18 February 2021

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Selwyn District Council
Attention: Jocelyn Lewes

By email: Jocelyn.Lewes@selwyn.govt.nz

Dear Jocelyn,

PRIVATE PLAN CHANGE REQUEST TO THE OPERATIVE SELWYN DISTRICT PLAN- RFI
PC200069: SPRINGS ROAD LINCOLN

1. Further to your request for further information on 10 December 2020 relating to the application above, we set out below a response to each of your specific requests and include an amended ODP in **Attachment 1** and amended ODP Text in **Attachment 2**.

RFI Matters

Scope of Plan Change Request

RFI 1. Please provide evidence that the owners of the following properties are party to, or supportive of, the request:

208 Collins Road (Lot 1 DP 55313) being a parcel of 1.7738 ha

1521 Springs Road (Lot 1 DP 20660) being a parcel of 6.1191 ha

534 Springs Road (Lot 1 DP 494430) being a parcel of 0.6396 ha

Response:

2. The plan change proponent has met or made contact with all of the above-mentioned property owners in relation to the plan change request. Some are fully supportive, whereas others are reserving their position. Ultimately, the plan change does not preclude owners from continuing their existing activities/use of land and in any event, their views on the proposal can be conveyed by way of submissions.

RFI 2. If any, or all, of the above land owners do not wish to be party to the plan change, please provide the rationale for including these parcels in the plan change request.

Response:

3. Firstly, the spatial extent of the plan change request reflects existing physical and/or legal boundaries that logically define the extent of the zoning and ODP.

4. It is otherwise noted that the above landowners potentially stand to benefit in a financial manner from the plan change request and the request does not preclude or inhibit their existing land uses or activities.

RFI 3. It is also noted that 36 Collins Road (Lot 7 DP 68631), being a parcel of 4.4887 ha, has been excluded for the plan change request. The effect of this is that the site will retain its Rural (Outer Plains) zoning and be surrounded on three sides by land zoned Living, which is an outcome Policy B4.3.3 seeks to avoid as it can increase the potential for reverse sensitivity effects. Please provide the rationale for excluding this parcel from the plan change request and address the conflict with Policy B4.3.3 and advise how reverse sensitivity effects may be addressed.

Response:

5. The plan change proponent has made contact with this property owner in relation to the plan change request and the site is now included on the ODP. This property would be adjoined by a stormwater management area to the east and a large reserve to the north, neither of these land uses would be susceptible to reverse sensitivity effects (i.e. from limited grazing or cropping). With regard to the Living Z zone proposed to adjoin on the western boundary of this property, an appropriate boundary treatment (similar to Te Whariki and the request site) could be included if necessary, at subdivision stage. The request is consistent with Policy B4.3.3.

Consultation with Rūnanga

RFI 4. It is noted that the plan change application has been provided to Mahaanui Kurataiao Limited for their comment. Please provide a copy of any feedback received.

Response:

6. A copy of the plan change request feedback from Mahaanui Kurataiao Limited is included in **Attachment 6**.

RFI 5. The request also identifies that the applicant is "mindful of the sensitive and culturally significant features on the plan change site such as natural waterways, springs and indigenous vegetation of within the plan change site as it develops is a matter that will be addressed at the time of subdivision and development and support cultural values associated with the site. It is expected that any subdivision consent for development of the zone can and will incorporate conditions of consent addressing these requirements." This statement is not supported by the ODP text. Please identify if the existing framework within the Operative District Plan is sufficient to achieve the statement above.

Response:

7. The request ODP text has been updated to support this statement.

8. It is noted that failure to be in accordance with the relevant ODP requirements is currently a discretionary activity under 12.1.6.7, giving Council scope to ensure that ODP requirements can be met at subdivision stage.

Consultation

RFI 6. Please advise what, if any, consultation has been undertaken with the LII Drain committee.

Response:

9. The LII Drain Committee is aware of the plan change as the Chairperson is the vendor of the majority of the land within the plan change request. The LII Drain Committee will have the opportunity to reply via submissions.

Higher Order Documents

RFI 7. Please provide a thorough assessment of the plan change request against all the relevant provisions of the Canterbury Regional Policy Statement and the Canterbury Land and Water Regional Plan.

Response:

10. An updated assessment of the plan change request against the relevant provisions of the Canterbury Regional Policy Statement and the Canterbury Land and Water Regional Plan is included in **Attachment 3**.

RFI 8. As acknowledged in the plan change request, the area is subject to inundation in a 200-year Average Recurrence Interval flood event, and that it may contain areas that fall within the Regional Policy Statement definition of 'high hazard'. Please ensure that the assessment requested above considers CRPS Policy 11.3.2 Avoid development in an area subject to inundation.

Response:

11. Please refer to memo prepared by E2 Environmental in response to RFI query No. 8. The response provides further explanation around definition of high hazard, and notes that no proposed residential zoned areas are in the "high hazard zone" where velocity × depth factor is modelled to be greater than 1 m²/s or flood depths are greater than 1 meter in a 0.2% AEP flood event. Furthermore, also refer to the original Inovo services report as part of the plan change application Appendix A, section 2.5 and table 3 and Figure A1 which addressed flooding as well.

RFI 9. Please also provide an assessment of the plan change request against the Our Space (2018-2048): Greater Christchurch Settlement Pattern Update, and the planning directions for supporting urban growth in Greater Christchurch.

Response:

12. An updated assessment of the plan change request against the Our Space (2018-2048): Greater Christchurch Settlement Pattern Update is included in **Attachment 4**.

Heritage and Culture

RFI 10. Throughout the text, and in the ODP, 'The Springs' O'Callaghan farmhouse ('Chudleigh') is identified as a heritage item. It is not identified as such within the Operative District Plan but the Proposed District Plan has identified both the house and its setting as a heritage item.

Response:

13. It is acknowledged that Chudleigh is not presently listed as a heritage item in the operative Plan. The heritage listing (H323) in the PDP includes both the farmhouse building and the adjacent heritage setting and the relevant heritage provisions have instant legal effect. Accordingly, provision has been made for this feature within the plan change proposal.

RFI 11. Please identify the size of the area to be zoned Living X around Chudleigh. Please consider and advise if there is an alternative way within the plan change request to acknowledge Chudleigh rather than spot zoning. Please also identify if any rules are required to ensure that the context and setting of Chudleigh are not compromised by the surrounding development as proposed e.g. setback and fencing provisions, restriction on further subdivision.

Response:

14. The zoning around the Chudleigh heritage setting has been amended to Living Z on the amended ODP and commentary is provided in the ODP text. It is noted that the extent of the setting is the immediate garden setting of the house (as marked on the Proposed District Plan maps), rather than the land parcel as a whole, notwithstanding the potential archaeological values of the property.

15. The PDP contains rules (SUB-R18) that are applicable at the time of subdivision, so as to ensure that the size and shape of any future site is adequate to contain each historic item within its setting. This also extends to consideration of whether the historic heritage values can be retained and protected if the land is subdivided.

16. Finally, the ODP text includes reference to Chudleigh, its setting and its heritage values, ensuring that such matters can be considered at the time of subdivision.

17. These matters provide sufficient scope for the Council to ensure that the context and setting are not compromised by subdivision on the adjacent land.

RFI 12. Please note that the Proposed District Plan identifies the Chudleigh as a heritage item (heritage building and its setting) and the relevant provisions have immediate effect.

Response:

18. As above, instant legal effect is recognised/noted.

National Policy Statement on Urban Development 2020 (NPS-UD)

RFI 13. This Plan Change is heavily reliant on the NPS-UD to address the conflict with the Regional Policy Statement, particularly CRPS Objectives 6.2.1 and 6.2.2.5, and their associated policies.

Response:

19. Noted.

RFI 14. The requests relies on Policy 8 as it assets that it would add significantly to development capacity. Paragraphs 115-117 of the application discuss the theoretical existing capacity within Lincoln. However this assessment does not consider the percentage increase that the request will add to both the existing township and wider district over the short/medium/long term timeframes considered by the NPS-UD. Please consider this and amend the assessment accordingly. In this regard, please consider the targets set out in Objective B4.3.9 in the Operative District Plan, as well as Our Space. Please note that at its meeting on 9 December 2020, Council adopted an update its Housing and Business Development Capacity Assessment for the short, medium and long term. **https://www.selwyn.govt.nz/data/assets/pdf_file/0006/360735/PUBLIC-Agenda-Council-Meeting-9-December-2020.pdf pages 39-54**

Response:

20. Mike Copeland of Copeland Brown has provided the following statement in response to this RFI point:

"Selwyn District has a current population of 69,700 implying around 24,890 households, assuming an average of 2.8 persons per household[1]. Therefore the proposed development of up to 2,000 dwellings represents around 8% of the existing dwellings in the District.

The Housing and Business Development Capacity Assessment Update (2020) report in section 4.1 identifies additional housing demand of 7,127 during 2020-2030 and 8,690 between 2030 and 2050. Whilst the much slower assumed growth rate between 2030-2050 is questioned by the author, these figures imply total households (i.e. existing plus growth) of 32,017 in 2030 and 40,707 in 2050. Therefore the proposed development of up to 2,000 dwellings represents around 6% of dwellings in the District in 2030 and 5% in 2050.

The current combined population of Lincoln West and Lincoln East statistical areas is 8,130[2] or 2,904 households assuming an average of 2.8 persons per household. The up to 2,000 additional dwellings of the proposed Plan Change represents up to 69% of the existing dwellings in Lincoln. The Capacity Assessment Update report does not give additional housing demand estimates for Lincoln. However, implying the same percentage increases as for the District implies total households of 3,736 in 2030 and 4,749 in 2050.

[1]This is the average size of household assumed by Statistics New Zealand in their medium growth forecasts over the next decade.
[2] Source: Statistics New Zealand NZStat. Subnational population estimates (RC,SA2) by age and sex at 30 June 1996-2020 (2020 boundaries).

Therefore the proposed development of up to 2,000 dwellings represents around 54% of dwellings in Lincoln in 2030 and 42% in 2050.

The Housing and Business Development Capacity Assessment Update (2020) report in the Executive Summary of Appendix 1 identifies Selwyn District sufficiency of housing capacity of +2,543 in the short term (2020-2023), -2,737 in the medium term (2020-2030) and -18,337 in the long term (2020-2050). Plan Change requests currently lodged with the Selwyn District Council provide for a total of 10,567 additional dwellings.[3] This includes the up to 2,000 additional dwellings to be developed under the proposed Lincoln South Plan Change. However, in this regard:

i. There is no certainty that all of the Plan Changes currently lodged with the Council will be approved – either at all, or to the extent of their maximum dwelling yield proposed due to environmental, infrastructure, transport or other factors;

ii. Even where other plan changes are approved, they may not all result in full development of their dwelling yields due to market supply and demand factors. However, the potential for such development will play an important role in providing greater competition or "contestability" in the Selwyn District and Greater Christchurch housing markets.

iii. The thrust of the NPS-UD is not to enable only sufficient capacity, but for supply (or at least potential supply) to exceed expected demand. Only when this occurs can we expect reductions in upward pressure on residential land and house prices to occur".

21. In summary, Mr Copeland's response notes that the proposal for 2,000 households represents:

a) approximately 8% of the existing dwellings in the District currently; around 6% of projected dwellings in the District in 2030; and, 5% of that projected in 2050.

b) approximately 69% of the existing dwellings in Lincoln currently; around 54% of projected dwellings in Lincoln in 2030; and, 42% of that projected in 2050.

22. Accounting for the above, the proposal is considered to clearly 'add significantly to development capacity'.

RFI 15. Please demonstrate how the plan change request achieves Objective 2 and Policy 1(d), particularly in terms of supporting competitive land and development markets, when all of the development capacity that may be required to meet expected demand for housing in Lincoln over the short, medium and long term is to be provided by the one developer.

Response:

23. In response to this matter, Mr Copeland notes that there is nothing in the Plan Change which is intended to preclude other areas for new residential development being approved. The whole thrust of the NPS-UD is not to enable only sufficient capacity but for supply (or

[3] Source: Email from Jocelyn Lewes, Selwyn District Council, to Jeremy Phillips, dated 27 January, 2021.

at least potential supply – see discussion below regarding "contestability" versus competition in a market) to exceed expected demand. Only when this occurs can we expect downward pressure (or reductions in upward pressure) on residential land and house prices to occur.

24. However even in the absence of existing or known future competitors in the market there are always potential future entrants – i.e. markets are "contestable" and therefore benefit from the characteristics of greater competition when barriers to entry are lowered. Enabling one competitor (RIDL) to enter the market by approving the Plan Change adds to the level of "contestability" or competiveness in the market as compared to not allowing RIDL to enter the market or restricting the scale of RIDL's entry to enable other new entrants.

25. Some existing residential property owners in Lincoln (the Selwyn District and Greater Christchurch generally) are potential competitors to the extent infill development is possible, albeit inertia, land banking and preferences for low density housing may inhibit the extent of competition from this source. Therefore with the approval of the Plan Change RIDL will face competition from this source.

26. As alluded to in RFI 17, the Plan Change will provide additional competition within Greater Christchurch and not just the Lincoln residential land market. In this context RIDL will add to the level of competition from all current and future potential entrants within this Greater Christchurch market. This is especially true with respect to residential development alternatives within the Selwyn District (e.g. at Rolleston, Prebbleton, etc.) but also to varying degrees within Christchurch City and even the Waimakariri District. The residential land market contains a series of sub-markets defined by location and suitability for particular types of residential development – e.g. some buyers of new dwellings will weigh up the costs and benefits of a new smaller higher density inner city apartment or townhouse versus a single detached house on its own section more distant from the City CBD. However at the very least approving the Plan Change will mean RIDL will face competition and exert competition particularly on other areas of greenfields residential development in Greater Christchurch.

27. New residential development also competes to some extent with existing dwellings – for example some potential new home buyers will trade off the costs of a new dwelling some distance from the CBD against an existing dwelling of lesser quality (because it is an existing rather than new dwelling) but closer to places of work, entertainment, etc.

28. Therefore enabling the scale of development as proposed by the Plan Change will not mean RIDL will be a monopoly supplier of residential land for development at Lincoln. Even if RIDL over the short, medium and longer term provides 100% of new residential sections at Lincoln, so long as it has to face the various sources of existing and potential new competition described above, the market will have benefited from greater competition than if RIDL is prevented from entering the market or if the scale of RIDL's entry is downsized to enable scope for other competitors to enter the market. Such attempts to "manage the competition" in the market are more likely to prevent the benefits from greater competition emerging.

RFI 16. Please provide a more thorough assessment of how the request supports an urban environment that supports the reduction in greenhouse gas emissions and is resilient to the current and future effects of climate change, as required by Objective 8 and Policies 1 and 6.

Response:

29. The request supports reductions in greenhouse gas emissions (at a local and Greater Christchurch scale), through the provision for alternative modes of transport., connectivity and accessibility (to local, township and regional services and amenities), and the potential for servicing by public transport (i.e. buses).

30. The request achieves resilience to the likely current and future effects of climate change through: the site's distance from coastal and low lying areas susceptible to sea-level rise and storm surges; and the potential for building and landscape design to address increased mean temperatures or amplification of heat extremes.

31. With regard to heavy rain fall events/frequency (in conjunction with subdivision design), the RFI response from E2 Environmental demonstrates that the request is consistent with CRPS 11.3.2 (Avoid development in areas subject to inundation) and that flood resilience is achieved. The response also states that the effects of climate change will be included in any design (at subdivision stage).

32. In a Greater Christchurch context, the plan change site has considerable advantages over greenfield or intensification growth in flood prone coastal and low-lying areas.

RFI 17. The assessment of the criteria in Policy 1 of the NPS-UD for 'well-functioning urban environments' provided with the request only considers this in relation to the plan change area. As noted in paragraph 132 of the request, the urban environment is considered to encompass all of Greater Christchurch. Therefore, please provide an assessment of how the request would contribute to the function of the wider urban environments of the Lincoln township, the surrounding district and the Greater Christchurch area.

Response:

33. It is considered that the proposal will achieve the following outcomes at a **localised, township, and regional scale**:

    a) Have and enable a variety of homes that meet the needs, in terms of type, price, and location, of different households, and would enable Māori to express their cultural traditions and norms, to the extent relevant to the site context. This is relevant in a localised and Greater Christchurch context.

    b) Provide access to suitably located and sized business sectors, recognising local facilities within the Plan Change site, accessibility to business activities in Lincoln and the wider offerings in Greater Christchurch.

    c) Provide good accessibility for all people between housing, jobs, community services, natural spaces, and open spaces, including by way of public or active transport noting the preceding point and the findings in the transport assessment. Aside from localised transport connections, the proposal provides excellent accessibility to State Highway 75 and 76, and its connections to Greater Christchurch.

    d) Support the competitive operation of land and development markets by adding greater competition to the Greater Christchurch residential land market, with the

corresponding reduction in housing cost being a contributing factor to "well-functioning urban environments".

In this respect, Mr Copeland has advised that the Plan Change will provide additional competition within Greater Christchurch and not just the Lincoln residential land market and will therefore add to the level of competition from all current and future potential entrants within this Greater Christchurch market. This is especially true with respect to residential development alternatives within the Selwyn District (e.g. at Rolleston, Prebbleton, etc.) but also to varying degrees within Christchurch City and even the Waimakariri District. The residential land market contains a series of sub-markets defined by location and suitability for particular types of residential development – e.g. some buyers of new dwellings will weigh up the costs and benefits of a new smaller higher density inner city apartment or townhouse versus a single detached house on its own section more distant from the City CBD. However at the very least, approving the Plan Change will mean land within the plan change area will face competition and exert competition particularly on other areas of greenfields residential development in Greater Christchurch.

e) Support reductions in greenhouse gas emissions (at a local and Greater Christchurch scale), through provision for alternative transport modes, connectivity and accessibility (to local, township and regional services and amenities), and the potential for servicing by public transport.

f) Achieve resilience to the likely current and future effects of climate change through: the site's distance from coastal and low lying areas susceptible to sea-level rise and storm surges; the land's resilience to heavy rainfall events/frequency (in conjunction with subdivision design), and the potential for building and landscape design to address increased mean temperatures or amplification of heat extremes. In a Greater Christchurch context, the plan change site has considerable advantages over greenfield or intensification growth in flood prone coastal and low lying areas.

34. In summary, it is maintained that the proposal will contribute to well-functioning urban environments, at a localised, district-wide and Greater Christchurch scale.

RFI 18. At various points in the request, reference is made to providing for growth, both up and out, yet the request does not consolidate development closer to the town centre of Lincoln. Please provide an assessment of the building heights and densities proposed in the request relative to Policies 3(d) and 1(a). This assessment should demonstrate, in terms of the proposed densities, what the differences are on the ground between 12 and 15hh/ha and how the proposal provides for a variety of homes that meet the needs of different households, including all age groups.

Response:

35. Policy 1(a) seeks urban environments that 'have or enable a variety of homes that: (i) meet the needs, in terms of type, price, and location, of different households'[4].

[4] It is assumed that part (a)(ii) of Policy 1 is not relevant to this specific RFI point.

36. The proposal will 'enable' the outcome sought by Policy 1(a)(i) by providing for a variety of homes, needs, types, price-points and locations within the plan change area, within Lincoln, Selwyn and within the Greater Christchurch market generally.

37. Within the plan change area the proposed Living Z zoning provides for a variety in residential densities, including Low Density (average allotment size of 600m^2 and a minimum individual allotment size of 500m^2), Medium Density Small-lot (maximum average of 500m^2, with minimum of 400m^2), and Medium Density Comprehensive (maximum average of 350m^2, with no minimum site size) with the higher density (15hh/Ha) residential areas located adjacent to key open spaces and green corridors. On the ground, the low and medium density areas will provide for conventional standalone houses and sites, potentially for larger families. In contrast, the medium density comprehensive areas will provide for comprehensively designed and developed housing that offers smaller and more affordable housing, through terraced, multi-unit or smaller scale apartment styled developments or through other comprehensive housing forms (such as retirement housing, social housing, or sheltered/supportive housing). Of note, the proposal enables this variety in housing, but other than by way of adopting existing density rules in the Plan, it does not specifically prescribe them.

38. Additional information has been added to the Urban Design Statement in **Attachment 13** showing some example visual differences between the proposed densities on the ground between 12 and 15 hh/ha. The ODP has the potential to provide for a variety of homes within the Living Z zoning (low density, medium density (small lot), medium density (comprehensive) that meet the needs of different households, including all age groups.

39. Policy 3 seeks that district plans 'enable' 'building heights and density of urban form commensurate with the greater of: (i) the level of accessibility by existing or planned active or public transport to a range of commercial activities and community services; or (ii) relative demand for housing and business use in that location'. In this respect, demand for housing (as is addressed in response to RFI item 14) is the principal driver of the proposed building height and density enabled by the proposed plan change.

Versatile Soils

RFI 19. The area of the plan change request contains Class 1, 2 and 4 soils. Policy B1.1.8 seeks to avoid rezoning land which contains versatile soils for new residential or business development if the land is appropriate for other activities; and there are other areas adjoining the township which are appropriate for new residential or business development which do not contain versatile soils. Please address this policy and provide an assessment against both tests contained within it.

Response:

40. The area of the plan change request is comprised of Land Use Capability (LUC) Class 1, 2 and 3 soils as illustrated below in **Figure 1**.

41. **Figure 1** also illustrates the LUC soil 'versatility' classifications for the Lincoln Township surrounds. Notably, many existing Outline Development Plan areas (i.e. Flemington, Barton Fields, Rosemerryn, Te Whariki and Liffey Springs) occupy soils characterised as Classes 1 and 2. As the request area is predominantly comprised of Class 2 and 3 soils, it

is considered a more efficient use of land when compared to these other recently developed, or developing areas (occupying Class 1 and 2 soils).

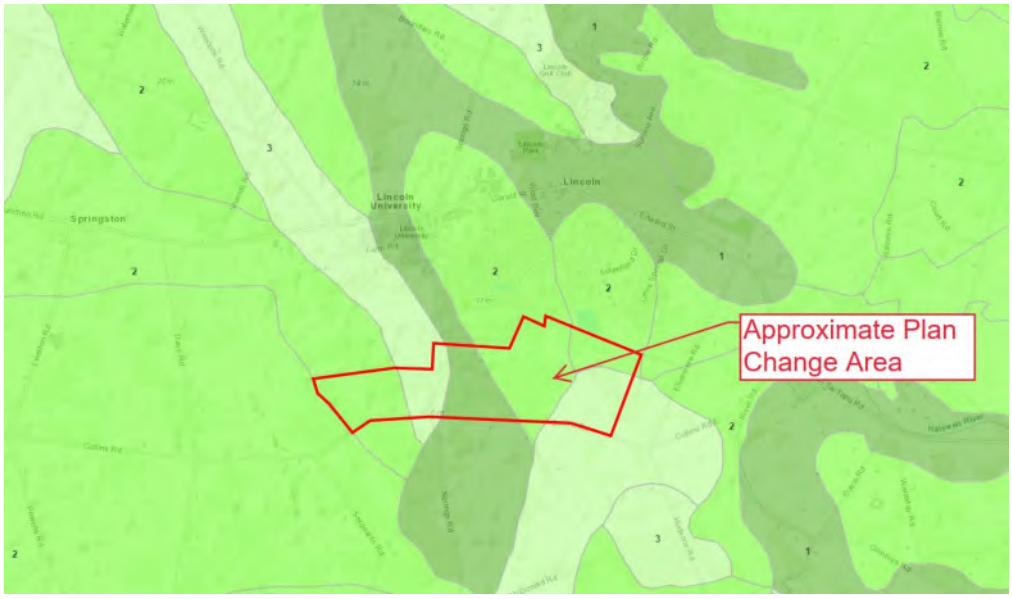

Figure 1: NZLRI LUC Classes 1-3 (Land Resource Inventory) (Source: Canterbury Maps)

42. The soil classes on the subject land are appropriate for a range of uses according to the LUC classifications (including cropping, grazing and forestry), as is the balance of land surrounding the Lincoln Township (which has not precluded historic residential rezoning or development). However, the LUC classifications only form part of the overall soil versatility characterisation.

43. Whilst this land could be used for other activities, the Council have indicated in their Versatile Soils Baseline Report (guiding the Proposed District Plan) that the protection of these soils is not absolute and shall be balanced against the relevant factors, as established by case law[5].In considering whether land is of high versatility, it needs to be assessed in the perspective of its setting, and the LUC is only one relevant factor. Factors can include (but are not limited to) bio-physical, social, and economic factors such as soil (texture, structure, water holding capacity, stability, slope and drainage), temperature, aspect, wind exposure and shelter, transport (ease and distance), proximity to labour, electricity, irrigation water and effects of the use on neighbours and the neighbours on the use[6].

44. As illustrated by **Figure 2** and **Figure 3** below, the request area is subject to other factors affecting the versatility of the soils. Over approximately one-third of the request area is categorised by Landcare Research's (Manaaki Whenua) S-Maps as having poor soil drainage, whilst the entirety of the request area has a high risk of bypass flow. The avoidance, or reduced use (i.e. grazing irrigation) of poorly drained soils characterised by

[5] Canterbury Regional Council v Selwyn District Council [1997] NZRMA 25
[6] Baseline Assessment Versatile Soils (DW015), Selwyn District Council, 12 December 2018

high bypass flow will improve water quality[7]. These traits balance the overall characterisation of the request area soil versatility.

45. In relation to the use of the land for other activities, the Versatile Soils Baseline Report indicated that the District is not currently facing an issue of the loss of versatile soils or the loss of productive capacity of rural soils in relation to urban development. Furthermore, this report acknowledges should there be a need to rezone land, the use of versatile soils may occur on the fringes of a number of townships in order to cater for urban growth.

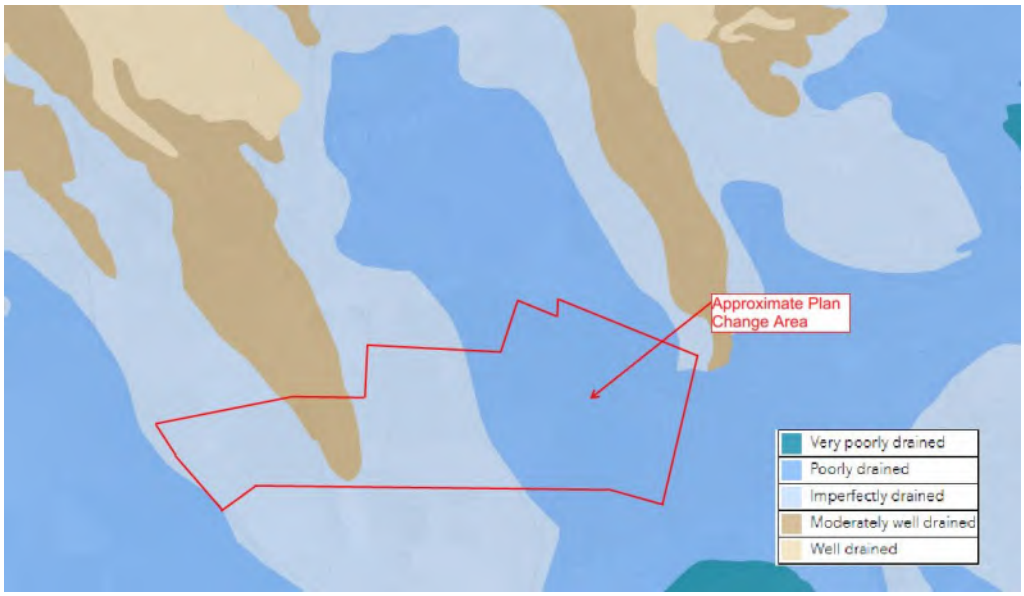

Figure 2: S-Maps Soil Drainage Classification (Source: Canterbury Maps/Landcare Research)

Figure 3: S-Maps Soil Bypass Flow Risk Classification (Source: Canterbury Maps/Landcare Research)

[7] Collins, Rob, et al. "Best management practices to mitigate faecal contamination by livestock of New Zealand waters." New Zealand Journal of Agricultural Research 50.2 (2007): 267-278.

46. There are limited areas adjoining Lincoln which would be appropriate for new residential development (irrespective of the versatile soils). The Lincoln Structure Plan has identified a number of general constraints to future growth, including University and Crown Research Institute (CRI) land ownership to the north/north-west, the Halswell/Huritini River drainage catchment to the north/north-east, and high-water table/flood areas to the east.

47. On the basis of the matters discussed above, it is considered that the plan change request is not contrary to Policy B1.1.8.

RFI 20. Tables 3 and 4 in the assessment of efficiency and effectiveness identify that a cost/disadvantage of these options is the "loss of low productivity rural land". As the majority of the plan change request area rests upon Class 1 and 2 soils, please qualify the statement that this land is 'of low productivity'.

Response:

48. As discussed above, the LUC classifications are only one measure of soil versatility and the soils should be assessed in the context of their setting (as established by Case Law[8]). The request area has poor soil drainage qualities and consequently has a higher risk of bypass flow, which can adversely affect water quality in the receiving environment. In addition, the request area also has a moderate vulnerability to Phosphorus leaching[9]. Therefore, these factors influence land management practices and pose a constraint on the overall productivity of the request area (to maintain water quality/avoid nitrate leaching).

Operative District Plan

RFI 21. The plan change request seeks only to vary the Operative District Plan by incorporating the proposed ODP into Appendix, however it is considered that there are a number of rules that also need to be amended to reflect the intent of the request.

Response:

49. Noted.

RFI 22. As the Living X zone is not mentioned in Rule C4.7.1/Table C4.1 Site Coverage Allowances, please provide a quantum to be included in this table. Similarly please consider if it is appropriate that any development in the Living X zone rely on the minimum setbacks for buildings set out in Table C4.2 or if a more specific building setback framework is established to address the intent of this zone.

Response:

50. It is understood that based on other townships in the District (i.e. Leeston) the Living X Zone may be developed to the extent of the Living 1 Zone (40% site coverage/2m internal setbacks). While no figure is referenced in Table C4.1 (site coverage) for the Living X Zone, a figure could be included for the purposes of clarification. It is acknowledged that the Living X area shown on the ODP is development constrained and will likely require substantially larger residential sites (i.e. 2000m^2 minimum lot sizes). Therefore, it would not be practical

[8] Canterbury Regional Council v Selwyn District Council [1997] NZRMA 25
[9] S-Maps Phosphorus Leaching Vulnerability (Source: Canterbury Maps/Landcare Research) https://canterburymaps.govt.nz/map?webmap=5ada91fd013742c0924d4935ac475a70

or viable for these sites to be developed up to 40% coverage. A suitable site coverage control for the Lincoln South Living X Zone is the lesser of 20% of the land area or 400m^2.

51. It is recognised that the Living X portion of the request area is influenced by stormwater management requirements and that residential building platforms determined prior to building consent stage will likely impose larger internal boundary setbacks than are currently required by Table C4.2. A 5m internal boundary setback and a 10m road boundary setback would be sufficient to maintain the rural-residential aesthetic intended.

RFI 23. The LI Creek and the LII River are identified in Appendix E12 Waterbodies, which sets out on which waterbodies Council wishes to establish esplanade reserves and strips. Having regard to s230 of the RMA, please consider if this table should be amended to include Spring Creek. Please also provide advice on the suitability of existing provisions in the Operative District Plan that address waterbodies.

Response:

52. Future subdivision of the request area will result in the eventual creation of allotments less than 4ha in area along the periphery of Spring Creek. Under Section 230 of the Act, an esplanade reserve can be taken for one of more of the purposes outlined in Section 229 of the Act when private land is subdivided. Therefore, it is not necessary to amend Appendix 12 - Waterbodies, as there is already sufficient scope provided under the Act.

53. Rule 12.1.4.26 is a subdivision matter for discretion in the Operative District Plan stating the following – "For the subdivision of land which contains or adjoins any waterbody (excluding aquifers) any mitigation to protect the hydrological characteristics and any ecological values of the waterbody (excluding aquifers)". Spring Creek meets the definition of a waterbody and will be suitably addressed by this matter at subdivision stage.

RFI 24. Existing Rules C4.9.33 and C4.9.34 provided for a building setback of 50m from the Business B2B zone to address reverse sensitivity effects of possible activities from this zone. Please consider if it is appropriate that a similar setback be required for that area of the plan change request adjacent the Business 2B zone.

Response:

54. Noted, a 50m setback distance is now provided on the ODP and the ODP text has been amended. Should the Business 2B area zoning change to residential or Business 1 equivalent, then it is anticipated that the setback would no longer be required.

RFI 25. The visual assessment acknowledges that the plan change "would result in an overall change of character form open and rural to one that is more dense and suburban in nature". It goes on to state that "management of fencing and bulk and location of the development will create a sense of openness throughout the site" and that the change is "partially mitigated through fencing controls and landscape planting". Mitigation measures are to be incorporated within the plan change, primarily through the ODP and the adoption/location of different zones. However, the ODP largely shows the Living Z zone immediately adjacent the boundary with the Rural (Outer Plains) boundary, and no mention is made of any provisions relating to fencing, either existing within the Operative District Plan or proposed. How does the plan change request proposed to address interface between the proposed Living and existing

Rural zones? Further, how does the plan change request propose to manage reverse sensitivity effects with rural zoned land to west, south and east?

Response:

55. It is appropriate to defer the fencing specifications until subdivision stage, noting that the Living Z zoning has fencing rules (limiting fence height proximate to the road boundary and also relative to the dwelling facade) and that a design sympathetic to rural character can be established at subdivision stage (as was the case with consented development in ODP Area 4 of Prebbleton). It is anticipated that sites fronting Collins Road will be sought after for their rural outlook and it will be in the developer's interest to maintain that outlook.

56. Properties adjoining reserves (i.e. stormwater reserves) in the Living Z zone also have fencing treatment managed by rules in the Operative District Plan. Again, it is anticipated that these sites will be sought after for their outlook and a compliant fencing design that is sympathetic to rural character can be established at the time of subdivision.

57. The width of Collins Road (20m) will provide a sufficient separation distance mitigating potential reverse sensitivity effects from the predominantly undersized rural properties on the southern side of Collins Road. These properties appear to be used for a combination of grazing and cropping. Notably, a planted bund of a lessor width was accepted by Council as an appropriate buffer between the Te Whariki subdivision and the request area operating as a dairy farm.

58. Similarly, the presence of rural activities to the east and the west of the request area are recognised. The esplanade reserve and the stormwater management areas adjacent to the Araiara/LII River, in conjunction with the lower residential density (Living X, 2000m^2 minimum) will provide sufficient separation distance to avoid potential reverse sensitivity effects. For the western rural boundary, the green link shown on the ODP adjoining the existing stream would provide an acceptable buffer from rural activities on the adjacent properties.

RFI 26. As acknowledged in the plan change request, part of the area may be subject to surface flooding. While the request indicates that the flooding hazard can be managed, please identify what measures may be necessary to protect the proposed residential development from flooding. Such measures may include the stipulation of minimum finished floor levels or established of building platforms. It is noted that the existing specific provisions (Rules C4.1.1 and C12.1.4.81) in the Operative District Plan are specific to Tai Tapu. Please consider and advise if it is considered necessary to amend these existing rules or to incorporate additional provisions into the plan to address the flooding hazard.

Response:

59. The eastern area of the site that may be subject to surface flooding is proposed to be zoned as Living X (Large Lot Residential). Locally raising ground levels to create elevated platforms for residential dwellings will be required to provide sufficient freeboard to protect dwellings from flooding (minimum 400mm above 0.5% Annual Exceedance Probability flood event is typically used). The balance of each lot area would be allowed to flood in extreme events. Limiting the area of raised ground levels to building platforms only mitigates the effect of displacing flood waters elsewhere.

60. Proposed wording for rule setting minimum levels for Living X zone as follows ;

"Any dwelling on land located in Living X zone in Lincoln South shall have a minimum freeboard height of 400mm above the 0.5% Annual Exceedance Probability Flood Event, and shall be sited on a building platform to be established prior to the issue of a building consent for the dwelling, which is of sufficient size to accommodate a dwelling and associated curtilage, in accordance with any applicable resource consent conditions for subdivision requiring the provision of building platforms in the Living X zone in Lincoln South.

RFI 27. Please advise if the presence of the 33kV power lines along Collins Road and Springs Road is required to be addressed by the inclusion of specific rules within either C12 Subdivision or C4 Buildings.

Response:

61. The New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34:2001) contains restrictions on the location of structures and activities in relation to National Grid transmission lines. Buildings and activity in the vicinity of National Grid transmission lines must comply with NZECP 34:2001. Accordingly, activity in this location is already regulated and any future development would need to be designed and established in accordance with NZECP 34:2001.

62. In terms of options to practically address this, undergrounding of high voltage cables along Springs Road frontage may be cost prohibitive. One option to consider is a similar approach to that taken by during development of Te Whariki Stage 4 whereby a 5 metre wide easement is established along the boundary for lots fronting Springs Road (eastern side only). No dwellings or any other structures constructed of metal (including boundary fencing) would be permitted within the easement. This easement would be shown on the subdivision scheme plan at subdivision application stage.

63. This approach also lends support to restricting vehicle access off Springs Road to residential lots.

64. Further options and discussions with Orion will take place during subdivision design and prior to subdivision application.

65. Existing 33kV power lines along Collins Road are on the opposite side (south side) of Collins Road and therefore do not impact the proposed development.

RFI 28. The assessment of the request against the objectives and policies of the Operative District Plan is not considered to be complete. Please provide an assessment of the request against all of the relevant provisions of the Operative District Plan, including those identified within this letter, as well as Objective B3.4.3 and Policy B3.4.39; Objective B1.3.2 and Policies B1.3.1 and B1.3.3; and Policy B3.1.7.

Response:

66. The provisions noted have been assessed and consistency is achieved. An amended assessment against the objectives and policies of the Operative District Plan is included as **Attachment 12.**

Outline Development Plan (ODP)

RFI 29. Please provide an assessment of the ODP against all the matters set out in Policy B4.3.8, including:

- ***Identifying any cultural (including Te Taumutu Rūnanga values), natural, and historic or heritage features and values and show how they are to be enhanced or maintained;***

- ***Indicating how required infrastructure will be provided and how it will be funded;***

- ***Demonstrating how effective provision is made for a range of transport options, including public transport systems, pedestrian walkways and cycleways, both within and adjoining the ODP area;***

- ***Showing how other potential adverse effects on and/or from nearby existing or designated strategic infrastructure (including requirements for designations, or planned infrastructure) will be avoided, remedied or appropriately mitigated;***

- ***Showing how other potential adverse effects on the environment, the protection and enhancement of surface and groundwater quality, are to be avoided, remedied or mitigated;***

- ***Including any other information which is relevant to an understanding of the development and its proposed zoning; and***

- ***Demonstrating that the design will minimise any reverse sensitivity effects.***

Response:

Principal through roads, connection and integration with the surrounding road networks, relevant infrastructure services and areas for possible future development;

67. A primary road is shown on the ODP with the ability to provide a through connection from Springs Road to Ellesmere Road (via Moirs Lane). This could potentially link to a bypass road that was contemplated by Council in the past.

68. Secondary roads are shown on the ODP and where possible will connect with areas of existing development including, Jimmy Adams Terrace (to Ararira Springs Primary School), to Te Whariki, and also to Verdeco Park. Green links and cycle ways will provide north-south and east-west linkages across the majority of the request area and can provide a link to the rail trail. Indicative infrastructure servicing is also illustrated in the ODP figures within the Urban Design Statement (**Attachment 13**).

Any land to be set aside for:

- *community facilities or schools;*

69. No community facilities or schools are shown on the ODP, but this does not preclude the ability for them to be provided if required in the future.

- *parks and land required for recreation or reserves;*

70. Four recreational reserves and various green links are shown on the ODP, noting that these are provided on both sides of Springs Road. An approximate 20m wide recreational reserve with a possible cycleway is provided along Spring Creek and provides connectivity to the Te Whariki subdivision and existing green links.

- *any land to be set aside for business activities;*

71. A local neighbourhood centre with a Business 1 zoning has been identified on the ODP fronting Springs Road opposite the undeveloped Business 2B Zone. Business 1 zones are pleasant areas for people to live or work within and produce a high standard of amenity that is compatible with residential activities. The ODP indicates that higher density housing will be provided adjoining the neighbourhood centre.

- *the distribution of different residential densities;*

72. The ODP illustrates the distribution of different residential densities. The majority of which will provide for Living Z Low Density residential development (minimum 12hh/ha). Higher residential densities are proposed adjacent to key open spaces and green corridors, including both small-lot medium density development and comprehensive medium density development (minimum 15hh/ha). Areas of Living X zoning (with a minimum lot area of 2000m^2) are included on the eastern side of the request area.

- *land required for the integrated management of water systems, including stormwater treatment, secondary flow paths, retention and drainage paths;*

73. Stormwater management areas and flow/drainage paths are illustrated on the ODP.

- *land reserved or otherwise set aside from development for environmental or landscape protection or enhancement; and*

74. Green links are provided adjacent to the existing waterbodies as shown on the ODP. Reserves developed at subdivision stage will naturalise and enhance the existing waterbodies, protecting them from development within the riparian margins.

- *land reserved or otherwise set aside from development for any other reason, and the reasons for its protection.*

75. The Chudleigh homestead is identified in the ODP text as a feature with heritage value and it is recognised that the relevant heritage provisions in the Proposed District Plan have instant legal effect and provide protection from inappropriate development through the relevant planning framework.

Demonstrate how each ODP area will achieve a minimum net density of at least 10 lots or household units per hectare ;

76. The ODP area is designed to achieve an overall minimum net density of 12hh/ha, incorporating all of the residential zones. This is based on a developable area on the request site of approximately 150-165ha, and the establishment of up to 2,000 new households.

Identify any cultural (including Te Taumutu Rūnanga values), natural, and historic or heritage features and values and show how they are to be enhanced or maintained;

77. The site does not contain identified/isted waahi tapu, taonga, or other sites of significance to Iwi, although the presence of natural surface waterbodies and springs are acknowledged to be of significant cultural value. Consultation was undertaken with Mahaanui Kurataiao Limited to provide feedback from the Te Taumutu Runanga as the Kaitiaki. Measures such as waterbody setbacks/naturalisation and on-site stormwater management areas are agreed by the Runanga to provide acceptable mitigation for cultural effects and are included in the ODP text.

78. With regard to historic or heritage values, the only feature of significance to the request is the Chudleigh homestead, which will be maintained or enhanced with the future development of the site under the relevant planning provisions in the Proposed District Plan (with instant legal effect). This feature is identified on the ODP.

79. With regard to natural values, the request area has been used for farming for many years and there are no notable indigenous plantings located on the site. The request will provide an opportunity for the enhancement of riparian zones with indigenous species and increased margins. Consequently, the enhancement of these areas will also support aquatic ecology. This outcome is consistent with the recommendations (1 and 6) received from the Te Taumutu Rūnanga.

Indicate how required infrastructure will be provided and how it will be funded;

80. The necessary infrastructure will be co-ordinated between the Council and the developer at the time of subdivision, with the costs of development being met by the developer, and indirectly by the Council through the collection of Development Contributions.

Set out the phasing and co-ordination of subdivision and development in line with the phasing shown on the Planning Maps and Appendices;

81. The phasing and co-ordination of subdivision will be influenced by the detailed infrastructure design which is to be completed prior to subdivision application. It is likely that future development will be completed in a staged/progressive manner across the request area. This may require the staging to be managed to ensure that servicing meets the demand of the development.

Demonstrate how effective provision is made for a range of transport options, including public transport systems, pedestrian walkways and cycleways, both within and adjoining the ODP area;

82. Shared pedestrian and cycle connections are shown throughout the ODP area, including connections to existing networks to the north, enhancing connectivity to other parts of Lincoln. The 820 and 80 bus routes currently travel from either the east or the west stopping at Lincoln University. In addition, the 87 route from Leeston travels through Springston using Leeston Road. One (or more) of these bus routes could be realigned to service Collins Road and Springs Road, or use the proposed Primary road (via Jimmy Adams Terrace or Ellesmere Road) if demand for service is sufficient.

Show how other potential adverse effects on and/or from nearby existing or designated strategic infrastructure (including requirements for designations, or planned infrastructure) will be avoided, remedied or appropriately mitigated;

83. The existing Allendale pump station is the only nearby existing designated strategic infrastructure. This was initially designated for the purposes of wastewater treatment prior to the commissioning of the Pines Waste Water Treatment Plant. It is understood that the Council do not hold any active consents to authorising discharges with the use of the facility for wastewater treatment. As a result of the request, the storage pond would be required to temporarily contain diluted overflow during a 1-in-5-year rainfall event. The odour assessment included as **Attachment 7** demonstrates that the required temporary use of the facility for this purpose would have less than minor effects on future residential development.

Show how other potential adverse effects on the environment, the protection and enhancement of surface and groundwater quality, are to be avoided, remedied or mitigated;

84. The ODP text states that all new sites would be serviced by a reticulated sewer network (using a combination of gravity and local pressure networks). This would ensure that any potential adverse effects on ground water quality are limited. Stormwater generated by new sites and network roads will be treated and disposed of through swales and basins, ensuring that no untreated stormwater will reach groundwater or surface waterbodies. As specified in the ODP text, a detailed design of the stormwater management areas will be undertaken by the developer in collaboration with the Council at subdivision stage, in accordance with Regional Council requirements.

Include any other information which is relevant to an understanding of the development and its proposed zoning; and

85. The ODP text provides a description of the proposed zones and gives an indication of the resultant allotment areas, which in conjunction with the ODP provides an indication of the residential density distribution. The 'finding material' (A4.5 Townships & Zones) section of the Operative District Plan gives a further breakdown of each zone and the anticipated environmental outcomes for the public's benefit.

Demonstrate that the design will minimise any reverse sensitivity effects.

86. A 50m setback buffer will be provided to avoid reverse sensitivity effects in relation to the adjoining Business 2B zoned land. This setback buffer is now shown on the ODP.

87. With regard to potential reverse sensitivity effects from rural activities, the ODP text states that lower residential densities (i.e. Living X) and the stormwater management areas would provide a transitional buffer to the rural zoned land adjoining to the east. Collins Road performs the function of a setback buffer for the predominantly undersized rural properties located to the south. For the rural areas to the west, the green link shown on the ODP and waterbody setbacks volunteered will provide an adequate separation distance to minimise potential reverse sensitivity effects.

RFI 30. The text accompanying the proposed ODP should make reference to how development of the area should acknowledge the cultural, natural and heritage features of the area, and how these may be incorporated into any design philosophy accompanying future

development. It should also incorporate the urban design principles set out at paragraph 20 of the plan change request.

Response:

88. Noted, the ODP text has been amended to directly recognise cultural, natural and heritage features in the request area.

RFI 31. It is considered that the description and illustration of the proposed density associated with the Living Z and Living X zones shown on the ODP may create confusion with the Proposed District Plan. Please consider amending this.

Response:

89. Noted, this has been amended on the ODP.

RFI 32. The secondary connections north – to Verdeco Park and Te Whāriki have not been provided for within these subdivisions. Please advise of any discussions with the developers of these area as to the feasibility of roading connections between the area of the plan change and the consented developments to the north.

Response:

90. The plan change proponent has met with a Verdeco Park representative and is familiar with Ngai Tahu as an organisation. Furthermore, they are familiar with their consented subdivision layouts and construction progress on-site. They are keen to work with them at subdivision stage to provide any appropriate linkages where possible, to more integrate the neighbouring developments.

RFI 33. Please annotate the ODP (or supporting text) to include any measures appropriate to address reverse sensitivity matters between the Living and Rural zone, as well as between the Living Zones themselves.

Response:

91. The ODP text has been updated to include reference to features mitigating potential reverse sensitivity effects. The ODP is now marked with the setback buffer from the adjoining Business 2B Zone.

RFI 34. Please identify by name the existing waterways within the plan change area.

Response:

92. The Blue network ODP (within the ODP figures in the updated Urban Design Statement – **Attachment 13**) has been updated to include the existing waterway names, to the extent that these are known.

RFI 35. To address CPTED issues, it is noted that any of the proposed reserve along the waterbodies should have extensive road frontages, rather than being behind houses.

Response:

93. This is a subdivision matter for discretion (Rule 12.1.4.16) which can be appropriately resolved at that time. The green network is indicative and the developer can modify the road layout at subdivision stage with further feedback from Council's Urban Designer.

RFI 36. Please consider if the ODP needs to address the presence of the 33kV power lines along Collins Road and Springs Road.

Response:

94. The 33kV power lines on the eastern side of Springs Road are now marked on the ODP and are referenced in the ODP text. The lines along Collins Road are on the opposite side (south side) of Collins Road and therefore do not impact the proposed development.

RFI 37. The ODP should also be amended to reflect any matters raised in the points in this letter, particularly regarding roading and reserves.

Response:

95. Noted.

RFI 38. It is noted that through the Proposed District Plan process, Council is seeking to establish a consistent ODP design with an approach to minimise features on an ODP and utilise assessment considerations in supporting text. While this is a request to change the Operative District Plan, please be aware that alignment of the ODP design may be sought as this request progress.

Response:

96. Noted.

Infrastructure

Water

RFI 39. The Infrastructure Assessment provided with the application was reviewed by Council's Asset Manager – Water Services.

Response:

97. Noted.

RFI 40. The Lincoln Sewage Treatment Plan, referred to in the request as the Allendale Pump Station, is located on the north-eastern boundary of the plan change area. This area is designated (SDC-153) and Rule C4.9.32 requires that any dwelling shall be setback not less than 150m from the boundary of the designed area. The plan change request has not sought to vary this rule, therefore please demonstrate how this will be achieved and address any other reserve sensitivity effects that may arise from the location of residential activity in close proximity to the designated area. This is particularly relevant as the request proposes that the

ponds will be required to buffer wastewater flows from the plan change area during periods of wet weather.

Response:

98. A review of the potential odour effects relating to the existing designation and the setback required by Rule 4.9.32 has been undertaken by Cathy Nieuwenhuijsen of Golder Associates Limited and is included as **Attachment 7**.

99. To summarise her assessment, the designation is no longer required for treatment of sewage prior to discharging into the Ararira/LII River, which was permitted by CRC210644 until 31 March 2013. All of Lincoln's wastewater is pumped to the Pines WWTP for treatment. As a result of the request, during a critical storm event up to 700m^3 of diluted wastewater may be temporarily stored in the existing tanks (up to 600m^3) and any additional (up to 100m^3) may be stored in the pond.

100. The assessment concludes that a 150m buffer is not required based on the temporary storage during peak rainfall events, and that there is expected to be less than minor odour effects beyond the boundary. No restrictions on land use within the request area are considered necessary to mitigate against reverse sensitivity odour. Therefore, it is requested that Rule C4.9.32 be **amended** in the Operative District Plan (Townships Volume) insofar that it does not apply to the Lincoln South request area (with reference to the applicable Appendix/ODP).

RFI 41. Council's Asset Manager – Water Services has advised that the design of wastewater systems should ensure that all wastewater is directed/discharged directly to the Allendale Pump Station. The applicant is also advised that the Vernon Drive Water Treatment Plant has been designed for the existing predicted growth of Lincoln and therefore is considered to be at capacity. As such, a new water treatment plant site will be required as part of the request and provision should be shown within the ODP for this.

Response:

101. As outlined in the Infrastructure Report, the proposal to connect to the existing ø140mm sewer rising main in Springs Road is proposed as a short-term measure until a dedicated pipeline for the entire development is constructed to discharge directly to the Allendale Pump Station. Construction of a dedicated wastewater pipeline to convey wastewater from the western catchment directly to Allendale Pump Station is a significant infrastructure investment which would be underutilised in the initial phases until sufficient houses are developed / occupied. Details to be determined in consultation with SDC at the time of subdivision design and consent application.

102. Requirements for upgrading of the existing water treatment at Vernon Drive or development of new water supply and treatment plant within the development would be determined in consultation with SDC at the time of subdivision design and consent application. Therefore, no site has been identified on the ODP until further design and discussions with SDC have taken place.

RFI 42. Council's current consent capacity to abstract water may limit the ability to service the development. Please advise if there are any resource consents for water abstraction within the plan change area and if these will be transferred to Council.

Response:

Existing consents for water abstraction within the plan change areas as follows;

- CRC042703 - to take and use water from Springs Creek for the spray irrigation of 70 hectares (max. rate 70 L/s, 42 L/s when flow in LII drops). Being a water take from surface water this consent is unable to be transferred and will be surrendered if the plan change is successful.

- CRC001158 - to take and use water from bore M36/1419 at max. rate of 42 L/s, volume not exceeding 73,030 m^3 in any period of 21 consecutive days. Bore M36/1419 is a 27m deep bore of diameter Ø200mm, located close to Springs Road.

- CRC152245 - to take and use water from bore M36/3531 at a max. rate of 26.3 L/s, volume not exceeding 978 m^3 /day, and 119,044 m^3/year. M36/3531 is a 19m deep bore of diameter Ø150mm, located near the intersection of Collins Road & Springs Road.

103. The consents to take groundwater for irrigation purposes could possibly be transferred to Council, the applicant is willing to discuss the options at a further state in the future, likely during subdivision design stage.

RFI 43. Please assess the downstream effect of stormwater on the capacity of the LII drainage network.

Response:

104. Proposed Stormwater Management Area (SMA's) will be designed to attenuate the peak flow generated by the development so that the post-development flows do not exceed the pre-development flows for events up to a 2% AEP event of any duration. The estimated pre-development runoff from the ODP area of 1.5 to 6.4m^3/s for the 2% AEP 12 hr & 1 hour rainfall event respectively. The maximum flow capacity in the Ararira / LII River measured at Pannetts Road some 5.5km downstream is 10.6m^3/s instantaneous and 7.6m/s 7-day average flow (ref: Ararira/LII Catchment - Hydrology, Ecology and Water Quality Report, Golder Associates, November 2015). Therefore, the downstream effect on the peak flow capacity of the LII drainage network will be minor.

105. The volume of runoff generated by the development will increase and be discharged slowly over a period of time after the storm peak. Therefore, flows in the LII drainage network will remain at pre-development levels for a longer period after the storm peak. This may result in tributaries and land drains of the LII drainage network taking slightly longer to remove subsurface water to the same level as pre-development.

106. It is noted that capacity of the Awarira / LII River catchment is typically governed by extensive submerged weed growth in the river channel which can cause water level rises from 0.23 to 0.97 m in reaches between the LI/LII confluence and the outlet to Te Waihora / Lake Ellesmere (ref: AECOM report AEE Lincoln Stormwater Discharges and Ancillary Activities (2011)). Regular weed clearing and maintenance programmes has a more significant effect on the capacity of the LII drainage network than any increase in discharge volume generated by the proposed development. This is also supported by comments

made in report titled Ararira/LII Catchment - Hydrology, Ecology and Water Quality Report by Golder Associates, November 2015 ;

'Flooding in the lower parts of the [Ararira/LII River] catchment, particularly around Yarrs Lagoon is common and is caused predominately by high groundwater levels and saturated soils rather than excessive runoff of catchment rainfall. Flooding can be particularly widespread when water levels in Te Waihora / Lake Ellesmere are high as this causes a backwater effect which can extend for several kilometres up the Ararira / LII River .... High groundwater levels and the flat topography of the Ararira / LII Rover catchment makes efficient land drainage both necessary and a challenge, requiring regular waterway maintenance by the SDC and LII Drainage Committee. Maintenance of the drainage network to remove sediment and weed is an important requirement to preserve land drainage'.

Reserves

RFI 44. The plan change request have been reviewed by Council's Manager – Open Space and Property.

Response:

107. Noted.

RFI 45. The reserve placement distribution appears to be largely dictated by the location of spring heads. A more through assessment is requested on the importance of the springs, along with an indication of how these will be dealt with within the development and integrated into the reserve network. It also raises questions about how these areas will be developed – for drainage or recreational purposes?

Response:

108. The springs will be addressed as part of the detailed subdivision design, noting that the springs are all located close to existing waterbodies or historic drains that would be naturalised as part of the site development.

109. The presence of the springs does not preclude the potential for reserves to be developed for recreational purposes, although it is noted that a drainage function may affect the overall Development Contributions calculations for reserves.

RFI 46. The central reserve to the north does not take into account the proximity to the new large reserve (of approximately 8,400m2 being developed on the southern boundary of Te Whāriki, immediate adjacent the area shown on the ODP. As such, while sufficient green space should be provided at the head of Springs Creek, a neighbourhood reserve in this location is not supported.

Response:

110. Noted. The large new reserve proposed next to the southern boundary of Te Whariki is designed to allow for the head of Springs Creek and adjoining reserves. The size of this reserve has been reduced considerably, to link with and support the Te Whariki reserves rather than creating a new neighbourhood reserve.

RFI 47. In removing the central reserve to the north, adjacent Te Whāriki, the central reserve to the south could be moved north a bit to provide the required distribution of 500m, unless the location of this reserve is dictated by the location of a spring.

Response:

111. Noted. The central reserve to the south as been moved to the north to provide the required 500m distribution.

RFI 48. Please advise of the purpose and rationale of the large reserve proposed in the south eastern portion of the area, adjacent the stormwater management area on the eastern boundary. It does not appear to correlate with the provision of open space around an area of medium density residential development and it is assumed that its location may also be dictated by the location of a spring and/or the need to buffer the parcel to the south.

Response:

112. Agreed. The purpose and rationale for the green space in the south eastern corner is to protect existing springs from development while providing amenity to adjoining residential properties. There is no medium density residential proposed in this location.

RFI 49. Council's Manager – Open Space and Property has advised that pedestrian linkages through to Moirs Lane and Jimmy Adams Terrace are desirable, and provision for these should be allowed for, within the reserve and roading networks.

Response:

113. Noted. We have not included these links on the movement or green network figures to keep the ODP uncluttered. We understand the request and will work with Council to provide these during the subdivision and consenting stage.

RFI 50. In regards to the various esplanade reserves, Council's Manager – Open Space and Property has advised that Council will want to confirm the widths of such, particularly along the LII where the width of existing drainage reserve/LINZ land adjoins, but is not included within the PC area.

Response:

114. Noted, any required esplanade widths will be confirmed at subdivision stage as part of the detailed survey of the site.

RFI 51. Please advise how the current boundary treatment along the southern boundary of the Te Whāriki development is to be incorporated into the plan change area.

Response:

115. The existing boundary treatment shared with the Te Whariki development site will be addressed as part of the detailed design at subdivision stage.

Transport

RFI 52. The Integrated Transport Assessment provided with the application was reviewed by Council's Asset Manager – Transportation.

Response:

116. Noted.

RFI 53. Council operates a Paramics Transport model for Lincoln which has been recently updated. The traffic assessment provided with the request does not appear to have utilised this model to consider the effects of the proposal on the existing Lincoln township and wider network. It is requested that the applicant liaise with Council to expand the model to incorporate this plan change area and this model is then used to inform the ITA for this request. Following this, Council will require any traffic modelling, results and analysis to be peer reviewed by Abley Consultants.

Response:

117. Please see the relevant response included in **Attachment 8**.

RFI 54. Council abandoned the concept of the Lincoln Southern Bypass due to the practical difficulties with poor soil conditions, high water tables and natural flowing (and culturally sensitive) springs within the area, combined with the refusal of the Lincoln University to allow any extension of Weedons Road through to at least Verdeco Park. The high cost compared to low use was also a predominate factor in Councils decision at the time not to proceed with the bypass. Therefore, please provide an assessment of how dependent the proposal is on a roading/bypass connection between Ellesmere Junction Road/Weedons Road and Springs Road to cater for this development? The applicant is advised that as Council has formally rejected perusing such a connection, the full responsibility to provide it if required would be on the applicant.

Response:

118. Please see the relevant response included in **Attachment 8**. The bypass has been removed from the ODP.

RFI 55. As raised above, there are no vehicle transport connections provided from the Verdeco Park and Te Whāriki subdivisions to the north of the plan change area, and the applicant is requested to consider the suitability of the roading layout if these connections cannot be secured. It is critical that the sufficient roading, pedestrian and other similar linkages are made to the adjoining Lincoln Township network for integration and permeability, yet there are no proposals on how this will be achieved in detail for ODP requirements.

Response:

119. This matter has been addressed by the ODP figures in the Urban Design Statement and some potential connections/linkages are shown. The plan change proponent intends to work with adjacent landowners to establish these connections where possible at the time of subdivision.

RFI 56. Moirs Lane includes an important cycleway link for the Little River Rail Trail along it and beyond to River Road. How would this be catered for in an off road facility and road/intersection crossing points?

Response:

120. Please see the relevant response included in **Attachment 8.**

RFI 57. The existing Springs/Collins Road intersection is not suited for substantial increases in use. What are the proposals for this being upgraded?

Response:

121. Please see the relevant response included in **Attachment 8**.

RFI 58. Please clarify what status and form Collins Road is proposed to have. Please also advise if it is proposed that sites will have individual access off Collins Road.

Response:

122. Please see the relevant response included in **Attachment 8**.

RFI 59. As part of any localised network upgrade, along with Collins Rd being formed and sealed as would be expected, a bridge and new carriageway through to Ellesmere Road would also be an outcome required to cater for access to the southern development areas as opposed to just relying on one northern connection off Ellesmere Road. This is made more important, as it may eventuate with no other local roading connections north into the existing township roading network able to being made by the proposal, making this connection even more important to provide.

Response:

123. Please see the relevant response included in **Attachment 8**.

RFI 60. The ITA refers to no direct (lot) access to Springs Road. What is the rational for this approach? Direct access has been supported for the existing subdivisions to the north, thereby facilitating urban frontage upgrades and speed limit changes to integrate the area into an urban form setting. As such it is an outcome that is desired for the plan change area.

Response:

124. Please see the relevant response included in **Attachment 8**.

RFI 61. Please advise how management of the existing stock underpass, which is shown as a pedestrian link, will address CPTED principles.

Response:

This is a subdivision matter for discretion (Rule 12.1.4.16) which can be appropriately resolved at that time with input feedback from Council's Urban Designer. ***RFI 62. The applicant is requested to confirm that all the upgrades to existing roads (widening, sealing, intersections and urban frontage upgrades etc.) are at the developers cost in addition to all***

new roads and transport requirements related to the proposal. It is noted for example a more significant upgrade of the Gerald/Springs/Ellesmere Junction Road intersection is proposed in the ITA, yet this requires third party land from the likes of the Lincoln University and Ag Research that Council know will not be forthcoming. Please advise how the applicant will obtain all the necessary land and undertake the upgrades identified necessary different to the current plans in train.

Response:

125. Please see the relevant response included in **Attachment 8**.

RFI 63. Council is planning to fully upgrade Gerald St from east to west over the 10 years as part of an arterial road and town center upgrade for Lincoln. How does this development impact on those plans and details – bypass or otherwise with the increased or redirected traffic generated by the proposed development? The upgrade was agreed on the basis a bypass was not what Council wanted in comparison.

Response:

126. Please see the relevant response included in **Attachment 8**.

RFI 64. Council is planning to upgrade the Ellesmere Road arterial between Lincoln and the City with a coordinated widening and intersection safety upgrade programme. How does this development impact on those plans and details, considering the application identifies the upgrade of Ellesmere Rd south of Edward St (but needed to Collins Rd), but not north ?

Response:

127. Please see the relevant response included in **Attachment 8**.

RFI 65. Through the development of Te Whāriki, Council has experienced having to deal with numerous road construction issues experienced by that developer due to poor soils, high water tables that have created settlements of both roads and footpaths. The proposed development area extends further south into allegedly worse areas than in Te Whāriki with increased the risk of these issues being exacerbated. Council does not want roading assets vested in it that then lead to a continuation of problems it then has to bear the cost on for perpetuity. How will this risk be addressed by the applicant and what long term protections will be there for Council?

Response:

128. Based on the geotechnical investigation carried out to date, pavement construction is not considered to be a greater risk than similar parts of Christchurch where soft soils and high groundwater are present. Further investigation and specific design will be carried out at the subdivision design and consenting stage. The issues experienced on the adjacent subdivision can be mitigated, if required, through conservative design to reduce SDC's perceived long term risks.

Geotechnical Assessment

RFI 66. The Geotechnical Assessment provided with the application was peer reviewed on behalf of Council by Ian McCahon of Geotech Consulting Limited and this is attached for your information.

Response:

129. Noted.

RFI 67. It is requested that:

- ***[Coffey] research publicly available borehole information (ECan well data base and NZ Geotechnical Database) to verify the deeper profile which is only inferred as shear wave velocity profile in parts of the site, and increase the number of locations where ground conditions are known, particularly along the northern side, and thus enhance confidence in the overall geotechnical model.***

- ***comment on lateral spread as a potential hazard [is also provided].***

Response:

130. The following response has been prepared by Coffey and a revised geotechnical assessment is included in **Attachment 9**.

131. Site testing – Comment: *The MBIE guidance suggests 0.2 to 0.5 deep tests per hectare at plan change stage to characterize the soil profile to a depth of at least 15m. This gives a range 35 to 89 tests for the 178 ha area as given in the Coffey report, or about twice the number actually made. The western part west of Springs Road has only six tests with spacing up to 0.7 km apart. The MASW surveys help, but they are along part of one side of the site and in the eastern quarter. The number and depth of testing is questionable (refer to comments in (3), below). More testing is essential at subdivision consent stage, if the plan change proceeds.*

132. After the initial review, additional investigation has been carried out, and nearby data available from the NZGD and ECan well records has been added. This brings the number of investigations to 54 locations (plus MASW) which is in the range suggested by MBIE. We note that the western portion of the site appears to be geologically consistent so for this plan change the test density in this area is considered acceptable.

133. Subsurface Conditions – Comment: *The MASW profiles do not correlate particularly well with the stratigraphy inferred from the CPT tests. Our experience with MASW profiling on other sites in the Christchurch area has also highlighted a need for caution with their interpretation. The report does not refer to any geotechnical information other than the CPTs and MASW made as part of this investigation, and therefore there is no confirmation of soil types below the depth of the CPT tests, many of which are relatively shallow and with an average depth of only 5.5m. We have checked several bores on the Ecan well data base. The four looked at do show gravel soils from a depth similar to that shown in the closest CPT tests, and it does appear that the soils below about 5m are dense enough and of a grading such that liquefaction is not an issue. However, we recommend that Coffey research publicly available borehole information (Ecan well data base and NZ Geotechnical*

Database) to verify the deeper profile. This will probably also increase the number of locations where ground conditions are known, particularly along the northern side, and thus enhance confidence in the overall geotechnical model.

The soil profile as described is generally consistent with that determined for the subdivisions along the north side. We note that the area to the northeast does contain significant amounts of organics in places, such that careful consideration had to be given to how these more compressible soils would respond to filling and building loads. Without any sampling by test pit or borehole in this plan change area, there is a possibility that organic soils will be more widespread than anticipated.

134. Coffey reviewed the NZGD and ECan boreholes as part of the initial assessment and concluded that the majority of the site was underlain (at varying depths) by dense gravel soils hence the choice of CPTs to confirm the upper soil profile (borehole and well logs appended to updated report for reference). For subdivision consent, we expect to carry out several machine drilled boreholes to confirm this layer on the site.

135. Due to time constraints, the MASW was not able to be calibrated with the on site CPTs, this will be carried out during the subdivision consent phase. We note that the MASW did consistently identify shear wave velocities in excess of 200m/s, indicating dense materials that are unlikely to liquefy at depth.

136. As shown in the ODP, the eastern area is proposed to comprise stormwater management areas and Living X (large Lot residential sites) due to the potential increased risk of poor ground conditions (yet to be determined prior to subdivision consent stage). We expect the north-eastern and eastern areas of the site will require the most intensive investigation to confirm ground conditions.

137. Liquefaction potential – Comment: *The analysis is by the MBIE standard procedure with appropriate input parameters. The use of a 1m water table depth for the eastern part is probably conservative. As no liquefaction outputs are provided, it is not known at what depths the liquefaction is predicted to occur. There is no discussion of evidence of ground damage in the 2010-11 earthquakes. It is noted that the site has certainly been well tested to in excess of SLS shaking and probably in excess of ULS shaking in the September 2010 earthquake, yet the closest residential land at the time of the earthquakes – further north with generally more sandy soils - was all classified Foundation Technical Category TC1 by MBIE, suggesting little to no ground damage.*

The recent subdivisions adjacent to the north side also considered liquefaction. The land north of the subject land and west of Springs Road was concluded to be mostly TC1 with two small areas of equivalent TC2, similar to the conclusions in this report. The Te Whariki subdivision has had numerous reports compiled for it and the various stages. For one stage on the east side of Springs Road, an early report designated the whole area as requiring TC2 foundations, to address both peat consolidation issues as well as some areas of higher liquefaction hazard. A later report by another consultant amended this to TC1 for most of the area with TC2 restricted to only 6% of the lots where proximity to natural springs or detention basins increased lateral spread hazard. Therefore, the current report is consistent in general conclusion with the work done on adjacent areas, which are on very similar ground conditions.

Lateral spread has not been assessed. This will need to be addressed at subdivision consent stage for land along all waterways, either natural or formed, and around stormwater detention ponds and the like.

Our conclusion is that the analysis and conclusions are probably appropriate, but that Coffey need to comment on lateral spread as a potential hazard.

138. Agreed, lateral spread / stretch risk will be assessed once a subdivision plan is further developed. Initially, we consider that potential TC2 foundations, on Lots adjacent to waterways (dependent on their distance from such waterways), will mitigate any risk associated with lateral spread / stretch.

RFI 68. It is also noted that the geotechnical assessment provided does not cover all of the plan change area – excluding 208 Collins Road, 1521 and 1543 Springs Road. While the reviewer has made comment on this matter, please provide advice on the appropriateness of geotechnical conditions of these parcels.

Response:

139. Coffey consider that the ground conditions for the three land parcels mentioned, along with 36 Collins Road, to be consistent with surrounding investigations already completed for the larger areas. 208 Collins Road, 1521 and 1543 Springs Road are considered to be low risk geotechnically. 36 Collins Road has more potential geotechnical risk however 4 CPTs are present on this site that can be incorporated into the subdivision consent stage investigations. The CPT traces are included in the updated report (CPTs 56181 to 56184).

Preliminary Site Investigation (PSI) Report

RFI 69. The PSI report provided with the application was peer reviewed on behalf of Council by Environment Canterbury.

Response:

140. Noted.

RFI 70. Given the size of the plan change area, it is considered that the PSI report is light on detail and makes too many assumptions without supporting evidence, given the potential number of houses that may be developed on the site over time. In particular, the PSI does not cover all of the plan change area – excluding 208 Collins Road, 1521 and 1543 Springs Road.

Response:

141. An amended PSI report is included as **Attachment 10**. Four additional parcels of land have been provided in Table 1 – Site Information. If these parcels of land come in the possession of the plan change submitter once the plan change has been potentially approved, then the further DSI will cover the properties. Furthermore, we believe the PSI has adequate detail for plan change purposes and as Section 4: Recommendations mentions, a DSI will be required prior to the next stage, that being the subdivision consent.

RFI 71. The map with the HAIL areas outlined did not include a landfill site in the southwestern corner of Lot 2 DP 494430 that is already flagged on the LLUR. Table 2 appeared to dismiss this as being a landfill and called it low risk because there was "no visible presence of large earthmoving in historical aerial photographs". However, the aerial imagery clearly shows a reasonably large pit that was filled with unknown material, and while it may not have been a municipal landfill, there is potential for there to be contaminants present. The filling appears to have taken place in the 1960's and 1970's, when environmental considerations and regulations were very different to what they are now. The PSI should be updated to reflect that this is an area of concern that needs to be investigated.

Response:

142. The borrow pit area is noted on our site plan (to the west of Springs Road). We note that the LLUR does not have any reference to landfill on Lot 2 DP 494430 (to the east of Springs Road).

RFI 72. Further, the assertion in Table 2 that the farm yard area is considered to be low risk for A10, or any other HAIL activities, especially without any testing is challenged. The yard has been present since at least the 1940's, and could have accommodated a number of potential HAIL activities that may not be immediately clear from only a walk over, which only assesses the current state of the site without considering what may have occurred there in the past.

Response:

143. Please refer to the revised Preliminary Site Investigation report included in **Attachment 10**. Table 2 and Section 4 were revised to increase risk from low to low-to-high. We consider this will be further investigated with a DSI if the plan change is approved.

RFI 73. Asbestos was not flagged as a potential contaminant of concern despite the buildings being present at the site since the 1940's, and it is recommended that this is considered as a contaminant of concern in respect of any DSI that may be undertaken at a later date.

Response:

144. Please refer to the revised Preliminary Site Investigation report included in **Attachment 10**. A New paragraph was added at the end of Section 1.2 'Scope of Works'. A New paragraph was added in Section 3 – 'Summary' after Table 2. A New sentence added in Section 4 – 'Recommendations' at the end of paragraph 4.

RFI 74. The PSI report also notes that the borrow pit in the western part of the site had been remediated, however neither Environment Canterbury nor Council holds any reports that confirm this. Please provide evidence supporting this claim otherwise this area should also be investigated further. Note that land use consent (RC105097) was granted to undertake quarrying activities to extract a total volume of 35,000m3 of gravel.

Response:

145. Please refer to the revised Preliminary Site Investigation report included in **Attachment 10**. The word 'remediated' was removed from Figure 1. The amended report added a part

sentence to the 4th paragraph addressing further investigation into the borrow pit is needed.

RFI 75. It is also requested that the plan change area be shown on the historical aerial photographs included in Appendix A to the PSI report. It is also noted that there is a considerable gap in aerial photos between 1994 and 2017, despite imagery being publically available.

Response:

146. Please refer to the revised Preliminary Site Investigation report included in **Attachment 10**. Aerials were amended, and additional photos are included.

RFI 76. It is also requested that the location of the photographs included in Appendix B to the PSI report be shown on Figure 1: 1491 Springs Road – Site Plan.

Response:

147. Photo locations have been added to Figure 1 in the revised Preliminary Site Investigation report included in **Attachment 10**.

RFI 77. Should the plan change request be approved, a Detailed Site Investigation (DSI) will be required over all the identified HAIL areas of the site. If the DSI identifies contamination that exceeds the soil contaminant standards for residential use, then a Remedial Action Plan will be required, remedial works will be required to be undertaken as per the plan, and a Site Validation Report will be required to be submitted to council confirming that the site is suitable for residential use.

Response:

148. We expect that a DSI will be required for future development (at the time of subdivision), as noted in Section 4.

Ecological Assessment

RFI 78. The Ecological Assessment provided with the application was peer reviewed on behalf of Council by Greg Burrell, Instream Consulting Limited and this is attached for your information.

Response:

149. Noted.

RFI 79. It is requested that the following further matters be addressed:

Wetland identification, significance, and protection

RFI 80. There are numerous ponds and wetland areas across the plan change area. No assessment has been made of their ecological significance or how they would be protected or enhanced. This needs to be done because the proposed Outline Development Plan does not identify wetland values.

Response:

150. Please see the relevant response included in **Attachment 11**.

Location, state, and protection of springs

RFI 81. There are large springs at the headwaters and in the bed of Springs Creek, plus numerous springs are indicated across the plan change area on Environment Canterbury's GIS database. Springs have significant ecological and cultural value. Better identification of these critical habitats is needed, along with an indication of how their flows, water quality, and ecological values will be protected or enhanced by the plan change.

Response:

151. Please see the relevant response included in **Attachment 11**.

Canterbury mudfish

RFI 82. The ecology report notes that "Maintenance of Canterbury mudfish habitat is not necessarily at odds with a plan change, but identification of habitats is critical as early as possible in the planning process." Given their Nationally Critical conservation status, the suggestion that Canterbury mudfish could be present is of great significance to the proposed plan change. Sampling for mudfish is therefore essential before a new Outline Development Plan can be considered.

Response:

152. Please see the relevant response included in **Attachment 11**.

Freshwater mussels (kākahi)

RFI 83. The ecology report notes that kākahi could be present in the Collins Drain tributaries, but there has been no dedicated survey. Kākahi are a declining species and they are uncommon in Canterbury. They are present in the wider catchment, but are vulnerable to common waterway management practices, such as sediment removal. If there is potential kākahi habitat present, then it should be surveyed for kākahi and the plan change should take into account protection and enhancement of kākahi habitat.

Response:

153. Please see the relevant response included in **Attachment 11**.

Proposed District Plan

RFI 84. Council notified its Proposed District Plan on 5th October 2020. While the list of statutory documents to be considered when changing a district plan, as prescribed in s74 and s75 of the RMA, does not include a Proposed District Plan, case law suggests that s74 is not an exhaustive list and that scope exists to consider the provisions of the Proposed District Plan. As such, please provide an assessment of the request against the relevant provisions of the Proposed District Plan, and in particular those provisions that have immediate effect.

Response:

154. An assessment of the plan change request against the proposed District Plan, to the extent relevant, is included in **Attachment 5**. However, it is noted that a submission has been lodged on the Proposed Plan seeking that the Plan Change land be zoned for residential activity in a manner that is generally consistent with this plan change request. Accounting for this and the very early stage of the Plan review process, limited weight should be afforded to the proposed District Plan.

155. We trust that this satisfies your further information request. Should further clarification or information be required, please don't hesitate to contact the undersigned.

Yours sincerely,

Novo Group Limited

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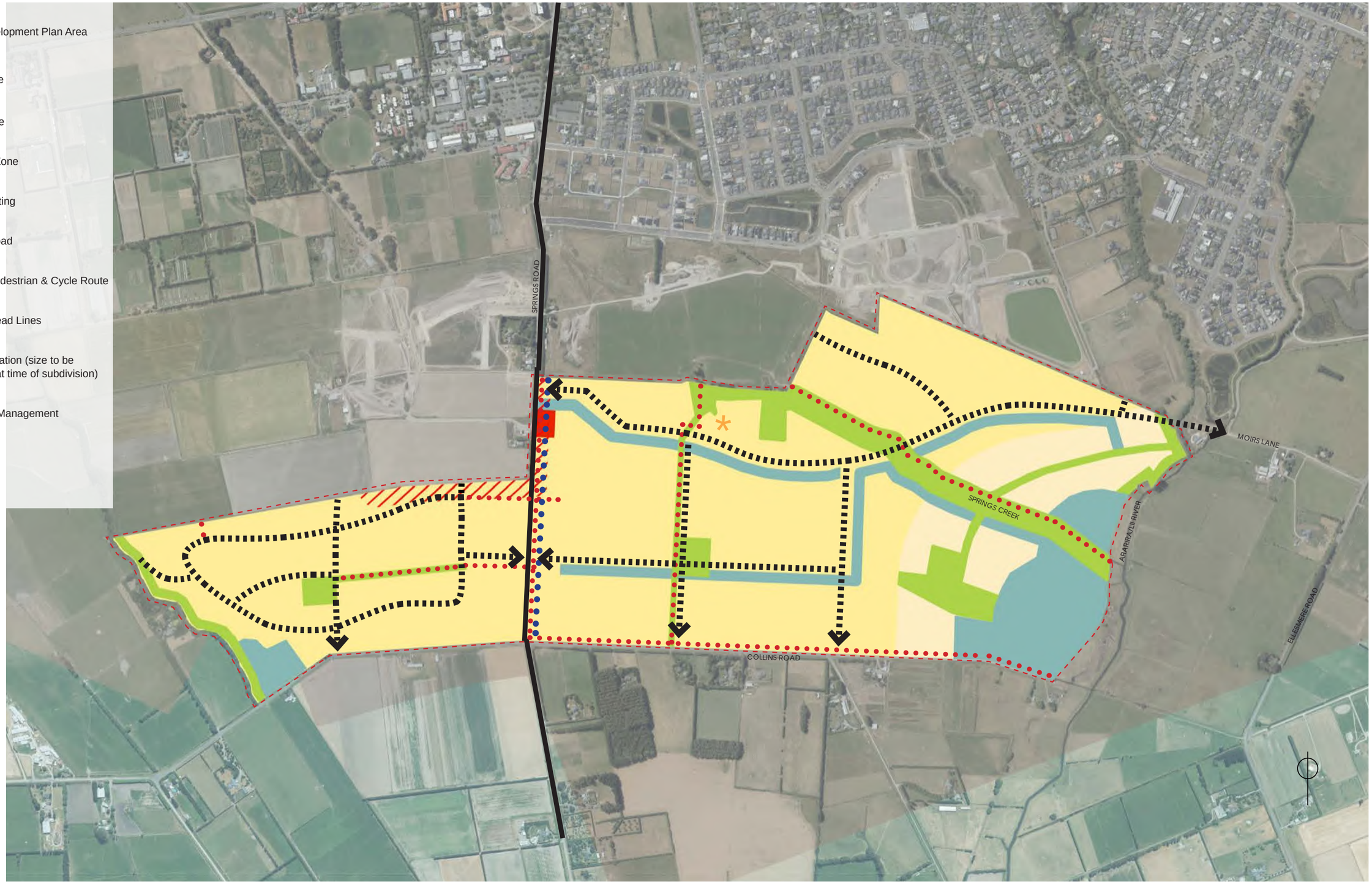
Attachment 1: Amended ODP

OUTLINE DEVELOPMENT PLAN (ODP) - LINCOLN SOUTH

LEGEND

- Outline Development Plan Area
- Living Z Zone
- Living X Zone
- Business 1 Zone
- Heritage Setting
- Indicative Road
- Indicative Pedestrian & Cycle Route
- 33kV Overhead Lines
- Reserve Location (size to be determined at time of subdivision)
- Stormwater Management
- Setback



LANDUSE AND DENSITY

LEGEND

- Outline Development Plan Area

Living Z

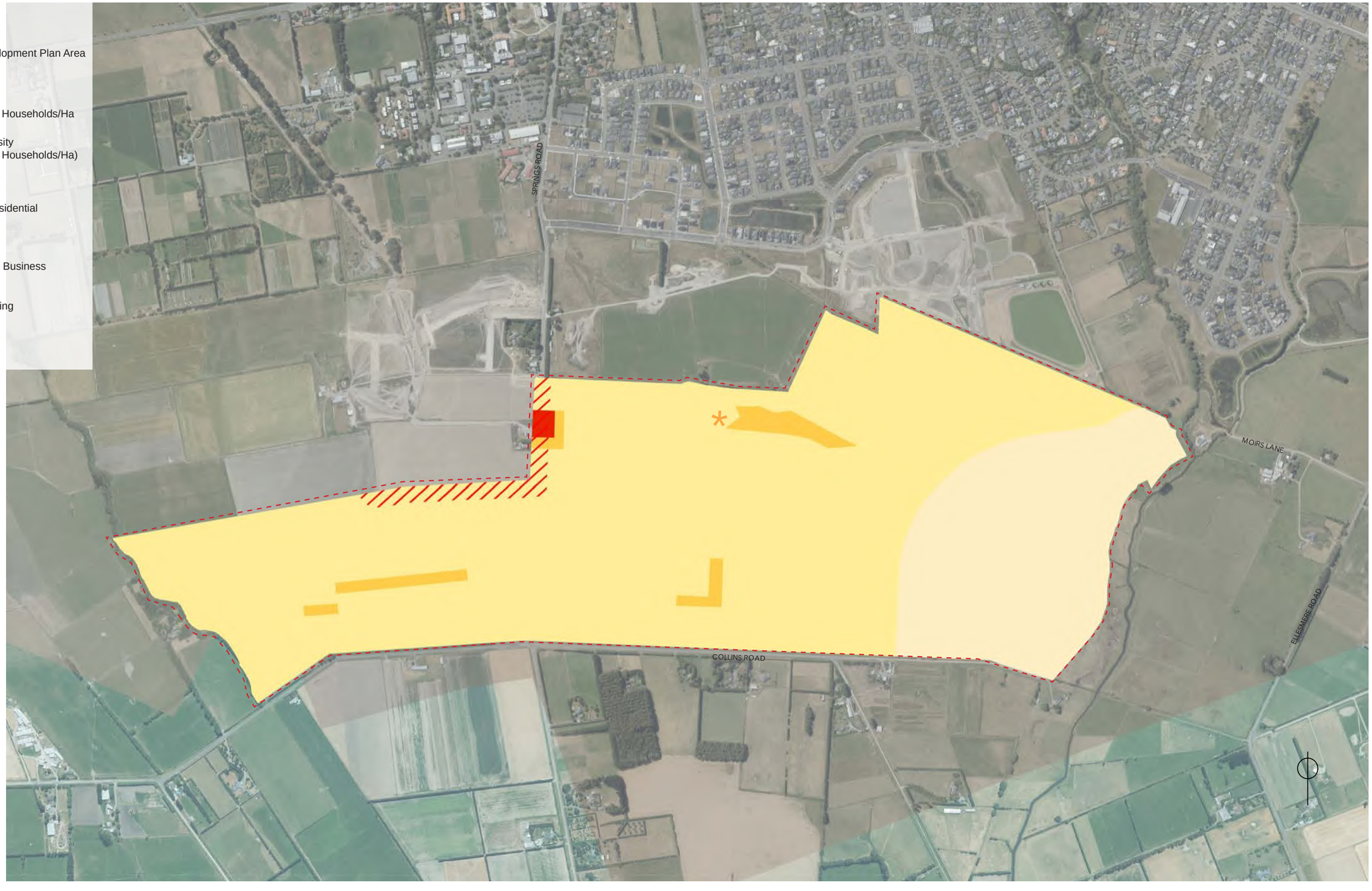
- Low Density (Minimum 12 Households/Ha
- Medium Density (Minimum 15 Households/Ha)

Living X

- Large Lot Residential

Business

- Commercial / Business
- Heritage Setting
- Setback



MOVEMENT AND CONNECTIVITY

LEGEND

- Outline Development Plan Area
- Potential Bypass Road (Weedons Road)
- Primary Road
- Secondary Road
- 2.5m Shared Path (off road)
- Possible Green Link & Cycleway
- 33kV Overhead Lines
- Stock Underpass Turned into Pedestrian Link

GREEN / OPEN SPACE NETWORK

LEGEND

- Outline Development Plan Area
- Recreation Reserve
- Existing Green Space
- Green Link
- Existing Green Link
- 500m and 800m Walkable Catchment

BLUE NETWORK

LEGEND

- Outline Development Plan Area
- Stormwater Management System / Areas
- Waterway
- Existing Drain
- Existing Allendale Pump Station and Emergency Storage
- Indicative Waste Water Pump Station
- Springs Locations

Attachment 2: Amended ODP Text

OUTLINE DEVELOPMENT PLAN – SOUTH LINCOLN

Introduction

The Outline Development Plan (ODP) area comprises approximately 190 hectares and is bounded by the Te Whariki and Verdeco subdivisions to the north, Collins Road to the south, an ephemeral waterway termed Western Boundary Drain to the west, and the LII River to the east.

Land Use

The development area shall achieve a minimum net density of 12 household per hectare, averaged over the area. The zoning framework supports a variety of site sizes to achieve this minimum density requirement. Should this area be developed in stages, confirmation at the time of subdivision of each stage, and an assessment as to how the minimum net density of 12 household per hectare for the overall area can be achieved, will be required.

Medium density areas within the development area are able to be supported by adjacent amenities that include key open spaces, green corridors, waterbodies, and a small commercial centre.

For the Chudleigh Homestead and its immediate surrounds, a larger site size that accounts for the heritage values and setting associated with this building shall be provided for at the time of subdivision.

A low density area of Living X zoning is located on the eastern extent of the ODP, with a minimum lot area of 2,000m^2. This low density area will provide a buffer between the higher density residential areas located centrally within the ODP area, and the adjoining rural areas to the east, and will otherwise meet stormwater objectives for the site.

A dwelling setback of 50m from dwellings to the boundary of the neighbouring Business 2B Zone is provided to avoid potential reverse sensitivity effects associated with activities in that zone.

The 33kV overhead powerlines along the eastern side of Springs Road may affect direct vehicle access and can be addressed at the time of subdivision accounting for the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34:2001).

The small local commercial centre is proposed on Springs Road towards the northern part of the ODP area in a location that complements the nearby Business 2B Zone, provides good accessibility and will meet some of the convenience needs of residents in the immediate area.

Access and Transport

The ODP employs a roading hierarchy that delivers a range of integrated transport options, including active transport connections at the boundary of the development area to adjacent neighbourhoods that facilitate the use of existing and future public transport routes. Roading connections shall be designed to achieve permeability, whilst minimising the number of new intersections and maintaining appropriate intersection spacing. The proposed roading hierarchy will deliver an accessible and coherent neighbourhood that provides safe and efficient access to the new development.

An integrated network of roads will facilitate the safe and efficient distribution of internal traffic, provide access to properties, assist in connecting the open space reserves network both within and beyond the site and provide links to adjoining neighbourhoods.

The transport network for the area shall integrate into the pedestrian and cycle network established in adjoining neighbourhoods and the wider township. Cycling and walking will be contained within the road reserve and incorporated into the roading design of the overall road network where applicable. Adequate space must be provided to accommodate cyclists and to facilitate safe and convenient pedestrian movements.

Open Space, Recreation, and Community Facilities

Recreation reserves are provided throughout the ODP area in addition to green links and reserves that provide open space and facilitate attractive pedestrian connections. The location of these reserves has been determined based on the number of reserves established in the wider area and to ensure people living within the development block have access to open space reserve is within a 500m walking radius of their homes.

There is an opportunity to integrate the collection, treatment, and disposal of stormwater with open space reserves where appropriate. Pedestrian and cycle paths are required to integrate into the green network to ensure a high level of connectivity is achieved, and to maximise the utility of the public space. Council's open space requirements cited in the Long Term Plan and Activity Management Plans should be adhered to during subdivision design.

Springs Creek is a spring fed tributary of the Ararira/LII River with headwater springs situated within the grounds of the historic 'Chudleigh' homestead. The creek alignment has been modified over time to straighten the channel and improve its drainage function. There is opportunity to enhance and incorporate this natural feature into the wider green and blue network of the site.

An approximate 20m wide recreation reserve with possible cycleway is provided along Springs Creek and provides connectivity to the Te Whariki subdivision and its existing green links.

The proposed reserve network provides an opportunity to create an ecological corridor. Plant selection in the new reserves and riparian margins will include native tree and shrub plantings. Reserves will ensure that dwellings are setback an appropriate distance from waterbodies.

Servicing

There are a range of options available for the collection, treatment, and disposal of stormwater. Detailed stormwater solutions are to be determined by the developer in collaboration with Council at subdivision stage and in accordance with Environment Canterbury requirements. Systems will be designed to integrate into both the transport and reserve networks where practicable.

The spring-fed Lincoln Main Drain (LMD) crosses the northeast portion of the site from northwest to southeast and serves as the main drain outlet for the Te Whariki subdivision. The drain is to be diverted to the northern boundary of the development site, but detailed design will ensure its ongoing function is not compromised. There is opportunity to naturalise and enhance the LMD as part of the wider green and blue network of the site.

The provision of infrastructure to service the area shall align with the Council's indicative infrastructure staging plan, unless an alternative arrangement is made by the landowner/developer and approved by Council.

Cultural

The importance of natural surface waterbodies and springs to Manawhenua is recognised and provided for by the ODP. Measures such as a 10 metre waterbody setback for development, the naturalisation of waterway margins with indigenous planting, and increased riparian margins will support cultural values associated with the ODP area.

For all earthworks across the site, an Accidental Discovery Protocol will be implemented at the time of site development, in addition to appropriate erosion and sediment controls, to assist in mitigating against the potential effects on wahi tapu and wahi taonga values generally.

Attachment 3: Updated CRPS & CLWRP Assessment

Canterbury Regional Policy Statement

1. The Selwyn District Plan is required under Section 73(4) of the Resource Management Act to give effect to the Canterbury Regional Policy Statement 2013 (RPS). Section 74(2) of the Act also requires territorial authorities to have regard to any proposed regional policy statement when preparing or changing a district plan.

2. The most relevant objectives and policies of the RPS are those contained in Chapters 5 (to the extent relevant to the entire region), 6, 7, 11, 15 and 16. Relevant objectives and policies are considered in Table 1 below.

Table 1: Assessment of the plan change provisions against the objectives of the Regional Policy Statement

Regional Policy Statement provisions	Comment / Assessment
Chapter 5 – Land Use and Infrastructure	
Objective 5.2.1 – Location, design and function of development (Entire Region) *Development is located and designed so that it functions in a way that:* *1) achieves consolidated, well designed and sustainable growth in and around existing urban areas as the primary focus for accommodating the region's growth; and* *2) enables people and communities, including future generations, to provide for their social, economic and cultural well-being and health and safety; and which:* *a) maintains, and where appropriate, enhances the overall quality of the natural environment of the Canterbury region, including its coastal environment, outstanding natural features and landscapes, and natural values;* *b) provides sufficient housing choice to meet the region's housing needs;* *c) encourages sustainable economic development by enabling business activities in appropriate locations;* *d) minimises energy use and/or improves energy efficiency;* *e) enables rural activities that support the rural environment including primary production;* *f) is compatible with, and will result in the continued safe, efficient and effective use of regionally significant infrastructure;* *g) avoids adverse effects on significant natural and physical resources including regionally significant infrastructure, and where avoidance is impracticable, remedies or mitigates those effects on those resources and infrastructure;* *h) facilitates the establishment of papakāinga and marae; and* *i) avoids conflicts between incompatible activities.*	The proposal will facilitate development that is 'located and designed' to function in a way that achieves the outcomes sought by objective 5.2.1. The plan change site is located on the fringe of urban Lincoln and adjoins areas developed, or developing for residential use. Accounting for this, the proposal will achieve 'consolidated, well designed and sustainable growth… around existing urban areas'. The proposal otherwise delivers housing supply, consistent with the NPS-UD, that 'enables people and communities, including future generations, to provide for their social, economic and cultural well-being and health and safety'. More specifically, it will: a) Not diminish the quality of the natural environment (accounting for the site's location and existing zoning); b) Improve housing choice; c) Make provision for (enable) business activities at an appropriate scale within the Plan Change site; d) Be compatible with, and will result in the continued safe, efficient and effective use of regionally significant infrastructure; e) Avoid adverse effects on significant natural and physical resources (including nearby infrastructure); and f) Avoid conflict with incompatible activities. The request area is currently operating as a dairy farm directly adjoining an urban environment. The request extent aligns with existing road boundaries and would provide an appropriate buffer from rural-residential activities occurring in the area. The proposal is therefore assessed as being consistent with objective 5.2.1.
Policy 5.3.7 ***Strategic land transport network and arterial roads (Entire Region)*** *In relation to strategic land transport network and arterial roads, the avoidance of development which:* *1. adversely affects the safe efficient and effective functioning of this network and these roads, including the*	In respect of Policy 5.3.7 Strategic land transport network and roads and as addressed in the ITA, the proposed development will not impact upon the ability of the roading network (including Arterial Roads) to fulfil current or future strategic transport requirements.

ability of this infrastructure to support freight and passenger transport services; and 2. *in relation to the strategic land transport network and arterial roads, to avoid development which forecloses the opportunity for the development of this network and these roads to meet future strategic transport requirements.*	
5.4 ANTICIPATED ENVIRONMENTAL RESULTS *1. New urban and rural residential development is consolidated in, around and integrated with existing urban areas.* *2. All rural-residential development is located in areas zoned for rural residential development.* *3. New urban and rural residential development maintains and improves the functioning and qualities of the existing urban areas.* *4. New development is appropriately serviced by sewerage, stormwater, potable water and multi-modal transport infrastructure.* *5. New urban development provides for community facilities where appropriate.* *6. Canterbury's important natural and physical resources affected by development are maintained.* *7. Regionally significant infrastructure provides safe, effective and efficient services to people and the community.* *8. The rural primary productive potential of Canterbury is maintained.* *9. Ngāi Tahu can develop appropriate papakāinga housing and marae on ancestral land.* *10. Potential land use, subdivision and/or development conflicts are avoided.*	With the exception of result (1) which is resolved by the NPS-UD, for the aforementioned reasons the proposal is assessed as being consistent with the relevant anticipated environmental results set out in Chapter 5.
Chapter 6 – Recovery and Rebuilding of Greater Christchurch	
Objective 6.2.1 Recovery framework *Recovery, rebuilding and development are enabled within Greater Christchurch through a land use and infrastructure framework that:* *1. identifies priority areas for urban development within Greater Christchurch;* *2. identifies Key Activity Centres which provide a focus for high quality, and, where appropriate, mixed-use development that incorporates the principles of good urban design;* *3. avoids urban development outside of existing urban areas or greenfield priority areas for development, unless expressly provided for in the CRPS;* *4. protects outstanding natural features and landscapes including those within the Port Hills from inappropriate subdivision, use and development;* *5. protects and enhances indigenous biodiversity and public space;* *6. maintains or improves the quantity and quality of water in groundwater aquifers and surface waterbodies, and quality of ambient air;*	Chapter 6 applies to Greater Christchurch, an area which is defined as including that part of Selwyn District which includes the subject land. In the first instance, it is noted that NPS-UD Policy 8 resolves the tension with those provisions in Chapter 6 seeking to identify, and constrain, areas of urban development within Greater Christchurch. It is also stressed that the site directly adjoins areas zoned for residential use and can easily be incorporated into the township. This includes requirements for suitable sewer, water and stormwater servicing; avoidance of significant reverse sensitivity effects, natural hazard effects, and ecological effects; supporting relevant cultural values; and, integrating into or consolidating with existing settlements. Accounting for the above and the assessments provided, in regard Objective 6.2.1, the proposal will protect the environmental qualities set out in that objective and provide for a consolidated and integrated urban form that is able to be fully serviced and has the potential to utilise existing reticulated water and wastewater capacity and integrate with strategic infrastructure / transport networks.

7. maintains the character and amenity of rural areas and settlements;

8. protects people from unacceptable risk from natural hazards and the effects of sea-level rise;

9. integrates strategic and other infrastructure and services with land use development;

10. achieves development that does not adversely affect the efficient operation, use, development, appropriate upgrade, and future planning of strategic infrastructure and freight hubs;

11. optimises use of existing infrastructure; and

12. provides for development opportunities on Māori Reserves in Greater Christchurch.

Objective 6.2.2 Urban form and settlement pattern
The urban form and settlement pattern in Greater Christchurch is managed to provide sufficient land for rebuilding and recovery needs and set a foundation for future growth, with an urban form that achieves consolidation and intensification of urban areas, and avoids unplanned expansion of urban areas, by:
1. aiming to achieve the following targets for intensification as a proportion of overall growth through the period of recovery:
(a) 35% averaged over the period between 2013 and 2016
(b) 45% averaged over the period between 2016 to 2021
(c) 55% averaged over the period between 2022 and 2028;
2. providing higher density living environments including mixed use developments and a greater range of housing types, particularly in and around the Central City, in and around Key Activity Centres, and larger neighbourhood centres, and in greenfield priority areas and brownfield sites;
3. reinforcing the role of the Christchurch central business district within the Greater Christchurch area as identified in the Christchurch Central Recovery Plan;
4. providing for the development of greenfield priority areas on the periphery of Christchurch's urban area, and surrounding towns at a rate and in locations that meet anticipated demand and enables the efficient provision and use of network infrastructure;
5. encouraging sustainable and self-sufficient growth of the towns of Rangiora, Kaiapoi, Woodend, Lincoln, Rolleston and Prebbleton and consolidation of the existing settlement of West Melton;
6. Managing rural residential development outside of existing urban and priority areas; and
7. Providing for development opportunities on Māori Reserves.

Policy 6.3.1 Development within the Greater Christchurch area
In relation to recovery and rebuilding for Greater Christchurch:
1. give effect to the urban form identified in Map A, which identifies the location and extent of urban development that will support recovery, rebuilding and planning for future growth and infrastructure delivery;
2. give effect to the urban form identified in Map A (page 6-27) by identifying the location and extent of the indicated Key Activity Centres;
3. enable development of existing urban areas and greenfield priority areas, including intensification in appropriate locations, where it supports the recovery of Greater Christchurch;
4. ensure new urban activities only occur within existing urban areas or identified greenfield priority areas as shown on Map A, unless they are otherwise expressly provided for in the CRPS;
5. provide for educational facilities in rural areas in limited circumstances where no other practicable options exist within an urban area;

The site is not located in a sensitive landscape, nor will any sensitive indigenous vegetation be affected. Water quality can be maintained at the time of detailed design through engineering solutions and regional plan/discharge consent requirements.

The proposal may have some (minor and localised) effect on rural character and amenity as a result of more intensive residential development than the Operative Plan permits, though the landscape and visual assessment confirms that such effects will be appropriately minimised.

Accordingly, whilst the proposal is not consistent with the prescriptive provisions in Chapter 6 directing urban growth to specific areas (a tension resolved by the NPS-UD), it is otherwise consistent with the outcomes sought in these provisions.

6. provide for a metropolitan recreation facility at 466-482 Yaldhurst Road; and
7. avoid development that adversely affects the function and viability of, or public investment in, the Central City and Key Activity Centres.

Objective 6.2.4 Integration of transport infrastructure and land use *Prioritise the planning of transport infrastructure so that it maximises integration with the priority areas and new settlement patterns and facilitates the movement of people and goods and provision of services in Greater Christchurch, while:* *1. managing network congestion;* *2. reducing dependency on private motor vehicles;* *3. reducing emission of contaminants to air and energy use;* *4. promoting the use of active and public transport modes;* *5. optimising use of existing capacity within the network; and* *6. enhancing transport safety.*	The Plan Change site is well located relative to the District's Arterial road network. The site's proximity to urban Lincoln and associated public transport links and commercial/community services will assist in minimising travel distances and reducing dependency on motor vehicles. The Transport Assessment has confirmed the suitability of the adjoining road network for the vehicle movements anticipated and an integrated transport assessment has been undertaken in support of the proposal. Accordingly, the proposal is assessed as being consistent with these provisions.
Policy 6.3.4 Transport effectiveness *Ensure that an efficient and effective transport network that supports business and residential recovery is restored, protected and enhanced so that it maintains and improves movement of people and goods around Greater Christchurch by:* *1. avoiding development that will overload strategic freight routes;* *2. providing patterns of development that optimise use of existing network capacity and ensuring that, where possible,* *3. new building projects support increased uptake of active and public transport, and provide opportunities for modal choice;* *4. providing opportunities for travel demand management; requiring integrated transport assessment for substantial developments; and* *5. improving road user safety.*	
Policy 6.3.5 Integration of land use and infrastructure *Recovery of Greater Christchurch is to be assisted by the integration of land use development with infrastructure by:* *1. Identifying priority areas for development to enable reliable forward planning for infrastructure development and delivery;* *2. Ensuring that the nature, timing and sequencing of new development are co-ordinated with the development, funding, implementation and operation of transport and other infrastructure in order to:* *a. optimise the efficient and affordable provision of both the development and the infrastructure;* *b. maintain or enhance the operational effectiveness, viability and safety of existing and planned infrastructure;* *c. protect investment in existing and planned infrastructure; and* *d. ensure new development does not occur until provision for appropriate infrastructure is in place;* *3. Providing that the efficient and effective functioning of infrastructure, including transport corridors, is maintained, and the ability to maintain and upgrade that infrastructure is retained;* *4. Only providing for new development that does not affect the efficient operation, use, development, appropriate upgrading and safety of existing strategic infrastructure, including by avoiding noise sensitive activities within the 50dBA Ldn airport noise contour for Christchurch International Airport, unless the activity is within an existing residentially zoned urban area,*	

residential greenfield area identified for Kaiapoi, or residential greenfield priority area identified in Map A (page 6-28); and *5. Managing the effects of land use activities on infrastructure, including avoiding activities that have the potential to limit the efficient and effective, provision, operation, maintenance or upgrade of strategic infrastructure and freight hubs.*	
6.2.3 Sustainability *Recovery and rebuilding is undertaken in Greater Christchurch that:* *1. provides for quality living environments incorporating good urban design;* *2. retains identified areas of special amenity and historic heritage value;* *3. retains values of importance to Tangata Whenua;* *4. provides a range of densities and uses; and* *5. is healthy, environmentally sustainable, functionally efficient, and prosperous.*	These provisions have been addressed in the urban design assessment in support of the proposal and are implemented primarily through the proposed ODP, which is in accordance with policy 6.3.3 and will guide the detail of any future subdivision design and development and ensure that the proposal provides for a range of densities and quality living environments. In addition, the proposal has been assessed as delivering a 'well functioning urban environment' in a manner consistent with that sought by the NPS-UD. The proposal does not impact on any identified areas of special amenity and historic heritage value, or values of importance to Tangata Whenua. On this basis, the proposal is consistent with these provisions.
6.3.2 Development form and urban design *Business development, residential development (including rural residential development) and the establishment of public space is to give effect to the principles of good urban design below, and those of the NZ Urban Design Protocol 2005, to the extent appropriate to the context:* *1. Tūrangawaewae – the sense of place and belonging – recognition and incorporation of the identity of the place, the context and the core elements that comprise the place. Through context and site analysis, the following elements should be used to reflect the appropriateness of the development to its location: landmarks and features, historic heritage, the character and quality of the existing built and natural environment, historic and cultural markers and local stories.* *2. Integration – recognition of the need for well-integrated places, infrastructure, movement routes and networks, spaces, land uses and the natural and built environment. These elements should be overlaid to provide an appropriate form and pattern of use and development.* *3. Connectivity – the provision of efficient and safe high quality, barrier free, multimodal connections within a development, to surrounding areas, and to local facilities and services, with emphasis at a local level placed on walking, cycling and public transport as more sustainable forms of transport.* *4. Safety – recognition and incorporation of Crime Prevention Through Environmental Design (CPTED) principles in the layout and design of developments, networks and spaces to ensure safe, comfortable and attractive places.* *5. Choice and diversity – ensuring developments provide choice and diversity in their layout, built form, land use housing type and density, to adapt to the changing needs and circumstances of the population.* *6. Environmentally sustainable design – ensuring that the process of design and development minimises water and resource use, restores ecosystems, safeguards mauri and maximises passive solar gain.* *7. Creativity and innovation – supporting opportunities for exemplar approaches to infrastructure and urban form to lift the benchmark in the development of new urban areas in the Christchurch region.*	
6.3.3 Development in accordance with outline development plans *Development in greenfield priority areas and rural residential development is to occur in accordance with the provisions set out in an outline development plan or other rules for the area. Subdivision must not proceed ahead of the incorporation of an outline development plan in a district plan. Outline development plans and associated rules will:* *1. Be prepared as:* *(a) a single plan for the whole of the priority area; or*	

(b) where an integrated plan adopted by the territorial authority exists for the whole of the priority area and the outline development plan is consistent with the integrated plan, part of that integrated plan; or
(c) a single plan for the whole of a rural residential area; and
2. Be prepared in accordance with the matters set out in Policy 6.3.2;
3. To the extent relevant show proposed land uses including:
(a) Principal through roads, connections with surrounding road networks, relevant infrastructure services and areas for possible future development;
(b) Land required for community facilities or schools;
(c) Parks and other land for recreation;
(d) Land to be used for business activities;
(e) The distribution of different residential densities, in accordance with Policy 6.3.7;
(f) Land required for stormwater treatment, retention and drainage paths;
(g) Land reserved or otherwise set aside from development for environmental, historic heritage, or landscape protection or enhancement;
(h) Land reserved or otherwise set aside from development for any other reason, and the reasons for its protection from development;
(i) Pedestrian walkways, cycleways and public transport routes both within and adjoining the area to be developed;
4. Demonstrate how Policy 6.3.7 will be achieved for residential areas within the area that is the subject of the outline development plan, including any staging;
5. Identify significant cultural, natural or historic heritage features and values, and show how they are to be protected and/or enhanced;
6. Document the infrastructure required, when it will be required and how it will be funded;
7. Set out the staging and co-ordination of subdivision and development between landowners;
8. Demonstrate how effective provision is made for a range of transport options including public transport options and integration between transport modes, including pedestrian, cycling, public transport, freight, and private motor vehicles;
9. Show how other potential adverse effects on and/or from nearby existing or designated strategic infrastructure (including requirements for designations, or planned infrastructure) will be avoided, remedied or appropriately mitigated;
10. Show how other potential adverse effects on the environment, including the protection and enhancement of surface and groundwater quality, are to be avoided, remedied or mitigated;
11. Show how the adverse effects associated with natural hazards are to be avoided, remedied or mitigated as appropriate and in accordance with Chapter 11 and any relevant guidelines; and
12. Include any other information that is relevant to an understanding of the development and its proposed zoning.

6.3.7 Residential location, yield and intensification
In relation to residential development opportunities in Greater Christchurch:
1. Subject to Policy 5.3.4, residential greenfield priority area development shall occur in accordance with Map A. These areas are sufficient for both growth and residential relocation through to 2028.
2. Intensification in urban areas of Greater Christchurch is to be focused around the Central City, Key Activity Centres and neighbourhood centres commensurate with their scale and function, core public transport routes, mixed-use areas, and on suitable brownfield land.
3. Intensification developments and development in greenfield priority areas shall achieve at least the following residential net densities averaged over the whole of an ODP area (except

where subject to an existing operative ODP with specific density provisions): *(a) 10 household units per hectare in greenfield areas in Selwyn and Waimakariri District;* *(b) 15 household units per hectare in greenfield areas in Christchurch City;* *4. Intensification development within Christchurch City to achieve an average of:* *(a) 50 household units per hectare for intensification development within the Central City;* *(b) 30 household units per hectare for intensification development elsewhere.* *5. Provision will be made in district plans for comprehensive development across multiple or amalgamated sites.* *6. Housing affordability is to be addressed by providing sufficient intensification and greenfield priority area land to meet housing demand during the recovery period, enabling brownfield development and providing for a range of lot sizes, densities and appropriate development controls that support more intensive developments such as mixed use developments, apartments, townhouses and terraced housing.*	
6.3.9 Rural residential development *In Greater Christchurch, rural residential development further to areas already zoned in district plans as at 1st January 2013 can only be provided for by territorial authorities in accordance with an adopted rural residential development strategy prepared in accordance with the Local Government Act 2002, subject to the following:* *1. In the case of Christchurch City, no further rural residential development is to be provided for within the Christchurch City Plan area;* *2. The location must be outside the greenfield priority areas for development and existing urban areas;* *3. All subdivision and development must be located so that it can be economically provided with a reticulated sewer and water supply integrated with a publicly owned system, and appropriate stormwater treatment and disposal;* *4. Legal and physical access is provided to a sealed road, but not directly to a road defined in the relevant district plan as a Strategic or Arterial Road, or as a State highway under the Government Roading Powers Act 1989;* *5. The location and design of any proposed rural residential development shall:* *(a) avoid noise sensitive activities occurring within the 50 dBA Ldn air noise contour surrounding Christchurch International Airport so as not to compromise the future efficient operation of Christchurch International Airport or the health, well-being and amenity of people;* *(b) avoid the groundwater protection zone for Christchurch City's drinking water;* *(c) avoid land between the primary and secondary stop banks south of the Waimakariri River;* *(d) avoid land required to protect the landscape character of the Port Hills;* *(e) not compromise the operational capacity of the Burnham Military Camp, West Melton Military Training Area or Rangiora Airfield;* *(f) support existing or upgraded community infrastructure and provide for good access to emergency services;* *(g) avoid significant reverse sensitivity effects with adjacent rural activities, including quarrying and agricultural research farms, or strategic infrastructure;* *(h) avoid significant natural hazard areas including steep or unstable land;* *(i) avoid significant adverse ecological effects, and support the protection and enhancement of ecological values;* *(j) support the protection and enhancement of ancestral land, water sites, wāhi tapu and wāhi taonga of Ngāi Tahu;* *(k) where adjacent to or in close proximity to an existing urban or rural residential area, be able to be integrated into or consolidated with the existing settlement; and*	The proposal would not deliver rural-residential development (in the Greater Christchurch area defined as residential with an average density of 1-2 households per hectare). The large-lot residential development identified on the ODP (development constrained area) would produce a minimum of 3hh/ha. Whilst the policy is not strictly relevant to the current proposal, it reinforces a number of the findings in regards to those policies which are relevant.

(l) avoid adverse effects on existing surface water quality. *6. An outline development plan is prepared which sets out an integrated design for subdivision and land use, and provides for the long-term maintenance of rural residential character.* *7. A rural residential development area shall not be regarded as in transition to full urban development.*	
6.4 ANTICIPATED ENVIRONMENTAL RESULTS *1. Recovery and rebuilding is enabled within Greater Christchurch.* *2. Priority areas and existing urban areas identified provide the location for all new urban development.* *3. Significant natural resources are protected from inappropriate development.* *4. People are protected from unacceptable risk from natural hazards.* *5. Infrastructure, and urban and rural development, are developed in an integrated manner.* *6. The use of existing infrastructure is optimised.* *7. Development opportunities are provided for on Māori Reserves.* *8. Growth is provided for through both greenfield and brownfield development opportunities.* *9. Higher density living environments are provided.* *10. Greenfield development is provided for at a rate that meets demand and enables the efficient provision and use of infrastructure.* *11. Growth of rural towns within Greater Christchurch is sustainable and encourages self-sufficiency.* *12. Rural residential development is appropriately managed.* *13. Development incorporates good urban design.* *14. Areas of special amenity, heritage value, or importance to Ngāi Tahu are retained.* *15. Residential development contains a range of densities.* *16. Transport infrastructure appropriately manages network congestion, dependency of private vehicles is reduced, emissions and energy use from vehicles is reduced, and transport safety is enhanced.* *17. The function and role of the Central City, the Key Activity and neighbourhood centres is maintained.* *18. Sufficient business land is provided for, and different types of business activity take place in appropriate locations, adopting appropriate urban design qualities.*	With the exception of result (2) which is resolved by the NPS-UD, for the aforementioned reasons the proposal is assessed as being consistent with the relevant anticipated environmental results set out in Chapter 6.
Chapter 7 Freshwater	
Objective 7.2.1 Sustainable management of fresh water *The region's fresh water resources are sustainably managed to enable people and communities to provide for their economic and social well-being through abstracting and/or using water for irrigation, hydro-electricity generation and other economic activities, and for recreational and amenity values, and any economic and social activities associated with those values, providing:* *1. the life-supporting capacity ecosystem processes, and indigenous species and their associated freshwater ecosystems and mauri of the fresh water is safe-guarded;* *2. the natural character values of wetlands, lakes and rivers and their margins are preserved and these areas are protected from inappropriate subdivision, use and development and*	Water quality and the effects of any water use necessary for development of the proposed Living Z and Living X Zones can be managed at the time of detailed design and subdivision through engineering solutions and regional plan/discharge consent requirements. This conclusion is supported by the technical assessment accompanying the Plan Change.

where appropriate restored or enhanced; and *3. any actual or reasonably foreseeable requirements for community and stockwater supplies and customary uses, are provided for.* ***Objective 7.2.4 – Integrated management of fresh water resources*** *Fresh water is sustainably managed in an integrated way within and across catchments, between activities, and between agencies and people with interest in water management in the community, considering:* *1. the Ngai Tahu ethic of Ki Uta Ki Tai (from the mountains to the sea);* *2. the interconnectivity of surface water and groundwater;* *2. the effects of land uses and intensification of land uses on demand for water and water quality; and* *4. kaitiakitanga and the ethic of stewardship; and* *5. any net benefits of using water, and water infrastructure, and the significance of those benefits to the Canterbury region.*	
Chapter 11 Natural Hazards	
Objective 11.2.1 Avoid new subdivision, use and development of land that increases risks associated with natural hazards. *New subdivision, use and development of land which increases the risk of natural hazards to people, property and infrastructure is avoided or, where avoidance is not possible, mitigation measures minimise such risks.* ***Objective 11.2.3 Climate change and natural hazards*** *The effects of climate change, and its influence on sea levels and the frequency and severity of natural hazards, are recognised and provided for.*	The subject land is not exposed to any significant natural hazard risks and the proposal has otherwise been assessed by Coffeys and Inovo as suitable for the intended density of development, accounting for natural hazard risks. Accordingly, the proposal is consistent with these provisions and their associated policies.
Chapter 15 Soils	
Objective 15.2.1 Maintenance of soil quality *Maintenance and improvement of the quality of Canterbury's soil to safeguard their mauri, their life supporting capacity, their health and their productive capacity*	The Selwyn District Council's Versatile Soils Baseline assessment concluded that the loss of versatile soils is not currently an issue within the District, nor is it likely to be within the next 10 years. On that basis, it is considered that the land use intensification proposed by this plan change (and any associated impacts on soil productive capacity) will not detract from the availability of versatile soils in any significant way. Accordingly, the proposal is consistent with this objective and its associated policies.
Chapter 16 Energy	
Objective 16.2.1 – Efficient use of energy *Development is located and designed to enable the efficient use of energy, including:* *1. maintaining an urban form that shortens trip distances* *2. planning for efficient transport, including freight* *3. encouraging energy-efficient urban design principles* *4. reduction of energy waste* *5. avoiding impacts on the ability to operate energy infrastructure efficiently.*	The Plan Change site is located in close proximity to State Highway 75 and 76 and the existing transport links within and servicing the Lincoln township (Arterial roads) and the proposed ODP effectively provides transport links and connections for all modes of transport. These measures are consistent with objective 16.2.1.

3. Overall, whilst the proposal is not consistent with the prescriptive provisions in Chapter 6 directing new residential zones to be located within identified greenfield priority areas, (a tension resolved by the NPS-UD), it is otherwise consistent with the outcomes sought in these provisions and the overarching direction set out in the Regional Policy Statement.

Land and Water Regional Plan, Canterbury Air Regional Plan

4. The operative Land and Water Regional Plan broadly seeks to manage land and water within the Canterbury Region, by setting water allocation limits and limits on the type and amount of discharges permitted.

5. Notably, objective 3.5 that *'Land uses continue to develop and change in response to socio-economic and community demand'* recognises (generally) the potential for development and change, as is proposed by the plan change. As a caveat to this, objective 3.24 seeks that *'All activities operate at good environmental practice or better to optimise efficient resource use and protect the region's fresh water resources from quality and quantity degradation'* and a number of more specific objectives and policies permeate the Plan in respect of particular water-related issues.

6. It is anticipated that any future discharges associated with the development of the proposed Plan Change site will either fall to be permitted under the Rules of the Land and Water Regional Plan, or will be assessed in an integrated manner through the resource consent process, with Environment Canterbury as the administering body. At such time as detailed development plans for development are advanced, various options for the design and management of discharges will be available (if required) to ensure any adverse effects are minimised.

7. Accounting for this and the technical assessment by Inovo Projects confirming that the proposed increase in density can be readily serviced by water, wastewater and stormwater infrastructure, the proposal is concluded to be generally consistent with the operative Land and Water Regional Plan.

8. The objectives and policies of the Canterbury Air Regional Plan broadly seek (in relation to those activities emitting discharges to air) best practicable options to minimise the effects of discharges, manage and in some situations avoid discharges of PM_{10}, manage discharges of odour and dust from solid or liquid waste, and addressing localised effects of discharges including relative to sensitive receptors. The proposed Plan Change will not generally result in any discharges to air and will therefore not conflict with objectives 5.1-5.10 (or the related policies). To the extent that air discharges from other nearby activities are concerned (such as the Lincoln WWTP), the odour assessment by Golder Associates has confirmed that the Plan Change will be sufficient to avoid incompatibility between activities or diminished amenity values.

9. In summary, the proposed Plan Change is not considered to be inconsistent with the relevant Regional Plans.

Attachment 4: Our Space Assessment

Our Space

10. Our Space 2018-2048: Greater Christchurch Settlement Pattern Update Whakahāngai O Te Hōrapa Nohoanga ('Our Space') was prepared to satisfy the requirements of the National Policy Statement on Urban Development Capacity (NPS-UDC) for high growth councils to produce a 'future development strategy' that shows there will be sufficient, feasible development capacity to support housing and business growth needs over the medium (next 10 years) and long term (10 to 30 years).

11. Those parts of Our Space of particular relevance to the proposal are assessed in Table 1 below.

Table 1: Assessment of the proposal against the provisions of Our Space

Our Space Provision	Comment / Assessment
Chapter 5. Our Plan	
What will urban growth look like in different areas of Greater Christchurch? *Rolleston continues to grow as the principal centre in Selwyn, with a range of new developments supporting a vibrant town centre and the choice of housing broadening to reflect the changing demand profile of the growing town. Industrial and large format retail expand around the I-Zone Southern Business Hub, benefitting from improved connections across State Highway 1. Lincoln develops while retaining its village and university character, with opportunities emerging from new academic and business partnerships through the Lincoln Hub initiative.*	The proposal is consistent with this broad overview as to how urban growth is envisaged in Selwyn.
5.3 Selwyn and Waimakariri towns *The current district plans for Selwyn and Waimakariri provide for greenfield housing areas in alignment with the settlement pattern outlined for Greater Christchurch in Map A of the Canterbury Regional Policy Statement (CRPS). This map was inserted into the CRPS22 following the adoption of the Land Use Recovery Plan and covers the post-earthquake recovery period through to 2028.* *The Partnership has previously considered the longer term growth needs of Greater Christchurch through to 2041, with the extent of planned greenfield areas around Christchurch City and the main towns in Selwyn and Waimakariri to support future housing growth delineated by the Projected Infrastructure Boundary on Map A.* *Given the projected shortfalls in housing development capacity in Selwyn and Waimakariri to meet their future needs, a change to the CRPS is proposed to allow Chapter 6 and Map A the flexibility to respond to identified medium term capacity needs. Additional capacity will be directed in the first instance to the key towns of Rolleston, Rangiora and Kaiapoi in support of the public transport enhancement opportunities mentioned elsewhere in this Update. This is likely to identify future development areas in the two districts that are within the Projected Infrastructure Boundary. Such a change would be prepared subsequent to this Update and would likely be notified in 2019.23 These new areas will provide much of the capacity required over both the medium and long term. A 2019 change to the CRPS would ensure that land can be rezoned to meet medium term capacity needs, and the longer term will be further considered as part of a comprehensive review of the CRPS scheduled for 2022.*	As noted earlier in respect of the CRPS provisions, the NPS-UD provides a more enabling approach towards the enablement of greenfield housing areas and as such, the containment of such areas to the areas delineated by the Projected Infrastructure Boundary on Map A is no longer considered appropriate. Notably, this section of Our Space acknowledges: • *'Projected shortfalls in housing development capacity in Selwyn and Waimakariri to meet their future needs';* • A need for *'the flexibility to respond to identified medium term capacity needs'* • *'Additional capacity will be directed in the first instance to the key towns of Rolleston, Rangiora and Kaiapoi in support of the public transport enhancement opportunities…'* • *'Longer term* [housing needs] *will be further considered as part of a comprehensive review of the CRPS scheduled for 2022'* • *'While it is intended Our Space provides direction to inform future Resource Management Act processes, Figure 16 is indicative only'* • *'it is expected that new urban housing in Waimakariri and Selwyn will achieve a minimum net density of 12 households per hectare'.*

While it is intended Our Space provides direction to inform future Resource Management Act processes, Figure 16 is indicative only. *To most efficiently utilise land within identified future development areas, consideration will also be given to appropriate residential densities. An evaluation of the appropriateness of existing minimum densities specified in the CRPS for each territorial authority including a review of what has been achieved to date, constraints and issues associated with achieving these minimum densities, and whether any changes to minimum densities is likely to be desirable and achievable across future development areas will commence in 2019.* *In the meantime, it is expected that new urban housing in Waimakariri and Selwyn will achieve a minimum net density of 12 households per hectare where any Future Development Area is subsequently zoned. For this purpose, net density has the same meaning as set out in the Canterbury Regional Policy Statement. This will also provide strong guidance for the development of District Plans for both Waimakariri and Selwyn districts.*	Whilst the proposed Plan Change proposes to enable housing supply in advance of the CRPS review in 2022 and in an area that is not 'indicatively' earmarked for growth in Our Space, the enablement of housing supply as proposed is clearly enabled by the NPS-UD. And notably, the proposed change is otherwise consistent with the outcomes envisaged in the bullet points listed above.
Selwyn District and Waimakariri District are undertaking reviews of their respective District Plans. Both reviews will also assess additional provisions to encourage and enable redevelopment within existing urban areas and close to town centres. This is in response to the projected changes in housing demand over the next thirty years, and the role that redevelopment plays to deliver smaller, more affordable housing types that will increasingly be needed to meet future demand. Until these reviews are complete, an understanding of whether any remaining development capacity shortfalls remain is uncertain and can be better understood as part of future capacity assessments in 2020 and every three years thereafter. *For Selwyn, this Update supports the purpose and direction of Selwyn 2031 by promoting a sustainable, consolidated centres-based urban growth pattern that supports the changing population and their housing needs. This, in turn, allows for greater public transport usage. The District Plan Review is supporting this by not actively seeking to rezone additional land for living or business outside of the Projected Infrastructure Boundary.* *This Update will help provide a further evidence base for updates to Selwyn 2031 and other strategic documents to accommodate long-term growth through high quality urban environments. Any potential additional provision of business and housing land within the Greater Christchurch area in Selwyn will be strongly guided by this evidence and the current structure plans and town centre studies, ongoing market indicator monitoring and the evolution of the policy framework through the district plan review process.*	This proposed Plan Change provides an opportunity to understand '*whether any remaining development capacity shortfalls remain'*. This has been assessed by Copeland Brown and in the supporting information in the section 32 assessment, with reference to the policy directives in the NPS-UD. For the reasons stated elsewhere in the section 32 assessment and technical reports (in particular the urban design assessment by DCM Urban), the proposal otherwise promotes *'a sustainable, consolidated centres-based urban growth pattern that supports the changing population and their housing needs. This, in turn, allows for greater public transport usage'.*
5.4 Sequencing and staging of growth *At a local level the Capacity Assessment outlined which areas signalled for growth are already supported by trunk infrastructure. This primarily relates to wastewater networks. Infrastructure strategies associated with the recent completed 2018-2028 Long Term Plans have documented the planned infrastructure works scheduled to be completed over the medium and long term to unlock remaining growth areas. These integrate and align with structure plans for main towns covering the development phasing associated with the efficient roll-out of infrastructure.* *At a Greater Christchurch level sequencing is important to align with cross-boundary investments, especially those relating to the transport network. Collaborative planning*	Per the assessment by Inovo, capacity in the wastewater (and other infrastructure/servicing) network exists to support the proposal. The CRPS provisions, particularly Policies 6.3.2 to 6.3.7 have been assessed, with the requirements for good urban design, alignment with infrastructure needs and integration with existing urban areas satisfied by the proposal. Sufficiency of development capacity has also been assessed, in accordance with the requirements of the NPS-UD.

undertaken when developing infrastructure strategies and regional land transport plans will be the mechanism to address and resolve any potential misalignment.

Future growth areas identified in Figure 15 and 16 will require more detailed planning, technical assessments and consultation with landowners to determine more specific staging of development. Existing policies in Chapter 6 of the CRPS already provide clear direction which these detailed planning processes must give effect to, particularly Policies 6.3.2 to 6.3.7. They ensure the staging of development considers how to support good urban design, align with infrastructure needs and integrate with existing urban areas. Associated policy wording is proposed to complement a change to the CRPS Map A. This will enable District Plan reviews for Selwyn and Waimakariri Districts to, over the medium term, zone and otherwise enable development capacity in accordance with meeting the medium term housing targets incorporated in the CRPS. Reviews of targets and the sufficiency of development capacity are part of periodic capacity assessments and enable the CRPS and district plans to remain responsive to demonstrated need.

6.1 Responsive planning

With many of the primary drivers and influencers of urban development in Greater Christchurch being in a state of change, a responsive approach to planning is necessary to ensure that future opportunities to shape our urban areas and achieve our desired outcomes are realised. This will require monitoring and evaluation, continued relationship building and commitment to this partnership. Key drivers of change at the local, national and global level include:

• Shifting post-earthquake trends in the residential, commercial and industrial markets, as well as the development sector, as the rebuild and recovery of Greater Christchurch continues to mature;

• Emerging Government policy in relation to urban growth and development, transport, regional economic growth, and local government funding and financing, which will provide new opportunities for our approach to planning;

• Changing population and household profiles, and composition of the local economy, which will influence the type of housing and employment that is required in the future to meet the needs and preferences of residents;

• Growing need to manage and adapt to the natural hazard risk facing our coastal communities given the anticipated sea level rise, and related coastal inundation and groundwater level effects, over the next 30 years and beyond.

Given these drivers of change, this Update has been prepared to provide greater certainty over the medium term in regard to how development capacity issues will be addressed (Section 4, Our Challenges) and more flexibility over the long term to enable the Partnership to further consider the most appropriate planning directions and responses.

In response to this Update, the Regional Council and District Councils will insert the relevant housing targets directly into their respective plans, in accordance with NPSUDC Policies PC5 to PC11.

This section of Our Space is particularly relevant to this proposal and the context in which the Plan change is made. Specifically:

- Shifting trends in the residential property market (significant demand, limited supply and cost escalation) since the release of the CRPS and Our Space underpin this application.
- The NPS-UD is a significant Government policy that fundamentally affects planning and enablement in relation to urban growth and development, transport, regional economic growth, and local government funding and financing.
- Maturation of the Selwyn local economy (with associated work, education and recreational opportunities) and improved transport accessibility (in terms of CSM, public transport, and local connections to services) has influenced the uptake of available residential land in Rolleston and the demands for additional housing supply.
- The proposal is on land with very low natural hazard risk, including allowances for sea level rise or climate change.

In addition to the factors above, the information provided elsewhere in the section 32 assessment regarding housing supply and demand and the extent to which this proposal adds significantly to development capacity in accordance with the NPS-UD supports a responsive approach.

12. Overall, it is acknowledged that the proposal is not expressly contemplated by Our Space which identifies (through Figure 16 and its text) indicative locations of future development areas in Greater Christchurch within the Projected Infrastructure Boundary. However, consistent with the findings regarding the directive policies in Chapter 6 of the CRPS, the recently released NPS-UD provides a more enabling and responsive approach to growth.

13. Accounting for the NPS-UD, the recognition in Our Space that responsive planning is required in response to drivers of change, and that the proposal is otherwise consistent with the key outcomes sought in Our Space in respect of the location and form of growth, the proposal is assessed as being not inconsistent with Our Space.

Attachment 5: Proposed Selwyn District Plan Assessment

Proposed Selwyn District Plan

14. The proposed Selwyn District Plan ('proposed plan') was notified on 5 October 2020 and submissions closed in December 2020. Submissions are yet to be notified, meaning that procedurally, the proposed plan is still subject to further submissions, hearings, decisions, and appeals.

15. It is further noted that the applicant for this plan change has filed submissions on the proposed plan seeking rezoning of the land to General Residential, in a manner consistent with the outcomes sought by this proposed change to the operative plan.

16. Accounting for the above, limited weight should be afforded to the provisions of the proposed plan at this time. Notwithstanding, an assessment of those provisions in the proposed plan of particular relevance is provided below in Table 1.

Table 1: Assessment of the proposal against the provisions of the pSDP

PSDP Provision	Comment / Assessment
Sensational Selwyn *SD-DI-O1* *Selwyn is an attractive and pleasant place to live, work, and visit, where development:* *1. takes into account the character of individual communities;* *2. is well-connected, safe, accessible, and resilient; and* *3. enhances environmental, economic, cultural and social outcomes for the benefit of the entire District.*	Through its layout, edge treatment and connectivity the proposal provides for development that accounts for the characteristics of the local community and its position at the urban/rural interface. Similarly the ODP provides for well-connected, safe and accessible development, and the technical assessments have demonstrated that the development will be resilient to natural hazards. Finally, the assessments have demonstrated the positive environmental, economic, cultural and social outcomes of the proposal, and the avoidance of adverse effects.
SD-DI-O2 *Selwyn's prosperous economy is supported through the efficient use of land, resources, and infrastructure, while ensuring existing activities are protected from incompatible activities.*	The proposal provides for an efficient use of land and infrastructure (particularly accounting for the existing adjoining infrastructure) and avoids conflict with any existing incompatible activities.
Integration and Land Use, Ecosystems, and Water - Ki Uta Ki Tai *SD-DI-O3* *Land and water resources are managed through an integrated approach, which recognises both the importance of ki uta ki tai to Ngāi Tahu and the inter-relationship between ecosystems and natural processes.*	The technical assessments have demonstrated that development can occur in a manner consistent with this objective.
Our Environment *SD-DI-O4* *Places, landscapes, and features which are significant to Selwyn's character, cultural heritage, or are of spiritual importance to Ngāi Tahu, are identified, recognised for their values, and protected for future generations.*	The subject land is not subject to any significant values and noting its existing zoning and the visual/urban design assessment, Specific provision is made in the ODP and the ODP text to maintain the heritage value of 'Chudleigh'. The presence of SASM-47 is acknowledged in the Proposed District Plan and the request will maintain/enhance values associated with this feature. Therefore the proposal is consistent with this objective.

Vibrant and Viable Centres *SD-DI-O5* *Selwyn's hierarchy of activity centres are the preferred location for shopping, leisure, cultural, entertainment, and social interaction experiences in accordance with their anticipated role within the Activity Centre Network.*	The proposal will further support the Lincoln town centre, and the small commercial centres proposed will operate in accordance with their anticipated role within the Activity Centre Network.
Community Needs *SD-IR-O1* *The important infrastructure needs of the community are fulfilled, and their operation is protected.*	Per the Inovo assessment, the proposal is able to be supported by existing or planned community infrastructure and accounting for the noise and odour assessments will not otherwise compromise the continued operation of community infrastructure.
Effects of Important Infrastructure *SD-IR-O2* *The development, upgrade, maintenance, and operation of all important infrastructure is enabled in a way that minimises adverse effects, while having regard to the practical constraints and the logistical and technical practicalities associated with important infrastructure.*	As noted above, the noise and odour assessments confirm that the proposal will not adversely affect important infrastructure.
Natural Hazards *SD-IR-O3* *The risk from natural hazards, including the effects of climate change, to people, property, and important infrastructure is not increased, other than where necessary to provide for important infrastructure that has no reasonable alternative.*	The hazards assessment confirms that the proposal will not be subject to unacceptable hazard risks.
Partnership with Ngāi Tahu *SD-MWV-O1* *Strengthen the partnership between the Council and Ngāi Tahu by recognising the cultural significance of Selwyn to Ngāi Tahu and Te Taumutu and Ngāi Tūāhuriri Rūnanga by:* 1. *Promoting active and meaningful participation by those who hold mana whenua in the resource management decision-making process;* 2. *Recognising that only those who hold mana whenua can identify their relationship with their culture, traditions, ancestral lands, waterbodies, wāhi tapu and other taonga;* 3. *Enabling the exercise of kaitiakitanga by those who hold mana whenua over Selwyn;* 4. *Providing for the contemporary connections, cultural and spiritual values held by tāngata whenua; and* 5. *Continuing to enable tāngata whenua to protect, develop and use Māori Land in a way which is consistent with their culture, traditions and aspirations.*	Consultation with mana whenua has commenced and the majority of recommendations received have been incorporated into the Plan Change and proposed ODP.
Compact and Sustainable Township Network *SD-UFD-O1* *Urban growth is located only in or around existing townships and in a compact and sustainable form that aligns with its anticipated role in the Township Network, while responding to the community's needs, natural landforms, cultural values, and physical features.*	The proposal is located 'around existing townships' and is in a 'compact and sustainable form'.
Urban Growth and Development *SD-UFD-O2*	As addressed by Copeland Brown and consistent with the directions in policy 2 of the NPS-UD to provide 'at least sufficient development capacity to meet expected demand', the proposal supports the

There is sufficient feasible development capacity to meet anticipated demands for housing and business activities.	provision of 'sufficient feasible development capacity to meet anticipated demands for housing'.
Integration of Land Use and Infrastructure *SD-UFD-O3* *Urban growth and development:* *1. is well-integrated with the efficient provision, including the timing and funding, of infrastructure; and* *2. has the ability to manage or respond to the effects of climate change.*	The Inovo assessment demonstrates consistency with this objective insofar as it relates to infrastructure; and the hazards assessment has otherwise confirmed that the effects of climate change can be readily managed by the proposal.
TRAN-O1 *People and places are connected through safe, efficient, and convenient land transport corridors and land transport infrastructure which is well integrated with land use activities and subdivision development.*	The transport assessment and further information has demonstrated consistency with these provisions.
TRAN-O2 *Land transport corridors and land transport infrastructure are protected from incompatible land use activities and subdivision development.*	
TRAN-O3 *Land transport corridors and land transport infrastructure support the needs of people and freight, while ensuring adverse effects on the surrounding environment from their establishment and operation are managed.*	
CL – Contaminated Land *NH – Natural Hazards* *HAZS- Hazardous substances*	For completeness, it is noted that contaminated land and natural hazards matters have been assessed and there are no associated implications or effects for the proposed Plan Change. The plan change site is not subject to any risks associated with hazardous substances.
HH-O1 *To protect historic heritage items from inappropriate subdivision, use, and development.*	Instant legal effect of the heritage provisions is noted, and the presence of 'Chudleigh' (H323) is acknowledged on the ODP. This can be appropriately addressed at subdivision stage.
TREE - Notable Trees	There are no notable trees on the site.
SASM-O1 *The historic and contemporary relationship of Ngāi Tahu mana whenua with their ancestral lands, water, sites, wāhi tapu, and wāhi taonga within the Selwyn District is recognised and protected.*	The importance of the Ararira/LII and Spring Creek are acknowledged (SASM-47) and the riparian margins of these waterbodies will be enhanced at subdivision stage.
SASM-P2 *Recognise the cultural significance of ngā wai/water bodies and the historic and contemporary Ngai Tahu customary uses and values associated with these water bodies by managing adverse effects of activities within riparian margins*	
EIB-O1 *Indigenous biodiversity within the district is managed through the exercise of kaitiakitanga and stewardship, in order that:* *1. Areas of significant indigenous vegetation and significant habitats of indigenous fauna are*	The AEL assessment demonstrates that there is little indigenous vegetation on the request site. The request provides the opportunity for indigenous species to be established along riparian margins to improve the aquatic habitat for indigenous fauna.

protected to ensure no net loss of indigenous biodiversity, and 2. *Other indigenous biodiversity values are maintained and enhanced, and* ***3.*** *The restoration and enhancement of areas of indigenous biodiversity is encouraged and supported.*	
NATC-O1 *The natural character of surface water bodies and their margins is preserved.* *NATC-O2* *The relationship of tangata whenua and their traditions, values and interests associated with water bodies are recognised and provided for.*	As above, the margins of the existing waterbodies would be protected and enhanced with the subdivision of the site. Esplanade reserves may be created at the time of subdivision.
NFL - Natural Features and Landscapes	For completeness, it is noted that this attribute is not applicable to the Plan Change site.
PA-O1 *Selwyn's community has access to and along the District's surface water bodies and coastal marine area.*	Public access can be enhanced at the time of subdivision with the creation of esplanade reserves or strips.
SUB-O1 *Subdivision design and layout maintains or enhances the amenity values of the zone.*	These provisions and associated policies and rules would readily apply to the land following rezoning, and the proposed Plan Change does not present any inconsistency. It is noted that R18 (Historic Heritage), R20 (SASM) and R21 (EIB) have instant legal effect.
SUB-O2 *Every site created by subdivision has the characteristics, infrastructure, and facilities appropriate for the intended use of the land.*	
SUB-O3 *Site sizes reflect the anticipated development outcomes of the zone.*	
ASW - Activities on the Surface of Water *CE - Coastal Environment* *EW - Earthworks* *LIGHT - Light* *NOISE - Noise* *SIGN - Signs* *TEMP - Temporary Activities*	For completeness, it is noted that none of these attributes are applicable to the Plan Change (albeit they may apply to future activities on the land).
UG-Overview *The Selwyn District is a desirable place to live, work, and play, which is generating a demand for housing and business opportunities to support the needs of the growing community now and into the future. The Urban Growth chapter assists in meeting these demands by encouraging a consolidated and compact settlement pattern that optimises the use and development of resources. This chapter also assists in ensuring there is enough urban development capacity available to meet the District's housing and business needs while assuring that high quality living and business environments continue to be developed to implement the adopted Development Plans.*	The Urban Growth overview recognises the 'demand for housing and business opportunities to support the needs of the growing community now and into the future' and the need to ensure 'there is enough urban development capacity available to meet the District's housing and business needs'. The Plan Change proposal responds to these demands and supports the provision of sufficient development capacity for housing. The plan change proposal otherwise 'demonstrates consistency with all of the urban growth policies' and 'does not conflict with legitimately established land use activities, compromise the quality of the environments that

Ongoing urban development capacity is provided through the identification of new urban areas that are subject to the Urban Growth Overlay and by enabling existing sites to be intensified or redeveloped. The need for zoning processes to demonstrate consistency with all of the urban growth policies and to consider relevant Development Plans will ensure that new urban growth areas do not conflict with legitimately established land use activities, compromise the quality of the environments that people value, and result in adverse environmental effects. *The intensification of activities and redevelopment of existing land within urban zones is encouraged to support the District's urban growth needs. This includes through increased housing densities and the development and implementation of Urban Intensification Plans and Development Plans to achieve integrated settlement patterns and to complement the ongoing provision of new urban areas.* *The Urban Growth Overlay maps the spatial locations identified in Development Plans that have been adopted by SDC. These assist in determining where new urban areas can locate around townships and delivering the outcomes that are anticipated to be achieved within these environments. Any urban development or subdivision of land outside of the existing township boundaries is precluded unless the urban growth policies have been fulfilled through the zoning process under Schedule 1 of the RMA.* *The General Rural Zone activity-based rules apply to the land that is subject to the Urban Growth Overlay to enable the majority of rural land uses to continue. Additional rules apply to ensure that land use and subdivision development does not undermine the future zoning or development of the land that will assist in meeting the growth needs of the district. All other site-specific rules to achieve the urban growth outcomes will be determined through the zoning process.*	people value, and result in adverse environmental effects'.
UG-O1 *Urban growth is provided for in a strategic manner that:* *1. Achieves attractive, pleasant, high quality, and resilient urban environments;* *2. Maintains and enhances the amenity values and character anticipated within each residential, kainga nohoanga, or business area;* *3. Recognises and protect identified Heritage Sites, Heritage Settings, and Notable Trees;* *4. Protects the health and well-being of water bodies, freshwater ecosystems, and receiving environments;* *5. Provides for the intensification and redevelopment of existing urban sites;* *6. Integrates with existing residential neighbourhoods, commercial centres, industrial hubs, inland ports, or knowledge areas;* *7. Is coordinated with available infrastructure and utilities, including land transport infrastructure; and* *8. Enables people and communities, now and future, to provide for their wellbeing, and their health and safety.*	The proposed plan change and supporting assessments have demonstrated that the proposal will: 1. Deliver an attractive, pleasant, high quality, and resilient urban environment; 2. Maintain and enhance the amenity values and character anticipated within the residential area; 3. Integrate with existing residential neighbourhoods and commercial centres; 4. Be well coordinated with available infrastructure and utilities, including land transport infrastructure; and 5. Enable people and communities, now and future, to provide for their wellbeing, and their health and safety.
UG-O2 *Townships maintain a consolidated and compact urban form to support:* *1. Accessible, sustainable and resilient residential neighbourhoods, commercial centres, industrial hubs, inland ports, or knowledge areas;* *2. The role and function of each urban area within the District's Township Network and the economic and social prosperity of the District's commercial centres; and*	As demonstrated in the urban design, servicing and transport assessments, the urban form (and ODP) proposed for the Plan Change supports: 1. Accessible, sustainable and resilient residential neighbourhoods; 2. The role and function of the Lincoln urban area and the District's commercial centres; and 3. Efficient servicing of townships and integration with existing and planned infrastructure.

3. *The efficient servicing of townships and integration with existing and planned infrastructure.*	
UG-O3 *There is sufficient feasible housing and sufficient business development capacity within Greater Christchurch to ensure:* 1. *The housing bottom lines are met;* 2. *A wide range of housing types, sizes, and densities are available to satisfy social and affordability needs and respond to demographic change; and* 3. *Commercial and industrial growth is supported by a range of working environments and places to locate and operate businesses consistent with the District's Activity Centre Network.*	As noted above, this provision (and the NPS-UD) seeks sufficiency (i.e. a minimum rather than maximum) supply of housing development capacity which the proposal will support. The plan change otherwise provides for 'A wide range of housing types, sizes, and densities are available to satisfy social and affordability needs and respond to demographic change'.
Urban Growth *UG-P1 Spatially identify new urban growth areas supported by a Development Plan.* *UG-P2 Provide for the rezoning of land to establish new urban areas within the Urban Growth Overlay.* *UG-P3 Avoid the zoning of land to establish any new urban areas or extensions to any township boundary in the Greater Christchurch area of the District outside the Urban Growth Overlay.* *UG-P6 Enable rural production to continue on land that is subject to an Urban Growth Overlay, while avoiding the establishment of those activities that may unreasonably hinder any future urban zoning required to assist in meeting the District's urban growth needs.*	The proposal is not within an identified new urban growth area, but is supported by a Development Plan (ODP). The proposal seeks 'the zoning of land to establish [a] new urban area or extensions to any township boundary in the Greater Christchurch area of the District outside the Urban Growth Overlay' and is therefore clearly inconsistent with policy UG-P3. However, the NPS-UD provides for such rezoning and resolves this tension. In terms of UG-P6, development of the land in accordance with the operative rural residential zoning of the land would not support rural production and 'may unreasonably hinder any future urban zoning required to assist in meeting the District's urban growth needs'. Accordingly, this policy indirectly supports the proposed rezoning of the land.
Urban Form *UG-P7 Any new urban areas shall deliver the following urban form and scale outcomes:* 1. *Township boundaries maintain a consolidated and compact urban form;* 2. *The form and scale of new urban areas support the settlements role and function within the District's Township Network;* 3. *The natural features, physical forms, opportunities, and constraints that characterise the context of individual locations are identified and addressed to achieve appropriate land use and subdivision outcomes, including where these considerations are identified in any relevant Development Plans; and* 4. *The extension of township boundaries along any strategic transport network is discouraged where there are more appropriate alternative locations available.*	In terms of UG-P7, the proposal has been assessed as: 1. Maintaining a consolidated and compact urban form, as described in the assessment by DCM Urban; 2. Providing a form and scale of urban activity that support Rolleston's role and function within the District's Township Network, noting its proximity, and connectivity to Rolleston especially; 3. Having no particular natural features, physical forms, or constraints that suggest urbanisation of the land is inappropriate; and 4. Providing for an appropriate form of expansion along strategic transport network, accounting for the powerlines on Springs Road and the ability to provide safe and efficient access to the transport network.
UG-P8 Avoid the following locations and areas when zoning land to extend township boundaries to establish new urban areas: 1. *Sites and Areas of Significance to Māori;* 2. *Significant Natural Areas;* 3. *Outstanding Natural Landscapes and Visual Amenity Landscapes; and* 4. *High Hazard Areas.*	In terms of UG-P8: 1. For Sites and Areas of Significance to Māori, SASM-47 is recognised along the existing watercourses and would be protected from inappropriate development. 2. There are no Significant Natural Areas; 3. There are no Outstanding Natural Landscapes and Visual Amenity Landscapes; and 4. For High Hazard Areas, the large-lot residential development (Living X) will ensure minimum

	building platforms are achieved to avoid the high hazard event scenarios.
UG-P9 Recognise and provide for the finite nature of the versatile soil resource when zoning land to extend township boundaries to establish new urban areas.	Effects on versatile soils have been assessed as acceptable.
UG-P10 Ensure the establishment of high-quality urban environments by requiring that new urban areas: *1. Maintain the amenity values and character anticipated within each township and the outcomes identified in any relevant Development Plan;* *2. Recognise and protect identified Heritage Sites, Heritage Settings, and Notable Trees; and* *3. Preserving the rural outlook that characterises the General Rural Zone through appropriate landscape mitigation, densities, or development controls at the interface between rural and urban environments.*	The proposed ODP provides for a high-quality urban environment by: 1. Adopting controls on built development consistent with those in the adjacent residential areas and otherwise ensuring a high quality and well-connected development through the use of an ODP; 2. Directly recognising identified Heritage Sites, and Heritage Settings. 3. Providing an appropriate interface at the rural and urban edge through the use of separation buffers where required accounting for adjacent land uses.
UG-P11 When zoning land to establish any new urban area or to extend any township boundary, avoid reverse sensitivity effects on: *1. any adjoining rural, industrial, inland port, or knowledge zone; and* *2. on the safe, efficient and cost-effective operation of important infrastructure, land transport infrastructure, and the strategic transport network.*	The transport, noise and odour assessments have demonstrated consistency with this policy.
UG-P12 Ensure the zoning of land to extend township boundaries to establish new urban areas demonstrates how it will integrate with existing urban environments, optimise the efficient and cost-effective provision of infrastructure, and protect natural and physical resources, by: *1. Aligning the zoning, subdivision and development with network capacity and availability of existing or new infrastructure, including through the staging of development;* *2. Avoiding adverse effects on the ground and surface water resource by requiring connections to reticulated water, wastewater, and stormwater networks where they are available, or by demonstrating that the necessary discharge approvals can be obtained for all on-site wastewater and stormwater treatment and disposal facilities;* *3. Ensuring the land is located where solid waste collection and disposal services are available;* *4. Prioritising accessibility and connectivity between the land and adjoining neighbourhoods, commercial centres, open space reserves, and community facilities, including education providers, public reserves, and health services; and* *5. Requiring safe, attractive and convenient land transport infrastructure that promotes walking, cycling, and access to public transport and public transport facilities to encourage energy efficiency and improve peoples' health and wellbeing.*	The transport, servicing and urban design assessments have addressed these matters, confirming that the plan change area can be effectively integrated with the existing Lincoln urban environment and community infrastructure.
Development Capacity *UG-P13 Residential growth – Greater Christchurch area* *Any new residential growth area within the Greater Christchurch area shall only occur where:*	The proposal is consistent with this policy insofar that: 1. It will assist in meeting the housing bottom lines (minimum housing targets) of 8,600 households over the medium-term period through to 2028.

1. *Extensions assist in meeting the housing bottom lines (minimum housing targets) of 8,600 households over the medium-term period through to 2028.* 2. *A HDCA and FDS identify a need for additional feasible development capacity for the township and the additional residential land supports the rebuild and recovery of Greater Christchurch;* 3. *The land is subject to an Urban Growth Overlay and the area is either:* a. *a 'greenfield priority area', or any subsequent urban growth areas or urban containment boundaries, in the CRPS where it is a residential activity; or* b. *identified in an adopted Rural Residential Strategy and in accordance with CRPS Policy 6.3.9 where it is a rural residential activity.* 4. *The minimum net densities of 12hh/ha for residential activities or 1 to 2hh/ha for rural residential activities are met;* 5. *A diversity in housing types, sizes and densities is demonstrated to respond to the demographic changes and social and affordability needs identified in a HDCA, FDS or outcomes identified in any relevant Development Plan; and* 6. *An ODP is prepared that addresses the matters listed in UG-ODP Criteria and incorporated into this Plan before any subdivision proceeds.*	2. The minimum net densities of 12hh/ha for residential activities are met; 3. A diversity in housing types, sizes and densities is demonstrated to respond to the demographic changes and social and affordability needs (albeit not as identified in a HDCA, FDS or outcomes identified in any relevant Development Plan); and 6. An ODP is prepared that addresses the matters listed in UG-ODP Criteria (that would be incorporated into the Plan before any subdivision proceeds). The proposal is not consistent with the balance of the policy, albeit such tension is resolved by the policy direction in the NPS-UD.
UG-SCHED1 - Residential Growth Area ODP Criteria *1. A single ODP shall be prepared for each new residential growth area and incorporated into the Planning Maps and the relevant Development Area chapter of this Plan;* *2. Each ODP shall illustrate how the site characteristics and topography have been addressed through the identification of:* a. *Principal through roads and connections both within and adjoining the ODP area, including principal walking and cycling networks and public transport and freight routes;* b. *Methods for the integrated management of water, stormwater, and wastewater and associated infrastructure consistent with {Link,11991,UG-P15};* c. *How each ODP area will:* i. *Achieve the minimum net density requirements and outcomes listed in UG-P5 or UG-P6 are to be achieved;* ii. *Be staged to allow the subdivision development to align with the timing, funding, and availability of network infrastructure capacity; and* iii. *Integrate into any adjoining land that is subject to the Urban Growth Overlay;* *3. The following features and outcomes are to be illustrated on an indicative subdivision concept plan containing lot configurations and sizes that is to accompany the ODP;* a. *Any land to be set aside to protect or enhance environmental, conservation, landscape, heritage or cultural (including to provide for the interests of nga rūnanga) values;* b. *Any land to be set aside for community facilities, schools, open space reserve or commercial activities and how accessibility and connectivity between these locations is supported in the land transport network;* c. *Any land to be set aside to effectively manage hazard risk or contaminated land;*	The proposed ODP have been prepared in accordance with the requirements of UG-SCHED1 and their format (appearance) and content (text) is based on the ODPs set out in Part 3 of the proposed Plan.

d. *Any methods or boundary treatments required to mitigate reverse sensitivity effects and promote compatible land use activities, including protecting important infrastructure, or a designated site; and* e. *Any other information which is relevant to the understanding of the development and its proposed zoning.*	
RESZ-Objectives *RESZ-O1 Safe, convenient, pleasant, and healthy living environments that meet the needs and preferences of the community.* *RESZ-O2 Residential activities are the principal use in residential zones.* *RESZ-O3 A wide range of housing typologies and densities are provided for to ensure choice for the community and to cater for population growth and changing demographics.* *RESZ-O4 Increased residential densities occur in close proximity to activity centres, public transport routes, and public open spaces.* *RESZ-O5 Built form is of a high design standard and appearance that responds to and reinforces positive aspects of the local environment.* *RESZ-O6 The role, function, and predominant character of the residential zones is not compromised by non-residential activities.* *RESZ-O7 Residents have access to a range of community, recreation, education, health, and corrections activities and facilities that support, maintain, and enhance the surrounding residential amenity.*	These provisions will guide eventual development of the subject land, however it is noted that the proposed Plan Change provides for residential development in a manner consistent with these objectives.
LLRZ-Overview *The Large Lot Residential Zone is located within township areas in Coalgate, Darfield, Dunsandel, Kirwee, Leeston, Lincoln, Prebbleton, Rolleston, Southbridge, Springfield, Tai Tapu, and West Melton.* *The Large Lot Residential Zone provides an opportunity for people to enjoy a spacious living environment while being close to an urban centre. The Large Lot Residential Zone is typically located on the fringe of townships and provides a transition to the surrounding rural area.* *Development, including fencing, will maintain an open and spacious character that contrasts with the built-up areas and rural land. Where portions of the zone are adjacent to or from part of the entrance to a township, development will be managed to ensure that it visually enhances the approach to the township.* *LLRZ-O1 The Large Lot Residential Zone provides for residential activity on large sites, in a manner compatible with the retention of an open and spacious peri-urban character at the rural interface.* *LLRZ-P1 Provide for a very low density and spacious residential character by:* *managing the density of development; and* *managing the height, bulk and form of development.*	These provisions relate to the proposed zoning of the subject land for rural residential purposes, in the proposed plan as notified. Notably, these provisions: 1. Identify the land as providing for a *'living environment while being close to an urban centre'* rather than as a rural environment. 2. Recognises that the land is *'located on the fringe of townships and provides a transition to the surrounding rural area'.* 3. Provide for residential activity (LLRZ-01) and residential character (LLRZ-P1), rather than rural character. Whilst these provisions clearly anticipate a lower density of development than that proposed by the Plan Change, it is notable that these provisions ultimately recognise the land as residential (rather than rural) which can appropriately integrate with neighbouring urban residential and rural land.

17. Overall, it is acknowledged that the proposal is not consistent with those urban-growth related provisions which seek to limit growth to locations where a HDCA and FDS identify a need for additional feasible development capacity for Lincoln and the land is a 'greenfield priority area', or any subsequent urban growth areas or urban containment boundaries, in the CRPS where it is a residential activity. However, such tension is resolved by the more enabling provisions in the NPS-UD.

18. In all other respects, the proposal achieves consistency (or avoids inconsistency) with the relevant provisions of the proposed plan.

Attachment 6: Mahaanui Kurataiao Limited Consultation

Mahaanui
Kurataiao Ltd

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17 December 2020

To

ATTN:

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Private Plan Change Lincoln South

Report

Manawhenua Statement

Ngāi Tahu are tangata whenua of the Canterbury region, and hold ancestral and contemporary relationships with Canterbury. The contemporary structure of Ngāi Tahu is set down through the Te Rūnanga o Ngāi Tahu Act 1996 (TRoNT Act) and, through this structure and this Act, sets the requirements for recognition of tangata whenua in Canterbury.

The following Rūnanga hold manawhenua over the project's location, as it is within their takiwā:

- Te Taumutu Rūnanga

The natural resources – water (waterways, waipuna (springs), groundwater, wetlands); mahinga kai; indigenous flora and fauna; cultural landscapes and land - are taonga to manawhenua and they have concerns for activities potentially adversely affecting these taonga. These taonga are integral to the cultural identity of ngā rūnanga manawhenua and they have a kaitiaki responsibility to protect them. The policies for protection of taonga that are of high cultural significance to ngā rūnanga manawhenua are articulated in the Mahaanui Iwi Management Plan (IMP).

Assessment of Proposal

- The application is for a Private Plan Change to support the development of 2000+ residential lots across 186 ha in Lincoln, to the south of the township.

- The Private Plan Change requires amending the Selwyn District Planning Maps to rezone the site to Living X, Living Z and Business 1 (for the Local Centre). An Outline Development Plan (ODP) for South Lincoln has also been developed and is to be added to the ODP-Lincoln.

- The proposed site is an existing dairy farm of approx. 186 ha, and is adjacent to Te Whāriki subdivision and positioned on either side of Springs Rd. There are no known NZAA Māori sites in the immediate area.

- There are numerous waterways adjacent to and running through the site. This includes the Western Boundary Drain (an ephemeral waterway) and the Ararira (LII) River, which define the western and eastern boundaries of the site. Additionally, the spring-fed Lincoln Main Drain crosses through the site and Springs Creek (a spring-fed tributary of the Ararira) has headwater springs within the site.

- The Preliminary Site Investigation (PSI) identified that some areas of the site had experienced HAIL activity. This includes a high risk of adverse effects to underlying soil and groundwater as a result of a known offal pit/farm dump, and a moderate risk as a result of the use/storage of agrochemicals, farm related chemicals, and bulk petrol storage.

- The site includes Class 1, 2 and 4 soils. As Class 1-3 soils are considered 'versatile' soils, there is an issue regarding whether it is appropriate to develop these soils for residential purposes.

- Most of the site consists of poorly drained soils and relatively high groundwater levels. Existing drains within the site may be diverted to maximise the opportunity for developing the land. Therefore, two Stormwater Management Areas (SMA) are proposed for the downslope at the end of each catchment to provide stormwater treatment and attenuation. They will consist of:
    - A first flush basin (first 20mm of rainfall)
    - A wetland with the capacity to provide water quality polishing in rainfall events up to the first flush depth of 20mm, and provide live storage in large rainfall events exceeding the 20% AEP event
    - A detention basin to provide water quantity attenuation in large rainfall events greater than the first flush event but up to the 2% AEP.
    - After treatment and attenuation, the stormwater will be discharged into the Ararira to the east and an existing private drain to the west.

- Due to the flood risk in particular areas of the site, certain lots will be constructed so that the ground levels are set above road levels. This will enable the roads to act as secondary flow paths.

- The majority of new sites will be serviced by a gravity sewer network discharging to 2 new pump stations located to the western and eastern margins of the site. The lots that cannot be serviced by gravity sewer will utilise Local Pressure Sewer to discharge into the gravity network. A third pump station may be required to service the north-eastern portion of the site north of Springs Creek.

- Four recreation serves will be created throughout the ODP area, alongside green links and general reserves. This includes the possibility of a 20m wide cycleway along Spring Creek. The applicant has stated that the proposed reserve network may provide an opportunity to create an ecological corridor. These reserves would include indigenous trees and shrubs.

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Evaluation in relation to Mahaanui Iwi Management Plan (MIMP)

The matters that are relevant to this particular proposal have been identified as:

P4.3 To base tāngata whenua assessments and advice for subdivision and residential land development proposals on a series of principles and guidelines associated with key issues of importance concerning such activities, as per Ngāi Tahu subdivision and development guidelines.

P6.1 To require on-site solutions to stormwater management in all new urban, commercial, industrial and rural developments (zero stormwater discharge off site) based on a multi-tiered approach to stormwater management:

(a) Education - engaging greater general public awareness of stormwater and its interaction with the natural environment, encouraging them to take steps to protect their local environment and perhaps re-use stormwater where appropriate;

(b) Reducing volume entering system - implementing measures that reduce the volume of stormwater requiring treatment (e.g. rainwater collection tanks);

(c) Reduce contaminants and sediments entering system - maximising opportunities to reduce contaminants entering stormwater e.g. oil collection pits in carparks, education of residents, treat the water, methods to improve quality; and

(d) Discharge to land-based methods, including swales, stormwater basins, retention basins, and constructed wetponds and wetlands (environmental infrastructure), using appropriate native plant species, recognising the ability of particulars species to absorb water and filter waste.

P6.5 To encourage the design of stormwater management systems in urban and semi urban environments to provide for multiple uses: for example, stormwater management infrastructure as part of an open space network that provides for recreation, habitat and customary use values.

P11.8 To require the planting of indigenous vegetation as an appropriate mitigation measure for adverse impacts that may be associated with earthworks activity.

WM6.17 To require the development of stringent and enforceable controls on the following activities given the risk to water quality:

(b) Subdivision and development adjacent to waterways;

WM13.7 To recognise the protection, establishment, and enhancement of riparian areas along waterways and lakes as a matter of regional importance, and a priority for Ngāi Tahu.

CL3.8 To require, where a proposal is assessed by tāngata whenua as having the potential to affect wāhi tapu or wāhi taonga, one or more of the following:

(a) Low risk to sites:

(i) Accidental discovery protocol (ADP) - See Appendix 3 of the Mahaanui Iwi Management Plan.

(b) High risk to sites:

(i) Cultural Impact Assessment (CIA).

Conclusion

This proposal was brought to Te Taumutu Rūnanga at a kaitiaki hui on Wednesday 16 December. Various comments and recommendations were made, and these are included below.

The Ngāi Tahu Subdivision and Development Guidelines (attached at the end of this document) provide a means of succinctly communicating a general series of principles for ngā rūnanga regarding development. They recognise that while subdivision and development can have adverse effects on rūnanga values, they can also provide opportunities to enhance those very values.

Due to the scale of the proposal, and the broader context of development throughout the Selwyn District, these development guidelines are incredibly important to understanding how adverse effects may be mitigated. Te Taumutu Rūnanga recognise that the developer in this sense has pre-empted some of these key concerns by proposing a 10m setback from all waterbodies, creating recreation reserves, remediating potentially contaminated land, and creating stormwater management areas.

As discussed in the Ngāi Tahu Subdivision and Development Guidelines, developers have the potential to incentivise homeowners to adopt more sustainable and self-sufficient approaches to water, waste and energy. This may include measures such as greywater systems and rainwater collection tanks. On a broader scale, as identified by the client, there are opportunities for the integration of stormwater collection, treatment and disposal in the open space reserves. The rūnanga agree that a more integrative approach to stormwater management is important to promoting sustainable development.

As referenced in the protection of waterways is a significant concern to the rūnanga. The 10m waterway setback is considered an appropriate mitigation measure when used in conjunction with naturalisation of the waterways and riparian planting of indigenous, locally sourced vegetation. However, the kaitiaki have queried the suitability of lots within the flood management area of the Ararira.

Although there are no known NZAA Māori sites identified within the proposed area, Lincoln is a significant area for the rūnanga and there is a potential for wāhi tapu/wāhi taonga to be discovered. An Accidental Discovery Protocol for all earthworks, is considered sufficient to protect cultural values across the site.

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Recommendations

Recommendation 1

Indigenous planting is considered a critical mitigation measure for the large-scale development. This should be done with locally sourced vegetation, including naturalisation of the Lincoln Main Drain, Springs Creek, and other waterbodies.

Recommendation 2

A robust Erosion and Sediment Control Plan consistent with Environment Canterbury's Erosion and Sediment Control Guidelines. All contractors should be familiar with this.

Recommendation 3

The remediation of contaminated sites to minimise the risk of contaminant-laden stormwater entering waterbodies.

Recommendation 4

On-site stormwater control measures are considered an important facet of mitigating the effects of large-scale development. These are not only important in the context of the development as a whole, but also within each individual property. Rainwater tanks are one way through which stormwater management can be improved.

Recommendation 5

As noted above, the applicant has the capacity to require improved water efficiency throughout the subdivision. This may include incentivising homeowners to adopt green technology and sustainability initiatives.

Recommendation 6

The principles and policies identified in the Ngāi Tahu Subdivision and Development Guidelines should be incorporated into the development designs. These guidelines have been attached at the end of this document.

Recommendation 7

For all earthworks across the site, an Accidental Discovery Protocol consistent with Appendix 3 of the Mahaanui Iwi Management Plan is recommended. This is considered sufficient to protect any potential wāhi tapu/wāhi taonga values in the area.

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Mahaanui Kurataiao and its staff are available to discuss this report further or assist in direct engagement with rūnanga if desired.

Report Prepared by:

Helen Matunga

Environmental Advisor

Peer Reviewed By:

Brad Thomson

Environmental Advisor

Appendix 1 : NGĀI TAHU SUBDIVISION AND DEVELOPMENT GUIDELINES

Cultural landscapes

1 A cultural landscape approach is the most appropriate means to identify, assess and manage the potential effects of subdivision and development on cultural values and significant sites [refer Section 5.8 Issue CL1].
2 Subdivision and development that may impact on sites of significance is subject Ngāi Tahu policy on Wāhi tapu me wāhi taonga and Silent Files (Section 5.8, Issues CL3 and CL4).
3 Subdivision and development can provide opportunities to recognise Ngāi Tahu culture, history and identity associated with specific places, and affirm connections between tāngata whenua and place, including but not limited to:
   (i) Protecting and enhancing sites of cultural value, including waterways;
   (ii) Using traditional Ngāi Tahu names for street and neighborhood names, or name for developments;
   (iii) Use of indigenous species as street trees, in open space and reserves;
   (iv) Landscaping design that reflects cultural perspectives, ideas and materials;
   (v) Inclusion of interpretation materials, communicating the history and significance of places, resources and names to tāngata whenua; and
   (vi) Use of tāngata whenua inspired and designed artwork and structures.

Stormwater

1 All new developments must have on-site solutions to stormwater management (i.e. zero stormwater discharge off site), based on a multi-tiered approach to stormwater management that utilises the natural ability of Papatūānuku to filter and cleanse stormwater and avoids the discharge of contaminated stormwater to water [refer to Section 5.4, Policy P6.1].
2 Stormwater swales, wetlands and retention basins are appropriate land based stormwater management options. These must be planted with native species (not left as grass) that are appropriate to the specific use, recognising the ability of particular species to absorb water and filter waste.
3 Stormwater management systems can be designed to provide for multiple uses. For example, stormwater management infrastructure as part of an open space network can provide amenity values, recreation, habitat for species that were once present on the site, and customary use.
4 Appropriate and effective measures must be identified and implemented to manage stormwater run off during the construction phase, given the high sediment loads that stormwater may carry as a result of vegetation clearance and bare land.
5 Councils should require the upgrade and integration of existing stormwater discharges as part of stormwater management on land rezoned for development.
6 Developers should strive to enhance existing water quality standards in the catchment downstream of developments, through improved stormwater management.

Earthworks

1 Earthworks associated with subdivision and development are subject to the general policy on Earthworks (Section 5.4 Issue P11) and Wāhi tapu me wāhi taonga (Section 5.8, Issue CL3), including the specific methods used in high and low risk scenarios for accidental finds and damage to sites of significance.

2 The area of land cleared and left bare at any time during development should be kept to a minimum to reduce erosion, minimise stormwater run off and protect waterways from sedimentation.
3 Earthworks should not modify or damage beds and margins of waterways, except where such activity is for the purpose of naturalisation or enhancement.
4 Excess soil from sites should be used as much as possible on site, as opposed to moving it off site. Excess soil can be used to create relief in reserves or buffer zones.

Attachment 7: Review of Potential Odour Effects - Golder

GOLDER

16 February 2020

Project No. 20438027-004-L-Rev0

Jocelyn Lewes
Selwyn District Council
2 Norman Kirk Drive,
Rolleston 7614,
Selwyn

REVIEW OF ODOUR EFFECTS RELATING TO LINCOLN SEWAGE TREATMENT PLANT SETBACK - LINCOLN SOUTH PLAN CHANGE

Dear Jocelyn,

Rolleston Industrial Developments Ltd (RIDL) have lodged a private plan change request with Selwyn District Council (SDC) (Plan change request 69). This plan change is to change the Selwyn District Plan (Plan) by rezoning approximately 186 hectares of Rural Outer Plains Zone to Living X, Living Z and Business 1 Zones, in Lincoln. Following the application, SDC have issued a request for further information (RFI). Item 40 of the RFI identifies the current restriction on housing when within 150 m of the boundary of the area designated for the Lincoln Sewage Treatment Plant (rule C4.9.32 of the Plan). The request is as follows:

> *40. The Lincoln Sewage Treatment Plan, referred to in the request* [plan change request] *as the Allendale Pump Station, is located on the north-eastern boundary of the plan change area. This area is designated (SDC-153) and Rule C4.9.32 requires that any dwelling shall be setback not less than 150 m from the boundary of the designed area. The plan change request has not sought to vary this rule, therefore please demonstrate how this will be achieved and address any other reserve sensitivity effects that may arise from the location of residential activity in close proximity to the designated area. This is particularly relevant as the request proposes that the ponds will be required to buffer wastewater flows from the plan change area during periods of wet weather.*

This letter[1] provides a review on the potential odour effects of the Lincoln Sewage treatment plant operations on the proposed Lincoln South Plan Change area and whether the existing 150 m setback is still required to prevent reverse sensitivity odour effects.

Background

The Lincoln Sewage Treatment Plant included sequential batch reactor (SBR) tanks and oxidation pond treatment system prior to discharge into the L II River. The discharge of treated wastewater was only permitted under CRC210644 until 31 March 2013. There is no longer discharge of wastewater, or treatment

[1] This letter is subject to the limitations provided in Attachment 1.

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of wastewater at this site and since 2013 all wastewater is pumped to the Pines WWTP in Rolleston for treatment. Currently the tanks and pond are available for emergency wastewater storage events.

It is noted that the 150 m setback rule for housing (referred to in the RFI) was set when there was sewage treatment undertaken at the site.

Wastewater Storage at Allendale Pump Station

Using conservative assumptions, WSP (2020)[2] estimated that with the addition of the Lincoln South Plan Change area (2,000 households), that a 1 in 5-year annual reoccurrence interval (ARI) 12-hour storm event, would result in 700m^3 of wastewater overflow from the Eastern Selwyn Sewerage Scheme. This volume of wastewater would need to be stored near to the Allendale pump station. It is understood that this would be stored firstly in the three former SBR tanks (up to 600 m^3) and then any additional (up to 100 m^3) within the adjacent pond.

As the storage would be required following high rainfall events (due to water infiltration into the wastewater system), WSP[3] have estimated that the 700 m^3 of excess wastewater would be approximately 2 to 3.5 times more dilute than the normal municipal wastewater, and wastewater entering the pond being at the upper end of this level of dilution.

Once normal system flows have resumed, WSP[3] have also estimated that it would take 1 hour to empty the three former SBR storage tanks and they consider it is unlikely that the pond would be emptied.

Odour Potential

A key driver of odour is the maintenance of the wastewater in a non-septic state – that is avoiding anaerobic conditions. For the tanks, the duration that wastewater is to be stored in them is expected to be relatively low, i.e., it is expected to be a number of hours[3]. Therefore, the wastewater in the tanks is unlikely to become septic prior to being pumped to the Pines WWTP.

For the pond storage, we have undertaken a desktop review of the oxygen demand of the inflow wastewater compared to the ability of the pond to provide this demand with its existing residual dissolved oxygen inventory.

New Zealand municipal wastewater typically has a biochemical oxygen demand (BOD_5) of approximately 200 to 300 g/m^3 (MfE 2003[4]). Therefore, the dilute wastewater that could be discharged into the pond in a wet weather event is estimated to have a biological oxygen demand in the order of 8.5 kg[5].

The pond has an area of 3.32 ha (WSP[3]) and is understood to currently have a water level of around 1.2 m deep. Based on a review of historical aerial photographs available through Google Earth, we can see no strong evidence that the pond suffers from seasonal algal blooms, i.e., there is no obvious sign of such events, or other pond discolouration. Some aerial photographs indicate significant surface aerations (white caps) during wind events. Therefore, it is likely that at least the top 0.5 m of the pond, would be close to being fully saturated (or close to it) with oxygen. At sea level and a temperature of 25 °C, the saturated dissolved

[2] Memorandum WSP Charlotte Mills to Bruce Van Duyn 31 October 2020.

[3] Pers Comms Charlotte Mills (WSP), Bruce van Duyn Carter Group).

[4] Section 2.3 of Sustainable wastewater management: A handbook for smaller communities MfE (2003). Accessed at https://www.mfe.govt.nz/publications/waste/sustainable-wastewater-management-handbook-smaller-communities-part-1-0 last accessed 9/2/2020.

[5] 8.5 kg = ((300 g/m^3 * 100 m^3) / (1000 g/kg)) / 3.5 (assumed dilution factor).

oxygen content is 8 g/m^3 (footnote[6]). This means there is approximately 130 kg[7] of available dissolved oxygen inventory within the pond when dilute sewage enters. At lower temperatures, the percentage dissolved oxygen in saturated conditions will be higher, therefore, this is considered to be a conservative assumption.

Using the above assumptions, if the BOD_5 demand of the inflow was met within the top 0.5 m of the pond, this would result in an approximate reduction in the dissolved oxygen content of 6.3 % (i.e., 8.5 kg / 133 kg). This would reduce the dissolved oxygen to 7.5 g/m^3 (footnote [8]). It is noted that the pond may not be fully mixed, and a small area of lower dissolved oxygen may occur in the pond, however, it is expected that pond mixing, and natural aeration is expected to readily restore the dissolved oxygen to typical levels within hours. Therefore, the dissolved oxygen content is unlikely to reduce as much as indicated by the above simplistic calculation.

Odour Effects

Regarding odour effects on the proposed Lincoln South subdivision, given the distance between the tanks and the boundary with the subdivision (approximately 190 m), the low frequency which the tanks will be used and the expected short duration of storages, there are expected to be less than minor odour effects from the use of the tanks as short-term wastewater storage in high rainfall events.

Regarding the use of the pond, the natural capacity of the pond to provide the oxygen required by the dilute wastewater is expected to result in a less than minor potential for offsite odour effects. The use of the pond for receiving excess wastewater flows would be infrequent (one event in five years), and these events have a very low potential to cause odour that could be recognised at the proposed sub-division.

It is also noted that it is unclear if using the pond for buffering excessive wastewater flow during 1 in 5 year ARI storm event would be adopted by SDC or whether additional tank storage would be installed. While the option of additional tank storage has not been fully evaluated, due to the distance to the plan change area, and relatively short-term storage of wastewater (as is the case for the current tanks), it is expected that several additional tanks located close to the current tanks, would be unlikely to result in offsite odour effects at the Lincoln South Plan change area.

Therefore, when considering odour effects, it is considered that a 150 m buffer, as current Rule C4.9.32 suggests is not required. While this was appropriate for the previous use of the Lincoln WWTP system, given the current consented use of the Lincoln WWTP, based on the tanks/pond being used only for storage during peak rainfall events, there is expected to be less than minor odour effects beyond the boundary and no restrictions on land use in the Lincoln South subdivision is considered necessary to mitigate against reverse sensitivity odour.

Closing

We trust the above information will assist RIDL in understanding the odour impacts on the proposed Lincoln South Plan Change area due to the Lincoln WWTP operation in a wet weather scenario. If you have any queries regarding this letter, please contact the undersigned by email at cnieuwenhuijsen@golder.co.nz or by phone at (021) 782 440.

[6] https://www.fondriest.com/environmental-measurements/parameters/water-quality/dissolved-oxygen/. Last Accessed 15/2/2021.

[7] 133 kg = (((3.32 ha x 10,000 m^2/ha) * 0.5m) * 8 g/m3) / 1000 g/kg.

[8] 7.5g/m^3 = (133 kg - 8.5 kg) / (3.32 * 10,000 * 0.5).

Yours sincerely,

Golder Associates (NZ) Limited

Cathy Nieuwenhuijsen
Senior Air Quality Consultant

CN/RC/mt

Attachment: Report Limitations.

https://golderassociates-my.sharepoint.com/personal/mtsoy_golder_com/documents/documents/2021/cathy/20438027-004-l-rev0-review of odour effects lincoln wwtp.docx

ATTACHMENT 1

Report Limitations

Report Limitations

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Attachment 8: Transport Response – Novo Group

16 February 2021

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O - 03 365 5570
info@novogroup.co.nz

Selwyn District Council

Attention: Jocelyn Lewes

By email: Jocelyn.Lewes@selwyn.govt.nz

Dear Jocelyn,

PC200069: LINCOLN SOUTH TRANSPORT RESPONSE TO RFI

1. Further to your Request for Further Information (RFI), this letter provides a response to the transport related queries that fall within the remit of the Integrated Transport Assessment. This is considered to be points 53 to 65 of the RFI. This letter addresses these matters in the order they have been raised.

> *53. Council operates a Paramics Transport model for Lincoln which has been recently updated. The traffic assessment provided with the request does not appear to have utilised this model to consider the effects of the proposal on the existing Lincoln township and wider network. It is requested that the applicant liaise with Council to expand the model to incorporate this plan change area and this model is then used to inform the ITA for this request. Following this, Council will require any traffic modelling, results and analysis to be peer reviewed by Abley Consultants.*

2. Updated traffic modelling has been undertaken by Abley Consultants Ltd and is included as **Attachment 1** of this letter. This modelling has been undertaken for three scenarios, being:

   - Base Model: The original model prior to adding the Plan Change traffic;
   - With Development: Including the Plan Change traffic, but not the Lincoln Bypass Connection between Ellesmere Junction Road and Springs Road; and
   - With Western Arterial: Including the Plan Change traffic and the completed Lincoln Bypass.

3. In addition to the above, the following changes were made compared to the assumptions in the ITA (and that of the base model):

   - The Council's proposed intersection arrangement has been adopted at the Springs Road / Ellesmere Junction Road / Gerald Street intersection; and
   - The primary access into the Plan Change site from Springs Road has been modelled as traffic signals (rather than a roundabout).

Intersection Results

4. The operation of the key intersections is summarised in Table 4.3 and Table 4.4 of the Abley report. This indicates that the intersections are all predicted to operate satisfactorily with the inclusion of the Plan Change traffic and no intersection is predicted to operate worse than Level of Service D overall.

5. The operation of individual turning movements at the intersection is also set out in **Attachment 1**. This identifies that no movement is predicted to operate worse than Level of Service D. Overall, this is considered to indicate the network can satisfactorily accommodate the traffic predicted from the proposed Plan Change.

University Access Operation

6. The operation of the University access points has been included within the traffic model. This would not normally be reported on, as it relates to private property access rather than the public roading network and therefore is typically not provided with the same level of scrutiny. However, the following discusses the operation of these accesses given the data is available.

7. The northern entrance to the University from Springs Road (at Farm Road that is currently unformed, although assumed to be formed within the model) is predicted to have the right turn out operating at Level of Service F during the AM peak hour when the Plan Change traffic is added to the road network without the Lincoln Bypass. This improves to Level of Service E with the Western Arterial / Lincoln Bypass added. That said, this Level of Service is predicted to only affect two to five vehicles in the peak hour. This operation is considered to be satisfactory given the very low volume of traffic that is affected.

8. The right turn into the southern University access (at Engineering Drive) is predicted to operate at Level of Service F in the AM peak when the Plan Change traffic is added to the road network. This improves to Level of Service E within the inclusion of the Lincoln Bypass. We understand that this does not affect the operation of through traffic on Springs Road, as the queueing is contained within the flush median. Whilst not ideal, this is considered tolerable as there is no effect on the operation of Springs Road.

9. Furthermore, Lincoln University has additional options for access, most notably access to / from Ellesmere Junction Road. This would further alleviate potential issues or delays and would assist in optimising the traffic network.

Modelling Summary

10. It is considered that the traffic modelling undertaken indicates the traffic effects of the Plan Change will be acceptable on the surrounding road network.

> *54. Council abandoned the concept of the Lincoln Southern Bypass due to the practical difficulties with poor soil conditions, high water tables and natural flowing (and culturally sensitive) springs within the area, combined with the refusal of the Lincoln University to allow any extension of Weedons Road through to at least Verdeco Park. The high cost compared to low use was also a predominate factor in Councils decision at the time not to proceed with the bypass. Therefore, please provide an assessment of how dependent the proposal is on a roading/bypass connection between Ellesmere Junction Road/Weedons Road and Springs Road to cater for this development? The applicant is advised that as Council has*

formally rejected perusing such a connection, the full responsibility to provide it if required would be on the applicant.

11. The above traffic modelling included options with and without the Bypass. Whilst the modelling indicates the network will operate better with the Bypass than without, the operation without the Bypass is acceptable. As such, the Plan Change is not dependent on the Bypass.

> *55. As raised above, there are no vehicle transport connections provided from the Verdeco Park and Te Whāriki subdivisions to the north of the plan change area, and the applicant is requested to consider the suitability of the roading layout if these connections cannot be secured. It is critical that the sufficient roading, pedestrian and other similar linkages are made to the adjoining Lincoln Township network for integration and permeability, yet there are no proposals on how this will be achieved in detail for ODP requirements.*

12. This matter has been addressed by others.

> *56. Moirs Lane includes an important cycleway link for the Little River Rail Trail along it and beyond to River Road. How would this be catered for in an off road facility and road/intersection crossing points?*

13. The existing legal road width for Moirs Lane is approximately 20m. There is sufficient width for 2× 3.5m lanes plus 1.5m shoulder plus 3.0m shared path on the northern side and 3.0m wide berm / reserve on the southern. The shared path would then connect to the existing formed road crossing at Ellesmere Road.

14. The traffic volumes on Ellesmere Road are predicted to increase by between 127 and 165 vehicles per hour as a result of this Plan Change. The peak hour traffic volumes will in the order of 330 vehicles per hour. No specific cycle crossing (beyond the current formed crossing) is considered to be necessary on Ellesmere Road given these volumes.

> *57. The existing Springs/Collins Road intersection is not suited for substantial increases in use. What are the proposals for this being upgraded?*

15. The Springs Road / Collins Road intersection is not predicted to experience a notable increase in traffic as a result of this development. The Collins Road eastern approach is predicted to have an increase in traffic of between 20 and 23 vehicles per hour as a result of the Plan Change. As such, no alteration to the existing intersection form is considered necessary.

> *58. Please clarify what status and form Collins Road is proposed to have. Please also advise if it is proposed that sites will have individual access off Collins Road.*

16. Collins Road will be a Local Road and formed as such. Direct property access will be provided to this road.

> *59. As part of any localised network upgrade, along with Collins Rd being formed and sealed as would be expected, a bridge and new carriageway through to Ellesmere Road would also be an outcome required to cater for access to the southern development areas as opposed to just relying on one northern connection off Ellesmere Road. This is made more important, as it may eventuate with no other local roading connections north into the existing township roading network able to being made by the proposal, making this connection even more important to provide.*

17. The extension of Collins Road has not been assumed in the Abley traffic modelling, which indicates that the effects of the Plan Change on the surrounding road network are acceptable. Therefore, it is not proposed to upgrade Collins Road beyond the site frontage.

> *60. The ITA refers to no direct (lot) access to Springs Road. What is the rational for this approach? Direct access has been supported for the existing subdivisions to the north, thereby facilitating urban frontage upgrades and speed limit changes to integrate the area into an urban form setting. As such it is an outcome that is desired for the plan change area.*

18. The rational for no direct (lot) access to Springs Road is based on the Te Whariki Stage 4 approach where there is no direct (lot) access due to the overhead 33kV power lines. From a traffic perspective, direct (lot) access to Spring Road can be accommodated. Therefore, direct (lot) access to Springs Road is dependent on how the 33kV power lines are dealt with. Further options regarding undergrounding the cables or keeping them as-is with a 5m wide easement will be discussed with Orion and decided during the subdivision design stage prior to subdivision application. Therefore, the ODP has been updated accordingly not prohibiting direct (lot) access.

> *61. Please advise how management of the existing stock underpass, which is shown as a pedestrian link, will address CPTED principles.*

19. This is addressed in the RFI response document.

> *62. The applicant is requested to confirm that all the upgrades to existing roads (widening, sealing, intersections and urban frontage upgrades etc.) are at the developers cost in addition to all new roads and transport requirements related to the proposal. It is noted for example a more significant upgrade of the Gerald/Springs/Ellesmere Junction Road intersection is proposed in the ITA, yet this requires third party land from the likes of the Lincoln University and Ag Research that Council know will not be forthcoming. Please advise how the applicant will obtain all the necessary land and undertake the upgrades identified necessary different to the current plans in train.*

20. The Plan Change will cover the costs of the following works (in their entirety):

    a. Collins Road along the frontage of the Plan Change site;

    b. Springs Road along the frontage of the Plan Change site;

    c. The access intersections (and internal road network); and

    d. Moirs Lane (including associated segment of Rail Trail cycle route).

21. The Plan Change is proposed to include Development Contributions to assist Council in delivering the following upgrades:

    a. Ellesmere Junction Road / Springs Road / Gerald Street traffic signals (including any land acquisition);

    b. Ellesmere Road / Edward Street roundabout;

    c. Ellesmere Road upgrade north of Edward Street;

d. Ellesmere Road (given some of this will require upgrading as the residential land south of Edward Street gets developed and the road link through the Plan Change site serves a wider benefit).

22. With regards to land purchase to facilitate the intersection improvements, the modelling has identified that the Council's proposed intersections at Ellesmere Junction Road / Springs Road / Gerald Street and Ellesmere Road / Edward Street will be sufficient and no additional land is required. Similarly, the road corridor improvements are anticipated to occur within the existing legal road width, so no additional land is required.

> *63. Council is planning to fully upgrade Gerald St from east to west over the 10 years as part of an arterial road and town centre upgrade for Lincoln. How does this development impact on those plans and details – bypass or otherwise with the increased or redirected traffic generated by the proposed development? The upgrade was agreed on the basis a bypass was not what Council wanted in comparison.*

23. The Plan Change is predicted to increase traffic on Gerald Street by approximately 230 to 250 vehicles per hour (without the Bypass) and 240 to 270 vehicles per hour with the Bypass. This is not considered to materially affect the plans for the Gerald Street upgrade.

> *64. Council is planning to upgrade the Ellesmere Road arterial between Lincoln and the City with a coordinated widening and intersection safety upgrade programme. How does this development impact on those plans and details, considering the application identifies the upgrade of Ellesmere Rd south of Edward St (but needed to Collins Rd), but not north?*

24. Paragraph 83 of the ITA set out a threshold of 3,000 vehicles per day as the capacity of a 6.0m wide rural carriageway. Although this calculation was undertaken with regard to Ellesmere Road south of Edward Street, it is also applicable to Ellesmere Road north of Edward Street. The existing traffic volumes on Ellesmere Road north of Edward Street are in the order of 3,250 vehicles per day[1], indicating this road should already be upgraded.

25. Whilst the Plan Change will add traffic to Ellesmere Road (north of Edward Street), this will largely be dependent on the staging of the subdivision and the timing of the connection to Ellesmere Road. In addition, the timing of the upgrade is immediate and therefore is not affected by the Plan Change.

> *65. Through the development of Te Whāriki, Council has experienced having to deal with numerous road construction issues experienced by that developer due to poor soils, high water tables that have created settlements of both roads and footpaths. The proposed development area extends further south into allegedly worse areas than in Te Whāriki with increased the risk of these issues being exacerbated. Council does not want roading assets vested in it that then lead to a continuation of problems it then has to bear the cost on for perpetuity. How will this risk be addressed by the applicant and what long term protections will be there for Council?*

26. This is addressed in the RFI responses by Inovo. We would expect that new roads will be constructed appropriately and will be fit-for-purpose.

[1] From the Mobile Road website.

27. We trust this letter satisfactorily addresses the transport matters raised in the Council's RFI.

Yours sincerely,

Novo Group Limited

Nick Fuller

Senior Transport Engineer

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021-032-TL001D

Attachment 1: Abley Modelling Note

Transport + Location Intelligence

South Lincoln Private Plan Change Modelling

Prepared for:	Rolleston Industrial Developments Ltd
Job Number:	RIDL-J001
Revision:	Revised draft
Issue Date:	15 February 2021
Prepared by:	Chris Blackmore, Senior Transportation Planner
Reviewed by:	Evan Stranks, Senior Transportation Engineer

1. Development Overview

Abley were commissioned by Rolleston Industrial Developments Ltd (RIDL) to model a residential development, totalling around 2,000 households, in South Lincoln.

Modelling was carried out within the Lincoln s-Paramics microsimulation model. This model has been developed by Abley for Selwyn District Council (SDC), and permission has been granted by SDC to use the model for this work.

Diagrams of the proposed development area were provided by RIDL for inclusion in the Lincoln model, shown in **Figure 1.1**.

Trip generation from the residential development was provided by RIDL for use in the modelling, morning and evening peak generation for inbound and outbound trips is shown in **Table 1.1**. Other trip generation and distribution, including expanding the peak hour generation to a two-hour level and then distributing the generated volumes onto the network have been informed by similar residential developments within the existing Lincoln model.

Trip generation and distribution for the small 450sqm GFA commercial / retail development has been based on the existing commercial and retail activity within the model. No additional passby reductions have been made at this time.

The model runs a two-hour morning period from 07:00 to 09:00 and a two-hour evening period from 16:00 to 18:00. From these results are reported for a peak hour in the morning from 08:00 to 09:00 and in the evening from 17:00 to 18:00.

Paramics microsimulation is a stochastic modelling package, which means there is some inherent variability between modelling runs. To account for this the results presented are the averages of five model runs. Generally, outlier results are excluded from the analysis however this has not been required for any of the results reported here.

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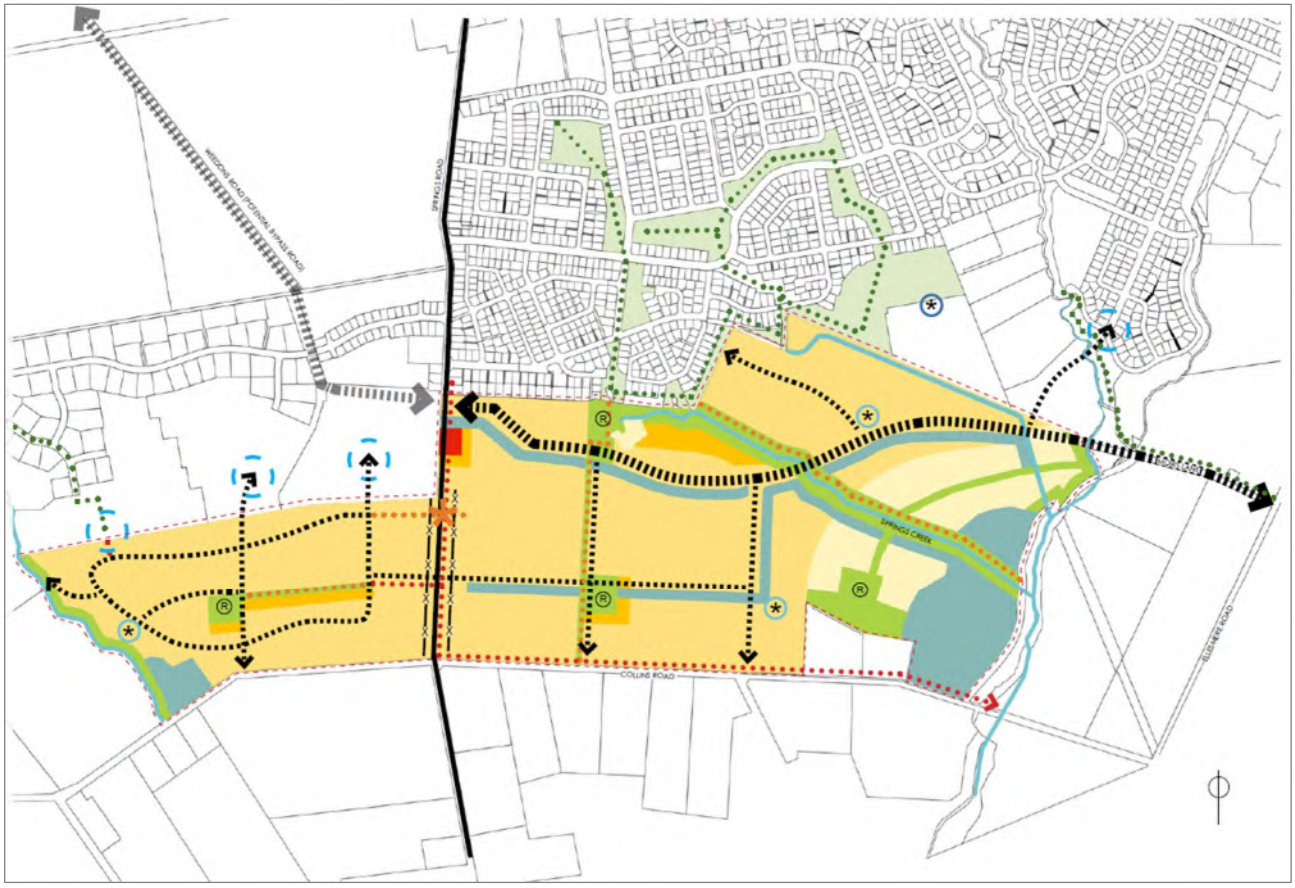


Figure 1.1 Overview of South Lincoln Development, supplied by RIDL

Table 1.1 Trip Generation per Developed Household, supplied by RIDL

Period	Arrivals	Departures	Total
Morning Peak Hour	0.175	0.525	0.7
Evening Peak Hour	0.441	0.259	0.7
Daily	3.5	3.5	7.0

2. Modelled Network

2.1 Base Network

The base network utilised for this analysis corresponds to the 2031 future model developed for SDC. This includes development of all current ODP areas, including Verdeco Park and residential development south of Southfield Dr, which are both currently under construction. This model also includes infrastructure included by SDC as part of the draft 2021-2024 Long Term Plan in line with other modelling conducted for SDC in Lincoln.

Small changes to corridor operation have been included to ensure vehicle behaviour along key links, especially Springs Rd, is realistic and responses to vehicle congestion are appropriate. These changes have been maintained across all model networks to maintain a fair comparison.

A significant improvement to routing choice has been made in the northern exits to and from Christchurch. Vehicles travelling along the Springs Rd and Shands Rd corridors are now able to react to delay on each corridor and can make a choice between the two routes. This is improved from previous modelling where the corridor choice was deterministic and fixed. As with the minor changes, this has been kept consistent across the model networks.

The base network used is shown in **Figure 2.1**.

Figure 2.1 Base Model Network

2.2 Inclusion of South Lincoln Development

Road connections were included in line with the plans shown in **Figure 1.1**. Infrastructure included at intersections was agreed with RIDL and represents intersection forms which would typically be associated with Connector class roads.

The network including development is shown in **Figure 2.2**.

Figure 2.2 Network including South Lincoln Development

2.3 Inclusion of Western Arterial

The alignment used for the Western Arterial connection is as per the supplied plans shown in **Figure 1.1**. It connects to the southern approach of the Ellesmere Jct / Weedons roundabout, forms connections with Farm Rd and Verdeco Blvd before ending at the western approach of the newly formed intersection with Springs Rd and the unnamed Development Connector road.

The network including both development and the Western Arterial is shown in **Figure 2.3**.

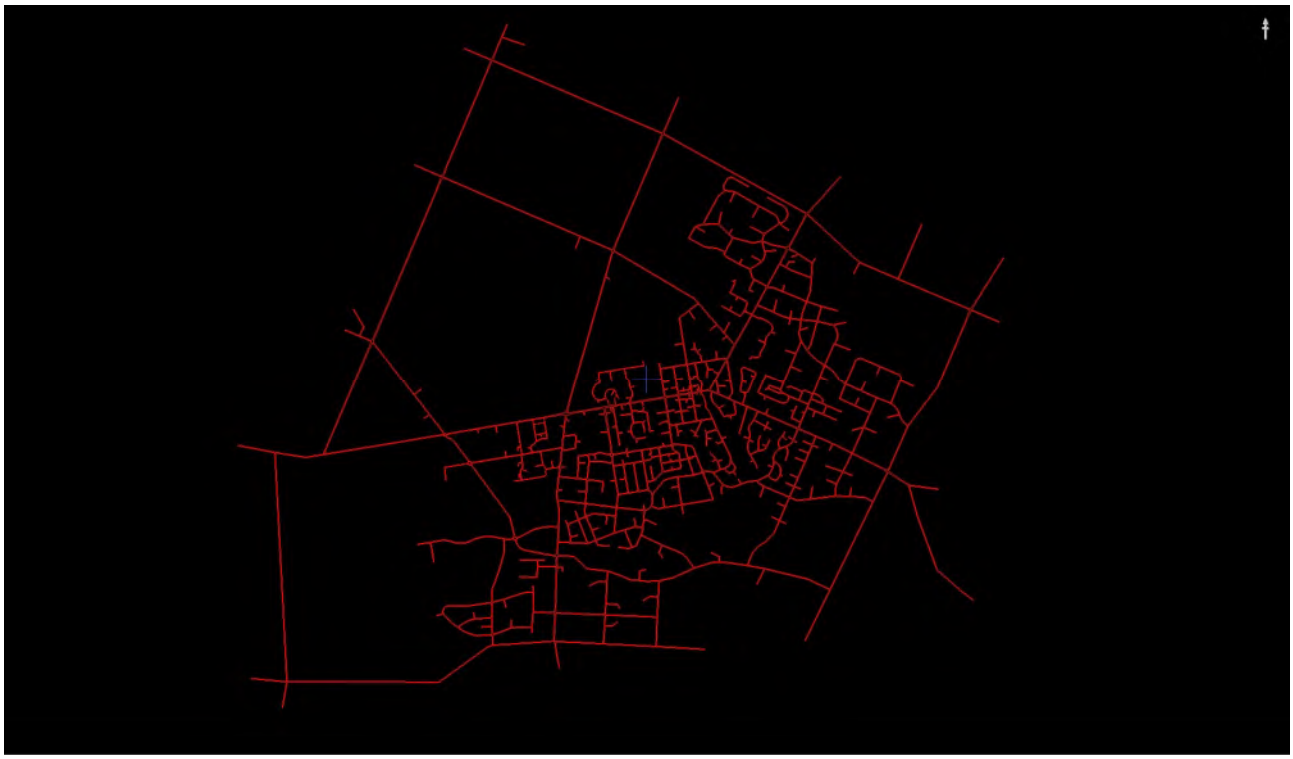


Figure 2.3 Network including South Lincoln Development and Western Arterial

3. Included Modelling Assumptions

The main assumptions relied on in this modelling are listed below. While these would have an impact on results if not included, they are in line with previous modelling undertaken for SDC and provide a consistent basis with which to analyse the impact of the South Lincoln Development.

- Lincoln University activity, especially the main car park, remains located in the south-eastern corner of the University land. While there has been discussion of the formation of a large carpark on the north-western corner of the Springs Rd / Ellesmere Jct intersection there is no publicly available information at this time.
- The University access at Springs Rd / Farm Rd is currently unformed. This is assumed to become a formed access in the future network to allow a second access to the University off Springs Rd. There is no formal announcement from the University to undertake this development, however this assumption is in line with other modelling conducted for SDC.
- The Western Arterial forms an intersection with Farm Rd, along with the formation of the Farm Rd / Springs Rd intersection this is assumed to provide a new western entrance and east-west route for vehicles to enter and exit the University.
- The trip distribution for the residential and commercial development is assumed to follow the same patterns as existing residential vehicle trips, i.e. the residents of the new development access the town centre, supermarket and other destinations at the same rate as existing residents. This also means that residents of the new development travel to and from Christchurch and Rolleston at the same rate as existing residents.

4. Outputs Provided

4.1 Volumes

The 'With Development' model shows that increases in traffic volumes in both peaks are primarily along Springs Rd and Ellesmere Jct / Gerald St, with other collectors also seeing some increase. When the Western Arterial connection is included around 300 vehicles divert from Springs Rd to the arterial corridor. Refer to **Table 4.1**, **Figure 4.1** and **Figure 4.2** for the morning peak results and **Table 4.2**, **Figure 4.3** and **Figure 4.4** for evening peak results.

Table 4.1 Two-Way Volumes on Key Corridors in the Morning Peak (08:00-09:00)

Measurement point	No Development	With Development	With Western Arterial
Springs N of Verdeco	410	1246	969
Springs S of Ellesmere Jct / Gerald	803	1482	1249
Springs N of Ellesmere Jct / Gerald	586	1060	927
Ellesmere Jct W of Uni	959	1125	770
Weedons N of Ellesmere Jct	600	749	918
Gerald W of Springs	1056	1287	1295
W Art N of Verdeco	0	0	383
Days N of Collins	0	30	3
Ellesmere S of Edward	203	328	330

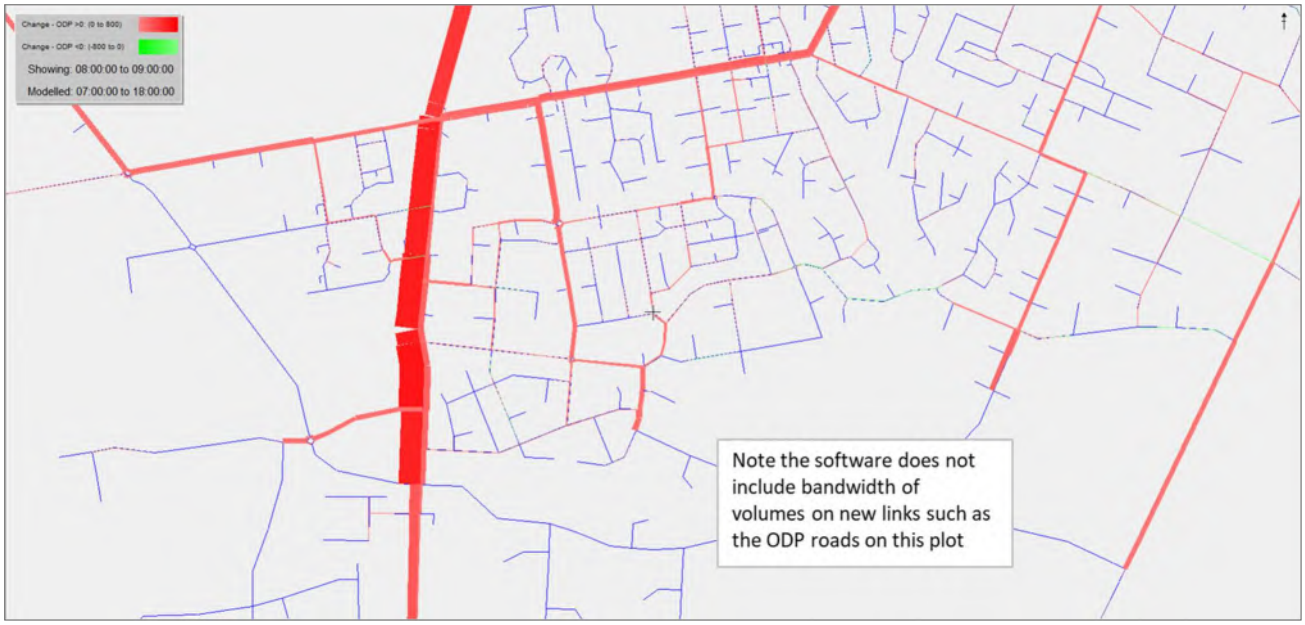


Figure 4.1 Change in Volume between No Development and Development in the Morning Peak (08:00-09:00)

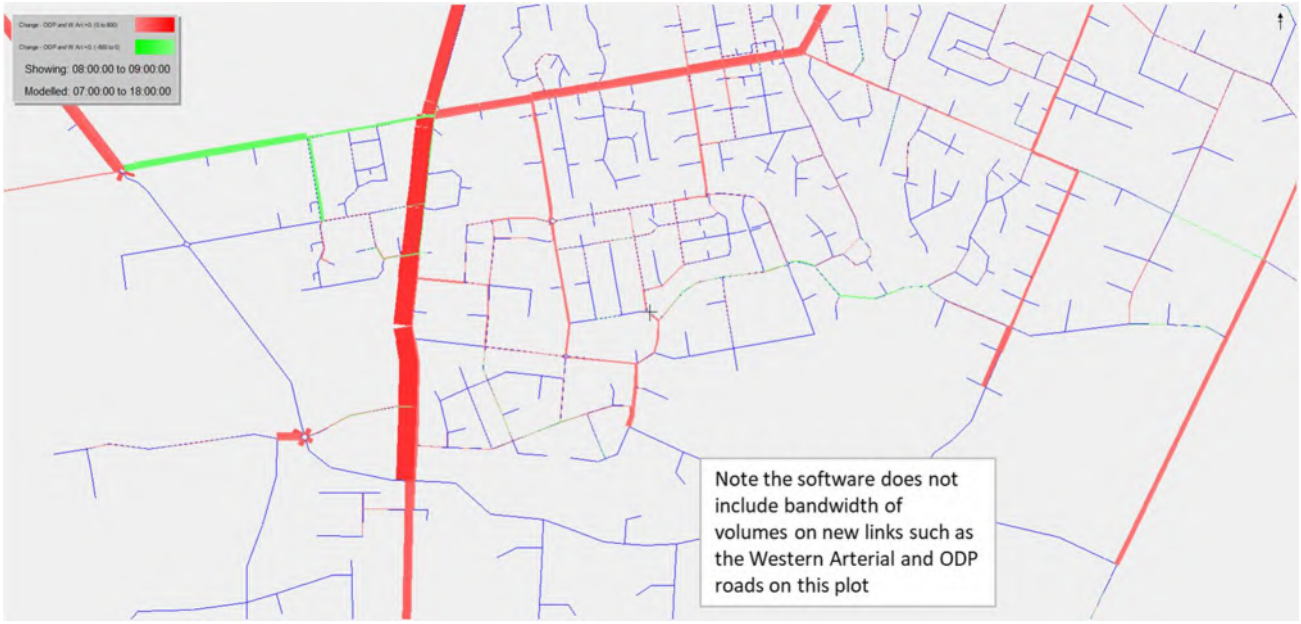


Figure 4.2 Change in Volume between No Development and Development with Western Arterial in the Morning Peak (08:00-09:00)

Table 4.2 Two-Way Volumes on Key Corridors in the Evening Peak (17:00-18:00)

Measurement point	No Development	With Development	With Western Arterial
Springs N of Verdeco	539	1055	836
Springs S of Ellesmere Jct / Gerald	903	1343	1134
Springs N of Ellesmere Jct / Gerald	510	625	563
Ellesmere Jct W of Uni	825	928	701
Weedons N of Ellesmere Jct	448	523	589
Gerald W of Springs	1125	1383	1395
W Art N of Verdeco	0	0	252
Days N of Collins	0	18	5
Ellesmere S of Edward	158	319	323

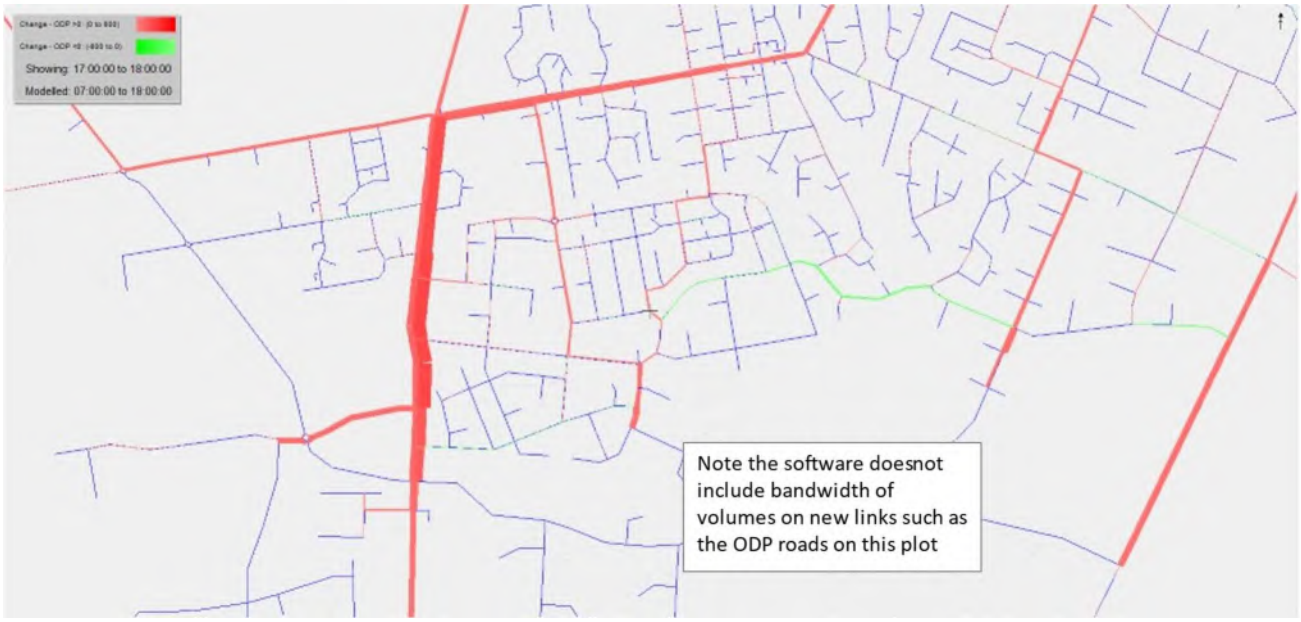


Figure 4.3 Change in Volume between No Development and Development in the Evening Peak (17:00-18:00)

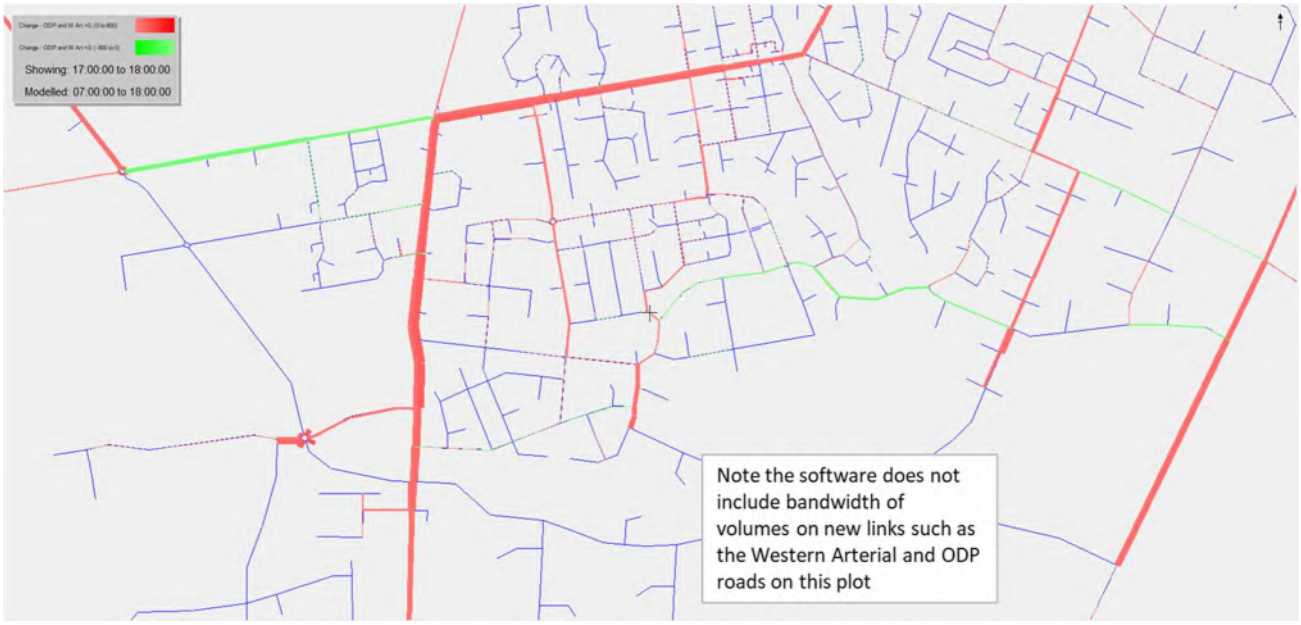


Figure 4.4 Change in Volume between No Development and Development with Western Arterial in the Evening Peak (17:00-18:00)

4.2 Intersection Performance

The delay and Level of Service (LOS) of key intersections have been evaluated and compared between the 'without development', 'with development', and 'with Western Arterial' models. LOS is calculated for roundabouts and signalised intersections on the basis of average weighted approach while for priority control intersections it is calculated as the worst approach averaged across movements. The performance of key intersections in the morning peak hour is demonstrated in **Table 4.3** and the evening peak hour in **Table 4.4**. Further breakdowns of the individual movements are attached as Appendix A.

Table 4.3 Intersection Performance at Key Intersections in the Morning Peak (08:00-09:00)

Intersection	No Development			With Development			With Western Arterial		
	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Springs / Gerald / Ellesmere Jct Signals	1626	17	B	2373	34	C	2098	26	C
Gerald / James / Edward Signals	1298	12	B	1545	13	B	1546	13	B
Weedons / Ellesmere Jct RAB	957	5	A	1125	6	A	1313	8	A
Springs / Anaru Priority	474	2	A	1293	3	A	1027	2	A
Springs / Southfield Priority	496	5	A	1315	31	D	1042	16	C
Springs / Verdeco Priority	421	4	A	1275	23	C	983	14	B
Springs / West Arterial Signals	254	1	A	1046	17	B	1103	17	B
Springs / ODP Access South Priority	140	3	A	500	7	A	440	6	A
Springs / Collins Priority	141	3	A	160	3	A	139	4	A

Table 4.4 Intersection Performance at Key Intersections in the Evening Peak (17:00-18:00)

Intersection	No Development			With Development			With Western Arterial		
	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Springs / Gerald / Ellesmere Jct Signals	1668	17	B	2116	21	C	1895	18	B
Gerald / James / Edward Signals	1375	11	B	1510	12	B	1528	12	B
Weedons / Ellesmere Jct RAB	827	4	A	928	4	A	1004	5	A
Springs / Anaru Priority	483	2	A	1021	2	A	789	2	A
Springs / Southfield Priority	567	4	A	1092	12	B	869	7	A
Springs / Verdeco Priority	552	4	A	1086	8	A	852	7	A
Springs / West Arterial Signals	571	2	A	1061	17	B	1144	16	B
Springs / ODP Access South Priority	195	3	A	434	5	A	417	5	A
Springs / Collins Priority	195	2	A	176	4	A	173	4	A

4.3 Accessway Performance

Accessway performance for the Lincoln University accesses onto Springs Rd have been collected for the northern (Farm Rd) and southern (main carpark) intersections. The LOS for priority control intersections it is calculated as the worst approach averaged across movements. The performance of the accesses in the morning peak hour is demonstrated in **Table 4.5** and the evening peak hour in **Table 4.6**. Further breakdowns of the individual movements are included within Appendix A.

Table 4.5 Access Performance in the Morning Peak (08:00-09:00)

Intersection	No Development			With Development			With Western Arterial		
	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Springs Rd Uni Entrance North Priority	808	5	A	1488	29	D	1255	16	C
Springs Rd Uni Entrance South Priority	691	6	A	1389	27	D	1135	21	C

Table 4.6 Access Performance in the Evening Peak (17:00-18:00)

Intersection	No Development			With Development			With Western Arterial		
	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Springs Rd Uni Entrance North Priority	906	10	B	1352	16	C	1141	13	B
Springs Rd Uni Entrance South Priority	728	4	A	1217	11	B	1009	7	A

Springs / Gerald / Ellesmere Jct Signals

Intersection Movement value is weighted delay for signals and roundabouts and worst movement for priority intersections ***Approach values are only calculated for priority intersections***

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Springs Rd North	Left	56	4	A				47	4	A				72	7	A				50	6	A				73	6	A				50	5	A			
Springs Rd North	Thru	206	14	B				59	13	B				217	33	C				128	12	B				178	31	C				81	12	B			
Springs Rd North	Right	12	16	B				9	24	C				13	53	D				9	23	C				15	38	D				10	20	B			
Gerald St East	Left	122	16	B				182	18	B				162	19	B				347	21	C				175	20	B				351	20	B			
Gerald St East	Thru	268	19	B				329	19	B				264	24	C				329	22	C				260	22	C				329	22	C			
Gerald St East	Right	80	32	C				46	25	C				138	28	C				45	27	C				107	24	C				46	29	C			
Springs Rd South	Left	24	13	B				94	16	B				102	34	C				112	21	C				16	25	C				46	16	B			
Springs Rd South	Thru	227	15	B				308	17	B				609	34	C				347	22	C				545	24	C				325	17	B			
Springs Rd South	Right	111	19	B				215	17	B				235	29	C				289	23	C				276	25	C				312	19	B			
Ellesmere Jct Rd West	Left	5	10	B				40	13	B				10	51	D				42	14	B				9	21	C				45	12	B			
Ellesmere Jct Rd West	Thru	396	17	B				299	16	B				393	47	D				306	17	B				380	34	C				286	16	B			
Ellesmere Jct Rd West	Right	119	23	C				42	20	C				157	53	D				111	33	C				63	33	C				12	24	C			
Intersection		1626	17	B				1668	17	B				2373	34	C				2116	21	C				2098	26	C				1895	18	B			

Gerald / James / Edward Signals

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
James St North	Left	354	10	B				312	10	A				373	11	B				325	10	B				372	11	B				335	11	B			
James St North	Right	90	17	B				13	24	C				107	26	C				15	19	B				102	26	C				16	17	B			
Edward St East	Thru	261	10	B				299	8	A				405	9	A				356	8	A				420	9	A				351	8	A			
Edward St East	Right	285	7	A				467	8	A				301	7	A				463	8	A				299	7	A				461	8	A			
Gerald St West	Left	42	17	B				22	16	B				40	17	B				20	17	B				41	19	B				25	18	B			
Gerald St West	Thru	265	19	B				263	20	C				318	21	C				331	21	C				312	22	C				339	21	C			
Intersection		1298	12	B				1375	11	B				1545	13	B				1510	12	B				1546	13	B				1528	12	B			

Weedons / Ellesmere Jct RAB

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Weedons Rd North	Left	425	6	A				200	3	A				499	7	A				257	3	A				284	7	A				164	3	A			
Weedons Rd North	Thru	0	0	A				0	0	A				0	0	A				0	0	A				254	6	A				136	2	A			
Weedons Rd North	Right																																				
Ellesmere Jct Rd East	Left	0	0	A				0	0	A				0	0	A				0	0	A				0	0	A				1	0	A			
Ellesmere Jct Rd East	Thru	125	3	A				240	4	A				130	3	A				247	3	A				123	9	A				211	6	A			
Ellesmere Jct Rd East	Right	175	3	A				248	4	A				247	4	A				267	4	A				158	11	B				200	8	A			
West Arterial South	Left	0	0	A				0	0	A				0	0	A				0	0	A				20	3	A				42	5	A			
West Arterial South	Thru	0	0	A				0	0	A				0	0	A				0	0	A				220	3	A				90	5	A			
West Arterial South	Right	0	0	A				0	0	A				0	0	A				0	0	A				0	0	A				0	0	A			
Ellesmere Jct Rd West	Left																																				
Ellesmere Jct Rd West	Thru	232	6	A				139	6	A				248	8	A				158	6	A				206	12	B				125	7	A			
Ellesmere Jct Rd West	Right	0	0	A				0	0	A				0	0	A				0	0	A				49	12	B				34	6	A			
Intersection		957	5	A				827	4	A				1125	6	A				928	4	A				1313	8	A				1004	5	A			

Springs Rd Uni Entrance North Priority

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Springs Rd North	Thru	350	1	A	435	2	A	270	2	A	284	2	A	455	5	A	526	8	A	582	2	A	593	2	A	328	2	A	407	5	A	436	2	A	448	2	A
Springs Rd North	Right	85	6	A				15	8	A				71	27	D				11	10	A				78	18	C				11	8	A			
Springs Rd South	Left	6	2	A	353	1	A	2	1	A	485	2	A	10	3	A	940	4	A	3	2	A	630	2	A	8	2	A	826	1	A	2	3	A	566	2	A
Springs Rd South	Thru	347	1	A				483	2	A				931	4	A				627	2	A				818	1	A				564	2	A			
Uni Access West	Left	19	4	A	20	5	A	132	10	B	137	10	B	17	18	C	22	29	D	119	15	C	129	16	C	20	13	B	22	16	C	118	13	B	127	13	B
Uni Access West	Right	1	12	B				5	17	C				5	66	F				10	31	D				2	43	E				9	20	C			
Intersection		808	12	B	808	5	A	906	17	C	906	10	B	1488	66	F	1488	29	D	1352	31	D	1352	16	C	1255	43	E	1255	16	C	1141	20	C	1141	13	B

Springs Rd Uni Entrance South Priority

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Springs Rd North	Thru	133	1	A	354	6	A	249	1	A	277	1	A	290	4	A	463	27	D	565	2	A	593	2	A	169	1	A	331	21	C	423	2	A	447	2	A
Springs Rd North	Right	221	8	A				28	3	A				172	67	F				29	6	A				162	41	E				24	5	A			
Springs Rd South	Left	13	2	A	295	2	A	3	2	A	187	2	A	21	3	A	881	3	A	3	2	A	336	2	A	22	3	A	761	2	A	3	2	A	270	2	A
Springs Rd South	Thru	282	2	A				184	2	A				860	3	A				333	2	A				739	2	A				267	2	A			
Uni Access West	Left	38	4	A	42	5	A	242	4	A	264	4	A	35	15	C	45	17	C	232	10	B	287	11	B	38	11	B	43	12	B	245	7	A	292	7	A
Uni Access West	Right	4	11	B				22	6	A				10	23	C				55	15	C				5	19	C				47	12	B			
Intersection		691	11	B	691	6	A	728	6	A	728	4	A	1389	67	F	1389	27	D	1217	15	C	1217	11	B	1135	41	E	1135	21	C	1009	12	B	1009	7	A

Springs / Anaru Priority

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Springs Rd North	Left	6	2	A	137	2	A	9	1	A	276	2	A	5	2	A	301	2	A	15	3	A	628	2	A	4	0	A	175	2	A	13	1	A	478	2	A
Springs Rd North	Thru	131	2	A				267	2	A				296	2	A				613	2	A				171	2	A				465	2	A			
Anaru Rd East	Left	2	1	A	36	2	A	6	1	A	11	1	A	7	2	A	73	3	A	18	2	A	28	2	A	4	1	A	71	2	A	15	1	A	21	1	A
Anaru Rd East	Right	35	2	A				4	1	A				66	3	A				10	1	A				67	2	A				6	2	A			
Springs Rd South	Thru	295	2	A	301	2	A	187	2	A	197	2	A	881	2	A	919	2	A	337	2	A	365	2	A	762	2	A	781	2	A	270	2	A	290	2	A
Springs Rd South	Right	5	1	A				10	2	A				38	2	A				27	2	A				19	2	A				20	2	A			
Intersection		474	2	A	474	2	A	483	2	A	483	2	A	1293	3	A	1293	3	A	1021	3	A	1021	2	A	1027	2	A	1027	2	A	789	2	A	789	2	A

Springs / Southfield Priority

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Springs Rd North	Left	22	3	A	132	1	A	22	1	A	273	1	A	17	3	A	303	1	A	32	2	A	631	1	A	10	3	A	176	2	A	26	2	A	479	2	A
Springs Rd North	Thru	110	1	A				252	1	A				286	1	A				599	1	A				166	2	A				452	2	A			
Southfield Dr East	Left	25	2	A	89	5	A	43	3	A	51	4	A	25	23	C	75	31	D	40	11	B	48	12	B	27	7	A	91	16	C	47	7	A	53	7	A
Southfield Dr East	Right	64	6	A				8	5	A				51	34	D				8	18	C				64	19	C				7	8	A			
Springs Rd South	Thru	237	1	A	275	1	A	189	1	A	243	2	A	868	2	A	936	2	A	357	2	A	414	3	A	717	1	A	775	2	A	283	2	A	337	2	A
Springs Rd South	Right	38	3	A				54	4	A				68	5	A				57	8	A				58	3	A				54	5	A			
Intersection		496	6	A	496	5	A	567	5	A	567	4	A	1315	34	D	1315	31	D	1092	18	C	1092	12	B	1042	19	C	1042	16	C	869	8	A	869	7	A

Springs / Verdeco Priority

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Springs Rd North	Thru	80	2	A	135	2	A	244	2	A	296	2	A	225	2	A	309	4	A	476	2	A	642	3	A	152	3	A	193	4	A	391	3	A	503	3	A
Springs Rd North	Right	55	3	A				51	4	A				84	11	B				166	7	A				41	9	A				111	5	A			
Springs Rd South	Left	6	1	A	143	2	A	6	1	A	209	2	A	13	1	A	732	2	A	17	1	A	359	2	A	5	1	A	631	2	A	7	1	A	296	2	A
Springs Rd South	Thru	138	2	A				203	2	A				719	2	A				342	2	A				625	2	A				289	2	A			
Verdeco Dr West	Left	137	4	A	143	4	A	40	4	A	47	4	A	216	23	C	233	23	C	73	6	A	85	8	A	150	14	B	160	14	B	47	6	A	53	7	A
Verdeco Dr West	Right	6	4	A				7	4	A				18	24	C				12	18	C				10	12	B				6	12	B			
Intersection		421	4	A	421	4	A	552	4	A	552	4	A	1275	24	C	1275	23	C	1086	18	C	1086	8	A	983	14	B	983	14	B	852	12	B	852	7	A

Springs / West Arterial Signals

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Springs Rd North	Left	0	0	A				0	0	A				99	10	B				172	18	B				46	14	B				112	15	B			
Springs Rd North	Thru	100	1	A				314	2	A				154	13	B				360	21	C				106	14	B				303	17	B			
Springs Rd North	Right	0	0	A				0	0	A				0	0	A				0	0	A				24	21	C				34	17	B			
ODP Road East	Left	0	0	A				0	0	A				26	13	B				61	15	B				23	14	B				58	14	B			
ODP Road East	Thru	0	0	A				0	0	A				0	0	A				0	0	A				102	11	B				43	17	B			
ODP Road East	Right	0	0	A				0	0	A				362	19	B				88	17	B				298	17	B				65	19	B			
Springs Rd South	Left	0	0	A				0	0	A				0	0	A				0	0	A				36	22	C				47	11	B			
Springs Rd South	Thru	154	1	A				256	2	A				381	18	B				316	12	B				305	23	C				265	12	B			
Springs Rd South	Right	0	0	A				0	0	A				24	19	B				64	22	C				22	23	C				69	18	B			
West Arterial West	Left	0	0	A				0	0	A				0	0	A				0	0	A				36	9	A				18	17	B			
West Arterial West	Thru	0	0	A				0	0	A				0	0	A				0	0	A				68	15	B				77	18	B			
West Arterial West	Right	0	0	A				0	0	A				0	0	A				0	0	A				37	13	B				53	19	B			
Intersection		254	1	A				571	2	A				1046	17	B				1061	17	B				1103	17	B				1144	16	B			

Springs / ODP Access South Priority

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Springs Rd North	Left	0	0	A	31	3	A	0	0	A	140	3	A	9	2	A	87	4	A	25	2	A	223	3	A	10	2	A	77	3	A	23	2	A	213	3	A
Springs Rd North	Thru	31	3	A				140	3	A				23	3	A				87	3	A				23	3	A				91	3	A			
Springs Rd North	Right	0	0	A				0	0	A				55	4	A				111	4	A				45	4	A				100	4	A			
ODP Road East	Left	0	0	A	0	0	A	0	0	A	0	0	A	5	3	A	75	7	A	16	3	A	67	5	A	4	3	A	76	6	A	13	4	A	63	5	A
ODP Road East	Thru	0	0	A				0	0	A				17	3	A				33	4	A				16	3	A				29	4	A			
ODP Road East	Right	0	0	A				0	0	A				53	8	A				18	6	A				57	7	A				21	7	A			
Springs Rd South	Left	0	0	A	109	1	A	0	0	A	55	1	A	0	0	A	114	2	A	0	0	A	50	2	A	0	0	A	98	2	A	0	0	A	51	2	A
Springs Rd South	Thru	109	1	A				55	1	A				100	2	A				42	2	A				88	2	A				43	2	A			
Springs Rd South	Right	0	0	A				0	0	A				14	1	A				8	2	A				10	1	A				8	2	A			
ODP Road West	Left	0	0	A	0	0	A	0	0	A	0	0	A	199	4	A	224	4	A	73	3	A	93	3	A	163	3	A	188	3	A	72	2	A	91	3	A
ODP Road West	Thru	0	0	A				0	0	A				25	4	A				21	4	A				24	4	A				19	5	A			
ODP Road West	Right	0	0	A				0	0	A				1	0	A				0	0	A				1	0	A				0	0	A			
Intersection		140	1	A	140	3	A	195	2	A	195	3	A	500	4	A	500	7	A	434	3	A	434	5	A	440	3	A	440	6	A	417	3	A	417	5	A

Springs / Collins Priority

		No ODP												ODP, no West Art												ODP and West Art											
		AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)						AM Peak (0800-0900)						PM Peak (1700-1800)					
		Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach			Movement			Approach		
Approach	Movement	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS	Flow	Average Delay	LOS
Springs Rd North	Left	0	0	A	31	2	A	0	0	A	140	2	A	1	0	A	29	2	A	0	0	A	104	2	A	1	0	A	26	2	A	0	0	A	103	2	A
Springs Rd North	Thru	0	0	A				0	0	A				0	0	A				0	0	A				0	0	A				0	0	A			
Springs Rd North	Right	31	2	A				140	2	A				28	2	A				104	2	A				25	2	A				103	2	A			
Collins Rd East	Left	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	12	3	A	0	0	A	16	4	A	0	0	A	10	4	A	0	0	A	14	4	A
Collins Rd East	Thru	0	0	A				0	0	A				6	3	A				14	3	A				4	3	A				12	4	A			
Collins Rd East	Right	0	0	A				0	0	A				6	4	A				2	7	A				5	4	A				2	5	A			
Springs Rd South	Left	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A
Springs Rd South	Thru	0	0	A				0	0	A				0	0	A				0	0	A				0	0	A				0	0	A			
Springs Rd South	Right	0	0	A				0	0	A				0	0	A				0	0	A				0	0	A				0	0	A			
Collins Rd West	Left	110	3	A	110	3	A	55	2	A	55	2	A	108	2	A	118	2	A	50	2	A	56	2	A	93	2	A	103	2	A	49	3	A	55	3	A
Collins Rd West	Thru	0	0	A				0	0	A				10	2	A				7	3	A				10	2	A				6	4	A			
Collins Rd West	Right	0	0	A				0	0	A				0	0	A				0	0	A				0	0	A				0	0	A			
Intersection		141	3	A	141	3	A	195	2	A	195	2	A	160	2	A	160	3	A	176	2	A	176	4	A	139	2	A	139	4	A	173	3	A	173	4	A

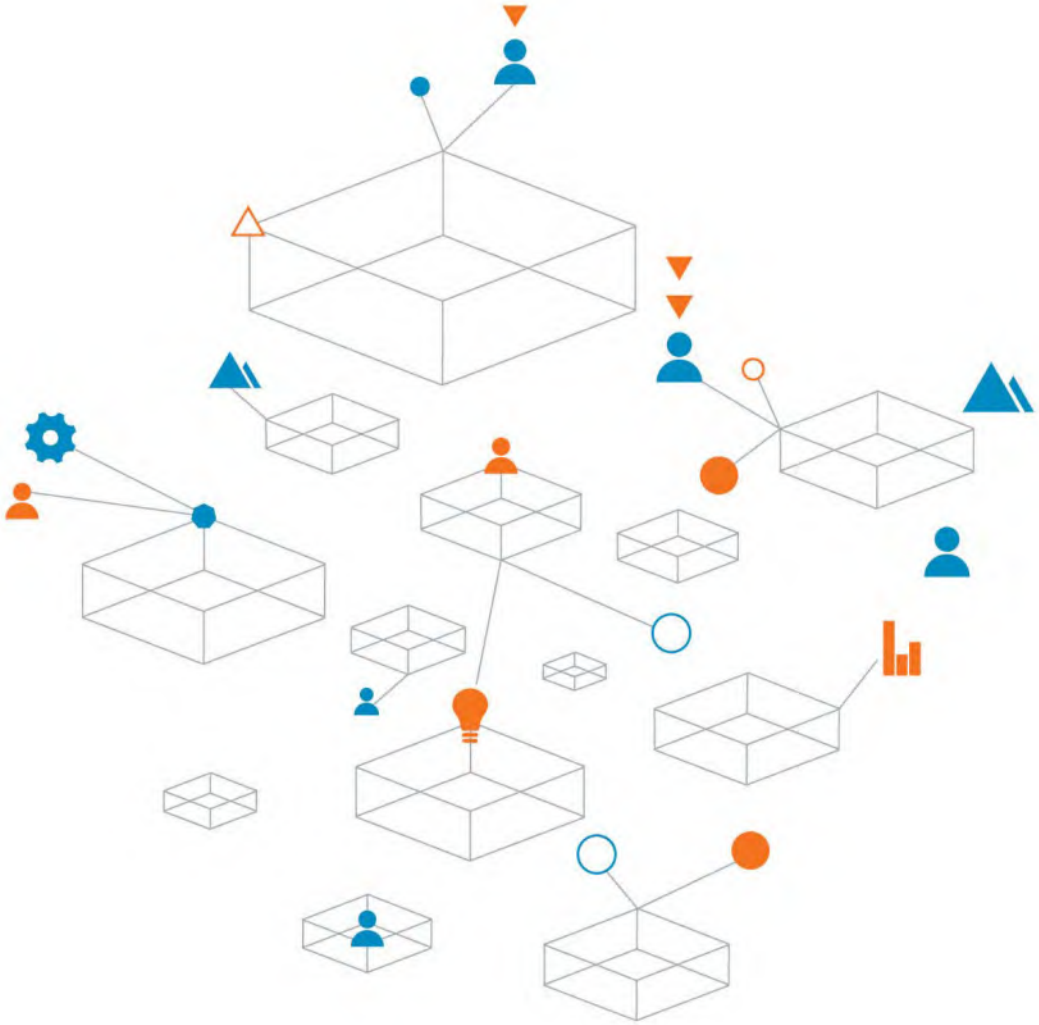
Attachment 9: Amended Geotechnical Assessment - Coffey

Rolleston Industrial Developments Ltd
1491 Springs Road, Lincoln

773-CHCGE280252

Geotechnical Assessment Report – Rev 2

28 January 2021



Trust is the cornerstone of all our projects

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28 January 2021

Our ref: 773-CHCGE280252

Rolleston Industrial Developments Ltd
ASB House, 166 Cashel Street
Christchurch Central

Attention: Tim Carter / Bruce Van Duyn

Executive Summary: 1491 Springs Road, Lincoln – Geotechnical Assessment to support a Plan Change application

Rolleston Industrial Developments Ltd has engaged Coffey Services (NZ) Limited to carry out a geotechnical investigation and assessment of suitability for the proposed Plan Change and future subdivision at 1491 Springs Road, Lincoln, Canterbury. The purpose of this report is to support a Plan Change application for the construction of approximately 2,000 new residential Lots at the site.

The site investigations and preliminary liquefaction assessment indicates that the site is predominantly TC1-like. Other geotechnical hazards (erosion, slippage and inundation) are considered low risk with appropriate future engineering design.

Our assessment has considered the items required by Section 106 of the RMA and in our opinion the site is considered geotechnically suitable for Plan Change and future subdivision. Further investigations and design will be carried out at the subdivision consent stage.

If you have any queries, please contact he undersigned.

For and on behalf of Coffey

Chris Thompson
BSc (Tech)
Associate Engineering Geologist

1491 Springs Road, Lincoln

Prepared for
Rolleston Industrial Developments Ltd

Prepared by
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28 January 2021

773-CHCGE280252

Quality information

Revision history

Revision	Description	Date	Originator	Reviewer	Approver
V2	GAR	28/01/2021	CT	RB	CT
V1	GAR	20/10/2020	CT	RB	CT
V0	GAR	15/10/2020	CT	RB	CT

Distribution

Report Status	No. of copies	Format	Distributed to	Date
Final	1	PDF	Bruce Van Duyn – Rolleston Industrial Developments	28/01/2021

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Tables

Appendices

1. Introduction

Rolleston Industrial Developments Ltd has engaged Coffey Services (NZ) Limited to carry out a geotechnical investigation and assessment of suitability for a proposed Plan Change and future subdivision at 1491 Springs Road, Lincoln, Canterbury. The purpose of this report is to support a Plan Change application for the construction of approximately 2,000 new residential Lots at the site.

Our assessment has considered the items required by Section 106 of the RMA. In our opinion the site is considered geotechnically suitable for subdivision subject to further investigation and design at the subdivision consent stage.

2. Scope

An investigation methodology for the 178 Ha site was developed and carried out by Coffey, as outlined below:

- Review of previous geotechnical investigations including previous work on the site and surrounding area.
- Site walkover to assess geotechnical hazards.
- Completion of 20 piezocone penetration tests (CPTs). The CPT tests were a primary investigation tool used to develop the preliminary ground model at the site.
- Excavation of 16 test pits in the identified borrow area near the intersection of Springs and Collins roads.
- Three multi-channel analysis of surface waves (MASW) geophysical investigation lines with a total length of 2.6km were measured to supplement the CPTs and provide continuous profiles of information about soils below CPT refusal depths.
- Assessment of the geotechnical hazards at the site per Section 106 of the RMA.
- Geotechnical analyses and reporting.

Coffey have considered the following in the preparation of this report:

- Existing geotechnical investigation data available in the area from the New Zealand Geotechnical Database (NZGD).
- New geotechnical investigations data.
- Project correspondence with the wider Plan Change consultants engaged by Rolleston Industrial Developments Ltd.

Reference has also been made to the MBIE Guidance Part D: Subdivisions, to confirm that the requirements outlined in these documents have been incorporated in this report.

3. Proposed development

The proposed Plan Change area comprises a series of land parcels totalling 178 Ha located to the south of Lincoln, bordering the existing Te Whariki and Verdeco Park subdivisions. The overall site has a gentle downslope east from Springs Road towards the “L II” River. It also slopes gently down to the west from a high point just west of Springs Road.

There are a number of springs and associated drains / waterways located within the Plan Change area that will be incorporated into the overall development plan. The site is predominantly used for grazing and some cropping.

To the west of Springs Road, a small area has been used as a borrow area for sourcing gravel and was backfilled in the past 5 to 10 years. An older borrow pit is also located in this area.

4. Site investigation

The location of the geotechnical investigations carried out on the site to develop the ground model, along with the location of the MASW lines, are provided in Figure 1 (in Appendix A). The results are summarised below. Investigation results are presented in Appendix B (CPT traces), Appendix C (MASW report), Appendix D (test pits), and Appendix E (additional test data).

Table 1: CPT investigation summary

Reference	Depth of test (metres below ground level)	Depth to groundwater (as measured in CPT hole)	Termination criteria
CPT 01	7.5	2.78	Effective refusal
CPT 02	5.21	1.96	Effective refusal
CPT 03	5.83	2.17	Effective refusal
CPT 04	6.24	1.25	Effective refusal
CPT 05	4.37	1.37	Effective refusal
CPT 06	12.02	1.26	Effective refusal
CPT 07	4.15	0.90	Effective refusal
CPT 08	5.24	1.50	Effective refusal
CPT 09	4.94	1.52	Effective refusal
CPT 10	6.34	1.48	Effective refusal
CPT 11	5.91	2.58	Effective refusal
CPT 12	6.65	1.75	Effective refusal
CPT 13	7.82	1.50	Effective refusal
CPT 14	4.36	0.61	Effective refusal
CPT 15	4.91	0.46	Effective refusal
CPT 16	2.28	Not encountered	Effective refusal
CPT 17	5.60	2.50	Effective refusal
CPT 18	2.22	Not encountered	Effective refusal
CPT 19	7.62	3.40	Effective refusal
CPT 20	1.53	Not encountered	Effective refusal

Note: CPT20 was carried out through a fill area so is not indicative of the general area.

Table 2: Test pit investigation summary

Reference	Depth of test (metres below ground level)	Depth to groundwater (as measured)	Termination criteria
TP 01	0.85	Not encountered	Target depth
TP 02a	0.95	Not encountered	Target depth
TP 02b	0.8	Not encountered	Target depth
TP 02c	3.5	Not encountered	Target depth
TP 03	4.4	Not encountered	Target depth
TP 04a	3.85	Not encountered	Target depth
TP 04b	0.2	Not encountered	Target depth
TP 05	3.0	Not encountered	Target depth
TP 06	3.1	Not encountered	Target depth
TP 07	3.0	Not encountered	Target depth
TP 08a	0.45	Not encountered	Target depth
TP 08b	1.4	Not encountered	Target depth
TP 08c	2.6	Not encountered	Target depth
TP 09a	2.4	Not encountered	Target depth
TP 09b	2.2	Not encountered	Target depth
TP 10	2.75	Not encountered	Target depth

Table 3: Additional data summary

Reference	Depth of test (metres below ground level)	Depth to groundwater (as measured)	Termination criteria
CPT 113586	2.6	Not recorded	Effective refusal
BH 113495	15.2	4.2	Target depth
CPT 113582	1.7	Not recorded	Effective refusal
CPT 136840	5.3	1.5	Effective refusal
CPT 136850	6.0	0.7	Effective refusal
CPT 136855	6.7	2.4	Effective refusal
CPT 125194	5.9	Not recorded	Effective refusal
CPT 125215	6.4	Not recorded	Effective refusal
CPT 56181	6.7	0.7	Effective refusal
CPT 56182	4.1	0.7	Effective refusal
CPT 56183	4.5	0.6	Effective refusal
CPT 56184	8.3	0.7	Effective refusal
CPT 152915	7.7	Not recorded	Effective refusal
M36/7635	8.8	4.3	Target depth
M36/1419	30.2	Not recorded	Target depth
M36/2834	19.0	4.3	Target depth
M36/7531	24.0	3.2	Target depth
M36/5054	13.0	Not recorded	Target depth

4.1. MASW profiles results

The MASW geophysical survey was measured in three profiles totalling 2.6 km in length, two east-west across the site and one north-south as shown in Figure 1 (Appendix A) and in Figure 1 of the geophysics report (Appendix C). The MASW profiles are considered to be good data that can be calibrated in detail to the other geotechnical investigations data for the subdivision consent. It captures the ground profile and soil conditions below the generally shallow depth of refusal of the CPTs above. The MASW profiles show that non-liquefying gravels are consistently present over the site below the weaker upper soil layers whose properties have been measured in more detail by the CPTs, and that these gravels increase in density with depth.

5. Site performance

5.1. Ground motion

The site is not in an area mapped for ground damage effects as part of the Canterbury Earthquake Sequence response, however the nearby Lincoln University strong motion sensor recorded the following peak ground accelerations (PGA):

- 4 September 2010: 0.437g
- 22 February 2011: 0.12g
- Later 2011 earthquakes: <0.1g

Based on the above, we consider that the site was “sufficiently tested” to the serviceability limit state (SLS) level of earthquake demand during the 4 September 2010 earthquake of the Canterbury earthquake sequence (CES) using the MBIE[1] and Bradley & Hughes (2012)[2] procedures.

An assessment has been made regarding predicted earthquake-induced deformation that may occur in a design earthquake based on geological setting, site terrain, and the level of “test” previously experienced. It is considered that:

- An SLS earthquake event is likely to cause less damage to that experienced in the 4 September 2010 earthquake and to be similar to the February 2011 earthquake.
- Under ultimate limit state (ULS) conditions, the nature of land and building damage is likely to be similar to that already experienced in the 4 September 2010 earthquake of the CES.

[1] Ministry of Business, Innovation and Employment (MBIE), December 2012: Repairing and rebuilding houses affected by the Canterbury earthquakes
[2] Bradley & Hughes (2012) Conditional Peak Ground Accelerations in the Canterbury Earthquakes for Conventional Liquefaction Assessment. Report for DBH (MBIE), April 2012.

6. Ground model

6.1. Geology

The geological map[3] of the area indicates that the site is near the geological boundary of “Grey to brown alluvium, comprising silty sub-angular gravel and sand forming alluvial fans (Q1a)” (also known as colluvium) and “Grey river alluvium, comprising gravel, sand and silt, in active floodplains (Q1a).” of the Springston Formation.

6.2. Groundwater

Based on the observed groundwater levels recorded from the CPTs, the groundwater appears to be shallower in the eastern portions of the site and gradually deepens to the west. Conservatively, for the initial liquefaction assessment, we have used a groundwater level of 1.0mbgl for the eastern portion and 2.0m to 2.5mbgl for the western portion of the site. This can be refined later.

6.3. Investigation findings

Twenty CPTs, sixteen test pits, NZGD data and 2.6km of MASW geophysical investigation have been used to develop the ground model for the 1491 Springs Road subdivision. A summary of the ground model is provided below:

Table 4: Ground profile

Description		Strength/ consistency	Thickness (m)	Depth to top of layer (mbgl)
Springston Formation	Sandy silt and organic silt (topsoil)		0.3 to 0.4	0.0
	Interbedded alluvium: Silt, sandy silt and silty sand	Soft to very stiff	West of Springs Road – 1.0 to 2.2 East of Springs Road – 3.5 to 5.5	0.3 to 0.4
	Interbedded alluvium: typically sand and gravel deposits with some layers of silt, sandy silt and silty sand	Medium dense to dense, non-liquefiable	>20m	West of Springs Road – 1.0 to 2.2 East of Springs Road – 3.5 to 5.5

The above ground profile is simplified as an illustration; however, the actual ground profile includes a highly interbedded (interfingered) layering of silty alluvium and sandy / gravel alluvium. These layers have different geotechnical properties (strength) and are present in various thicknesses across the site, as shown in the CPT investigations. The eastern edge of the site has potentially organic deposits in the low-lying area, however, this will be further investigated during the subdivision consent stage once the overall development plan is confirmed.

[3] Forsyth, P.J.; Barrell, D.J.A.; Jongens, R. (compilers) 2008: Geology of the Christchurch area: scale 1:250,000. Lower Hutt: GNS Science. Institute of Geological & Nuclear Sciences 1:250,000 geological map 16. 67 p. + 1 folded map

The MASW geophysical investigation has confirmed that relatively dense non-liquefiable deposits are present below the termination depth of the CPTs conducted. The assessment of these deposits as being non-liquefiable is based on the shear wave velocities recorded being greater than 200m/s and increasing with depth. This assessment correlates with the well logs available on or near the site that indicate the presence of gravel layers (extending to at least 20mbgl) beneath the surficial fine-grained deposits.

The test pits were carried out across the two previously identified borrow areas to confirm the backfill materials and extents. The test pits have identified non-engineered fill that can predominantly be reworked and placed as engineered fill during subdivision construction.

6.4. Site sub-soil class

In accordance with NZS1170.5, Section 3.1.3, a subsoil classification of “Class D – Deep or soft soil sites” can be assumed for the site.

7. Geotechnical hazard assessment

7.1. Erosion

The site has relatively flat topography and is bounded by newly developed residential areas as well as grassed paddock land. Provided appropriate stormwater systems are installed as part of the development, there will be few viable sources of erosion at this site.

7.2. Falling debris

As there are no slopes or exposed hills or rock faces surrounding the site, there are no sources of falling debris at the site, or for the surrounding area.

7.3. Subsidence

7.3.1. Liquefaction induced settlement

Soils that are usually considered to be liquefiable comprise saturated geologically young (i.e. Holocene and late Pleistocene) loose sands and silts. With this in mind, we consider that the interbedded silt / sandy silt / silty sand overbank deposits of the Springston Formation may be susceptible to liquefaction and that a triggering analysis will determine which soil layers will liquefy when subjected to the SLS and ULS earthquake demands.

SLS and ULS design earthquake scenarios are assessed using the parameters provided by the MBIE Guidance for an Importance Level 2 (IL2) structure and a Class D subsoil site. The earthquake parameters adopted for design and for the liquefaction analysis are presented in Table 3.

Table 5: Earthquake scenario and parameters for analysis

Earthquake scenario	Moment magnitude (M_w)	α_{max} (g)
SLS	7.5	0.13
	6.0	0.19
ULS	7.5	0.35

The liquefaction triggering analysis was carried out for the CPTs shown on the site plan (Appendix A) using the Boulanger and Idriss (2014) method[4] and proprietary liquefaction assessment software[5], in accordance with the updates to the MBIE Guidance[1] (Issue 7 October 2014).

For a more accurate representation of the stratified soils in the CPT profiles, the auto transition layer detection (ATL) function was selected in the Geologismiki software. This function addresses the disparity between friction and end tip recordings of a CPT where the tip recordings are influenced by a softer layer above or beneath a harder / denser layer.

The liquefaction triggering analyses show that under SLS and ULS conditions, some of the interbedded silt / sandy silt / silty sand overbank deposits encountered at each CPT location are vulnerable to liquefaction whereas the clay-like soils in the eastern portion are considered unlikely to liquefy.

7.3.2. Free-field settlements

The type of settlement that is most commonly estimated when liquefaction analysis is conducted (refer to Section 6.3) is referred to as the *free-field settlement*. Free-field settlement is the component of land settlement that does not take account of foundation influences (e.g. loads and stiffness), or the effects of ground loss, lateral spread, strength degradation, sand ejecta and ground cracks.

According to the MBIE Guidance, an “Index Value” for categorising future expected land performance can be assigned by analysing the upper 10m of the soil profile. The rationale for this is that liquefaction in the upper 10m of the profile is known to be most manifested at the ground surface. Where CPTs refused before 10m, we have assigned Technical Categories based on the results of the MASW confirming dense non-liquefiable deposits below termination depths of the CPTs.

The estimated free-field settlement values and the correlated residential foundation Technical Category, as defined by Table 3.1 of the MBIE Guidance, are given in Table 4.

[4] Boulanger, R.W., Idriss, I.M., CPT and SPT liquefaction triggering procedures, Report No. UCD/CGM-14/01, April 2014, Centre for Geotechnical Modelling, Department of Civil and Environmental Engineering at the University of California, Davis, California
[5] Geologismiki Geotechnical Software, CLiq v.3.0.3.2 – CPT Liquefaction Assessment Software

Table 6: Estimated "free-field" post-liquefaction ground surface settlements and Technical Category[6]

CPT Location	Termination Depth (mbgl)	Free-field settlements to refusal depth (mm)		MBIE Technical Category
		SLS	ULS	TC
CPT01	7.5	~15	~25	TC1
CPT02	5.21	~10	~25	TC1
CPT03	5.83	<5	<10	TC1
CPT04	6.24	<15	~20	TC1
CPT05	4.37	<10	~20	TC1
CPT06	12.02	~15	~25	TC1
CPT07	4.15	<5	~10	TC1
CPT08	5.24	<15	~20	TC1
CPT09	4.94	<10	~15	TC1
CPT10	6.34	<10	~25	TC1
CPT11	5.91	~15	~40	TC2
CPT12	6.65	~15	~35	TC2
CPT13	7.82	~25	~50	TC2
CPT14	4.36	<10	~15	TC1
CPT15	4.91	<5	<5	TC1
CPT16	2.28	<5	~25	TC1
CPT17	5.60	<10	~25	TC1
CPT18	2.22	<5	~15	TC1
CPT19	7.62	~15	~25	TC1
CPT20	1.53	N/A	N/A	Not assessed

The CPT analyses show that the site is predominantly TC1-like with small areas that contain TC2-like ground. Once a groundwater monitoring programme has been carried out, we consider that an updated liquefaction analysis will generally reduce the predicted free-field settlements for the currently TC2-like locations as the groundwater measured in the CPT holes is generally deeper than that conservatively assumed for these analyses.

We note that the additional CPTs obtained from the NZGD correlate well with our assessment of the above locations, and these results have not been included in this Plan Change report. They will be included in future subdivision consent phase reports and analysis.

7.3.3. Static settlement

The presence of potentially organic soils in the low-lying eastern portion of the site increases the risk of static settlement in this area. It is likely that this area may be used for stormwater detention basins and as a result of this usage, residential buildings are unlikely. This risk will be assessed further once the overall development plan is confirmed. However, we do not anticipate this limiting development in the area with appropriate geotechnical design and construction.

[6] It should be noted that these settlement estimates only account for the free-field component of the expected settlement. Actual total settlements under SLS or ULS earthquake loading may be greater.

7.4. Slippage

We have not observed any sources of land instability on the site and due to the flat site topography, we consider the risk of slope failure to be very low. The appropriate design of batter slopes near waterways will mitigate this risk further.

7.5. Inundation

In relation to stormwater inundation, we recommend that drainage design and management be addressed by specialist consultants as it is beyond the scope of this report. We expect that with appropriate stormwater and flood control systems, the risk of inundation will be low.

8. Conclusions

The overall site is well covered with CPT probes, test pits and MASW profile investigations. Based on the on-site testing carried out to date, the majority of the site is TC1-like with some minor pockets of TC2-like performance.

We consider that the site is suitable for development subject to further investigation and design at the subdivision consent stage.

It is likely that additional geotechnical investigation will be required to refine the technical categories for the proposed Lots once a subdivision plan has been further developed. We also recommend that a groundwater monitoring programme is implemented to allow for more accurate liquefaction and ground settlement analyses.

9. Limitations

This report has been prepared solely for the use of our client, Rolleston Industrial Developments Ltd, their professional advisers and Selwyn District Council (SDC) in relation to the specific project described herein. No liability is accepted in respect of its use for any other purpose or by any other person or entity.

It is recommended that all other parties seek professional geotechnical advice to satisfy themselves as to its on-going suitability for their intended use.

As subsurface information has been obtained from discrete investigation locations, which by their nature only provide information about a relatively small volume of subsoils, there may be special conditions pertaining to this site which have not been disclosed by the investigation and which have not been taken into account in the report. If variations in the subsoils occur from those described or assumed to exist, then the matter should be referred to us immediately.

Please also refer to the enclosed *Important Information about Your Coffey Report*.

10. Closure

If you have queries or require further clarification regarding aspects of this report, please contact the undersigned.

For and on behalf of Coffey

Prepared by

Chris Thompson
BSc (Tech)
Associate Engineering Geologist

Reviewed by

Richmond Beetham
BSc MSc Eng BE CMEngNZ CPEng PEngGeol
Principal Geotechnical Engineer

Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

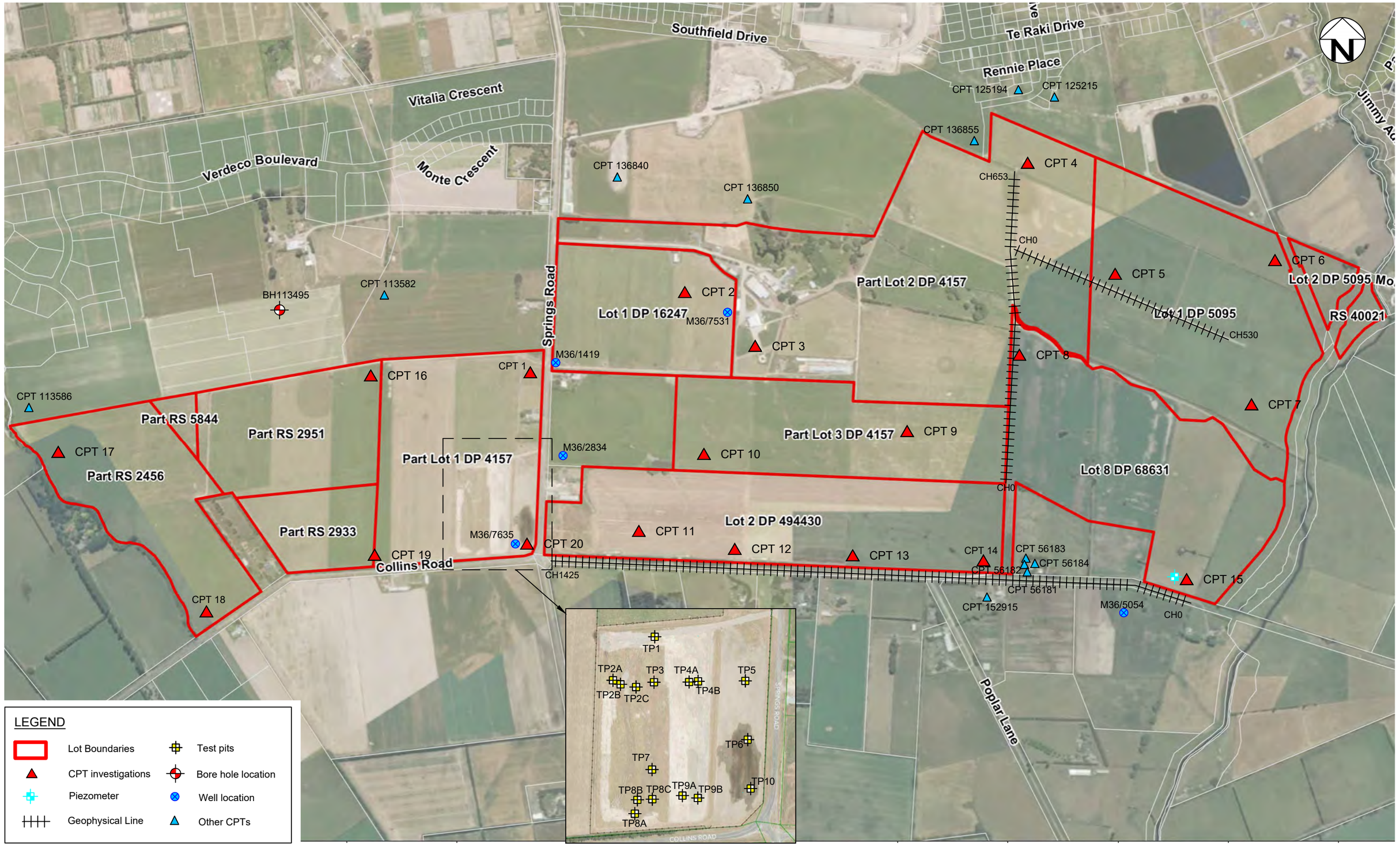
Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

Appendix A - Site Plan



LEGEND

- Lot Boundaries
- CPT investigations
- Piezometer
- Geophysical Line
- Test pits
- Bore hole location
- Well location
- Other CPTs

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	LM	CT	13/10/2020
	B	INVESTIGATION LOCATIONS ADDED	RZ	CT	20/01/2021

100 0 100 200 300 400

Scale (metres) 1:8000

drawn	LM/RZ
approved	CT
date	20/01/2021
scale	1:8000
original size	A3

coffey
A TETRA TECH COMPANY

client: ROLLESTON INDUSTRIAL DEVELOPMENTS LIMITED

project: 1491 SPRINGS ROAD
LINCOLN, CHRISTCHURCH

title: SITE INVESTIGATION PLAN

project no: 773-CHCGE280252 | figure no: Figure1 | rev: B

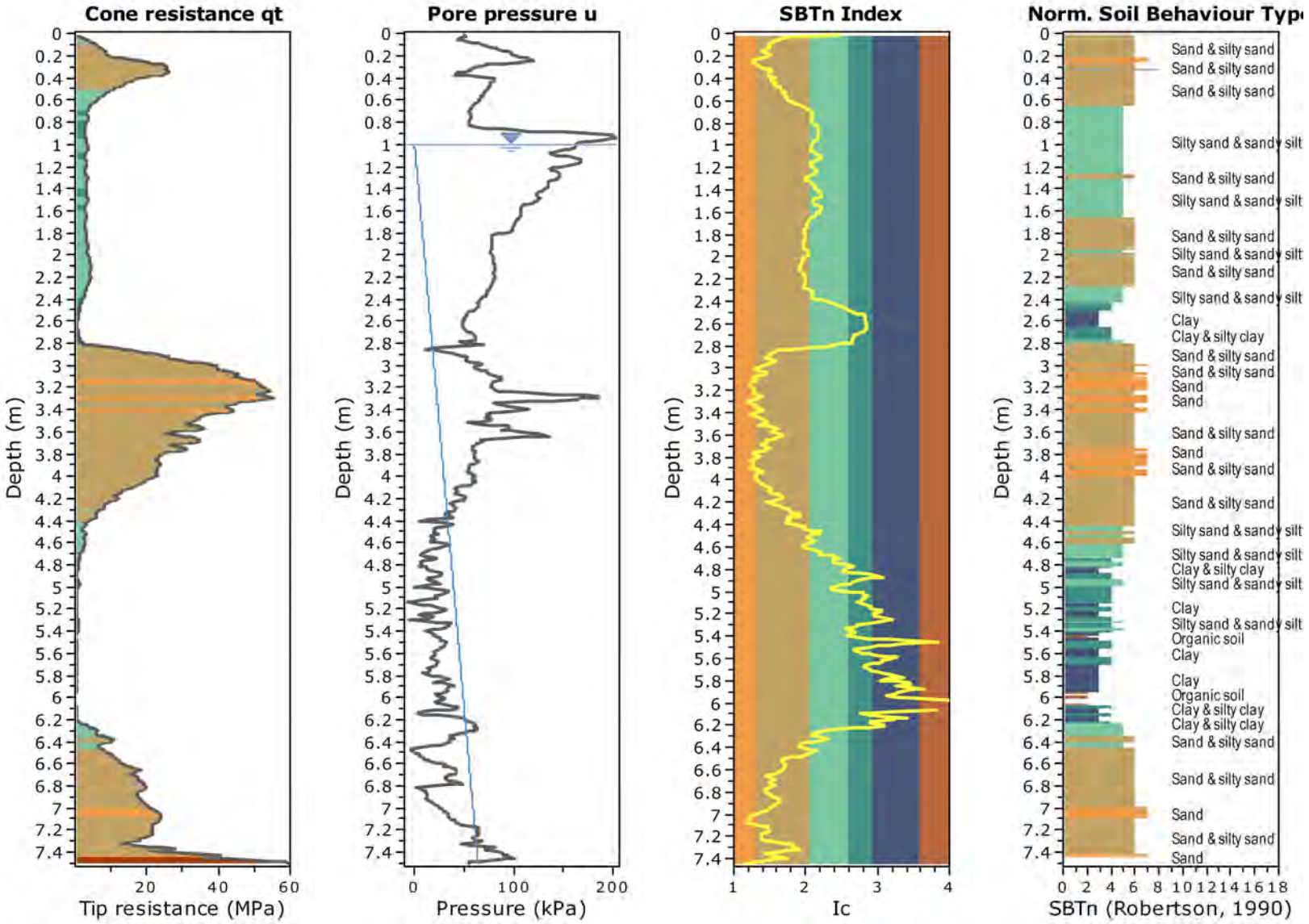
PLOT DATE: 20/01/2021 12:31:05 PM DWG FILE: \\TTS808FS2.TT.LOCAL\Sd809\GENZ\PROJECTS\03 TETRALINX PROJECTS\280000 - 289999\280252 - 1491 SPRINGS ROAD, LINCOLN\06 DRAWINGS\GNZ DRAWINGS\SITE PLAN_RZ - STANDARD\SITE PLAN_RZ.DWG

Appendix B - CPT traces

Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 1
Total depth: 7.50 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 2
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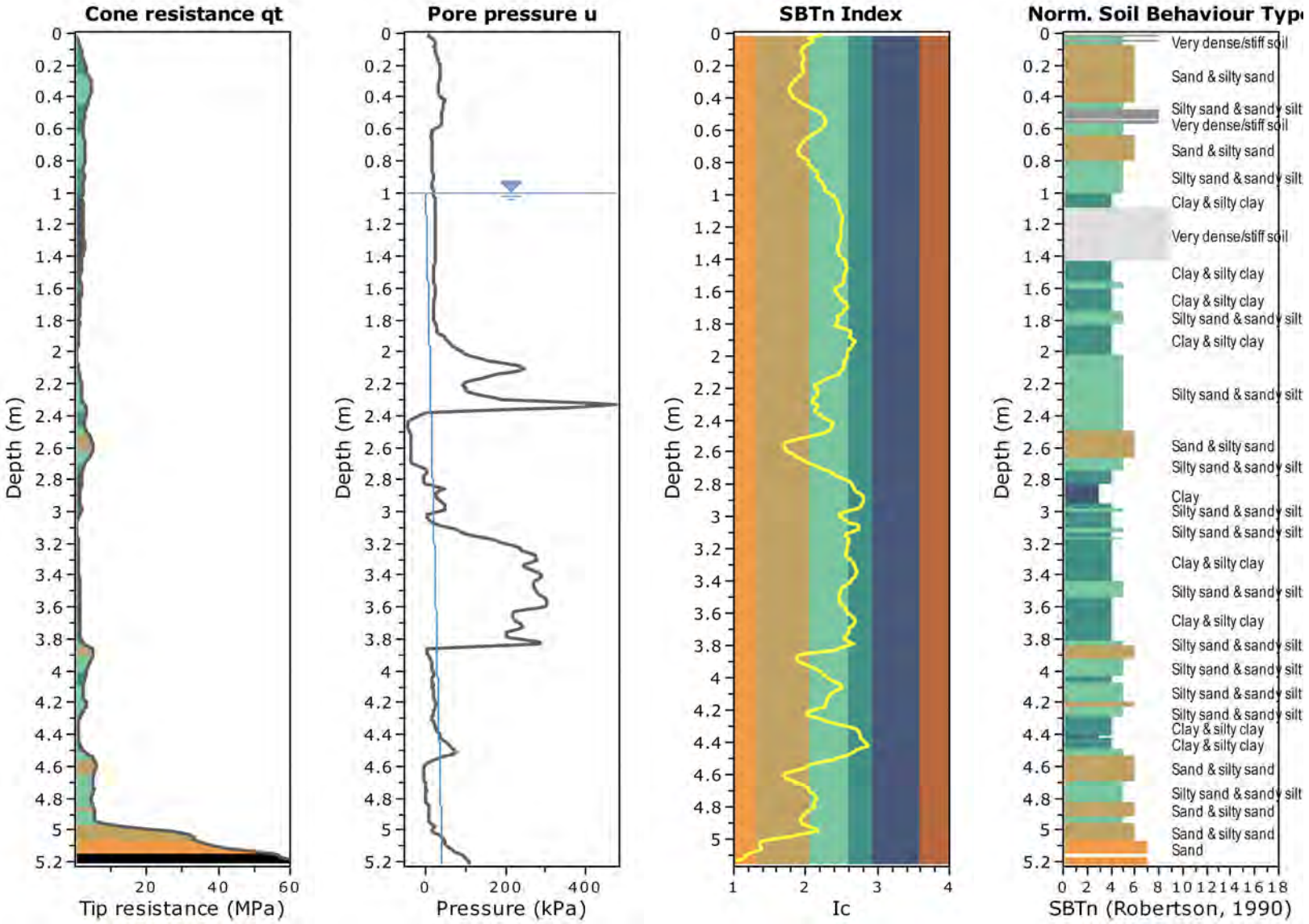
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 3
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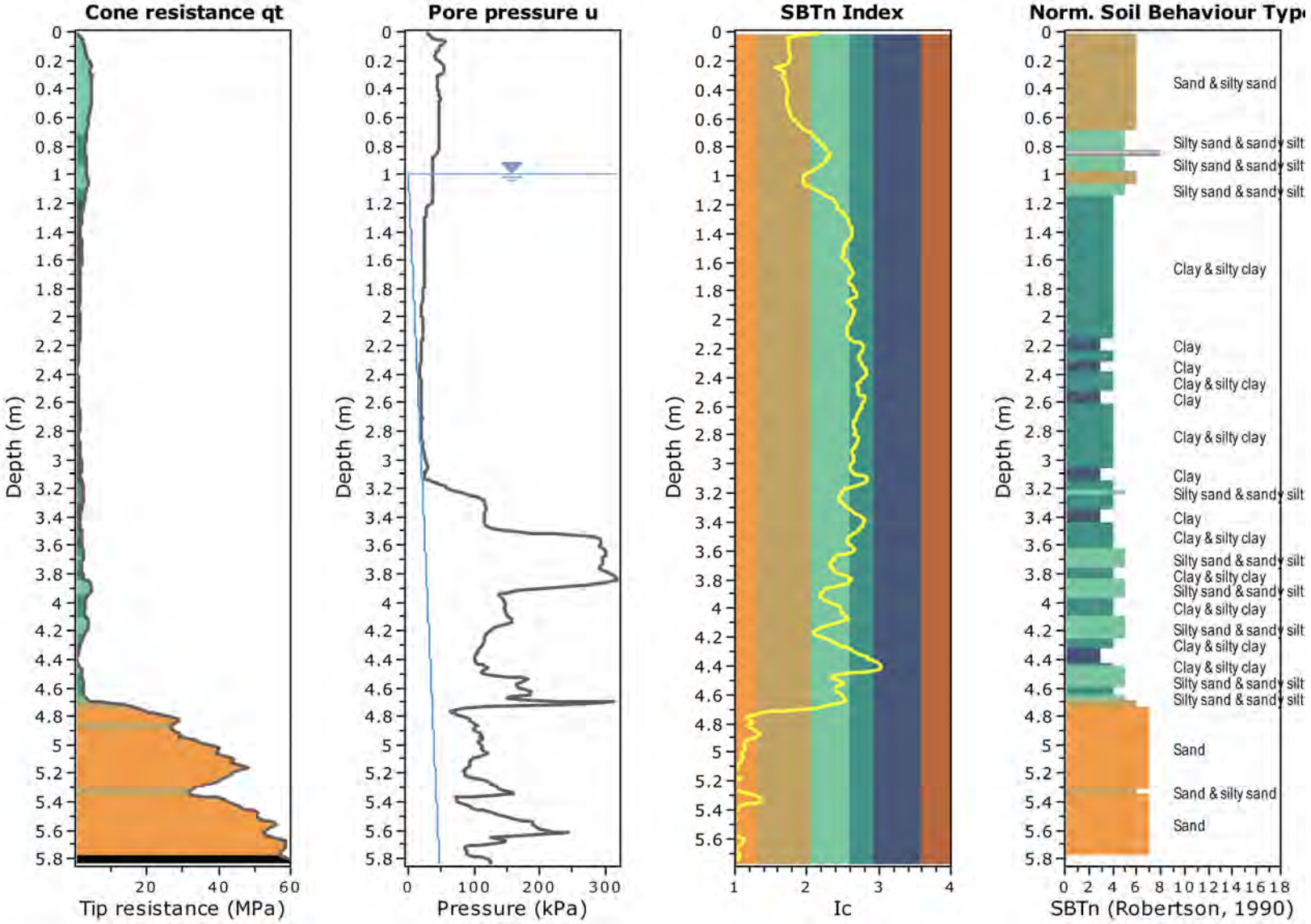
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
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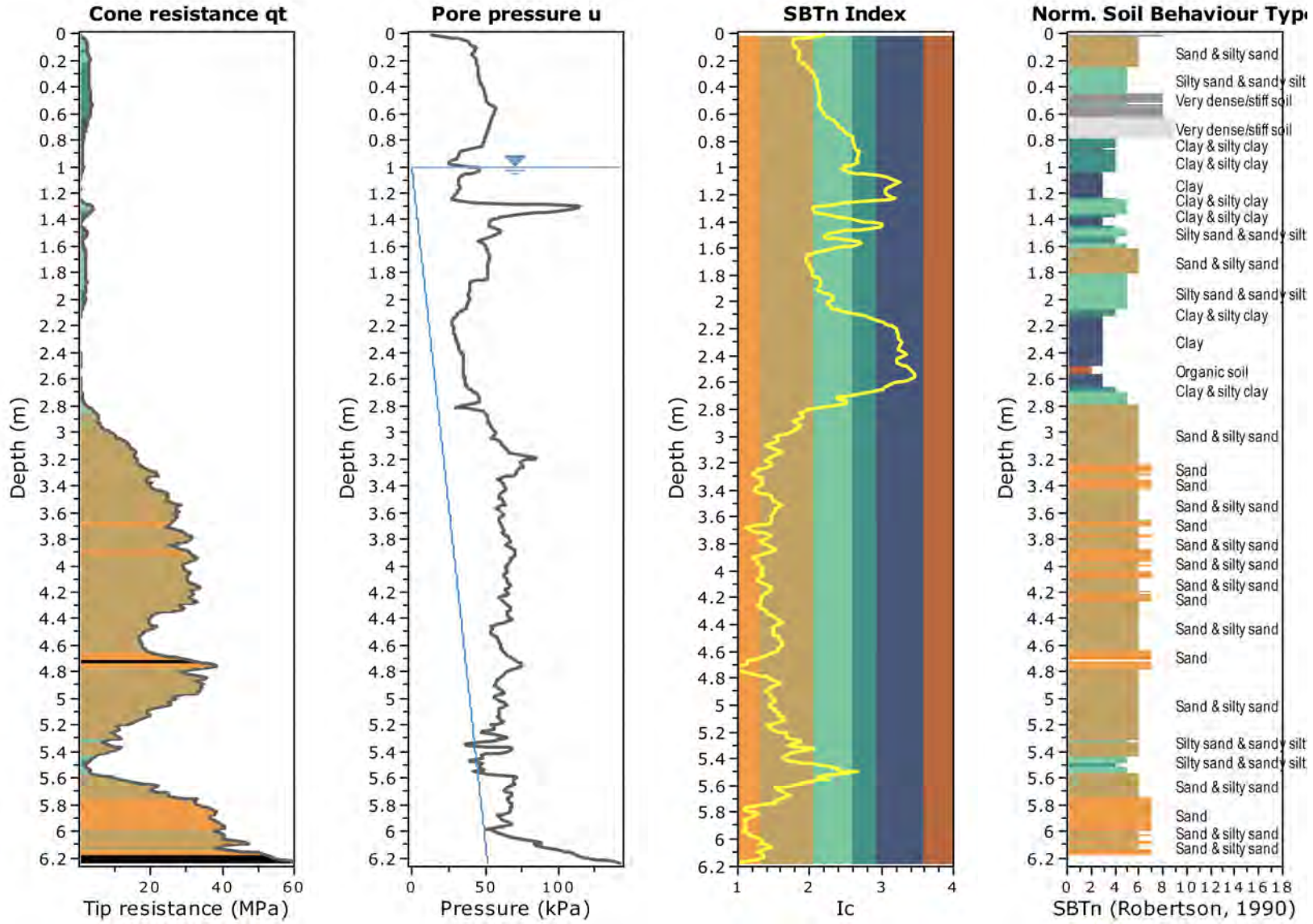
CPT: CPT 4
Total depth: 6.24 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

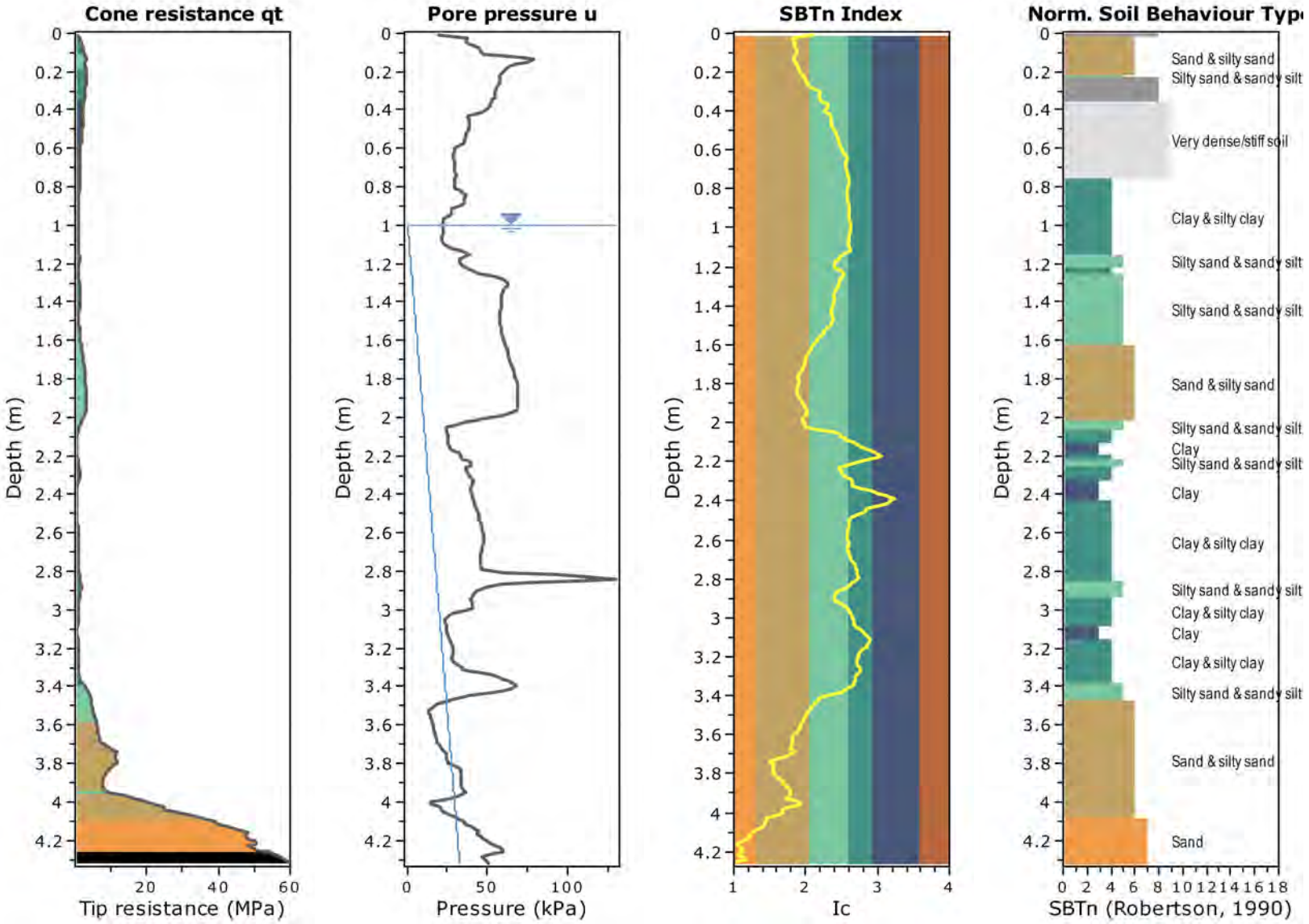
Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 5
Total depth: 4.32 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

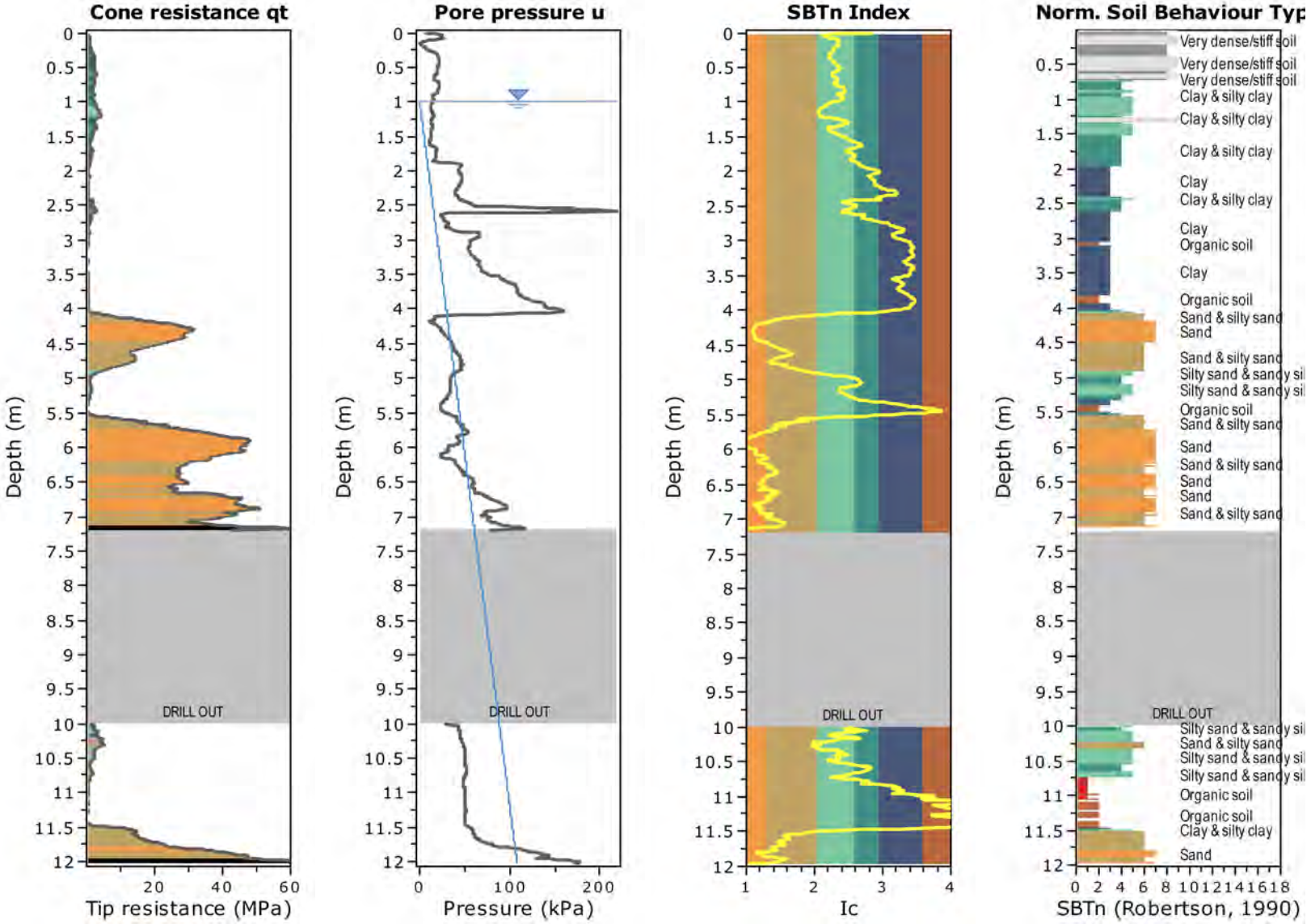
Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 6
Total depth: 12.02 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
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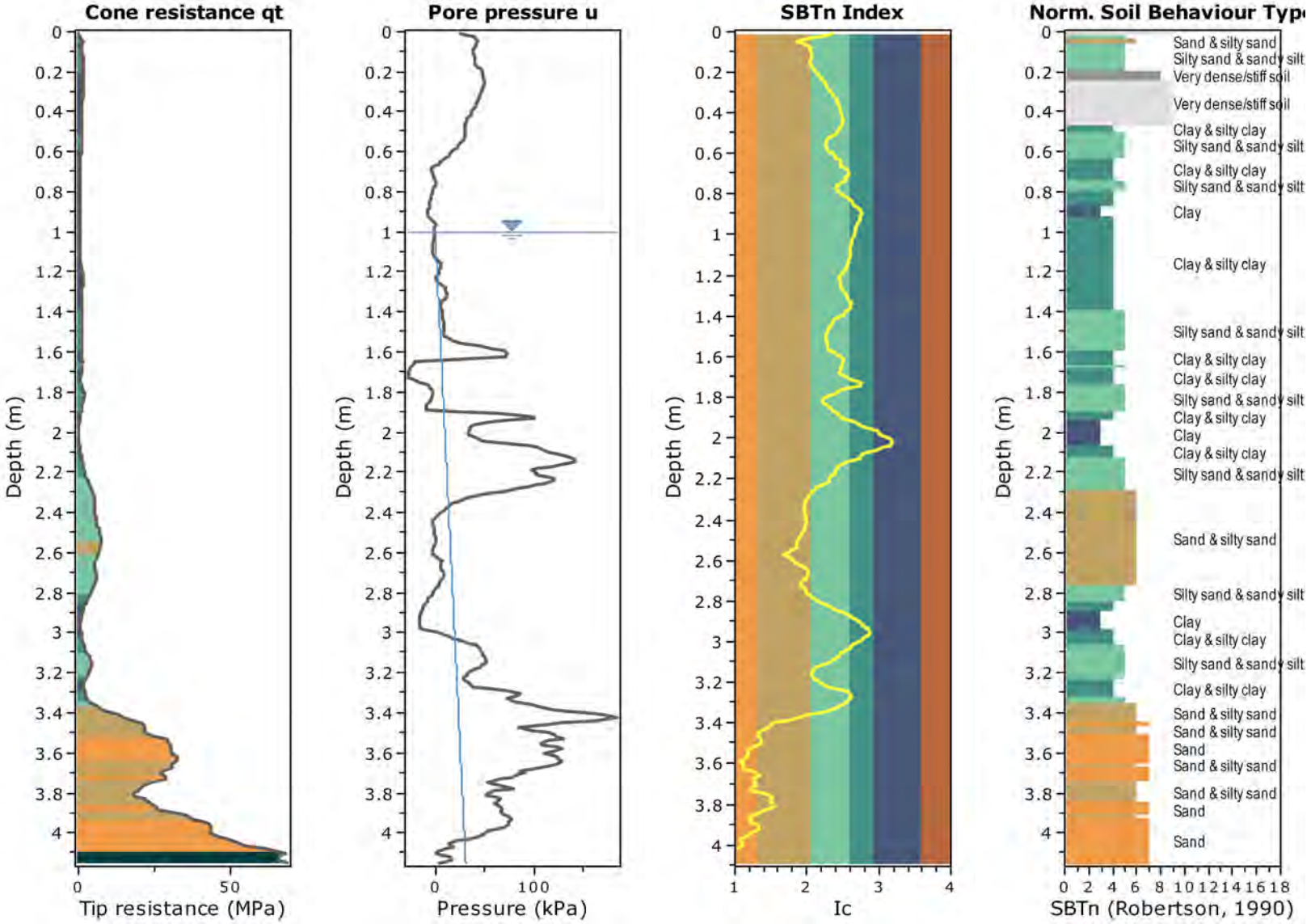
CPT: CPT 7
Total depth: 4.15 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

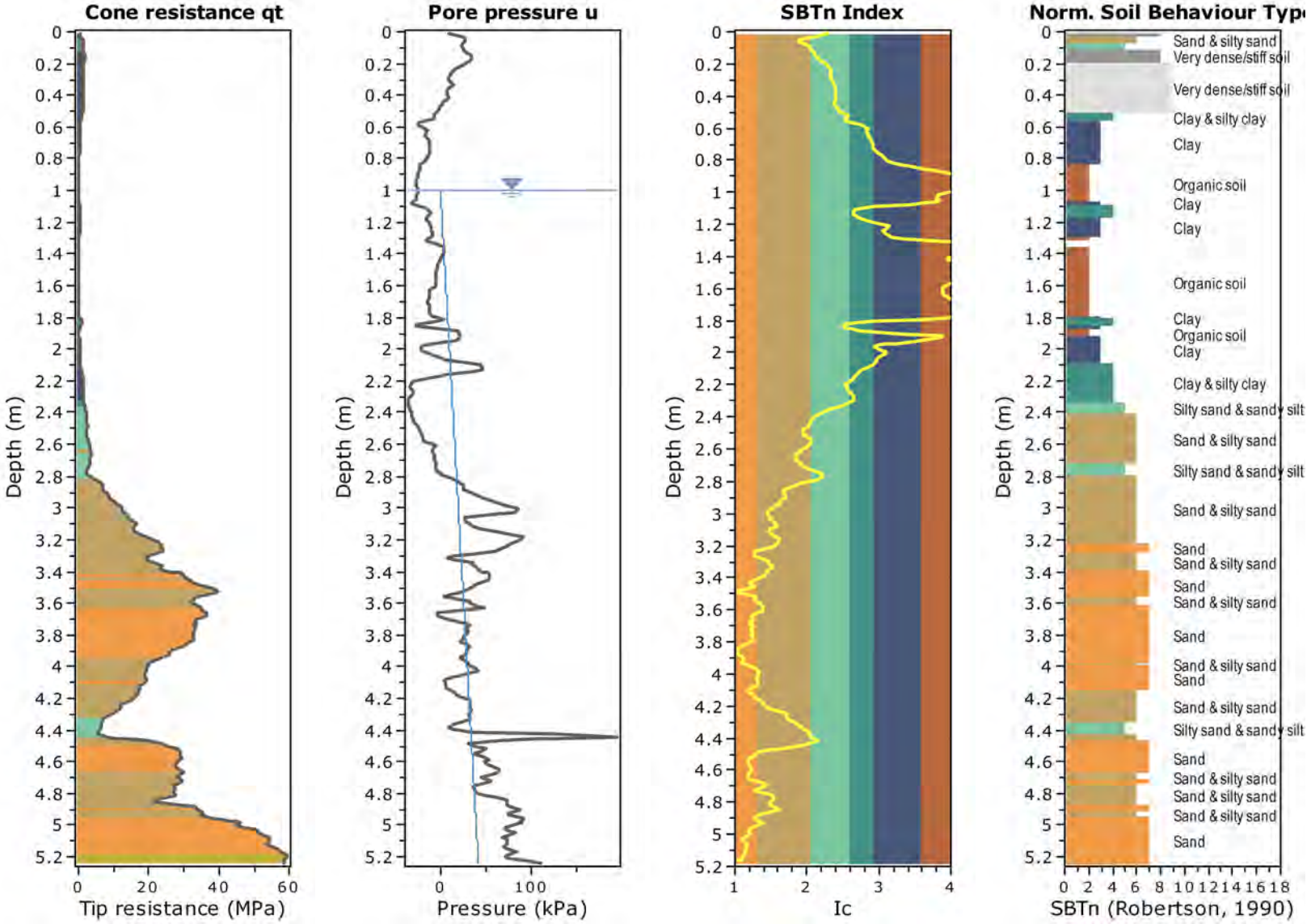
Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 8
Total depth: 5.24 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

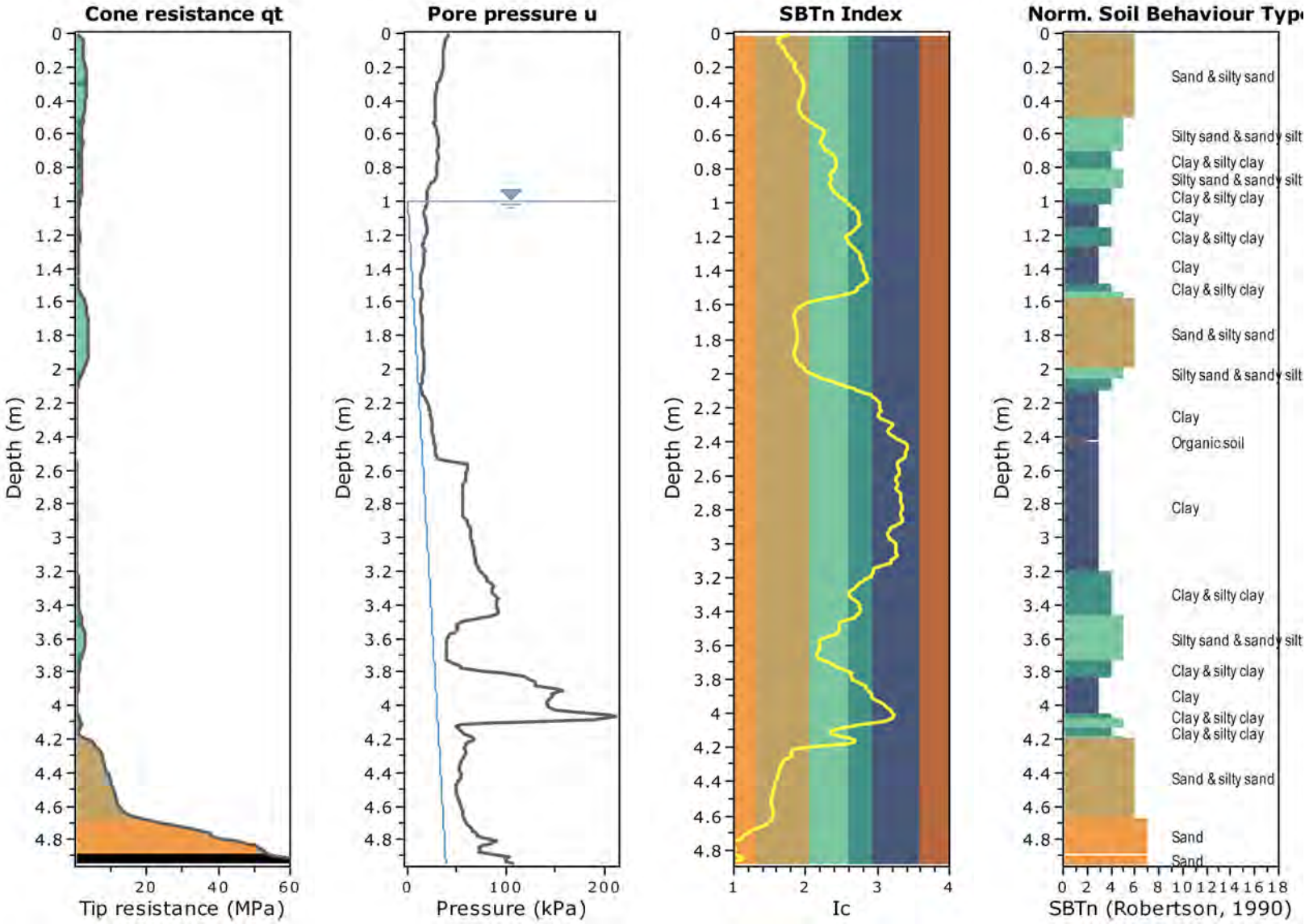
Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 9
Total depth: 4.94 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

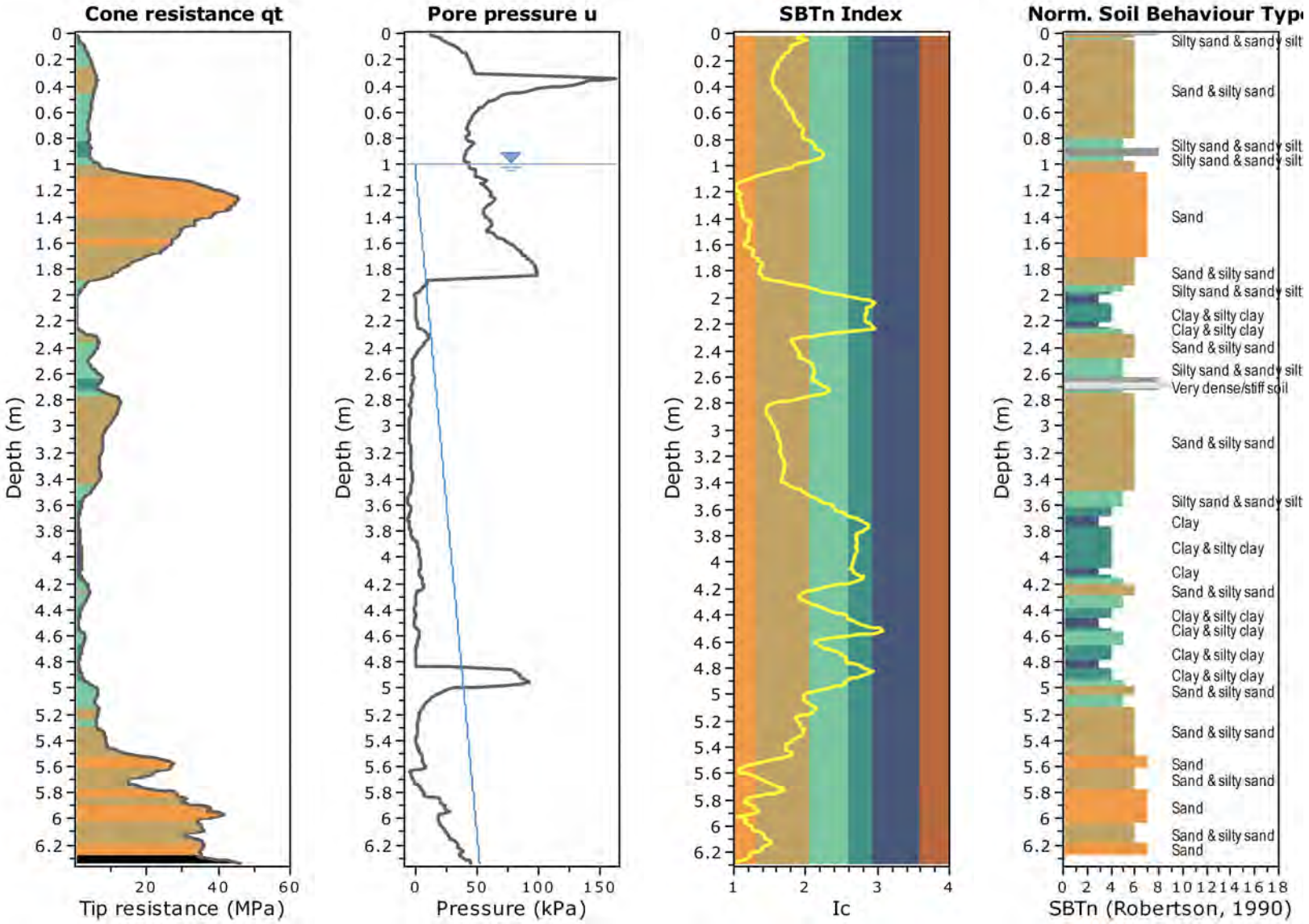
Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 10
Total depth: 6.34 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

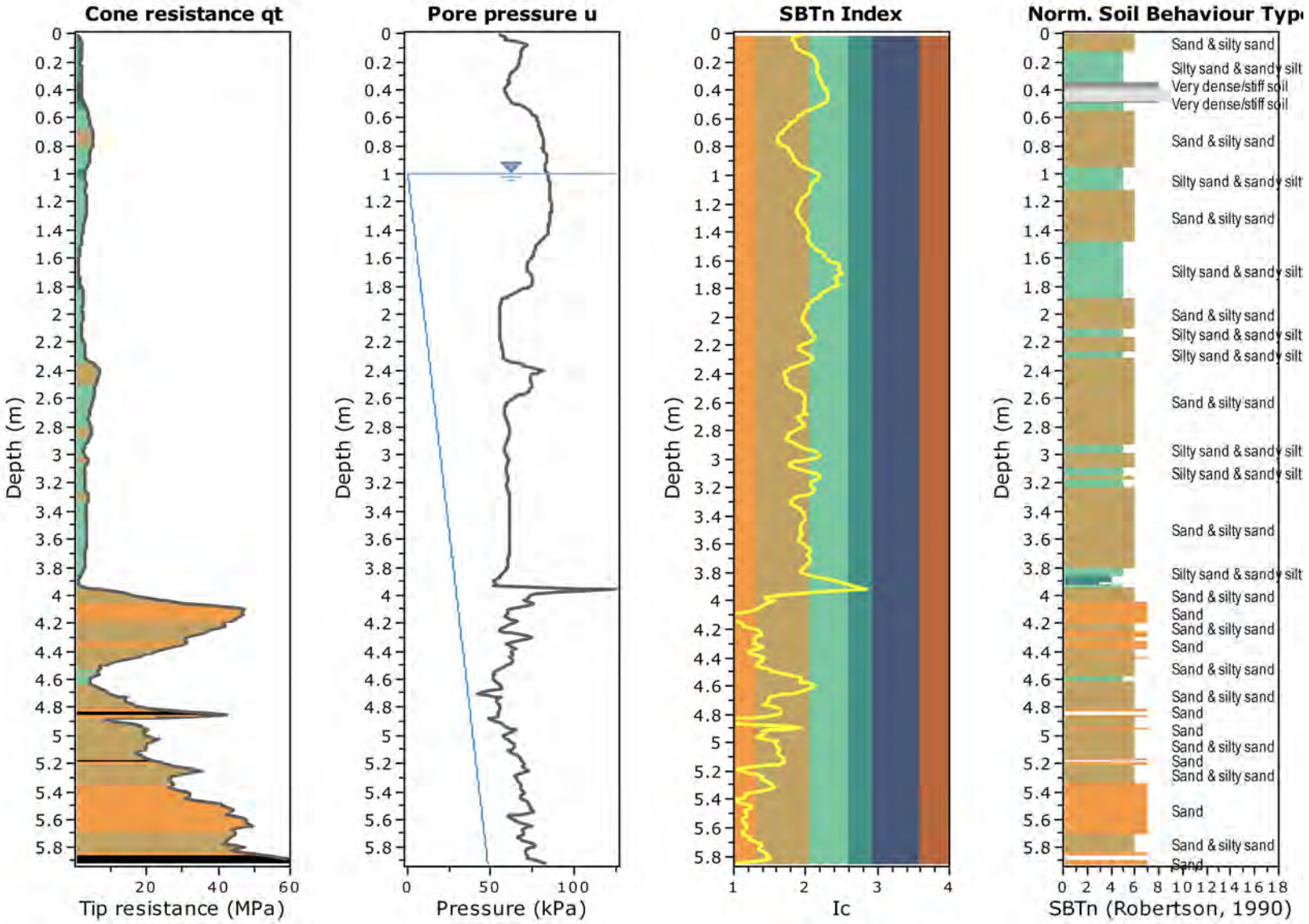
Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**

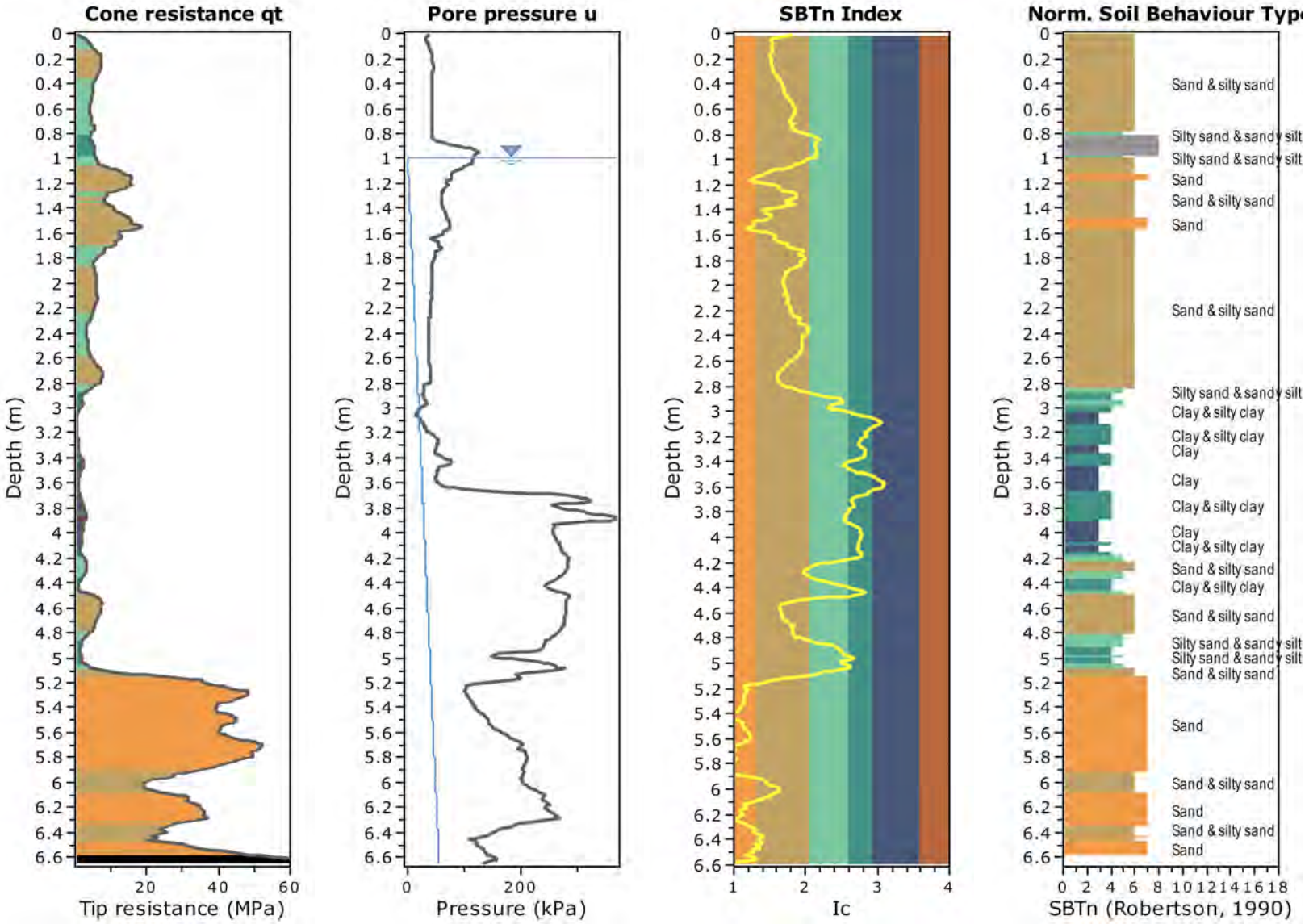
CPT: CPT 11
Total depth: 5.91 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 12
Total depth: 6.65 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

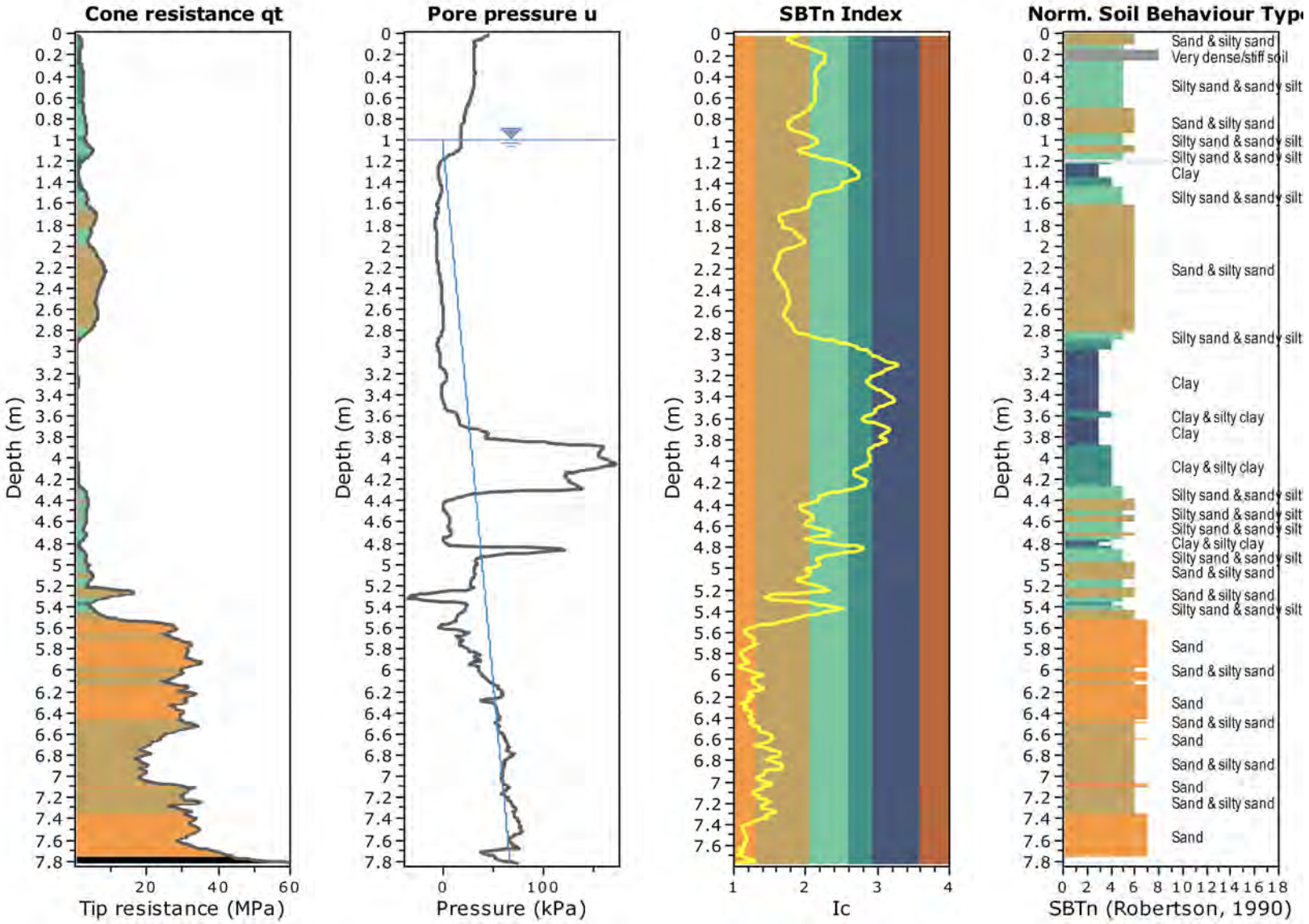
Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**

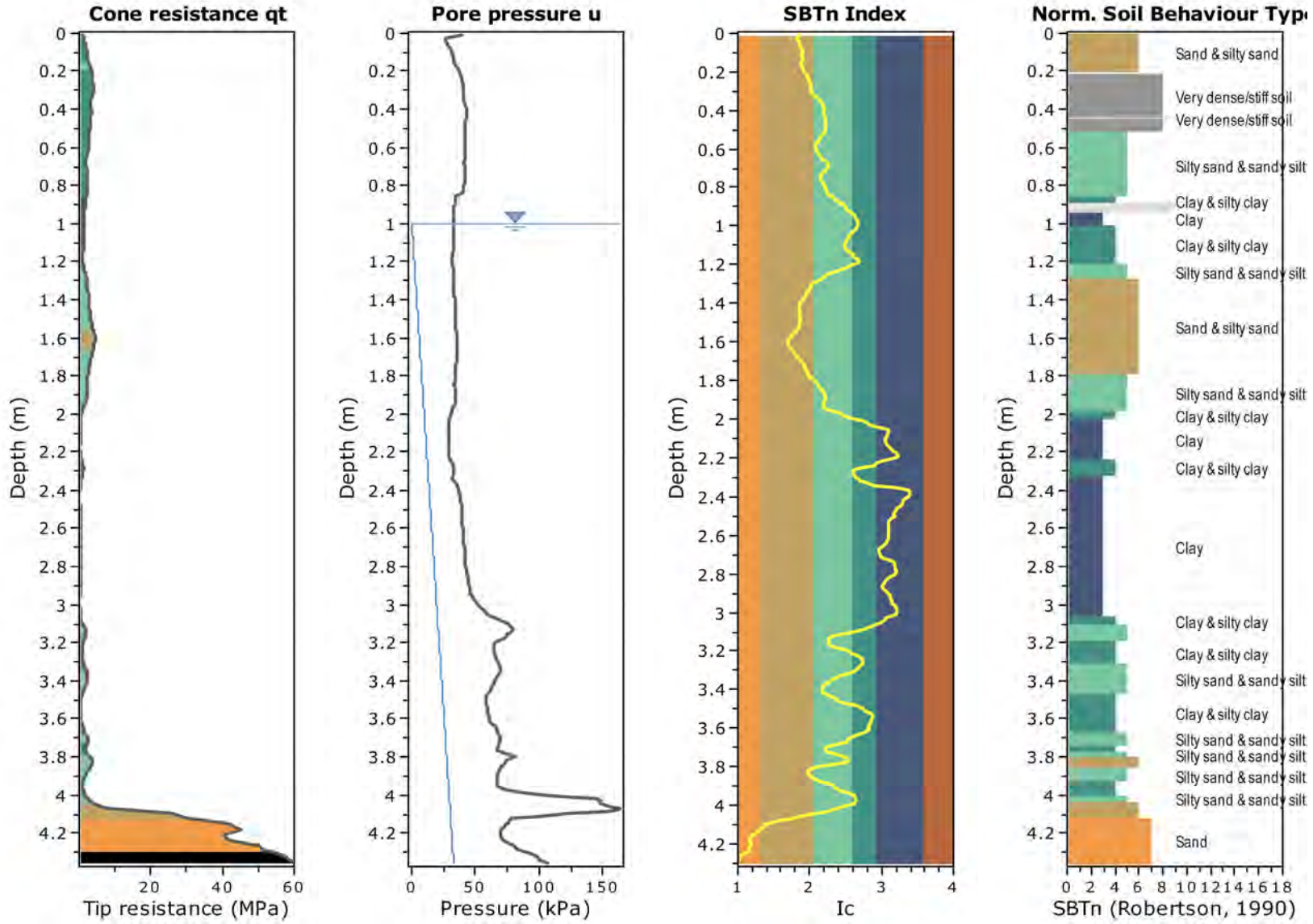
CPT: CPT 13
Total depth: 7.82 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**

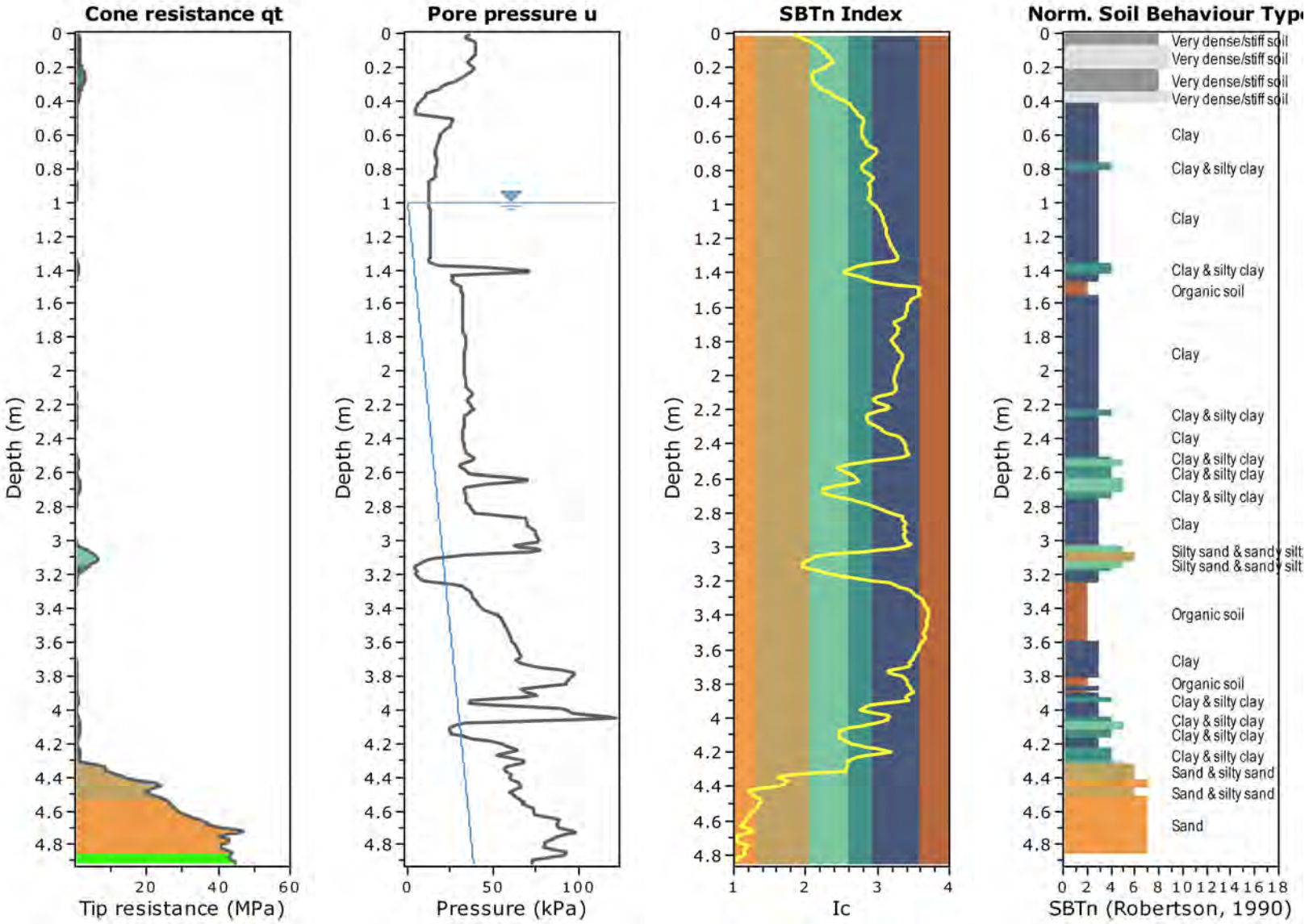
CPT: CPT 14
Total depth: 4.36 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**

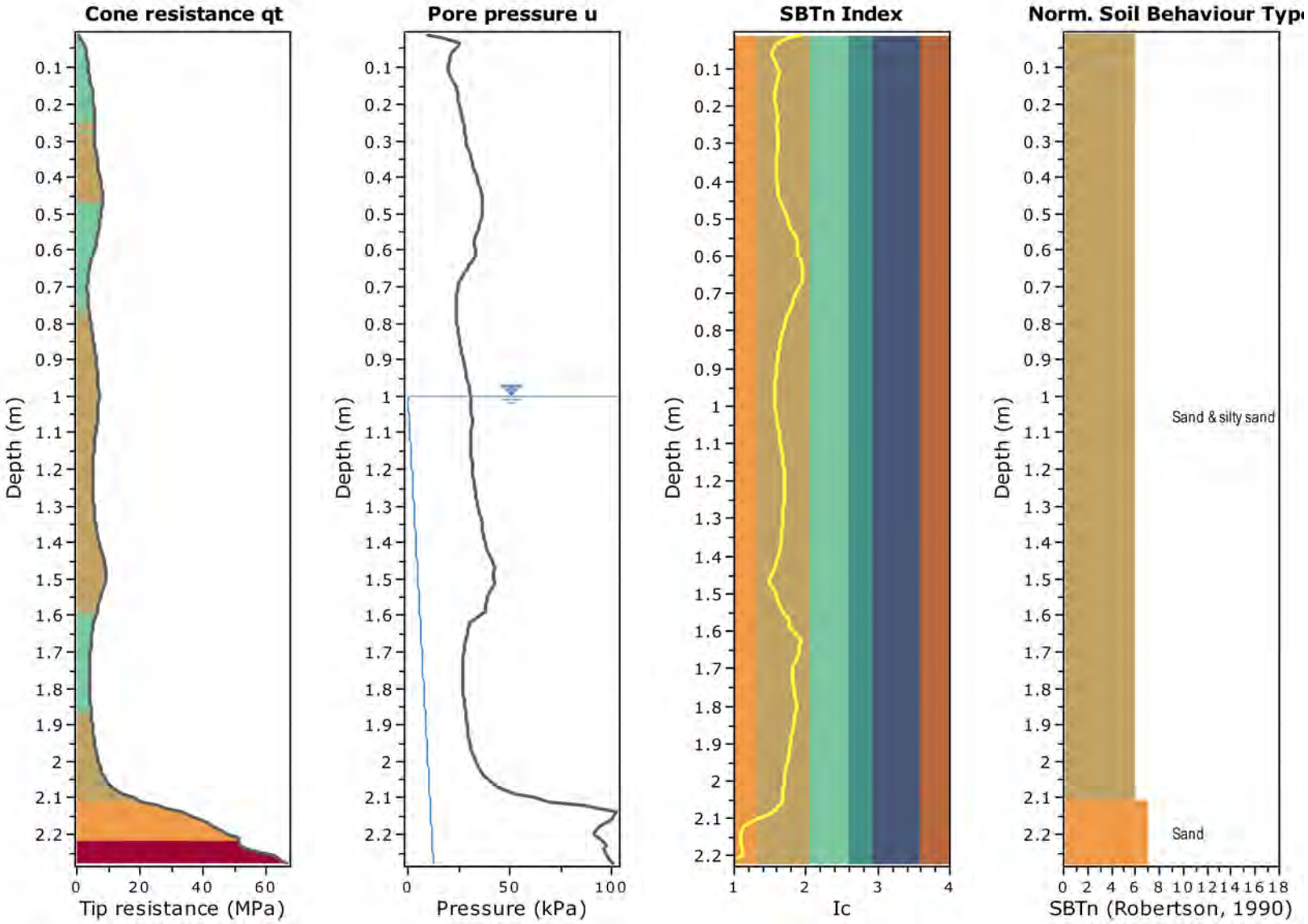
CPT: CPT 15
Total depth: 4.91 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 16
Total depth: 2.28 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

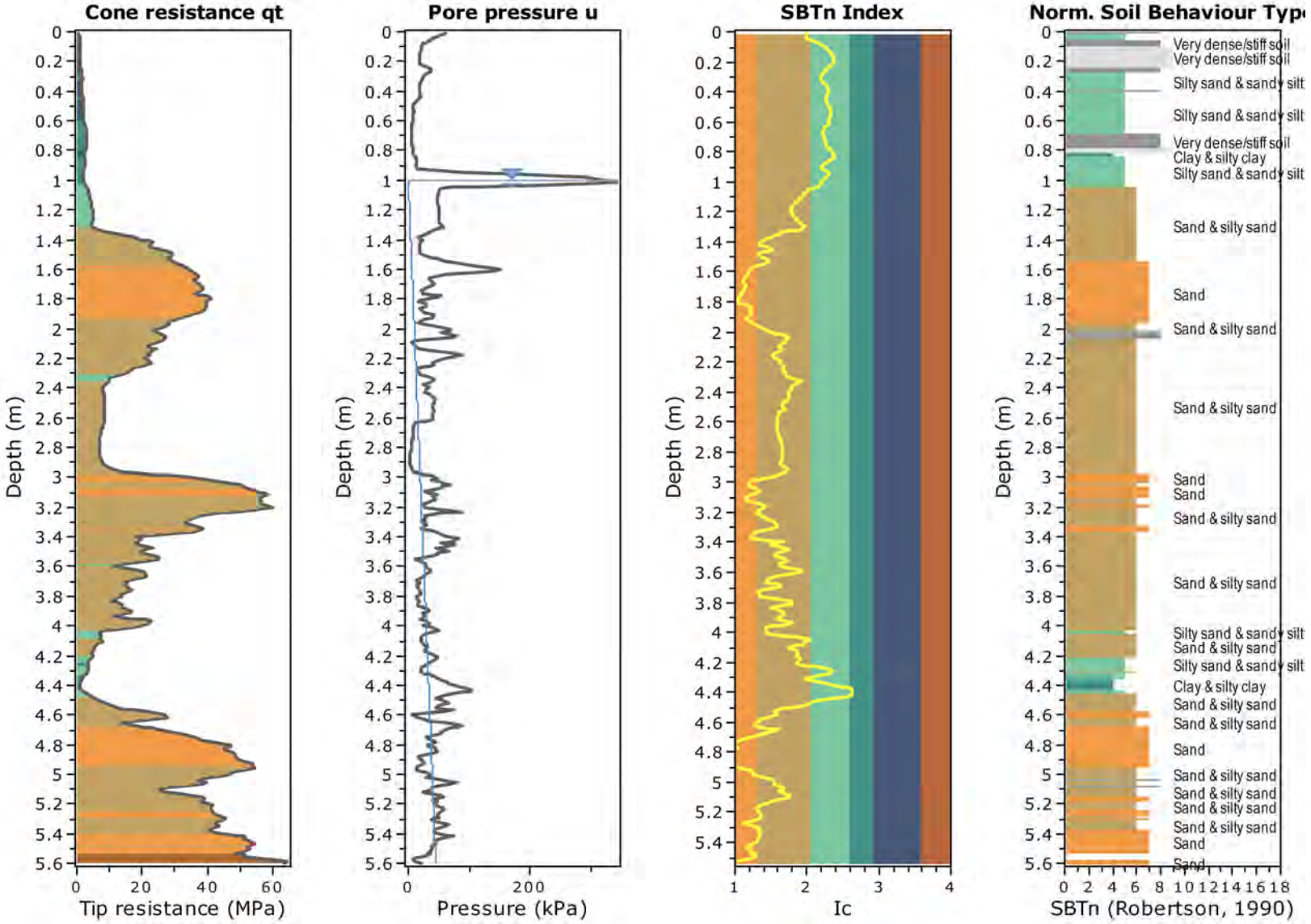
Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**

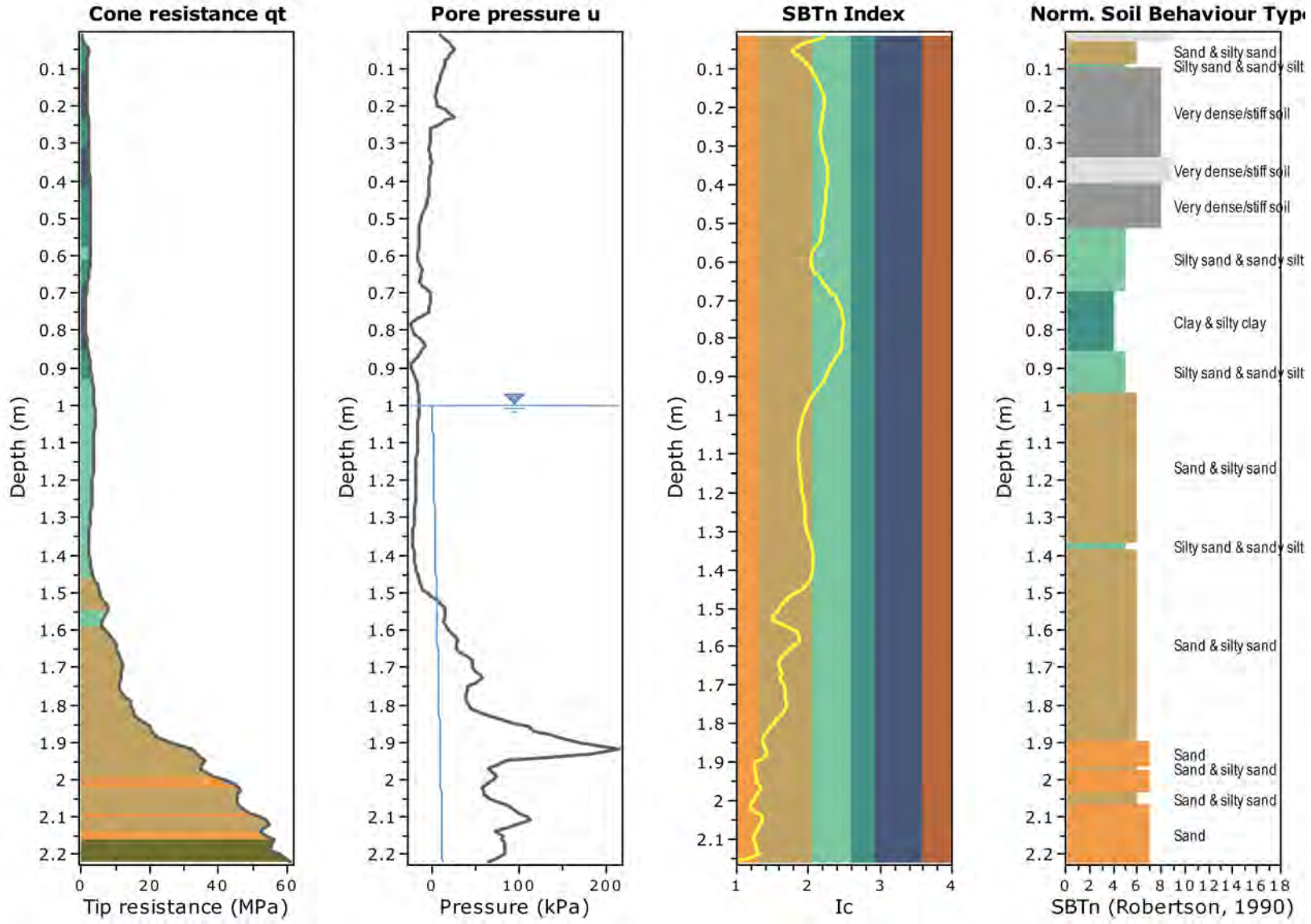
CPT: CPT 17
Total depth: 5.60 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**

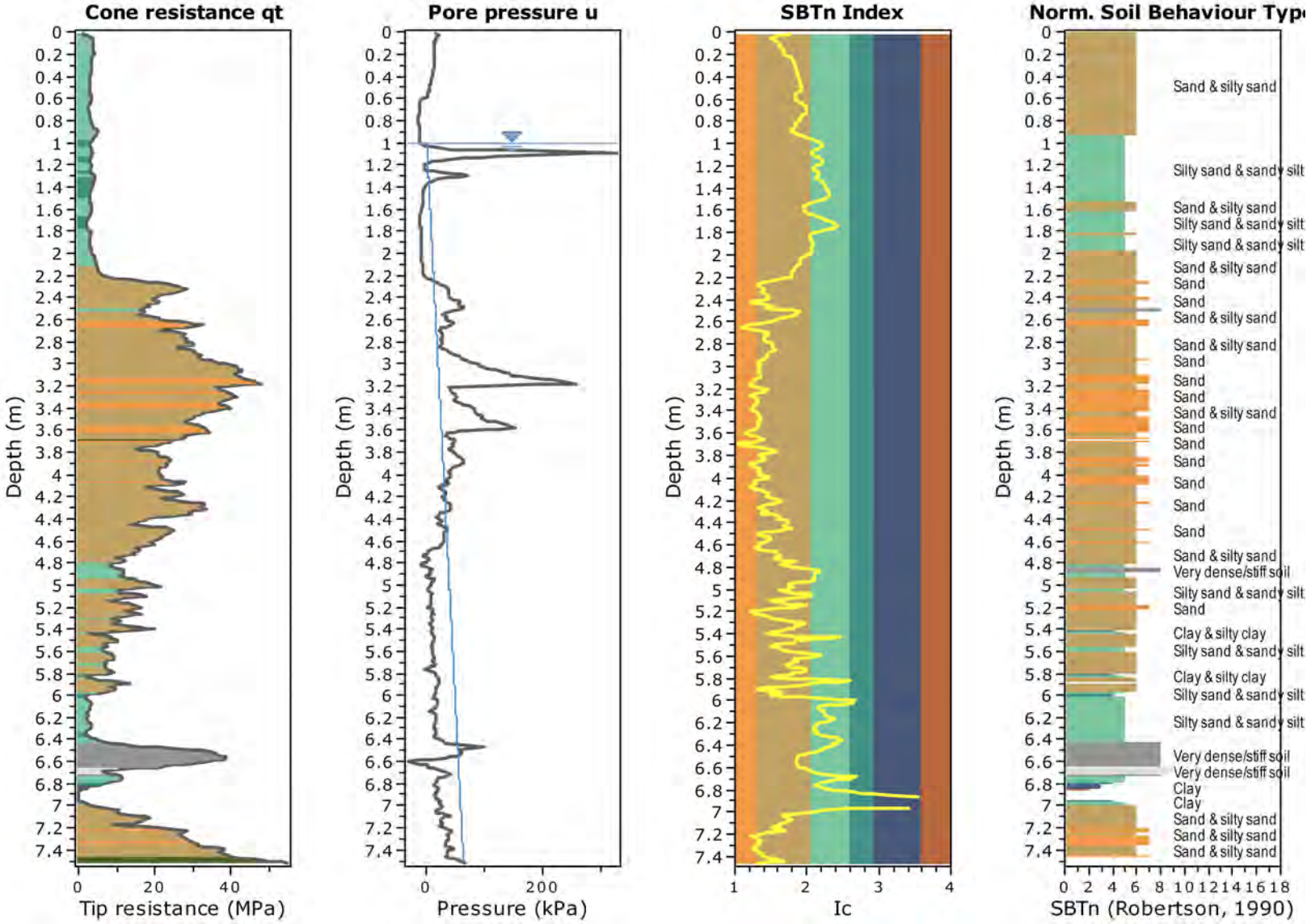
CPT: CPT 18
Total depth: 2.22 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 19
Total depth: 7.52 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

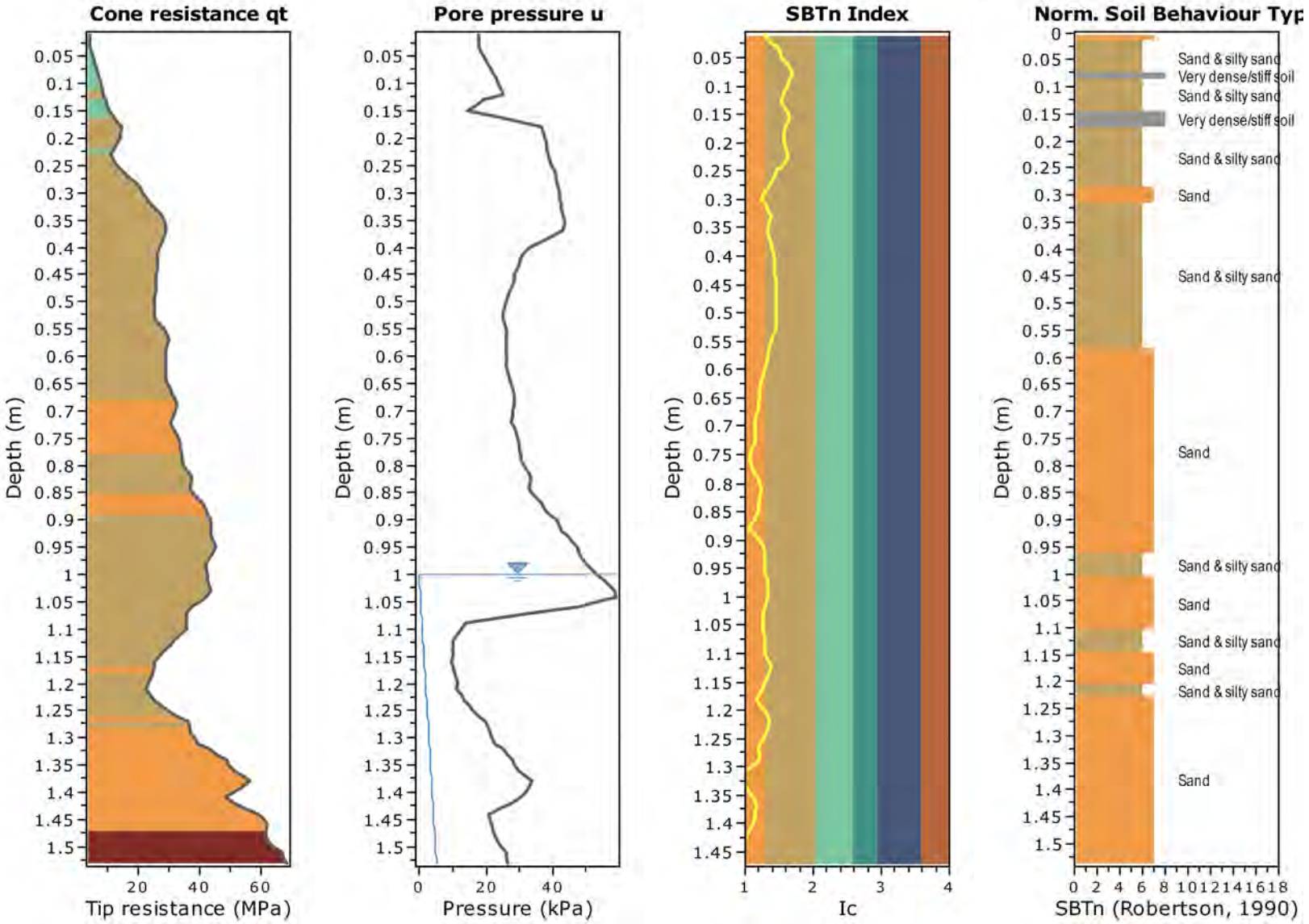
Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

Project: **Lincoln South**
Location: **1491 Springs Road, Lincoln**

CPT: CPT 20
Total depth: 1.53 m, Date: 13-Oct-20
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Appendix C - Geophysical Report

October 2020

GEOPHYSICAL REPORT

1491 Springs Road, Lincoln:

MASW Survey

Report prepared for Coffey Services (NZ) Ltd

Southern
Geophysical Ltd

3/28 Tanya St, Bromley, Christchurch 8062

Ph: 03 384 4302

Web: www.southerngeophysical.com

Data collected and report prepared for Southern Geophysical Ltd by:

Christian Rüegg, MSc, Senior Geophysicist

Nick McConachie, BSc, Geophysicist

Internal review by:

Mike Finnemore, PhD, Senior Geophysicist

Table of Contents

SGL Reference: 2054

Report Version 1

Summary:

Southern Geophysical Ltd was contracted to undertake a geophysical survey using Multi-channel Analysis of Surface Waves (MASW) at a site at 1491 Springs Road, Lincoln, Christchurch. The survey was conducted on October 9, 2020, and included three MASW lines (Figure 1). The aim of the survey was to assess the shear-wave velocities of the subsurface to a depth of over 20 m. The results show shear-wave velocities (V_s) varying across the site. The depth to velocities consistent with gravels (180 m/s to 220 m/s) ranges from very near the surface to approximately 15 m depth.

Methodology:

MASW is a geophysical technique that uses the dispersive nature of surface waves to model shear-wave velocity versus depth.

A MASW survey is undertaken as a series of lines or points across the surface of the site. The MASW lines in this survey were acquired using a 24-channel towed seismic array, with 4.5 Hz geophones. The geophone spacing was 1 m and the source offset was 10 m. The seismic source was an 8 lb sledgehammer impacting an aluminium plate. Recording parameters for the MASW survey were set with a 0.125 ms sample interval, 1.5 s record length, 24 dB gains, and a geophone trigger system. Shot records were acquired at 10 m spacing along the MASW lines.

The shot records were processed using the Kansas Geological Survey software package SurfSeis6++ ©. The geometry for each shot record was set according to the survey parameters and the dispersion curves were generated and edited. The inversions were run using a 10 layer variable depth model. The velocity data was interpolated into 2D profiles showing V_s variations with depth (Figures 2 to 6). The output shear-wave velocity data is included as data files (CSV format), supplementary to this report.

Survey positions were recorded using a Geo 7X Trimble GNSS system with a Tornado antenna. The GNSS positions were differentially corrected using a local GeoNet base station. The GNSS points were output in the Mt Pleasant 2000 datum, with heights in Mean Sea Level (MSL). The accuracy of the survey positions is +/- 0.1 m. The site had minor changes in topography (heights ranging from 3.07 to 9.96 MSL), but the changes were very gradual across a large area.

Results:

Three MASW lines were acquired at the site with a total line length of 2.6 kilometres (Figure 1). The ground conditions were farm tracks and roads for MASW 1 and 2, and a roadside grass verge for MASW 3.

The MASW profiles have been plotted at a 1:2000 scaling ratio in order to show all the data in one display (Figure 2), as well as at a 1:700 scaling ratio to show more detail along each MASW line (Figures 3 to 6).

In homogenous soils, with gradually increasing shear-wave velocities and no sharp lateral discontinuities, the accuracy of the shear-wave velocities derived from the MASW processing is considered to be +/- 10%.[1] The quality of the seismic data and the dispersion curves used in this report is excellent, with a good signal-to-noise ratio. If there is a velocity inversion present in the shear-wave profile (decreasing velocity with depth), the shear-wave velocity of the reduced velocity zone and the thickness of that zone can often be underestimated by the inversion process.

Conclusions:

While the limitations of the MASW method should be considered when evaluating these results, the quality of the data collected at the site and the confidence in the shear-wave velocities derived from the MASW data is high. It is suggested that the 200 m/s shear-wave velocity contour likely correlates with a gravel surface, however the results should be correlated with intrusive ground tests to confirm the site geology.

[1] Stephenson, W.J., Louie, J.N., Pullammanappallil, S., Williams, R.A., and Odum, J.K. 2005. Blind Shear-wave Velocity Comparison of ReMi and MASW Results with Boreholes to 200 m in Santa Clara Valley: Implications for Earthquake Ground-Motion Assessment. *Bulletin of the Seismological Society of America*, Vol. 95, pp. 2506-2516.

Disclaimer:

This document has been provided by Southern Geophysical Ltd subject to the following:

Non-invasive geophysical testing has limitations and is not a complete source of testing. Often there is a need to couple non-invasive methods with invasive testing methods, such as drilling, especially in cases where the non-invasive testing indicates anomalies.

This document has been prepared for the particular purpose outlined in the project proposal and no responsibility is accepted for the use of this document, in whole or in part, in other contexts or for any other purpose. Southern Geophysical Ltd did not perform a complete assessment of all possible conditions or circumstances that may exist at the site. Conditions may exist which were undetectable given the limited nature of the enquiry Southern Geophysical Ltd was retained to undertake with respect to the site. Variations in conditions often occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account. Accordingly, additional studies and actions may be required by the client.

We collected our data and based our report on information which was collected at a specific point in time. The passage of time affects the information and assessment provided by Southern Geophysical Ltd. It is understood that the services provided allowed Southern Geophysical Ltd to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes for whatever reason. Where data is supplied by the client or other sources, including where previous site investigation data have been used, it has been assumed that the information is correct. No responsibility is accepted by Southern Geophysical Ltd for incomplete or inaccurate data supplied by others. This document is provided for sole use by the client and is confidential to that client and its professional advisers. No responsibility whatsoever for the contents of this document will be accepted to any person other than the client. Any use which a third party makes of this document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Southern Geophysical Ltd accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.

DRAWING- **Figure 1: Geophysical Site Investigation**

LOCATION- **1491 Springs Road, Lincoln**

NOTES-

Coordinates Mount Pleasant 2000 TM Grid.
Aerial photograph sourced from LINZ, Crown Copyright ©
Every second MASW point is labelled with chainage along the line.

SCALE (m)
0 100 200 300 400

N

A3

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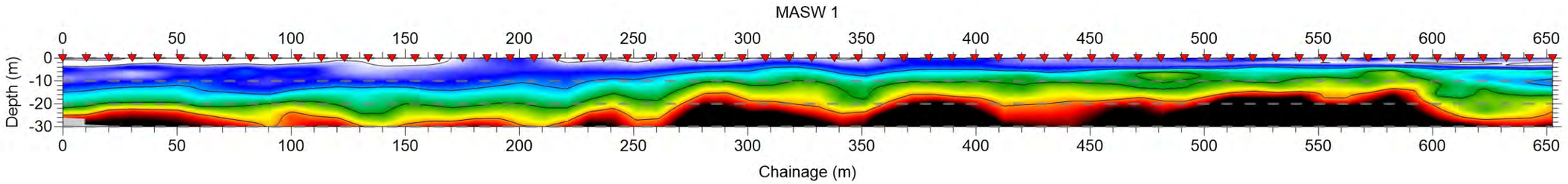
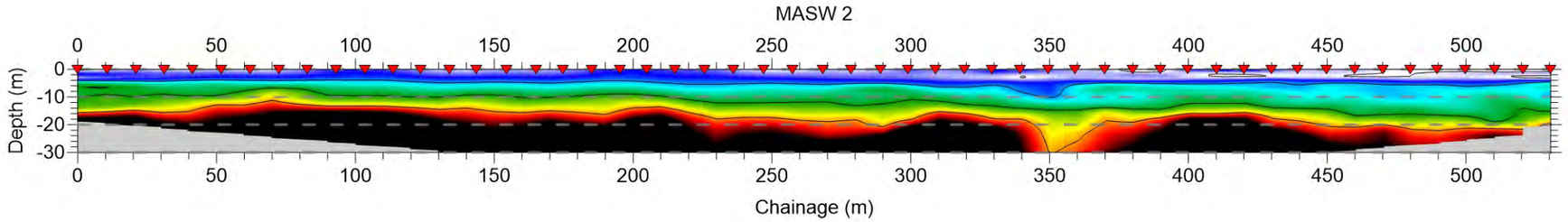
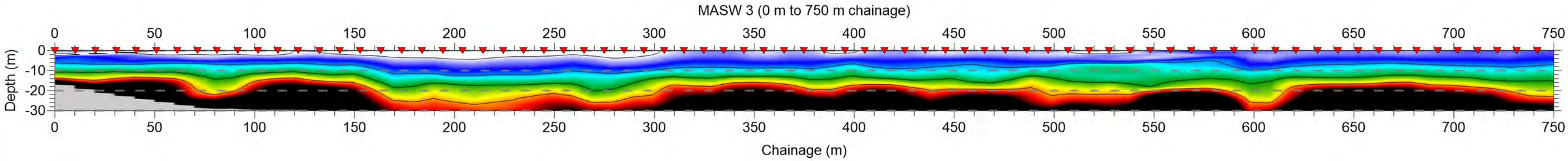
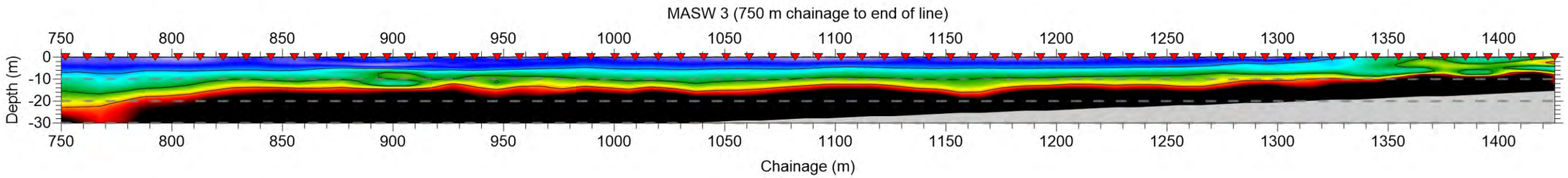
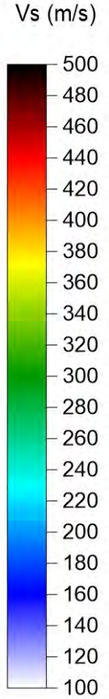
www.southerngeophysical.com











DRAWING- **Figure 2: All MASW Profiles (1:2000 scaling ratio)**

LOCATION- **1491 Springs Road, Lincoln**

NOTES MASW Vs profiles have contour intervals of 100 m/s (Vs).

See site map for location of points.

▼ Surface position of MASW shot records (contours interpolated between data points)

No data (insufficient depth imaging with MASW)

A3

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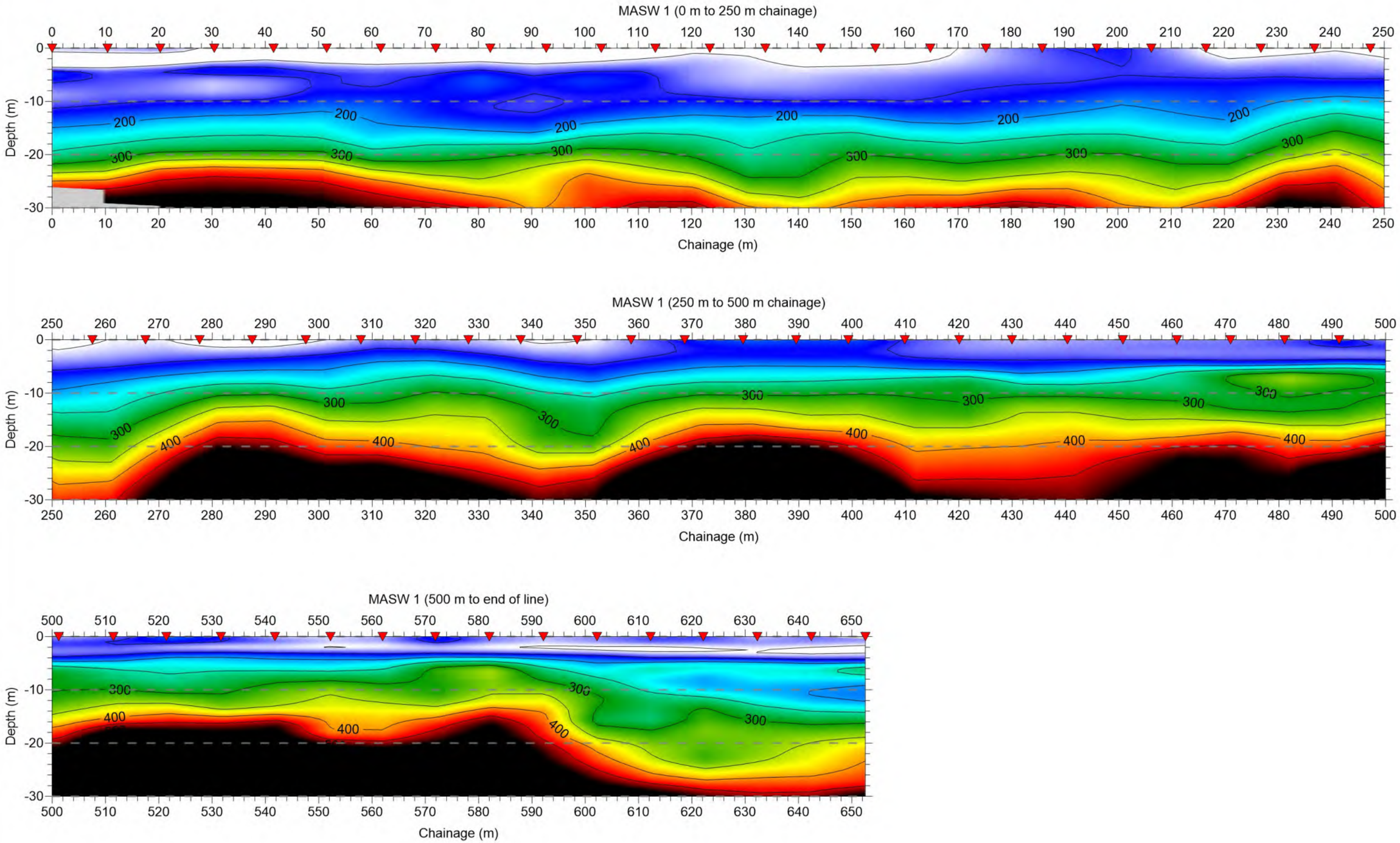

DRAWING- **Figure 3: MASW 1 (1:700 scaling ratio)**

LOCATION- **1491 Springs Road, Lincoln**

NOTES MASW Vs profiles have contour intervals of 50 m/s (Vs).

See site map for location of points.

▼ Surface position of MASW shot records (contours interpolated between data points)

No data (insufficient depth imaging with MASW)

A3

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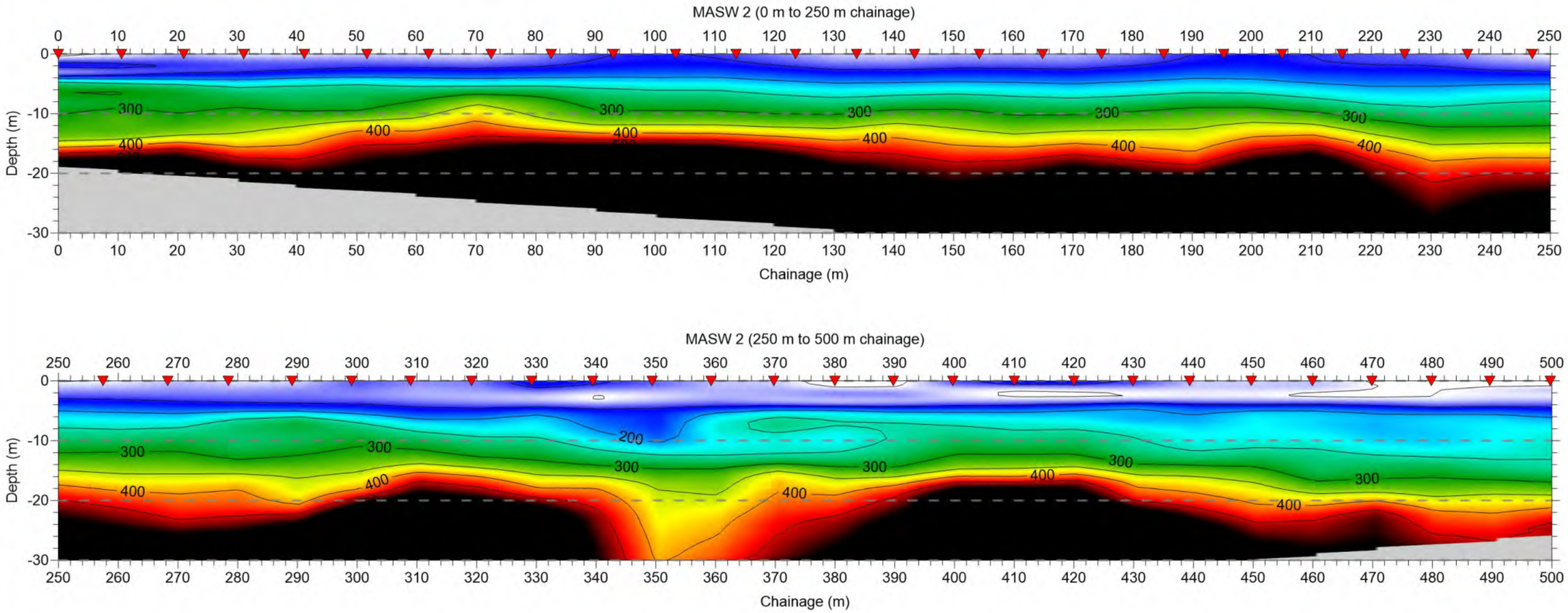

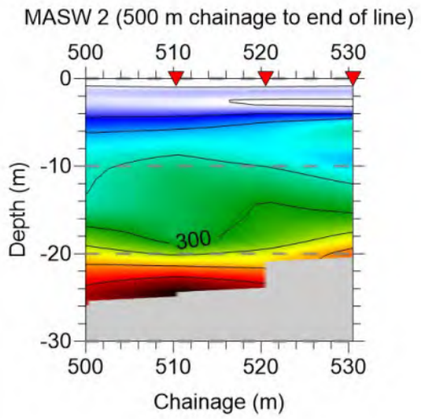

DRAWING- **Figure 4: MASW 2 (1:700 scaling ratio)**

LOCATION- **1491 Springs Road, Lincoln**

NOTES MASW Vs profiles have contour intervals of 50 m/s (Vs).

See site map for location of points.

Surface position of MASW shot records (contours interpolated between data points)

No data (insufficient depth imaging with MASW)

A3

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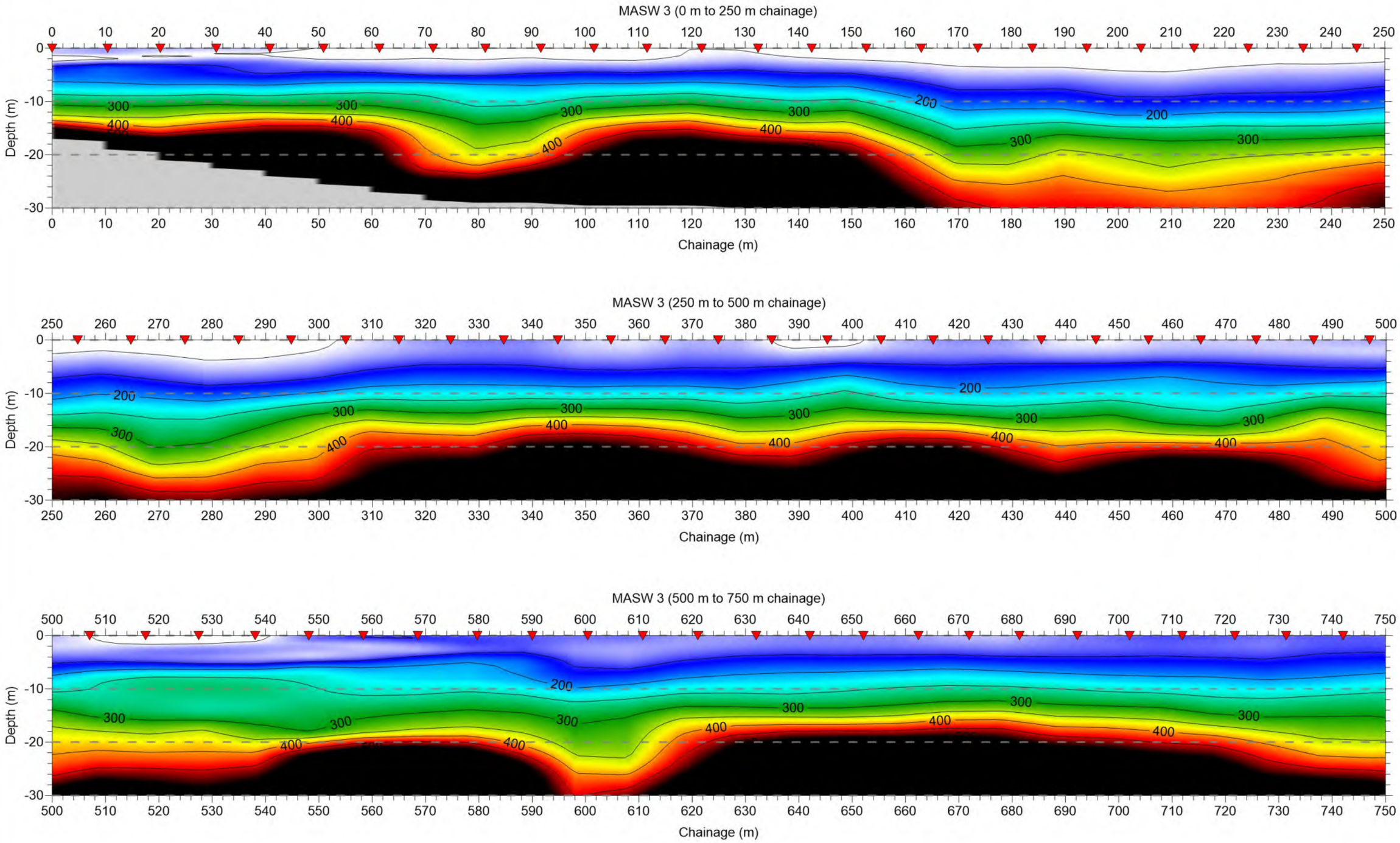
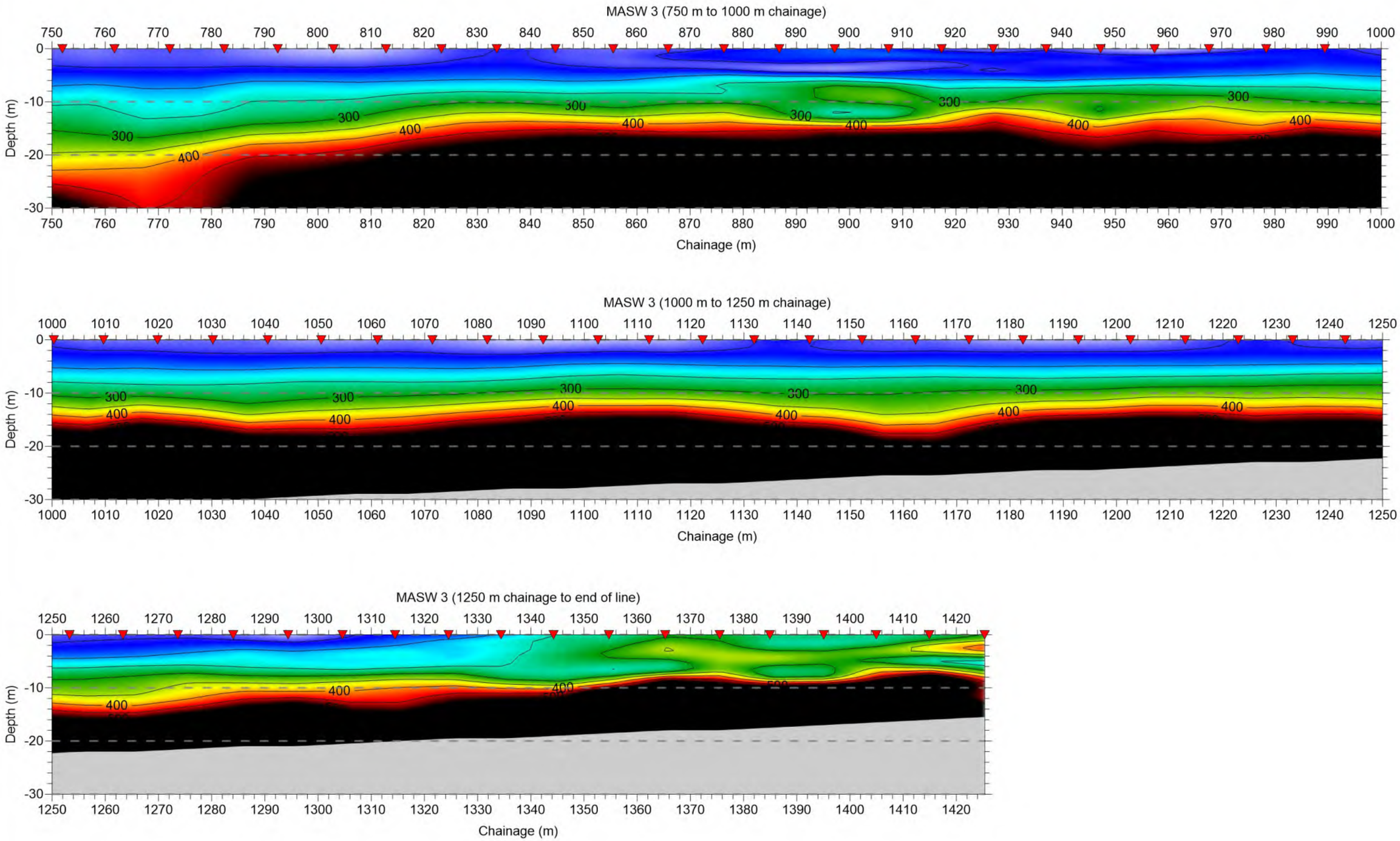


DRAWING- **Figure 5: MASW 3 (1:700 scaling ratio)**	NOTES MASW Vs profiles have contour intervals of 50 m/s (Vs).	▼ Surface position of MASW shot records (contours interpolated between data points)	**Southern Geophysical Ltd**
LOCATION- **1491 Springs Road, Lincoln**	See site map for location of points.	No data (insufficient depth imaging with MASW)	www.southerngeophysical.com
			A3



DRAWING- **Figure 6: MASW 3 (1:700 scaling ratio)**

LOCATION- **1491 Springs Road, Lincoln**

NOTES MASW Vs profiles have contour intervals of 50 m/s (Vs).

See site map for location of points.

Surface position of MASW shot records (contours interpolated between data points)

No data (insufficient depth imaging with MASW)

A3

Southern Geophysical Ltd

www.southerngeophysical.com

Appendix D - Test pit logs

coffey
A TETRA TECH COMPANY

Engineering Log - Excavation

Excavation ID.	***TP01***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
			Not Encountered			0.0		ML	**Sandy SILT**: low plasticity, brown, with some gravel.	D			**TOPSOIL**
								ML	**Sandy SILT**: low plasticity, brown-grey, with some gravel and trace of wood.				**FILL**
						0.5		GW	**Sandy GRAVEL**: fine to coarse grained, well graded, sub-rounded, brown-grey.				**SPRINGSTON FORMATION**
						1.0			Test pit TP01 terminated at 0.85 m Target depth				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Excavation

Excavation ID.	***TP02A***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
			Not Encountered			0.0		ML	**Sandy SILT**: low plasticity, brown, with minor gravel.	D			**TOPSOIL / FILL**
						0.5		ML	**Sandy SILT**: low plasticity, brown.				**SPRINGSTON FORMATION**
								ML	**SILTY SAND**: fine grained, low plasticity, pale brown.				
								GW	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, yellow-brown.				
						1.0			Test pit TP02A terminated at 0.95 m Target depth				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

CDF_0_9_06_LIBRARY.GLB rev:AR Log COF EXCAVATION CHCGE280252 GINT LOGS.GPJ <<DrawingFile>> 28/01/2021 08:39

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Excavation

Excavation ID.	***TP02B***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
			Not Encountered			0.5		ML	**Sandy SILT**: brown, with minor gravel.	D			**TOPSOIL / FILL**
								GW	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded to sub-angular, brown-grey.				**SPRINGSTON FORMATION**
						1.0			Test pit TP02B terminated at 0.8 m Target depth				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey
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Engineering Log - Excavation

Excavation ID.	***TP02C***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
								ML	**Sandy SILT**: low plasticity, brown, with minor gravel.	D			**TOPSOIL**
						0.5		ML	**Sandy SILT**: low plasticity, brown, with some gravel, trace of wood fragments and organics.	M			**FILL**
			Not Encountered			1.5		ML	**Clayey SILT**: medium plasticity, blue-grey, trace of wood fragments and minor organics.				
						2.0							
						2.5							
						3.0							
						3.5		GW-GM	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, pale brown.	D			**SPRINGSTON FORMATION**
									Test pit TP02C terminated at 3.5 m Target depth				

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP03***		
sheet:	1 of 2		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
								ML	**Sandy SILT**: low plasticity, brown.	D			**TOPSOIL**
			Not Encountered			0.5		ML	**Clayey SILT**: medium plasticity, pale blue-grey, with trace of wood fragments, organics, and gravel.	M			**FILL**
						1.0							
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP03***		
sheet:	2 of 2		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
			Not Encountered					ML	**Clayey SILT**: medium plasticity, pale blue-grey, with trace of wood fragments, organics, and gravel. *(continued)*	M			**FILL**
								GW-GM	**Sandy GRAVEL**: fine - medium grained, well graded, sub-rounded, pale brown.	D			**SPRINGSTON FORMATION**
						4.5			Test pit TP03 terminated at 4.4 m Target depth				
						5.0							
						5.5							
						6.0							
						6.5							
						7.0							
						7.5							

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shearpeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP04A***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
						0.0		ML	**Sandy SILT**: low plasticity, pale brown.	D			**TOPSOIL**
						0.5		ML	**Clayey SILT**: low plasticity, grey-pale brown, with some gravel and wood fragments.	M			**FILL**
			Not Encountered			1.0							
						1.5							
						2.0		SM	**Sandy SILT**: low plasticity, pale brown, with some wood fragments.	D			
						2.5							
						3.0							
						3.5			**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, brown.				**SPRINGSTON FORMATION**

Test pit TP04A terminated at 3.85 m
Target depth

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

client:	***Rolleston Industrial Developments Limited***	Excavation ID.	***TP04B***
principal:	***-***	sheet:	1 of 1
project:	***1491 Springs Road***	project no.	***773-CHCGE280252***
location:	***Lincoln***	date excavated:	***14 Jan 2021***
		date completed:	***14 Jan 2021***
		logged by:	***C. Thompson***
		checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
			Not Encountered					ML	**SILTY SAND**: low plasticity, brown.	D			**TOPSOIL**
								GM	**Sandy SILT**: pale brown-grey.				**SPRINGSTON FORMATION**
									Test pit TP04B terminated at 0.2 m Target depth				
						0.5							
						1.0							
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP05***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
						0.0		ML	**SILTY SAND**: low plasticity, pale brown.	D			**TOPSOIL**
						0.5		SP	**Sandy SILT**: low plasticity, pale brown, with minor gravel.				**FILL**
			Not Encountered			1.0		ML	**SILT**: low plasticity, brown, with minor gravel, contains remnants of building material and organic fragments.	M			
						1.5							
						2.0							
						2.5							
						3.0		GM	**Sandy GRAVEL**: fine - coarse grained, well graded, low plasticity, blue-grey.	M			**SPRINGSTON FORMATION**
									Test pit TP05 terminated at 3.0 m Target depth				
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP06***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information							material substance						
method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) (100 200 300 400)	structure and additional observations
			Not Encountered					ML	**Sandy SILT**: low plasticity, brown.	D			**TOPSOIL**
						0.5		ML	**SILT**: low plasticity, blue-grey, with minor gravel, contains remnants of building material and organic fragments.	W			**FILL**
						1.0							
						1.5							
						2.0							
						2.5							
						3.0		GM	**Sandy GRAVEL**: fine - coarse grained, sub-rounded, brown.				**SPRINGSTON FORMATION**
									Test pit TP06 terminated at 3.1 m Target depth				
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP07***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
						0.0		ML	**SILTY SAND**: low plasticity, pale brown.	D			**TOPSOIL**
								ML	**SILT**: low plasticity, grey, with minor gravel, traces of wood and organic fragments.	M			**FILL**
			Not Encountered			0.5							
						1.0							
						1.5							
						2.0							
						2.5							
						3.0		GM	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, blue-grey.				**SPRINGSTON FORMATION**
									Test pit TP07 terminated at 3.0 m Target depth				
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP08A***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
			Not Encountered					ML	**Sandy SILT**: low plasticity, pale brown.	D			**TOPSOIL**
								ML	**SILT**: low plasticity, pale brown.				**SPRINGSTON FORMATION**
						0.5		GM	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, low plasticity, brown.	D			
									Test pit TP08A terminated at 0.45 m Target depth				
						1.0							
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Excavation

Excavation ID.	***TP08B***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
			Not Encountered			0.0		ML	**SILTY SAND**: low plasticity, pale brown.	D			**TOPSOIL**
								ML	**SILT**: low plasticity, pale brown.				**SPRINGSTON FORMATION**
						0.5		GM	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, brown.				
						1.0							
						1.5			Test pit TP08B terminated at 1.4 m Target depth				
						2.0							
						2.5							
						3.0							
						3.5							

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP08C***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) (100 200 300 400)	structure and additional observations
								ML	**SILTY SAND**: low plasticity, pale brown.	D			**TOPSOIL**
			Not Encountered			0.5		ML	**SILT**: low plasticity, brown-grey, with traces of gravel, wood and organic fragments.	M			**FILL**
						1.0							
						1.5							
						2.0							
						2.5		GM	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, yellow-brown.	M			**SPRINGSTON FORMATION**
									Test pit TP08C terminated at 2.6 m Target depth				
						3.0							
						3.5							

CDF_0_9_06_LIBRARY.GLB rev:AR Log COF EXCAVATION CHCGE280252 GINT LOGS.GPJ <<DrawingFile>> 28/01/2021 08:39

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP09A***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
			Not Encountered			0.0		ML	**SILTY SAND**: low plasticity, pale brown.	D			**TOPSOIL**
						0.5		ML	**SILT**: low plasticity, blue-grey, with some gravel, traces of organic and fibres.	M			**FILL**
						1.0							
						1.5							
						2.0		GM	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, yellow-brown.				**SPRINGSTON FORMATION**
						2.5			Test pit TP09A terminated at 2.4 m Target depth				
						3.0							
						3.5							

CDF_0_9_06_LIBRARY.GLB rev:AR Log COF EXCAVATION CHCGE280252 GINT LOGS.GPJ <<DrawingFile>> 28/01/2021 08:39

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

client:	***Rolleston Industrial Developments Limited***	Excavation ID.	***TP09B***
principal:	***-***	sheet:	1 of 1
project:	***1491 Springs Road***	project no.	***773-CHCGE280252***
location:	***Lincoln***	date excavated:	***14 Jan 2021***
		date completed:	***14 Jan 2021***
		logged by:	***C. Thompson***
		checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:
equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
						0.0		ML	**Sandy SILT**: low plasticity, brown.	D			**TOPSOIL**
			Not Encountered			0.5		ML	**SILT**: low plasticity, yellow-brown, with some gravel and traces of organic fragments.	M			**FILL**
						2.0		GM	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, yellow-brown.				**SPRINGSTON FORMATION**
						2.2			Test pit TP09B terminated at 2.2 m Target depth				
						2.5							
						3.0							
						3.5							

CDF_0_9_06_LIBRARY.GLB rev:AR Log COF EXCAVATION CHCGE280252 GINT LOGS.GPJ <<DrawingFile>> 28/01/2021 08:39

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shearpeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP10***		
sheet:	1 of 1		
project no.	***773-CHCGE280252***		
client:	***Rolleston Industrial Developments Limited***	date excavated:	***14 Jan 2021***
principal:	***-***	date completed:	***14 Jan 2021***
project:	***1491 Springs Road***	logged by:	***C. Thompson***
location:	***Lincoln***	checked by:	***B.Chau***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Hitachi 16t Track | excavation method: Swamp Bucket | excavation dimensions: 3.0 m long 1.2 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
						0		ML	**SILTY SAND**: low plasticity, brown.	D			**TOPSOIL / FILL**
						0.5		ML	**SILT**: low plasticity, brown, with some gravel.	M			**FILL**
			Not Encountered			1.0		ML	**SILT**: low plasticity, brown, with minor gravel, contains remnants of building material and organic fragments.	W			
						1.5							
						2.0							
						2.5		GM	**Sandy GRAVEL**: fine - coarse grained, well graded, sub-rounded, blue-grey.	M			**SPRINGSTON FORMATION**
						3.0			Test pit TP10 terminated at 2.75 m Target depth				
						3.5							

CDF_0_9_06_LIBRARY.GLB rev:AR Log COF EXCAVATION CHCGE280252 GINT LOGS.GPJ <<DrawingFile>> 28/01/2021 08:39

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Appendix E - Additional test data

DAVIS OGILVIE
Davis Ogilvie & Partners Limited
Level 1, 24 Moorhouse Avenue,Addington, Christchurch 8140
Office 0800 999 333 Email hello@do.nz
www.do.nz

DEEP INVESTIGATION RESULTS

Job Nº / **37441**
Test Nº / **BH 04**

PROJECT: 1484 - 1506 Springs Road, Lincoln (Various lots and DPs)
CLIENT: Lincoln Developments Limited
LOCATION: Refer to attached Geotechnical Site Plan (G02a).

Date: 05/07/18
Time: 9:00 AM
Excavation Method: Geoprobe 8140LC - track

COORDINATES: East 2466609 North 5727964
GRID: NZTM
RL GROUND:
DATUM: Ground
INCLINATION: Vertical
ORIENTATION:
HOLE DEPTH: 15.2m

Ground Water	USCS	Description	Weathering (SW, MW, HW, CW)	Graphic Log	Depth (m)	TCR (%)	SPT N-value (Uncorrected)	Sample	Backfill & Installation
	TS	Fine sandy SILT; dark brown. Moist, non-plastic contains rootlets (TOPSOIL)			0.00				Sand
	ML	Fine sandy SILT; greyish brown. Non-plastic.			0.50	100			
	SM	Silty fine SAND; greyish brown.			1.00				
	ML	Fine sandy SILT; grey mottled orange brown. Non plastic.			1.50	100		3, 8 / 8, 8, 9, 20 N = 45	
	GW	Fine sandy GRAVEL; greyish brown. Gravel is sub-rounded to sub-angular greywacke, densely compacted.			2.00	100			Bentonite
	GW	Fine to coarse GRAVEL with minor clay; grey. Gravel is sub-rounded greywacke, densely compacted.			2.50				
	GW	Fine to coarse sandy silty, fine to coarse GRAVEL with trace cobbles; grey.			3.00	100		8, 12 / 15, 20, 20, 5 N = 60	
					3.50	100			
					4.00	100			
					4.50			8, 7 / 8, 10, 7, 11 N = 36	
					5.00	100			
					5.50				
	GW	Fine to coarse GRAVEL; grey. Gravel is sub-rounded to sub-angular greywacke.			6.00			8, 18 / 13, 13, 13, 11 N = 50	
	GW	Fine to coarse sandy, fine to coarse GRAVEL with trace silt and trace boulders; grey.			6.50	50			
					7.00				
					7.50	100		3, 5 / 9, 10, 9, 10 N = 38	
					8.00				
					8.50	100			
	GW	Fine to coarse sandy silty, fine to coarse GRAVEL with trace cobbles; greyish brown. Densely compacted.			9.00	100		10, 17 / 23, 37 N = 60	
					9.50				
					10.00	100			
					10.50			14, 18 / 19, 20, 21 N = 60	
	GW	Fine to coarse sandy, fine to coarse GRAVEL with trace silt; greyish brown. Densely compacted.			11.00	100			Surrounding ground collapse
					11.50				
					12.00	100		13, 17 / 18, 18, 20, 4 N = 60	
					12.50				
					13.00	100			
					13.50				
					14.00	100		6, 6 / 12, 17, 23, 8 N = 60	
					14.50				
		EOH: 15.20m			15.00	100			
								18, 18 / 18, 15, 20, 7 N = 60	

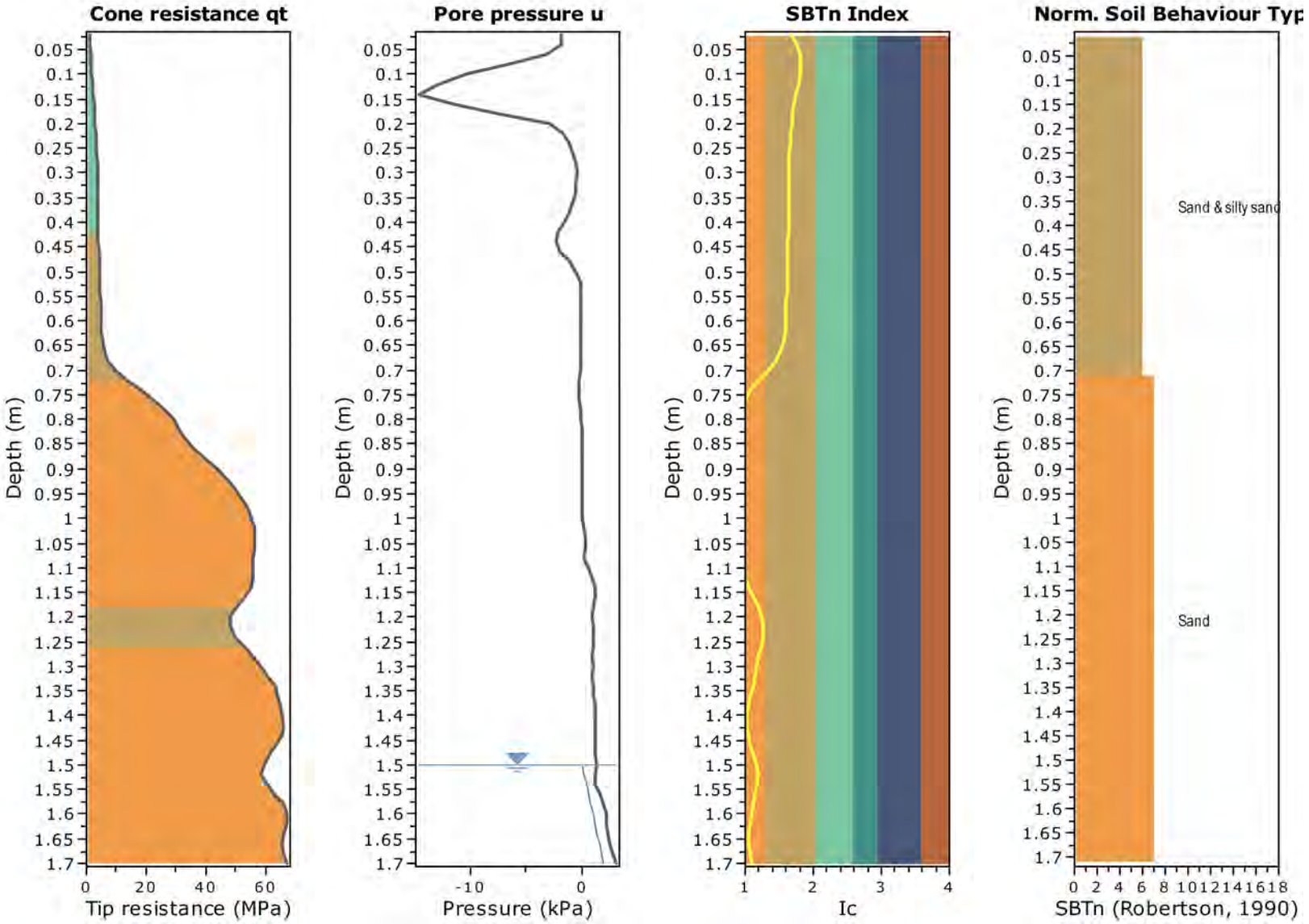
Logged By:	Start Date:	Remarks
KT	05/07/2018	
Plotted By:	**End Date:**	
KL	05/07/2018	
Checked By:	**Driller:**	
KT	McMillan Drilling	

NZGD ID: BH_113495

Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 113582
Total depth: 1.70 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

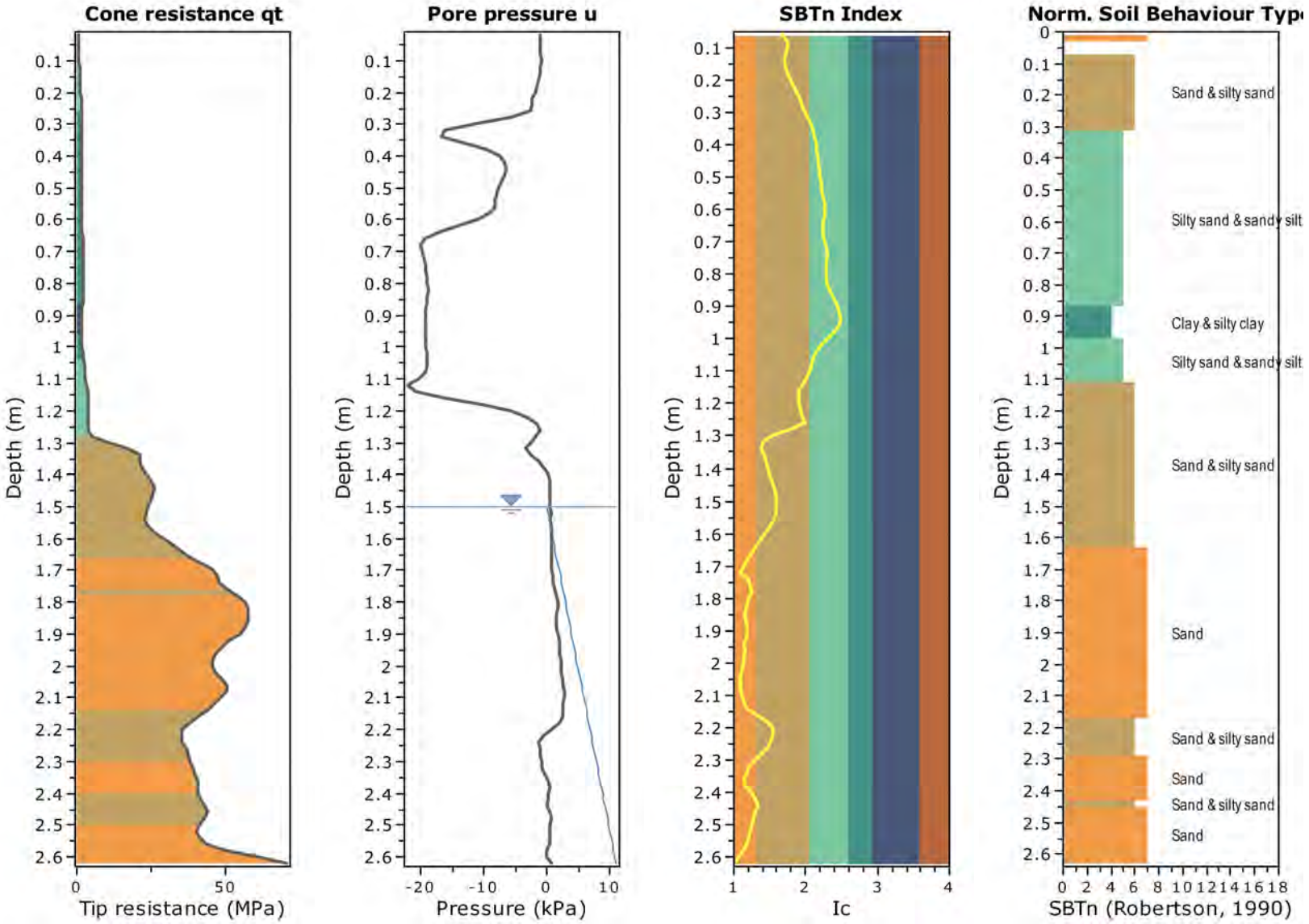
Project: **1491 Springs Road Lincoln**
Location:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 113586
Total depth: 2.62 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

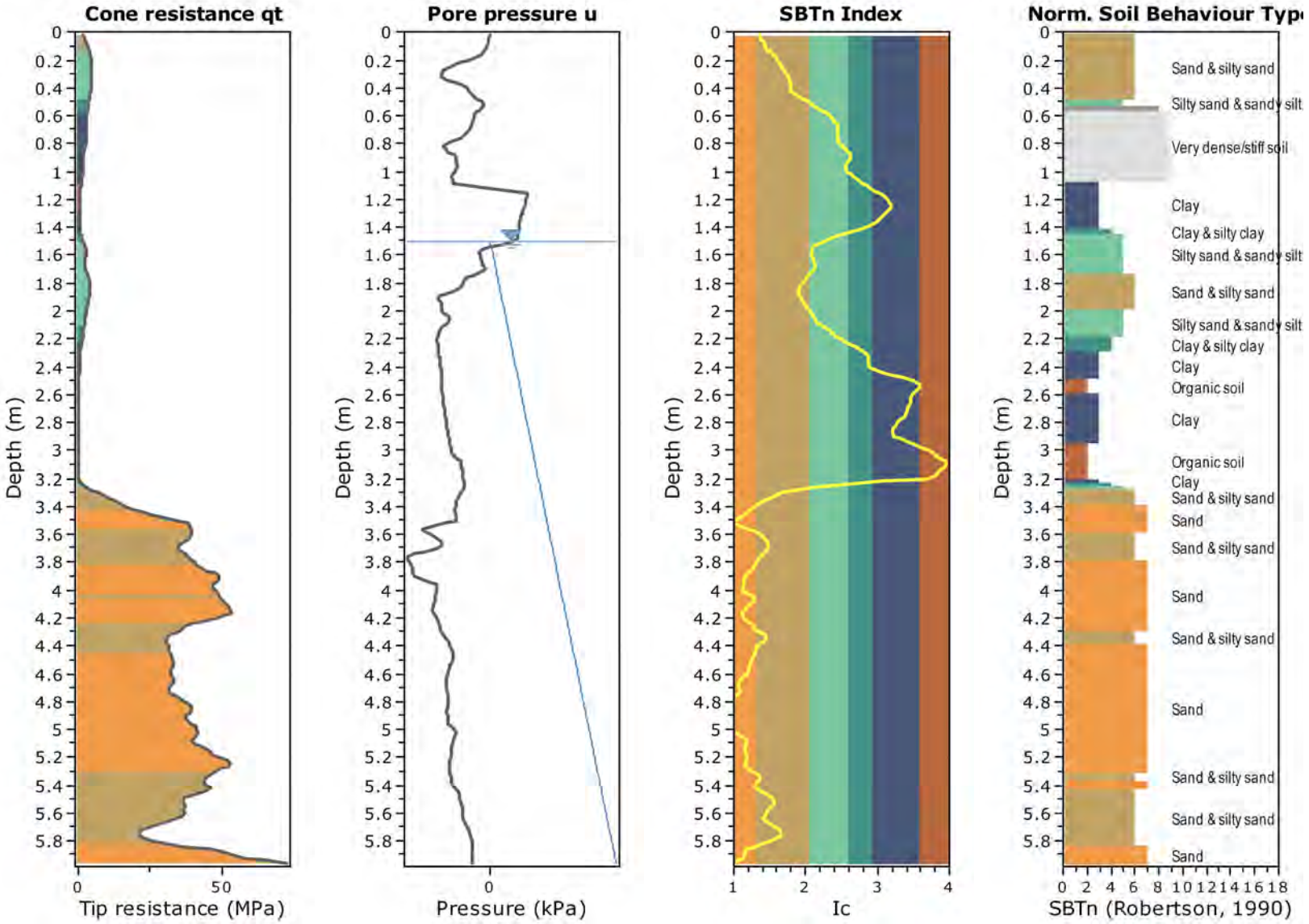
Project: **1491 Springs Road Lincoln**
Location:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

Project: **1491 Springs Road Lincoln**
Location:

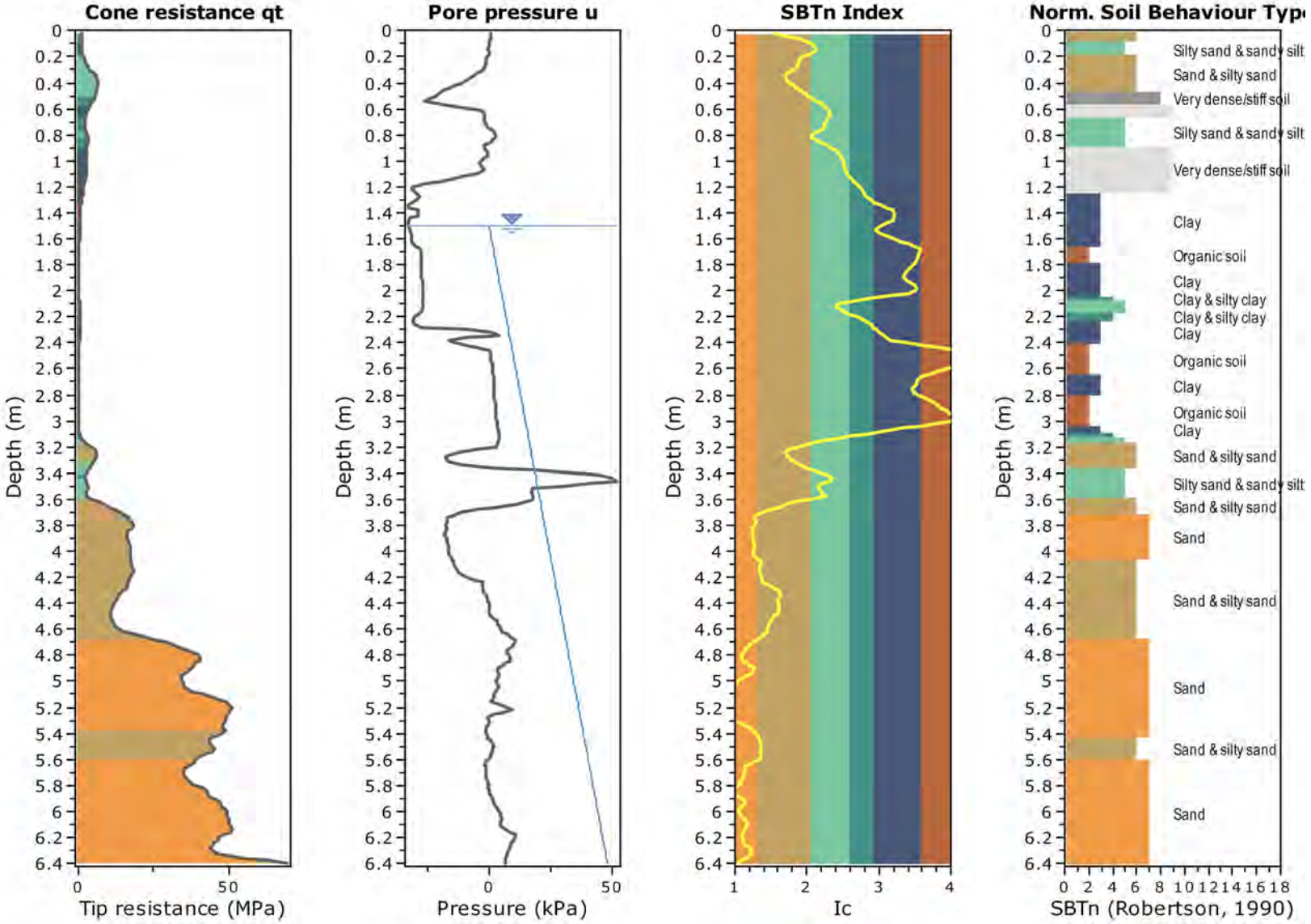
CPT: CPT 125194
Total depth: 5.96 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 125215
Total depth: 6.40 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

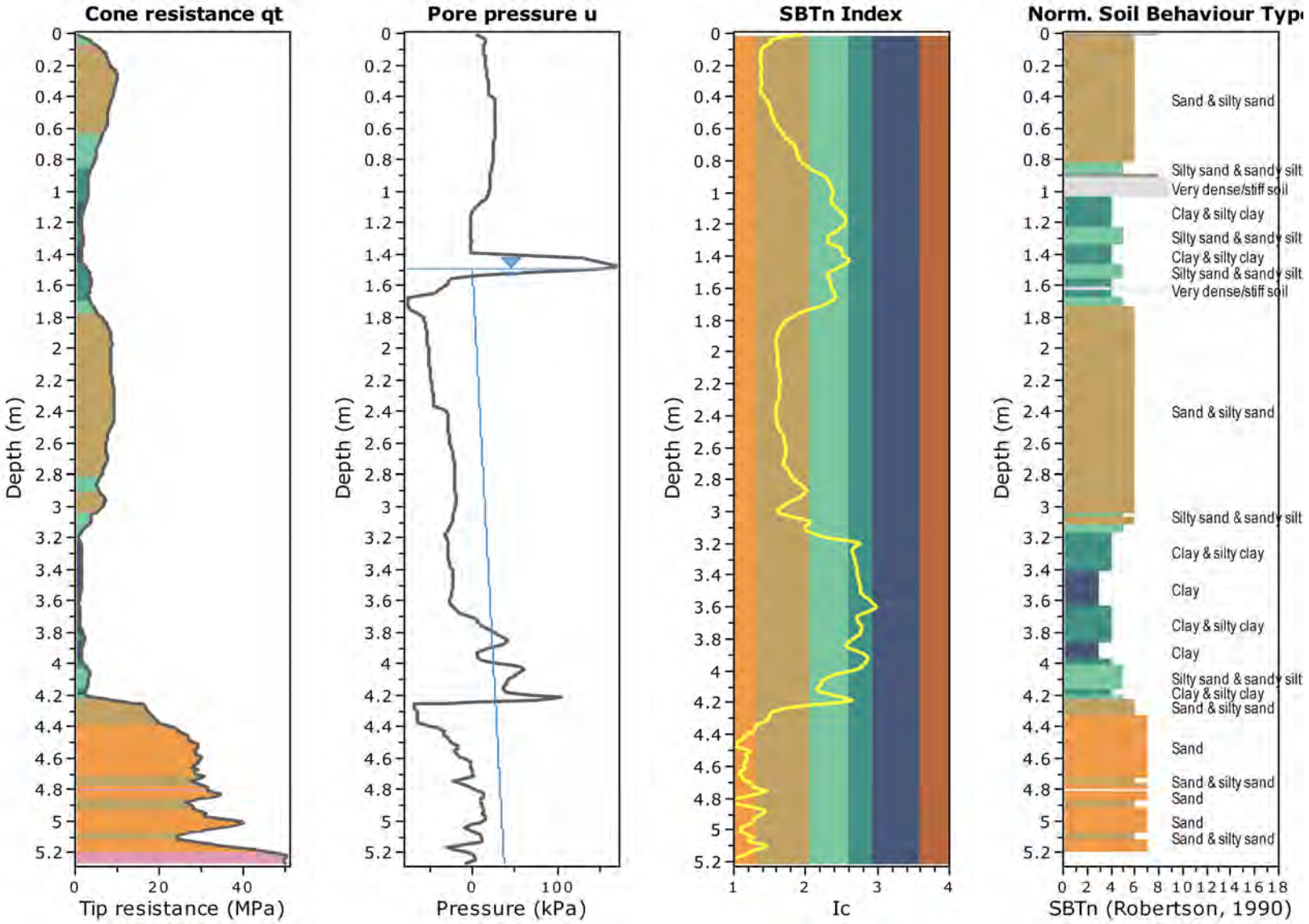
Project: **1491 Springs Road Lincoln**
Location:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 136840
Total depth: 5.27 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

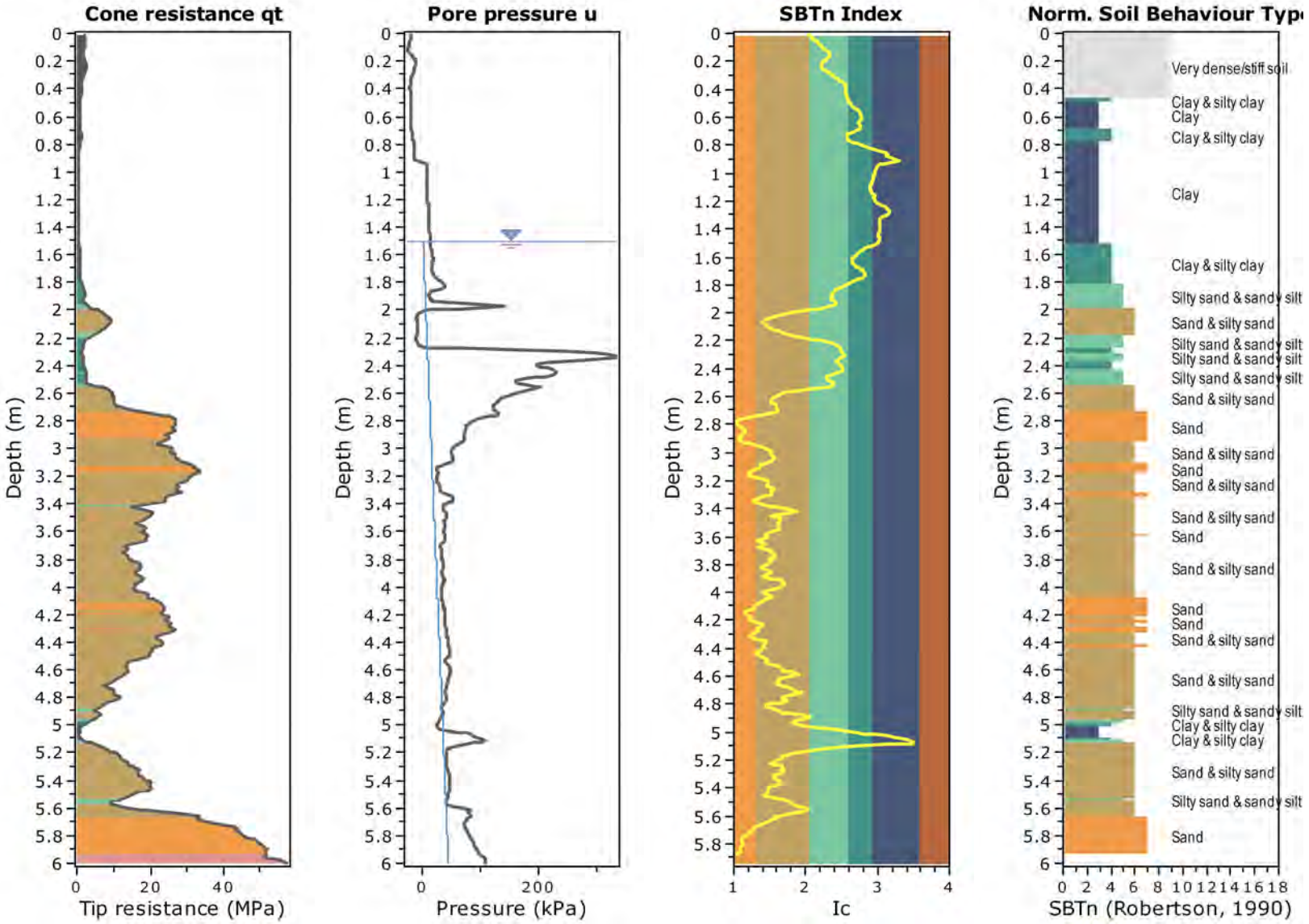
Project: **1491 Springs Road Lincoln**
Location:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 136850
Total depth: 6.00 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **1491 Springs Road Lincoln**
Location:



Coffey
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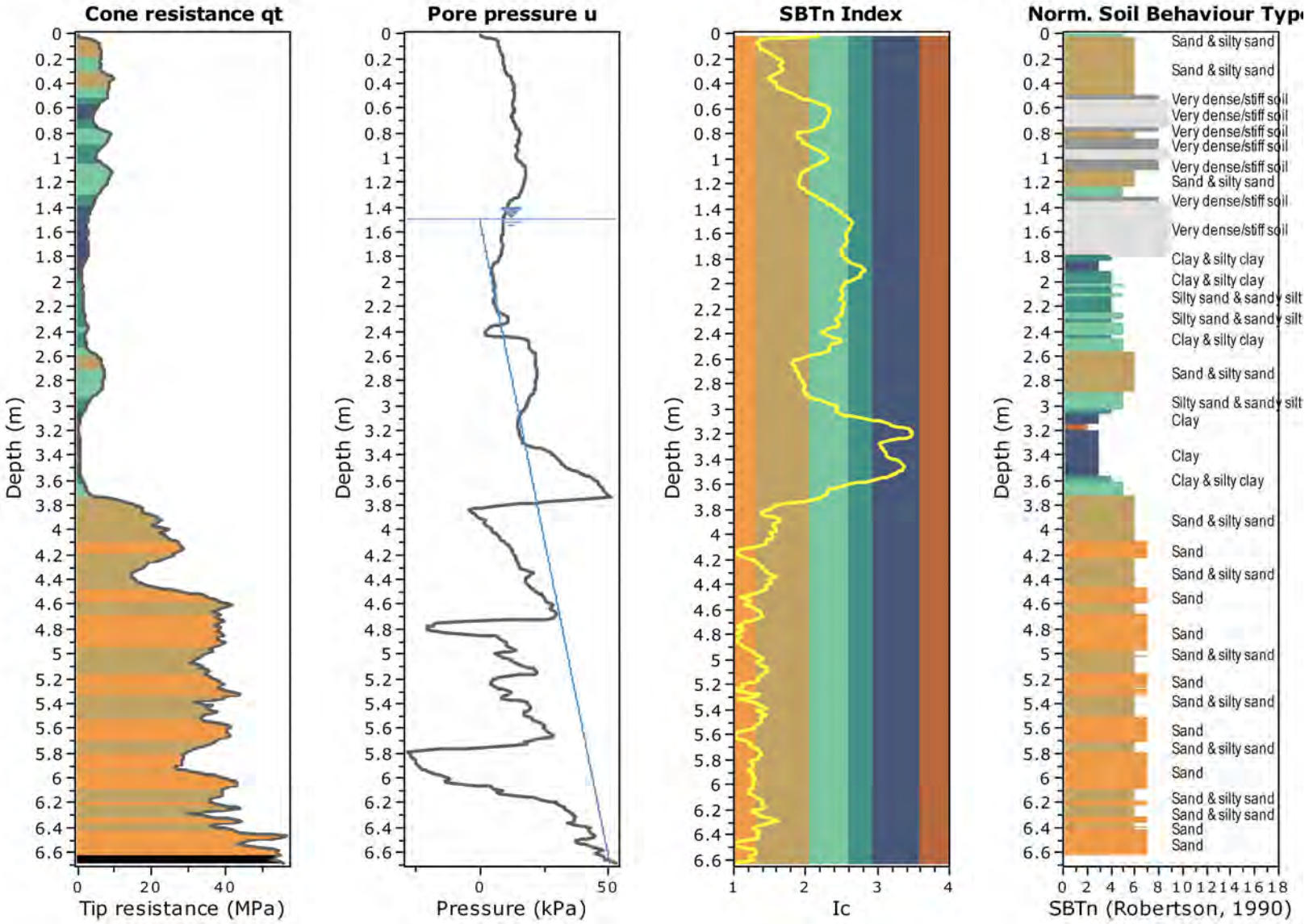
Project: **1491 Springs Road Lincoln**
Location:

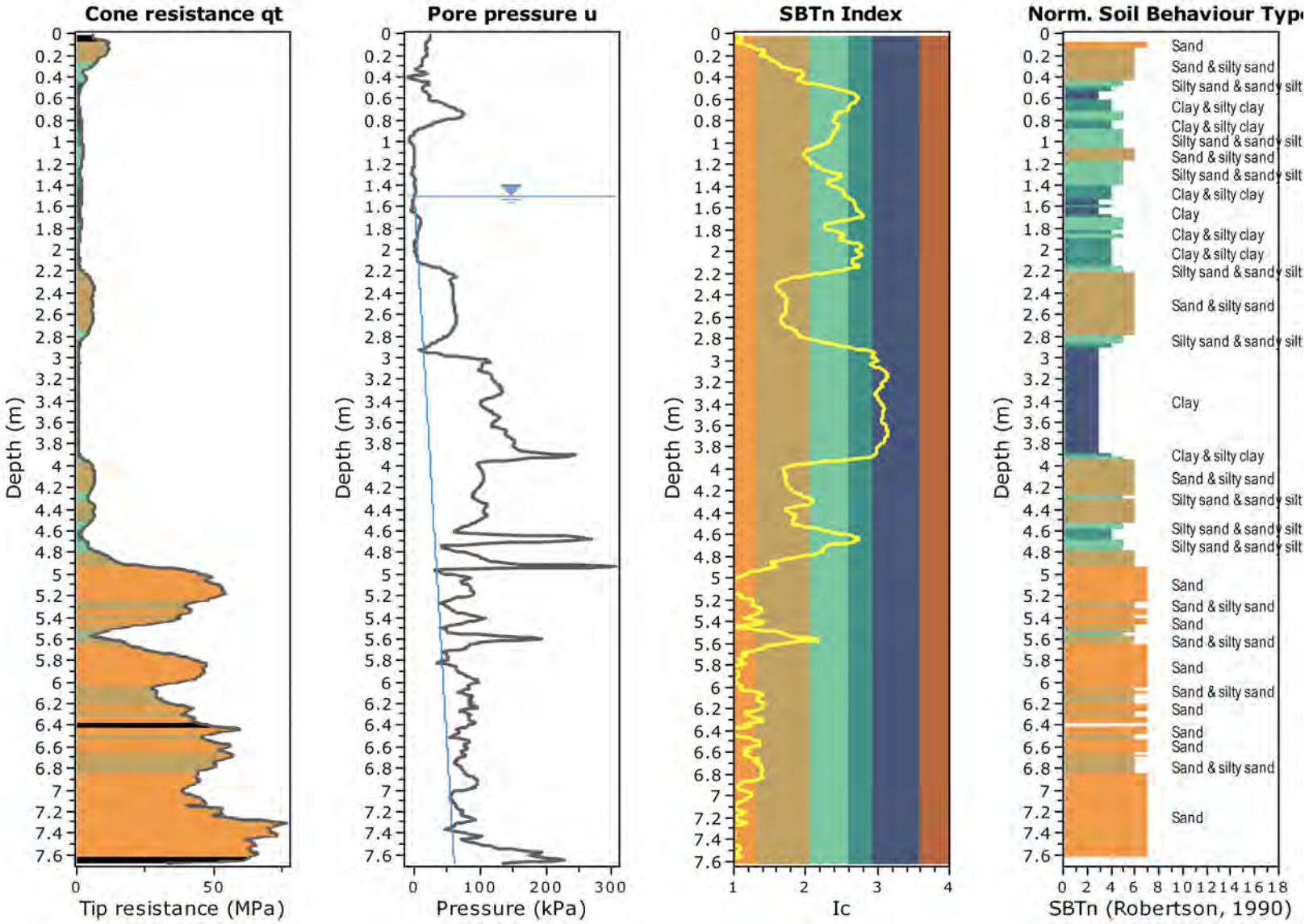
CPT: CPT 136855
Total depth: 6.69 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 152915
Total depth: 7.68 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

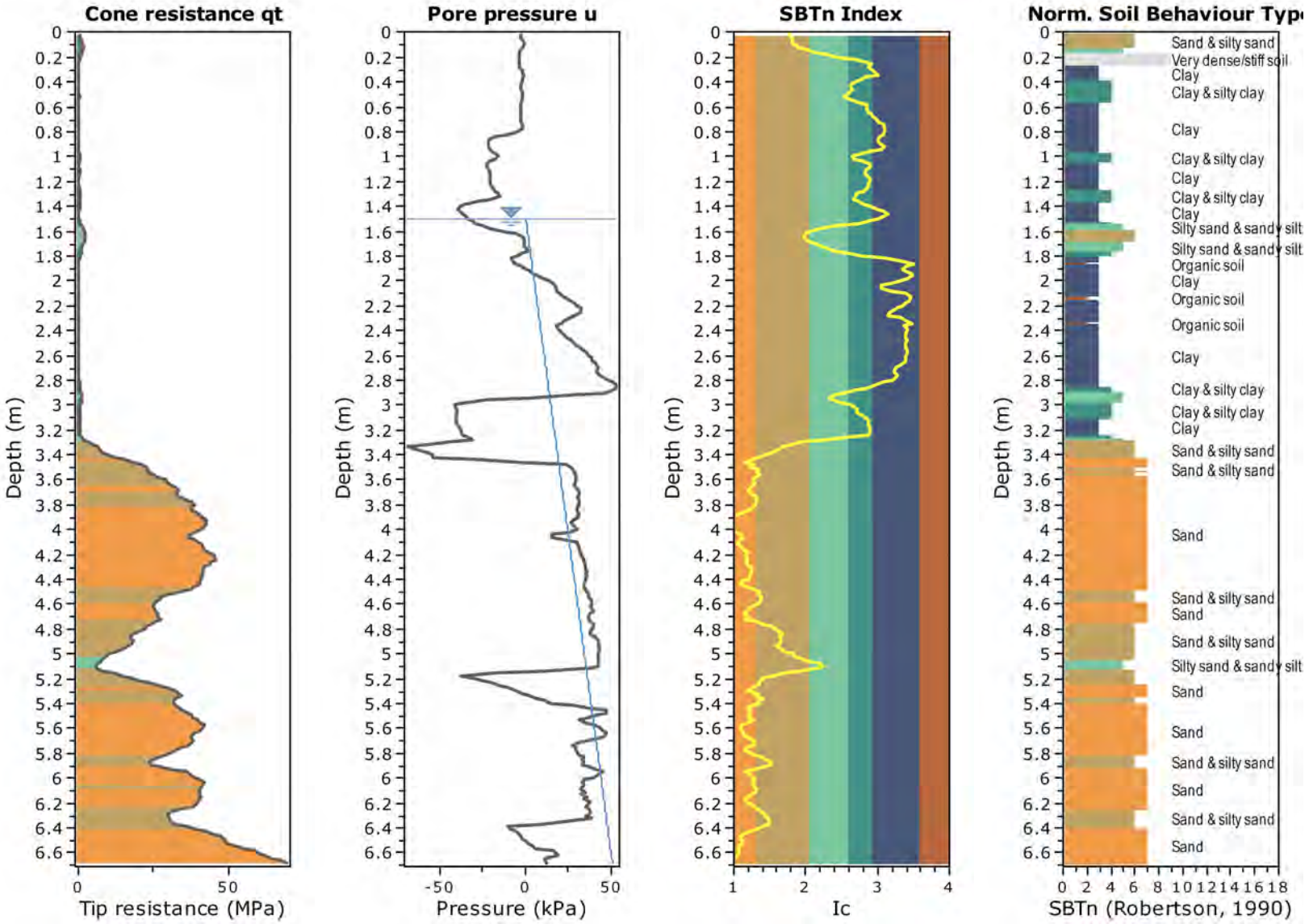
Project: **1491 Springs Road Lincoln**
Location:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

Project: **1491 Springs Road Lincoln**
Location:

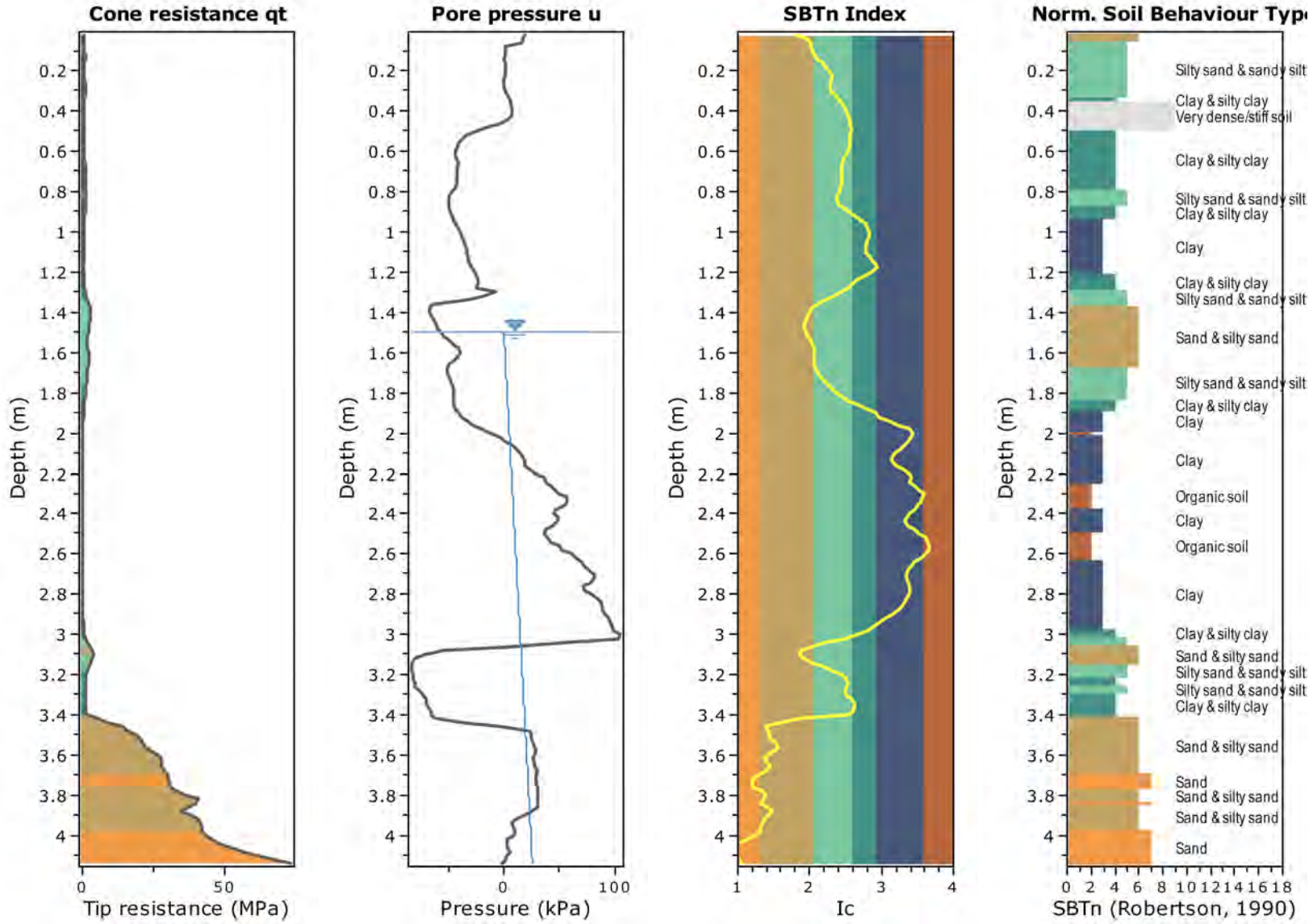
CPT: CPT 56181
Total depth: 6.69 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 56182
Total depth: 4.14 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

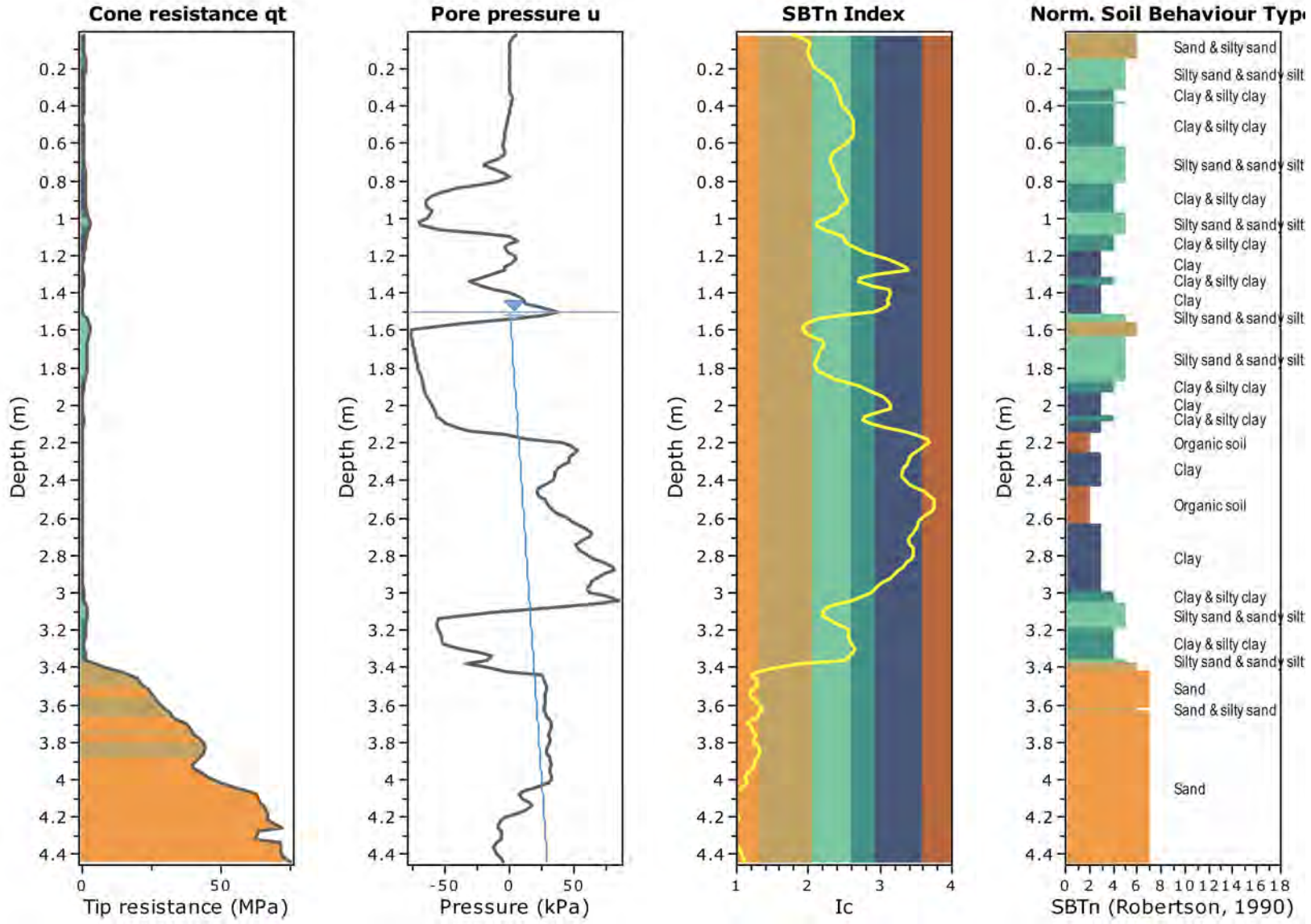
Project: **1491 Springs Road Lincoln**
Location:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 56183
Total depth: 4.44 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

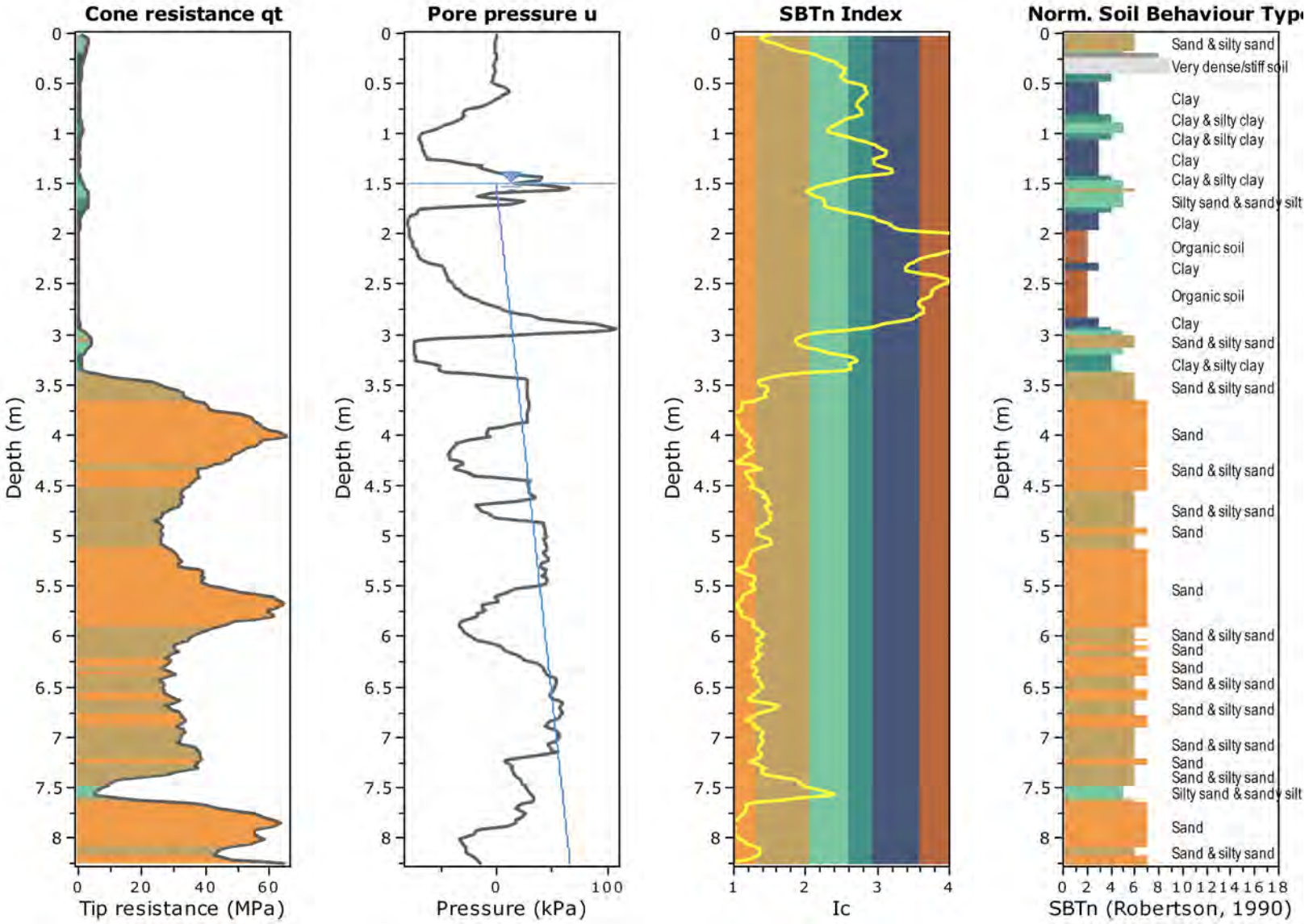
Project: **1491 Springs Road Lincoln**
Location:



Coffey
1/254 Montreal Street
Christchurch 8013
www.coffey.com

CPT: CPT 56184
Total depth: 8.26 m, Date: 27-Jan-21
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

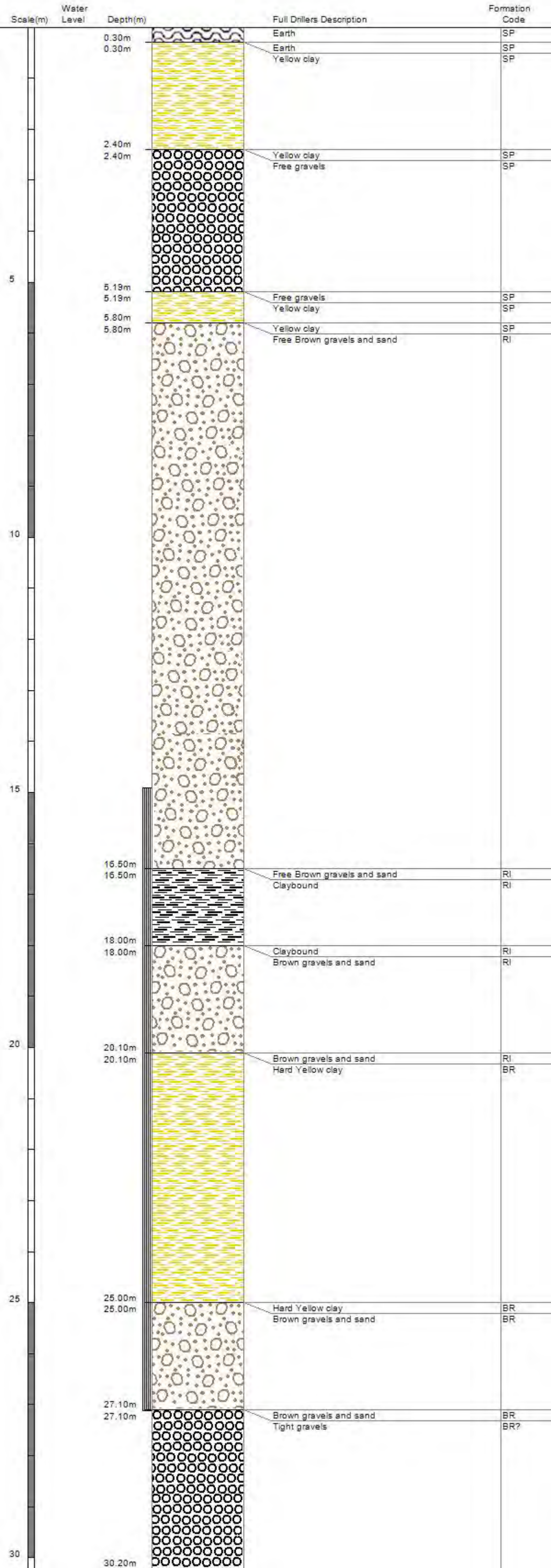
Project: **1491 Springs Road Lincoln**
Location:



Borelog for well M36/1419

Grid Reference (NZTM): 1557218 mE, 5166208 mN
Location Accuracy: 2 - 15m
Ground Level Altitude: 7.7 m +MSD Accuracy: < 0.5 m
Driller: McMillan Drilling Ltd
Drill Method: Cable Tool
Borelog Depth: 30.2 m Drill Date: 06-Dec-1974

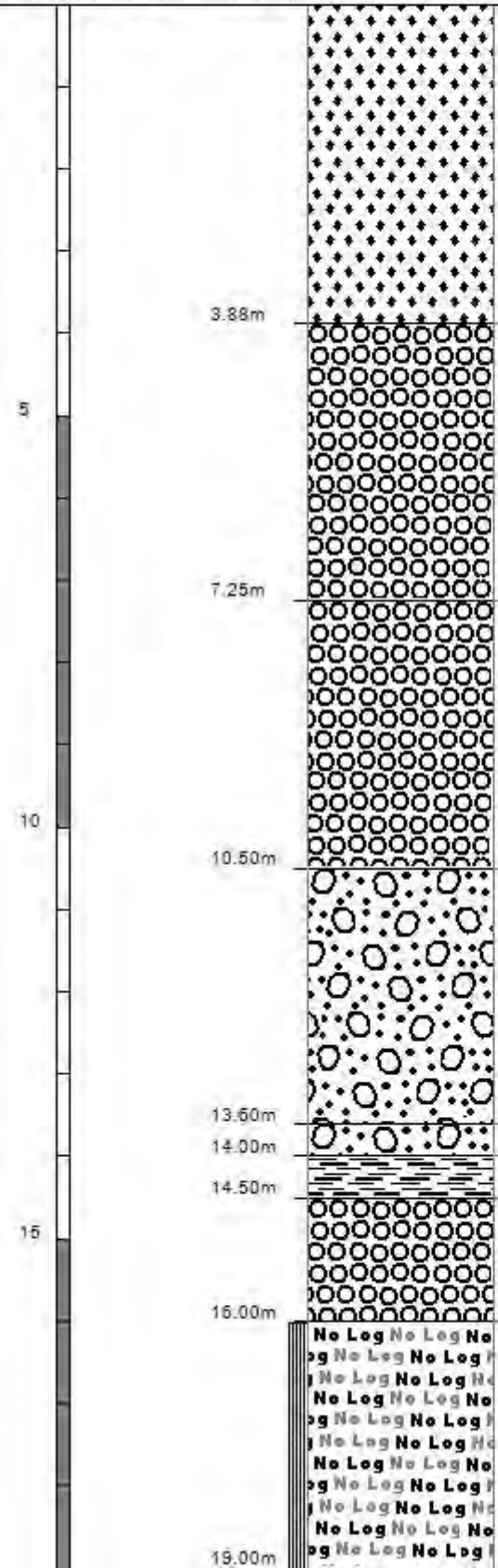
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M36/2834

Grid Reference (NZTM): 1557245 mE, 5166013 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 9.6 m +MSD Accuracy: < 2.5 m
Driller: Smith, J R & I G
Drill Method: Cable Tool
Borelog Depth: 19.0 m Drill Date: 06-Jul-1982

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

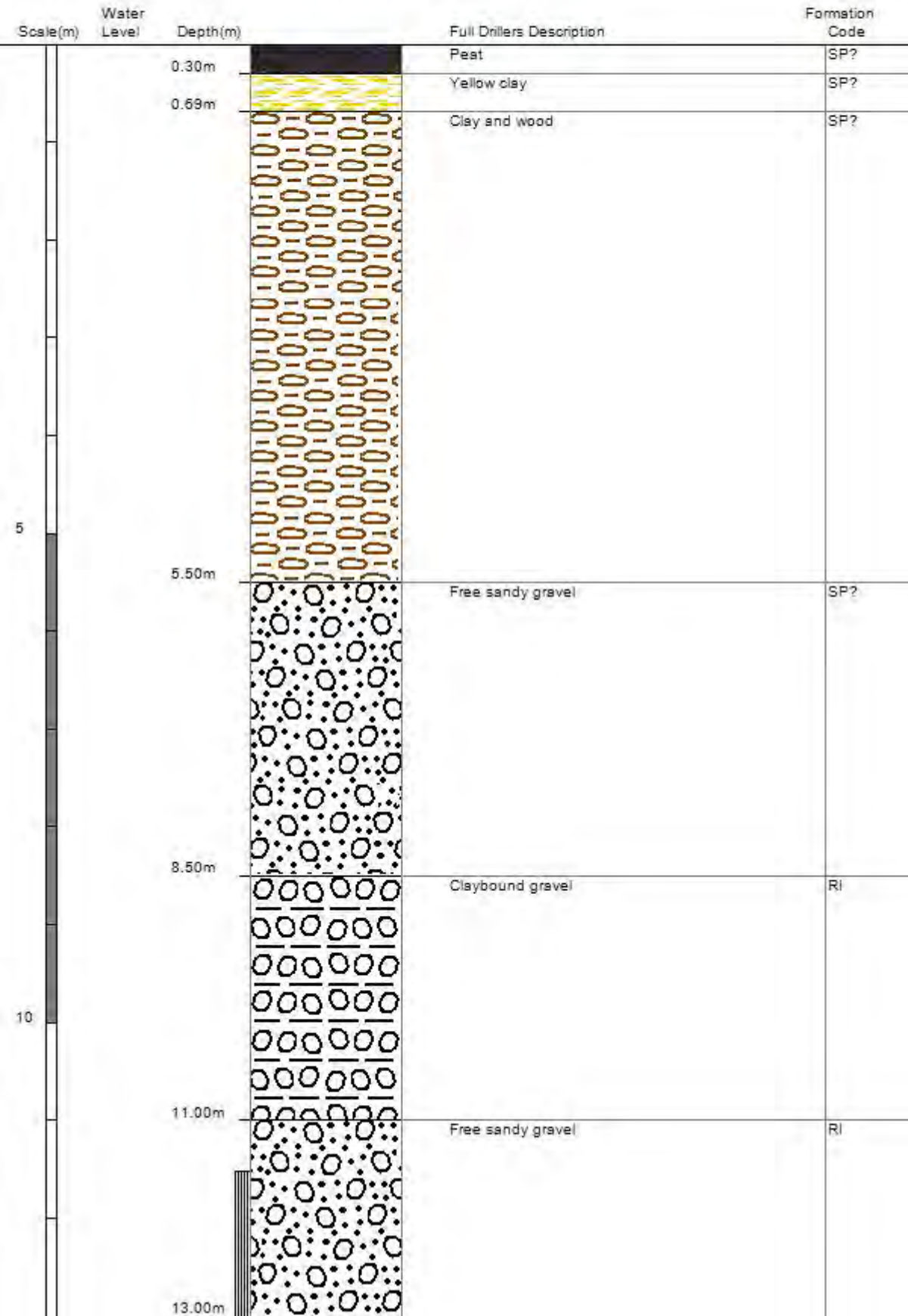


Full Drillers Description	Formation Code
Sand	SP
Free gravel	SP
Free gravel	SP
Free gravel and sand	RI
Tighter gravel and sand	RI
Clay	RI
Free gravel	RI
No log	RI

Borelog for well M36/5054

Grid Reference (NZTM): 1558545 mE, 5165643 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 7.9 m +MSD Accuracy: < 2.5 m
Driller: Smiths Welldrilling
Drill Method: Cable Tool
Borelog Depth: 13.0 m Drill Date: 20-Nov-1993

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M36/7531

Grid Reference (NZTM): 1557605 mE, 5166323 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 8.0 m +MSD Accuracy: < 0.5 m
Driller: McMillan Drilling Ltd
Drill Method: Rotary Rig
Borelog Depth: 24.0 m Drill Date: 01-Mar-2004

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code
			Earth	SP
		0.60m		
		0.60m	Earth	SP
			moist brown clay	SP
		3.80m		
		3.80m	moist brown clay	SP
			very moist silty blue clay	SP
5		5.50m		
		5.50m	very moist silty blue clay	SP
			free very wet sandy gravel	RI
		8.40m		
		8.40m	free very wet sandy gravel	RI
			free lightly stained water-bearing sandy gravel	RI
		9.50m		
		9.50m	free lightly stained water-bearing sandy gravel	RI
10			free lightly stained water-bearing sandy gravel	RI
		11.00m		
		11.00m	free lightly stained water-bearing sandy gravel	RI
			very free lightly stained water-bearing sandy gravel	RI
		13.80m		
		13.80m	very free lightly stained water-bearing sandy gravel	RI
			clay-bound sandy gravel	RI
15		15.00m		
		15.00m	clay-bound sandy gravel	RI
			sand, few gravels	RI
		16.70m		
		16.70m	sand, few gravels	RI
			lightly stained, water-bearing, very sandy gravel	RI
20		20.60m		
		20.60m	lightly stained, water-bearing, very sandy gravel	RI
		21.20m	claybound gravel	RI
		21.20m	claybound gravel	RI
			lightly stained water-bearing sandy gravel	RI
		23.95m		

Borelog for well M36/7635

Grid Reference (NZTM): 1557146 mE, 5165803 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 6.4 m +MSD Accuracy: < 0.5 m
Driller: McMillan Drilling Ltd
Drill Method: Rotary Rig
Borelog Depth: 8.8 m Drill Date: 14-Apr-2004

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code
			Earth	SP
		0.20m		
		0.20m	Earth	SP
			moist sandy gravel	SP
1		1.00m		
		1.00m	moist sandy gravel	SP
			dark brown peat and glass	SP
		1.70m		
		1.70m	dark brown peat and glass	SP
			moist dark brown sandy peat	SP
2		2.10m		
		2.10m	moist dark brown sandy peat	SP
			very moist very sandy gravel	SP
		2.60m		
		2.60m	very moist very sandy gravel	SP
			wet sandy gravel	SP
3				
		4.50m		
		4.50m	wet sandy gravel	SP
			sandy gravel	SP
5				
6				
7		7.30m		
		7.30m	sandy gravel	SP
			water-bearing sandy gravel	SP
8		8.00m		
		8.00m	water-bearing sandy gravel	SP
			free water-bearing stained sandy gravel	SP
		8.80m		

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Design Review Sheet (DRS)

Details of project being reviewed			Review	
Project Name: 1491 Springs Road			**Reviewer Name:** Ian McCahon – Geotech Consulting	
Design Review Stage: Plan Change	**Review Due Date:** N/A			
Report No: 773-CHCGE280252	**Revision Date:** 20/10/20	**Revision No:** 1	**Revision Date:**	**Revision No:**
Report Title: Geotechnical Assessment Report for 1491 Springs Road, Lincoln	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Project Manager: Chris Thompson	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

This package comprises:			Comment Type	
☐ Specifications	☐ Spreadsheets	☐ Calculations	1	Critical issue – to be resolved
☐ Drawings	☐ Supplier data	☒ Reports	2	Important issue – request change
☐ Other:			3	Discussion item – potential change (address during next stage)
			4	Note to originator – no change necessary

Item No.	Referenced Document	Comments	Date	Comment type	Responses	Date	Comment Closed (Y/N)
1	773-CHCGE280252 GAR Rev 1	Point #2 – Site testing - comment The MBIE guidance suggests 0.2 to 0.5 deep tests per hectare at plan change stage to characterize the soil profile to a depth of at least 15m. This gives a range	20/11/20	3	After the initial review, additional investigation has been carried out, and nearby data available from the NZGD and ECan well records has been added. This bring the number of investigations to 54 locations (plus MASW) which is in	28/01/21	

		35 to 89 tests for the 178 ha area as given in the Coffey report, or about twice the number actually made. The western part west of Springs Road has only six tests with spacing up to 0.7 km apart. The MASW surveys help, but they are along part of one side of the site and in the eastern quarter. The number and depth of testing is questionable (refer to comments in (2), below). More testing is essential at subdivision consent stage, if the plan change proceeds.			the range suggested by MBIE. We note that the western portion of the site appears to be geologically consistent so for this plan change the test density in this area is considered acceptable.		
2	""	Point #3 – Subsurface Conditions - comment The MASW profiles do not correlate particularly well with the stratigraphy inferred from the CPT tests. Our experience with MASW profiling on other sites in the Christchurch area has also highlighted a need for caution with their interpretation. The report does not refer to any geotechnical information other than the CPTs and MASW made as part of this investigation, and therefore there is no confirmation of soil types below the depth of the CPT tests, many of which are relatively shallow and with an average depth of only 5.5m. We have checked several bores on the Ecan well data base. The four looked at do show gravel soils	20/11/20	3	Coffey reviewed the NZGD and ECan boreholes as part of the initial assessment and concluded that the majority of the site was underlain (at varying depths) by dense gravel soils hence the choice of CPTs to confirm the upper soil profile (borehole and well logs appended to updated report for reference). For subdivision consent, we expect to carry out several machine drilled boreholes to confirm this layer on the site. Due to time constraints, the MASW was not able to be calibrated with the on site CPTs, this will be carried out during the subdivision consent phase. We note that the MASW did consistently identify shear wave velocities in excess of	28/01/21	

		from a depth similar to that shown in the closest CPT tests, and it does appear that the soils below about 5m are dense enough and of a grading such that liquefaction is not an issue. However, we recommend that Coffey research publicly available borehole information (Ecan well data base and NZ Geotechnical Database) to verify the deeper profile. This will probably also increase the number of locations where ground conditions are known, particularly along the northern side, and thus enhance confidence in the overall geotechnical model. The soil profile as described is generally consistent with that determined for the subdivisions along the north side. We note that the area to the northeast does contain significant amounts of organics in places, such that careful consideration had to be given to how these more compressible soils would respond to filling and building loads. Without any sampling by test pit or borehole in this plan change area, there is a possibility that organic soils will be more widespread than anticipated.			200m/s, indicating dense materials that are unlikely to liquefy at depth. As shown in the ODP, the eastern area is proposed to comprise stormwater management areas and Living X (large Lot residential sites) due to the potential increased risk of poor ground conditions (yet to be determined prior to subdivision consent stage). We expect the northeastern and eastern areas of the site will require the most intensive investigation to confirm ground conditions.		
3	“”	Point #4 – Liquefaction Potential - comment	20/11/20	2	Agreed, lateral spread / stretch risk will be assessed once a subdivision plan is further developed. Initially, we consider	28/01/21	

		The analysis is by the MBIE standard procedure with appropriate input parameters. The use of a 1m water table depth for the eastern part is probably conservative. As no liquefaction outputs are provided, it is not known at what depths the liquefaction is predicted to occur. There is no discussion of evidence of ground damage in the 2010-11 earthquakes. It is noted that the site has certainly been well tested to in excess of SLS shaking and probably in excess of ULS shaking in the September 2010 earthquake, yet the closest residential land at the time of the earthquakes – further north with generally more sandy soils - was all classified Foundation Technical Category TC1 by MBIE, suggesting little to no ground damage. The recent subdivisions adjacent to the north side also considered liquefaction. The land north of the subject land and west of Springs Road was concluded to be mostly TC1 with two small areas of equivalent TC2, similar to the conclusions in this report. The Te Whariki subdivision has had numerous reports comp0lied for it and the various stages. For one stage on the east side of Springs Road, an early report designated the whole area as			that potential TC2 foundations, on Lots adjacent to waterways (dependent on their distance from such waterways), will mitigate any risk associated with lateral spread / stretch.		

		requiring TC2 foundations, to address both peat consolidation issues as well as some areas of higher liquefaction hazard. A later report by another consultant amended this to TC1 for most of the area with TC2 restricted to only 6% of the lots where proximity to natural springs or detention basins increased lateral spread hazard. Therefore, the current report is consistent in general conclusion with the work done on adjacent areas, which are on very similar ground conditions. Lateral spread has not been assessed. This will need to be addressed at subdivision consent stage for land along all waterways, either natural or formed, and around stormwater detention ponds and the like. Our conclusion is that the analysis and conclusions are probably appropriate, but that Coffey need to comment on lateral spread as a potential hazard.					
4	SDC PC200069 RFI dated 10 December 2020 [Erratum 16 December 2020] item #68	It is also noted that the geotechnical assessment provided does not cover all of the plan change area – excluding 208 Collins Road, 1521 and 1543 Springs Road. While the reviewer has not made comment on this matter, please provide	10/12/20 & 16/12/20	2	Coffey consider that the ground conditions for the three land parcels mentioned, along with 36 Collins Road, to be consistent with surrounding investigations already completed for the larger areas. 208 Collins Road, 1521 and 1543 Springs Road are considered to be	28/01/21	

		advice on the appropriateness of land conditions of these parcels.			low risk geotechnically. 36 Collins Road has more potential geotechnical risk however 4 CPTs are present on this site that can be incorporated into the subdivision consent stage investigations. The CPT traces are included in the updated report (CPTs 56181 to 56184)		
END OF COMMENT							

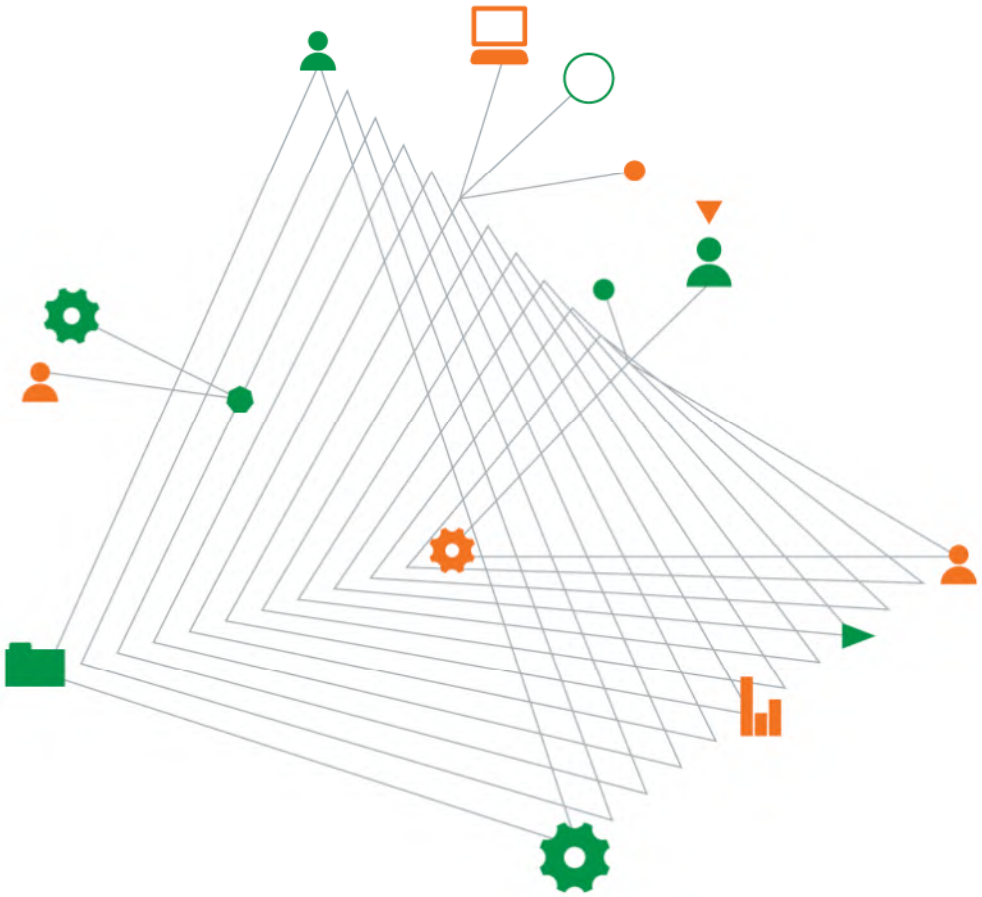
Attachment 10: Amended Preliminary Site Investigation - Coffey

Rolleston Industrial Developments Limited

Preliminary Site Investigation

1491 Springs Road, Lincoln

21 December 2020



Experience comes to life when it is powered by expertise

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Preliminary Site Investigation - 1491 Springs Road, Lincoln

Prepared for
Rolleston Industrial Developments Ltd

Prepared by
Coffey Services (NZ) Limited
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NZBN: 9429033691923

Project Reviewer	Emma Waterhouse Principal Environmental & Social Consultant
Project Manager	Ray Mayor Project Environmental Engineer

21 December 2020

773-CHCGE280252

Quality information

Revision history

Revision	Description	Date	Originator	Reviewer	Approver
v0 draft	Original Draft	14/10/2020	Alistair Brown	Ray Mayor	David Tully

Distribution

Report Status	No. of copies	Format	Distributed to	Date
Final	1	PDF	Rolleston Industrial Developments Ltd	19/10/2020
Revised Final	1	PDF	Rolleston Industrial Developments Ltd	21/12/2020

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Appendices

1. Introduction

Coffey Services (NZ) Limited (Coffey) has been commissioned by Rolleston Industrial Developments Ltd ('the client') to conduct a Preliminary Site Investigation (PSI) to support the proposed Plan Change and future subdivision for the property located at 1491 Springs Road, Lincoln (the "site", Figure 1).

The proposed Plan Change area comprises a series of land parcels located to the south of Lincoln, bordering the existing Te Whariki and Verdeco Park subdivisions.

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) (NESCS) Regulations apply to selected activities on sites where an activity or industry on the Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL) is, has, or is more likely than not to have occurred. The objective of this PSI was to assess the potential for contaminants to have been deposited at the site as a result of current and/or historical activities undertaken within or in the immediate vicinity of the site and accordingly determine if any further investigation work is required under the NES.

This PSI report has been reviewed by a Suitably Qualified and Experienced Practitioner (SQEP), as required by the NES.

1.1. Objectives

The objectives of this PSI were to:

- Identify potentially contaminating (HAIL) activities or potential sources of contamination that might have occurred or exist at the site.
- Confirm the suitability of the land for subdivision and provide recommendations regarding additional works required prior to any future development.

1.2. Scope of works

The scope of work was undertaken in general accordance with the staged process defined by the Ministry for Environment (MfE) Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils (revised 2011) and the findings are presented in accordance with the MfE Contaminated Land Management Guideline No.1: Reporting on Contaminated Sites in New Zealand (revised 2011). Both the above documents are incorporated by reference into the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES).

In summary, the following scope of works was undertaken:

- Review of Environment Canterbury's Listed Land-Use Register (LLUR) for the site.
- Review of published geological maps and the Coffey database to appraise likely soil and groundwater conditions at the site.
- Review of selected publicly available aerial photographs or other accessible historical photographs.
- Site walkover, focussed on areas with structures or visible land disturbance to consider land contamination indicators (e.g. visual evidence of waste dumping/material spills, chemical storage and/or usage areas, anomalous die-back in vegetation, ground staining).

- Preparation of this PSI report. As required by the NESCS, this report was reviewed and approved by a suitably qualified and experienced practitioner (SQEP).

This PSI is limited to the above scope of works. A building asbestos survey and review of property files was not included in this scope of works; therefore, the property files will require review and it is recommended an asbestos survey be completed as part of any future detailed site investigation to inform all potential HAIL activities that may have occurred on the site.

2. Site information

2.1. Site description

The site is located approximately 2.5 km south-west of the central Lincoln township and approximately 20 km south-west of Christchurch's central business district.

The site is bordered by agricultural land-use in all directions with a stream running along the eastern boundary of the site. The site is irregular in shape with predominately flat topography. The details of the site are listed in Table 1.

Table 1: Site information

Address	Legal Description	Property Area (m^2)
1491 Springs Road, Lincoln	LOT 2 DP 494430 PT LOT 1 16247 LOTS 1-2 DP 5095 PT LOTS 1-3 DP 4157 LOT 8 DP 686 31 RS 38994 40021 PT RS 2951 PT RS 5844 PT RS 2456 PT RS 2933 BLK VIII LEESTON S D	1,781,300
36 Collins Road, Lincoln	LOT 7 DP 68631 BLK V HALSWELL SD	44,900
1521 Springs Road, Lincoln	LOT 1 DP 20660 BLKS V HALSWELL SD VIII L EESTON SD	61,200
1543 Springs Road, Lincoln	LOT 1 DP 494430	6,400
208 Collins Road, Lincoln	LOT 1 DP 55313 BLK VIII LEESTON SD	17,700

2.2. Geology and hydrogeology

The geological map indicates that surface geology consists of OIS1 (Holocene) river deposits which is primarily described as modern river floodplain/low-level degradation tce. Unweathered, variably sorted gravel/sand/silt/clay surfaces <2 degree slope.

The nearest surface water body to the site is the L II River located on the eastern boundary of the site. This river flows in a general southerly direction eventually feeding into Lake Ellesmere approximately 10 km south of the site.

For further information, refer to Coffey's Geotechnical Assessment Report produced in October 2020.

2.3. Site history

The following sections summarise the historical activities undertaken within or in the immediate vicinity of the site, as determined from the information sources reviewed during this PSI.

2.3.1. Listed land-use register

Environment Canterbury's LLUR was accessed on 9 October 2020 and noted that the site contained two HAIL activities identified as more likely than not to have occurred within the site. These HAIL activities are labelled as category G3 (landfill sites) and category G5 (waste disposal to land).

Three investigations were recorded within the Council records for the site, two preliminary site investigations in 2009 and 2011 as well as a detailed site investigation in 2011. These investigation reports were not made available during this PSI, however, due to the date of these investigations being prior to the current NES regulations coming into effect in 2012, these reports are not considered suitable for use as supporting documentation for any resource consent applications.

2.3.2. Historical aerial photographs

Historical aerial photographs of the site and the surrounding area taken between 1942 and 2017 were sourced from the Local Government Geospatial Alliance's (LGGA) Retrolens and the Canterbury Maps Viewer. A summary of observations made from the review of these photographs is provided below. Copies of aerial photographs reviewed are included in Appendix A.

The site was in use as potential grazing or agricultural land from the initial 1942 historical aerial image with a single residential structure in the northern section of the site. The site has remained in use as agricultural land through all of the historical aerial images reviewed to present day.

A section of land on the north-western corner of Springs Road and Collins Road can be seen to be covered in trees and shrub in the initial 1963 historical aerial image. These trees appear to have been removed in the 1980-84 image and potential excavation works can be seen from the 1994 historical image up to 2010 where the site appears to be gradually re-covered by grass.

Structures can be seen to have been constructed within 36 Collins Road, 1521 Springs Road, 1543 Springs Road and 208 Collins Road by the 1963 historical aerial image. Structures within all of these properties remain largely unchanged until present day.

The aerial imagery indicated that the site appears to have been used for agricultural purposes since before 1943 and may be impacted by HAIL category A10 (persistent pesticide bulk storage or use).

2.3.3. Site walkover

Coffey staff conducted a site walkover of the site on 9 October 2020. Photographs taken during the walkover are included in Appendix B.

Large sections of the site contained grassed areas and no areas of die-off or staining were noted during this walkover. A pit was located covered by hardfill aggregates and some burnt tree material. A series of structures containing general farm storage and equipment were located within the eastern section of the site as well as an above ground fuel storage tank.

An area of excavation can be seen in the central-northern off-site area. These works are not expected to have impacted on the site.

A conversation held with the previous site owner noted a borrow pit within the western section of the site, which it is understood has already had environmental reporting completed for it. This reporting

was not available at the time of this investigation, as such, further investigation into in-situ contaminant levels within this area is recommended during any further investigation. The site owner also noted an offal pit / farm dump in the centre of the western area of the site. On-site observations confirmed the location of the offal pit / farm dump.

3. Summary

Coffey was contracted by the client to conduct a PSI for the property at 1491 Springs Road (the 'site', Figure 1). This investigation has been undertaken to confirm the suitability of the site for subdivision.

Coffey completed a review of Environment Canterbury's LLUR, published geological maps, publicly available historical aerial photographs and completed a site walkover of the site and interview with the previous owner on the 9 October 2020.

On the basis of the information reviewed and collected, Coffey has identified a number of actual or potential HAIL activities to have occurred on-site as summarised in Table 2: Identified potential contamination source areas are shown on Figure 1.

Table 2: Identified actual or potential HAIL activities

Actual/Potential HAIL Activities	Land Use	Information Source	Considered Risk Potential for Contamination to Surrounding Environment
Persistent pesticide bulk storage or use (HAIL Category A10)	Use of pesticide and other agrochemicals in agricultural activities	Site walkover observations, historical aerial photographs.	The risk potential to the underlying soil and groundwater is considered **moderate** due to: • Relatively long period of use (since prior to 1943). • Likely use of non-environmentally persistent chemicals in the paddocks. • Potential down-gradient groundwater users.
	Storage of farm related chemicals	Site walkover observations	The considered risk potential to the underlying soil and groundwater is considered **low-high** due to: • Presence of concrete floors preventing any spilt/leaked chemical contacting with soil/water. • No evidence of spills or staining on floor. • Unknown historical handling or storage methods
Storage tanks or drums for fuel, chemicals or liquid waste (HAIL Category A17)	Bulk petrol storage	Site walkover observations	The risk potential to the underlying soil and groundwater is considered **moderate** due to: • Evidence of spills or staining on surrounding ground.

Landfill sites (HAIL Category G3)	Land filling activities	Environment Canterbury's LLUR	The risk potential to the underlying soil and groundwater is considered **low-high** due to: • Unknown source for fill material. • Unknown remedial works completed on soils.
Waste disposal to land (HAIL Category G5)	Farm dump / offal pit	Environment Canterbury's LLUR, site walkover observations	The risk potential to the underlying soil and groundwater is considered **high** due to: • Known offal pit / farm dump. • Contents of the pit are unknown.

As previously mentioned, a building asbestos survey was not included in the original scope of works, therefore, the risk potential is unknown at this time. However, due to the age of some of the existing buildings, asbestos containing material (ACM) is expected to be present and should be assessed during any future site investigation.

The site walkover and review of site history information indicates the following key potential receptors that may be relevant to the site:

- Earthworks contractors who may come into contact with potentially contaminated soil during any proposed future development works.
- Future occupiers of the properties within the site.
- Ecosystems associated with springs and other water bodies within the boundaries of the site and immediately off-site to the east.

4. Recommendations

Due to the presence of HAIL activities on the site, the NESCS regulations are considered to apply to the site. Subdividing or changing land use is a permitted activity under section 8(4)(b) of the NESCS if the report on the site states that it is highly unlikely that there will be a risk to human health if the activity is done to the piece of land.

The potential of contamination to soil and waterways associated with the identified potential sources of contamination are considered low to high (refer to Table 2 above), depending on the activity identified. However, it is considered unlikely that there will be a risk to human health with the proposed plan change and subdivision providing that the potential contaminant source areas listed in Table 2 (but not limited to) are assessed and remediated (if appropriate) and waste material and soils impacted by the presence of the offal pit / farm dump (and any other sources identified) be removed during any future redevelopment works within the site.

The site is considered to be suitable for plan change and subdivision, with any consent granted for the site, conditional on a detailed site investigation (DSI) and / or remediation works (e.g. remediation and validation of farm dumps / offal pits) being carried out (where required) prior to any earthworks and or building consents being granted.

Coffey recommends sampling is undertaken in the vicinity of all identified sources of contamination in addition to soil characterisation samples taken from grazing areas to create a detailed site investigation (DSI) prior to earthworks consent being granted to ensure elevated heavy metals and

excessive use of fertilisers are not present. It is also recommended that all waste material and soils impacted by the presence of the offal pit / farm dump (and any other identified impacted soils) be removed during any redevelopment works within the site. Due to the age of the structures within the properties comprising the proposed redevelopment, if demolition or these structures is required, that a full asbestos survey be completed on these structures prior to demolition and any asbestos materials removed by a suitably qualified and experienced asbestos removal specialist.

In addition, it is expected that (depending on the findings of a DSI) a site management plan, contaminated site management plan and or a remedial action plan will be required prior to any disturbance works being undertaken. It is expected that an unidentified finds protocol be included in any site management plan to assist in the management of any unexpected contamination that may be encountered (not previously identified). On completion of all earthworks associated with any future development, a site validation report (or similar) will be required to be submitted to Council confirming that the site is suitable for its intended use.

5. Limitations

The findings of this report should be read together with “Important Information ‘About Your Coffey Environmental Report’ (attached).

6. References

MfE (2003) Contaminated Land Management Guideline No. 1: Reporting on Contaminated Sites in New Zealand. Ministry for the Environment, Wellington, New Zealand. (Revised 2011).

MfE (2004). Ministry for the Environments Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils. Ministry for the Environment, Wellington, New Zealand. (Revised 2011).

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

Edbrooke S.W., Forsyth, P.J., and Jongens, R. **(2014).** Geological Map of New Zealand 1:250 000. Prepared by Edbrooke S.W., Forsyth, P.J., and Jongens, R. Lower Hutt, New Zealand. Institute of Geological and Nuclear Sciences Limited (GNS).

Important information about your **Coffey** Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

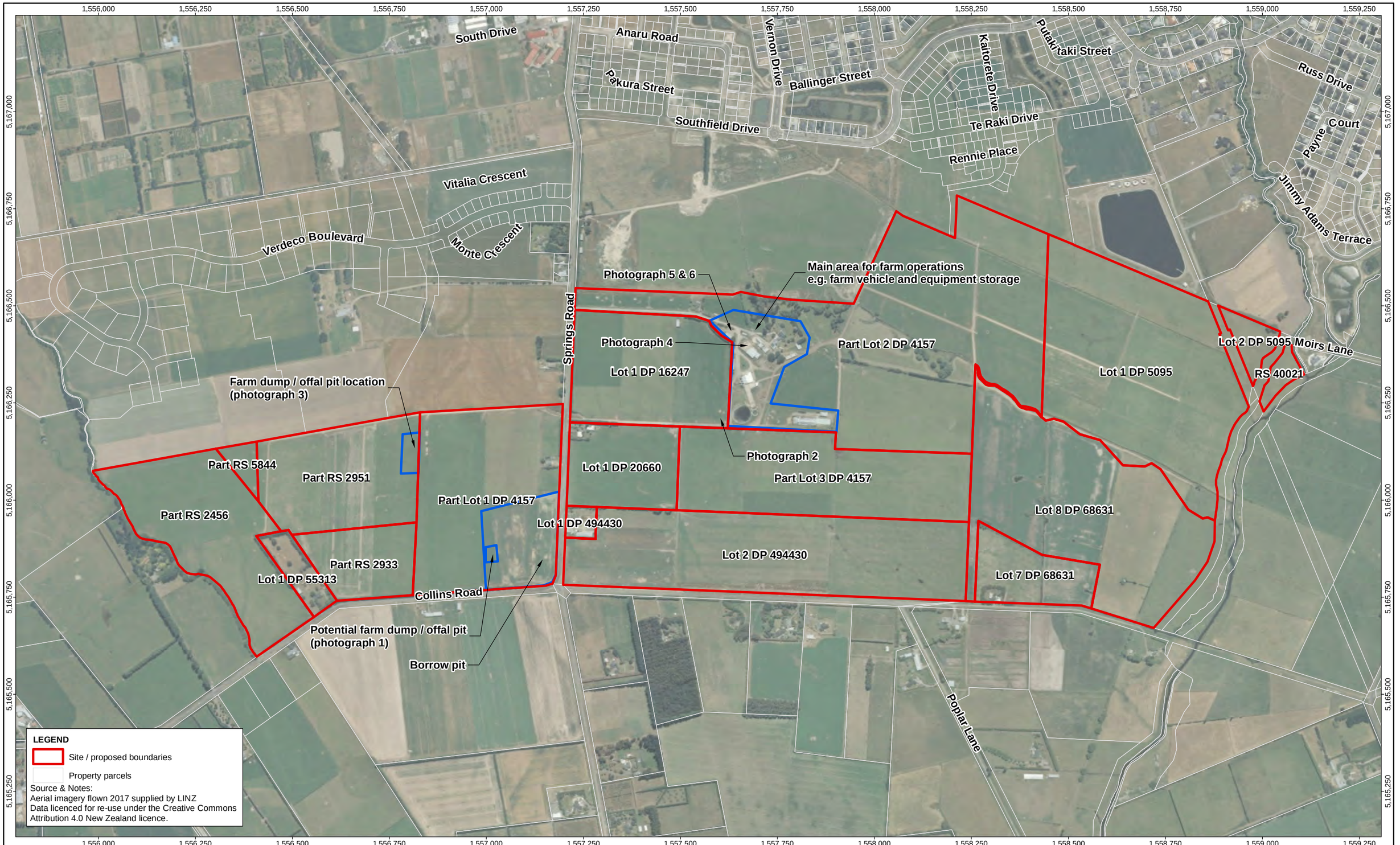
The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Figures



revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	RZ	RM	17.12.20

N

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SCALE 1:9,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	RM
date	17.12.2020
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client:	CARTER GROUP LTD.
project:	1491 SPRINGS ROAD, LINCOLN, CHRISTCHURCH
title:	SITE PLAN
project no:	773-CHCGE280252
figure no:	01
rev:	A

MXD ref: 280252_01_GIS002_1

Appendix A – Historical aerial photographs

LEGEND

Site / proposed boundaries

Source & Notes:
Aerial imagery flown 1942 supplied by LINZ
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revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	RZ	RM	17.12.20

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SCALE 1:9,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	RM
date	17.12.2020
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client:	CARTER GROUP LTD.
project:	1491 SPRINGS ROAD, LINCOLN, CHRISTCHURCH
title:	HISTORICAL AERIAL - 1942
project no:	773-CHCGE280252
figure no:	01
rev:	A

MXD ref: 280252_HIS_1942_1

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	RZ	RM	18.12.20

0 100 200 300 400
SCALE 1:9,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	RM
date	18.12.2020
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client:	CARTER GROUP LTD.
project:	1491 SPRINGS ROAD, LINCOLN, CHRISTCHURCH
title:	HISTORICAL AERIAL - 1963
project no:	773-CHCGE280252
figure no:	02
rev:	A

MXD ref: 280252_HIS_1963_1

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LEGEND

Site / proposed boundaries

Source & Notes:
Aerial imagery flown 1974 supplied by LINZ
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revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	RZ	RM	17.12.20

N

0 100 200 300 400
SCALE 1:9,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	RM
date	17.12.2020
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: CARTER GROUP LTD.

project: 1491 SPRINGS ROAD, LINCOLN, CHRISTCHURCH

title: HISTORICAL AERIAL - 1974

project no: 773-CHCGE280252 | figure no: 03 | rev: A

MXD ref: 280252_HIS_1974_1

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LEGEND

Site / proposed boundaries

Source & Notes:
Aerial imagery flown 1980-1984 supplied by LINZ
Data licenced for re-use under the Creative Commons Attribution 4.0 New Zealand licence.

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MXD ref: 280252_HS_19801984_1

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	RZ	RM	18.12.20

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0 100 200 300 400
SCALE 1:9,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	RM
date	18.12.2020
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: CARTER GROUP LTD.

project: 1491 SPRINGS ROAD, LINCOLN, CHRISTCHURCH

title: HISTORICAL AERIAL - 1980-1984

project no: 773-CHCGE280252 | figure no: 04 | rev: A

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LEGEND

Site / proposed boundaries

Source & Notes:
Aerial imagery flown 1994 supplied by LINZ
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revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	RZ	RM	17.12.20

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SCALE 1:9,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	RM
date	17.12.2020
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

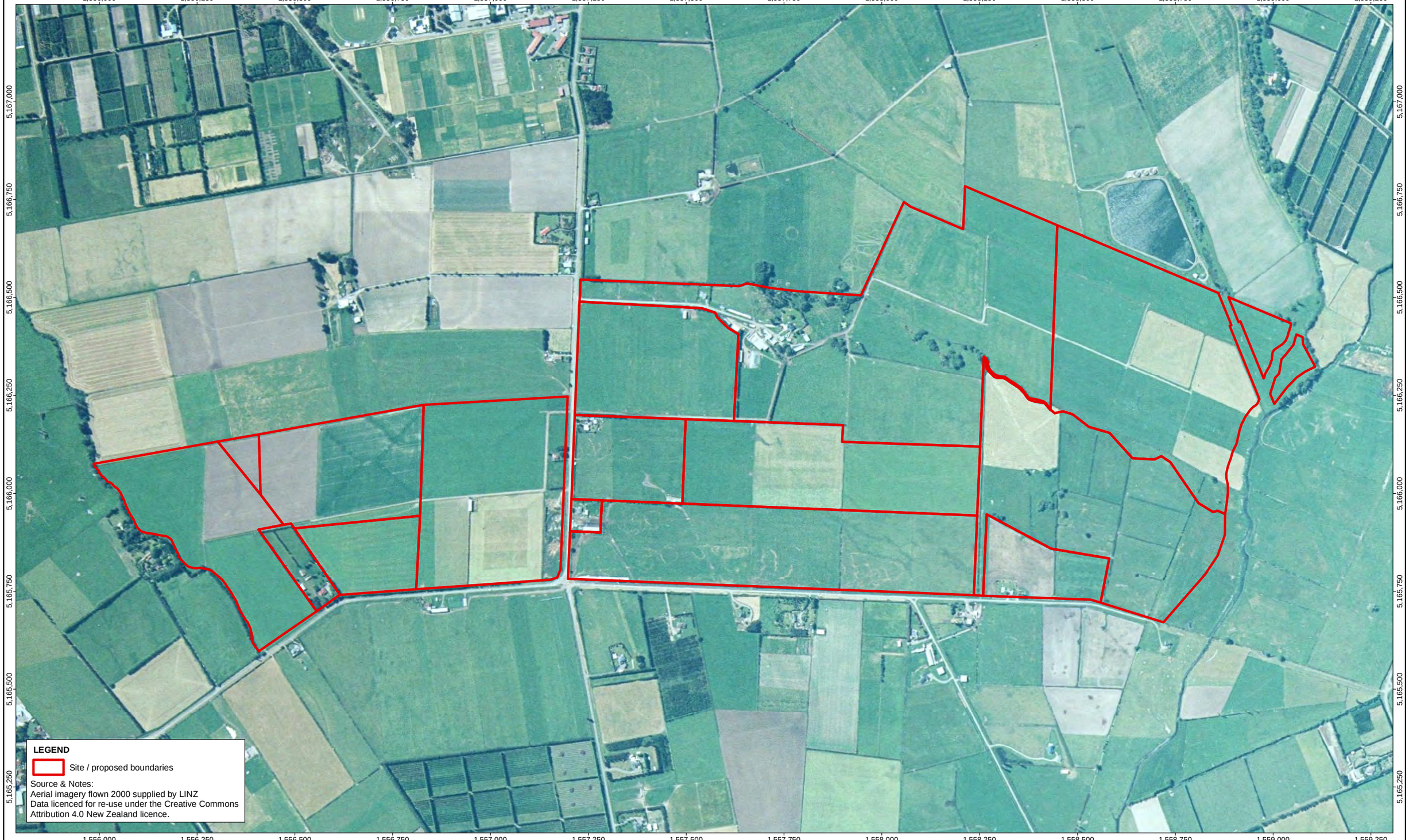
client: CARTER GROUP LTD.

project: 1491 SPRINGS ROAD, LINCOLN, CHRISTCHURCH

title: HISTORICAL AERIAL - 1994

project no: 773-CHCGE280252 | figure no: 05 | rev: A

MXD ref: 280252_HIS_1994_1



revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE	RZ	RM	17.12.20

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SCALE 1:9,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	RM
date	17.12.2020
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: CARTER GROUP LTD.

project: 1491 SPRINGS ROAD, LINCOLN, CHRISTCHURCH

title: HISTORICAL AERIAL - 2000

project no: 773-CHCGE280252 | figure no: 06 | rev: A

MXD ref: 280252_HIS_2000_1

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	RZ	RM	18.12.20

revision

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SCALE 1:9,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	RM
date	18.12.2020
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: CARTER GROUP LTD.

project: 1491 SPRINGS ROAD, LINCOLN, CHRISTCHURCH

title: HISTORICAL AERIAL - 2004-2010

project no: 773-CHCGE280252 | figure no: 07 | rev: A

MXD ref: 280252_HIS_20042010_1

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LEGEND

Site / proposed boundaries

Source & Notes:
Aerial imagery flown 2017 supplied by LINZ
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revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	RZ	RM	17.12.20

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0 100 200 300 400

SCALE 1:9,000 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	RM
date	17.12.2020
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client:	CARTER GROUP LTD.
project:	1491 SPRINGS ROAD, LINCOLN, CHRISTCHURCH
title:	HISTORICAL AERIAL - 2017
project no:	773-CHCGE280252
figure no:	08
rev:	A

MXD ref: 280252_HIS_2017_1

Appendix B – Selected site photographs

Photograph 1: Potential farm dump / offal pit location showing general material and site cover.

Photograph 2: General site cover and land-use.

scale	drawn	AB	coffey	client:	Carter Group			
	approved	RM		project:	1491 Springs Road Preliminary Site Invsetigation			
	date	Oct-20		title:	Site photgraphs			
	scale	NTS		project no:	773-CHCGE280252	figure no:	1 of 3	rev:
	original size	A4						

Photograph 3: Known offal pit / farm dump within western section of the site.

Photograph 4: Raised above ground petrol tank. Minor staining observed.

scale	drawn	AB	coffey	client:	Carter Group			
	approved	RM		project:	1491 Springs Road Preliminary Site Invsetigation			
	date	Oct-20		title:	Site photgraphs			
	scale	NTS		project no:	773-CHCGE280252	figure no:	2 of 3	rev:
	original size	A4						

Photograph 5: General farm equipment and storage on hardfill.

Photograph 6: Farm vehicle and equipment storage on hardfill.

scale	drawn	AB	coffey	client:	Carter Group			
	approved	RM		project:	1491 Springs Road Preliminary Site Invsetigation			
	date	Oct-20		title:	Site photgraphs			
	scale	NTS		project no:	773-CHCGE280252	figure no:	3 of 3	rev:
	original size	A4						

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Attachment 11: Ecology Response - AEL

Aquatic Ecology

Phone: (03) 366-4070
Cell: 021 022-62517
Email: mark@ael.org.nz
Internet: www.ael.org.nz

Jocelyn Lewes
Selwyn District Council

15 February 2021

Dear Jocelyn

RFI Response in respect to Request for Further Information for SDC Plan Change 69; paras. 80-83

Fishing survey methods

In order to gain an understanding of the aquatic species present in the springs and wetlands in the proposed development area (Lincoln South, PC 69), a fish netting and trapping operation was undertaken. This was undertaken using baited Gee Minnow™ traps (App. I, Fig. i) and baited mini fyke nets (App. I, Fig ii) were utilised.

One, two or five traps were set per spring, based on the size and likely abundance of fish. A total of 28 traps were set across 18 locations (App. I, Fig iii), overnight on the 13th Jan 2021. Three small fyke nets (App. I, Fig. ii) were also set overnight to assess the presence of rudd in Spring Creek, the main waterway on the property. The so-called mini fyke nets have a hoop size of 0.35 m, a leader length of 1.5 m, and a stretched-mesh size of 20 or 25 mm. Nets were set in the evening of 14th Jan 2021, and raised during the following morning.

All captured fish were anesthetised, identified, measured, and after recovery, released back into their resident habitat.

In lotic (i.e. flowing) waters, electric fishing was conducted under AEL's electric fishing permits (MPI Permit 605, DOC 70754-FAU and under authority from NCFGC). In combination, these reaches encompassed all hydrological habitat types in the area, including pool, riffle, fast run, and slow run habitats. The total sample time (i.e., the total time that the machine was actively electrifying the water) for these reaches was 18 minutes. Captured fish were then anaesthetised, identified, measured, and upon recovery from anaesthesia, released back into their resident habitats.

Sites EF 1 and EF 2 were electro-fished on the 19th Jan 2021, and sites EF 3 and EF 4 on the 20th Jan 2021, all using a conventional Kainga EFM300 electric fishing machine at an operating voltage of 100-200 V. D.C. The voltage provided a sufficient electrical field size to prevent escapement. Electric fishing serves to briefly (approx. 3 seconds) render fish unconscious to facilitate their capture in nets for identification. The machine incorporates a timer, allowing the effective fishing time to be recorded. Overall conditions for fish capture using electric fishing were adequate, with high water conductivity and excellent water clarity.

Mussel Survey methods

In order to assess the presence of freshwater mussels (Kākahi) in the LII River, a boat survey was attempted in order to observe and record the presence of mussels embedded in the fine sediments. The proposed method involved gradually working up the river in a small outboard boat, using a bathyscope to visually assess the riverbed for the presence of kākahi. This method was therefore abandoned, as the soft sediment in the LII meant the waterway was unsafe to survey by food.

However, visual mussel surveys were able to be carried out in Spring Creek, and three other drains on the property (i.e. Collins Road drains). At each of these locations, 5-minute visual surveys were executed at 50 metre intervals along the waterway. A bathyscope was used to accurately examine the bed of each waterway. 15 sites along Spring Creek were surveyed, along with 1-3 sites in each of the three drains (App. I, Fig. v).

Invertebrate collection

Two macroinvertebrate samples were taken during an ecological survey of the proposed development area. One sample was collected using the sampling protocol required for hard substrate, and one was collected using the sampling protocol required for soft sampling.

The first collection method used was a semi-quantitative collection technique called “protocol C1”, appropriate for riffle habitat in stony streams (Stark *et al.* 2001). This methodology is consistent with data collection for compliance monitoring for AEE (Assessment of Environmental Effects) and SOE (State of the Environment) reporting. Stream invertebrates are affected by flood flows, and published protocols advise that sampling should not be undertaken within 3-4 weeks of floods. In this instance, no significant rainfall events occurred in the three weeks prior to collection.

The mechanics of collecting macroinvertebrates using Protocol C1 are detailed in Stark et al. (2001), and it is not necessary to provide further detail here. One macroinvertebrate composite sample was collected from Spring Creek (App. I, Fig. iii, vi). This was composed of eight kick-net sub-samples with a combined habitat area of approximately 0.72 m^2 (8 x 0.3 m x 0.3 m). The kick net sample was collected across the stream transect, working upstream in a zigzag manner.

The second collection method used was a similar semi-quantitative collection technique called “protocol C2”, appropriate for soft-bottomed streams (Stark *et al.* 2001). Macroinvertebrates were collected using a standard 0.3 m wide, 500-micron kicknet. Protocol C2 involves jabbing along the overhanging vegetation on the bank margin, or macrophytes, with the kicknet for 1 m, then sweeping the kicknet through the disturbed section twice. This process was repeated 10 times to create a composite sample (total sample area = 0.3 m x 1 m x 10 m = 3 m2). From this composite sample a one-pottle subsample was taken.

Samples were field-preserved in iso-propyl alcohol, and the aquatic macroinvertebrates for the drain branches were transported to the Christchurch laboratory for identification using the standard identification keys.

Georeferencing the Outline Development Plan to field habitats.

A ruggedised electronic tablet was used in the field with an accurate Google Earth™ overlay of the development plan. These overlays are depicted in App. I. In this way, habitats in the field could be assessed in the context of the development plan. Particularly, all of the actual and possible springs from the ECan database were uploaded into the field GPS.

RESULTS

Para 80 Wetland identification, significance, and protection

During the field survey, almost all surface waterbodies were ecologically surveyed for fish values. All of the significant waterbodies were fenced with a single hot-wire from the grazing dairy herd. The luxuriant nature of the fenced vegetation suggested it was sufficient to dissuade dairy cows from grazing the riparian area. Regenerating vegetation was largely introduced common herbs around the water edge (e.g. monkey musk) with pasture grasses further away from the water’s edge. Some wetlands had C. secta and *Juncus* species which appeared to be naturally regenerating.

Only one wetland coincided with a proposed residential development area, and this was categorised as possible high density on the current outline development plan. This wetland is depicted in the Appendix I (Fig. 1, GM 05, App. I, Fig. iii). This pond had a water connection to Springs Creek, but flow was not perceptible at the time. At the time of writing, it was unknown whether the waterbody was fed by groundwater (therefore a spring), or was a pond with a drainage outlet (Fig. 1). The pond appeared to be subject to riparian grazing, by sheep (landowner pers. comm.), but dairy cows were denied access to this wetland. This pond was fished with 2 baited Gee Minnow traps, but no fish were caught. For context, neighbouring pond (GM 06) provided habitat for upland bully (no significant conservation status), and no catch was recorded in GM07.

Some riparian flax was present at this location, and a number of introduced trees around the water's edge. The evident riparian grazing probably limits the development of an indigenous riparian border. Further investigation would reveal the hydrological nature and origin of the wetland. If it is a pond with little redeeming value, and possibly artificially created, the pond could be decommissioned. Should the wetland prove to be a spring, or a wetland with significant ecological value, protection by way of a reserve or other green space around the wetland could be provided.

Three wetlands are on land currently proposed for general residential land use, close to the border of the proposed higher-density residential zone. Wetland GM06 may be a spring, and had the common upland bully present. However, no fish were recorded from wetlands GM07 and GM08. GM07 was bordered with poplar and covered in pondweed/water fern, but the wetland at GM08 was encircled with large mature *Carex secta* (Purei), and had an outlet to Springs Creek.

Figure 1. Pond GM05 which coincides with a proposed high-density residential area. The water fern (*Azolla rubra)*, and the common duckweed (*Lemna minor*) obscures the water surface.

All other ponds and possible springs fell within proposed green space or stormwater management areas, well away from the proposed high-density residential area. Within the Springs Creek esplanade reserve, GM09 had some *C. secta*, but largely ringed by willow. It appeared to be suffering from an algal bloom, but common bully (conservation status of 'not threatened') were identified from the habitat.

Springs Creek itself is linear, possibly channelised in the past, with a uniform (engineered) cross section, and a sand substrate. Introduced grasses and the soft herb (Monkey musk) encroached to the water's edge. I suggest that it has significant enhancement potential. Large (T.L. 900, 1200 mm) specimens of the longfin eel (Conservation status, declining) were caught in fyke net set in the main channel (Fykes 1, 2, 3, App. I, Fig. iii), and these would benefit from physical habitat heterogeneity.

The swale immediately to the west of the Plan Change Area (informally referred to as "university drain", adjacent to Pendah farm, was completely dry, with the channel basin vegetated in terrestrial grasses. This is consistent with our survey of this swale (March 2019) as part of the consenting for the Verdeco Park development on Springs Road, and upgradient of this Plan Change area. We formally reported on the values of this waterway in a s92 response report on 11 April 2019.

With the Plan Change, the area will be destocked, and wetland riparian zones may benefit, depending on the effectiveness of current fencing around the wetlands. The current fenced riparian strip around each wetland is narrow, only a few metres in width, probably insufficient to provide the ecological buffering to sustain diverse wetland ecology. More green space around the springs and ponds, especially if planted in a diverse range of wetland species, will promote wildlife, aquatic ecology and amenity values. I understand from the Landscape/Urban Designer for the Plan Change that this intention of planted green space around the springs and ponds is the aim once further investigation at time of subdivision design takes place.

However, it is important that the geohydrological flow which feeds springs is respected. There are examples of the loss of flow into spring heads where the proportion of impervious area is high. An investigation of springhead flow loss in Ka Pūtahi Creek was attributed to multiple causes (low rainfall, low aquifer recharge from the Waimakariri River, but the inadvertent diversion of shallow groundwater (c. 45 L/s) into a neighbouring subcatchment was likely to be a major contributor (Nikora 2004).

In summary, with understanding of the local geohydrology, stormwater conveyance and treatment, along with the distribution of pervious land, springhead discharge can be preserved. If discharge can be preserved, when combined with a wider, more biodiverse riparian buffer, ecological values in the springs and wetlands can be protected and enhanced.

Para 81 Location, state and protection of springs

The entire Plan Change Area was then physically surveyed for springs (survey trace in App. I, Fig. iv), with the exception of the area to the west of Springs Road, which is known to be devoid of water bodies. I am confident no other surface water bodies exist that have not been logged in this physical survey.

All springs are all fenced from stock with hotwire fences, as discussed above. However, the lack of adventive saplings in the fenced areas would suggest that fencing has only been completed in the recent past (i.e. last 10 years). The comments made in respect to wetlands above would apply to springs, but there was difficulty in the field definitively categorising wetlands as springs, so my comments in regard to wetlands also apply to spring heads.

Para 82 Canterbury Mudfish and aquatic ecology

Five fish species were caught at this property, with an overall total of 153 fish (App. II). The three species identified from the Gee Minnow™ (GM) traps were upland bully (*Gobiomorphus breviceps*), common bully (*Gobiomorphus cotidianus*) and inanga (*Galaxias maculatus*). One species was identified in the small fyke nets, the longfin eel (*Anguilla dieffenbachii*). Along with upland bully and longfin eel, the shortfin eel (*Anguilla australis*) was also identified during electric fishing. As documented by Dunn *et al.* (2017), the longfin eel and inanga have a conservation status of "At Risk – Declining". All inanga were caught in one GM trap, at site GM 10 (App. I, Fig. iii, vi).The upland bully, common bully and shortfin eel are considered "Not Threatened" (Dunn *et al.* 2017).

In particular, despite targeted trap placement, no Canterbury mudfish were recorded in any of the 17 locations sampled. Given the presence of potential predators (eels > 23 cm TL) in the Plan Change Area, we doubt they would survive cohabitation.

We note too, with some relief, that no pest fish were recorded in the Plan Change Area, as these are difficult to manage and eliminate. An illegal introduction of rudd (a member of the goldfish family) into the Lake Ellesmere catchment had led to spread in neighbouring catchments, including the Halswell River catchment. Unfortunately, the Plan Change raises the possibility of illegal introduction of pest

fish (e.g. rudd or tench) into the area, although control methods were successful in eliminating rudd from the Travis Wetland in Christchurch.

A total of 11 species of invertebrate were identified in the macroinvertebrate sample at site IS 1, and 12 in the sample at site IS 2 (App. III). The samples found an abundance of *Potamopyrgus antipodarum*, also known as the New Zealand mud snail, at both sites. Also present were two young Koura (*Paranephrops zealandicus*, App. I, Fig. viii). Koura have a national conservation status in New Zealand of "At Risk – Declining" (Grainger *et al.* 2018). All other identified invertebrates are considered "Not Threatened". Another koura was identified during electric fishing, at site EF 4 (App. I, Figs. iii, ix). This individual measured 59mm. Koura require stable banks, steady flows, and refugia to form healthy populations. If the banks are stable, like along the LII River, koura will form burrows, which are quite evident along this reach.

The *Austridotea* isopods identified are likely to be *A. annectens* due to the range this species is found in. While of ecological interest, it does not possess significant conservation status. All other species within the *Austridotea* genus are confined to Otago and Southland (Chapman et al 2011).

Para. 83 Mussels (kākahi)

After a systematic survey of four waterways in the proposed area, all of which are connected to the LII River, no freshwater mussels (kākahi) were found. Given the amount of survey effort imparted as part of this study, we are currently confident that freshwater mussel populations are unlikely to be present in the Plan Change Area.

Partly because of the ignorance around their habitat requirements, the conservation status of freshwater mussel has changed from At Risk-Naturally Uncommon to now Data Deficient (Grainger *et al.* 2018). However, because the physical habitat characteristics of freshwater mussels are poorly known, and their distribution is very patchy in mid-Canterbury, there remains the possibility that some could be found in the future. Should they be identified, then it a fairly simple exercise to translocate the molluscs to a safe location. AEL has significant experience and permits in the translocation of mussels and fish.

Yours sincerely,

Mark Taylor

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Appendix I.

Figure i. Line of five GM traps set at site GM 02.

Figure ii. Two small fyke nets set at Fyke 01/02, Spring Creek.

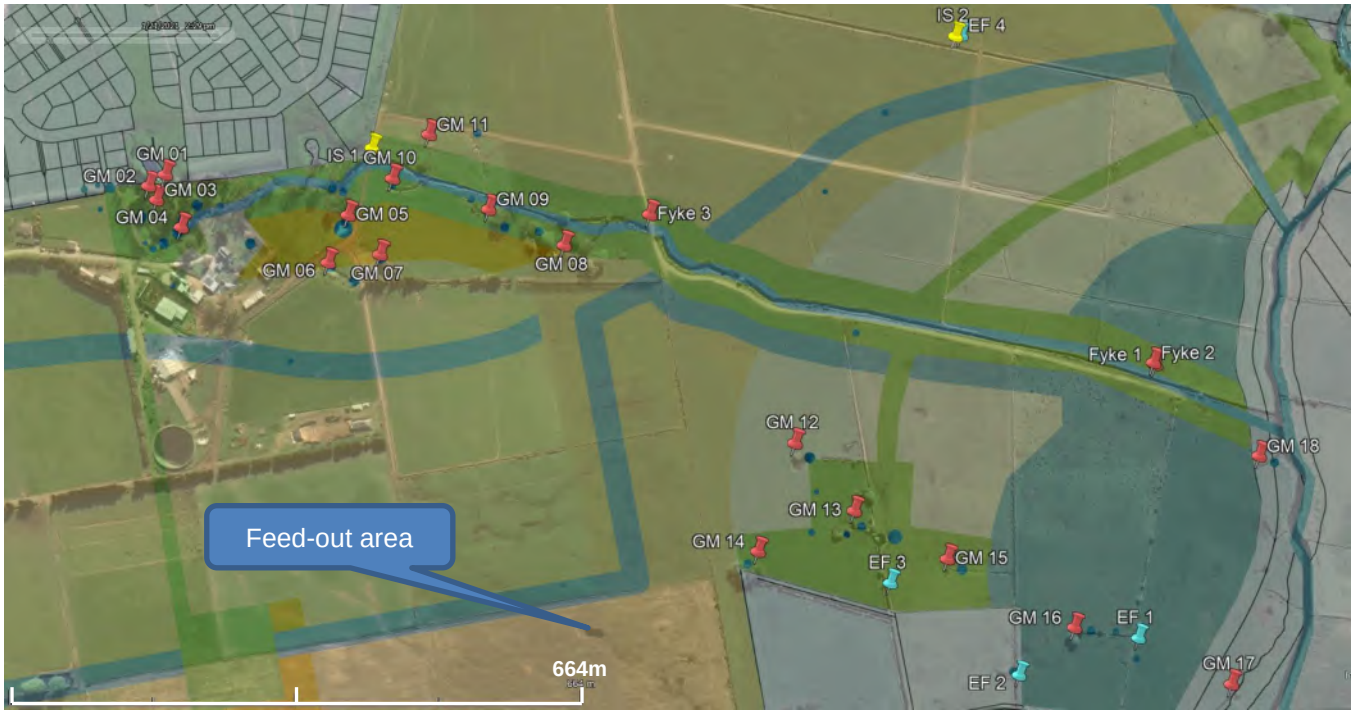

Figure iii. Map showing locations of Gee Minnow™ traps (GM), small fyke nets (Fyke), invertebrate samples (IS) and electric fishing sites (EF). The proposed development plan has been overlaid.

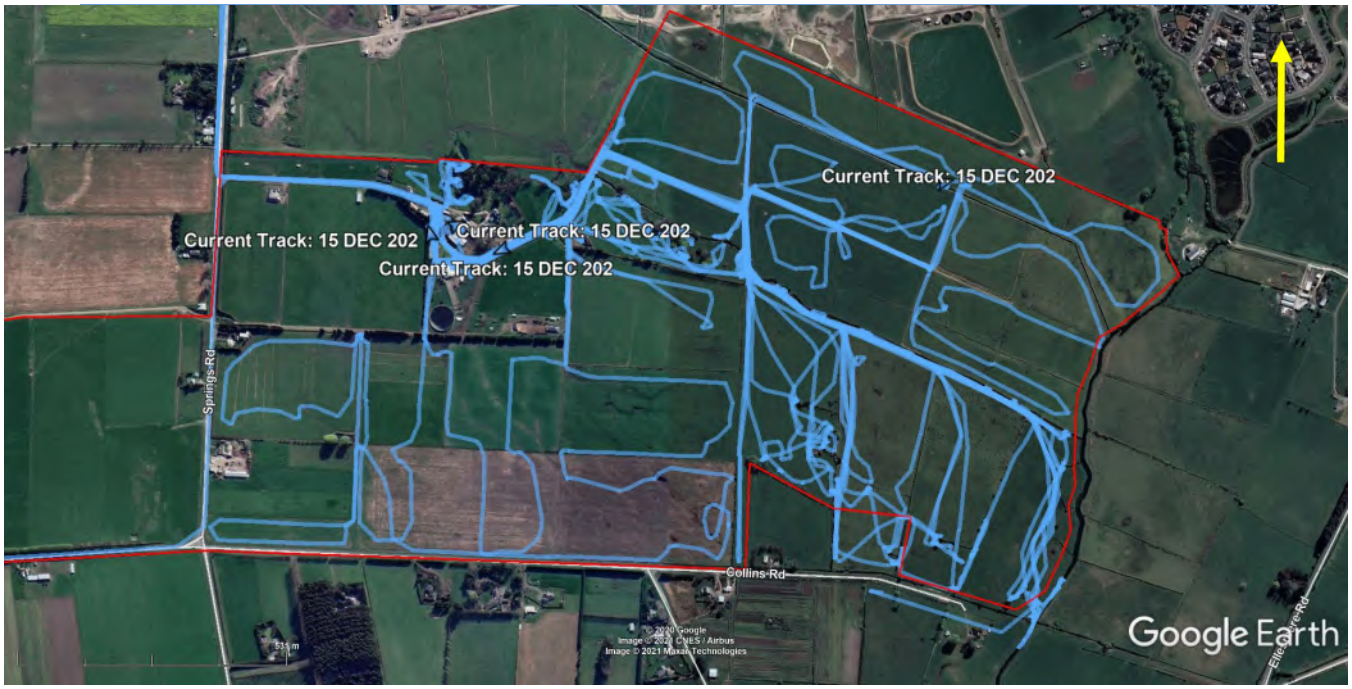

Figure iv. GPS track file for the survey for wetlands.

Figure v. Freshwater mussel (kākahi) survey locations. No mussels were identified during the survey. The LII River was not surveyable at the time of the field investigation.

Figure vi. Spring at site GM 10. The presence of inanga was recorded at this location.

Figure vii. Invertebrate sample location, Spring Creek. Between a culvert and a pumphouse.

Figure viii. Juvenile koura (*Paranephrops zealandicus*) from the Spring Creek invertebrate sample.

Figure ix. Koura caught during electric fishing, measuring 59mm.

Appendix II

- Fish Catch Table

Species	Gee Minnow™ traps	Fyke Nets	Electric Fishing	Total
Upland bully	82		28	110
Common bully	19			19
Unidentified bully	1		3	4
Inanga	15			15
Shortfin eel			1	1
Longfin eel		2	2	4
Koura			1	1
Total	**117**	**2**	**35**	**154**

Appendix III

- Invertebrate Table

	Species	Sample 1, hard substrate	Sample 2, soft substrate
ANNELIDA			
Oligochaeta		24	
Hirudinea		3	
MOLLUSCA			
Gastropoda			
Hydrobiidae	*Potamopyrgus antipodarum*	562	5
Physidae	*Physa acuta*	2	10
Planorbidae	*Gyraulus*		15
Bivalvia			
Sphaeridae	*Pisidium*	2	
CRUSTACEA			
Amphipoda			
Paracalliopidae	*Paracalliope fluviatilis*	104	385
Isopoda			
Idoteidae	*Austridotea*	7	
Decapoda			
Parastacidae	*Paranephrops zelandicus*	2	
Ostracoda		8	6
INSECTA			
Diptera			
Orthocladiinae		20	
Tanypodinae			14
Chironominae	*Tanytarsus*		2
Trichoptera			
Leptoceridae	*Hudsonema amabile*	3	
Hydrobiosidae	*Hydrobiosis*	1	
	Hydrobiosis parumbripennis		1
	Psilochorema	1	
Hydroptilidae	*Oxyethira albiceps*	58	18
Hemiptera			
Corixidae	*Sigara aguta*	2	
Veliidae	*Microvelia*		56
Odonata			
Coenagrionidae	*Xanthocnemis zelandica*		1
Coleoptera			
Dytiscidae	*Liodessus*		1
No. Scoring taxa		15	12
TOTAL No. of animals		799	514
MCI-hb		80.0	68.2

Attachment 12: Assessment against the Objectives and Policies of the Operative District Plan

Table 1: Assessment of relevant plan provisions against the objectives of the District Plan

District Plan provisions	Comment / Assessment
Township Volume - Chapter B4 Growth Townships	
Objective B4.1.1 *A range of living environments is provided for in townships, while maintaining the overall 'spacious' character of Living zones, except within Medium Density areas identified in an Outline Development Plan where a high quality, medium density of development is anticipated.* *Objective B4.1.2* *New residential areas are pleasant places to live and add to the character and amenity values of townships.* *Policy B4.1.10* *Ensure there is adequate open space in townships to mitigate adverse effects of buildings on the aesthetic and amenity values and "spacious" character.*	The proposal will ensure that Lincoln continues to provide for a range of living environments generally. The subject land itself will also provide for arrange of living environments, including high quality, medium density development. The subject area will be a pleasant place to live and will contribute to the character and amenity of Lincoln. Open space is provided throughout the plan change site, including greenspaces along site edges and waterbodies, and recreation reserves.
Objective B4.3.1 *The expansion of townships does not adversely affect:* *Natural or physical resources;* *Other activities;* *Amenity values of the township or the rural area; or* *Sites with special ecological, cultural, heritage or landscape values.* *Objective B4.3.3* *For townships within the Greater Christchurch area, new residential or business development is to be provided within existing zoned land or priority areas identified in the Regional Policy Statement and such development is to occur in general accordance with an operative Outline Development Plan.* *Objective B4.3.4* *New areas for residential or business development support the timely, efficient and integrated provision of infrastructure, including appropriate transport and movement networks through a coordinated and phased development approach.* *Objective B4.3.5* *Ensure that sufficient land is made available in the District Plan to accommodate additional households in the Selwyn District portion of the Greater Christchurch area between 2013 and 2028 through both Greenfield growth areas and consolidation within existing townships.* *Policy B4.3.1* *Ensure new residential, rural residential or business development either:* *- Complies with the Plan policies for the Rural Zone; or* *- The land is rezoned to an appropriate Living Zone that provides for rural-residential activities (as defined within the Regional Policy Statement) in accordance with an* ***Outline*** *Development Plan incorporated into the District Plan; or* *- The land is rezoned to an appropriate Living or Business zone and, where within the Greater Christchurch area, is*	The Plan Change will not adversely affect any notable natural or physical resources, beyond the removal of some land from primary production. There are no other activities that the expansion will adversely affect, and amenity values will generally be maintained, albeit the values of the site itself will change from a rural to an urban amenity. The site has no notable special values. The proposal will not be consistent with Objective B4.3.3 and Policy B4.3.1 in so far as the development will not be within a priority area, however an ODP is proposed. In regard to infrastructure, the proposal will place additional demand on services such as water and sewer. Upgrades will be required to service the proposal site and this can be undertaken through a combination of developer contribution and existing planned Council upgrades. The proposal will not leave Rural zoned land surrounded by urban zoning, noting it incorporates the properties at 1521 and 1543 Springs Road and 36 and 208 Collins Road. The township shape will remain reasonably compact, albeit the proposal will expand the township further to the south rather than consolidating development closer to the town centre.

contained within existing zoned land and greenfield priority areas identified in the Regional Policy Statement and developed in accordance with an Outline Development Plan incorporated into the District Plan. *Policy B4.3.3* *Avoid zoning patterns that leave land zoned Rural surrounded on three or more boundaries with land zoned Living or Business.* *Policy B4.3.6* *Encourage townships to expand in a compact shape where practical.*	
Policy B4.3.56 *Ensure that new Greenfield urban growth only occurs within the Outline Development Plan areas identified on the Planning Maps and Appendices, and in accordance with the phasing set out in Policy B4.3.9.* *Policy B4.3.57* *Ensure any land rezoned for new residential development has motor vehicle access from an alternative collector or arterial road other than Gerald Street.* *Policy B4.3.58* *Ensure stormwater disposal from any land rezoned for new residential or business development will not adversely affect water quality in the LI or LII waterbodies; or exacerbate potential flooding from the LI or LII waterbodies "downstream".* *Policy B4.3.59* *Achieve integration between the rezoning of land for new residential development at Lincoln and associated provisions for utilities, community facilities and areas for business development.* *Policy B4.3.60* *Ensure rezoning any land for new residential or business development does not create or exacerbate potential "reverse sensitivity" issues in respect of activities in the Business 3 Zone or surrounding Rural Zone.* *Policy B4.3.61* *Consider any potential adverse effects of rezoning land for new residential or business development to the north of Lincoln Township on the 'rural-urban' landscape contrast of the area with Christchurch City, as identified in the RPS.* *Policy B4.3.63* *Ensure that development within each of the Outline Development Plan areas identified on the Planning Maps and Appendices within Lincoln addresses the specific matters relevant to each ODP Area number listed below:*	The proposal entails Greenfield urban growth that is not within the Outline Development Plan areas identified on the Planning Maps and Appendices, however it is considered appropriate accounting for the recent policy direction in the NPS-UD, as is assessed later in this report. The subject land has motor vehicle access from an alternative arterial road other than Gerald Street. Stormwater disposal from the rezoned land will not adversely affect water quality in the LI or LII waterbodies; or exacerbate potential flooding from the LI or LII waterbodies "downstream" – refer to the Inovo Projects / E2 assessment in **Appendix A** of the plan change request document. Accounting for its location and physical connectivity, the proposal will effectively integrate with adjacent residential land, and with utilities, community facilities and business within the Lincoln township. As has been assessed earlier, the proposed rezoning will not create or exacerbate potential "reverse sensitivity" issues in respect of activities in the Business 3 Zone or surrounding Rural Zone. The proposal is not within an existing Outline Development Plan area, however it addresses the equivalent matters insofar that these are relevant to the subject land – refer **Appendix E** of the plan change request document.
Township Volume: Chapter B2 Physical Resources	
Objective B2.1.1 *An integrated approach to land use and transport planning to ensure the safe and efficient operation of the District's roads, pathways, railway lines and airfields is not compromised by adverse effects from activities on surrounding land or by residential growth.*	The Transport Assessment contained in Appendix D of the plan change request document has confirmed that traffic generated from the proposal can be safely accommodated within the road network. Any new roads within the subdivision will be designed in accordance with the current standards of the District Plan.

Objective B2.1.2

An integrated approach to land use and transport planning to manage and minimise adverse effects of transport networks on adjoining land uses, and to avoid "reverse sensitivity" effects on the operation of transport networks.

Objective B2.1.3

Future road networks and transport corridors are designed, located and protected, to promote transport choice and provide for: a range of sustainable transport modes; and alternatives to road movement of freight such as rail.

Objective B2.1.4

Adverse effects of land transport networks on natural or physical resources or amenity values, are avoided, remedied or mitigated, including adverse effects on the environment from construction, operation and maintenance.

Objective B2.1.5

Policy B2.1.2

Manage effects of activities on the safe and efficient operation of the District's existing and planned road network, considering the classification and function of each road in the hierarchy.

Policy B2.1.3

Recognise and protect the primary function of roads classified as State Highways and Arterial Roads in Part E, Appendix 7, to ensure the safe and efficient flow of 'through' traffic en route to its destination.

Policy B2.1.4(a)

Ensure all sites, allotments or properties have legal access to a legal road which is formed to the standard necessary to meet the needs of the activity considering:

– the number and type of vehicle movements generated by the activity;

– the road classification and function; and

– any pedestrian, cycle, public transport or other stock access required by the activity.

Policy B2.1.12

Address the impact of new residential or business activities on both the local roads around the site and the District's road network, particularly Arterial Road links with Christchurch City.

Policy B2.1.13

Minimise the effects of increasing transport demand associated with areas identified for urban growth by promoting efficient and consolidated land use patterns that will reduce the demand for transport.

Policy B2.1.15

Require pedestrian and cycle links in new and redeveloped residential or business areas, where such links are likely to provide a safe, attractive and accessible alternative route for pedestrians and cyclists, to surrounding residential areas, business or community facilities.

Policy B2.1.23

Where a township is already largely developed on both sides of a State Highway or railway line:

– Discourage new residential or business development from extending the township further along the State Highway or railway line if there are alternative, suitable sites; or, if not,

In regard Policy 2.1.15, the proposed Outline Development Plan for the subject site includes requirement for new pedestrian links within the subject to area, to ensure adequate connectivity for a range of transport modes.

In regard the arterial function of Springs Road, the proposal recognises and protects the function of this road and provides for its efficient flow.

In regards utilities and as stated in the Infrastructure Report contained in **Appendix A** of the plan change request document**,** while the township is subject to some sewer and water supply constraints currently, they are able to be resolved.

– Restrict new residential or business areas to extending further along one side of the State Highway or railway line only. *Objective B2.2.2* *Efficient use of utilities is promoted.* *Objective B2.2.3* *The provision of utilities where any adverse effects on the receiving environment and on people's health, safety and wellbeing is managed having regard to the scale, appearance, location and operational requirements of the facilities.* *Policy B2.2.2* *Ensure activities have access to the utilities they require at the boundary prior to any new allotment being sold; or prior to any new activity taking place on an existing allotment.* *Policy B2.2.3* *Encourage the "market" to determine the efficient use of utilities.* *Policy B2.2.5* *Avoid potential 'reverse sensitivity' effects of activities on the efficient development, use and maintenance of utilities*	
Township Volume: Chapter B3 Health and Safety Values	
Objective B3.1.1 *Ensure activities do not lead to or intensify the effects of natural hazards.* *Objective B3.1.2* *Ensure potential loss of life or damage to property from natural hazards is mitigated.* *Objective B3.1.3* *Ensure methods to mitigate natural hazards do not create or exacerbate adverse effects on other people or the environment.* *Policy B3.1.7* *Ensure any new residential or business development does not adversely affect the efficiency of the District's land drainage system or the risk of flooding from waterbodies.*	Flood hazard effects have been appropriately managed and mitigated as described in **Appendix A** of the plan change request document and there are no other notable natural hazards within the Plan Change area. Geotechnical investigations have indicated that the land predominantly has a technical category of TC1. SMA's are proposed to provide appropriate treatment and attenuation. Flood levels will be controlled by outlet structures and it is noted that compensatory storage may be required to offset structures constructed within the flood plain. Further assessment would occur prior to subdivision application, incorporating new modelling to inform the detailed design. This will ensure that the existing drainage network and risk of flooding from waterbodies is appropriately managed.
Objective B3.4.3 *"Reverse sensitivity" effects between activities are avoided.*	A 50m buffer setback will be provided for reverse sensitivity effects in relation to the adjoining Business 2B zoned land and this setback is shown on the ODP. With regard to reverse sensitivity effects from rural activities, the ODP text states that lower density areas (Living X) would provide a transitional buffer with regard to the rural environment. These lower densities/larger allotments would enable potential reverse sensitivity effects to be managed by increased separation distances (noting that Collins Road will provide a separation distance from rural zoned properties). For rural activities to the east and west of the request area, the esplanade reserves, stormwater management areas, and green links shown on the ODP will provide a sufficient setback to avoid

	potential reverse sensitivity effects. Therefore, the request is consistent with Objective B3.4.3.
Objective B3.4.4 states: *Growth of existing townships has a compact urban form and provides a variety of living environments and housing choices for residents, including medium density housing typologies located within areas identified in an Outline Development Plan.*	The proposal will maintain a relatively compact town form albeit the town will extend further to the south than is currently the case. The proposal will provide for a variety of living environments and housing choices.
Objective B3.4.5 *Urban growth within and adjoining townships will provide a high level of connectivity both within the development and with adjoining land areas (where these have been or are likely to be developed for urban activities or public reserves) and will provide suitable access to a variety of forms of transport.*	The Plan Change area will have a good level of connectivity to the remainder of the township, with provision for pedestrian and cycle links as well as vehicle access.
Policy B3.4.1 *To provide zones in townships based on the existing quality of the environment, character and amenity values, except within Outline Development Plan areas in the Greater Christchurch area where provision is made for high quality medium density housing.*	The proposal will provide for a character and amenity that is consistent with the remainder of the Lincoln Township and the existing developing Te Whāriki and Verdeco subdivisions on adjacent land.

Policy B3.4.3
 	
To provide Living zones which:
 	
- *are pleasant places to live in and provide for the health and safety of people and their communities;*
- *are less busy and more spacious than residential areas in metropolitan centres;*
- *have safe and easy access for residents to associated services and facilities;*
- *provide for a variety of living environments and housing choices for residents, including medium density areas identified in Outline Development Plans;*
- *ensure medium density residential areas identified in Outline Development Plans are located within close proximity to open spaces and/or community facilities and*
- *ensure that new medium density residential developments identified in Outline Development Plans are designed in accordance with the following design principles:*
  - *access and connections to surrounding residential areas and community facilities and neighbourhood centres are provided for through a range of transport modes;*
  - *block proportions are small, easily navigable and convenient to encourage cycle and pedestrian movement;*
  - *streets are aligned to take advantage of views and landscape elements;*
  - *section proportions are designed to allow for private open space and sunlight admission;*
  - *a subdivision layout that minimises the number of rear lots;*
  - *layout and design of dwellings encourage high levels of interface with roads, reserves and other dwellings;*
	The proposed Living zone will meet the outcomes sought by Policy B3.4.3.
	
	It is considered that the ODP reserves, stormwater management and green link features, and the separation distance of Collins Road will ensure effects arising from conflicting land uses are minimised, particularly reverse sensitivity with rural neighbours. It is also noted that the majority of the properties directly opposite (south) from the request area are undersized and subsequently would have a lesser potential to accommodate activities at a viable scale generating nuisance effects. Therefore, the request is consistent with Policy B3.4.39.

- *a diversity of living environments and housing types are provided to reflect different lifestyle choices and needs of the community;* - *a balance between built form and open spaces complements the existing character and amenity of the surrounding environment and;* - *any existing natural, cultural, historical and other unique features of the area are incorporated where possible to provide a sense of place, identity and community.* *Policy B3.4.39* *Avoid rezoning land for new residential development adjoining or near to existing activities which are likely to be incompatible with residential activities, unless any potential 'reverse sensitivity' effects will be avoided, remedied or mitigated.*	
Township Volume: Chapter B1 Natural Resources	
Objective B1.1.2 *New residential or business activities do not create shortages of land or soil resources for other activities in the future.* *Policy B1.1.8* *Avoid rezoning land which contains versatile soils for new residential or business development if:* *- the land is appropriate for other activities; and* *- there are other areas adjoining the township which are appropriate for new residential or business development which do not contain versatile soils.* *Objective B1.2.2* *Activities on land and the surface of water in Selwyn District:* *- Do not adversely affect ground or surface water resources;* *- Do not adversely affect waahi tapu or waahi taonga;* *- Maintain or enhance the ecological and habitat values of waterbodies and their margins;* *- Maintain or enhance the water quality and ecological values of sites of mahinga kai (food gathering); and* *- Promote public access along rivers and streams, where appropriate.* *Policy B1.2.1* *Ensure all activities in townships have appropriate systems for water supply, and effluent and stormwater treatment and disposal to avoid adverse effects on the quality of ground water or surface waterbodies.* *Policy B1.2.2* *Ensure land rezoned to a Living or Business zone can be serviced with a water supply and effluent and stormwater disposal without adversely affecting groundwater or surface waterbodies.* *Policy B1.2.5* *Require any sewage treatment and disposal to be reticulated in the townships of Castle Hill, Doyleston, Lake Coleridge Village, Leeston, Lincoln, Prebbleton, Rolleston, Southbridge, Springston, Tai Tapu and West Melton.* *Objective B1.3.1* *Areas of "significant indigenous vegetation and significant habitats of indigenous fauna" are recognised and protected as townships expand.* *Policy B1.3.1*	The Plan Change area is understood to encompass some areas of versatile soils[10]. The proposal is not understood to create a shortage of land or soil resources and the area of versatile soils to be removed from productive use is not large relative to the wider availability of versatile soils in the District. Accounting for the buffers provided for within the ODP, the development of the site will not adversely affect any water resources, sites of sensitive cultural value, ecological values or access to rivers or streams. The site will be able to be adequately serviced, noting that subdivision will not be able to occur until such time as adequate infrastructure provision is confirmed to Council satisfaction. There is no significant indigenous fauna/flora identified on the Council planning maps and in Operative District Plan. The site has been subject to a comprehensive survey and ecological assessment to determine values as part of the request (Completed by Mark Taylor of Aquatic Ecology Ltd). The RFI response addresses wetland identification, significance, and protection. This response is included in **Attachment 11.** With the successful plan change request, the area will be destocked, and wetland riparian zones will benefit from increased margins protected by eventual reserves/green links. This will support a diverse range of wetland species, will promote wildlife, aquatic ecology and amenity values. There would be an opportunity at the time of subdivision where the waterways are available for design and enhancement in respect to ecological function. Notably, if the recommendations of the ecological assessment are incorporated, then the likelihood of environmental benefits is increased,

[10] Selwyn District Council Baseline Assessment – Versatile Soils (DW015), Dec 2018. Figure 9.

Ensure any wetland or area containing indigenous vegetation on a site is assessed to establish its ecological values, before the land is rezoned for new residential or business development. *Policy B1.3.2* *Ensure any site which is assessed under Part E, Appendix 8 as a site potentially worthy of protection is legally and physically protected from any adverse effects of rezoning the land or any subsequent activities on the land.*	and the proposal will be consistent with Objective B1.3.1, Policy B1.3.1 and Policy B1.3.2.

19. Overall, it is considered that the proposed Plan Change is generally consistent with the objectives and policies of the Selwyn District Plan, particularly those seeking to provide pleasant living environments with high amenity. The proposal is not consistent with Objective B4.3.3 and Policy 4.3.1 which seek to ensure that new development is contained within the Regional Policy Statement priority areas, however the National Policy Statement on Urban Development resolves that policy tension, as discussed below. Overall, it is considered that the resultant character, amenity and environmental effects of the proposal are consistent with those sought in the District Plan for Lincoln. Given this, it is considered that the proposal is an appropriate means of achieving the outcomes sought by the objectives and policies of the District Plan.

Attachment 13: Amended Urban Design Statement - DCM

LINCOLN SOUTH PLAN CHANGE

FOR ROLLESTON INDUSTRIAL DEVELOPMENTS LIMITED

18 FEBRUARY 2021
PROJECT. 2020_113
REVISION E

LINCOLN SOUTH PLAN CHANGE - URBAN DESIGN STATEMENT

Project no:	2020_113
Document title:	2020_113 Carter Lincoln South Plan Change_Urban Design Statement_E
Revision:	E
Date:	18 February 2021
Client name:	Rolleston Industrial Developments Limited

Author: David Compton-Moen / Peter McAuley

DOCUMENT HISTORY AND STATUS

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C	23/10/2020	COUNCIL ISSUE	DCM/PM	JP (NOVO)	BVD
D	28/10/2020	COUNCIL ISSUE	DCM/PM	JP(NOVO)	
E	18/02/2021	RFI RESPONSE	DCM/PM	JP(NOVO)	

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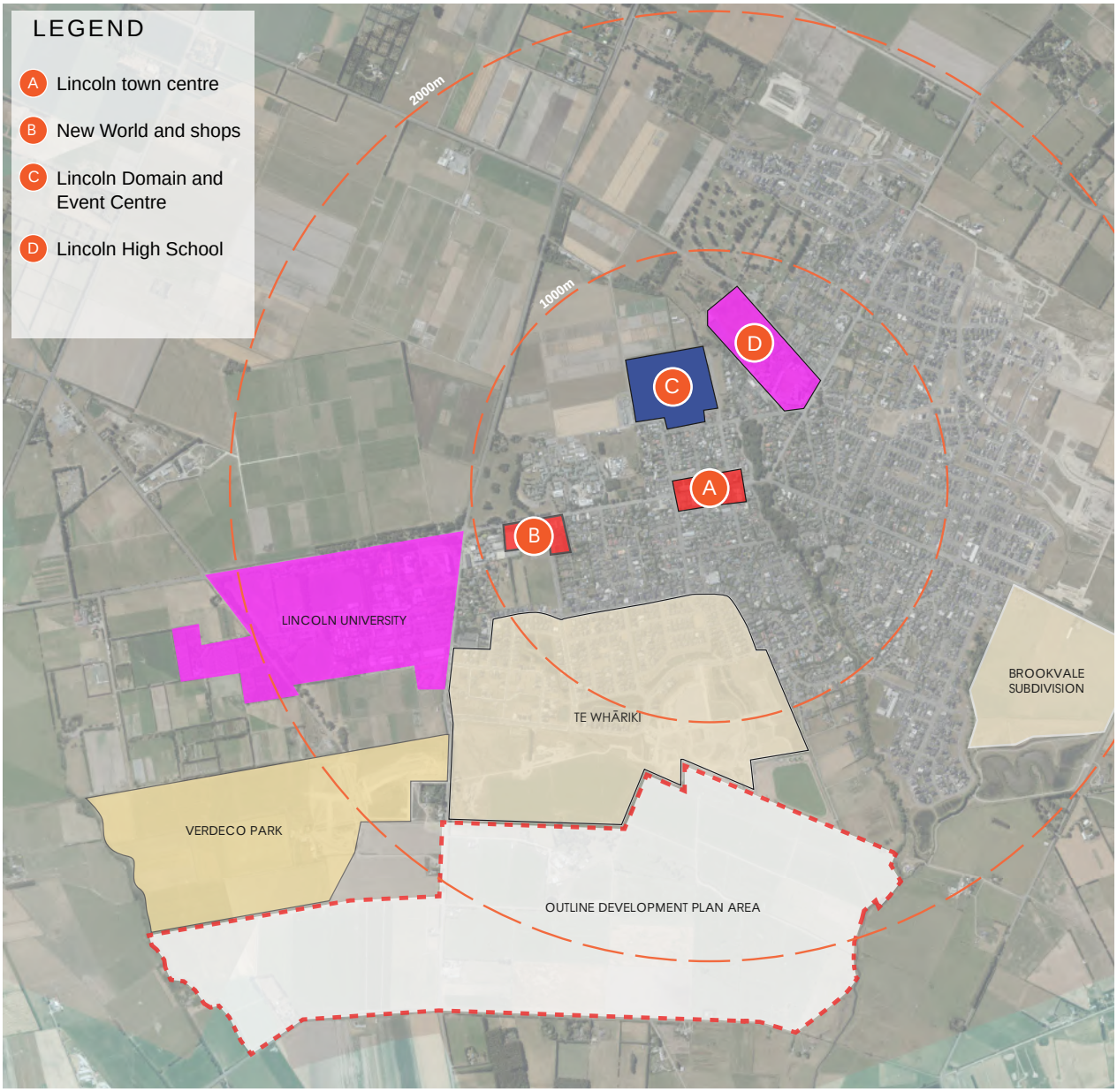
CONTENTS

INTRODUCTION

DCM Urban and Inovo Projects Limited have been commissioned by Rolleston Industrial Developments Limited to prepare an Urban Design Statement and Outline Development Plan (ODP) for approximately 190Ha area on the southern edge of the existing settlement. Input into this plan and statement has also been provided by:

- Mainland Surveying - Survey
- Novo Group Limited - Planning and Traffic
- E2 Environmental - Stormwater
- Coffey - Geotechnical and PSI



LOCATION MAP (nts)

LOCATION AND CONTEXT

Lincoln South Plan change site is approximately a 190ha area immediately to the south of Lincoln township, adjacent to the Te Whariki (Residential - Living Z) and Verdeco (Residential - Living Z, Living 3 and Business 2) developments, straddling either side of Springs Road. The site extends south to Collins Road. The land is currently zoned Rural – Outer Plains. Stage 4 of Te Whariki is currently under development, consisting of approximately 360 lots, typically ranging in size from 430-1000m^2. The development is supported by an extensive blue and green network running through the area, providing a mix of amenity and informal recreation values to current and future residents. Dwellings are typically single storey ranging in size from 150-220m^2, with a range of materials and forms.

The plan change site is typically flat, sloping down from northwest to southeast towards LI and the LII River. Vegetation and landcover is predominantly open grass paddocks with large vegetation restricted to internal and road boundaries. Shelter belts, including poplar and macrocarpa species, line Springs Road but otherwise the ODP is free of any significant vegetation with the exception of around the Homestead and Springs Creek. Springs Creek traverses the eastern half of the ODP before linking with the LII River.

CURRENT LINCOLN ODP'S - GROWTH AREAS

There are 8 Outline Development Plans currently in the Selwyn District Plan for Lincoln. Each ODP is at a different stage of development with a brief summary below:

ODP 1 – TE WHARIKI SUBDIVISION

Three stages of this subdivision have been completed and the fourth (final – 34.0ha with a net density of 10.6HH/ha) stage is currently under construction, due for completion next year. Stages 1-3 are mostly built out with only lots remaining in the final stage, being 360 lots with an average lot size of 647m^2.

ODP 2 – LIFFEY SPRINGS AND ARARIRA SPRINGS PRIMARY – TE PUNA O ARARIRA

The subdivision design is currently underway for Brookvale as an extension of the existing development of Liffey Springs, extending the township up to the intersection of Edward Street and Ellesmere Road. The development comprising of approximately 248 general residential lots and 40 medium density lots. All of the sites within Liffey Springs, west of the LII River have been, constructed.

ODP3 – ROSEMERRYN AND FLEMINGTON DEVELOPMENT

Stages 1-11 of Rosemerryn have been constructed and sold with Stages 13, 14 and 16 currently on the market. Eventually the development will extend out to Ellesmere Road with the development of Stages 15, 17-24. The residential development is supported by a small commercial development. Stages 1-5 of Flemington have been constructed and sold, with Stages 6-11 sold and awaiting construction, and Stage 12 currently on the market. The development is proposed to be supported by a small commercial development.

ODP 4 – BARTON FIELDS

In northern Lincoln and currently under construction.

ODP 5 - VERDECO

The residential area of this ODP is complete with the Business area yet to be established.

ODP 6 - 'VEGE BLOCK' MEDIUM DENSITY

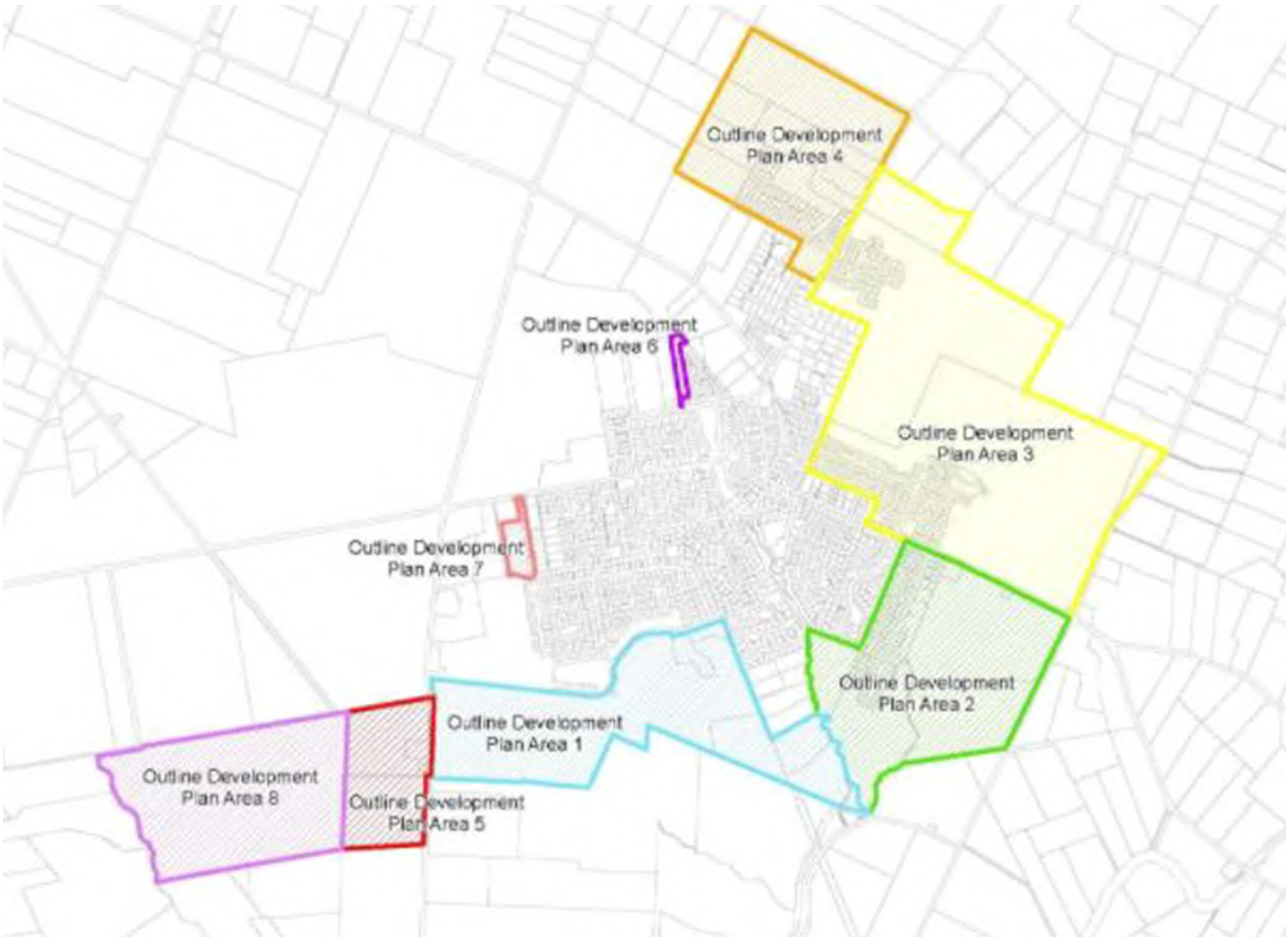
Is designed to achieve a density in excess of 15hh/Ha but is yet to be developed.

ODP 7 - VERNON DRIVE BUSINESS 3 TO LIVING Z ZONE

Is designed to achieve a density in excess of 20hh/Ha but is yet to be developed.

ODP 8 - VERDECO PARK

Comprises rural residential lots with a general approach of locating smaller lots (minimum of 3,000m^2) around the outside of the site. Currently under construction.



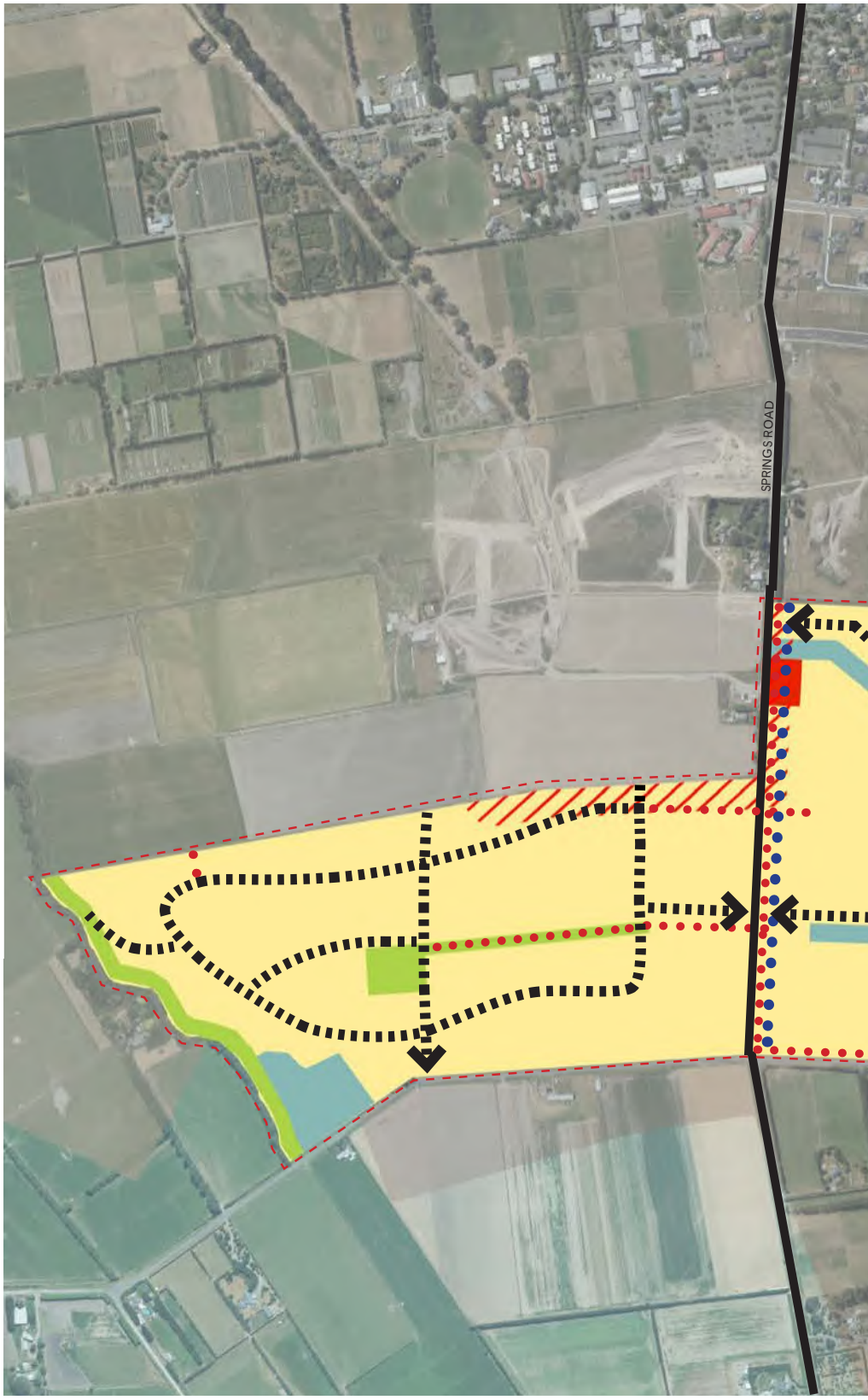
The image above was sourced from the Operative Selwyn District Plan, highlighting 8 current ODP areas in Lincoln. The majority of these ODP's are either built out, under construction or in the design phase.

CURRENT OPD MAP (source: eplan.selwyn.govt.nz)

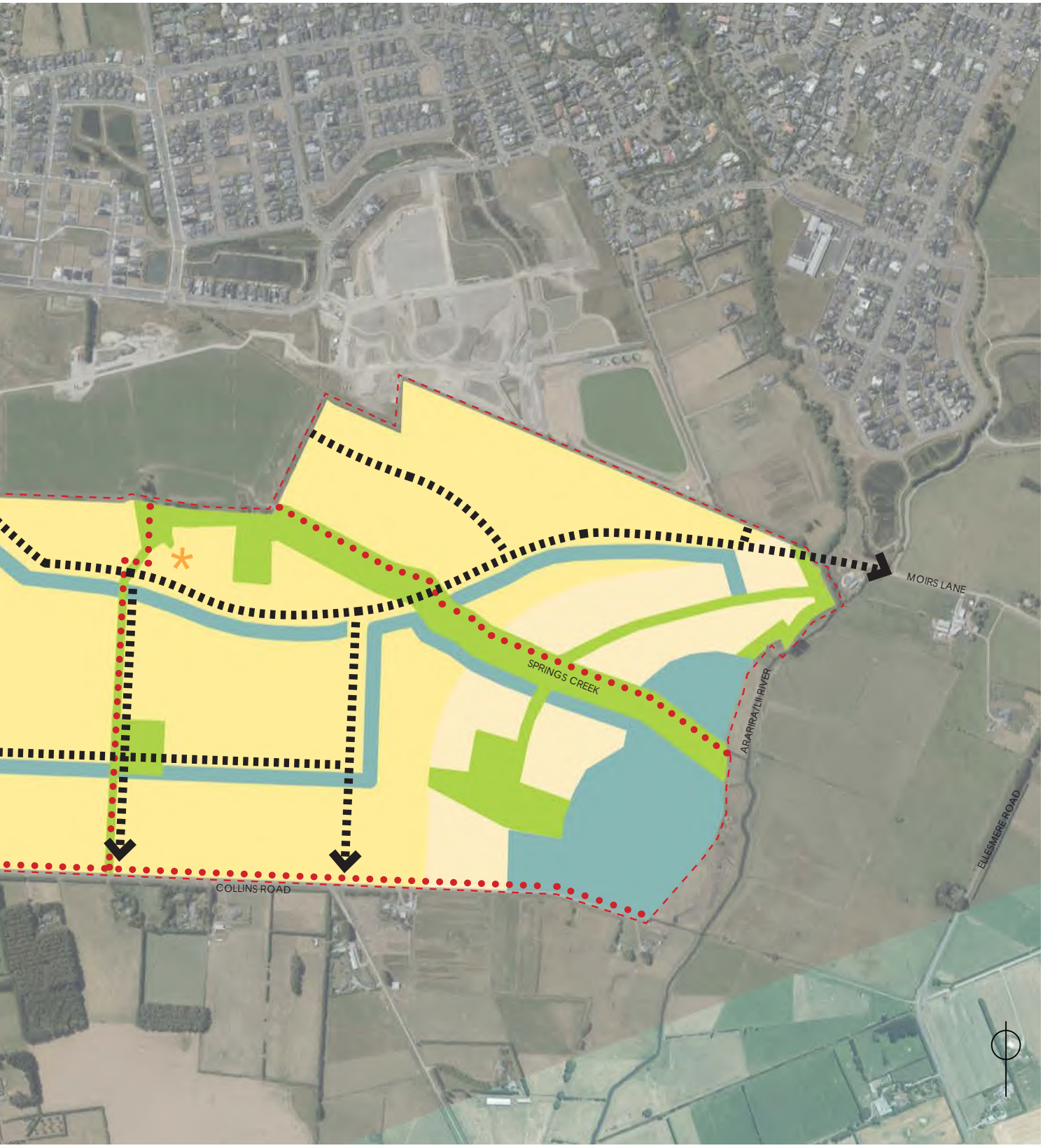
OUTLINE DEVELOPMENT PLAN (ODP) - LINCOLN S

LEGEND

- Outline Development Plan Area
- Living Z Zone
- Living X Zone
- Business 1 Zone
- Heritage Setting
- Indicative Road
- Indicative Pedestrian & Cycle Route
- 33kV Overhead Lines
- Reserve Location (size to be determined at time of subdivision)
- Stormwater Management
- Setback



OUTH


MOIRS LANE
SPRINGS CREEK
ARARIRA/TILI RIVER
ELLESMERE ROAD
COLLINS ROAD

LANDUSE AND DENSITY

(CONTEXT, CHARACTER, CHOICE)

The ODP area is designed to achieve a minimum net density of 12 households per hectare with higher density residential units located within Medium density (15hh/Ha) areas adjacent to key open spaces and green corridors. Two residential densities are proposed within the ODP being Living X and Living Z (low density, medium density - small lot, and medium density - comprehensive). The aim is to create diversity and variety of housing typology without compromising lifestyle. The provision of smaller residential lot sizes are recognised as an important method to reduce sale prices and meet the demands of a greater proportion of the community, particularly first home buyers seeking a warm, energy efficient home that meets modern lifestyle needs. The density provides for a mix of dwelling types and lot sizes to cater to a wide range of the residential market. It allows for people of different ages and incomes to mix and create a diverse community, as well as for people to move within the development as their needs change.

LANDUSE	MINIMUM INDIVIDUAL LOT SIZE	AVERAGE LOT SIZE
Living X	2,000m^2	2,000m^2
Living Z - Low Density	500m^2	600m^2
Living Z - Medium Density (small lot)	400m^2	500m^2
Living Z - Medium Density (comprehensive)	None	350m^2 (maximum)

The ODP adopts three zone types from the District Plan, being: Living Z, Living X and Business. The Living Z zone is a natural extension of the existing Te Whāriki and Verdeco developments. A small commercial area, or neighbourhood shops, is proposed at the intersection of Springs Road and the proposed primary road. This development will be designed to serve the new community with day to day products, with likely tenants being a dairy, takeaways and a café.

KEY ASPECTS

- Diversity of house size and lot size to provide choice
- Provision of higher density with higher amenity areas
- Retention and protection of the Homestead

LEGEND

Outline Development Plan Area

LIVING Z

Low Density (Minimum 12 Households/Ha)

Medium Density (Minimum 15 Households/Ha)

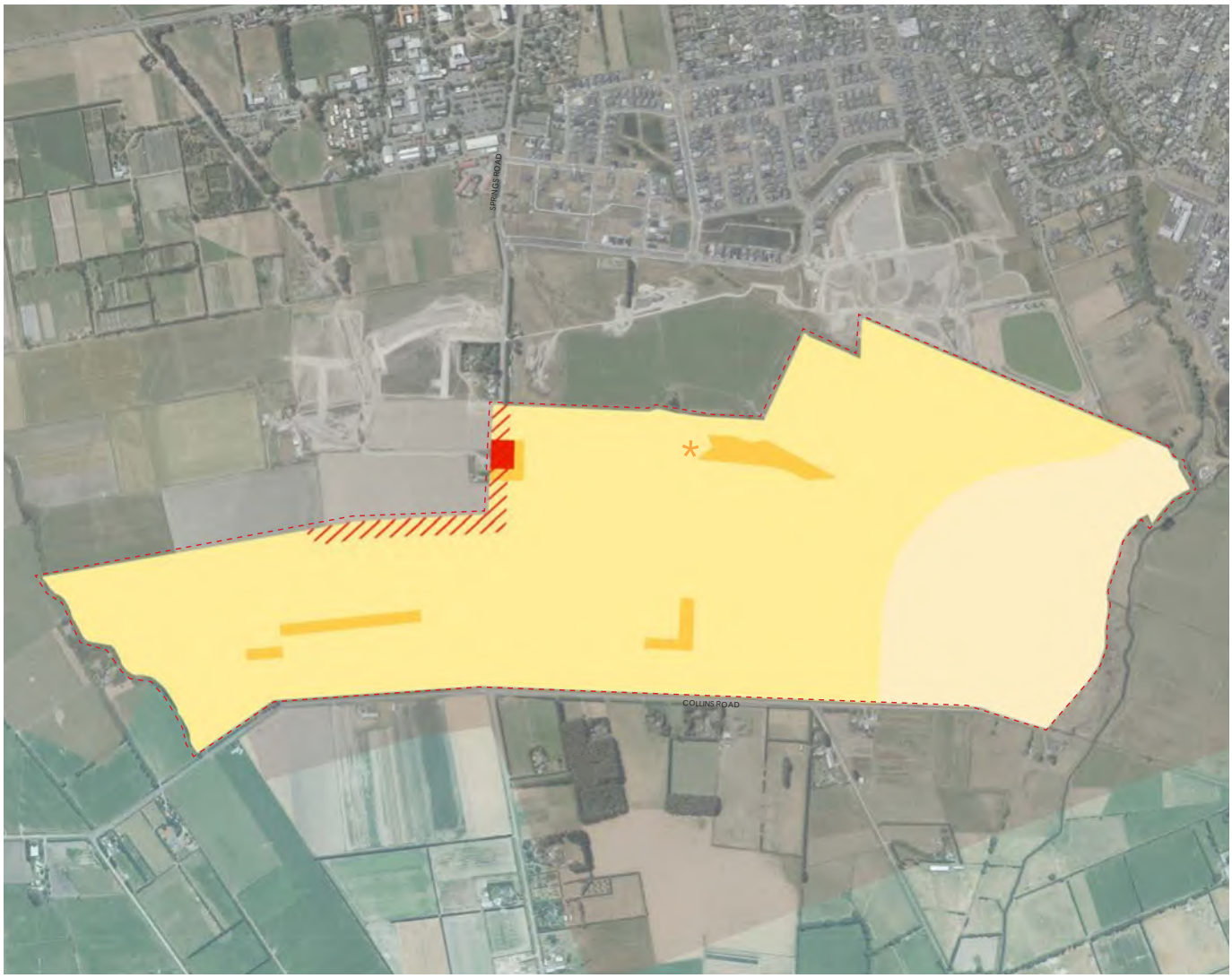
LIVING X

Large Lot Residential

Commercial / Business

Heritage Setting

Setback



LANDUSE AND DENSITY MAP (nts)

The ODP provides a minimum net density of 12 households per hectare with higher density develop located near high amenity spaces or close to commercial amenities.

THE FOLLOWING DIAGRAMS ARE INDICATIVE ONLY BUT SHOW THE POTENTIAL DIFFERENCE IN DENSITIES, PROVIDING A VARIETY OF HOUSING TYPOLOGIES TO MEET THE NEEDS OF DIFFERENT HOUSEHOLDS, INCLUDING ALL AGE GROUPS

A. LARGE LOT RESIDENTIAL (~2000m² LOTS)

B. LOW DENSITY RESIDENTIAL (>500m² LOTS)

C. MEDIUM DENSITY RESIDENTIAL (>400m² LOTS)

D. COMPREHENSIVE MEDIUM DENSITY RESIDENTIAL (250m² TYPICAL LOTS)

	A. LARGE LOT	B. LOW DENSITY	C. MEDIUM DENSITY	D. MEDIUM DENSITY COMPREHENSIVE
BLOCK SIZE	60m X 175m; 10,500m²	60m X 175m; 10,500m²	60m X 175m; 10,500m²	60m X 175m; 10,500m²
LOT SIZE (MINIMUM)	2000m²	500m²	400m²	None
AVERAGE LOT SIZE	2000m²	600m²	500m² (maximum)	350m²
NUMBER OF HOUSEHOLDS	5	17	21	30
DENSITY (HH/Ha)*	3	12	14	21

NOTE

* Based on 30% of developable land given over to open space (both green and blue networks) and movement networks (public roads)

1. Vehicle access to all Comprehensive Medium Density units is via a shared R.O.W. to consolidate vehicle crossings and provide a high-quality, highly accessible streetscape;

2. Blocks typically run north-south to maximise the amount of sunlight entering into private outdoor living ares at the rear of dwellings.

MOVEMENT AND CONNECTIVITY

(CHOICE, CONNECTIONS, CUSTODIANSHIP AND COLLABORATION)

Walkability and connectivity are key principles of the ODP with a hierarchy of street types and connections provided throughout the area. The aim of the movement network is to provide a range of modal options for residents, to reduce car-dependancy for short local trips while recognising private vehicle use is necessary for longer trips. The ODP encourages connectivity using primary and secondary routes running through the area from west to east, with a future primary connection from Springs Road through to Moirs Lane. The routes will connect through to existing roads where possible, including Springs, Collins, the Verdeco development and Moirs Lane. The Primary Road's connection with Springs Road is proposed to align where it is possible to connect to a Potential Bypass Road through ODP Area 5 (Verdeco Business 2B and Living Z area) and then on to an unformed section of Weedons Road.

The primary road route will include a 2.5m wide minimum shared path separate from the main carriageway, and is likely to function as a collector road. The development of housing in this location would be developed to minimise interruption to pedestrian/cycle/vehicle movements by encouraging the use of consolidated vehicle crossings or laneways depending on the adjoining typology. Both primary and secondary routes will provide pedestrian and cycle facilities on both sides of the road, street trees and parking.

Smaller tertiary streets (not shown) or local/neighbourhood streets will ideally run north-south to create a highly connected and permeable neighbourhood. These roads are not shown to allow future design flexibility at the final subdivision stage. The design of the local streets will encourage slow vehicle movements combined with pedestrian and cycle facilities, either separate or shared depending on the design of the street. The layout of the blocks will have a predominantly north-south orietnation where possible to maximise solar gain into rear yards (outdoor living spaces) of all properties.

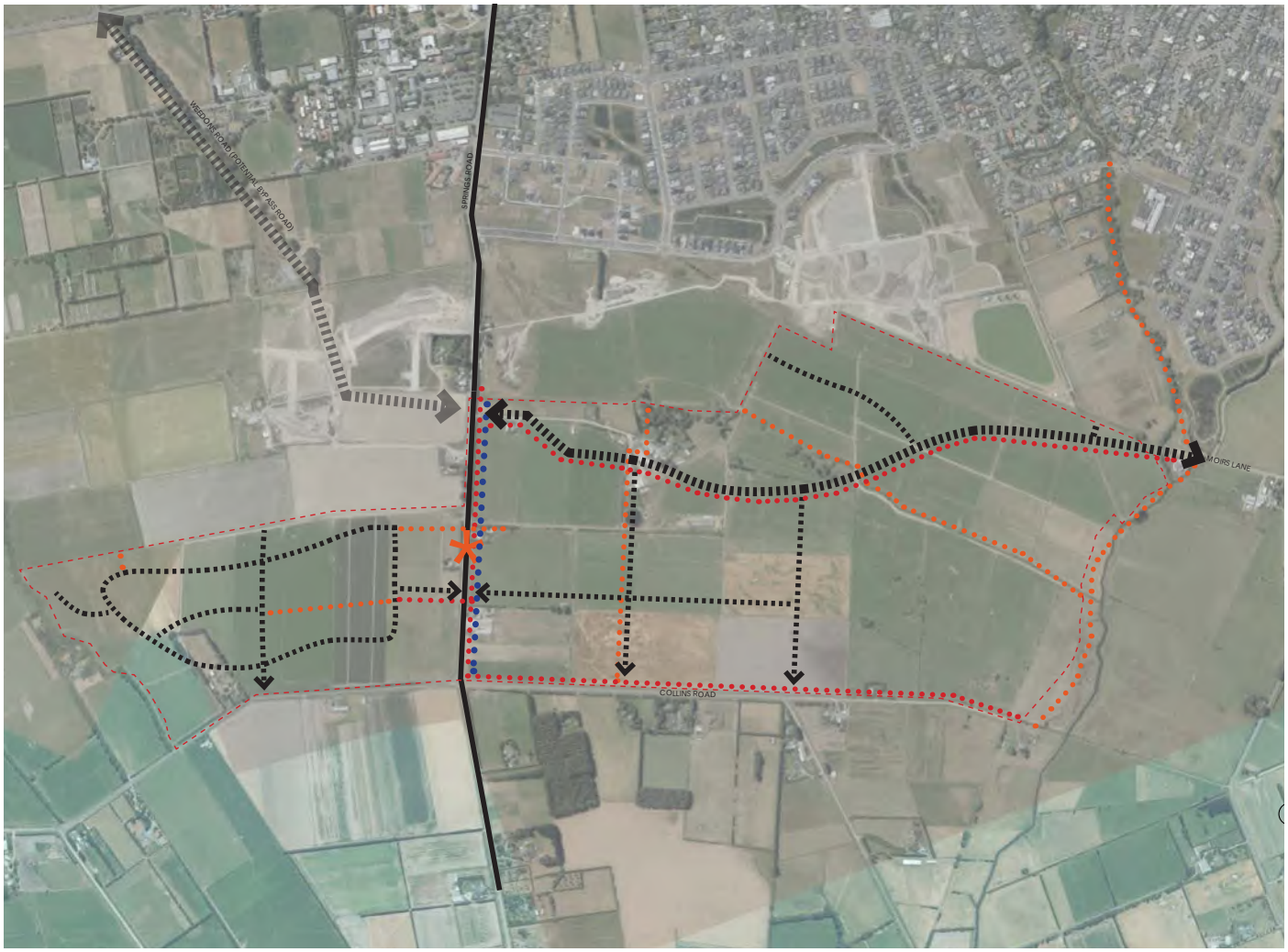
Supporting the road network, off road pedestrian and cycle paths connect through to existing networks in Te Whariki, Liffey Springs and the Rail Trail.

KEY ASPECTS

- Street heirarchy providing different modal allocation
- Connection with a potential bypass road highlighted in Lincoln ODP Area 5 (Verdeco)
- A well-connected network which combines with the green / blue network and existing facilities connecting to key destinations (school, childcare, town centre)
- A high level of legibility created through street heirarchy
- Prioritising walking and cycling with a mix of on-road, separate, and off-road facilities to promote active transport modes
- Direct access onto Springs Road for individual properties should be avoided
- Streets with a high level of amenity

LEGEND

- Outline Development Plan Area
- Potential Bypass Road (Weedons Road)
- Primary Road
- Secondary Road
- 2.5m Shared Path (off road)
- Possible Green Link & Cycleway
- 33kV Overhead Lines
- Stock Underpass Turned into Pedestrian Link



MOVEMENT AND CONNECTIVITY MAP (nts)

Providing for a variety of different modal options over a well-connected movement network provides future residents with choice.

GREEN / OPEN SPACE NETWORK

(Choice, Connections, Custodianship and Collaboration)
The Green network proposed builds on the existing network through Te Whāriki and the Springs Creek corridor to provide a green strip running through the eastern half of the Plan Change area providing amenity to a large number of future residents. The network also combines with the movement network to provide shared off-road facilities connecting through to Ararira Springs Primary – Te Puna o Ararira, the homestead and the future playground being developed in Te Whāriki.

The ODP proposes four additional Neighbourhood reserves within the project boundary to provide amenity for residents, the majority of residents being within a 5minute walk, or 500m radius of the spaces. It is likely the sizes of the reserves will range between 3,000m^2 and 6,000m^2 with the exact size and position of these reserve being determined at the time of subdivision. These reserves will be 'tied' to the location of higher density developments, providing amenity for residents on smaller sections.

Linking the ODP to existing Te Whāriki residential development, green links 10-20m wide are proposed, and in many cases will be integrated with landscape features such as natural waterways and stormwater management areas/corridors.

It is not anticipated that a Sport and Recreation Park (2.5Ha or more) is required within the study area, given the site's close proximity to Lincoln University's fields and Lincoln Domain and Event Centre (1.8km away).

KEY ASPECTS

- Integrating green, blue and movement networks to create a high level of connectivity, amenity and active travel options
- Celebrating Springs Creek as an important natural feature of the ODP area, to create a sense of place
- Provides sufficient space near waterways and wetland areas to enable habitat protection as well as providing access for future residents

LEGEND

Outline Development Plan Area

Green Link

Existing Green Space

Recreation Reserve

Existing Green Link

500m and 800m Walkable catchment

GREEN / OPEN SPACE MAP (nts)

The ODP connects with existing green spaces to provide a high level of amenity for future residents. The design recognises the importance of Springs Creek traversing the eastern half of the ODP to create future residential dwellings with a high degree of amenity and space.

BLUE NETWORK

The blue network is an integral component of the ODP area with several springs and waterways present. Springs Creek traverses the eastern half of the ODP area, starting at the Homestead and running east before combining with LII River. LII River is positioned along the eastern boundary of the ODP area along with a waterway from the Te Whāriki development directed to the north of the development. The Te Whariki development includes several stormwater detention basins along its southern boundary which are planted with native species and contain walking and cycling paths. Springs Creek is a spring fed tributary of the LII River with headwater springs situated within the grounds of the historic 'Chudleigh' homestead. The creek alignment has been modified over time to straighten the channel and improve its drainage function. There is opportunity to enhance and incorporate this natural feature into the wider green and blue network of the site.

Stormwater management areas are proposed in the southwestern and southeastern corners of the ODP. The intention is for stormwater to be separate from natural waterways, ensuring water is treated before it can enter LII River. Stormwater runoff from the majority of the site will be conveyed by a network of swales and pipes to two proposed Stormwater Management Areas (SMA's) for treatment and attenuation before being discharged into the LII River to the east and an existing private drain to the west of the site. Detailed design of the SMA's will be determined by the developer in collaboration with Council at the subdivision stage and in accordance with Environment Canterbury requirements.

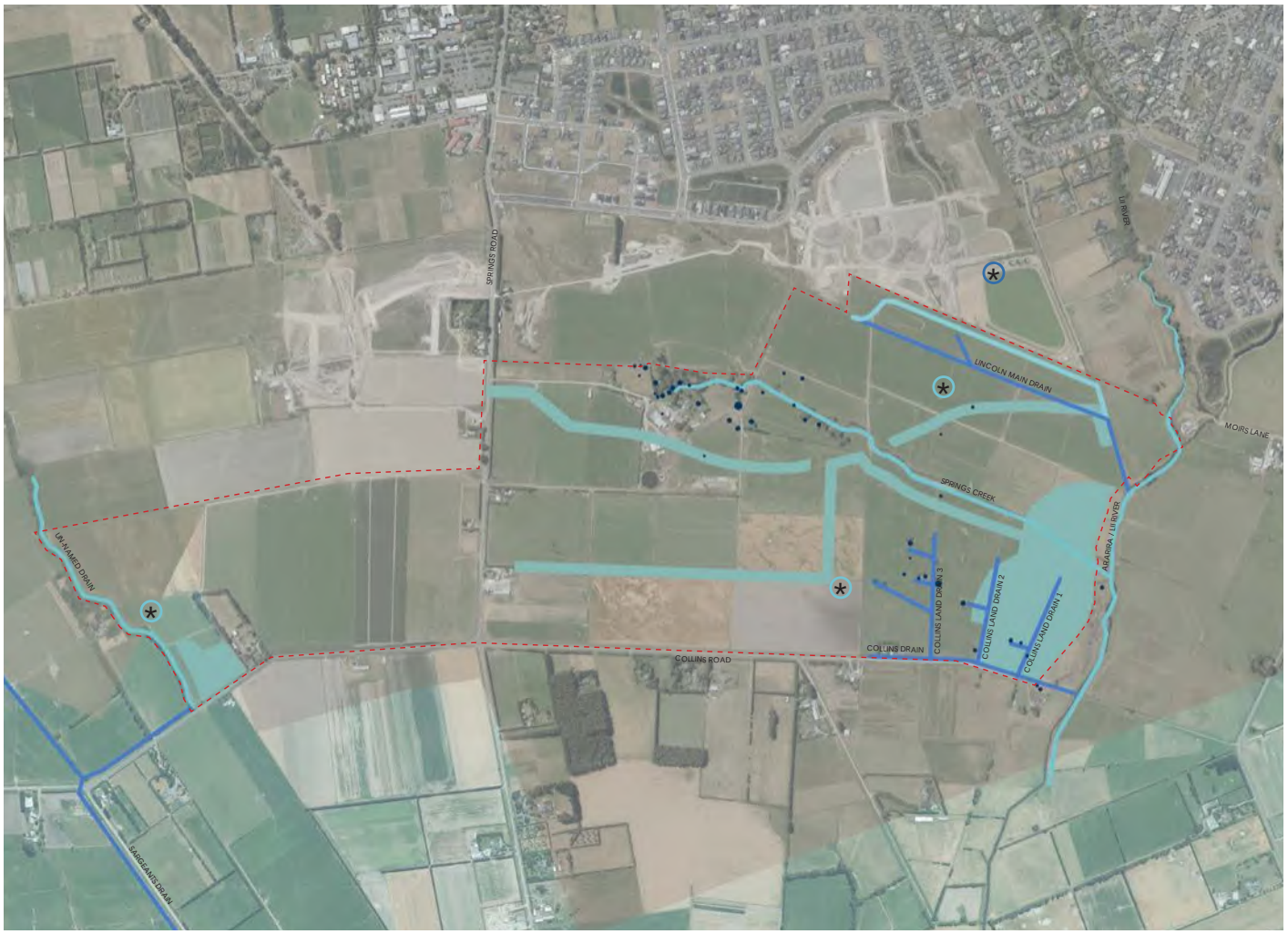
The spring-fed Lincoln Main Drain (LMD) crosses the northeast portion of the site from northwest to southeast and serves as the main drain outlet for the Te Whariki subdivision. The drain is to be diverted to the northern boundary of the development site but detailed design will ensure its ongoing function is not compromised. There is opportunity to naturalise and enhance the LMD as part of the wider green and blue network of the site.

KEY ASPECTS

- Separation of stormwater from natural waterways
- Use of low impact design techniques including grass swales and detention basins
- Development setback, via a reserve, from Springs Creek

LEGEND

- Outline Development Plan Area
- Stormwater Management System / areas
- Waterway
- Existing Drain
- Springs Locations
- Existing Allendale Pump Station and Emergency Storage
- Indicative Waste Water Pump Station



BLUE NETWORK MAP (nts)

SUMMARY AND CONCLUSIONS

The proposed Lincoln South Plan Change is a natural extension of existing residential development occuring to the south of the existing developments of Te Whāriki and Verdeco. Covering an area of approximately 190Ha, the ODP will provide a mix of house and lot sizes in a location which is well served by existing and future amenities. A strong green and blue network provides a base for the development, recognising and protecting natural features in the area.

Many of the Lincoln's ODP's have been developed, or are in the process of being developed creating the need to identify future growth areas for the township over the coming years. The ODP will:

- Provide a diversity of house size and lot size to provide choice
- Locate higher density with higher amenity areas
- Retain and protect heritage and cultural elements, including the Homestead
- Create a street heirarchy providing different modal allocation
- Create a connection with a potential bypass road highlighted in Lincoln ODP Area 5 (Verdeco)
- Continue a well-connected network which combines with the green / blue network and existing facilities connecting to key destinations (school, childcare, town centre)
- Create a high level of legibility created through street heirarchy
- Prioritise walking and cycling with a mix of on-road, separate, and off-road facilities to promote active transport modes
- Avoid direct access onto Springs Road for individual properties
- Create streets with a high level of amenity
- Provide a quantity of greenspace and facilities appropriate for the future population
- Integrate green, blue and movement networks to create a high level of connectivity, amenity and active travel options
- Celebrate Springs Creek as an important natural feature of the ODP area, to create a sense of place
- Provide sufficient space near waterways and wetland areas to enable habitat protection as well as providing access for future residents
- Ensure stormwater is kept separate from natural waterways prior to treatment
- Encourage the use of low impact design techniques including grass swales and detention basins
- Ensure a development setback, via a reserve, from Springs Creek

URBAN DESIGN PRINCPLES

The design principles that underpin this ODP are in line with the Ministry for the Environment's design guide for urban New Zealand "People Places Spaces" which is endorsed by the 'New Zealand Urban Design Protocol'.

PRINCIPLE	PURPOSE
Consolidation and dispersal	Density and Landuse - To promote higher-intensity development around existing or new nodes and lower density on the periphery. This allows local communities, businesses and public transport to be strengthened and resource efficiencies achieved, while reducing environmental impacts on peripheral areas.
Integration and connectivity	Movement Networks – To promote development that is integrated and connected with its surrounding environment and community. This facilitates ease of access, economy of movement and improved social interaction.
Diversity and adaptability	Variation in typology and lot size - To promote choice through the provision of a diverse mix of compatible activities and uses, so built environments can adapt over time. This facilitates the ability to respond efficiently to social, technical and economic changes.
Legibility and identity	Strong Green and Blue network - To promote environments that are easily understood by their users, and that display a strong local identity and appropriate visual character. This facilitates an enhanced usage, enjoyment and pride in local places.
Environmental responsiveness	Strong Green and Blue Network - To promote urban environments that are responsive to natural features, ecosystems, water quality, reduced energy usage and waste production.

Attachment 14: E2 Environmental CRPS Response

Memo

To:	Selwyn District Council	From:	Daniel McMullan, Andrew Tisch
Cc:	Bruce Van Duyn, Peter McAuley, Tim McLeod	Date:	17 February 2021
Subject:	**Lincoln South Plan Change – RFI response to query #8**		

Introduction

Following a plan change request submission to Selwyn District Council (SDC) for 1491 Springs Road south of Lincoln, a number of requests for further information (RFI) have come back from SDC. This memo is in response to RFI #8.

RFI #8

RFI #8 is provided below:
"As acknowledged in the plan change request, the area is subject to inundation in a 200-year Average Recurrence Interval flood event, and that it may contain areas that fall within the Regional Policy Statement definition of 'high hazard'. Please ensure that the assessment requested above considers CRPS Policy 11.3.2 *Avoid development in an area subject to inundation*."

For reference, the key aspect of the 'high hazard' definition is "flood hazard areas subject to inundation events where the water depth (metres) x velocity (metres per second) is greater than or equal to 1 or where depths are greater than 1 metre, in a 0.2% annual exceedance probability flood event"

Canterbury Regional Policy Statement (CRPS) 11.3.2

CRPS 11.3.2 is provided below from the Environment Canterbury (Ecan) ePlan[1].
11.3.2 Avoid development in areas subject to inundation
In areas not subject to Policy 11.3.1 that are subject to inundation by a 0.5% AEP flood event; any new subdivision, use and development (excluding critical infrastructure) shall be avoided unless there is no increased risk to life, and the subdivision, use or development:

1. is of a type that is not likely to suffer material damage in an inundation event; or
2. is ancillary or incidental to the main development; or
3. meets all of the following criteria:
    a. new buildings have an appropriate floor level above the 0.5% AEP design flood level; and
    b. hazardous substances will not be inundated during a 0.5% AEP flood event;

    provided that a higher standard of management of inundation hazard events may be adopted where local catchment conditions warrant (as determined by a cost/benefit assessment).

When determining areas subject to inundation, climate change projections including sea level rise are to be taken into account.

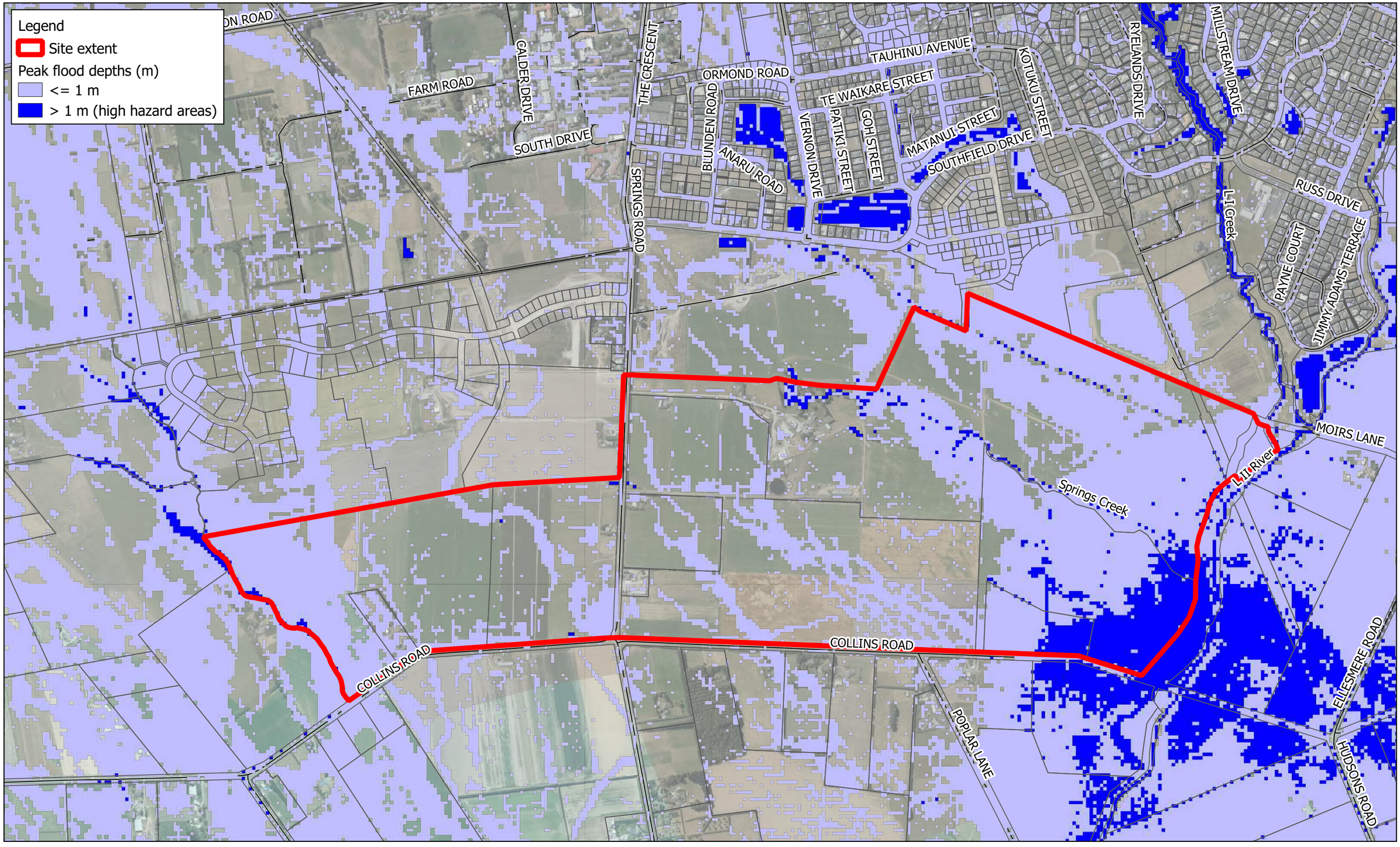
[1] Environment Canterbury. (2020). *Chapter 11 – Natural Hazards*. Retrieved from eplan.ecan.govt.nz

Response to RFI #8

Areas of high hazard have been determined based on hydraulic modelling results provided by SDC (H. Roulston, personal communication, November 18, 2020). Plans showing areas of high hazard via peak water depth and peak 'velocity x depth' maps for the 0.2% AEP flood event including the effects of climate change are provided in Appendix A. These show that there are no areas where the velocity x water depth factor is greater than 1 m^2/s, with areas of water depth greater than 1 m focussed in the ponding area at the south-east corner of the site, along with other areas in waterways and minor depressions. This low velocity x water depth factor will be due to flat gradients on the floodplain, wide overland flow paths that do not concentrate flows, and ponded water that is slow moving despite potentially being relatively deep.

As per CRPS 11.3.1, development in high hazard areas will be avoided. In some minor locations, the high hazard areas identified by the model results will need to be verified against finished levels due to the hydraulic model's coarse representation of the terrain.

CRPS 11.3.2 relates to areas outside of the high hazard area but that are subject to inundation in the 0.5% AEP flood event. In these areas, development will also be avoided where there is increased risk to life. In the subdivision design phase, this would also consider access / egress routes in addition to maintaining appropriate freeboard above the 0.5% AEP flood event for building floor levels. Where suitable, there may be filling of ground levels to above the 0.5% AEP flood level to provide platforms for development. However, this would be dependent upon the ability to provide compensatory storage and ensure there are no negative effects downstream of the site. Existing areas of inundation may also be shifted through the development of stormwater / flood management infrastructure. The effects of climate change will be included in any assessment / design.



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Map Projection: Transverse Mercator
Horizontal Datum: NZGD 2000
Grid: NZGD 2000 New Zealand Transverse Mercator

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Lincoln South Plan Change

Figure A1: Peak flood depths in a 0.2% AEP flood event including the effects of climate change (2081-2100, RCP8.5)
Model results provided by Selwyn District Council.

Job Number	20055
Revision	1
Date	16/02/2021

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Legend
Site extent
Velocity x Water Depth
< 1 m²/s
>= 1 m²/s (high hazard areas)

FARM ROAD
CALDER DRIVE
SOUTH DRIVE
THE CRESCENT
SPRINGS ROAD
ORMOND ROAD
BLUNDEN ROAD
ANARU ROAD
VERNON DRIVE
PATIKI STREET
GOH STREET
TAUHINU AVENUE
TE WAIKARE STREET
MATANUI STREET
SOUTHFIELD DRIVE
KOTUKU STREET
RYELANDS DRIVE
MILLSTREAM DRIVE
L I Creek
RUSS DRIVE
PAYNE COURT
JIMMY ADAMS TERRACE
MOIRS LANE
L II River
Springs Creek
COLLINS ROAD
COLLINS ROAD
POPLAR LANE
ELLESMERE ROAD
HILDSONS ROAD

Paper Size A3

100 0 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: NZGD 2000
Grid: NZGD 2000 New Zealand Transverse Mercator

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Lincoln South Plan Change

Figure A2: Peak 'velocity x water depth' in a 0.2% AEP flood event including the effects of climate change (2081-2100, RCP8.5)
Model results provided by Selwyn District Council.

Job Number	20055
Revision	1
Date	16/02/2021

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