to a maximum of **3.1 metres** in depth, while fill will be up to **2.1 metres** in height.

(c) One road (being an upgrade of an existing Right of Way) and two new Right of Ways are proposed to service the additional Lots.

(d) All servicing and infrastructure has been sized to accommodate the additional Lots.

25 A full updated set of Plans are attached in **Appendix [B]** of my evidence.

26 In terms of resource consents required, these are listed in the s42A report and I have summarised those as follows, in order as presented in the s42A report:

(a) Subdivision:

(i) A **non-complying activity** pursuant to Rule 4.7.5(iii) in that the subdivision results in allotment sizes below the minimum allotment sizes prescribed for the RLA3, RLA4 and RLA6 areas.

(ii) A **non-complying activity** pursuant to Rule 4.7.5(iii) for subdivision resulting in more than 160 Lots in the Rural Resource Area 5. The proposal results in a total of 204 Lots in the Rural Resource Area 5.

(iii) A **non-complying activity** pursuant to Rule 4.7.5(xi) for subdivision not in accordance with the Structure Plan listed in Schedule 19.23 of the Plan. In this case, the minimum allotment sizes do not accord to the minimums specified for the RLA 3, 4 and 6 areas, as well as the provision of platforms being located outside of the "area for location future building platform" in RLA 6.

(b) Residential Building platforms:

[5] On top of the significant earthworks already consented under RC220396 and subsequent variants (RC220396V1, RC220396V2 and RC220396V4).

(i) Rule 4.7.2.ii.a.vii.a and Rule 4.7.2.ii.a.vii.b provide for Residential Building Platforms (**RBP**) to be provided, as a controlled activity, provided that the RBPs are no greater than 1,000m^2 and, within the RLA6, the RBP is identified in the "Area for locating future building platform" on the Structure Plan. In this case, the original scheme plan submitted with the Application only identified RBPs on Lots within the RLA6 and Lot 127. An updated set of Plans are attached to this evidence detailing RBPs on ALL proposed Lots. In light of the updated plan, the RBPs require consideration as a **discretionary activity** pursuant to Rule 4.7.4(i) as a result of platforms being located outside of the "Area for locating future building platform" in RLA6.

(c) Earthworks:

(i) A **discretionary activity** pursuant to Rule 4.7.4(i) for earthworks exceeding the limits (3,000m^3 and 2,000m^2 per site) specified in Rule 4.7.6J(b). In this case, the proposal involves approximately 135,050m³ of cut, 158,629.36m³ of fill, and a total earthworks area of 132,553m^2.

(d) Internal setback:

(i) A **discretionary (restricted) activity** pursuant to Rule 4.7.3(x) for a breach to the internal setback requirements of Rule 4.7.6(A)(L)(iii). This rule requires that any site within Rural Resource Area (5) adjoining the Rural Resource Area must maintain a minimum 25 metre setback from the zone boundary. The RBPs on Lots 118, 127 and 128 are located approximately 10m from the Rural Resource Area boundary and therefore do not comply with this standard[6].

(e) Access sight distances

(i) I note that an application to breach Rule 12.7.1(ii) in relation to sight distances from access/intersections (as a **discretionary (restricted) activity** pursuant to Rule 12.7.1(viii)) was initially sought in the AEE. As I will discuss in paragraphs 57 of my evidence, this rule is no longer intended to trigger as part of this application, but instead deferred for future Lot owners to

[6] I note that the rule relates explicitly to buildings. While a specific building design is not sought at this time, the provision of a building platform sets an expectation to Lot owners that development can occur, with a controlled activity consent under Rule 4.7.2(ib), anywhere within the footprint of the building platform. As such, this consent seeks to establish that expectation by assessing and consenting a setback breach as part of this application.

secure, should a breach to sight distances from intersections and vehicular access result.

(f) Variation to Conditions:

(i) The proposal also requires a variation to the conditions of the underlying subdivision consent (RC220396) to amend the approved scheme plan, to reflect the proposed lot configuration. Such an application is to be treated as a **discretionary activity** pursuant to s 127 of the RMA**.**

(g) Other consents required from Otago Regional Council:

(i) The proposed earthworks will require an updated land use consent and discharge permit from Otago Regional Council (**ORC**) in relation to the additional earthworks. The Applicant already holds the necessary consents[7] from ORC for the current consented works. These applications will be sought should CODC be of a mind to approve this application.

27 Overall, I agree with Mr Monthule-McIntosh that the proposal is to be considered as a **non-complying activity.**

Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS)

28 In relation to the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS), Mr Monthule-McIntosh states the following:

> While the original DSI was stated to address the six Rural Lifestyle Areas, it was prepared for a materially different subdivision and earthworks layout. It has not been confirmed by a suitably qualified and experienced practitioner that the DSI, RAP and SMP adequately address the revised works footprint and intensified residential use now proposed, particularly within RLA6. The existence of regional consent RM23.549.07 does not remove the separate requirement to assess and manage risks to human health under the NES-CS. On this basis, and noting that no PSI/DSI has been submitted in support of this application, the proposal should be considered as a discretionary activity in accordance with Regulation 11 of the NES-CS.

[7] RM.23.549.05 and RM.23.549.06.

29 The Preliminary and Detailed Site Investigations (**PSI** and **DSI**), Remedial Action Plan and Contaminated Soils Management Plan (**RAP**/**CSMP**), and Site Validation Report (**SVR**) are all attached in **Appendix [C]** to my evidence. Prior to the lodgement of the AEE, I reviewed these documents and note that the NES-CS is not considered to apply to this proposal because:

(a) WSP Opus recommended that, in areas where rural residential (Lifestyle) rezoning is proposed, a DSI should be undertaken on the site areas where HAIL activities have been identified. The PSI confirms that the identified HAIL activities are confined to specific orchard, farmyard, fuel storage and landfill areas. None of the identified HAIL areas overlap with RLA6. Accordingly, the PSI does not identify any activity or industry described in the HAIL as being undertaken, having been undertaken, or being more likely than not to have been undertaken within RLA6.[8] As such, the proposed Lots contained in RLA6 are not classified as a "piece of land" within the context of the NES-CS and the NES-CS does not apply;

(b) The areas of intensification within RLA3 and RLA4, were subject to past HAIL activities in the form of orchards (refer to following figure noting that orchard 4 and 6 are most relevant). These were subject to a DSI[9]. The DSI[10] confirmed that orchard sampling results indicated no exceedance to the human health guidelines and that it is unlikely that there will be a risk to human health if the piece of land is subdivided and subsequently used for residential purposes. Accordingly, the subdivision and subsequent residential use of these areas is a permitted activity under the NES-CS.

[8] PSI prepared by WSP Opus, 2018

[9] DSI prepared by WSP Opus, 2022

[10] Section 11.1.1.1 of the DSI prepared by WSP Opus, 2022.



Figure 6: Investigated Site for this DSI, defined by red areas (historic orchards) and blue area (farmyard)

Figure 1: Extract of "figure 6" from the DSI showing the orchard HAIL areas overlayed the scheme plan. This image shows orchard areas "4" and "6" located within RLA3 and RLA4 which is the subject of this application.

(c) The DSI confirms that contaminant exceeding the applicable residential soil guideline values were identified only within the “farmyard” areas, which are located in areas subject to RLA1 and identified in “blue” in the figure above. These areas are not proposed to be altered/modified as part of this Application. In any event, the DSI recommended remediation of those areas where exceedances were identified[11].

(d) WSP prepared a RAP and CSMP dated 9 July 2024, which was revised 27 February 2025 following external peer review (WSP, 2025). The most recent revision following an update to proposed development and remediation proposals was completed 20 May 2025.

(e) Remediation of the "farmyard" areas in line with the published RAP/CSMP was carried out at the site between 23 August 2024 and 19 May 2025. The SVR concludes that the site has been fully remediated and is suitable for residential use. The SVR further concludes that, having regard to the proposed development and residential end use, it is highly unlikely that residual soil contaminants will pose a risk to human health.

[11] Section 11.1.1.2 of the DSI prepared by WSP Opus, 2022

(f) Summarising the above:

(i) No activity or industry described in the HAIL has been identified as being undertaken, having been undertaken, or being more likely than not to have been undertaken within the RLA6 area.

(ii) The DSI confirmed that no exceedances of the applicable human health guidelines were identified within the RLA3 and RLA4 areas, and that those areas are suitable for subdivision and residential use;

(iii) All contaminants exceeding the applicable residential soil guidelines elsewhere on the site (in areas not affected by this proposal), have been remediated as per the SVR such that it is highly unlikely that there will be a risk to human health if residential activity occurs on the land.

30 For further reassurance, I note for the Panel that Condition 1 of the NES-CS land use conditions attached to RC220396V4 requires accidental discovery protocols to be followed in the event that unanticipated areas with potential soil contamination are identified during subdivisional works. This condition remains and as per the attached RAP/CSMP[12], accidental discovery remains a requirement for all earthworks on the Site.

31 Based on the above, no further consents are required under either the NES-CS or Otago Regional Council's Waste Plan.

The Section 42A Report (s42A) prepared by Mr Oli Monthule-McIntosh

32 The s42A report assesses the following matters with respect to effects on the environment (listed in order as shown in the s42A report):

(a) Effects on landscape and visual amenity values

(b) Effects on Rural Character

(c) Effects on open space and recreation

(d) Transportation effects

(e) Effects associated with servicing

(f) Effects on productive land

[12] Section 7.9 of the RAP/CSMP, prepared by WSP Opus, dated 3 October 2024.

(g) Effects on reverse sensitivity

(h) Earthworks and geotechnical effects

(i) Ecological effects

(j) Heritage and cultural effects

(k) Positive effects

33 For completeness, I have elected to comment on each of these matters and highlight where my opinions either agree, or differ, to that of Mr Monthule-McIntosh's assessment.

Effects on landscape and visual amenity values

34 In terms of landscape and visual amenity values, the s42A report notes that both landscape experts generally agree that the additional development proposed within RLAs 3 and 4 would result in very low to low landscape and visual effects, with the proposal being readily absorbed within the existing Shannon Farm development pattern. Accordingly, the reporting officer concludes that the effects within RLAs 3 and 4 would be no more than minor. I agree with that assessment.

35 The principal area of disagreement between the landscape experts, and ultimately myself and the reporting officer, relates to the proposed subdivision of RLA6. While RMM concludes that the proposal would result in landscape effects ranging from low to low-moderate, remaining no more than minor, BML considers that the introduction of 17 allotments would materially alter the spatial structure established through the Shannon Farm Structure Plan. In particular, BML considers that RLA6 performs an important transitional role between the more intensively developed lower Rural Lifestyle Areas and the open upper slopes, and that the proposal would reduce the openness and legibility of this landscape, resulting in more than minor adverse landscape effects.

36 Mr Monthule-McIntosh ultimately adopts BML's conclusions and finds that, notwithstanding the proposed landscape mitigation measures, the proposal would fundamentally alter the development pattern anticipated through Plan Change 14 and the operative Structure Plan.

37 In considering Mr Monthule-McIntosh's assessment, I consider that the purpose of the SAL in this case, has been misunderstood. The overarching Objective for the RRA(5), as informed by Objective 4.3.10 is to:

> Within the Rural Resource Area (5), provide for a range of rural living opportunities on lots of varied sizes and shapes, integrated with rural productive uses and recreational opportunities, and in a way that protects the Outstanding Natural Landscape, **maintains the values of the Significant Amenity Landscape**, provides for rural amenity, is appropriately serviced, and manages potential effects on surrounding rural uses.

38 As a starting point, there is no dispute between myself and Mr Monthule-McIntosh that the proposal does not compromise the ONL. That part of the objective (protects the ONL) is therefore satisfied.

39 With respect to the SAL, the objective is concerned with maintaining the "values".

40 SALs have been a feature of the Central Otago District Plan prior to Plan Change 14, however the inherent values of each and every SAL within the District are not specifically defined within the Plan itself. As explained in Mr Milne's evidence, the "values" of the SAL as it relates to Shannon Farm/RRA (5), were confirmed through conferencing for PC14 as essentially revolving around the "legibility of the landform". The Structure Plan included the provision of a "No Build Area", which was devised on the basis of ensuring that development did not creep up the hill side near the saddle of the landform itself, and thereby acts as a mechanism to prevent any risk of development compromising the "legibility of the landform".

41 The proposed development within the RLA 6 does not encroach in the "No Build Area". Yes, the RLA6 lots are located in the SAL, but so too are the consented Lots within RLA2 and areas of RLA3, 4 and 5. Beyond Shannon Farm, there are countless examples of development in the SAL. The point to make however, is that development in the SAL is not prohibited, or discouraged in either the RRA(5), or elsewhere in the District[13]. The "objective" of the plan is to **maintain** the inherent values of the SAL in question. The value of the SAL in this case, is the "legibility of the landform". Furthermore, with the exception of the RRA(5) provisions, there is no general policy direction in the District Plan as it relates the SAL specifically.

42 As per Mr Milne's evidence, the proposed location of the lots within RLA 6 allows for a band of open space in the form of the balance lot to be maintained between the developed area and the open, upper slopes (and more sensitive slopes) of the SAL, as identified by the No Build Area. The proposed lots will introduce additional built form and domestic activity on the lower slopes, which he considers is capable of being absorbed. The

[13] Within the Central Otago District Plan, there are no specific Rules pertaining to land in the SAL with the exception of specific height controls as detailed in Standard 4.7.6A(f).

effect of additional built form is moderated by the location of the lots, the size and placement of building platforms, the controls on curtilage, the fencing controls, and the retention of the balance land as open pasture, retaining the current land use of the SAL. The additional residential allotments within RLA 6 will read as a cohesive and coherent periphery to the wider Shannon Farm development. Mr Milne concludes that effects on the "legibility of the SAL" will be low to low-moderate, or minor[14].

43 I agree with Mr Milne's assessment because in my opinion, it appropriately distinguishes between the values that the SAL seeks to maintain and the means by which those values are managed. I consider Mr Monthule-McIntosh's assessment places undue emphasis on the increase in the number of allotments, rather than the resulting landscape outcome. The focus of the assessment should not simply be whether additional development occurs within the SAL, but whether this specific proposal maintains the landscape values that led to the SAL classification and which are specifically recognised through the RRA (5) framework. As Mr Milne explains, the defining landscape value of the Shannon Farm SAL is the legibility of the landform, particularly the distinction between the lower foothills capable of accommodating rural lifestyle development and the more visually prominent upper slopes. That outcome is principally achieved through the No Build Area, which remains entirely unaffected by the proposal. Mr Milne concludes that the proposal does not extend development into the most sensitive parts of the landscape or compromise the purpose that the Structure Plan is seeking to achieve (essentially Objective 4.3.10).

44 In terms of nighttime effects, I do not consider those are relevant in the context of the SAL. The values of the SAL is associated with the legibility of the landform. Those values do not exist at night time. Furthermore, the site is not that of a remote setting such that night time lighting creates a sense of domestication that otherwise should not exist. The area will be lit up by virtue of street lighting, and 160 consented dwellings. The proposed Lots are not considered to materially alter this fact.

Effects on Rural Character

45 With regard to rural character, the section 42A Report assesses rural character separately from landscape and visual amenity, recognising that the relevant character is not the site's historic pastoral character, but the anticipated rural lifestyle character established through Plan Change 14

[14] With reference to the seven-point landscape and visual effects rating scale and comparative RMA threshold scale of effect, 'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines'. Tuia Pita Ora New Zealand Institute of Landscape Architects, July 2022. Page 140.

and the Shannon Farm Structure Plan. Mr Monthule-McIntosh considers that the Structure Plan deliberately created a graduated pattern of development, with smaller allotments concentrated in the more visually contained areas of the site and progressively larger or less developed areas toward the foothills.

46 While Mr Monthule-McIntosh accepts that the additional development proposed within RLAs 3 and 4 would not, in isolation, result in more than minor adverse rural character effects, he considers that the cumulative increase in density across those areas would weaken the intended distinction between the various Rural Lifestyle Areas. In his opinion, this would result in a more intensive and homogenous pattern of rural lifestyle development than that anticipated through Plan Change 14.

47 I am not persuaded that the proposal gives rise to "significant" adverse effects on rural character. While the proposal increases the density of development beyond that anticipated through Plan Change 14, it does not fundamentally alter the overall character of the Shannon Farm development. In my view, the graduated pattern of allotment sizes remains, albeit with a less pronounced distinction between the Rural Lifestyle Areas than was initially the case. The larger allotments continue to be located on the more elevated foothills and remain generally larger than those within the lower RLAs, thereby retaining the overall hierarchy envisaged through the Structure Plan.

48 I also consider it important to identify who will actually experience the alleged effects on rural character. As discussed in relation to landscape and visual effects, I accept Mr Milne's evidence that the additional development within RLAs 3 and 4 will be largely absorbed within the existing Shannon Farm development pattern and will not materially alter the character of the development when viewed from the surrounding rural environment. This assessment is shared with Ms Harshey. Likewise, while the proposal introduces additional allotments within RLA6, the development remains visually associated with the wider Shannon Farm development and does not alter the broader rural character experienced beyond the site.

49 The principal character effects identified by Mr Monthule-McIntosh are therefore internal to the development itself. In my opinion, those effects should be viewed in the context of a master-planned rural lifestyle community that has always anticipated a significant degree of residential development. The proposal does not introduce an incompatible land use or urban form. Instead, it modifies the density of an already anticipated rural lifestyle environment. Future residents will purchase within that environment understanding the character of the development as ultimately

constructed, rather than by reference to the earlier subdivision layout approved through PC14.

50 I also consider it relevant that the proposal responds to a demonstrated change in market demand. As outlined by Mr Colegrave, there is clear demand towards smaller rural lifestyle allotments, reflecting changing household preferences and the desire for more manageable property sizes. In my opinion, larger allotments do not necessarily equate to higher levels of amenity. Rather, the proposal provides a form of rural lifestyle living that better aligns with market expectations while retaining the key characteristics of the Shannon Farm development, including generous open space, landscaping, productive land, and a high-quality built environment. To the contrary, it is not uncommon for some larger Lots to be too big to manage, that they are subject to a lesser quality of amenity due to neglect or poor site management.

51 If I consider "rural amenity" more specifically, rural amenity is not defined in the Plan. More broadly however, Policies 4.4.2 (landscape and amenity values) and 4.4.10 (rural subdivision and development) refers to characteristics such as open space, landscape and natural character amenity values of the rural environment. Landscape and natural character has largely been assessed above but in terms of "open space", the district plan defines this as:

> **Open space** means any land or space which is not occupied by buildings and which provides benefits to the general public as an area of visual, cultural, educational, or recreational amenity values.

52 I agree with Mr Milne's evidence that the Rural Lifestyle Production Area, open space network, amenity edges, shelterbelts, and those parts of RLAs 3 and 4 unaffected by the proposal all remain unchanged and will continue to make a significant contribution to the open space and rural amenity values of the receiving environment. Furthermore, the proposed allotments remain substantial in size, with development confined to defined building platforms, ensuring that a strong sense of openness is retained across the development.

53 While I acknowledge the definition of open space relates to areas not occupied by buildings, it is also relevant to recognise that, under the existing consent, there is no restriction on the extent of planting that may occur within RLAs 3 and 4 outside the designated building platforms. As such, even if the current consent were implemented, the "perceived" openness of these areas could be substantially reduced over time through landscaping and planting. In my opinion, this reinforces that the proposal does not

materially diminish the open space or rural amenity values of the site when compared with the environment already anticipated under the operative consent.

54 Ultimately, I consider the proposal continues to achieve the character outcomes sought for the Rural Resource Area (5). Viewed from the surrounding environment, Shannon Farm will continue to read as a cohesive and comprehensively master-planned rural lifestyle development. Internally, while the development will be more intensive than originally anticipated, it nevertheless provides a high-quality rural living environment that responds to contemporary market demand without undermining the fundamental landscape, amenity and character outcomes established through Plan Change 14. Accordingly, I do not agree that the proposal gives rise to significant adverse effects on rural character.

Effects on open space and recreation

55 I agree with Mr Monthule-McIntosh that the wider Shannon Farm development has a high level of access to open space and recreational opportunities, both within the subdivision and through the consented mountain bike trail network. I agree that the proposal would not remove, reduce or compromise the function of those facilities.

Transportation effects

56 In terms of transport effects, I agree with Mr Monthule-McIntosh that the effects of additional vehicle movements originating from the proposal can be accommodated within the approved and proposed road network without materially affecting the safety or efficiency of the local transport network. Any detailed design matters associated with the new road and right-of-way arrangements can be appropriately addressed through conditions of consent and additional demand on the roading network can be offset by developer contributions.

57 In relation to sight distances and the potential for future vehicle crossings to infringe the minimum separation distances from intersections, Mr Monthule-McIntosh considers it is inappropriate to approve such infringements without first identifying the specific location of each access. Given the size and configuration of the proposed allotments, it is not the applicant's preference to fix vehicle crossing locations at the subdivision stage, as doing so would unnecessarily constrain the future design and development of individual lots. Accordingly, the applicant no longer seeks consent for any potential infringement of Rule 12.7.1(ii), with any such infringements to be addressed by future landowners at the time access locations are determined.

58 I do not consider there is any issue with deferring the assessment of potential sight distance infringements to the future landowners. As Mr Carr explains, the effects associated with individual vehicle crossings are site-specific and can only be properly assessed once their location is known. He also notes that the required sight distance is directly related to vehicle speed, meaning shorter sight distances may be acceptable where operating speeds are lower, such as in the vicinity of intersections and within this no-exit, low-speed road environment. Furthermore, this is a residential subdivision where frequent vehicle crossings are an anticipated component of the road environment, and road users can reasonably be expected to be alert to vehicles entering and leaving adjoining properties. In my opinion, any future sight distance issues can therefore be appropriately assessed and managed through subsequent resource consent applications, should they be required, without giving rise to unacceptable transport safety effects.

Effects associated with servicing

59 In terms of servicing, I concur with Mr Monthule-McIntosh's recollection of a pre-application meeting conducted between the Applicant's consultant's team and Council planning staff and Council's Three Waters staff in November 2025. In particular, it was confirmed that neither Council's Three Waters Engineers nor the Development Engineer have identified any reason why the proposed additional allotments could not be serviced through the existing Shannon Farm servicing framework, subject to the recommended conditions. Overall, Council concludes that the proposed additional Lots can be adequately serviced, and consistent with the advice provided in the Infrastructure Feasibility Report, that informed the application.

60 The s42A report does recommend further conditions[15] to ensure the design, ownership, operation, maintenance and ongoing access arrangements associated with the proposed pressure wastewater system servicing Lots 161–166 are appropriately established prior to certification. As per Mr Buchanan's evidence, Condition 21(o)(iv) is considered to be appropriate in that it requires the registration of a consent notice to be enshrined on the Title, detailing that if gravity wastewater cannot be achieved, that a private pumped system will be acceptable subject to specific details regarding ownership, operation, maintenance and ongoing access arrangements.

61 In relation to firefighting, Fire and Emergency New Zealand (FENZ) has submitted that further consideration should be given to firefighting water

[15] Condition 20(o)(iv).

supply and emergency access, particularly in relation to the accessibility of hydrants from future building platforms and compliance with SNZ PAS 4509:2008. This matter is also addressed in Mr Buchanan's evidence whereby Mr Buchanan confirms that existing conditions of RM220396V4 already require compliance with SNZ PAS 4509:2008, that this has been complied with to date, and will continue to apply for the proposed intensification. Despite this, Mr Buchanan sees no issues with the proposed conditions and these are more or less accepted, with slight amendments to wording which I discuss later in my evidence.

62 Overall, it is considered that adverse effects in relation to infrastructure will be no more than minor.

Effects on productive land

63 I agree with Mr Monthule-McIntosh that productive capacity matters were extensively traversed during the PC14 proceedings. The result of that process was the establishment of the Rural Lifestyle Production Area (RLPA) which forms part of the Structure Plan. No part of this proposal affects the RLPA. Furthermore, the additional development in the RLA6 land is not subject to highly productive soils nor does it provide any meaningful contribution to the primary production sector.

Effects on reverse sensitivity

64 I agree with Mr Monthule-McIntosh that despite the increase in residential allotments proposed, the underlying controls introduced through PC14 (which includes specific measures/consenting requirements relating to noise from frost fighting wind machines), and no-complaint covenants associated with subdivision consents, will continue to remain in place to manage the potential for reverse sensitivity effects. I agree with Mr Monthule-McIntosh's assessment that the proposal would not give rise to any more than minor adverse reverse sensitivity effects.

Earthworks and geotechnical effects

65 I agree with Monthule-McIntosh that earthworks and geotechnical effects can be appropriately managed through conditions of consent and the detailed engineering design process.

66 In my experience, the scale of earthworks proposed in this case are expected with a development of this nature. The scale of the works are commensurate to the degree of development proposed and will be suitably managed by a comprehensive Environmental Management Plan as already implemented for the consented development. Subject to compliance and

adherence to a suitably certified EMP, the risk of adverse effects arising from site wide bulk earthworks are very low.

67 In terms of geotechnical effects, I agree with Mr Monthule-McIntosh that the wider site has been assessed in relation to natural hazards through both PC14 and the underlying subdivision consent itself. The result of those investigations identified two “super-Lots”, being Lots 1003 and 1004, that were to be subject to further investigations before being developed. Those Lots have since been investigated and formed the basis of RC250169/RC220396V4 which has since been consented. As such, there are no other natural hazard or geotechnical matters that are considered relevant to this proposal.

Ecological effects

68 I agree with Mr Monthule-McIntosh that the proposal will have less than minor adverse ecological effects. All works are proposed in areas that are either, already modified, or subject to pastoral land. In the case of the RLA3 and RLA4 land, these areas are already subject to consented development and earthworks. With regard to the RLA6 area, that area represents existing pasture grass and is not characterised by any indigenous vegetation or habitat.

Heritage and cultural effects

69 Mr Monthule-McIntosh is correct in that parts of the wider site include a historic water race, but is unsure as to whether the proposal affects these water races. Mr Monthule-McIntosh notes in the s42A report that the Applicant should provide confirmation of the location and heritage/ archaeological status of the water races, as well as provide confirmation as to whether the proposal affects the races.

70 As per Mr Milne’s evidence, the water races are identified within the RMM Graphics Attachment as being located beyond the extent of the proposal (but within the Shannon Farm Site), with the exception of a water race in RLA 4 which is already subject to modifications.

71 Recognising that this proposal seeks to develop largely within the fabric of the already modified areas of the Shannon Farm site, I consider that heritage values continue to remain no more than minor.

Positive effects

72 The section 42A Report accepts that there is demand for rural lifestyle allotments within Shannon Farm but affords this matter limited weight on

the basis that the application was not supported by updated application-specific economic evidence. That evidential gap has now been addressed through the expert evidence of Mr Fraser Colegrave.

73 Mr Colegrave concludes that Cromwell continues to experience sustained population and employment growth, resulting in ongoing demand for rural lifestyle living. His analysis demonstrates that the proposal responds to a genuine and current market demand for allotments within the 1,500m² to 3,000m² size range, being the very segment that has experienced strong sales within Shannon Farm and which remains comparatively under-supplied within the wider Cromwell market. This expert analysis is consistent with the evidence of Mr Croft, whose practical experience marketing the initial stages of Shannon Farm provides direct evidence of the strong market demand for smaller rural lifestyle allotments within the development.

74 In addition to satisfying demonstrated market demand, Mr Colegrave concludes that the proposal will generate a number of positive economic outcomes. These include making more efficient use of land already identified and consented for residential development, achieving greater efficiency from existing infrastructure investment, increasing housing choice and competition within the rural lifestyle market, and consolidating additional growth within an already master-planned and serviced development rather than encouraging dispersed rural subdivision.

75 In my opinion, Mr Colegrave's evidence directly addresses the concern raised in the section 42A Report regarding the absence of contemporary, application-specific economic evidence. It demonstrates that the proposal will generate tangible economic benefits through responding to demonstrated market demand, making more efficient use of land and existing infrastructure, and increasing housing choice within the rural lifestyle market. These benefits are now supported by robust expert evidence and should therefore be afforded appropriate weight in the planning assessment. I consider that the economic benefits will be realised within a development already anticipated by the Rural Resource Area (5) planning framework and do not compromise the environmental outcomes sought by Objective 4.3.10 and Policy 4.4.18.

The relevant policy framework

National policy statements

National Policy Statement for Indigenous Biodiversity

76 I agree with Mr Monthule-McIntosh that the proposal does not affect identified significant indigenous biodiversity, and the National Policy Statement for Indigenous Biodiversity 2023 does not materially alter the assessment.

National Policy Statement for Freshwater Management 2020

77 I agree with Mr Monthule-McIntosh that, while freshwater and stormwater matters are managed through existing regional consents, the present application does not itself seek approval for activities that materially engage the National Policy Statement for Freshwater Management 2020.

National Policy Statement for Highly Productive Land

78 As per the AEE, the areas of the site identified as RLA 1 to 6 and RPLA are considered rural lifestyle zones and are not considered to be within the scope of the NPS-HPL as they are not equivalent to general rural or rural production zones. As such, the NPS-HPL is not considered to apply, and consistent with the conclusions reached under RC220396.

National Policy Statement for Urban Development

79 I note that Mr Monthule-McIntosh considers the proposal falls outside the scope of the National Policy Statement on Urban Development 2020 (NPS-UD) because it relates to rural lifestyle development rather than "urban development". In my view, this is not the correct application of the NPS-UD. The applicability of the NPS-UD does not turn on whether a proposal constitutes urban development. Rather, clause 1.3(1)(b) provides that the NPS-UD applies to planning decisions made by local authorities that affect an “urban environment”, which the NPS-UD defines as:

> urban environment means any area of land (regardless of size, and irrespective of local authority or statistical boundaries) that:
>
> a) is, or is intended to be, predominantly urban in character; and
>
> b) is, or is intended to be, part of a housing and labour market of at least 10,000 people

80 Accordingly, the relevant question is whether the proposal affects an urban environment as defined by the NPS-UD, not whether the development itself is characterised as urban or rural.

81 I agree with Mr Colegrave's conclusion that Cromwell is appropriately regarded as a Tier 3 urban environment under the NPS-UD. This is

consistent with the position I adopted in evidence[16] prepared for council-initiated Plan Change 19 (Residential areas), where I considered that Cromwell met, or was rapidly approaching, the definition of an urban environment, with areas within the District that are clearly predominantly urban. While Council did not expressly determine Cromwell's tier classification through the Plan Change 19 process, it did recognise the relevance of the NPS-UD in its decision-making[17].

82 As outlined by Mr Colegrave, Cromwell has experienced sustained population and employment growth since the NPS-UD came into effect. His analysis demonstrates that Cromwell now forms, or is expected in the very near future to form, part of a housing and labour market of more than 10,000 people, thereby satisfying the definition of an "urban environment" under the NPS-UD. As Cromwell is neither a Tier 1 nor Tier 2 urban environment, I accept Mr Colegrave's conclusion that it should appropriately be regarded as a Tier 3 urban environment.

83 Given my conclusion that the proposal affects an urban environment for the purposes of the NPS-UD, I have undertaken an assessment of the relevant objectives and policies. That assessment is attached as **Appendix [D]** to my evidence.

84 In summary, I consider the proposal is well aligned with the direction of the NPS-UD. While the proposal seeks to increase the residential yield beyond that originally anticipated through Plan Change 14 and the Rural Resource Area (5) provisions, it does so within an existing master-planned development that was specifically identified as an appropriate location for growth due to its proximity to Cromwell and its employment, services, schools and community facilities. The proposal therefore contributes to the NPS-UD's overarching objective of supporting well-functioning urban environments by providing additional housing choice and development capacity in response to demonstrated market demand.

85 The evidence of Messrs Colegrave and Croft demonstrates that market conditions have evolved since the approval of Plan Change 14, with strong interest now existing for smaller rural lifestyle allotments than those originally anticipated through the Structure Plan. In my opinion, the NPS-UD recognises that urban environments are not static and that planning decisions should be responsive to changing community needs where doing so contributes to well-functioning urban environments. Particularly pertinent

[16] Paragraph 6.9, Evidence of Mr Jake Woodward, on behalf of Lowburn Viticulture Ltd (Submitter 19/123), Plan Change 19, Stage 2 Hearing.

[17] Paragraph 62, Plan Change 19 – Decision of the Central Otago District Council Hearings Panel, dated 27 June 2024.

to this application, is that the proposal capitalises on significant infrastructure investment already committed through Shannon Farm, while continuing to achieve the landscape, servicing and environmental outcomes that underpin the Rural Resource Area (5).

86 Overall, I consider the proposal advances the NPS-UD's enabling direction by increasing housing choice, improving the responsiveness of the land and development market, making efficient use of existing infrastructure, and providing additional development capacity within a strategically planned growth area. In my opinion, these are positive planning outcomes that weigh in favour of granting consent.

Regional Policy Statements

87 A comprehensive assessment of the relevant Otago Regional Policy Statements was undertaken in the AEE, albeit the refencing to certain policies in the Otago Regional Policy Statement 2021 has changed since the application was first filed[18]. I maintain that the assessment within the AEE continues to remain relevant.

88 Mr Monthule-McIntosh concludes that:

> Overall, the proposal is partially consistent with the ORPS 2021 insofar as it avoids direct development within the ONL and would not materially compromise primary production or rural industry. However, I consider the proposal to be inconsistent with the landscape outcomes sought by NFL-O2 and NFL-P3. In particular, the intensification of RLAs 3 and 4 would erode the intended distinction between the Rural Lifestyle Areas and contribute to a more homogenous pattern of development, while the more substantial intensification of RLA6 would materially reduce the openness, coherence and legibility of the SAL foothills.

89 I disagree with Mr Monthule-McIntosh in relation to his assessment of Objective NFL-O2 and Policy NFL-P3, in which this relates to “highly valued natural features and landscapes”. I consider Mr Monthule-McIntosh is overstating the values of the SAL and I would question the extent to which it is “highly valued”, recognising that despite public notification, no submissions were received in opposition with concerns of the SAL. Relying on Mr Milne’s advice, the values of this particular SAL relates to the legibility of landforms, which the No Build Area protects. This proposal does not encroach in that area nor does it affect that legibility. Development is confined to an area adjacent to the road, where at least one residential

[18] The application was lodged in June 2025. The Otago Regional Policy Statement was made fully operative on 9 July 2026.

activity has already been accepted, with this proposal being considered one that can be suitably absorbed.

90 Otherwise, I agree with Mr Monthule-McIntosh's assessment that all remaining provisions are not materially compromised by this development. I consider overall that the proposal is consistent with the Regional Policy Statement 2021.

District Plan

91 With regard to the District Plan, I have alluded to the fact that the Site is located in the RRA(5), a bespoke and unique Zone that resulted from Plan Change 14 (**PC14**) as outlined in **Mr Croft's** evidence. Through the establishment of the RRA(5), two key provisions were inserted into the District Plan which relate specifically (and only) to this Zone; Objective 4.3.10 and Policy 4.4.18. I agree with Mr Monthule-McIntosh that the greatest weight should be given to these provisions, but not at the expense or total disregard of the wider District Planning framework.

92 In terms of Objective 4.3.10, this Objective reads as follows:

> Within the Rural Resource Area (5), provide for a range of rural living opportunities on lots of varied sizes and shapes, integrated with rural productive uses and recreational opportunities, and in a way that protects the Outstanding Natural Landscape, maintains the values of the Significant Amenity Landscape, provides for rural amenity, is appropriately serviced, and manages potential effects on surrounding rural uses.

93 In terms of Policy 4.4.18, this Policy reads as follows:

> To provide for rural lifestyle subdivision and development while avoiding, remedying or mitigating adverse effects on the environment by:
>
> a. Requiring subdivision and development to be undertaken in general accordance with the Structure Plan in Schedule 19.23;
>
> b. Integrating a range of complementary activities within the rural setting, including:
> •Rural living
> • Farming and agriculture
> • Horticulture
> • Recreation and Open Space
>
> c. Adhering to minimum and average allotment sizes for subdivision;
>
> d. Ensuring that subdivision is designed to:

i. facilitate convenient, safe, efficient and easy access for vehicles, pedestrians and cyclists; and

ii. facilitate the safe and efficient operation and the economic provision of roading and network utility services to secure an appropriate, integrated and planned development; and

iii. have regard to the natural landform in Rural Lifestyle Areas 1-6, including through the alignment of lot boundaries and roading, and landscaping and planting design within public spaces;

e. Ensuring that the subdivision layout within each contiguous area of RLA1 provides for a range of allotment sizes and shapes and comprises pockets of smaller lots offset by larger lots and open space;

f. Encouraging the extent of earthworks to not exceed that required for the installation of services, access and building platforms, while recognising that the contouring of land may either be required for, or limited by, geotechnical and/or aesthetic considerations;

g. Managing the character and amenity values of the Rural Resource Area (5) and surrounding areas by controlling land use activities, avoiding building within the no build areas shown on the Structure Plan, and avoiding urban forms of subdivision and development;

h. Minimising adverse effects of built form resulting from inappropriate building scale, location and external appearance;

i. Enhancing landscape values through the implementation of planting schemes tailored to specific areas within the Rural Resource Area (5);

j. Providing for an efficient access and open space network;

k. Providing adequate infrastructure to service development while minimising adverse effects;

l. Avoiding building in high risk natural hazard areas;

m. Managing the potential for reverse sensitivity effects on adjoining rural land uses;

n. Maintaining the productive potential of the Rural Lifestyle Production Area through ensuring that the allotment sizes and location of residential activity within the Rural Lifestyle Production Area do not prevent or significantly inhibit its productive use;

o. Ensuring the Rural Lifestyle Production Area is used for productive purposes alongside providing for rural living by requiring 50% of each allotment to be planted for productive purposes prior to the establishment of residential activity;

p. Complementing, rather than competing with, urban areas in the district by providing a focus on rural living activities.

q. Maintaining the open and natural character and legibility of Rural Lifestyle Area 6 by:

    i. Avoiding subdivision and building in the No Build Area;

    ii. Enabling building within the "Area for Future Building Platform" provided it is well integrated into the landscape;

    iii. Other than as provided in ii, avoiding building in the area outside of the No Build Area unless it be demonstrated that the legibility and open and natural character of the Rural Lifestyle Area 6 will be maintained;

    iv. Avoiding subdivision in the area outside of the No Build Area unless:

        a. the creation of additional lots is necessary to facilitate rural activity or ecological restoration and use of the land is restricted to such purpose in perpetuity through a legal mechanism; or

        b. a dwelling has been approved under Rule 4.7.4.xi on each of the lots proposed to be created; and

        c. in respect of a and b the subdivision will avoid adverse effects on, and maintain, the legibility and open and natural character of the Rural Lifestyle Area 6 and will not result in delineation of boundaries through fencing or planting.

    v. Requiring that any planting is natural in design and avoids any linear or geometric forms and comprises only native species endemic to the area except for low height producing grass species such as browntop;

    vi. Requiring that any roads are largely enclosed by planting.

94 In considering the proposal against these two provisions, it is first important, and necessary, to understand the purpose and the intent of the RRA (5), and why it was established. This information is found in the explanatory text that informs Policy 4.4.18 and says (my **emphasis** added where relevant):

> "… Rural Resource Area (5) **enables rural lifestyle subdivision and development**, providing for a range of densities that foster a **sensitive and creative response within the landscape of the site while also providing for greater diversity of living opportunities that contributes to the strengthening of rural communities.**
>
> The Structure Plan in Schedule 19.23 provides for the growth of rural lifestyle development within Rural Resource Area (5) in an integrated, sustainable and planned manner. The Structure Plan enables development that will respect the unique characteristics of the area and the surrounding environment by identifying areas capable of absorbing a range of densities of rural lifestyle development commensurate to the landscape values of the area. Those parts of the site containing Waenga 5 soils are subject to additional controls to recognise the value of the soil resource and to ensure that it is predominantly retained for productive use. The Structure Plan also identifies areas where no built development is to occur as a response to the identification of hazard areas where people and property are likely to be at greater risk. Development is required to be set back from adjoining properties containing established rural land uses to manage potential reverse sensitivity. The Outstanding Natural Landscape of the Pisa Range has been avoided through the implementation of the Structure Plan.
>
> Minimum and, in some cases, average allotment areas have been identified for each Rural Lifestyle Area identified on the Structure Plan. The areas capable of having smaller lots and denser rural living development are on the flat and less visibly prominent core of the zone. Larger lots are located on the outer edges of the zone, responding to the landscape values within the Significant Amenity Landscape and enabling use of the soils in the southern part of the zone for productive land uses. A No Build Area and designated area within RLA6 for locating future buildings ensures that development on the most highly visible areas valued for their open and legible character is avoided, while enabling development in the least sensitive area, and providing for potential development of the balance only where it is possible to maintain landscape values.
>
> …

> Rural Resource Area (5) is in relatively close proximity to the urban area of Cromwell and its shops, services, employment and schools. Commercial activities are limited to avoid undermining the functioning of this urban area."

95 In my opinion, the explanatory text is particularly useful because it identifies the fundamental purpose of the Zone. While it recognises that different Rural Lifestyle Areas (within the Shannon Farm development) are to accommodate varying densities, the emphasis is not simply on allotment sizes. Rather, the purpose is to provide for a range of rural living opportunities in locations capable of accommodating development, in a manner that does not compromise landscape, productive and rural amenity values that justified the zoning in the first instance.

96 That distinction is important here. There is no dispute that the proposal breaches the minimum allotment provisions applying within Rural Lifestyle Areas 3, 4 and 6 and the maximum number of Lots. However, the policy framework is not simply concerned with whether a minimum allotment size or total number or Lots are met. Rather, the relevant question in my view, is whether the environmental outcomes sought by the District Plan, including Objective 4.3.10 continue to be achieved. Lot sizes are essentially tools for implementing a particular environmental outcome, informed by the policy framework.

97 In considering the environmental outcomes sought by Objective 4.3.10 and Policy 4.4.18, I have undertaken a detailed analysis of these provision in **Appendix [E]** of my evidence where I consider that overall, the proposal continues to provide for rural living opportunities that remain integrated with productive land, and open space, and avoids development within the Outstanding Natural Landscape and No Build Area.

98 With respect to some of the particularly relevant matters of Policy 4.4.18, I accept that the proposal is inconsistent with Policy 4.4.18(c) in isolation, which seeks adherence to the prescribed minimum and average allotment sizes. However, that inconsistency should not, in my opinion, be determinative. The policy must be read as a whole. It contains numerous directives directed towards landscape protection, servicing, infrastructure, productive land, reverse sensitivity, open space and maintaining rural character, some of which, Mr Monthule-McIntosh and I agree the proposal is consistent with.

99 With reliance on Mr Milne's evidence, it is considered that the landscape values that PC14 sought to protect, remain protected with the proposed additional lots, and despite the additional density, the proposal maintains the "values of the SAL".

100 Policy 4.4.18(q) seeks to maintain the open and natural character and legibility of the RLA6. I have considered this point further recognising the differences in opinion between the landscape experts:

(a) While the proposal introduces additional allotments within RLA6, I do not consider it is contrary to the intent of this policy when it is read as a whole. The proposal continues to avoid subdivision and development within the identified No Build Area, thereby maintaining protection of the visually prominent upper slopes that were identified through the PC14 process as being the most sensitive component of the landscape. This represents one of the principal mechanisms by which the District Plan seeks to maintain the open character of RLA6 and remains entirely unchanged as assessed by Mr Milne.

(b) While additional building platforms are proposed outside the identified "Area for Future Building Platform", Mr Milne's evidence demonstrates that the proposal continues to maintain the legibility and open character of RLA6. The additional Lots (in RLA6) are concentrated on the lower slopes adjacent to the consented road alignment, follow the existing landform, and read as a logical extension of the consented Shannon Farm subdivision rather than as sporadic or fragmented development. This design approach maintains a substantial band of open hillside between the proposed development and the No Build Area, preserving the visual separation that was fundamental to the Structure Plan.

(c) Mr Milne's evidence also concludes that the proposal will result in landscape and visual effects within RLA6 that are generally low to low-moderate, and therefore no more than minor. As such, I consider the proposal therefore maintains the landscape values that Policy 4.4.18(q) seeks to protect, notwithstanding the increased density.

(d) While Policy 4.4.18(q)(iv) contemplates subdivision outside the No Build Area only in limited circumstances, I do not consider that this provision should be read in isolation from the remainder of the policy framework. The purpose of subclause (q) is to maintain the open and natural character and legibility of RLA6 which, in my view, continues to be achieved despite the additional Lots proposed.

101 As noted above, I have undertaken a comprehensive assessment of the wider District Plan framework in **Appendix [E]** to my evidence. In considering that assessment, it is my opinion that the proposal does not need to be entirely consistent with every element of every objective and policy in order to be regarded as *not contrary* to the District Plan. This is

particularly relevant to Policy 4.4.18, which contains a broad range of directives addressing multiple aspects of the Shannon Farm development. In my opinion, the proposal remains consistent with the majority of those directives, including those relating to landscape outcomes, infrastructure, open space, productive land, reverse sensitivity, servicing and the integrated development of the site. While I acknowledge that the proposal departs from aspects of the policy relating to allotment sizes and the development anticipated within RLA6, I do not consider those departures outweigh the proposal's overall consistency with the policy or undermine the principal environmental outcomes it seeks to achieve. Accordingly, when Policy 4.4.18 is read as a whole, I do not consider the proposal to be contrary to its overall intent or direction.

102 In terms of Mr Monthule-McIntosh's assessment of the objectives and policies, his assessment concludes that the proposal is:

(a) **Consistent** with a number of the District Plan provisions relating to servicing, roading, open space, recreation, productive land, reverse sensitivity, ecology, heritage and natural hazards. Those matters are either appropriately addressed through the existing Shannon Farm framework, technical evidence, or recommended conditions.

(b) **Inconsistent** with Objective 4.3.10 and Policy 4.4.18, which establish the site-specific policy framework for Rural Resource Area (5). His conclusion is that the proposal would substantially depart from the minimum allotment size framework for RLAs 3 and 4, replace the single-allotment outcome anticipated for RLA6 with 17 residential allotments, and introduce building platforms outside the identified "Area for Future Building Platform". These departures would materially weaken the planned distinction between the RLAs, reduce the open and legible character of RLA6, and result in a more intensive and homogenous rural lifestyle development pattern than anticipated through PC14.

103 Despite acknowledging that the proposal is indeed consistent with various aspects of the District Plan, **Mr Monthule-McIntosh's** concludes overall that the proposal "is contrary to the key objectives and policies of the District Plan".

104 As the Panel will appreciate from my assessment of the objectives and policies, I disagree with Mr Monthule-McIntosh's conclusion that the proposal is contrary to the District Plan. In my opinion, his assessment places considerable emphasis on the proposal's departure from the subdivision pattern and allotment size framework established through PC

14, rather than assessing whether the environmental outcomes sought by the policy framework (particularly the overarching objective under 4.3.10) continue to be achieved.

105 As discussed throughout my evidence, the proposal continues to maintain the fundamental outcomes anticipated for the RRA (5) particularly with regard to maintaining the “values of the SAL”. While the proposal results in additional allotments and smaller lot sizes within parts of the development, I do not consider those changes, of themselves, result in the environmental outcomes sought by Objective 4.3.10 and Policy 4.4.18 no longer being achieved.

106 I also consider it appropriate to have regard to the NPS-UD. In my opinion, the NPS-UD provides important context for assessing this application. The proposal is consistent with the enabling direction of that national policy statement. It responds to demonstrated changes in market demand identified by Messrs Colegrave and Croft, provides additional housing choice and development capacity within an existing master-planned growth area, makes efficient use of substantial infrastructure already provided through PC14, and contributes to a well-functioning urban environment.

107 The NPS-UD recognises that urban environments (as defined in the NPS-UD) are expected to evolve over time and that planning decisions should be responsive to changing community needs, particularly where proposals provide additional development capacity and contribute to well-functioning urban environments. The proposal does not challenge the strategic planning decision made through PC 14 that Shannon Farm is an appropriate location for growth. Instead, I consider it represents a refinement of that approved framework to better respond to market conditions while continuing to achieve the landscape, amenity and servicing outcomes that underpinned the original rezoning.

108 Accordingly, while I acknowledge that the proposal is not fully consistent with every aspect of the RRA (5) provisions, particularly the prescribed allotment size framework, I do not consider it is contrary to the overall direction or intent of the District Plan when read as a whole. When the proposal is considered alongside the enabling direction of the NPS-UD, I am satisfied that it achieves a positive overall planning outcome by providing additional housing choice and development capacity within an established, strategically planned and appropriately serviced area, whilst maintaining the key environmental outcomes sought by both the District Plan and the wider statutory framework.

Part 2

109 In terms of Part 2 of the RMA, Mr Monthule-McIntosh concludes the following:

> I do not consider that a separate resort to Part 2 is necessary, as the relevant planning instruments provide a coherent and complete framework for assessing the proposal. In any event, the adverse landscape, rural character and plan-integrity outcomes identified above would not promote the sustainable management purpose of the Act.

110 While I agree that it is not necessary to resort to a Part 2 assessment, I disagree with Mr Monthule-McIntosh's conclusion that the proposal does not promote the sustainable management purpose of the Act. While I acknowledge the proposal departs from aspects of the subdivision framework established through PC14, for the reasons set out earlier in this evidence I do not consider those departures result in adverse landscape, rural character or plan integrity effects of the significance suggested in the section 42A Report.

111 As discussed throughout my evidence, I consider the proposal continues to achieve the principal environmental outcomes anticipated by the RRA (5). While the proposal introduces a greater number of allotments than originally anticipated, I do not consider that change, in itself, undermines the purpose or intent of the planning framework, and adverse effects are considered in my opinion, to be no more than minor. This is particularly true when considering the evolution of planning context since PC 14 was approved. As discussed earlier in my evidence, I consider the proposal is subject to, and generally consistent with, the National Policy Statement on Urban Development. The evidence of Mr Colegrave and Mr Croft demonstrates that market demand has changed, with a clear preference for smaller rural lifestyle allotments than those originally envisaged. In my opinion, the proposal represents an appropriate response to those changing circumstances by increasing housing choice and development capacity within an existing, strategically planned and well-serviced growth area, whilst continuing to achieve the environmental outcomes that underpinned the original rezoning.

112 Accordingly, even if a broad assessment under Part 2 were considered necessary, I am satisfied that granting consent would promote the sustainable management of natural and physical resources under the Act. The proposal enables people and communities to provide for their social and economic wellbeing by responding to demonstrated housing demand and making efficient use of existing infrastructure, while appropriately

managing adverse environmental effects. The proposal achieves the matters of national importance under s6(b) in terms of avoiding effects on the ONL. The proposal is, in my view, also consistent with s7(c) in terms of maintaining amenity values and represents an efficient use of the land resource (s7b). For these reasons, I consider that Part 2, when viewed in conjunction with the District Plan and the NPS-UD, weighs in favour of granting consent.

The submission received;

113 The application was publicly notified with the submission period closing on 7 May 2026. At the close of the submission period, only two submissions were received, one of which was since withdrawn.

114 The remaining submission, submitted by Fire and Emergency NZ (**FENZ**). FENZ neither supports nor opposes the application, but seeks that any consent granted include appropriate provision for firefighting water supply and emergency service access. FENZ recommended the provision of a condition to address their concerns.

115 As detailed in Mr Buchanan's evidence, conditions of consent will ensure compliance with SNZ PAS 4509:2008 and the CODC Code of Practice.

Conditions

116 Should the Panel be of a mind to grant consent, the s42A report included a suite of conditions. I have reviewed these conditions, alongside the rest of the project team, and an updated copy of the conditions are attached in **Appendix [F].** This document has been "cleaned" for legibility with Council's recommended changes highlighted in blue, and my changes highlighted in red.

117 I summarise those changes as follows:

(a) I have re-ordered the number to correct a drafting error in the original s42A report (condition 2 was numbered condition 1, affecting all other numbering).

(b) Condition 23 incorrectly refers to Condition 20(aa). This should refer to Condition 21(bb). This error stems from earlier variations and I simply propose to have this corrected as part of this process.

(c) All plans detailed in Condition 1, have been revised to reflect the "Revision H" plan set, which is attached in full to my evidence in **Appendix [B].**

(d) I have recommended a minor deletion in Condition 20, to correct a typo.

(e) In light of Mr Buchanan's evidence, several engineering conditions are proposed to be tweaked, as follows:

(i) Condition 21(j) is amended in include reference to RLA 4, as opposed to just RLA 1. The Right of Way access contained within RLA 4 and noted as areas F, G, H, T, J & Y on the proposed scheme plan are proposed to be 6m legal width and formed in accordance with this condition.

(ii) Condition 21(k) is amended to remove RLA 4, as a consequence of the changes made to 21(j).

(iii) Condition 21(k)(vii) is amended to reflect the requirements of 4404:2004 to reflect the existing consented stages which have already been designed and constructed in accordance with this standard.

(iv) Condition 21(m)(viii)(a) and (b) is updated to reference SNZ PAS 4509:2008.

118 All other conditions are accepted as presented.

Conclusion

119 This application seeks a refinement of the consented Shannon Farm subdivision in response to sustained population growth and demonstrated changes in market demand since Plan Change 14 was approved.

120 In my opinion, the assessment of this proposal should focus on whether it continues to achieve the environmental outcomes sought by the Rural Resource Area (5), rather than whether it adheres rigidly to the subdivision pattern established through Plan Change 14.

121 District Plan rules, and resource consents, are tools by which to open up an evaluation of the appropriateness of the activity. The same is true with Structure Plans, in that they are tools used to assist with making decisions under the wider policy framework in which it stems from. The appropriateness in my view, is determined by the proposals alignment with the policy provisions. The prescribed allotment sizes, densities and the Structure Plan, are mechanisms for achieving those outcomes, not ends in themselves. Having regard to the evidence before the Hearing Panel, I am satisfied that the proposal continues to protect the Outstanding Natural Landscape, maintains the values of the Significant Amenity Landscape,

preserves rural amenity, provides for productive land, and utilises the integrated infrastructure and open space framework established through the Structure Plan. These are all matters that Objective 4.3.10 seeks to achieve.

122 Beyond landscape and rural character, there is broad agreement between myself and Mr Monthule-McIntosh that the proposal can be appropriately serviced and that effects relating to transport, infrastructure, ecology, natural hazards, heritage, reverse sensitivity and productive land are either no more than minor or can be appropriately managed through conditions of consent. I generally support the recommended conditions, subject to the minor amendments identified in my evidence.

123 While I acknowledge that the proposal departs from aspects of the Rural Resource Area (5) provisions, particularly in relation to allotment sizes and development within RLA6, I do not accept that these departures mean the proposal is contrary to the District Plan when read as a whole. In my view, the section 42A Report places disproportionate weight on those aspects of the policy framework, without giving equivalent consideration to the many policy directions that the proposal continues to achieve, or to the broader statutory context, including the National Policy Statement on Urban Development. Section 104(1)(b) requires regard to be had to not just District Plans, but that of any relevant regional and national policy statement

124 In my opinion, this proposal represents a logical evolution of the anticipated Shannon Farm development rather than a departure from it. It delivers 44 additional residential allotments within an existing, well-serviced and comprehensively planned growth area, responds to contemporary housing demand, makes efficient use of substantial infrastructure already committed, and continues to achieve the key environmental outcomes that underpinned Plan Change 14. The effects of the additional development are largely internalised within the Shannon Farm development itself and do not compromise the wider landscape, servicing or amenity outcomes anticipated by the District Plan. When considered in its entirety, and alongside the enabling direction of the NPS-UD, I consider the proposal represents a positive planning outcome that satisfies both limbs of s104D of the RMA, and that resource consent should be granted.

Dated this 23 July 2026



Jacob (Jake) Paul Woodward

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **1233739**

Land Registration District **Otago**

Date Issued 08 January 2026

Prior References

126180 OT106/99 OT7C/632
OT7C/633

Estate Fee Simple

Area 233.1880 hectares more or less

Legal Description Lot 1000 Deposited Plan 615998

Registered Owners

New Zealand Cherry Corp (Leyser) LP

Interests

Excepting and reserving from part formerly Section 4, part Section 5 and Section 11 Block III Cromwell Survey District to Her Majesty the Queen all minerals, mineral oil, gas, metals, coal and valuable stone under the surface of the land

Subject to Section 8 Mining Act 1971 (affects part formerly Sections 96, 98, 99, 100, 101, 102 and 103 Block III Cromwell Survey District)

Subject to Section 168A Coal Mines Act 1925 (affects part formerly Sections 96, 98, 99, 100, 101, 102 and 103 Block III Cromwell Survey District)

Part formerly Lot 2 DP 330709 and part formerly Section 54 Block III Cromwell Survey District is subject to interests, easements and rights under the Land relating to mining, mines and minerals

Subject to a right to convey water over part marked XN on DP 615998 created by Easement Instrument 6264801.4 - 23.12.2004 at 9:00 am

The easements created by Easement Instrument 6264801.4 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right to convey water over part marked XN on DP 615998 created by Easement Instrument 7073932.4 - 17.10.2006 at 9:00 am

Subject to a right (in gross) to convey electricity over part marked XG and XH and a right (in gross) to transform electricity part marked XH all on DP 615998 in favour of Aurora Energy Limited created by Easement Instrument 11175490.2 - 6.8.2018 at 7:29 am

11211780.3 Mortgage to Bank of New Zealand - 31.8.2018 at 4:12 pm

13078798.2 Variation of Mortgage 11211780.3 - 22.8.2024 at 4:51 pm

Subject to a right (in gross) to convey electricity over part marked XK and XM on DP 615998 in favour of Aurora Energy Limited created by Easement Instrument 13245069.1 - 1.8.2025 at 9:29 am

13403075.3 Surrender of the right to convey water marked A on DP 344529 created by Easement Instrument 7073932.4 as appurtenant to Lots 1-5 DP 420009 - 8.1.2026 at 4:08 pm

13403075.4 Surrender of the right to convey water marked A on DP 344529 created by Easement Instrument 6264801.4 as appurtenant to Lots 1-4 DP 344529 - 8.1.2026 at 4:08 pm

Subject to a right of way over part marked D and a right of way and a right to convey water over part marked B and G all on DP 615998 created by Easement Instrument 13403075.7 - 8.1.2026 at 4:08 pm

The easements created by Easement Instrument 13403075.7 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey water over part marked B, G and D all on DP 615998 in favour of Shannon Farm Owners Association Incorporated created by Easement Instrument 13403075.8 - 8.1.2026 at 4:08 pm

Subject to a right (in gross) to convey water over part marked AH, AI and XL all on DP 615998 in favour of Ripponvale Irrigation Company Limited created by Easement Instrument 13403075.9 - 8.1.2026 at 4:08 pm

The easements created by Easement Instrument 13403075.9 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right to convey water over parts marked AC, AD, XA, XB, XC, XD, XE, XJ and XK all on DP 615998 created by Easement Instrument 13403075.10 - 8.1.2026 at 4:08 pm

Some of the easements created by Easement Instrument 13403075.10 are subject to Section 243 (a) Resource Management Act 1991 (see DP 615998)

Subject to a right (in gross) to drain sewage over part marked B, D, AG, AH, AJ, FB, FC, FD, FU, FT, FW and G all on DP 615998 in favour of Central Otago District Council created by Easement Instrument 13403075.11 - 8.1.2026 at 4:08 pm

The easements created by Easement Instrument 13403075.11 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey water over part marked D and WA on DP 615998 in favour of Central Otago District Council created by Easement Instrument 13403075.12 - 8.1.2026 at 4:08 pm

The easements created by Easement Instrument 13403075.12 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to drain water and store water over parts marked SA and SE and a right to drain water over parts marked AB, AC, AD, AG, AH, AI, FC, SD, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, AF, AM, AN, XM and AQ all on DP 615998 in favour of Central Otago District Council created by Easement Instrument 13403075.13 - 8.1.2026 at 4:08 pm

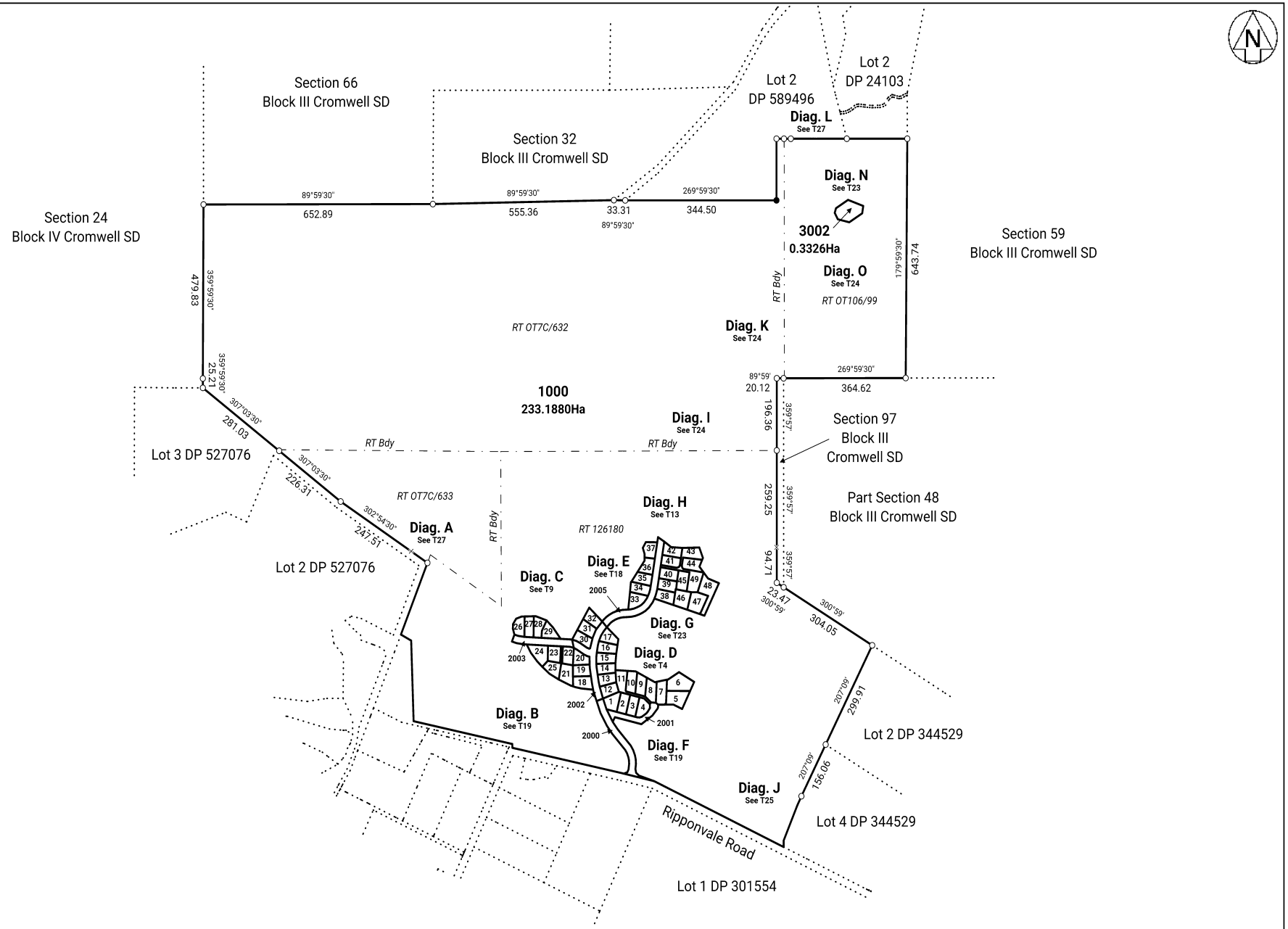
The easements created by Easement Instrument 13403075.13 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey telecommunications over parts marked B, D and G on DP 615998 in favour of Chorus New Zealand Limited created by Easement Instrument 13403075.14 - 8.1.2026 at 4:08 pm

The easements created by Easement Instrument 13403075.14 are subject to Section 243 (a) Resource Management Act 1991

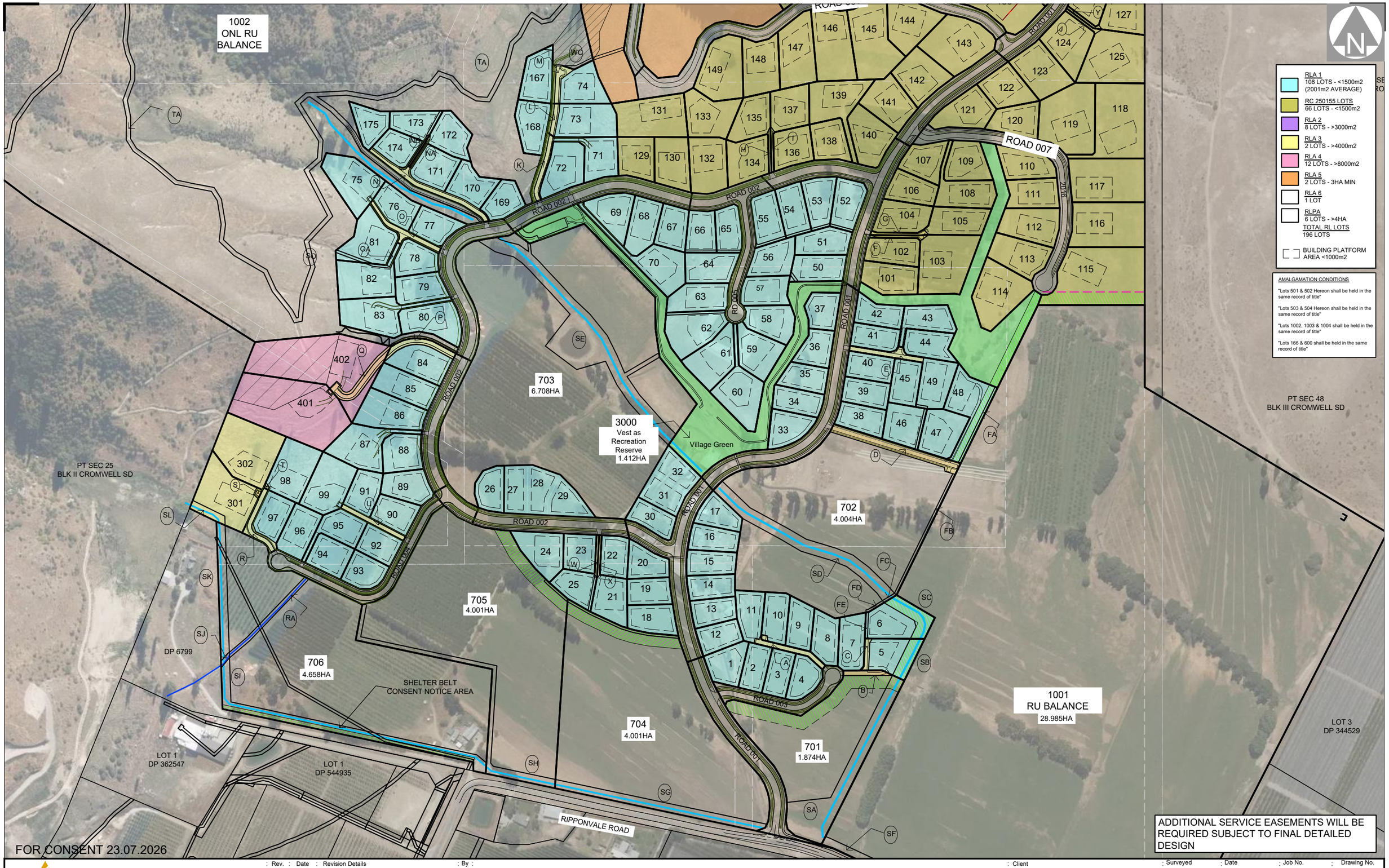
Subject to a right (in gross) to convey electricity over parts marked B, D, AA, AB, AC, AD, AE, AI, AL, WA, XE, G, AM, AN, AO, AP, XB, XD, XF, XI and XL and a right (in gross) to transform electricity over parts marked AA, AB, AC, AD, AL and AP all on DP 615998 in favour of Aurora Energy Limited created by Easement Instrument 13403075.15 - 8.1.2026 at 4:08 pm

The easements created by Easement Instrument 13403075.15 are subject to Section 243 (a) Resource Management Act 1991



T 1/27

Land District: Otago Digitally Generated Plan Generated on: 28/01/2026 09:29am Page 13 of 39	Lots 1 - 49, 1000, 2000 - 2003, 2005 and 3002 being a subdivision of Lot 2 DP 330709, Sections 4, 11, 26, 27, 28, 54, 96, 98, 99, 100, 101, 102, 103 and Part Sections 5 and 25 all Block III Cromwell S.D. and Part Run 1201R	Surveyor: Paul Timothy Cook Firm: Clark Fortune McDonald & Associate	Title Plan LT 615998 Approved on: 28/01/2026



CLARK FORTUNE McDONALD
LAND SURVEYORS - LAND DEVELOPMENT - PLANNING CONSULTANTS
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Tel. (03)441-6044, Email admin@cfma.co.nz, www.cfma.co.nz

Rev.	Date	Revision Details	By
A	19.10.22	ADJUST LOT LAYOUT & STAGING	RB
B	02.11.22	ADD ADDITIONAL EASEMENTS	RB
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

SHANNON FARM DEVELOPMENT

LOTS 1-175, 201-208, 301-302, 401-402, 416-425, 500-504, 600, 701 -706, 1001-1002, 2000-2016, 3000-3002 BEING A SUBDIVISION OF SEC 4, PT5, 11, PT25, 27, 28, 54, 98, 100, 102, 101,103 BLK III CROMWELL SD, PT RUN 1201R & LOT 2 DP 330709

LOT LAYOUT OVERVIEW

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 001
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Ensuring the information is the most recent issue. - Copyright on this drawing is reserved.	Drawn: RB	Date: 11.07.22	Scale: 1:4000 @ A3	
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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RLA 1
108 LOTS - <1500m2
(2001m2 AVERAGE)

RC 250155 LOTS
66 LOTS - <1500m2

RLA 2
8 LOTS - >3000m2

RLA 3
2 LOTS - >4000m2

RLA 4
12 LOTS - >8000m2

RLA 5
2 LOTS - 3HA MIN

RLA 6
1 LOT

RLPA
6 LOTS - >4HA

TOTAL RL LOTS
196 LOTS

BUILDING PLATFORM AREA <1000m2

MAJOR CONT (10m)

MINOR CONT (2m)

AMALGAMATION CONDITIONS

"Lots 501 & 502 Hereon shall be held in the same record of title"

"Lots 503 & 504 Hereon shall be held in the same record of title"

"Lots 1002, 1003 & 1004 shall be held in the same record of title"

"Lots 166 & 600 shall be held in the same record of title"

SEC 32 BLK III CROMWELL SD

LOT 1
DP 539341

SEC 59
BLK III CROMWELL SD

Vest as Local purpose reserve

3002
3320m2

NO BUILD AREA

600
36.277HA

NO BUILD AREA

ALIGNMENT MAY BE ADJUSTED TO FOLLOW FINAL TRAIL ROUTE

ROAD 006

ROAD 001

ROAD 007

1002
ONL RU
BALANCE

PT SEC 48
BLK III CROMWELL SD

ADDITIONAL SERVICE EASEMENTS WILL BE REQUIRED SUBJECT TO FINAL DETAILED DESIGN

FOR CONSENT 28.07.2026

Rev.	Date	Revision Details	By
A	19.10.22	Reconfigure with geotech area bulk lots	RB
D	22.12.22	Add no build area to lots 503 & 502	RB
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

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SHANNON FARM DEVELOPMENT

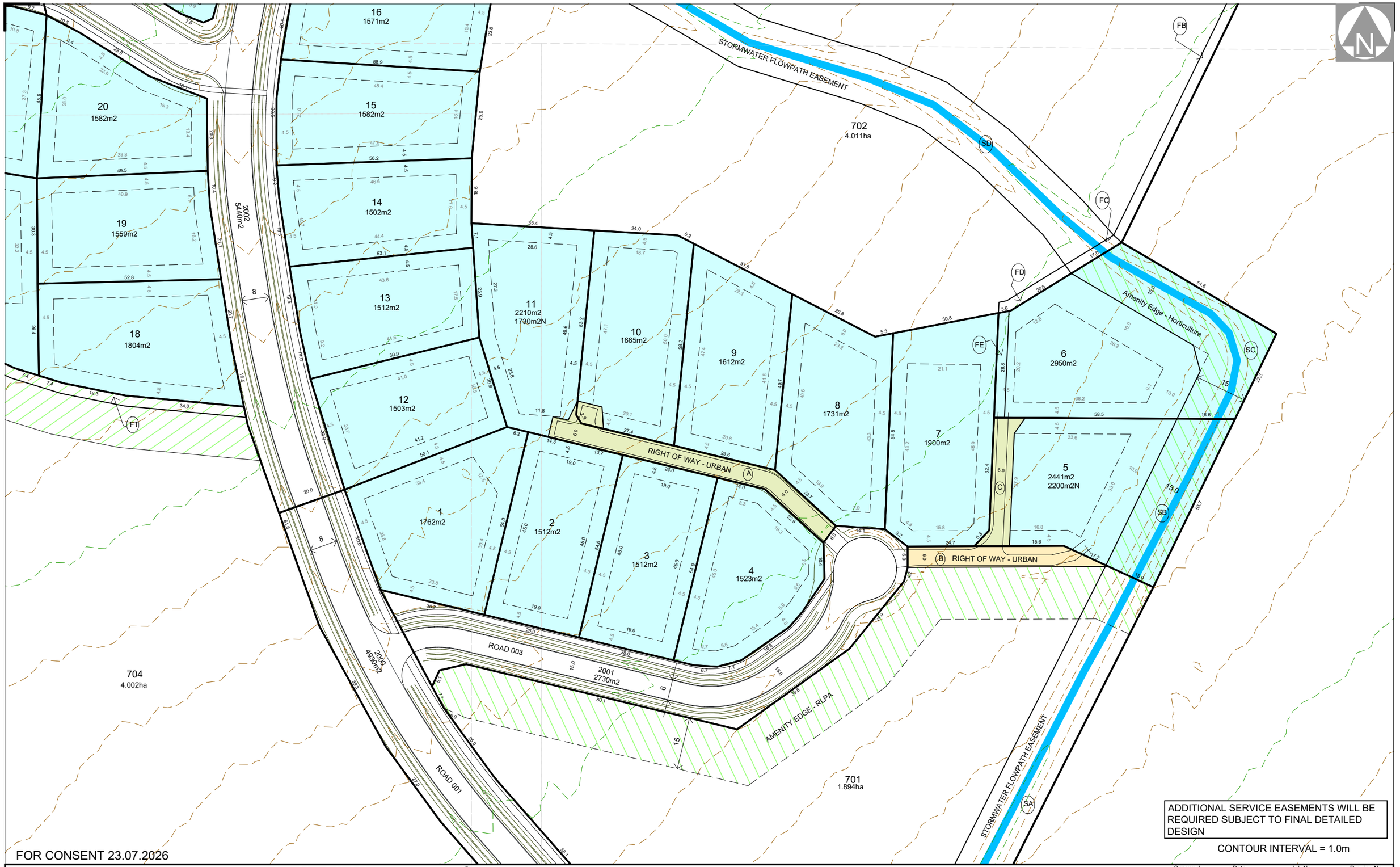
LOTS 1-175, 201-208, 301-302, 401-402, 416-425, 500-504, 600, 701 -706, 1001-1002, 2000-2016, 3000-3002 BEING A SUBDIVISION OF SEC 4, PT5, 11, PT25, 27, 28, 54, 98, 100, 102, 101,103 BLK III CROMWELL SD, PT RUN 1201R & LOT 2 DP 330709

LOT LAYOUT OVERVIEW

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	Drawn: RB	Date: 11.07.22	Drawing No.: 01 Sheet 002
	Checked: –	Date: –	Scale: 1:4000 @ A3
			Datum & Level: LINDIS PK 2000 NZVD2016
			Rev.: H

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CONTOUR INTERVAL = 1.0m

FOR CONSENT 23.07.2026

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Rev.	Date	Revision Details	By
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

SHANNON FARM DEVELOPMENT

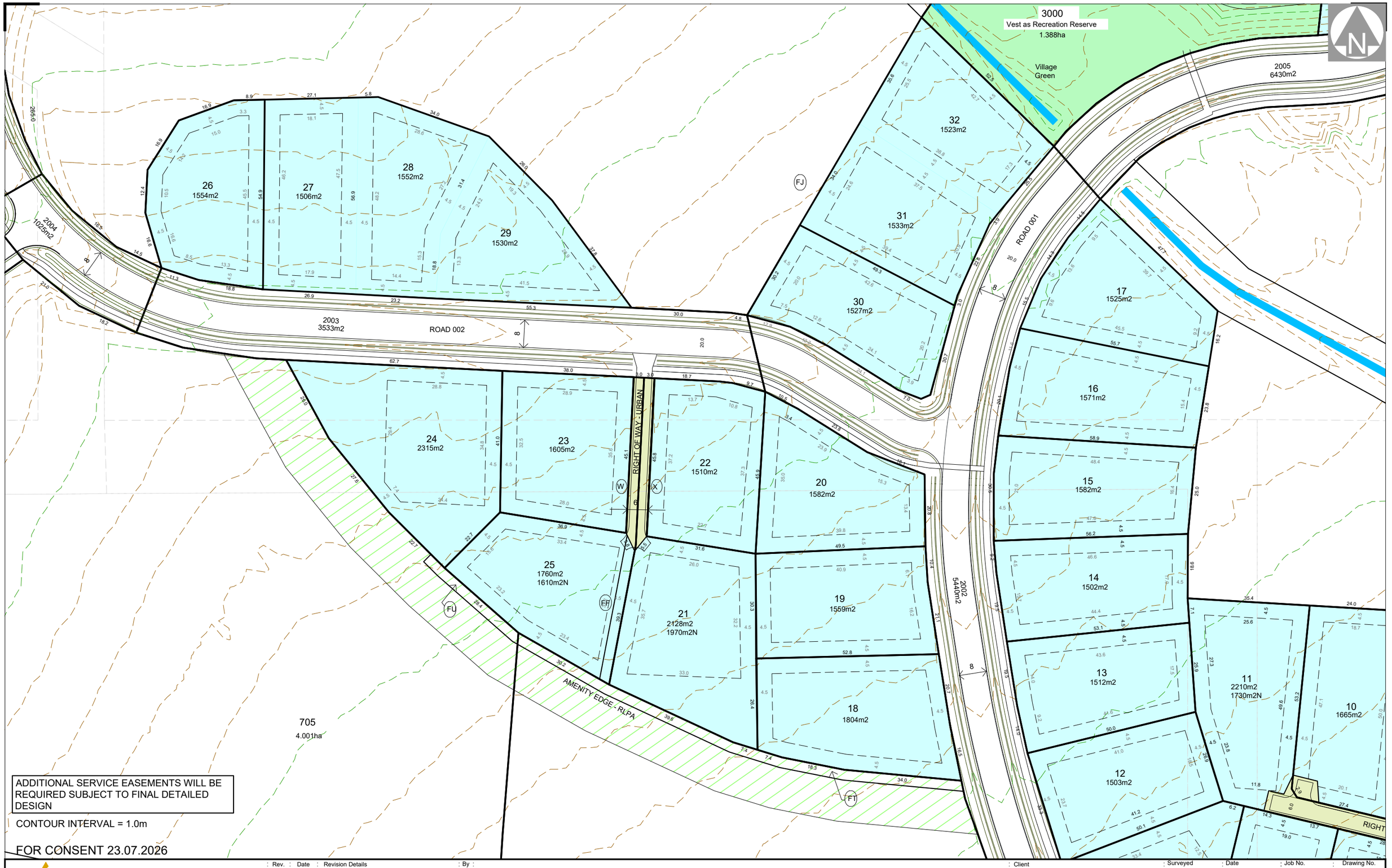
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LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 003	
	Drawn: RB	Date: 11.07.22	Scale: 1:1 @ A3		
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H	

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CONTOUR INTERVAL = 1.0m

FOR CONSENT 23.07.2026

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Rev.	Date	Revision Details	By
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

SHANNON FARM DEVELOPMENT

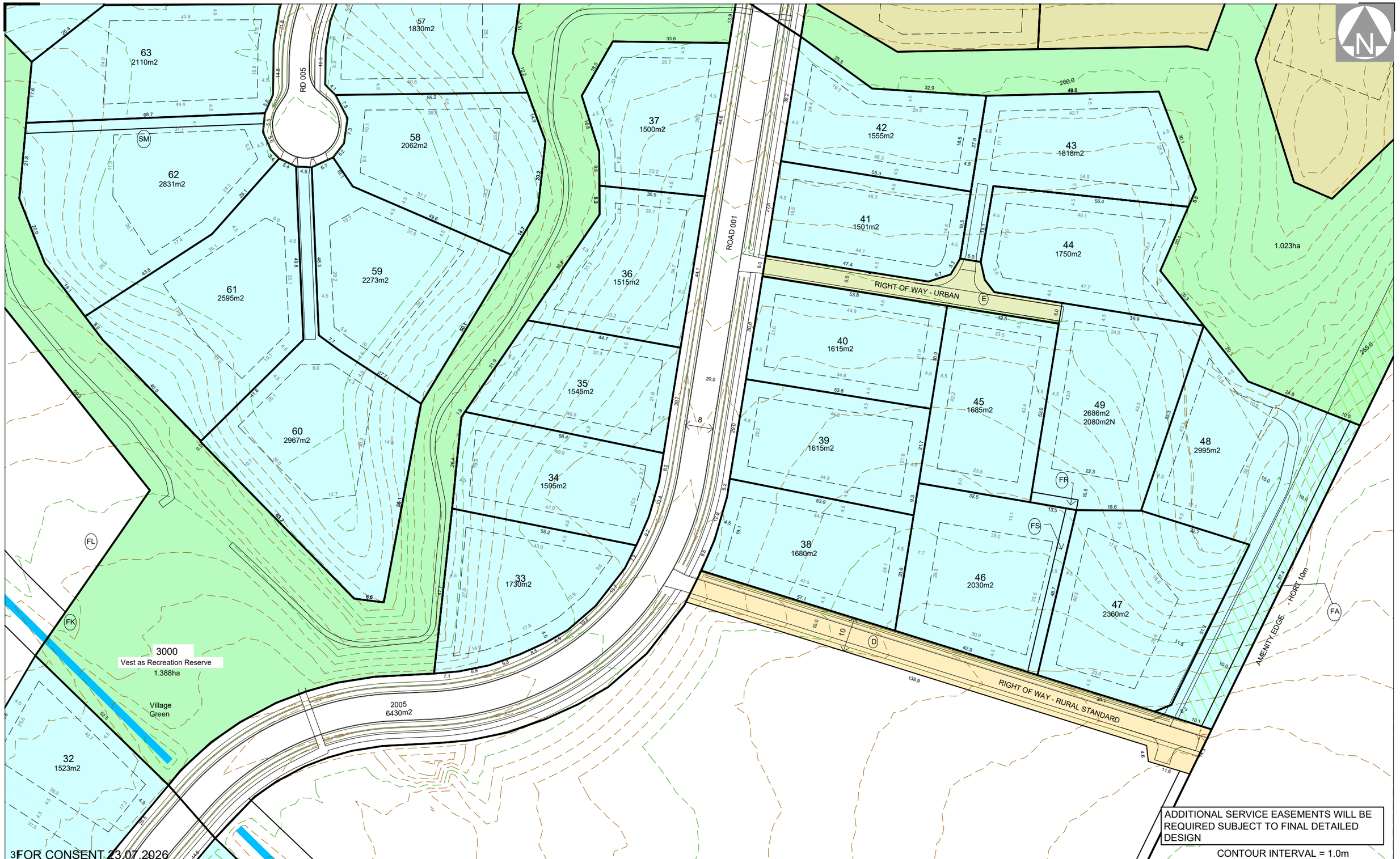
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LOT LAYOUT

Client	Surveyed	Date	Job No.	Drawing No.
NZ CHERRY CORP	–	–	15729	01 Sheet 004
	Drawn	Date	Scale	
	RB	11.07.22	1:1 @ A3	
	Checked	Date	Datum & Level	Rev.
	–	–	LINDIS PK 2000 NZVD2016	H

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H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

SHANNON FARM DEVELOPMENT

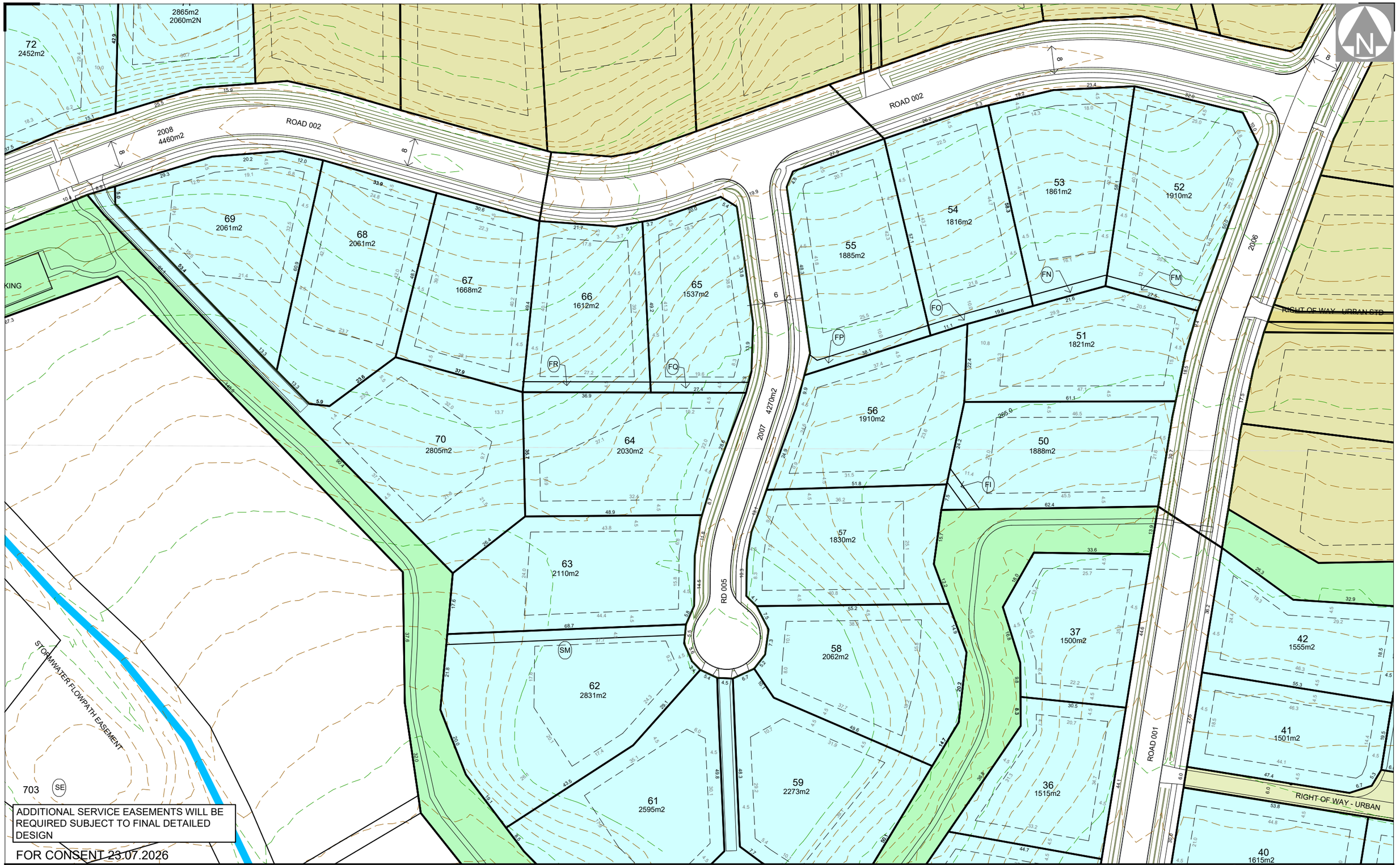
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LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729
	Drawn: RB	Date: 11.07.22	Drawing No.: 01 Sheet 005
	Checked: –	Date: –	Scale: 1:1 @ A3
			Datum & Level: LINDIS PK 2000 NZVD2016
			Rev.: H

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ADDITIONAL SERVICE EASEMENTS WILL BE REQUIRED SUBJECT TO FINAL DETAILED DESIGN

FOR CONSENT 23.07.2026

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SHANNON FARM DEVELOPMENT

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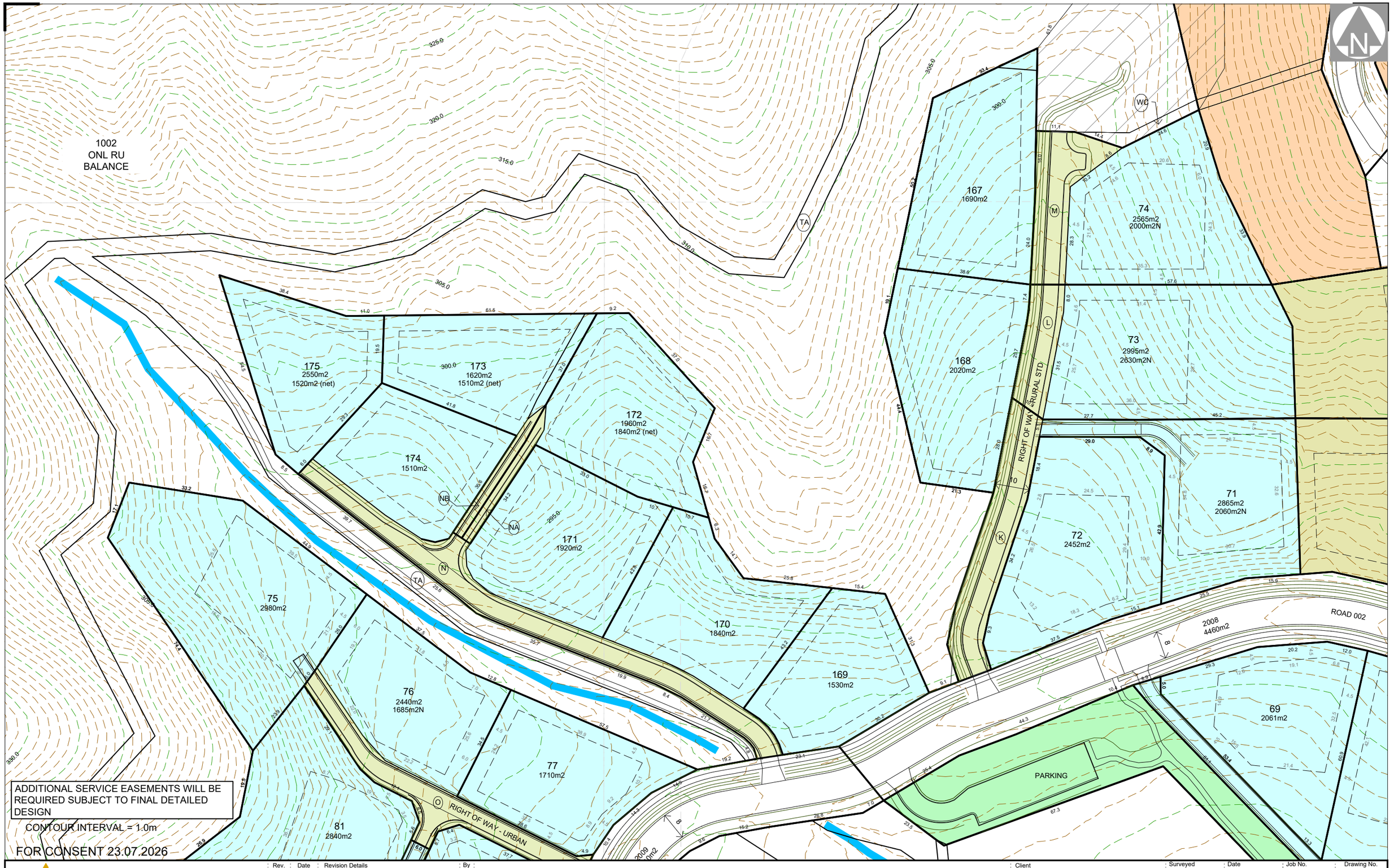
LOT LAYOUT

Client: NZ CHERRY CORP

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Surveyed	Date	Job No.	Drawing No.	
–	–	15729	01 Sheet 006	
Drawn	Date	Scale		
RB	11.07.22	1:1 @ A3		
Checked	Date	Datum & Level	Rev.	
–	–	LINDIS PK 2000 NZVD2016	H	

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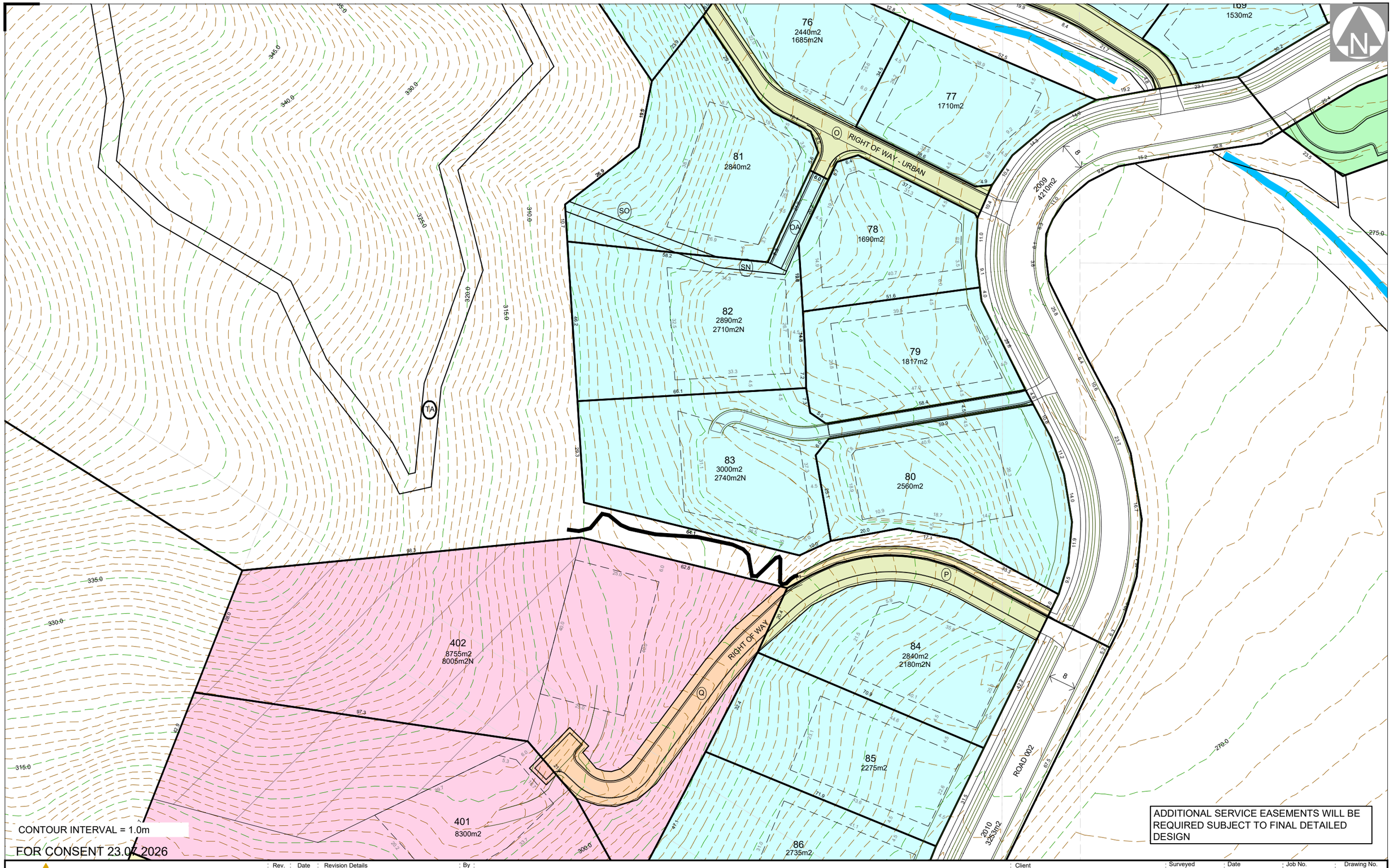
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LOTS 1-175, 201-208, 301-302, 401-402, 416-425, 500-504, 600, 701 -706, 1001-1002, 2000-2016, 3000-3002 BEING A SUBDIVISION OF SEC 4, PT5, 11, PT25, 27, 28, 54, 98, 100, 102, 101,103 BLK III CROMWELL SD, PT RUN 1201R & LOT 2 DP 330709

LOT LAYOUT

Client	Surveyed	Date	Job No.	Drawing No.	
NZ CHERRY CORP	–	–	15729	01 Sheet 007	
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	RB	11.07.22	1:1 @ A3		
	Checked	Date	Datum & Level	Rev.	
	–	–	LINDIS PK 2000 NZVD2016	H	

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CONTOUR INTERVAL = 1.0m

FOR CONSENT 23.07.2026

ADDITIONAL SERVICE EASEMENTS WILL BE REQUIRED SUBJECT TO FINAL DETAILED DESIGN

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Tel. (03)441-6044, Email admin@cfma.co.nz, www.cfma.co.nz

Rev.	Date	Revision Details	By
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

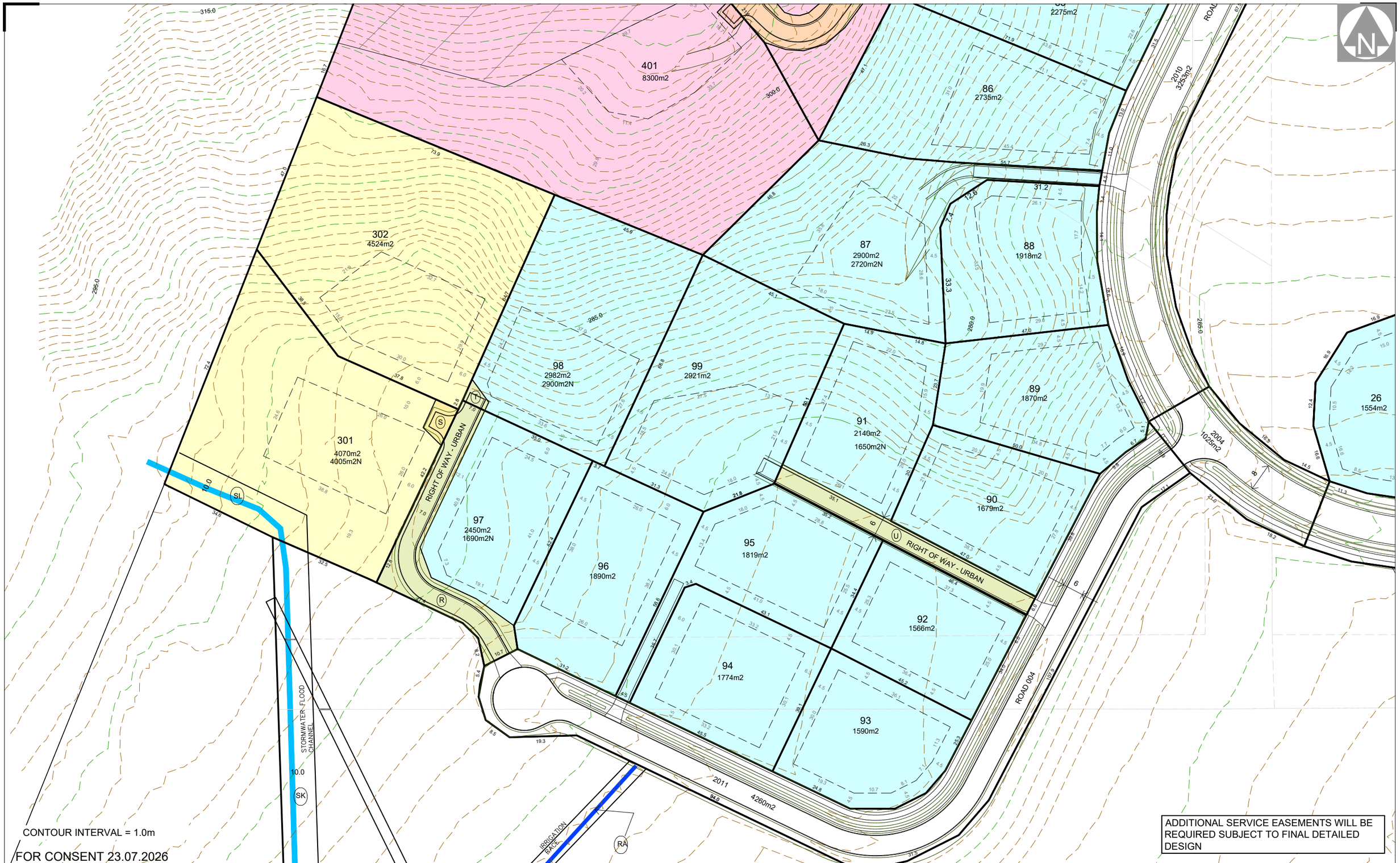
SHANNON FARM DEVELOPMENT

LOTS 1-175, 201-208, 301-302, 401-402, 416-425, 500-504, 600, 701 -706, 1001-1002, 2000-2016, 3000-3002 BEING A SUBDIVISION OF SEC 4, PT5, 11, PT25, 27, 28, 54, 98, 100, 102, 101,103 BLK III CROMWELL SD, PT RUN 1201R & LOT 2 DP 330709

LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 008	
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	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H	

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Rev.	Date	Revision Details	By
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

SHANNON FARM DEVELOPMENT

LOTS 1-175, 201-208, 301-302, 401-402, 416-425, 500-504, 600, 701 -706, 1001-1002, 2000-2016, 3000-3002 BEING A SUBDIVISION OF SEC 4, PT5, 11, PT25, 27, 28, 54, 98, 100, 102, 101,103 BLK III CROMWELL SD, PT RUN 1201R & LOT 2 DP 330709

LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 009
	Drawn: RB	Date: 11.07.22	Scale: 1:1 @ A3	
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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AMALGAMATION CONDITIONS

"Lots 501 & 502 Hereon shall be held in the same record of title"

"Lots 503 & 504 Hereon shall be held in the same record of title"

"Lots 1002, 1003 & 1004 shall be held in the same record of title"

"Lots 166 & 600 shall be held in the same record of title"

NO BUILD AREA

NO BUILD AREA

501
2.922HA

2015
1930m2

ROAD 006
2014
8020m2

2013
3200m2

2012
5250m2

2016

2008

2006

2007

ROAD 007

RIGHT OF WAY - URBAN OTD

AMENITY EDGE - HORT 15m

ADDITIONAL SERVICE EASEMENTS WILL BE REQUIRED SUBJECT TO FINAL DETAILED DESIGN

FOR CONSENT 23.07.2026

CONTOUR INTERVAL = 1.0m

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Rev.	Date	Revision Details	By
D	22.12.22	Add no build area to lots 503 & 502	RB
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

SHANNON FARM DEVELOPMENT

LOTS 1-175, 201-208, 301-302, 401-402, 416-425, 500-504, 600, 701 -706, 1001-1002, 2000-2016, 3000-3002 BEING A SUBDIVISION OF SEC 4, PT5, 11, PT25, 27, 28, 54, 98, 100, 102, 101,103 BLK III CROMWELL SD, PT RUN 1201R & LOT 2 DP 330709

LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 011	
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	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016		Rev.: H

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AMALGAMATION CONDITIONS

"Lots 501 & 502 Hereon shall be held in the same record of title"

"Lots 503 & 504 Hereon shall be held in the same record of title"

"Lots 1002, 1003 & 1004 shall be held in the same record of title"

"Lots 166 & 600 shall be held in the same record of title"

ADDITIONAL SERVICE EASEMENTS WILL BE REQUIRED SUBJECT TO FINAL DETAILED DESIGN

N

420
1.285ha
NO BUILD AREA

419
8350m2
NO BUILD AREA

418
8150m2
NO BUILD AREA

417
9340m2
NO BUILD AREA

416
1.201ha
NO BUILD AREA

166
3490m2

165
5150m2
4000m2(n)

164
2750m2
2270m2(n)

163
3310m2
2800m2(n)

162
3330m2
2940m2(n)

161
2970m2
2790m2(n)

160
3500m2

159
2985m2

158
3070m2

208
3049m2

207
3285m2

206
3105m2

205
3295m2

204
3210m2

203
3015m2

202
3005m2

201
3330m2

NO BUILD AREA

2013
1.036ha

CONTOUR INTERVAL = 1.0m

FOR CONSENT 23.07.2026

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Rev.	Date	Revision Details	By
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

SHANNON FARM DEVELOPMENT

LOTS 1-175, 201-208, 301-302, 401-402, 416-425, 500-504, 600, 701 -706, 1001-1002, 2000-2016, 3000-3002 BEING A SUBDIVISION OF SEC 4, PT5, 11, PT25, 27, 28, 54, 98, 100, 102, 101,103 BLK III CROMWELL SD, PT RUN 1201R & LOT 2 DP 330709

LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729
	Drawn: RB	Date: 11.07.22	Drawing No.: 01 Sheet 012
	Checked: –	Date: –	Scale: 1:1500 @ A3
			Datum & Level: LINDIS PK 2000 NZVD2016
			Rev.: H

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PEDESTRIAN LINK TO LEGAL ROAD

423
8190m2

424
8030m2

425
1.121HA

422
9800m2

421
8045m2

NO BUILD AREA

NO BUILD AREA

9530m2

2015

1002
ONL RU BALANCE
78.110HA

503
3890m2

504
2.633ha

RL 397.00

NO BUILD AREA

TA

TA

AMALGAMATION CONDITION

"Lots 501 & 502 Hereon shall be held in the same record of title"

"Lots 503 & 504 Hereon shall be held in the same record of title"

ADDITIONAL SERVICE EASEMENTS WILL BE REQUIRED SUBJECT TO FINAL DETAILED DESIGN

CONTOUR INTERVAL = 1.0m

FOR CONSENT 23.07.2026

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Rev.	Date	Revision Details	By
C	22.12.22	Add RL to lot 504 platform	RB
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

SHANNON FARM DEVELOPMENT

LOTS 1-175, 201-208, 301-302, 401-402, 416-425, 500-504, 600, 701 -706, 1001-1002, 2000-2016, 3000-3002 BEING A SUBDIVISION OF SEC 4, PT5, 11, PT25, 27, 28, 54, 98, 100, 102, 101,103 BLK III CROMWELL SD, PT RUN 1201R & LOT 2 DP 330709

LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 013	
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	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H	

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1002
ONL RU
BALANCE

PT SEC 48
BLK III CROMWEL

PT SEC 48
BLK III CROMWELL SD

PT SEC 25
BLK II CROMWELL SD

DP 6799

LOT 1
DP 362547

LOT 1
DP 544935

LOT 3
DP 344529

LOT 4
DP 344529

1001
RU BALANCE
28.985HA
(RU)

703
6.708HA
RLPA

3000
Vest as
Recreation
Reserve
1.412HA
Village Green

702
4.004HA
RLPA

705
4.001HA

706
4.658HA
RLPA
SHELTER BELT
CONSENT NOTICE AREA

704
4.001HA

701
1.874HA
RLPA

ROAD 002
ROAD 003
ROAD 004
ROAD 005
ROAD 006
ROAD 007
RD 005
RIPPONVALE ROAD

FOR CONSENT 23.07.2026

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Rev.	Date	Revision Details	By
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

SHANNON FARM DEVELOPMENT
STRUCTURE PLAN OVERLAY

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 014
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	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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SEC 32 BLK III CROMWELL SD

LOT 1
DP 539341

TB

TC

423

422

RLA2

424

421

425

WE

WF

TA

ALIGNMENT MAY BE ADJUSTED TO FOLLOW FINAL TRAIL ROUTE

ROAD 006

NO BUILD AREA

Vest as Local Purpose Reserve

3002
3320m2

WB

120

419

166

208

165

164

207

V

418

RLA6

RLA4

163

162

205

206

417

204

AD

AE

AC

AB

AA

AF

AG

AH

AJ

AK

AL

AM

AN

AP

AQ

AR

AS

AT

AU

AV

AW

AX

AY

AZ

BA

BB

BC

BD

BE

BF

BG

BH

BI

BJ

BK

BL

BM

BN

BO

BP

BQ

BR

BS

BT

BU

BV

BW

BX

BY

BZ

CA

CB

CC

CD

CE

CF

CG

CH

CI

CJ

CK

CL

CM

CN

CO

CP

CQ

CR

CS

CT

CU

CV

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CZ

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KY

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LL

LM

LN

LO

LP

LQ

LR

LS

LT

LU

LV

LW

LX

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LZ

MA

MB

MC

MD

ME

MF

MG

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SV

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YZ

ZA

ZB

ZC

ZD

ZE

ZF

ZG

ZH

ZI

ZJ

ZK

ZL

ZM

ZN

ZO

ZP

ZQ

ZR

ZS

ZT

ZU

ZV

ZW

ZX

ZY

ZZ

503

504

NO BUILD AREA

RLA5

600
36.277HA

501

ROAD 001

ROAD 006

ROAD 007

RLA1

RLA3

1002
ONL RU
BALANCE

PT SEC 48
BLK III CROMWELL SD

BLK III CROMWELL SD

FOR CONSENT 23.07.2026

Rev.	Date	Revision Details	By
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	ADD LOTS 101 - 166 TO LAYOUT FOR CONSENT	RB

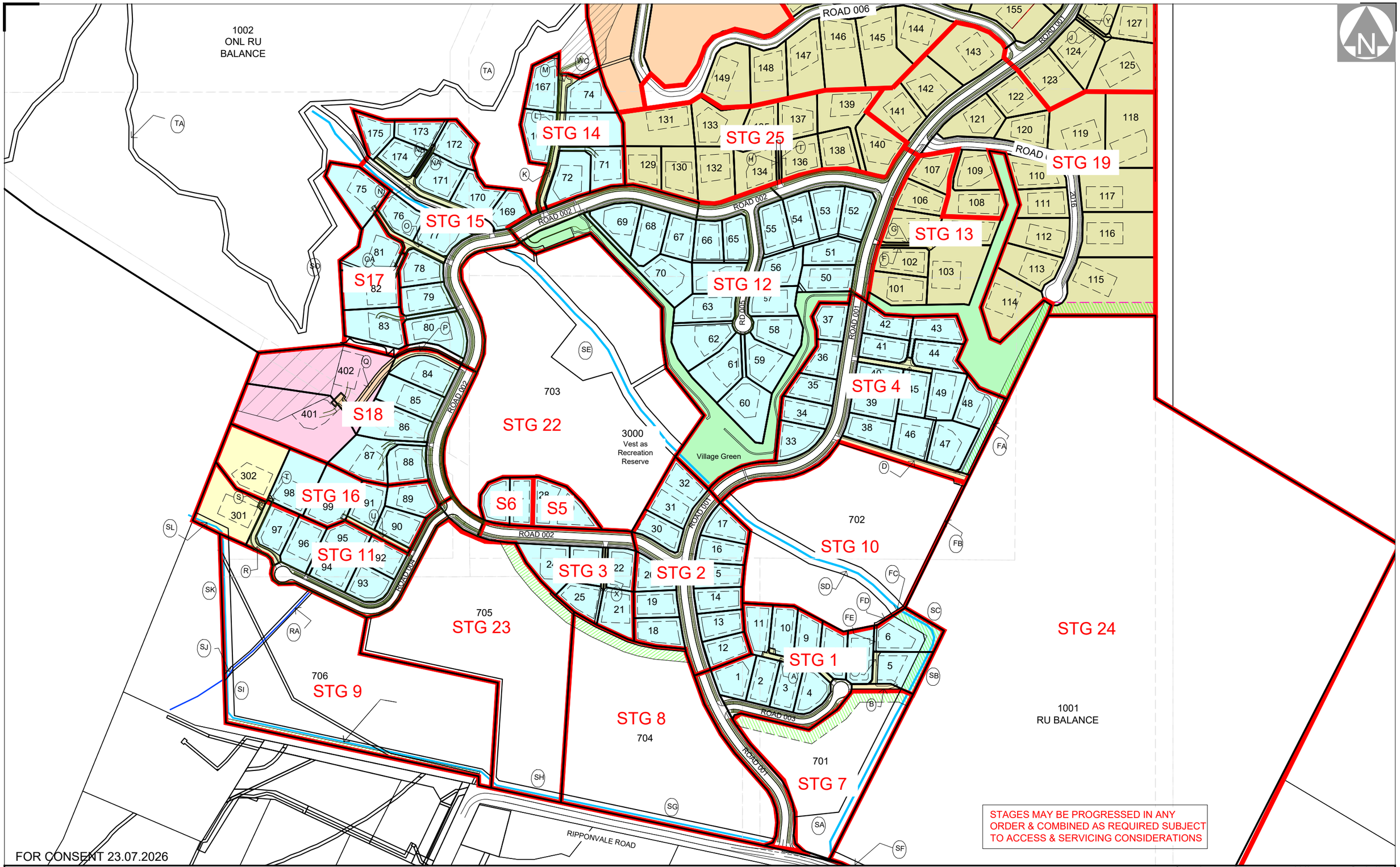
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SHANNON FARM DEVELOPMENT
STRUCTURE PLAN OVERLAY

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 015
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	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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Rev.	Date	Revision Details	By
F	03.04.25	UPDATE STAGING	RB
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	UPDATE STAGING FOR LOTS 101-166	RB

SHANNON FARM DEVELOPMENT
STAGING

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 016
	Drawn: RB	Date: 11.07.22	Scale: 1:4000 @ A3	
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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SEC 32 BLK III CROMWELL SD

LOT 1 DP 539341

SEC 59 BLK III CROMWELL SD

Vest as Local purpose reserve

3002
3320m2

NO BUILD AREA

ALIGNMENT MAY BE ADJUSTED TO FOLLOW FINAL TRAIL ROUTE

ROAD 006

ROAD 001

ROAD 002

NO BUILD AREA

600
36.277HA

STG 20

STAGE 21

STG 14

STG 25

STG 19

PT SEC 48
BLK III CROMWELL SD

STAGES MAY BE PROGRESSED IN ANY ORDER & COMBINED AS REQUIRED SUBJECT TO ACCESS & SERVICING CONSIDERATIONS

FOR CONSENT 23.07.2026

CLARK FORTUNE McDONALD
LAND SURVEYORS - LAND DEVELOPMENT - PLANNING CONSULTANTS
QUEENSTOWN | DUNEDIN | CHRISTCHURCH | GORE

309 Lower Shotover Road, P.O.Box 553 Queenstown
Tel. (03)441-6044, Email admin@cfma.co.nz, www.cfma.co.nz

Rev.	Date	Revision Details	By
F	03.04.25	UPDATE STAGING	RB
G	15.10.25	ADD LOTS 167 - 175 TO LAYOUT FOR CONSENT	RB
H	23.07.26	UPDATE STAGING FOR LOTS 101-166	RB

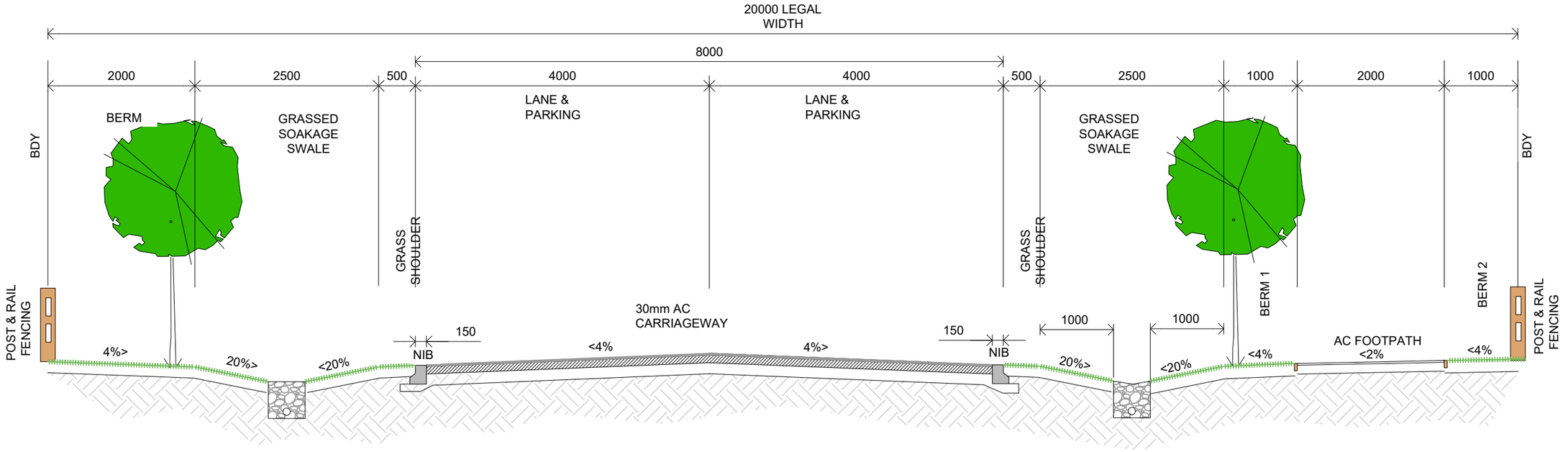
SHANNON FARM DEVELOPMENT
STAGING

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 017
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	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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ROAD 001 - ENTRY TO RESERVE - WIDENING FOR PARKING

2 X 2.75m MOVEMENT, 1 x 2.5m PARKING & 1 x 2.0m FOOTPATH

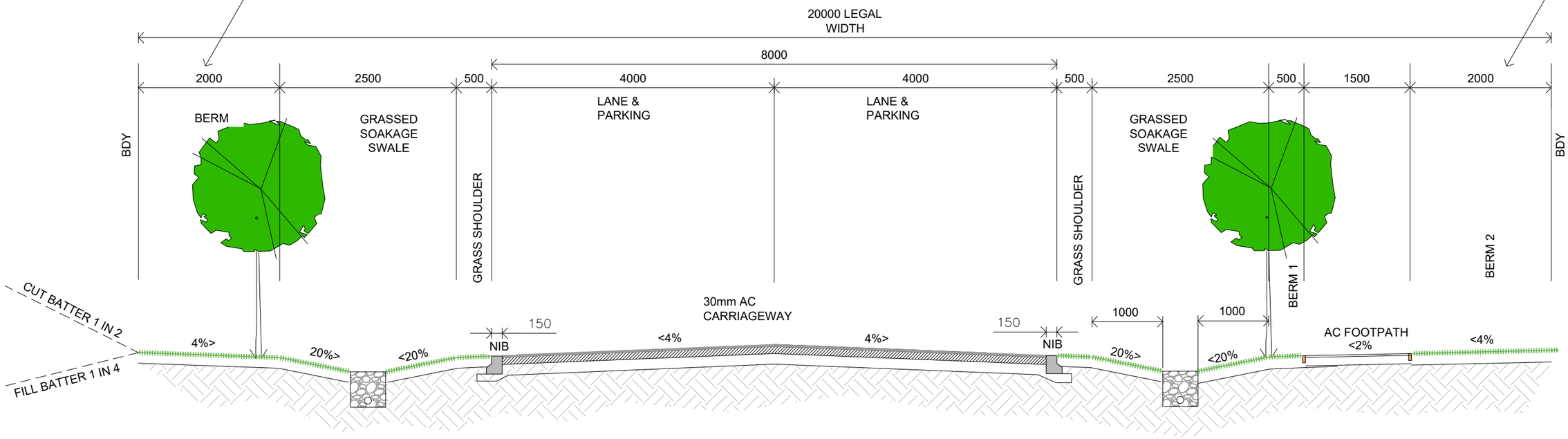


FINAL BERM WIDTH MAY BE REDUCED ADJOINING BATTER SLOPES TO REDUCE EARTHWORKS

FINAL BERM WIDTH MAY BE REDUCED ADJOINING BATTER SLOPES TO REDUCE EARTHWORKS

ROAD 001 & 002 - RLA1 AREAS

2 X 2.75m MOVEMENT, 1 x 2.5m PARKING & 1 x 2.0m FOOTPATH



FOR CONSENT 23.07.2026

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Rev.	Date	Revision Details	By
-	-	-	-

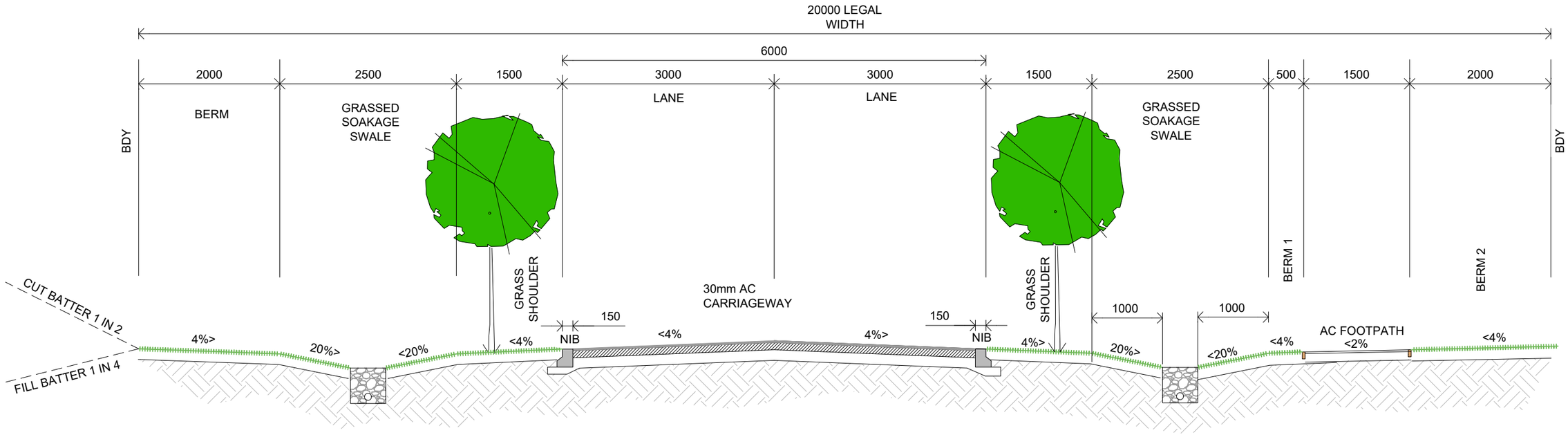
SHANNON FARM DEVELOPMENT
TYPICAL ROAD SECTIONS

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 018
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	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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ROAD 001 - RLA 2-4

2 X 3.0m MOVEMENT & SHOULDER, 1 x 1.5m FOOTPATH



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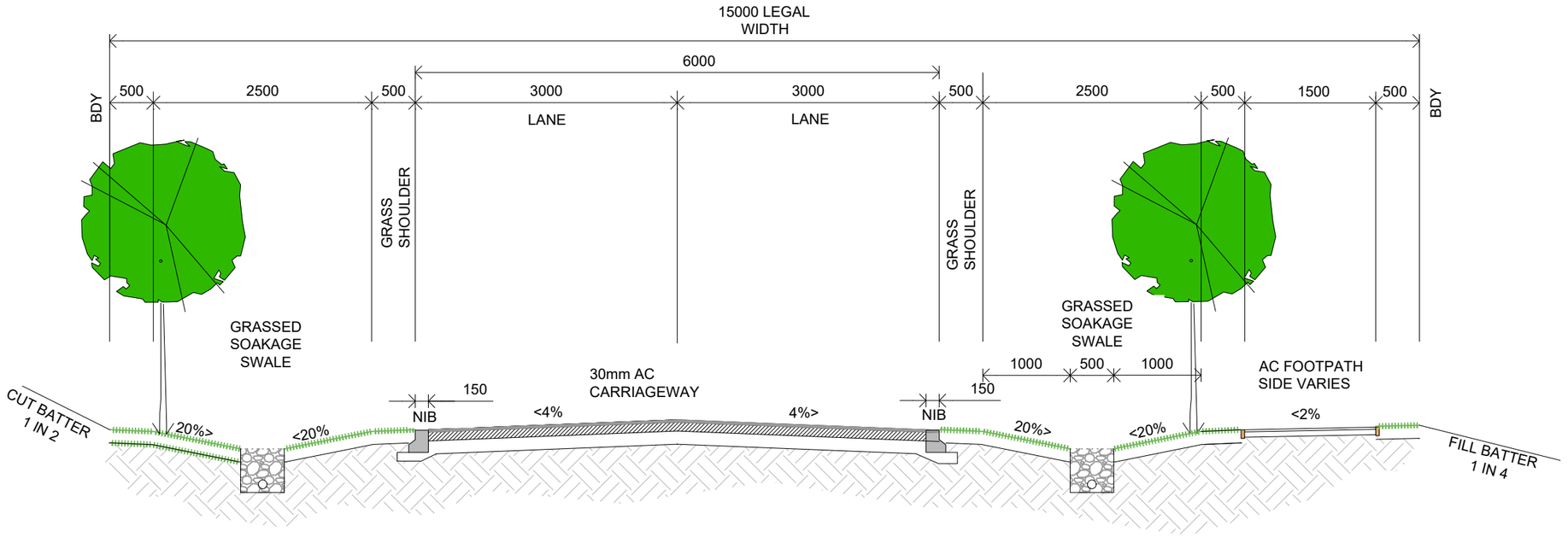
Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM DEVELOPMENT
TYPICAL ROAD SECTIONS

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 019
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Ensuring the information is the most recent issue. - Copyright on this drawing is reserved.	Drawn: RB	Date: 11.07.22	Scale: 1:60 @ A3	
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

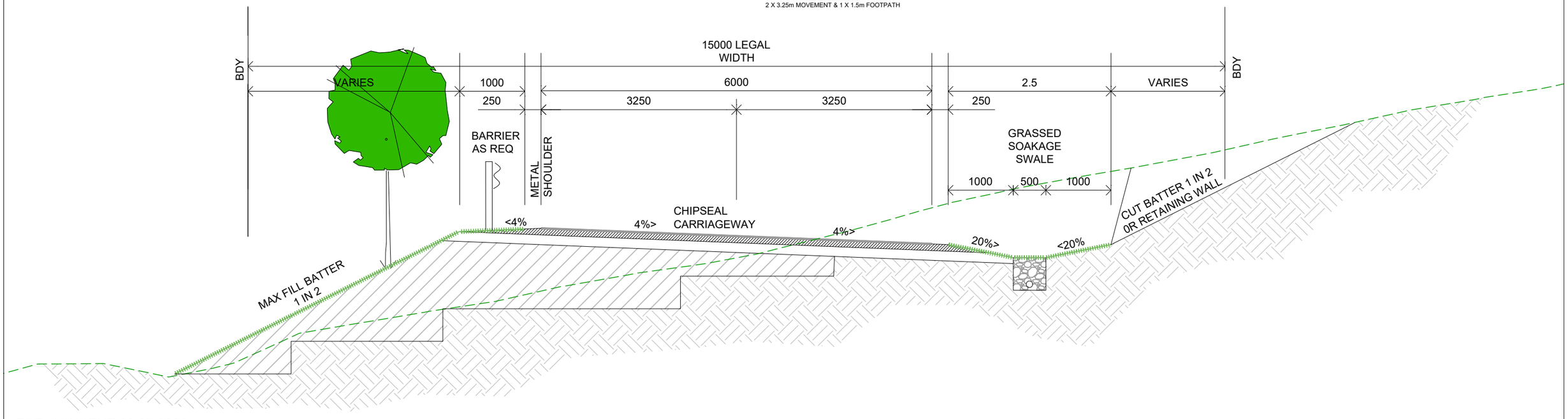
ROAD 003 - 005 & 007

1 X 3.5m MOVEMENT, 1 X 2.5m PARKING 1 X 1.5m FOOTPATH



ROAD 006

2 X 3.25m MOVEMENT & 1 X 1.5m FOOTPATH



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Rev.	Date	Revision Details	By
H	23.07.26	ADD ROAD 007 & INCREASE 006 ROAD WIDTH	RB

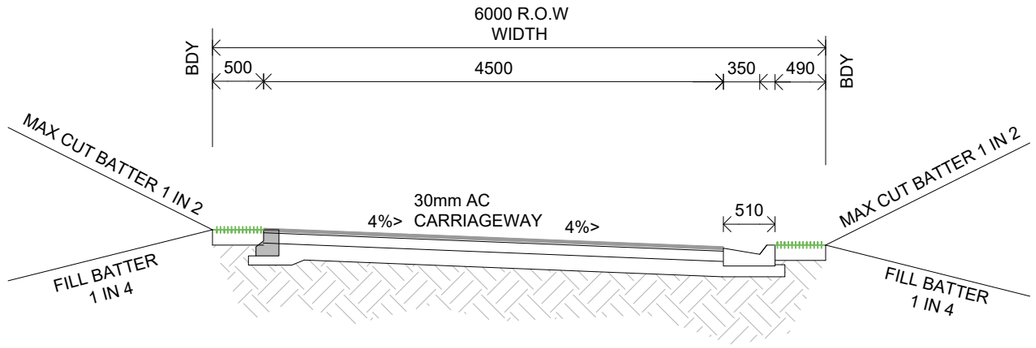
SHANNON FARM DEVELOPMENT
TYPICAL ROAD SECTIONS

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 020
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	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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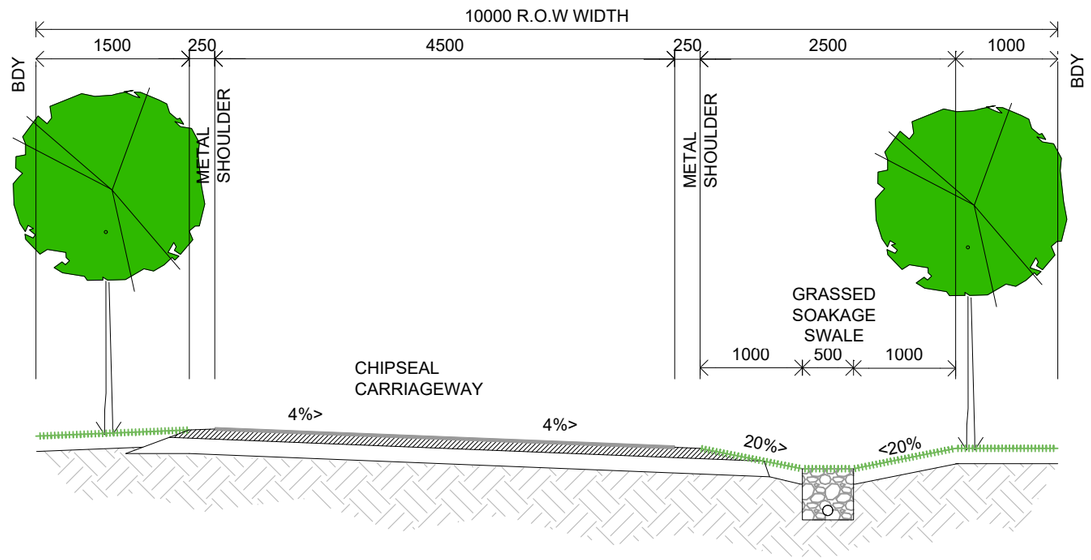
6m RIGHT OF WAY ACCESS - URBAN STANDARD

4.85m MOVEMENT LANE



10m RIGHT OF WAY ACCESS - RURAL STANDARD

4.5m MOVEMENT LANE & SHOULDERS



FOR CONSENT 23.07.2026

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LAND SURVEYORS - LAND DEVELOPMENT - PLANNING CONSULTANTS
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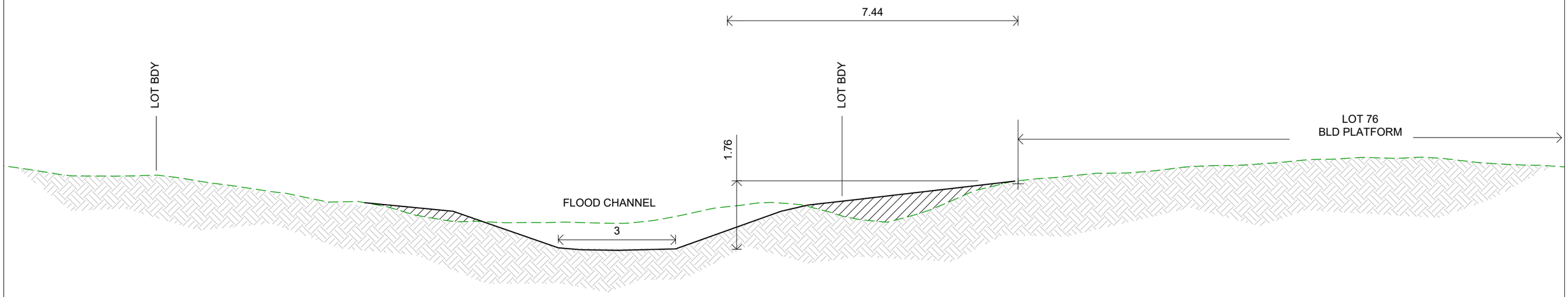
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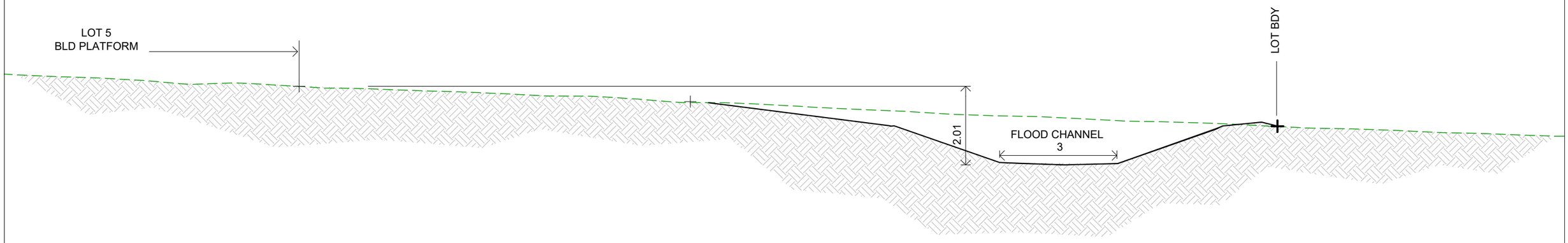
SHANNON FARM DEVELOPMENT
TYPICAL ROAD SECTIONS

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 021
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Ensuring the information is the most recent issue. - Copyright on this drawing is reserved.	Drawn: RB	Date: 11.07.22	Scale: 1:60 @ A3	
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

FLOOD CHANNEL- OPPOSITE LOT 76



FLOOD CHANNEL- OPPOSITE LOT 5



FOR CONSENT 23.07.2026

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Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM DEVELOPMENT
TYPICAL FLOOD CHANNEL SECTIONS

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 022
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Ensuring the information is the most recent issue. - Copyright on this drawing is reserved.	Drawn: RB	Date: 11.07.22	Scale: 1:100 @ A3	
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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PROPOSED MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	BURDENED LAND	BENIFITED LAND
Right of way	A	Lot 11	Lot 8, 9 & 10
	B	Lot 701	Lot 5 & 6
	C	Lot 5	Lot 6
	D	Lot 702	Lot 46, 47 & 48
	E	Lot 49	Lot 43, 44 & 45
	F	Lot 103	Lot 105
	G	Lot 105	Lot 103
	H	Lot 135	Lot 137
	I	Lot 137	Lot 135
	J	Lot 125	Lot 127
	Y	Lot 127	Lot 125
	K	Lot 71	Lot 73, 74 & 1004
	L	Lot 73	Lot 74 & 1004
	M	Lot 74	Lot 1004
	N	Lot 175	Lots 170-174
	NA	Lot 172	Lot 173
	NB	Lot 173	Lot 172
	O	Lot 76	Lot 77, 75, 81 & 82
	P	Lot 84	Lot 401 & 402
	Q	lot 402	Lot 401
	R	Lot 97	Lot 98, 301 & 302
	S	Lot 301	Lot 97, 98 & 301
	T	Lot 98	Lot 97, 302 & 301
	U	Lot 91	Lot 99
	V	Lot 420	Lot 417, 418, 419, 207, 208
	W	Lot 25	Lot 21
	X	Lot 21	Lot 25
	AA	Lot 161	Lot 162-166
	AB	Lot 162	Lot 163-166
	AC	Lot 163	Lot 162 & 164-166
	AD	Lot 164	Lot 161, 163, 165, 166
	AE	Lot 165	Lot 162 - 164
Right to drain sewage	FS	Lot 46	Lot 49 & 45
	FR	Lot 49	Lot 45
	Q	Lot 402	Lot 401
	P	Lot 91	Lot 401 & 402
	H	Lot 135	Lot 137
	AA	Lot 161	Lot 162-166
	AB	Lot 162	Lot 163-166
	AC	Lot 163	Lot 164-166
	AD	Lot 164	Lot 165-166
	AE	Lot 165	Lot 166
	U	Lot 97	Lot 104
Right to convey water	B	Lot 701	Lot 5 & 6
	C	Lot 5	Lot 6
	W	Lot 25	Lot 21
	X	Lot 21	Lot 25
	F	Lot 304	Lot 305
	G	Lot 305	Lot 304
	P	Lot 84	Lot 401 & 402
	Q	Lot 402	Lot 401
Right to convey water (irrigation)	SJ, RA	Lot 706	Lot 702, 703 & 705

PROPOSED MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	SHOWN	BURDENED LAND	GRANTEE
Right of way (pedestrian & cycle)	TA	Lot 1002	Central Otago District Council
	TB	Lot 423	
	TC	Lot 422	
Right to drain sewage	FF, B	Lot 701	Central Otago District Council
	C	Lot 5	
	FE	Lot 6	
	A	Lot 11	
	FB, FC, FD	Lot 702	
	FT	Lot 704	
	FU	Lot 705	
	FA	Lot 48	
	E	Lot 49	
	FI	Lot 50	
	FJ	Lot 57	
	FK	Lot 58	
	FL	Lot 52	
	FM	Lot 53	
	FN	Lot 54	
	FO	Lot 55	
	FP	Lot 65	
	FQ	Lot 66	
	WC	Lot 1002	
	WD	Lot 502	
	K	Lot 71	
	L	Lot 73	
	M	Lot 74	
	O	Lot 76	
	R	Lot 97	
	J	Lot 310	
	I	Lot 309	
	H	Lot 308	
	V	Lot 420	
Right to drain water	SA	Lot 701	Central Otago District Council
	SB	Lot 5	
	SC	Lot 6	
	FC, SD	Lot 702	
	SE	Lot 703	
	SF	Lot 1001	
	SG	Lot 704	
	SH	Lot 705	
	SI, SJ, SK	Lot 706	
	SL	Lot 301	
Right to convey water	A	Lot 11	Central Otago District Council
	AA	Lot 161	
	AB	Lot 162	
	AC	Lot 163	
	AD	Lot 164	
	AE	Lot 165	
	D	Lot 702	
	H	Lot 308	
	I	Lot 309	
	J	Lot 310	
	WC	Lot 1002	
	K	Lot 71	
	L	Lot 73	
	M	Lot 74	
	O	Lot 76	
	R	Lot 97	
	V	Lot 420	
	WA, WB	Lot 600	
	WE, WF	Lot 425	
	WD	Lot 502	

PROPOSED MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	SHOWN	BURDENED LAND	GRANTEE
Right to store water	WA	Lot 600	Central Otago District Council
	WE	Lot 425	
Right to convey electricity	A	Lot 11	Aurora Energy Ltd
	AA	Lot 161	
	AB	Lot 162	
	AC	Lot 163	
	AD	Lot 164	
	AE	Lot 165	
	B	Lot 701	
	C	Lot 5	
	D	Lot 702	
	E	Lot 49	
	F	Lot 304	
	G	Lot 305	
	H	Lot 308	
	I	Lot 309	
	J	Lot 310	
	K	Lot 71	
	L	Lot 73	
	M	Lot 74	
	O	Lot 76	
	P	Lot 84	
	Q	Lot 401	
	U	Lot 91	
	R	Lot 97	
	V	Lot 420	
	W	Lot 25	
	X	Lot 21	
Right to convey telecomunications	A	Lot 11	Aurora Energy Ltd
	AA	Lot 161	
	AB	Lot 162	
	AC	Lot 163	
	AD	Lot 164	
	AE	Lot 165	
	B	Lot 701	
	C	Lot 5	
	D	Lot 702	
	E	Lot 49	
	F	Lot 304	
	G	Lot 305	
	H	Lot 308	
	I	Lot 309	
	J	Lot 310	
	K	Lot 71	
	L	Lot 73	
	M	Lot 74	
	O	Lot 82	
	P	Lot 90	
	Q	Lot 401	
	U	Lot 91	
	R	Lot 97	
	V	Lot 420	
	W	Lot 25	
	X	Lot 21	

NOTES

ADDITIONAL SERVICE EASEMENTS WILL BE REQUIRED SUBJECT TO FINAL DETAILED DESIGN

EXTENT & ALIGNMENT OF SHOWN SERVICE EASEMENTS SUBJECT TO FINAL AS CONSTRUCTED SERVICE LOCATIONS

IDENTIFIED BUILDING PLATFORMS SHALL BE SUBJECT TO A CONSENT NOTICE

RURAL AMENITY EDGE AREAS SHALL BE SUBJECT TO A CONSENT NOTICE

LOTS 2000 - 2016 SHALL VEST AS ROAD IN THE CENTRAL OTAGO DISTRICT COUNCIL

LOTS 3000 & 3001 SHALL VEST AS RECREATION RESERVE IN THE CENTRAL OTAGO DISTRICT COUNCIL

LOTS 3002 SHALL VEST AS LOCAL PURPOSE RESERVE (WATER SUPPLY) IN THE CENTRAL OTAGO DISTRICT COUNCIL

FOR CONSENT 23.07.2026

CLARK FORTUNE McDONALD
LAND SURVEYORS - LAND DEVELOPMENT - PLANNING CONSULTANTS
QUEENSTOWN | DUNEDIN | CHRISTCHURCH | GORE

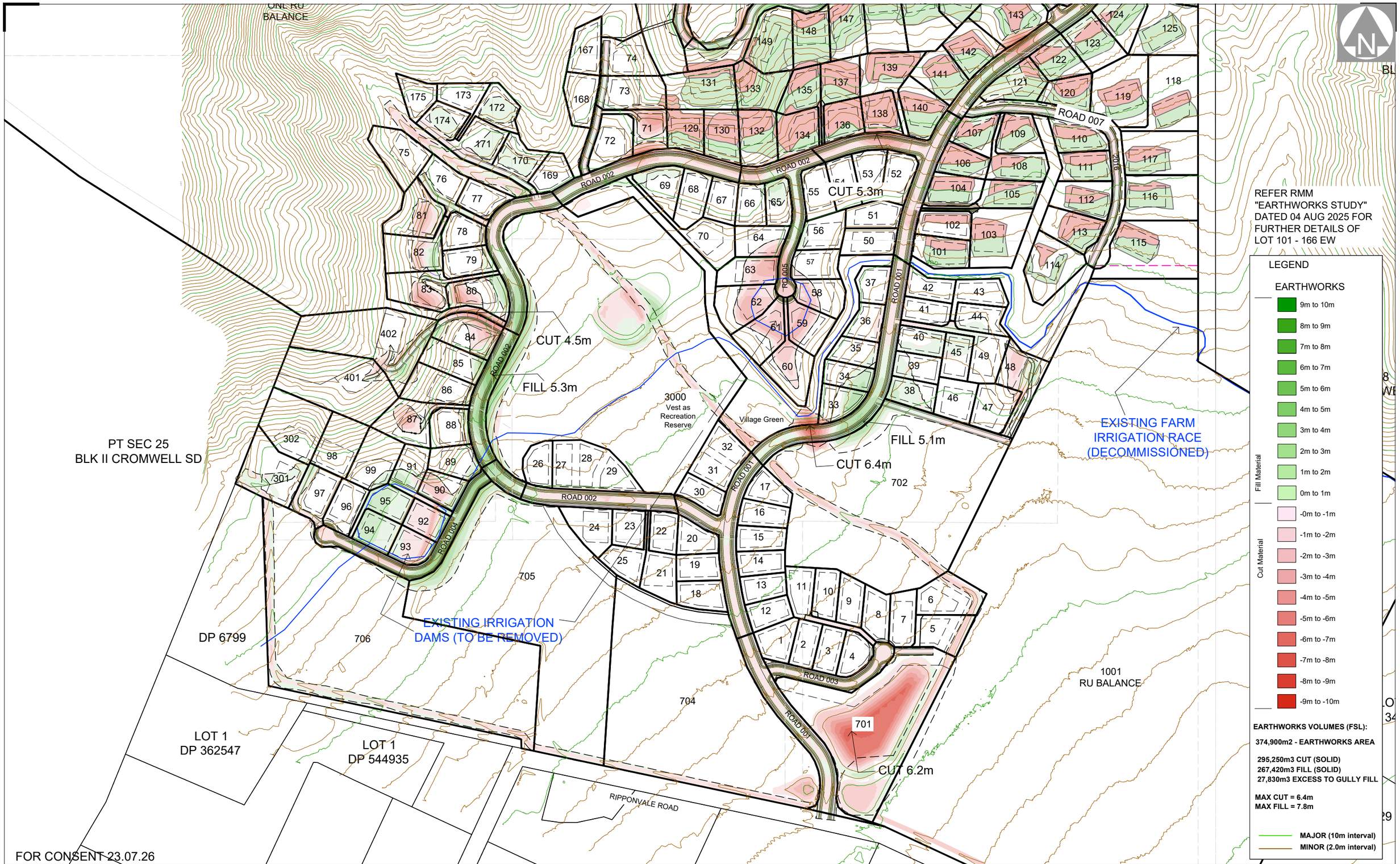
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Rev.	Date	Revision Details	By
G	15.10.25	UPDATE FOR 167 - 175 LOTS FOR CONSENT	RB
H	23.07.26	UPDATE FOR 101 - 166 LOTS FOR CONSENT	RB

SHANNON FARM DEVELOPMENT
EASEMENT SCHEDULE

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 023
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	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: H

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FOR CONSENT 23.07.26

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Rev.	Date	Revision Details	By
A	20.10.22	Update boundaries	RB
B	10.11.22	Add SW channel	RB
C	01.10.24	Add Detention Basin and Irrigation Pond	LM
G	25.09.25	Add lots 167 - 175	RB
H	23.07.26	Add EW for Lots 101-166 from RMM design	RB

SHANNON FARM DEVELOPMENT
BULK EARTHWORKS LAYOUT

Client: NZ CHERRY CORP (LEYSER) L.P

Notes:
All dimensions shown are in meters unless shown otherwise.
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- Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions.
- Ensuring the information is the most recent issue.
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Surveyed	–	Date	–
Drawn	RB	Date	22.08.22
Checked	–	Date	–

Job No. 15729 | Drawing No. 02 Sheet 001
Scale 1:2000 @ A1, 1:4000 @ A3
Datum & Level: LINDIS PK 2000 NZVD2016 | Rev. H

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SEC 59
BLK III CROMWELL
SD

NO BUILD
AREA

PT SEC 48
BLK III CROMWELL
SD

ROAD 001
ROAD 002
ROAD 006
ROAD 007

CUT 5.1m
FILL 7.8m
CUT 5.3m

REFER RMM
"EARTHWORKS STUDY"
DATED 04 AUG 2025 FOR
FURTHER DETAILS OF
LOT 101 - 166 EW

LEGEND

EARTHWORKS

Fill Material
- 9m to 10m
- 8m to 9m
- 7m to 8m
- 6m to 7m
- 5m to 6m
- 4m to 5m
- 3m to 4m
- 2m to 3m
- 1m to 2m
- 0m to 1m

Cut Material
- -0m to -1m
- -1m to -2m
- -2m to -3m
- -3m to -4m
- -4m to -5m
- -5m to -6m
- -6m to -7m
- -7m to -8m
- -8m to -9m
- -9m to -10m

EARTHWORKS VOLUMES (FSL):

374,900m2 - EARTHWORKS AREA

295,250m3 CUT (SOLID)
267,420m3 FILL (SOLID)
27,830m3 EXCESS TO GULLY FILL

MAX CUT = 6.4m
MAX FILL = 7.8m

MAJOR (10m interval)
MINOR (2.0m interval)

FOR CONSENT 23.07.26

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Rev.	Date	Revision Details	By
A	20.10.22	Update boundaries	RB
C	01.10.24	Add Detention Basin and Irrigation Pond	LM
G	25.09.25	Add lots 167 - 175	RB
H	23.07.26	Add EW for Lots 101-166 from RMM design	RB

SHANNON FARM DEVELOPMENT
BULK EARTHWORKS LAYOUT

Client: NZ CHERRY CORP (LEYSER) L.P	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 02 Sheet 002
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Ensuring the information is the most recent issue. - Copyright on this drawing is reserved.	Drawn: RB	Date: 22.08.22	Scale: 1:2000 @ A1, 1:4000 @ A3	
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000, NZVD2016	Rev.: H

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RL 310m - 250KPA

RL 305m - 300KPA

PRESSURE ZONE 2

PRESSURE ZONE 2

PRESSURE ZONE 1

100mm

150mm MAIN

200mm FALLING MAIN & 150mm RISING MAIN

prv

RL 250m CONTOUR LIMIT OF SERVICE FROM EXISTING TOWN RESERVOIR/ 800KPA FROM NEW TANK

150mm FALLING MAIN & 150mm RISING MAIN

PUMP STATION

200mm MAIN

EXISTING 100mm

RL 250m CONTOUR

CONNECT NEW MAIN TO EX 100mm

NEW 200mm MAIN

EXISTING 100mm (RETAIN)

NOTES:

- INDICATIVE LAYOUT ONLY. SUBJECT TO DETAILED ENGINEERING DESIGN.
- SHOWN PIPE SIZES ARE INTERNAL DIAMETER.
- SUBJECT TO RESOURCE CONSENT.

FOR CONSENT 23.07.2026

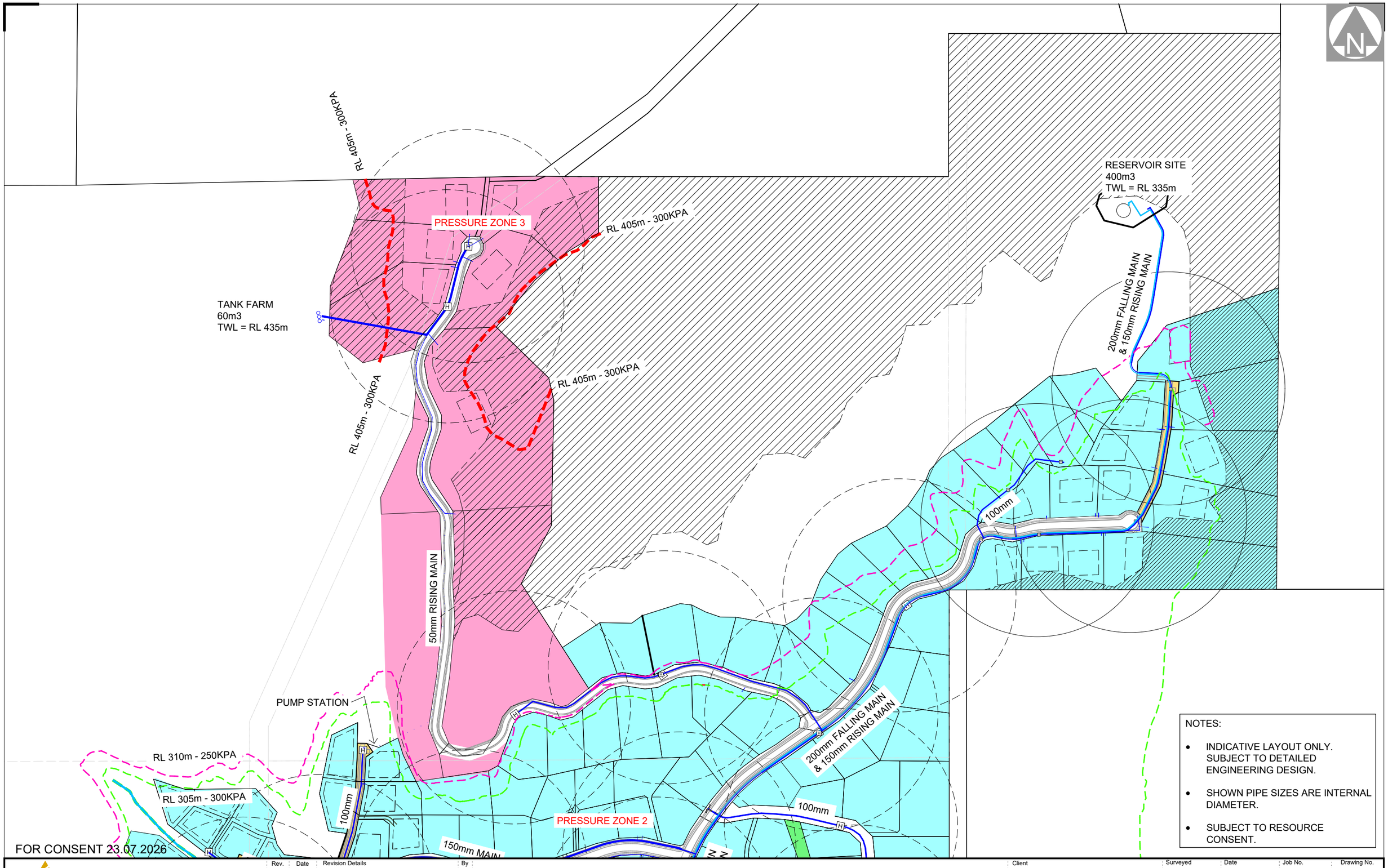
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Rev.	Date	Revision Details	By
B	06.06.25	Update for Lots 101-166	RB
G	25.05.25	Add Lots 167 - 175	RB
H	23.07.26	Combine 167-175 lots & 101-166 plan versions	RB

SHANNON FARM SUBDIVISION
WATER RETICULATION OVERVIEW

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 03 Sheet 001	
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- SUBJECT TO RESOURCE CONSENT.

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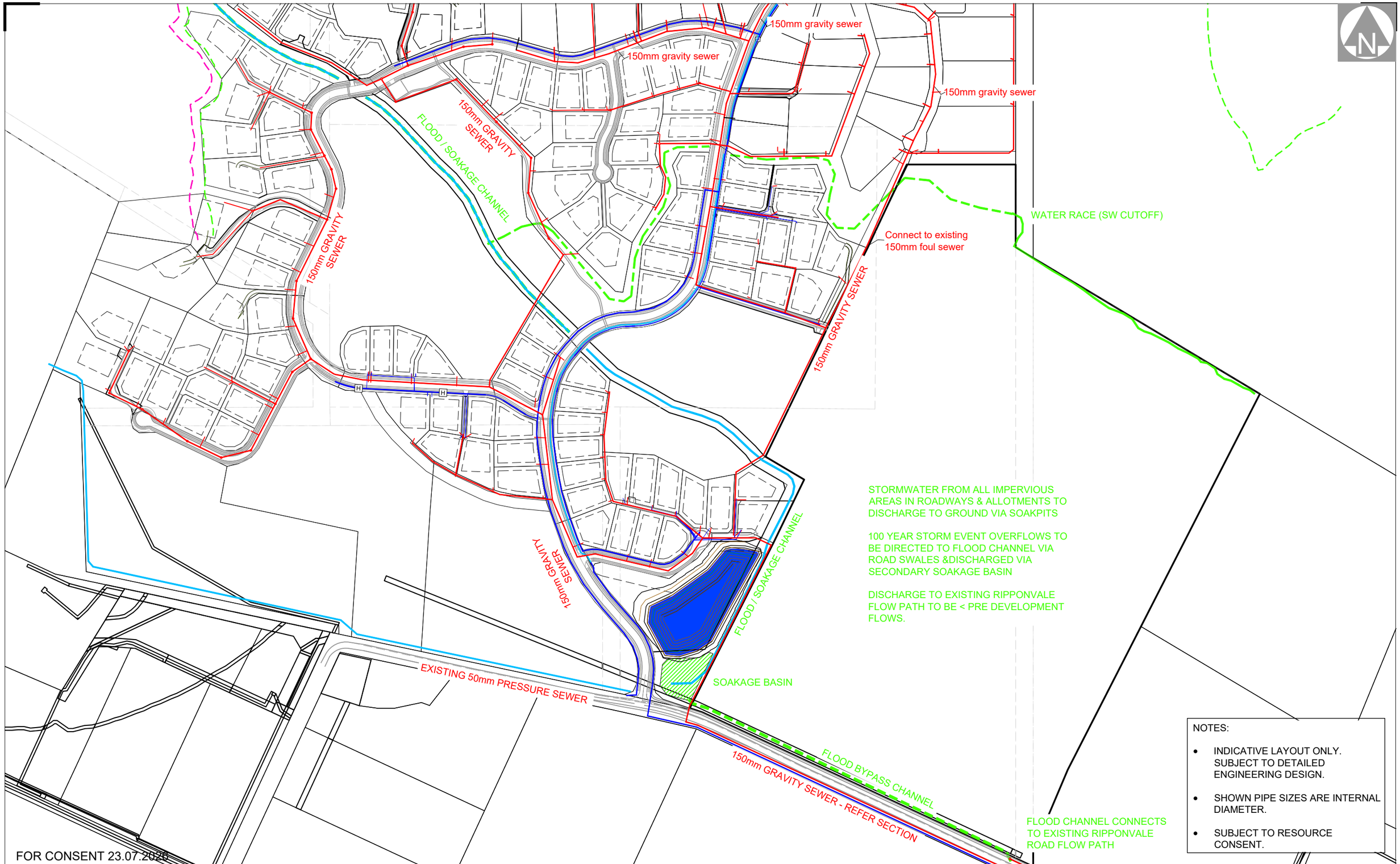
Rev.	Date	Revision Details	By
B	06.06.25	Update for Lots 101-166	RB
G	25.05.25	Add Lots 167 - 175	RB
H	23.07.26	Combine 167-175 lots & 101-166 plan versions	RB

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WATER RETICULATION OVERVIEW

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 03 Sheet 002
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G	25.05.25	Add Lots 167 - 175	RB
H	23.07.26	Combine 167-175 lots & 101-166 plan versions	RB

SHANNON FARM SUBDIVISION
WASTEWATER & STORMWATER OVERVIEW

Client: NZ CHERRY CORP

Surveyed: – Date: –

Drawn: RB Date: 11.07.22

Checked: – Date: –

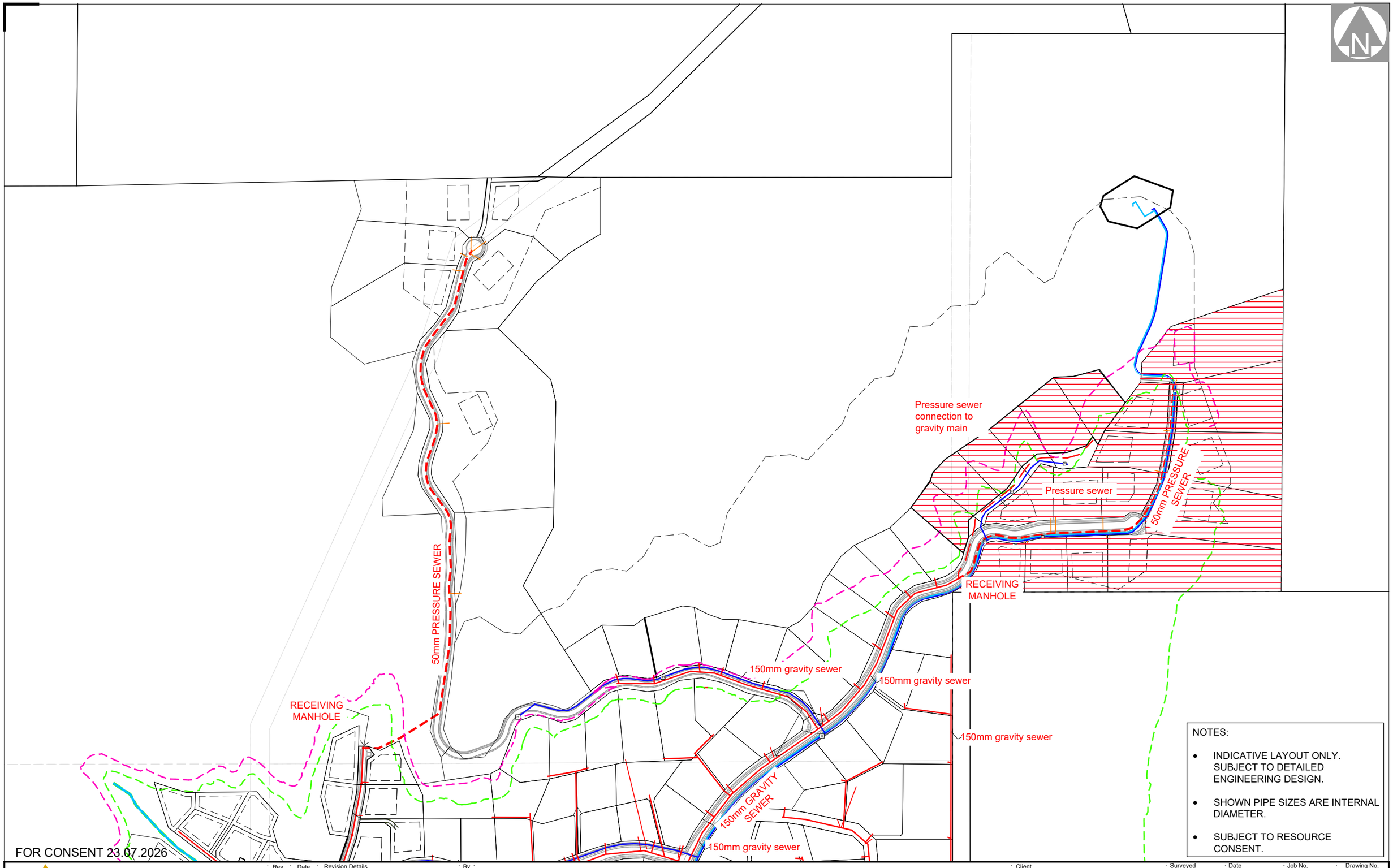
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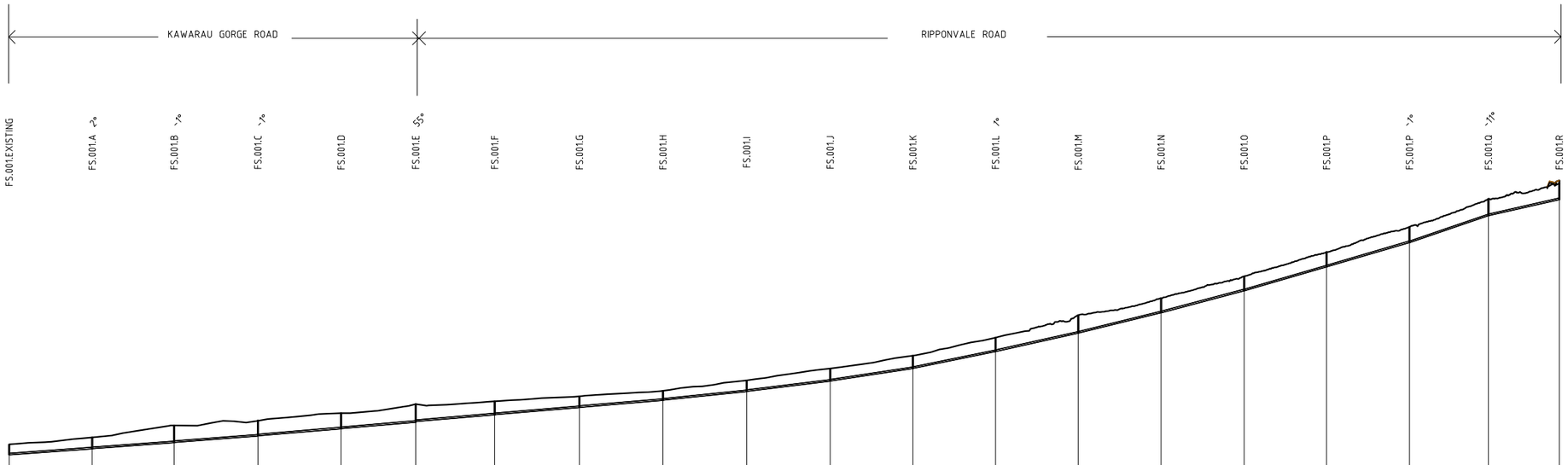
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WASTEWATER OVERVIEW

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		FS.001.EXISTING	FS.001.A	FS.001.B	FS.001.C	FS.001.D	FS.001.E	FS.001.F	FS.001.G	FS.001.H	FS.001.I	FS.001.J	FS.001.K	FS.001.L	FS.001.M	FS.001.N	FS.001.O	FS.001.P	FS.001.P	FS.001.Q	FS.001.R
PIPE SIZE (mm) & CLASS			150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC	150PVC
GRADE %			0.71%	0.71%	0.75%	0.84%	0.83%	0.83%	0.81%	0.83%	1.00%	1.22%	1.49%	2.01%	2.19%	2.42%	2.61%	2.86%	2.90%	3.36%	2.23%
DATUM R.L.	207																				
DEPTH TO INVERT	1	1	1.1	1.07	1.65	1.62	1.47	1.44	1.5	1.47	1.74	1.66	1.3	1.27	1.09	1.06	0.92	0.89	1.09	1.06	1.22	1.19	1.24	1.21	1.35	1.32	1.74	1.71	1.4	1.37	1.4	1.37	1.44	1.41	1.52	1.49	1.63	1.6	1.85
INVERT LEVEL	215.6	215.6	216.167	216.197	216.756	216.786	217.388	217.418	218.082	218.112	218.706	218.786	219.415	219.446	220.105	220.135	220.8	220.83	221.63	221.66	222.631	222.661	223.834	223.864	225.449	225.479	227.212	227.242	229.154	229.184	231.258	231.288	233.537	233.567	235.862	235.892	238.429	238.459	239.968
DESIGN SURFACE LEVEL	216.595		217.266		218.405		218.914		219.582		220.447		220.711		221.19		221.716		222.716		223.849		225.077		226.801		228.947		230.552		232.653		234.974		237.383		240.054		241.814
EXISTING SURFACE LEVEL	216.595		217.266		218.405		218.853		219.582		220.447		220.711		221.19		221.716		222.716		223.849		225.077		226.801		228.947		230.552		232.653		234.974		237.383		240.054		241.814
CHAINAGE	0	79.32	79.32	78.28	157.6	80.08	237.68	79.45	317.13	71.29	388.42	75.5	463.92	80.92	544.84	79.84	624.67	80	704.67	79.81	784.48	78.98	863.46	78.98	942.43	79.02	1021.45	79.17	1100.62	79.36	1179.98	78.72	1258.7	79.21	1337.91	75.43	1413.34	67.72	1481.06

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SHANNON FARM SUBDIVISION
GRAVITY FOUL CONNECTION TO EXISTING MAIN

Client: NZ CHERRY CORP

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144 Ripponvale Road, Cromwell

Preliminary Site Investigation for NZ Cherry Corp



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Approved for Release By

Robert Bond
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Report Checklist

Summary contaminated sites report checklist					
Report contained in this document	☒	☐	☐	☐	☐
Report sections and information to be presented	**PSI**	**DSI**	**RAP**	**SVR**	**MMP**
Executive summary	☒	☐	☐	☐	☐
Scope of work	☒	☐	☐	☐	☐
Site identification	☒	☐	☐	☐	☐
Site history	☒	S	S	S	S
Site condition and surrounding environment	☒	S	S	S	S
Geology and hydrology	A	☐	S	S	S
Sampling and analysis plan and sampling methodology	A	☐	X	☐	☐
Field quality assurance and quality control (QA/QC)	N	☐	X	☐	S
Laboratory QA/QC	N	☐	X	☐	X
QA/QC data evaluation	N	☐	X	☐	X
Basis for guideline values	☒	☐	☐	☐	☐
Results	A	☐	☐	☐	S
Site characterisation	☒	☐	☐	☐	☐
Remedial actions	X	X	☐	S	S
Validation	X	X	X	☐	S
Contaminated materials management plan (CMMP)	X	X	☐	S	S
Ongoing site monitoring	X	X	X	N	☐
Conclusions and recommendations	☒	☐	☐	☐	☐

Key:

PSI - preliminary site investigation report SIR detailed site investigation report
RAP - site remedial action plan
SVR - site validation report
MMP - ongoing monitoring and management plan
A - Readily available information should be included
S - A summary of this section's details will be adequate if detailed information has been included in an available referenced report
N - Include only if no further site investigation is to be undertaken
X - Not applicable and can be omitted.

(MfE. *Contaminated Land management guidelines No. 1.* 2011a)

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Document History and Status

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0	11/07/18	LAB	CB	RB	Final
1	14/05/19	LAB	RB	RB	Final R1

Revision Details

Revision	Details
1	Plan change information from client incorporated

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Executive Summary

A Preliminary Site Investigation (PSI) has been undertaken in order to assess the potential for contamination to be present at 144 Ripponvale Road, Cromwell (the Site). This PSI has been commissioned as part of a plan change request which may involve rezoning a portion of the land. It is proposed that parts of the site are be rezoned for a rural residential (lifestyle) end use with other areas remaining as production land (horticultural use).

The site requires this assessment under the NESCS guidance as current site activities are outlined in the Hazardous Activities and Industries List (HAIL).

As part of this PSI assessment the following works were completed:

- A site walkover to assess the current site condition and its surrounding environment;
- An assessment of historical information relating to the site and its surroundings (this may be from documented or anecdotal evidence) including the review of historical aerial photographs;
- A review of information relating to resource consents, geological conditions and hydrology of the site;
- A review of local authority GIS records and searches of ORCs HAIL register; and
- Characterisation of the site in line with NES guidance giving recommendations of remedial options should they be required

A summary of the main findings of this report concludes that:

- The site has been subject to unlicensed landfilling activities in the past which in places are ongoing;
- Orchards have been present on areas of the site which have been subjected to spraying in line with best practice at the time with a range of pesticides;
- Petroleum storage both above ground and below ground is or has been undertaken in the central area of the site around the buildings.
- The site is currently mixed use open pastoral land with orchards and grazing livestock present;
- Livestock holding pens are present on site which may have historically been used for the application of pesticides as part of a spray race operation
- Storage of pesticides and other livestock chemicals are held within locked buildings with only small quantities kept on site at any given time;
- The underlying geology comprises glacial gravel to the east and schist to the west which has a mobile groundwater regime;
- No obvious signs of vegetation dieback was noted in any location across the site.

The Preliminary Site Investigation has revealed that uses on the site include unlicensed landfilling, orchards and fuel storage. Anecdotal evidence indicates that the landfill operations are for offal pits as well as other miscellaneous waste materials. Spraying of orchards is an ongoing process with records kept of the pesticides used in recent years.

The risks to human health have been assessed on the basis of the historical activities which may have occurred on specific areas of the site and can be split in to the following activities:.

- **Orchards**: The risks associated with the application of pesticide sprays within the orchards is considered to be Low to Moderate;
- **Petroleum storage**: The risks associated with the storage of petroleum products and spillages within the near surface environment are considered to be Moderate;
- **Pesticide Storage and mixing**: The risks associated with the storage of pesticides within the enclosed store and mixing of these is considered to be Moderate

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- **Unlicensed landfilling:** The risks to human health and the environment associated with the unlicensed landfill (not the offal pits) are considered to be High
- **Offal Pits:** The risks associated with the offal pits due to their depth are considered to be Low to Moderate;
- **Livestock storage and spraying:** The risk to human health associated with potential spray race operations within the stock yard is considered to be Moderate to High.

Taking into consideration the information herein, it is considered more likely than not that the risk to human health and groundwater associated with potential contamination derived from historic and ongoing activities across the site as a whole is considered to be **Moderate to High**

Based on the results of this investigation, WSP Opus recommends that areas where rezoning to a more sensitive rural residential (lifestyle) use and/or development of the site is proposed, a Detailed Site Investigation should be undertaken on the specific site areas where HAIL activities have been identified in order to satisfy the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS), more specifically:

- **Orchards**: Investigation of the historic areas of orchard activities be undertaken where rezoning to a more sensitive use is proposed to determine the risks posed to human health with respect to potential future ground disturbance. Taking in to consideration the large areas of land involved with this proposed development, investigations should be designed to give a broad overview of potential contaminants initially with a more detailed second phase of investigation undertaken on areas highlighted as being a risk to human health within the initial screening assessment.
- **Petroleum storage**: Investigation and/or removal of the buried fuel storage tank should be undertaken in order to assess whether leakages to groundwater have occurred and to remove the source of any potential ongoing contamination from this tank.
- **Pesticide Storage and mixing**: Site specific investigation of the areas where pesticide storage and more importantly mixing occurs should be undertaken as these areas have an increased likelihood of concentrated contaminants being present.
- **Unlicensed landfilling:** Further assessment of areas where landfilling has been undertaken should be undertaken. This assessment should take in to consideration potential ground gas and groundwater contamination issues associated with unlicensed landfilling with consideration given to remediation/removal of landfilling materials.
- **Offal Pits:** At this stage no further investigation of the offal pits are considered necessary due to their depth of burial. Should these areas be proposed for deeper excavation for foundation solutions then this recommendation should be reassessed to protect workers coming in to contact with possible microbial contamination.
- **Livestock storage and spraying:** The areas where livestock have been held within pens, particularly close to the buildings in the central area of the site, should be investigated to assess if spray race activities have been undertaken in these areas.

Should any other ground conditions be encountered that are not covered herein a Suitably Qualified and Experience Practitioner in contaminated land assessment should be consulted in order to assess the risks to human health and sensitive receptors

Prior to any demolition being carried out an assessment of the buildings should be undertaken by a specialist asbestos in buildings assessor in order to determine the risks posed prior to any demolition on site. This would effectively reduce the potential for soil contamination associated with asbestos containing materials in later stages of development and protect the demolition contractors from the release of un-investigated potentially hazardous materials

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1 Introduction

A Preliminary Site Investigation has been undertaken on behalf of NZ Cherry Corp for a piece of land located on Ripponvale Road, Cromwell (herein referred to as 'the site') in order to assess the potential for contamination to be present on the site.

The site is located at 144 Ripponvale Road and its surroundings to the north of the road. This PSI has been commissioned as part of a plan change request which may involve rezoning a portion of the land. It is proposed that parts of the site are be rezoned for a rural residential (lifestyle) end use with other areas remaining as production land (horticultural use). A preliminary structure plan for the site is presented in Appendix A

1.1 Objective

This report has been prepared in order to assess the potential for ground contamination to be present across the site. The presence of orchard activities on parts of the site indicates that the site is considered to be within the remit of the National Environmental Standard for Assessing and Managing Contaminants in Soil (NESCS) 2011, Appendix C – Hazardous Activities and Industries List (HAIL) namely:

A10. Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds.

In addition the site is currently a working farm with livestock and packing sheds located at various locations. As such the following objectives have been identified:

- A site walkover to assess the current site condition and its surrounding environment;
- An assessment of historical information relating to the site and its surroundings (this may be from documented or anecdotal evidence) including the review of historical aerial photographs;
- A review of information relating to resource consents, geological conditions and hydrology of the site;
- A review of local authority records and searches of Otago Regional Councils (ORCs) HAIL register; and
- Characterisation of the site in line with NES guidance giving recommendations of remedial options should they be required.

1.2 Scope of Work

In order to achieve the objectives set out above, the following scope of works was undertaken:

- A review of the site history from aerial photographs and anecdotal evidence;
- A site inspection by a Suitably Qualified and Experienced Practitioner;
- A review of documented data from ORC and Central Otago District Council (CODC) with respect to the site;
- Assessment of the geological and hydrogeological conditions for the site and
- Characterisation of the site to determine the environmental and human health risks associated with the site along with recommendations for further work should it be deemed necessary.

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2 Site Identification

The site is located at 144 Ripponvale Road, approximately 2.5km west of Cromwell town centre as shown on Figure 1 below. Site details are provided in Table 1.

Table 1: Site Identification

Site Address	144 Ripponvale Rd, Cromwell
Legal Description	Sections 4, 5, 11, Pt 25, 26, 27, 28, 54 Block III Cromwell SD,
Titles	126180 OT7C/632 OT106/99
Owner	Leyser Brothers Limited
Approximate total site area	220ha
Territorial Authority	Central Otago District Council (CODC)

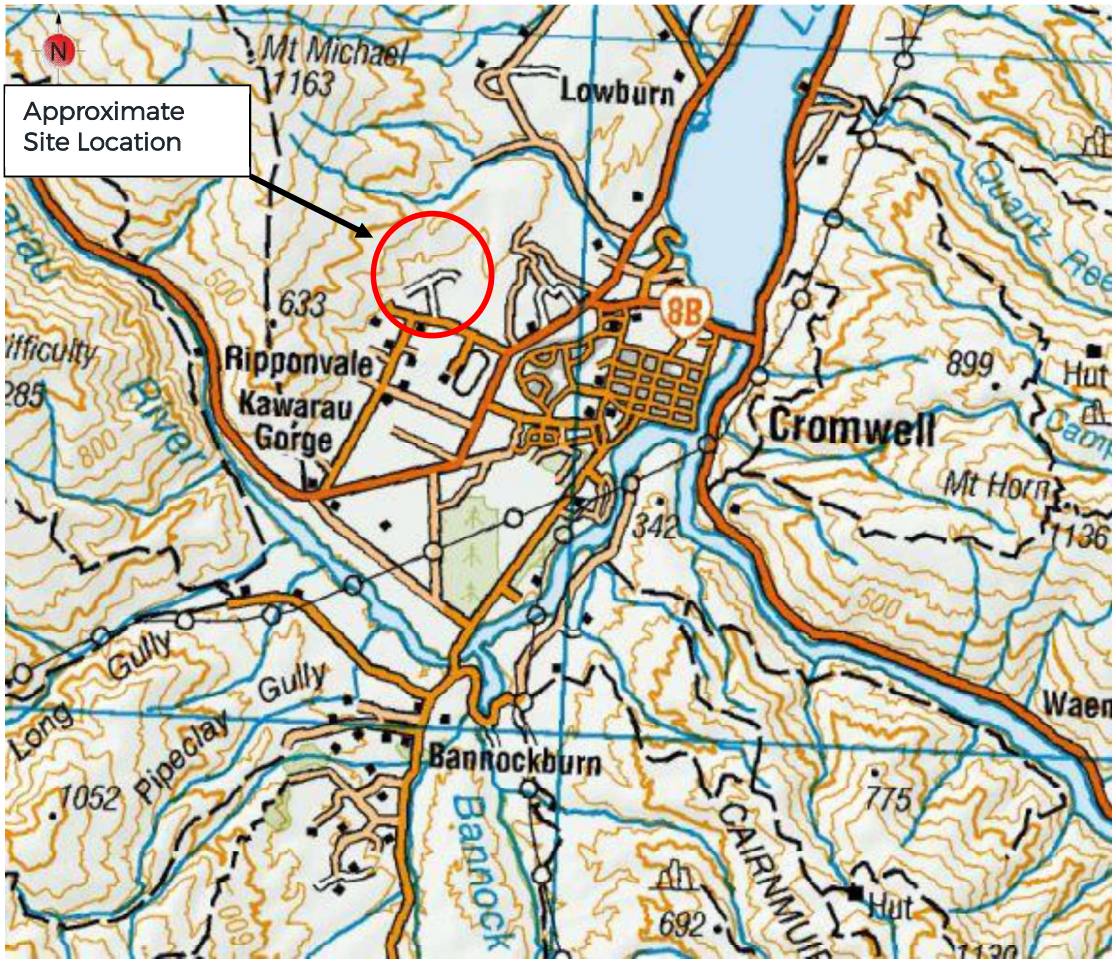


Figure 1: Site Location Plan

A Quickmap diagram detailing the current legal site boundaries, and appellations of properties nearby are shown in Figure 2 along with the approximate location of the site under investigation.

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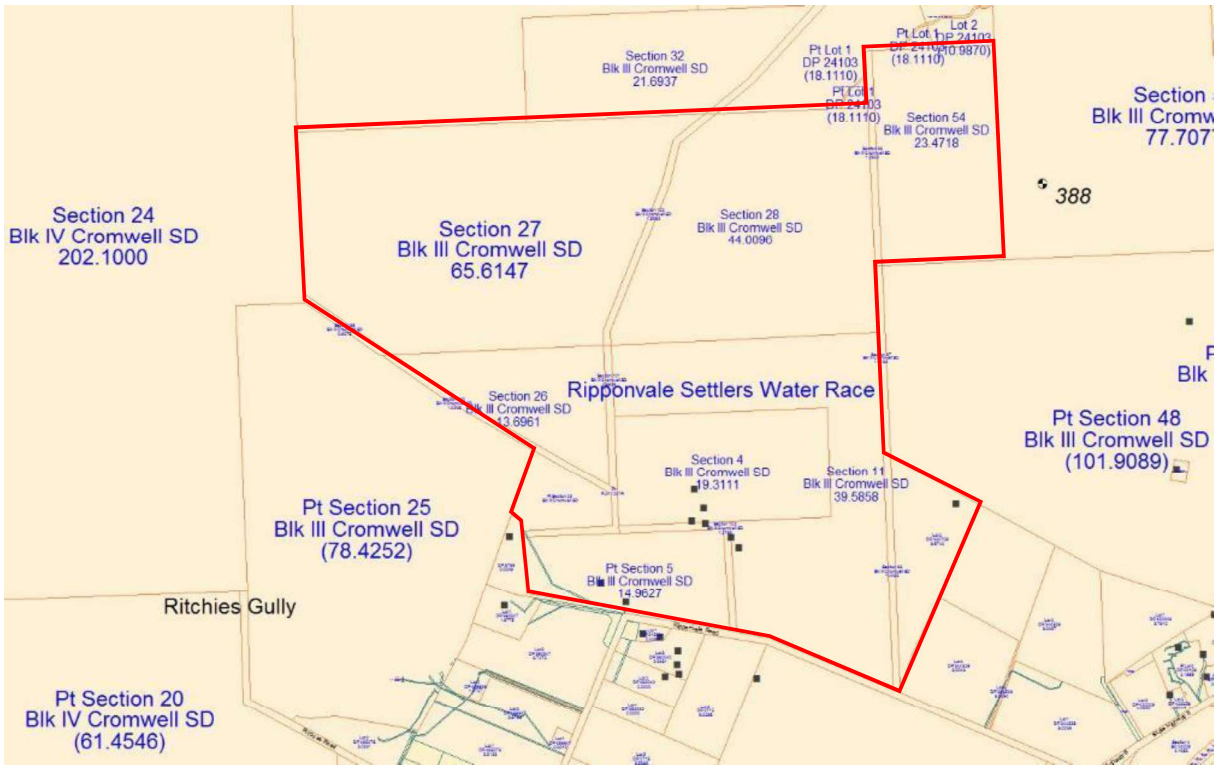


Figure 2: Quickmap of site and surrounds (the piece of land)

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3 Site Description

3.1 Site History

Details of the site history have been gained from a review of sources including historical aerial photographs from Google Earth and Retrolens, historical topographical maps from Maps Past, and a review of WSP Opus's Quickmap ArcGIS database. Historical information is presented in Appendix A with aerial photos presented in Table 2.

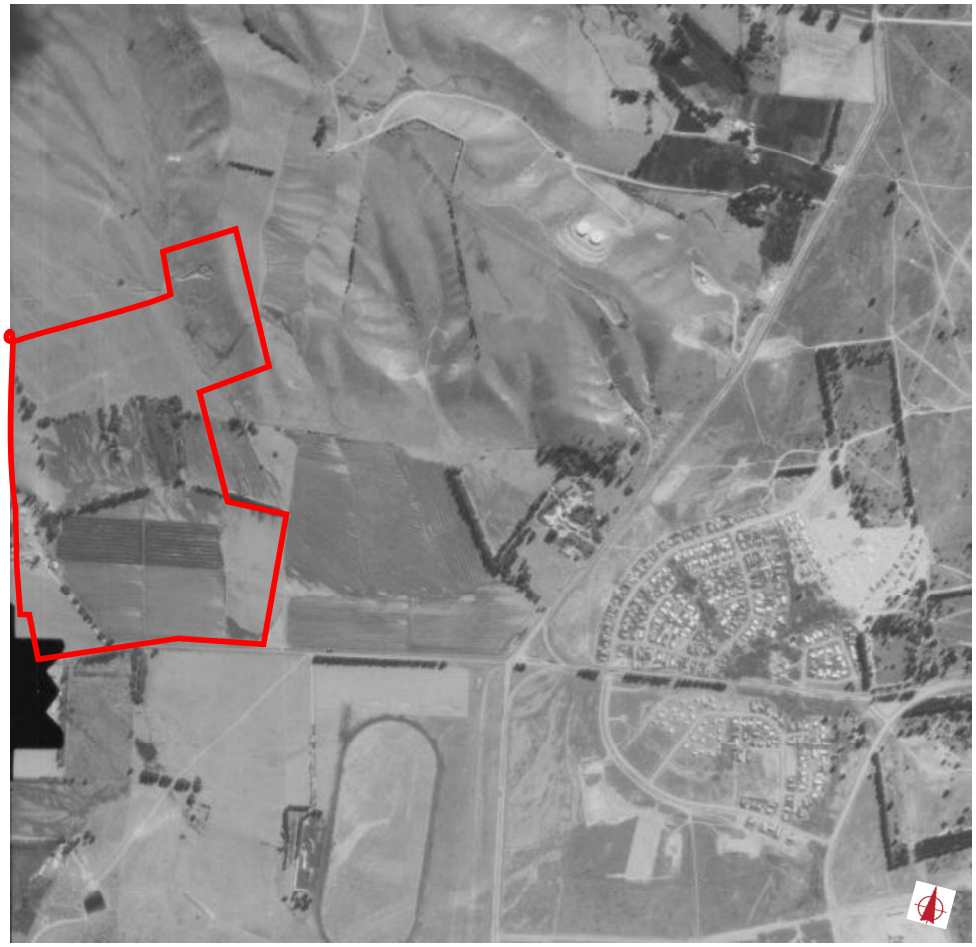
Table 2: Site History, (approximate site location is outlined in red)

Photograph Year and Source	Observations
1958 Retrolens	

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Photograph Year and Source	Observations
1979 Maps Past	

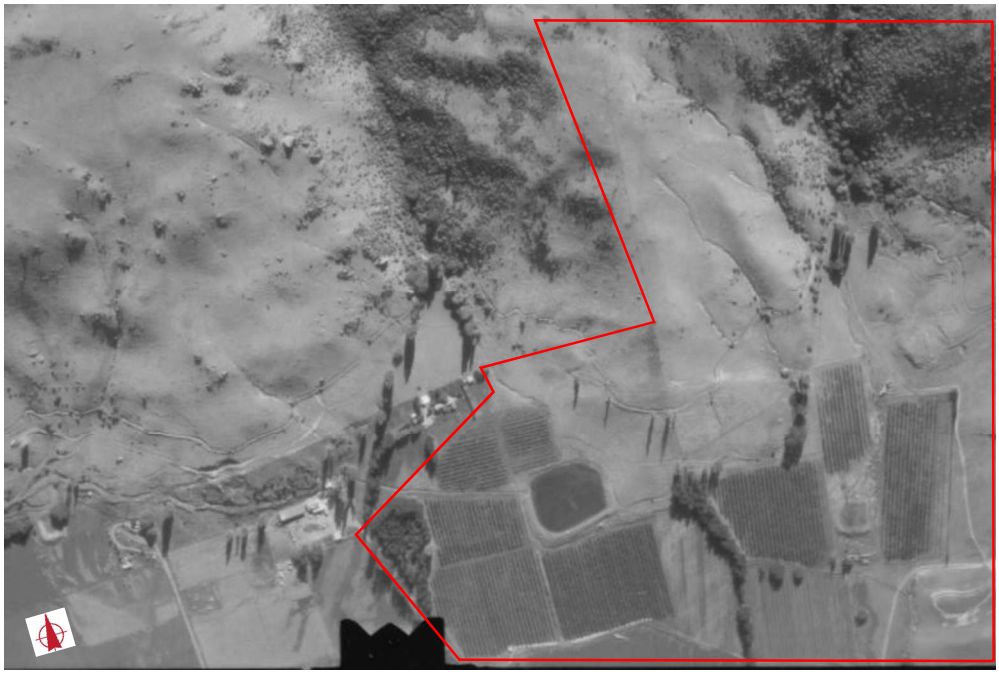
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Photograph Year and Source	Observations
1982 Retrolens	

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Photograph Year and Source	Observations
1983 Retrolens	

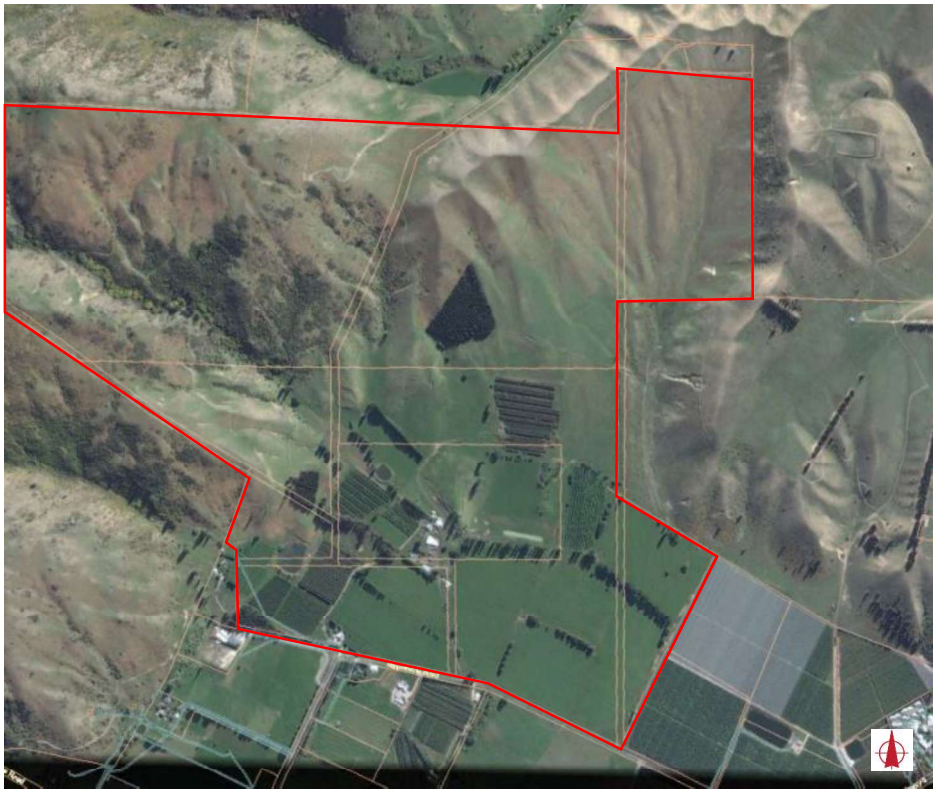
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Photograph Year and Source	Observations
1984 Retrolens	
1991 retrolens	

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Photograph Year and Source	Observations
2003 Retrolens	

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Photograph Year and Source	Observations
2012 Google Earth	
2015 Google Earth	

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3.1.1 Certificates of Title

A search for relevant certificates of title was undertaken for the site along with any associated survey plans. This was to help determine the historical ownership and layout of the site. These details may give an indication as to past uses on the site and the potential for HAIL activities. Relevant certificates of title and survey plans are also presented within Appendix A.

3.1.2 Council Records

A review of the GIS database held by CODC has revealed nine building consents and two resource consents for the site area (112-144 Ripponvale Rd). Details of these consents are summarised in Table 3.

Table 3: CODC Consent Details

Type of Consent	Date	Details
Building	Feb 1995	Additions to Packhouse
	June 1997	Installation of fire
	November 1998	Additions to dwelling
	November 1998	Farm building
	June 2004	New domestic garage
	June 2004	Erect domestic garage
	November 2007	Smoko Room and ablution block
	July 2012	Install a new fire appliance
	July 2015	Internal alterations to existing dwelling
Resource	November 2003	2 Lot rural subdivision
	November 2003	Subdivision creating 15 allotments of 2ha each

3.1.3 HAIL Database Search

A review of the HAIL database held by ORC has revealed that the site does not currently appear on the database. However it goes on to state that from current aerial photographs the land does appear to be used for horticultural purposes which may be associated with persistent pesticide storage or use. Aerial photographs also show the presence of stockyards, which may be associated with sheep dips.

The response continues indicating that 'If your enquiry relates to a rural property, please note that many current and past activities undertaken on farms may not be listed on the database, as they can be more difficult to identify. Activities such as use, storage, formulation, and disposal of pesticides, offal pits, landfills, animal dips, and fuel tanks have the potential to contaminated land'.

A copy of the HAIL search results is provided in Appendix A.

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It should be noted that the lack of detail on a property file or "no files of note" entry is not confirmation of no HAIL activities being present, or historically present on the site, it merely represents the council's knowledge of the site.

3.1.4 Anecdotal Evidence

Discussions with the current site owner, Mr Leyser, indicate that the property has been in his possession since approximately 1973. In that time the paddocks on site have been in use for various farming purposes including various livestock (sheep, cattle and deer) and orchards. Much of the current pastoral land present was at some stage planted with fruiting trees including pears, apples and stone fruit.

Previous offal pits were delineated by Mr Leyser during the site inspection, however it is unknown if further landfilling beyond those noted and described have been undertaken on site.

3.1.5 Historic Orchards

Based on the findings of the historical images in Table 2 and anecdotal evidence, an overview of the locations where orchards have historically been located (or may have been located) have been assessed and are presented in Figure 3.



Figure 3: Historic Orchard Locations

3.1.6 Heritage

The Heritage New Zealand Pouhere Taonga Act 2014 makes it unlawful for any person to modify or destroy, or cause to be modified or destroyed, the whole or any part of an archaeological site without the prior authority of Heritage New Zealand.

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In order to establish the heritage status of the site the Heritage New Zealand database was consulted. The site was not found on the database[1].

3.2 Geology and Hydrogeology

The geology of the site is shown on the 1:250,000 scale GNS Geology Web Map extract (accessed October 2017) as shown in Figure 4.

This map indicates the site to be underlain by Middle Quaternary glacial outwash deposits comprising muddy to sandy gravel to the east with the western part of the site underlain by Permian to Triassic Schist comprising psammitic and subordinate pelitic schist (TZIV); including areas and bands of greenschist, minor marble and metachert, and rare ultramafic bodies.

The eastern side of the property is located within the western part of the Cromwell Terrace Aquifer catchment. The Cromwell Terrace Aquifer is an unconfined aquifer with a free water table. The mean depth to the water table is 20m and the aquifer has good water quality.

The nearest water bodies are various dams located on the site. The area is crossed by numerous irrigation features including a water race on the eastern site boundary however the nearest flowing surface water is the Kawaru Arm of Lake Dunstan approximately 2.7km south east.

A search of ORC well database indicates that there is one operation well located on the site which was installed in June 2014. This well is utilised for irrigation, stock feed and drinking purposes. The bore is located on Sec 11 Blk III Cromwell SD, adjacent to the cherry orchard to the east. Details of the water permit are presented in Appendix A.

A review of the GNS Active Faults Database indicates that the nearest active fault runs north east to south west directly though the western part of the site.

GNS Active Faults Database names the fault as the Pisa Fault (#8402). The fault is reverse with a recurrence interval of >10,000 to <=20,000 years (V) and a very low slip rate. There is no further information available relating to this fault line

[1] http://www.heritage.org.nz/the-list

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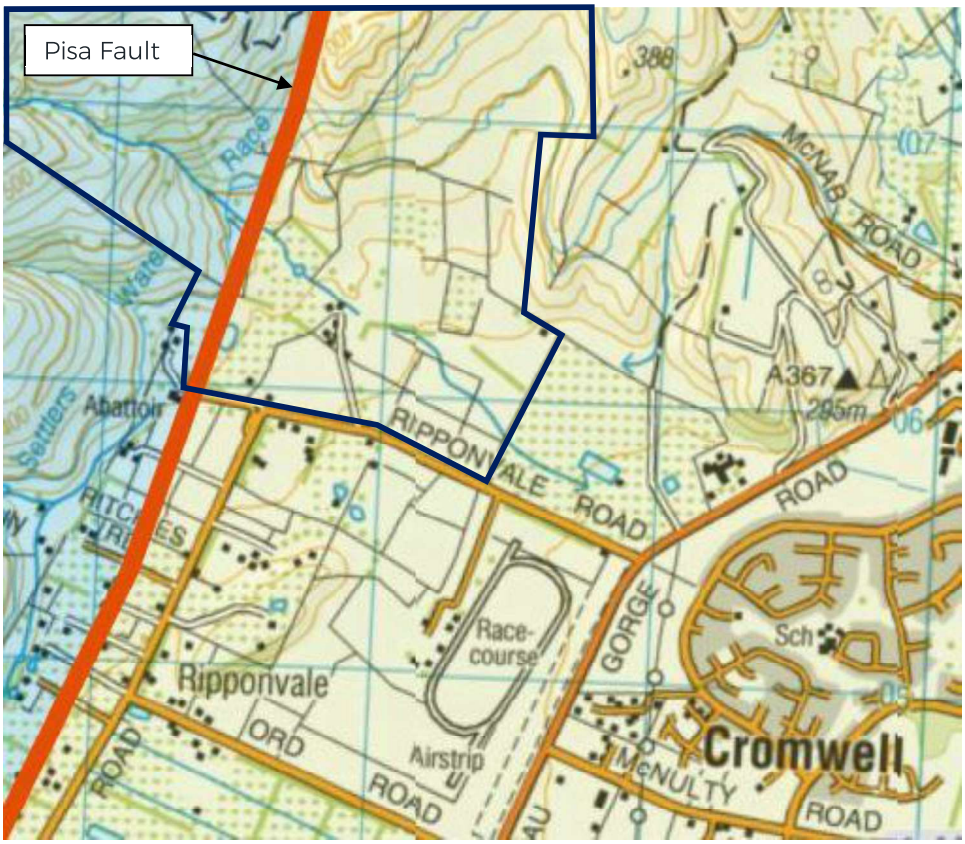


Figure 4: GNS Geological Extract

4 Site Inspection

4.1 Site Condition and Surrounding Environment

A site walkover was undertaken as part of a preliminary Environmental Site Assessment on 23rd March 2018 by a WSP Opus SQEP. A summary of the inspection is outlined below and a selection of site photographs presented within Appendix B. These photos are numbered to correspond to the areas detailed below.

The site was accessed off Ripponvale Rd on the southern boundary of the site. 144 Ripponvale Road is located to the north of the main site access and an alternative entrance further along Ripponvale Rd was used to enter the site.

The site inspection centred on activities undertaken in the central part of the site where the majority of the site buildings were located. For the purposes of this inspection the site was split into areas which are described in more detail in Table 4 below and indicated on the site layout plan as Figure 4

Table 4: Site Walkover Summary

Site Area (Fig 5)	Description of Activities
A	Waste pit filled with cardboard, bin liners containing unknown materials, empty plastic drench containers and other miscellaneous items Remaining area to the east of the pit contained other deposited items including:

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Site Area (Fig 5)	Description of Activities
	• Antifreeze wire bound container • Empty diesel drum • Wood • Wire fencing • Machinery • Small disused fuel tank • Empty drenching containers • Mobile fuel/water container
B	Open sided tractor/machinery shed with a shipping container located adjacent to the southern side. Materials within the shed included: • Two diesel drums containing product • Pesticide spray unit • Batteries on a pallet • Bags of unknown material (assumed to be for cattle feed)
C	Worker accommodation and site office with numerous disused cars (no number plates) parked along the eastern side of the buildings. A locked outhouse containing livestock drenching chemicals which were indicated to be mainly organic in nature is located here.
D	Residential housing which have been present on site since at least 1958 (visible on aerial photograph of this year).
E	Packing shed and cold store with current refrigeration unit on northern side of building.
F	Waste pit containing miscellaneous items. Site owner indicated that any unwanted items from within Area A were disposed of in to this pit with materials burnt before being buried with 1m of overburden.
G	Disused underground fuel storage tank with vent (petrol).
H	Offal Pits. At least three have already been infilled with a fourth currently open to a depth in excess of 3m containing deceased calves).
I	Disused cars and farm machinery.
J	Pesticide chemical store with Hazchem sign above door. Concrete floor inside and on entrance in a moderate condition. A list of chemicals used was on wall and is detailed in Appendix C. The store itself was unkempt as can be seen in the site photographs.
K	Above ground diesel storage tank with no bunding.
L	Disused refrigerant unit inside building.
M	Old tyre store which also contains machinery.
N (separate plan – Fig 6)	Old offal pit located away from buildings on hillside to the north west of the site.
P (separate plan – Fig 6)	Large water containers adjacent to hummocky ground. This area is indicated by site owner to contain buried wire fencing and steel alongside the drainage ditch.

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Figure 5: Site Description Areas

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Figure 6: Wider Site Area for description purposes

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In addition to the site walkover the site was inspected via helicopter on 22nd March 2018 which gave aerial views of potentially contaminated area of the site. Photographs taken at the time of this aerial site inspection are also presented in Appendix B.

Assessment of the activities undertaken on the site indicates that various pieces of land on the site have been subject to activities on the HAIL. As such the following HAIL activities apply to the site in accordance with NESCS guidance:

A10: Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds

A13: Petroleum or Petrochemical Industries... ...or bulk storage of Petroleum or petrochemicals above or below ground

A17: Storage tanks or drums for fuel, chemicals or liquid waste

G3: Landfill sites

G5: Waste Disposal to land

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5 Conceptual Site Model

This section of the report relates to the assessment of contamination arising from the previous and current land uses, both on and off the site that may impact on development proposals. This is achieved by detailing the nature and extent of contamination, the potential migration pathways and to identify potential receptors to the extent possible based on information gathered from the desk study and site visit. Data gaps and uncertainties are identified during the preparation of the conceptual model, which assists in designing a more detailed investigation.

The following conceptual site model been identified based on a land use change for a rural use across the site. These may need to be amended in light of any further development proposals in the future:

5.1 Potential Sources of Contamination

A review of all data sources and anecdotal evidence indicates that the site has been subject to uncontrolled filling in some areas along with orchards, pesticide storage and fuel storage. Buildings on the site were also considered to be of an age where asbestos may have been used within the building fabric in some instances.

Potential sources of contamination typically associated with these activities may include:

- Multi-residue pesticides
- Heavy metals;
- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Petroleum Hydrocarbons (TPH) with BTEX; and
- Asbestos.

5.2 Potential Pathways

Plausible pathways such as inhalation, dermal contact, ingestion, leaching, and migration of contaminated groundwater, migration of ground gases and hazardous vapours as well as aggressive attack on construction materials have all be considered as part of the development of the conceptual site model for the piece of land on this site.

The most plausible migration pathways are dependent upon the type of contaminants and are considered to be:

- Inhalation of contaminated dust (particularly asbestos containing materials should demolition of buildings occur);
- Dermal contact with contaminated soils/water;
- Ingestion of contaminated material or food; and
- Leaching of contaminants into groundwater.

5.3 Potential Receptors

Given the proposed development on the site in addition to potential contaminants associated with historic uncontrolled filling, then the most sensitive receptors identified are as follows:

Residents and visitors (end-users) to the site;

Construction workers during earthworks and construction; and

Environmental receptors including groundwater.

Using the data obtained from various sources and brought together within this report, a conceptual site model (CSM) has been derived for the site and is presented in Figure 7.

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The term **possible pollutant linkage** as used above is defined as one that has the potential to represent unacceptable risks to human health or the environment but has not been identified through risk assessment. Where a possible pollutant linkage has been identified above, these should be subjected to investigation and risk assessment during a DSI in order to establish whether a **significant pollutant linkage** exists.

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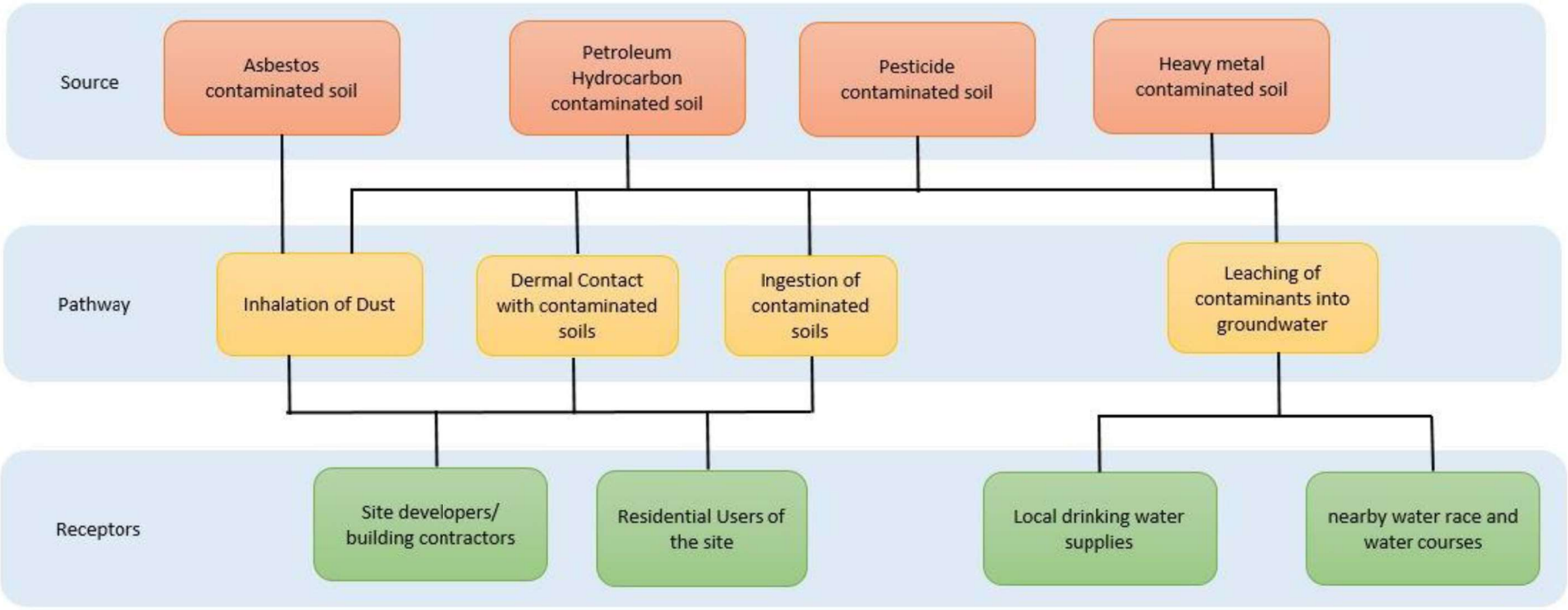


Figure 7: Conceptual Site Model

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5.4 Discussion of Conceptual Site Model

Site history, anecdotal evidence, historical aerial photography and site inspections indicate that a number of HAIL activities have been or are currently present at the site.

Aerial photography provides clear evidence that the site has been used for production land since at least 1958 and has undergone a number of changes to the buildings.

No records exist of the type of pesticides historically used from this activity however it is considered plausible given its age that older pesticides may have been used at this site. In the absence of any soil sampling data identifying potential presence of heavy metals in soils it is unclear if contaminants exist in the soils. Therefore, a data gap exists regarding the actual risks should earthworks be undertaken at site in terms of human health:

Hydrocarbon storage was noted within the central 'hub' of the site in and around the buildings. Spillage over a number of years appears to have occurred adjacent to these locations and the integrity of the underground storage tank could not be ascertained during the site inspection.

There is therefore a risk of exposure to workers on site from hydrocarbon contaminated soils and should these soils remain the exposure risk to site occupiers must also be considered.

Groundwater beneath the site is considered to be a sensitive aquifer with extractions occurring along Ripponvale road for both irrigation and domestic consumption. Migration of contaminants from site should therefore be considered as the local granular soils are likely to enable migration to occur.

A DSI would be required to fill these data gaps and refine the conceptual site model if earthworks or a change in land use were proposed at the locations identified in table 4.

6 Basis for Guideline Values

For contaminated site assessments the hierarchy of reference documents containing guidelines for soils and waters, the MfE Contaminated Land Management Guidelines No 2 (November 2003) is referred to.

The site currently comprises open pasture land, orchards and general production land and is currently zoned as a Rural Resource Area according to the district plan.

An area of the site is proposed for rezoning from Rural Resource to a new rural zone (Rural Resource Area (5)) which is likely to incorporate rural lifestyle blocks. As a rural residential/lifestyle land use is considered the most sensitive end use of the site as detailed within Table 5, the recommendations outlined in this report must be considered when changing the land use and developing this land.

The primary human health receptors have been determined to be site workers, residential users and visitors following any development of sections of the site.

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Table 5: Land Use Scenario

Scenario	Description
Rural / lifestyle block	Rural residential land use, including home-grown produce consumption (25 per cent). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land. Note: Consumption of eggs, milk and meat from animals raised on site is excluded. Produce consumption is limited to home-grown vegetables. Sites for which consumption of home-grown eggs, milk or meat is important will need to be evaluated on a site-specific basis.
Residential	Standard residential lot, for single dwelling sites with gardens, including home-grown produce consumption (10 per cent).
High-density residential	Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption); applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens, but not high-rise apartments.
Parks / recreational	Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Commercial / industrial outdoor worker (unpaved)	Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (ie, a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site.

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7 Site Characterisation

The purpose of this preliminary site investigation, is to provide as assessment of the historical land uses to determine whether the activities have, more likely than not, resulted in contamination of the soil and underlying groundwater that may be hazardous to human health.

On the basis of a review of information currently available, as well as observations made during the site inspection, and through the compilation of a conceptual site model our assessment of the site is as follows:

- The site has been subject to unlicensed landfilling activities in the past which in places are ongoing;
- Orchards have been present on areas of the site which have been subjected to spraying with a range of pesticides;
- Petroleum storage both above ground and below ground is or has been undertaken in the central area of the site around the buildings;
- The site is currently mixed use open pastoral land with orchards and grazing livestock present;
- Livestock holding pens are present on site which may have historically been used for the application of pesticides as part of a spray race operation;
- Storage of pesticides and other livestock chemicals are held within locked buildings with only small quantities kept on site at any given time;
- Buildings present on the site are likely to have been built prior to 1970, therefore there is a possibility that asbestos and lead based paints may have been used within the building fabric and contaminated near surface soils within the vicinity of the structures.
- The underlying geology comprises glacial gravel to the east and schist to the west which has a mobile groundwater regime;
- No obvious signs of vegetation dieback was noted in any location across the site.

Potential human health risks have been evaluated using the Likelihood and Consequence scales tabulated below to determine a risk level – low, moderate, high, very high or extreme. The assessed risk level allows prioritisation of investigations and assessment measures.

Table 6: Risk Allocation Table

	Consequence				
Likelihood	Insignificant	Minor	Medium	Major	Catastrophic
Almost certain	Moderate	Moderate	Very High	Extreme	Extreme
Likely	Low	Moderate	High	Very High	Extreme
Possible	Low	Moderate	Moderate	Very High	Very High
Unlikely	Low	Low	Moderate	High	Very High
Rare	Low	Low	Low	Moderate	High

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The risks to human health have been assessed on the basis of the historical activities which may have occurred on specific areas of the site and can be split in to the following activities:.

- **Orchards**: The risks associated with the application of pesticide sprays within the orchards is considered to be Low to Moderate. This is due to the reduction in the presence of persistent pesticides as time passes due to degradation and leaching, therefore reducing their likely presence at the site;
- **Petroleum storage**: The risks associated with the storage of petroleum products and spillages within the near surface environment are considered to be Moderate. Insufficient information on the removal of store petroleum is available meaning that it is possible these are present on site and will require management;
- **Pesticide Storage and mixing**: The risks associated with the storage of pesticides within the enclosed store and mixing of these is considered to be Moderate due to the potential for spillages to have occurred within this area taking in to consideration the ad hoc manner of storage of the pesticides;
- **Unlicensed landfilling:** The risks to human health and the environment associated with the unlicensed landfill (not the offal pits) are considered to be High. This is because the fill material is uncontrolled it may contain many toxic wastes including chemical drums, asbestos and heavy metals. Exposure to these if unearthed presents a direct threat to those undertaking the works, future users and a migration risk from leachate or soil disturbance.
- **Offal Pits:** The risks associated with the offal pits taking in to consideration their depth and age are considered to be Low to Moderate. Once buried, decomposition occurs over a period of 3 months to 3 years. If the pit is excavated during this time a biological risk is present. Groundwaters passing through the pit will become contaminated and therefore any wells/bores within at least 500m of the pits should be assessed before consumption occurs;
- **Livestock storage and spraying:** The risk to human health associated with potential spray race operations within the stock yard is considered to be Moderate to High due to the persistence of metals should they have been used on site and their effect on human health.

Taking into consideration the information herein, it is considered more likely than not that the risk to human health and groundwater associated with potential contamination derived from historic and ongoing activities across the site as a whole is considered to be **MODERATE TO HIGH.**

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8 Conclusions and Recommendations

The Preliminary Site Investigation has revealed that uses on the site include unlicensed landfilling, orchards and fuel storage. Anecdotal evidence indicates that the landfill operations are for offal pits as well as other miscellaneous waste materials. Spraying of orchards is an ongoing process with records kept of the pesticides used in recent years.

The conceptual site model and initial qualitative human health risk assessment presented herein is based upon information gained from a site inspection, anecdotal evidence, and other sources. The conceptual site model indicates that historical and current site activities have a Moderate to high potential risk of having contaminated areas of the site.

Hazardous activities are noted to have been undertaken on parts of the site. Therefore, more detailed investigation to assess the residual risks associated with these activities would be required in order to provide a greater understanding of the risks in the context of the proposed end use for particular areas of the site.

8.1 Recommendations

Based on the results of this investigation, WSP Opus recommends that areas where rural residential (Lifestyle) rezoning is proposed, a Detailed Site Investigation should be undertaken on the site areas where HAIL activities have been identified. This is to satisfy the requirements of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS), more specifically:

- **Orchards**: Investigation of the historic areas of orchard activities be undertaken where rural residential rezoning is proposed to determine the risks posed to human health with respect to potential future ground disturbance. Taking in to consideration the large areas of land involved with this proposed rezoning, investigations should be designed to give a broad overview of potential contaminants initially with a more detailed second phase of investigation undertaken on areas highlighted as being a risk to human health within the initial screening assessment.
- **Petroleum storage**: Investigation and/or removal of the buried fuel storage tank should be undertaken in order to assess whether leakages to groundwater have occurred and to remove the source of any potential ongoing contamination from this tank.
- **Pesticide Storage and mixing**: Site specific investigation of the areas where pesticide storage and more importantly mixing occurs should be undertaken as these areas have an increased likelihood of concentrated contaminants being present.
- **Unlicensed landfilling:** Further assessment of areas where landfilling has been undertaken should be undertaken. This assessment should take in to consideration potential ground gas and groundwater contamination issues associated with unlicensed landfilling with consideration given to remediation/removal of landfilling materials.
- **Offal Pits:** At this stage no further investigation of the offal pits are considered necessary due to their depth of burial. Should these areas be proposed for deeper excavation in the future, such as for foundation solutions then this recommendation should be reassessed to protect workers coming in to contact with possible microbial contamination.
- **Livestock storage and spraying:** The areas where livestock have been held within pens, particularly close to the buildings in the central area of the site, should be investigated to assess if spray race activities have been undertaken in these areas.

Should any other ground conditions be encountered that are not covered herein a Suitably Qualified and Experience Practitioner in contaminated land assessment should be consulted in order to assess the risks to human health and sensitive receptors.

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Prior to any demolition being carried out an assessment of the buildings should be undertaken by a specialist asbestos in buildings assessor in order to determine the risks posed prior to any demolition on site. This would effectively reduce the potential for soil contamination associated with asbestos containing materials in later stages of development and protect the demolition contractors from the release of un-investigated potentially hazardous materials.

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9 Applicability and Limitations

This report has been produced on behalf of NZ Cherry Corp and no responsibility is accepted to any third party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of WSP Opus. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill. This report should only be reproduced in full.

We have reviewed information across the entire site. However this investigation concentrates on contamination levels in the soil through the identified 'piece of land' where development is proposed to occur. As such any further earthworks outside of this area of sampling would require further investigation to establish the risk posed to human health.

This report has been prepared for a specific purpose, as agreed between Opus and the Client. A tailored scope of works has been used to achieve the objectives, and the report should therefore not be used for different objectives.

This report has been prepared by WSP Opus with all reasonable skill and care within the terms of the Contract with the Client, and taking account of the information made available by the Client, as well as the staff and resources devoted to it by agreement with the Client. The findings and opinions conveyed via this report are based on information obtained from a variety of sources, as detailed, which WSP Opus believes are reliable. Nevertheless, WSP Opus cannot and does not guarantee the authenticity or reliability of any information supplied by other parties.

The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry best practice. Due to the inherent variation in spatial and temporal patterns of contamination, the interpretation of site conditions at the site is not necessarily a complete description of all material at the site. Whilst this report may express an opinion on the possible configuration of strata or contaminants, this is for guidance only, and no liability can be accepted for its accuracy. Should further data be obtained that differs from that presented in this report, then conclusions and recommendations may no longer be valid.

No soil or ground water samples have been taken for this investigation.

The report is valid at the date of release. The condition of the site may change with time so that the results and interpretation are no longer valid. In addition, guidelines and legislation may change, making assessment of results and recommendations invalid.

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New Zealand Cherry Corps Ltd

SHANNON FARM CROMWELL

DETAILED SITE INVESTIGATION

30 OCTOBER 2022

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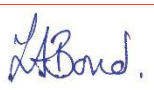
Question today
Imagine tomorrow
Create for the future

SHANNON FARM CROMWELL
DETAILED SITE INVESTIGATION

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REV	DATE	DETAILS
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002		Final for Issue

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Approved by:	Rob Bond	28/10/2022	

REPORT CHECKLIST

SUMMARY CONTAMINATED SITES REPORT CHECKLIST					
Report contained in this document	☐	☒	☐	☐	☐
Report sections and information to be presented	**PSI**	**DSI**	**RAP**	**SVR**	**MMP**
Executive summary	☐	☒	☐	☐	☐
Scope of work	☐	☒	☐	☐	☐
Site identification	☐	☒	☐	☐	☐
Site history	☐	S	S	S	S
Site condition and surrounding environment	☐	S	S	S	S
Geology and hydrology	A	☒	S	S	S
Sampling and analysis plan and sampling methodology	A	☒	X	☐	☐
Field quality assurance and quality control (QA/QC)	N	☒	X	☐	S
Laboratory QA/QC	N	☒	X	☐	X
QA/QC data evaluation	N	☒	X	☐	X
Basis for guideline values	☐	☒	☐	☐	☐
Results	A	☒	☐	☐	S
Site characterisation	☐	☒	☐	☐	☐
Remedial actions	X	X	☐	S	S
Validation	X	X	X	☐	S
Contaminated materials management plan (CMMP)	X	X	☐	S	S
Ongoing site monitoring	X	X	X	N	☐
Conclusions and recommendations	☐	☒	☐	☐	☐

KEY:

PSI - preliminary site investigation report

DSI detailed site investigation report

RAP - site remedial action plan

SVR - site validation report

MMP - ongoing monitoring and management plan

A - Readily available information should be included

S - A summary of this section's details will be adequate if detailed information has been included in an available referenced report

N - Include only if no further site investigation is to be undertaken

X - Not applicable and can be omitted.

(MfE. *Contaminated Land management guidelines No. 1*. 2011a)

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ABBREVIATIONS

CLMG 1	Contaminated Land Management Guideline No. 1: Reporting on Contaminated Sites in New Zealand
CLMG 5	Contaminated Land Management Guideline No. 5: Site investigation and analysis of soils
CMMP	Contaminated Materials Management Plan
CoC	Chain of Custody
CODC	Central Otago District Council
CSM	Conceptual Site Model
CSMP	Contaminated Site Management Plan
DSI	Detailed Site Investigation
H&S	Health and Safety
HAIL	Hazardous Activities and Industries List
IANZ	International Accreditation New Zealand
ILAC	International Laboratory Accreditation Cooperation
ILAC-MRA	ILAC Mutual Recognition Arrangement
IRB	International Risk Based
LINZ	Land Information New Zealand
LRIS	Land Resource Information Systems
m bgl	meters below ground level
MfE	Ministry for the Environment
MMP	Ongoing Monitoring and Management Plan
N/A	Not applicable
ND	Not derived
NES	National Environmental Standards
NESCS	National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
NL	No limit - derived value exceeds 10,000mg/kg
NZRB	New Zealand Risk Based
ORC	Otago Regional Council
PoL	Piece of Land

PSI	Preliminary Site Investigation
PSSP	Project Site Safety Plan
QA/QC	Quality assurance and Quality Control
RAP	Remedial Action Plan
SCS (health)	Soil Contaminant Standards for Health
SGV	Soil Guideline Value
SID	Safety in Design
SQEP	Suitable Qualified and Experienced Practitioner
SSL	Soil Screening Level
SVR	Site Validation Report
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxicity Equivalent – indication of the toxicity of a mixture of compounds

EXECUTIVE SUMMARY

New Zealand Cherry Corps Ltd commissioned a Detailed Site Investigation (DSI) for the subdivision and development of Shannon Farm, located at 112 & 144 Ripponvale Rd, Cromwell (herein referred to as 'the site'). Situated adjacent the Pisa Range, the total site covers approximately 220ha.

It is understood that the proposed works include the subdivision and development of residential housing. This DSI is based on the preliminary lot layout plan obtained in July 2022 and solely covers the planned development areas.

Based on site visit observations, previous investigations, council records and a review of historic aerial imagery, the site and/or surrounding area has been subject to HAIL activities, namely:

- A10. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds;
- A13. Petroleum or petrochemical industries, including a petroleum depot, terminal, blending plant or refinery, or facilities for recovery, reprocessing or recycling petroleum-based materials, or bulk storage of petroleum or petrochemicals above or below ground;
- A17. Storage tanks or drums for fuel, chemicals or liquid waste;
- G3. Landfill sites;
- G5. Waste disposal to land.
- I. Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

The presence of known and potential HAIL activities on the site and/or surrounding area may have given rise to migration of contaminants within the vicinity of the source or either via surface water run-off or through groundwater migration.

As such, a Piece of Land (PoL) has been delineated, under NESCS regulations, requiring a DSI for assessment of the risks to human health associated with ground disturbance.

DETAILED SITE INVESTIGATION WORKS

To achieve the objective of the DSI, a judgemental and grid-based sampling pattern was adopted across the farmyard and orchards respectively. A total of 74 samples were taken from the farmyard and surrounds using either a hand trowel or geotechnical test pits, while 195 samples were taken from the orchards using hand excavations only. Appropriate QA procedures were followed during sampling events.

Depending on the location of the samples from the farmyard, they were analysed for a suite of heavy metals (HM); organochlorine pesticides (OCPs); asbestos; total petroleum hydrocarbons (TPHs); polycyclic aromatic hydrocarbons (PAHs); and/or benzene, toluene, ethylbenzene and xylene (BTEX). Samples taken from the orchards were generally composited on a 3:1 ratio and analysed for a suite of heavy metals and OCPs.

SUBSURFACE CONDITIONS

Soils generally comprised sandy SILT with some gravel; brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded. Some rootlets. A summary of the general geology is given in Table 7 and detailed geotechnical logs of the test pits can be found in Appendix F.

No groundwater was encountered within any of the locations investigated.

RESULTS

No human health exceedances were reported for heavy metals nor OCPs from the orchards. Moreover, all samples were found to comprise OCP concentrations below their limit of reporting.

The farmyard area reported four samples with concentrations for lead, zinc or arsenic above relevant human health criteria for a Residential (10% produce) and Rural Residential (25% produce) land use.

The majority of samples taken both from the orchards and the farmyard returned heavy metal or hydrocarbon concentrations above background concentrations, except for orchards 5 and 6 which can be considered as cleanfill.

DEVELOPMENT PROPOSALS

It is understood that the proposed development plans include subdividing and developing the site into 158 (rural) residential lots. The size of the lots will differ, with the lots generally increasing in size from south to north of the site

NES-CS CONSIDERATIONS

Soil analysis results from the investigation works indicate that concentrations of contaminants of concern exceed the predicted local background concentrations for heavy metals, OCPs and hydrocarbons on the site. As such, the NES-CS does apply to the site.

Considering the proposed development plans, the works would involve significant soil disturbance. For any soil disturbance in excess of permitted activity volumes of the site, works can be considered a Restricted Discretionary Activity under the NES-CS as contaminants of concern exceed their applicable standard for a residential end use.

RECOMMENDATIONS

Based on the findings of this investigation, WSP recommends that:

- Any soil disturbance within the PoL should be undertaken in accordance with a Remediation Action Plan (RAP) and Contaminated Site Management Plan (CSMP), prepared by a SQEP and including appropriate processes and procedures to mitigate the risk soil exposure presents to site personnel. The CSMP would be in addition to standard site management procedures and be incorporated into the general site management plan as an additional form of control.
- The RAP is developed to determine the best approach to manage earthworks on the site with respect to contaminated soils. The RAP and CMMP can be combined.
- An appropriate Accidental Contaminant Discovery Procedure should be included within any site management plan in case additional unexpected discoveries occur within the fill materials;

- Materials are considered suitable for re-use on-site, however a geotechnical specialist should be consulted to determine their suitability for foundation and development purposes;
- Should off-site disposal be considered, it is recommended that surface soils from areas highlighted yellow in Figure 7 are stockpiled on site and composite TCLP analyses are scheduled for heavy metals prior to offsite disposal by a contaminated land specialist. Alternatively, should site constraints mean that stockpiling is unviable this may be carried out at the landfill (following liaison). This may incur additional costs from the landfill operator
- Should any ground conditions be encountered across the site which is not anticipated from the findings of this report a Suitably Qualified and Experienced Practitioner (SQEP) should be consulted in order to reassess the risks to human health;
- This DSI report is submitted to the consenting authority; and
- This DSI report is submitted to the regional authority to facilitate updating the HAIL database.

1 INTRODUCTION

New Zealand Cherry Crops Ltd commissioned a Detailed Site Investigation (DSI) for the proposed subdivision and development of residential housing, located at 112 & 144 Ripponvale Rd, Cromwell (herein referred to as 'the site'). Situated east of the Pisa Range and approximately 3km north-west of Cromwell town centre, the site covers approximately 240ha.

It is understood that the site is the subject of a plan change which involves rezoning with the proposed works comprising subdivision and subsequent development of residential lots on the site.

Following the completion of a Preliminary Site Investigation (PSI) (WSP Opus, 2018), several site areas with (historic) HAIL activities have been identified as per the MfE Hazardous Activities and Industries List (HAIL). The MfE HAIL document is a compilation of activities and industries that are considered likely to cause land contamination resulting from hazardous substances use, storage or disposal. The HAIL is intended to identify most situations in New Zealand where hazardous substances could cause, and in many cases, have, caused land contamination.

The report recommended that areas where rural residential (Lifestyle) rezoning is proposed, a Detailed Site Investigation (DSI) should be undertaken.

Preparation of a DSI under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) Regulations 2011 (Ministry for the Environment , 2012) will provide information as to whether soil contamination from current and historical activities onsite is likely to be present at levels that could adversely impact human health.

This assessment relates to the proposed ground disturbance activities for the subdivision and development of Shannon Farm. It should be noted that areas of the site that are not to be developed at this stage in time are excluded from this investigation.

1.1 OBJECTIVE

The objective of this investigation is to characterise the contamination risk both to human health and the environment during and following any potential future soil disturbance works on the site. The conclusions of this investigation may be used in support of obtaining consent under the NESCS and to meet any requirements from Central Otago District Council (CODC) and Otago Regional Council (ORC).

As such, the following objectives have been identified:

- Determine whether potentially contaminating activities have been undertaken on the site or its surrounds;
- Undertake sampling and analysis of selected soils across the site for determined contaminants of concern associated with potential and known HAIL activities;
- Assess the risks associated with these potential contaminants to affect human health or the environment;
- Determine the likely impact upon sensitive receptors including site users and occupiers on the site; and

— Give details of further investigations or remedial options, if required.

1.2 SCOPE OF WORK

This report will be prepared in general accordance with the requirements for a DSI referred to in the *Users' Guide National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health* (Ministry for the Environment , 2012) and *Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand* (Ministry for the Environment, Revised 2021) and *No.5: Site Investigation and Analysis of Soils* (Ministry for the Environment , 2021)

To achieve the objectives, the following scope was undertaken:

— Site walkover to assess the current site condition and its surrounding environment and to inform the investigation design;

— A review of historical information relating to the site and its surroundings ;

— Review local geological and hydrogeological conditions through publicly available sources;

— Review of previous reports and information pertaining to the site from local authority records or other available sources;

— Sampling of approximately 195 samples from the (historic) orchards, using hand excavations, and 74 samples from the farmyard using hand excavations or test pits, with appropriate QA procedures;

— Analysis for determined contaminants of concern based on the known history of the site (heavy metals/trace elements, TPH/PAH/BTEX along with asbestos);

— Site characterisation indicating the potential human health and environmental risks associated with the site and likely consenting requirements under the NESCS Regulations (2011); and

— Remedial and/or management options should contaminants of concern be encountered in excess of soil guideline values.

This report has been reviewed by a Suitably Qualified and Experienced Practitioner (SQEP), as per the NESCS Regulations (Ministry for the Environment , 2012).

2 SITE IDENTIFICATION

The site is located on 112 & 144 Ripponvale Rd, Cromwell, approximately 3km north-west of Cromwell town centre. The Pisa Range can be seen west of the site, with Lake Dunstan situated to the east. The site covers approximately 240ha and comprises a rural land use with orchard and farming activities.

Following a brief review of the ORC HAIL database and surrounding site data, the site has been noted as comprising a Piece of Land (PoL) associated with potential historic HAIL activities. The site location is shown in Figure 1, the site layout with the PoL as recorded by the ORC is indicated on Figure 2 and site details are provided in Table 1.

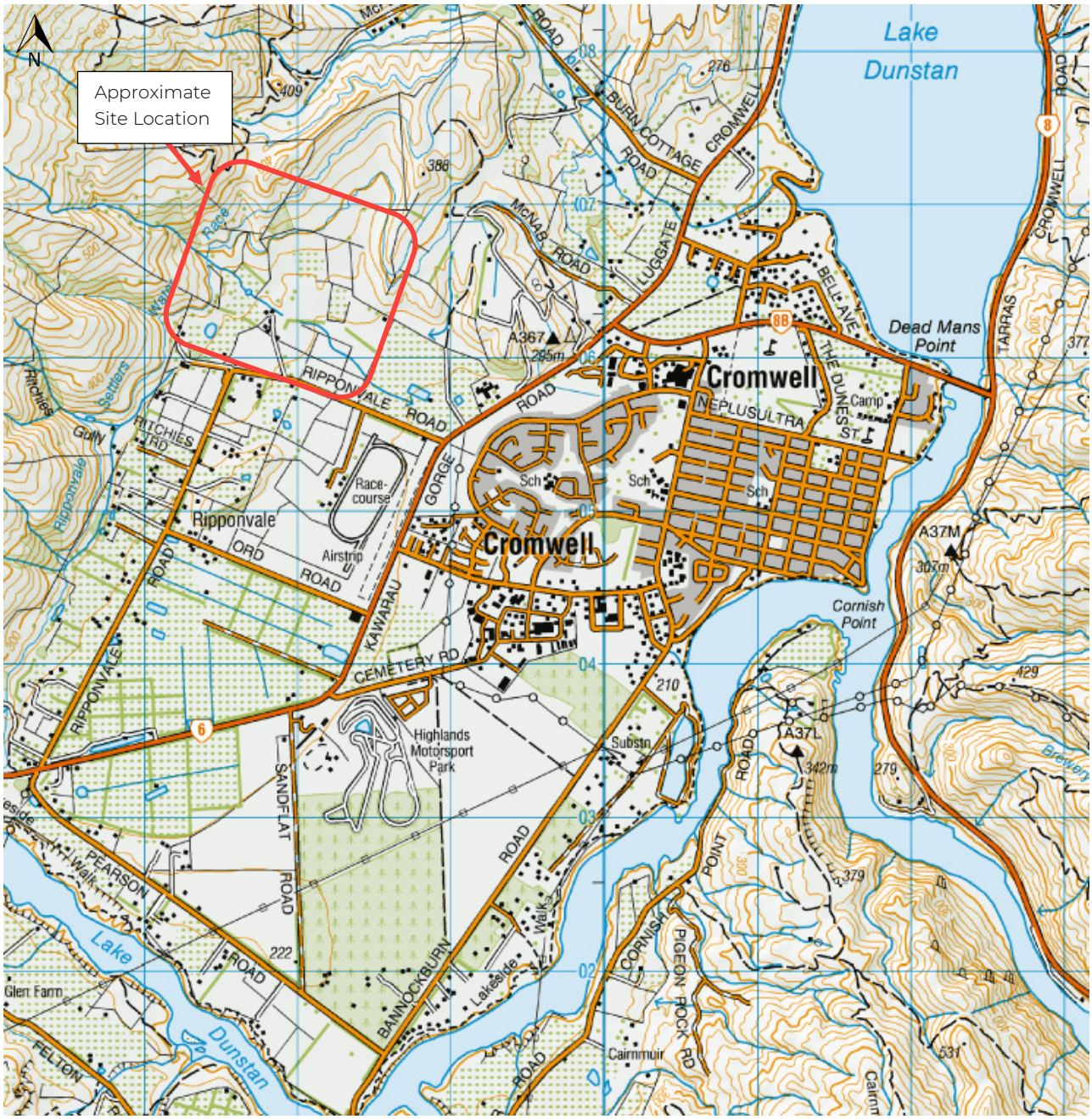


Figure 1: Site Location

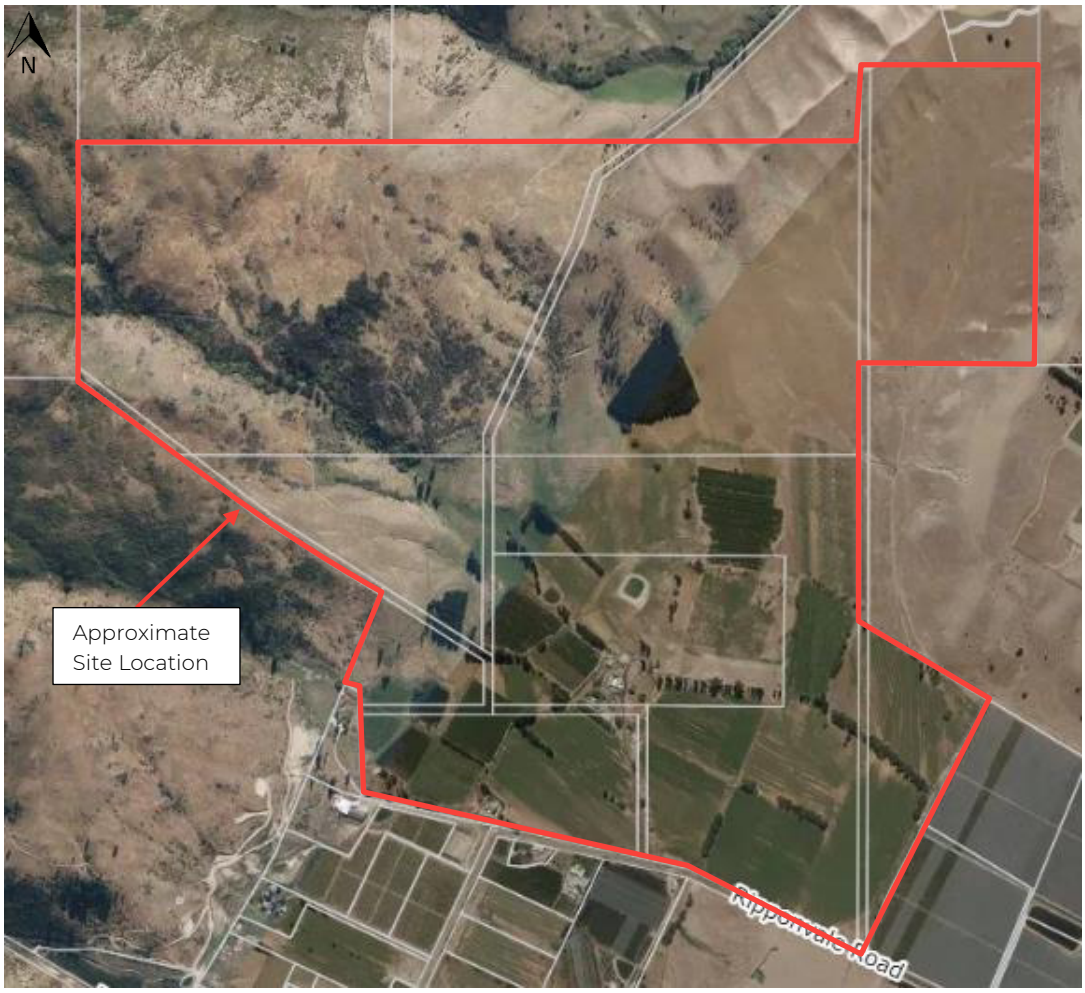


Figure 2: Site layout

Table 1: Site details

Site Address	112 and 144 Ripponvale Rd, Cromwell
Territorial Authority	Central Otago District Council (CODC)
Legal Description	Lot 2 DP 330709; SEC 4, 11, 26-28, 54, 96, 98-103; Pt SEC 5, 25 1201R BLK III Cromwell SD
Certificate of Title	7C/632, 7C/633, 106/99 126180
Approximate total site area (including part of road reserve)	243.34 ha (2,433,400m^2)
NES Permitted Activity threshold volumes: 1) total site disturbance, and 2) yearly off-site movement of soil (based on the approximate total site area)	 121,670 m^3 24,334 m^3

3 DEVELOPMENT PROPOSALS

It is understood that the proposed development plans include subdividing and developing the site into 158 (rural) residential lots. The size of the lots will differ, with the lots generally increasing in size from south to north of the site. A summary of the proposed areas is given in Table 2 below and the proposed development plans can be found in Appendix A.

Table 2: Summary of proposed Lots

AREA	NUMBER OF LOTS	SIZE OF LOTS
RLA 1	106	<1500 m^2 (average: 2002 m^2)
RLA 2	8	>3000 m^2
RLA 3	10	>4000 m^2
RLA 4	25	>8000 m^2
RLA 5	2	>3 HA
RLA 6	1	TBC
RLPA	6	>4 HA

4 PRELIMINARY SITE INVESTIGATION INFORMATION

4.1 ENVIRONMENTAL SETTING

The environmental setting of the site has been summarised below from a review of the PSI along with Central Otago District Council (CODC) and Otago Regional Council's (ORC) property and environmental databases (CODC, 2022) (ORC, 2022).

4.1.1 GEOLOGY

The geology of the site is shown on the 1:250,000 scale GNS Geology Web Map extract (GNS Science, 2022) as shown in Figure 3.

This map indicates the majority of the site comprises Holocene river deposits. These river deposits are typically loose, commonly angular, boulders, gravel, sand and silt forming alluvial fans. The deposits grade into scree (upslope) and valley alluvium.

The Pisa Range to the west of the site consists of Basement metamorphic rock and Early Pleistocene river deposits are found north of the site.

A review of the GNS Active Faults Database (GNS Science, 2022) indicates that the nearest active fault is the Pisa Fault, which runs through the site. The Pisa Fault has a reverse dominant movement sense and a recurrence interval of >10,000 to <=20,000 years (V) and a very low slip rate.

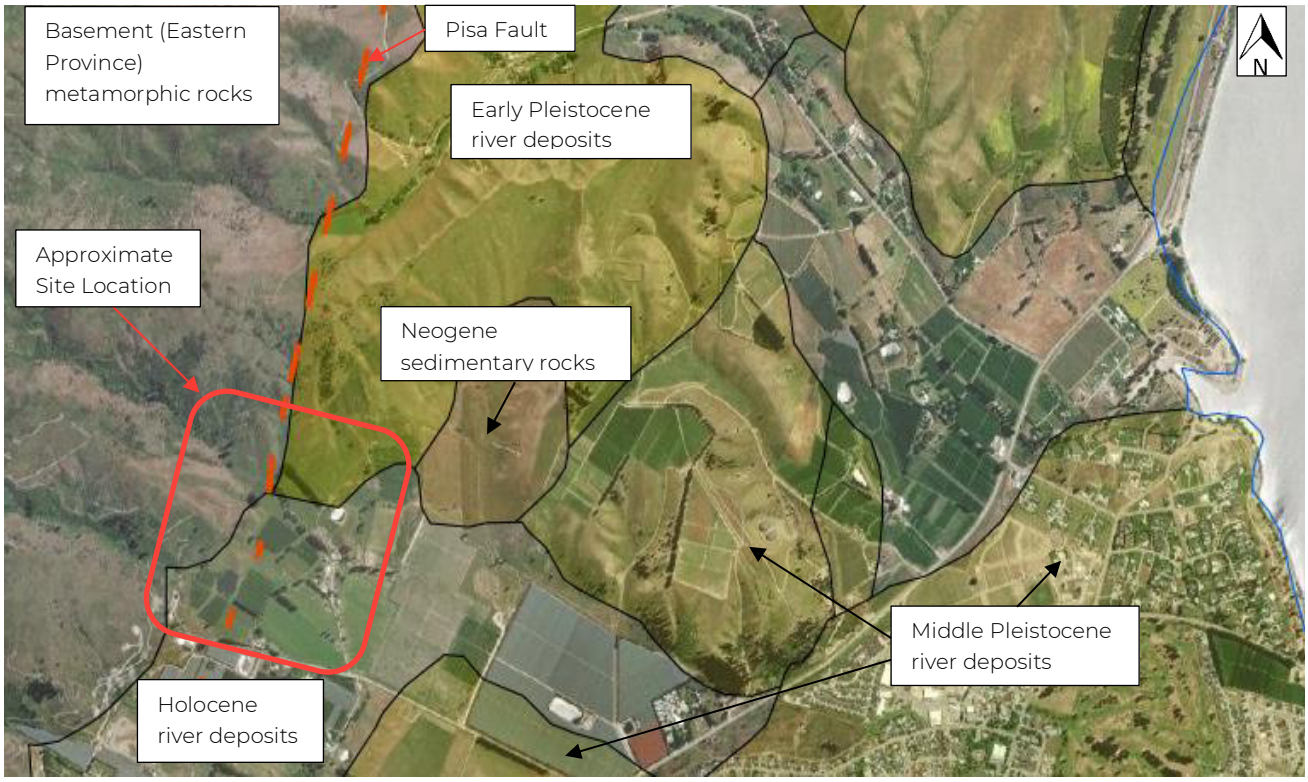


Figure 3: Geology of the site

4.1.2 TOPOGRAPHY, HYDROLOGY AND HYDROGEOLOGY

Details of the site hydrology and hydrogeology have been gained from a review of sources including GNS Science (GNS Science, 2022) and a search of council records. A summary of the relevant data can be found in Table 2 below.

The eastern part of the site is situated in the Cromwell Terrace Aquifer. The Cromwell Terrace Aquifer is an unconfined aquifer with a free water table. The mean depth to the water table is approximately 20m and the aquifer has good water quality. The annual total rainfall is approximately 437mm/yr[1].

The nearest water bodies are various dams located on the site. Several irrigation features cross the site including a water race along the eastern boundary. The Kawarau Arm of the Mata-au/Clutha River is noted to be the nearest surface water bodies, approximately 3km south-east of the site.

The ORC well database indicates one operational well to be located in the south-eastern corner of the site. The well was drilled in May 2014 and is utilised for irrigation, stock feed and drinking purposes. The depth to water was indicated to be 34m bgl (m below ground level). The liquefaction potential is indicated as low to none as the ground in predominantly underlain by rock or firm sediments (A Domain).

The site is situated at approximately 260m amsl (above mean sea level). The topography slopes upwards towards the Pisa Range west of the site.

Table 3: Summary of topographical, hydrological and hydrogeological data

Topography	Upwards slope towards Pisa Range in the west.
Nearest Surface Water Body	Kawarau Arm of Lake Dunstan
Height above Mean Sea Level	Approximately 260m amsl
General Flow Direction	Generally north-west to south-east towards the Clutha/Mata-Au River.
Groundwater Status	Cromwell Terrace Aquifer
No. of known Boreholes and wells within 500m	One

4.1.3 HERITAGE NZ

The Heritage New Zealand Pouhere Taonga Act 2014 makes it unlawful for any person to modify or destroy, or cause to be modified or destroyed, the whole or any part of an archaeological site without the prior authority of Heritage New Zealand.

In order to establish the heritage status of the site the Heritage New Zealand database was consulted. The site was not found on the database (Heritage New Zealand Pouhere Taonga, 2022).

[1] The National Climate Database accessed October 2022 via cliflo.niwa.co.nz.

4.2 SITE HISTORY

Details of the site history have been gained from a review of the Preliminary Site Investigation (PSI) carried out by WSP Opus (now WSP) in 2018 (WSP Opus, 2018).

The majority of the site has been zoned as Rural Residential, with the eastern part zoned as Rural.

The Ministry for the Environment (MfE) created a list of potentially contamination activities and industries in October 2011. This Hazardous Activities and Industries List (HAIL) is a compilation of the activities and industries likely to cause land contamination resulting from hazardous substance use, storage or disposal.

The PSI identified several Pieces of Land as comprising potential HAIL activities as defined by the MfE's HAIL (Ministry for the Environment , 2012). A review of the online HAIL database held by ORC confirmed that the site is recorded as a verified HAIL

A summary of the identified HAIL Activities is given in Table 4 and are illustrated on Figures 5 and 6 below.

Table 4: Summary of identified HAIL activities (WSP Opus, 2018)

HAIL ACTIVITY	SITE AREA (FIGURES 3 & 4)	RISK
A10. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds	Orchards - Figure 3 B, C, J	Bulk storage: Moderate; Orchards: Low to Moderate
A13. Petroleum or Petrochemical Industries … or bulk storage of petroleum or petrochemicals above or below ground.	A, G, K	Moderate
A17. Storage tanks or drums for fuel, chemicals or liquid waste	A, B	Moderate
G3. Landfill sites	A, F	High
G5. Waste Disposal to Land	A, F	High

Based on the findings, WSP Opus recommended that areas where rural residential (Lifestyle) rezoning is proposed, a Detailed Site Investigation (DSI) should be undertaken on the site areas where HAIL activities have been identified. This to satisfy the requirements of the NESCS, more specifically for the following areas:

- Orchards;
- Petroleum Storage;
- Pesticide Storage and mixing;
- Unlicensed Landfilling;
- Offal Pits; and
- Livestock storage and spraying.



Figure 4: Overview of historic orchards (WSP Opus, 2018)



Figure 5: Overview of site description areas of HAIL activities (WSP Opus, 2018)

4.2.1 CURRENT SITE CONDITION AND SURROUNDING ENVIRONMENT

A site inspection was carried out by an Environmental Scientist on 5-8 September 2022. Photos were taken of the site and its surrounds, these can be seen within Appendix B.

The site is located in a rural residential area, east of the township of Cromwell and adjacent the Pisa Range. Access to the site is via Ripponvale Road on the southern boundary of the site. The main access to the site was via a gravel driveway at 112 Ripponvale Rd, with an alternative option further north at 144 Ripponvale Rd.

The farmyard with the majority of the buildings, is located at the end of the driveway, in the centre of the site, with livestock paddocks; and orchards surrounding the farm. Aside from livestock farming, the main activity currently being carried out on the site was firewood chopping and storage.

As the site borders the Pisa Range, the landscape generally slopes down towards the south-east. Several dams were located on site.

The site inspection was centred on activities undertaken in the farmyard. The south-eastern area of the farm comprised several waste pits, scrap metal, empty oil drums and other miscellaneous items. Two of the waste pits were exposed.

A packing shed was located in the centre of the site, with an open pole shed for machinery situated to the south. Worker accommodation, a site office and some smaller workshops were also noted, one containing a hazardous chemicals sign above the front door (pesticide store). Furthermore, a residential dwelling is located in the south-western corner of the farmyard.

The activities associated with livestock farming were ongoing. As such, several cow and sheep pens and paddocks were noted, with a potential disused sheep dip or footbath north of the sheep pens. A long row of trees was located to the west of the cow pens, with tyres, oil drums, a disused car, several waste pits and scrap metal alongside. A burn pile was noted at the western end of the row of trees.

A creek flowed along the northern boundary of the farmyard, turning south around the sheep pens along the eastern boundary of the farmyard and towards Ripponvale Rd.

During the first three days of the site works, the weather was overcast with some rain and snow flurries on Monday. A cold breeze persisted throughout the week. By Thursday the weather was sunny and clear with only a slight breeze.

A minimal amount of rainfall was recorded during the site visit and no surface water was present on site. No significant places of run-off were seen. No signs of vegetation dieback were encountered anywhere on the site.

4.3 ASSESSMENT OF HAIL ACTIVITIES

Based on site visit observations, council records and a review of previous investigations, the site has been subject to HAIL activities, namely:

A8. Livestock dip or spray race operations

A10. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds

A13. Petroleum or Petrochemical Industries ... or bulk storage of petroleum or petrochemicals above or below ground.

A17. Storage tanks or drums for fuel, chemicals or liquid waste

G3. Landfill sites

G5. Waste Disposal to Land

Due to the age of the buildings on site, the presence of asbestos or heavy metals in the construction materials is possible. As such, a conservative approach is warranted, and the following HAIL activity has been added:

I. Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

The presence of known HAIL activities on the site may have given rise to migration of contaminants to near surface soils within the vicinity of the source or either via surface water run-off or through groundwater migration.

As such, the site is noted as a 'Piece of Land' under NESCS regulations.

4.4 CONCEPTUAL SITE MODEL

Using the identified potential HAIL activities or industries a site-specific conceptual site model can be developed. A conceptual site model relates to the assessment of contamination arising from the previous and current land uses, both on and off the site that may impact on development proposals. This is achieved by detailing the nature and extent of contamination, the potential migration pathways and to identify potential receptors to the extent possible based on information gathered from the desk study and site visit. Data gaps and uncertainties are identified during the preparation of the conceptual model, which assists in designing a more detailed investigation.

Based on the site history the following conceptual site model (CSM) was produced. The CSM is used to support the decision-making process for contaminated land management. The five basic activities associated with developing a conceptual site model are:

- Identification of potential contaminants;
- Identification and characterisation of the source(s) of contamination;
- Delineation of potential migration pathways through environmental media, such as groundwater, surface water, soils sediment, biota, air, service lines;
- Identification and characterisation of potential receptors (human, ecological or building infrastructure);
- Determination of the limits of the study area or system boundaries.

Data gaps and uncertainties are identified during the preparation of the conceptual site model, which assists in designing any detailed investigation that may follow.

For there to be an effect on receptors there must be a contamination source and a mechanism (pathway) for contamination to affect human health or the environment (receptor).

The desk-based information on the site has enabled the development of a conceptual site model as shown in Table 7.

A possible pollutant linkage between the contaminant source and receptor is defined as one that has the potential to represent unacceptable risks to human health or the environment.

Table 5: Site-specific Conceptual Site Model (CSM)

AREA & HAIL CATERGORY	LIKELY SOURCES OF IMPACT	POTENTIALLY IMPACTED MEDIA	CONTAMINANTS OF CONCERN	MIGRATION PATHWAY	POTENTIAL EXPOSURE PATHWAY	POTENTIAL SENSITIVE RECEPTORS
Orchards – HAIL A10	Pesticides associated with orchards	Impacts are likely to be limited to shallow soils (the upper few meters).	— Heavy metals (HM); and — Organochlorine Pesticides (OCPs).	— Surface runoff containing impacted soil or dissolved contaminants; — Infiltration of contaminants in soil; and — Groundwater transport through soil, including in preferential pathways (service trenches, through higher permeability soils and/or high groundwater levels.	— Ingestion or dermal contact with impacted soil, including surface soils during excavation work; and — Ingestion or dermal contact with impacted surface water or groundwater during excavation work. —	— Workers and visitors at the site during site works; — Workers and visitors following the development of the site; and — Surface water ecosystems.
Farm – HAIL A8	Livestock dip or spray race operations	Impacts are likely to be limited to shallow soils (the upper few meters) and possibly deeper soils.	— Heavy metals; and — Organochlorine Pesticides (OCPs).			
Farm – HAIL A13 & A17	Leaking from (bulk) storage tanks or drums for fuel	Impacts are likely to be limited to shallow soils (the upper few meters) and possibly deeper soils.	— Heavy metals; — Total Petroleum Hydrocarbons (TPHs); — Polycyclic Aromatic Hydrocarbons (PAHs); and — Benzene, Toluene, Ethylbenzene, Xylene (BTEX).			
Farm – G3 & G7	Landfill sites or waste disposal to land	Impacts are likely to be limited to shallow soils (the upper few meters) and possibly deeper soils.	— Heavy metals; — OCPs; — Hydrocarbons (TPHs, PAHs, BTEX).			

On the basis of the findings within the desk-based study and potential risks to human health detailed in the CSM from identified contaminants of concern within the farmyard area and surrounding orchards, further assessment in the form of a Detailed Site Investigation (DSI) was warranted.

Considering the proposed development plans, the Investigated Site is defined in Figure 6 below and is the subject of the DSI. The Investigated Site covers the areas with noted HAIL activities that are proposed for development at this stage in time and thus forming a possible pollutant linkage between the contaminant source and receptor. The red areas in the Figure illustrate the (historic) orchards and the blue area delineates the farmyard.

Findings of the DSI are presented in the following sections of this report.

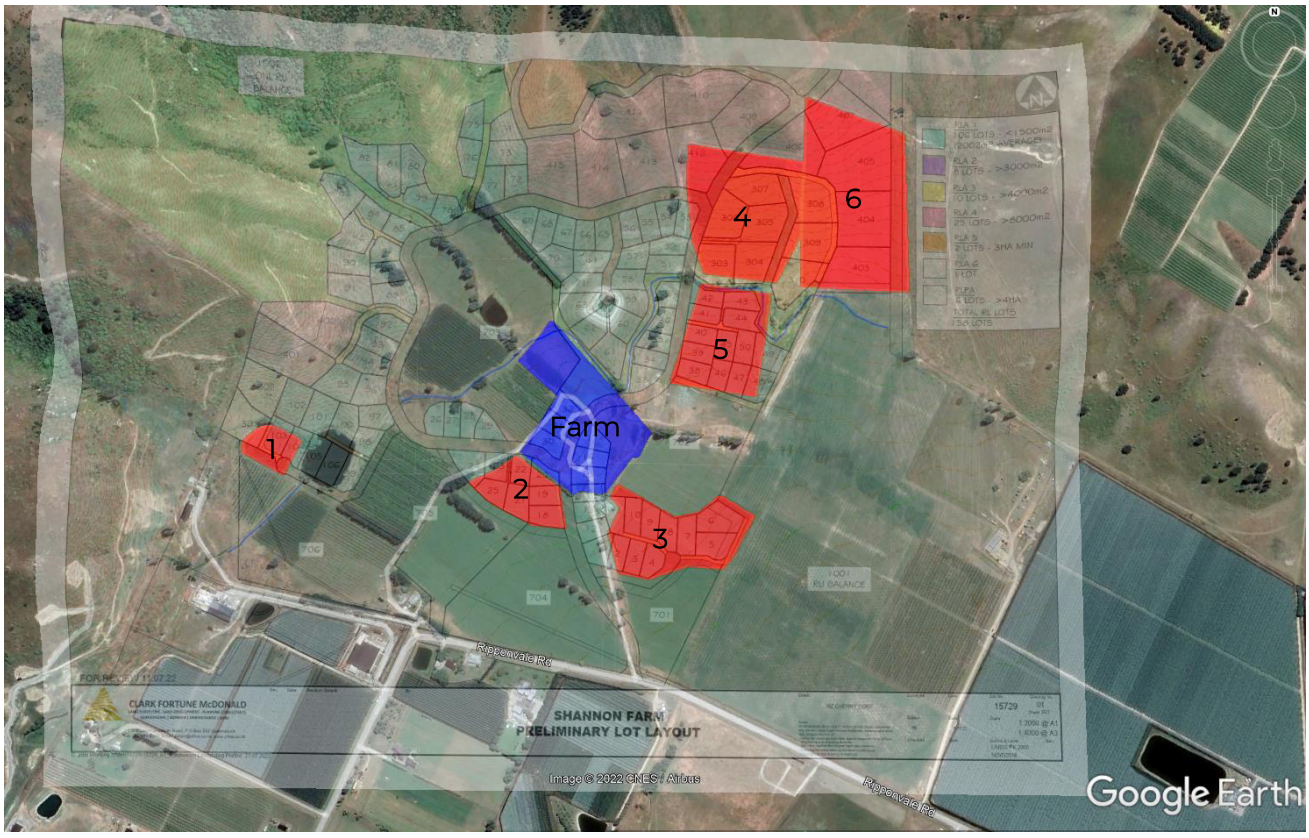


Figure 6: Investigated Site for this DSI, defined by red areas (historic orchards) and blue area (farmyard)

5 DATA QUALITY OBJECTIVES

Systematic planning is critical for successful implementation of an environmental assessment and is used to define the type, quantity and quality of data needed to inform decisions. The United States Environmental Protection Agency (US EPA) has defined a process for establishing data quality objectives (DQOs), which has been referenced in the MfE CLMG No. 5 (Ministry for the Environment , 2021).

DQOs ensure that:

- The study objectives are set;
- Appropriate types of data are collected (based on contemporary land use and chemicals of concern);
- The Tolerance Levels are set for potential decision-making errors.

The DQO process is a seven-step iterative planning approach. The outputs of the DQO process are qualitative and quantitative statements which are developed in the first six steps. They define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose and specify the performance requirements for the quality of information to be obtained from the data. The output from the first six steps is then used in the seventh step to develop the data collection design that meets all performance criteria and other design requirements and constraint. The DQO process adopted for the DSI is outlined in Appendix C.

6 DETAILED SITE INVESTIGATION

6.1 SAMPLING DESIGN AND FIELDWORK

The MfE CLMG No. 5 outlines the three types of sampling patterns commonly used for site investigations, comprising judgemental, systematic and stratified sampling (Ministry for the Environment , 2021).

To achieve the objectives of the DSI, the Investigated Site was split up into two categories: the orchards and the farmyard.

6.1.1 ORCHARDS

The intrusive investigation works were undertaken at the site on 5-6 and 8 September 2022 by WSP Engineers.

A systematic grid-based sampling pattern was adopted across the different orchards. Depending on the size of the area, a different number of samples was taken.

Soil samples were collected from near-surface soils (0.10-0.15m bgl) with a hand trowel and placed in laboratory supplied jars, leaving minimal headspace, and closed with Teflon-coated lids. Soils were logged concurrently.

Samples were stored in a sealed cooler and transported to the laboratory under chain of custody. Dedicated disposable nitrile gloves were worn for each sampling episode and all non-dedicated equipment was decontaminated between sampling locations to minimise the potential of cross-contamination.

Selected soil samples were submitted to Analytica Laboratories (Analytica) for analysis of determined contaminants of concern. Analytica are accredited by International Accreditation New Zealand (IANZ) for the analytical suites requested.

Generally, samples were composited on a 3:1 ratio (labelled “A”, “B”, “C”) and tested for heavy metals and OCPs. A total of 7 QA samples were taken, that were tested against individually collected samples (labelled “D”).

A summary of the samples taken is presented in Table 6 and sample location plans are attached in Appendix D.

Table 6: Summary of soil samples collected from orchards

ZONE AND APPROX AREA	SAMPLE NAMES	NUMBER OF SAMPLES TAKEN	SAMPLING DATE	DEPTH (M BGL)	SCHEDULED ANALYSIS	GEOLOGY
Orchard 1 – 0.4ha	S1.1 – S1.5	15	08/09/2022	0.10 - 0.15	Generally composited 3:1 ratio and analysed for HM & OCPs	TOPSOIL comprising sandy SILT with some gravel; brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded.
Orchard 2 – 0.9ha	S2.1 – S2.5	17 + 1 QA	05/09/2022	0.10 – 0.15		
Orchard 3 – 2.1ha	S3.1 – S3.9	28 + 1 QA	05/09/2022	0.10 – 0.15		
Orchard 4 – 3.4ha	S4.1 – S4.14	44 + 2 QA	05/09/2022	0.10 – 0.15		
Orchard 5 – 2.1ha	S5.1 – S5.9	28 + 1 QA	06/09/2022	0.10 – 0.15		
Orchard 6 – 4.6ha	S6.1 – S6.18	56 + 2 QA	06/09/2022	0.10 – 0.15		

6.1.2 FARMYARD

The intrusive investigation works were undertaken at the site on 6-8 September 2022 by a WSP Environmental Engineer.

Soil samples were collected from surface soils (0.05 – 0.20 m bgl) and deeper soils (0.20 – 0.40 m bgl) with a hand trowel or from test pits using an excavator (0.30 – 1.00 m bgl).

Based on the findings of the PSI and on-site observations a judgemental sampling pattern was adopted across the farmyard.

Soil conditions were logged, and soil samples were placed in laboratory supplied jars, leaving minimal headspace, and closed with Teflon-coated lids.

Samples were stored in a sealed cooler and transported to the laboratory under chain of custody. Dedicated disposable nitrile gloves were worn for each sampling episode and all non-dedicated equipment was decontaminated between sampling locations to minimise the potential of cross-contamination.

Selected soil samples were submitted to Analytica Laboratories (Analytica) for analysis of determined contaminants of concern. Soil samples were selected for analysis based on a combination of sample depth and filed observations. Analytica are accredited by International Accreditation New Zealand (IANZ) for the analytical suites requested.

Samples were analysed for contaminants based on historical HAIL activities and on-site observations made during the investigations. These generally comprised a suite of heavy metals (HM); organochlorine pesticides (OCPs); total petroleum hydrocarbons (TPHs); benzene, toluene, ethylene and xylene (BTEX); polycyclic aromatic hydrocarbons (PAHs); and/or asbestos. Specific sampling details for locations are shown in Table 7.

A summary of the samples taken from the farmyard is given in Table 7 below and a sample location plan is available in Appendix D, along with detailed test pit logs for test pits excavated to a depth greater than 0.50m bgl. Shallow test pits generally comprised the geology described in Table 7.

Table 7: Summary of soil samples collected from the farmyard

ZONE AND APPROX AREA	SAMPLE NAMES	NUMBER OF SAMPLES	SAMPLING DATE	DEPTH (M BGL)	SCHEDULED ANALYSIS	GENERAL GEOLOGY (DETAILED TESTPIT LOGS IN APPENDIX D)
Area A – Sheep pens	FA1 – FA12	12 + 2 QA	06/09/2022	0.05 – 0.20	All: HM & OCPs; FA6: + TPH, PAH, BTEX	TOPSOIL comprising sandy SILT with some gravel in the sheep paddocks to lots of gravel in the sheep pens; brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded. Some rootlets.
Area C – Work shed	FC1 – FC8	8	05/09/2022	0.05 – 0.40	HM; TPH; PAH; BTEX	0.05 – 0.25m bgl: MADE GROUND comprising fine silty SAND; light brown with some darker patches. Soft; dry; subangular to rounded. 0.25 – 0.40m bgl: Sandy SILT with some gravel; brown. Soft; dry to moist; moderate plasticity; Sand is fine to coarse; subangular to rounded.
Area D – Surrounding farmyard	FD1 – FD14	12 + 1 QA	08/09/2022	0.15 – 0.20	All: HM; FD2-FD3 & FD7-FD9: + OCPs FD5, FD6, FD14: + TPH, PAH, BTEX FD10 & FD13: Asbestos	Sandy SILT with some gravel; brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded. Some rootlets.
Area F – Cow pens	FF1 – FF7	7	06/09/2022	0.05 – 0.20	All: HM; FF6: + TPH, PAH, BTEX	TOPSOIL comprising sandy SILT with some gravel; brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded. Some rootlets.
Test pits	TP01-S1 – TP19-S27	30 + 2 QA	06-07/09/2022	0.05 – 1.0	All: HM; TP08-S9, TP08-S10, TP09-S11, TP09-S12: + OCPs; 22 samples: + TPH; 15 samples: + BTEX; 21 samples: + PAH	0.05 – 0.15m bgl: Sandy SILT with some gravel and traces of clay; brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded. Some rootlets. Subangular to rounded, fine to coarse schist; subangular to rounded schist cobbles. 0.15 – 1.50m bgl: Clayey SILT with some sand and gravel; brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded, fine to coarse schist; subangular to rounded schist cobbles.

7 BASIS FOR GUIDELINE VALUES

7.1 SOIL CONTAMINANT STANDARDS FOR THE PROTECTION OF HUMAN HEALTH

The MfE *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health* ('MfE (2011) Methodology') (Ministry for the Environment, 2011) sets out a risk-based derivation methodology for health-based standards to apply to soil contaminants in New Zealand under the Resource Management Act 1991 (New Zealand Government, 1991).

The MfE (2011) Methodology provides a suite of numerical criteria for priority contaminants that are legally binding as gazetted under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health ('the NESCS') (Ministry for the Environment , 2012). These numerical criteria are applied as screening criteria (Tier 1 criteria), as conservative clean-up targets, to inform on site management actions, or to trigger further investigation with a Tier 2 assessment. The MfE (2011) Methodology utilises standardised receptors and exposure parameters to calculate Soil Contaminant Standards for health ($SCSs_{(health)}$) for the following five generic land-use scenarios:

- Rural residential (guidelines for lifestyle block 0%, 10% and 25% produce scenarios);
- Residential (guidelines for 0%, 10% and 25% produce scenarios);
- High-density residential;
- Recreational;
- Commercial/industrial outdoor worker (unpaved).

With respect to assessment under the NESCS, the assessment criteria for this investigation have been based on the proposed land uses as Rural Residential and Residential.

Assessment criteria has been selected depending on the proposed size of the section. Section sizes of 4000m^2 or more have been assessed against the more conservative 25% produce consumption (Rural Residential) and smaller sections against a 10% produce consumption criteria (Residential). These criteria are detailed in Table 9.

We consider that based on the proposed use of the site, these exposure scenarios are appropriate and no further adjustment of the $SCSs_{(health)}$ as set out in the NESCS is necessary in this instance.

7.1.1 OTHER SOIL GUIDELINES

Where there is no appropriate soil contaminant standard for the contaminant, the *MfE Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values* (Ministry for the Environment , 2003) provides the following hierarchy to determine the order in which guideline values in reference documents should be used in a contaminated site assessment:

1 New Zealand documents that derive risk-based guideline values.
2 Rest-of-the-world documents that derive risk-based guideline values.
3 New Zealand documents that derive threshold values.
4 Rest-of-the-world documents that derive threshold values.

The estimated upper limit of background concentrations for trace elements (arsenic, cadmium, chromium, copper, mercury, lead, nickel and zinc) have been adopted for assessment against NESCS requirements in this report.

Table 8: Land Use Scenario

Scenario	Description
Rural / lifestyle block	Rural residential land use, including home-grown produce consumption (25 per cent). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land. Note: Consumption of eggs, milk and meat from animals raised on site is excluded. Produce consumption is limited to home-grown vegetables. Sites for which consumption of home-grown eggs, milk or meat is important will need to be evaluated on a site-specific basis.
Residential	Standard residential lot, for single dwelling sites with gardens, including home-grown produce consumption (10 per cent).
High-density residential	Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption); applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens, but not high-rise apartments.
Parks / recreational	Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Commercial / industrial outdoor worker (unpaved)	Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (ie, a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site.

7.2 DISPOSAL OPTIONS

In addition to assessing the human health risks associated with the development and end use of the site, a high-level assessment of off-site disposal options for any excess spoil generated during site redevelopment works has been conducted. Dependant on the contamination condition of the spoil, offsite disposal options range from disposal to cleanfill sites (lowest cost) through managed fill sites to licensed hazardous waste landfills (highest cost).

As disposal to a cleanfill site is likely to represent the most cost-effective off-site disposal option, the soil results have been compared to the WasteMINZ definition of 'Clean Fill' Material within the publication entitled: *Technical Guidelines for Disposal to Land* (WasteMINZ, 2018):

> *"Clean Fill Material Virgin excavated natural materials (VENM) such as clay, soil and rock that are free of:*
>
> 1 *combustible, putrescible, degradable or leachable components;*
> 2 *hazardous substances or materials (such as municipal solid waste) likely to create leachate by means of biological breakdown;*
> 3 *products or materials derived from hazardous waste treatment, stabilisation or disposal practices;*
> 4 *materials such as medical and veterinary waste, asbestos, or radioactive substances that may present a risk to human health if excavated;*
> 5 *contaminated soil and other contaminated materials; and*
> 6 *liquid waste.*
>
> *When discharged to the environment, clean fill material will not have a detectable effect relative to the background."*

As such background concentrations are considered appropriate for assessment of cleanfill criteria for soils disposal. Any soils which contain contaminant concentrations in excess of the cleanfill criteria are considered to be Controlled Fill or Managed Fill[2].

Controlled Fill is described as:

> *'Predominantly clean fill material that may also contain inert construction and demolition materials and soils from sites that may have contaminant concentrations in excess of local background concentrations, but with specified maximum total concentrations that will not restrict future land use.'*

With Managed Fill described as:

> *'Predominantly clean fill material and controlled fill material that may also contain material with contaminant concentrations in excess of controlled fill limits where site specific management controls are in place to manage discharges to the environment.'*

For assessment of possible disposal options, results have been compared against the cleanfill definition (through the use of background concentrations) and acceptance criteria for Class A and B landfills. Individual landfill facilities will have their own specific criteria for acceptance which are based around these definitions and criteria and should be consulted prior to removal should off-site disposal be considered .

[2] Technical Guidelines for Disposal to Land: WasteMINZ 2018.

8 RESULTS

8.1 SUBSURFACE CONDITIONS

Soils generally comprised brown sandy SILT with some gravel with a moderate plasticity and some rootlets. A summary of the general geology is given in Table 7 and detailed logs of the test pits deeper than 0.50m bgl can be found in Appendix D.

An area along the eastern boundary of the farmyard has been noted to comprise a multitude of overgrown waste pits, some of which were uncovered and appeared to still be in use (refer to Figure 7). Investigation of the open pits indicated that they were filled with plastic containers, scrap metal, cardboard, barbed wire, suitcases, and other miscellaneous waste materials.

No groundwater was encountered within any of the locations investigated.

It should be noted that hydrocarbon staining, and faint odours were observed in and surrounding the work shed.

8.2 ANALYTICAL RESULTS

A summary of the analytical results can be found in Appendix E with the detailed laboratory reports and chain of custody in Appendix F.

Total contaminant concentrations were assessed against appropriate human health criteria for a Rural Residential (25% produce) and Residential (10% produce) end use. The following summarises the findings:

8.2.1 ORCHARDS:

No human health exceedances were reported for heavy metals nor OCPs. Moreover, all samples were found to comprise OCP concentrations below their limit of reporting.

Several samples exceeded the predicted local background concentrations for arsenic and/or copper. Table 9 summarises these exceedances:

Table 9: Summary of contaminant concentration exceedances

AREA	NESCS CRITERIA USED	HUMAN HEALTH EXCEEDANCES	BACKGROUND EXCEEDANCES
Orchard 1	10%	None	All samples (5) for arsenic and copper.
Orchard 2	10%	None	One sample and QA for arsenic; and three samples for copper.
Orchard 3	10%	None	Four samples for arsenic.
Orchard 4	25%	None	All samples (16 + 2 QA) for copper.
Orchard 5	10%	None	None
Orchard 6	25%	None	None

8.2.2 FARMYARD

Four samples reported concentrations for lead, zinc or arsenic above relevant human health criteria for a Residential (10% produce) land use:

- Lead (Pb): Samples FA6 (447mg/kg) & TP12-S16 (288mg/kg) > 210mg/kg;
- Zinc (Zn): Sample FA11 (8380mg/kg) > 7400mg/kg;
- Arsenic (As): Sample TP09-S11 (47.8mg/kg) > 20mg/kg.

In addition, seven samples reported exceedances of Rural Residential (25% produce) land use:

- Arsenic (As): Samples FA12 and QA (17.5 & 18.2mg/kg); FD12 (17.7mg/kg); FD14 (17.5mg/kg); TP16-S24QA (18.3mg/kg) > 17mg/kg;
- Cadmium (Cd): FA11 (1.09mg/kg); TP09-S12 (2.3mg/kg); TP10-S13 (1.78mg/kg) > 0.8mg/kg.

No traces of asbestos were found in any of the samples taken.

Several samples reported contaminant concentrations above their predicted local background concentrations. As hydrocarbons are not considered naturally occurring substances, any measured concentrations above the limit of reporting are considered a background exceedance.

Table 10 summarises the human health and background exceedances. A summary of the analytical results can be found in Appendix E with the detailed laboratory reports and chain of custody in Appendix F.

Table 10: Summary of human health and background exceedances

AREA	HUMAN HEALTH EXCEEDANCE (10% OR 25%)	BACKGROUND EXCEEDANCE
A – Sheep pens	Two – Residential (10%): - Pb: FA6 - Zn: FA11 + Two – Rural Residential (25%): - As: FA12 & FA12QA - Cd: FA11	— HM: As (7+2QA), Cd (1), Cu (4), Pb (2), Hg (6 +1QA), Zn (5); — OCPs: DDT (2), Endrin (2); — TPHs (1).
C – Work shed	None	— HM: As (7), Pb (3), Hg (7), Zn (1); — TPHs (8), PAHs (6).
D – Surrounding farmyard	Two – Rural Residential (25%): - As: FD12 & FD14	— HM: As (8), Cu (2), Pb (6), Hg (5), Ni (1), Zn (4); — OCPs: DDT (3), Beta-BHC (2); — TPHs (3), PAHs (3).
F – Cow pens	None	— HM: As (5), Pb (1), Hg (1), Zn (2).
Test pits	Two – Residential (10%): - As: TP09-S11 - Pb: TP12-S16 + Three – Rural Residential (25%): - As: TP16-S24QA - Cd: TP09-S12 & TP09-S13	— HM: As (22 +2QA), Cd (3), Cu (4), Pb (4 +1QA), Hg (8 +1QA), Zn (8 +1QA); — OCPs: DDT (1), Beta-BHC (2), Endrin (2); — TPHs (6), PAHs (4).

9 QUALITY ASSESSMENT AND QUALITY CONTROL

The field and laboratory quality assurance and quality control (QA/QC) programme was based on data quality indicators (DQIs) chosen to assess the suitability of the dataset. These are discussed in the following sections.

9.1 FIELD QUALITY PROGRAMME

Table 14 summarises the field quality programme for the DSI.

Table 11: Field Quality Programme

Environmental consultant	The environmental consultant maintains Quality Assurance Systems certified to AS/NZS ISO 9001:2000. Qualified and experienced personnel with at least 5 years' experience completed the field works.
Procedures	All work was conducted in accordance with relevant statutory health, safety and environmental (HSE) sampling guidelines, as well as standard company HSE and environmental field procedures. Standard field sampling sheets were used. Details recorded included WSP staff and contractors present, time on/off-site, weather conditions, calibration records and other observations relevant to the works.
Sampling	Collection of samples was undertaken by appropriately qualified and experienced personnel following WSP standard field procedures which are based on industry accepted standard practice. Chain of custody was used to ensure the integrity of samples from collection to receipt by the laboratory.
Equipment decontamination	Undertaken after each sampling episode where equipment used was not dedicated. Field sampling procedures conformed to WSP QA/QC protocols to prevent cross contamination, preserve sample integrity, and allow for collection of a suitable data set from which to make technically sound and justifiable decisions with data of satisfactory usability.
Transportation	Samples were stored in coolers on-site and during transport by the field scientist to the laboratory. Chain of custody forms were completed on-site and sent with the samples. Chain of custody forms are presented with laboratory reports in Appendix F, and include the sampler's name, date of sampling, sample matrix, sample containers and preservation used, and analysis requested. The laboratory confirmed receipt of the samples and specified the condition on delivery and the scheduled analyses. Laboratory sample receipt documentation indicated that appropriate holding times were met for the primary laboratory and intra-laboratory duplicates.
Reporting	Report generally complies with the MfE CLMG No. 1 (Ministry for the Environment, Revised 2021).

9.2 LABORATORY QUALITY PROGRAMME

Table 12 summarises the laboratory quality program for the DSI.

Table 12: Laboratory Quality Programme

Holding times	Samples were transported to the primary laboratory, and all primary samples were extracted and analysed within the holding times for the analyses requested.
Methods	Analysis was carried out by laboratories with IANZ certification for the required analyses. Several laboratory QA analyses were carried out. Methods used by the laboratories were consistent with MfE CLMG No. 5 (Ministry for the Environment , 2021).
Reporting Limits	Detection limits were sufficient to enable comparison against the appropriate guidelines

10 QA/QC DATA EVALUATION

10.1 CONSISTENCY

Consistent and repeatable sampling techniques and methods were utilised. The same samplers and methodology were used for all sampling locations. The sampling was in general accordance with the sampling and analysis procedures and as per standard industry procedures.

Each sample was analysed using identical methods for each analyte and laboratory practical quantitation limits (PQLs) were consistent over each laboratory batch.

From the orchards, samples S2.3C, S3.6D, S4.3D, S4.9D, S5.6D, S6.4D and S6.13D were taken in duplicate for quality assurance purposes and reported acceptable concentration differences (RPD <20%). Laboratory duplicates taken, showed an RPD <10%.

From the farmyard area, samples FA7, FA12, FD11, TP13-S19 and TP16-S24 were taken in field duplicate. RPD values were acceptable, below 35%, except for FA12 DDT concentrations with a RPD value of 85%. This value is considered to be an anomaly and is not considered to be of concern, especially as the DDT concentrations reported are marginally elevated compared to the limit of reporting. Laboratory QA samples reported RPD values <50%.

10.2 COMPLETENESS

All critical samples were analysed for the contaminants of concern identified at the site. Appropriate methods and PQLs were adopted for the investigation. All sample documentation was completed appropriately and sample holding times were complied with.

10.3 SUMMARY

WSP considers that the sample collection, documentation, handling, storage and transportation procedures utilised are of an acceptable standard and the analytical results provided by the laboratories are deemed reliable and complete, therefore the data are considered fit for purpose.

It is considered that the QA/QC procedures and results were acceptable and that the conclusions of the report have not been significantly affected by the sampling or analytical procedures.

11 DISCUSSION AND SITE CHARACTERISTICS

11.1 ANALYTICAL RESULTS

11.1.1 HUMAN HEALTH CRITERIA

11.1.1.1 ORCHARDS

No human health exceedances were reported for any of the samples analysed. As such, all sample locations are considered to have contaminant concentrations below soil guideline values for both 10% and 25% Residential end use under the NESCS Regulations (2011) (Ministry for the Environment , 2012).

11.1.1.2 FARMYARD

Residential (10% Produce):

Four samples reported contaminant concentrations above NES-CS Residential (10% produce) human health criteria: FA6 and TP12-S16 for lead; FA11 for zinc; and TP09-S11 for arsenic (Ministry for the Environment , 2012).

It is considered likely that the arsenic and zinc exceedances originated from a former sheep dip or footbath due to observational evidence. As the full extent of the contamination is unclear, further delineation will be necessary but can be undertaken concurrent with remediation.

As test pit TP12 was dug in the vicinity of a former underground petrol tank, this may be the source of the lead exceedance. Only the surface sample (0.20m bgl) contained the elevated contaminant concentrations and sample TP12-S17, taken at 0.50m bgl did not. As such, remediation is recommended up to a depth of approximately 0.50m bgl.

Furthermore, sample FA6 was taken in one of the sheep pens, beneath an iron sheet held up by oil drums. As the full extent of the contamination is unclear, further delineation is recommended.

As relevant human health criteria have been exceeded in these areas, they should be remediated prior to residential development to eliminate possible human health risks.

Rural Residential (25% Produce):

Several samples were found to exceed the more conservative soil guideline values for a Rural Residential (25% produce) end use for areas where larger section sizes are proposed.

The arsenic and cadmium exceedances that were found in or near the former sheep dip or footbath. Samples FA11, FA12, TP09-S12 were located near samples which exhibited Residential (10% produce) exceedances. As such, these will require remediation regardless of end use designation.

Further elevations were found for arsenic and cadmium surrounding the farmyard. Taking the proposed development plans into account, these locations are earmarked for lots <1500m^2. As such, the Residential (10% produce) soil guideline values are deemed appropriate for these locations and as such do not exceed relevant human health criteria.

However, soils from these areas cannot be used in Rural Residential lots and if development plans were to change, further investigation might be needed.

Although not exceeding human health criteria, the PAH and TPH results showed evidence of hydrocarbons present in the samples across the farmyard. Most of the hydrocarbon concentrations were not excessive and did not exceed the Benzo(a)pyrene Toxic equivalency factor limit of reporting (BaP TEQ LOR), with the exception of the following areas:

- Area C – Work shed: Heavy machinery was stored here; and hydrocarbon staining, and odours were observed.
- Samples FD5 and FD6: Outside shed, slightly elevated.
- Test pit 12: Location of former underground petrol tank.
- Test pit 5: Dug adjacent an oil drum along the eastern boundary between the farm area and the sheep paddocks.

A site plan indicating the delineated areas with human health exceedances where remediation is recommended is given in Figure 7 below.

11.1.2 ENVIRONMENTAL DISCHARGE CRITERIA

The heavy metal concentrations were assessed against predicted local background concentrations to determine applicability of the NES-CS and determine whether they meet cleanfill criteria (Landcare Research Limited , 2016).

As hydrocarbon compounds are generally not considered to be naturally occurring compounds (and in this instance are associated with possible HAIL activities), their presence above their limit of reporting is considered to be above background.

Tables 9 and 10 summarise the analytical results exceeding relevant predicted local background concentrations.

As the majority of the samples sourced from the farmyard and Orchards 1-4 reported heavy metal concentrations above local background concentrations, the NES-CS does apply to the site and appropriate consent should be sought.

11.2 WASTE DISPOSAL

The results were compared against predicted local background concentrations, to determine cleanfill criteria, and landfill acceptance criteria to assess appropriate disposal options, refer to Tables E1-E4 in Appendix E. A summary of the appropriate waste disposal measures can be found in Tables 13 and 14, and a proposed site remediation plan is given in Figure 7 below.

Orchards

Orchards 5 and 6 can be considered as cleanfill soils, due to contaminant concentrations found below predicted background concentrations.

The remaining (historic) orchards reported concentrations exceeding background concentrations and thus cannot be considered as cleanfill. These soils can be re-used on site, and this is considered to be the most sustainable and cost-effective action.

However, if offsite soil disposal is considered, elevated concentrations of arsenic and/or copper exceeding Class B Landfill acceptance criteria (Ministry for the Environment , 2004) indicate that further TCLP testing to assess the leaching potential of specific contaminants may be needed for landfill acceptance confirmation.

Farmyard

The majority of the farmyard site comprised contaminant concentrations above predicted local background concentrations. As such, soils removed from the farmyard site cannot be considered as cleanfill.

Two areas, the sheep dip and underground petrol tank, were found to exceed relevant human health criteria. As such, these areas, indicated on Figure 7 below (red), should be appropriately remediated. Further TCLP testing to assess the leaching potential of trace elements will be required prior to disposal to landfill due to levels of lead and/or zinc exceeding Class A Landfill acceptance criteria.

For the remaining farmyard area, soils can generally be re-used on site and do not need to be disposed of. This is considered to be the most sustainable and cost-effective action.

It should however be noted that soils from the yellow areas indicated on Figure 7 can only be re-used within the farmyard area earmarked for a Residential (10% produce) end use with lot sizes <1500m^2 or recreational areas. This, as contaminant concentrations were found above soil guideline values for a more sensitive end use (Rural Residential). More detailed remediation plans should be scoped based on development plans within a Remediation Action Plan.

It is understood that off-site soil disposal is not considered as part of the development works at this stage in time.

If offsite soil disposal is considered, the presence of elevated concentrations of arsenic, chromium, copper, lead, nickel and/or zinc exceeding Class B Landfill acceptance criteria (Ministry for the Environment , 2004) indicate that further TCLP testing should be completed to assess the leaching potential of specific contaminants prior to disposal to landfill for the areas indicated in yellow on Figure 7.

Anecdotal evidence and on-site observations indicate that an area with multiple, now overgrown, waste pits have been noted. Due to the size of the area and number of suggested waste pits, it is recommended that this area is further assessed and remediated during preparation of the ground

for development. Disposal of materials from these areas may be considered domestic or commercial refuse and should be considered on a specific basis during remedial works.

Table 13: Soil disposal categories for the Orchards

ORCHARD	CLEANFILL	CLASS A	CLASS B	REUSE ON SITE
Orchard 1	No (copper & arsenic)	No, TCLP required	No	Yes
Orchard 2	No (copper & arsenic)	No, TCLP required	No	Yes
Orchard 3	No (arsenic)	Yes	No; TCLP required	Yes
Orchard 4	No (copper)	No, TCLP required	No	Yes
Orchard 5	Yes	Yes	No; TCLP required	Yes
Orchard 6	Yes	Yes	No; TCLP required	Yes

Table 14: Soil disposal categories for the Farmyard

AREA	CLEANFILL	CLASS A	CLASS B	REUSE ON SITE
Area A – Sheep dip	No	No, TCLP required	No	No
Area A – Sheep pens	No	No, TCLP required	No	Yes – Residential (10% produce)
Area A – Sheep paddocks	No	Yes	No TCLP required	Yes - Residential (10% produce)
Area C – Work shed	No	Yes, hotspot FC3 requires TCLP	No TCLP required	Yes - Residential (10% produce)
Surrounding farm	No	Yes, surrounding packing shed & petrol tank requires TCLP	No TCLP required	Yes - Residential (10% produce)
Cow pens	No	Yes, hotspots FF4 & FF7 require TCLP	No TCLP required	Yes - Residential (10% produce)
Test pits	Generally, no	Yes, some hotspots require TCLP	No TCLP required	Yes - Residential (10% produce), except sheep dip and petrol tank (TP12)



Figure 7: Site remediation plan, with areas to be remediated (red); areas suitable for Residential (10% produce) end use (yellow); and landfill area (green). Dashed lines indicate the extent of the area is unclear.

11.3 CONSENTING REQUIREMENTS

Following a review of the preliminary site investigation information, it was concluded that it is more likely than not that an activity or industry described in the HAIL is being or has been undertaken on the Piece of Land. As such, the NESCS applies and in order to fully assess risks to human health associated with ground disturbance activities a detailed site investigation was triggered.

11.3.1 SOIL DISTURBANCE

Based on the reported soil results, contaminants of concern exceeding predicted background concentrations are present on some sections of the site.

For works on the site to be considered a Permitted Activity for disturbing soil under NESCS, the following applies:

a controls to minimise the exposure of humans to mobilised contaminants must –

- i be in place when the activity begins;
- ii be effective while the activity is done;
- iii be effective until the soil is reinstated to an erosion-resistant state;

b the soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done;

c the volume of the disturbance of the soil of the piece of land must be no more than $25m^3$ per $500m^2$

d soil must not be taken away in the course of the activity, except that, -

- i for the purpose of laboratory analysis, any amount of soil may be taken away as sample;
- ii for all other purposes combined, a maximum of $5m^3$ per $500m^2$ of soil may be taken away per year;

e soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind;

f the duration of the activity must be no longer than 2 months;

g the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised;

For any soil disturbance in excess of permitted activity volumes works will fall into a Restricted Discretionary Activity as soil contaminant levels within the piece of land exceed the predicted background concentrations and the applicable standard. Matters over which the discretion is limited may include (but are not limited to):

- Remediation or management methods;
- Adequacy of a site management plan or site validation report;
- Duration of the resource consent.

12 CONCLUSIONS AND RECOMMENDATIONS

A Detailed Site Investigation was carried out at the site on 5th – 8th September 2022 in order to determine the chemical characteristics of near surface soils and deeper soils where HAIL activities were more likely than not considered to have occurred. An assessment of the risks to human health associated with potential contaminants of concern was required in order to satisfy the NESCS and local council requirements for residential subdivision and development.

12.1 NES-CS ASSESSMENT

Soil analysis results from the investigation works indicate that concentrations of contaminants of concern exceed the predicted local background concentrations for heavy metals, OCPs and hydrocarbons on the site. As such, the NES-CS does apply to the site.

Considering the proposed development plans, the works would involve significant soil disturbance. For any soil disturbance in excess of permitted activity volumes of the site, works can be considered a Restricted Discretionary Activity under the NES-CS as contaminants of concern exceed their applicable standard for a residential end use.

Conditions associated with a restricted discretionary activity are likely to include, but not be limited to the need for either a Remediation Action Plan (RAP) with subsequent validation or Ongoing Site Management Plan (OSMP).

All soil disturbance works within the delineated Piece(s) of Land (PoL) will require as a minimum a Site Management Plan (SMP), which includes protocols for unexpected contamination discovery, and a Remediation Action Plan (RAP) if the PoL is to be disturbed in excess of permitted activity volumes.

12.2 SAFETY IN DESIGN

Safety in Design (SID) considers the safety of those who are involved in the construction of, maintenance of, cleaning of, repair of and demolition of a structure, or anything that has been constructed.

As part of the assessment of this site we have taken reasonably practicable steps to assess the potential for hazards associated with potentially contaminated land to exist. We have, through the development of a CSM and selected site sampling, assessed the qualitative level of risk posed to human health and have made various recommendations to address the plausible risks.

Where identified, this report indicates hazards and risks to health and safety associated with contaminated land which must be communicated to the design team, the client and associated stakeholders as required by the Health and Safety at Work Act 2015. Risks include potential exposure to contaminated soils through ingestion or dermal contact.

12.3 RECOMMENDATIONS

Based on the findings of this investigation, WSP recommends that:

- Any soil disturbance within the PoL should be undertaken in accordance with a Remediation Action Plan (RAP) and Contaminated Site Management Plan (CSMP), prepared by a SQEP and including appropriate processes and procedures to mitigate the risk soil exposure presents to site personnel. The CSMP would be in addition to standard site management procedures and be incorporated into the general site management plan as an additional form of control.
- The RAP is developed to determine the best approach to manage earthworks on the site with respect to contaminated soils. The RAP and CMMP can be combined.
- An appropriate Accidental Contaminant Discovery Procedure should be included within any site management plan in case additional unexpected discoveries occur within the fill materials;
- Materials are generally considered suitable for re-use on-site, however a geotechnical specialist should be consulted to determine their suitability for foundation and development purposes;
- Should off-site disposal be considered, it is recommended that surface soils from areas highlighted yellow in Figure 7 are stockpiled on site and composite TCLP analyses are scheduled for heavy metals prior to offsite disposal by a contaminated land specialist. Alternatively, should site constraints mean that stockpiling is unviable this may be carried out at the landfill (following liaison). This may incur additional costs from the landfill operator
- Should any ground conditions be encountered across the site which is not anticipated from the findings of this report a Suitably Qualified and Experienced Practitioner (SQEP) should be consulted in order to reassess the risks to human health;
- This DSI report is submitted to the consenting authority; and
- This DSI report is submitted to the regional authority to facilitate updating the HAIL database.

13 SQEP CERTIFICATION OF REPORT

National Environmental Standard for assessing and managing contaminants in soil to protect human health

DETAILED SITE INVESTIGATION CERTIFYING STATEMENT

I Lisa Bond of WSP New Zealand Ltd certify that:

1 this detailed site investigation meets the requirements of the Resource Management (National Environmental Standard for assessing and managing contaminants in soil to protect human health) Regulations 2011 because it has been:

   a done by a suitably qualified and experienced practitioner, and

   b done in accordance with the current edition of *Contaminated Land Management Guidelines No 5 – Site Investigation and Management of Soils*; and

   c reported on in accordance with the current edition of *Contaminated land management guidelines No 1 – Reporting on contaminated sites in New Zealand,* and

   d the report is certified by a suitably qualified and experienced practitioner.

2 This detailed site investigation concludes that:

   a [For activities under R10 of the NESCS] does exceed the applicable standard in Regulation 7 of the Resource Management (National Environmental Standard for assessing and managing contaminants in soil to protect human health) Regulations 2011

Evidence of the qualifications and experience of the suitably qualified and experienced practitioner who have done this investigation and certified this report are available on request from WSP New Zealand Ltd.

Signed and dated:  Bond, Lisa (allab0)
2022.10.30
10:33:19 +13'00'

14 LIMITATIONS

This report ('Report') has been prepared by WSP New Zealand Limited ('WSP') exclusively for the Central Otago District Council ('Client') in accordance with the NZIA Agreement for Sub-Consultant Services dated 7 December 2021 ('Agreement').

Permitted Purpose

This Report has been prepared expressly for the purpose of assessing the risks to human health associated with the proposed redevelopment of the community hall and appropriate disposal options of the soils ('Permitted Purpose'). WSP accepts no liability whatsoever for the use of the Report, in whole or in part, for any purpose other than the Permitted Purpose. Unless expressly stated otherwise, this Report has been prepared without regard to any special interest of any party other than the Client.

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The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Agreement and the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report and/or otherwise communicated to the Client. Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and/or recommendations in the Report ('Conclusions') are based in whole or in part on information provided by the Client and other parties ('Information'). The Information has not been and have not been verified by WSP and WSP accepts no liability for the reliability, adequacy, accuracy and completeness of the Information.

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Appendix A

Proposed Development Plans

PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
New Zealand Cherry Corps Ltd	Shannon Farm 112-144 Ripponvale Rd, Cromwell	6-XZ738.00

Photo No.	Date
1	05/09/2022

Description

The site investigation took place from 5-8 September 2022 by a WSP Environmental Scientist.

Access to the site was via a gravel driveway off Ripponvale Rd.



Photo No.	Date
2	05/09/2022

Description

Soil samples were collected from (historic) orchards and the farmyard. Figure 1 shows an overview of (historic) Orchard 3, currently in use as a sheep paddock.



	PHOTOGRAPHIC LOG

Client Name	**Site Location**	**Project No.**
New Zealand Cherry Corps Ltd	Shannon Farm 112-144 Ripponvale Rd, Cromwell	6-XZ738.00

Photo No.	**Date**
3	05/09/2022

Description

Samples were collected with a hand trowel and placed into laboratory supplied glass jars with minimal headspace.

Equipment was decontaminated between sampling locations to prevent cross-contamination. Soils were logged and sample details were noted.



Photo No.	**Date**
4	05/09/2022

Description

Overview of (historic) Orchard 2, currently in use as a sheep paddock.



	PHOTOGRAPHIC LOG	
Client Name New Zealand Cherry Corps Ltd	**Site Location** Shannon Farm 112-144 Ripponvale Rd, Cromwell	**Project No.** 6-XZ738.00

Photo No.	Date
5	05/09/2022

Description

Sample taken from Orchard 4, still currently in use as an orchard.

Samples were taken from near-surface soils, composited on a 3:1 ratio and tested for a suite of heavy metals and OCPs.



Photo No.	Date
6	05/09/2022

Description

Overview of Orchard 4, looking south.

Orchards 4-6 are located in the northern end of the site on a higher terrace. The farmyard can be seen in the background.



PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
New Zealand Cherry Corps Ltd	Shannon Farm 112-144 Ripponvale Rd, Cromwell	6-XZ738.00

Photo No.	Date
7	06/09/2022

Description

Sheep pens were seen in the northern end of the farmyard.



Photo No.	Date
8	06/09/2022

Description

Sample FA6 was taken underneath an iron sheet held up by oil barrels. Located in one of the southernmost sheep pens.



PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
New Zealand Cherry Corps Ltd	Shannon Farm 112-144 Ripponvale Rd, Cromwell	6-XZ738.00

Photo No.	Date
9	06/09/2022

Description

Overview of the sheep paddocks adjacent the sheep pens. Looking east towards Cromwell township.

A creek runs along the eastern boundary of the sheep paddocks, south towards Ripponvale Rd.



Photo No.	Date
10	06/09/2022

Description

A cow stable was located adjacent several fenced cow pens and paddocks. Two calves were currently inhabiting the stable.

Some miscellaneous items were noted in the paddocks, including oil drums, fertilizer barrels and a battery.



PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
New Zealand Cherry Corps Ltd	Shannon Farm 112-144 Ripponvale Rd, Cromwell	6-XZ738.00

Photo No.	Date
11	06/09/2022

Description

A work shed with machinery was located in the southern end of the farmyard.

Several oil drums and canisters were seen. Hydrocarbon staining and faint odours were noted.



Photo No.	Date
12	06/09/2022

Description

Overview of (historic) Orchard 6, looking south.

Orchard 4-6 were located in the northern end of the site on an elevated terrace.



	PHOTOGRAPHIC LOG	
Client Name New Zealand Cherry Corps Ltd	**Site Location** Shannon Farm 112-144 Ripponvale Rd, Cromwell	**Project No.** 6-XZ738.00

Photo No.	**Date**
13	06/09/2022

Description

Overview of (historic) Orchard 5, looking south.

Orchard 4-6 were located in the northern end of the site on an elevated terrace.



Photo No.	**Date**
14	07/09/2022

Description

Location of testpits TP02 and TP03, adjacent an exposed waste pit.



	PHOTOGRAPHIC LOG

Client Name	**Site Location**	**Project No.**
New Zealand Cherry Corps Ltd	Shannon Farm 112-144 Ripponvale Rd, Cromwell	6-XZ738.00

Photo No.	**Date**
15	07/09/2022

Description

Location of testpit TP05, along the eastern boundary of the farmyard, adjacent two oil barrels.



Photo No.	**Date**
16	07/09/2022

Description

Location of testpit TP07. Indicated to be the location of a former above ground diesel tank. A soil scrape was taken to cover a larger area.



	PHOTOGRAPHIC LOG	
Client Name New Zealand Cherry Corps Ltd	**Site Location** Shannon Farm 112-144 Ripponvale Rd, Cromwell	**Project No.** 6-XZ738.00

Photo No.	Date
17	07/09/2022

Description

Location of testpits TP08 and TP09. Indicated to be the location of a former waste pit. Concrete blocks were seen leading towards the sheep pens.



Photo No.	Date
18	07/09/2022

Description

Testpit TP09 was located in between the sheep pens and the creek. A discoloured grass pathway was noted leading from the concrete blocks to the creek.



PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
New Zealand Cherry Corps Ltd	Shannon Farm 112-144 Ripponvale Rd, Cromwell	6-XZ738.00

Photo No.	Date
19	07/09/2022

Description

A large storage area of tyres and oil drums was noted west of the farmyard.



Photo No.	Date
20	07/09/2022

Description

An above ground petrol tank was noted in the western part of the farmyard. Testpit TP16 was dug here and sample FD14 was taken underneath the tank.



PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
New Zealand Cherry Corps Ltd	Shannon Farm 112-144 Ripponvale Rd, Cromwell	6-XZ738.00

Photo No.	Date
21	08/09/2022

Description

Orchard 1 is located in the south-western part of the site. A dam is seen east of the orchard with run-off flowing towards the dam.



Photo No.	Date
22	08/09/2022

Description

Sample FD5 was taken in front of a work shed in the center of the farmyard.



Appendix B

Site Photographs

1002
ONL RU
BALANCE

RLA 1
106 LOTS - <1500m2
(2002m2 AVERAGE)

RLA 2
8 LOTS - >3000m2

RLA 3
10 LOTS - >4000m2

RLA 4
25 LOTS - >8000m2

RLA 5
2 LOTS - 3HA MIN

RLA 6
1 LOT

RLPA
6 LOTS - >4HA

TOTAL RL LOTS
158 LOTS

703
702
705
706
704
701
1001
RU BALANCE

FOR REVIEW 11.07.22

CLARK FORTUNE McDONALD
LAND SURVEYORS - LAND DEVELOPMENT - PLANNING CONSULTANTS
QUEENSTOWN | DUNEDIN | CHRISTCHURCH | GORE

309 Lower Shotover Road, P.O.Box 553 Queenstown
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Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM
PRELIMINARY LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: -	Date: -	Job No.: 15729	Drawing No.: 01 Sheet 001
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Ensuring the information is the most recent issue. - Copyright on this drawing is reserved.	Drawn: RB	Date: 11.07.22	Scale: 1:2000 @ A1, 1:4000 @ A3	
	Checked: -	Date: -	Datum & Level: LINDIS PK 2000, NZVD2016	Rev.: -

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RLA 1
106 LOTS - <1500m2
(2002m2 AVERAGE)

RLA 2
8 LOTS - >3000m2

RLA 3
10 LOTS - >4000m2

RLA 4
25 LOTS - >8000m2

RLA 5
2 LOTS - 3HA MIN

RLA 6
1 LOT

RLPA
6 LOTS - >4HA

TOTAL RL LOTS
158 LOTS

423
422
424
421
425
420
419
208
207
418
204
205
206
417
201
202
203
416
600
502B
502A
501A
501B
408
410
411
409
407
406
405
412
413
414
415
75
74
76
73
77
72
82
81
80
307

1002
ONL RU
BALANCE

FOR REVIEW 11.07.22

CLARK FORTUNE McDONALD
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Rev.	Date	Revision Details	By
-	-	-	-

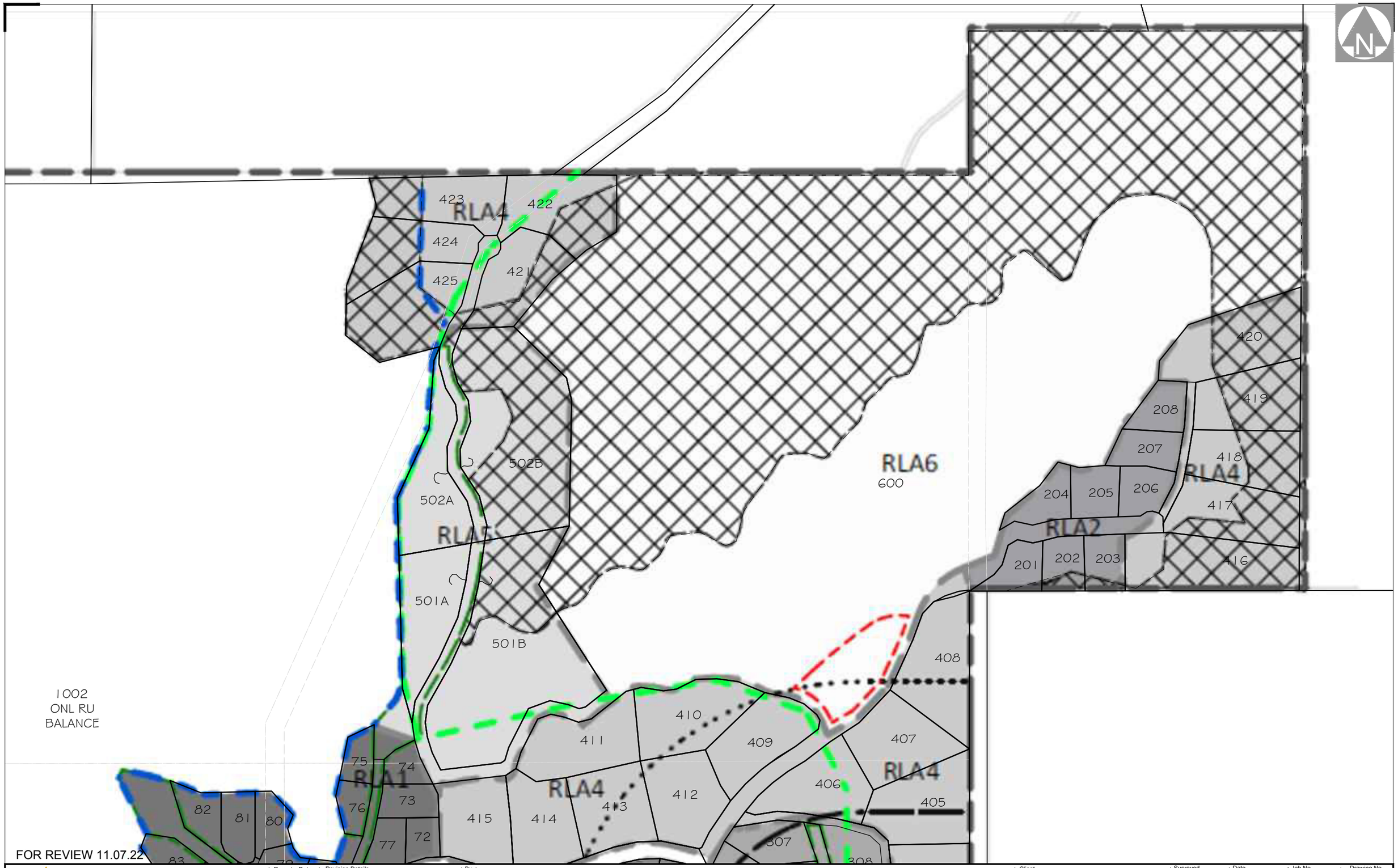
SHANNON FARM
PRELIMINARY LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: -	Date: -	Job No.: 15729	Drawing No.: 01 Sheet 002
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	Checked: -	Date: -	Datum & Level: LINDIS PK 2000, NZVD2016	Rev.: -

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1002
ONL RU
BALANCE

RLA1 RLA4 RLA3 RLA4 RLA1 RLA1 RLA3 RLA4 RLA1 RLA1 RLA1 RLA1 RLA1 RLA3 RLA1 RLA1 RLA1 RLA1 RLA1



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Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM
PRELIMINARY LOT LAYOUT
STRUCTURE PLAN OVERLAY

Client: NZ CHERRY CORP	Surveyed: -	Date: -	Job No.: 15729	Drawing No.: 01 Sheet 004
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	Checked: -	Date: -	Datum & Level: LINDIS PK 2000, NZVD2016	Rev.: -

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Appendix C

Data Quality Objectives (DQO)

Table DQO1 DQO process

STEP	DESCRIPTION	OUTCOMES
1	State the problem	Based on our understanding of the project, the following "problem" has been identified: The site has been used historically for a land use which is indicative of an increased risk of contamination. It is understood that historical activities may include an underground and above ground petrol tank, orchards, livestock dip or spray race, and landfilling, which are activities described on the MfE Hazardous Activities and Industries List (HAIL). The client has an obligation under the Health and Safety at Work Act to identify risks to workers and contractors working on the site. One such risk is the risk of exposure to contaminants and therefore in order to properly understand the level of risk and how best to manage it further, investigations of the soil contaminant conditions is required. Contaminants of concern include heavy metals, OCPs, asbestos, PAHs, TPHs and BTEX. It is understood that the proposed works include subdivision and residential development. Contaminant characteristics of the soil need to be understood in order to identify appropriate disposal locations for the soil excess. The upgrade works trigger the Resource Management (National Environmental Standard for Assessment and Management of Contaminated Soils to Protect Human Health) Regulations. Soil contaminant conditions must be understood in order to determine consenting requirements and risks to human health.
2	Identify the decisions/goal of the investigation	The decisions to be made based on the results of the investigation are as follows: — Is the site investigation design sufficiently robust to meet the requirements of Contaminated Land Management Guideline No. 5, Site Investigation and Analysis of Soil? — Have all the contaminants of concern been identified? — Are the data gaps at the site clear? — Are there contaminant risks which need to be managed during the works? — Are there contaminant risks that need to be managed on completion of the works? — What controls are needed to manage the contaminant risks during and on completion of the works? — What consents and permits are triggered by the presence of contamination? — What is the cost of managing contamination risks and what impact will this have on the overall works budget?

STEP	DESCRIPTION	OUTCOMES
3	Identify the inputs to the decision	The inputs required to make the above decisions are as follows: — Background data on site history and materials used in the construction of the site infrastructure. — Observation data including presence of odours and discolouration of the soil — Geological data — Concentrations of contaminants of concern in soil — Site assessment criteria for soil — Distribution of identified soil contamination (if any)
4	Define the study boundaries/constraints on data	The boundaries of the investigation have been identified as follows: — Spatial boundaries: the spatial boundary of the investigation area is defined as the geographical extent of the proposed works, as shown on Figure 6 and the depth of exploration. — Temporal boundaries: the date of the project inception (September 2022) to the completion of the field work under the proposed investigation.
5	Develop a decision rule *The purpose of this step is to define the parameters of interest, specify the action levels, and combine the outputs of the previous DQO steps into an 'if…then…' decision rule that defines the conditions that would cause the decision maker to choose alternatives actions.*	If concentrations exceed the adopted assessment criteria and development of the area is desired, then: — Consent will be sought — Controls will be implemented to manage contaminant risks during and on completion of works — Soil excess will be disposed of at a facility that is licenced to accept this type of waste. — Requirements for further assessment, remedial and/or management options will be considered.
6	Specify limits on decision errors	The acceptable limits on decision errors to be applied in the investigation and the manner of addressing possible decision errors have been developed based on the data quality indicators (DQIs) of precision, accuracy, representativeness, comparability and completeness and are presented in Tables DQO2 and DQO3.
7	Optimise the design for obtaining data *The purpose of this step is to identify a resource effective data collection design for generating data that satisfies the DQOs.*	This assessment has been designed considering the information obtained during the desktop review of information undertaken by WSP (2022) and presented in this report. The data collection design that is expected to satisfy the DQOs is described in detail in Section 6.1 (sampling design and fieldwork). It is based on the principles set out in CLMG No. 5 and the details of the proposed works. To ensure the design satisfies the DQOs, DQIs (for accuracy, comparability, completeness, precision and reproducibility) have been established to set acceptance limits on field methodologies and laboratory data collected. Further detail has on DQI has been provided below.

DQIs for sampling techniques and laboratory analysis of collected soil samples define the acceptable level of error required for this assessment. The adopted field methodologies and data obtained have been assessed by reference to DQIs as follows:

- Precision: a quantitative measure of the variability (or reproducibility) of data.
- Accuracy: a quantitative measure of the closeness of reported data to the true value.
- Representativeness: the confidence (expressed qualitatively) that data is representative of each media present on the site.
- Comparability: a qualitative parameter expressing the confidence with which one data set can be compared with another.
- Completeness: a measure of the amount of useable data (expressed as a percentage) from a data collection activity.

A summary of the field and laboratory DQIs for the validation assessment are provided in Tables DQO2 and DQO3.

Table DQO2 DQIs for field techniques

DQI
Precision
Standard operating procedures (SOPs) appropriate and complied with
Collection of intra-laboratory and on field duplicates
Accuracy
WSP SOPs appropriate and complied with
Representativeness
Appropriate media samples
Sample design appropriate to identify potential sources
Comparability
Same SOPs used on each occasion
Experienced sampler
Climatic conditions (temperature, rainfall, wind)
Same type of samples collected
Completeness
SOPs appropriate and complied with
All required samples collected

Table DQO3 DQIs for laboratory

DQI	**ACCEPTABLE LIMITS**
Precision	
International Accreditation New Zealand (IANZ) certified laboratory	IANZ accreditation for analyses performed

DQI	ACCEPTABLE LIMITS
Accuracy	
Analysis of laboratory matrix spikes, laboratory control samples and surrogate recoveries	70-130% inorganics/metals 60-140% organics 10-40% semi-volatile organic compounds
Representativeness	
All required samples analysed	As per Section 8
Comparability	
Sample analytical methods used (including clean-up)	As per MfE CLMG No. 5
Same units	Justify/quantify if different
Same laboratories	Justify/quantify if different
Sample PQLs	Less than nominated criteria
Completeness	
All critical samples analysed	As per Section 8
All required analytes analysed	As per Section 8
Appropriate methods and PQLs	As per MfE CLMG No. 5
Sample documentation complete	
Sample holding times complied with	

Appendix D

Sample Location Plans and Detailed Test pit Logs

Investigated Orchard Locations



Sample location plan – Orchards 1-3

Heavy metals & OCPs

Quality Assurance



Sample location plan – Orchards 4-6

Heavy metals & OCPs

Quality Assurance

N



Sample location plan – Farmyard Hand Trowel

Heavy metals & OCPs

Heavy metals & hydrocarbons

Asbestos

N



Sample location plan – Farmyard Testpits

Testpit Location

N



Test Pit No. TP01

Project:	Shannon Farm DSI	*Location:*	East of farmyard, 112 & 144 Ripponvale Rd, (
Client:	New Zealand Cherry Crops Ltd	*Coordinates:*	Not established
Contractor:	Chappy Contracting	*Ref. Grid:*	NZMG
Project No.:	6-XZ738.00	*R.L.:*	250 m

DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm)	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
0	MADE GROUND comprising clayey SILT with some sand and gravel, rare cobbles, and rootlets; brown with occasional darker mottled burnt sections. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded, fine to coarse schist with occasional pieces of burnt schist; subangular to rounded schist cobbles.				0	0 2 4 6 8 10 12 14 16 18 20			
1	END OF HOLE AT 1m - Target Depth Reached			248	1				
2				246	2				
3					3				
4					4	0 4 8 13 18 23 28 33 38 43 48 Inferred CBR (%)			

Test Methods:
Field Description of Soil and Rock, NZ Geotechnical Soc., 2005

Notes:

Date Tested: 7/09/2022
Tested by: Elizabeth Hannon
Date Reported: 7/09/2022

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Approved by

Signed by: Tara Verhulst
Designation:
Date: 12/10/2022

Test Pit No. TP05

Project:	Shannon Farm DSI	*Location:*	Eastern boundary of farmyard, 112 & 144 Rip
Client:	New Zealand Cherry Crops Ltd	*Coordinates:*	Not established
Contractor:	Chappy Contracting	*Ref. Grid:*	NZMG
Project No.:	6-XZ738.00	*R.L.:*	249 m

DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm)	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
1	Clayey SILT with some sand and gravel, rare cobbles, and rootlets; brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded, fine to coarse schist; subangular to rounded schist cobbles.					0 2 4 6 8 10 12 14 16 18 20			
	END OF HOLE AT 1m - Target Depth Reached			248	1				
2					2				
3				246	3				
4					4	0 4 8 13 18 23 28 33 38 43 48 Inferred CBR (%)			

Test Methods:

Field Description of Soil and Rock, NZ Geotechnical Soc., 2005

Notes:

Located adjacent two oil drums. Faint hydrocarbon odour.

Date Tested: 7/09/2022

Tested by: Elizabeth Hannon

Date Reported: 7/09/2022

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Signed by: Tara Verhulst

Designation:

Date: 12/10/2022

Test Pit No. TP07

Project:	Shannon Farm DSI	*Location:*	Center of site, former above ground diesel tar
Client:	New Zealand Cherry Crops Ltd	*Coordinates:*	Not established
Contractor:	Chappy Contracting	*Ref. Grid:*	NZMG
Project No.:	6-XZ738.00	*R.L.:*	252 m

DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm)	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
	TOPSOIL comprising clayey SILT with frequent rootlets and rar sand; dar brown. Soft; moist; moderate plasticity; sand is fine to coarse.					0 2 4 6 8 10 12 14 16 18 20			
	Clayey SILT with minor sand, some gravel, rare cobbles, roots, and rootlets; brown. Soft; moist; moderate plasticity; sand is fine to coarse; subbangular to rounded, fine to coarse schist with occasional pieces of burnt schist; subangular to rounded schist cobbles; and several metal waratahs.								
1	END OF HOLE AT 0.5m - Target Depth Reached			250	1				
2					2				
3					3				
4				248	4	0 4 8 13 18 23 28 33 38 43 48 Inferred CBR (%)			

Test Methods:

Field Description of Soil and Rock, NZ Geotechnical Soc., 2005

Notes:

Metal waratahs found in testpit at approximately 0.30m bgl.

Date Tested: 7/09/2022

Tested by: Elizabeth Hannon

Date Reported: 7/09/2022

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Signed by: Tara Verhulst

Designation:

Date: 12/10/2022

Test Pit No. TP08

Project:	Shannon Farm DSI	*Location:*	North of farmyard, former waste pit, 112 & 14
Client:	New Zealand Cherry Crops Ltd	*Coordinates:*	Not established
Contractor:	Chappy Contracting	*Ref. Grid:*	NZMG
Project No.:	6-XZ738.00	*R.L.:*	257 m

DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm) 0 2 4 6 8 10 12 14 16 18 20	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
1	MADE GROUND comprising clayey SILT with some sand and gravel, roots, and rootlets; mottled dark brown and yellowish brown. Soft; moist; moderate plasticity; sand is fine and coarse; angular to rounded, fine and coarse schist, metal, and plastic gravel; subangular to rounded schist cobbles. Dark brown areas are highly organic.			256	1				
	Sandy SILT with frequent gravel and cobbles, and some clay; brown. Soft; moist; moderate plasticity; sand is fine and coarse; angular to rounded, fine and coarse schist; subangular to rounded schist cobbles.								
2	END OF HOLE AT 1.5m - Target Depth Reached				2				
3				254	3				
4					4	0 4 8 13 18 23 28 33 38 43 48 Inferred CBR (%)			

Test Methods:
Field Description of Soil and Rock, NZ Geotechnical Soc., 2005

Notes:

Date Tested: 7/09/2022
Tested by: Elizabeth Hannon
Date Reported: 7/09/2022

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Signed by: Tara Verhulst
Designation:
Date: 12/10/2022

Test Pit No. TP09

Project:	Shannon Farm DSI	*Location:*	North of farmyard, concrete blocks, 112 & 144
Client:	New Zealand Cherry Crops Ltd	*Coordinates:*	Not established
Contractor:	Chappy Contracting	*Ref. Grid:*	NZMG
Project No.:	6-XZ738.00	*R.L.:*	257 m

DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm)	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
0	Clayey SILT with some sand and gravel, roots, and rootlets; mottled dark brown and yellowish brown. Soft; moist; moderate plasticity; sand is fine to coarse; angular to rounded, fine anto coarse schist gravel; subangular to rounded schist cobbles. Dark brown areas are highly organic.					0 2 4 6 8 10 12 14 16 18 20			
1	END OF HOLE AT 1m - Target Depth Reached			256	1				
2					2				
3				254	3				
4					4	0 4 8 13 18 23 28 33 38 43 48 Inferred CBR (%)			

Test Methods:
Field Description of Soil and Rock, NZ Geotechnical Soc., 2005

Notes:

Date Tested: 7/09/2022
Tested by: Elizabeth Hannon
Date Reported: 7/09/2022

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Signed by: Tara Verhulst
Designation:
Date: 12/10/2022

Test Pit No. TP10

Project:	Shannon Farm DSI	*Location:*	North-west of farmyard, 112 & 144 Ripponval
Client:	New Zealand Cherry Crops Ltd	*Coordinates:*	Not established
Contractor:	Chappy Contracting	*Ref. Grid:*	NZMG
Project No.:	6-XZ738.00	*R.L.:*	258 m

DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm)	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
0	Clayey SILT with some sand and gravel, rare cobbles, and rootlets; dark brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded, fine to coarse schist; subangular to rounded schist cobbles.					0 2 4 6 8 10 12 14 16 18 20			
	Clayey SILT with some sand and gravel, rare cobbles, and rootlets; dark brownish black. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded, fine to coarse schist; subangular to rounded schist cobbles.								
1	END OF HOLE AT 1m - Target Depth Reached			256	2				
2				254	4				
3									
4						0 4 8 13 18 23 28 33 38 43 48 Inferred CBR (%)			

Test Methods:
Field Description of Soil and Rock, NZ Geotechnical Soc., 2005

Notes:

Date Tested: 7/09/2022
Tested by: Elizabeth Hannon
Date Reported: 7/09/2022

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Signed by: Tara Verhulst
Designation:
Date: 12/10/2022

Test Pit No. TP12

Project:	Shannon Farm DSI	*Location:*	North of farmyard, former underground petrol
Client:	New Zealand Cherry Crops Ltd	*Coordinates:*	Not established
Contractor:	Chappy Contracting	*Ref. Grid:*	NZMG
Project No.:	6-XZ738.00	*R.L.:*	257 m

DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm)	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
	Clayey SILT with some sand and gravel, rare cobbles; dark brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded, fine to coarse schist; subangular to rounded schist cobbles.					0 2 4 6 8 10 12 14 16 18 20			
1	END OF HOLE AT 0.5m - Target Depth Reached			256	1				
2					2				
3				254	3				
4					4	0 4 8 13 18 23 28 33 38 43 48 Inferred CBR (%)			

Test Methods:

Field Description of Soil and Rock, NZ Geotechnical Soc., 2005

Notes:

Faint hydrocarbon stains and odour.

Date Tested: 7/09/2022

Tested by: Tara Verhulst

Date Reported: 7/09/2022

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Signed by: Tara Verhulst

Designation:

Date: 12/10/2022

Test Pit No. TP13

Project:	Shannon Farm DSI	*Location:*	West of farmyard, along row of trees, 112 & 1
Client:	New Zealand Cherry Crops Ltd	*Coordinates:*	Not established
Contractor:	Chappy Contracting	*Ref. Grid:*	NZMG
Project No.:	6-XZ738.00	*R.L.:*	258 m

DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm)	SOIL TESTS: SHEAR STRENGTH (kPa)	SOIL TESTS: OTHER TESTS	SOIL TESTS: SAMPLES
	Clayey SILT with some sand and gravel, rare cobbles, and rootlets; dark brown. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded, fine to coarse schist; subangular to rounded schist cobbles.					0 2 4 6 8 10 12 14 16 18 20			
1	END OF HOLE AT 0.5m - Target Depth Reached			256	1				
2				254	2				
3					3				
4					4	0 4 8 13 18 23 28 33 38 43 48 Inferred CBR (%)			

Test Methods:

Field Description of Soil and Rock, NZ Geotechnical Soc., 2005

Notes:

Several testpits dug along row of trees. Due to similar geology these have been grouped under TP13.

Date Tested: 7/09/2022

Tested by: Tara Verhulst

Date Reported: 7/09/2022

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Signed by: Tara Verhulst

Designation:

Date: 12/10/2022

Test Pit No. TP18

Project:	Shannon Farm DSI	*Location:*	Work shed south of farmyard, 112 & 144 Ripp
Client:	New Zealand Cherry Crops Ltd	*Coordinates:*	Not established
Contractor:	Chappy Contracting	*Ref. Grid:*	NZMG
Project No.:	6-XZ738.00	*R.L.:*	248 m

DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm)	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
	Clayey SILT with some sand and gravel, rare cobbles; dark brownish black. Soft; moist; moderate plasticity; sand is fine to coarse; subangular to rounded, fine to coarse schist; subangular to rounded schist cobbles.					0 2 4 6 8 10 12 14 16 18 20			
1	END OF HOLE AT 0.5m - Target Depth Reached				1				
2				246	2				
3					3				
4				244	4				
						0 4 8 13 18 23 28 33 38 43 48 Inferred CBR (%)			

Test Methods:

Field Description of Soil and Rock, NZ Geotechnical Soc., 2005

Notes:

Noticeable hydrocarbon stains and odour. Timber foundations noted at approximatly 0.40m bgl.

Date Tested: 7/09/2022

Tested by: Tara Verhulst

Date Reported: 7/09/2022

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Signed by: Tara Verhulst

Designation:

Date: 12/10/2022

Appendix E

Summary Tables of Analytical Results

Shannon Farm Orchards - 6-XZ738.00 - 016GX
Table E1 - Heavy Metals and OCPs in Soil

Sample Name	Sampling Date	Depth (m bgl)	Heavy Metals								OCPs		
			Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury	Nickel	Zinc	DDT	Beta-BHC	Endrin
Background Concentrations[1]			11.04	0.43	60.82	47.36	38.8	-	33.42	191	-	-	-
Limit of Reporting (LOR)		mg/kg	0.125	0.005	0.125	0.075	0.25	0.025	0.05	0.05	0.02	0.005	0.05
NESCS[2]	Rural residential/lifestyle block (25% produce)		17	0.8	290	>10,000	160	200	-	-	45	-	-
IRB NEPM SGV HILD[3]			-	-	-	-	-	-	400	7400	-	-	-
NESCS[2]	Residential (10% produce)		20	3	460	>10,000	210	310	-	-	70	-	-
IRB NEPM SGV HILD[3]			-	-	-	-	-	-	400	7400	-	-	-
Disposal[4]	Class A Landfill		**100**	**20**	**100**	**100**	**100**	**4**	**200**	**200**	**500**	-	-
	Class B Landfill		*10*	*2*	*10*	*10*	*10*	*0.4*	*20*	*20*	50	-	-

Units			mg/kg										
Orchard 1													
Composite (S1.1A, S1.1B, S1.1C)	8/09/2022	0.1	*13.2*	0.14	*15.9*	***108***	*17.5*	<0.025	*25.9*	*97.4*	<0.020	<0.0050	<0.050
Composite (S1.1A, S1.1B, S1.1C)	8/09/2022	0.1	-	-	-	-	-	-	-	-	-	<0.0050	<0.050
Composite (S1.2A, S1.2B, S1.2C)	8/09/2022	0.1	*13.4*	0.14	*16*	***124***	*16.7*	<0.025	*24.7*	*94*	<0.020	<0.0050	<0.050
Composite (S1.3A, S1.3B, S1.3C)	8/09/2022	0.1	*13.5*	0.17	*17.3*	***132***	*17.5*	<0.025	*24.3*	*103*	<0.020	<0.0050	<0.050
Composite (S1.4A, S1.4B, S1.4C)	8/09/2022	0.1	*13.7*	0.13	*15.9*	*86.9*	*16.3*	<0.025	*23.1*	*86.9*	<0.020	<0.0050	<0.050
Composite (S1.5A, S1.5B, S1.5C)	8/09/2022	0.1	*13.5*	0.17	*15.8*	***201***	*16.3*	<0.025	*22.4*	*101*	<0.020	<0.0050	<0.050
Orchard 2													
S2.3C	5/09/2022	0.1	*12*	0.19	*14.4*	*16.8*	*14.6*	<0.025	16.9	*65.1*	<0.020	<0.0050	<0.050
S2.3C	5/09/2022	0.1	-	-	-	-	-	-	-	-	-	<0.0050	<0.050
S2.3CQA	5/09/2022	0.1	*12*	0.16	*14.8*	*17.6*	*15.5*	<0.025	18.1	*68.9*	<0.020	<0.0050	<0.050
S2.3CQA	5/09/2022	0.1	-	-	-	-	-	-	-	-	-	<0.0050	<0.050
S2.4A	5/09/2022	0.1	*11*	0.22	*13.7*	*14.8*	*13.6*	<0.025	17	*61*	<0.020	<0.0050	<0.050
Composite (S2.1A, S2.1B, S2.1C)	5/09/2022	0.1	5.4	0.13	9.5	***218***	8.36	<0.025	8.64	*49.4*	<0.020	<0.0050	<0.050
Composite (S2.1D, S2.3A, S2.3B)	5/09/2022	0.1	9.9	0.19	*12.9*	***127***	*14.3*	<0.025	16.2	*70.8*	<0.020	<0.0050	<0.050
Composite (S2.2A, S2.2B, S2.2C)	5/09/2022	0.1	5.1	0.22	7.3	***576***	7.55	<0.025	7.66	*72*	<0.020	<0.0050	<0.050
Composite (S2.4A, S2.4B, S2.4C)	5/09/2022	0.1	*11*	0.21	*13.4*	*16.5*	*15.2*	<0.025	16.6	*72*	<0.020	<0.0050	<0.050
Composite (S2.5A, S2.5B, S2.5C)	5/09/2022	0.1	*11*	0.2	*13.3*	*14.6*	*13.3*	<0.025	16.2	*60.2*	<0.020	<0.0050	<0.050
Orchard 3													
S3.6D	5/09/2022	0.1	*11*	0.15	*13.5*	*16.7*	*14.5*	0.04	16.4	*62.9*	<0.020	<0.0050	<0.050
S3.6D QA	5/09/2022	0.1	*11*	0.15	*12.8*	*15.4*	*13.7*	<0.025	15.6	*59.5*	<0.020	<0.0050	<0.050
Composite (S3.1A, S3.1B, S3.1C)	5/09/2022	0.1	*11*	0.2	*14.9*	*19.3*	*16.4*	<0.025	18.3	*81.8*	<0.020	<0.0050	<0.050
Composite (S3.2A, S3.2B, S3.2C)	5/09/2022	0.1	*10*	0.16	*13.3*	*16.7*	*14.7*	<0.025	16.1	*69.8*	<0.020	<0.0050	<0.050
Composite (S3.3A, S3.3B, S3.3C)	5/09/2022	0.1	*12*	0.2	*14.3*	*17.1*	*14.8*	<0.025	17	*67.7*	<0.020	<0.0050	<0.050
Composite (S3.4A, S3.4B, S3.4C)	5/09/2022	0.1	*11*	0.21	*13.6*	*15.9*	*14.7*	<0.025	16.3	*63.4*	<0.020	<0.0050	<0.050
Composite (S3.5A, S3.5B, S3.5C)	5/09/2022	0.1	*12*	0.21	*15*	*18.7*	*16*	<0.025	19.5	*69.6*	<0.020	<0.0050	<0.050
Composite (S3.6A, S3.6B, S3.6C)	5/09/2022	0.1	*12*	0.2	*14*	*16.9*	*15.3*	<0.025	17.3	*66.6*	<0.020	<0.0050	<0.050
Composite (S3.7A, S3.7B, S3.7C)	5/09/2022	0.1	*12*	0.22	*13.3*	*17*	*14.3*	<0.025	16.6	*67.5*	<0.020	<0.0050	<0.050
Composite (S3.7A, S3.7B, S3.7C)	5/09/2022	0.1	*11*	0.22	*14.2*	*17.2*	*14.3*	<0.025	17.1	*68.5*	-	-	-
Composite (S3.8A, S3.8B, S3.8C)	5/09/2022	0.1	*11*	0.2	*14.2*	*17*	*14.2*	<0.025	16.9	*64.8*	<0.020	<0.0050	<0.050
Composite (S3.9A, S3.9B, S3.9C)	5/09/2022	0.1	*11*	0.2	*13.1*	*17.1*	*13.9*	<0.025	16.4	*64.2*	<0.020	<0.0050	<0.050
Orchard 4													
S4.3D	5/09/2022	0.1	5.1	0.18	8	***154***	8.38	<0.025	7.9	*48.9*	<0.020	<0.0050	<0.050
S4.3D QA	5/09/2022	0.1	5.1	0.16	7.8	***143***	8.22	<0.025	7.84	*48.9*	<0.020	<0.0050	<0.050
S4.9D	5/09/2022	0.1	5.8	0.12	7.7	*97.6*	8.51	<0.025	8.02	*41.4*	<0.020	<0.0050	<0.050
S4.9D QA	5/09/2022	0.1	5.7	0.12	7.8	***112***	8.65	<0.025	7.72	*41.2*	<0.020	<0.0050	<0.050
Composite (S4.1A, S4.1B, S4.1C)	5/09/2022	0.1	7.1	0.14	9.5	***119***	*10.8*	<0.025	10.5	*58*	<0.020	<0.0050	<0.050
Composite (S4.2A, S4.2B, S4.2C)	5/09/2022	0.1	7.4	0.2	10	*92.7*	*11.1*	<0.025	11.5	*59.9*	<0.020	<0.0050	<0.050
Composite (S4.3A, S4.3B, S4.3C)	5/09/2022	0.1	4.5	0.11	6.5	***133***	7.98	<0.025	6.57	*45*	<0.020	<0.0050	<0.050
Composite (S4.4A, S4.4B, S4.4C)	5/09/2022	0.1	5.8	0.13	7.7	***125***	8.55	<0.025	8.27	*41.8*	<0.020	<0.0050	<0.050
Composite (S4.5A, S4.5B, S4.5C)	5/09/2022	0.1	5.4	0.11	7.5	***118***	7.87	<0.025	7.55	*38.9*	<0.020	<0.0050	<0.050
Composite (S4.6A, S4.6B, S4.6C)	5/09/2022	0.1	7.6	0.18	9.7	***144***	*10.6*	<0.025	10.7	*52.9*	<0.020	<0.0050	<0.050
Composite (S4.7A, S4.7B, S4.7C)	5/09/2022	0.1	5.1	0.13	7.2	***123***	8.24	<0.025	7.1	*39.4*	<0.020	<0.0050	<0.050
Composite (S4.8A, S4.8B, S4.8C)	5/09/2022	0.1	6	0.15	8.2	***213***	8.81	<0.025	8.3	*51.8*	<0.020	<0.0050	<0.050
Composite (S4.9A, S4.9B, S4.9C)	5/09/2022	0.1	7.8	0.19	9.5	***153***	*10.8*	<0.025	10.2	*54.8*	<0.020	<0.0050	<0.050
Composite (S4.10A, S4.10B, S4.10C)	5/09/2022	0.1	6	0.18	8.6	***258***	8.98	<0.025	9.02	*71.5*	<0.020	<0.0050	<0.050
Composite (S4.10A, S4.10B, S4.10C)	5/09/2022	0.1	-	-	-	-	-	-	-	-	<0.020	<0.0050	<0.050
Composite (S4.11A, S4.11B, S4.11C)	5/09/2022	0.1	7.3	0.26	10	***234***	*10.4*	<0.025	12.2	*60.8*	<0.020	<0.0050	<0.050
Composite (S4.12A, S4.12B, S4.12C)	5/09/2022	0.1	5.8	0.15	8.1	***175***	9.04	<0.025	8.13	*46*	<0.020	<0.0050	<0.050
Composite (S4.13A, S4.13B, S4.13C)	5/09/2022	0.1	8	0.18	9.7	*78.6*	*10.6*	<0.025	11.5	*58*	<0.020	<0.0050	<0.050
Composite (S4.14A, S4.14B, S4.14C)	5/09/2022	0.1	5.8	0.18	7.5	***203***	9.51	<0.025	8.06	*45.1*	<0.020	<0.0050	<0.050

Shannon Farm Orchards - 6-XZ738.00 - 016GX
Table E1 - Heavy Metals and OCPs in Soil

Sample Name	Sampling Date	Depth (m bgl)	Heavy Metals								OCPs		
			Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury	Nickel	Zinc	DDT	Beta-BHC	Endrin
Background Concentrations[1]			11.04	0.43	60.82	47.36	38.8	-	33.42	191	-	-	-
Limit of Reporting (LOR)		mg/kg	0.125	0.005	0.125	0.075	0.25	0.025	0.05	0.05	0.02	0.005	0.05
NESCS[2]	Rural residential/lifestyle block (25% produce)		17	0.8	290	>10,000	160	200	-	-	45	-	-
IRB NEPM SGV HILD[3]			-	-	-	-	-	-	400	7400	-	-	-
NESCS[2]	Residential (10% produce)		20	3	460	>10,000	210	310	-	-	70	-	-
IRB NEPM SGV HILD[3]			-	-	-	-	-	-	400	7400	-	-	-
Disposal[4]	Class A Landfill		**100**	**20**	**100**	**100**	**100**	**4**	**200**	**200**	**500**	-	-
	Class B Landfill		*10*	*2*	*10*	*10*	*10*	*0.4*	*20*	*20*	50	-	-

Units			mg/kg										
Orchard 5													
S5.6D	6/09/2022	0.1	9.7	0.12	9.3	*11.5*	*16.3*	<0.025	10.3	*46.3*	<0.020	<0.0050	<0.050
S5.6D.QA	6/09/2022	0.1	9.8	0.11	10	*11.3*	*15.8*	<0.025	10.6	*45*	<0.020	<0.0050	<0.050
Composite (S5.1A, S5.1B, S5.1C)	6/09/2022	0.1	7.6	0.12	8.7	*12.8*	*11*	<0.025	9.49	*44.8*	<0.020	<0.0050	<0.050
Composite (S5.1A, S5.1B, S5.1C)	6/09/2022	0.1	7.4	0.12	8.3	*12.8*	*10.7*	<0.025	9.48	*45.9*	-	-	-
Composite (S5.2A, S5.2B, S5.2C)	6/09/2022	0.1	8.4	0.12	9	*11.3*	*13.5*	<0.025	10.1	*46.2*	<0.020	<0.0050	<0.050
Composite (S5.3A, S5.3B, S5.3C)	6/09/2022	0.1	9.5	0.14	10	*12.2*	*14.1*	<0.025	11.1	*48.8*	<0.020	<0.0050	<0.050
Composite (S5.4A, S5.4B, S5.4C)	6/09/2022	0.1	8.1	0.16	9.6	*11.5*	*13*	<0.025	10.2	*52.3*	<0.020	<0.0050	<0.050
Composite (S5.5A, S5.5B, S5.5C)	6/09/2022	0.1	8.9	0.13	9.6	*12*	*14.3*	<0.025	10.3	*47.6*	<0.020	<0.0050	<0.050
Composite (S5.6A, S5.6B, S5.6C)	6/09/2022	0.1	8	0.14	8.6	*10.5*	*13.2*	<0.025	9.29	*47.5*	<0.020	<0.0050	<0.050
Composite (S5.7A, S5.7B, S5.7C)	6/09/2022	0.1	8.7	0.15	9.1	*10.4*	*15.1*	<0.025	9.67	*44*	<0.020	<0.0050	<0.050
Composite (S5.8A, S5.8B, S5.8C)	6/09/2022	0.1	8.5	0.14	8.9	*10.8*	*14.8*	<0.025	9.33	*45.4*	<0.020	<0.0050	<0.050
Composite (S5.9A, S5.9B, S5.9C)	6/09/2022	0.1	8.5	0.12	8.4	9.57	*17*	<0.025	8.53	*42.2*	<0.020	<0.0050	<0.050
Orchard 6													
S6.4D	6/09/2022	0.1	6.4	0.1	8.8	*10.4*	9.71	<0.025	9.13	*42.8*	<0.020	<0.0050	<0.050
S6.4D.QA	6/09/2022	0.1	6.3	0.12	8.7	*10.4*	9.72	<0.025	9.16	*42.7*	<0.020	<0.0050	<0.050
6.13D	6/09/2022	0.1	6.6	0.13	9.2	*11.1*	*10.4*	<0.025	9.42	*45.7*	<0.020	<0.0050	<0.050
S6.13D.QA	6/09/2022	0.1	6.8	0.14	9.5	*11.5*	*10.1*	<0.025	9.42	*49*	<0.020	<0.0050	<0.050
Composite (S6.1A, S6.1B, S6.1C)	6/09/2022	0.1	5.8	0.16	8.1	*10.7*	9.88	<0.025	8.53	*41.2*	<0.020	<0.0050	<0.050
Composite (S6.2A, S6.2B, S6.2C)	6/09/2022	0.1	5.3	0.091	7.4	*11.1*	9.23	<0.025	8.01	*38.4*	<0.020	<0.0050	<0.050
Composite (S6.3A, S6.3B, S6.3C)	6/09/2022	0.1	6.1	0.06	7.8	*12.9*	*10.5*	<0.025	8.21	*41.2*	<0.020	<0.0050	<0.050
Composite (S6.4A, S6.4B, S6.4C)	6/09/2022	0.1	5.7	0.067	8.2	*13.3*	*11.1*	<0.025	8.83	*45.2*	<0.020	<0.0050	<0.050
Composite (S6.5A, S6.5B, S6.5C)	6/09/2022	0.1	5.4	0.11	8.9	*11.2*	8.94	<0.025	7.8	*40.4*	<0.020	<0.0050	<0.050
Composite (S6.6A, S6.6B, S6.6C)	6/09/2022	0.1	5.4	0.11	8	*10.3*	9.46	<0.025	8.32	*40.4*	<0.020	<0.0050	<0.050
Composite (S6.7A, S6.7B, S6.7C)	6/09/2022	0.1	6.1	0.13	8.1	*10.4*	9.11	<0.025	7.98	*39.7*	<0.020	<0.0050	<0.050
Composite (S6.8A, S6.8B, S6.8C)	6/09/2022	0.1	5.9	0.12	7.9	*10.1*	*10.4*	<0.025	8.19	*41.3*	<0.020	<0.0050	<0.050
Composite (S6.9A, S6.9B, S6.9C)	6/09/2022	0.1	5.2	0.1	7.6	9.34	9.2	<0.025	7.78	*39.4*	<0.020	<0.0050	<0.050
Composite (S6.10A, S6.10B, S6.10C)	6/09/2022	0.1	5.3	0.098	7.2	9.38	8.62	<0.025	7.68	*37.8*	<0.020	<0.0050	<0.050
Composite (S6.11A, S6.11B, S6.11C)	6/09/2022	0.1	5.3	0.13	7.2	9.45	9.53	<0.025	7.65	*39.6*	<0.020	<0.0050	<0.050
Composite (S6.12A, S6.12B, S6.12C)	6/09/2022	0.1	6	0.12	7.9	9.5	9.64	<0.025	8.07	*39.6*	<0.020	<0.0050	<0.050
Composite (S6.12A, S6.12B, S6.12C)	6/09/2022	0.1	5.9	0.11	8	9.46	9.38	<0.025	8.04	*37.5*	-	-	-
Composite (S6.13A, S6.13B, S6.13C)	6/09/2022	0.1	5.7	0.15	8.1	9.54	9.45	<0.025	7.99	*41.5*	<0.020	<0.0050	<0.050
Composite (S6.14A, S6.14B, S6.14C)	6/09/2022	0.1	5.4	0.12	6.9	8.48	9.14	<0.025	7.46	*36.6*	<0.020	<0.0050	<0.050
Composite (S6.15A, S6.15B, S6.15C)	6/09/2022	0.1	5.9	0.12	7.5	9.01	9.12	<0.025	8.05	*40.4*	<0.020	<0.0050	<0.050
Composite (S6.16A, S6.16B, S6.16C)	6/09/2022	0.1	6.2	0.11	7.7	8.96	9.05	<0.025	7.7	*42.6*	<0.020	<0.0050	<0.050
Composite (S6.17A, S6.17B, S6.17C)	6/09/2022	0.1	5.5	0.11	7.4	8.46	9.52	<0.025	7.41	*39.1*	<0.020	<0.0050	<0.050
Composite (S6.18A, S6.18B, S6.18C)	6/09/2022	0.1	5.4	0.11	7.3	8.68	*10.4*	<0.025	7.88	*38.2*	<0.020	<0.0050	<0.050
Composite (S6.18A, S6.18B, S6.18C)	6/09/2022	0.1	5.4	0.11	7.3	8.68	*10.4*	<0.025	7.88	*38.2*	-	<0.0050	<0.050

Key:

Underline	Exceedance of Background Concentrations
Purple Fill	Laboratory duplicate of sample for QA purposes
Orange Fill	Exceedance of Rural residential SCS
Yellow Fill	Exceedance of Residential SCS
Bold	Exceedance of Waste Disposal Criteria - Class A
Italics	Exceedance of Waste Disposal Criteria - Class B

Notes:

1. LRIS Predicted Background Soil Contaminants, New Zealand, Landcare Research Limited, Updated 2016
2. Ministry for the Environment, 2012. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
3. National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Australia); Schedule B1 (as amended May 2013) - Guideline on Investigation Levels For Soil and Groundwater, Federal Register of Legislative Instruments F2013C00288, National Environmental Protection Council. (HIL - Health Investigation Level).
4. MfE Module 2 - Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification. Appendix A.

Shannon Farm Farmyard - 6-XZ738.00 - 016GX
Table E2 - Heavy Metals and OCPs in Soil

Sample Name	Sampling Date	Depth (m bgl)	Heavy Metals								OCPs		
			Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury	Nickel	Zinc	DDT	Beta-BHC	Endrin
Background Concentrations[1]			11.04	0.43	60.82	47.36	38.8	-	33.42	191	-	-	-
Limit of Reporting (LOR)		mg/kg	0.125	0.005	0.125	0.075	0.25	0.025	0.05	0.05	0.02	0.005	0.05
NESCS[2]	Rural residential/lifestyle block (25% produce)		17	0.8	290	>10,000	160	200	-	-	45	-	-
IRB NEPM SGV HILD[3]			-	-	-	-	-	-	400	7400	-	-	-
NESCS[2]	Residential (10% produce)		20	3	460	>10,000	210	310	-	-	70	-	-
IRB NEPM SGV HILD[3]			-	-	-	-	-	-	400	7400	-	-	-
Disposal[4]	Class A Landfill		**100**	**20**	**100**	**100**	**100**	**4**	**200**	**200**	**500**	-	-
	Class B Landfill		*10*	*2*	*10*	*10*	*10*	*0.4*	*20*	*20*	50	-	-

Units			mg/kg										
Area A - Sheep pens													
FA1	6/09/2022	0.15	*17*	0.079	*14.6*	*27.3*	*15.9*	<0.025	*20.9*	*115*	<0.020	<0.0050	<0.050
FA2	6/09/2022	0.20	*11*	0.024	*11*	*20.5*	*14.4*	<0.025	19.6	*57.3*	<0.020	<0.0050	<0.050
FA3	6/09/2022	0.10	*9.3*	0.17	*10*	*52.6*	*21.1*	0.027	*20.5*	***665***	<0.020	<0.0050	<0.050
FA4	6/09/2022	0.10	*11*	0.2	*12*	*62.3*	*66.2*	0.026	17.1	***223***	<0.020	<0.0050	<0.050
FA5	6/09/2022	0.15	9.8	0.18	*11*	*36.7*	*15.7*	<0.025	15.1	***254***	<0.020	<0.0050	<0.050
FA6	6/09/2022	0.15	*15.9*	0.13	*17.7*	*57.9*	***447***	0.039	*23.6*	*142*	<0.020	<0.0050	0.17
FA7	6/09/2022	0.20	*11*	0.26	*13.2*	*41.9*	*23.8*	0.03	16.5	***410***	<0.020	<0.0050	<0.050
FA7	6/09/2022	0.20	*12*	0.27	*12*	*45.7*	*25.3*	0.028	16.9	***437***	-	-	-
FA7.QA	6/09/2022	0.20	*12*	0.2	*12*	*36.2*	*23*	0.033	16.7	***290***	<0.020	<0.0050	<0.050
FA8	6/09/2022	0.15	*14.9*	0.16	*13.8*	*26.9*	*21.3*	0.047	19.1	*166*	<0.020	<0.0050	<0.050
FA9	6/09/2022	0.20	*14.8*	0.078	*14.7*	*25.1*	*20.9*	<0.025	19	*100*	<0.020	<0.0050	<0.050
FA10	6/09/2022	0.20	*13.2*	0.033	*15.8*	*19.9*	*17*	<0.025	*20.5*	*78.4*	<0.020	<0.0050	<0.050
FA11	6/09/2022	0.05	7.4	1.09	*12.6*	***181***	*19.2*	0.026	*26.3*	***8380***	<0.020	<0.0050	<0.050
FA12	6/09/2022	0.20	*17.5*	0.12	*15.8*	*33.6*	*22.8*	<0.025	17.5	*179*	0.02	<0.0050	<0.050
FA12.QA	6/09/2022	0.20	*18.2*	0.15	*17.6*	*27.6*	*23.1*	<0.025	17.5	*176*	0.05	<0.0050	0.053
Area C - Work shed													
FC1	6/09/2022	0.05	*11*	0.12	*14.8*	*31.9*	*32.2*	0.058	17	*149*	-	-	-
FC2	6/09/2022	0.25	*12.6*	0.16	*14.8*	*25.7*	*73.3*	0.067	18.3	*176*	-	-	-
FC3	6/09/2022	0.10	*12*	0.23	*14*	*35.1*	*64.6*	0.098	16.8	***240***	-	-	-
FC4	6/09/2022	0.10	*14.7*	0.18	*17.3*	*29.7*	*56.4*	0.1	18.6	*189*	-	-	-
FC5	6/09/2022	0.40	*13.7*	0.076	*15.6*	*17.7*	*18.4*	<0.025	19.3	*109*	-	-	-
FC6	6/09/2022	0.10	*13.7*	0.042	*16.3*	*18.9*	*17.7*	0.026	20	*74.5*	-	-	-
FC6	6/09/2022	0.10	*14.4*	0.046	*16.1*	*19.2*	*18*	0.026	19.9	*77.2*	-	-	-
FC7	6/09/2022	0.10	*14*	0.061	*17.3*	*20.7*	*27.5*	0.067	19.6	*104*	-	-	-
FC8	6/09/2022	0.15	*13*	0.052	*17.4*	*19.7*	*18.7*	0.035	19	*78.8*	-	-	-
Area D - Surrounding farmyard													
FD1	8/09/2022	0.20	*14.3*	0.066	*17.9*	*24.6*	*17.2*	<0.025	*23.6*	*173*	-	-	-
FD2	8/09/2022	0.15	8.5	0.29	*12*	*35.4*	*22.2*	0.04	16.5	*173*	0.02	0.024	<0.050
FD2		0.15	-	-	-	-	-	-	-	-	-	0.022	<0.050
FD3	8/09/2022	0.15	7.8	0.039	8.8	*16.5*	*13.1*	<0.025	12.1	*68.1*	<0.020	<0.0050	<0.050
FD4	8/09/2022	0.20	*14*	0.089	*15.3*	*30*	*24.8*	<0.025	*21.8*	*120*	-	-	-
FD4	8/09/2022	0.20	*13.4*	0.11	*14.4*	*29.2*	*25.2*	<0.025	*20.1*	*115*	-	-	-
FD5	8/09/2022	0.15	*13.6*	0.27	*13.9*	*27.8*	*64.5*	0.037	14.4	***304***	-	-	-
FD6	8/09/2022	0.15	*13.7*	0.3	*13.2*	*28.1*	*42.7*	0.027	15.6	***463***	-	-	-
FD7	8/09/2022	0.20	*12*	0.17	*12*	*94.9*	*58.1*	<0.025	15.1	*141*	0.08	<0.0050	<0.050
FD8	8/09/2022	0.20	*11*	0.15	*11*	*26.5*	*40.4*	0.033	14.1	*168*	0.03	<0.0050	<0.050
FD9	8/09/2022	0.15	*16.1*	0.11	*17.1*	*29.7*	*24.7*	<0.025	18.6	*119*	<0.020	<0.0050	<0.050
FD11QA	8/09/2022	0.15	7.1	0.073	10	*15*	*19.8*	<0.025	12.2	*88.4*	-	-	-
FD11	8/09/2022	0.15	8.7	0.08	*12*	*17.5*	*22.3*	<0.025	14.5	*84*	-	-	-
FD12	8/09/2022	0.15	*17.7*	0.16	*18.6*	*37.3*	*74.2*	<0.025	*25.2*	***232***	-	-	-
FD14	8/09/2022	0.20	*17.5*	0.4	*20.6*	*56*	*76.8*	0.12	*34.1*	***472***	-	-	-
Area F - Cow pens													
FF1	6/09/2022	0.15	*13.1*	0.048	*14.9*	*20.6*	*16.5*	<0.025	*21.6*	*71.1*	<0.020	<0.0050	<0.050
FF2	6/09/2022	0.15	*12*	0.042	*15.8*	*20.6*	*15.6*	<0.025	*21.4*	*84.8*	-	-	-
FF3	6/09/2022	0.05	*12*	0.089	*14.2*	*22.8*	*18.2*	<0.025	19.7	99	<0.020	<0.0050	<0.050
FF4	6/09/2022	0.20	9.5	0.095	*12*	*22.8*	*24.8*	<0.025	15.6	***306***	<0.020	<0.0050	<0.050
FF5	6/09/2022	0.15	*12.7*	0.1	*16.1*	*26.9*	*41.5*	0.031	*21.5*	*112*	-	-	-
FF6	6/09/2022	0.15	*12.7*	0.11	*16.2*	*24.2*	*19.4*	<0.025	*21.6*	*106*	<0.020	<0.0050	<0.050
FF7	6/09/2022	0.15	*11*	0.11	*14.4*	*24.4*	*27.1*	<0.025	19.3	***200***	-	-	-

Shannon Farm Farmyard - 6-XZ738.00 - 016GX
Table E2 - Heavy Metals and OCPs in Soil

Sample Name	Sampling Date	Depth (m bgl)	Heavy Metals								OCPs		
			Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury	Nickel	Zinc	DDT	Beta-BHC	Endrin
Background Concentrations[1]			11.04	0.43	60.82	47.36	38.8	-	33.42	191	-	-	-
Limit of Reporting (LOR)		mg/kg	0.125	0.005	0.125	0.075	0.25	0.025	0.05	0.05	0.02	0.005	0.05
NESCS[2]	Rural residential/lifestyle block (25% produce)		17	0.8	290	>10,000	160	200	-	-	45	-	-
IRB NEPM SGV HILD[3]			-	-	-	-	-	-	400	7400	-	-	-
NESCS[2]	Residential (10% produce)		20	3	460	>10,000	210	310	-	-	70	-	-
IRB NEPM SGV HILD[3]			-	-	-	-	-	-	400	7400	-	-	-
Disposal[4]	Class A Landfill		**100**	**20**	**100**	**100**	**100**	**4**	**200**	**200**	**500**	-	-
	Class B Landfill		*10*	*2*	*10*	*10*	*10*	*0.4*	*20*	*20*	50	-	-

Units			mg/kg										
Testpits													
TP01-S1	6/09/2022	1.00	*16.5*	0.055	*15*	25.8	19.5	<0.025	*25.8*	74.6	-	-	-
TP02-S2	6/09/2022	0.30	*14.4*	0.11	*15*	27.6	*34.8*	<0.025	*20.5*	*98*	-	-	-
TP03-S3	6/09/2022	0.30	*14.8*	0.059	*16.7*	22.4	*18.2*	<0.025	*22.8*	*79.8*	-	-	-
TP04-S4	6/09/2022	0.10	10	0.17	*12*	23.9	*21*	<0.025	16.4	***224***	-	-	-
TP05-S5	6/09/2022	0.50	*14*	0.054	*16.9*	20.4	*18.6*	<0.025	*22.3*	*79.8*	-	-	-
TP05-S6	6/09/2022	0.05	*13.3*	0.19	*14.9*	23.8	*22.6*	0.026	19.2	*137*	-	-	-
TP06-S7	6/09/2022	0.15	*14.4*	0.11	*15.7*	22.7	*20.7*	0.026	*21.2*	*99.6*	-	-	-
TP07-S8	6/09/2022	0.30	*13.5*	0.37	*15.7*	31.6	*41.2*	0.062	19	***327***	-	-	-
TP08-S9	6/09/2022	0.50	*12.7*	0.044	*11*	22	*14*	<0.025	14.1	*60.3*	<0.020	0.005	<0.050
TP08-S10	6/09/2022	1.0	10	0.072	9.2	20.8	*22.3*	<0.025	12.9	*64.3*	<0.020	<0.0050	<0.050
TP09-S11	6/09/2022	0.20	47.8	0.089	*13.2*	26.1	*22.3*	<0.025	18.3	*110*	<0.020	<0.0050	0.067
TP09-S12	6/09/2022	0.10	*17*	*2.3*	*12*	***1300***	*31*	<0.025	*24.7*	***5060***	0.03	0.054	0.083
TP10-S13	6/09/2022	0.25	*13.1*	1.78	9.5	***1030***	*24.3*	<0.025	19.3	***3950***	-	-	-
TP10-S14	6/09/2022	0.20	6.9	0.064	8.6	14.2	9.92	<0.025	10.2	*59.4*	-	-	-
TP10-S15	6/09/2022	1.0	*13*	0.082	*14*	23	*17.3*	<0.025	18.4	*92*	-	-	-
TP11-S15	7/09/2022	0.15	*11*	0.083	*14.8*	22.7	14.9	<0.025	*20.1*	*86.8*	-	-	-
TP12-S16	7/09/2022	0.20	8.8	0.36	9.5	34.9	***288***	0.08	12.4	***583***	-	-	-
TP12-S17	7/09/2022	0.50	*11*	0.094	*12.9*	24.2	*20.1*	<0.025	*20.3*	*98.2*	-	-	-
TP12-S17	7/09/2022	0.50	*11*	0.095	*13.5*	22	*18.8*	<0.025	*20.6*	*106*	-	-	-
TP13-S17	7/09/2022	0.20	*12*	0.046	*14.6*	18.9	*14.4*	<0.025	*20.1*	69.9	-	-	-
TP13-S18	7/09/2022	0.20	*12.6*	0.085	*17.1*	20.5	*17.3*	<0.025	*22.2*	*83.8*	-	-	-
TP13-S19A	7/09/2022	0.15	*12*	0.14	*16.8*	***120***	*20.2*	<0.025	*20.1*	*90.5*	-	-	-
TP13-S19	7/09/2022	0.50	*15.3*	0.053	*19.6*	26.4	*20*	0.033	*25.2*	*90.5*	-	-	-
TP13-S19QA	7/09/2022	0.50	*16*	0.047	*19.5*	27	*20.2*	<0.025	*26.2*	*91.4*	-	-	-
TP13-S20	7/09/2022	0.40	*12*	0.084	*15.3*	20.2	*16.5*	<0.025	*21.8*	*78.2*	-	-	-
TP13-S21	7/09/2022	0.20	*11*	0.072	*13.4*	17.5	*14.1*	<0.025	*20.4*	*67.1*	-	-	-
TP14-S22	7/09/2022	0.20	10	0.12	*14.1*	*53.1*	*59.9*	0.062	18.5	***347***	-	-	-
TP15-S23	7/09/2022	0.30	*12*	0.083	*14.8*	19.9	*18.8*	<0.025	*20.8*	*95.1*	-	-	-
TP16-S24	7/09/2022	0.15	*12.8*	0.27	*17*	40.9	*56.3*	0.067	*26.2*	***254***	-	-	-
TP16-S24QA	7/09/2022	0.15	*18.3*	0.29	*19.3*	47.3	*60.5*	0.049	29.5	***271***	-	-	-
TP17-S25	7/09/2022	0.30	*14.1*	0.035	*16.6*	20.2	*17.9*	<0.025	*20.5*	*74.2*	-	-	-
TP18-S26	7/09/2022	0.50	*13.8*	0.032	*17*	17.3	*17.6*	<0.025	*21.5*	*76.8*	-	-	-
TP19-S27	7/09/2022	0.20	*14.2*	0.45	*17.5*	36.3	33.9	0.027	*20.7*	***450***	-	-	-

Key:

Underline	Exceedance of Background Concentrations
Purple Fill	Laboratory duplicate of sample for QA purposes
Orange Fill	Exceedance of Rural residential SCS
Yellow Fill	Exceedance of Residential SCS
Bold	Exceedance of Waste Disposal Criteria - Class A
Italics	Exceedance of Waste Disposal Criteria - Class B

Notes:

1. LRIS Predicted Background Soil Contaminants, New Zealand, Landcare Research Limited, Updated 2016
2. Ministry for the Environment, 2012. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
3. National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Australia); Schedule B1 (as amended May 2013) - Guideline on Investigation Levels For Soil and Groundwater, Federal Register of Legislative Instruments F2013C00288, National Environmental Protection Council. (HIL - Health Investigation Level).
4. MfE Module 2 - Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification. Appendix A.

Shannon Farm Farmyard - 6-XZ738.00 - 016GX
Table E3 - TPHs and BTEX in Soil

Sample Name	Sampling Date	Depth(m bgl)	Total Petroleum Hydrocarbons (TPHs)			BTEX				
			TPH C7 - C9	TPH C10 - C14	TPH C15 - C36	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene
Limit of reporting (LOR)		mg/kg wt	10	15	25	0.05	0.1	0.05	0.1	0.05
Protection of Human Health - NZRB[1]		Residential Use [2,3,4]	(500)[m]	(510)[x]	NA	1.1[v]	(82)[v]	(59)[v]	(59)[v]	(59)[v]
Disposal[5]		Class A Landfill	-	-	-	**10**	**2000**	**1000**	**2000**	**2000**
		Class B Landfill	-	-	-	*1*	*200*	*100*	*200*	*200*
Units			mg/kg							
Area A - Sheep pens										
FA6	6-Sep-22	0.15	<10	<15	98	<0.050	<0.10	<0.050	<0.10	<0.050
Area C - Work shed										
FC1	06/09/2022	0.05	<10	<15	4954	<0.050	<0.10	<0.050	<0.10	<0.050
FC2	06/09/2022	0.25	<10	<15	463	<0.050	<0.10	<0.050	<0.10	<0.050
FC3	06/09/2022	0.10	<10	<15	436	<0.050	<0.10	<0.050	<0.10	<0.050
FC4	06/09/2022	0.10	<10	<15	530	<0.050	<0.10	<0.050	<0.10	<0.050
FC5	06/09/2022	0.40	<10	<15	269	<0.050	<0.10	<0.050	<0.10	<0.050
FC6	06/09/2022	0.10	<10	19	620	<0.050	<0.10	<0.050	<0.10	<0.050
FC7	06/09/2022	0.10	<10	<15	322	<0.050	<0.10	<0.050	<0.10	<0.050
FC8	06/09/2022	0.15	<10	19	1750	<0.050	<0.10	<0.050	<0.10	<0.050
Area D - Surrounding farmyard										
FD5	8-Sep-22	0.15	<10	<15	27	<0.050	<0.10	<0.050	<0.10	<0.050
FD5	8-Sep-22	0.15	<10	<15	-	<0.050	<0.10	<0.050	<0.10	<0.050
FD6	8-Sep-22	0.15	<10	<15	1477	<0.050	<0.10	<0.050	<0.10	<0.050
FD14	8-Sep-22	0.20	<10	<15	214	<0.050	<0.10	<0.050	<0.10	<0.050
Area F - Cow pens										
FF6	06/09/2022	0.15	<10	<15	58	<0.050	<0.10	<0.050	<0.10	<0.050
Testpits										
TP01-S1	07/09/2022	1.00	<10	<15	<25	-	-	-	-	-
TP03-S3	07/09/2022	0.30	<10	<15	<25	-	-	-	-	-
TP05-S5	07/09/2022	0.50	<10	<15	<25	<0.050	<0.10	<0.050	<0.10	<0.050
TP05-S6	07/09/2022	0.05	<10	466	1610	<0.050	<0.10	<0.050	<0.10	<0.050
TP06-S7	07/09/2022	0.15	<10	<15	<25	<0.050	<0.10	<0.050	<0.10	<0.050
TP07-S8	07/09/2022	0.30	<10	<15	129	<0.050	<0.10	<0.050	<0.10	<0.050
TP08-S9	07/09/2022	0.50	<10	<15	48	<0.050	<0.10	<0.050	<0.10	<0.050
TP08-S10	07/09/2022	1.0	<10	<15	288	<0.050	<0.10	<0.050	<0.10	<0.050
TP10-S14	07/09/2022	0.20	<10	<15	<25	-	-	-	-	-
TP12-S16	07/09/2022	0.20	<10	<15	740	<0.050	<0.10	<0.050	<0.10	<0.050
TP12-S17	07/09/2022	0.50	<10	<15	<25	<0.050	<0.10	<0.050	<0.10	<0.050
TP13-S17	07/09/2022	0.20	<10	<15	<25	-	-	-	-	-
TP13-S18	07/09/2022	0.20	<10	<15	<25	<0.050	<0.10	<0.050	<0.10	<0.050
TP13-S19A	07/09/2022	0.15	<10	<15	<25	<0.050	<0.10	<0.050	<0.10	<0.050
TP13-S19	07/09/2022	0.50	<10	<15	<25	-	-	-	-	-
TP13-S20	07/09/2022	0.40	<10	<15	<25	-	-	-	-	-
TP13-S21	07/09/2022	0.20	<10	<15	<25	<0.050	<0.10	<0.050	<0.10	<0.050
TP15-S23	07/09/2022	0.30	<10	<15	<25	<0.050	<0.10	<0.050	<0.10	<0.050
TP16-S24	07/09/2022	0.15	<10	<15	41	<0.050	<0.10	<0.050	<0.10	<0.050
TP16-S24	07/09/2022	0.15	<10	<15	-	-	-	-	-	-
TP17-S25	07/09/2022	0.30	<10	<15	<25	<0.050	<0.10	<0.050	<0.10	<0.050
TP18-S26	07/09/2022	0.50	<10	<15	<25	<0.050	<0.10	<0.050	<0.10	<0.050

Key:

Underline	Exceedance of Background Concentrations
Purple Fill	Laboratory duplicate of sample for QA purposes
Yellow Fill	Exceedance of Residential SCS

Notes:

1. Ministry for the Environment (MfE) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011) Module 4: Tier 1 Soil Acceptance Criteria.
2. Applied criteria are for sandy silt surface soils (<1m) and all pathways are assessed.
3. Brackets denotes values exceed threshold likely to correspond to residual separate phase hydrocarbons. The suffixed letters indicate the limiting pathway for each criterion as follows: m - maintenance/excavation; v - volatalisation; x - PAH surrogate.
4. NA - indicates estimated health-based criterion exceed 20,000mg/kg. At 20,000mg/kg residual separate phase is expected to have formed in the soil matrix. Some aesthetic impact may be noted.
5. MfE Module 2 - Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification. Appendix A.

Shannon Farm Farmyard - 6-XZ738.00 - 016GX
Table E4 - PAHs in Soil

Sample Name	Sampling Date	Depth (m bgl)	Polycyclic Aromatic Hydrocarbons (PAHs)																		
			1-Methylnaphtalene	2-Methylnaphtalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo[b+j]fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ (Zero)
Limit of reporting (LOR)		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.03	0.01
NESCS[1]		Rural residential/lifestyle block (25% produce)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-
Protection of Human Health - NZRB[2,3,4]			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2[P]	-	(160)[P]	-	-
NESCS[1]		Residential (10% produce)	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
Protection of Human Health - NZRB[2,3,4]			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63[V]	-	(1,600)[P]	-	-
Disposal[6]		Class A Landfill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	-	-	300	-
		Class B Landfill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*20*	-	-	30	-

Units			mg/kg dry wt																		
Area A - Sheep pens																					
FA6	6-Sep-22	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
Area C - Work shed																					
FC1	06/09/2022	0.05	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	0.11	0.03	<0.010
FC2	06/09/2022	0.25	<0.010	<0.010	<0.010	0.011	0.014	0.089	0.077	0.12	0.037	0.038	0.094	<0.010	0.16	<0.010	0.037	<0.010	0.06	0.14	0.12	0.11
FC3	06/09/2022	0.10	<0.010	<0.010	<0.010	0.012	0.018	0.087	0.079	0.13	0.04	0.034	0.089	<0.010	0.14	<0.010	0.04	<0.010	0.065	0.11	0.12	0.11
FC4	06/09/2022	0.10	<0.010	<0.010	<0.010	0.014	<0.010	0.058	0.057	0.096	0.029	0.021	0.063	<0.010	0.09	<0.010	0.026	<0.010	0.018	0.084	0.09	0.08
FC5	06/09/2022	0.40	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
FC6	06/09/2022	0.10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	0.028	0.082	0.03	<0.010
FC7	06/09/2022	0.10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
FC8	06/09/2022	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	0.043	0.028	0.063	<0.020	<0.010	0.049	<0.010	0.081	<0.010	<0.010	<0.010	0.22	<0.020	0.05	0.04
Area D - Surrounding farmyard																					
FD5	8-Sep-22	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	0.025	0.032	<0.020	<0.010	0.017	<0.010	0.029	<0.010	0.015	<0.010	<0.010	0.033	0.04	0.03
FD5	8-Sep-22	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	0.029	0.039	0.02	<0.010	0.026	<0.010	0.043	<0.010	0.017	<0.010	<0.010	0.05	-	-
FD6	8-Sep-22	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	0.02	<0.020	0.03	<0.010	<0.010	<0.010	0.026	<0.010	0.012	<0.010	<0.010	0.026	0.04	0.02
FD14	8-Sep-22	0.20	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
Area F - Cow pens																					
FF6	06/09/2022	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
Testpits																					
TP01-S1	07/09/2022	1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP03-S3	07/09/2022	0.30	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP05-S5	07/09/2022	0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP05-S6	07/09/2022	0.05	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	0.96	0.03	<0.010
TP06-S7	07/09/2022	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP07-S8	07/09/2022	0.30	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP08-S9	07/09/2022	0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	0.028	<0.010	<0.010	<0.010	0.014	0.022	0.03	<0.010
TP08-S10	07/09/2022	1.0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	0.011	0.036	<0.020	<0.010	0.012	<0.010	<0.020	<0.010	0.01	<0.010	<0.010	<0.020	0.03	0.02
TP10-S14	07/09/2022	0.20	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP12-S16	07/09/2022	0.20	<0.010	<0.010	<0.010	0.078	0.065	0.57	0.54	0.82	0.28	0.26	0.63	0.065	0.8	<0.010	0.29	<0.010	0.094	0.79	0.81	0.81
TP12-S17	07/09/2022	0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP13-S17	07/09/2022	0.20	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP13-S18	07/09/2022	0.20	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP13-S19A	07/09/2022	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP13-S19	07/09/2022	0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP13-S20	07/09/2022	0.40	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP13-S21	07/09/2022	0.20	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP15-S23	07/09/2022	0.30	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP16-S24	07/09/2022	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP16-S24	07/09/2022	0.15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	-	-
TP17-S25	07/09/2022	0.30	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010
TP18-S26	07/09/2022	0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.020	<0.020	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.020	0.03	<0.010

Key:

Underline	Exceedance of Background Concentrations
Purple Fill	Laboratory duplicate of sample for QA purposes
Orange Fill	Exceedance of Rural residential SCS
Yellow Fill	Exceedance of Residential SCS

Notes:

1. Ministry for the Environment, 2012. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
2. Ministry for the Environment (MfE) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011) Module 4: Tier 1 Soil Acceptance Criteria
3. Applied criteria are for sandy silt surface soils (<1m) and all pathways are assessed.
4. Brackets denotes values exceed threshold likely to correspond to residual separate phase hydrocarbons. The suffixed letters indicate the limiting pathway
5. NA - indicates estimated health-based criterion exceed 20,000mg/kg. At 20,000mg/kg residual separate phase is expected to have formed in the soil matrix. Some aesthetic impact may be noted.
6. MfE Module 2 - Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification. Appendix A.

Appendix F

Laboratory Results and Chain of Custody

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

22-33488

ANALYTICA LABORATORIES

CLIENT INFORMATION				Lab ID (Lab use only)	22-33488	Registered By	SJL	Date Registered	13/9/22
Client	WSP								
Address	69 Tarbert Street, Alexandra								
Project Leader	Tara Verhulst								
Project ID	6-XZ738.00	PO Number							
Site	Shannon Farm Cromwell								
Sampler	Tara Verhulst								
Phone	029 02010739								
Email	tara.verhulst@wsp.com								
Invoice Email	NZ.AP@wsp.com								

Please composite 3:1 ratio.

CoC for samples in several chilly bins.

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED											
	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests, high odour, bulk material)
						Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX	Asbestos (P/A)		
1	S1.1A	0.10	8/9/22		S	x	x				composite
2	S1.1B	"	"		S						
3	S1.1C	"	"		S						
4	S1.2A	"	"		S	x	x				comp.
5	S1.2B	"	"		S						
6	S1.2C	"	"		S						
7	S1.3A	"	"		S	x	x				comp.
8	S1.3B	"	"		S						
9	S1.3C	"	"		S						
10	S1.4A	"	"		S	x	x				comp.
11	S1.4B	"	"		S						
12	S1.4C	"	"		S						
13	S1.5A	"	"		S	x	x				comp.
14	S1.5B	"	"		S						
15	S1.5C	"	"		S						
16					S						
17					S						
18					S						
19					S						

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
	All soils, sediment, sludge	Potable, Ground, Bore, Surface, Fresh	Sea Water, Geothermal	Effluent, Trade Waste, Leachate

Sender Name		Received by (Lab Staff)	DR	Courier company	NZC	Courier #	SWC0001563
Date Sent		Time sent		Date Received	12/09/22	Time Received	11:00 am / pm
Seal Status	✓	Sample Chilled	✓				

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ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Lab ID (Lab use only)		Registered By		Date Registered	
Client	WSP								
Address	69 Tarbert Street, Alexandra								
Project Leader	Tara Verhulst								
Project ID	6-XZ738.00	PO Number							
Site	Shannon Farm Cromwell								
Sampler	Tara Verhulst								
Phone	029 02010739								
Email	tara.verhulst@wsp.com								
Invoice Email	NZ.AP@wsp.com								

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED											
	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests, high odour, bulk material)
						Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX	Asbestos (P/A)		
1	FD.1	0.20	8/9/22		S	x					
2	FD.2	0.15	"		S	x	x				
3	FD.3	0.15	"		S	x	x				
4	FD.4	0.20	"		S	x					
5	FD.5	0.15	"		S	x		x			
6	FD.6	0.15	"		S	x		x			
7	FD.7	0.20	"		S	x	x				
8	FD.8	0.20	"		S	x	x				
9	FD.9	0.15	"		S	x	x				
10	FD.10	0.10	"		S				x		Asbestos Samples in PNO
11	FD.11	0.15	"		S	x					
12	FD.HQA	0.15	"		S	x					
13	FD.12	0.15	"		S	x					
14	FD.13	0.15	"		S				x		Asbestos Samples in Dunedin.
15	FD.14	0.20	"		S	x		x			
16					S						
17					S						
18					S						
19					S						

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
	All soils, sediment, sludge	Potable, Ground, Bore, Surface, Fresh	Sea Water, Geothermal	Effluent, Trade Waste, Leachate

Sender Name		Received by (Lab Staff)		Courier company		Courier #	
Date Sent		Time sent	am : pm	Date Received		Time Received	am : pm	Seal Status		Sample Chilled	

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Samples transferred to:
Date: 9.9.22
Initials EK

Auckland	
Hamilton To:	✓
Wellington	
Christchurch	
Dunedin From	✓

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION			Page #	1	of	9
Client	WSP		Customer Comments / Instructions			
Address	69 Tarbert St., Alexandra					
Project Leader	Tara Verhulst					
Project ID	6-XZ738.00	PO #				
Site	Shannon Farm, Cromwell					
Sampler	Tara Verhulst					
Phone	02902010739					
Email	tara.verhulst@wsp.com					
Invoice Email	NZ.AP@wsp.com					

Samples spread over several chilly bins. Samples often labeled without "S" in front of numbers, however these are same samples.

LABORATORY USE ONLY							
Laboratory Job #			Seal Status		Priority (mark with X)		
Date Received	/ /	Received By		Sample Temp Status		Routine	x	Urgent	

TESTS REQUESTED

Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: HM-8	Analysis Requests/Suites: COC				Sample Comments
29	SS.1A		6/9/22	:	S or W		x	x				
	SS.1B		〃	:	S or W							composite
	SS.1C		〃	:	S or W							
	SS.2A		〃	:	S or W		x	x				
	SS.2B		〃	:	S or W							comp.
	SS.2C		〃	:	S or W							
	SS.3A		〃	:	S or W		x	x				
	SS.3B		〃	:	S or W							comp.
	SS.3C		〃	:	S or W							
	SS.4A		〃	:	S or W		x	x				
	SS.4B		〃	:	S or W							comp.
	SS.4C		〃	:	S or W							
	SS.5A		〃	:	S or W		x	x				
	SS.5B		〃	:	S or W							comp.
	SS.5C		〃	:	S or W							
	SS.6A		〃	:	S or W		x	x				
	SS.6B		〃	:	S or W							comp.
46	SS.6C		〃	:	S or W							

Relinquished by			Received by	DR		Courier	NZC
Date	/ /	Time	:	Date	12/9/22	Time	11 AM	Courier #	8WC0001563

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Lab ID (Lab use only)		Registered By		Date Registered	
Client	WSP								
Address	69 Tarbert Street, Alexandra								
Project Leader	Tara Verhulst								
Project ID	6-XZ738.00	PO Number							
Site	Shannon Farm Cromwell								
Sampler	Tara Verhulst								
Phone	029 02010739								
Email	tara.verhulst@wsp.com								
Invoice Email	NZ.AP@wsp.com								

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED												
	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests, high odour, bulk material)
						Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX			
7	1 SS.6D		6/9/22		S	x	x				
	2 SS.6D.QA		"		S	x	x				
	3 SS.7A		"		S	x	x				composite
	4 SS.7B		"		S						
	5 SS.7C		"		S						
	6 SS.8A		"		S	x	x				comp.
	7 SS.8B		"		S						
	8 SS.8C		"		S						
	9 SS.9A		"		S	x	x				comp.
	10 SS.9B		"		S						
	11 SS.9C		"		S						
	12 SS.1A		"		S	x	x				comp.
	13 SS.1B		"		S						
	14 SS.1C		"		S						
	15 SS.2A		"		S	x	x				comp.
	16 SS.2B		"		S						
3	17 SS.2C		"		S						
	18				S						
	19				S						

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
	All soils, sediment, sludge	Potable, Ground, Bore, Surface, Fresh	Sea Water, Geothermal	Effluent, Trade Waste, Leachate

Sender Name		Received by (Lab Staff)		Courier company		Courier #	
Date Sent		Time sent am : pm	Date Received		Time Received am : pm	Seal Status	Sample Chilled

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CHAIN OF CUSTODY

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Project Leader	Tara Verhulst								
Project ID	6-XZ738.00	PO Number							
Site	Shannon Farm Cromwell								
Sampler	Tara Verhulst								
Phone	029 02010739								
Email	tara.verhulst@wsp.com								
Invoice Email	NZ.AP@wsp.com								

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED

	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests, high odour, bulk material)
						Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX			
1	56.3A				S	x	x				composite
2	56.3B				S						
3	56.3C				S						
4	56.4A				S	x	x				comp.
5	56.4B				S						
6	56.4C				S						
7	56.4D				S	x	x				
8	56.4D.QA				S	x	x				
9	56.5A				S	x	x				comp.
10	56.5B				S						
11	56.5C				S						
12	56.6A				S	x	x				comp.
13	56.6B				S						
14	56.6C				S						
15	56.7A				S	x	x				comp.
16	56.7B				S						
17	56.7C				S						
18					S						
19					S						

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
	All soils, sediment, sludge	Potable, Ground, Bore, Surface, Fresh	Sea Water, Geothermal	Effluent, Trade Waste, Leachate

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Project ID	6-XZ738.00	PO Number							
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Sampler	Tara Verhulst								
Phone	029 02010739								
Email	tara.verhulst@wsp.com								
Invoice Email	NZ.AP@wsp.com								

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED										
					Analysis Requests/Suites [Enter Test Code Below]					
	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX			Sample Comments (ie: extra test requests,high odour, bulk material)
1	56.8A		6/9/22		S	x	x				
2	56.8B		"		S						composite
3	56.8C		"		S						
4	56.9A		"		S	x	x				
5	56.9B		"		S						comp.
6	56.9C		"		S						
7	56.10A		"		S	x	x				
8	56.10B		"		S						comp.
9	56.10C		"		S						
10	56.11A		"		S	x	x				
11	56.11B		"		S						comp.
12	56.11C		"		S						
13	56.12A		"		S	x	x				
14	56.12B		"		S						comp.
15	56.12C		"		S						
16	56.13A		"		S	x	x				
17	56.13B		"		S						comp.
18	56.13C		"		S						
19	6.13D		"		S	x	x				

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
	All soils, sediment, sludge	Potable, Ground, Bore, Surface, Fresh	Sea Water, Geothermal	Effluent, Trade Waste, Leachate

Sender Name		Received by (Lab Staff)		Courier company		Courier #	
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Invoice Email	NZ.AP@wsp.com								

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED

	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests, high odour, bulk material)
						Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX			
01	S6.13D QA				S	x	x				
2.	S6.14A				S	x	x				composite
3.	S6.14B				S						
4.	S6.14C				S						
5	S6.15A				S	x	x				comp.
6	S6.15B				S						
7.	S6.15C				S						
8.	S6.16A				S	x	x				comp.
9.	S6.16B				S						
10	S6.16C				S						
11	S6.17A				S	x	x				comp.
12	S6.17B				S						
13	S6.17C				S						
14	S6.18A				S	x	x				comp.
15	S6.18B				S						
S 16	S6.18C				S						
17					S						
18					S						
19					S						

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
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Invoice Email	NZ.AP@wsp.com								

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED												
	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests, high odour, bulk material)
						Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX			
6	1 FA1	0.15	6/9/22		S	x	x				
	2 FA2	0.20	"		S	x	x				
	3 FA3	0.10	"		S	x	x				
	4 FA4	0.10	"		S	x	x				
	5 FA5	0.15	"		S	x	x				
	6 FA6	0.15	"		S	x	x	x			
	7 FA7	0.20	"		S	x	x				
	8 FA7.QA	0.20	"		S	x	x				
	9 FA8	0.15	"		S	x	x				
	10 FA9	0.20	"		S	x	x				
	11 FA 10	0.20	"		S	x	x				
	12 FA 11	0.05	"		S	x	x				
	13 FA12	0.20	"		S	x	x				
	14 FA12.QA	0.20	"		S	x	x				
	15 FF1	0.15	"		S	x	x				
	16 FF2	0.15	"		S	x					
	17 FF3	0.05	"		S	x	x				
	18 FF4	0.20	"		S	x	x				
9	19 FF5	0.15	"		S	x					

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
	All soils, sediment, sludge	Potable, Ground, Bore, Surface, Fresh	Sea Water, Geothermal	Effluent, Trade Waste, Leachate

Sender Name		Received by (Lab Staff)		Courier company		Courier #	
Date Sent		Time sent	am : pm	Date Received		Time Received	am : pm	Seal Status		Sample Chilled	

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analytica.co.nz

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Lab ID (Lab use only)		Registered By		Date Registered	
Client	WSP								
Address	69 Tarbert Street, Alexandra								
Project Leader	Tara Verhulst								
Project ID	6-XZ738.00	PO Number							
Site	Shannon Farm Cromwell								
Sampler	Tara Verhulst								
Phone	029 02010739								
Email	tara.verhulst@wsp.com								
Invoice Email	NZ.AP@wsp.com								

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED											
	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests,high odour, bulk material)
						Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX			
35	1 FF6	0.15	6/9/22		S	x	x	x			
	2 FF7	0.15	"		S	x					
	3 FC1	0.05	"		S	x		x			
	4 FC2	0.25	"		S	x		x			
	5 FC3	0.10	"		S	x		x			
	6 FC4	0.10	"		S	x		x			
	7 FC5	0.40	"		S	x		x			
	8 FC6	0.10	"		S	x		x			
	9 FC7	0.10	"		S	x		x			
	10 FC8	0.15	"		S	x		x			
	11 TP01-S1	1.00	7/9/22		S	x		x			
	12 TP02-S2	0.30	"		S	x					
	13 TP03-S3	0.30	"		S	x		x			
	14 TP04-S4	0.10	"		S	x					
	15 TP05-S5	0.50	"		S	x		x			
	16 TP05-S6	0.05	"		S	x		x			
	17 TP06-S7	0.15	"		S	x		x			
	18 TP07-S8	0.30	"		S	x		x			
33	19 TP08-S9	0.50	"		S	x	x	x			

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
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CHAIN OF CUSTODY

ANALYTICA LABORATORIES

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Client	WSP								
Address	69 Tarbert Street, Alexandra								
Project Leader	Tara Verhulst								
Project ID	6-XZ738.00	PO Number							
Site	Shannon Farm Cromwell								
Sampler	Tara Verhulst								
Phone	029 02010739								
Email	tara.verhulst@wsp.com								
Invoice Email	NZ.AP@wsp.com								

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED											
	Sample ID	Depth (mm)	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests, high odour, bulk material)
						Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX	TPH/PAH		
1	TP08-S10	1.0	7/9/22		S	x	x	x			
2	TP09-S11	0.20	"		S	x	x				
3	TP09-S12	0.10	"		S	x	x				
4	TP10-S13	0.25	"		S	x					
5	TP10-S14	0.80	"		S	x		x			
6	TP10-S15	1.0	"		S	x					
7	TP11-S15	0.15	"		S	x					
8	TP12-S16	0.20	"		S	x		x			
9	TP12-S17	0.50	"		S	x		x			
10	TP13-S17	0.20	"		S	x			x		
11	TP13-S18	0.20	"		S	x		x			
12	TP13-S19A	0.15	"		S	x		x			
13	TP13-S19	0.50	"		S	x			x		
14	TP13-S19QA	0.50	"		S	x					
15	TP13-S20	0.40	"		S	x			x		
16	TP13-S21	0.20	"		S	x		x			
17	TP14-S22	0.20	"		S	x					
18	TP15-S23	0.30	"		S	x		x			
19	TP16-S24	0.15	"		S	x		x			

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
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Project ID	6-XZ738.00	PO Number							
Site	Shannon Farm Cromwell								
Sampler	Tara Verhulst								
Phone	029 02010739								
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Invoice Email	NZ.AP@wsp.com								

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED

	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests,high odour, bulk material)
						Heavy metals - ICP_S_HM8	OCP	TPH/PAH/BTEX			
13 1	TP16-S24QA	0.15	7/9/22		S	x					
2	TP17-S25	0.30	"		S	x		x			
3	TP18-S26	0.50	"		S	x		x			
16 4	TP19-S27	0.20	"		S	x					
5					S						
6					S						
7					S						
8					S						
9					S						
10					S						
11					S						
12					S						
13					S						
14					S						
15					S						
16					S						
17					S						
18					S						
19					S						

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
	All soils, sediment, sludge	Potable, Ground, Bore, Surface, Fresh	Sea Water, Geothermal	Effluent, Trade Waste, Leachate

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Samples transferred to:
Date: 9.9.22
Initials EK

Auckland	
Hamilton To:	✓
Wellington	
Christchurch	
Dunedin Fedex:	✓

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sales@analytica.co.nz
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Certificate of Analysis

WSP New Zealand Limited
69 Tarbert Street
Alexandra 9320

Attention: Tara Verhulst
Phone: 029 020 10739
Email: tara.verhulst@wsp.com

Lab Reference: 22-33488
Submitted by: Tara Verhulst
Date Received: 13/09/2022
Testing Initiated: 13/09/2022
Date Completed: 20/09/2022
Order Number:
Reference: 6-XZ738.00

Sampling Site: Shannon Farm, Cromwell

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Heavy Metals in Soil

		Client Sample ID	FD.1 0.20	FD.2 0.15	FD.3 0.15	FD.4 0.20	FD.5 0.15
		Date Sampled	08/09/2022	08/09/2022	08/09/2022	08/09/2022	08/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-16	22-33488-17	22-33488-18	22-33488-19	22-33488-20
Arsenic	mg/kg dry wt	*0.125*	14.3	8.5	7.8	14.0	13.6
Cadmium	mg/kg dry wt	*0.005*	0.066	0.29	0.039	0.089	0.27
Chromium	mg/kg dry wt	*0.125*	17.9	12	8.8	15.3	13.9
Copper	mg/kg dry wt	*0.075*	24.6	35.4	16.5	30.0	27.8
Lead	mg/kg dry wt	*0.25*	17.2	22.2	13.1	24.8	64.5
Mercury	mg/kg dry wt	*0.025*	<0.025	0.040	<0.025	<0.025	0.037
Nickel	mg/kg dry wt	*0.05*	23.6	16.5	12.1	21.8	14.4
Zinc	mg/kg dry wt	*0.05*	173	173	68.1	120	304

Heavy Metals in Soil

		Client Sample ID	FD.6 0.15	FD.7 0.20	FD.8 0.20	FD.9 0.15	FD.11.QA 0.15
		Date Sampled	08/09/2022	08/09/2022	08/09/2022	08/09/2022	08/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-21	22-33488-22	22-33488-23	22-33488-24	22-33488-25
Arsenic	mg/kg dry wt	*0.125*	13.7	12	11	16.1	7.1
Cadmium	mg/kg dry wt	*0.005*	0.30	0.17	0.15	0.11	0.073
Chromium	mg/kg dry wt	*0.125*	13.2	12	11	17.1	10
Copper	mg/kg dry wt	*0.075*	28.1	94.9	26.5	29.7	15.0
Lead	mg/kg dry wt	*0.25*	42.7	58.1	40.4	24.7	19.8
Mercury	mg/kg dry wt	*0.025*	0.027	<0.025	0.033	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	15.6	15.1	14.1	18.6	12.2
Zinc	mg/kg dry wt	*0.05*	463	141	168	119	88.4

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.
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Heavy Metals in Soil

Client Sample ID			FD.11 0.15	FD.12 0.15	FD.14 0.20	S5.6D	S5.6D.QA
Date Sampled			08/09/2022	08/09/2022	08/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-26	22-33488-27	22-33488-28	22-33488-47	22-33488-48
Arsenic	mg/kg dry wt	*0.125*	8.7	17.7	17.5	9.7	9.8
Cadmium	mg/kg dry wt	*0.005*	0.080	0.16	0.40	0.12	0.11
Chromium	mg/kg dry wt	*0.125*	12	18.6	20.6	9.3	10
Copper	mg/kg dry wt	*0.075*	17.5	37.3	56.0	11.5	11.3
Lead	mg/kg dry wt	*0.25*	22.3	74.2	76.8	16.3	15.8
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	0.12	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	14.5	25.2	34.1	10.3	10.6
Zinc	mg/kg dry wt	*0.05*	84.0	232	472	46.3	45.0

Heavy Metals in Soil

Client Sample ID			S6.4D	S6.4D.QA	6.13D	S6.13D.QA	FA1 0.15
Date Sampled					06/09/2022		06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-70	22-33488-71	22-33488-99	22-33488-100	22-33488-116
Arsenic	mg/kg dry wt	*0.125*	6.4	6.3	6.6	6.8	17.0
Cadmium	mg/kg dry wt	*0.005*	0.10	0.12	0.13	0.14	0.079
Chromium	mg/kg dry wt	*0.125*	8.8	8.7	9.2	9.5	14.6
Copper	mg/kg dry wt	*0.075*	10.4	10.4	11.1	11.5	27.3
Lead	mg/kg dry wt	*0.25*	9.71	9.72	10.4	10.1	15.9
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	9.13	9.16	9.42	9.42	20.9
Zinc	mg/kg dry wt	*0.05*	42.8	42.7	45.7	49.0	115

Heavy Metals in Soil

Client Sample ID			FA2 0.20	FA3 0.10	FA4 0.10	FA5 0.15	FA6 0.15
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-117	22-33488-118	22-33488-119	22-33488-120	22-33488-121
Arsenic	mg/kg dry wt	*0.125*	11	9.3	11	9.8	15.9
Cadmium	mg/kg dry wt	*0.005*	0.024	0.17	0.20	0.18	0.13
Chromium	mg/kg dry wt	*0.125*	11	10	12	11	17.7
Copper	mg/kg dry wt	*0.075*	20.5	52.6	62.3	36.7	57.9
Lead	mg/kg dry wt	*0.25*	14.4	21.1	66.2	15.7	447
Mercury	mg/kg dry wt	*0.025*	<0.025	0.027	0.026	<0.025	0.039
Nickel	mg/kg dry wt	*0.05*	19.6	20.5	17.1	15.1	23.6
Zinc	mg/kg dry wt	*0.05*	57.3	665	223	254	142

Heavy Metals in Soil

Client Sample ID			FA7 0.20	FA7.QA 0.20	FA8 0.15	FA9 0.20	FA10 0.20
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-122	22-33488-123	22-33488-124	22-33488-125	22-33488-126
Arsenic	mg/kg dry wt	*0.125*	11	12	14.9	14.8	13.2
Cadmium	mg/kg dry wt	*0.005*	0.26	0.20	0.16	0.078	0.033
Chromium	mg/kg dry wt	*0.125*	13.2	12	13.8	14.7	15.8
Copper	mg/kg dry wt	*0.075*	41.9	36.2	26.9	25.1	19.9
Lead	mg/kg dry wt	*0.25*	23.8	23.0	21.3	20.9	17.0
Mercury	mg/kg dry wt	*0.025*	0.030	0.033	0.047	<0.025	<0.025

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Heavy Metals in Soil

	Client Sample ID		FA7 0.20	FA7.QA 0.20	FA8 0.15	FA9 0.20	FA10 0.20
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Nickel	mg/kg dry wt	*0.05*	16.5	16.7	19.1	19.0	20.5
Zinc	mg/kg dry wt	*0.05*	410	290	166	100	78.4

Heavy Metals in Soil

	Client Sample ID		FA11 0.05	FA12 0.20	FA12.QA 0.20	FF1 0.15	FF2 0.15
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-127	22-33488-128	22-33488-129	22-33488-130	22-33488-131
Arsenic	mg/kg dry wt	*0.125*	7.4	17.5	18.2	13.1	12
Cadmium	mg/kg dry wt	*0.005*	1.09	0.12	0.15	0.048	0.042
Chromium	mg/kg dry wt	*0.125*	12.6	15.8	17.6	14.9	15.8
Copper	mg/kg dry wt	*0.075*	181	33.6	27.6	20.6	20.6
Lead	mg/kg dry wt	*0.25*	19.2	22.8	23.1	16.5	15.6
Mercury	mg/kg dry wt	*0.025*	0.026	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	26.3	17.5	17.5	21.6	21.4
Zinc	mg/kg dry wt	*0.05*	8,380	179	176	71.1	84.8

Heavy Metals in Soil

	Client Sample ID		FF3 0.05	FF4 0.20	FF5 0.15	FF6 0.15	FF7 0.15
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-132	22-33488-133	22-33488-134	22-33488-135	22-33488-136
Arsenic	mg/kg dry wt	*0.125*	12	9.5	12.7	12.7	11
Cadmium	mg/kg dry wt	*0.005*	0.089	0.095	0.10	0.11	0.11
Chromium	mg/kg dry wt	*0.125*	14.2	12	16.1	16.2	14.4
Copper	mg/kg dry wt	*0.075*	22.8	22.8	26.9	24.2	24.4
Lead	mg/kg dry wt	*0.25*	18.2	24.8	41.5	19.4	27.1
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	0.031	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	19.7	15.6	21.5	21.6	19.3
Zinc	mg/kg dry wt	*0.05*	99.0	306	112	106	200

Heavy Metals in Soil

	Client Sample ID		FC1 0.05	FC2 0.25	FC3 0.10	FC4 0.10	FC5 0.40
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-137	22-33488-138	22-33488-139	22-33488-140	22-33488-141
Arsenic	mg/kg dry wt	*0.125*	11	12.6	12	14.7	13.7
Cadmium	mg/kg dry wt	*0.005*	0.12	0.16	0.23	0.18	0.076
Chromium	mg/kg dry wt	*0.125*	14.8	14.8	14.0	17.3	15.6
Copper	mg/kg dry wt	*0.075*	31.9	25.7	35.1	29.7	17.7
Lead	mg/kg dry wt	*0.25*	32.2	73.3	64.6	56.4	18.4
Mercury	mg/kg dry wt	*0.025*	0.058	0.067	0.098	0.10	<0.025
Nickel	mg/kg dry wt	*0.05*	17.0	18.3	16.8	18.6	19.3
Zinc	mg/kg dry wt	*0.05*	149	176	240	189	109

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Heavy Metals in Soil

Client Sample ID			FC6 0.10	FC7 0.10	FC8 0.15	TP01-S1 1.00	TP02-S2 0.30
Date Sampled			06/09/2022	06/09/2022	06/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-142	22-33488-143	22-33488-144	22-33488-145	22-33488-146
Arsenic	mg/kg dry wt	*0.125*	13.7	14.0	13.0	16.5	14.4
Cadmium	mg/kg dry wt	*0.005*	0.042	0.061	0.052	0.055	0.11
Chromium	mg/kg dry wt	*0.125*	16.3	17.3	17.4	15.0	15.0
Copper	mg/kg dry wt	*0.075*	18.9	20.7	19.7	25.8	27.6
Lead	mg/kg dry wt	*0.25*	17.7	27.5	18.7	19.5	34.8
Mercury	mg/kg dry wt	*0.025*	0.026	0.067	0.035	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	20.0	19.6	19.0	25.8	20.5
Zinc	mg/kg dry wt	*0.05*	74.5	104	78.8	74.6	98.0

Heavy Metals in Soil

Client Sample ID			TP03-S3 0.30	TP04-S4 0.10	TP05-S5 0.50	TP05-S6 0.05	TP06-S7 0.15
Date Sampled			07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-147	22-33488-148	22-33488-149	22-33488-150	22-33488-151
Arsenic	mg/kg dry wt	*0.125*	14.8	10	14.0	13.3	14.4
Cadmium	mg/kg dry wt	*0.005*	0.059	0.17	0.054	0.19	0.11
Chromium	mg/kg dry wt	*0.125*	16.7	12	16.9	14.9	15.7
Copper	mg/kg dry wt	*0.075*	22.4	23.9	20.4	23.8	22.7
Lead	mg/kg dry wt	*0.25*	18.2	21.0	18.6	22.6	20.7
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	0.026	0.026
Nickel	mg/kg dry wt	*0.05*	22.8	16.4	22.3	19.2	21.2
Zinc	mg/kg dry wt	*0.05*	79.8	224	79.8	137	99.6

Heavy Metals in Soil

Client Sample ID			TP07-S8 0.30	TP08-S9 0.50	TP08-S10 1.0	TP09-S11 0.20	TP09-S12 0.10
Date Sampled			07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-152	22-33488-153	22-33488-154	22-33488-155	22-33488-156
Arsenic	mg/kg dry wt	*0.125*	13.5	12.7	10	47.8	17.0
Cadmium	mg/kg dry wt	*0.005*	0.37	0.044	0.072	0.089	2.30
Chromium	mg/kg dry wt	*0.125*	15.7	11	9.2	13.2	12
Copper	mg/kg dry wt	*0.075*	31.6	22.0	20.8	26.1	1,300
Lead	mg/kg dry wt	*0.25*	41.2	14.0	22.3	22.3	31.0
Mercury	mg/kg dry wt	*0.025*	0.062	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	19.0	14.1	12.9	18.3	24.7
Zinc	mg/kg dry wt	*0.05*	327	60.3	64.3	110	5,060

Heavy Metals in Soil

Client Sample ID			TP10-S13 0.25	TP10-S14 0.20	TP10-S15 1.0	TP11-S15 0.15	TP12-S16 0.20
Date Sampled			07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-157	22-33488-158	22-33488-159	22-33488-160	22-33488-161
Arsenic	mg/kg dry wt	*0.125*	13.1	6.9	13.0	11	8.8
Cadmium	mg/kg dry wt	*0.005*	1.78	0.064	0.082	0.083	0.36
Chromium	mg/kg dry wt	*0.125*	9.5	8.6	14.0	14.8	9.5
Copper	mg/kg dry wt	*0.075*	1,030	14.2	23.0	22.7	34.9
Lead	mg/kg dry wt	*0.25*	24.3	9.92	17.3	14.9	288
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	0.080

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Heavy Metals in Soil

			Client Sample ID	TP10-S13 0.25	TP10-S14 0.20	TP10-S15 1.0	TP11-S15 0.15	TP12-S16 0.20
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Nickel	mg/kg dry wt	*0.05*		19.3	10.2	18.4	20.1	12.4
Zinc	mg/kg dry wt	*0.05*		3,950	59.4	92.0	86.8	583

Heavy Metals in Soil

			Client Sample ID	TP12-S17 0.50	TP13-S17 0.20	TP13-S18 0.20	TP13-S19A 0.15	TP13-S19 0.50
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-162	22-33488-163	22-33488-164	22-33488-165	22-33488-166
Arsenic	mg/kg dry wt	*0.125*		11	12	12.6	12	15.3
Cadmium	mg/kg dry wt	*0.005*		0.094	0.046	0.085	0.14	0.053
Chromium	mg/kg dry wt	*0.125*		12.9	14.6	17.1	16.8	19.6
Copper	mg/kg dry wt	*0.075*		24.2	18.9	20.5	120	26.4
Lead	mg/kg dry wt	*0.25*		20.1	14.4	17.3	20.2	20.0
Mercury	mg/kg dry wt	*0.025*		<0.025	<0.025	<0.025	<0.025	0.033
Nickel	mg/kg dry wt	*0.05*		20.3	20.1	22.2	20.1	25.2
Zinc	mg/kg dry wt	*0.05*		98.2	69.9	83.8	90.5	90.5

Heavy Metals in Soil

			Client Sample ID	TP13-S19QA 0.50	TP13-S20 0.40	TP13-S21 0.20	TP14-S22 0.20	TP15-S23 0.30
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-167	22-33488-168	22-33488-169	22-33488-170	22-33488-171
Arsenic	mg/kg dry wt	*0.125*		16.0	12	11	10	12
Cadmium	mg/kg dry wt	*0.005*		0.047	0.084	0.072	0.12	0.083
Chromium	mg/kg dry wt	*0.125*		19.5	15.3	13.4	14.1	14.8
Copper	mg/kg dry wt	*0.075*		27.0	20.2	17.5	53.1	19.9
Lead	mg/kg dry wt	*0.25*		20.2	16.5	14.1	59.9	18.8
Mercury	mg/kg dry wt	*0.025*		<0.025	<0.025	<0.025	0.062	<0.025
Nickel	mg/kg dry wt	*0.05*		26.2	21.8	20.4	18.5	20.8
Zinc	mg/kg dry wt	*0.05*		91.4	78.2	67.1	347	95.1

Heavy Metals in Soil

			Client Sample ID	TP16-S24 0.15	TP16-S24QA 0.15	TP17-S25 0.30	TP18-S26 0.50	TP19-S27 0.20
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-172	22-33488-173	22-33488-174	22-33488-175	22-33488-176
Arsenic	mg/kg dry wt	*0.125*		12.8	18.3	14.1	13.8	14.2
Cadmium	mg/kg dry wt	*0.005*		0.27	0.29	0.035	0.032	0.45
Chromium	mg/kg dry wt	*0.125*		17.0	19.3	16.6	17.0	17.5
Copper	mg/kg dry wt	*0.075*		40.9	47.3	20.2	17.3	36.3
Lead	mg/kg dry wt	*0.25*		56.3	60.5	17.9	17.6	33.9
Mercury	mg/kg dry wt	*0.025*		0.067	0.049	<0.025	<0.025	0.027
Nickel	mg/kg dry wt	*0.05*		26.2	29.5	20.5	21.5	20.7
Zinc	mg/kg dry wt	*0.05*		254	271	74.2	76.8	450

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Heavy Metals in Soil

Client Sample ID			Composite (S1.1A, S1.1B, S1.1C)	Composite (S1.2A, S1.2B, S1.2C)	Composite (S1.3A, S1.3B, S1.3C)	Composite (S1.4A, S1.4B, S1.4C)	Composite (S1.5A, S1.5B, S1.5C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-177	22-33488-178	22-33488-179	22-33488-180	22-33488-181
Arsenic	mg/kg dry wt	*0.125*	13.2	13.4	13.5	13.7	13.5
Cadmium	mg/kg dry wt	*0.005*	0.14	0.14	0.17	0.13	0.17
Chromium	mg/kg dry wt	*0.125*	15.9	16.0	17.3	15.9	15.8
Copper	mg/kg dry wt	*0.075*	108	124	132	86.9	201
Lead	mg/kg dry wt	*0.25*	17.5	16.7	17.5	16.3	16.3
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	25.9	24.7	24.3	23.1	22.4
Zinc	mg/kg dry wt	*0.05*	97.4	94.0	103	86.9	101

Heavy Metals in Soil

Client Sample ID			Composite (S5.1A, S5.1B, S5.1C)	Composite (S5.2A, S5.2B, S5.2C)	Composite (S5.3A, S5.3B, S5.3C)	Composite (S5.4A, S5.4B, S5.4C)	Composite (S5.5A, S5.5B, S5.5C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-182	22-33488-183	22-33488-184	22-33488-185	22-33488-186
Arsenic	mg/kg dry wt	*0.125*	7.6	8.4	9.5	8.1	8.9
Cadmium	mg/kg dry wt	*0.005*	0.12	0.12	0.14	0.16	0.13
Chromium	mg/kg dry wt	*0.125*	8.7	9.0	10	9.6	9.6
Copper	mg/kg dry wt	*0.075*	12.8	11.3	12.2	11.5	12.0
Lead	mg/kg dry wt	*0.25*	11.0	13.5	14.1	13.0	14.3
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	9.49	10.1	11.1	10.2	10.3
Zinc	mg/kg dry wt	*0.05*	44.8	46.2	48.8	52.3	47.6

Heavy Metals in Soil

Client Sample ID			Composite (S5.6A, S5.6B, S5.6C)	Composite (S5.7A, S5.7B, S5.7C)	Composite (S5.8A, S5.8B, S5.8C)	Composite (S5.9A, S5.9B, S5.9C)	Composite (S6.1A, S6.1B, S6.1C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-187	22-33488-188	22-33488-189	22-33488-190	22-33488-191
Arsenic	mg/kg dry wt	*0.125*	8.0	8.7	8.5	8.5	5.8
Cadmium	mg/kg dry wt	*0.005*	0.14	0.15	0.14	0.12	0.16
Chromium	mg/kg dry wt	*0.125*	8.6	9.1	8.9	8.4	8.1
Copper	mg/kg dry wt	*0.075*	10.5	10.4	10.8	9.57	10.7
Lead	mg/kg dry wt	*0.25*	13.2	15.1	14.8	17.0	9.88
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	9.29	9.67	9.33	8.53	8.53
Zinc	mg/kg dry wt	*0.05*	47.5	44.0	45.4	42.2	41.2

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Heavy Metals in Soil

Client Sample ID			Composite (S6.2A, S6.2B, S6.2C)	Composite (S6.3A, S6.3B, S6.3C)	Composite (S6.4A, S6.4B, S6.4C)	Composite (S6.5A, S6.5B, S6.5C)	Composite (S6.6A, S6.6B, S6.6C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-192	22-33488-193	22-33488-194	22-33488-195	22-33488-196
Arsenic	mg/kg dry wt	*0.125*	5.3	6.1	5.7	5.4	5.4
Cadmium	mg/kg dry wt	*0.005*	0.091	0.060	0.067	0.11	0.11
Chromium	mg/kg dry wt	*0.125*	7.4	7.8	8.2	8.9	8.0
Copper	mg/kg dry wt	*0.075*	11.1	12.9	13.3	11.2	10.3
Lead	mg/kg dry wt	*0.25*	9.23	10.5	11.1	8.94	9.46
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	8.01	8.21	8.83	7.80	8.32
Zinc	mg/kg dry wt	*0.05*	38.4	41.2	45.2	40.4	40.4

Heavy Metals in Soil

Client Sample ID			Composite (S6.7A, S6.7B, S6.7C)	Composite (S6.8A, S6.8B, S6.8C)	Composite (S6.9A, S6.9B, S6.9C)	Composite (S6.10A, S6.10B, S6.10C)	Composite (S6.11A, S6.11B, S6.11C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-197	22-33488-198	22-33488-199	22-33488-200	22-33488-201
Arsenic	mg/kg dry wt	*0.125*	6.1	5.9	5.2	5.3	5.3
Cadmium	mg/kg dry wt	*0.005*	0.13	0.12	0.10	0.098	0.13
Chromium	mg/kg dry wt	*0.125*	8.1	7.9	7.6	7.2	7.2
Copper	mg/kg dry wt	*0.075*	10.4	10.1	9.34	9.38	9.45
Lead	mg/kg dry wt	*0.25*	9.11	10.4	9.20	8.62	9.53
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	7.98	8.19	7.78	7.68	7.65
Zinc	mg/kg dry wt	*0.05*	39.7	41.3	39.4	37.8	39.6

Heavy Metals in Soil

Client Sample ID			Composite (S6.12A, S6.12B, S6.12C)	Composite (S6.13A, S6.13B, S6.13C)	Composite (S6.14A, S6.14B, S6.14C)	Composite (S6.15A, S6.15B, S6.15C)	Composite (S6.16A, S6.16B, S6.16C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-202	22-33488-203	22-33488-204	22-33488-205	22-33488-206
Arsenic	mg/kg dry wt	*0.125*	6.0	5.7	5.4	5.9	6.2
Cadmium	mg/kg dry wt	*0.005*	0.12	0.15	0.12	0.12	0.11
Chromium	mg/kg dry wt	*0.125*	7.9	8.1	6.9	7.5	7.7
Copper	mg/kg dry wt	*0.075*	9.50	9.54	8.48	9.01	8.96
Lead	mg/kg dry wt	*0.25*	9.64	9.45	9.14	9.12	9.05
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	8.07	7.99	7.46	8.05	7.70
Zinc	mg/kg dry wt	*0.05*	39.6	41.5	36.6	40.4	42.6

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Heavy Metals in Soil

Client Sample ID			Composite (S6.17A, S6.17B, S6.17C)	Composite (S6.18A, S6.18B, S6.18C)
Date Sampled				
Analyte	Unit	*Reporting Limit*	22-33488-207	22-33488-208
Arsenic	mg/kg dry wt	*0.125*	5.5	5.4
Cadmium	mg/kg dry wt	*0.005*	0.11	0.11
Chromium	mg/kg dry wt	*0.125*	7.4	7.3
Copper	mg/kg dry wt	*0.075*	8.46	8.68
Lead	mg/kg dry wt	*0.25*	9.52	10.4
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	7.41	7.88
Zinc	mg/kg dry wt	*0.05*	39.1	38.2

Organochlorine Pesticides - Soil

Client Sample ID			FD.2 0.15	FD.3 0.15	FD.7 0.20	FD.8 0.20	FD.9 0.15
Date Sampled			08/09/2022	08/09/2022	08/09/2022	08/09/2022	08/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-17	22-33488-18	22-33488-22	22-33488-23	22-33488-24
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	0.0088	<0.0050	0.076	0.015	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	0.0085	<0.0050	0.0087	0.013	<0.0050
Total DDT	mg/kg dry wt	*0.02*	0.020	<0.020	0.080	0.030	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	0.024	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	100	130	95	92	94

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Organochlorine Pesticides - Soil

Client Sample ID			S5.6D	S5.6D.QA	S6.4D	S6.4D.QA	6.13D
Date Sampled			06/09/2022	06/09/2022			06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-47	22-33488-48	22-33488-70	22-33488-71	22-33488-99
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	130	140	140	130	100

Organochlorine Pesticides - Soil

Client Sample ID			S6.13D.QA	FA1 0.15	FA2 0.20	FA3 0.10	FA4 0.10
Date Sampled				06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-100	22-33488-116	22-33488-117	22-33488-118	22-33488-119
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010

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Organochlorine Pesticides - Soil

			Client Sample ID	S6.13D.QA	FA1 0.15	FA2 0.20	FA3 0.10	FA4 0.10
			Date Sampled		06/09/2022	06/09/2022	06/09/2022	06/09/2022
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*		100	130	130	99	100

Organochlorine Pesticides - Soil

			Client Sample ID	FA5 0.15	FA6 0.15	FA7 0.20	FA7.QA 0.20	FA8 0.15
			Date Sampled	06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-120	22-33488-121	22-33488-122	22-33488-123	22-33488-124
2,4'-DDD	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*		<0.050	0.17	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*		130	97	130	130	130

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Organochlorine Pesticides - Soil

	Client Sample ID		FA9 0.20	FA10 0.20	FA11 0.05	FA12 0.20	FA12.QA 0.20
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-125	22-33488-126	22-33488-127	22-33488-128	22-33488-129
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	0.0065
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	0.012	0.017
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	0.0079	0.025
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	0.020	0.050
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	0.053
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	140	140	130	98	97

Organochlorine Pesticides - Soil

	Client Sample ID		FF1 0.15	FF3 0.05	FF4 0.20	FF6 0.15	TP08-S9 0.50
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	06/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-130	22-33488-132	22-33488-133	22-33488-135	22-33488-153
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010

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Organochlorine Pesticides - Soil

		Client Sample ID	FF1 0.15	FF3 0.05	FF4 0.20	FF6 0.15	TP08-S9 0.50
		Date Sampled	06/09/2022	06/09/2022	06/09/2022	06/09/2022	07/09/2022
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	130	130	130	130	96

Organochlorine Pesticides - Soil

		Client Sample ID	TP08-S10 1.0	TP09-S11 0.20	TP09-S12 0.10	Composite (S1.1A, S1.1B, S1.1C)	Composite (S1.2A, S1.2B, S1.2C)
		Date Sampled	07/09/2022	07/09/2022	07/09/2022		
Analyte	Unit	*Reporting Limit*	22-33488-154	22-33488-155	22-33488-156	22-33488-177	22-33488-178
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	0.021	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	0.0077	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	0.030	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	0.054	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	0.067	0.083	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	99	98	93	140	130

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Organochlorine Pesticides - Soil

			Client Sample ID	Composite (S1.3A, S1.3B, S1.3C)	Composite (S1.4A, S1.4B, S1.4C)	Composite (S1.5A, S1.5B, S1.5C)	Composite (S5.1A, S5.1B, S5.1C)	Composite (S5.2A, S5.2B, S5.2C)
			Date Sampled					
Analyte	Unit	*Reporting Limit*		22-33488-179	22-33488-180	22-33488-181	22-33488-182	22-33488-183
2,4'-DDD	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*		130	130	130	130	130

Organochlorine Pesticides - Soil

			Client Sample ID	Composite (S5.3A, S5.3B, S5.3C)	Composite (S5.4A, S5.4B, S5.4C)	Composite (S5.5A, S5.5B, S5.5C)	Composite (S5.6A, S5.6B, S5.6C)	Composite (S5.7A, S5.7B, S5.7C)
			Date Sampled					
Analyte	Unit	*Reporting Limit*		22-33488-184	22-33488-185	22-33488-186	22-33488-187	22-33488-188
2,4'-DDD	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

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Organochlorine Pesticides - Soil

	Client Sample ID		Composite (S5.3A, S5.3B, S5.3C)	Composite (S5.4A, S5.4B, S5.4C)	Composite (S5.5A, S5.5B, S5.5C)	Composite (S5.6A, S5.6B, S5.6C)	Composite (S5.7A, S5.7B, S5.7C)
	Date Sampled						
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	130	130	130	130	130

Organochlorine Pesticides - Soil

	Client Sample ID		Composite (S5.8A, S5.8B, S5.8C)	Composite (S5.9A, S5.9B, S5.9C)	Composite (S6.1A, S6.1B, S6.1C)	Composite (S6.2A, S6.2B, S6.2C)	Composite (S6.3A, S6.3B, S6.3C)
	Date Sampled						
Analyte	Unit	*Reporting Limit*	22-33488-189	22-33488-190	22-33488-191	22-33488-192	22-33488-193
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020

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Organochlorine Pesticides - Soil

	Client Sample ID		Composite (S5.8A, S5.8B, S5.8C)	Composite (S5.9A, S5.9B, S5.9C)	Composite (S6.1A, S6.1B, S6.1C)	Composite (S6.2A, S6.2B, S6.2C)	Composite (S6.3A, S6.3B, S6.3C)
	Date Sampled						
TCMX (Surrogate)	%	*1*	130	150	130	130	140

Organochlorine Pesticides - Soil

	Client Sample ID		Composite (S6.4A, S6.4B, S6.4C)	Composite (S6.5A, S6.5B, S6.5C)	Composite (S6.6A, S6.6B, S6.6C)	Composite (S6.7A, S6.7B, S6.7C)	Composite (S6.8A, S6.8B, S6.8C)
	Date Sampled						
Analyte	Unit	*Reporting Limit*	22-33488-194	22-33488-195	22-33488-196	22-33488-197	22-33488-198
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	130	140	130	140	140

Organochlorine Pesticides - Soil

	Client Sample ID		Composite (S6.9A, S6.9B, S6.9C)	Composite (S6.10A, S6.10B, S6.10C)	Composite (S6.11A, S6.11B, S6.11C)	Composite (S6.12A, S6.12B, S6.12C)	Composite (S6.13A, S6.13B, S6.13C)
	Date Sampled						
Analyte	Unit	*Reporting Limit*	22-33488-199	22-33488-200	22-33488-201	22-33488-202	22-33488-203
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

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Organochlorine Pesticides - Soil

			Client Sample ID	Composite (S6.9A, S6.9B, S6.9C)	Composite (S6.10A, S6.10B, S6.10C)	Composite (S6.11A, S6.11B, S6.11C)	Composite (S6.12A, S6.12B, S6.12C)	Composite (S6.13A, S6.13B, S6.13C)
			Date Sampled					
4,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*		200	130	130	140	130

Organochlorine Pesticides - Soil

			Client Sample ID	Composite (S6.14A, S6.14B, S6.14C)	Composite (S6.15A, S6.15B, S6.15C)	Composite (S6.16A, S6.16B, S6.16C)	Composite (S6.17A, S6.17B, S6.17C)	Composite (S6.18A, S6.18B, S6.18C)
			Date Sampled					
Analyte	Unit	*Reporting Limit*		22-33488-204	22-33488-205	22-33488-206	22-33488-207	22-33488-208
2,4'-DDD	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

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Organochlorine Pesticides - Soil

			Client Sample ID	Composite (S6.14A, S6.14B, S6.14C)	Composite (S6.15A, S6.15B, S6.15C)	Composite (S6.16A, S6.16B, S6.16C)	Composite (S6.17A, S6.17B, S6.17C)	Composite (S6.18A, S6.18B, S6.18C)
			Date Sampled					
gamma-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*		130	160	140	140	100

Total Petroleum Hydrocarbons - Soil

			Client Sample ID	FD.5 0.15	FD.6 0.15	FD.14 0.20	FA6 0.15	FF6 0.15
			Date Sampled	08/09/2022	08/09/2022	08/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-20	22-33488-21	22-33488-28	22-33488-121	22-33488-135
C7-C9	mg/kg dry wt	*10*		<10	<10	<10	<10	<10
C10-C14	mg/kg dry wt	*15*		<15	<15	<15	<15	<15
C15-C36	mg/kg dry wt	*25*		27	1,477	214	98	58
C7-C36 (Total)	mg/kg dry wt	*50*		<50	1,477	214	98	58

Total Petroleum Hydrocarbons - Soil

			Client Sample ID	FC1 0.05	FC2 0.25	FC3 0.10	FC4 0.10	FC5 0.40
			Date Sampled	06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-137	22-33488-138	22-33488-139	22-33488-140	22-33488-141
C7-C9	mg/kg dry wt	*10*		<10	<10	<10	<10	<10
C10-C14	mg/kg dry wt	*15*		<15	<15	<15	<15	<15
C15-C36	mg/kg dry wt	*25*		4,954	463	436	530	269
C7-C36 (Total)	mg/kg dry wt	*50*		4,954	463	436	530	269

Total Petroleum Hydrocarbons - Soil

			Client Sample ID	FC6 0.10	FC7 0.10	FC8 0.15	TP01-S1 1.00	TP03-S3 0.30
			Date Sampled	06/09/2022	06/09/2022	06/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-142	22-33488-143	22-33488-144	22-33488-145	22-33488-147
C7-C9	mg/kg dry wt	*10*		<10	<10	<10	<10	<10
C10-C14	mg/kg dry wt	*15*		19	<15	19	<15	<15
C15-C36	mg/kg dry wt	*25*		620	322	1,750	<25	<25
C7-C36 (Total)	mg/kg dry wt	*50*		638	322	1,769	<50	<50

Total Petroleum Hydrocarbons - Soil

			Client Sample ID	TP05-S5 0.50	TP05-S6 0.05	TP06-S7 0.15	TP07-S8 0.30	TP08-S9 0.50
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-149	22-33488-150	22-33488-151	22-33488-152	22-33488-153
C7-C9	mg/kg dry wt	*10*		<10	<10	<10	<10	<10
C10-C14	mg/kg dry wt	*15*		<15	466	<15	<15	<15

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Total Petroleum Hydrocarbons - Soil

			Client Sample ID	TP05-S5 0.50	TP05-S6 0.05	TP06-S7 0.15	TP07-S8 0.30	TP08-S9 0.50
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
C15-C36	mg/kg dry wt	*25*		<25	1,610	<25	129	48
C7-C36 (Total)	mg/kg dry wt	*50*		<50	2,076	<50	129	<50

Total Petroleum Hydrocarbons - Soil

			Client Sample ID	TP08-S10 1.0	TP10-S14 0.20	TP12-S16 0.20	TP12-S17 0.50	TP13-S17 0.20
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-154	22-33488-158	22-33488-161	22-33488-162	22-33488-163
C7-C9	mg/kg dry wt	*10*		<10	<10	<10	<10	<10
C10-C14	mg/kg dry wt	*15*		<15	<15	<15	<15	<15
C15-C36	mg/kg dry wt	*25*		288	<25	740	<25	<25
C7-C36 (Total)	mg/kg dry wt	*50*		288	<50	740	<50	<50

Total Petroleum Hydrocarbons - Soil

			Client Sample ID	TP13-S18 0.20	TP13-S19A 0.15	TP13-S19 0.50	TP13-S20 0.40	TP13-S21 0.20
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-164	22-33488-165	22-33488-166	22-33488-168	22-33488-169
C7-C9	mg/kg dry wt	*10*		<10	<10	<10	<10	<10
C10-C14	mg/kg dry wt	*15*		<15	<15	<15	<15	<15
C15-C36	mg/kg dry wt	*25*		<25	<25	<25	<25	<25
C7-C36 (Total)	mg/kg dry wt	*50*		<50	<50	<50	<50	<50

Total Petroleum Hydrocarbons - Soil

			Client Sample ID	TP15-S23 0.30	TP16-S24 0.15	TP17-S25 0.30	TP18-S26 0.50
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-171	22-33488-172	22-33488-174	22-33488-175
C7-C9	mg/kg dry wt	*10*		<10	<10	<10	<10
C10-C14	mg/kg dry wt	*15*		<15	<15	<15	<15
C15-C36	mg/kg dry wt	*25*		<25	41	<25	<25
C7-C36 (Total)	mg/kg dry wt	*50*		<50	<50	<50	<50

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	FD.5 0.15	FD.6 0.15	FD.14 0.20	FA6 0.15	FF6 0.15
			Date Sampled	08/09/2022	08/09/2022	08/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-20	22-33488-21	22-33488-28	22-33488-121	22-33488-135
1-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	*0.01*		0.025	0.020	<0.010	<0.010	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*		0.032	<0.020	<0.020	<0.020	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*		<0.020	0.030	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010

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Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	FD.5 0.15	FD.6 0.15	FD.14 0.20	FA6 0.15	FF6 0.15
			Date Sampled	08/09/2022	08/09/2022	08/09/2022	06/09/2022	06/09/2022
Chrysene	mg/kg dry wt	*0.01*		0.017	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	*0.02*		0.029	0.026	<0.020	<0.020	<0.020
Fluorene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*		0.015	0.012	<0.010	<0.010	<0.010
Naphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	mg/kg dry wt	*0.02*		0.033	0.026	<0.020	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.040	0.040	0.030	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		0.030	0.020	<0.010	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	*1*		110	110	110	110	110

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	FC1 0.05	FC2 0.25	FC3 0.10	FC4 0.10	FC5 0.40
			Date Sampled	06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-137	22-33488-138	22-33488-139	22-33488-140	22-33488-141
1-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	*0.01*		<0.010	0.011	0.012	0.014	<0.010
Anthracene	mg/kg dry wt	*0.01*		<0.010	0.014	0.018	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	*0.02*		<0.020	0.089	0.087	0.058	<0.020
Benzo[a]pyrene	mg/kg dry wt	*0.01*		<0.010	0.077	0.079	0.057	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*		<0.020	0.12	0.13	0.096	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*		<0.020	0.037	0.040	0.029	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*		<0.010	0.038	0.034	0.021	<0.010
Chrysene	mg/kg dry wt	*0.01*		<0.010	0.094	0.089	0.063	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	*0.02*		<0.020	0.16	0.14	0.090	<0.020
Fluorene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*		<0.010	0.037	0.040	0.026	<0.010
Naphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	*0.01*		<0.010	0.060	0.065	0.018	<0.010
Pyrene	mg/kg dry wt	*0.02*		0.11	0.14	0.11	0.084	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.030	0.12	0.12	0.090	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		<0.010	0.11	0.11	0.080	<0.010
Anthracene-d10 (Surrogate)	%	*1*		94	110	100	110	110

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	FC6 0.10	FC7 0.10	FC8 0.15	TP01-S1 1.00	TP03-S3 0.30
			Date Sampled	06/09/2022	06/09/2022	06/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-142	22-33488-143	22-33488-144	22-33488-145	22-33488-147
1-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010

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Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	FC6 0.10	FC7 0.10	FC8 0.15	TP01-S1 1.00	TP03-S3 0.30
			Date Sampled	06/09/2022	06/09/2022	06/09/2022	07/09/2022	07/09/2022
Acenaphthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	*0.02*		<0.020	<0.020	0.043	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	*0.01*		<0.010	<0.010	0.028	<0.010	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*		<0.020	<0.020	0.063	<0.020	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	mg/kg dry wt	*0.01*		<0.010	<0.010	0.049	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	*0.02*		<0.020	<0.020	0.081	<0.020	<0.020
Fluorene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	*0.01*		0.028	<0.010	0.22	<0.010	<0.010
Pyrene	mg/kg dry wt	*0.02*		0.082	<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.030	0.030	0.050	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		<0.010	<0.010	0.040	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	*1*		100	110	100	110	110

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	TP05-S5 0.50	TP05-S6 0.05	TP06-S7 0.15	TP07-S8 0.30	TP08-S9 0.50
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-149	22-33488-150	22-33488-151	22-33488-152	22-33488-153
1-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	0.028
Fluorene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	0.014
Pyrene	mg/kg dry wt	*0.02*		<0.020	0.96	<0.020	<0.020	0.022
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.030	0.030	0.030	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	*1*		110	110	110	110	110

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Polycyclic Aromatic Hydrocarbons - Soil

	Client Sample ID		TP08-S10 1.0	TP10-S14 0.20	TP12-S16 0.20	TP12-S17 0.50	TP13-S17 0.20
	Date Sampled		07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-154	22-33488-158	22-33488-161	22-33488-162	22-33488-163
1-Methylnaphthalene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	*0.01*	<0.010	<0.010	0.078	<0.010	<0.010
Anthracene	mg/kg dry wt	*0.01*	<0.010	<0.010	0.065	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	*0.02*	<0.020	<0.020	0.57	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	*0.01*	0.011	<0.010	0.54	<0.010	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*	0.036	<0.020	0.82	<0.020	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*	<0.020	<0.020	0.28	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*	<0.010	<0.010	0.26	<0.010	<0.010
Chrysene	mg/kg dry wt	*0.01*	0.012	<0.010	0.63	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*	<0.010	<0.010	0.065	<0.010	<0.010
Fluoranthene	mg/kg dry wt	*0.02*	<0.020	<0.020	0.80	<0.020	<0.020
Fluorene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*	0.010	<0.010	0.29	<0.010	<0.010
Naphthalene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	*0.01*	<0.010	<0.010	0.094	<0.010	<0.010
Pyrene	mg/kg dry wt	*0.02*	<0.020	<0.020	0.79	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*	0.030	0.030	0.81	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*	0.020	<0.010	0.81	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	*1*	100	120	100	110	120

Polycyclic Aromatic Hydrocarbons - Soil

	Client Sample ID		TP13-S18 0.20	TP13-S19A 0.15	TP13-S19 0.50	TP13-S20 0.40	TP13-S21 0.20
	Date Sampled		07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-164	22-33488-165	22-33488-166	22-33488-168	22-33488-169
1-Methylnaphthalene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
Fluorene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*	0.030	0.030	0.030	0.030	0.030

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Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	TP13-S18 0.20	TP13-S19A 0.15	TP13-S19 0.50	TP13-S20 0.40	TP13-S21 0.20
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	*1*		120	110	120	120	120

Polycyclic Aromatic Hydrocarbons - Soil

			Client Sample ID	TP15-S23 0.30	TP16-S24 0.15	TP17-S25 0.30	TP18-S26 0.50
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-171	22-33488-172	22-33488-174	22-33488-175
1-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Chrysene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020
Fluorene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Naphthalene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Pyrene	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.03*		0.030	0.030	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	*1*		110	110	110	110

BTEX in Soil

			Client Sample ID	FD.5 0.15	FD.6 0.15	FD.14 0.20	FA6 0.15	FF6 0.15
			Date Sampled	08/09/2022	08/09/2022	08/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-20	22-33488-21	22-33488-28	22-33488-121	22-33488-135
Benzene	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
m,p-Xylene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Toluene-d8 (Surrogate)	%	*1*		100	99	100	99	100
p-Bromofluorobenzene (Surrogate)	%	*1*		99	98	98	100	98

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BTEX in Soil

	Client Sample ID		FC1 0.05	FC2 0.25	FC3 0.10	FC4 0.10	FC5 0.40
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-137	22-33488-138	22-33488-139	22-33488-140	22-33488-141
Benzene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
m,p-Xylene	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene-d8 (Surrogate)	%	*1*	98	98	98	100	100
p-Bromofluorobenzene (Surrogate)	%	*1*	100	98	100	100	99

BTEX in Soil

	Client Sample ID		FC6 0.10	FC7 0.10	FC8 0.15	TP05-S5 0.50	TP05-S6 0.05
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-142	22-33488-143	22-33488-144	22-33488-149	22-33488-150
Benzene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
m,p-Xylene	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene-d8 (Surrogate)	%	*1*	99	100	99	99	99
p-Bromofluorobenzene (Surrogate)	%	*1*	97	100	96	100	100

BTEX in Soil

	Client Sample ID		TP06-S7 0.15	TP07-S8 0.30	TP08-S9 0.50	TP08-S10 1.0	TP12-S16 0.20
	Date Sampled		07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-151	22-33488-152	22-33488-153	22-33488-154	22-33488-161
Benzene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
m,p-Xylene	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene-d8 (Surrogate)	%	*1*	100	100	99	100	98
p-Bromofluorobenzene (Surrogate)	%	*1*	120	110	100	99	99

BTEX in Soil

	Client Sample ID		TP12-S17 0.50	TP13-S18 0.20	TP13-S19A 0.15	TP13-S21 0.20	TP15-S23 0.30
	Date Sampled		07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-162	22-33488-164	22-33488-165	22-33488-169	22-33488-171
Benzene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
m,p-Xylene	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene-d8 (Surrogate)	%	*1*	99	99	98	100	99

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BTEX in Soil

			Client Sample ID	TP12-S17 0.50	TP13-S18 0.20	TP13-S19A 0.15	TP13-S21 0.20	TP15-S23 0.30
			Date Sampled	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
p-Bromofluorobenzene (Surrogate)	%	*1*		99	100	92	100	98

BTEX in Soil

			Client Sample ID	TP16-S24 0.15	TP17-S25 0.30	TP18-S26 0.50
			Date Sampled	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-172	22-33488-174	22-33488-175
Benzene	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050
Toluene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10
Ethylbenzene	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050
m,p-Xylene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10
o-Xylene	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050
Toluene-d8 (Surrogate)	%	*1*		99	99	99
p-Bromofluorobenzene (Surrogate)	%	*1*		97	97	98

Soil Composite

			Client Sample ID	S1.1A 0.10	S1.1B 0.10	S1.1C 0.10	S1.2A 0.10	S1.2B 0.10
			Date Sampled	08/09/2022	08/09/2022	08/09/2022	08/09/2022	08/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-1	22-33488-2	22-33488-3	22-33488-4	22-33488-5
Soil - Composite prep - DS				Complete	Complete	Complete	Complete	Complete

Soil Composite

			Client Sample ID	S1.2C 0.10	S1.3A 0.10	S1.3B 0.10	S1.3C 0.10	S1.4A 0.10
			Date Sampled	08/09/2022	08/09/2022	08/09/2022	08/09/2022	08/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-6	22-33488-7	22-33488-8	22-33488-9	22-33488-10
Soil - Composite prep - DS				Complete	Complete	Complete	Complete	Complete

Soil Composite

			Client Sample ID	S1.4B 0.10	S1.4C 0.10	S1.5A 0.10	S1.5B 0.10	S1.5C 0.10
			Date Sampled	08/09/2022	08/09/2022	08/09/2022	08/09/2022	08/09/2022
Analyte	Unit	*Reporting Limit*		22-33488-11	22-33488-12	22-33488-13	22-33488-14	22-33488-15
Soil - Composite prep - DS				Complete	Complete	Complete	Complete	Complete

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Soil Composite

Client Sample ID			S5.1A	S5.1B	S5.1C	S5.2A	S5.2B
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-29	22-33488-30	22-33488-31	22-33488-32	22-33488-33
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S5.2C	S5.3A	S5.3B	S5.3C	S5.4A
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-34	22-33488-35	22-33488-36	22-33488-37	22-33488-38
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S5.4B	S5.4C	S5.5A	S5.5B	S5.5C
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-39	22-33488-40	22-33488-41	22-33488-42	22-33488-43
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S5.6A	S5.6B	S5.6C	S5.7A	S5.7B
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-44	22-33488-45	22-33488-46	22-33488-49	22-33488-50
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S5.7.C	S5.8A	S5.8B	S5.8C	S5.9A
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-51	22-33488-52	22-33488-53	22-33488-54	22-33488-55
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S5.9B	S5.9C	S6.1A	S6.1B	S6.1C
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-56	22-33488-57	22-33488-58	22-33488-59	22-33488-60
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

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Soil Composite

Client Sample ID			S6.2A	S6.2B	S6.2C	S6.3A	S6.3B
Date Sampled			06/09/2022	06/09/2022	06/09/2022		
Analyte	Unit	*Reporting Limit*	22-33488-61	22-33488-62	22-33488-63	22-33488-64	22-33488-65
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S6.3C	S6.4A	S6.4B	S6.4C	S6.5A
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-66	22-33488-67	22-33488-68	22-33488-69	22-33488-72
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S6.5B	S6.5C	S6.6A	S6.6B	S6.6C
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-73	22-33488-74	22-33488-75	22-33488-76	22-33488-77
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S6.7A	S6.7B	S6.7C	S6.8A	S6.8B
Date Sampled						06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-78	22-33488-79	22-33488-80	22-33488-81	22-33488-82
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S6.8C	S6.9A	S6.9B	S6.9C	S6.10A
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-83	22-33488-84	22-33488-85	22-33488-86	22-33488-87
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S6.10B	S6.10C	S6.11A	S6.11B	S6.11C
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-88	22-33488-89	22-33488-90	22-33488-91	22-33488-92
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

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Soil Composite

Client Sample ID			S6.12A	S6.12B	S6.12C	S6.13A	S6.13B
Date Sampled			06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-93	22-33488-94	22-33488-95	22-33488-96	22-33488-97
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S6.13C	S6.14A	S6.14B	S6.14C	S6.15A
Date Sampled			06/09/2022				
Analyte	Unit	*Reporting Limit*	22-33488-98	22-33488-101	22-33488-102	22-33488-103	22-33488-104
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S6.15B	S6.15C	S6.16A	S6.16B	S6.16C
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-105	22-33488-106	22-33488-107	22-33488-108	22-33488-109
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S6.17A	S6.17B	S6.17C	S6.18A	S6.18B
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33488-110	22-33488-111	22-33488-112	22-33488-113	22-33488-114
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S6.18C
Date Sampled			
Analyte	Unit	*Reporting Limit*	22-33488-115
Soil - Composite prep - DS			Complete

Moisture Content

Client Sample ID			FD.5 0.15	FD.6 0.15	FD.14 0.20	FA6 0.15	FF6 0.15
Date Sampled			08/09/2022	08/09/2022	08/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-20	22-33488-21	22-33488-28	22-33488-121	22-33488-135
Moisture Content	%	*1*	15	17	13	21	20

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Moisture Content

	Client Sample ID		FC1 0.05	FC2 0.25	FC3 0.10	FC4 0.10	FC5 0.40
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	06/09/2022	06/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-137	22-33488-138	22-33488-139	22-33488-140	22-33488-141
Moisture Content	%	*1*	12	16	11	22	21

Moisture Content

	Client Sample ID		FC6 0.10	FC7 0.10	FC8 0.15	TP01-S1 1.00	TP03-S3 0.30
	Date Sampled		06/09/2022	06/09/2022	06/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-142	22-33488-143	22-33488-144	22-33488-145	22-33488-147
Moisture Content	%	*1*	7	9	4	6	18

Moisture Content

	Client Sample ID		TP05-S5 0.50	TP05-S6 0.05	TP06-S7 0.15	TP07-S8 0.30	TP08-S9 0.50
	Date Sampled		07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-149	22-33488-150	22-33488-151	22-33488-152	22-33488-153
Moisture Content	%	*1*	10	26	20	24	15

Moisture Content

	Client Sample ID		TP08-S10 1.0	TP10-S14 0.20	TP12-S16 0.20	TP12-S17 0.50	TP13-S17 0.20
	Date Sampled		07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-154	22-33488-158	22-33488-161	22-33488-162	22-33488-163
Moisture Content	%	*1*	18	15	24	16	12

Moisture Content

	Client Sample ID		TP13-S18 0.20	TP13-S19A 0.15	TP13-S19 0.50	TP13-S20 0.40	TP13-S21 0.20
	Date Sampled		07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-164	22-33488-165	22-33488-166	22-33488-168	22-33488-169
Moisture Content	%	*1*	14	22	11	13	11

Moisture Content

	Client Sample ID		TP15-S23 0.30	TP16-S24 0.15	TP17-S25 0.30	TP18-S26 0.50
	Date Sampled		07/09/2022	07/09/2022	07/09/2022	07/09/2022
Analyte	Unit	*Reporting Limit*	22-33488-171	22-33488-172	22-33488-174	22-33488-175
Moisture Content	%	*1*	14	18	6	16

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
OCP in Soil	Samples are extracted with hexane, pre-concetrated then analysed by GC-MSMS. (Chlordane (sum) is calculated from the main actives in technical Chlordane: Chlordane, Nonachlor and Heptachlor). (In accordance with in-house procedure).
Total DDT	Sum of DDT, DDD and DDE (4,4' and 2,4 isomers)

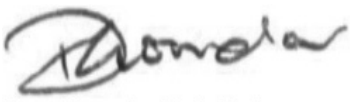
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Method Summary

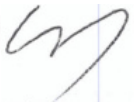
TPH in Soil	Solvent extraction, silica cleanup, followed by GC-FID analysis. (C7-C36). (In accordance with in-house procedure based on US EPA 8015).
PAH in Soil	Solvent extraction, silica cleanup, followed by GC-MS analysis. **Benzo[a]pyrene TEQ (LOR)**: The most conservative TEQ estimate, where a result is reported as less than the limit of reporting (LOR) the LOR value is used to calculate the TEQ for that PAH. **Benzo[a]pyrene TEQ (Zero)**: The least conservative TEQ estimate, PAHs reported as less than the limit of reporting (LOR) are not included in the TEQ calculation. Benzo[a]pyrene toxic equivalence (TEQ) is calculated according to *'Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health'*. Ministry for the Environment. 2011. (In accordance with in-house procedure).
VOC in Soil	Methanol extraction in accordance with US-EPA 5030A, analysis via GCMS with headspace sample introduction. (In-house procedure based on US EPA Method 5021).
Soil Composite*	Analytica Laboratories is not accredited for the preparation of composite samples; however, the chemical analysis does hold IANZ accreditation. As composite analysis is conducted when requested by the sampler if they deem fit as per the NES guideline, the results of the chemical analyses still hold proper accreditation based on Analytica's methods.
Moisture	Moisture content is determined gravimetrically by drying at 103 °C.



Thara Samarasinghe, B.Sc.
Technician



Divya Goundar DipSciTech
Technician



Adam Ang
Team Leader

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ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Lab ID (Lab use only)	22-33273	Registered by	Ginny	Date Registered	9/9/22
Client	WSP								
Address	69 Tarbert Street, Alexandra								
Project Leader	Tara Verhulst								
Project ID	6-XZ738.00	PO Number							
Site	Shannon Farm Cromwell								
Sampler	Tara Verhulst								
Phone	029 02010739								
Email	tara.verhulst@wsp.com								
Invoice Email	NZ.AP@wsp.com								

*Updated COC 1 pg 1.

Samples labelled wrong in field and should be changed as follows:
- S3.8A → S3.9A (sample with #7 is right)
- S4.3A (0.10) #1 → S2.1A
- S4.5A (0.10) #2 → S2.1B
- S4.7B (0.10) #3 → S2.3A
- S4.9C (0.10) #4 → S2.2C
- S4.14A (0.10) #6 → S2.2A
- S4.11C (0.10) #5 → S2.2B

CLIENT REQUESTS (Please Tick)											
Routine	X	Priority		Urgent		ESDAT		QC Report		Drinking Water	

TESTS REQUESTED											
	Sample ID	Depth	Sampling Date	Time	Matrix (Please Circle)	Analysis Requests/Suites [Enter Test Code Below]					Sample Comments (ie: extra test requests, high odour, bulk material)
						Heavy metals - ICP_S_HM7	TPH/PAH	OCP			
1	S2.1A		5/9/22		S	x		x			composite
2	S2.1B				S						
3	S2.2A				S						
4	S2.1C				S	x		x			
5	S2.1D QA				S	x		x			
6	S2.2B				S	x		x			
7	S2.2C				S						composite
8	S2.3A				S						
9	S2.3B				S	x		x			composite
10	S2.3C				S						
11	S2.4A				S	x		x			composite
12	S2.4B				S						
13	S2.4C				S						
14	S2.5A				S	x		x			composite
15	S2.5B				S						
16	S2.5C				S						
17					S						
18					S						
19					S						

Matrix Key	S (Solids)	CW (Clean Water)	SW (Saline Water)	WW (Waste Water)
	All soils, sediment, sludge	Potable, Ground, Bore, Surface, Fresh	Sea Water, Geothermal	Effluent, Trade Waste, Leachate

Sender Name		Received by (Lab Staff)		Courier company		Courier #	
Date Sent		Time sent	am : pm	Date Received		Time Received	am : pm	Seal Status		Sample Chilled	

Page _____ of _____

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #	1	of	6
Client	WSP			Customer Comments / Instructions			
Address	69 Tarbert St, Alexandra			COC for samples in 5 chilly bins. Please composite 3:1 ratio (unless stated otherwise) & test for HM & OCP.			
Project Leader	Lisa Bond						
Project ID	6-x2738.00	PO #	/				
Site	Shannon Farm Cromwell						
Sampler	Tara Verhulst						
Phone	02902010739						
Email	tara.verhulst@wsp.com						
Invoice Email	NZ.AP@wsp.com						

LABORATORY USE ONLY								
Laboratory Job #				Seal Status		Priority (mark with X)		
Date Received	/ /	Received By		Sample Temp Status		Routine	X	Urgent

TESTS REQUESTED

Replaced with updated COC

Missing Samples Double ups.

Analysis Requests/Suites: HM-1 ∞, OCP

Samples transferred to: Date: 07/09/22 Initials: KE

Auckland; Hamilton ✓; Wellington; Christchurch; Dunedin

Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	HM-1 ∞	OCP	Sample Comments
	S2.1A		5/9/22	:	S or W		x	x	composite
	S2.1B		"	:	S or W				
	S2.1C		"	:	S or W				
	S2.1D		"	:	S or W		x	x	comp.
	S2.3A		"	:	S or W				
	S2.3B ✓		"	:	S or W				
9	S2.3C ✓		"	:	S or W		x	x	
9	S2.3C.QA ✓		"	:	S or W		x	x	
	S2.2A		"	:	S or W		x	x	comp.
	S2.2B		"	:	S or W				
	S2.2C		"	:	S or W				
	S2.4A ✓		"	:	S or W		x	x	comp.
	S2.4B ✓		"	:	S or W				
	S2.4C ✓		"	:	S or W				
	S2.5A ✓		"	:	S or W		x	x	comp.
	S2.5B ✓		"	:	S or W				
	S2.5C ✓		"	:	S or W				
			"	:	S or W				

Relinquished by			Received by	DL		Courier	NZC
Date	/ /	Time	:	Date	8/9/22	Time	8 AM	Courier #	8470002472

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #	2	of	6
Client	WSP			Customer Comments / Instructions			
Address	69 Tarbert St., Alexandra						
Project Leader	Tara Verhulst						
Project ID	6-X2738.00	PO #					
Site	Shannon Farm Cromwell						
Sampler	Tara Verhulst						
Phone	0290 20107 39						
Email							
Invoice Email							

LABORATORY USE ONLY								
Laboratory Job #				Seal Status		Priority (mark with X)		
Date Received	/ /	Received By		Sample Temp Status		Routine	x	Urgent

TESTS REQUESTED

Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: HM-8	OCP				Sample Comments
	S3.1A		5/9/22	:	S or W		x	x				comp.
	S3.1B		"	:	S or W							
	S3.1C		"	:	S or W							
	S3.2A		"	:	S or W		x	x				comp.
	S3.2B		"	:	S or W							
	S3.2C		"	:	S or W							
	S3.3A		"	:	S or W		x	x				comp.
	S3.3B		"	:	S or W							
	S3.3C		"	:	S or W							
	S3.4A		"	:	S or W		x	x				comp.
	S3.4B		"	:	S or W							
	S3.4C		"	:	S or W							
	S3.5A		"	:	S or W		x	x				comp.
	S3.5B		"	:	S or W							
	S3.5C		"	:	S or W							
	S3.6A		"	:	S or W		x	x				comp.
	S3.6B		"	:	S or W							
	S3.6C		"	:	S or W							

Relinquished by				Received by				Courier	
Date	/ /	Time	:	Date	/ /	Time	:	Courier #	

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analytica.co.nz

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #	3	of	6
Client	WSP			Customer Comments / Instructions			
Address							
Project Leader	Tara Verkuijst						
Project ID	6-x2738.00	PO #					
Site	Shannon Farm Cromwell						
Sampler	Tara Verkuijst						
Phone	0290201 0739						
Email							
Invoice Email							

LABORATORY USE ONLY								
Laboratory Job #				Seal Status		Priority (mark with X)		
Date Received	/ /	Received By		Sample Temp Status		Routine	X	Urgent

TESTS REQUESTED

Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: HM-8	Analysis Requests/Suites: OCP				Sample Comments
33	S3.6D		5/9/22	:	S or W		X	X				
34	S3.6DQA		"	:	S or W		X	X				
	S3.7A		"	:	S or W		X	X				comp.
	S3.7B		"	:	S or W							
	S3.7C		"	:	S or W							
	S3.8A		"	:	S or W		X	X				comp.
	S3.8B		"	:	S or W							
	S3.8C		"	:	S or W							
	S3.9A		"	:	S or W		X	X				comp.
	S3.9B		"	:	S or W							
	S3.9C		"	:	S or W							
	S4.1A		"	:	S or W		X	X				comp.
	S4.1B		"	:	S or W							
	S4.1C		"	:	S or W							
	S4.2A		"	:	S or W		X	X				comp.
	S4.2B		"	:	S or W							
	S4.2C		"	:	S or W							
			/ /	:	S or W							

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Date	/ /	Time :	Date	/ /	Time :	Courier #	

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ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION		Page #	4	of	6
Client	WSP	Customer Comments / Instructions			
Address					
Project Leader	Tara Verhulst				
Project ID	6-X2738.00 PO #				
Site	Shannon Farm, Cromwell				
Sampler					
Phone	02902010739				
Email					
Invoice Email					

LABORATORY USE ONLY								
Laboratory Job #				Seal Status		Priority (mark with X)		
Date Received	/ /	Received By		Sample Temp Status		Routine	x	Urgent

TESTS REQUESTED

Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: HM-8	OCP				Sample Comments
	S4.3A		5/9/22	:	S or W		x	x				comp.
	S4.3B		"	:	S or W							
	S4.3C		"	:	S or W							
	S4.4A		"	:	S or W		x	x				comp.
	S4.4B		"	:	S or W							
	S4.4C		"	:	S or W							
	S4.5A		"	:	S or W		x	x				comp.
	S4.5B		"	:	S or W							
	S4.5C		"	:	S or W							
59	S4.3D		"	:	S or W		x	x				
60	S4.3DQA		"	:	S or W		x	x				
	S4.6A		"	:	S or W		x	x				comp.
	S4.6B		"	:	S or W							
	S4.6C		"	:	S or W							
	S4.7A		"	:	S or W		x	x				comp.
	S4.7B		"	:	S or W							
	S4.7C		"	:	S or W							
			"	:	S or W							

Relinquished by			Received by			Courier	
Date	/ /	Time :	Date	/ /	Time :	Courier #	

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #	5	of	6
Client	WSP			Customer Comments / Instructions			
Address							
Project Leader	Tara Verhulst						
Project ID	6-X2738.00	PO #					
Site	Shannon Farm, Cromwell						
Sampler							
Phone	02902010739						
Email							
Invoice Email							

LABORATORY USE ONLY							
Laboratory Job #		Seal Status		Priority (mark with X)			
Date Received	/ /	Received By		Sample Temp Status		Routine	X	Urgent	

TESTS REQUESTED

Lab ID	Sample ID (missing?)	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: AM-8	Analysis Requests/Suites: OCP				Sample Comments
	S4.8A		5/9/22	:	S or W		X	X				COMP.
	S4.8B		11	:	S or W							
	S4.8C		11	:	S or W							
	S4.9A		11	:	S or W		X	X				COMP.
	S4.9B		11	:	S or W							
	S4.9C		11	:	S or W							
73	S4.9D		11	:	S or W		X	X				
74	S4.9DQA		11	:	S or W		X	X				
	S4.10A		11	:	S or W		X	X				COMP.
	S4.10B		11	:	S or W							
	S4.10C		11	:	S or W							
	S4.11A		11	:	S or W		X	X				COMP.
	S4.11B		11	:	S or W							
	S4.11C		11	:	S or W							
	S4.12A		11	:	S or W		X	X				COMP.
	S4.12B		11	:	S or W							
	S4.12C		11	:	S or W							
			/ /	:	S or W							

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Date	/ /	Time :	Date	/ /	Time :	Courier #	

ENVIRONMENTAL TESTING:

CHAIN OF CUSTODY

ANALYTICA LABORATORIES

CLIENT INFORMATION				Page #	6	of	6
Client	WSP			Customer Comments / Instructions			
Address							
Project Leader	Tara Verhulst						
Project ID	6-X2738.00	PO #					
Site	Shamrock Farm, Cromwell						
Sampler							
Phone	0290201 0739						
Email							
Invoice Email							

LABORATORY USE ONLY								
Laboratory Job #				Seal Status		Priority (mark with X)		
Date Received	/ /	Received By		Sample Temp Status		Routine	X	Urgent

TESTS REQUESTED

Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites: HM-8	OCP	HOLD/COLD			Sample Comments
	S4.13A		5/9/22	:	S or W		X	X				comp.
	S4.13B		11	:	S or W							
	S4.13C		11	:	S or W							
	S4.14A		11	:	S or W		X	X				comp.
	S4.14B		11	:	S or W							
	S4.14C		11	:	S or W							
			/ /	:	S or W							
90	S4.15		5/9/22	:	S or W				X			
91	S4.16		11	:	S or W				X			
			/ /	:	S or W							
92	S2-3C QA		HOLD/COLD	:	S or W							
			/ /	:	S or W							
			/ /	:	S or W							
			/ /	:	S or W							
			/ /	:	S or W							
			/ /	:	S or W							
			/ /	:	S or W							
			/ /	:	S or W							

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Certificate of Analysis

WSP New Zealand Limited
69 Tarbert Street
Alexandra 9320

Attention: Tara Verhulst
Phone: 029 0201 0739
Email: tara.verhulst@wsp.com

Lab Reference: 22-33273
Submitted by: Tara Verhulst
Date Received: 09/09/2022
Testing Initiated: 9/09/2022
Date Completed: 16/09/2022
Order Number:
Reference: 6-XZ738.00

Sampling Site: Shannon Farm Cromwell

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Heavy Metals in Soil

	Client Sample ID		S2.3C	S2.4A	S3.6D	S3.6D QA	S4.3D
	Date Sampled		05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-8	22-33273-9	22-33273-33	22-33273-34	22-33273-59
Arsenic	mg/kg dry wt	*0.125*	12	11	11	11	5.1
Cadmium	mg/kg dry wt	*0.005*	0.19	0.22	0.15	0.15	0.18
Chromium	mg/kg dry wt	*0.125*	14.4	13.7	13.5	12.8	8.0
Copper	mg/kg dry wt	*0.075*	16.8	14.8	16.7	15.4	154
Lead	mg/kg dry wt	*0.25*	14.6	13.6	14.5	13.7	8.38
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	0.040	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	16.9	17.0	16.4	15.6	7.90
Zinc	mg/kg dry wt	*0.05*	65.1	61.0	62.9	59.5	48.9

Heavy Metals in Soil

	Client Sample ID		S4.3D QA	S4.9D	S4.9D QA	S2.3C QA	Composite (S2.1A, S2.1B, S2.1C)
	Date Sampled		05/09/2022	05/09/2022	05/09/2022	05/09/2022	
Analyte	Unit	*Reporting Limit*	22-33273-60	22-33273-73	22-33273-74	22-33273-92	22-33273-93
Arsenic	mg/kg dry wt	*0.125*	5.1	5.8	5.7	12	5.4
Cadmium	mg/kg dry wt	*0.005*	0.16	0.12	0.12	0.16	0.13
Chromium	mg/kg dry wt	*0.125*	7.8	7.7	7.8	14.8	9.5
Copper	mg/kg dry wt	*0.075*	143	97.6	112	17.6	218
Lead	mg/kg dry wt	*0.25*	8.22	8.51	8.65	15.5	8.36
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.
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Heavy Metals in Soil

Client Sample ID			S4.3D QA	S4.9D	S4.9D QA	S2.3C QA	Composite (S2.1A, S2.1B, S2.1C)
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	
Nickel	mg/kg dry wt	*0.05*	7.84	8.02	7.72	18.1	8.64
Zinc	mg/kg dry wt	*0.05*	48.9	41.4	41.2	68.9	49.4

Heavy Metals in Soil

Client Sample ID			Composite (S2.1D, S2.3A, S2.3B)	Composite (S2.2A, S2.2B, S2.2C)	Composite (S2.4A, S2.4B, S2.4C)	Composite (S2.5A, S2.5B, S2.5C)	Composite (S3.1A, S3.1B, S3.1C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33273-94	22-33273-95	22-33273-96	22-33273-97	22-33273-98
Arsenic	mg/kg dry wt	*0.125*	9.9	5.1	11	11	11
Cadmium	mg/kg dry wt	*0.005*	0.19	0.22	0.21	0.20	0.20
Chromium	mg/kg dry wt	*0.125*	12.9	7.3	13.4	13.3	14.9
Copper	mg/kg dry wt	*0.075*	127	576	16.5	14.6	19.3
Lead	mg/kg dry wt	*0.25*	14.3	7.55	15.2	13.3	16.4
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	16.2	7.66	16.6	16.2	18.3
Zinc	mg/kg dry wt	*0.05*	70.8	72.0	72.0	60.2	81.8

Heavy Metals in Soil

Client Sample ID			Composite (S3.2A, S3.2B, S3.2C)	Composite (S3.3A, S3.3B, S3.3C)	Composite (S3.4A, S3.4B, S3.4C)	Composite (S3.5A, S3.5B, S3.5C)	Composite (S3.6A, S3.6B, S3.6C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33273-99	22-33273-100	22-33273-101	22-33273-102	22-33273-103
Arsenic	mg/kg dry wt	*0.125*	10	12	11	12	12
Cadmium	mg/kg dry wt	*0.005*	0.16	0.20	0.21	0.21	0.20
Chromium	mg/kg dry wt	*0.125*	13.3	14.3	13.6	15.0	14.0
Copper	mg/kg dry wt	*0.075*	16.7	17.1	15.9	18.7	16.9
Lead	mg/kg dry wt	*0.25*	14.7	14.8	14.7	16.0	15.3
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	16.1	17.0	16.3	19.5	17.3
Zinc	mg/kg dry wt	*0.05*	69.8	67.7	63.4	69.6	66.6

Heavy Metals in Soil

Client Sample ID			Composite (S3.7A, S3.7B, S3.7C)	Composite (S3.8A, S3.8B, S3.8C)	Composite (S3.9A, S3.9B, S3.9C)	Composite (S4.1A, S4.1B, S4.1C)	Composite (S4.2A, S4.2B, S4.2C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33273-104	22-33273-105	22-33273-106	22-33273-107	22-33273-108
Arsenic	mg/kg dry wt	*0.125*	12	11	11	7.1	7.4
Cadmium	mg/kg dry wt	*0.005*	0.22	0.20	0.20	0.14	0.20
Chromium	mg/kg dry wt	*0.125*	13.3	14.2	13.1	9.5	10
Copper	mg/kg dry wt	*0.075*	17.0	17.0	17.1	119	92.7
Lead	mg/kg dry wt	*0.25*	14.3	14.2	13.9	10.8	11.1
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	16.6	16.9	16.4	10.5	11.5
Zinc	mg/kg dry wt	*0.05*	67.5	64.8	64.2	58.0	59.9

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Heavy Metals in Soil

Client Sample ID			Composite (S4.3A, S4.3B, S4.3C)	Composite (S4.4A, S4.4B, S4.4C)	Composite (S4.5A, S4.5B, S4.5C)	Composite (S4.6A, S4.6B, S4.6C)	Composite (S4.7A, S4.7B, S4.7C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33273-109	22-33273-110	22-33273-111	22-33273-112	22-33273-113
Arsenic	mg/kg dry wt	*0.125*	4.5	5.8	5.4	7.6	5.1
Cadmium	mg/kg dry wt	*0.005*	0.11	0.13	0.11	0.18	0.13
Chromium	mg/kg dry wt	*0.125*	6.5	7.7	7.5	9.7	7.2
Copper	mg/kg dry wt	*0.075*	133	125	118	144	123
Lead	mg/kg dry wt	*0.25*	7.98	8.55	7.87	10.6	8.24
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	6.57	8.27	7.55	10.7	7.10
Zinc	mg/kg dry wt	*0.05*	45.0	41.8	38.9	52.9	39.4

Heavy Metals in Soil

Client Sample ID			Composite (S4.8A, S4.8B, S4.8C)	Composite (S4.9A, S4.9B, S4.9C)	Composite (S4.10A, S4.10B, S4.10C)	Composite (S4.11A, S4.11B, S4.11C)	Composite (S4.12A, S4.12B, S4.12C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33273-114	22-33273-115	22-33273-116	22-33273-117	22-33273-118
Arsenic	mg/kg dry wt	*0.125*	6.0	7.8	6.0	7.3	5.8
Cadmium	mg/kg dry wt	*0.005*	0.15	0.19	0.18	0.26	0.15
Chromium	mg/kg dry wt	*0.125*	8.2	9.5	8.6	10	8.1
Copper	mg/kg dry wt	*0.075*	213	153	258	234	175
Lead	mg/kg dry wt	*0.25*	8.81	10.8	8.98	10.4	9.04
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	8.30	10.2	9.02	12.2	8.13
Zinc	mg/kg dry wt	*0.05*	51.8	54.8	71.5	60.8	46.0

Heavy Metals in Soil

Client Sample ID			Composite (S4.13A, S4.13B, S4.13C)	Composite (S4.14A, S4.14B, S4.14C)
Date Sampled				
Analyte	Unit	*Reporting Limit*	22-33273-119	22-33273-120
Arsenic	mg/kg dry wt	*0.125*	8.0	5.8
Cadmium	mg/kg dry wt	*0.005*	0.18	0.18
Chromium	mg/kg dry wt	*0.125*	9.7	7.5
Copper	mg/kg dry wt	*0.075*	78.6	203
Lead	mg/kg dry wt	*0.25*	10.6	9.51
Mercury	mg/kg dry wt	*0.025*	<0.025	<0.025
Nickel	mg/kg dry wt	*0.05*	11.5	8.06
Zinc	mg/kg dry wt	*0.05*	58.0	45.1

Organochlorine Pesticides - Soil

Client Sample ID			S2.3C	S2.4A	S3.6D	S3.6D QA	S4.3D
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-8	22-33273-9	22-33273-33	22-33273-34	22-33273-59
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

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Organochlorine Pesticides - Soil

Client Sample ID			S2.3C	S2.4A	S3.6D	S3.6D QA	S4.3D
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	120	120	120	120	130

Organochlorine Pesticides - Soil

Client Sample ID			S4.3D QA	S4.9D	S4.9D QA	S2.3C QA	Composite (S2.1A, S2.1B, S2.1C)
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	
Analyte	Unit	*Reporting Limit*	22-33273-60	22-33273-73	22-33273-74	22-33273-92	22-33273-93
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050

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Organochlorine Pesticides - Soil

	Client Sample ID		S4.3D QA	S4.9D	S4.9D QA	S2.3C QA	Composite (S2.1A, S2.1B, S2.1C)
	Date Sampled		05/09/2022	05/09/2022	05/09/2022	05/09/2022	
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	120	120	130	110	120

Organochlorine Pesticides - Soil

	Client Sample ID		Composite (S2.1D, S2.3A, S2.3B)	Composite (S2.2A, S2.2B, S2.2C)	Composite (S2.4A, S2.4B, S2.4C)	Composite (S2.5A, S2.5B, S2.5C)	Composite (S3.1A, S3.1B, S3.1C)
	Date Sampled						
Analyte	Unit	*Reporting Limit*	22-33273-94	22-33273-95	22-33273-96	22-33273-97	22-33273-98
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	120	120	120	120	120

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Organochlorine Pesticides - Soil

Client Sample ID			Composite (S3.2A, S3.2B, S3.2C)	Composite (S3.3A, S3.3B, S3.3C)	Composite (S3.4A, S3.4B, S3.4C)	Composite (S3.5A, S3.5B, S3.5C)	Composite (S3.6A, S3.6B, S3.6C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33273-99	22-33273-100	22-33273-101	22-33273-102	22-33273-103
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	120	120	120	110	120

Organochlorine Pesticides - Soil

Client Sample ID			Composite (S3.7A, S3.7B, S3.7C)	Composite (S3.8A, S3.8B, S3.8C)	Composite (S3.9A, S3.9B, S3.9C)	Composite (S4.1A, S4.1B, S4.1C)	Composite (S4.2A, S4.2B, S4.2C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33273-104	22-33273-105	22-33273-106	22-33273-107	22-33273-108
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

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Organochlorine Pesticides - Soil

			Client Sample ID	Composite (S3.7A, S3.7B, S3.7C)	Composite (S3.8A, S3.8B, S3.8C)	Composite (S3.9A, S3.9B, S3.9C)	Composite (S4.1A, S4.1B, S4.1C)	Composite (S4.2A, S4.2B, S4.2C)
			Date Sampled					
Dieldrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*		120	120	120	120	120

Organochlorine Pesticides - Soil

			Client Sample ID	Composite (S4.3A, S4.3B, S4.3C)	Composite (S4.4A, S4.4B, S4.4C)	Composite (S4.5A, S4.5B, S4.5C)	Composite (S4.6A, S4.6B, S4.6C)	Composite (S4.7A, S4.7B, S4.7C)
			Date Sampled					
Analyte	Unit	*Reporting Limit*		22-33273-109	22-33273-110	22-33273-111	22-33273-112	22-33273-113
2,4'-DDD	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*		<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*		<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020	<0.020	<0.020	<0.020

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Organochlorine Pesticides - Soil

Client Sample ID			Composite (S4.3A, S4.3B, S4.3C)	Composite (S4.4A, S4.4B, S4.4C)	Composite (S4.5A, S4.5B, S4.5C)	Composite (S4.6A, S4.6B, S4.6C)	Composite (S4.7A, S4.7B, S4.7C)
Date Sampled							
TCMX (Surrogate)	%	*1*	110	120	120	110	110

Organochlorine Pesticides - Soil

Client Sample ID			Composite (S4.8A, S4.8B, S4.8C)	Composite (S4.9A, S4.9B, S4.9C)	Composite (S4.10A, S4.10B, S4.10C)	Composite (S4.11A, S4.11B, S4.11C)	Composite (S4.12A, S4.12B, S4.12C)
Date Sampled							
Analyte	Unit	*Reporting Limit*	22-33273-114	22-33273-115	22-33273-116	22-33273-117	22-33273-118
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	*1*	120	110	140	110	120

Organochlorine Pesticides - Soil

Client Sample ID			Composite (S4.13A, S4.13B, S4.13C)	Composite (S4.14A, S4.14B, S4.14C)
Date Sampled				
Analyte	Unit	*Reporting Limit*	22-33273-119	22-33273-120
2,4'-DDD	mg/kg dry wt	*0.005*	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	*0.005*	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	*0.003*	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	*0.005*	<0.0050	<0.0050

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Organochlorine Pesticides - Soil

			Client Sample ID	Composite (S4.13A, S4.13B, S4.13C)	Composite (S4.14A, S4.14B, S4.14C)
			Date Sampled		
4,4'-DDT	mg/kg dry wt	*0.005*		<0.0050	<0.0050
Total DDT	mg/kg dry wt	*0.02*		<0.020	<0.020
alpha-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050
Aldrin	mg/kg dry wt	*0.005*		<0.0050	<0.0050
beta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	*0.005*		<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010
delta-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050
Dieldrin	mg/kg dry wt	*0.05*		<0.050	<0.050
Endosulfan I	mg/kg dry wt	*0.005*		<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	*0.01*		<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	*0.005*		<0.0050	<0.0050
Endrin	mg/kg dry wt	*0.05*		<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	*0.01*		<0.010	<0.010
Endrin ketone	mg/kg dry wt	*0.005*		<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	*0.005*		<0.0050	<0.0050
Heptachlor	mg/kg dry wt	*0.005*		<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	*0.005*		<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	*0.005*		<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	*0.01*		<0.010	<0.010
trans-nonachlor	mg/kg dry wt	*0.01*		<0.010	<0.010
trans-Chlordane	mg/kg dry wt	*0.01*		<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	*0.02*		<0.020	<0.020
TCMX (Surrogate)	%	*1*		120	130

Soil Composite

			Client Sample ID	S2.1A	S2.1B	S2.2A	S2.2B	S2.2C
			Date Sampled	05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*		22-33273-1	22-33273-2	22-33273-3	22-33273-4	22-33273-5
Soil - Composite prep - DS				Complete	Complete	Complete	Complete	Complete

Soil Composite

			Client Sample ID	S2.3A	S2.3B	S2.4B	S2.4C	S2.5A
			Date Sampled	05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*		22-33273-6	22-33273-7	22-33273-10	22-33273-11	22-33273-12
Soil - Composite prep - DS				Complete	Complete	Complete	Complete	Complete

Soil Composite

			Client Sample ID	S2.5B	S2.5C	S3.1A	S3.1B	S3.1C
			Date Sampled	05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*		22-33273-13	22-33273-14	22-33273-15	22-33273-16	22-33273-17
Soil - Composite prep - DS				Complete	Complete	Complete	Complete	Complete

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Soil Composite

Client Sample ID			S3.2A	S3.2B	S3.2C	S3.3A	S3.3B
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-18	22-33273-19	22-33273-20	22-33273-21	22-33273-22
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S3.3C	S3.4A	S3.4B	S3.4C	S3.5A
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-23	22-33273-24	22-33273-25	22-33273-26	22-33273-27
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S3.5B	S3.5C	S3.6A	S3.6B	S3.6C
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-28	22-33273-29	22-33273-30	22-33273-31	22-33273-32
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S3.7A	S3.7B	S3.7C	S3.8A	S3.8B
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-35	22-33273-36	22-33273-37	22-33273-38	22-33273-39
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S3.8C	S3.9A	S3.9B	S3.9C	S4.1A
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-40	22-33273-41	22-33273-42	22-33273-43	22-33273-44
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S4.1B	S4.1C	S4.2A	S4.2B	S4.2C
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-45	22-33273-46	22-33273-47	22-33273-48	22-33273-49
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

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Soil Composite

Client Sample ID			S4.3A	S4.3B	S4.3C	S4.4A	S4.4B
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-50	22-33273-51	22-33273-52	22-33273-53	22-33273-54
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S4.4C	S4.5A	S4.5B	S4.5C	S4.6A
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-55	22-33273-56	22-33273-57	22-33273-58	22-33273-61
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S4.6B	S4.6C	S4.7A	S4.7B	S4.7C
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-62	22-33273-63	22-33273-64	22-33273-65	22-33273-66
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S4.8A	S4.8B	S4.8C	S4.9A	S4.9B
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-67	22-33273-68	22-33273-69	22-33273-70	22-33273-71
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S4.9C	S4.10A	S4.10B	S4.10C	S4.11A
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-72	22-33273-75	22-33273-76	22-33273-77	22-33273-78
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			S4.11B	S4.11C	S4.12A	S4.12B	S4.12C
Date Sampled			05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-79	22-33273-80	22-33273-81	22-33273-82	22-33273-83
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

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Soil Composite

		Client Sample ID	S4.13A	S4.13B	S4.13C	S4.14A	S4.14B
		Date Sampled	05/09/2022	05/09/2022	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-84	22-33273-85	22-33273-86	22-33273-87	22-33273-88
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

		Client Sample ID	S4.14C	S2.1C	S2.1D
		Date Sampled	05/09/2022	05/09/2022	05/09/2022
Analyte	Unit	*Reporting Limit*	22-33273-89	22-33273-90	22-33273-91
Soil - Composite prep - DS			Complete	Complete	Complete

Method Summary

Elements in Soil Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.

OCP in Soil Samples are extracted with hexane, pre-concetrated then analysed by GC-MSMS. (Chlordane (sum) is calculated from the main actives in technical Chlordane: Chlordane, Nonachlor and Heptachlor). (In accordance with in-house procedure).

Total DDT Sum of DDT, DDD and DDE (4,4' and 2,4 isomers)

Soil Composite* Analytica Laboratories is not accredited for the preparation of composite samples; however, the chemical analysis does hold IANZ accreditation. As composite analysis is conducted when requested by the sampler if they deem fit as per the NES guideline, the results of the chemical analyses still hold proper accreditation based on Analytica's methods.

Thara Samarasinghe, B.Sc.
Technician

Divya Goundar DipSciTech
Technician

Adam Ang
Team Leader

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Certificate of Analysis

WSP New Zealand Limited
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Attention: Tara Verhulst
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Email: tara.verhulst@wsp.com

Lab Reference: 22-33225
Submitted by: Tara Verhulst
Date Received: 09/09/2022
Testing Initiated: 9/09/2022
Date Completed: 12/09/2022
Order Number: N/A
Reference: 6-XZ738.00

Sampling Site: Shannon Farm Cromwell
Description of Work: Soil - Shannon Farm Cromwell

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Asbestos in Soil (Qualitative)

Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed
22-33225-1	FD.10 0.10	N/A	Soil	08/09/2022	12/09/2022
22-33225-2	FD.10 0.15	N/A	Soil	08/09/2022	12/09/2022

Information in the above table supplied by the client: Client Sample ID, Sample Location, Date Sampled.

Laboratory ID	Client Sample ID	Fibre Types	Trace Asbestos (Presence / Absence)	Asbestos (Presence / Absence)
	Units			
22-33225-1	FD.10 0.10	Organic Fibres Asbestos NOT Detected.	Absent	Absent
22-33225-2	FD.10 0.15	Organic Fibres Asbestos NOT Detected.	Absent	Absent

Information in the above table supplied by the client: Client Sample ID.

Asbestos in Soil (Qualitative) Approver:

Laura Facoory, B.Sc.
Laboratory Technician

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.
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Method Summary

Asbestos Fibres in Soil (Qualitative)	Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 Method for the qualitative identification of asbestos in bulk samples. Note 1: The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques. Note 2: Trace asbestos is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased on site. This is not the sole indicator for the friable nature of the asbestos present. Note 3: If mineral fibres of unknown type are detected, by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised. Note 4: The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description.

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New Zealand Cherry Corps (Leyser) Ltd

REMEDIATION ACTION PLAN AND CSMP

SHANNON FARM, CROMWELL

3 OCTOBER 2024



REMEDIATION ACTION PLAN & CSMP
SHANNON FARM, CROMWELL

New Zealand Cherry Corps (Leyser) Ltd

WSP
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REV	DATE	DETAILS
Rev1	10/03/2023	Draft.
Rev2	15/03/2023	Finalise for approval and issue.
Rev3	06/04/2023	Amendments to include option for on-site encapsulation.
Rev4	28/07/2023	Inclusion of remediation methodology for landfill area following peer review.
Rev 5	09/08/2024	Update of RAP with contact details and up to date development plan and site-specific remediation plan
Rev 6	03/10/2024	Update to include methodology for offal pit remediation and their location

	NAME	DATE	SIGNATURE
Prepared by:	Tara Verhulst	28/07/2023	
Reviewed by:	Lisa Bond CEnvP	28/07/2023	
Approved by:	Lisa Bond	09/08/2024	

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A Site Development Plans

ABBREVIATIONS

CLMG 1	Contaminated Land Management Guideline No. 1: Reporting on Contaminated Sites in New Zealand
CLMG 5	Contaminated Land Management Guideline No. 5: Site investigation and analysis of soils
CMMP	Contaminated Materials Management Plan
CoC	Chain of Custody
CODC	Central Otago District Council
CSM	Conceptual Site Model
CSMP	Contaminated Site Management Plan
DSI	Detailed Site Investigation
H & S	Health and Safety
HAIL	Hazardous Activities and Industries List
IANZ	International Accreditation New Zealand
ILAC	International Laboratory Accreditation Cooperation
ILAC-MRA	ILAC Mutual Recognition Arrangement
IRB	International Risk Based
LINZ	Land Information New Zealand
LRIS	Land Resource Information Systems
m bgl	meters below ground level
MfE	Ministry for the Environment
MMP	Ongoing Monitoring and Management Plan
N/A	Not applicable
ND	Not derived
NES	National Environmental Standards
NES-CS	National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
NL	No limit - derived value exceeds 10,000mg/kg
NZRB	New Zealand Risk Based
ORC	Otago Regional Council
PoL	Piece of Land

PSI	Preliminary Site Investigation
PSSP	Project Site Safety Plan
QA/QC	Quality assurance and Quality Control
RAP	Remedial Action Plan
$SCS_{(health)}$	Soil Contaminant Standards for Health
SGV	Soil Guideline Value
SID	Safety in Design
SQEP	Suitable Qualified and Experienced Practitioner
SSL	Soil Screening Level
SVR	Site Validation Report
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxicity Equivalent – indication of the toxicity of a mixture of compounds

1 INTRODUCTION

1.1 BACKGROUND

WSP New Zealand (WSP) were engaged by New Zealand Cherry Corps (Leyser) Ltd (herein referred to as NZ Cherry) to develop a Remediation Action Plan (RAP) and Contaminated Materials Management Plan (CMMP) for the Shannon Farm development where HAIL activities have been delineated. The Shannon Farm development is located at 112 & 144 Ripponvale Rd, Cromwell and covers approximately 240ha. This RAP refers to activities within the identified pieces of land where remediation is likely to be required (herein referred to as "the site").

The Shannon Farm site is the subject of a plan change which involves rezoning with the proposed works comprising subdivision and subsequent development of residential lots. An assessment of potential risks to human health from contaminants in the soil was required to determine if HAIL activities were present and the likely risks to human health from these activities.

Following the completion of a Preliminary Site Investigation (PSI) (WSP Opus, 2018), several site areas with (historic) HAIL activities were identified as per the Ministry for the Environment's Hazardous Activities and Industries List (MfE's HAIL). A Detailed Site Investigation (DSI) was completed on the HAIL areas to further delineate contaminants of concern and determine risks to human health associated with these contaminants (WSP, 2022).

As the DSI encountered contaminants in excess of their relevant soil contaminants standard, ground disturbance in excess of permitted activity volumes will require consent under the Ministry for the Environment (MfE) National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) and will require management in the form of a RAP and CMMP.

1.2 PURPOSE OF THIS DOCUMENT

This RAP has been prepared to provide remedial options and procedures covering the handling, management and, if needed off-site disposal or on-site encapsulation of potentially contaminated soils identified within the piece of land, along with any accidental discovery of unknown contamination during the proposed soil disturbance activities. Methodologies within this RAP/CMMP are intended to enable the chosen remedial option to be conducted in a way that protects human health in accordance with the policy objectives of the NESCS.

The information and recommendations in this RAP/CMMP are not intended to relieve the Contractor of their responsibility for the health and safety of their workers and contractors. Nor is it intended to relieve contractors undertaking work on the site of their responsibilities under the Health and Safety at Work Act 2015 and associated regulations.

This document should be updated if further site-specific information becomes available regarding contamination.

2 SITE IDENTIFICATION

The site is located on 112 & 144 Ripponvale Rd, Cromwell, approximately 3km north-west of Cromwell town centre. The Pisa Range can be seen west of the site, with Lake Dunstan situated to the east. The site covers approximately 240ha and comprises a rural land use with orchard and farming activities.

Following a brief review of the ORC HAIL database and surrounding site data, the site has been noted as comprising a Piece of Land (PoL) associated with potential historic HAIL activities. The site location is shown in Figure 1, the general site layout is indicated on Figure 2 and site details are provided in Table 1.

Table 1: Site Details.

Site Address	112 and 144 Ripponvale Rd, Cromwell
Territorial Authority	Central Otago District Council (CODC)
Legal Description	Lot 2 DP 330709; SEC 4, 11, 26-28, 54, 96, 98-103; Pt SEC 5, 25 1201R BLK III Cromwell SD
Certificate of Title	7C/632, 7C/633, 106/99 126180
Approximate total site area (including part of road reserve)	243.34 ha (2,433,400m^2)
Approximate area of 'Piece of Land' proposed for remediation	900 m^2
NES Permitted Activity threshold volumes: 1) total site disturbance, and 2) yearly off-site movement of soil (based on the approximate total site area)	 45 m^3 9 m^3

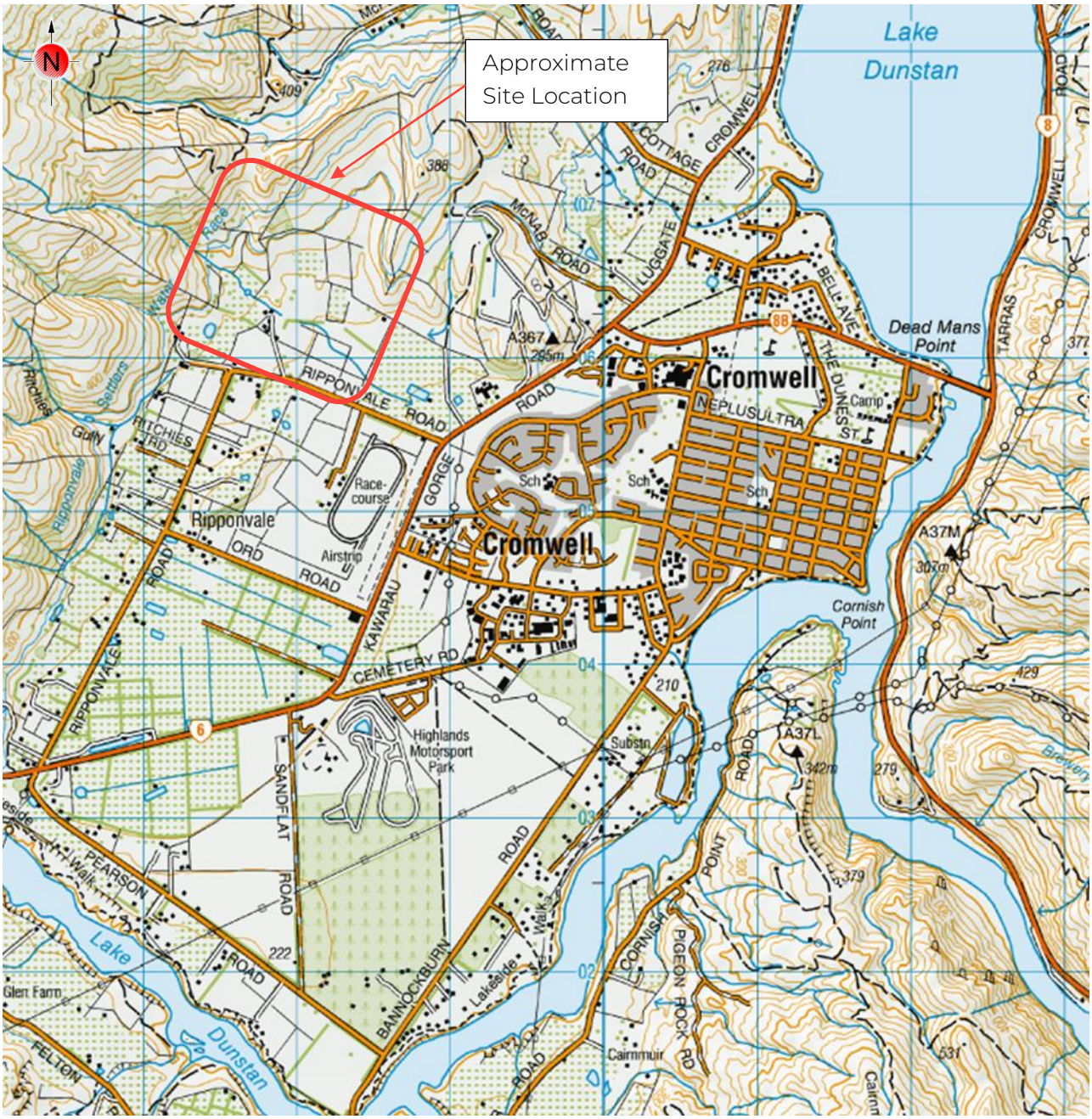


Figure 1: Site Location Plan

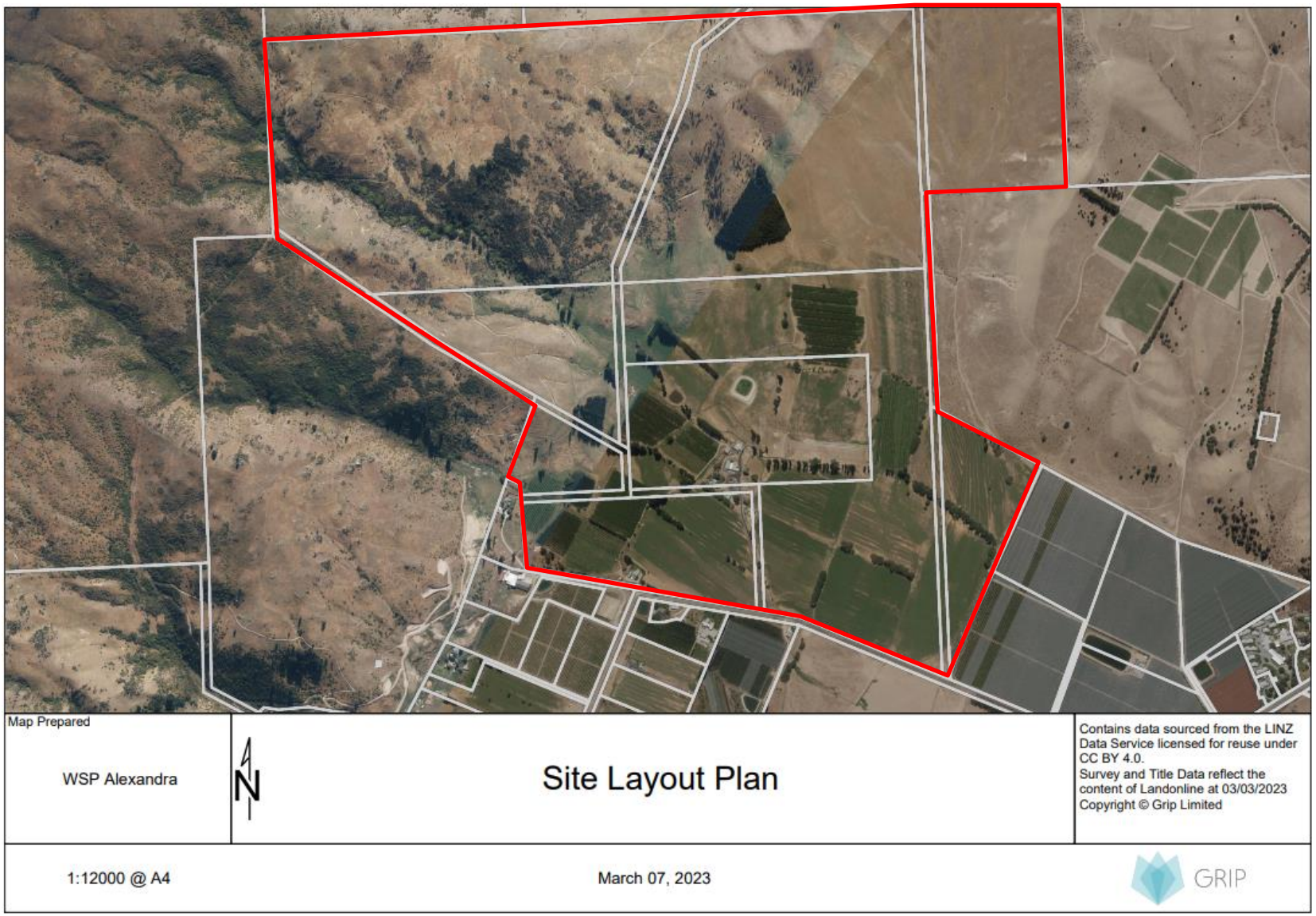


Figure 2: Site Layout

3 DEVELOPMENT PROPOSALS

It is understood that the proposed development plans include subdividing and developing the site into 158 (rural) residential lots. The size of the lots will differ, with the lots generally increasing in size from south to north of the site. A summary of the proposed areas is given in Table 2 below and the proposed development plans can be found in Appendix A.

Table 2: Summary of Proposed Lots

Area	Number of LOTS	Size of lots
RLA 1	106	<1500 m^2 (average: 2002 m^2)
RLA 2	8	>3000 m^2
RLA 3	10	>4000 m^2
RLA 4	25	>8000 m^2
RLA 5	2	>3 HA
RLA 6	1	TBC
RLPA	6	>4 HA

4 REVIEW OF PSI AND DSI REPORTS

4.1 REGIONAL GEOLOGY

The geology of the site is taken from the 1:250,000 scale GNS Geology Web Map extract (GNS Science, 2022).

This map indicates the majority of the site comprises Holocene river deposits. These river deposits are typically loose, commonly angular, boulders, gravel, sand and silt forming alluvial fans. The deposits grade into scree (upslope) and valley alluvium.

The Pisa Range to the west of the site consists of Basement metamorphic rock and Early Pleistocene river deposits are found north of the site.

4.2 GROUNDWATER

Details of the site hydrology and hydrogeology have been gained from a review of sources including GNS Science (GNS Science, 2022) and a search of council records. A summary of the relevant data can be found in Table 3 below.

The eastern part of the site is situated in the Cromwell Terrace Aquifer. The Cromwell Terrace Aquifer is an unconfined aquifer with a free water table. The mean depth to the water table is approximately 20m and the aquifer has good water quality. The annual total rainfall is approximately 437mm/yr[1].

The nearest water bodies are various dams located on the site. Several irrigation features cross the site including a water race along the eastern boundary. The Kawarau Arm of the Mata-au/Clutha River is noted to be the nearest surface water bodies, approximately 3km south-east of the site.

The ORC well database indicates one operational well to be located in the south-eastern corner of the site. The well was drilled in May 2014 and is utilised for irrigation, stock feed and drinking purposes. The depth to water was indicated to be 34m bgl (m below ground level). The liquefaction potential is indicated as low to none as the ground in predominantly underlain by rock or firm sediments (A Domain).

The site is situated at approximately 260m amsl (above mean sea level). The topography slopes upwards towards the Pisa Range west of the site.

Table 3: Summary of topographical, hydrological and hydrogeological data

Topography	Upwards slope towards Pisa Range in the west.
Nearest Surface Water Body	Kawarau Arm of Lake Dunstan
Height above Mean Sea Level	Approximately 260m amsl
General Flow Direction	Generally north-west to south-east towards the Clutha/Mata-Au River.
Groundwater Status	Cromwell Terrace Aquifer
No. of known Boreholes and wells within 500m	One

[1] The National Climate Database accessed October 2022 via cliflo.niwa.co.nz.

4.3 SURROUNDING ENVIRONMENT

The site is located in a rural residential area, east of the township of Cromwell and adjacent the Pisa Range. Access to the site is via Ripponvale Road on the southern boundary of the site. The main access to the site was via a gravel driveway at 112 Ripponvale Rd, with an alternative option further north at 144 Ripponvale Rd.

Surrounding the site to the south beyond Ripponvale Road are other horticultural businesses and the Cromwell race course. To the east is located a cherry orchard with land to the north and west rising steeply in places and designated either outstanding natural landscape or significant amenity landscape.

4.4 SITE HISTORY

The site has previously been in use as horticultural land which includes a central farm area where a packing shed, cold store, sheep pens (and dip) and other storage and dwellings are located.

4.5 HAIL STATUS OF SITE

Based on the findings of the DSI, the online HAIL database held by ORC has been updated to show that the site has verified HAIL areas present for the following categories:

- A10: Persistent pesticide bulk storage or use.
- G3: Landfill sites. (within Leyser Orchard Farmyard A and B)

The contamination status for the HAIL sites varies depending upon the findings of the DSI with some orchards being acceptable, others (outside the scope of the DSI) not investigated and Farmyard A 'acceptable' and Farmyard B 'contaminated'. The location of the HAIL activities on the ORC database is shown in Figure 3.

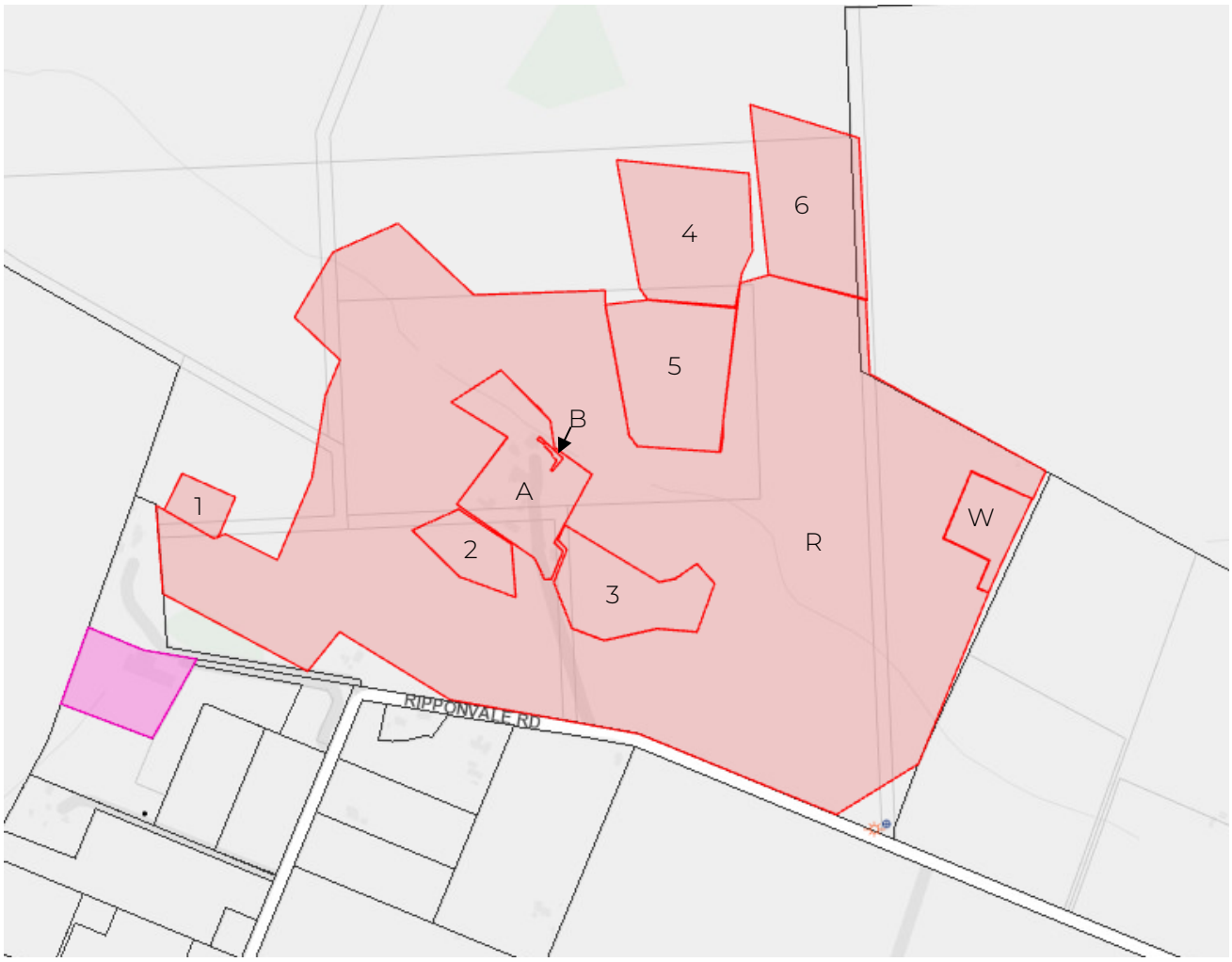


Figure 3: Location of HAIL activities from ORC Database
(Pink area outside of Shannon Farm site area)

ORC references: 1-6 investigated orchards (acceptable); W – Worker accommodation (acceptable); A – Farmyard A (acceptable); B – Farmyard B (contaminated); R – Remainder of orchard (not investigated).

5 REMEDIATION ACTION PLAN

5.1 REMEDIAL GOALS

The goal of the remedial works presented below is to ensure soils within the development areas comply with the NESCS for a residential (10% produce) land use and to ensure compliance with the project consent conditions.

5.2 REMEDIAL STRATEGY

Based on the results of the DSI (WSP, 2022), concentrations of arsenic, cadmium, lead and/or zinc in surface soils in specific locations on site do not comply with the Site's proposed land use criteria and remediation of these locations are required in order to comply with the NESCS. A draft remediation site plan is outlined in Figure 4 below.

The following outline remedial strategies were developed for the Site areas exceeding applicable land use criteria:

- Heavy metals in sheep pens
  - Delineation using field screening techniques with appropriate QA.
  - Excavation of surface soils and stockpile within demarcated 'contaminated zone'.
  - Sampling of stockpile to assess disposal on or off-site or reuse potential.
  - Validation sampling and analysis using combined field screening and lab testing to confirm remediation objectives.
- Heavy metals and/or hydrocarbons associated with former underground fuel storage tank
  - Excavation and removal of tank
  - Removal of noticeably contaminated soils surrounding the tank and removal to landfill.
  - Validation sampling and analysis of surrounding soils.

In addition to areas where elevated contaminants have been found, historic landfill areas within the demarcated remediation zone will also be excavated and removed from the PoL.

- Domestic/commercial refuse from landfilling area
  - Excavation and removal to suitable landfill.
- Waste from offal pits
  - Excavation and segregation of organic wastes/ larger materials/domestic refuse (if present)
  - Sampling and analysis of separated soils to assess suitability for reuse on site
  - Removal of offal/domestic waste to suitable landfill

.



Figure 4: Remediation Plan, updated Oct 2024.

5.2.1 HEAVY METAL REMEDIAL METHODOLOGY FOR SHEEP PENS

The following methodology shall be followed during the remediation of arsenic, cadmium, zinc and lead contaminated soil in the sheep pens:

- On-site delineation of the areas where remediation is to be undertaken shall be completed by a CLS prior to commencement of works to determine the lateral extent of the contaminated soil.
- Following confirmation of the extent of the remedial areas, the contaminated soil shall then be removed via mechanical excavation under the direction of the CLS.
- During excavation, appropriate personal protective equipment (PPE) (as detailed in Section 6.3.1) shall be donned, and soil shall be loaded directly into trucks. The soils will either be disposed off-site or encapsulated on-site:
    a. Soils are transported and disposed of directly to an acceptable facility (TBD). If stockpiling is to occur prior to disposal, the measures outlined in Section 7.8 shall be followed to avoid cross-contamination of “dirty” and “clean” soils.
    b. If on-site encapsulation of contaminated soils is preferred, a suitable borrow pit will be designated and consent gained, with appropriate controls in place to mitigate contaminating the surrounding areas (eg. Low-permeability geotextile fabric to prevent leaching). This RAP will be updated with details on the borrow pit once available.
- If required, the soils shall be kept damp during transport in the trucks as to avoid the creation of dust. The soils should not be overly wet.
- Following excavation and removal, validation assessment using field XRF screening and QA sampling shall be completed to confirm remedial goals have been achieved.
- Should hotspots of contaminants remain following screening additional excavations within these areas shall be undertaken under the direction of the CLS.

5.2.2 HEAVY METAL REMEDIAL METHODOLOGY FOR FUEL TANK

The following methodology shall be followed during the remediation of lead contaminated soil associated with a former underground fuel storage tank:

- Following confirmation of the locations of the remedial areas by the CLS, the contaminated soil shall be removed via mechanical excavation under the guidance of the CLS.
- Excavation shall be undertaken in layers of 250mm. After each layer XRF screening shall be completed to validate remediation or determine if further excavation is required.
- During excavation, appropriate personal protective equipment (PPE) (as detailed in Section 6.3.1) shall be donned, and soil shall be loaded directly into trucks. The soils will either be disposed off-site or encapsulated on-site:
    a. Soils are transported and disposed of directly to an acceptable facility (TBD). If stockpiling is to occur prior to disposal, the measures outlined in Section 7.8 shall be followed to avoid cross-contamination of “dirty” and “clean” soils.
    b. If on-site encapsulation is preferred, a suitable borrow pit will be designated and consented for, for the contaminated material with appropriate controls to mitigate contaminating the

surrounding areas (eg. Low-permeability geotextile fabric to prevent leaching). This RAP will be updated with details on the borrow pit once available.

- If required, the soils shall be kept damp during transport in the trucks as to avoid the creation of dust. The soils should not be overly wet.
- Following excavation and removal, validation soil sampling shall be completed and reported by the CLS to confirm remedial goals have been achieved.
- Where field XRF screening results do not meet the remedial goals (NESCS for residential land use), the CLS shall determine the depth and extent of further excavation required and the repetition of remedial excavation and validation sampling shall occur.
- Should visual hydrocarbon contamination be encountered, although not found to be in excess of human health, these shall also be excavated to remove traces of visual or olfactory contaminated soil.

5.2.3 REFUSE REMEDIAL METHODOLOGY FOR LANDFILL AREA

The following methodology shall be followed during the remediation of the buried refuse in the landfill area:

- Under guidance of the CLS, a site scrape shall be undertaken of the demarcated landfill area to identify any possible waste pits.
- Mechanical excavation shall be undertaken of the refuse material with minimal soil disturbance. A record of materials removed (photographic and written) shall be kept to document potential sources of contamination for assisting with validation post remediation.
- The refuse will be transported and disposed of directly to an acceptable landfill facility (TBD) as domestic or commercial waste. Prior acceptance of the landfill facility should be obtained.
- Should visual or olfactory evidence of contamination be encountered, excavation shall be halted, and the accidental discovery protocol will be implemented (refer to Section 7.9). Laboratory samples will likely be taken of the suspect soils and recommendations will be made by the CLS after analysis, under guidance of an SQEP.
- Validation of pit walls and base for each excavation area shall be carried out following removal of buried materials for a suite of contaminants based on observations made by the CLS during remediation and in consultation with the SQEP.
- Information of the source site / sample results from any imported clean material to fill in the waste pits shall be made available to the CLS.

A geotechnical professional shall be consulted on the suitability of the ground for development following excavation and infilling.

5.2.4 OFFAL PIT REMEDIAL METHODOLOGY

The following methodology shall be followed during the remediation of the offal pits.

- Under guidance of the CLS, a site scrape shall be undertaken of the locality of the offal pits area to identify any possible waste pits.
- Mechanical excavation shall be undertaken of the refuse material with minimal soil disturbance. A record of materials removed (photographic and written) shall be kept to document potential sources of contamination for assisting with validation post remediation.
- If required, waste materials will be stockpiled on an impermeable layer to prevent cross contamination or egress into underlying soils and covered as per procedures outlined in Section 7.8.
- Separation of organic waste and larger waste materials shall be completed with separated materials stockpiled on impermeable layer as per Section 7.8.
- Sampling and analysis of the segregated soils will be completed to assess reuse potential of soils
- The offal/refuse will be transported and disposed as soon as practicable to an acceptable landfill facility (TBD) as domestic or commercial waste. Prior acceptance of the landfill facility should be obtained.
- Should visual or olfactory evidence of gross contamination be encountered, excavation shall be halted, and the accidental discovery protocol will be implemented (refer to Section 7.9). Laboratory samples will likely be taken of the suspect soils and recommendations will be made by the CLS after analysis, under guidance of an SQEP.
- Validation of each offal pit area shall be carried out following removal of buried materials for a suite of contaminants based on observations made by the CLS during remediation and in consultation with the SQEP.
- Information of the source site / sample results from any imported clean material to fill in the waste pits shall be made available to the CLS.

A geotechnical professional shall be consulted on the suitability of the ground for development following excavation and infilling.

6 ROLES AND RESPONSIBILITIES

The allocated roles for the implementation of this RAP/CMMP are provided in Table 4.

Table 4: Roles and Responsibilities.

Role	Responsibilities	Responsible Party	Contact Details
Project Owner	Overall authority of the site and proposed works.	NZ Cherry Corp	Paul Croft PCroft@infinitywanaka.com
Project Manager	Responsible for project compliance with resource consents, authorities, and management plans. Responsible for ensuring all earthworks contractors are inducted into the requirements of project resource consents and authorities and this RAP/CMMP.	NZ Cherry Corp	Mark Tammett +64 21 921 490 mark@procon.net.nz
Contractor	Responsible for the completion of the proposed remedial works in accordance with resource consents and authorities, contract documents and this RAP/CMMP. Responsible for ensuring all Site staff are inducted into the requirements of this RAP/CMMP and all required tools and equipment are available during works. Preparation of an ECSP and health and safety documentation prior to commencing works.	South Roads	Mat Scully +64 27 276 8069 mathew.scully@southroads.co.nz
Contaminated Land Specialist	Responsible for the preparation of this RAP/CSMP in accordance with CLMG No.1 (MfE, 2021a). Responsible for completion of validation/clearance inspections and reporting. To be available throughout the remediation works in the case of an accidental discovery of additional contamination.	WSP	SQEP: Lisa Bond 021 2246736 Lisa.Bond@wsp.com
Regulatory Authority	Overall authority over Site works in accordance with district and regional planning rules.	Central Otago District Council (CODC)	Ryan Parker Ryan.Parker@codc.govt.nz

Role	Responsibilities	Responsible Party	Contact Details
		Otago Regional Council (ORC)	Melanie Heather 027 5641758 Melanie.Heather@orc.govt.nz Pollution hotline 0800 800 033

7 CONTAMINATED SITE MANAGEMENT PLAN

7.1 GENERAL

The purpose of this section is to provide procedures for the management of earthworks relating to the identified contaminated soil on the site to ensure works are conducted in a manner that appropriately manages the potential impacts of the soil contamination relating to human health. These measures must be established prior to commencing works and be maintained throughout the site works.

Contamination is only one of several hazards that may need to be managed during the works. Details of how hazards unrelated to contaminated land are to be managed on-site will be provided by the primary contractor in the overall project health, safety and environment plan/documentation.

This section of the RAP/CMMP has been developed to outline the appropriate control measures when conducting remedial works at the site to effectively:

- Minimise worker contact with contaminated soil.
- Ensure that contaminated material is appropriately managed.

The site contractor will be responsible for the implementation of the procedures outlined in this RAP. A Contaminated Land Specialist / Suitably Qualified and Experienced Practitioner (SQEP) in contaminated land management (as detailed in the MfE User Guide (MfE, 2012)) shall be engaged to monitor the site works in order to provide confidence that the controls and management of site materials are appropriate and adhered to. The SQEP shall collate the site records and observations as well as validation data and sign off the RAP data and produce an appropriate validation report.

7.2 PREPARATION AND SITE SETUP

Prior to commencing works on-site, the following shall be completed:

- An Erosion and Sediment Control Plan (ESCP) shall be prepared by the contractor, and a hard copy maintained on-site. All erosion and sediment controls shall be implemented prior to commencing works and maintained throughout the works until site stabilisation has been achieved.
- All site staff shall be inducted into the requirements of this RAP/CMMP, and a hard copy shall be maintained on-site.
- Appropriate fencing/demarcation of the site and areas requiring remediation shall be erected to clearly delineate the remedial work areas.
- A site hazard board shall be displayed at the entrance of the site including reference to heavy metal contaminated soil as a site risk.
- A water supply point shall be confirmed on-site, or a water cart made available during proposed soil disturbance activities.

- A CLS shall be engaged and confirmed as available during the project to guide remedial works, complete validation and be on-call during site works in the event of an accidental discovery.
- Supply of appropriate PPE for site workers shall be confirmed as detailed in Section 8.3.

7.3 PERSONAL PROTECTIVE EQUIPMENT

Due to concentrations of arsenic, cadmium, zinc and lead in the Piece of Land exceeding the NESCS human health criteria for residential land use, WSP recommend the following controls with respect to PPE and personal hygiene are implemented during remediation works on-site:

- Safety boots, safety glasses, long sleeve coverings, hard hat and earmuffs (task dependant).
- Dust masks – when visible dust is present.
- Hand washing facility for use prior to eating and drinking.

7.4 EROSION AND SEDIMENT CONTROL

During the proposed works, all practical steps must be taken to minimise soil erosion and discharge of sediment off-site. Prior to works commencing the contractor shall prepare a site-specific ESCP to highlight the location of proposed erosion and sediment control measures during the works. Erosion and sediment control measures required during the works may include:

- Timing earthworks to avoid adverse weather conditions.
- Minimising the area of land to be disturbed at one time and minimising the length of time that the disturbed land is exposed.
- Daily monitoring of erosion and sediment control measures and practices including checking surrounding roadways for signs of sediment tracking.
- Any accumulation of sediment within protection systems shall be removed daily or prior to forecast weather events.
- Use of a stabilised site entry/exit points.
- Implementation of a dedicated on-site traffic route to avoid un-stabilised areas.
- An agreed location for on-site stockpiling of soil proposed for reuse to avoid stormwater run-off to neighbouring sensitive receptors.
- Segregation of ‘clean’ imported material and ‘dirty’ material to avoid cross contamination.
- Use of a dedicated refuelling area (secure, bunded, located away from waterways, open excavations and stormwater drains).
- Identification of low points and proposed locations for sediment control devices (sediment socks, witches’ hats, silt fences etc).
- Location of bin loading activities for soil requiring off-site disposal.
- Location of water source or water cart used for dust suppression.

7.5 STORMWATER MANAGEMENT

All practical steps must be taken to separate 'clean' and 'dirty' stormwater/surface runoff. Separation and diversion of clean stormwater away from areas of ground disturbance is standard practice for any earthworks activity but becomes more important where contaminants are present. To minimise the potential for clean stormwater to encounter contaminated soil, the stormwater and sediment controls detailed in the ESCP for the works shall be implemented. At a minimum these controls should include:

- Diverting 'clean' stormwater away from excavated areas using on-site topography and/or sediment socks;
- Allowing stormwater falling within the Site to infiltrate land; and
- Inspections before and after any rainfall or weather event sufficient to generate runoff. Any corrective actions should be completed within 24hrs or prior to any forecast weather event. Key inspection points are identified as stormwater sump protection, clean/dirty water diversion systems and stockpiles.

7.6 DUST MANAGEMENT

Dust must be minimised in accordance with the *Good Practice Guide for Assessing and Managing Dust* (MfE, 2016).

Dust may be created during development works due to vehicular movement on unsealed roads and ground disturbance activities. The works shall be conducted, and dust suppression techniques shall be employed, such that there shall be no visible generation of dust. During works, the following methods will be employed to minimise dust generation and distribution:

- Weather forecasts shall be obtained each day during work to check for predicted high wind conditions and any such predictions shall be notified to relevant construction staff so that dust management procedures are adequately prepared and implemented.
- Dry and friable soils shall be dampened with water in windy conditions. A water tanker (or equivalent) should be kept on-site and used for dust control.
- Limit drop heights of soil from the excavator bucket into trucks.
- Vehicle speeds should be no more than 5 km/hr on-site.
- Vehicle movements shall be via dedicated haul routes and avoid un-stabilised areas.
- Ensure vehicles do not leave the site with excess soils between the tyre tread as this will be distributed on public roads and will generate dust.
- If dust cannot be controlled during excessively windy conditions, then earthworks shall cease until dust can be managed.
- If dust release occurs, the time, duration, location and cause is to be recorded in the daily report as well as remedial action performed.

The objective of these measures is to prevent visible dust emissions beyond the work area boundary.

7.7 WASTE MANAGEMENT

7.7.1 OFF-SITE SOIL DISPOSAL

In all cases of off-site disposal:

- Trucks transporting soil for off-site disposal shall be covered;
- Have the necessary permits from the disposal facility to confirm that the facility can receive the materials prior to off-site transportation; and
- Weighbridge dockets and/or a summary sheets shall be retained.

7.7.1.1 SOIL TRACKING

The following measures shall be implemented to prevent soil from being dispersed onto roads or transported to another site (excluding transport to a disposal facility) as well as to minimise generation of dust during off-site soil disposal:

- Trucks shall stick to dedicated haul routes and avoid tracking over unstabilised areas.
- Any excess soil on vehicle tyres or machinery shall be removed before vehicles leave the work area.
- All trucks transporting excavated soil to the selected disposal facility shall be appropriately covered.
- Excavated soil shall be placed directly into a truck for immediate off-site disposal where possible, where onsite stockpiling prior to disposal is required, controls detailed in Section 8.8 shall be followed.
- Spillages of soil during placement in trucks shall be cleaned up as soon as practicable. Spillages shall not be left unattended as contaminated soil could be trafficked by trucks and transported off-site.

7.8 STOCKPILING OF CONTAMINATED MATERIAL

Stockpiling of contaminated material should be avoided during remedial works. However, in the event that stockpiling of contaminated material is required, the following controls shall be implemented:

- Stockpiled material shall be placed on an impermeable layer (polyethylene or similar) to prevent contamination of in-situ soils.
- Perimeter bunding shall be installed around the stockpile to prevent stormwater runoff from the stockpile into the surrounding area or the infiltration of stormwater into the stockpile area.
- Stockpiled material should be dampened during windy conditions or covered.
- Where stockpiles are to remain in place overnight, over weekends or public holidays, the stockpile should be covered, including where rain events are forecast.

7.9 ACCIDENTAL DISCOVERY PROTOCOL

If during earthworks, contaminated soils or hazardous material in addition to those already identified are encountered, cease all work in the area of concern until the CLS has assessed and identified the material.

Where the procedures are in conflict with any applicable resource consent conditions, the conditions of consent shall take precedence until such time as a suitably qualified professional is consulted and an agreed resolution found with CODC Environmental Health Officers or ORC Contaminated Land Officers.

Evidence of additional contamination likely to trigger a stop work procedure may include:

- Visual (buried refuse, metal objects, building material, soil or water staining/bleaching/ discolouration);
- Chemical odours (fuel, sulphurous, rotting vegetation or sewage);
- Separate phase liquids or 'rainbow effect' films on groundwater;
- Auditory (gas leaks, flowing or dripping liquid); and
- Demolition or landfill material that may contain asbestos.

If any such indicators are observed during earthworks, the following steps should be taken:

- Cease all work within a 5m radius, make the work area safe and restrict access to all workers until instructed by the CLS or approved delegate;
- Shut off all ignition sources and, if possible, contain any contaminant discharge and close/divert any water flow;
- Advise the CLS/SQEP and NZ Cherry Corp;
- Work shall not resume until the 'all clear' is given by the SQEP;
- The CLS (in consultation with the site foreman) shall assess the Site and consult with the SQEP. If the assessment concludes that confirmation of contamination is required, the following actions shall be implemented:
  - Notify the regulatory authorities (ORC and CODC), if required, that suspected contamination has been discovered and the contingency action is being implemented.
  - Control the site: install temporary fencing/demarcation, temporary cover, silt traps and bunding as required around the area of potential additional contamination.
  - Small volumes of excavated soil shall be contained in covered skips to minimise contaminated discharges from rainfall runoff and dust.
  - If this is not possible, larger volumes shall be covered and bunded to manage dust and stormwater runoff.
  - Potentially contaminated water shall be collected and disposed of to an appropriately licensed treatment facility. It must not be discharged to the construction stormwater system.
  - Samples of the suspect material shall be collected by the CLS for laboratory analyses using appropriate procedures (if required).

- The results of any laboratory analysis shall be assessed against the relevant human health and environmental discharge regulatory standards/acceptance criteria as appropriate;
- This RAP/CMMP shall be updated with any additional remedial action and required controls measures based on the contaminant of concern; and
- Any soils or material requiring off-site disposal must be disposed of at facilities consented to accept the material.

7.10 SITE RECORD KEEPING AND MONITORING REQUIREMENTS

Records which should be kept on site during the remedial works include the following:

- Daily site conditions including weather conditions if soil has been stockpiled outside;
- Condition and replacement of erosion and sediment control measures;
- Progress / problems associated with the remedial work;
- Monitoring data including stockpile locations and movement of soil within the site;
- Any requirements for further analysis of soil samples for landfill acceptance or re-use purposes;
- Safety, health and environmental discussions and safety non-compliance issues;
- Third party complaints lodged regarding the works, as well as all corrective measures implemented to limit such complaints from reoccurring;
- Waste disposal or transport dockets of all soils transported off site;
- Information of the source site / sample results from any imported clean material; and
- Any other relevant information pertinent to the movement of contaminated soil on or off site.

These records will be used for preparation of the Site Validation Report once work at the site is complete.

8 SITE VALIDATION

The CLS will be available for the duration of the remediation works and site validation will occur concurrently with the remedial works. The CLS shall confirm the remedial goals have been achieved, this will consist of the following:

- Visual confirmation that any excavation and removal has been completed to the horizontal and vertical extent required as identified during delineation soil sampling and screening.
- Validation using field XRF screening and QA soil sampling on a 1:10 basis (XRF to lab testing) shall be completed in the sheep dip areas on completion of remediation in general accordance with the MfE, *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils* (CLMG No.5) (MfE, 2021b).
- Validation of other areas will be completed using standard sampling and analysis in general accordance with CLMG No.5.

8.1 SITE VALIDATION REPORT

Within 20 working days of completion of remedial works, the CLS shall prepare a Site Validation Report (SVR) in accordance with the NESCS consent to present the following:

- A summary of the works undertaken including a statement confirming whether the remedial works at the site have been completed in accordance with this CSMP/RAP;
- The location and dimensions of the excavations carried out, including a relevant site plan;
- A summary of validation screening and soil sampling undertaken, including tabulated analytical results, and interpretation of the results compared with the applicable guideline criteria and remedial goals;
- Details on the borrow pit designated for encapsulation of the contaminated soils, if applicable;
- Copies of the disposal dockets for soil and waste material removed from site, if applicable;
- Records of unexpected contamination encountered during the works and contingency measures undertaken, if applicable;
- Details regarding any complaints and/or breaches of the procedures set out in this RAP/CMMP;

The SVR will be written in general accordance with the requirements of the MfE 2011(a) guidelines and as such will be reviewed by an SQEP. A copy of the SVR will be provided to CODC and forwarded to ORC for updating of the HAIL database.

9 ONGOING SITE MANAGEMENT

Unless elevated contamination concentrations are identified during site validation which cannot be mitigated, ongoing site monitoring is unlikely to be required.

The SQEP will determine the need for an ongoing management plan based on the findings of the site validation process.

Should material be retained on site in a consented borrow pit, an ongoing site management plan specific to that area will be completed to be held on file by council and on title.

10 DISCLAIMER AND LIMITATIONS

This report ('Report') has been prepared by WSP New Zealand Limited ('WSP') exclusively for NZ Cherry Corp ('Client') in accordance with the Short Form Agreement with the Client dated 2 March 2023 ('Agreement').

PERMITTED PURPOSE

This Report has been prepared expressly for the purpose to investigate and assess potential risk to human health, ecology and options for soil disposal, based on the proposed works ('Permitted Purpose'). WSP accepts no liability whatsoever for the use of the Report, in whole or in part, for any purpose other than the Permitted Purpose. Unless expressly stated otherwise, this Report has been prepared without regard to any special interest of any party other than the Client.

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QUALIFICATIONS AND ASSUMPTIONS

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Agreement and the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report and/or otherwise communicated to the Client. Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and/or recommendations in the Report ('Conclusions') are based in whole or in part on information provided by the Client and other parties ('Information'). The Information has not been and have not been verified by WSP and WSP accepts no liability for the reliability, adequacy, accuracy and completeness of the Information.

The data reported and Conclusions drawn by WSP in this Report are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

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12 LIMITATIONS

This report ('Report') has been prepared by WSP New Zealand Limited ('WSP') exclusively for The Queenstown Commercial Ltd. ('Client') in accordance with the Project Change Notice PF-PR-107 with the Client dated 23/11/2022. ('Agreement').

Permitted Purpose

This Report has been prepared expressly for the purpose of assessing the risks to human health associated with potential contaminants of concern, in order to satisfy the NES-CS and local council requirements for subdivision, land use change and development of the site ('Permitted Purpose'). WSP accepts no liability whatsoever for the use of the Report, in whole or in part, for any purpose other than the Permitted Purpose. Unless expressly stated otherwise, this Report has been prepared without regard to any special interest of any party other than the Client.

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12.1 RAP LIMITATIONS

a This RAP report has been prepared for the client for the purpose described in the scope of works only. WSP is not responsible for validity, appropriateness, sufficiency or consequences arising from the use of the report for any other purpose.

b This report is not intended for, and may not be used by, any third parties without WSP' prior written authorisation; however, WSP acknowledges that the report may be provided to the Contractor engaged by the client to develop the site, and the Contaminated Land Specialist / SQEP engaged to provide specialist services. WSP accepts no responsibility to any third party (including, for clarity, the Contractor and/or Contaminated Land Specialist / SQEP) who uses or relies upon this report).

c WSP has provided the report based on the various assumptions contained in this report.

d This RAP provides a framework for managing the contamination hazards and presents a summary of identified hazards and mitigation measures relevant to the expected site conditions.

e WSP holds no responsibility for any deviations from the plan which may result in harm to the site workers, damage to the environment or breaches of consent.

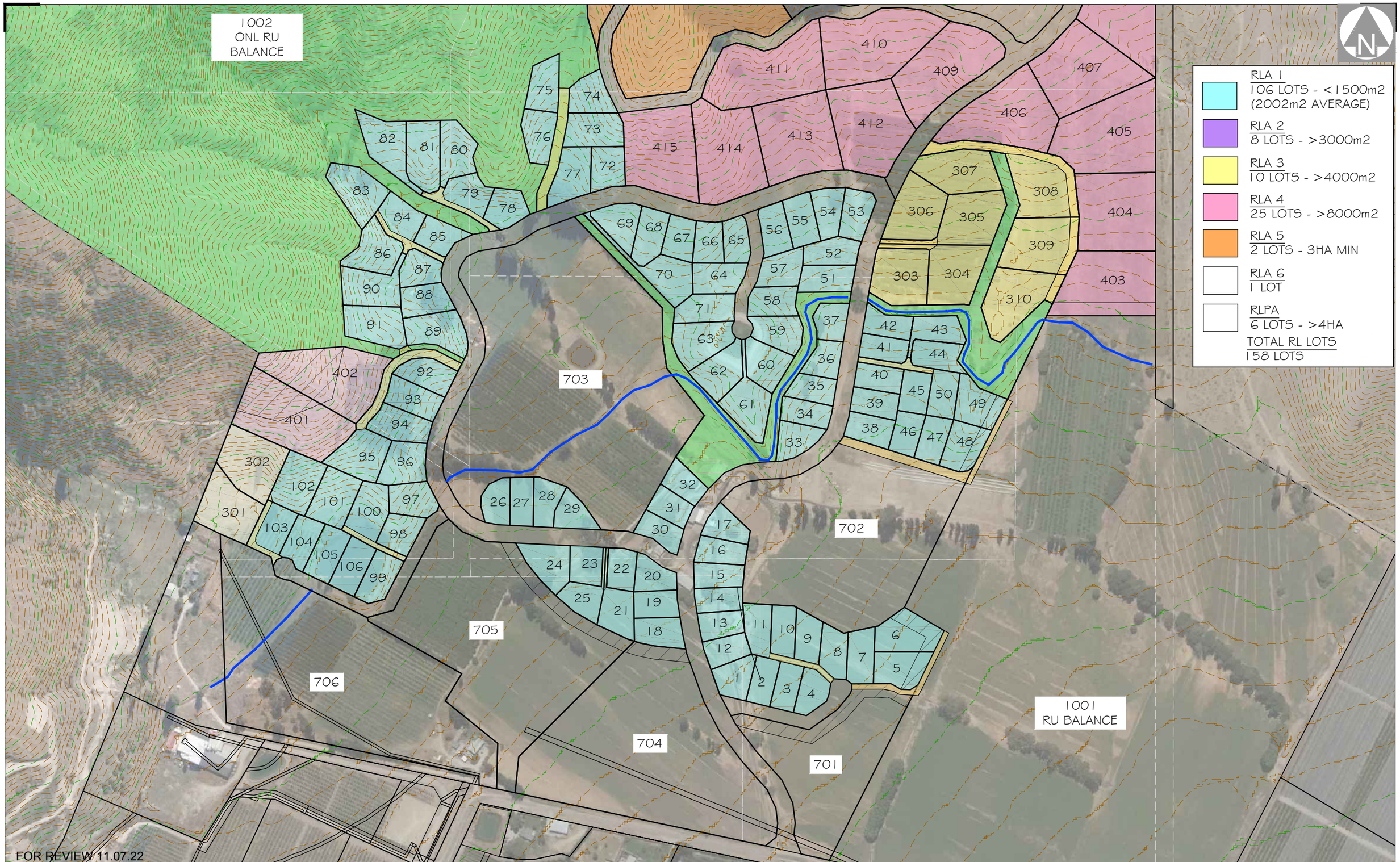
f The responsibilities of the Contaminated Land Specialist / SQEP in terms of compliance with this RAP, are restricted to the inspection, investigation and advice on the management of any suspected contamination encountered during the earthworks. The Contaminated Land Specialist / SQEP has no responsibility for instructing the Contractor or for the measurement and administration of the contract.

g In accordance with the provisions of the *Health and Safety at Work Act 2015*, it is the responsibility of the PCBU of the place of work to communicate to their workers and contractors undertaking work on the site, the extent of residual contamination, associated hazards and recommended procedures. This RAP provides information and recommendations to augment this process but is not intended to relieve the PCBU of the place of work of their responsibility for the health and safety of their workers and subcontractors.

h Only a limited amount of information has been collected and this report does not purport to completely describe all the site characteristics, properties or hazards. The nature and continuity of the ground between test locations has been inferred using an industry standard approach and it must be appreciated that actual conditions could vary from the assumed model.
This report has been prepared by WSP based on the information made available by the client, as well as the staff and resources devoted to it by agreement with the client. The findings and opinions conveyed via this report are based on information obtained from a variety of sources. WSP does not guarantee the authenticity or reliability of this third-party information or of any information made available to WSP by the client, its staff, or resources.

Appendix A

Site Development Plan



FOR REVIEW 11.07.22

CLARK FORTUNE McDONALD
LAND SURVEYORS - LAND DEVELOPMENT - PLANNING CONSULTANTS
QUEENSTOWN | DUNEDIN | CHRISTCHURCH | GORE

309 Lower Shotover Road, P.O.Box 553 Queenstown
Tel. (03)441-6044, Email admin@cfma.co.nz, www.cfma.co.nz

Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM
PRELIMINARY LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: -	Date: -	Job No.: 15729	Drawing No.: 01 Sheet 001
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Ensuring the information is the most recent issue. - Copyright on this drawing is reserved.	Drawn: RB	Date: 11.07.22	Scale: 1:2000 @ A1, 1:4000 @ A3	
	Checked: -	Date: -	Datum & Level: LINDIS PK 2000, NZVD2016	Rev.: -

C:\jobs Working folder\15729\15729_01_Subdivision Layout.dwg Plotted: 21.07.2022

RLA 1
106 LOTS - <1500m2
(2002m2 AVERAGE)

RLA 2
8 LOTS - >3000m2

RLA 3
10 LOTS - >4000m2

RLA 4
25 LOTS - >8000m2

RLA 5
2 LOTS - 3HA MIN

RLA 6
1 LOT

RLPA
6 LOTS - >4HA

TOTAL RL LOTS
158 LOTS

1002
ONL RU
BALANCE

FOR REVIEW 11.07.22

CLARK FORTUNE McDONALD
LAND SURVEYORS - LAND DEVELOPMENT - PLANNING CONSULTANTS
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Rev.	Date	Revision Details	By
-	-	-	-

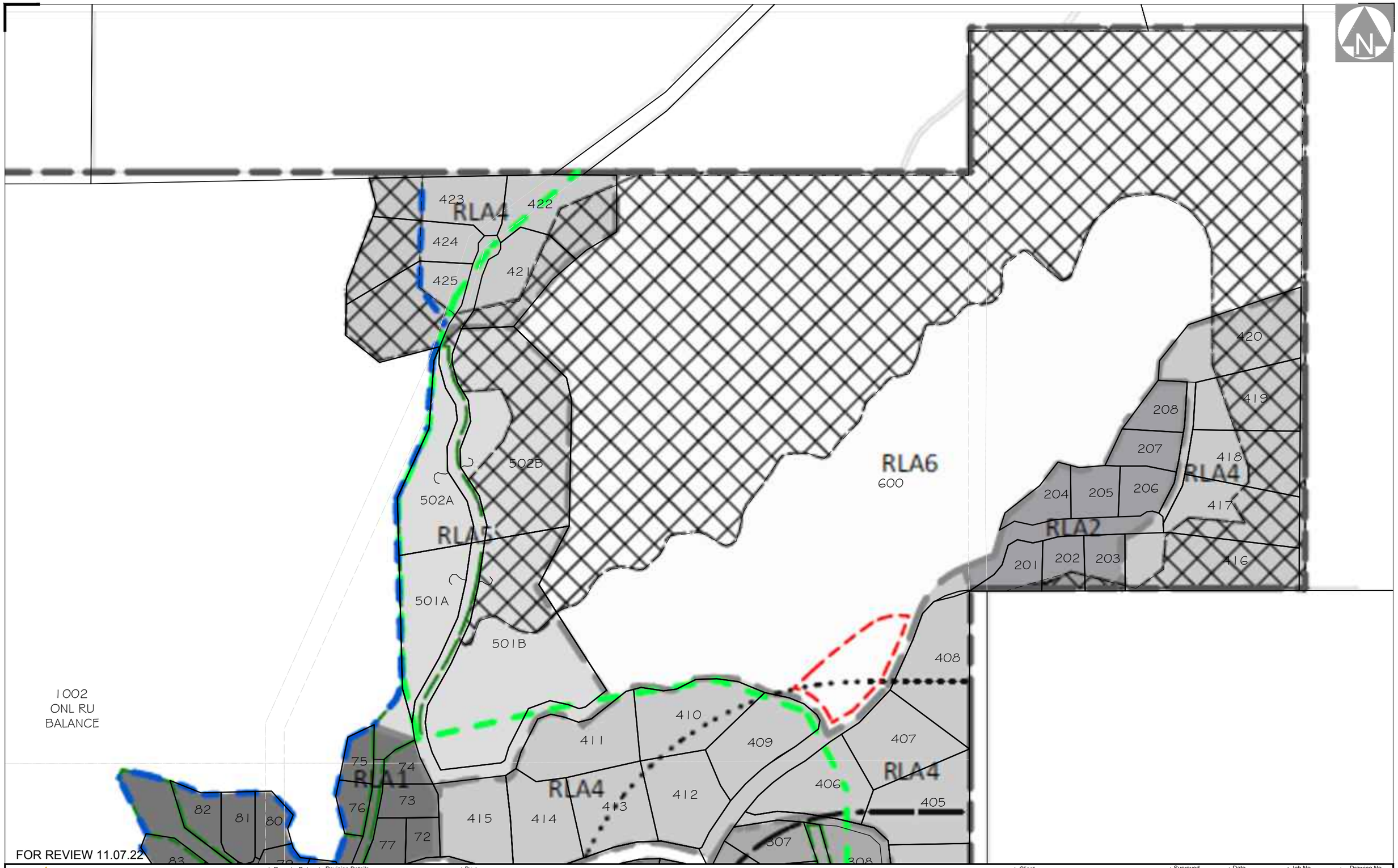
SHANNON FARM
PRELIMINARY LOT LAYOUT

Client: NZ CHERRY CORP	Surveyed: -	Date: -	Job No.: 15729	Drawing No.: 01 Sheet 002
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	Checked: -	Date: -	Datum & Level: LINDIS PK 2000, NZVD2016	Rev.: -

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1002
ONL RU
BALANCE

RLA1 RLA4 RLA4 RLA3 RLA1 RLA1 RLA1 RLA4 RLA3 RLA1 RLA1 RLA1 RLA1 RLA1 RLA3 RLA1 RLA1 RLA1 RLA1 RLA1



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Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM
PRELIMINARY LOT LAYOUT
STRUCTURE PLAN OVERLAY

Client: NZ CHERRY CORP	Surveyed: -	Date: -	Job No.: 15729	Drawing No.: 01 Sheet 004
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	Checked: -	Date: -	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: -

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Confidential

New Zealand Cherry Corps (Leyser) Ltd
Site Validation Report

Shannon Farm, Cromwell

29 September 2025

6-XZ750.00



Site Validation Report

Shannon Farm, Cromwell

New Zealand Cherry Corps (Leyser) Ltd

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REV	DATE	DETAILS
A	7/10/2025	Final for client issue

	NAME	DATE	SIGNATURE
Prepared by:	Tessa Collins	29/09/2025	
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ABBREVIATIONS

CLMG 1	Contaminated Land Management Guideline No. 1: Reporting on Contaminated Sites in New Zealand
CLMG 5	Contaminated Land Management Guideline No. 5: Site investigation and analysis of soils
CMMP	Contaminated Materials Management Plan
CoC	Chain of Custody
CODC	Central Otago District Council
CSM	Conceptual Site Model
CSMP	Contaminated Site Management Plan
DSI	Detailed Site Investigation
H & S	Health and Safety
HAIL	Hazardous Activities and Industries List
IANZ	International Accreditation New Zealand
ILAC	International Laboratory Accreditation Cooperation
ILAC-MRA	ILAC Mutual Recognition Arrangement
IRB	International Risk Based
LINZ	Land Information New Zealand
LRIS	Land Resource Information Systems
m bgl	meters below ground level
MfE	Ministry for the Environment
MMP	Ongoing Monitoring and Management Plan
N/A	Not applicable
ND	Not derived
NES	National Environmental Standards
NES-CS	National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
NL	No limit - derived value exceeds 10,000mg/kg
NZRB	New Zealand Risk Based
ORC	Otago Regional Council
PoL	Piece of Land
PSI	Preliminary Site Investigation

PSSP	Project Site Safety Plan
QA/QC	Quality assurance and Quality Control
RAP	Remedial Action Plan
$SCS_{(health)}$	Soil Contaminant Standards for Health
SGV	Soil Guideline Value
SID	Safety in Design
SQEP	Suitable Qualified and Experienced Practitioner
SSL	Soil Screening Level
SVR	Site Validation Report
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxicity Equivalent – indication of the toxicity of a mixture of compounds

1 INTRODUCTION

WSP New Zealand (WSP) were engaged by New Zealand Cherry Corps (Leyser) Ltd (herein referred to as NZ Cherry) to assess whether successful remediation of the Piece of Land (PoL) at the site has been completed to enable residential development at The Shannon Farm development located at 112 & 144 Ripponvale Road, Cromwell which covers approximately 240 hectares (ha) ('The Site'). The site was formerly used for farming activities associated with sheep pens, paddocks and orchards.

The Shannon Farm site is subject of a plan change which involves rezoning with the proposed works comprising subdivision and subsequent development of residential lots.

1.1 OBJECTIVES

The objective of this investigation report was to validate that the soil has been remediated appropriately and characterise any unexpected contamination encountered. The conclusions of this investigation may be used in support of consent conditions under the NES-CS from CODC and consent to disturb a contaminated site from Otago Regional Council (ORC).

To achieve the objectives, the following scope was undertaken:

- A site walkover to assess the site condition prior to remediation;
- Site supervision during remedial activities and to detail areas where additional work may be required to achieve the objectives;
- Analysis for determined contaminants of concern based on the remediation objectives This is mainly heavy metals with an allowance for other contaminants following on-site observations;
- Comparison of the soil analysis results with applicable background, remediation objectives and standard risk values;
- Site characterisation following remediation completion indicating the potential human health risks associated with the site; and
- Preparation of this SVR in accordance with the requirements of the Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand (Revised 2021) (Ministry for the Environment, 2021)

This report has been reviewed by a Suitably Qualified and Experiences Practitioner (SQEP), as per the NES-CS Regulations (Ministry for the Environment , 2012).

1.2 SITE DETAILS

The site is located at 144 Ripponvale Road, approximately 2.5km west of Cromwell town centre.

The site is currently under development as residential lots with associated roadways, pavements, berms and waterways.

Site identification details are provided in Table 1 below and the proposed site layout is indicated on the development plans in Appendix A.

Table 1: Site Identification

Site Address	112 and 144 Ripponvale Road, Cromwell
Legal Description	Lot 2 DP 330709; SEC 4, 11, 26-28, 54, 96, 98-103; Pt SEC 5, 25 1201R BLK III Cromwell SD
Titles	7C/632, 7C/633, 106/99 126180
Owner	Leyser Brothers Limited
Approximate total site area	243.43 ha (2,433,400m2)
Territorial Authority	Otago District Council (ODC)

1.3 CURRENT SITE CONDITIONS

The site validation works were carried out concurrently with the remedial works by a Suitably Qualified Environmental Practitioner in Contaminated Land Management (SQEP).

A substantial amount of earthworks is currently underway on site including the preparation of site services, waterway diversions and stormwater retention ponds, roadways, pavements and berms.

1.4 DEVELOPMENT PROPOSALS

It is understood that the proposed development plans include subdividing and developing the site into 158 (rural) residential lots. The size of the lots will differ, with the lots generally increasing in size from south to north of the site. A summary of the proposed areas is given in Table 2 below and the proposed development plans can be found in Appendix A.

Table 2: Summary of Proposed Lots

Area	Number of LOTS	Size of lots
RLA 1	106	<1,500 m^2 (average: 2002 m^2)
RLA 2	8	>3,000 m^2
RLA 3	10	>4,000 m^2
RLA 4	25	>8,000 m^2
RLA 5	2	>3 HA
RLA 6	1	TBC
RLPA	6	>4 HA

1.5 SITE GEOLOGY

The geology of the site is taken from the 1:250,000 scale GNS Geology Web Map extract (GNS Science , 2022).

This map indicates the majority of the site comprises Holocene river deposits. These river deposits are typically loose, commonly angular, boulders, gravel, sand and silt forming alluvial fans. The deposits grade into scree (upslope) and valley alluvium.

The Pisa Range to the west of the site consists of Basement metamorphic rock and Early Pleistocene river deposits are found north of the site.

Details of the site hydrology and hydrogeology have been gained from a review of sources including GNS Science (GNS Science, 2022) and a search of council records. A summary of the relevant data can be found in Table 3 below.

Table 3: Summary of topographical, hydrological and hydrogeological data

Topography	Upwards slope towards Pisa Range in the west
Nearest Major Surface Water Body	Kawarau Arm of Lake Dunstan
Height above Mean Sea Level	Approximately 260m amsl
General Flow Direction	Generally north-west to south-east towards the Clutha/Mata-Au River.
Groundwater Status	Cromwell Terrace Aquifer
No. of known Boreholes and wells within 500m	One

1.6 SITE HISTORY

Discussions with the previous site owner, Mr Leyser, indicate that the property had been in his possession since approximately 1973 until it was acquired by the current owners in August 2004. During that time the paddocks on site had been in use for various farming purposes including various livestock (sheep, cattle and deer) and orchards. Much of the pastoral land present was at some stage planted with fruiting trees including pears, apples and stone fruit.

Offal pits were delineated by the SQEP during the initial (PSI) site inspection along with open holes used for domestic uncontrolled landfilling present in the farmyard area. However it was unknown if further landfilling beyond those noted and described had been undertaken on site.

1.7 SUMMARY OF PREVIOUS INVESTIGATION FINDINGS

A Preliminary Site Investigation (PSI) was undertaken by WSP in July 2018 (WSP Opus, 2018) which identified potential HAIL areas. A Detailed Site Investigation (DSI) was subsequently completed in October 2022 (WSP, 2022) in proposed areas of rezoning where HAIL activities had been identified. The following HAIL activities were found:

A10: Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds

A13: Petroleum or Petrochemical Industries including a petroleum depot, terminal, blending plant or refinery, or bulk storage of Petroleum or petrochemicals above or below ground

A17: Storage tanks or drums for fuel, chemicals or liquid waste

G3: Landfill sites

G5: Waste Disposal to land

The DSI sampling design split the investigated site into two categories: the orchards and the farmyards. A total of 188 samples were collected within the orchard (zones 1 -6) and selected samples analysed for heavy metals and organochlorine pesticides (OCPs). A total of 69 samples were collected within the farmyard (areas A, C, D, F and from test pits) and selected samples analysed for heavy metals, OCPs, total petroleum hydrocarbons (TPHs), benzene, toluene, ethylene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), and/or asbestos.

Orchard sampling results indicated no human health exceedances were reported for any of the samples analysed. As such, all sample locations are considered to have contaminant concentrations below soil guideline values for both 10% and 25% Residential end use under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) Regulations (2011) ((Ministry for the Environment , 2012).Farmyard sampling results indicated various samples exceeded guideline values for both 10% and 25% Residential end use under the NESCS Regulations (2011) (Ministry for the Environment, 2012).

As the DSI encountered contaminants in excess of their relevant soil contaminants standard, ground disturbance in excess of permitted activity volumes required consent under the NESCS and required management in the form of a Remediation Action Plan RAP and Contaminated Site Management Plan CSMP.

WSP prepared a RAP and CSMP dated 9th July 2024, which was revised 27th February 2025 following external peer review (WSP, 2025). The most recent revision following an update to proposed development and remediation proposals was completed 20 May 2025.

As detailed in the RAP the following remediation strategies were developed for the site areas exceeding applicable land use criteria:

- Heavy metals in sheep pens:
- Delineation using field screening techniques with appropriate QA;
- Excavation of surface soils and stockpile within demarcated ‘contaminated zone’;
- Sampling of stockpile to assess disposal off-site or reuse potential;
- Assessment of stockpile sample results to determine acceptability for on-site retention;
- Placement of soils within a berm with appropriate controls in an area adjacent to an access road; and
- Validation sampling and analysis to confirm remediation objectives.

- Heavy metals and/or hydrocarbons associated with former underground fuel storage tank:
  - Excavation and removal of tank
  - Removal of noticeably contaminated soils surrounding the tank and removal to landfill.
  - Validation sampling and analysis of surrounding soils.

In addition to areas where elevated contaminants have been found, historic landfill areas within the demarcated remediation zone were also be excavated and removed from the PoL, these included accidental discoveries of landfill pits.

- Domestic/commercial refuse from landfilling area
  - Excavation and removal to suitable landfill.
- Waste from offal pits
  - Excavation and segregation of organic wastes/ larger materials/domestic refuse (if present)
  - Sampling and analysis of separated soils to assess suitability for reuse on site or disposal requirements
  - Removal of offal/domestic waste to suitable landfill
  - Validation of soils from beneath offal stockpiles to ensure contaminants have not been introduced into storage site prior to disposal.

For reporting purposes the Pices of Land (PoL) where remediation has occurred is referred to as ‘the Site’ within this Site Validation Report. The remediation site areas are outlined on Figure 1, Appended to this report.

2 IMPLEMENTATION OF THE RAP AND CSMP

The Remediation Action Plan and Contaminated Site Management Plan outlined the methods to be used to achieve the remedial objectives for the site.

The site contractor (South Roads) was responsible for the implementation of the procedures outlined in the RAP. A Suitably Qualified and Experienced Practitioner (SQEP) in contaminated land management has monitored the remedial site works in order to provide confidence that controls are in place and work was completed to their satisfaction. The SQEP then collated the data from this validation and has produced this validation report. A SQEP is a suitably qualified and experienced practitioner as detailed in the MfE's User Guide (MfE, 2012).

3 REMEDIAL OBJECTIVES AND BASIS FOR GUIDELINE VALUES

The remediation of soil contamination at the site is based on ensuring that the completed development is safe for human use as a residential subdivision.

The MfE (2011) Methodology utilises standardised receptors and exposure parameters to calculate Soil Contaminant Standards for health ($SCS_{(health)}$) for five generic land-use scenarios. With respect to assessment under the NES-CS, the assessment criteria for this investigation have been based on analysis of the proposed land use as rural residential (25% produce) and residential (10% produce) depending on the density of development proposed for each area of the site. The soil contaminant standards have been selected for this end use to ensure that future site users are protected from contaminants of concern. These standards are considered to address exposure risks to contaminants in soil via any areas where there is likely to be soil contact, including areas where vegetables may be grown for consumption by residents.

Assessment criteria was selected depending on the proposed size of the section. Section sizes of 4000m2 or more have been assessed against the more conservative 25% produce consumption (Rural Residential) and smaller sections against a 10% produce consumption criteria (Residential). These criteria are detailed in Table 4. We consider that based on the proposed use of the site, these exposure scenarios are appropriate and no further adjustment of the SCSs(health) as set out in the NESCS is necessary in this instance.

Table 4: Land Use Scenario

Scenario	Description
Rural / lifestyle block	Rural residential land use, including home-grown produce consumption (25 per cent). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land. Note: Consumption of eggs, milk and meat from animals raised on site is excluded. Produce consumption is limited to home-grown vegetables. Sites for which consumption of home-grown eggs, milk or meat is important will need to be evaluated on a site-specific basis.
Residential	Standard residential lot, for single dwelling sites with gardens, including home-grown produce consumption (10 per cent).
High-density residential	Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption); applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens, but not high-rise apartments.
Parks / recreational	Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Commercial / industrial outdoor worker (unpaved)	Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (ie, a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site.

3.1 APPLICABLE RESOURCE CONSENTS

Resource Consent RC220396 was granted by CODC on 13 September 2023. A variation to the consent (RC220396V2) was submitted in May 2025, a copy of which is provided in Appendix B. NESCS conditions applicable to this report only are appended for reference and are summarised in Section 8.

ORC have issued consent (RM23.549.07) to disturb a contaminated site for the purpose of undertaking earthworks for residential development. A copy of the consent is provided in Appendix B.

Conditions applicable to the ORC consent and activities and/or compliance checks associated with them are summarised in Section 8.

4 CONTAMINATION MANAGEMENT METHODS

4.1 MANAGEMENT METHODS USED

The risk to site users during remedial works was considered to be acceptably low with works undertaken in accordance with standard site management practices and any additional procedures outlined in the RAP/CSMP. Earthworks for the management of contaminated soils were managed in discrete units with sampling completed during each unit of work for verification, further assessment or validation. These units were broken down as follows:

1. Removal of buried fuel tank
    a. samples tank1-tank5 Taken 23/08/2025)
2. Offal pits excavation and stockpiling.
    a. samples 1-8 taken 14/11/2024 and samples OPV7a & OPV7b taken 25/11/2024
3. Delineation of Sheep dip contamination including:
    a. Pre-strip verification of soil contaminants using XRF and lab samples
    b. stockpiling of soils and verification - samples (stockpile 1-10) taken 23/08/2024
    c. Validation sampling post strip (RV1-RV10 taken 23/08/2024)
    d. Validation sampling post stockpile removal (VAL1-VAL8)??? TAKEN 19/MAY 2025)
4. Berm Verification:
    a. Verification sampling of berm location pre-placement of contaminated soils
    b. Verification of stockpiled soil within berm 1-5 19/05/2025
5. Landfill Pit Validation samples 1-4 taken 16/06/2025

Soil management and validation works completed during each unit of earthworks are outlined in Section 7.

During the earthworks on site, the Contractor and CLS have actively monitored for the conditions/materials specified in the RAP as contamination indicators. Whilst additional landfill pits were found across parts of the site, no unexpected soil contamination was encountered with the majority of the infilled pits containing waste materials such as plastic bags and bottles, glass, paper and cardboard.

Assessment of initial verification testing and the analysis of the stockpiled soils on the sheep dip area indicated that soils were suitable for retention on site within an encapsulation bund. Amendments to the RAP were undertaken to incorporate encapsulation of soils, with a variation to consent obtained.

On completion of the filling of the bund with the contaminated soils, a layer of geotextile was placed along the sides and on top of the soils to create a low permeability delineation layer. A minimum of 500 mm of soil was placed above the geotextile and the area will be landscaped in accordance with the landscaping plan for the site.

4.2 TIMING OF THE WORKS

The soil remediation works commenced on 23 August 2024 with on-site validation taking place until August 2025.

4.3 OFF-SITE DISPOSAL

Removal of soils from the sheep dip area of the site for disposal was not undertaken as part of the remedial works.

Waste materials from within the landfill pits, the removed fuel tank, and offal pit waste, which included some soils which had become intermixed during removal, were all taken to Victoria Flats landfill, Queenstown. Disposal dockets associated with these waste streams are presented in Appendix C.

A total of 176,900 kg of contaminated soil and waste material (including offal) was deposited between 6 and 22 November 2024.

5 VALIDATION SAMPLING AND ANALYSIS

5.1 SAMPLING RATIONALE AND METHODOLOGY

Part time site supervision to oversee remedial works and facilitate validation sampling of soils was undertaken between 23 August 2024 and 19 May 2025 and were completed in phases which aligned with earthworks being completed by contractors. Photographs taken at the time of the site works are presented in Appendix D. An outline of the works completed for each unit is described in Section 7.

Within the sheep dip unit of works verification sampling utilising field screening of soils was completed using X-ray fluorescence (XRF) techniques by a licensed WSP Environmental Scientist. Concurrent QA soil sampling was undertaken for validation purposes. Following stockpiling and post remediation, the same locations were validated for confirmation of achievement of the remedial objectives using hand sampling and laboratory analysis to ensure consistent and authentic results for validation purposes.

The fuel tank removal involved the sampling of the sides and base of the excavation by hand following removal of the tank.

The offal pits unit of work collected nine validation samples by hand from the sides and, where possible, base of the pits (from excavator bucket). Offal stockpile validation sampling collected a total of 19 soil samples with samples analysed for heavy metals and PAH following removal of the stockpiles to landfill.

The sheep dip area of the site collected a total of 78 soil samples in various phases through the validation process with selected samples analysed for arsenic and cadmium which were noted to be the contaminants of concern for this unit of remedial work.

The landfill area of the site was visually inspected prior to and following removal of waste with heavy metals tested initially as a screen for validation purposes. Visual assessment of the landfill contents was completed to determine whether other contaminants were needed to be analysed.

All scheduled laboratory analysis was under the direction of the SQEP.

5.2 FIELD QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

Samples were collected from a hand trowel and put in laboratory supplied glass jars, as appropriate for heavy metals. Each sample jar was individually labelled, stored in a sealed cooler and transported to the laboratory under chain of custody. Dedicated disposable nitrile gloves were worn for each sampling episode and all non-dedicated equipment was decontaminated between sampling locations to minimise the potential of cross contamination.

5.3 LABORATORY QA/QC

The Hill Laboratories Analysis Reports have been appended for perusal. These reports includes the analytical methods used by the laboratory and the laboratory accreditation for analytical methods used.

All laboratory analyses were completed through Hill Laboratories. Hill Laboratories are accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

6 REMEDIATION AND VALIDATION WORKS

The results of the chemical laboratory analysis were compared against the adopted NES-CS Soil Contaminant Standards for Health ($SCS_{(health)}$) and are summarised in Section 5. The proposed land use within the redevelopment area was assessed as being a rural residential (25% produce) end use and residential 10%. Photographs taken during each unit of remediation and validation work are presented as sections within Appendix D.

6.1 FUEL TANK

The buried fuel tank was located in proximity to the stream which runs north to south through the site and adjacent to the main roadway through the site. Soils were excavated and the tank removed on 23 August 2023. The tank was placed on the ground nearby for inspection before being transported for landfill disposal.

Soils around the sides and base of the excavation generally comprised light brown dry silty Sand and Gravel with no visual or olfactory evidence of fuel oils noted within the soils remaining in the stockpile created or pit walls. Pipework to the tank was minimal on the northern side of the excavation and appeared to have been disconnected at some time in the past. The tank itself was generally in good condition and relatively dry with a slight smell of diesel emanating from the top.

Validation samples were taken as shown in Figure 2 with samples 1 – 3 taken from the sidewalls at depths of approximately 1.2m – 1.5m bgl. Sample 4 was taken from the base of the excavation at 2.3m bgl and sample 5 was taken from the stockpile of soil which had been excavated.

A validation letter report (6-X750.00_CLM_LTR_109 Rev A) dated 29 October 2024 was produced following the remediation validation works. Validation analysis results for Heavy metals, TPH/BTEX and PAH indicated that soils were below their respective soil contaminant guideline values and were suitable for reuse on site. A summary of the results is appended as Table 1 in the Summary Tables.

No soils were taken off site as part of this remediation work.

The letter report outlining the full findings of remediation and validation is included in Appendix E.

6.2 OFFAL PITS

The offal pits located on the northern part of the development area, at the base of the slope up to the existing irrigation pond was completed on 9 September 2024. A WSP Engineer was attendance during excavation works and wore appropriate health and safety equipment including a Tyvek suit and respirator (due to odours).

Five offal pits were excavated with the arisings (partly decomposed carcasses and soil) stockpiled alongside initially. Observations during excavations indicated that the northern side of pit 5 may have been contaminated with hydrocarbons. To ensure that all potentially contaminated soils had been removed the site engineer requested that the base of each pit was over-excavated by 500mm with visual observations made to ensure that all traces of organic matter had been removed from the pits.

Validation samples were taken from the base of each of the five offal pits with four samples taken from locations within the each stockpile for disposal assessment.

Locations of each offal pit and the samples taken are presented in Figure 3.

Validation samples from the base of the pits indicated that contaminants were below their respective soil contaminant guideline value and that removal and remediation of the offal pits had been successfully achieved.

Pits were backfilled with cleanfill material derived on-site from areas not designated as HAIL.

Arisings from the offal pits were initially stockpiled adjacent to the pits and were subsequently transferred to a holding area which was created in a hollow to the south of the offal pit locations and bunded around its sides with an access made on the northern side. Arisings were generally segregated into three stockpile base on content as follows:

- Stockpile 1 contained Bailage netting and metal/wires only. This stockpile was located on a plastic liner and had not been covered, however no contaminated soil or offal waste was noted within the stockpile.
- Stockpile 2 contained organic offal waste and was fully lined at base and covered by plastic with soil on top to prevent wind blowing plastic. Stockpile located on northern part of bunded area at a higher elevation than the ponding water and was not causing any ongoing potential contamination issues.
- Stockpile 3 contained a mixture of soils, metal wires/ waste and minimal offal waste. This stockpile was located on the north-eastern part of the bunded area.

Stockpile locations within the bunded area are shown on Figure 4 along with validation sample locations.

Stockpiles were covered with plastic whilst awaiting acceptance at Victoria Flats Landfill. Following their removal to landfill soils from beneath the stockpiles were sampled with visual assessment of the holding area completed by the SQEP. Some remnant organic material (including bones) were noted during the validation visit on 14 November 2024 and the contractor was instructed to remove visual signs of offal waste prior to secondary validation testing completed on 25 November 2025. A summary of the results o

Visual assessment on 25 November did not find evidence of remnants of the offal pit waste remaining with soil validation analysis from beneath the stockpile locations confirming soil contaminants were below their respective soil contaminant guideline value. A summary of the results is appended as Table A2 in the summary Tables. These observations and results confirmed successful remediation and removal of offal waste from the bunded area of the site and this area was considered suitable for its intended use.

6.3 SHEEP DIP

During the DSI arsenic, cadmium, lead and zinc within three sample locations in the sheep dip area exceeded both the residential 10% and rural residential 25% end use land criteria. Prior to remediation excavations on the sheep dip site, on-site screening of soils took place on 23 August 2024 using X-ray fluorescence (XRF) techniques by a licensed WSP Environmental Scientist, to give an outline of areas where soils would require excavation and deposition to an alternative location. Arsenic was considered the indicator contaminant of concern with multiple readings taken from the XRF and readings of cadmium noted where elevated due to a hotspot found in the DSI. A total of 29 surface locations were screened at a depth of 0.1 m bgl. The field screening locations are presented in Figure 5 and summarised in Table 3 of the appended Summary Tables. Assessment of field screening data against QA lab samples was completed which indicated that

Arsenic exceeded both the residential 10% and rural residential 25% end use land criteria in sample location XR1 (28.8 mg/kg). Cadmium was noted to exceed both end use land criteria in sample location XR16 (28 mg/kg).

As a conservative measure approximately 120m^3 was scraped to a depth of approximately 0.2m bgl and stockpiled in-situ using a mechanical excavator. A total of 10 samples from varying depths were collected from within the now mixed stockpile soils to determine general contaminant concentrations. The sample locations within the stockpile are shown in Figure 6.

The stockpiled soils were proposed to be encapsulated within a berm along a nearby roadside and as such analytical results were compared against recreational guideline values based on the proposed end use of the soil from the RAP. A summary of the results are appended in Table A6 of the Summary tables.

Analytical results from the stockpile identified no exceedances of the recreational end use land criteria.

Following the site strip and stockpiling, on the same day (23 August 2024) further verification sampling was undertaken across the stripped area to determine if further stripping was required to remediate the sheep dip area of the site. A total of 21 field screening samples using XRF techniques were collected and a total of 10 QA soil samples to determine whether field screening was reliable were completed. Validation sample locations are shown in Figure 7.

Results indicated soils that within vicinity of validation sample location V4 required further stripping and incorporation into the stockpile soils when removed to the encapsulation cell within the Berm.

Following the removal of the stockpiled material and soil in the vicinity of V4, a total of eight soil samples were collected and results indicated no exceedances of arsenic or cadmium against both residential 10% and rural residential 25% end use land criteria. The locations of the final validation samples from the sheep dip area are shown in Figure 8, with a summary of the analytical results and assessment criteria presented in Table A6, of the appended summary tables.

6.4 BERM VALIDATION

Low level contaminated soils were proposed to be placed within an encapsulation cell along a road berm on site as shown in Figure 9. An Assessment of Environmental Effects (AEE) was completed to assess suitability of the soils to be placed and the risks posed to the environment associated with their placement. This included analysis of soils for leachability using SPLP. The design of the proposed encapsulation cell was finalised following discussions with ORC and included within Revision 8 of the RAP.

Movement of soils from the stockpile and placement within the encapsulation cell was completed on 15 May 2025. Photos showing the preparation and movement of soils are presented in Appendix D. Following completion, and prior to covering with the delineating layer the Site was visited on May 19 2025 to collect a total of five soil samples within the new soil bund for heavy metals analysis. The location of Berm validation samples are shown in Figure 8, with the as built location of the berm shown in Figure 12. Results indicate no exceedances of the recreational end land use criteria as summarised in Table A6 of the appended summary tables. To assess potential environmental effects, SPLP analysis for zinc was also completed on the Berm samples (zinc having concentrations above ecological soil guideline values). Results were compared to leachability analysis for construction landfills (Class 2 C&D) which are generally unlined and similar in nature to the placed soil within the berm.

Leachability results indicate that the zinc present within berm soils is relatively non-leachable being well below landfill Class 2 leachability acceptance criteria which assumes highly acidic (landfill) conditions for mobilisation of contaminants which are not reflective of site conditions and are therefore conservative in nature. For completeness, reference has also been made in the summary tables to the ANZG for freshwater protection which shows the average leachability of zinc to be above the 80% species protection level for surface water. This reference value needs to be viewed in light of the contaminant pathway being via direct migration to surface waters via run off from site rather than via the actual migration pathway through soils to groundwater where attenuation and dilution will occur. Based on these factors zinc concentrations within the berm are considered to pose little risk to environmental receptors.

As contaminant concentrations following mixing of the soils and placement into the Berm below a defining layer were below recreational land use criteria and considered to pose a low risk to the environment, no further ongoing management of the soils is required.

6.5 LANDFILL AREAS

The DSI identified two uncontrolled landfill pits to be present on Site. Due to the potential for additional landfill pits to be present across site, management of additional landfill pits following an unexpected discovery was outlined within the RAP. This included visual observations of the type of waste present in the pit (to indicate potential contaminants of concern, the removal of waste to an approved facility (Victoria Flats) and validation sampling of the walls and/or base following excavation.

In addition to the two known landfill pits, three additional landfill pits were encountered across the site and were found to contain general household rubbish along with plastic containers and glass bottles. No olfactory or visual evidence of liquids or hydrocarbons were noted within the pits with the contents generally non-putrescible. Their locations are also presented in Figure 10.

Following excavation, soil samples were taken from the base of each pit (Samples 1 – 4 and Road 2) along with two samples from the side walls of pits 1 and 4 (labelled west and east). All samples were scheduled for heavy metals as a contaminant indicator for validation. In the absence of other potential contaminants within the materials removed this was considered appropriate to assess that waste had been removed. All results were below their respective soil contaminant standard for a residential end use. A summary of the results is appended in Table A7 of the Summary Tables.

Pits were then backfilled with site won uncontaminated materials generally comprising a mixture of alluvial fan and outwash gravel to the specification of the geotechnical engineer. Approximate locations of site sourced soils for backfilling are shown in Figure 11.

7 QUALITY ASSESSMENT AND QUALITY CONTROL

The field and laboratory quality assurance and quality control (QA/QC) program was based on data quality indicators (DQIs) chosen to assess the suitability of the dataset. These are discussed in the following sections.

7.1 FIELD QUALITY PROGRAM

Table 5 summarises the field quality program for the site validation.

Table 5: Field Quality Programme

Environmental consultant	The environmental consultant maintains Quality Assurance Systems certified to AS/NZS ISO 9001:2000. Qualified and experienced personnel completed the field works.
Procedures	All work was conducted in accordance with relevant statutory health, safety and environmental (HSE) sampling guidelines, as well as standard company HSE and environmental field procedures. Standard field sampling sheets were used. Details recorded included WSP staff and contractors present, time on/off-site, weather conditions, calibration records and other observations relevant to the works.
Sampling	Collection of samples was undertaken by appropriately qualified and experienced personnel following WSP standard field procedures which are based on industry accepted standard practice. Chain of custody was used to ensure the integrity of samples from collection to receipt by the laboratory.
Equipment decontamination	Undertaken after each sampling episode where equipment used was not dedicated. Field sampling procedures conformed to WSP QA/QC protocols to prevent cross contamination, preserve sample integrity, and allow for collection of a suitable data set from which to make technically sound and justifiable decisions with data of satisfactory usability.
Transportation	Chain of custody forms were completed and sent with the samples. Chain of custody forms are presented with laboratory reports in Appendix F, and include the sampler's name, date of sampling, sample matrix, sample containers and preservation used, and analysis requested. The laboratory confirmed receipt of the samples and specified the condition on delivery and the scheduled analyses. Laboratory sample receipt documentation indicated that appropriate holding times were met for the primary laboratory samples.
Reporting	Report generally complies with the MfE CLMG No. 1.

7.2 LABORATORY QUALITY PROGRAM

Table 6 summarises the laboratory quality program for the site validation.

Table 6: Laboratory Quality Programme

Holding times	Samples were transported to the primary laboratory, and all primary samples were extracted and analysed within the holding times for the analyses requested.
Methods	Analysis was carried out by laboratories with IANZ certification for the required analyses. Methods used by the laboratories were consistent with MfE CLMG No. 5.
Reporting Limits	Detection limits were sufficient to enable comparison against the appropriate guidelines

7.3 QA/QC DATA EVALUATION

Table 7: QA/QC Data Evaluation.

Documentation and data completeness	Refer to sections 6 & 7
Data representativeness	Refer to sections 6 & 7
Precision and accuracy of sampling and analysis for each analyte in each environmental matrix informing data users of the reliability, unreliability or qualitative value of the data.	Refer to sections 6 & 7
Data comparability checks	
Collection and analysis of samples by different personnel.	N/A
Collection and analysis by the same personnel using the same methods but at different times.	Site works were spread over numerous days due to the extent of earthworks progressing, however all sampling was completed by the same two personnel (CLS and SQEP) who work closely together and follow the same standard operating procedures.
Use of different sampling or analytical methodologies from those stipulated in the guideline documents.	N/A
Spatial and temporal changes.	Sampling occurred over a number of seasons due to the complexity of earthworks, however units of work were completed at the same time and were consistent..
Relative percentage differences between XRF and laboratory duplicates.	Acceptable - Refer to Section 7.2 and Table A3

WSP considers that the sample collection, documentation, handling, storage and transportation procedures utilised are of an acceptable standard and the analytical results provided by the laboratories are deemed reliable and complete, therefore the data are considered fit for purpose.

It is considered that the QA/QC procedures and results were acceptable and that the conclusions of the report have not been significantly affected by the sampling or analytical procedures.

8 CONSENT COMPLIANCE

Resource consents were sought from both CODC (NESCS Consent) and ORC (Land Use Consent) for remediation works completed on site.

8.1 CODC CONSENT RC220396V2

CODC issued RC 220396 with a Discretionary Activity status, with a variation issued in May 2025 (RC220396V2) in order to revise the staging sequence for development within Stages 12 to 14. The purpose of the proposed re-staging is to facilitate the timelier delivery of certain allotments within those stages without altering the overall number, layout, or physical outcome of the consented subdivision. Conditions pertaining to the NES-CS are outlined below:

Table 8: CODC Consent Condition Details

NES-CS Condition No.	Condition Details	Summary of meeting requirement
1	Prior to the commencement of earthworks, a Site Management Plan (SMP) and Remediation Action Plan (RAP) must be developed by a suitably qualified and experienced person. The SMP and RAP may be incorporated into a single document. Both plans must take into consideration the recommendations of the WSP Detailed Site Investigation dated October 2022 and provided in support of the application. At a minimum the SMP and RAP must include the following: a. Procedures to minimise risk of exposure to persons on the site. b. Approaches to managing and remediating earthworks involving contaminated soils including but not limited to the areas identified in Figure Seven of the Detailed Site Investigation c. An accidental discovery protocol to be followed in the event that unanticipated areas with potential soil contamination are identified during subdivisional works.	**Met** RAP/CSMP completed and signed off by SQEP which included (a), (b) and (c). As a live document, updates to the RAP were undertaken when remedial plans changed with the most recent version being Revision 8 which included details for encapsulation of sheep dip soils retained on site.
2	A copy of the SMP and RAP must be provided to Central Otago District Council at least 10 working days prior to the commencement of works. CODC may recommend changes be made to either document at least 5 working days before the commencement of works.	**Met**
3	The SMP and RAP must be implemented at all times during construction works associated with the approved subdivision.	**Met** The updated Revision 8 of the RAP is held on site within the site office and is referred to during construction works within the delineated contaminated areas. An accidental discovery protocol is included for all other areas of the site.

NES-CS Condition No.	Condition Details	Summary of meeting requirement
4	A copy of the SMP and RAP must be accessible on site at all times.	**Met** The updated Revision 8 of the RAP is held on site within the site office.
5	If any potentially contaminated soils from areas identified in yellow in Figure 7 of the WSP Detailed Site Investigation are to be removed from the site, the soils must be tested for heavy metals and, where soil is not able to be considered cleanfill, disposed of to an appropriately accredited landfill facility.	**Met** Soils have been retained on site within an encapsulation bund as per Figure 12 of this report
6	In accordance with Section 128 of the Resource Management Act 1991, the conditions of this consent may be reviewed on and in the period within 6 (six) months upon each anniversary of the date of this consent, if, on reasonable grounds, the consent authority finds that: a. There is or is likely to be an adverse environmental effect as a result of the exercise of this consent, which was unforeseen when the consent was granted; b. Monitoring of the exercise of the consent has revealed that there is or is likely to be an adverse environmental effect; or c. There has been a change in the circumstances and the conditions of consent are no longer appropriate in terms of the purpose of the Act.	**Met** Remedial assessment and encapsulation validation results have concluded that there are no risks to human health associated with soils remaining on site.

8.2 ORC CONSENT RM23.549.07V1

ORC issued Land Use Consent RM23.549.07V1 to disturb a contaminated site for the purpose of undertaking earthworks for residential development. Conditions pertaining to validation remedial works are outlined below:

Table 9: ORC Consent Condition Details

Land Use Consent Condition No.	Condition Details	Summary of meeting requirement
4	Prior to the commencement of the works described in Condition 1 of this consent the Consent Holder must ensure that all personnel working on the site are made aware of, and have access at all times to: a) The contents of this document; and b) The most recent approved version of the Contaminated Soil Management Plan for the site, referenced in Condition 9; and c) The Remedial Action Plan for the site, prepared by WSP Limited dated 22 November 2024. Copies of these documents must be present on-site at all times while the work authorised by this consent is being undertaken.	Met The updated Revision 8 of the RAP/CAMP is held on site within the site office and is referred to during construction works.

Land Use Consent Condition No.	Condition Details	Summary of meeting requirement
5	Any site investigation must be undertaken in accordance with the Ministry for the Environment publications Contaminated Land Management Guidelines, No.5 (revised 2021).	Met All works have been undertaken under the supervision of an SQEP and in accordance with CLMG5
6.	With the exception of the contaminated material to be encapsulated as set out in the Remediation Action Plan prepared by WSP Limited dated 22 November 2024, soil or waste materials removed from the contaminated area must be deposited at a disposal site that holds a consent to accept the relevant level of contamination except in circumstances where: a) The soil or waste materials meet the definition of 'cleanfill'; and b) Notice is given to the Consent Authority five working days prior its removal from the subject site.	Met All contaminated soils have been retained on site and encapsulated. Waste materials with inclusions of soil from landfill pits and offal waste were disposed to Victoria Flats Landfill, Queenstown.
7.	Site sourced and imported material used to fill any excavation must: a) Consist of clean quarry sourced aggregate; or b) Not be sourced from any site listed as a HAIL site, unless the material has been tested by a Suitably Qualified and Experienced Practitioner and confirmed as meeting the definition of cleanfill.	Met Site sourced materials have been used from areas of the site outside those delineated as a piece of land which has undergone HAIL activities as per the findings of the DSI. General locations of site won material used for filling operations are shown in Figure 11.
10	a) The activities authorised by this consent must occur in accordance with the Remediation Action Plan (RAP) prepared by WSP Limited dated 22 November 2024, or any updates approved by the Consent Authority under part (c) of this condition; and b) No activity on the subject site may commence until all measures identified in the RAP as needing to be put in place prior to commencement of any works have been established; and c) The RAP may be amended at any time. Any amendments must be: i. For the purpose of improving the efficacy of the contaminated site management procedures, and shall not result in reduced discharge quality; ii. Consistent with the conditions of this resource consent; and iii. Submitted in writing to the Consent Authority for certification, prior to any amendments being implemented.	Met RAP updates have been approved by ORC, Revision 8 applies. Prior to commencement of works on the contaminated areas, contractors had a briefing from the SQEP outlining procedures within the RAP.
11	All personnel working on the site must be made aware of the relevant requirements contained in the RAP required by Condition 10. A copy of the RAP, must be held on-site at all times.	Met RAP held at site office. Prior to commencement of works on the contaminated areas,

Land Use Consent Condition No.	Condition Details	Summary of meeting requirement
		contractors had a briefing from the SQEP outlining procedures within the RAP.
12	All sampling and testing of contamination on the site must be overseen by a suitably qualified and experienced person. All sampling must be undertaken in accordance with the Ministry for the Environment's Contaminated Land Management Guidelines.	Met WSP SQEP oversaw remediation sampling and analysis scheduling. All works were in accordance with those outlined in CLMG 5.
13	The Consent Holder must forward copies of the results of any soil analyses undertaken as a result of the exercise of this consent to the Consent Authority within 10 working days of receiving the results from the independent service provider.	Partially Met All sampling and analysis results are appended to this SVR which will be forwarded to the consent authority.
14	The Consent Holder must maintain a record of any environmental complaints relating to the works. The register must include, but not be limited to: a) The date, time, location and nature of the complaint; b) The name, phone number, and address of the complainant, unless the complainant elects not to supply this information; c) action taken by Consent Holder to remedy the situation and any policies or methods put in place to avoid or mitigate the problem occurring again. The Consent Holder must, within 24 hours, inform the Consent Authority of any complaints received from any person about activities on the site associated with the consented works.	Met No Complaints in relation to contaminated soil management have been received. Complaints in relation to other environmental site aspects are not covered in report.
15	In the event that any unexpected contaminated soil or material is uncovered by the works, an accidental discovery protocol shall be implemented, including but not limited to the following steps: a) Earthworks within ten metres of unexpected contaminants must cease immediately; b) All practicable steps must be taken to prevent the contaminated material becoming entrained in stormwater. Immediate steps must include, where practicable: i. diverting any stormwater runoff from surrounding areas away from the contaminated material; and ii. minimising the exposure of the contaminated material, including covering the contaminants with an impervious cover; c) Notification of the Consent Authority, within 24 hours of the discovery; d) Earthworks within ten metres of unexpected contaminants must not recommence until a suitably qualified and experienced contaminated land practitioner (SQEP) confirms to the Consent	Partially Met Additional landfill pits were encountered on site and were delineated and notified. Works around these areas were susoended until the SQEP had been to site to assess potential risks. Unexpected discoveries did not impact stormwater runoff and were managed in a timely manner so as not to be ongoing during rainfall. Discovery records and validation following removal of waste is included in this SVR.

Land Use Consent Condition No.	Condition Details	Summary of meeting requirement
	Authority that continuing works does not represent a significant risk to the environment; e) All records and documentation associated with the discovery must be kept and copies must be provided to the Consent Authority upon request.	
17	Stockpiling of contaminated material on the site must be avoided where practicable. In the event that temporary stockpiling of suspected potential or contaminated material is required, then the stockpiles must be managed as below: a) Stockpiled material must be placed on polythene sheeting or similar impervious material to prevent contamination of underlying material; and b) Stockpiled material must be placed not within 20 metres away from any open excavation; and c) Stockpiles must include a perimeter bund or berm installed to prevent runoff leaving the area and stormwater from other areas entering the stockpile area; and d) If any rainfall is forecasted that has the potential to cause runoff from the stockpiles, or if the stockpiles are left overnight, over the weekend or over public holidays, the stockpiled material must be covered with a suitable material to prevent stormwater runoff coming into contact with contaminated material.	Partially Met Stockpiled soils were temporarily created in the sheep dip area whilst assessment for on site encapsulation was completed. The stockpile was approx.. 20m from the diverted stormwater channel, covered in an impervious plastic layer to prevent dust creation and stormwater runoff. Whilst a bund around the stockpile was not created soils were appropriate covered and managed to ensure erosion and sediment controls were in place. Stockpiles of materials from the offal pits were initially not placed on an impermeable layer. This was rectified with all soil stockpiles also covered with plastic to prevent erosion and runoff. The three offal waste stockpiles were located in a bunded area to prevent stormwater ingress from other areas and were at a lower elevation to the rest of the site to prevent runoff occurring.
17	a) The Consent Holder must notify the Consent Authority in writing of the completion of the works no less than 10 working days following the completion of works and must provide photographs of the areas where work has been undertaken. b) Photographs must be in colour and be no smaller than 200 x 150 millimetres in size and be in JPEG form.	Met Earthworks were completed in May 2025.. Photographs of where remedial works were undertaken are appended to this report
18	Within three months of the completion of the works the Consent Holder must provide the Consent Authority with a Site Validation Report (SVR), prepared by a suitably qualified and experienced practitioner and in accordance with Contaminated Land Management Guideline No 1. The SVR should contain sufficient detail to address the following matters: a) Summary of the works undertaken; b) The location and dimensions of the excavations carried out, including a relevant site plan;	Met This SVR includes the required details

Land Use Consent Condition No.	Condition Details	Summary of meeting requirement
	c) Records of any unexpected contamination encountered during the works, including GPS coordinates, if applicable; d) The location and dimensions of any contaminated soil remaining on-site (if any); e) A summary of sampling (if any) and analysis undertaken for validation sampling, and for unexpected contamination (if applicable), tabulated analytical results including laboratory transcripts, and interpretation of the results in the context of the relevant soil guideline values; f) Copies of disposal dockets for material removed from site, if any; and g) Details regarding any complaints received by the Consent Holder and/or breaches of the procedures set out in the RAP and/or Remedial Action Plan.	
19	In the event that the Site Validation Report provided to the Consent Authority as required by Condition 18 of this consent confirms that an Ongoing Management Plan (OMP) is required, an OMP shall be prepared by a Suitably Qualified Person and submitted for approval from the Consent Authority.	Met An OMP is not required for site as agreed with the Senior Compliance Officer of ORC.

9 CONCLUSIONS AND RECOMMENDATIONS

Remediation of the site in line with the published RAP/CSMP was carried out at the site between 23 August 2024 and 19 May 2025. Validation sampling confirms successful completion that remediation of the site was completed.

The validation assessment has confirmed the following:

- The buried fuel tank was successfully removed with no residual TPH present and heavy metal concentrations below relevant criteria.
- Successful removal of offal waste and other miscellaneous materials present in the offal pits.
- Remediation of the sheep dip area of the site with soils sufficiently encapsulated and below soil criteria concentrations for both human health and environmental protection.
- Successful removal of waste found within landfill pits uncovered during earthworks or previously known from the DSI.

Taking into consideration development proposals along with the end use for a residential purpose, it is considered highly unlikely that there will be a risk to human health associated with residual soil contaminants in soil.

Remedial works have therefore been successful, and the site is considered to have been fully remediated and suitable for a residential end use.

9.1 RECOMMENDATIONS

Based on the findings of this investigation WSP recommends that:

- This validation report is submitted to the consenting authority(ies) to fulfill relevant conditions within the resource consent; and
- This validation report is submitted to the regional authority in order to facilitate updating the HAIL database.

10 LIMITATIONS

This report ('Report') has been prepared by WSP New Zealand Limited ('WSP') exclusively for The Queenstown Commercial Ltd ('Client') in accordance with the Project Change Notice PF-PR-107 with the Client dated 23/11/2022 ('Agreement').

Permitted Purpose

This Report has been prepared expressly for the purpose of assessing the risks to human health associated with potential contaminants of concern, in order to satisfy the NES-CS and local council requirements for subdivision, land use change and development of the site ('Permitted Purpose'). WSP accepts no liability whatsoever for the use of the Report, in whole or in part, for any purpose other than the Permitted Purpose. Unless expressly stated otherwise, this Report has been prepared without regard to any special interest of any party other than the Client.

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The data reported and Conclusions drawn by WSP in this Report are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

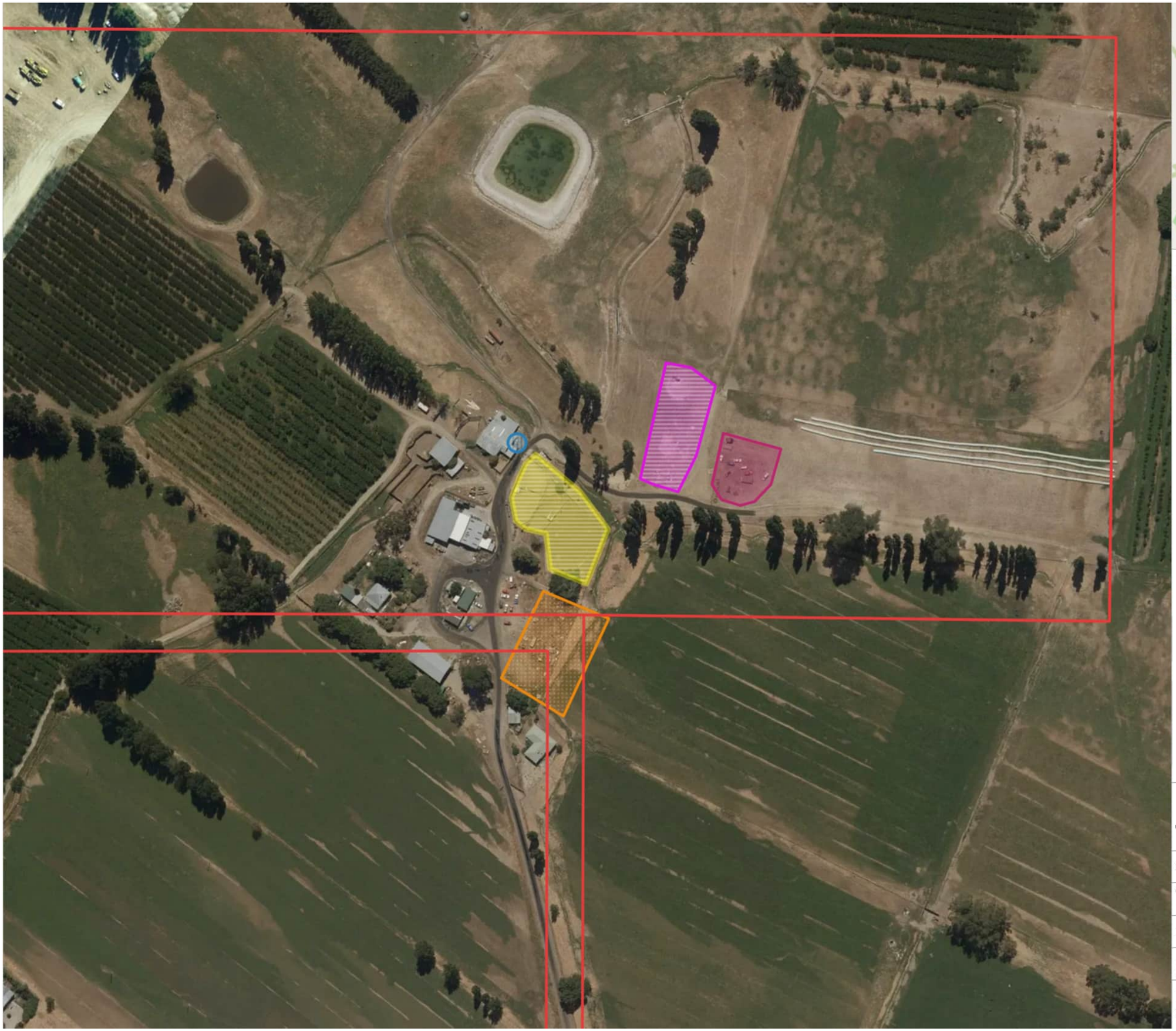
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FIGURES





Legend

- Site Boundary
- Fuel Tank Location
- Sheep Dip Area
- Landfill Pits Area
- Offal Pit Location
- Offal Pit Stockpiles Location

0 25 m 50 m

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Site Location

Client: New Zealand Cherry Corps (Leyser) Ltd		Size: A3
Project: Shannon Farm Cromwell	Drawn: TC	Figure No.: 1
Date: 03-10-2025	Checked: LB	
Proj No: 6-XZ750.00	Scale: 1:2000	Version: Final



Legend

- Tank Validation Sample Locations
- Stockpiled Soil
- Excavation Location

0 1 m 2 m

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Title: Fuel Tank Validation Sample Locations		
Client: New Zealand Cherry Corps (Leyser) Ltd		Size: A4
Project: Shannon Farm Cromwell	Drawn: TC	Figure No.: 2
Date: 08-10-2025	Checked: LB	
Proj No: 6-XZ750.00	Scale: 1:62	Version: Final



Legend

- Excavated Offal
- Offal Pit Stockpiles post

0 5 m 10 m

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Produced by **Datanest.earth**

Title: Offal Pit Remediation Site Plan		
Client: New Zealand Cherry Corps (Leyser) Ltd		Size: A4
Project: Shannon Farm Cromwell	Drawn: TC	Figure No.: 3
Date: 07-08-2025	Checked: LB	
Proj No: 6-XZ750.00	Scale: 1:341	Version: Final



Legend

- Offal Pit Stockpile Validation Samples
- Earth Bund surrounding Offal Stockpiles

0 5 m 10 m

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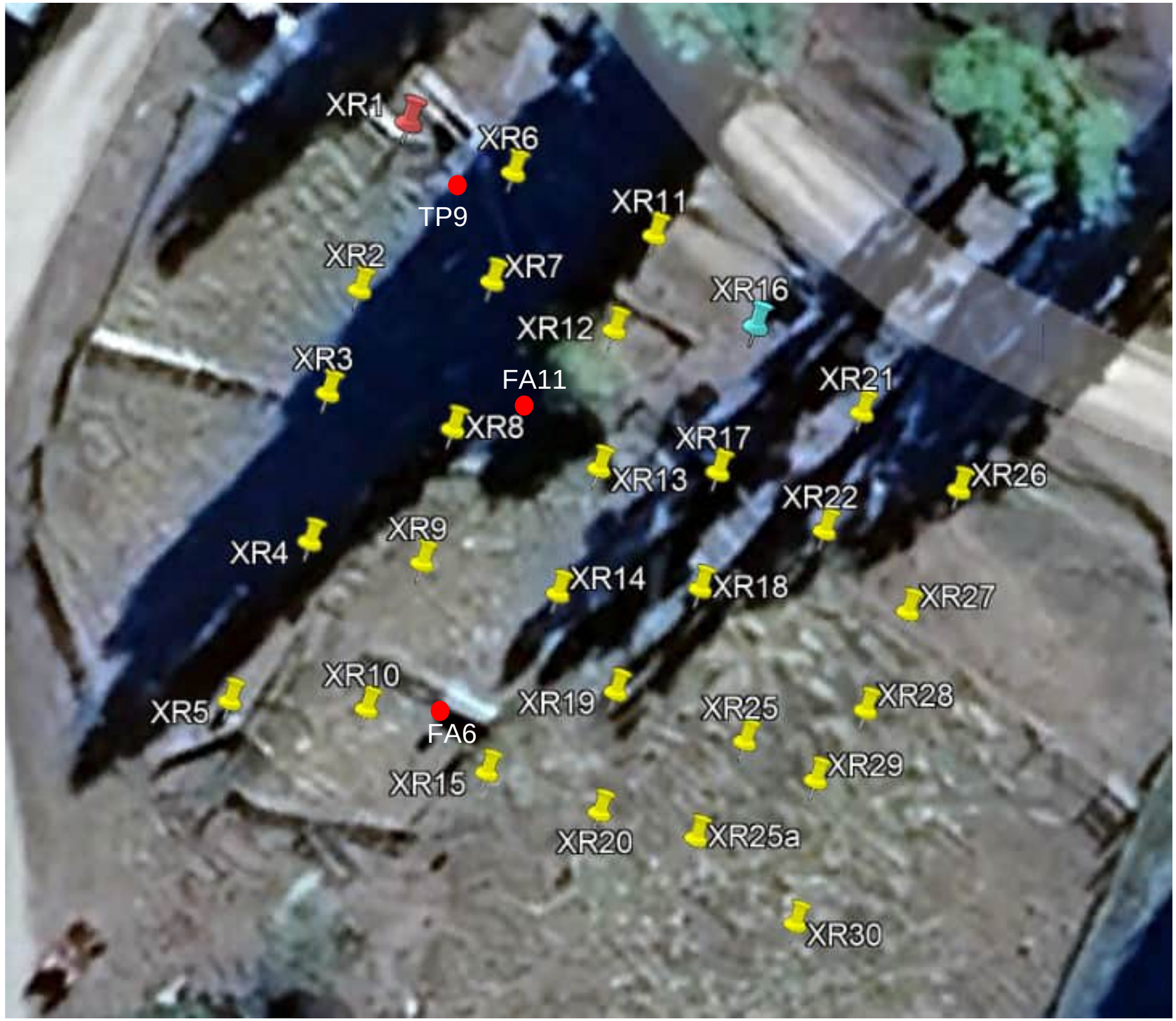
Title: Offal Pit Storage Stockpiles		
Client: New Zealand Cherry Corps (Leyser) Ltd		Size: A4
Project: Shannon Farm Cromwell	Drawn: TC	Figure No.: 4
Date: 07-08-2025	Checked: LB	
Proj No: 6-XZ750.00	Scale: 1:500	Version: Final

Key:

- Pre-cut Verification Sample Locations (XRF)
- Elevated Arsenic above Residential SGV
- Elevated Cadmium above Residential SGV
- Contaminated sample location - DSI

Scale: 10.00 m

Note: Buildings no longer present on site



REVISION	AMENDMENT	APPROVED	DATE
A			

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Image source: Google Earth Pro

SCALES: As shown
ORIGINAL SIZE: A3
DRAWN: LAB
DESIGNED:
APPROVED:
DRAWING VERIFIED:
DESIGN VERIFIED:
APPROVED DATE:

PROJECT: Shannon Farm Remediation Works

TITLE: Sheep Dip Contaminated Soil Verification Sample Location Plan

WSP PROJECT NO. (SUB-PROJECT): 6-XZ750.00
SHEET NO.: Figure 5
REVISION: REV A

Key:

- DSI Sample Locations in excess of HH SGV
- Contaminated sample location - DSI
- Approx. area of soil strip (approx 0.3m depth)

Scale: 10.00 m

Note: Buildings are no longer present on site



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DESIGN VERIFIED:
APPROVED DATE:

PROJECT: Shannon Farm Remediation Works

TITLE: Sheep Dip Stockpile Sample Location Plan

WSP PROJECT NO. (SUB-PROJECT): 6-XZ750.00
SHEET NO.: Figure 6
REVISION: REV A

Key:

- Validation Sample Locations
- Validation Sample Locations exceeding SGV
- Validation Sample Locations (XRF)
- Contaminated Soil Sample Location - DSI
- Contaminated Soil Sample Location - Verification Testing

Scale: 10.00 m

Note: Building is no longer present on site



REVISION	AMENDMENT	APPROVED	DATE
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DRAWN: LAB
DESIGNED:
APPROVED:
DRAWING VERIFIED:
DESIGN VERIFIED:
APPROVED DATE:

PROJECT: Shannon Farm Remediation Works

TITLE: Sheep Dip Area Initial Remediation Validation Sample Location Plan

WSP PROJECT NO. (SUB-PROJECT): 6-XZ750.00
SHEET NO.: Figure 7
REVISION: REV A



Legend

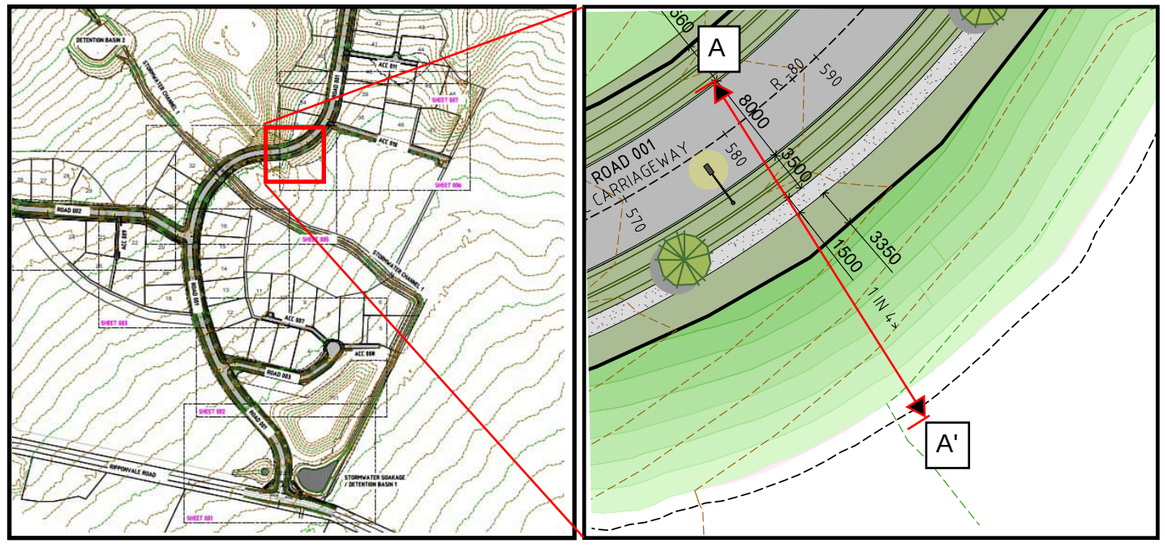
- Final Validation Sample Locations
- Final Site strip Area (approx)
- Berm Sample Locations
- Berm Area (approx)

0 5 m 10 m

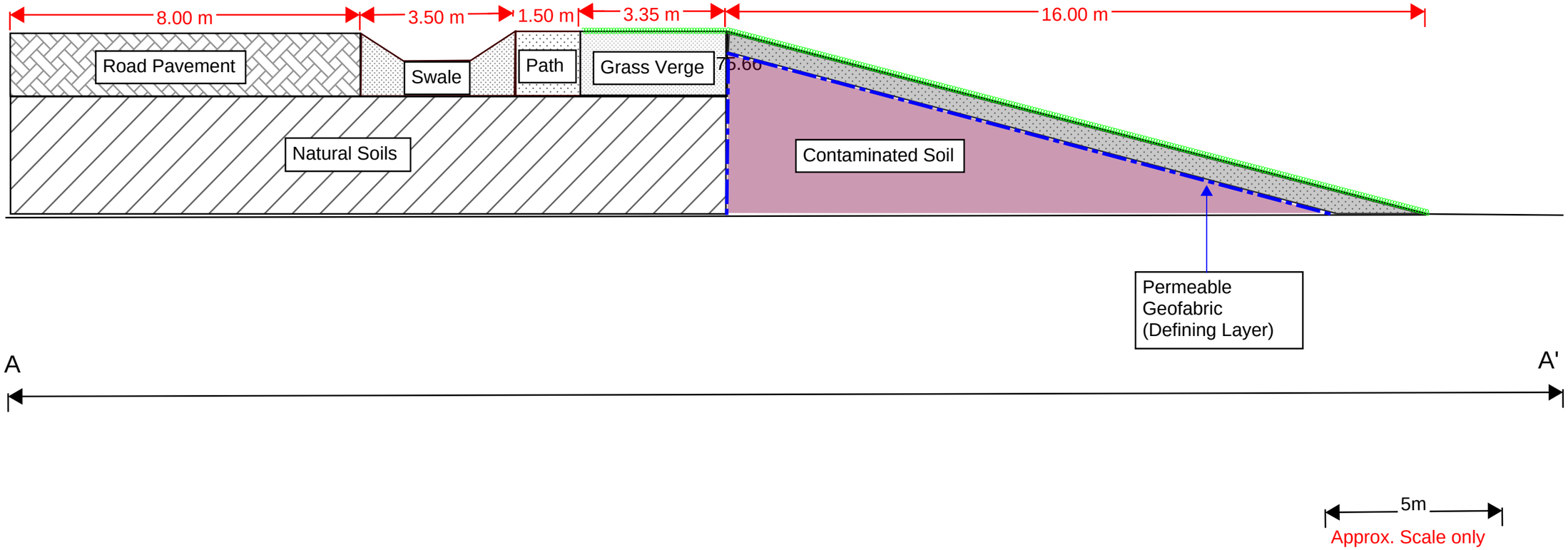
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Produced by **Datanest.earth**

Title: Final site Strip Validation Sample Locations		
Client: New Zealand Cherry Corps (Leyser) Ltd		Size: A4
Project: Shannon Farm Cromwell	Drawn: TC	Figure No.: 8
Date: 07-08-2025	Checked: LB	
Proj No: 6-XZ750.00	Scale: 1:456	Version: Final



Extract from Engineering Drawings 15729_E001



REVISION	AMENDMENT	APPROVED	DATE
A			19-07-2023

Alexandra Office
69 Tarbert Street
9391,
New Zealand

SCALES

ORIGINAL SIZE A3

DRAWN LAB | DESIGNED | APPROVED RB

DRAWING VERIFIED | DESIGN VERIFIED | APPROVED DATE 22-11-2024

Figure 9

PROJECT
Shannon Farm Remediation Action Plan

TITLE
Outline design details for contaminated soil disposal in road berm

WSP PROJECT NO. (SUB-PROJECT) 6-XZ750.00 015GX

SHEET NO. PLN003

REVISION REV A



Legend

Landfill Pit Validation Samples

0 10 m 20 m

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Produced by **Datanest.earth**

Title: Landfill Pits Validation Sample Locations		
Client: N/A		Size: A4
Project: Shannon Farm Cromwell	Drawn: TC	Figure No.: 10
Date: 07-08-2025	Checked: LB	
Proj No: 6-XZ750.00	Scale: 1:750	Version: Final



Legend

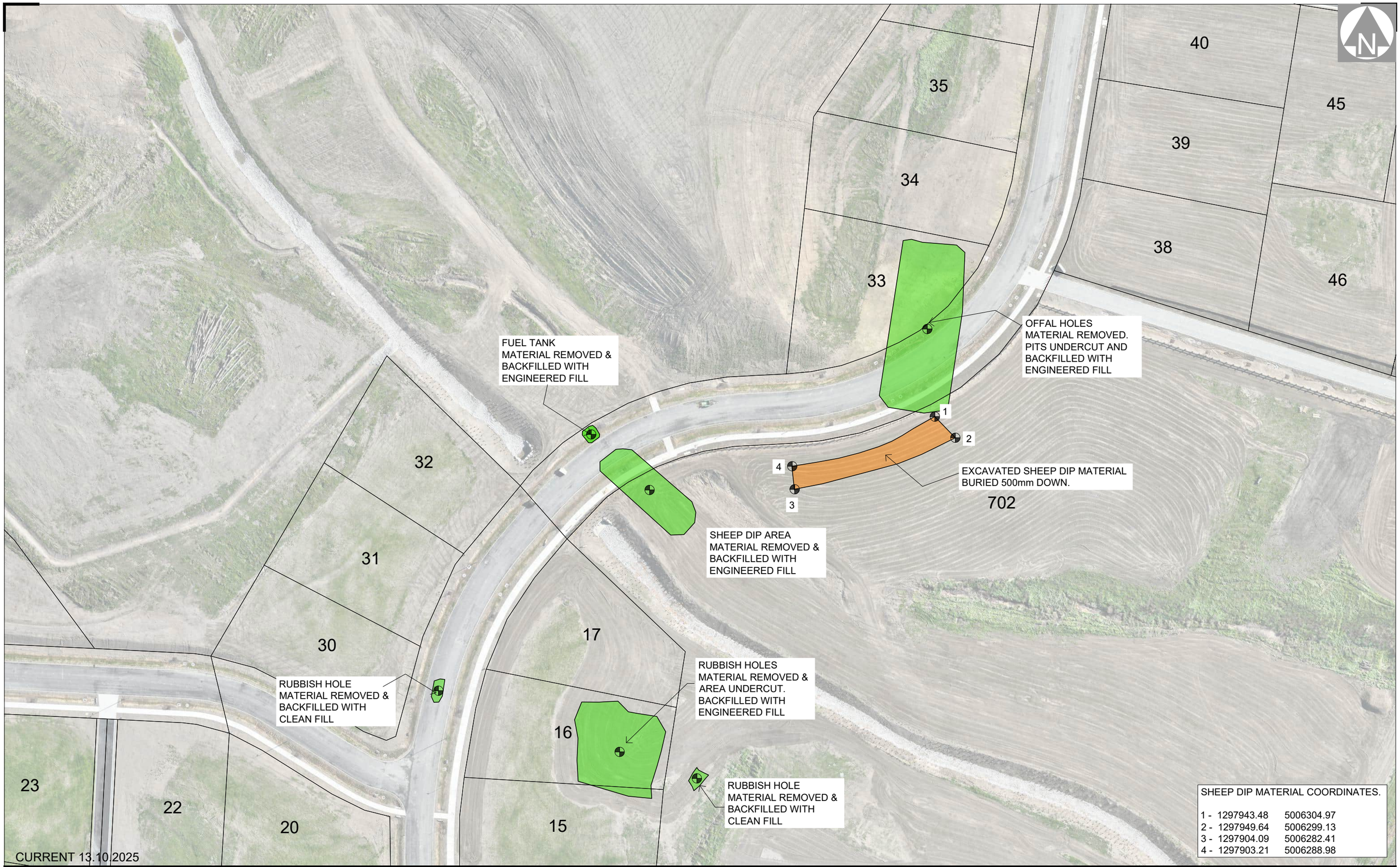
Site Sourced Material Locations (Approx)

0 50 m 100 m

LINZ CC BY 4.0 © Imagery Basemap contributors

Produced by **Datanest.earth**

Title: Locations of Site Won Soils for infilling of landfill pits		
Client: New Zealand Cherry Corps (Leyser) Ltd		Size: A4
Project: Shannon Farm Cromwell	Drawn: TC	Figure No.: 11
Date: 08-08-2025	Checked: LB	
Proj No: 6-XZ750.00	Scale: 1:3000	Version: Final



CLARK FORTUNE McDONALD
LAND SURVEYORS - LAND DEVELOPMENT - PLANNING CONSULTANTS
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Tel. (03)441-6044, Email admin@cfma.co.nz, www.cfma.co.nz

Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM DEVELOPMENT
REMEDIAL ACTION PLAN - ASBUILT DATA

Client: NZ CHERRY CORP (LEYSER) LP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 16 Sheet 001	
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Ensuring the information is the most recent issue. - Copyright on this drawing is reserved.	Drawn: RB	Date: 13.10.25	Scale: 1:500 @ A1 1:1000 @ A3		
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: –	

S:\JOBS\15700\15729\acad\15729_16_Contaminated material location.dwg Plotted: 13.10.2025

SUMMARY TABLES

Table 1 - Heavy Metal and Petroleum Hydrocarbon Soil Analytical Results for Human Health and Environment

Adopted Criteria																							
Analyte					Heavy Metals							BTEX						TPH			
Location	Sample Name	Sampling Date	Laboratory Number	Depth (m bgl)	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel (NEPM[5])	Zinc (NEPM[5])	Benzene	Toluene	Ethylbenzene	Xylenes (m & p)	o-Xylene	Total Xylenes	C7 - C9 Fraction	C10 - C14 Fraction	C15 - C36 Fraction	C7 - C36 Total
Background Concentrations[1]					11.04	0.43	60.82	47.36	60.82	33.42	191	-	-	-	-	-	-	-	-	-	-
NESCS[2]/NEPM[3]			Rural residential / lifestyle block 25% produce		17	1	290	>10,000	160	1,200	30,000	-	-	-	-	-	-	-	-	-	-
MfE, 1999 Guidelines[4]			Residential use (1 - 4 m bgl),		-	-	-	-	-	-	-	**1.9**	**170**	**92**	**130**	**130**	**130**	**500**	**670**	**N/A**	-
			Agricultural use (1 - 4 m bgl),		-	-	-	-	-	-	-	**1.9**	**170**	**92**	**130**	**130**	**130**	**500**	**670**	**N/A**	-
Units					mg/kg																
Tank 1	Tank 1	23-Aug-24	3659610.11	0.0 - 0.1	17	0.11	14	26	38	21	117	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80
Tank 2	Tank 2	23-Aug-24	3566445.12	0.4 - 0.5	13	<0.10	14	24	21	21	96	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80
Tank 3	Tank 3	23-Aug-24	3566445.13	0.8 - 0.9	12	<0.10	14	28	17.3	20	65	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80
Tankpit Base	Tank 4	23-Aug-24	3566445.14	0.0 - 0.1	12	<0.10	14	24	20	22	74	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80
Stockpile 1	Tank 5	23-Aug-24	3566445.15	0.8 - 0.9	13	<0.10	15	24	19.7	21	80	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80

Key:

Underline	Indicates an exceedance of Background Concentrations
Orange Fill	Indicates an exceedance of the NESCS/NEPM for Rural residential / lifestyle block 25% produce
Bold Text	Indicates an exceedance of the MfE Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sities in New Zealand
-	Indicates no criteria/not analysed.
m bgl	Indicates meters below ground level.
mg/kg	Indicates milligrams per kilogram (dry weight).
Grey Text	Indicates concentration below the laboratory limit of reporting (LOR).
Grey Text Underlined	Indicates LOR greater than Background Concentrations.

Notes:

1. Landcare Research (2016). Background soil concentrations of selected trace elements and organic contaminants in New Zealand. Report No. LC2440, November 2015.
2. Ministry for the Environment (2011). Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Publication number ME 1055, June 2011.
3. National Environmental Protection Council (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013).
4. Ministry for the Environment (2011). Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011).

Shannon Farm Remediation - 6-XZ750.00

Table A2: Offal Pits and Stockpile Validation

Heavy Metals in Soil

		Heavy Metals						
		mg/kg						
		Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Nickel	Zinc
Limit of Reporting (LOR)		0.125	0.005	0.125	0.075	0.25	0.05	0.05
NESCS[2]	Rural residential/lifestyle block (25% produce)	17	0.8	290	>10,000	160	-	-
IRB NEPM SGV HILD[3]		-	-	-	-	-	400	7400
NESCS[2]	Residential (10% produce)	20	3	460	>10,000	210	-	-
IRB NEPM SGV HILD[3]		-	-	-	-	-	400	7400

Sample Name	Sampling Date	Laboratory Number	Depth (m bgl)	mg/kg						
S3 (SP1)	4-Sep-24	3666788_3	Stockpile	9	< 0.10	11	23	11.8	15	78
S4 (SP2)		3666788_4		9	< 0.10	11	20	11.8	16	56
S9 (SP3/4)		3666788_9		8	< 0.10	9	19	11.4	14	47
S5 (SP5)		3666788_5		9	< 0.10	10	19	13.8	14	54
S1 (P1)	4-Sep-24	3666788_1	Base of Pit	3	< 0.10	4	3	4.8	3	20
S2 (P2)		3666788_2		6	< 0.10	11	19	12.2	13	51
S8 (P3)		3666788_8		6	< 0.10	7	15	9.1	9	37
S7 (P4)		3666788_7		6	< 0.10	7	12	8.6	9	35
S6 (P5)		3666788_6		7	< 0.10	8	16	10.1	10	38
OPV1	14-Nov-24	3718734.1	0.1	10	0.12	12	25	15.9	16	114
OPV2		3718734.2	0.1	9	0.11	11	22	14.6	16	131
OPV3		3718734.3	0.1	13	0.15	14	20	19.5	18	75
OPV4		3718734.4	0.1	9	0.11	13	21	13.6	17	92
OPV5		3718734.5	0.1	10	< 0.10	15	20	14.3	20	83
OPV6		3718734.6	0.1	10	0.11	12	20	14.4	18	75
OPV7		3718734.7	0.1	9	1.15	11	33	43	17	1,090
OPV7b	25-Nov-25	3727808.2	0.1	9	0.13	15	21	19.3	19	92

Key:

SP - Initial stockpile samples on removal of waste

P - Validation sample from base of offal pit

OPV - Offal Pit stockpile removal validation sample

Orange Fill — Exceedance of Rural residential SCS

Yellow Fill — Exceedance of Residential SCS

Notes:

1. LRIS Predicted Background Soil Contaminants, New Zealand, Landcare Research Limited, Updated 2016

2. Values taken from Table 2.

2. Ministry for the Environment, 2012. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

3. National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Australia); Schedule B1 (as amended May 2013) - Guideline on Investigation Levels For Soil and Groundwater, Federal Register of Legislative Instruments F2013C00288, National Environmental Protection Council. (HIL - Health Investigation Level).

5. New Zealand Risk Based Guidelines: An implementation framework for ecological soil guideline values Landcare Research July 2023 (incorporating the median ambient background concentrations of these trace elements) Based on Typical soils*

* Check notes within Technical Guidelines for further information

https://www.legislation.gov.au/Details/F2013C00288/Html/Volume_19#_Toc351713616

Sheep Dip Remediation Validation Testing – XRF Results

Sample Location ID (V)	Date	Time	As (mg/kg)	+/-	QA Sample	RPD (%)	Comments
V1	23/08/2024	13:09	14.4	1.6	QA RV1;	3	
V2	23/08/2024	13:11	13.5	1.6			
V3	23/08/2024	13:12	13.5	1.7			
V4	23/08/2024	13:16	28.3	1.8	QA RV2	8	
V5	23/08/2024	13:17	8.1	1.4			
V6	23/08/2024	13:20	11.2	1.4	QA RV3	-29	
V7	23/08/2024	13:22	6.9	1.3			
V8	23/08/2024	13:35	9.1	1.4			
V9	23/08/2024	13:37	10.9	1.5	QA RV4	-10	
V10	23/08/2024	14:27	11.4	1.4	QA RV5	4	
V11	23/08/2024	14:28	12.4	1.4	QA RV10	-5	
V12	23/08/2024	14:29	12.4	1.4			
V13	23/08/2024	13:31	9.9	1.4			
V14	23/08/2024	14:32	12.1	1.2	QA RV9	-7	
V15	23/08/2024	14:34	9.5	1.4	QA RV8	-31	Weather deteriorating; possible effect on XRF results due to elevated water content of soils.
V16	23/08/2024	14:36	10.3	1.5			
V17	23/08/2024	14:39	2.8	1.5			
V18	23/08/2024	14:41	8.6	1.5			
V19	23/08/2024	14:44	9.8	1.4	QA RV7	-59	Weather deteriorating; possible effect on XRF results due to elevated water content of soils.
V20	23/08/2024	14:46	12.1	1.5	QA RV6	1	
V21	23/08/2024	14:50	9.3	1.6			

Note: LOD = Limit of detection; Red fill = Arsenic (As) concentration above Residential (10% produce) criteria (20mg/kg)

Shannon Farm - 6-XZ750.00

Table A4: Sheep Dip XRF QA Results

Heavy Metals in Soil

		Heavy Metals						
		mg/kg						
		Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Nickel	Zinc
Limit of Reporting (LOR)		0.125	0.005	0.125	0.075	0.25	0.05	0.05
NESCS[2]	Residential (10% produce)	20	3	460	>10,000	210	-	-
IRB NEPM SGV HILD[3]		-	-	-	-	-	400	7400
NZRB [5]	Eco-SGV 80% Species Protection	60	17	400	245	1290	-	320

Sample Name	Sampling Date	Laboratory Number	Depth (m bgl)	mg/kg						
RV1	23-Aug-24	3659610.1	GL	14	< 0.10	15	22	15.7	21	75
RV2		3659610.2	GL	26	0.19	15	30	21	19	220
RV3		3659610.3	GL	15	< 0.10	7	17	10.2	9	53
RV4		3659610.4	GL	12	< 0.10	11	19	12.7	18	69
RV5		3659610.5	GL	11	< 0.10	13	19	15.1	17	71
RV6		3659610.6	GL	12	< 0.10	10	35	15.2	16	115
RV7		3659610.7	GL	18	0.11	17	26	20	22	159
RV8		3659610.8	GL	13	< 0.10	14	22	16.3	19	77
RV9		3659610.9	GL	13	< 0.10	15	20	16.5	19	81
RV10		3659610.1	GL	13	< 0.10	15	22	18.7	21	116

Key:

Yellow Fill	Exceedance of Residential SCS
Red Box	Exceedance of Ecological SGV

Notes:

1. LRIS Predicted Background Soil Contaminants, New Zealand, Landcare Research Limited, Updated 2016
2. Values taken from Table 2.
2. Ministry for the Environment, 2012. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
3. National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Australia); Schedule B1 (as amended May 2013) - Guideline on Investigation Levels For Soil and Groundwater, Federal Register of Legislative Instruments F2013C00288, National Environmental Protection Council. (HIL - Health Investigation Level).
5. New Zealand Risk Based Guidelines: An implementation framework for ecological soil guideline values Landcare Research July 2023 (incorporating the median ambient background concentrations of these trace elements) Based on Typical soils*

* Check notes within Technical Guidelines for further information

Shannon Farm - 6-XZ750.00

Table A5: Sheep Dip Final Validation

Selected Heavy Metals in Soil

		Heavy Metals	
		mg/kg	
		Arsenic	Cadmium
Limit of Reporting (LOR)		0.125	0.005
NESCS[2]	Rural residential/lifestyle block (25% produce)	17	0.8
IRB NEPM SGV HILD[3]		-	-
NESCS[2]	Residential (10% produce)	20	3
IRB NEPM SGV HILD[3]		-	-
NZRB [5]	Eco-SGV 80% Species Protection	60	17

Sample Name	Sampling Date	Laboratory Number	Depth (m bgl)	mg/kg		RPD
Val 1	19-May-25	3892969.1	0.05	16	0.2	
Val 2		3892969.2	0.05	14	0.11	
Val 3		3892969.3	0.05	12	< 0.10	
Val 4		3892969.4	0.05	13	0.2	
Val 5		3892969.5	0.05	11	< 0.10	2.4
Dup (Val5)		3892969.9	0.05	10	< 0.10	
Val 6		3892969.6	0.05	12	< 0.10	
Val 7		3892969.7	0.05	16	0.11	
Val 8		3892969.8	0.05	12	< 0.10	

Key:

Orange Fill	Exceedance of Rural residential SCS
Yellow Fill	Exceedance of Residential SCS
Red Box	Exceedance of Ecological SGV
Bold	Exceedance of Waste Disposal Criteria

Notes:

1. LRIS Predicted Background Soil Contaminants, New Zealand, Landcare Research Limited, Updated 2016
2. Values taken from Table 2.
2. Ministry for the Environment, 2012. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
3. National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Australia); Schedule B1 (as amended May 2013) - Guideline on Investigation Levels For Soil and Groundwater, Federal Register of Legislative Instruments F2013C00288, National Environmental Protection Council. (HIL -
4. WasteMINZ: Technical Guidelines for Disposal to Land Revision 3.1; September 2023
5. New Zealand Risk Based Guidelines: An implementation framework for ecological soil guideline values Landcare Research July 2023 (incorporating the median ambient background concentrations of these trace elements) Based on Typical soils*
6. If total concentration exceeded TCLP required to assess acceptability
7. Acceptance criteria have not been set; rather compliance is achieved by demonstrating the soil or rock being disposed of is in its natural condition. Local Background conditions should be referred

(a) Interim

* Check notes within Technical Guidelines for further information

https://www.legislation.gov.au/Details/F2013C00288/Html/Volume_19#_Toc351713616

Shannon Farm - 6-XZ750.00

Table A6: New Berm and Sheep Dip Stockpile Results

Heavy Metals in Soil

			Heavy Metals							
			mg/kg							mg/L
			Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Nickel	Zinc	Zinc
Background Concentrations[1]		Type								
		Limit of Reporting (LOR)	0.125	0.005	0.125	0.075	0.25	0.05	0.05	
NESCS[2]	Recreation		80	400	2,700	>10,000	880	-	-	
IRB NEPM SGV HILD[3]			-	-	-	-	-	1,200	30,000	
NZRB [5]	Eco-SGV 80% Species Protection		60	17	400	245	1290	-	320	
ANZG[6]	Freshwater 80% protection*									0.031

Sample Name	Sampling Date	Laboratory Number	Depth (m bgl)							
SP1	23-Aug-24	3659609.1	Stockpile samples	25	0.43	14	118	21	21	1,100	NA
SP2		3659609.2		16	0.3	11	61	37	19	730	NA
SP3		3659609.3		11	0.15	10	46	14.7	16	650	NA
SP4		3659609.4		10	0.13	11	27	16	15	230	NA
SP5		3659609.5		11	< 0.10	12	20	15.6	18	93	NA
SP6		3659609.6		12	< 0.10	13	22	19.1	18	140	NA
SP7		3659609.7		15	0.19	17	29	26	20	177	NA
SP8		3659609.8		18	0.16	16	26	26	20	154	NA
SP9		3659609.9		15	< 0.10	21	26	22	24	117	NA
SP10		3659609.1		16	< 0.10	13	19	15.6	18	76	NA
Bund 1	19-May-25	3892970.1	0.1m	10	0.17	10	35	18.6	15	610	0.049
Bund 2		3892970.2	0.3m	14	0.17	15	38	22	20	360	0.024
Bund 3		3892970.3	0.2m	15	0.39	12	82	18.7	20	1,140	0.103
Bund 4		3892970.4	0.2m	13	0.17	13	34	19.5	19	430	0.039
Bund 5		3892970.5	0.25m	12	0.2	13	41	19	16	420	0.053
		Mean Concentration of soils		14.2	0.2	13.4	41.6	20.7	18.6	428.5	0.0536

Key:

SP - Stockpile Sample

Bund - Sample within Berm once placed

Purple Fill	Exceedance of Background Concentrations
Green Fill	Exceedance of Recreation SCS
Red Box	Exceedance of Ecological SGV
Blue Box	Exceedance of Freshwater default guideline value

Notes:

1. LRIS Predicted Background Soil Contaminants, New Zealand, Landcare Research Limited, Updated 2016
2. Values taken from Table 2.
2. Ministry for the Environment, 2012. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
3. National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Australia); Schedule B1 (as amended May 2013) - Guideline on Investigation Levels For Soil and Groundwater, Federal Register of Legislative Instruments F2013C00288, National Environmental Protection Council. (HIL - Health Investigation Level).
5. New Zealand Risk Based Guidelines: An implementation framework for ecological soil guideline values Landcare Research July 2023 (incorporating the median ambient background concentrations of these trace elements) Based on Typical soils*
6. https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants/search

* Check notes within Technical Guidelines for further information

NA - Not Analysed

Shannon Farm - 6-XZ750.00
Table A7: Landfill Pits Validation
Heavy Metals in Soil

		Heavy Metals							
		mg/kg							
		Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury	Nickel	Zinc
Limit of Reporting (LOR)		0.125	0.005	0.125	0.075	0.25	0.025	0.05	0.05
NESCS[2]	Residential (10% produce)	20	3	460	>10,000	210	310	-	-
IRB NEPM SGV HILD[3]		-	-	-	-	-	-	400	7400
NZRB [5]	Eco-SGV 80% Species Protection	60	17	400	245	1290	-	-	320

Sample Name	Sampling Date	Laboratory Number		mg/kg							
West Hole - 1	16-May-25	3892969.11	Base of excavation	14	<0.10	12	25	18.1	<0.10	19	71
East Hole - 2		3892969.12		15	0.24	14	29	20	<0.10	19	153
1	16-Jun-25	3920269.1		14	< 0.10	10	24	16.5	< 0.10	19	51
2		3920269.2		12	< 0.10	10	21	13.9	< 0.10	18	47
3		3920269.3		13	< 0.10	13	28	19.1	< 0.10	23	76
4		3920269.4		14	< 0.10	13	28	16.5	< 0.10	24	87
Road 2	14-Feb-25	3893969.1		16	<0.10	14	26	16.3	<0.10	23	58

Key:

Purple Fill	Exceedance of Background Concentrations
Yellow Fill	Exceedance of Residential SCS
Red Box	Exceedance of Ecological SGV

2. Values taken from Table 2.
2. Ministry for the Environment, 2012. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
* Check notes within Technical Guidelines for further information

https://www.legislation.gov.au/Details/F2013C00288/Html/Volume_19# Toc351713616

APPENDICES

A PROPOSED DEVELOPMENT PLANS

ENGINEERING DESIGN PLANS

SHANNON FARM STAGE 1
ENGINEERING DRAWINGS

REVISION A

EARTHWORKS, ROADING AND SERVICES

JOB No. 15729

FOR

NZ CHERRY CORP (LEYSER) LP LTD

FOR TENDER 14.06.24

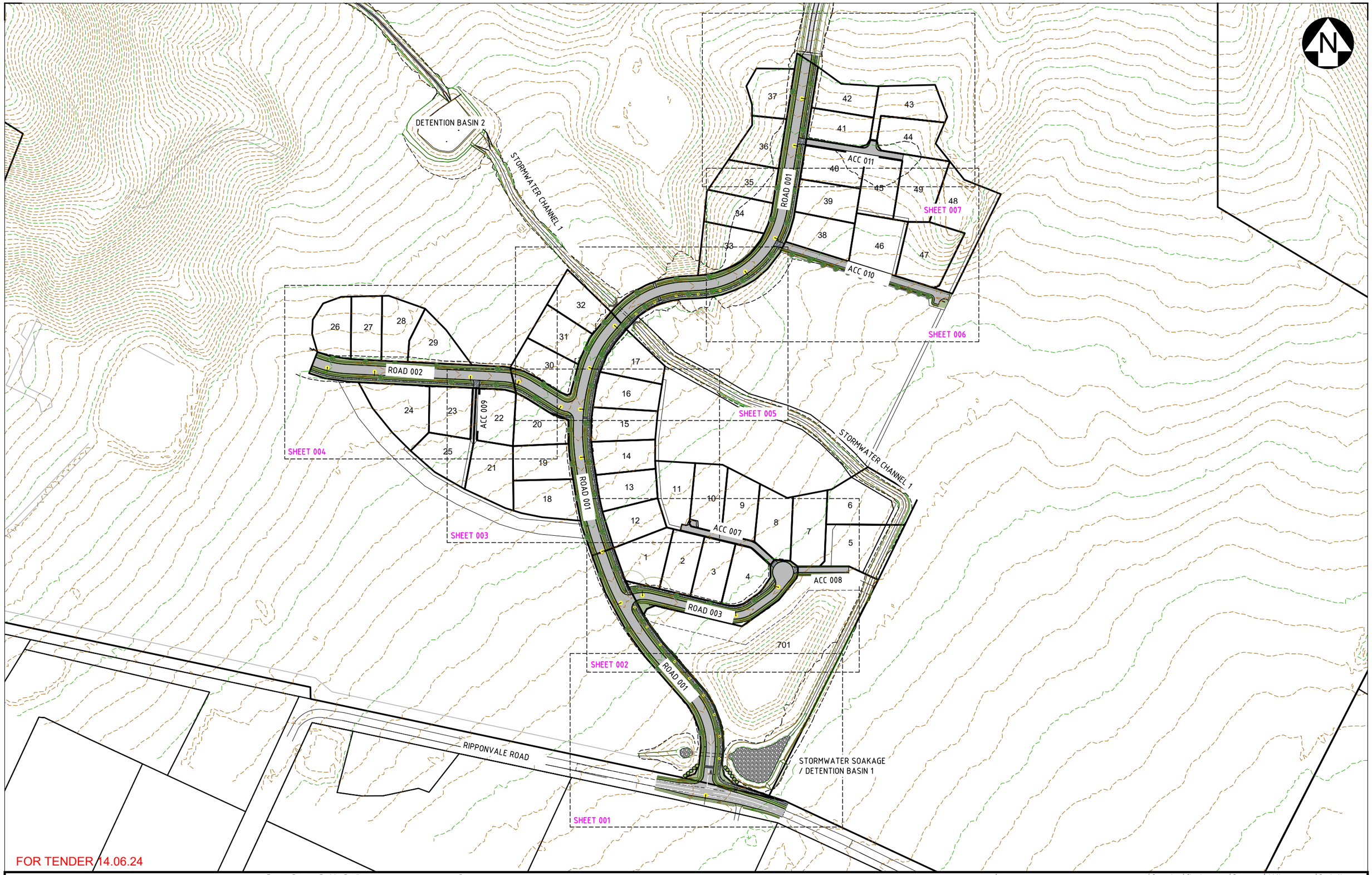
SHEET INDEX

SHEET No	DRAWING TITLE	REVISION	SHEET No	DRAWING TITLE	REVISION	SHEET No	DRAWING TITLE	REVISION
SHEET 001	ROAD LAYOUT	-	SHEET 103	DRAINAGE LAYOUT	-	SHEET 202	WATER RETICULATION LAYOUT	-
SHEET 002	ROAD LAYOUT	-	SHEET 104	DRAINAGE LAYOUT	-	SHEET 203	WATER RETICULATION LAYOUT	-
SHEET 003	ROAD LAYOUT	-	SHEET 105	DRAINAGE LAYOUT	-	SHEET 204	WATER RETICULATION LAYOUT	-
SHEET 004	ROAD LAYOUT	-	SHEET 106	DRAINAGE LAYOUT	-	SHEET 205	WATER RETICULATION LAYOUT	-
SHEET 005	ROAD LAYOUT	-	SHEET 107	DRAINAGE LAYOUT	A	SHEET 206	WATER RETICULATION LAYOUT (RESERVOIR)	A
SHEET 006	ROAD LAYOUT	-	SHEET 108	DRAINAGE LAYOUT	-	SHEET 207	WATER DETAILS	-
SHEET 007	ROAD LAYOUT	-	SHEET 109	DRAINAGE LAYOUT	-	SHEET 208	WATER DETAILS	-
SHEET 008	ROAD LAYOUT	-	SHEET 110	DRAINAGE LAYOUT	-	SHEET 300	IRRIGATION LAYOUT	-
SHEET 009	ROAD 001 LONGSECTION	-	SHEET 111	DRAINAGE LAYOUT	-	SHEET 301	IRRIGATION LAYOUT	-
SHEET 010	ROAD 002, 003 & 009 LONGSECTION	-	SHEET 112	DRAINAGE SECTIONS	-	SHEET 302	IRRIGATION LAYOUT	-
SHEET 011	ROAD 007, 008 & 011 LONGSECTION	-	SHEET 113	DRAINAGE SECTIONS	-	SHEET 303	IRRIGATION LAYOUT	-
SHEET 012	ROAD 001 TYPICAL SECTIONS	-	SHEET 114	DRAINAGE SECTIONS	-	SHEET 304	IRRIGATION RACE DIVERSION	-
SHEET 013	ROAD 002 & 003 TYPICAL SECTIONS	-	SHEET 115	DRAINAGE SECTIONS	-	SHEET 305	IRRIGATION RACE DIVERSION SECTIONS	-
SHEET 014	ACCESS 007, 008, 009, 010 & 011 TYPICAL SECTIONS	-	SHEET 116	DRAINAGE SECTIONS	-	-		-
SHEET 015	TYPICAL DRIVEWAY CROSSING DETAIL	-	SHEET 117	DRAINAGE SECTIONS	-	-		-
SHEET 016	ROAD 001 SECTIONS	-	SHEET 118	DRAINAGE SECTIONS	-	-		-
SHEET 017	ROAD 001 SECTIONS	-	SHEET 119	DRAINAGE SECTIONS	-	-		-
SHEET 018	ROAD 001 SECTIONS	-	SHEET 120	DRAINAGE SECTIONS	-	-		-
SHEET 019	ROAD 001 SECTIONS	-	SHEET 121	BASIN 1 DETAILS	-	-		-
SHEET 020	ROAD 002 SECTIONS	-	SHEET 122	CULVERT DETAILS	-	-		-
SHEET 021	ROAD 003, 007 & 008 SECTIONS	-	SHEET 123	BASIN 2 DETAILS	-	-		-
SHEET 022	ROAD 009, 010 & 011 SECTIONS	-	SHEET 124	DRAINAGE DETAILS	-	-		-
SHEET 100	DRAINAGE LAYOUT	-	SHEET 125	DRAINAGE DETAILS	-	-		-
SHEET 101	DRAINAGE LAYOUT	-	SHEET 200	WATER RETICULATION LAYOUT	-	-		-
SHEET 102	DRAINAGE LAYOUT	-	SHEET 201	WATER RETICULATION LAYOUT	-	-		-

PREPARED BY

CLARK FORTUNE McDONALD & ASSOCIATES
REGISTERED LAND SURVEYORS, LAND DEVELOPMENT AND PLANNING CONSULTANTS

S:\JOBS\15700\15729\ACAD\ENGINEERING\15729_E001_SHANNON FARM_STAGE 1_REVA.DWG
ENTER 12D JOB LOCATION HERE



FOR TENDER 14.06.24

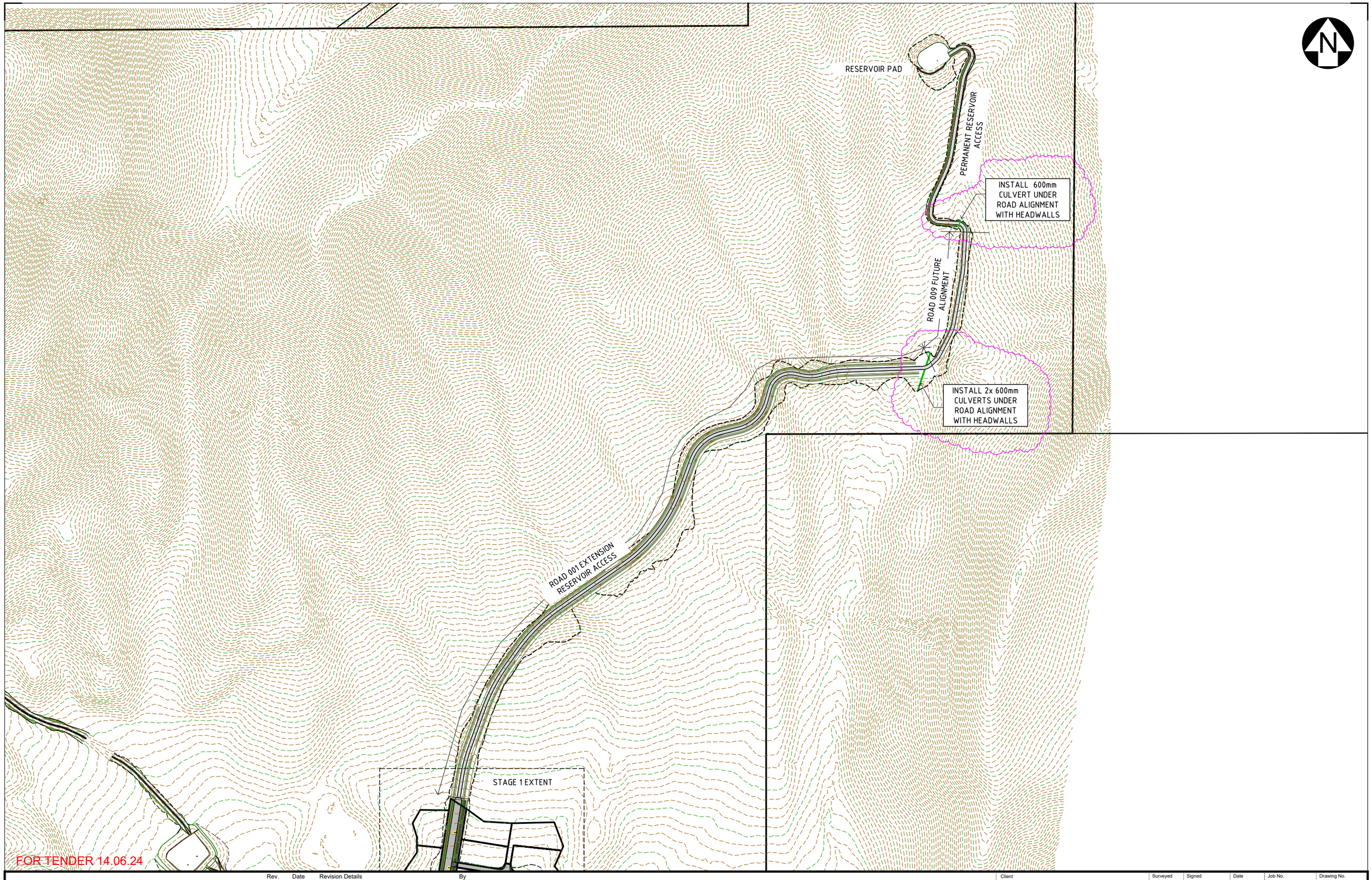
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Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM STAGE 1
OVERVIEW

Client: NZ CHERRY CORP (LEYSER) LP LTD	Surveyed	Signed	Date	Job No. 15729	Drawing No. E001 OVERVIEW
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Copywrite on this drawing is reserved.	Drawn RB	Signed	Date 05.03.24	Scale 1:1500 @ A1 1:3000 @ A3	
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A	14.06.24	ADD CULVERT DETAILS	RB

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OVERVIEW

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	Designed -	Signed	Date -	Datum & Level LINDIS PK 2000 / NZVD2016	Rev. A

LEGEND
EARTHWORKS

Fill Material
- 4.5m to 5.0m+
- 4.0m to 4.5m
- 3.5m to 4.0m
- 3.0m to 3.5m
- 2.5m to 3.0m
- 2.0m to 2.5m
- 1.5m to 2.0m
- 1.0m to 1.5m
- 0.5m to 1.0m
- 0m to 0.5m

Cut Material
- -0m to -0.5m
- -0.5m to -1.0m
- -1.0m to -1.5m
- -1.5m to -2.0m
- -2.0m to -2.5m
- -2.5m to -3.0m
- -3.0m to -3.5m
- -3.5m to -4.0m
- -4.0m to -4.5m
- -4.5m to -5.0m+

LEGEND

- STREET TREES - REFER RMM LANDSCAPE PLANS FOR DETAILS
- BOLLARD LIGHTING - REFER XYST LIGHTING DESIGN FOR DETAILS
- STREET LIGHT - REFER TO XYST LIGHTING DESIGN FOR DETAILS
- MINOR CONTOUR - 0.5m INTERVAL
- MAJOR CONTOUR - 2.0m INTERVAL

N

50 80

50 80

ROAD 001
AC CARRIAGEWAY
FLUSH NIB
SWALE
FLUSH NIB
SWALE
CONC FOOTPATH
R 0.7
70
60
50
40
TC 32.2
30
25.7
20
10
50m CWL
GWT
4000
4000

CULVERT

CONNECTION FOR FUTURE CHANNEL 2

CONCRETE & IRON RAIL RUMBLE STRIP ENTRANCE FEATURE. (REFER RMM LANDSCAPE PLANS FOR DETAILS)

STORMWATER SOAKAGE/ DETENTION BASIN 1 REFER TO DRAIANGE DETAILS

GIVE WAY
RG6 GIVE WAY

REFER RMM LANDSCAPE DRAWINGS FOR ENTRANCE FEATURE DETAILS

RIPPONVALE ROAD
EX CHIPSEAL CARRIAGEWAY
CL

EXISTING SEAL EDGE

5960 (EXISTING)
3500
3500

TIE INTO EXISTING

CWL
50m CWL
15000 (TAPER)
R8000
FLUSH NIB
CONT
1500
GWLL
AC TO INTERSECTION
0
12000 GAP
3000
3000
2500
R8000
27000 (TAPER)
FLUSH NIB
CONC FOOTPATH
SWALE
CWL
50m CWL
RIPPONVALE ROAD
AC CARRIAGEWAY
CWL
SHOULDER WIDENING
NEW SWALE (TIE INTO EX)
30000 (TAPER)
15000
28500
30000 (TAPER)
CL
3500
3500
5810 (EXISTING)
TIE INTO EXISTING
EX DRIVEWAY

OVERLAY OF EXISTING RIPPONVALE ROAD PAVEMENT TO CORRECT GEOMETRY THROUGH INTERSECTION.

LINE MARKING LEGEND

CWL	= CONTINUOUS WHITE LINE - 100mm THICK
CONT	= CONTINUITY LINE - 1m STRIP 3m GAP - 100mm THICK
CL	=CENTRE LINE - 3m STRIP - 7m GAP - 100mm THICK
GWLL	=GIVE WAY LIMIT LINE - 300mm THICK
GWT	=GIVE WAY TRIANGLE (URBAN) - REFER MOTSAM PT 2 FIG 3.9A

ALL MARKINGS SHALL BE INSTALLED IN ACORDANCE WITH MOTSAM.

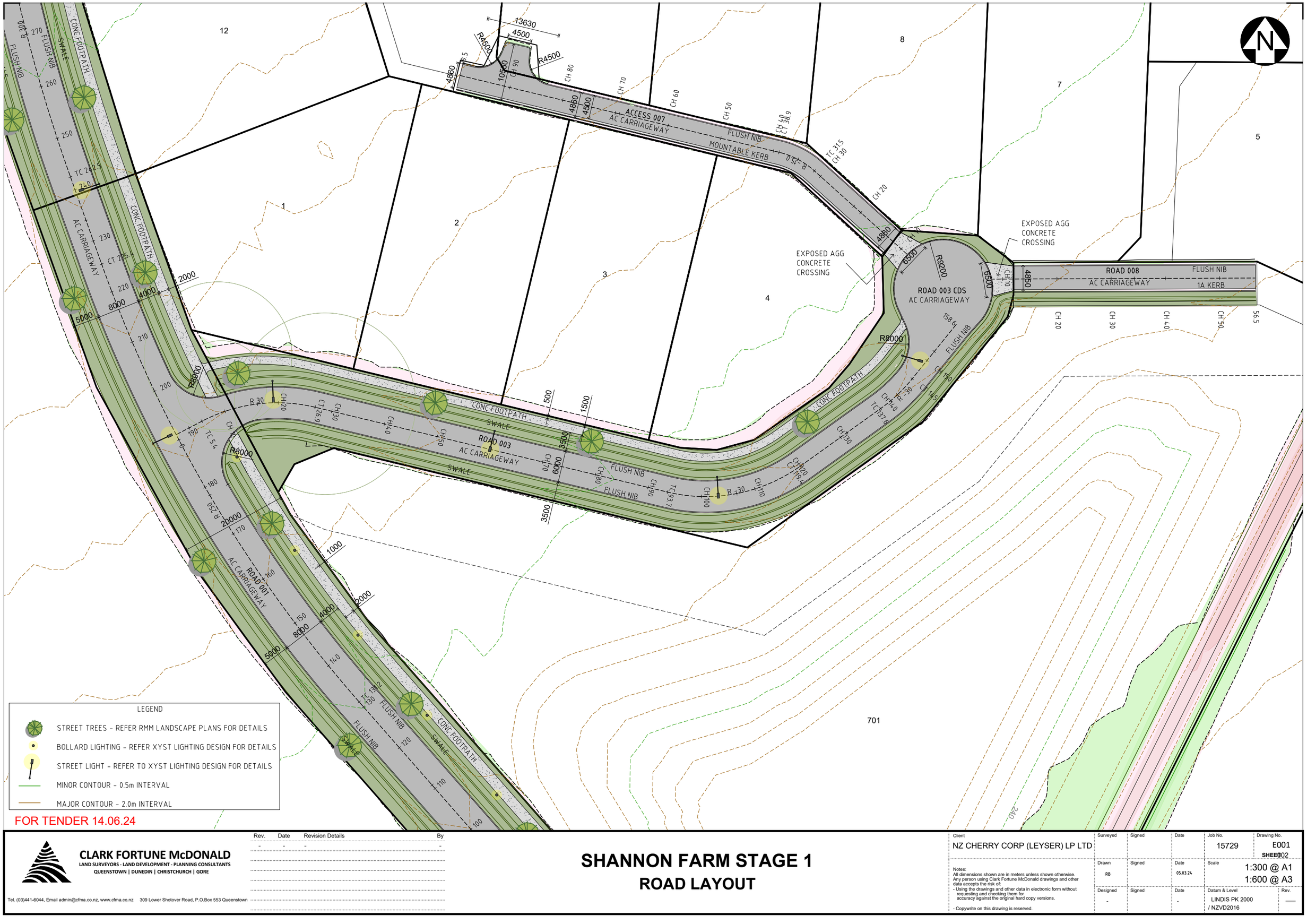
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Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM STAGE 1
ROAD LAYOUT

Client: NZ CHERRY CORP (LEYSER) LP LTD	Surveyed	Signed	Date	Job No. 15729	Drawing No. E001 SHEET 001
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Copy-write on this drawing is reserved.	Drawn RB	Signed	Date 05.03.24	Scale 1:200 @ A1 1:400 @ A3	
	Designed -	Signed	Date -	Datum & Level LINDIS PK 2000 / NZVD2016	Rev. —



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Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM STAGE 1
ROAD LAYOUT

Client: NZ CHERRY CORP (LEYSER) LP LTD	Surveyed	Signed	Date	Job No. 15729	Drawing No. E001 SHEET 002
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Copywrite on this drawing is reserved.	Drawn RB	Signed	Date 05.03.24	Scale 1:300 @ A1 1:600 @ A3	
	Designed -	Signed	Date -	Datum & Level LINDIS PK 2000 / NZVD2016	Rev. —

ROAD 002
AC CARRIAGEWAY
EXPOSED AGG CONCRETE CROSSING
ROAD 001
AC CARRIAGEWAY
SWALE
FLUSH NIB
CONC FOOTPATH
1A KERB
ACCESS 8009
16
15
14
13
12
11
10
23
22
21
20
19
18

LEGEND

- STREET TREES - REFER RMM LANDSCAPE PLANS FOR DETAILS
- BOLLARD LIGHTING - REFER XYST LIGHTING DESIGN FOR DETAILS
- STREET LIGHT - REFER TO XYST LIGHTING DESIGN FOR DETAILS
- MINOR CONTOUR - 0.5m INTERVAL
- MAJOR CONTOUR - 2.0m INTERVAL

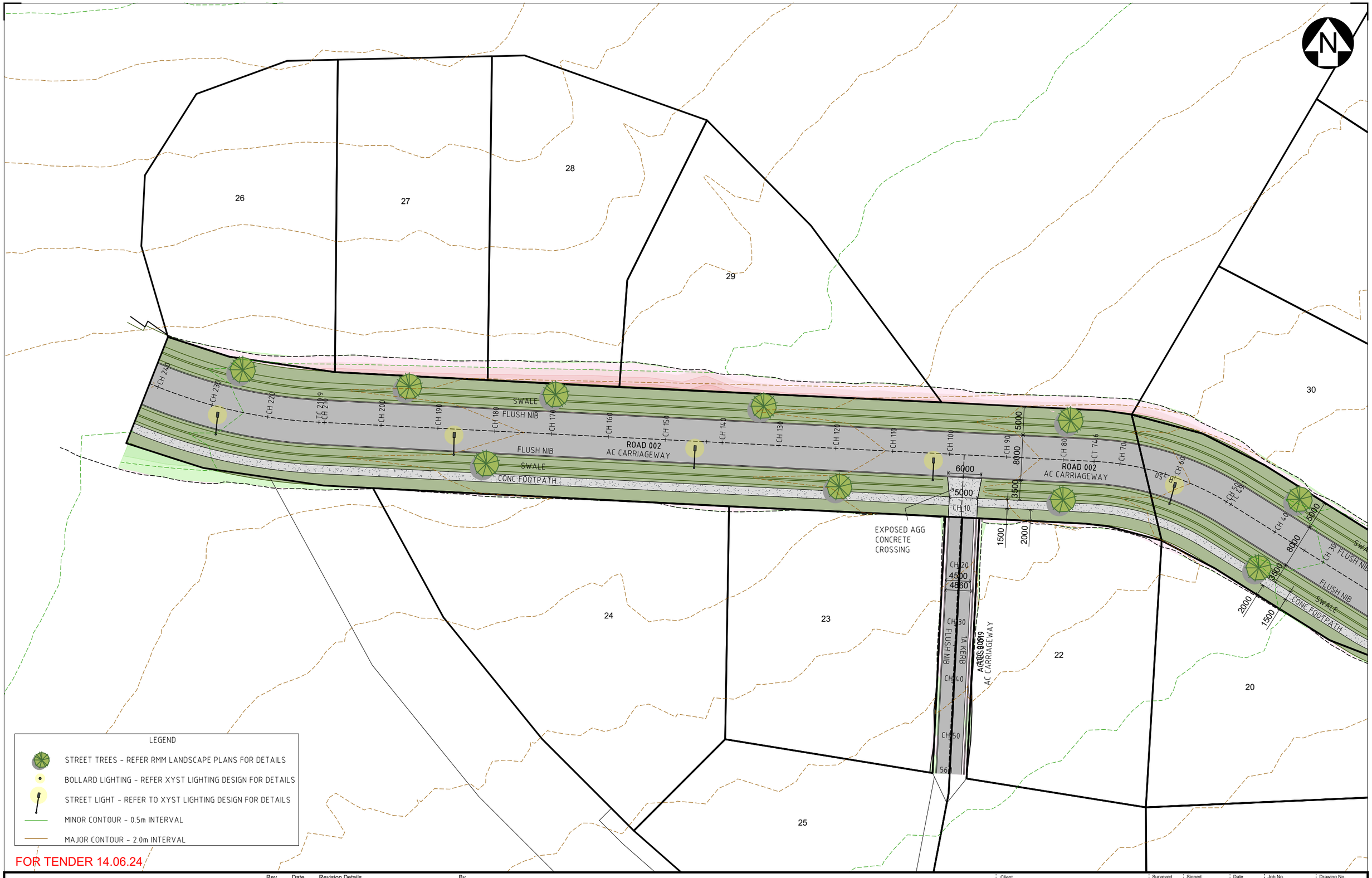
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Rev.	Date	Revision Details	By
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SHANNON FARM STAGE 1
ROAD LAYOUT

Client: NZ CHERRY CORP (LEYSER) LP LTD	Surveyed	Signed	Date	Job No. 15729	Drawing No. E001 SHEET 03
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Copywrite on this drawing is reserved.	Drawn RB	Signed	Date 05.03.24	Scale 1:300 @ A1 1:600 @ A3	
	Designed -	Signed	Date -	Datum & Level LINDIS PK 2000 / NZVD2016	Rev. —



LEGEND

- STREET TREES - REFER RMM LANDSCAPE PLANS FOR DETAILS
- BOLLARD LIGHTING - REFER XYST LIGHTING DESIGN FOR DETAILS
- STREET LIGHT - REFER TO XYST LIGHTING DESIGN FOR DETAILS
- MINOR CONTOUR - 0.5m INTERVAL
- MAJOR CONTOUR - 2.0m INTERVAL

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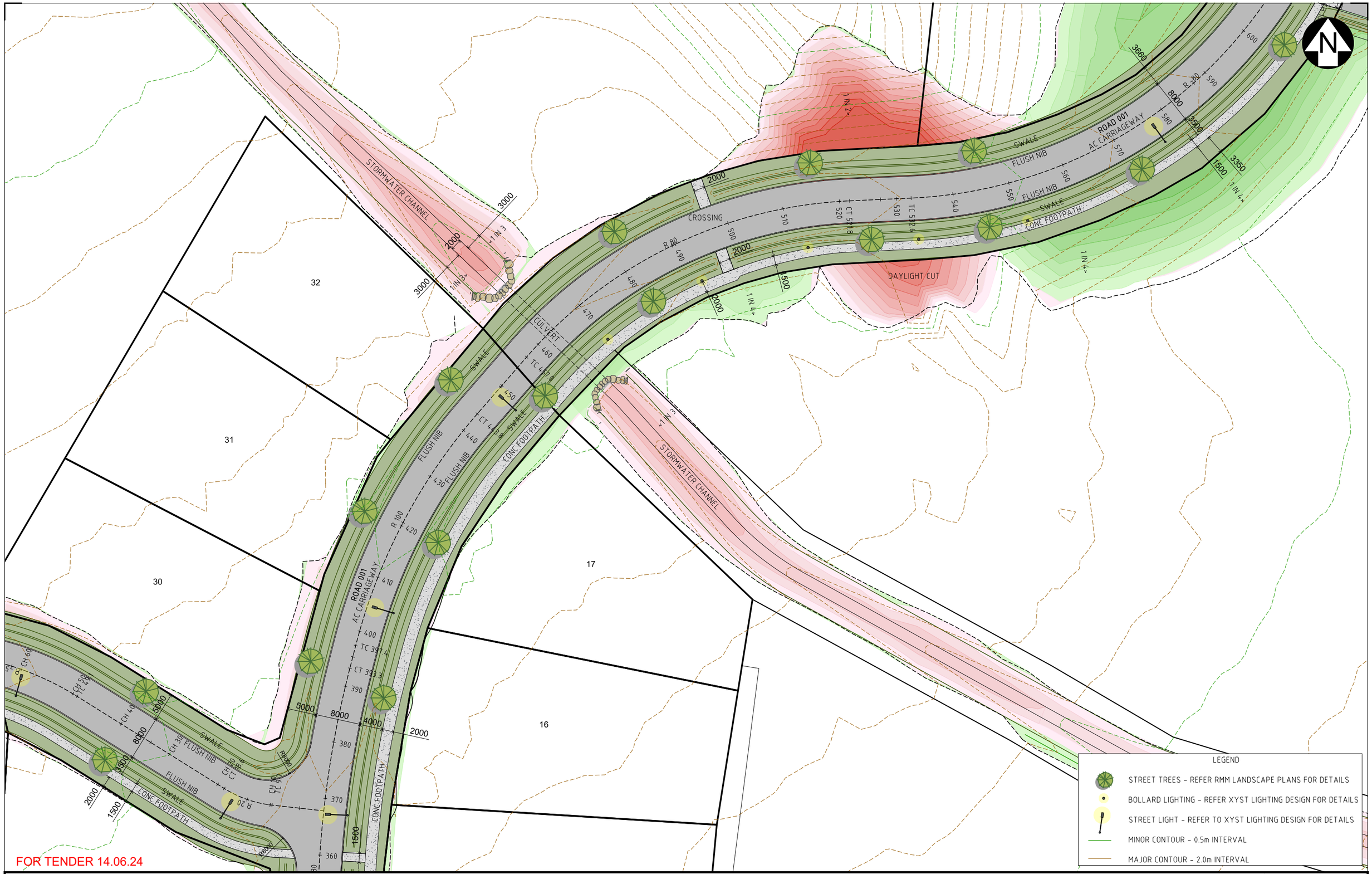
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SHANNON FARM STAGE 1
ROAD LAYOUT

Client: NZ CHERRY CORP (LEYSER) LP LTD	Surveyed	Signed	Date	Job No. 15729	Drawing No. E001 SHEET 004
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Copywrite on this drawing is reserved.	Drawn RB	Signed	Date 05.03.24	Scale 1:300 @ A1 1:600 @ A3	
	Designed -	Signed	Date -	Datum & Level LINDIS PK 2000 / NZVD2016	Rev. —



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LEGEND

- STREET TREES - REFER RMM LANDSCAPE PLANS FOR DETAILS
- BOLLARD LIGHTING - REFER XYST LIGHTING DESIGN FOR DETAILS
- STREET LIGHT - REFER TO XYST LIGHTING DESIGN FOR DETAILS
- MINOR CONTOUR - 0.5m INTERVAL
- MAJOR CONTOUR - 2.0m INTERVAL

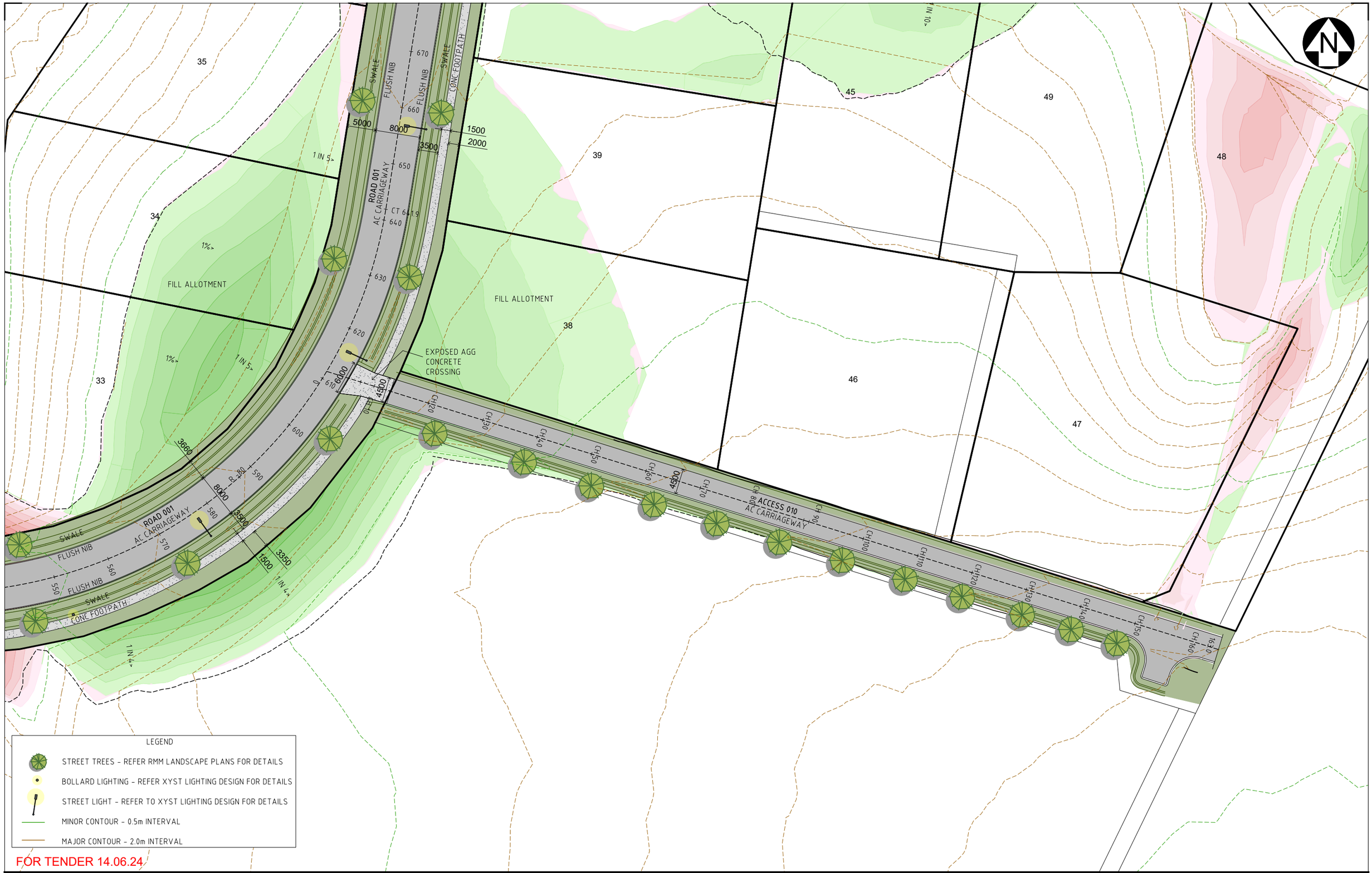
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Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM STAGE 1
ROAD LAYOUT

Client: NZ CHERRY CORP (LEYSER) LP LTD	Surveyed	Signed	Date	Job No. 15729	Drawing No. E001 SHEET 005
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions.	Drawn RB	Signed	Date 05.03.24	Scale 1:300 @ A1 1:600 @ A3	
- Copywrite on this drawing is reserved.	Designed -	Signed	Date -	Datum & Level LINDIS PK 2000 / NZVD2016	Rev. —



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Rev.	Date	Revision Details	By
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SHANNON FARM STAGE 1
ROAD LAYOUT

Client: NZ CHERRY CORP (LEYSER) LP LTD	Surveyed	Signed	Date	Job No. 15729	Drawing No. E001 SHEET 006
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Copywrite on this drawing is reserved.	Drawn RB	Signed	Date 05.03.24	Scale 1:300 @ A1 1:600 @ A3	
	Designed -	Signed	Date -	Datum & Level LINDIS PK 2000 / NZVD2016	Rev. —

ROAD 001 EXTENSION
TEMPORARY GRAVEL ACCESS TO RESERVOIR SITE

FULL FUTURE ROAD CORRIDOR TO BE EXCAVATED AND TEMPORARY ROAD TO BE FORMED ALONG CENTERLINE OF WITH 100mm AP40 RUNNING COURSE.

INSTALL GATES AT STAGE EXTENT TO PREVENT PUBLIC ACCESS TO RESERVOIR SITE

STAGE 1 EXTENT
END OF SEAL FORMATION

ROAD 001
AC CARRIAGEWAY

ACCESS 011
AC CARRIAGEWAY

SWALE
FLUSH NIB
CONC FOOTPATH
100mm AP40 ACCESS
MOUNTABLE KERB

EXPOSED AGG CONCRETE CROSSING

1 IN 5
1 IN 10

37
36
42
41
40
43
44
45
49

LEGEND

- STREET TREES - REFER RMM LANDSCAPE PLANS FOR DETAILS
- BOLLARD LIGHTING - REFER XYST LIGHTING DESIGN FOR DETAILS
- STREET LIGHT - REFER TO XYST LIGHTING DESIGN FOR DETAILS
- MINOR CONTOUR - 0.5m INTERVAL
- MAJOR CONTOUR - 2.0m INTERVAL

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-	-	-	-

SHANNON FARM STAGE 1
ROAD LAYOUT

Client: NZ CHERRY CORP (LEYSER) LP LTD	Surveyed	Signed	Date	Job No. 15729	Drawing No. E001 SHEET 07
Notes: All dimensions shown are in meters unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Copywrite on this drawing is reserved.	Drawn RB	Signed	Date 05.03.24	Scale 1:300 @ A1 1:600 @ A3	
	Designed -	Signed	Date -	Datum & Level LINDIS PK 2000 / NZVD2016	Rev. —

B RESOURCE CONSENTS

Consent Type: Variation to Land Use/Subdivision Consent

Consent Number: 220396 as varied by 220396V1 & 220396v2

Purpose: Change to conditions 1 and 2 of RC220396 in the rural resource area

Location of Activity: 112 & 144 RIPPONVALE ROAD, CROMWELL

Legal Description: SEC 11 BLK III CROMWELL SD (Record of Title 126180)

Lapse Date: 13 September 2028, unless the consent has been given effect to before this date.

[Additions are shown underlined and deletions shown as struck through]

Subdivision Conditions:

1. The subdivision shall be undertaken in accordance with the plans of subdivision being:

   - Shannon Farm Development Lot Layout Overview Sheets 001 and 002 Revision E
   - Shannon Farm Development Lot Layout Details Sheets 003 to 013 Revision E
   - Shannon Farm Development Staging Sheets 016 and 017 Revision ~~E~~F
   - Shannon Farm Development Typical Road Sections Sheets 018 to 021 Revision E
   - Shannon Farm Bulk Earthworks Layout Sheets 001 and 002 Revision ~~B~~ C
   - Shannon Farm Subdivision Water Reticulation Overview Sheets 001 and 002 Revision A
   - Shannon Farm Subdivision Wastewater and Stormwater Reticulation Overview Sheet 003 Revision A
   - Shannon Farm Subdivision Wastewater Reticulation Overview Sheet 004 Revision A
   - Shannon Farm Subdivision Connection to Existing Services Sheet 007 Revision A

   as amended by the following conditions

2. This subdivision may be staged. For the purposes of issuing approvals under Sections 223 and 224(c) of the Resource Management Act 1991, the conditions of this consent shall be applied only to the extent that they are relevant to each particular stage proposed. This consent may be progressed in the following stages:

Stage	RLA Lots	Total (RLA)	Access Lots	Open Space Lots
1	1-11	11	2000 & 2001	-

2	12-17, 18-20 & 30-32	12	2002	-
3	21-25	5	2003	-
4	33-49	17	2005	-
5	28 & 29	2	2003	-
6	26 & 27	2	2003	-
7	701	1	-	-
8	704	1	2000	-
9	706	1	-	-
10	702	1	-	-
11	92-97 & 301	7	2004 & 2011	-
12	~~50-54,303-307, 412 & 413~~ 303-307	~~12~~ 5	2006	3001
13	~~55-66 & 414~~ 50-70	~~13~~ 21	2007 & 2008	3000
14	~~67-74, 1004 & 415~~ 71-74 & 1004	~~10~~ 4	2008	-
15	76-80 & 1003	6	2009	-
16	89-91, 98, 99 & 302	6		-
17	75 & 81-83	4	-	-
18	84 – 88, 401 & 402	7	2010	-
19	~~403-406, 409 & 308-310~~ 403-406, 409, 412 - 415 & 308-310	~~8~~ 12	2012	-
12	50-54,303-307, 412 & 413	12	2006	3001
13	55-66 & 414	13	2007	3000
14	67-74, 1004 & 415	10	2008	-

15	76-80 & 1003	6	2009	-
16	89-91, 98, 99 & 302	6		-
17	75 & 81-83	4	-	-
18	84 – 88, 401 & 402	7	2010	-
19	403-406, 409 & 308-310	8	2012	-
20	407, 408, 201-208 & 416-420	15	2013	-
21	410, 411, 421-425, 501-504 & 600	10	2014	-
22	703	1	-	-
23	705	1	-	-
24	1001	1	-	-

With the exception of Stages 9 & 24, Stage 1 must be in advance of all other Stages. Otherwise, the stages set out above may be progressed in any order, providing all necessary subdivision works, servicing, provision of formed legal access, granting or reserving of easements and all other works required to satisfy conditions of this consent are completed for each stage, prior to certification being issued as necessary under Sections 223 and 224(c) of the Resource Management Act 1991.

3. All subdivisional designs and approvals are to be in accordance with NZS 4404:2004 and the July 2008 version of the CODC Addendum, which is the Council's Code of Practice for Subdivision as modified by these conditions of consent.

4. Prior to the commencement of any subdivisional works, the consent holder must obtain the approval of Central Otago District Council's Environmental Engineering Manager for the works, in accordance with Clause 1.5 of NZS 4404:2004.

5. It is the consent holder's responsibility to obtain any necessary licences to occupy for privately owned assets within land to be vested in Central Otago District Council. Evidence of the granting of any such licences must be provided at the time a request is made for Section 224(c) certification of the relevant land.

Traffic Management

6. The consent holder shall obtain and implement a traffic management plan approved by Council prior to undertaking any works within or adjacent to Council's road reserve that affects the normal operating conditions of the road reserve through disruption, inconvenience or delay. The Traffic Management Plan shall be prepared by a certified Temporary Traffic Management Planner (TTMP) as validated on their code of practice for temporary traffic management (CoPTTM) ID certification. All contractors obligated to implement temporary traffic management plans shall employ a qualified Site Traffic Management Supervisor (STMS) to manage the site in accordance with the requirements of the NZTA's "Traffic Control Devices Manual Part 8: Code of practice for

l) Prior to the construction of any dwelling on Lots 5, 6, 17, 32, 75, 76, 77, 96, 97, 301 and 701, the consent holder or successor must demonstrate that the minimum floor level of the dwelling is above the 1% AEP flood level for the lot.

23. A consent notice condition must be registered on the relevant Records of Title for any lot in respect of which the Schedule 2A statement required in the context of Condition 20~~(z)~~ (aa) indicates that building construction would only be suitable if specified mitigation measures and/or remedial works were carried out at the time of construction. The consent notice condition must require that, prior to any construction work (other than work associated with geotechnical investigation), the owner of such a lot must submit to council for certification, plans prepared by a suitably qualified engineer detailing the proposed mitigation measures and/or remedial works and require the owner to implement all such measures prior to occupation of any building.

24. The consent holder will register a no complaints covenant in relation to the effects of rural productive activities over all saleable Records of Title (excluding reserves and utility allotments) for all Rural Lifestyle Area allotments in favour of Lots 1-4 DP 344529. The covenant will be in a form approved by Council (acting reasonably). A solicitor's undertaking to register such covenant will be required before issue of a s224(c) certificate for the relevant stage of the development. The covenant required by this clause may be registered in the same legal instrument as other developer covenants.

Building Platform Land Use Conditions

1. Building platforms must be shown on the face of the survey plan for the relevant lots in general accordance with those shown on the plans attached as Appendix One.

2. Buildings within the consented building platforms on Lots 208, 401, 402, 403, 404, 406, 408, 409, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425 and 501 may breach the minimum yards provided they are located within the building platforms identified on the lots on the plans attached as Appendix One.

NES-CS Land Use Conditions

1. Prior to the commencement of earthworks, a Site Management Plan (SMP) and Remediation Action Plan (RAP) must be developed by a suitably qualified and experienced person. The SMP and RAP may be incorporated into a single document. Both plans must take into consideration the recommendations of the WSP Detailed Site Investigation dated October 2022 and provided in support of the application. At a minimum the SMP and RAP must include the following:

    a. Procedures to minimise risk of exposure to persons on the site.

    b. Approaches to managing and remediating earthworks involving contaminated soils including but not limited to the areas identified in Figure Seven of the Detailed Site Investigation

    c. An accidental discovery protocol to be followed in the event that unanticipated areas with potential soil contamination are identified during subdivisional works.

2. A copy of the SMP and RAP must be provided to Central Otago District Council at least 10 working days prior to the commencement of works. CODC may recommend changes be made to either document at least 5 working days before the commencement of works.

3. The SMP and RAP must be implemented at all times during construction works associated with the approved subdivision.

4. A copy of the SMP and RAP must be accessible on site at all times.

5. If any potentially contaminated soils from areas identified in yellow in Figure 7 of the WSP Detailed Site Investigation are to be removed from the site, the soils must be tested for heavy metals and, where soil is not able to be considered cleanfill, disposed of to an appropriately accredited landfill facility.

6. In accordance with Section 128 of the Resource Management Act 1991, the conditions of this consent may be reviewed on and in the period within 6 (six) months upon each anniversary of the date of this consent, if, on reasonable grounds, the consent authority finds that:

    a. There is or is likely to be an adverse environmental effect as a result of the exercise of this consent, which was unforeseen when the consent was granted;

    b. Monitoring of the exercise of the consent has revealed that there is or is likely to be an adverse environmental effect; or

    c. There has been a change in the circumstances and the conditions of consent are no longer appropriate in terms of the purpose of the Act.

Advice Notes:

1. *Any change of use of Lots 701 and 706 has not been assessed as part of this application in terms of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011 (The NES-CS). Any change of use of these lots will need to consider the NES-CS.*

2. *Further resource consent under Rule 4.7.2(ib) of the Operative Central Otago District Plan 2008 or any superseding rule will be required prior to the establishment of residential activity on any lot in the Rural Lifestyle Areas or Rural Production Lifestyle Area.*

3. *Potable water use within the subdivision will be metered and charged according to Council's fees and charges and any policies related to the supply of potable water.*

4. *Development contributions of $509,128.21, $412,165.07 and $225,696.68 (exclusive of goods and services tax) are payable for water, wastewater and roading respectively pursuant to the Council's Policy on Development and Financial Contributions contained in the Long Term Council Community Plan. Payment is due upon application under the Resource Management Act 1991 for certification pursuant to section 224(c). The Council may withhold a certificate under section 224(c) of the Resource Management Act 1991 if the required Development and Financial Contributions have not been paid, pursuant to section 208 of the Local Government Act 2002 and Section 15.5.1 of the Operative District Plan.* The payment required at the time of section 224(c) certification of any one stage is to be commensurate with the number of allotments to be certified.

5. *In addition to the conditions of a resource consent, the Resource Management Act 1991 establishes through sections 16 and 17 a duty for all persons to avoid unreasonable noise, and to avoid, remedy or mitigate any adverse effect created from an activity they undertake.*

6. *Resource consents are not personal property. The ability to exercise this consent is not restricted to the party who applied and/or paid for the consent application.*

7. *It is the responsibility of any party exercising this consent to comply with any conditions imposed on the resource consent prior to and during (as applicable) exercising the resource consent. Failure to comply with the conditions may result in prosecution, the penalties for which are outlined in section 339 of the Resource Management Act 1991.*

8. *The lapse period specified above may be extended on application to the Council pursuant to section 125 of the Resource Management Act 1991.*

9. *This is a resource consent. Please contact the Council's Building Services Department, about any building consent requirements for the work.*

~~Issued at Central Otago on 13 September 2023~~

Reissued at Central Otago on 23 May 2025 pursuant to Section 127(1) of the Resource Management Act 1991



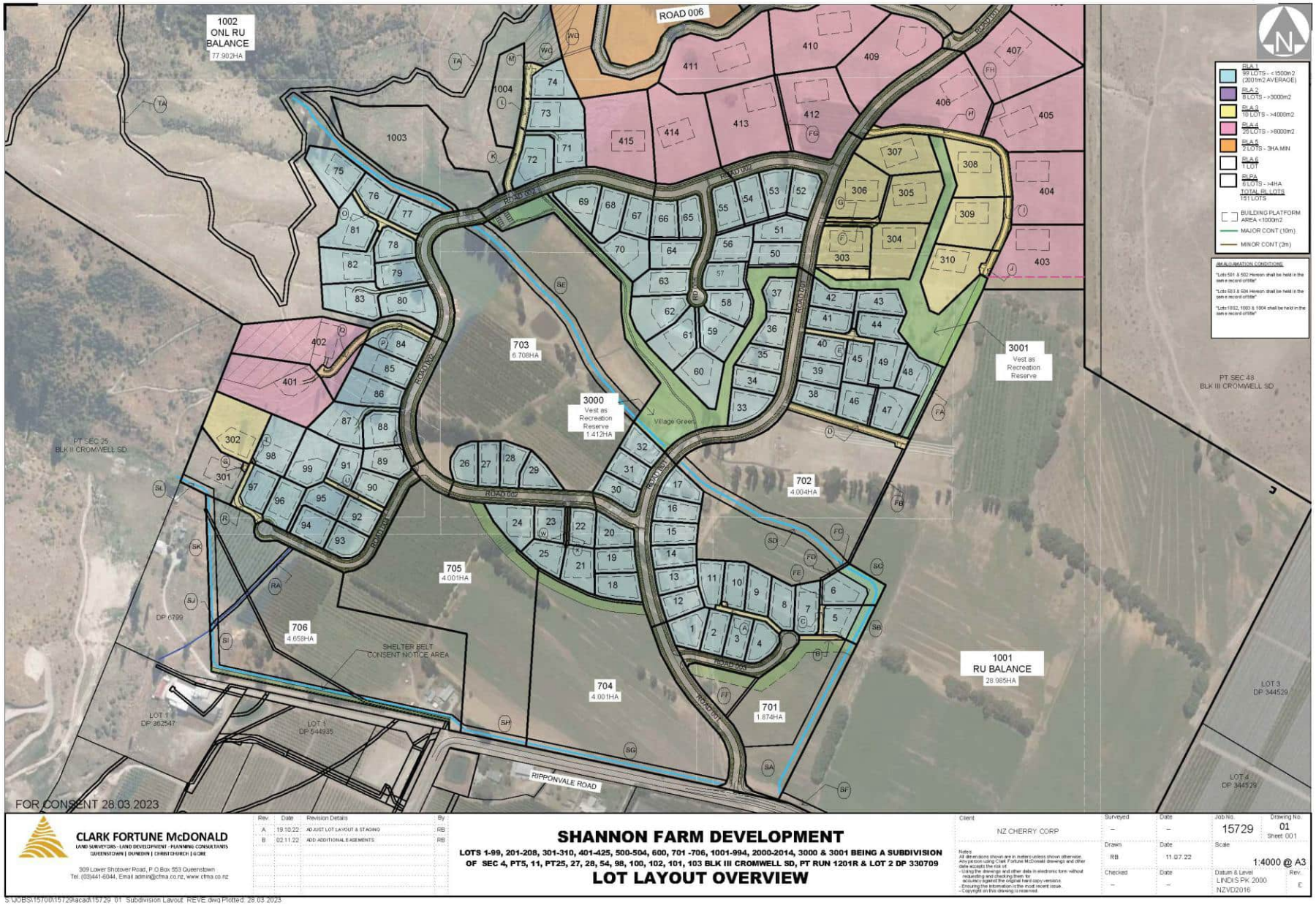
Jessie Dick
PLANNING SUPPORT OFFICER

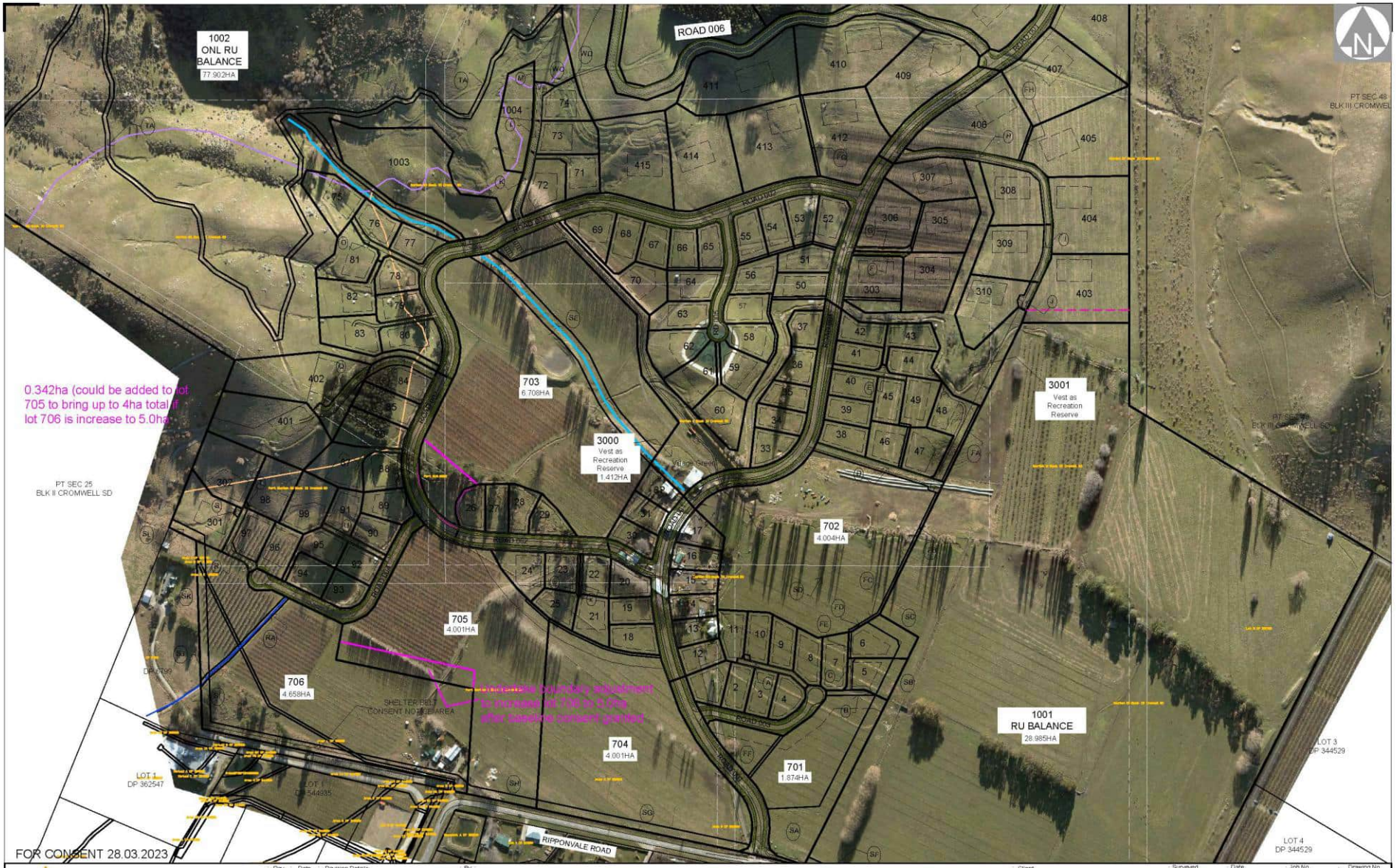
Conditions 21(s), 22(j) and 23 corrected pursuant to Section 133A of the Resource Management Act 1991. Original decision dated 13 September 2023

Conditions 1 and 15 amended, and new Condition 21(aa) added, pursuant to Section 127(1) of the Resource Management Act 1991

Conditions 1 and 2 amended, pursuant to Section 127(1) of the Resource Management Act

Appendix One: Approved Plan/s for RC220396V1 (scanned image(s), not to scale)





CLARK FORTUNE McDONALD
LAND SURVEYORS - LAND DEVELOPMENT - PLANNING CONSULTANTS
QUEENSTOWN | DUNEDIN | CHRISTCHURCH | GORE

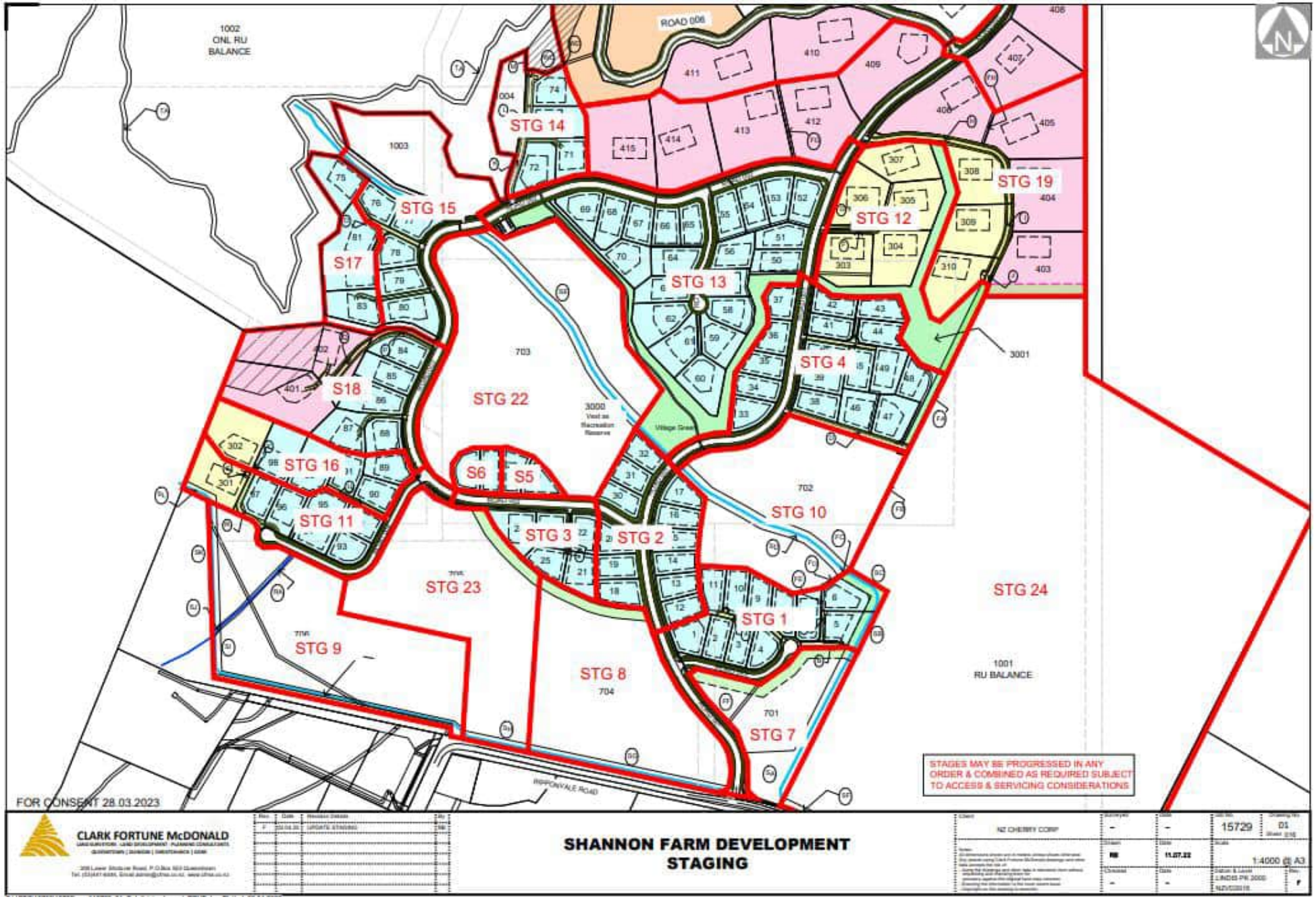
309 Lower Shotover Road, P.O.Box 553 Queenstown
Tel. (03)441-6044, Email admin@cfma.co.nz, www.cfma.co.nz

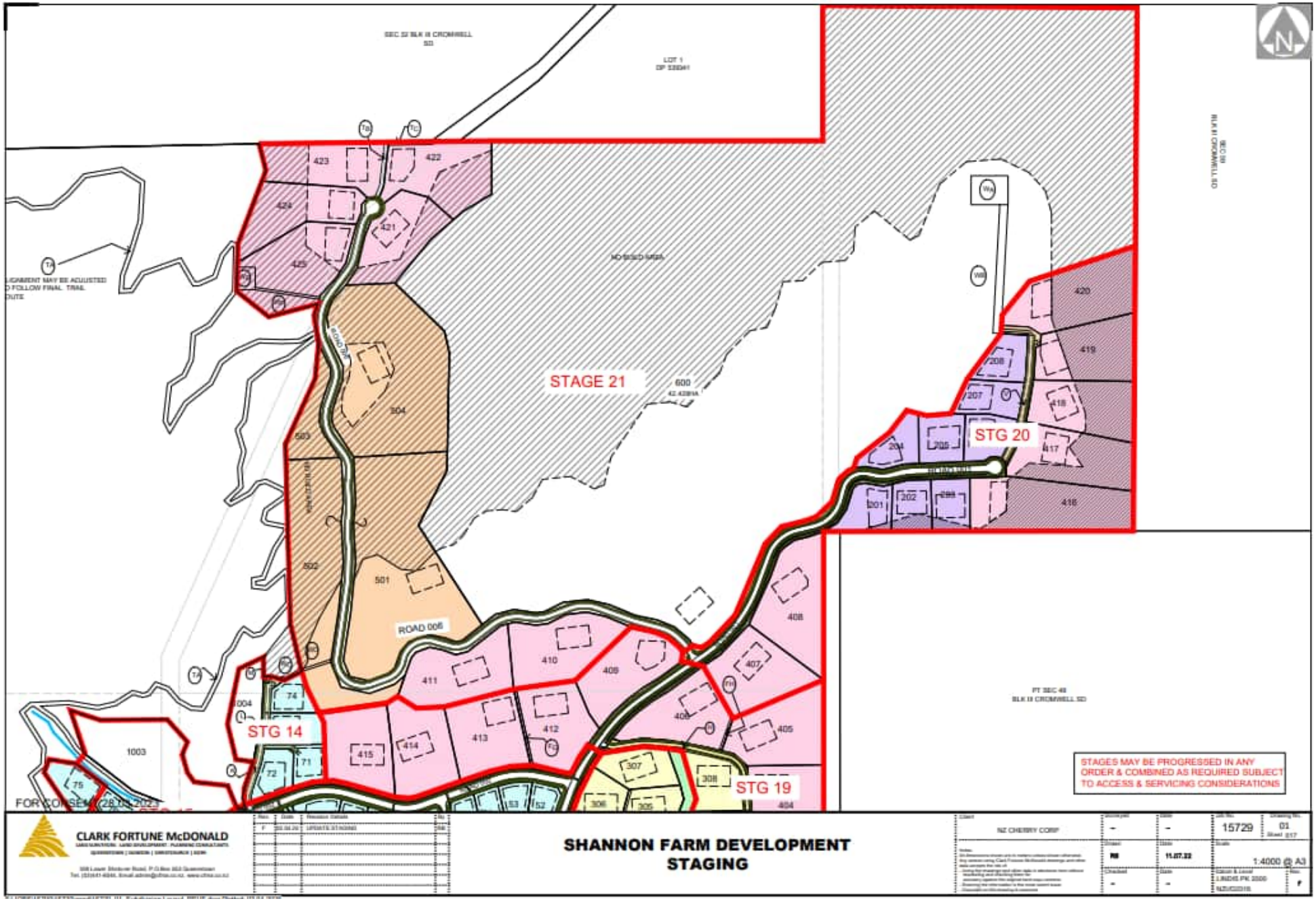
Rev.	Date	Revision Details	By
-	-	-	-

SHANNON FARM DEVELOPMENT
STRUCTURE PLAN OVERLAY

Client: NZ CHERRY CORP	Surveyed: –	Date: –	Job No.: 15729	Drawing No.: 01 Sheet 014	
Notes: All dimensions shown are in metres unless shown otherwise. Any person using Clark Fortune McDonald drawings and other data accepts the risk of: - Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions. - Ensuring the information is the most recent issue. - Copyright on this drawing is reserved.	Drawn: RB	Date: 11.07.22	Scale: 1:4000 @ A3		
	Checked: –	Date: –	Datum & Level: LINDIS PK 2000 NZVD2016	Rev.: E	

S:\JOBS\15700\15729\acad\15729 01 Subdivision Layout REVE.dwg Plotted: 28.03.2023


1002
CNL RU
BALANCE
ROAD 006
STG 14
STG 15
STG 19
STG 12
STG 13
STG 4
STG 22
STG 16
STG 11
STG 10
STG 3
STG 2
STG 1
STG 24
STG 23
STG 9
STG 8
STG 7
S17
S18
S6
S5
1003
703
702
704
701
3001
3000
Vest as
Recreation
Reserve
Village Green
1001
RU BALANCE
RIPPONVALE ROAD
STAGES MAY BE PROGRESSED IN ANY
ORDER & COMBINED AS REQUIRED SUBJECT
TO ACCESS & SERVICING CONSIDERATIONS
FOR CONSENT 28.03.2023
CLARK FORTUNE McDONALD
SHANNON FARM DEVELOPMENT
STAGING
NZ CHERRY CORP
15729
1:4000 @ A3



CLARK FORTUNE McDONALD

SHANNON FARM DEVELOPMENT
STAGING

Client	NZ CHERRY CORP
Job No.	15729
Drawing No.	01
Drawn	RB
Date	11.07.22
Scale	1:4000 @ A3
Checked	–
Datum & Level	LINDIS PK 2000

Our Reference: 1249070055-39845 Consent No. RM23.549.07.V1

LAND USE CONSENT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: New Zealand Cherry Corp (Leyser) LP

Address: C/- Jackson Valentine Limited, Level 3, 258 Stuart Street, Dunedin

To disturb a contaminated site for the purpose of undertaking earthworks for residential development

For a term expiring 1 March 2029

Location of consent activity:	Approximately 1.4 kilometres west from the intersection of Ripponvale Road and Kawarau Gorge Road, Cromwell
Legal description of consent location:	Lot 2 Deposited Plan 330709 and Section 4, 11, 98, 101, 103 Block III Cromwell Survey District and Part Section 5, 25 Block Ill Cromwell Survey District and Part Run 1201R Section 27-28, 96, 99, 102 Block III Cromwell Survey District Section 26, 100 Block III Cromwell Survey District Section 54 Block III Cromwell Survey District

Map Reference approximate site midpoint (NZTM 2000): E1297818 N5006243

Conditions

Specific

1. This consent authorises the disturbance of contaminated land at the locations specified above and as generally shown in the map in Appendix A to this consent.

2. The disturbance of contaminated land must be carried out in accordance with the plans and all information submitted with the application, detailed below, and all referenced by the Consent Authority as consent number RM23.549:

a) Resource consent application and supporting information report signed by the applicant and dated 28 March 2023, including the following forms:
    a. Form 1 – Application for resource consent
    b. Form 18 – Application to disturb a contaminated site
    c. Form 28 – Application to carry out earthworks for residential development
    d. Form 10C – Application to construct a defence against water
    e. Form 3 – Application to divert water
    f. Form 50 – Application to reclaim the bed of a river
    g. Policy Sheet for Form 50 – Reclamation of the bed of a river

b) Information & Assessment of Environmental Effects NZ Cherry Corp (Leyser) Ltd Residential Earthworks, Watercourse Diversion, Reclamation, Defence against water & Contaminated Site, prepared by Nick Geddes, Clark Fortune McDonald dated June 2023

c) Shannon Farm Streetscapes Landscape Concept prepared by Rough Milne Mitchell Landscape Architects dated 4 November 2022

d) Subdivision scheme plans prepared by Clark Fortune McDonald dated June 2023

e) Environmental Management Plan prepared by Enviroscope dated 24 October 2022

f) Preliminary Site Investigation carried out by WSP Opus dated 2018

g) Detailed Site Investigation carried out by WSP dated 2022

h) Further information responses dated 4 August 2023, 14 August 2023 and 1 February 2024 (hydrology report)

i) Remediation Action Plan and Contaminated Site Management Plan prepared by WSP, dated 22 November 2024

j) All plans and information submitted with resource consent application RM24.702, including:
    a. Form 1 – Application for resource consent
    b. Form 18 – Application to disturb a contaminated site
    c. Form 22 – Application to change/cancel consent conditions

If there are any inconsistencies between the above information and the conditions of this consent, the conditions of this consent will prevail.

3. The activities authorised by this consent must only be exercised in conjunction with Water Permit RM23.549.01, Land Use Consent RM23.549.02, Land Use Consent RM23.549.03, Land Use Consent RM23.549.04, Land Use Consent RM23.549.05 and Discharge Permit RM23.549.06.

4. Prior to the commencement of the works described in Condition 1 of this consent the Consent Holder must ensure that all personnel working on the site are made aware of, and have access at all times to:

   a) The contents of this document; and
   b) The most recent approved version of the Contaminated Soil Management Plan for the site, referenced in Condition 9; and
   c) The Remedial Action Plan for the site, prepared by WSP Limited dated 22 November 2024.

   Copies of these documents must be present on-site at all times while the work authorised by this consent is being undertaken.

5. Any site investigation must be undertaken in accordance with the Ministry for the Environment publications Contaminated Land Management Guidelines, No.5 (revised 2021).

6. With the exception of the contaminated material to be encapsulated as set out in the Remediation Action Plan prepared by WSP Limited dated 22 November 2024, soil or waste materials removed from the contaminated area must be deposited at a disposal site that holds a consent to accept the relevant level of contamination except in circumstances where:

   a) The soil or waste materials meet the definition of 'cleanfill'; and
   b) Notice is given to the Consent Authority five working days prior its removal from the subject site.

7. Site sourced and imported material used to fill any excavation must:

   a) Consist of clean quarry sourced aggregate; or
   b) Not be sourced from any site listed as a HAIL site, unless the material has been tested by a Suitably Qualified and Experienced Practitioner and confirmed as meeting the definition of cleanfill.

8. No soil disturbance or soil shifting, unloading, loading will take place if wind speed is higher than 14 metres per second and the soil is dry and prone to becoming airborne, unless a dust suppressant is applied.

Performance Monitoring

9. a) The Consent Holder must notify the Consent Authority in writing at least 10 working days prior to works commencing in contaminated areas on the subject site.
   b) This notification must provide written confirmation that the site manager has been provided with a copy of the consent conditions including referenced documents such as the Remediation Action Plan and is aware of any reporting requirements.

10. a) The activities authorised by this consent must occur in accordance with the Remediation Action Plan (RAP) prepared by WSP Limited dated 22 November 2024, or any updates approved by the Consent Authority under part (c) of this condition; and

    b) No activity on the subject site may commence until all measures identified in the RAP as needing to be put in place prior to commencement of any works have been established; and

    c) The RAP may be amended at any time. Any amendments must be:
        i. For the purpose of improving the efficacy of the contaminated site management procedures, and shall not result in reduced discharge quality;
        ii. Consistent with the conditions of this resource consent; and
        iii. Submitted in writing to the Consent Authority for certification, prior to any amendments being implemented.

11. All personnel working on the site must be made aware of the relevant requirements contained in the RAP required by Condition 10. A copy of the RAP, must be held on-site at all times.

12. All sampling and testing of contamination on the site must be overseen by a suitably qualified and experienced person. All sampling must be undertaken in accordance with the Ministry for the Environment's Contaminated Land Management Guidelines.

13. The Consent Holder must forward copies of the results of any soil analyses undertaken as a result of the exercise of this consent to the Consent Authority within 10 working days of receiving the results from the independent service provider.

14. The Consent Holder must maintain a record of any environmental complaints relating to the works. The register must include, but not be limited to:

    a) The date, time, location and nature of the complaint;
    b) The name, phone number, and address of the complainant, unless the complainant elects not to supply this information;
    c) action taken by Consent Holder to remedy the situation and any policies or methods put in place to avoid or mitigate the problem occurring again.

    The Consent Holder must, within 24 hours, inform the Consent Authority of any complaints received from any person about activities on the site associated with the consented works.

15. In the event that any unexpected contaminated soil or material is uncovered by the works, an accidental discovery protocol shall be implemented, including but not limited to the following steps:

    a) Earthworks within ten metres of unexpected contaminants must cease immediately;

b) All practicable steps must be taken to prevent the contaminated material becoming entrained in stormwater. Immediate steps must include, where practicable:
    i. diverting any stormwater runoff from surrounding areas away from the contaminated material; and
    ii. minimising the exposure of the contaminated material, including covering the contaminants with an impervious cover;
c) Notification of the Consent Authority, within 24 hours of the discovery;
d) Earthworks within ten metres of unexpected contaminants must not recommence until a suitably qualified and experienced contaminated land practitioner (SQEP) confirms to the Consent Authority that continuing works does not represent a significant risk to the environment;
e) All records and documentation associated with the discovery must be kept and copies must be provided to the Consent Authority upon request.

16. Stockpiling of contaminated material on the site must be avoided where practicable. In the event that temporary stockpiling of suspected potential or contaminated material is required, then the stockpiles must be managed as below:
    a) Stockpiled material must be placed on polythene sheeting or similar impervious material to prevent contamination of underlying material; and
    b) Stockpiled material must be placed not within 20 metres away from any open excavation; and
    c) Stockpiles must include a perimeter bund or berm installed to prevent runoff leaving the area and stormwater from other areas entering the stockpile area; and
    d) If any rainfall is forecasted that has the potential to cause runoff from the stockpiles, or if the stockpiles are left overnight, over the weekend or over public holidays, the stockpiled material must be covered with a suitable material to prevent stormwater runoff coming into contact with contaminated material.

17. a) The Consent Holder must notify the Consent Authority in writing of the completion of the works no less than 10 working days following the completion of works and must provide photographs of the areas where work has been undertaken.

    b) Photographs must be in colour and be no smaller than 200 x 150 millimetres in size and be in JPEG form.

18. Within three months of the completion of the works the Consent Holder must provide the Consent Authority with a Site Validation Report (SVR), prepared by a suitably qualified and experienced practitioner and in accordance with Contaminated Land Management Guideline No 1. The SVR should contain sufficient detail to address the following matters:

    a) Summary of the works undertaken;

    b) The location and dimensions of the excavations carried out, including a relevant site plan;

    c) Records of any unexpected contamination encountered during the works, including GPS coordinates, if applicable;

d) The location and dimensions of any contaminated soil remaining on-site (if any);

e) A summary of sampling (if any) and analysis undertaken for validation sampling, and for unexpected contamination (if applicable), tabulated analytical results including laboratory transcripts, and interpretation of the results in the context of the relevant soil guideline values;

f) Copies of disposal dockets for material removed from site, if any; and

g) Details regarding any complaints received by the Consent Holder and/or breaches of the procedures set out in the RAP and/or Remedial Action Plan.

19. In the event that the Site Validation Report provided to the Consent Authority as required by Condition 18 of this consent confirms that an Ongoing Management Plan (OMP) is required, an OMP shall be prepared by a Suitably Qualified Person and submitted for approval from the Consent Authority.

General

20. a) All earthworks must be managed to avoid the potential for accidental cross-contamination of materials to occur. In particular movement of contaminated soil on or across impermeable land and/or deposition of contaminated soil on exposed and uncontaminated land must either be avoided or measures implemented to ensure that no cross contamination occurs.

b) There must be no mixing of topsoils, road materials, and underlying natural soils.

c) In the event that cross contamination of previously uncontaminated parts of the site occurs, the contamination must be remedied in accordance with the Site Validation Report required by Condition 18.

21. With the exception of the contaminated material to be encapsulated as set out in the Remediation Action Plan prepared by WSP Limited and dated 22 November 2024, no contaminated material from the site may be used to form the fill at the site.

22. All machinery; temporary fencing and signs; chemicals; rubbish, debris and other materials must be removed upon completion of the works.

23. In the event that an unidentified archaeological site is located during works, the following will apply:

a) Work must cease immediately at that place and within 20 metres around the site.

b) All machinery must be shut down, the area must be secured, and the Heritage New Zealand Pouhere Taonga Regional Archaeologist and the Consent Authority must be notified.

c) If the site is of Maori origin, the Consent Holder must also notify the appropriate iwi groups or kaitiaki representative of the discovery and ensure site access to enable appropriate cultural procedures and tikanga to be undertaken, as long as all statutory requirements under legislation are met (Heritage New Zealand Pouhere Taonga Act 2014, Protected Objects Act 1975).

d) If human remains (koiwi tangata) are uncovered the Consent Holder must advise the Heritage New Zealand Pouhere Taonga Regional Archaeologist, NZ Police, the Consent Authority and the appropriate iwi groups or kaitiaki representative and the above process under (c) will apply. Remains are not to be disturbed or moved until such time as iwi and Heritage New Zealand Pouhere Taonga have responded.

e) Works affecting the archaeological site and any human remains (koiwi tangata) must not resume until Heritage New Zealand Pouhere Taonga gives written approval for work to continue. Further assessment by an archaeologist may be required.

f) Where iwi so request, any information recorded as the result of the find such as a description of location and content, must be provided for their records.

24. Under section 125 of the Resource Management Act 1991, this consent lapses two years after the date of commencement of the consent unless:

a) The consent is given effect to; or

b) The Consent Authority extends the period after which the consent lapses.

Notes to Consent Holder

1. *Under the Heritage New Zealand Pouhere Taonga Act 2014 an archaeological site is defined as any place in New Zealand that was associated with human activity that occurred before 1900 and provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand (see Section 6). For pre-contact Maori sites this evidence may be in the form of Taonga (artefacts) such as toki (adzes) or flake tools as well as bones, shells, charcoal, stones etc. In later sites of European/Chinese origin, artefacts such as bottle glass, crockery etc. may be found, or evidence of old foundations, wells, drains or similar structures. Pre-1900 buildings are also considered archaeological sites. Burials/koiwi tangata may be found from any historic period. Archaeological sites are legally protected under Sections 42(1) & (2) of the Heritage New Zealand Pouhere Taonga Act 2014. It is an offence under Section 87 of the Heritage New Zealand Pouhere Taonga Act 2014 to modify or destroy an archaeological site without an Authority from Heritage New Zealand Pouhere Taonga irrespective of whether the works are permitted, or a consent has been issued under the Resource Management Act 1993 or Building Act 1991.*

2. *If you require a replacement consent upon the expiry date of this consent, any new application should be lodged at least 6 months prior to the expiry date of this consent. Applying at least 6 months before the expiry date may enable you to continue to exercise this consent under section 124 of the Resource Management Act 1991 until a decision is made on the replacement application (and any appeals are determined).*

3. *The Consent Holder is responsible for obtaining all other necessary consents, permits, and licences, including those under the Building Act 2004, the Biosecurity Act 1993, the Conservation Act 1987, and the Heritage New Zealand Pouhere Taonga Act 2014. This consent does not remove the need to comply with all other applicable Acts (including the Property Law Act 2007 and the Health and Safety at Work Act 2015), regulations, relevant Bylaws, and rules of law. This consent does not constitute building consent approval. Please check whether a building consent is required under the Building Act 2004.*

4. *Any work involving asbestos must be undertaken in accordance with the Health and Safety at Work (asbestos) Regulations 2016.*

5. *The Consent Holder will be required to pay the Consent Authority an administration and monitoring charge to recover the actual and reasonable costs incurred to ensure ongoing compliance with the conditions attached to this consent, collected in accordance with Section 36 of the Resource Management Act 1991.*

6. *Note: Cleanfill is defined in the Regional Plan: Water as: A natural material such as sand, gravel and rock, and such other materials as concrete, brick or demolition products that are free of soluble materials and are therefore not subject to biological or chemical breakdown.*

7. *This consent does not authorizse the discharge of contaminated material to land. Additional consent is required if encapsulation of any contaminated material at the site is proposed.*

8. *Where information is required to be provided to the Consent Authority in conditions 9-14 this is provided in writing to compliance@orc.govt.nz , and the email heading is to reference RM23.549.07 and the condition(s) the information relates to.*

Issued at Dunedin this 29th day of February 2024
Reissued at Dunedin this 13th day of March 2025 to reflect a variation of conditions under Section 127 of the Resource Management Act 1991



Mat Bell
Team Leader Consents

Appendix A

Aerial photo showing the general location of works authorised by this consent (shaded yellow, green and red). *Note: TCLP means Toxicity Characteristic Leaching Procedure* (Source: Application)



Otago Regional Council

ORC NOTIFICATION RECOMMENDATION REPORT

Application No:	RM24.702
Prepared for:	Staff Consents Panel
Prepared by:	Danielle Ter Huurne, Senior Consents Planner
Date:	28 February 2025

Subject: **Notification recommendation for application RM24.702 by New Zealand Cherry Corp (Leyser) LP to dispose of contaminated land in an encapsulation cell for the purpose of residential development and to vary Land Use Consent RM23.549.07**

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1. Purpose

To report and make recommendations under sections 95A-G of the Resource Management Act 1991 (the Act) on the notification decision for the above application.

2. Background Information

Applicant: New Zealand Cherry Corp (Leyser) LP

Applicant's Agent: Nick Geddes, Clark Fortune McDonald

Site address or location: 114 Ripponvale Road, Cromwell; approximately 1.3 kilometres (km) northwest of the intersection of State Highway 6 and Ripponvale Road.

Legal description(s) of the site: Lot 2 Deposited Plan 330709 and Section 4, 11, 98, 101, 103 Block III Cromwell Survey District and Part Section 5, 25 Block Ill Cromwell Survey District and Part Run 1201R Section 27-28, 96, 99, 102 Block III Cromwell Survey District Section 26, 100 Block III Cromwell Survey District Section 54 Block III Cromwell Survey District

Record of title number and owner: 126180, OT7C/632, OT7C/633 and OT106/99; New Zealand Cherry Corp (Leyser) LP

HAIL References:

HAIL.01974.01, 02, .04, .05, .06, .07, .08 and .09: A10: Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds.

HAIL.01974.03:

A10: Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds.

G3: Landfill sites.

A17: Storage tanks or drums for fuel, chemicals or liquid waste.

G5: Waste disposal to land (excluding where biosolids have been used as soil conditioners).

A13: Petroleum or petrochemical industries including a petroleum depot, terminal, blending plant or refinery, or facilities for recovery, reprocessing or recycling petroleum-based materials, or bulk storage of petroleum or petrochemicals above or below ground.

Map reference, containment cell (NZM 2000): E 1297877 N 5006285

Consent(s) sought:

Land Use Consent RM24.702.01 to deposit contaminated soil in an encapsulation cell.

Purpose: For the purpose of residential development.

Current consents:

Water Permit RM23.549.01 to divert and dam water for the purpose of flood mitigation for a residential development.

Land Use Consent RM23.549.02 to reclaim the bed of an unnamed watercourse for the purpose of flood mitigation for a residential development.

Land Use Consent RM23.549.03 to alter and place structures in the bed of two unnamed watercourses for the purpose of residential development.

Land Use Consent RM23.549.04 to construct defences against water for the purpose of flood mitigation for a residential development.

Land Use Consent RM23.549.05 to undertaken residential earthworks for the purpose of residential development.

Discharge Permit RM23.549.06 to discharge sediment to land where it may enter water during residential earthworks for the purpose of residential development.

Land Use Consent RM23.549.07 to disturb a contaminated site for the purpose of undertaking earthworks for residential development.

Section 124 timeframes:

- Not applicable.

2.1 Key issues/risks

At this stage there are no principal issues in contention that need to be raised.

2.2 Summary

I recommend the application is processed on a non-notified basis. This is because:

- The adverse effects on the environment from the proposed activity will be less than minor;
- Adverse effects on persons will be less than minor; and
- There are no special circumstances to warrant notification of the application.

3. Description of Activity

Nick Geddes of Clark Fortune McDonald has provided a description of the proposal at Section 1 of the Application titled: *NZ Cherry Corp (Leyser) Ltd s.127 Variation: RM23.549.07 Conditions 2, 4, 6, 10 & 20. S.88 Deposit hazardous waste in, on or under land,* dated November 2024. This description is adopted for this report. The key points of the activity are explained below:

Land Use Consent RM23.549.07 was granted on 29 February 2024 and authorises the disturbance of contaminated land on the site and requires that soil and waste materials removed from the contaminated area must be deposited at a disposal site that can accept the relevant level of contamination.

The Applicant now proposes to dispose of contaminated soils from the sheep pens and sheep dip, on-site in an encapsulation cell. Figures 1 to 3 below illustrate the location of the encapsulation cell/containment bund and a cross-section. In a further information response on 23 January 2025 the Applicant confirmed that the contamination bund will be located entirely within private property.

A geotextile membrane which meets TNZ F/7 specifications will be installed at the base and top of the contaminated soil layer to ensure that contaminants are unable to leach in significant quantities through underling soils. A minimum of 500 mm of soil will be placed over the geotextile layer and the area will be landscaped.



Figure 1: Aerial of site and surrounds illustrating proposed location of encapsulation cell. [Source: Application].

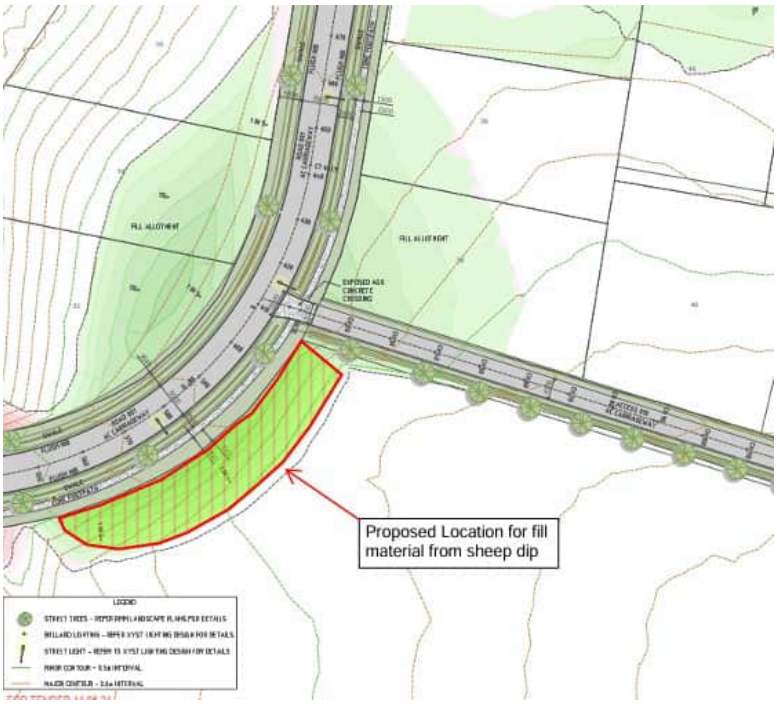
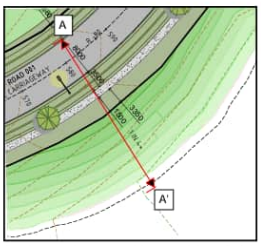


Figure 2: Location of encapsulation cell. [Source: Application].



Extract from Engineering Drawings 15729_E001

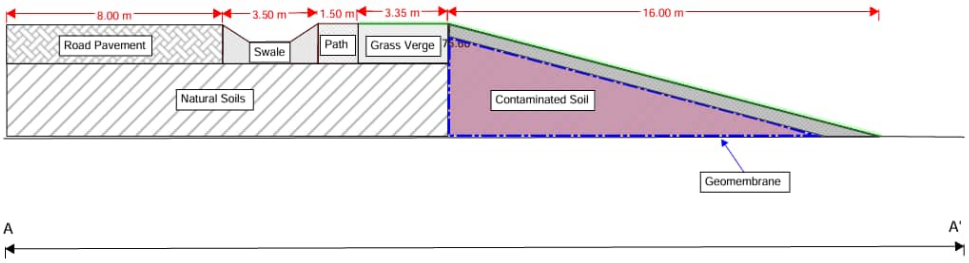


Figure 1: Cross-section of containment bund. [Source: Application].

As RM23.549.07 only consented the disturbance of contaminated land, a new consent is required for the disposal and encapsulation of contaminated land. To reflect the above changes and to avoid conflicts between the new consent and RM23.549.07, the Applicant now seeks to vary Conditions 2, 4, 6, 10 and 20 of RM23.549.07 as follows:

2. The disturbance of contaminated land must be carried out in accordance with the plans and all information submitted with the application, detailed below, and all referenced by the Consent Authority as consent number RM23.549:
   a) Resource consent application and supporting information report signed by the applicant and dated 28 March 2023, including the following forms:
      a. Form 1 – Application for resource consent
      b. Form 18 – Application to disturb a contaminated site
      c. Form 28 – Application to carry out earthworks for residential development
      d. Form 10C – Application to construct a defence against water
      e. Form 3 – Application to divert water
      f. Form 50 – Application to reclaim the bed of a river
      g. Policy Sheet for Form 50 – Reclamation of the bed of a river
   b) Information & Assessment of Environmental Effects NZ Cherry Corp (Leyser) Ltd Residential Earthworks, Watercourse Diversion, Reclamation, Defence against water & Contaminated Site, prepared by Nick Geddes, Clark Fortune McDonald dated June 2023
   c) Shannon Farm Streetscapes Landscape Concept prepared by Rough Milne Mitchell Landscape Architects dated 4 November 2022
   d) Subdivision scheme plans prepared by Clark Fortune McDonald dated June 2023
   e) Environmental Management Plan prepared by Enviroscope dated 24 October 2022
   f) Preliminary Site Investigation carried out by WSP Opus dated 2018
   g) Detailed Site Investigation carried out by WSP dated 2022
   h) Further information responses dated 4 August 2023, 14 August 2023 and 1 February 2024 (hydrology report)
   i) <u>Remediation Action Plan and Contaminated Site Management Plan prepared by WSP, dated 22 November 2024</u>
   j) <u>All plans and information submitted with resource consent application RM24.702, including:</u>

a. Form 1 – Application for resource consent
b. Form 18 – Application to disturb a contaminated site
c. Form 22 – Application to change/cancel consent conditions

If there are any inconsistencies between the above information and the conditions of this consent, the conditions of this consent will prevail.

4. Prior to the commencement of the works described in Condition 1 of this consent the Consent Holder must ensure that all personnel working on the site are made aware of, and have access at all times to:
   a) The contents of this document; and
   b) The most recent approved version of the Contaminated Soil Management Plan for the site, referenced in Condition 9; and
   c) The Remedial Action Plan for the site, prepared by WSP Limited dated ~~3 August 2023.~~ 22 November 2024.

   Copies of these documents must be present on-site at all times while the work authorised by this consent is being undertaken.

6. With the exception of the contaminated material to be encapsulated as set out in the Remediation Action Plan prepared by WSP Limited dated 22 November 2024, s~~S~~oil or waste materials removed from the contaminated area must be deposited at a disposal site that holds a consent to accept the relevant level of contamination except in circumstances where:
   a) The soil or waste materials meet the definition of 'cleanfill'; and
   b) Notice is given to the Consent Authority five working days prior its removal from the subject site.

10. a) The activities authorised by this consent must occur in accordance with the Remediation Action Plan (RAP) prepared by WSP Limited dated ~~23 August 2023~~ 22 November 2024, or any updates approved by the Consent Authority under part (c) of this condition; and
    b) No activity on the subject site may commence until all measures identified in the RAP as needing to be put in place prior to commencement of any works have been established; and
    c) The RAP may be amended at any time. Any amendments must be:
       i. For the purpose of improving the efficacy of the contaminated site management procedures, and shall not result in reduced discharge quality;
       ii. Consistent with the conditions of this resource consent; and
       iii. Submitted in writing to the Consent Authority for certification, prior to any amendments being implemented.

19. In the event that the Site Validation Report (SVR) provided to the Consent Authority as required under Condition 18 above confirms that an Ongoing Management Plan (OMP) is required, an OMP shall be prepared by a Suitably Qualified Person and submitted for approval from the Consent Authority.

2~~0~~1. With the exception of the contaminated material to be encapsulated as set out in the Remedial Action Plan prepared by WSP Limited dated 22 November 2024, n~~N~~o contaminated material from the site may be used to form the fill at the site.

In addition to the above, conditions 20 – 23 are also renumbered given the addition of Condition 19.

The Applicant has provided the following documentation with the application:

- Application forms 1, 18 and 22, signed by Nick Geddes on behalf of the Applicant and dated March 2025
- Assessment of Environmental Effects, *NZ Cherry Corp (Leyser) Ltd s.127 Variation: RM23.549.07 Conditions 2, 4, 6, 10 & 20. S.88 Deposit hazardous waste in, on or under land,* prepared by Nick Geddes of Clark Fortune McDonald, dated November 2024.
- Remediation Action Plan and Contaminated Site Management Plan, prepared by WSP and dated 22 November 2024.
- Further information response, *Shannon Farm Development: Additional information to inform remediation of sheep dip soil for proposed embankment soil bund,* dated 22 January 2025
- Further information via email, *RE: Expert audit/review – Contaminated land – NZ Cherry Corp (Leyser) GP Ltd*, from Nick Geddes on 28 February 2025

3.1 Description of the Environment

A description of the site and surrounding environment is provided in the application and the RM23.549 application. These descriptions are adopted for the purposes of this report. Key details are as follows:

- The site has previously been used as horticultural land which includes a central farm area where a packing shed, cold store, sheep pens (and dip), other storage and dwellings are located.
- The site has verified HAIL areas for:
  - A10: Persistent pesticide bulk storage or use.
  - G3: Landfill sites.
- The eastern part of the site is located in the Cromwell Terrace Aquifer, which is an unconfined aquifer with a free water table.
- The depth to groundwater is approximately 35 m below ground level (bgl).
- Groundwater flow direction is generally northwest to southeast towards the Clutha River/Mata-Au.
- There are several irrigation features within the site, including dams and a water race along the eastern boundary.
- An ephemeral watercourse flows through the centre of the site and only flows following periods of heavy rainfall. The Applicant has advised that the nearest watercourse to the proposed containment cell is a designed stormwater channel which is located 65 m from the proposed cell location.
- The Kawarau Arm of the Clutha River/Mata-Au is located approximately 3 kilometres (km) southeast of the site.
- The majority of the site comprises Holocene river deposits, which are typically loose, commonly angular, boulders, gravel, sand and silt forming alluvial fans.
- The site slopes upwards towards the Pisa Range west of the site.
- There are no Regionally Significant Wetlands or natural inland wetlands in proximity to the site.

3.1.1 Site Visit

A site visit was not undertaken for this application as there was considered to be sufficient photographic evidence, plans and aerial mapping information of the site to understand the

nature of the site. The scale and the nature of the activity proposed means that a site visit was not required in this instance.

4. Status of the Application

4.1 Regional Plan: Waste for Otago

Rule 5.6.1 of the Regional Plan: Waste (RPWaste) states:

5.6.1 Hazardous wastes at contaminated sites

1. *The disturbance of land; or*
2. *The discharge of hazardous waste into water; or*
3. *The discharge of hazardous waste onto or into land in circumstances that may result in that hazardous waste (or any other hazardous waste emanating as a result of natural processes from that hazardous waste) entering water; or*
4. *The deposit of any hazardous waste, in, on or under land; or*
5. *The discharge of hazardous waste into air at or from a contaminated site;*

*is a **discretionar**y activity.*

RM23.549 granted consent under Rule 5.6.1(1) for the disturbance of land. Given that the Applicant now proposes to dispose of contaminated soils on site, consent is also required under Rule 5.6.1(4).

4.2 Resource Management Act

This application to vary the consent conditions of an existing permit is pursuant to Section 127 of the Act.

Whether an application is truly one seeking variation, or whether in reality it is seeking consent to a materially different activity, is a question of fact and degree to be determined in the circumstances of the case. In the decision for Body Corporate 970101 v Auckland CC[1] the High Court held that where the variation would result in a fundamentally different activity, or one having materially different adverse effects, or one that seeks to expand or extend the original activity, it should be treated as a new application. This has been upheld in the Court of Appeal following an appeal on this decision[2]. The Council must compare any difference in adverse effects likely to follow from the proposed variation with those associated with the activity in its original form. If the change will result or potentially result in a consequential increase in adverse effects, the application must be treated as if it were for a new consent.

The proposed variation will ensure consistency between the current and proposed consents and will not alter the nature or scale of the consented activity.

Section 127(1) of the Act states that the holder of a resource consent may apply to a consent authority for a change or cancellation of a condition of the consent (other than any condition

[1] *Body Corporate v Auckland City C*ouncil [2000] 6 ELRNZ 183
[2] *Body Corporate 97010 v Auckland City C*ouncil [2000] 3 NZLR 513

as to the duration of the consent). Section 127(3) states that Sections 88 to 121 shall apply, with all necessary modifications, as if:

(a) *the application were an application for a resource consent for a* ***discretionary activity****; and*

(b) *the references to a resource consent and to the activity were references only to the change or cancellation of a condition and the effects of the change or cancellation respectively.*

Therefore, when considering the application, the Council is limited to only considering the effects of the proposed change to the condition, rather than the terms of the existing permit itself. The Council may grant or decline the application and, if granted, may impose conditions under Section 108 of the Act.

Section 127(4) provides that for the purposes of determining who is adversely affected by the change, the Council must consider, in particular, every person who make a submission on the original application and may be affected by the change.

Overall, the application is considered to be a ***discretionary*** activity.

4.1 Permitted Activity Rules

There are no permitted activity pathways for the disturbance of contaminated land or variation of consent conditions.

5. Assessment of Adverse Environmental Effects

An assessment of effects is provided in the application and that is adopted for the purposes of this report. Key details are outlined below as it relates to understanding the scale of effects and to inform the recommendation on notification.

5.1 Effects on Groundwater and Surface Water

As noted in Section 3 above, the depth to groundwater is 35 m bgl, and the nearest surface water body is a stormwater channel approximately 65 m from the proposed containment cell.

The Applicant's RAP states:

"Whilst on-site surface water receptors are present, these are located to the west of the proposed depositional location and at an elevation whereby any leaching of contaminants would be deeper than the levels at which the surface water is present. Inclusion of a geotextile membrane at the base and top of the contaminated soil layer will add an additional layer of protection to ensure that contaminants are unable to leach in significant quantities through underlying soils and therefore have minimal impact upon nearby surface water courses or underlying groundwater, which is located some 35m below ground level. Natural attenuation and dilution would therefore mitigate the migration of any contaminants which do migrate."

Erosion and sediment controls will also be in place to minimise the discharge of sediment from the site and in particular, to minimise the potential for clean stormwater to encounter contaminated soils. This includes diverting 'clean' water away from excavated areas using on-site topography and/or sediment stocks.

The application has been technically audited by Morphum on behalf of Council. Morphum's initial s92 request sought details of the proposed geotextile to ensure leaching of contaminants will be prevented, and confirmation of its suitability for the proposed intended use. In response, the Applicant has confirmed that the geotextile will meet the TNZ F/7 specifications. Morphum has confirmed that this is satisfactory and has raised no further concerns in respect of potential adverse effects on groundwater and surface water quality.

Overall, given the mitigation measures proposed and setbacks from sensitive receptors, adverse effects of the proposal on surface water and groundwater quality are expected to be less than minor.

5.2 Effects on Air Quality

The application details proposed mitigation measures to be implemented to ensure that any possible air pollution associated with the remediation works is minimised or avoided. These measures include:

- Dampening dry and friable soils in windy conditions and keeping soils damp during any transport in trucks;
- Covering stockpiled materials or keeping them damp;
- Limiting vehicle speeds on-site to 5 km/hr;
- Limiting drop heights of soil from excavator bucks into trucks;
- Ceasing works if dust cannot be controlled in excessively windy conditions; and
- Incident reporting if dust release occurs.

Morphum has raised no concerns in respect of air quality, and given the mitigation measures proposed, adverse effects on air quality are considered to be less than minor.

5.3 Effects on Human Health

Potential pathways for human exposure include dermal contact with, ingestion and inhalation of contaminated soil particles (dust), and leaching of contaminants to groundwater. Potential human receptors include contractors and site workers present during the remedial works, and future users and occupiers of the site present after the completion of works, as well as occupiers of adjoining sites.

In addition to mitigation measures noted above, site workers will be supplied with personal protective equipment and a hand washing facility for use prior to eating and drinking.

Given the mitigation measures proposed to reduce dust and exposure to contaminated soil particles, as well as the separation distance from water bodies, adverse effects on human health are considered to be less than minor.

5.4 Effects on Cultural Values

The site is not located within or adjacent to a statutory acknowledgement area, and there are no scheduled values in proximity to the site. Furthermore, given the setbacks from sensitive receptors, and provided the activity is undertaken in accordance with the application and proposed mitigation measures, adverse effects on water quality will be appropriately managed and mitigated. Adverse effects on cultural values are therefore considered to be less than minor.

5.7 Conclusion

Overall, the adverse effects of the proposed activities are considered to be less than minor.

6. Notification and Written Approvals

6.1 Section 95A Public Notification

Step 1: Is public notification mandatory as per questions (a) – (c) below?

(a) Has the applicant requested that the application be publicly notified? **No**

(b) Is public notification required by Section 95C? **No**
Has further information been requested and not provided within the deadline set by Council? **No**
Has the applicant refused to provide further information? **No**
Has the Council notified the applicant that it wants to commission a report but the applicant does not respond before the deadline to Council's request? **No**
Has the applicant refused to agree to the Council commissioning a report? **No**

(c) Has the application been made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977? **No**

Step 2: Is public notification precluded as per questions (a) – (b) below?

(a) Is public notification precluded by a rule in the plan or a NES? **No**

(b) Is the application for one or more of the following activities but no other activities**:**

(i) A controlled activity? **No**

(ii) **[Repealed]**

(iia) A restricted discretionary, discretionary or non-complying activity but only if the activity is a boundary activity? **No**

(iii) **[Repealed]**

Step 3: Does the application meet either of the criteria in (a) or (b) below?

(a) Is the application for a resource consent for one or more activities, and any of those activities is subject to a rule or national environmental standard that requires public notification? **No**

(b) Will the activity have or be likely to have adverse effects on the environment that are more than minor in accordance with Section 95D? **No**

The adverse environmental effects on the environment from the proposal are discussed in elsewhere of this report. Based on this review, I consider that there will not be more than minor adverse effects on the environment (discounting the site and adjacent sites).

Step 4: Do special circumstances exist in relation to the application that warrant the application being publicly notified? No

6.2 Section 95B Limited Notification

Step 1

Section 95B(2) Are there any affected groups or persons identified under Section 95B(2):

(a) Protected customary rights groups? **No**

(b) Customary marine title groups? **No**

Section 95B(3)(a) Is the proposed activity on or adjacent to, or may it affect, land that is the

subject of a statutory acknowledgement made in accordance with an Act specified in Schedule 11? **No**

Section 95B(3)(b) Is a person to whom a statutory acknowledgement is made an affected person under Section 95E? **No**

Step 2
Is Limited Notification precluded under Section 95B(6)?

(a) Is the application for a resource consent for one or more activities, and each activity is subject to a rule or national environmental standard that preclude limited notification? **No**

(b) **(i)** Is the proposal a Controlled Activity that requires consent under the District Plan (other than a subdivision of land)? **No**

(ii) [Repealed]

Step 3
Having regard to Section 95E of the Resource Management Act, identify persons who would be adversely affected by the proposed activity by effects that are minor or more than minor, but not less than minor and give reasons why affected parties were identified.

The following parties were not considered to be affected parties to the application as effects on them will be less than minor or they are not considered to be affected parties:

Party	Why they are not affected
Aukaha on behalf of mana whenua	The site is not located within, or adjacent to, a Statutory Acknowledgement Area, and there are no scheduled watercourses in proximity to the site. Given the setbacks from sensitive receptors and mitigation measures proposed, adverse effects on water quality and cultural values are considered to be less than minor. Adverse effects on Aukaha and TAMI are therefore considered to be less than minor
Te Ao Marama Incorporated (TAMI) on behalf of mana whenua	
The Department of Conservation (DoC)	There are no surface water bodies located in proximity to the containment cell; the nearest watercourse is a designed stormwater channel approximately 65 m from the cell. Furthermore, proposed mitigation measures and setbacks will ensure adverse effects on waterbodies and any ecological values are appropriately managed and mitigated. Adverse effects on DoC are therefore considered to be less than minor.
Public Health South	Given the setbacks from sensitive receptors and mitigation measures proposed, adverse effects on human health are considered to be appropriately managed

	and mitigated so to be less than minor. Adverse effects on Public Heath South are therefore considered to be less than minor.
Owners/occupiers of adjacent sites	Given the mitigation measures proposed and setbacks from sensitive receptors, including from site boundaries, adverse effects on the owners/occupiers of adjacent sites are considered to be less than minor.
Groundwater users	As discussed in Section 5.1, adverse effects on groundwater are not anticipated given the mitigation measures proposed and the depth to groundwater (35 m bgl). Furthermore, the encapsulation cell will be located over 500 m from the nearest bore, therefore adverse effects on other groundwater users are considered to be less than minor.

Have all persons identified as affected under Step 3 provided their written approvals? Not applicable

Step 4 Further notification in special circumstances

Do special circumstances exist in relation to the application that warrant notification of the application to any other persons not already determined to be eligible for limited notification under this section (excluding persons assessed under Section 95E as not being affected persons)? **No**

If Notification or limited notification is required then has the applicant paid the additional notification fee? Not applicable

7. NOTIFICATION RECOMMENDATION:

In accordance with the notification steps set out above, it is recommended that the application proceed on a non-notified basis.



Danielle Ter Huurne
Senior Consents Planner
28 February 2025

Otago Regional Council

DECISION ON NOTIFICATION

Sections 95A to 95G of the Resource Management Act 1991

Date: **##**

Application No: **RM24.702**

Subject: ***Decision on notification of resource consent application under delegated authority***

Decision under Delegated Authority

The Otago Regional Council decides that this resource consent application is to be processed on a **non-notified** basis in accordance with sections 95A to 95G of the Resource Management Act 1991.

The above decision adopts the recommendations and reasons outlined in the Notification Recommendation Report above in relation to this application. I have considered the information provided, reasons and recommendations in the above report. I agree with those reasons and adopt them.

This decision is made under delegated authority by:



Mat Bell
Team Leader Consents
13th March 2025

Otago Regional Council

ORC SECTION 42A REPORT

1. Summary of Recommendation

I recommend that this application be approved, subject to the conditions discussed at the end of this report.

Please note that this report contains the recommendations of the Senior Consents Planner and represents the opinion of the writer. It is not a decision on the application.

There are no principal issues in contention with the Applicant and no evidence was heard as it relates to the application as it is being processed non-notified without a hearing.

2. Section 104 Evaluation

Section 104 of the Act sets out the matters to be considered when assessing an application for a resource consent. These matters are subject to Part 2, the purpose and principles, which are set out in Sections 5 to 8 of the Act.

As this application is for a discretionary activity, the Council may grant or refuse the application. If granting consent, the Council may impose conditions under section 108 of the Act.

2.1 Section 104(1)

The remaining matters of Section 104 to be considered when assessing an application for a resource consent are:
(a) the actual and potential effects on the environment of allowing the activity;
(ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity
(b) any relevant provisions of a national environmental standard, other regulations, a national policy statement, the Regional Policy Statement (RPS), RPW; and
(c) any other matter the Council considers relevant and reasonably necessary to determine the application.

2.2 S104(1)(a) – Actual and potential effects on the environment of allowing the activity

The actual and potential adverse environmental effects of the proposed activity were considered earlier in this report.

In addition to these adverse effects, it is considered that the proposal will have the following positive effects:

- Proposed works and encapsulation of contaminated soils will allow for redevelopment of the site, whilst ensuring that adverse effects are appropriately managed and mitigated.

2.3 S104(1)(ab)

The applicant has not proposed or agreed to any measures to offset or compensate for adverse effects that will or may result from allowing the activity. This is because the effects are less than minor.

2.4 S104(1)(b) Relevant Planning Documents

2.4.1 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 came into effect on 1 January 2012. The NES provides a nationally consistent set of planning controls and soil contaminant values, and ensures that contaminated land is appropriately identified and assessed before it is developed and, if necessary, is remediated or managed to make the land safe for human use.

The Applicant has applied for resource consent from the Central Otago District Council under the NES. This report does not assess the proposed activity against the requirements of the NES and it is the responsibility of the Applicant to apply for any additional consents as necessary.

2.4.2 National Policy Statement for Sources of Drinking Water

Regulations 7 and 8 of the National Environmental Standard for Sources of Human Drinking Water (NES) need to be considered when assessing discharge permits that have the potential to affect registered drinking water supplies that provide 501 or more people with drinking water for 60 or more calendar days each year.

Regulations 11 and 12 of the NES requires Councils to place an emergency notification condition on relevant consent holders if it is assessed that the activity could pose a risk to the drinking water supply in the case of an unintended event (e.g., a spill or other accident). If the Council considers that such a risk exists, a condition must be placed on the consents that requires the consent holder to notify the drinking water supplier if such an event occurs. Regulation 11 states that Regulation 12 applies to activities with the potential to affect registered drinking water supplies that supply 25 or more people with drinking water for 60 or more days of a calendar year.

There are no NES drinking water supplies in close proximity to the site therefore there will be no adverse effects resulting from the proposal.

2.4.3 National Policy Statement for Freshwater Management

The NPS-FM 2020 was introduced in September 2020 and amended in December 2022, replacing previous iterations from 2011, 2014 and 2017. The NPS-FM sets out a single objective, that natural and physical resources are managed in a way that prioritises:

a. first, the health and well-being of water bodies and freshwater ecosystems;
b. second, the health needs of people (such as drinking water); and
c. third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

Section 104 of the RMA has been amended to include section 104(2F) which provides that when considering an application and any submissions received, a consent authority must not have regard to clause 1.3(5) or 2.1 of the NPSFM 2020 (which relates to the hierarchy of obligations in the NPSFM 2020). Subsection (2F) applies despite subsection (1)(b)(iii) and any other provision of the RMA.

As a result, clause 1.3(5) and clause 2.1 (the objective) of the NPSFM 2020 has not been assessed.

The relevant policies of the NPS-FM 2020 are considered below:

Policy 1: *Freshwater is managed in a way that gives effect to Te Mana o te Wai.*

Policy 2: *Tangata whenua are actively involved in freshwater management (including decision-making processes), and Māori freshwater values are identified and provided for.*

Policy 3: *Freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments.*

Policy 7: *The loss of river extent and values is avoided to the extent practicable.*

Policy 15: *Communities are enabled to provide for their social, economic, and cultural well-being in a way that is consistent with this National Policy Statement.*

For reasons outlined in Section 5.1 of the notification report, adverse effects on surface water and groundwater are expected to be acceptable. Overall, given the setbacks from sensitive receptors and mitigation measures proposed, the application is considered to be consistent with the NPS-FM.

2.4.4 Operative Otago Regional Policy Statement 2019 and Proposed Otago Regional Policy Statement 2021 (Decisions version)

The RPS's provide an overview of the resource management issues for the Otago Region and the ways of achieving integrated management of its natural and physical resources. There are currently two regional policy statements in play in the Otago Region:

- Otago Regional Policy Statement 2019 (ORPS 2019) fully operative; and
- Proposed Otago Regional Policy Statement (P-ORPS 2021), which was first notified on the 26th of June 2021 and on 30 September 2022 for the freshwater instrument components. On 30 March 2024 the P-ORPS 2021 was fully notified.

Section 104(2F) of the RMA only directs that consent authorities must not have regard to clause 1.3(5) or 2.1 of the NPSFM 2020 (which relates to the hierarchy of obligations in the NPSFM 2020). However, it does not otherwise direct that consent authorities must not have regard to provisions of other planning documents, such as regional policy statements, that similarly relate to the hierarchy of obligations. For completeness, IM-P2 has been given regard to for the purposes of this proposal, but in any case, consideration of this policy, or not, does not have any substantial impact on the recommendation in respect of the proposal.

2.4.2.1 Operative Regional Policy Statement

Objective 1.18 Otago's resources are used sustainably to promote economic, social, and cultural wellbeing for its people and communities

Policy 1.1.21 Social and cultural wellbeing and health and safety

Objective 4.6 Hazardous substances, contaminated land and waste materials do not harm human health or the quality of the environment in Otago.

Policy 4.6.4 Identify sites of known or potentially contaminated land in Otago.

Policy 4.6.5 Ensure contaminated or potentially contaminated land does not pose an unacceptable risk to people and the environment.

The proposal will provide for the wellbeing of the Applicant and provide for future development of the site. Regard has been given to cultural wellbeing and cultural values and the proposal is not expected to adversely affect cultural wellbeing. As discussed in Section 5 above, adverse effects on human health and the environment will be less than minor. Overall, the proposal is considered to be consistent with the relevant provisions of the O-RPS.

2.4.2.2 Proposed Otago Regional Policy Statement 2021

LF–WAI–O1 – Te Mana o te Wai
Otago's water bodies and their health and well-being are protected, and restored where they are degraded, so that the mauri of those water bodies is protected, and the management of land and water recognises and reflects that:
(1) water is the foundation and source of all life – na te wai ko te hauora o ngā mea katoa,
(2) there is an integral kinship relationship between water and Kāi Tahu whānui, and this relationship endures through time, connecting past, present and future,
(3) each water body has a unique whakapapa and characteristics,
(4) fresh water, land, and coastal water have a connectedness that supports and perpetuates life,
(4A) protecting the health and well-being of water protects the wider environment,
(5) Kāi Tahu exercise rakatirataka, manaakitaka and their kaitiakitaka duty of care and attention over wai and all the life it supports, and
(6) all people and communities have a responsibility to exercise stewardship, care, and respect in the management of fresh water.

LF–WAI–P2 – Mana whakahaere
Recognise and give practical effect to Kāi Tahu rakatirataka in respect of fresh water by:
(1) facilitating partnership with, and the active involvement of, mana whenua in freshwater management and decisionmaking processes,
(2) sustaining the environmental, social, cultural and economic relationships of Kāi Tahu with water bodies,
(3) providing for a range of customary uses, including mahika kai, specific to each water body, and
(4) incorporating mātauraka into decision making, management and monitoring processes, and
(5) managing wai and its connections with whenua in a holistic and interconnected way – ki uta ki tai.

LF-WAI-P3 Integrated management/ki uta ki tai
Manage the use of fresh water and land, using an integrated approach that is consistent with tikaka and kawa, that:
(1) sustains and, to the greatest extent practicable, restores or improves:
(a) the natural connections and interactions between water bodies (large and small, surface and ground, fresh and coastal, permanently flowing, intermittent and ephemeral),
(b) the natural connections and interactions between land and water, from the mountains to the sea,

(c) the habitats of mahika kai and indigenous species, including taoka species associated with the water body,
(4) manages the effects of the use and development of land to maintain or enhance the health and well-being of freshwater, coastal water and associated ecosystems,
(5) encourages the coordination and sequencing of regional or urban growth to ensure it is sustainable,
(6) has regard to foreseeable climate change risks, and the potential effects of climate change on water bodies, including on their natural functioning,
(7) has regard to cumulative effects, and
(8) applies a precautionary approach where there is limited available information or uncertainty about potential adverse effects, in accordance with IMP6.

LF–WAI–P4 – Giving effect to Te Mana o te Wai
All persons exercising functions and powers under this RPS and all persons who use, develop or protect resources to which this RPS applies must recognise that LF-WAI-O1, LFWAI-P1, LF-WAI-P2 and LF-WAI-P3 are fundamental to upholding Te Mana o te Wai, and must be given effect to when making decisions affecting fresh water, including when interpreting and applying the provisions of the LF chapter.

LF-FW-O1A – Visions set for each FMU and rohe In each FMU and rohe in Otago and within the timeframes specified in the freshwater visions in LF-VMO2 to LF-VM-O6:
(1) healthy freshwater and estuarine ecosystems support healthy populations of indigenous species (including nondiadromous galaxiids and Canterbury mudfish) and mahika kai that are safe for consumption,
(2) the interconnection of land, freshwater (including springs, groundwater, ephemeral water bodies, wetlands, rivers, and lakes) and coastal water is recognised,
(3) fish passage within and between catchments is provided for except where it is desirable to prevent the passage of some fish species in order to protect desired fish species, their life stages, or their habitats,
(4) the form, function and character of water bodies reflects their natural characteristics and natural behaviours to the extent reasonably practicable,
(5) the ongoing relationship of Kāi Tahu with wāhi tūpuna, including access to and use of water bodies, is sustained,
(6) the health of the water supports the health of people and their connections with water bodies,
(7) sustainable land and water management practices:
(a) support food and fibre production and the continued social, economic, and cultural wellbeing of Otago's people and communities, and
(b) improve the resilience of communities to the effects of climate change, and
(c) ensure communities are appropriately serviced by community water supplies, and other three waters infrastructure,
(8) direct discharges of wastewater to water bodies are phased out to the extent reasonably practicable, and
(9) freshwater is managed as part of New Zealand's integrated response to climate change and renewable electricity generation activities are provided for.

LF-VM-O2 Clutha Mata-Au FMU vision
In the Clutha Mata-au FMU, and in addition to the matters in LF-FW-O1A:
(1) management of the FMU recognises that:
(a) the Clutha Mata-au is a single connected system ki uta ki tai, and

(b) the source of the wai is pure, coming directly from Tāwhirimātea to the top of the mauka and into the awa,
(1A) sustainable abstraction occurs from lakes, river main stems or groundwater in preference to tributaries, to the extent reasonably practicable,
(6) the national significance of the ongoing operation, maintenance and upgrading of the Clutha hydro-electricity generation scheme, including its generation capacity, storage and operational flexibility and its contribution to climate change mitigation, is recognised and protected, and potential further development is provided for within this modified catchment,
(6A) water bodies support a range of outdoor recreation opportunities,
(7) in the Upper Lakes rohe, the high quality waters of the lakes and their tributaries are protected, and if degraded are improved recognising the significance of the purity of these waters to Kāi Tahu and to the wider community,
(7A) in the Lower Clutha rohe, opportunities to restore the natural form and function of water bodies are promoted wherever practicable, and
(8) the outcomes sought are to be achieved within the following timeframes:
(b) by 2030 in the Upper Lakes rohe,
(c) by 2045 in the Dunstan and Roxburgh rohe, and (d) by 2050 in the Manuherekia and Lower Clutha rohe.

LF-FW-P7 Fresh water
Environmental outcomes, attribute states (including target attribute states), environmental flows and levels, and limits ensure that:
(1) the health and well-being of water bodies and freshwater ecosystems is maintained or, if degraded, improved,
(2) the habitats of indigenous species with life stages dependent on water bodies are protected and sustained,
(2A) the habitats of trout and salmon are protected insofar as this is consistent with (2),
(2B) fish passage is provided for, except where it is desirable to prevent the passage of some fish species in order to protect desired fish species, their life stages, or their habitats,
(3) specified rivers and lakes are suitable for primary contact within the following timeframes:
(a) by 2030, 90% of rivers and 98% of lakes, and
(b) by 2040, 95% of rivers and 100% of lakes, and (4) resources harvested from water bodies including mahika kai and drinking water are safe for human consumption.

LF–LS–O11 – Land and soil
The availability and productive capacity of highly productive land for primary production is protected now and for future generations.

LF–LS–O12 – Use, development and protection
The use, development, and protection of land and soil:
(1) safeguards the life-supporting capacity of soil,
(2) contributes to achieving environmental outcomes for fresh water, and
(3) recognises the role of these resources in providing for the social, economic, and cultural well-being of Otago's people and communities.

LF–LS–P16 – Maintaining soil quality
Maintain soil quality by managing both land and freshwater resources, including the interconnections between soil health, vegetative cover and water quality and quantity.

LF–LS–P17 – Soil values
Maintain the health and productive potential of soils, to the extent reasonably practicable by managing the use and development of land in a way that is suited to the soil characteristics and that sustains mauri through healthy:
(1) soil biological activity and biodiversity,
(2) soil structure, and
(3) soil fertility

LF–LS–P18 – Soil erosion
Minimise soil erosion, and the associated risk of sedimentation in water bodies, resulting from land use activities by:
(1) implementing effective management practices to retain topsoil in-situ and minimise the potential for soil to be discharged to water bodies, including by controlling the timing, duration, scale and location of soil exposure,
(2) maintaining vegetative cover on erosion-prone land, and
(3) promoting activities that enhance soil retention.

LF–LS–P21 – Land use and fresh water
The health and well-being of water bodies and freshwater ecosystems is maintained to meet environmental outcomes set for Freshwater Management Units and/or rohe by:
(1) reducing or otherwise maintaining the adverse effects of direct and indirect discharges of contaminants to water from the use and development of land,
(2) managing land uses that may have adverse effects on the flow of water in surface water bodies or the recharge of groundwater,
(3) recognising the drylands nature of some of Otago and the resulting low water availability, and
(4) maintaining or, where degraded, enhancing the habitat and biodiversity values of riparian margins.

HAZ–CL–P14 – Managing contaminated land
Manage contaminated or potentially contaminated land so that it does not pose an unacceptable risk to people and the environment, by:
(1) assessing and, if required, monitoring contaminant levels and environmental risks,
(2) protecting human health in accordance with regulatory requirements,
(3) avoiding, as the first priority, and only where avoidance is not reasonably practicable, mitigating or remediating, adverse effects of the contaminants on the environment,
(4) requiring closed landfills to be managed in accordance with a closure plan that sets out monitoring requirements and, where necessary, any remedial actions required to address ongoing risks, and
(5) prioritising the identification and management of closed landfills and contaminated land at risk from the effects of climate change.

HAZ–CL–P15 – New contaminated land Avoid the creation of new contaminated land or, where this is not practicable, minimise to the extent reasonably practicable adverse effects on the environment and Kāi Tahu values.

The deposition of contaminated land in the containment cell will be appropriately managed to ensure that the works do not pose an unacceptable risk to people or the environment. Overall, adverse effects on water quality, soil quality, and cultural values are considered to be adequately mitigated, and the proposal is considered to be consistent with the above provisions.

2.4.5 Regional Plan: Waste

The following objective and policies are relevant to this application to disturb a potentially contaminated site:

Objective 5.3.1 Requires that any adverse effects of contaminated sites are avoided, remedied or mitigated.

Policy 5.4.2 Requires that contaminated sites in Otago are located and investigated.

Policy 5.4.3 To contain contaminated sites and rehabilitate them to the extent that it is practicable having regard to the use to which the land is to be put.

Policy 5.4.5 Requires that a register is prepared and maintained outlining details of sites that are contaminated.

The deposition of contaminated land on-site will be undertaken in a way that is consistent with current Ministry for the Environment guidelines and avoids and remedies adverse effects on human health and the environment. There will be no impacts on sites or resources of cultural significance to Kai Tahu. The activity is therefore consistent with the RPWaste.

2.4.6 Section 104(1)(c) Any other matters

The Kai Tahu ki Otago Natural Resource Management Plan 2005 (NRMP) is considered to be a relevant other matter for the consideration of this application. This is because the RPW is yet to be amended to take into account this Plan and this Plan expresses the attitudes and values of the four Papatipu Rūnaka: Te Rūnanga o Moeraki, Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou and Hokonui Rūnanga. The following objectives and policies are of most relevance to this application:

- To protect and restore the mauri of all water.
- To require all earthworks, excavation, filling or the disposal of excavated material to mitigate all adverse effects.

Effects on groundwater and surface water are considered to be less than minor and adverse effects will be mitigated. The application and proposed consent conditions are considered to meet the policies of the NRMP.

The Ngāi Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan 2008 - The Cry of the People, Te Tangi a Tauira is considered to be a relevant other matter for the consideration of this application. This is because the RPW is yet to be amended to take into account this Plan and this Plan expresses the attitudes and values of the four Rūnanga Papatipu o Murihiku – Awarua, Hokonui, Ōraka/Aparima and Waihōpai.

- Require that sufficient and appropriate information is provided with applications to allow tangata whenua to assess cultural effects (e.g. nature of the discharge, treatment provisions, assessment of alternatives, actual and potential effects).

Provided the works are undertaken in accordance with the application and consent conditions, the proposal will be in general accordance with this iwi management plan.

There are no other matters of concern that the Council considers relevant to this application.

3. Part 2 of the Act

The deposition of contaminated site in an encapsulation cell on-site is consistent with the purpose and principles of the Act as outlined in Sections 5-8. The proposed activities are consistent with sustaining the potential of natural resources to meet the needs of future generations, the safeguarding of the life-supporting capacity of water and avoiding, remedying and mitigating adverse effects on the environment. The site remediation will support the social and economic wellbeing, and health and safety of the community through enabling subsequent development of the site. The principles of the Treaty of Waitangi have been taken into account and the application has been processed according to Council's protocol for consultation with Iwi.

Overall, the application is consistent with Part 2 of the Act, given the minor nature of the activity and the proposed conditions of consent.

4. Section 108 and 108AA of the Act

The attached conditions are recommended in accordance with Sections 108 and 108AA of the Act.

These conditions have been recommended because:

- They will ensure works are undertaken in accordance with the plans and all information submitted with the application.
- They will encourage information sharing with Council.
- They will reduce any potential adverse effects of the activity on human health and the environment.
- They will allow Council to monitor the Consent Holder's compliance with recommended consent conditions.
- They will require sharing of the necessary management plans for review and acceptance by Council prior to commencement of works.
- They will require that specifications of the geotextile membrane are provided to the Consent Authority once installed.
- They will require the preparation of an Ongoing Management Plan should the SVR confirm that one is required.

5. Recommendation

That the Council grants to NZ Cherry Corp (Leyser) GP Ltd, Land Use Consent RM24.702.01, subject to the terms and conditions set out in the attached consent, and grants a variation to RM23.549.07 as shown in the attached consent.

5.1 Reasons for the Recommendation

(a) The effects of the activity are expected to be less than minor.
(b) The activity is consistent with the relevant statutory requirements.
(c) The activity is consistent with Part 2 of the Act.

5.2 Term of Consent

Case law has distilled the following factors that will be relevant to the Council's determination of the duration of a resource consent:

- The duration of a resource consent should be decided in a manner which meets the RMA's purpose of sustainable management;
- Whether adverse effects would be likely to increase or vary during the term of the consent;

- Whether there is an expectation that new information regarding mitigation would become available during the term of the consent;
- Whether the impact of the duration could hinder implementation of an integrated management plan (including a new plan);
- That conditions may be imposed requiring adoption of the best practicable option, requiring supply of information relating to the exercise of the consent, and requiring observance of minimum standards of quality in the receiving environment;
- Whether review conditions are able to control adverse effects;
- Whether the relevant plan addresses the question of the duration of a consent;
- The life expectancy of the asset for which consents are sought;
- Whether there was significant capital investment in the activity/asset; and
- Whether a particular period of duration would better achieve administrative efficiency.

A consent term expiring 1 March 2029 is recommended as this aligns with the expiry date of Land Use Consent RM24.549.07



Danielle Ter Huurne
Senior Consents Planner
28 February 2025

Otago Regional Council

DECISION ON RESOURCE CONSENT APPLICATION

Sections 113 of the Resource Management Act 1991

Date: **13 March 2025**

Application No: **RM24.702**

Subject: ***Decision on non-notified resource consent application under delegated authority***

1. Notification

The application was approved to be processed non-notified and under delegated authority on 13 March 2025.

2. Decision and Reasons for Decision

I have considered the information provided, reasons and recommendation in the above report.

No principal issues were in contention and no evidence was heard as this was a non-notified consent that did not require a hearing. There are no main findings as it relates to any principal issues in contention.

I agree with the reasons and recommendations provided by Danielle Ter Huurne, Senior Consents Planner in the above report and adopt them as the reasons for decision under Section 113(1) to (3). This decision, report and any accompanying letter are the written decision under Section 113(4).

3. Conditions (section 108)

Pursuant to sections 108 and 108AA of the RMA, this consent is issued subject to the appended conditions.

4. Decision under delegated authority

Under delegated authority, this resource consent application is granted by the Otago Regional Council by:



Mat Bell
Team Leader Consents
13th March 2025

C DISPOSAL DOCKETS

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109097
12 Nov 2024 2:24 pm

Reg LLA271 Southroads Ltd
Tag Id 628359
Special Waste

Billing Customer : Our Company
Permit Num : 418
Special Waste Type : Contaminated Soil
Truck Type : OPEN
Origin : Cromwell

Gross	52,720 Kg
Tare	17,620 Kg
Net	35,100 Kg

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109024
6 Nov 2024 3:45 pm

Reg LLA271 Southroads Ltd
Tag Id 628359
Special Waste

Billing Customer : Our Company
Permit Num : 418
Special Waste Type : Contaminated Soil
Truck Type : OPEN
Origin : Cromwell

Gross	51,840 Kg
Tare	17,600 Kg
Net	34,240 Kg

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109099
12 Nov 2024 4:23 pm

Reg LLA271 Southroads Ltd
Tag Id 628359
Special Waste

Billing Customer : Our Company
Permit Num : 418
Special Waste Type : Contaminated Soil
Truck Type : OPEN
Origin : Cromwell

Gross	51,020 Kg
Tare	17,520 Kg
Net	33,500 Kg

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109083
12 Nov 2024 7:45 am

Reg LLA271 Southroads Ltd
Tag Id 628359
Special Waste

Billing Customer : Our Company
Permit Num : 418
Special Waste Type : Contaminated Soil
Truck Type : OPEN
Origin : Cromwell

Gross	49,760 Kg
Tare	17,800 Kg
Net	31,960 Kg

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109035
7 Nov 2024 9:51 am

Reg LLA271 Southroads Ltd
Tag Id 628359
Special Waste

Billing Customer : Our Company
Permit Num : 418
Special Waste Type : Contaminated Soil
Truck Type : OPEN
Origin : Cromwell

Gross	52,400 Kg
Tare	17,780 Kg
Net	34,620 Kg

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109040
7 Nov 2024 12:48 pm

Reg LLA271 Southroads Ltd
Tag Id 628359
Special Waste

Billing Customer : Our Company
Permit Num : 418
Special Waste Type : Contaminated Soil
Truck Type : OPEN
Origin : Cromwell

Gross	49,600 Kg
Tare	17,680 Kg
Net	31,920 Kg

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109229
22 Nov 2024 10:12 am

Reg LLA271 Southroads Ltd
Tag Id 628359
Special Waste

Billing Customer : Our Company
Permit Num : 418
Special Waste Type : Contaminated Soil
Truck Type : OPEN
Origin : Cromwell

Gross	29,860 Kg
Tare	17,720 Kg
Net	12,140 Kg

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109093
12 Nov 2024 12:01 pm

Reg LLA271 Southroads Ltd
Tag Id 628359
Special Waste

Billing Customer : Our Company
Permit Num : 418
Special Waste Type : Contaminated Soil
Truck Type : OPEN
Origin : Cromwell

Gross	50,980 Kg
Tare	17,780 Kg
Net	33,200 Kg

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109014
6 Nov 2024 12:36 pm

Reg LLA271 Southroads Ltd
Tag Id 628359
Class B Soil

Billing Customer : Our Company
Job/Order Ref : SOU30226569
Truck Type : OPEN
Origin : Cromwell

Gross	51,480 Kg
Tare	17,620 Kg
Net	33,860 Kg

Scope Resources Ltd
Victoria Flats Landfill

WEIGHING DOCKET 109087
12 Nov 2024 9:50 am

Reg LLA271 Southroads Ltd
Tag Id 628359
Special Waste

Billing Customer : Our Company
Permit Num : 418
Special Waste Type : Contaminated Soil
Truck Type : OPEN
Origin : Cromwell

Gross	51,280 Kg
Tare	17,780 Kg
Net	33,500 Kg

D PHOTOLOG

	PHOTOGRAPHIC LOG

Client Name	**Site Location**	**Project No.**
New Zealand Cherry Corps (Leyser) Ltd	Shannon farm, Cromwell	6-XZ750.00

Photo No.	**Date**
1.	23/08/2024

Description

Buried Fuel Tank Removal.
Excavation location following removal



Photo No.	**Date**
2.	23/08/2024

Description

Buried Fuel Tank Removal.
Side wall and stockpile of removed soil showing minimal evidence of hydrocarbons present.



	PHOTOGRAPHIC LOG	
Client Name New Zealand Cherry Corps (Leyser) Ltd	**Site Location** Shannon farm, Cromwell	**Project No.** 6-XZ750.00

Photo No.	Date
3.	23/08/2024

Description

Buried Fuel Tank Removal - Fuel tank condition



Photo No.	Date
4.	23/08/2024

Description

Buried Fuel Tank Removal - Disconnected pipework



	PHOTOGRAPHIC LOG	
Client Name New Zealand Cherry Corps (Leyser) Ltd	**Site Location** Shannon farm, Cromwell	**Project No.** 6-XZ750.00

Photo No	**Date**
5.	04/09/2024

Description

Offal Pit Excavations



Photo No.	**Date**
6.	03/10/2024

Description

Offal Pit Laydown Area – Stockpile 1 (plastic bailage netting and wire on a plastic liner)



	PHOTOGRAPHIC LOG	
Client Name New Zealand Cherry Corps (Leyser) Ltd	**Site Location** Shannon farm, Cromwell	**Project No.** 6-XZ750.00

Photo No.	**Date**
7.	03/10/2024

Description

Offal Pit Laydown Area – Stockpile 2 (Offal waste covered in plastic wrap and lined at base)



Photo No.	**Date**
8.	03/10/2024

Description

Offal Pit Laydown Area – Stockpile 3 – mixed soil, some offal waste and plastics/metal covered in soil



	PHOTOGRAPHIC LOG	
Client Name New Zealand Cherry Corps (Leyser) Ltd	**Site Location** Shannon farm, Cromwell	**Project No.** 6-XZ750.00

Photo No.	Date
9.	14/11/2024

Description

Offal Pit bunded stockpile site.
Initial validation visit found remnants of bones at ground level and an additional stockpile which required removal.
Contractor instructed to complete additional ground level scrape to remove bones



Photo No.	Date
10.	25/11/2025

Description

Offal Pit stockpile area –
Final validation visit following removal of all stockpiles and site scrape.



	PHOTOGRAPHIC LOG	
Client Name New Zealand Cherry Corps (Leyser) Ltd	**Site Location** Shannon farm, Cromwell	**Project No.** 6-XZ750.00

Photo No.	Date
11.	23/08/2024

Description

Sheep Dip Area Remediation – Initial site strip following XRF screening and stockpile creation (pre plastic wrap)



Photo No.	Date
12.	15/05/2025

Description

Berm encapsulation cell preparation works



	PHOTOGRAPHIC LOG

Client Name	**Site Location**	**Project No.**
New Zealand Cherry Corps (Leyser) Ltd	Shannon farm, Cromwell	6-XZ750.00

Photo No.	**Date**
13.	19/05/2025

Description

Sheep dip soil placement in berm encapsulation cell. Wrapping layer visible.



Photo No.	**Date**
14.	19/05/2025

Description

Sheep dip stockpile location following removal to berm.



	PHOTOGRAPHIC LOG

Client Name	**Site Location**	**Project No.**
New Zealand Cherry Corps (Leyser) Ltd	Shannon farm, Cromwell	6-XZ750.00

Photo No.	**Date**
15.	19/05/2025

Description

Sheep dip remediation validation sampling



Photo No.	**Date**
16.	21/12/2024

Description

Landfill pits post removal of waste (fenced for security awaiting validation and infilling)



E FUEL TANK VALIDATION LETTER

29 October 2024

Mark Tammet
New Zealand Cherry Corps (Leyser) LP
Via e-mail:mark@procon.net.nz

Shannon Farm Cromwell Tank Removal Validation

WSP Report Reference: 6-XZ750.00_CLM_LTR_109 Rev A

Dear Mark,

WSP New Zealand Limited (WSP) was engaged by New Zealand Cherry Corps (Leyser) LP to undertake a soil validation assessment at Shannon Farm Cromwell, located at 112 Ripponvale Road, Cromwell 9384 ('the site'), following the removal of an underground fuel storage tank (UST). The site location is presented on Figure 1 included in the Figures attachment. The assessment and this letter are subject to the limitations outlined in Attachment A.

Project Background

The Shannon Farm development is located on a historic orchard with associated packing sheds and farm buildings. A previous Detailed Site Investigation of the site revealed the presence of a disused underground fuel storage tank which required removal as part of the site preparation works.

Site Attendance

A WSP SQEP attended site on 23 August 2024. Prior to soil sampling, the diesel tank was removed by South Roads, the contractor undertaking site development works, with the additional soil that had been excavated to facilitate the removal stockpiled to the northeast as shown on Figure 1.

The depth of the excavated pit was approximately 2.3 metres (m) below ground level (bgl) and the stockpile volume was approximately 60 m^3. A thorough inspection was completed by the SQEP of the work area from where the tank was removed. A visual representation of the excavation area and stockpile can be found in the photolog provided in Attachment B.

The validation soil sampling consisted of collecting soils samples from four locations of the pit – three from the walls and one from base of the excavation, as shown on Figure 2. These consisted of the following:

- Sample location TP01 collected from a depth of approximately 1.5 m bgl from the south wall of the excavation.
- Sample location TP02 collected from a depth of approximately 1.2 m bgl from the east wall of the excavation.

- Sample location TP03 collected from a depth of 1.5m bgl from the north wall of the excavation.
- Sample location TP04 collected from the base of the excavation (approximately 2.3m bgl).

To assist with the assessment of the stockpiled material for reuse, one soil sample (Tank 5) was also collected from the stockpile.

At each sampling location, soil was placed directly into labelled laboratory supplied sample containers using a dedicated pair of nitrile gloves. A photograph was taken with the soil description logged at each location.

Following sample collection, all samples were stored in chilled coolers and transported to Eurofins Environment Testing New Zealand Limited (Eurofins) under standard WSP chain of custody procedures for the following analysis:

- Total petroleum hydrocarbons (TPH)
- Benzene, toluene, ethylbenzene and xylene (BTEX)
- Heavy Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc)

Table 1.1, provides a summary of the laboratory analytical schedule for the assessment. Note PAH was not completed as part of the assessment due to the lack of visual evidence of hydrocarbons within the soils.

Table 1.1 Laboratory Analytical Schedule

ANALYTE	PRIMARY SAMPLES
TPH and BTEX	5
Heavy metals	5

Assessment of Findings

The laboratory results of the soil samples have been assessed for potential impacts on human health as well as assessing the stockpile samples for disposal purposes. Analytical results are summarised in Table 1 attached and laboratory analytical reports and chain of custody documentation are provided in Attachment C.

Soils encountered during the validation assessment comprised medium dense light brown-grey silty Sand and Gravel. No visual or olfactory evidence of fuel oils was noted in any of the soils within the excavation or stockpile. The tank was removed intact with inspection noting that it was in a reasonably good condition following removal with no notable holes or leakages. Pipework from the tank was minimal and appeared to have been removed a number of years ago prior to decommissioning.

Human Health Assessment

The laboratory results have been assessed against conservative soil contaminant standards for the protection of human health in a residential setting, although the location of the tank is along a proposed roadway. The standards assessed against are the most conservative:

- SCS(health) - Rural residential / lifestyle block 25% produce[1,1]
- MfE, 1999 Guidelines residential and agricultural use (Sand at 1 – 4 m bgl)[2]

Analytical results from samples collected and analysed during this investigation indicated:

- Concentrations of all contaminants of concern were reported below the adopted human health criteria and therefore are considered to represent a low risk to human health.

Disposal Criteria for the Stockpile

Analytical results from the sample collected and analysed during this investigation indicated the following with respect to the reuse of the excess soil generated during the removal of the underground diesel tank:

- The stockpile sample is below the human health criteria and can be disposed of as cleanfill pending approval from the receiving facility.
- All soils are suitable for reuse on-site.

Environmental and Site Services Assessment

Analytical results indicate that heavy metals are within the predicted background concentrations for the site (arsenic within the Central Otago region can be locally elevated due to geogenic considerations) with no organic contaminants of concern present above their laboratory limit of detection.

Soils are therefore considered to pose a very low risk to environmental receptors, including those associated with controlled waters on site.

The absence of organic contaminants indicates that there is no risk of tainting to waters within buried services and no risk of degradation of plastic pipes which may be used for services on site from organic contaminants.

[1] National Environmental Protection Council (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)
[2] Ministry for the environment (2011). Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011)

Conclusions

This soil assessment comprised a targeted sampling investigation at the site following the removal of the underground diesel tank. A SQEP was on-site to make observations and collect soil samples from the base and three walls of the excavation pit as well as a soil sample from the stockpile. After laboratory analysis of the samples the following conclusions are made:

- The concentrations of contaminants of concern in remaining soils do not pose a risk to site users or environmental receptors.
- The excavated material in the stockpile can be reused on site including being used to backfill the excavation subject to meeting geotechnical requirements.
- The soils pose no risk to new site services such as PE pipework or of tainting waters within these pipes.
- If the stockpiled material is removed from site, it can be disposed as cleanfill pending approval from the receiving landfill.

Should you have any queries regarding the findings of this tank pull validation assessment please contact the undersigned.

Written by:	Tessa Collins	Graduate Environmental Scientist	14 October 2024
Reviewed by:	Lisa Bond CEnvP SC	Principal Contaminated Land Specialist	14 October 2024

Regards



Lisa Bond
lisa.bond@wsp.com

Attachments:

- Figures - Figure 1: Site Location Figure 2: Sample Locations
- Tables – Table 1: Analytical results
- Attachment A: Report Limitations
- Attachment B: Photo log
- Attachment C: Laboratory Chains of Custody and Results

Figures



Map Prepared

WSP

Shannon Farm, Cromwell: Tank Location

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October 2, 2024

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Map Prepared

WSP

Shannon Farm: Sample Locations - Tank Pull

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October 2, 2024

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Tables

Table 1 - Heavy Metal and Petroleum Hydrocarbon Soil Analytical Results for Human Health and Environment

Adopted Criteria																							
Analyte					Heavy Metals							BTEX						TPH			
Location	Sample Name	Sampling Date	Laboratory Number	Depth (m bgl)	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel (NEPM[5])	Zinc (NEPM[5])	Benzene	Toluene	Ethylbenzene	Xylenes (m & p)	o-Xylene	Total Xylenes	C7 - C9 Fraction	C10 - C14 Fraction	C15 - C36 Fraction	C7 - C36 Total
Background Concentrations[1]					11.04	0.43	60.82	47.36	60.82	33.42	191	-	-	-	-	-	-	-	-	-	-
NESCS[2]/NEPM[3]			Rural residential / lifestyle block 25% produce		17	1	290	>10,000	160	1,200	30,000	-	-	-	-	-	-	-	-	-	-
MfE, 1999 Guidelines[4]			Residential use (1 - 4 m bgl),		-	-	-	-	-	-	-	**1.9**	**170**	**92**	**130**	**130**	**130**	**500**	**670**	**N/A**	-
			Agricultural use (1 - 4 m bgl),		-	-	-	-	-	-	-	**1.9**	**170**	**92**	**130**	**130**	**130**	**500**	**670**	**N/A**	-
Units					mg/kg																
Tank 1	Tank 1	23-Aug-24	3659610.11	0.0 - 0.1	17	0.11	14	26	38	21	117	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80
Tank 2	Tank 2	23-Aug-24	3566445.12	0.4 - 0.5	13	<0.10	14	24	21	21	96	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80
Tank 3	Tank 3	23-Aug-24	3566445.13	0.8 - 0.9	12	<0.10	14	28	17.3	20	65	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80
Tankpit Base	Tank 4	23-Aug-24	3566445.14	0.0 - 0.1	12	<0.10	14	24	20	22	74	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80
Stockpile 1	Tank 5	23-Aug-24	3566445.15	0.8 - 0.9	13	<0.10	15	24	19.7	21	80	<0.05	<0.05	<0.05	<0.10	<0.05	<0.15	<20	<20	<40	<80

Key:

Underline	Indicates an exceedance of Background Concentrations
Orange Fill	Indicates an exceedance of the NESCS/NEPM for Rural residential / lifestyle block 25% produce
Bold Text	Indicates an exceedance of the MfE Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sities in New Zealand
-	Indicates no criteria/not analysed.
m bgl	Indicates meters below ground level.
mg/kg	Indicates milligrams per kilogram (dry weight).
Grey Text	Indicates concentration below the laboratory limit of reporting (LOR).
Grey Text Underlined	Indicates LOR greater than Background Concentrations.

Notes:

1. Landcare Research (2016). Background soil concentrations of selected trace elements and organic contaminants in New Zealand. Report No. LC2440, November 2015.
2. Ministry for the Environment (2011). Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Publication number ME 1055, June 2011.
3. National Environmental Protection Council (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013).
4. Ministry for the Environment (2011). Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011).

Attachment A
Report Limitations

Limitations

This report ('Report') has been prepared by WSP exclusively for New Zealand Cheery Corps (Leyser) LP ('Client') in relation to the tank removal validation regarding the site preparation works. The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

Permitted Purpose

This Report has been prepared expressly for the purpose of assessing soil contamination at the site ('Permitted Purpose'). WSP accepts no liability whatsoever for the use of the Report, in whole or in part, for any purpose other than the Permitted Purpose. Unless expressly stated otherwise, this Report has been prepared without regard to any special interest of any party other than the Client.

WSP accepts no liability whatsoever for any use of this Report, in whole or in part, by any party other than the Client. Unless WSP agrees otherwise in writing, any use or any reliance on this Report by a third party is at its sole risk without recourse to WSP. Third parties must make their own enquiries and obtain independent advice in relation to any matter dealt with or any conclusion expressed in this Report.

Qualifications and Assumptions

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Agreement and the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report and/or otherwise communicated to the Client. Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and/or recommendations in the Report ('Conclusions') are based in whole or in part on information provided by the Client and other parties ('Information'). The Information has not been and have not been verified by WSP and WSP accepts no liability for the reliability, adequacy, accuracy and completeness of the Information.

The data reported and Conclusions drawn by WSP in this Report are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

Use and Reliance

This Report should be read in its entirety and must not be copied, distributed or referred to in part only. The Report must not be reproduced without WSP's prior approval in writing. WSP will not be responsible for interpretations or conclusions drawn by the reader of the Report. This Report (or sections of the Report) must not be used as part of a specification for a project or for incorporation into any other document without WSP's agreement in writing.

Disclaimer

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Attachment B
Photo Log

ATTACHMENT A	PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
Infinity Investment Group	Shannon Farm, Cromwell	6-XZ750.00

Photo No.	Date
1	23/08/2024

Description
Buried Tank.



Photo No.	Date
2	23/08/2024

Description
Location of tank removed.



ATTACHMENT A	PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
Infinity Investment Group	Shannon Farm, Cromwell	6-XZ750.00

Photo No.	Date
3	23/08/2024

Description

South side of excavation.



Photo No.	Date
4	23/08/2024

Description

Soil stockpile and pipework removed and northern wall of excavation



Attachment D

Laboratory Chains of Custody and Results

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3659610 SPv1
Contact:	Lisa Bond	**Date Received:**	29-Aug-2024
	C/- WSP New Zealand Limited	**Date Reported:**	02-Sep-2024
	PO Box 273	**Quote No:**	82748
	Alexandra 9320	**Order No:**	
		Client Reference:	6-XZ750.00 Shannon Farm Remediation
		Submitted By:	Lisa Bond

Sample Type: Soil

Sample Name:		RV1 23-Aug-2024	RV2 23-Aug-2024	RV3 23-Aug-2024	RV4 23-Aug-2024	RV5 23-Aug-2024
Lab Number:		3659610.1	3659610.2	3659610.3	3659610.4	3659610.5
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	14	26	15	12	11
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.19	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	15	15	7	11	13
Total Recoverable Copper	mg/kg dry wt	22	30	17	19	19
Total Recoverable Lead	mg/kg dry wt	15.7	21	10.2	12.7	15.1
Total Recoverable Nickel	mg/kg dry wt	21	19	9	18	17
Total Recoverable Zinc	mg/kg dry wt	75	220	53	69	71

Sample Name:		RV6 23-Aug-2024	RV7 23-Aug-2024	RV8 23-Aug-2024	RV9 23-Aug-2024	RV10 23-Aug-2024
Lab Number:		3659610.6	3659610.7	3659610.8	3659610.9	3659610.10
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	12	18	13	13	13
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.11	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	17	14	15	15
Total Recoverable Copper	mg/kg dry wt	35	26	22	20	22
Total Recoverable Lead	mg/kg dry wt	15.2	20	16.3	16.5	18.7
Total Recoverable Nickel	mg/kg dry wt	16	22	19	19	21
Total Recoverable Zinc	mg/kg dry wt	115	159	77	81	116

Sample Name:		Tank1 23-Aug-2024	Tank2 23-Aug-2024	Tank3 23-Aug-2024	Tank4 23-Aug-2024	Tank5 23-Aug-2024
Lab Number:		3659610.11	3659610.12	3659610.13	3659610.14	3659610.15
Individual Tests						
Dry Matter	g/100g as rcvd	90	90	97	94	88
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	17	13	12	12	13
Total Recoverable Cadmium	mg/kg dry wt	0.11	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	14	14	14	14	15
Total Recoverable Copper	mg/kg dry wt	26	24	28	24	24
Total Recoverable Lead	mg/kg dry wt	38	21	17.3	20	19.7
Total Recoverable Nickel	mg/kg dry wt	21	21	20	22	21
Total Recoverable Zinc	mg/kg dry wt	117	96	65	74	80
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
m&p-Xylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
o-Xylene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		Tank1 23-Aug-2024	Tank2 23-Aug-2024	Tank3 23-Aug-2024	Tank4 23-Aug-2024	Tank5 23-Aug-2024
Lab Number:		3659610.11	3659610.12	3659610.13	3659610.14	3659610.15
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 80	< 80	< 80	< 80	< 80

Analyst's Comments

It was observed that the containers for samples 3659610.11-15 were not completely filled. Volatile loss may have occurred due to the headspace created in the container.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-15
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	11-15
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-15
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.	0.05 - 0.10 mg/kg dry wt	11-15
TPH Headspace in Soil			
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	11-15
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	11-15
Total Petroleum Hydrocarbons in Soil			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	11-15
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	11-15

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 29-Aug-2024 and 02-Sep-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Kim Harrison MSc
Client Services Manager - Environmental

F CHAIN OF CUSTODY AND LABORATORY CERTIFICATES

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

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+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3659610 SPv1
Contact:	Lisa Bond	**Date Received:**	29-Aug-2024
	C/- WSP New Zealand Limited	**Date Reported:**	02-Sep-2024
	PO Box 273	**Quote No:**	82748
	Alexandra 9320	**Order No:**	
		Client Reference:	6-XZ750.00 Shannon Farm Remediation
		Submitted By:	Lisa Bond

Sample Type: Soil

Sample Name:		RV1 23-Aug-2024	RV2 23-Aug-2024	RV3 23-Aug-2024	RV4 23-Aug-2024	RV5 23-Aug-2024
Lab Number:		3659610.1	3659610.2	3659610.3	3659610.4	3659610.5
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	14	26	15	12	11
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.19	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	15	15	7	11	13
Total Recoverable Copper	mg/kg dry wt	22	30	17	19	19
Total Recoverable Lead	mg/kg dry wt	15.7	21	10.2	12.7	15.1
Total Recoverable Nickel	mg/kg dry wt	21	19	9	18	17
Total Recoverable Zinc	mg/kg dry wt	75	220	53	69	71

Sample Name:		RV6 23-Aug-2024	RV7 23-Aug-2024	RV8 23-Aug-2024	RV9 23-Aug-2024	RV10 23-Aug-2024
Lab Number:		3659610.6	3659610.7	3659610.8	3659610.9	3659610.10
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	12	18	13	13	13
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.11	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	17	14	15	15
Total Recoverable Copper	mg/kg dry wt	35	26	22	20	22
Total Recoverable Lead	mg/kg dry wt	15.2	20	16.3	16.5	18.7
Total Recoverable Nickel	mg/kg dry wt	16	22	19	19	21
Total Recoverable Zinc	mg/kg dry wt	115	159	77	81	116

Sample Name:		Tank1 23-Aug-2024	Tank2 23-Aug-2024	Tank3 23-Aug-2024	Tank4 23-Aug-2024	Tank5 23-Aug-2024
Lab Number:		3659610.11	3659610.12	3659610.13	3659610.14	3659610.15
Individual Tests						
Dry Matter	g/100g as rcvd	90	90	97	94	88
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	17	13	12	12	13
Total Recoverable Cadmium	mg/kg dry wt	0.11	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	14	14	14	14	15
Total Recoverable Copper	mg/kg dry wt	26	24	28	24	24
Total Recoverable Lead	mg/kg dry wt	38	21	17.3	20	19.7
Total Recoverable Nickel	mg/kg dry wt	21	21	20	22	21
Total Recoverable Zinc	mg/kg dry wt	117	96	65	74	80
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
m&p-Xylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
o-Xylene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		Tank1 23-Aug-2024	Tank2 23-Aug-2024	Tank3 23-Aug-2024	Tank4 23-Aug-2024	Tank5 23-Aug-2024
Lab Number:		3659610.11	3659610.12	3659610.13	3659610.14	3659610.15
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 80	< 80	< 80	< 80	< 80

Analyst's Comments

It was observed that the containers for samples 3659610.11-15 were not completely filled. Volatile loss may have occurred due to the headspace created in the container.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-15
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	11-15
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-15
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.	0.05 - 0.10 mg/kg dry wt	11-15
TPH Headspace in Soil			
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	11-15
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	11-15
Total Petroleum Hydrocarbons in Soil			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	11-15
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	11-15

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 29-Aug-2024 and 02-Sep-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Kim Harrison MSc
Client Services Manager - Environmental

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Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3666788 SPv2
Contact:	Lisa Bond	**Date Received:**	07-Sep-2024
	C/- WSP New Zealand Limited	**Date Reported:**	11-Oct-2024 **(Amended)**
	PO Box 273	**Quote No:**	
	Alexandra 9320	**Order No:**	
		Client Reference:	6-XZ750.00 Shannon Farm
		Submitted By:	Lisa Bond

Sample Type: Soil

Sample Name:		S1 (P1) 04-Sep-2024	S2 (P2) 04-Sep-2024	S3 (SP1) 04-Sep-2024	S4 (SP2) 04-Sep-2024	S5 (SP5) 04-Sep-2024
Lab Number:		3666788.1	3666788.2	3666788.3	3666788.4	3666788.5
Individual Tests						
Dry Matter	g/100g as rcvd	96	89	91	92	86
TCLP Weight of Sample Taken	g	-	-	50	50	50
TCLP Initial Sample pH	pH Units	-	-	8.8	7.4	8.7
TCLP Acid Adjusted Sample pH	pH Units	-	-	1.6	1.5	1.6
TCLP Extractant Type*		-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	NaOH/Acetic acid at pH 4.93 +/- 0.05	NaOH/Acetic acid at pH 4.93 +/- 0.05
TCLP Extraction Fluid pH	pH Units	-	-	5.0	5.0	5.0
TCLP Post Extraction Sample pH	pH Units	-	-	5.0	4.9	5.0
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	6	9	9	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	4	11	11	11	10
Total Recoverable Copper	mg/kg dry wt	3	19	23	20	19
Total Recoverable Lead	mg/kg dry wt	4.8	12.2	11.8	11.8	13.8
Total Recoverable Nickel	mg/kg dry wt	3	13	15	16	14
Total Recoverable Zinc	mg/kg dry wt	20	51	78	56	54
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
m&p-Xylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
o-Xylene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
2-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Acenaphthylene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Acenaphthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Benzo[a]anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.025	< 0.027	< 0.026	< 0.026	< 0.028
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.025	< 0.027	< 0.026	< 0.026	< 0.028
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Benzo[e]pyrene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

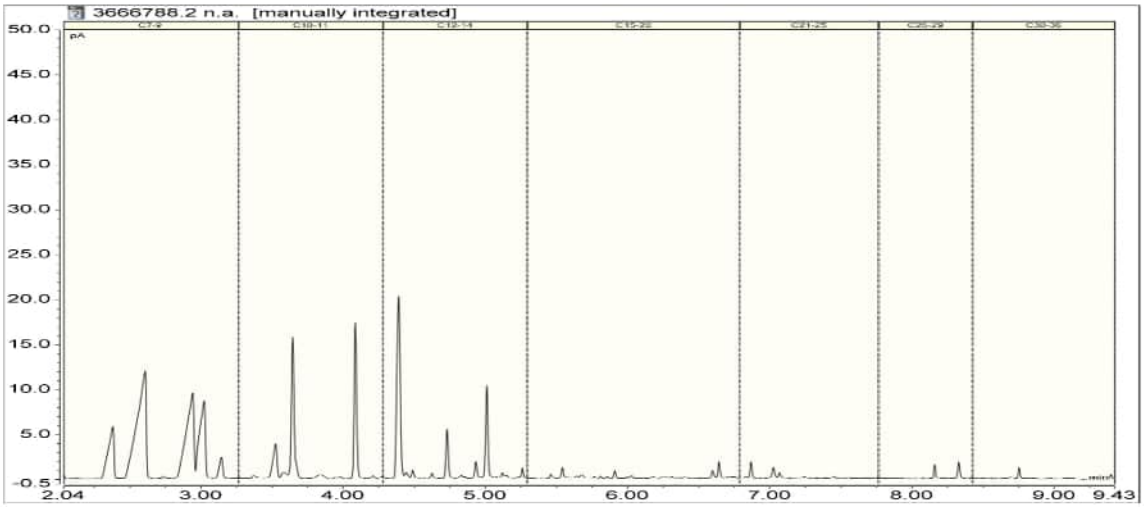
Sample Type: Soil						
Sample Name:		S1 (P1) 04-Sep-2024	S2 (P2) 04-Sep-2024	S3 (SP1) 04-Sep-2024	S4 (SP2) 04-Sep-2024	S5 (SP5) 04-Sep-2024
Lab Number:		3666788.1	3666788.2	3666788.3	3666788.4	3666788.5
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Benzo[k]fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Chrysene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.017	< 0.012
Fluorene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Perylene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Phenanthrene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.014	< 0.012
Pyrene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.017	< 0.012
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 20	200	< 20	< 20	< 20
C10 - C14	mg/kg dry wt	< 20	129	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	45	< 40	950
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 80	350	< 80	< 80	950

Sample Name:		S6 (P5) 04-Sep-2024	S7 (P4) 04-Sep-2024	S8 (P3) 04-Sep-2024	S9 (SP3/4) 04-Sep-2024
Lab Number:		3666788.6	3666788.7	3666788.8	3666788.9
Individual Tests					
Dry Matter	g/100g as rcvd	91	89	87	88
TCLP Weight of Sample Taken	g	-	-	-	50
TCLP Initial Sample pH	pH Units	-	-	-	8.6
TCLP Acid Adjusted Sample pH	pH Units	-	-	-	1.6
TCLP Extractant Type*		-	-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05
TCLP Extraction Fluid pH	pH Units	-	-	-	5.0
TCLP Post Extraction Sample pH	pH Units	-	-	-	5.0
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	7	6	6	8
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	8	7	7	9
Total Recoverable Copper	mg/kg dry wt	16	12	15	19
Total Recoverable Lead	mg/kg dry wt	10.1	8.6	9.1	11.4
Total Recoverable Nickel	mg/kg dry wt	10	9	9	14
Total Recoverable Zinc	mg/kg dry wt	38	35	37	47
BTEX in Soil by Headspace GC-MS					
Benzene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
m&p-Xylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
o-Xylene	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
2-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Acenaphthylene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Acenaphthene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Benzo[a]anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.027	< 0.027	< 0.027	< 0.027
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.026	< 0.027	< 0.027	< 0.027

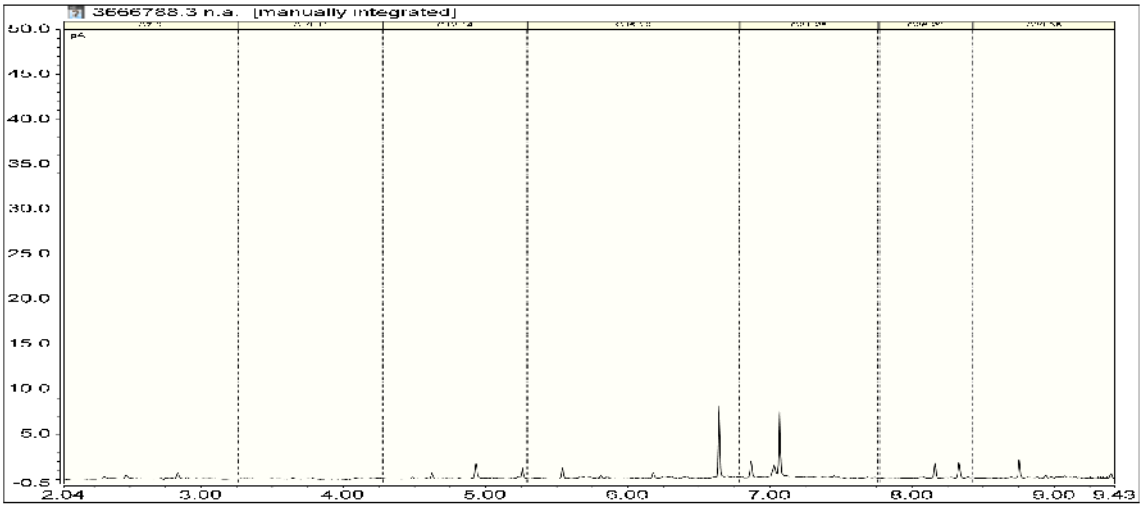
Sample Type: Soil					
Sample Name:		S6 (P5) 04-Sep-2024	S7 (P4) 04-Sep-2024	S8 (P3) 04-Sep-2024	S9 (SP3/4) 04-Sep-2024
Lab Number:		3666788.6	3666788.7	3666788.8	3666788.9
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Benzo[e]pyrene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Benzo[k]fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Chrysene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Fluorene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06
Perylene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Phenanthrene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Pyrene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Total Petroleum Hydrocarbons in Soil					
C7 - C9	mg/kg dry wt	< 20	< 20	< 20	< 20
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 80	< 80	< 80	< 80

Sample Type: Aqueous					
Sample Name:		S3 (SP1) [TCLP extract]	S4 (SP2) [TCLP extract]	S5 (SP5) [TCLP extract]	S9 (SP3/4) [TCLP extract]
Lab Number:		3666788.10	3666788.11	3666788.12	3666788.13
Individual Tests					
Total Chromium	g/m³	< 0.011	< 0.011	-	-
Total Copper	g/m³	< 0.011	< 0.011	< 0.011	0.027
Total Lead	g/m³	< 0.0021	< 0.0021	< 0.0021	0.0030
Total Zinc	g/m³	0.47	0.071	< 0.053	0.093

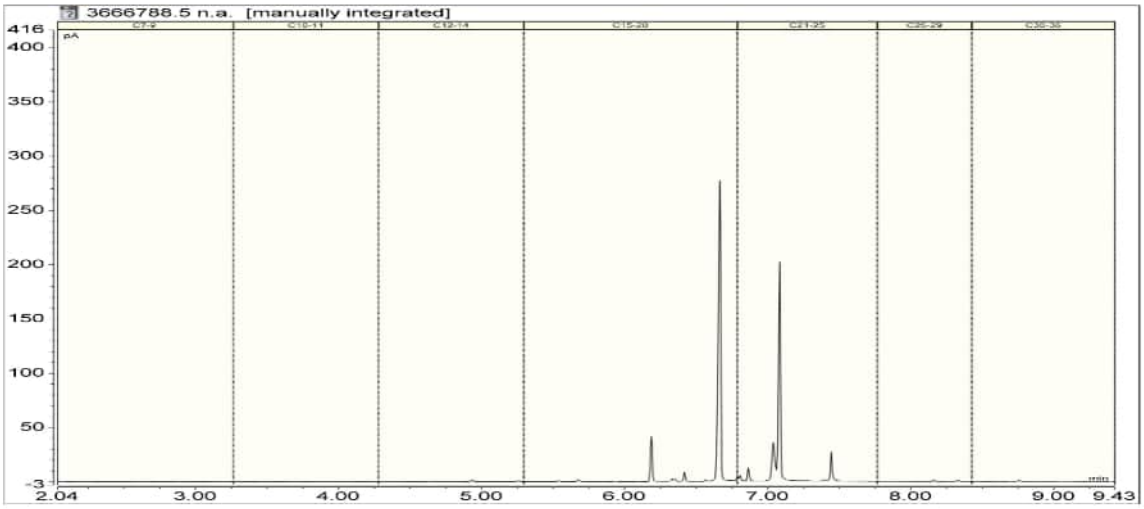
3666788.2
S2 (P2) 04-Sep-2024
Client Chromatogram for TPH by FID



3666788.3
S3 (SP1) 04-Sep-2024
Client Chromatogram for TPH by FID



3666788.5
S5 (SP5) 04-Sep-2024
Client Chromatogram for TPH by FID



Analyst's Comments

It was observed that the containers for samples {3666788.3, 4, 6, 7, 8} were not completely filled. Volatile loss may have occurred due to the headspace created in the containers.

Amended Report: This certificate of analysis replaces report '3666788-SPv1' issued on 11-Sep-2024 at 8:32 am. Reason for amendment: At the client's request, TCLPs have been added.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-9
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-9

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1-9
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1-9
Heavy Metals, Screen Level*	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-9
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.	0.05 - 0.10 mg/kg dry wt	1-9
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-9
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311.	-	3-5, 9
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	2-3, 5
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	1-9
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-9
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-9
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-9
TCLP Profile			
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	3-5, 9
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	3-5, 9
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	3-5, 9
TCLP Extractant Type*	US EPA 1311.	-	3-5, 9
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	3-5, 9
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	3-5, 9

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E (modified) : Online Edition.	-	10-13
Total Chromium	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.011 g/m^3	10-11
Total Copper	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.011 g/m^3	10-13
Total Lead	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.0021 g/m^3	10-13
Total Zinc	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.053 g/m^3	10-13

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 09-Sep-2024 and 11-Oct-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3727808 SPv1
Contact:	Lisa Bond	**Date Received:**	29-Nov-2024
	C/- WSP New Zealand Limited	**Date Reported:**	03-Dec-2024
	PO Box 273	**Quote No:**	82748
	Alexandra 9320	**Order No:**	PO NO. 303
		Client Reference:	6-XZ750.00 Shannon FM Offal Pit
		Submitted By:	Lisa Bond

Sample Type: Soil

		Sample Name:	OPV7a 25-Nov-2024	OPV7b 25-Nov-2024
		Lab Number:	3727808.1	3727808.2
Heavy Metals, Screen Level				
Total Recoverable Arsenic	mg/kg dry wt		10	9
Total Recoverable Cadmium	mg/kg dry wt		0.15	0.13
Total Recoverable Chromium	mg/kg dry wt		12	15
Total Recoverable Copper	mg/kg dry wt		21	21
Total Recoverable Lead	mg/kg dry wt		15.0	19.3
Total Recoverable Nickel	mg/kg dry wt		18	19
Total Recoverable Zinc	mg/kg dry wt		127	92

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-2

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 29-Nov-2024 and 03-Dec-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3718734 SPv1
Contact:	Lisa Bond C/- WSP New Zealand Limited PO Box 273 Alexandra 9320	**Date Received:**	19-Nov-2024
		Date Reported:	21-Nov-2024
		Quote No:	82748
		Order No:	261
		Client Reference:	6XZ750.00
		Add. Client Ref:	Offal Pot Waste Validation
		Submitted By:	Lisa Bond

Sample Type: Soil

Sample Name:		OPV1 14-Nov-2024	OPV2 14-Nov-2024	OPV3 14-Nov-2024	OPV4 14-Nov-2024	OPV5 14-Nov-2024
Lab Number:		3718734.1	3718734.2	3718734.3	3718734.4	3718734.5
Individual Tests						
Dry Matter	g/100g as rcvd	84	91	82	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	9	13	9	10
Total Recoverable Cadmium	mg/kg dry wt	0.12	0.11	0.15	0.11	< 0.10
Total Recoverable Chromium	mg/kg dry wt	12	11	14	13	15
Total Recoverable Copper	mg/kg dry wt	25	22	20	21	20
Total Recoverable Lead	mg/kg dry wt	15.9	14.6	19.5	13.6	14.3
Total Recoverable Nickel	mg/kg dry wt	16	16	18	17	20
Total Recoverable Zinc	mg/kg dry wt	114	131	75	92	83
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.3	< 0.3	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Acenaphthylene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Acenaphthene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Anthracene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.029	< 0.026	< 0.029	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.028	< 0.026	< 0.029	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Chrysene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Fluoranthene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Fluorene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	-	-
Perylene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Phenanthrene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-
Pyrene	mg/kg dry wt	< 0.012	< 0.011	< 0.012	-	-

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Sample Type: Soil				
Sample Name:		OPV6 14-Nov-2024	OPV7 14-Nov-2024	OPV8 14-Nov-2024
Lab Number:		3718734.6	3718734.7	3718734.8
Heavy Metals, Screen Level				
Total Recoverable Arsenic	mg/kg dry wt	10	9	8
Total Recoverable Cadmium	mg/kg dry wt	0.11	1.15	0.21
Total Recoverable Chromium	mg/kg dry wt	12	11	10
Total Recoverable Copper	mg/kg dry wt	20	33	18
Total Recoverable Lead	mg/kg dry wt	14.4	43	15.3
Total Recoverable Nickel	mg/kg dry wt	18	17	13
Total Recoverable Zinc	mg/kg dry wt	75	1,090	220

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-8
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-3
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-8
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-3
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-3
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1-3
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 19-Nov-2024 and 21-Nov-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3659609 SPv2
Contact:	Lisa Bond	**Date Received:**	29-Aug-2024
	C/- WSP New Zealand Limited	**Date Reported:**	14-Nov-2024 **(Amended)**
	PO Box 273	**Quote No:**	82748
	Alexandra 9320	**Order No:**	
		Client Reference:	6-XZ750.00 Shannon Farm Remediation
		Submitted By:	Lisa Bond

Sample Type: Soil

Sample Name:		SP1 23-Aug-2024	SP2 23-Aug-2024	SP3 23-Aug-2024	SP4 23-Aug-2024	SP5 23-Aug-2024
Lab Number:		3659609.1	3659609.2	3659609.3	3659609.4	3659609.5
Individual Tests						
SPLP Sample Weight	g	50	50	50	50	-
SPLP Extractant Type*		De-ionised Water, pH 5.8 +/- 0.4	De-ionised Water, pH 5.8 +/- 0.4	De-ionised Water, pH 5.8 +/- 0.4	De-ionised Water, pH 5.8 +/- 0.4	-
SPLP Final pH	pH Units	7.8	8.4	8.9	8.6	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	25	16	11	10	11
Total Recoverable Cadmium	mg/kg dry wt	0.43	0.30	0.15	0.13	< 0.10
Total Recoverable Chromium	mg/kg dry wt	14	11	10	11	12
Total Recoverable Copper	mg/kg dry wt	118	61	46	27	20
Total Recoverable Lead	mg/kg dry wt	21	37	14.7	16.0	15.6
Total Recoverable Nickel	mg/kg dry wt	21	19	16	15	18
Total Recoverable Zinc	mg/kg dry wt	1,100	730	650	230	93

Sample Name:		SP6 23-Aug-2024	SP7 23-Aug-2024	SP8 23-Aug-2024	SP9 23-Aug-2024	SP10 23-Aug-2024
Lab Number:		3659609.6	3659609.7	3659609.8	3659609.9	3659609.10
Individual Tests						
SPLP Sample Weight	g	-	50	50	-	50
SPLP Extractant Type*		-	De-ionised Water, pH 5.8 +/- 0.4	De-ionised Water, pH 5.8 +/- 0.4	-	De-ionised Water, pH 5.8 +/- 0.4
SPLP Final pH	pH Units	-	8.4	8.1	-	8.9
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	12	15	18	15	16
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.19	0.16	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	13	17	16	21	13
Total Recoverable Copper	mg/kg dry wt	22	29	26	26	19
Total Recoverable Lead	mg/kg dry wt	19.1	26	26	22	15.6
Total Recoverable Nickel	mg/kg dry wt	18	20	20	24	18
Total Recoverable Zinc	mg/kg dry wt	140	177	154	117	76

Sample Type: Aqueous

Sample Name:		SP1 [SPLP extract]	SP2 [SPLP extract]	SP3 [SPLP extract]	SP4 [SPLP extract]	SP7 [SPLP extract]
Lab Number:		3659609.11	3659609.12	3659609.13	3659609.14	3659609.15
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Arsenic	g/m³	0.044	0.032	0.0195	0.0133	0.0059
Total Cadmium	g/m³	0.000081	< 0.000053	< 0.000053	< 0.000053	< 0.000053
Total Chromium	g/m³	0.0030	0.00112	0.00124	0.00141	0.00076
Total Copper	g/m³	0.042	0.031	0.028	0.0162	0.0123
Total Lead	g/m³	0.0063	0.0051 #1	0.0026	0.0030	0.00184

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Aqueous						
Sample Name:		SP1 [SPLP extract]	SP2 [SPLP extract]	SP3 [SPLP extract]	SP4 [SPLP extract]	SP7 [SPLP extract]
Lab Number:		3659609.11	3659609.12	3659609.13	3659609.14	3659609.15
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Nickel	g/m³	0.0051	0.0067	0.0057	0.0035	0.0024
Total Zinc	g/m³	0.192	0.084 #2	0.094	0.045	0.0170

Sample Name:		SP8 [SPLP extract]	SP10 [SPLP extract]
Lab Number:		3659609.16	3659609.17
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn			
Total Arsenic	g/m³	0.0090	0.0128
Total Cadmium	g/m³	< 0.000053	< 0.000053
Total Chromium	g/m³	0.00089	0.00088
Total Copper	g/m³	0.0089	0.0052
Total Lead	g/m³	0.0024	0.00153
Total Nickel	g/m³	0.0023	0.00187
Total Zinc	g/m³	0.0154	0.0046

Analyst's Comments

#1 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample. Rep 1 = 0.0051mg/L, rep 2 = 0.0039mg/L

#2 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample. Rep 1 = 0.084mg/L, rep 2 = 0.109mg/L

Amended Report: This certificate of analysis replaces report '3659609-SPv1' issued on 02-Sep-2024 at 12:49 pm. Reason for amendment: At the client's request, SPLPs have been added.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-10
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-10
SPLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1312.	-	1-4, 7-8, 10
SPLP Profile			
SPLP Sample Weight	Gravimetric. US EPA 1312.	0.1 g	1-4, 7-8, 10
SPLP Extractant Type*	US EPA 1312 (Modified for New Zealand conditions to use De-ionised Water unless otherwise specified).	-	1-4, 7-8, 10
SPLP Final pH	pH meter. US EPA 1312.	0.1 pH Units	1-4, 7-8, 10

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E (modified) : Online Edition.	-	11-17
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B (modified) : Online Edition / US EPA 200.8.	0.000053 - 0.0011 g/m³	11-17

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 29-Aug-2024 and 14-Nov-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3892969 SPv1
Contact:	Lisa Bond	**Date Received:**	20-May-2025
	C/- WSP New Zealand Limited	**Date Reported:**	22-May-2025
	PO Box 273	**Quote No:**	82748
	Alexandra 9320	**Order No:**	675
		Client Reference:	6-XZ750.00 066GX
		Submitted By:	Lisa Bond

Sample Type: Soil

Sample Name:		VAL1 19-May-2025	VAL2 19-May-2025	VAL3 19-May-2025	VAL4 19-May-2025	VAL5 19-May-2025
Lab Number:		3892969.1	3892969.2	3892969.3	3892969.4	3892969.5
Individual Tests						
Total Recoverable Arsenic	mg/kg dry wt	16	14	12	13	11
Total Recoverable Cadmium	mg/kg dry wt	0.20	0.11	< 0.10	0.20	< 0.10

Sample Name:		VAL6 19-May-2025	VAL7 19-May-2025	VAL8 19-May-2025	DUP 19-May-2025	Road 2 CH70 - 1 14-Feb-2025
Lab Number:		3892969.6	3892969.7	3892969.8	3892969.9	3892969.10
Individual Tests						
Total Recoverable Arsenic	mg/kg dry wt	12	16	12	10	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.11	< 0.10	< 0.10	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	16
Total Recoverable Cadmium	mg/kg dry wt	-	-	-	-	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	-	-	-	14
Total Recoverable Copper	mg/kg dry wt	-	-	-	-	26
Total Recoverable Lead	mg/kg dry wt	-	-	-	-	16.3
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	< 0.10
Total Recoverable Nickel	mg/kg dry wt	-	-	-	-	23
Total Recoverable Zinc	mg/kg dry wt	-	-	-	-	58

Sample Name:		West Hole - 1 16-May-2025	East Hole - 2 16-May-2025
Lab Number:		3892969.11	3892969.12
Heavy Metals with Mercury, Screen Level			
Total Recoverable Arsenic	mg/kg dry wt	14	15
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.24
Total Recoverable Chromium	mg/kg dry wt	12	14
Total Recoverable Copper	mg/kg dry wt	25	29
Total Recoverable Lead	mg/kg dry wt	18.1	20
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	19	19
Total Recoverable Zinc	mg/kg dry wt	71	153

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No

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Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-12
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-9
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	10-12
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2 (modified).	-	1-9
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2 (modified).	2 mg/kg dry wt	1-9
Total Recoverable Cadmium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2 (modified).	0.10 mg/kg dry wt	1-9

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 20-May-2025 and 22-May-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3892970	SPv2
Contact:	Lisa Bond	**Date Received:**	20-May-2025	
	C/- WSP New Zealand Limited	**Date Reported:**	04-Jul-2025	**(Amended)**
	PO Box 273	**Quote No:**	82748	
	Alexandra 9320	**Order No:**	675	
		Client Reference:	6-XZ750.00 066GX	
		Submitted By:	Lisa Bond	

Sample Type: Soil

Sample Name:		Bund1 19-May-2025	Bund2 19-May-2025	Bund3 19-May-2025	Bund4 19-May-2025	Bund5 19-May-2025
Lab Number:		3892970.1	3892970.2	3892970.3	3892970.4	3892970.5
Individual Tests						
SPLP Sample Weight	g	50	50	50	50	50
SPLP Extractant Type*		De-ionised Water, pH 5.8 +/- 0.4	De-ionised Water, pH 5.8 +/- 0.4	De-ionised Water, pH 5.8 +/- 0.4	De-ionised Water, pH 5.8 +/- 0.4	De-ionised Water, pH 5.8 +/- 0.4
SPLP Final pH	pH Units	8.5	8.5	8.7	8.8	8.6
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	14	15	13	12
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.17	0.39	0.17	0.20
Total Recoverable Chromium	mg/kg dry wt	10	15	12	13	13
Total Recoverable Copper	mg/kg dry wt	35	38	82	34	41
Total Recoverable Lead	mg/kg dry wt	18.6	22	18.7	19.5	19.0
Total Recoverable Nickel	mg/kg dry wt	15	20	20	19	16
Total Recoverable Zinc	mg/kg dry wt	610	360	1,140	430	420

Sample Type: Aqueous

Sample Name:		Bund1 [SPLP Extract]	Bund2 [SPLP Extract]	Bund3 [SPLP Extract]	Bund4 [SPLP Extract]	Bund5 [SPLP Extract]
Lab Number:		3892970.6	3892970.7	3892970.8	3892970.9	3892970.10
Individual Tests						
Total Zinc	g/m^3	0.049	0.024	0.103	0.039	0.053

Analyst's Comments

Amended Report: This certificate of analysis replaces report '3892970-SPv1' issued on 22-May-2025 at 10:17 am.
Reason for amendment: SPLP zinc added.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-5
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-5

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Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
SPLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1312.	-	1-5
SPLP Profile			
SPLP Sample Weight	Gravimetric. US EPA 1312.	0.1 g	1-5
SPLP Extractant Type*	US EPA 1312 (Modified for New Zealand conditions to use De-ionised Water unless otherwise specified).	-	1-5
SPLP Final pH	pH meter. US EPA 1312.	0.1 pH Units	1-5

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E (modified) : Online Edition.	-	6-10
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.0011 g/m^3	6-10

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 20-May-2025 and 04-Jul-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Certificate of Analysis

Client:	WSP New Zealand Limited	**Lab No:**	3920269 SPv1
Contact:	Lisa Bond	**Date Received:**	19-Jun-2025
	C/- WSP New Zealand Limited	**Date Reported:**	24-Jun-2025
	PO Box 273	**Quote No:**	82748
	Alexandra 9320	**Order No:**	753
		Client Reference:	6-XZ750.00 045GX (Landfill Pits)
		Submitted By:	Lisa Bond

Sample Type: Soil

		Sample Name:	01 16-Jun-2025 11:20 am	02 16-Jun-2025 11:24 am	03 16-Jun-2025 11:33 am	04 16-Jun-2025 11:38 am
		Lab Number:	3920269.1	3920269.2	3920269.3	3920269.4
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt		14	12	13	14
Total Recoverable Cadmium	mg/kg dry wt		< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt		10	10	13	13
Total Recoverable Copper	mg/kg dry wt		24	21	28	28
Total Recoverable Lead	mg/kg dry wt		16.5	13.9	19.1	16.5
Total Recoverable Mercury	mg/kg dry wt		< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt		19	18	23	24
Total Recoverable Zinc	mg/kg dry wt		51	47	76	87

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-4
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-4

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 19-Jun-2025 and 24-Jun-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Client Services Manager - Environmental

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Assessment of the relevant provisions of the National Policy Statements

National Policy Statement for Urban Development 2020

Provision Number	Provision Description	Assessment
Part 2.1: Objectives		
Objective 1	New Zealand has well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future.	The proposal contributes to a well-functioning urban environment by providing additional housing choice in response to demonstrated market demand as detailed in Mr Colegrave's and Mr Croft's evidence. It supports the social and economic wellbeing of the Cromwell community through increasing the supply of rural lifestyle housing within an existing master-planned development that is appropriately serviced and integrated with infrastructure.
Objective 2	Planning decisions improve housing affordability by supporting competitive land and development markets.	The proposal supports competitive land and development markets by increasing the supply of rural lifestyle allotments in a market segment that Mr Colegrave identifies as being comparatively under-supplied. Increasing supply assists housing affordability by improving competition and consumer choice.
Objective 3	Regional policy statements and district plans enable more people to live in, and more businesses and community services to be located in, areas of an urban environment in which one or more of the following apply: (a) the area is in or near a centre zone or other area with many employment opportunities (b) the area is well-serviced by existing or planned public transport	The proposal is consistent with this objective. While Shannon Farm is not located within a centre zone, it was specifically identified through Plan Change 14 as being in close proximity to the Cromwell town centre and its shops, services, employment opportunities and community facilities. The proposal utilises an area already identified for residential growth and responds to demonstrated housing demand within that location. In doing so, it enables additional people to live in an area of the urban environment where there is high demand for housing, consistent with the intent of Objective 3.

	(c) there is high demand for housing or for business land in the area, relative to other areas within the urban environment.	
Objective 4	New Zealand's urban environments, including their amenity values, develop and change over time in response to the diverse and changing needs of people, communities, and future generations.	Objective 4 recognises that urban environments, including their amenity values, will develop and change over time in response to the diverse and changing needs of people, communities and future generations. In my opinion, this objective is particularly relevant to the present application. When Plan Change 14 was determined in 2022, the Structure Plan and associated density provisions represented Council's best assessment of how the Shannon Farm development should respond to the market conditions that existed at that time. However, planning decisions are not made in a vacuum, and it is entirely foreseeable that market demand will evolve over time. The evidence of Mr Colegrave demonstrates that Cromwell has continued to experience sustained population and employment growth since Plan Change 14 was approved, resulting in a continuing and increasing demand for rural lifestyle living. His economic analysis further demonstrates that demand has become concentrated in the 1,500m² to 3,000m² allotment range, rather than the larger allotments anticipated through the original Structure Plan. This conclusion is reinforced by the practical evidence of Mr Croft, whose direct involvement in marketing and selling the initial stages of Shannon Farm confirms that buyer demand has been strongest for smaller rural lifestyle allotments. In my opinion, this provides compelling "real world" evidence that market preferences have evolved since the completion of the Plan Change 14 process. The proposal is therefore not seeking to fundamentally alter the strategic planning framework established through Plan Change 14. Rather, it represents a refinement of the approved subdivision layout so that the development better reflects current market demand while continuing to achieve the environmental outcomes that underpinned the rezoning. Those outcomes, including landscape protection, servicing, productive land management, infrastructure efficiency and reverse sensitivity, remain unchanged. In my opinion, the proposal exemplifies the type of adaptive response anticipated by Objective 4. It recognises that urban environments are not static and that planning decisions should be sufficiently responsive to accommodate changing housing preferences, provided the underlying environmental outcomes continue to be achieved.
Objective 5	Planning decisions relating to urban environments, and FDSs,	

	take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).	This objective is directed towards planning decisions taking account of Treaty principles. There are no issues before the Hearing indicating inconsistency with this objective.
Objective 6	Local authority decisions on urban development that affect urban environments are: (a) integrated with infrastructure planning and funding decisions; and (b) strategic over the medium term and long term; and (c) responsive, particularly in relation to proposals that would supply significant development capacity.	The proposal is consistent with Objective 6 as it represents an efficient and integrated use of infrastructure that has already been strategically planned, consented and is currently being delivered through the Shannon Farm development. Plan Change 14 anticipated significant investment in transport, three waters, open space and other supporting infrastructure to facilitate a comprehensively planned rural lifestyle community. Rather than requiring new or unplanned infrastructure, the proposal capitalises on that existing investment by accommodating additional development capacity within the established infrastructure network. The evidence of Mr Colegrave and the Applicant's engineering experts confirms that the existing infrastructure has sufficient capacity to service the additional allotments without compromising its operation or requiring material upgrades. As such, the proposal represents a logical and efficient use of infrastructure already committed to through the implementation of Plan Change 14. Furthermore, the proposal demonstrates the type of responsiveness contemplated by Objective 6. While the strategic planning framework established through Plan Change 14 remains entirely appropriate, the evidence demonstrates that market demand has evolved since 2022. The proposal responds to that change by refining the subdivision layout within an existing master-planned development, thereby increasing development capacity without undermining the strategic infrastructure planning that underpins Shannon Farm.
Objective 7	Local authorities have robust and frequently updated information about their urban environments and use it to inform planning decisions.	This objective relates to local authorities maintaining robust information to inform planning decisions. It is directed to Council rather than the merits of the application.
Objective 8	New Zealand’s urban environments: (a) support reductions in greenhouse gas emissions; and (b) are resilient to the current and future	The proposal consolidates growth within an existing planned and serviced development, reducing pressure for dispersed rural subdivision. It makes efficient use of existing infrastructure and does not give rise to any identified climate change concerns.

	effects of climate change	
Part 2.2: Policies		
Policy 1	Planning decisions contribute to well-functioning urban environments, which are urban environments that, as a minimum: (a) have or enable a variety of homes that: (i) meet the needs, in terms of type, price, and location, of different households; and (ii) enable Māori to express their cultural traditions and norms; and (b) have or enable a variety of sites that are suitable for different business sectors in terms of location and site size; and (c) have good accessibility for all people between housing, jobs, community services, natural spaces, and open spaces, including by way of public or active transport; and (d) support, and limit as much as possible adverse impacts on, the competitive operation of land and development markets; and	The proposal contributes to a well-functioning urban environment in the manner contemplated by Policy 1. The evidence of Mr Colegrave demonstrates that Cromwell continues to experience sustained population and employment growth, resulting in strong demand for rural lifestyle housing, particularly within the 1,500m² to 3,000m² allotment range. The proposal responds directly to that demand by increasing the supply and diversity of housing choice within an existing master-planned community, thereby supporting a more competitive and responsive land and development market. The proposal also makes efficient use of land and infrastructure already established through Plan Change 14. Significant investment has already been made in transport, three waters, open space and community infrastructure to support the Shannon Farm development. By accommodating additional allotments within that existing framework, the proposal maximises the benefit derived from that investment without compromising the environmental outcomes that underpin the Rural Resource Area (5). Furthermore, Shannon Farm was expressly identified through Plan Change 14 as being in close proximity to Cromwell's employment, shops, services and schools, meaning the proposal provides additional housing in a location with convenient access to the facilities and opportunities that support a well-functioning urban environment.

	(e) support reductions in greenhouse gas emissions; and (f) are resilient to the likely current and future effects of climate change.	
Policy 2	Tier 1, 2, and 3 local authorities, at all times, provide at least sufficient development capacity to meet expected demand for housing and for business land over the short term, medium term, and long term.	While Policy 2 is directed primarily at local authorities and their obligation to ensure sufficient development capacity, the proposal is consistent with the intent of the policy. Mr Colegrave's evidence demonstrates that Cromwell continues to experience sustained population and employment growth, with the urban area now forming part of a housing and labour market exceeding 10,000 people. He further concludes that there is strong and continuing demand for rural lifestyle allotments, particularly within the 1,500m² to 3,000m² size range, which remains comparatively under-supplied. By increasing the supply of allotments within this market segment, the proposal contributes to meeting anticipated housing demand and provides additional development capacity within an existing, strategically planned and serviced growth area. In my opinion, this is entirely consistent with the enabling intent of Policy 2.
Policy 3	Only applies to tier 1	n/a
Policy 4	Only applies to tier 1	
Policy 5	Regional policy statements and district plans applying to tier 2 and 3 urban environments enable heights and density of urban form commensurate with the greater of: the level of accessibility by existing or planned active or public transport to a range of commercial activities and community services; or relative demand for housing and business use in that location.	The proposal provides additional housing density commensurate with demonstrated demand for rural lifestyle living within this location. While not conventional urban intensification, it reflects the relative demand identified by Mr Colegrave and utilises an area already identified for residential growth through PC14.
Policy 6	When making planning decisions that affect urban environments, decision-makers	In my opinion, Policy 6 is one of the most relevant provisions of the NPS-UD in the context of this application. While the proposal seeks to increase the number of allotments beyond that originally anticipated through Plan Change 14 and the Rural Resource Area (5) provisions, Policy 6 recognises that planning decisions affecting urban environments should not simply

	have particular regard to the following matters: a) the planned urban built form anticipated by those RMA planning documents that have given effect to this National Policy Statement b) that the planned urban built form in those RMA planning documents may involve significant changes to an area, and those changes: (i) may detract from amenity values appreciated by some people but improve amenity values appreciated by other people, communities, and future generations, including by providing increased and varied housing densities and types; and (ii) are not, of themselves, an adverse effect c) the benefits of urban development that are	seek to preserve the planned urban form established through existing planning documents. Rather, decision-makers are directed to have particular regard to the benefits of urban development, the contribution additional development capacity can make towards achieving the objectives of the NPS-UD, and that changes to the planned urban form are not, of themselves, an adverse effect. I acknowledge that the proposal departs from aspects of the density framework established through Plan Change 14. However, that departure should be viewed in its proper context. The strategic planning outcome reached through Plan Change 14 (that Shannon Farm is an appropriate location for rural lifestyle development supported by comprehensive infrastructure and subject to robust landscape, servicing and productive land controls) is not challenged by this application. Rather, the proposal refines the subdivision layout within that established framework in response to changing market conditions. As outlined in Mr Colegrave's evidence, market demand has evolved since Plan Change 14 was approved. His evidence demonstrates that the strongest demand now exists for smaller rural lifestyle allotments in the 1,500m² to 3,000m² range, a market segment that is comparatively under-supplied. That conclusion is reinforced by the practical evidence of Mr Croft, whose experience marketing the initial stages of Shannon Farm confirms that purchaser preferences have shifted towards smaller allotments. In my opinion, Policy 6 anticipates precisely this type of situation by recognising that planning decisions should be responsive to changing circumstances and should have particular regard to the benefits associated with providing additional and more diverse housing opportunities. In myview, the increase in residential yield is not, in itself, an adverse planning outcome. The relevant question is whether that increase undermines the environmental and strategic outcomes sought by the planning framework. As discussed elsewhere in my evidence, the proposal continues to achieve the fundamental outcomes of the Rural Resource Area (5), including the protection of landscape values, the maintenance of rural amenity, efficient infrastructure provision, management of reverse sensitivity, and the retention of the Structure Plan's strategic framework. In those circumstances, I consider the proposal represents an appropriate evolution of the Shannon Farm development rather than a departure from its underlying planning purpose. I therefore consider the proposal is entirely consistent with the direction of Policy 6. It provides additional development capacity within an existing master-planned community, responds to demonstrated changes in housing demand, makes more efficient use of significant infrastructure investment already committed through Plan Change 14, and contributes to the creation of a well-functioning urban environment without compromising the environmental outcomes that underpinned the original rezoning.

	consistent with well-functioning urban environments (as described in Policy 1) d) any relevant contribution that will be made to meeting the requirements of this National Policy Statement to provide or realise development capacity e) the likely current and future effects of climate change.	
Policy 7	**n/a**	n/a
Policy 8	Local authority decisions affecting urban environments are responsive to plan changes that would add significantly to development capacity and contribute to well functioning urban environments, even if the development capacity is: (a) unanticipated by RMA planning documents; or (b) out-of-sequence with planned land release.	While the proposal does not involve an unanticipated plan change, it responds to demonstrated market demand by providing additional development capacity within an existing planned development. It is consistent with the responsive and enabling approach promoted by this policy.
Policy 10	Tier 1, 2, and 3 local authorities: (a) that share jurisdiction over urban environments work together when implementing this	n/a

	National Policy Statement; and (b) engage with providers of development infrastructure and additional infrastructure to achieve integrated land use and infrastructure planning; and (c) engage with the development sector to identify significant opportunities for urban development.	
Policy 11	In relation to car parking: (a) the district plans of tier 1, 2, and 3 territorial authorities do not set minimum car parking rate requirements, other than for accessible car parks; and (b) tier 1, 2, and 3 local authorities are strongly encouraged to manage effects associated with the supply and demand of car parking through comprehensive parking management plans.	As a tier 3 authority, Central Otago District Council are not to set minimum carparks.

Assessment of relevant provisions of the Central Otago District Plan

Provision	Description	Assessment	Aligns with conclusion of s42A Report?
4.3.1	Objective - Needs of the District's People and Communities To recognise that communities need to provide for their social, economic and cultural wellbeing, and for their health and safety at the same time as ensuring environmental quality is maintained and enhanced.	The proposal responds positively to this objective by providing additional rural lifestyle living opportunities meeting an identifiable market demand identified in Mr Colegrave's evidence that support the social and economic wellbeing of the community, through expanded housing choice to respond to the desired demand and efficient use of zoned land. This point is somewhat agreed between myself and the s42A author. In my view, this clearly represents providing for the needs of the community. As per Mr Milne's evidence and that of Mr Buchanan's, the development integrates with existing infrastructure and maintains key environmental outcomes through appropriate landscape design, protection of significant landforms, and adherence to servicing and design controls. As such, the proposal strikes an appropriate balance between enabling community wellbeing and maintaining environmental quality. The proposal is overall considered to be **consistent** with this policy.	No. The s42A report considers that despite the proposal providing additional rural lifestyle housing opportunities (which in turn provides for wellbeing of the community, the proposal will not maintain environmental quality in respect of RLA6, the SAL, rural character, and the Structure Plan framework. I disagree with Mr Monthule-McIntosh's assessment for the reasons noted herein.
4.3.2	To protect the Districts outstanding natural landscapes and outstanding natural features, and land in the Upper Manorburn/Lake Onslow Landscape Management Area (including landforms) from the adverse effects of inappropriate subdivision, use and development.	As per Mr Milne's evidence, the proposal avoids effects on the ONL and therefore the inherent purpose of this objective, being the protection of ONLs, is achieved.	Yes. Mr Monthule-McIntosh and I agree that the ONL values are not affected.

4.4.1	To recognise the District's outstanding natural landscapes and outstanding natural features and land in the Upper Manorburn/Lake Onslow Landscape Management Area which: a. Are unique to the district, region or New Zealand; or b. Are representative of a particular landform or land cover occurring in the Central Otago District or of the collective characteristics and features which give the District it's particular character; or c. Represent areas of cultural or historic significance in the district, region or New Zealand; or d. Contain visually or scientifically outstanding geological features; or e. Have characteristics of cultural, historical and spiritual value that are significant to Kai Tahu ki Otago; f. Have high natural character values and high landscape quality that can be distinguished from the general landscapes of the Central Otago District	As per Objective 4.3.2, the proposal avoids effects on the ONL and therefore the inherent purpose of this policy is met.	

4.3.3	Objective - Landscape and Amenity Values To maintain and where practicable enhance rural amenity values created by the open space, landscape, natural character and built environment values of the District's rural environment, and to maintain the open natural character of the hills and ranges.	The landscape qualities have been thoroughly assessed by RMM and Mr Milne's subsequent evidence. Overall, the landscape assessment concludes that the proposed development represents an incremental extension of the consented Shannon Farm subdivision that responds appropriately to the landform, planning framework, and the area's anticipated rural lifestyle development pattern. Expanding on this, the proposed additional Lots in the RLA 6 are confined to the lower reaches of the SAL and will maintain the values of that SAL being the legibility of the landform. I agree with Mr Milne's evidence that the Rural Lifestyle Production Area, horticultural land, open space network, amenity edges, shelterbelts, and those parts of RLAs 3 and 4 unaffected by the proposal all remain unchanged and will continue to make a significant contribution to the open space and rural amenity values of the receiving environment. Furthermore, the proposed allotments remain substantial in size, with development confined to defined building platforms, ensuring that a strong sense of openness is retained across the development. Relying on this assessment, the proposal is considered to at least maintain rural amenity values created by the open space, landscape, natural character and built environment values of the District's rural environment, and to maintain the open natural character of the hills and ranges. Accordingly, the proposal is consistent with this Objective.	No. Mr Monthule-McIntosh considers the proposal will materially reduce openness, weaken the legibility of the foothill transition, and give rise to more than minor adverse landscape, visual amenity and rural character effects. I disagree. While there will be reductions in open space by virtue of additional Lots, the provision of building platforms, and the allotment sizes generally still provides a degree of open space. Internally, while the development will be more intensive than originally anticipated, it nevertheless provides a high-quality rural living environment that responds to contemporary market demand without undermining the fundamental landscape, amenity and character outcomes established through Plan Change 14. Accordingly, I do not agree that the proposal gives rise to significant adverse effects on rural character.

4.4.2	Policy– Landscape and Amenity Values To manage the effects of land use activities and subdivision to ensure that adverse effects on the open space, landscape, natural character and amenity values of the rural environment are avoided, remedied or mitigated through: (a) The design and location of structures and works, particularly in respect of the open natural character of hills and ranges, skylines, prominent places and natural features, (b) Development which is compatible with the surrounding environment including the amenity values of adjoining properties, (c) The ability to adequately dispose of effluent on site, (d) Controlling the generation of noise in back country areas, (e) The location of tree planting, particularly in respect of landscape values, natural features and ecological values, (f) Controlling the spread of wilding trees. (g) Encouraging the location and design of buildings to maintain the open natural character	Expanding on Objective 4.3.3, the proposal is consistent with the Landscape and Amenity Values policies of the District Plan. As confirmed in the landscape assessment, the subdivision has been carefully designed to integrate with the landform, with additional lots in RLA 6 located at the lower slopes of the SAL to maintain the legibility of the upper hills as defined for the SAL. Building platforms are sited to avoid skylines and prominent landforms, and further mitigation is achieved through fencing restrictions and naturalistic planting patterns. The proposed development remains compatible with the surrounding rural lifestyle context and will not detract from the amenity of adjoining properties. Servicing, including wastewater disposal, will be managed via reticulated infrastructure, avoiding on-site effluent concerns. No noise-generating activities or adverse tree planting effects are proposed, and wilding tree spread will be avoided through appropriate species selection.	

	of hills and ranges without compromising the landscape and amenity values of prominent hillsides and terraces.	Overall, the proposal avoids adverse effects on the District's open space, landscape, natural character and amenity values, and is therefore **consistent** with the relevant policy framework.	
4.4.3	To ensure that the development of infrastructure in the rural environment promotes sustainable management by: a. Requiring developers to contribute a fair and reasonable proportion of the costs involved, and b. Maintaining and enhancing the safe and efficient operation of the infrastructure network (including roading), while avoiding, remedying or mitigating adverse effects.	This policy seeks to ensure that infrastructure within the rural environment is developed in a manner that promotes sustainable management by requiring developers to contribute a fair and reasonable share of infrastructure costs while maintaining the safe and efficient operation of the infrastructure network. In my opinion, the proposal is consistent with this policy. The subdivision utilises and extends the integrated infrastructure framework established through Plan Change 14, including the existing road network, three waters infrastructure, servicing corridors and open space network. Mr Buchanan confirms that the additional allotments can be appropriately serviced and that the proposed infrastructure upgrades are sufficient to accommodate the increased residential yield. In terms of Policy (a), the applicant acknowledges responsibility for funding the infrastructure necessary to service the additional development. In relation to Policy (b), the evidence of Mr Carr demonstrates that the transport effects associated with the proposal can be appropriately managed and that the internal road network will continue to operate safely and efficiently which CODC agrees. Likewise, CODC's engineering team confirms that water, wastewater and stormwater infrastructure is capable of servicing the proposal, subject to the	Yes. Mr Monthule-McIntosh agrees that this proposal promotes sustainable management of infrastructure.

		recommended conditions of consent. Any future site-specific matters, such as the location of individual vehicle crossings, can be appropriately addressed at the time those accesses are established. Overall, I consider the proposal promotes the efficient use of existing infrastructure while maintaining the safe and efficient operation of the wider infrastructure network. It is therefore consistent with the intent of this policy.	
Objective 4.3.4	To maintain and enhance the quality of the District's recreation resources and public access to those resources.	The proposal does not remove/alter or modify any of the approved recreational spaces that are inherent to the overall subdivision design. The proposal is consistent here.	Yes. Mr Monthule-McIntosh agrees that the approved recreation framework remains available and appropriate to serve the development.
Objective 4.3.5 4.3.6	To maintain and enhance the quality of the District's water resources by avoiding, remedying or mitigating the adverse effects of land use activities adjacent to water bodies.	The proposal does not involve development within waterbody margins in a manner that would compromise natural character or public access. Potential construction-phase and stormwater effects can be managed through the existing earthworks management framework, regional consent framework and recommended conditions.	Yes. Mr Monthule-McIntosh agrees that the proposal does not involve development within waterbody margins in a manner that would compromise natural character or public access.
Objective 4.3.6	To preserve the natural character of the District's water bodies and their margins.		
Objective 4.3.7	To maintain the life-supporting capacity of the District's soil resource to ensure that the needs of present and future generations are met.	The proposal does not affect the Rural Lifestyle Production Area or alter the productive land controls established through PC14.	Yes. Mr Monthule-McIntosh agrees that the proposal does not affect the Rural Lifestyle Production Area or alter the productive land controls established through PC14. While the proposal involves substantial earthworks, those works can be managed through conditions and the existing construction management framework.

Objective 4.3.8	To recognise and provide for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.	The proposal does not involve any works that would affect significant indigenous vegetation or significant habitats of indigenous fauna.	Yes. Mr Monthule-McIntosh agrees that no significant indigenous vegetation, wetlands, waterbodies, or other ecological features have been identified that would be adversely affected by the proposed additional lots or associated works.
4.4.8	Policy - Adverse Effects on the Amenity Values of Neighbouring Properties. To ensure that the effects associated with some activities including (but not limited to): (a) Noise (including noise associated with traffic generation, night time operations), and vibration, (b) The generation of a high level of traffic, in particular heavy vehicles, (c) Glare, particularly from building finish, (d) A reduction in visual amenity due to excessive signage and the storage of goods or waste products on the site, (e) The generation of odour, dusts, wastes and hazardous substances, and (f) The use and/or storage of hazardous goods or substances do not significantly adversely affect the amenity values and privacy of neighbouring properties or the safe and efficient operation of the roading network.	The adverse effects on adjacent properties has been thoroughly canvassed in the AEE assessment where it is concluded that effects will be less than minor. As such, the proposal is **consistent** with this policy.	Yes. Mr Monthule-McIntosh agrees that the proposal does not adversely affect the amenity values and privacy of neighbouring properties or the safe and efficient operation of the roading network.
4.4.9	Policy - Effects of Rural Activities	Within the Rural Resource Area (5) Zone, Rule 4.7.6.E(b), (c) and (e) (relating to management of noise generating activities and acoustic insulation)	Partially. Mr Monthule-McIntosh considers the proposal is generally consistent through recognition of the controls established and

	To recognise that some rural activities, particularly those of a short duration or seasonal nature, often generate noise and other effects that can disturb neighbours by ensuring that new developments locating near such activities recognise and accept the prevailing environmental characteristics associated with production and other activities found in the Rural Resource Area.	have been updated to apply to future residential activities within the Zone, in order to safeguard legitimate rural activities in the area to operate unimpeded, and manage reverse sensitivity effects. These rules will equally apply to the additional Lots. Recognising that the proposed allotments are to sit within the context of an established (in terms of baseline) residential context, the proposal is not considered to give rise to additional effects on rural activities. The proposal is therefore **consistent** with this provision.	integrated into the District Plan. Mr Monthule-McIntosh considers that the increase in Lots along the boundary would not materially alter those mechanisms. I disagree with Mr Monthule-McIntosh that it is only partially consistent. The reality is that the proposal does not increase any degree of reverse sensitivity. The sensitivity of one Lot is no different if it were a number of Lots. The point is however that the District Plan controls remain binding on the additional Lots.
4.3.7	Objective - Soil Resource To maintain the life-supporting capacity of the District's soil resource to ensure that the needs of present and future generations are met.	The intensification is occurring within existing established (in terms of the consented baseline) Rural Lifestyle Areas and does not affect the RLPA which has identified soils that are suited for primary production. The proposal is therefore not considered to compromise the life-supporting capacity of the District's soil resource and is therefore **consistent** with this policy.	Yes, as above
4.4.10	To ensure that the subdivision and use of land in the Rural Resource Area avoids, remedies or mitigates adverse effects on: a. The open space, landscape and natural character amenity values of the rural environment in particular the hills and ranges,	Policy 4.4.10 seeks to ensure that subdivision and development within the Rural Resource Area avoids, remedies or mitigates adverse effects on a range of environmental values, with minimum and average allotment sizes identified as one mechanism for achieving those outcomes. In my opinion, the proposal is generally consistent with this policy. While the proposal departs from the minimum allotment size framework within parts of the Rural Resource Area (5), I do not consider	No. Mr Monthule-McIntosh considers that this policy recognises the role of allotment size and subdivision design in managing adverse effects on open space, landscape, natural character, amenity values, soils, heritage, ecology, water quality, roading and infrastructure. Mr Monthule-McIntosh's assessment is that the proposal would undermine the allotment size and spatial framework established for RRA(5), particularly in relation to RLA6 and the SAL

	b. The natural character and values of the District's wetlands, lakes, rivers and their margins, c. The production and amenity values of neighbouring properties, d. The safety and efficiency of the roading network, e. The loss of soils with special qualities, f. The ecological values of significant indigenous vegetation and significant habitats of indigenous fauna, g. The heritage and cultural values of the District, h. The water quality of the District's surface and groundwater resources, and i. Public access to or along the rivers and lakes of the District, particularly through the use of minimum (and average) allotment sizes	that this necessarily results in the adverse effects identified by the policy. Rather, the evidence I have relied on demonstrates that the relevant environmental outcomes continue to be achieved. In particular, I am satisfied that the proposal maintains the values of the Significant Amenity Landscape and the open space framework of Shannon Farm, while continuing to protect the Outstanding Natural Landscape and the legibility of the landform. As discussed by Mr Milne, the strategic landscape structure established through the Structure Plan, including the No Build Area, Rural Lifestyle Production Area, open space network and landscape controls, remains intact. The proposal will not adversely affect the natural character or values of wetlands, lakes or rivers, the productive capacity or amenity of neighbouring properties, ecological or heritage values, water quality, or public access. The transport evidence confirms that the safe and efficient operation of the roading network can be maintained, while the servicing evidence demonstrates that the proposal can be appropriately serviced without creating unacceptable infrastructure effects. While minimum and average allotment sizes are an important component of the District Plan framework, this policy makes clear that they are a means of managing environmental effects rather than an objective in their own right. This is consistent with my opinion on Policy 4.4.18 and the fact that the rules are merely tools, and that the	interface. I consider this is an incorrect interpretation of the policy. The proposal indeed breaches the lot sizes, but I rely on the evidence submitted to conclude that the environment outcomes that Policy 4.4.10 seek to achieve are met, as detailed in my assessment herein.

		focus of an infringement to density, is that of the outcome that the objective is seeking to achieve. I consider the proposal continues to avoid, remedy or mitigate the adverse effects identified by Policy 4.4.10, notwithstanding the proposed reduction in allotment sizes. Accordingly, I consider the proposal is generally consistent with the overall intent of this policy.	
Policy 4.4.12	To encourage land use practices that avoid, remedy or mitigate weed infestation, in particular wilding tree spread, and the spread of pest plants and animals throughout the district.	The underlying land use practice in this case, is that of a high quality rural residential lifestyle enclave which in turn is expected to manage the effects of wilding species. The proposal is consistent with this policy.	Yes. Mr Monthule-McIntosh agrees that the proposal does not raise any particular weed or pest management issue beyond those already managed through the Shannon Farm framework and recommended conditions
16.3.1	To ensure that subdivision avoids, remedies, or mitigates adverse effects on the safe and efficient operation of the districts roading network.	As per the transport assessment, it is considered that the additional Lots will not adversely affect the safe and efficient operation of the roading network. The proposal is therefore **consistent** with this policy.	Yes
16.3.2	To ensure that subdivisions provide all necessary services and infrastructure without adversely affecting the public interest and the ongoing viability of those services and infrastructure.	As per the infrastructure assessment, it is considered that the proposed additional Lots can be accommodated within the consented infrastructure framework without adversely affecting the public interest and the ongoing viability of those services and infrastructure. The proposal is therefore **consistent** with this policy.	Yes

16.3.3	To ensure that subdivision does not facilitate development that may potentially be at risk from hazards.	The proposal does not exacerbate any natural hazard risks and is **consistent** with this policy.	Yes
16.3.4	To ensure, where appropriate, that amenity values of the District created by the open space, landscape and natural character values, and areas of significant indigenous vegetation, significant habitat of statutorily managed sports fish and game are not adversely affected by subdivision.	As per Mr Milne's evidence, I consider the proposal is **consistent** with this policy.	No. Mr Monthule-McIntosh considers the proposal would adversely affect landscape, natural character and amenity values within the various Rural Lifestyle Areas within the RuRA(5) and, in particular, reduce the open foothill character anticipated for RLA6 by the Structure Plan.
16.3.5	To ensure that subdivision does not facilitate development that may compromise the life-supporting capacity of the District's water and soil resources.	As discussed above, the proposal does not compromise life-supporting capacity of soils.	Yes
16.3.7	To ensure that subdivision contributes to the open space, recreation and reserve needs of the community.	The proposal does not compromise the approved open space, recreation or access network.	Yes. Mr Monthule-McIntosh agrees the proposal does not compromise the approved open space, recreation or access network.
16.3.9	To ensure that the physical works involved in preparing land that is part of the subdivision avoids, remedies or mitigates adverse effects on: **a.** The stability of land. **b.** Water quality within natural watercourses and the stability of their margins. **c.** Neighbouring properties in respect of the effects of noise, dust and vibration.	All works will be appropriately managed by way of an EMP, as to be expected. The proposal is **consistent** with this policy.	Yes. Mr Monthule-McIntosh agrees that effects can be mitigated.
16.3.10	To ensure subdivisions are designed to facilitate an appropriate and co-ordinated ultimate pattern of development having regard to the particular environment within which the subdivision is located.	I consider that this policy is met in that the proposal seeks to redefine the subdivision at an early stage to account for the change in market dynamics. The revised subdivision pattern is not an arbitrary increase in density, but a targeted response to demonstrated changes in market demand since	No. Mr Monthule-McIntosh considers that the proposal would depart from the Structure Plan by increasing density and altering the intended role of RLA6, undermining the coordinated development pattern.

		Plan Change 14 was approved. As explained by Mr Colegrave, the market has evolved such that the originally anticipated lot size distribution no longer reflects purchaser preferences. In that sense, refining the subdivision layout within an established master-planned development is, in my view, entirely consistent with facilitating an appropriate ultimate pattern of development.	I do not agree with Mr McIntosh's conclusion that the proposal undermines the coordinated pattern of development anticipated by the Structure Plan. While the proposal increases the residential yield and refines the subdivision pattern within RLAs 3, 4 and 6, it remains a comprehensive, master-planned extension of the consented Shannon Farm development. The proposal utilises the established roading, servicing, open space and landscape framework, and does not result in fragmented or ad hoc development. Rather, it represents a coordinated refinement of an already integrated subdivision. In my opinion, the purpose of Policy 16.3.10 is to ensure that subdivision occurs in a planned and integrated manner, having regard to the characteristics of the receiving environment. Those outcomes continue to be achieved. While I acknowledge that the proposal departs from aspects of the Structure Plan, particularly in relation to density and the subdivision of RLA6, I do not consider those changes result in an uncoordinated pattern of development as inferred by Mr McIntosh. In my view, the proposal therefore continues to facilitate an appropriate and coordinated pattern of development, consistent with the intent of Policy 16.3.10.
16.4.7	To require that the design of subdivision, where relevant to the intended use, provides for the following matters: a. Facilitates convenient, safe and efficient access to all allotments including pedestrian access where appropriate.	Policy 16.4.7 requires that subdivision design appropriately responds to the intended use of the land by ensuring that allotments are well serviced, accessible, integrated with infrastructure and capable of accommodating future development in an efficient manner.	No. Mr Monthule-McIntosh considers that while access, servicing and open space are adequately addressed, the proposal does not achieve an appropriate overall design outcome or sufficiently respond to landform and earthworks considerations.

	b. Facilitates the safe and efficient provision and operation of services and infrastructure. c. Facilitates access to passive solar energy resources. d. Facilitates any foreseeable subsequent development or redevelopment including the economic provision of roading and network utility services. e. Facilitates adequate provision of, or contribution to, the open space, recreational and reserve needs of the community with physical links to existing reserve areas where this is practicable. f. Facilitates an appropriate level of access to heritage sites, natural features and water bodies where appropriate. g. Facilitates development which keeps earthworks to a minimum. h. Facilitates retention of the heritage values of a site or area.	In my opinion, the proposal is consistent with this policy. The subdivision builds upon the comprehensive master-planned framework established through Shannon Farm and has been designed to ensure that each allotment can be conveniently, safely and efficiently accessed. As discussed by Mr Carr, the internal road network will continue to operate safely and efficiently, while any future site-specific access matters can be appropriately addressed at the time vehicle crossings are established. The proposal also facilitates the efficient provision and operation of infrastructure by utilising the existing roading, three waters and servicing network established through the approved subdivision. The additional allotments are accommodated within this integrated servicing framework, making efficient use of existing infrastructure while providing for the orderly development of the remaining stages of Shannon Farm. The subdivision continues to provide appropriately sized building platforms capable of accommodating dwellings with good access to passive solar energy, while facilitating the efficient future development of each allotment. I am also satisfied that the proposal continues to provide an appropriate level of open space and recreational opportunity through the retention of the established reserve and open space network, together with pedestrian connections integrated throughout the subdivision.	I entirely disagree with this conclusion, which is inherently broad brush and overlooks the fact that the proposal is inherently consistent with the various directives of this policy. As per my assessment, I consider the proposal comfortably aligns with this Policy.

		There are no identified adverse effects on heritage values, natural features requiring public access, or other matters addressed by this policy. While the proposal requires additional earthworks, particularly within RLA6, I do not consider these are excessive or inconsistent with the intended development of the site. The extent of earthworks reflects the site's natural topography and has been appropriately considered by the applicant's technical experts. Furthermore, the earthworks remain subject to the wider landscape framework, building platform controls and mitigation measures that form part of the Shannon Farm development. I consider the proposal is entirely **consistent** with this policy.	

Policy 4.4.18 specific provisions

Provision	Description	Assessment	Aligns with conclusion of s42A Report?
4.4.18	To provide for rural lifestyle subdivision and development while avoiding, remedying or mitigating adverse effects on the environment by:		
a	Requiring subdivision and development to be undertaken in general accordance with the Structure Plan in Schedule 19.23;	While the proposal is not directly in accordance with the Structure Plan insofar as it relates to allotment sizes and the provision of allotments in the RLA 6 Zone, the intensification is inherently confined to areas that have been deemed appropriate in terms of residential development. These locations were previously determined as appropriate in that they retain the productive lower lying areas while respecting the landscape values	No. Mr Monthule-McIntosh considers the proposal is contrary where as I consider the proposal is not entirely consistent with this policy in isolation.

		of the upper slopes of the SAL and more broadly, the ONL. Added to this, this directive is only one matter within a broader suite of directives that overall, seek to achieve the purpose of Objective 4.3.10. Much like my assessment of Lot sizes, the structure plan is a tool to assist in guiding development to achieve the outcomes intend by Objective 4.3.10 (and others). Simply not adhering to the Structure Plan does not automatically infer or confirms that the proposal is inappropriate. As per the evidence of Mr Milne, I consider that the intent of the Objective is still achieved, despite non-compliance. While not entirely consistent with the Structure Plan, the proposal is generally **not contrary** to this provision.	
b	Integrating a range of complementary activities within the rural setting, including: • Rural living • Farming and agriculture • Horticulture • Recreation and Open Space	The proposal achieves the overall intent of the Zone through the provision of rural residential living is a holistic and master planned development that accommodates farming, agriculture, horticulture and open space, all the while avoiding ad hoc and fragmented development. The proposal is **consistent** with this policy.	Yes. Mr Monthule-McIntosh agrees that the proposal would not fundamentally alter the wider integration of rural living, open space, recreation and productive land established through PC14 and RC220396. The Rural Lifestyle Production Area (RLPA) would remain unaffected, and the approved recreation and open space framework would be retained.
c	Adhering to minimum and average allotment sizes for subdivision	While the proposed subdivision does not strictly adhere to the minimum and average allotment sizes prescribed for the respective Rural Lifestyle Areas, it continues to achieve the broader	No. Mr Monthule-McIntosh notes the minimum allotment sizes are breached.

		outcomes anticipated by the Rural Resource Area (5) Zone. This policy directive is not to be read in isolation. It is merely a directive to achieve the broader outcome sought by Objective 4.3.10. The proposed allotment sizes, while smaller in density than that prescribed to the RLA 3, 4 and 6 areas, remain generous in a rural living context and have been designed to integrate with the existing consented development pattern, while still maintaining a variation in densities. The variation in size is driven by a clear market demand for allotments in the ~2,000m² range, which has been evidenced through the uptake of earlier Lots and the evidence of Mr Colegrave and Mr Croft. Of particular relevance, the design avoids ad hoc fragmentation through implementing these Lots within the initial development phase and maintains an overall pattern that reinforces the intended rural lifestyle character of the area. As noted in the accompanying landscape assessment, the proposal maintains appropriate levels of open space, visual coherence, and integration with the surrounding landform. Therefore, while the proposal does not strictly comply with the minimum and average size standards, it is considered consistent with the underlying purpose of the policy, which is to manage density in a way that supports rural amenity, open space, and landscape values. Overall, while the proposal is **not consistent** to the specifics of this policy in isolation, the overall intent	

		of the policy when considered holistically within the broader spectrum and purpose of Policy 4.4.18 is generally achieved.	
d	Ensuring that subdivision is designed to: i. facilitate convenient, safe, efficient and easy access for vehicles, pedestrians and cyclists; and ii. facilitate the safe and efficient operation and the economic provision of roading and network utility services to secure an appropriate, integrated and planned development; and iii. have regard to the natural landform in Rural Lifestyle Areas 1-6, including through the alignment of lot boundaries and roading, and landscaping and planting design within public spaces;	As per the traffic assessment, the proposed additional Lots are able to be serviced in terms of transport and access requirements. The proposal is entirely **consistent** with this provision.	Yes. Mr Monthule-McIntosh considers the proposal is partly consistent. Mr Monthule-McIntosh notes that he does not consider the proposal fully satisfies the broader design component of clause (d)(iii), as the altered lot pattern in RLA6 and the degree of intensification across RLAs 3 and 4 would weaken the intended relationship between subdivision layout, landform and landscape response. I am not sure how one can reconcile with the assessment when the Lots within RLA 6 are inherently designed to follow the underlying landform.
e	Ensuring that the subdivision layout within each contiguous area of RLA1 provides for a range of allotment sizes and shapes and comprises pockets of smaller lots offset by larger lots and open space;	This policy relates to RLA 1 which remains unaffected by this proposal. As such, this policy is **not relevant.**	Yes. Mr Monthule-McIntosh agrees this is not relevant.
f	Encouraging the extent of earthworks to not exceed that required for the installation of services, access and building platforms, while recognising that the contouring of land may either be required for, or limited by, geotechnical and/or aesthetic considerations;	Minimal additional earthworks are required for the purposes of additional access. Otherwise, the site is subject to an approved EMP which manages effects of earthworks. The proposed additional works can be integrated within this framework. The proposal is **consistent** with this provision.	Yes. Mr Monthule-McIntosh agrees.

g	Managing the character and amenity values of the Rural Resource Area (5) and surrounding areas by controlling land use activities, avoiding building within the no build areas shown on the Structure Plan, and avoiding urban forms of subdivision and development;	The proposal appropriately manages the character and amenity values of the Rural Resource Area (5) by maintaining consistency with the Structure Plan in terms of the location of the additional Lots and consciously avoiding any development within the identified No Build Area. This approach ensures the protection of the area's open space and landscape values, particularly in relation to the upper slopes and more visually sensitive areas. The subdivision layout avoids any urban form or pattern of development, with Lots designed to follow landform and integrate with the surrounding rural lifestyle context. The proposal maintains a sense of openness and rural character as assessed by RMM, reinforced through the continued use of controls on building location, design, and landscaping. Accordingly, the proposal is **consistent** with this policy by avoiding development in the No Build Area, controlling land use in a manner that respects the landscape, and maintaining a clear distinction from urban subdivision patterns.	No. Mr Monthule-McIntosh considers the proposal would result in a materially more intensive and homogenous rural lifestyle pattern than anticipated through PC14. Mr Monthule-McIntosh notes that while design controls would assist in managing built form, they do not address the more fundamental character effect arising from the altered subdivision pattern. My assessment differs in that the proposal still represents a fundamentally large lot development that sits within a rural lifestyle context, supported by the surround rural environment. I do not agree that the proposal represents a homogenous outcome when the proposed intensification still achieves the graduated typologies upslope compared with RLA1, albeit in a way that brings the Lot sizes more into line with market demand.
h	Minimising adverse effects of built form resulting from inappropriate building scale, location and external appearance;	Existing Rules in the District Plan requiring consents for new builds will continue to remain unchanged. Proposed platforms on the Lots within RLA 6 will manage the location of development to ensure the retention of open space on the upper slopes. The proposal is **consistent** with this provision.	Yes.

i	Enhancing landscape values through the implementation of planting schemes tailored to specific areas within the Rural Resource Area (5);	No changes are proposed to the planting framework and therefore the proposal remains **consistent** with this provision.	Yes.
j	Providing for an efficient access and open space network	No changes are proposed to the open space network that is to be afforded to the public. The proposal is **consistent** with this provision.	Yes.
k	Providing adequate infrastructure to service development while minimising adverse effects	As per the Infrastructure Feasibility Assessment, the development can be appropriately accommodated by the existing infrastructure provided under RC220396. The proposal is **consistent** with this provision.	Yes.
l	Avoiding building in high risk natural hazard areas	The proposal avoids adding lots to areas of high risk natural hazards. The proposal is **consistent** with this provision.	Yes.
m	Managing the potential for reverse sensitivity effects on adjoining rural land uses;	The infilling of areas RLA 3 and 4 is not considered to give rise to any additional reverse sensitivity effects given these areas are predominantly internalised to the site. In addition, the RLA 6 area is located centrally and upslope within the wider Rural Resource Area (5) such that substantial separation distances are afforded from the surrounding properties which operate in a rural capacity. Accordingly, it is considered that the proposed intensification will have no more than minor adverse reverse sensitivity effects.	Yes.

		Furthermore, existing controls in the District Plan remains unchanged and includes: • Standards requiring that no audible bird scaring devices are used in the Horticulture Area (rule 4.7.6E(b)). The cherry orchard extension will be netted, consistent with the appellant's existing operation; • Standards requiring that there be no fixed wind machines within the RLPA, with provision made for portable machines only (rule 4.7.6E(c)); and • Standards prescribing the number, location and model of wind machines for frost control to be placed in the Horticulture Area (rule 4.7.6E(c)). The proposal is **consistent** with this provision.	
n	Maintaining the productive potential of the Rural Lifestyle Production Area through ensuring that the allotment sizes and location of residential activity within the Rural Lifestyle Production Area do not prevent or significantly inhibit its productive use;	No changes are proposed to the RLPA and therefore this provision is **not relevant.**	Yes.
o	Ensuring the Rural Lifestyle Production Area is used for productive purposes alongside providing for rural living by requiring 50% of each allotment to be planted for productive purposes prior to the establishment of residential activity;	No changes are proposed to the RLPA and therefore this provision is **not relevant.**	Yes.

p	Complementing, rather than competing with, urban areas in the district by providing a focus on rural living activities.	The proposal reinforces the rural living character of the zone and does not compete with urban zones. The typology remains distinct from urban forms and complements the broader district settlement pattern.	No. Mr Monthule-McIntosh considers that the increased density across RLAs 3, 4 and 6 would result in a greater number of lots comparable in size to those provided for in the Large Lot Residential Zone (Precincts 2 and 3) thereby reducing the distinction between the rural lifestyle role of RRA(5) and the large-lot residential opportunities provided within the District's residential zoning framework. The proposed allotments remain within the range of allotment sizes anticipated for the RRA(5) Zone, and Mr Colegrave identifies that there is demand for these Lot sizes which is not met elsewhere. I therefore disagree with Mr Monthule-McIntosh's conclusion here.
q	Maintaining the open and natural character and legibility of Rural Lifestyle Area 6 by: i. Avoiding subdivision and building in the No Build Area; ii. Enabling building within the "Area for Future Building Platform" provided it is well integrated into the landscape; iii. Other than as provided in ii, avoiding building in the area outside of the No Build Area unless it be demonstrated that the legibility and open and natural character of the Rural Lifestyle Area 6 will be maintained; iv. Avoiding subdivision in the area outside of the No Build Area unless: a. the creation of additional lots is necessary to facilitate rural activity or ecological restoration and use of the land is restricted to such purpose in perpetuity through a legal mechanism; or	With respect to clauses (q)(i) to (q)(iii), the proposal avoids any subdivision or development within the No Build Area, aligning with the explicit direction of the policy. As assessed in Mr Milne's evidence, the proposed lots and associated building platforms are concentrated along existing and consented roads, adjacent to the RLA 4 area. The proposed 1,000m² building platforms are positioned close to the road corridor, limiting encroachment into the more sensitive upper reaches of the SAL. This approach, combined with the retention of the No Build Area and surrounding open pasture, ensures that the values of the SAL is retained. Accordingly, the intent of clause (q)(iii) is met. As per (q)(ii), there is an inherent expectation of development within RLA 6, reflected in the identification of an "Area for Future Building Platform." This indicates a level of acceptance that domestication above the road and within RLA 6	No. Mr Monthule-McIntosh concludes that the inherent additional Lots will not maintain the open and natural character or legibility of RLA6. Rather, Mr McIntosh considers it would materially alter the intended role of RLA6 as a more open foothill area and transition between the developed lower RLAs and the open upper slopes. I consider Mr Monthule-McIntosh's assessment of this directive is too broad brush, recognising that there are a number of matters in this directive alone that this proposal conforms too. In my opinion, his assessment focuses almost exclusively on whether the additional allotments maintain the open and natural character of RLA6, without giving due weight to the proposal's consistency with the balance of the policy. The proposal fully complies with subclause (i), as no subdivision or building is proposed within the identified No Build Area. That area remains

	b. a dwelling has been approved under Rule 4.7.4.xi on each of the lots proposed to be created; and c. in respect of a and b the subdivision will avoid adverse effects on, and maintain, the legibility and open and natural character of the Rural Lifestyle Area 6 and will not result in delineation of boundaries through fencing or planting. v. Requiring that any planting is natural in design and avoids any linear or geometric forms and comprises only native species endemic to the area except for low height producing grass species such as browntop; vi. Requiring that any roads are largely enclosed by planting.	was contemplated at the inception of the RRU(5) Zone, albeit at a smaller scale than currently proposed. Nonetheless, the landscape assessment confirms that the additional allotments can be appropriately absorbed into the wider landscape without compromising the more open upper slopes of the SAL or the legibility of the landform. In relation to clause (q)(iv), the policy provides a pathway for subdivision outside the No Build Area where dwellings have been approved under Rule 4.7.4.xi[1], and where such subdivision avoids adverse effects and maintains the legibility and open, natural character of RLA 6, while also avoiding boundary delineation through fencing or planting. While the first limb of the policy (facilitating rural activity or ecological restoration) is not relevant to this application, the second limb is engaged. The landscape assessment confirms that the proposed building platforms are capable of complying with the District Plan's standards (including Rule 4.7.6), with a height limit of 5m. In addition, the Shannon Farm Design Guidelines provide for robust design controls relating to building siting, height, boundary treatments, and materials. These include requirements for rural-style fencing (e.g., post and rail), low-reflectivity cladding in muted earth tones, and planting that is naturalistic in form and comprised of native species endemic to the area, excluding only low-height productive grass species such as browntop.	protected and continues to perform its intended function of maintaining the legibility of the landform by preventing development from extending onto the more visually prominent upper slopes. Likewise, the proposal is consistent with subclauses (v) and (vi), with planting and roading continuing to be undertaken in accordance with the established Shannon Farm Design Guidelines and Structure Plan framework. The principal point of contention relates to subclauses (ii), (iii) and (iv). I acknowledge that the proposal departs from the Structure Plan by enabling additional subdivision and building outside the identified "Area for Future Building Platform". However, I do not accept that this necessarily results in a failure to maintain the open and natural character or legibility of RLA6. Rather, whether those outcomes are maintained is ultimately a matter of expert landscape assessment. As explained by Mr Milne, the landscape values of the Significant Amenity Landscape within Shannon Farm are fundamentally derived from the legibility of the landform. The proposal retains the No Build Area in its entirety, preserves the open balance land between the proposed development and the upper slopes, confines development to defined building platforms, limits curtilage, controls fencing and planting, and ensures the additional development reads as a cohesive extension of the existing Shannon Farm development. In his opinion, these measures maintain the legibility of the landform and the open character of RLA6, with

[1] Rule 4.7.4.xi reads as follows: Any building within Rural Lifestyle Area 6 that is located outside of the 'No Build' Area shown on the Structure Plan and is not within a residential building platform approved pursuant to Rule 4.7.2.ii.a.vii.b 'Area for locating future platform' is a discretionary activity.

		All curtilage activities will be confined within the identified building platforms, and planting will avoid any linear or geometric patterns. This, together with the strict design controls, is considered sufficient to mitigate the visual and landscape effects of the proposed additional lots and ensure the SAL's character and legibility is maintained. Accordingly, while the proposal involves subdivision in an area subject to a general policy direction to avoid, development is anticipated where qualifying criteria are met. In this case, it is assessed that the design response meets the qualifying criteria under clause (q)(iv)(c). On this basis, and relying on the expert landscape assessment, the proposal is not contrary to the underlying intent of Policy 4.4.18(q). In my assessment, I consider that while q(iii) seeks to avoid subdivision, this is only if the subdivision is unable to satisfy the objective of maintaining the legibility and open and natural character of the Rural Lifestyle Area 6 and will not result in delineation of boundaries through fencing or planting. Relying on the landscape assessment, I consider this criteria is met. Overall, it is assessed that the proposal is **not contrary** to this provision.	landscape effects remaining low to low-moderate, and no more than minor. I agree with that assessment. In my opinion, the policy does not require RLA6 to remain unchanged or entirely free from additional development. Rather, it requires that any development maintains the open and natural character and legibility of the area. While the proposal undoubtedly introduces additional residential allotments, I consider the expert landscape evidence demonstrates that the key landscape outcomes sought by Policy 4.4.18(q) continue to be achieved. Accordingly, although the proposal is not fully consistent with every element of the directive, I do not consider it is contrary to its overall intent or purpose.

CENTRAL OTAGO DISTRICT COUNCIL

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Consent Type: Subdivision and Land Use Consent

Consent Number: RC250155

Purpose: Subdivision consent and land use consent for 44 residential allotments to be incorporated into the approved Shannon Farm subdivision (RC220396, as amended)

Location of Activity: 112 & 144 Ripponvale Road, Cromwell

Legal Description:

RECORD OF TITLE OT7C/632:
SEC 27 BLK III CROMWELL SD
SEC 102 BLK III CROMWELL SD
SEC 99 BLK III CROMWELL SD
SEC 28 BLK III CROMWELL SD
SEC 96 BLK III CROMWELL SD

RECORD OF TITLE OT7C/633:
SEC 26 BLK III CROMWELL SD
SEC 100 BLK III CROMWELL SD

RECORD OF TITLE OT106/99:
SEC 54 BLK III CROMWELL SD

RECORD OF TITLE 126180:
PT SEC 25 BLK III CROMWELL SD
PT RUN 1201R
SEC 11 BLK III CROMWELL SD
SEC 101 BLK III CROMWELL SD
LOT 2 DP 330709
SEC 4 BLK III CROMWELL SD
SEC 103 BLK III CROMWELL SD
SEC 98 BLK III CROMWELL SD
PT SEC 5 BLK III CROMWELL SD

Lapse Date: XXXX 2031, unless the consent has been given effect to before this date.

SUBDIVISION CONDITIONS:

1. The proposed activity must be undertaken in general accordance with the information provided with the resource consent application received by the Council on 10 June 2025,

and further information provided at the hearing and in the applicant's right of reply, and the conditions of consent of RC220396 (as modified by RC220396V3).

2. RC250155 must be exercised in conjunction with RC220396, as varied.

Consent Type:	Variation to Land Use/Subdivision Consent
Consent Number:	RC220396v3 incorporating 220396V1 & 220396V2 &RC220396V4
Purpose:	Changes to allow for an additional 44 residential allotments approved under RC250155
Location of Activity:	112 & 144 Ripponvale Road, Cromwell
Legal Description:	SEC 11 BLK III CROMWELL SD (Record of Title 126180)
Lapse Date:	13 September 2028, unless the consent has been given effect to before this date.

[Additions are shown underlined and deletions shown as struck through – Changes made by Council under 'v3' shown in blue text]
Changes made by applicant shown in red tex

Subdivision Conditions:

1. The subdivision shall be undertaken in accordance with the plans of subdivision being:

   - Shannon Farm Development Lot Layout Overview Sheets 001 and 002 Revision **H**
   - Shannon Farm Development Lot Layout Details Sheets 003 to 013 Revision **H**
   - Shannon Farm Development Staging Sheets 016 and 017 Revision **H**
   - Shannon Farm Development Typical Road Sections Sheets 018 to 021 Revision **H**
   - Shannon Farm Bulk Earthworks Layout Sheets 001 and 002 Revision **H**
   - Shannon Farm Subdivision Water Reticulation Overview Sheets 001 and 002 Revision ~~-~~**H**
   - Shannon Farm Subdivision Wastewater and Stormwater Reticulation Overview Sheet 003 Revision **H**
   - Shannon Farm Subdivision Wastewater Reticulation Overview Sheet 004 Revision **H**
   - Shannon Farm Subdivision Connection to Existing Services Sheet 007 Revision A
   - **Earthworks Plans**

   as amended by the following conditions

2. This subdivision may be staged. For the purposes of issuing approvals under Sections 223 and 224(c) of the Resource Management Act 1991, the conditions of this consent

shall be applied only to the extent that they are relevant to each particular stage proposed. This consent may be progressed in the following stages:

Stage	RLA Lots	Total (RLA)	Access Lots	Open Space Lots
1	1-11	11	2000 & 2001	-
2	12-17, 18-20 & 30-32	12	2002	-
3	21-25	5	2003	-
4	33-49	17	2005	-
5	28 & 29	2	2003	-
6	26 & 27	2	2003	-
7	701	1	-	-
8	704	1	2000	-
9	706	1	-	-
10	702	1	-	-
11	92-97 & 301	7	2004 & 2011	-
12	~~50-54,303-307, 412 & 413~~ ~~303-307~~ 50 - 69	~~12~~ ~~5~~ 20	2006,2007 & 2008	~~3001~~ 3000
13	~~55-66 & 414~~ ~~50-70~~ 101 - 107	~~13~~ ~~21~~ 7	~~2007 & 2008~~	~~3000~~ 3001
14	~~67-74, 1004 & 415~~ 71-74 & 167-168 (previously 1004)	~~10~~ 4	2008	-

15	76-80 & 169-175 (previously 1003)	6	2009	-
16	89-91, 98, 99 & 302	6		-
17	75 & 81-83	4	-	-
18	84 – 88, 401 & 402	7	2010	-
19	~~403-406, 409 & 308-310~~ 403-406, 409, 412 - 415 & ~~308-310~~ 108–122 & 141–143.	~~8~~ ~~12~~ 18	2012 & 2016	
20	~~407, 408, 201-208 & 416-420~~ 144-166, 123–128, 201-208 & 418-420	~~15~~ 36	2013, 2014	3002 (local purpose reserve)
21	~~410, 411, 421-425, 501-504 & 600~~ 501-504, 421-425	~~10~~	~~2014~~ 2015	-
22	703	1	-	-
23	705	1	-	-
24	1001	1	-	-
25	129-140	12		

With the exception of Stages 9 & 24, Stage 1 must be in advance of all other Stages. Otherwise, the stages set out above may be progressed in any order, providing all necessary subdivision works, servicing, provision of formed legal access, granting or reserving of easements and all other works required to satisfy conditions of this consent

are completed for each stage, prior to certification being issued as necessary under Sections 223 and 224(c) of the Resource Management Act 1991.

3. All subdivisional designs and approvals are to be in accordance with NZS 4404:2004 and the July 2008 version of the CODC Addendum, which is the Council's Code of Practice for Subdivision as modified by these conditions of consent.

4. Prior to the commencement of any subdivisional works, the consent holder must obtain the approval of Central Otago District Council's Environmental Engineering Manager for the works, in accordance with Clause 1.5 of NZS 4404:2004.

5. It is the consent holder's responsibility to obtain any necessary licences to occupy for privately owned assets within land to be vested in Central Otago District Council. Evidence of the granting of any such licences must be provided at the time a request is made for Section 224(c) certification of the relevant land.

Traffic Management

6. The consent holder shall obtain and implement a traffic management plan approved by Council prior to undertaking any works within or adjacent to Council's road reserve that affects the normal operating conditions of the road reserve through disruption, inconvenience or delay. The Traffic Management Plan shall be prepared by a certified Temporary Traffic Management Planner (TTMP) as validated on their code of practice for temporary traffic management (CoPTTM) ID certification. All contractors obligated to implement temporary traffic management plans shall employ a qualified Site Traffic Management Supervisor (STMS) to manage the site in accordance with the requirements of the NZTA's "Traffic Control Devices Manual Part 8: Code of practice for temporary traffic management". The STMS shall implement the Traffic Management Plan. A copy of the approved plan shall be submitted to the Engineering Manager at Council prior to works commencing.

7. Prior to commencing any work on the site, the consent holder shall install a construction vehicle crossing, which all construction traffic shall use to enter and exit the site. The minimum standard for this crossing shall be a minimum compacted depth of 150mm AP40 metal that extends 6m into the site.

Earthworks

8. The EMP shall be accessible on site at all times during work under this consent.

9. The earthworks and site management shall be undertaken in accordance with the recommendations of the EMP submitted.

10. Prior to commencing any earthworks within the former farmyard areas of the site identified in Figure 6 of the Detailed Site Investigation provided as Attachment E5 to the application, the consent holder shall submit to Council for certification a Remediation Action Plan and Contaminated Site Management Plan, prepared by a Suitably Qualified Environmental Practitioner and including appropriate processes and procedures to

mitigate the risk soil exposure presents to any persons undertaking earthworks on site. This Management Plan is in addition to any standard site management procedures and shall be incorporated into the general site management plan as an additional form of control.

11. The consent holder shall implement suitable measures to prevent deposition of any debris on surrounding roads by vehicles moving to and from the site. If any material is deposited on any roads, the consent holder shall take immediate action, at their expense, to clean the roads. The loading and stockpiling of earth and other materials shall be confined to the subject site.

12. No earthworks, temporary or permanent, are to breach the boundaries of the subject site, with the specific exception of earthworks required to upgrade the relevant sections of Ripponvale Road, the associated intersection to the subject site and the shared walking / cycle path within the Ripponvale Road and State Highway 6 legal corridor.

13. All earth worked and/or exposed areas created as part of the subdivision shall be top-soiled and grassed, revegetated, or otherwise stabilised as soon as practicable.

14. The consent holder shall remedy any damage to all existing road surfaces and berms that result from work carried out for this consent. The applicant is to maintain photographic records of the 'before & after' condition of all potentially affected areas of road surfaces and berms and shall produce these to Council's Monitoring staff upon request, within five (5) working days of the request.

15. The irrigation dams located on proposed allotments ~~703 and~~ 59-60 must be drained prior to the completion of any of Stages 1, 2, 3 or 4 and the consent holder shall ensure that these dams remain empty until they are backfilled prior to completion of Stage 13.

16. The irrigation dam located on proposed allotments 90-95 must be drained and backfilled prior to the completion of Stage 11.

17. Hours of operation for earthworks, shall be:

    a) Monday to Saturday (inclusive): 7.00am to 6.00pm;

    b) Sundays and Public Holidays: No Activity

    In addition, no heavy vehicles are to enter or exit the site, and no machinery shall start up or operate earlier than 7.00am. All earthworks activity on the site is to cease by 6.00pm.

18. Exposed surfaces that are not to be built upon or suitably surfaced shall be grassed as soon as practicable as works progress.

To be completed before Council approval of the Survey Plan

19. Prior to the Council signing the Survey Plan pursuant to Section 223 of the Resource Management Act 1991, the consent holder shall complete the following:

a) All necessary easements shall be shown in the Memorandum of Easements attached to the Survey Plan to be duly granted or reserved. This shall include any easements necessary to protect rights of way or access to services.

20. The following amalgamation conditions must be shown on the face of the subdivision plan for the relevant stage

That Lots 501 and 502 hereon be held in the same record of title (See CSN Request 1837327)

That Lots 503 and 504 hereon be held in the same record of title (See CSN Request 1837327)

That Lots 166 and 600 hereon be held in the same Record of Title ~~title~~ (See CSN Request 1954104)

To be completed before issue of the section 224(c) certification

21. Prior to Section 224(c) certification, the following conditions shall be met:

a) As-built drawings of any assets to be vested in Council or located in land to be vested with Council are to be lodged with the Chief Executive in accordance with clause 1.5.10(b) of NZS 4404:2004. The as-built drawings are to be draughted electronically and are to be compatible with a CAD system nominated by the Chief Executive. As-built drawings shall be lodged electronically and in a hard copy A3 format and shall show the location and individual meter reference number against the relevant toby box location.

Roading and Access

b) The intersection of Road 001 and Ripponvale Road must be constructed to the requirements of Austroads Guide to Road Design and to the satisfaction of Council's Roading Manager as a requirement of section 224(c) certification for Stage 1 of the subdivision works

c) Prior to the issue of a certificate under section 224c of the Resource Management Act 1991 for the 51st rural lifestyle allotment, the widening of the existing seal of Ripponvale Road to a formed width of 7.0m seal with 0.25m metalled shoulders, from the principal access to 144 Ripponvale Road, eastwards to the intersection with State Highway 6, shall be completed.

Note: For the avoidance of doubt, "rural lifestyle allotment" only includes those allotments in the RLA 1-6.

d) Prior to the issue of a certificate under section 224c of the Resource Management Act 1991 for the 51st rural lifestyle allotment, the provision of a 2.0m wide shared walking and cycling path within the legal corridor of Ripponvale Road from the principal access to 144 Ripponvale Road, eastwards to the intersection with the State Highway, shall be completed.

e) Prior to the issue of a certificate under section 224c of the Resource Management Act 1991 for the 51st rural lifestyle allotment, a pedestrian/cyclist underpass shall be incorporated into State Highway 6 and be operational.

f) Roads 001 (Up to and including the intersection with Road 002 opposite Lot 306) and 002 must be formed in accordance with Table 3.1 of Councils July 2008 Addendum to NZS 4404:2004, Residential Local Road classification as modified by the following:

   i) An 8.0m wide asphaltic concrete surfaced carriageway within a 20m wide legal corridor

   ii) A subgrade CBR >7

   iii) A 9.5m radius asphaltic concrete surfaced turning circle at all permanent cul de sac heads, in addition to temporary cul de sac heads where considered necessary by Council's Roading Manager.

   iv) Flush nib kerb to provide a structural pavement edge.

   v) Stormwater from road is to be captured by mudtanks located in roadside swales and discharged to ground via soakpit.

   vi) Sealed vehicle entrances provided to adjoining lots in accordance with Part 29 of Council's Roading Policies, January 2015 or a registered as a consent notice on the Record of Title for all lots where access has been left to the time of dwelling construction.

   vii) Cut/fill batters outside ROW boundaries with maximum 4:1 gradient to match existing ground or other as agreed by Council's Infrastructure Manager.

g) Road 001 beyond the intersection with Road 002 opposite Lot 306 must be formed in accordance with Table 3.2(a) of Councils July 2008 Addendum to NZS 4404:2004, Rural Local Sealed classification as modified by the following:

   i) The road shall be constructed with a 6.0m width asphaltic concrete surfaced carriageway width within a 20.0m legal road corridor.

   ii) A subgrade CBR >7

   iii) A 9.5m radius asphaltic concrete surfaced turning circle at all permanent cul de sac heads, in addition to temporary cul de sac heads where considered necessary by Council's Roading Manager

   iv) Flush nib kerb to provide a structural pavement edge.

   v) Stormwater from road is to be captured by mudtanks located in roadside swales and discharged to ground via soakpit.

   vi) Sealed vehicle entrances provided to adjoining lots in accordance with Part 29 of Council's Roading Policies, January 2015 or registered as a consent notice on the Record of Title for all lots where access has been left to the time of dwelling construction.

vii) Cut and fill batters outside ROW boundaries with maximum 4:1 gradient to match existing ground or other as agreed by Infrastructure Manager.

h) Roads 003, 004 ~~and~~ 005 and 007 must be constructed in accordance with Table 3.1 of Councils July 2008 Addendum to NZS 4404:2004, Residential Local Road classification as modified by the following

i) The road shall be constructed with a 6.0m width asphaltic concrete surfaced carriageway width within a 15.0m legal road corridor.

ii) A subgrade CBR >7

iii) A 9.5m radius asphaltic concrete surfaced turning circle at all permanent cul de sac heads, in addition to temporary cul de sac heads where considered necessary by Council's Roading Manager.

iv) Flush nib kerb to provide a structural pavement edge.

v) Stormwater from road is to be captured by mudtanks located in roadside swales and discharged to ground via soakpit.

vi) Sealed vehicle entrances provided to adjoining lots in accordance with Part 29 of Council's Roading Policies, January 2015 or registered as a consent notice on the Record of Title for all lots where access has been left to the time of dwelling construction.

vii) Cut and fill batters outside ROW boundaries with maximum 4:1 gradient to match existing ground or other as agreed by Infrastructure Manager

i) Road 006 must be constructed in accordance with Table 3.2(a) of Councils July 2008 Addendum to NZS 4404:2004, Residential Local Road classification as modified by the following

i) The road shall be constructed with a 6.0m width asphaltic concrete surfaced carriageway width within a 15.0m legal road corridor.

ii) A subgrade CBR >7

iii) A 9.5m radius asphaltic concrete surfaced turning circle at all permanent cul de sac heads, in addition to temporary cul de sac heads where considered necessary by Council's Roading Manager

iv) Stormwater from road is to be captured by mudtanks located in roadside swales and discharged to ground via soakpit.

v) Sealed vehicle entrances provided to adjoining lots in accordance with Part 29 of Council's Roading Policies, January 2015 or registered as a consent notice on the Record of Title for all lots where access has been left to the time of dwelling construction.

vi) Cut/fill batters outside ROW boundaries with maximum 2:1 gradient to match existing ground or other as agreed by Infrastructure Manager.

j) All Rights of Way within the RLA 1 **& RLA 4** must be designed and constructed in accordance with the 'Right of Way' requirements of Table 3.1 of Council's July 2008 Addendum to NZS 4404:2004, as modified by the following:

i) 6.0m ROW legal width for ROWs "A" – "C", "E", "O", "R", "S", & "W/X"**, "F", "G", "H", "T", "J" & "Y"** the ROW serving Lots 170-171 and 174-175 and the ROW serving Lots 172-173.

ii) 10.0m ROW legal width for ROWs "D", "M", "L", "K"& "P.

iii) 4.5m asphaltic concrete carriageway.

iv) A subgrade CBR >7

v) 4% camber to kerb and channel.

vi) Heavy duty kerb crossing at entrance constructed in accordance with Council's Roading Policies January 2015, Part 29.

vii) Standard or mountable kerb and channel on lower side and nib kerb on higher side of the carriageway on 6.0m ROW.

viii) Cut/fill batters outside ROW boundaries with maximum 2:1 gradient to match existing ground or other as agreed by Infrastructure Manager on 10.0m ROW

ix) Mudtank collecting stormwater from ROW and discharging to soakpit within ROW.

x) Attractive low maintenance surfacing (crushed schist or similar) or mown grass along verges between carriageway and ROW boundary.

xi) Cut/fill batters outside ROW boundaries with maximum 2:1 gradient to match existing ground or other as agreed by Infrastructure Manager.

k) All Rights of Way within the RLAs 2**, 3** ~~to 4~~ and 6, and RLPA must be designed and constructed in accordance with the 'Right of Way' requirements of Table 3.1 of Council's July 2008 Addendum to NZS 4404:2004, as modified by the following:

i) 10.0m ROW width for ROWs "H", "I", "J", "Q", "V" & "F/G" **"AA", "AB", "AC", "AD" & "AE"**

ii) 4.5m wide two coat grade 3/5 chip seal, asphaltic concrete, concrete or concrete paving block surfacing.

iii) A subgrade CBR >7

iv) Stormwater from road is to be captured by mudtanks located in roadside swales and discharged to ground via soakpit.

v) Attractive low maintenance surfacing (crushed schist or similar) or mown grass along verges between carriageway and ROW boundary.

vi) Cut/fill batters outside ROW boundaries with maximum 2:1 gradient to match existing ground or other as agreed by Infrastructure Manager.

vii) Passing bays shall be required for any ROW **less than 4.5m wide and** over 50m **in length** at the discretion of the Council Engineering Manager at time of Engineering Approval. **Passing bays shall have widening not less than 6.0m to allow passing of a 90th percentile vehicle at not more than 50m spacings.**

l) An asphaltic concrete, concrete or concrete paver footpath must be constructed on one side of Roads 001 to 005 with crossings at intersections to NZS4121:2001 requirements and with the following:

i) 2.0m width for Road 001 to the entry to Reserve Lot 3000

ii) 1.5m width for Road 001 & Road 002 where it services RLA 1 Areas

iii) 1.5m width for Road 001 where it services the RLA 2-4

iv) 1.5m width for Road 003 – 005 where it services RLA 1 Areas

v) 100mm depth clean topsoil between footpath and boundary formed at 4% crossfall, trimmed and grassed to a mowable standard.

vi) All necessary traffic signs and road markings

vii) Cut/fill batters outside road boundaries with maximum 4:1 gradient to match existing ground or other as agreed by Infrastructure Manager.

viii) LED street lighting in accordance with NZS 4404 and Standard 4.7.6(A)(p) with lamps to be selected from Auckland Transport approved list. Should any conflict between NZS 4404 and Standard 4.7.6(A)(p) arise, the District Plan Standard takes precedence.

ix) Tree planting to be in accordance with Council's 'District Tree Management and Operational Guideline 2011' and with automated irrigation provided, all to the requirements of Council's Parks and Reserves Manager.

x) The location of trees and streetlights shall consider the likely location of future entranceways to residential lots. All

Water: Potable and Firefighting:

m) Water reticulation shall be extended from Council's network within either Waenga Drive or State Highway 6 along Ripponvale Road to serve the subdivision., including the following.

i) Updated water modelling is to be undertaken by Mott MacDonald (at the consent holder's expense) at the time of detailed engineering design if requested by Council's Three Waters Director.

ii) All works are to be designed and undertaken to the satisfaction of Councils Three Waters Director.

iii) The subdivision shall be fully reticulated from Waenga Drive, State Highway 6 or approved alternative point of connection, rider mains provided, and standard 20mm diameter connections installed to the boundary of each residential allotment. Modelling will confirm the required sizing of water

mains through the development and shall ensure that the requirements of the Fire and Emergency New Zealand Fire Fighting Water Supplies Code of Practice SNZ PAS 4509:2008 are met.

iv) Council's Three Waters Director may require any part of the water supply network be upgraded to serve future development. Any upsizing of the extended reticulation, beyond the requirements of the development and approved by Council's Three Waters Director is to be funded by Council.

v) Appropriately sized and metered connections (Acuflo toby/meter assembly) must be installed 300mm from the street boundary of all lots, with the supply connection then extended at least 300mm inside the boundary

vi) Where a property has a second water supply system the property shall be considered high hazard for backflow prevention and require a RPZ backflow preventer at the point of supply from the council network

vii) Land containing water reservoirs must be vested in Council

viii) For each stage, the Consent Holder shall provide evidence to the Council's Planning and Development Manager that adequate firefighting water supply and emergency service access have been provided for each allotment within that stage in accordance with SNZ PAS 4509:2008, including confirmation that:

(a) the location, flow and pressure of the reticulated hydrant network are adequate to serve the future residential development anticipated on each allotment **with a minimum class FW2 firefighting water supply in accordance with the NZ Fire Service Code of Practice for Firefighting Water Supplies SNZ PAS 4509:2008 ;**

(b) the distance and practical access between each approved residential building platform and the nearest available firefighting water supply are suitable for firefighting purposes, having particular regard to hose-run distances and access along any private right-of-way **in accordance with the requirements of the NZ Fire Service Code of Practice for Firefighting Water Supplies SNZ PAS 4509:2008**; and

(c) where the reticulated hydrant network cannot provide an adequate or practically accessible firefighting water supply for an allotment, an alternative or supplementary firefighting water supply complying with SNZ PAS 4509:2008 has been installed and made operational, or is otherwise secured through an appropriate consent notice registered against the Record of Title for that allotment.

Water: Irrigation:

n) Non-potable water reticulation shall be supplied to the allotments in the subdivision. Appropriately sized and metered connections (If metering is required by the entity managing the network) must be installed to the boundary of all lots, including the following:

i) The subdivision shall be fully reticulated from the irrigation source being either the Ripponvale Irrigation scheme or bore supply, rider mains shall be provided where necessary, and minimum 20mm diameter connections installed to the boundary of each residential allotment.

ii) A formal water supply document "Shannon Farm – Water Deed" or similar must be provided to Council to secure the supply and the daily water entitlement to each lot.

iii) Details of the management structure of the non-potable network must be provided to Council

iv) Evidence of any necessary permissions from Council's Roading Team to install services for any part of the network within road reserve

v) For lots to vest in CODC, irrigation connections to the non-potable network must be metered and installed with backflow prevention devices where a risk of cross connection exists.

Wastewater:

o) Wastewater reticulation shall be extended from Council's network within either Waenga Drive or State Highway 6 along Ripponvale Road to serve the subdivision to the following requirements:

i) The wastewater network is to be designed by a suitably qualified professional to adequately serve the subdivision. The minimum pipe sizes shall be DN150 gravity wastewater reticulation, or DN50 pressure mains where gravity drainage is not possible, along all subdivisional roads.

ii) Install standard DN100 laterals to all residential lots with cleaning eye installed at the street boundary. Laterals are to be extended to the buildable area of rear allotments.

iii) Council's Three Waters Director may require any part of the wastewater network be upgraded to serve future development. Any upsizing beyond the requirements of the development and approved by Council's Three Waters Director is to be funded by Council.

iv) The Councils preference is for gravity wastewater systems. Pumped systems will only be accepted when there is not a viable gravity wastewater solution. In such circumstances the following requirements must be complied with in perpetuity and must be registered on the relevant Titles by way of Consent Notice pursuant of s221 of the Act. This legal document must relate to the pressure sewer system servicing any lots within the subdivision and include provisions to ensure:

- Individual lot-owners are aware of installation requirements for onsite pressure sewer system components to be retained in private ownership i.e pipes, pumping unit and chamber, control/alarm panel and associated electrical components.

- Individual lot-owners are aware of ownership responsibilities, operational performance characteristics and maintenance requirements

associated with the private pressure sewer system components, including compliance with all relevant legislation and Council bylaws, policies & standards applicable at the time a residential unit is constructed on the lot;

- Individual lot-owners are aware that at the time a dwelling Is being constructed and until such time as a reticulated wastewater disposal system is connected to an onsite 'pressure sewer pump chamber' module, the individual lot-owner shall establish temporary portaloo or chemical toilet and worker hygiene facilities, with associated holding tank facilities and which are to be routinely serviced, emptied and maintained.

Stormwater

p) The design of the stormwater channel shown on the survey plan must be undertaken by a suitably qualified and experienced person and be submitted to Council as part of engineering approval.

Power and Telecommunications

q) Operational electricity and telecommunications connections must be provided underground to the boundary of each allotment. In relation to any 'rear allotments' accessed by a ROW, ducting must be provided to the edge of the 'net site area' to enable a connection to be made at the time the lots are built on.

Amenity Edges and Reserves

r) Prior to the issue of any section 224(c) certification for Stage 1, the Horticulture Amenity Edge contained within allotments 5 and 6 shall be a minimum width of 15m and planting shall be complete. Plantings in the Horticulture Amenity Edge shall predominantly consist of species elected from the Planting Schedule for the Rural Resource Area (5) contained in Schedule 19.25.

s) Prior to the issue of any section 224(c) certification for Stage 4, the Horticulture Amenity Edge contained within allotment~~s 47 and 4~~8 shall be a minimum width of 10m and plantings shall predominantly consist of species elected from the Planting Schedule for the Rural Resource Area (5) contained in Schedule 19.25 and shall be planted in accordance with accepted arboriculture practices.

t) Prior to the issue of any section 224(c) certification for Stage 7, the RLPA Amenity Edge contained within allotment 701 shall be a minimum width of 15m where trees shall be planted in two rows, a 2.5m minimum height (at the time of planting), the maximum spacing between plantings in the southern row shall be 4m and the northern row 5m. All species are to be planted in accordance with accepted arboriculture practices and shall be selected from Schedule 19.25 to achieve a 3-4m growth rate within 5 years of establishment.

u) Prior to the issue of any section 224(c) certification for Stage 8, the RLPA Amenity Edge contained within allotment 704 shall be a minimum width of 15m where trees shall be planted in two rows, a 2.5 metre minimum height (at the time of planting), the maximum spacing between plantings in the southern row shall be 4m and the northern row 5m. All species are to be planted in accordance with accepted arboriculture practices and shall be selected from Schedule 19.25 to achieve a 3-4 metre growth rate within 5 years of establishment.

v) Prior to the issue of any section 224(c) certification for Stage 23, the RLPA Amenity Edge contained within allotment 705 shall be a minimum width of 15m where trees shall be planted in two rows, a 2.5 metre minimum height (at the time of planting), the maximum spacing between plantings in the southern row shall be 4m and the northern row 5m. All species are to be planted in accordance with accepted arboriculture practices and shall be selected from Schedule 19.25 to achieve a 3-4 metre growth rate within 5 years of establishment.

w) Prior to the issue of any section 224(c) certification for Stage ~~12~~ 13:

i) The consent holder shall obtain Council approval for the vesting of recreation reserve land (Lot 3001) and reserve improvements (where applicable) and shall show that area of land on a subdivision plan.

ii) The Horticulture Amenity Edge contained within allotment 3001 shall be a minimum width of 10m and plantings shall predominantly consist of species elected from the Planting Schedule for the Rural Resource Area (5) contained in Schedule 19.25 and shall be planted in accordance with accepted arboriculture practices.

x) Prior to the issue of any section 224(c) certification for Stage ~~13~~ 12, the consent holder shall obtain Council approval for the vesting of recreation reserve land (Lot 3000) and reserve improvements (where applicable) and shall show that area of land on a subdivision plan.

y) The consent holder shall submit landscaping plans for Lots 3000 and 3001 for the approval of Council's Parks and Recreation Manager. The landscape plan shall show detailed landscaping treatment within each reserve allotment.

z) Prior to the issue of any section 224(c) certification for Stage 19, the Horticulture Amenity Edge contained within allotment ~~403~~ 115 shall be a minimum width of 15m and planting shall be complete. Plantings shall predominantly consist of species selected from the Planting Schedule for the Rural Resource Area (5) contained in Schedule 19.25.

Geotechnical Conditions

aa) Prior to the issue of any section 224(c) certification for Stages 1, 2, 3 or 4, the consent holder must provide a geotechnical certification in relation to the use of the former irrigation dam on proposed allotment 703 as a attenuation basin that has been prepared by suitably qualified geotechnical engineer as defined in

Section 1.2.2 of NZS4404:2010 and demonstrates to Council that the attenuation basin on allotment 703 represents an acceptable risk in terms of any potential flooding hazard.

bb) Prior to the issue of any section 224(c) certification for Stages 15 – 18, the consent holder must provide a geotechnical completion report and a Schedule 2A "Statement of professional opinion as to suitability of land for building construction" for Lots 75, 76, 78 – 91, 98, 99, 302, 401 & 402 in accordance with Section 2.6.1 of NZS4404: 2010 that has been prepared by suitably qualified geotechnical engineer as defined in Section 1.2.2 of NZS4404:2010 and demonstrates to Council that the proposed lots are suitable for building development. In the event that the site conditions within the lots are only found to be suitable for building construction subject to certain mitigation measures and/or remedial works being carried out, then a suitably qualified and experienced professional shall submit to the Council for review and approval full details of such works. The consent holder or successor shall be responsible for implementing all necessary mitigation measures and/or remedial works required to prepare the land for building construction with a consent notice imposed in accordance with Condition 22 in relation to any remediation works not carried out prior to Section 224(c) certification.

cc) Areas of potential rockfall as identified in the GeoSolve geotechnical assessment must be inspected and remediation carried out to minimise the risk of rockfall onto building platforms. The adequacy of remediation works must be certified by a geotechnical engineer.

dd) The water race that would run through Lots 89 to 95 must be re-routed underground through either Road 004, or Lots 705 and 706, using an appropriately sized pipe

Note: Running the undergrounded water race through Road 004 is subject to the consent holder obtaining any necessary licences or permissions from Central Otago District Council's Roading Manager to locate private assets within road reserve.

ee) Local Debris Flow Mitigation

Prior to s224(c) certification for any stage containing Lots 78, 79, 82, 83, 171, 172, 173, 174, and 175, the consent holder must design and construct upslope bunds (or equivalent diversion works) to deflect potential debris flows from local upslope gullies into controlled secondary flow paths, generally in accordance with the Tonkin & Taylor report dated July 2025. Raised fill platforms nominally 1m above surrounding land may be considered as part of debris flow management works for Lots 171, 172, 173, 174, and 175.

a. The debris flow management works must be located to intercept and convey flows down the accessways or boundaries between the following lots to eventually discharge to the West Gully:

- Between Lots 80/83 and 79/82, and between Lots 78/81 and 79/82; and

- Between Lots 171/172 and 173/174, between Lots 170 and 171, and between Lots173/174 and 175, and to the west of Lot 175.

b. The design must be certified by a Chartered Professional Engineer with experience in geotechnical and stormwater engineering.

c. On completion, the bunds and other conveyance works must be certified by the Engineer as having been constructed in accordance with the approved design.

d. As-built plans and certification must be provided to Council prior to s224(c).

e. Appropriate easements must be in place for any stormwater flow paths through private lots.

ff) (West Gully and North Gully Debris Flow Mitigation)

Prior to s224(c) certification for any stage containing Lots 75, 76, 77, 167, 168, 170, 171, 174, 175, the consent holder must consider the design and construction if necessary, of raised engineered fill building platforms to mitigate debris flows that may be generated along the West Gully and North Gully, together with associated individual accessways to those platforms

i) The design required must:

a. Integrate with the detailed subdivision design, including roading, stormwater drainage, and overland flow path mitigation;

b. Be in general accordance with the recommendations in the Tonkin & Taylor report dated July 2025; and

c. Ensure that platform levels and accessways do not conflict with or compromise the effectiveness of the wider stormwater drainage and debris flow management works.

ii) The design and construction of the works required by this condition must be:

a. Undertaken or supervised by a Chartered Professional Engineer experienced in geotechnical and civil engineering; and

b. Certified on completion as being constructed in accordance with the approved design and relevant engineering standards.

Financial Contribution

gg) Payment of a financial contribution of $156,251.78 + GST (exclusive of Goods and Services Tax) calculated in terms of Rule 15.6.1 of the Operative District Plan on the basis of 151 additional rural residential allotments in total. Payment is due upon application under the Resource Management Act 1991 for certification pursuant to Section 224(c). The payment required at the time of section 224(c) certification of any one stage is to be commensurate with the number of allotments to be certified. The Council may withhold a certificate under Section 224(c) certification of the

Resource Management Act 1991 if the required Development and Financial Contributions have not been paid, pursuant to section 208 of the Local Government Act 2002 and Section 15.5.1 of the Operative District Plan.

Ongoing Conditions/Consent Notices

22. The following conditions of the consent shall be complied with in perpetuity and shall be registered on Lots ~~1 to 99, 167 – 175, 201 to 208, 301 to 310, 401 to 425, 501, 504 and 600~~ 1 to 175, 201 to 208, 401 to 425, 501, 504 600 and 701 – 706 by way of Consent Notice pursuant to Section 221 of the Act:

    a) This lot has connections to a potable and a non-potable water network. The potable water supply servicing the allotment must only be used to supply water within buildings on the site. Any water connections to be used for irrigation or curtilage maintenance must be from the non-potable supply only. There must be no cross connections between the potable and non-potable water networks. At the time building consent is lodged for any building being connected to the potable water supply, the consent holder or successor must provide plans demonstrating compliance with this condition.

    b) Lot owners must sign up and remain a party to the "Shannon Farm – Water deed for irrigation" (Or similar irrigation water deed) for supply of irrigation water to the allotment as required by the entity managing irrigation water supply to the allotment

    c) Stormwater from buildings and impervious surfaces on all lots must be either disposed of to ground within the site using appropriately designed and constructed soak pits, or otherwise stored for beneficial re-use within the site

    d) Residential buildings on Lots ~~1 to 99, 167 – 175, 201 to 208, 301 to 310, 401 to 425, 501, 504 and 600~~ 1 to 175, 201 to 208, 401 to 425, 501, 504 and 600 must be located within the building platform identified on the plan of subdivision

    e) For a period of 15 years from May 2023 there shall be no construction of new dwellings on allotments 701 – 706 prior to planting of a minimum of 50% of the site in horticultural or viticultural species, and for that period of 15 years, any plants that die, become diseased, or are otherwise removed, shall be replaced with the same or similar horticultural or viticultural species.

    f) No residential building platforms shall be identified, and no new dwellings shall be constructed on allotments 701 – 706 prior to a Detailed Site Investigation under the National Policy Statement for Soil Contamination being submitted to Council for approval and confirming allotments 701 – 706 are suitable for residential occupation.

    g) All planting contained within the RLPA Amenity Edge on allotments 701, 704 and 705 shall be maintained by the landowner.

h) All planting contained within the Shelter Belt Planting Area on allotment 706 shall be maintained by the landowner.

i) All planting contained within the Horticulture 15m Amenity Edge on allotments 5 and 6 shall be maintained by the landowner.

j) All planting contained within the Horticulture 10m Amenity Edge on allotments ~~47 and~~ 48 shall be maintained by the landowner.

k) All planting contained within the Horticulture Amenity Edge on allotment 115 shall be maintained by the landowner

l) There shall be no buildings (excluding fences and retaining structures) located with the "no build" area on allotments 201 – 203, 416 – 420, 421 – 425, 401, 402, 501, 504 and 600.

m) Prior to the construction of any dwelling on Lots 5, 6, 17, 32, 75, 76, 77, 96, 97, 301 and 701, the consent holder or successor must demonstrate that the minimum floor level of the dwelling is above the 1% AEP flood level for the lot.

23. A consent notice condition must be registered on the relevant Records of Title for any lot in respect of which the Schedule 2A statement required in the context of Condition ~~20(z) (aa)~~ **21(bb)** indicates that building construction would only be suitable if specified mitigation measures and/or remedial works were carried out at the time of construction. The consent notice condition must require that, prior to any construction work (other than work associated with geotechnical investigation), the owner of such a lot must submit to council for certification, plans prepared by a suitably qualified engineer detailing the proposed mitigation measures and/or remedial works and require the owner to implement all such measures prior to occupation of any building.

24. The consent holder will register a no complaints covenant in relation to the effects of rural productive activities over all saleable Records of Title (excluding reserves and utility allotments) for all Rural Lifestyle Area allotments in favour of Lots 1-4 DP 344529. The covenant will be in a form approved by Council (acting reasonably). A solicitor's undertaking to register such covenant will be required before issue of a s224(c) certificate for the relevant stage of the development. The covenant required by this clause may be registered in the same legal instrument as other developer covenants.

25. The following conditions of the consent shall be complied with in perpetuity and shall be registered on Lots 71 – 83, 167 – 175 by way of Consent Notice pursuant to Section 221 of the Act:

a) All debris flow management works and hazard mitigation measures located within any of the lots hereon, including any bunds, diversion channels, engineered fill platforms, or associated structures, must be retained and maintained in good working order in perpetuity by the respective lot owners.

Advice note: Should there be any need to modify the hazard mitigation works for any reason (such as accommodating a specific future dwelling design), in addition to any other consents that may be required, a variation to this consent notice will

be required pursuant to Section 221 of the Resource Management Act 1991 (or equivalent). Such an application would be expected to provide advice from a Suitably Qualified and Experienced Chartered Professional Engineer familiar with the Tonkin & Taylor Report, dated July 2025 that any modifications does not undermine the integrity of the wider debris flow hazard mitigation measures nor undermine the downstream catchment from debris flows

b) Prior to the issue of building consent for any building, a site specific geotechnical investigation must be undertaken by a suitably qualified and experienced Chartered Professional Engineer to confirm bearing capacity, identify any localised geotechnical hazards, and certify that the proposed foundation design is appropriate for the site in accordance with the New Zealand Building Code.

c) Where colluvium and/or silt deposits exceeding 1 metre in depth are present, they must be removed or appropriately treated prior to foundation construction

d) All buildings must be constructed using flexible foundation systems capable of accommodating up to 100mm of differential movement without compromising structural integrity. Suitable systems include waffle slabs, reinforced gravel rafts, or ground beams of the type developed for TC2-class liquefaction-prone ground following the Christchurch earthquakes, or other equivalent solutions recommended by a Chartered Professional Engineer (Civil or Geotechnical).

e) The foundation design must be certified by a Chartered Professional Engineer as meeting the above performance requirement prior to the issue of building consent.

f) Foundation systems must be designed to allow for re-levelling if required.

g) This all cut slopes must be constructed at a maximum slope angle of 2H:1V (horizontal to vertical) and generally up to a maximum height of 5 metres, unless otherwise certified by a suitably qualified and experienced Chartered Professional Engineer.

h) Cut slope design and construction must be carried out in a manner that avoids undercutting any local landslide debris slide planes.

i) Lot-Specific Height and Development Restrictions

   i) Lots 167 and 168 – Cuts must be limited to a maximum height of 2 metres. These lots must be developed on engineered fill platforms extending onto the North Gully in accordance with a design certified by a Chartered Professional Engineer.

   ii) Lots 169 and 170 – No cutting is permitted into the toe of the historic, water race–triggered landslide

   iii) Lots 78, 80, 171, and 174 – Where cuts are proposed, retaining walls must be incorporated as necessary to mitigate the risk of cut slope movements encroaching on upslope accessways or adjoining lots. A combination of a lower retaining wall and upper cut may be used depending on the specific cut height and configuration, subject to engineering certification

Building Platform Land Use Conditions

1. Building platforms must be shown on the face of the survey plan for the relevant lots in general accordance with those shown on the plans attached as Appendix One.

2. Buildings within the consented building platforms on Lots 208, 401, 402, 403, 404, 406, 408, 409, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425 and 501 may breach the minimum yards provided they are located within the building platforms identified on the lots on the plans attached as Appendix One.

NES-CS Land Use Conditions

1. Prior to the commencement of earthworks, a Site Management Plan (SMP) and Remediation Action Plan (RAP) must be developed by a suitably qualified and experienced person. The SMP and RAP may be incorporated into a single document. Both plans must take into consideration the recommendations of the WSP Detailed Site Investigation dated October 2022 and provided in support of the application. At a minimum the SMP and RAP must include the following:

    a. Procedures to minimise risk of exposure to persons on the site.

    b. Approaches to managing and remediating earthworks involving contaminated soils including but not limited to the areas identified in Figure Seven of the Detailed Site Investigation

    c. An accidental discovery protocol to be followed in the event that unanticipated areas with potential soil contamination are identified during subdivisional works.

2. A copy of the SMP and RAP must be provided to Central Otago District Council at least 10 working days prior to the commencement of works. CODC may recommend changes be made to either document at least 5 working days before the commencement of works.

3. The SMP and RAP must be implemented at all times during construction works associated with the approved subdivision.

4. A copy of the SMP and RAP must be accessible on site at all times.

5. If any potentially contaminated soils from areas identified in yellow in Figure 7 of the WSP Detailed Site Investigation are to be removed from the site, the soils must be tested for heavy metals and, where soil is not able to be considered cleanfill, disposed of to an appropriately accredited landfill facility.

6. In accordance with Section 128 of the Resource Management Act 1991, the conditions of this consent may be reviewed on and in the period within 6 (six) months upon each anniversary of the date of this consent, if, on reasonable grounds, the consent authority finds that:

    a. There is or is likely to be an adverse environmental effect as a result of the exercise of this consent, which was unforeseen when the consent was granted;

b. Monitoring of the exercise of the consent has revealed that there is or is likely to be an adverse environmental effect; or

c. There has been a change in the circumstances and the conditions of consent are no longer appropriate in terms of the purpose of the Act.

Advice Notes:

1. *Any change of use of Lots 701 and 706 has not been assessed as part of this application in terms of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011 (The NES-CS). Any change of use of these lots will need to consider the NES-CS.*

2. *Further resource consent under Rule 4.7.2(ib) of the Operative Central Otago District Plan 2008 or any superseding rule will be required prior to the establishment of residential activity on any lot in the Rural Lifestyle Areas or Rural Production Lifestyle Area.*

3. *Potable water use within the subdivision will be metered and charged according to Council's fees and charges and any policies related to the supply of potable water.*

4. *Development contributions of $509,128.21, $412,165.07 and $225,696.68 (exclusive of goods and services tax) are payable for water, wastewater and roading respectively pursuant to the Council's Policy on Development and Financial Contributions contained in the Long Term Council Community Plan. Payment is due upon application under the Resource Management Act 1991 for certification pursuant to section 224(c). The Council may withhold a certificate under section 224(c) of the Resource Management Act 1991 if the required Development and Financial Contributions have not been paid, pursuant to section 208 of the Local Government Act 2002 and Section 15.5.1 of the Operative District Plan.* The payment required at the time of section 224(c) certification of any one stage is to be commensurate with the number of allotments to be certified.

5. *In addition to the conditions of a resource consent, the Resource Management Act 1991 establishes through sections 16 and 17 a duty for all persons to avoid unreasonable noise, and to avoid, remedy or mitigate any adverse effect created from an activity they undertake.*

6. *Resource consents are not personal property. The ability to exercise this consent is not restricted to the party who applied and/or paid for the consent application.*

7. *It is the responsibility of any party exercising this consent to comply with any conditions imposed on the resource consent prior to and during (as applicable) exercising the resource consent. Failure to comply with the conditions may result in prosecution, the penalties for which are outlined in section 339 of the Resource Management Act 1991.*

8. *The lapse period specified above may be extended on application to the Council pursuant to section 125 of the Resource Management Act 1991.*

9. *This is a resource consent. Please contact the Council's Building Services Department, about any building consent requirements for the work.*

~~Issued at Central Otago on 13 September 2023~~
~~Reissued at Central Otago on 23 May 2025 pursuant to Section 127(1) of the Resource Management Act 1991~~
~~Reissued at Central Otago on 20 November 2025 pursuant to Section 127(1) of the Resource Management Act 1991~~
Reissued at Central Otago on XXXXX pursuant to Section 127(1) of the Resource Management Act 1991