Appendix A

Infrastructure Assessment

Infrastructure Report

Skellerup South, Dunns Crossing Road

ROLLESTON INDUSTRIAL DEVELOPMENTS LTD

SKELLERUP SOUTH PLAN CHANGE

PROJECT 15084

ISSUE FINAL – 8 OCTOBER 2021

INOVO PROJECTS

Contents

QUALITY ASSURANCE

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1. Introduction

1.1. Purpose

Inovo Projects Ltd has been engaged by Rolleston Industrial Developments Ltd to prepare an Infrastructure Assessment for a proposed residential development at 423 Selwyn Road on the southwestern side of the of Rolleston. This Infrastructure Assessment has been prepared in support of a proposed Plan Change application for rezoning of the 28 ha site for residential use, resulting in development of approximately 350 new residential allotments.

The purpose of this report is to provide information on;

- Existing infrastructure around the site
- Proposed infrastructure for the development
- Conformance to national standards, Selwyn District Council's (SDC) policies and best practices relating to subdivision development, in particular:
  - Waterways, Wetlands and Drainage Guide (Christchurch City Council)
  - Selwyn District Council's *Engineering Code of Practice* (SDC ECOP)
  - NZS4404:2010 Land Development and Subdivision Infrastructure

1.2. Limitations

This report may not be reproduced, in whole or in part, without our prior written approval. This report has been prepared for the purpose stated in the report and may be relied upon for that purpose only. Assumptions made in the preparation of the report are as expressly stated in the report or set out below.

Where information has been supplied to us for the purpose of the report by another party, this information is believed to be reliable but we can accept no responsibility if this should prove not to be so.

2. Site Overview

2.1. Site Description

The proposed Plan Change site of approximately 28.43 ha is located on the south-western urban fringe of Rolleston township to the west of Dunns Crossing Road and north of Selwyn Road. The site is currently zoned Outer Plains in the Selwyn District Operative Plan and is used for dryland arable farming / grazing purposes. The site is directly adjacent to Plan Change areas PC70 (Farringdon Far West) on the east side of Dunns Crossing Road, and PC73 (Skellerup Block) to the northwest. The land is bounded by Outer Plains zoned land to the southwest and southeast.

The site has been used for farming purposes for at least 80 years and is currently covered in variety of pasture. There are some pine shelter belts along fence lines but otherwise there is no other vegetation within the block itself.

2.2. Ground Conditions

A preliminary geotechnical investigation and assessment of suitability for subdivision has been carried out by Tetra Tech Coffey as described in their *Skellerup South Plan Change Geotechnical Assessment Report* (Ref 773-CHCGE293048) dated September 2021.

The land is generally covered with approximately 100-300mm of topsoil overlying a layer of sandy silts. The sandy silt layer varies in thickness between 400-500mm, overlying a deep layer of sandy gravels. The geological model for the site is described as river alluvium deposits typically consisting of sandy gravel / gravelly silt (grading to sandy gravel) to greater than 20m depth

2.3. Groundwater & Bores

Piezometric contour data available on Canterbury Maps indicates depth to groundwater is 5 to 10m below ground level. Surrounding well logs show that initial groundwater was encountered between 5.3 to 5.8m below ground level.

The Environment Canterbury (ECan) GIS database shows no bores within the Skellerup South block.

There is an existing well (BX23/0830) located at 28 McLenaghan Road some 500m east of the northeast corner of the Skellerup Block which is nominated for community water supply bore but has not been developed yet. The site does not fall within a theoretical Community Drinking Water Supply Protection Zone.

2.4. Drainage Features

The site is gently sloping at 1:180 to 1:200 gradient to the south-southeast. The ground surface is slightly undulating with shallow flood channels crossing the sites as is typical of the Canterbury Plains.

A section of the Paparua Stockwater Race network crosses the site, entering mid-way along the western boundary and zig-zagging generally southeast through the block before terminating in a soak pit just before Selwyn Road. There are two shallow surface water bodies (ponds) next to the water race in the middle of the block near where the water race enters the block.

2.5. Existing Infrastructure

There is no existing SDC infrastructure located within the subject site, however, existing infrastructure to the neighbouring residential subdivisions to the north and east can be extended to the proposed development.

An existing Ø630mm sewer rising main is located in the southern side of Selwyn Road which conveys wastewater from the pump station located at the corner of Selwyn Road and Springston Rolleston Road, and pumps directly to 'The Pines' Wastewater Treatment Plant (WWTP). Further discussion of sewer infrastructure is found in Section 4.

There is a Ø200mm watermain in the eastern side of Dunns Crossing Road approximately 1,150m to the northeast of the site, with a Ø100mm connection eastwards across to Jean Archie Drive. Further discussion of water supply is found in Section 5.

3. Stormwater

3.1. Existing Stormwater Management

Discharge of stormwater to ground is common practice in the Rolleston area due to free-draining nature of the underlying gravels. As such, Rolleston has little stormwater reticulation network as most stormwater is discharged directly to ground via soakage pits and basins. Recent subdivisions to the east of the proposed rezoning such as Farringdon have utilised soakage to ground for stormwater management.

3.2. Stormwater Disposal

Geotechnical investigations for the rezoning sites confirm the sites have good drainage characteristics and that discharge to ground is feasible, as typical of the Rolleston area. As with all ground soakage systems, the efficiency can decrease over time. However, by adopting a conservative approach to the design of the systems, ensuring that there are adequate options for future upgrading and making allowance for secondary flows, ground soakage systems can provide a cost-effective long-term solution to stormwater disposal.

Residential sites will discharge primary runoff from rooves and hardstand areas directly to ground via on-site soak pits. The soak pits will be constructed as part of building consent process at the house building stage. Soakholes for house sites will be sized to deal with storms up to and including the 10% AEP 1 hour event.

Runoff from hardstand areas and roads will be collected and treated before discharging into ground via soakpits or infiltration trenches. Where kerb and channel are used, then a pit and pipe network will be used to convey stormwater to soakpits or infiltration basins / trenches. The approach to stormwater management for the proposed plan change area is consistent with similar residential subdivisions in Rolleston. Soakpits for road drainage will be sized for up to 2% AEP events plus runoff from residential lots once the on-site soakpit is inundated. All drainage infrastructure and soakpits associated with future roads will be constructed as part of any future subdivision and will be vested in SDC.

In general, the first flush stormwater runoff (i.e., first 15 to 25mm of any storm) is more polluted than the stormwater runoff from the remainder of the storm event. The first flush is generally treated using treatment systems which provide higher levels of contaminant removal than the treatment systems required for subsequent stormwater runoff. This first flush can be treated through a swale or infiltration basin or proprietary stormwater treatment devices such as hydrodynamic separators. Stormwater runoff from large rainfall events which exceed the first flush capacity can be discharged directly to ground using rapid infiltration trenches or soakpits.

Flows in excess of the capacity of the primary system can be directed to the roads which will act as secondary flow paths to safely convey stormwater through the developments.

Consent or a certificate of compliance for stormwater discharge to ground from the plan change site will be obtained from Environment Canterbury (ECan) at the subdivision consent stage. Any consents required from ECan will be transferred to SDC as required.

It is expected that all stormwater will be able to be permitted to discharge to ground and that from a stormwater perspective, the plan change can be supported with areas set-aside, if required, for stormwater treatment and attenuation as outlined above.

3.3. Flood Management

Detailed model results showing the extent and flood depth are available to view on the SDC's website This map shows the extent and depth of potential flooding during a 200-year ARI or 0.5% AEP flood resulting from heavy rainfall. **Figure 1** below shows the predicted flooding for the subject site.

As is typical of the Canterbury Plains, overland flow generated by continuous heavy rain or thunderstorms that the land cannot absorb becomes concentrated in shallow channels that cross the plains. The flood modelling indicates channels crossing or originating within the subject site and continuing over the southeast boundary. The predicted floodwater depth is generally less than 0.5m.

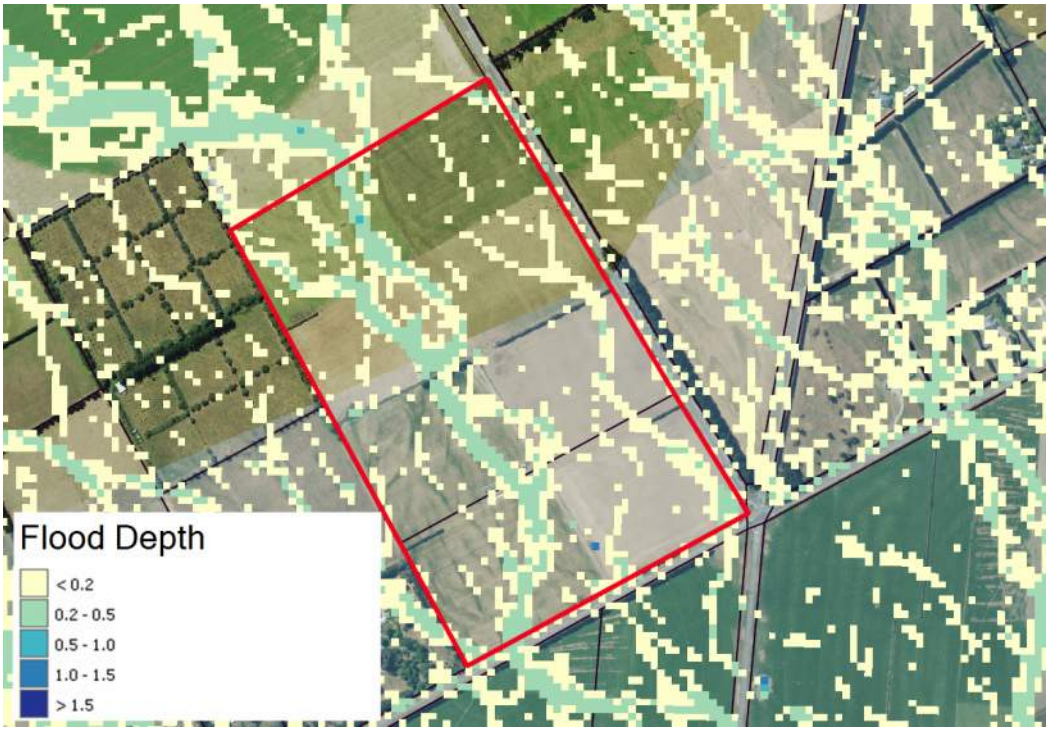

Figure 1 – Flood Depth Modelling from SDC Flooding Map

The flood modelling from ECan and SDC shows during the 0.2% ARI (1 in 500 year) rainfall event that the site will be classified as low hazard. The hazard map is shown below in **Figure 2**. The flood hazard is determined by the either depth (m) × velocity (m/s) or maximum depth (m) exceeding 1.0 It can be seen that there is one spot of high hazard on the site (near the southern end, central to the site), however this can be attributed to the localised depression at the soakpit at the end of the water race resulting in a depth of >1m.

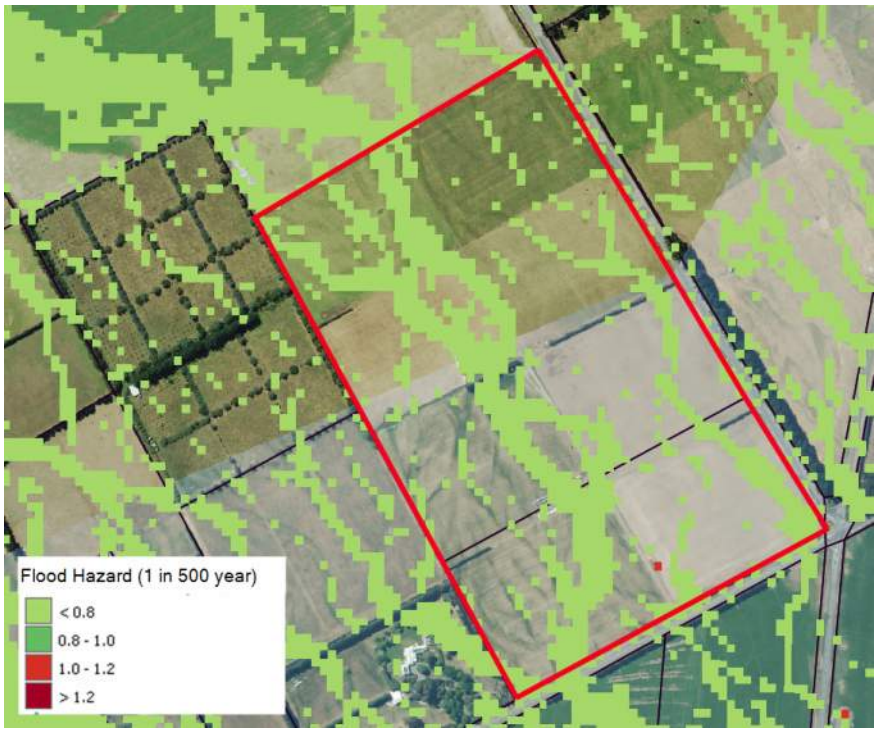

Figure 2 –0.2% AEP Flood Hazard Modelling from SDC

A flood risk assessment will be carried out at subdivision consent application stage as required by Section 106 of the Resource Management Act. Overland flow from upstream catchments will be considered to ensure that any potential adverse stormwater effects can be appropriately mitigated and minimum floor level rules set at

the time of subdivision and / or residential development. In general, ground levels for residential lots are set above internal road levels so the roads act as secondary flow paths to safely convey any potential floodwaters.

It is noted that currently there are no soak pits on the site other than the one associated with the water race. During extreme storm events, once the soil becomes saturated, all rain falling on the existing site can contribute to overland flow and therefore flooding downstream. Development of the site for residential use enables direct discharge of rainwater into the underlying gravels which does not occur pre-development. The overall effect is that runoff from the site may actually decrease in extreme events as a result of development. This effect will also occur if the site upslope is developed for residential use.

4. Wastewater

4.1. Reticulation

The site can be serviced by gravity reticulation draining to a pump station located on the southeast boundary of the site. Gravity mains designed in accordance with Part 6 of the SDC *Engineering Code of Practice* would follow internal road layout where possible.

A new sewer pump station located at or near the Selwyn/Dunns Crossing/Goulds Road intersection is anticipated to service the site as well as possible future residential development to the northwest of the site (Skellerup Block) and to the east of Dunns Crossing Road (Farringdon Far West). This centrally located pump station could pump wastewater to one of either;

a. an existing manhole at East Maddison Road (Asset ID 660520) approximately 1,160m to the east of Dunns Crossing / Selwyn Road intersection, which drains to the Farrington South Pump Station on Selwyn Road
b. an existing manhole on the Ø525mm gravity main on Selwyn Road approximately 1,600m to the east of Dunns Cross / Selwyn Road intersection (approximately 300m to the east of the Farrington South Pump Station pump station), which drains to the Selwyn Road RADAR pump station,
c. direct into the DN630mm Selwyn Road PS rising main running along Selwyn Road to the Pines WWTP, or
d. directly to the Pines WWTP via a new dedicated pumping line.

The final location of a new sewer pump station and rising main able to service the Skellerup South Block will be determined during the subdivision design in consultation with SDC.

4.2. Network Capacity

Refer to the Wastewater Network Capacity Assessment prepared by WSP attached as Appendix A for an assessment of the capacity of the SDC wastewater network to the Pines WWTP.

Modelling analysis by WSP indicates that the existing Ø630mm rising main in Selwyn Road has capacity to receive additional flows from the Skellerup South Block, although it would increase the incidence of surcharging in the gravity network draining to the Selwyn Road RADAR Pump Station by approximately 60mm during wet weather events. WSP noted that potential ongoing residential growth in Prebbleton, Lincoln and South Rolleston will at some point require capacity upgrades to the Selwyn Road Pump Station in the future.

WSP's modelling suggested that a connection into the gravity network to the east along Selwyn Road was feasible for the Skellerup South flows. This connection would result in wastewater flows being conveyed by via the Farringdon South pump station to the Selwyn Road RADAR pump station. Modelling completed by WSP found with the connection into the gravity network in Selwyn Road resulted in no issues within the Farringdon South or Selwyn Road pump stations in both the dry weather and wet weather conditions. A pump station would be required to pump into the gravity network on Selwyn Road due to insufficient cover to allow extension of the existing gravity main as far west as Selwyn Road / Dunn's Crossing Road intersection.

From a wastewater perspective, the plan change can be supported with new infrastructure servicing the plan change area as outlined above.

5. Potable Water

5.1. Reticulation

The existing Rolleston township reticulated supply extends along Dunns Crossing Road (Ø150mm main) to just opposite the northeast corner of the Skellerup Block to the north, changing from Ø150 to Ø200mm main just south of Boulez Mews. There is a Ø100mm cross connection across to Jean Archie Drive and then to 28 McLenaghan Drive where a public water supply well is still to be commissioned.

The SDC 5Waters Activity Management Plan Volume 2 – Water (2021 Draft) published on-line includes a masterplan layout showing proposed extension of the watermain network along Dunns Crossing Road, Goulds Road and Selwyn Road (refer to **Figure 3** below). Water reticulation can be extended into the plan change site from the proposed new watermain in Dunns Crossing Road.

Figure 3 – 30 Year Master Plan for Rolleston Water Supply (Skellerup South block highlighted in pink)

5.2. Water Demand

With reference to Section 7.5.1 of the SDC Code of Practice, the design peak water demand for the plan change site will be 0.15 l/s/lot, equating to 55 l/s for the 350 lots within the Skellerup South block.

The development area will also be designed to comply with the SNZ/PAS 4509:2008 *Fire Service Code of Practice*. The classification for firefighting water supply will be FW2 (25 l/s) as is normal for residential subdivisions.

5.3. Network Capacity

Network upgrades are already proposed by SDC to meet the anticipated growth of Rolleston over the next 30 years, including additional water sources (bores), storage reservoirs and pipeline infrastructure as outlined in the SDC 5Waters Activity Management Plan. The Activity Management Plan provides a good framework for the proposed expansion of water supply services but the timing is no longer valid as the development of land in Rolleston has overtaken previous predictions.

Refer to **Figure 3** above for the proposed extension of the reticulation network. As we understand, the preliminary sizing of these mains has taken into consideration proposed residential developments within the current urban limits of Rolleston, as well as the current Rural Residential ("Living 3") zoning for the adjacent

Skellerup Block (PC73) site to the north, but is unlikely to consider the additional demand from the Skellerup South site. If proposed plan change PC73 were to go ahead, along with this proposed plan change, then the watermains along Dunns Crossing Road and Selwyn Road would likely need to be upsized from the current proposal shown in **Figure 3**. Additional modelling will need to be undertaken to establish the sizing required for these upgrades, however upsizing the proposed mains in Dunns Crossing Road and Selwyn Road to Ø300mm would be a good place to begin modelling depending on the supply source and rate of supply.

Proposed development of the existing McLenaghan Road supply bore, or establishment of a new water source (bore site) on either the Skellerup Block (PC73) or Skellerup South site, will boost supply pressure to the western side of Rolleston. If an additional water source was established on either the Skellerup Block (PC73) or Skellerup South sites then the proposed mains in Dunns Crossing Road may be able to be kept at the current proposed sizes.

From a water supply perspective, the plan change can be supported by already planned upgrades or extensions of the Rolleston water supply network, subject to the final design taking into account the proposed plan change areas as outlined above.

6. Power / Telecommunications

6.1. Power

Initial consultation with Orion New Zealand Ltd has been carried out to assess the existing network capacity and any upgrade requirements. Orion have advised that Rolleston Zone Substation, located at the corner of Burnham School Road and Dunns Crossing Road, has a rated capacity of 40 MVA and is currently operating at approximately 95% available capacity. The proposed Plan Change site (and other proposed plan changes within the Rolleston township) would require additional capacity of approximately 5 MVA per 1000 lots, requiring significant alteration to the Orion network to provide sufficient electrical power.

Orion have advised they have started planning network upgrades including a new Zone Substation at Burnham and associated distribution reinforcement to service the proposed plan change areas. The existing 33 kV overhead network cables in Burnham School Road and Dunns Crossing Road are rated to 66 kV capacity which can double the network carrying capacity. There is an estimated 18 - 24 months turnaround time from initial planning to approval and construction of the required electrical infrastructure upgrades to supply the plan change sites. It is understood the plan change development will be deferred from occupation of dwellings due to the Waka Kotahi/NZTA upgrades to SH1/Dunns Crossing Road/Walkers Road which is due to be completed in 2024. Therefore, adequate time is available to facilitate any electrical infrastructure to supply the plan change site area.

Full appraisal of the network extension requirements will be carried out by the network provider if the proposed Plan Change is approved.

Power will be provided to all allotments to utility company and industry standards. All network and reticulation cabling will be installed underground. Transformer kiosk sites will be located on separate lots at locations approved by the utility company and SDC.

6.2. Streetlighting

Streetlighting will be provided to roading and reserves in accordance SDC engineering standards. The applicant will provide a streetlight plan consistent with other development in Rolleston.

6.3. Telecommunications

Telecommunications will be provided to all sites in the form of fibre optic network installed to utility company and industry standards. The existing fibre network in Dunns Crossing Road can be extended to the subject sites and distributed to individual allotments. All network and reticulation cabling will be installed underground.

7. Roading

7.1. Road Layout

The proposed primary roading layout is shown on the ODP plans attached to the planning application. There are proposed connections onto Dunns Crossing Road and to Selwyn Road. Possible future connections into neighbouring land surrounding the ODP site are indicated, such as the PC73 Skellerup Block to the North.

The proposed secondary roading patterns have been indicatively shown on the ODP plans attached to the planning application. Tertiary roads, if required, to further subdivide the main roading patterns will be determined during the subdivision design stage in consultation with SDC.

All road corridors will have 13m-23m legal width. Rights of way will be between 3.5m and 6.5m, dependant on the number of users and length of ROW.

7.2. Road Cross Section

Standard “SDC Low Profile” kerb and channel will be used in all roads in the subdivision, with cutdowns where appropriate for pedestrian crossings and ROW’s.

Asphalt footpaths are proposed in the roading network in accordance with SDC Engineering Code of Practice and in keeping with other recent subdivisions in Rolleston. Footpath layout and links to green spaces will be discussed further with SDC at the engineering approval stage.

7.3. Road Stormwater Drainage

Stormwater runoff within road corridors will be conveyed via kerb and channel into appropriately spaced sumps or roadside swales. All sumps will have trapped and/or inverted outlets, and connected to the piped stormwater network or conveyance swales. The road corridor will be used as overland flow paths to direct stormwater runoff when the primary drainage network is at full capacity.

8. Earthworks

8.1. Bulk Earthworks

The topography of the existing site is generally sloping to the south/southeast at an average gradient of 1:180 to 1:200 and with height difference of approximately 3m total elevation change for the Skellerup South block (refer to LiDAR contour plans included in Appendix C)

Bulk earthwork design will be determined by providing overland flow paths along roads and achieving a minimum grade from the top of kerb to the rear of the sections fronting the road. The design philosophy for the setting of earthwork levels will be determined by the following criteria:

1. Road longitudinal gradients not to exceed 1 in 20, not to be less than 1:450 where possible
2. Cut/fill balance where applicable
3. Overland flow paths for the subdivision are to follow the road layout, with the overall site overland flows not being different to the current situation.

To avoid carting material off-site, earthworks will be designed to achieve a cut/fill balance across the site. Any filling operations exceeding 300mm depth will be carried out in accordance with NZS4431:1989 *Code of Practice for Earthfill for Residential Development*. It is envisaged that material won from site, will be sufficient to use as structural engineered fill.

All earthworks on residential lots and roads will be carried out in accordance with principles outlined on the Environment Canterbury's Erosion Sediment Control Toolbox to minimising the adverse effects of erosion and sedimentation during construction. Dust and noise generation during earthworks construction is expected to be no worse than if the land was under cultivation or during harvest if farming operations continue on the site.

9. Summary & Conclusion

Primary stormwater runoff from residential allotments will be discharged directly to ground. Drainage and soakpits associated with roads will be constructed as part of any future subdivision and vested in SDC. The development will be designed to ensure that secondary flow will safely drain from the sections via the roading network.

Wastewater reticulation within the site can gravitate to a new pump station sized specifically for this new development or in conjunction with other nearby proposed plan change developments. A potential location for the new pump station is at Selwyn/Dunns Crossing/Gould Road intersection where it could service the Skellerup South Block as well as other proposed plan change sites to the northwest and northeast either side of Dunns Crossing Road. This pump station will pump into either the existing wastewater network to the east along Selwyn Road, the existing Ø630mm rising main in Selwyn Road, or via a new rising main laid directly to the Pines Wastewater Treatment Plant.

Water reticulation can be provided from the proposed extension of the SDC potable water network along Dunns Crossing Road. Upsizing of the watermains to provide sufficient capacity to cater for the proposed plan change may be required, subject to demand analysis at the detailed design stage. Proposed development of the existing McLenaghan Road supply bore, or establishment of a new water source (bore site) on either the Skellerup Block (PC73) or Skellerup South site, will boost supply pressure to the western side of Rolleston.

Existing electricity and fibre broadband networks in the neighbouring developments can be extended to service the proposed plan change areas. Electricity and telecommunications will be provided to all sites to utility company and industry standards. All cables within the development sites will be installed underground and kiosks will be constructed on separate individual lots.

From an infrastructure perspective, the proposed plan change can be supported by either the extension of existing infrastructure from neighbouring subdivisions or the provision of new water supply and wastewater infrastructure to service the development areas.

APPENDIX A | WSP WASTEWATER CAPACITY ASSESSMENT

Memorandum

To	Tim Carter, Bruce Van Duyn (Rolleston Industrial Developments Ltd)
Copy	Sue Harrison (WSP), Murray England (Selwyn District Council)
From	Brendon Schicker & Charlotte Mills
Office	Christchurch
Date	4 October 2021
File	3-C2369.00
Subject	Skellerup South Plan Change Wastewater Capacity Assessment
Ref	\\corp\anz\ProjectsNZ\3c\3-C2369.00 Skellerup South Plan Change\Home\03_Tech_Data\02_Tech_Out\SkellerupSouthPC 1 OCt update.docx

1 Summary

WSP was engaged by Rolleston Industrial Developments Ltd to complete a wastewater network capacity assessment for the Skellerup South Plan Change in Rolleston. The development is 28 ha with 350 lots.

Our assessment has considered two options for the connection to the network:

1 Local gravity network on Selwyn Road to the Farringdon South pump station.

2 Pump into the Selwyn Road pump station pressure main.

Our assessment has found that connection of the development to the gravity network is not predicted to cause an adverse impact on the existing wastewater system.

The connection to the Selwyn Road PS pressure main is predicted to have minor impacts. There is a predicted minor increase in the peak wet weather level at the Selwyn Road PS wet well of 60 mm.

There is also an option to construct a new pipeline from the development directly to the Pines wastewater treatment plant (WWTP).

Therefore, in our professional opinion, there are viable wastewater options to allow re-zoning of this land for residential use.

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2 Assumptions

2.1 General

- The ESSS 2020 – Calibration Network[1] wastewater model was used, which was modelled in InfoWorks ICM v6.0.9. This model has been recently updated to reflect changes in population and new infrastructure that has been built since the original model was developed in 2016, **however, calibration has not yet been completed**. In particular, and affecting this assessment, a wet weather response was identified in the Helpet pump station catchment (contributing to the Selwyn Road pump station) which is not currently represented in the model (in the model Rolleston does not have a wet weather flow response). An overview of the system is presented in Figure 1.

Figure 1: Wastewater System Overview

- To conservatively represent flow conditions, the highest observed rate of groundwater ingress to the wastewater collection system was assumed. This high groundwater was observed in June 2014, affecting the communities of Prebbleton, Lincoln, and Springston and was applied in the model as a constant baseflow.
- The model was run with the 20% AEP 12-hour design event (excluding climate change allowance) to replicate wet weather flow (WWF), as this was previously determined to be the critical storm duration for the ESSS system. To truly understand the impact of rainfall, a variety of rainfall events would need to be considered. However, there are many variables to consider, including but not limited to, the annual exceedance probability (AEP), intensity, duration, and timing of the event (in relation to flows in the wastewater system). Comprehensive modelling of a variety of design rainfall events has not been conducted as part of this assessment.

[1] WSP model reference: dcapa500app57:40000/SDC Wastewater Models

- For ease of modelling the connection point on the Selwyn Road PS rising main was assumed to be on Edwards Road. In reality a connection point on Selwyn Road for the development is more likely. Since this is a high-level assessment, we consider this will not cause a significant difference in results.

2.2 Scenario Specific

- Flows from the plan change area were calculated using the ***Engineering Code of Practice - Part 6: Wastewater Drainage*** (SDC, 20 February 2012) with the following inputs and assumptions:
    - Given number of lots: 350 will be developed (phone call between Tim Carter and Charlotte Mills on 02 September 2021).
    - Population per lot is 2.7 (SDC Engineering Code of Practice).
    - Residential flows are 220 L/person/day (SDC Engineering Code of Practice).
    - The peak to average ratio for dry weather flow rate is 2.5 (SDC Engineering Code of Practice).
    - The storm peak factor for wet weather on peak dry weather is 2 (SDC Engineering Code of Practice).

Table 1 summarises the potential flows from the developed plan change area.

Table 1: Calculated Flows for the Plan Change Area

Plan Change Area	Proposed Lots	Population	Calculated ADWF (L/s)	Calculated PDWF (L/s)	Calculated PWWF (L/s)
Scenario 1	350	945	2.4	6.0	12.0

3 Wastewater Servicing Options

There are three identified options to service the development:

1 Connect to the gravity network on Selwyn Road at manhole Asset ID 660520 near the intersection of Selwyn & East Maddisons Roads. The flows would then be conveyed via the Farringdon South pump station (PS) to the Selwyn Road PS that pumps to the Pines WWTP.

2 Pump into the Selwyn Road PS pressure main.

3 Construct a new pipeline to take the development flows directly to the Pines WWTP.

4 Modelling Methodology

Wastewater servicing options 1 and 2 for both peak dry weather flow (PDWF) and peak wet weather flow (PWWF) were assessed in the model. Option 3 appears viable at this stage, as the development is located close to the Pines WWTP and does not require modelling.

The following methodology was undertaken:

1 The ESSS 2020 - Calibration Network model, with the addition of the June 2014 baseflow was used as the Base scenario.

2 Four new scenarios were created, for both dry weather and wet weather flow comparisons, and a new sub-catchment representing the development added.

3 The dry weather scenario was updated to include the development's population to allow the impact of the diurnal flow from the development to be assessed.

4 The wet weather scenario was run with the maximum flow applied as a constant flow. No contributing area or population for the plan change area was added as these are accounted for in the flow applied.

5 For the option discharging to the gravity network, flows from the development were directly routed to manhole Asset ID 660520.

6 For the option pumping to the Selwyn Road pressure main, the pump was modelled as a constant discharge pumping at the peak wet weather flow.

7 Simulations were run to assess the impact of the development on the existing network during dry and wet weather.

5 Modelling Results

The predicted impact of the two connection options is presented below.

5.1 28 ha with 350 lots

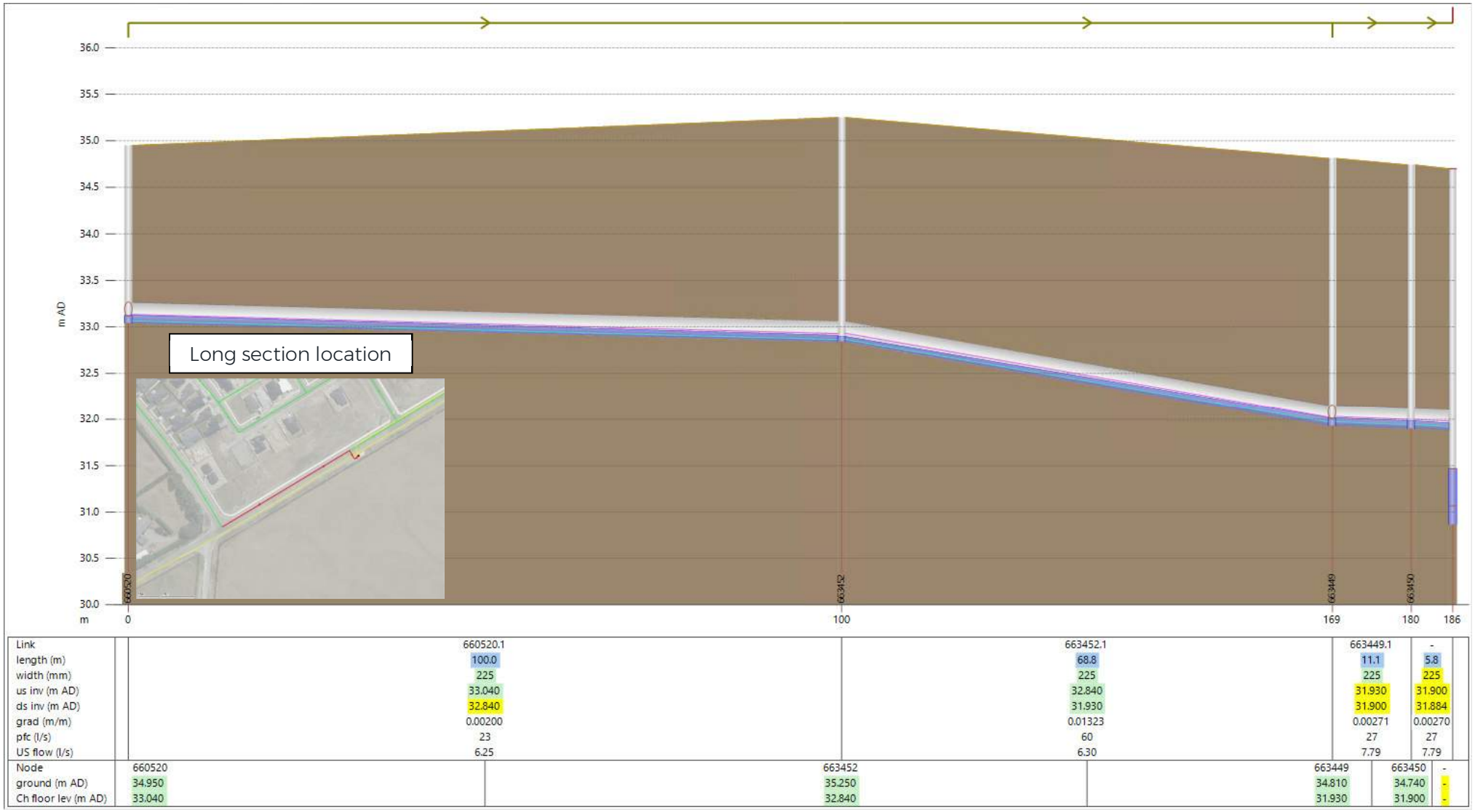
5.1.1 Option 1 – Gravity Connection

5.1.1.1 Dry Weather Results

No issues are predicted in the gravity network downstream of the connection point (manhole Asset ID 660520), refer to Figure 2. Farringdon South PS is predicted to have capacity for dry weather flow from the development.

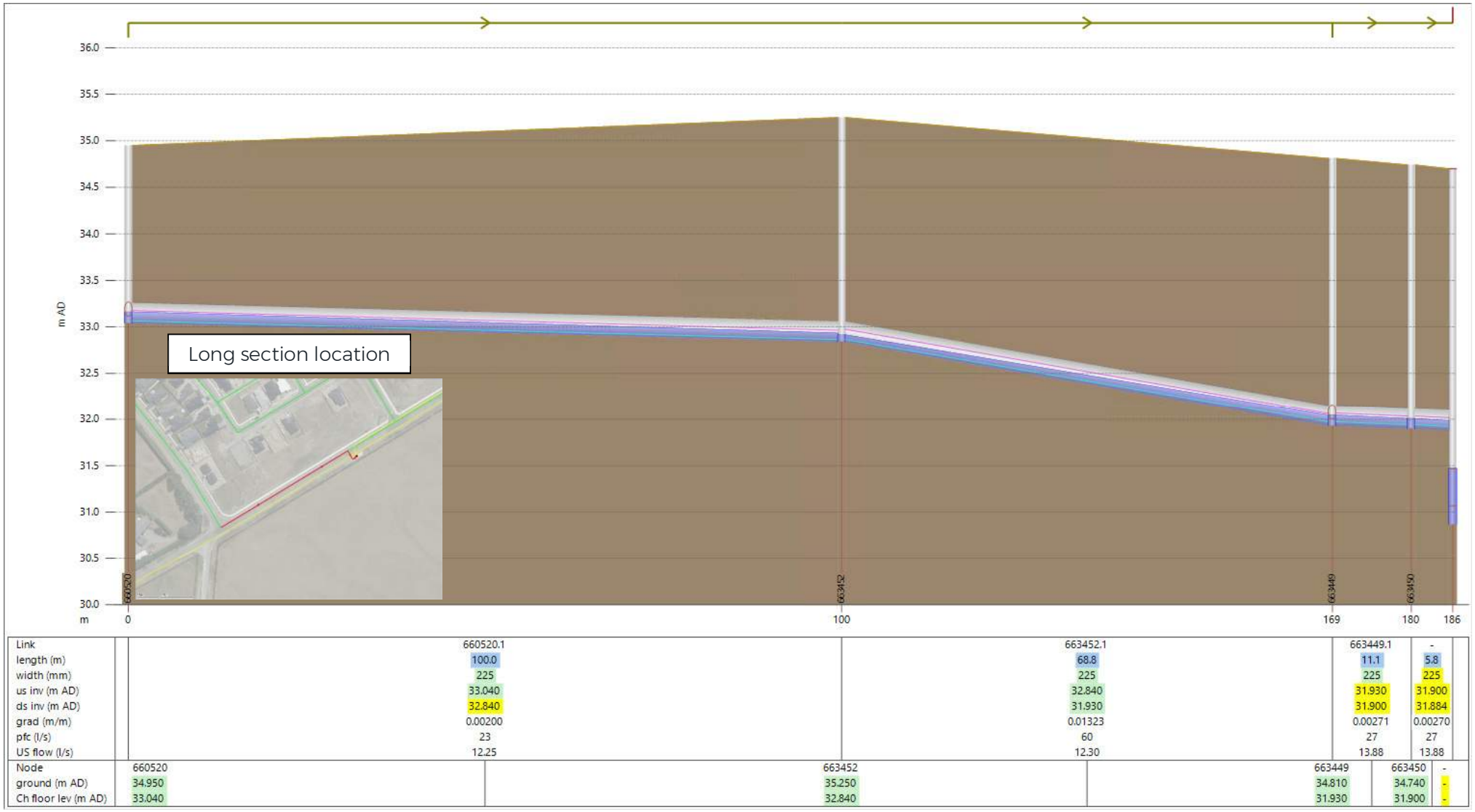
5.1.1.1 Wet Weather Results

There are no additional issues at peak wet weather flow compared to peak dry weather flow, refer to Figure 3.



Link		660520.1		663452.1		663449.1	-
length (m)		100.0		68.8		11.1	5.8
width (mm)		225		225		225	225
us inv (m AD)		33.040		32.840		31.930	31.900
ds inv (m AD)		32.840		31.930		31.900	31.884
grad (m/m)		0.00200		0.01323		0.00271	0.00270
pfc (l/s)		23		60		27	27
US flow (l/s)		6.25		6.30		7.79	7.79
Node	660520		663452		663449	663450	-
ground (m AD)	34.950		35.250		34.810	34.740	-
Ch floor lev (m AD)	33.040		32.840		31.930	31.900	-

Figure 2: Long section at PDWF from manhole Asset ID 660520 to the Farringdon South PS. Predicted levels in the current system without the development is shown by the light blue line



Link		660520.1		663452.1		663449.1	-
length (m)		100.0		68.8		11.1	5.8
width (mm)		225		225		225	225
us inv (m AD)		33.040		32.840		31.930	31.900
ds inv (m AD)		32.840		31.930		31.900	31.884
grad (m/m)		0.00200		0.01323		0.00271	0.00270
pfc (l/s)		23		60		27	27
US flow (l/s)		12.25		12.30		13.88	13.88
Node	660520		663452		663449	663450	-
ground (m AD)	34.950		35.250		34.810	34.740	-
Ch floor lev (m AD)	33.040		32.840		31.930	31.900	-

Figure 3: Long section at PWWF from manhole Asset ID 660520 to the Farringdon South PS. Predicted levels in the current system without the development is shown by the light blue line

5.1.2 Option 2 – Connection to Pressure Main

Connection to the Selwyn Road PS pressure main was assessed in the model. Selwyn Road PS also uses this pressure main, so the impact on its flowrate is reported. In addition to the flows from Rolleston, Selwyn Road PS also receives pumped flow from Lincoln and Prebbleton, which have a response to rainfall, so the wet weather results are different to the dry weather results.

5.1.2.1 Dry Weather

The Selwyn Road PS duty pump peak flow rate drops from 244 L/s to 241 L/s, when it pumps at the same time as the development. The predicted peak dry weather flow into the Selwyn Road PS is slightly above this flowrate, but due to the intermittent discharges from the pumped flows from Lincoln and Prebbleton and the storage at the Selwyn Road PS, the peak wet well level does not change – only the duty pump is predicted to operate.

5.1.2.2 Wet Weather

The Selwyn Road PS peak flowrate drops from 370 L/s to 365 L/s, when it pumps at the same time as the development. Peak wet weather flow into the station is slightly above this flowrate and the peak water level in the wet well is predicted to increase by 60 mm. Surcharging in the gravity network is already predicted due to the wet well level caused by the inflow exceeding the pump capacity, so this is increased, but the water level is still more than 3 m below ground level. However, with the potential ongoing development happening in Prebbleton, Lincoln, and South Rolleston, the Selwyn Road PS will at some point require a capacity upgrade in the future.

6 Conclusions

6.1 Gravity Connection

Our assessment has found that there are no issues predicted in the gravity network downstream of the connection point for the proposed development (28 ha with 350 lots).

6.2 Pressure Main Connection

The connection to the Selwyn Road PS pressure main is predicted to result in a minor increase in the peak wet weather water level at the Selwyn Road PS wet well (60 mm).

6.3 Construct New Pipeline

The alternative option to service the development with a separate pipeline that goes directly to the Pines WWTP is worth considering further. This was not modelled in this assessment.

7 Exclusions

- This assessment has not considered whether the Pines WWTP has capacity to accept flow from the development.
- We have not considered the specific requirements of how the development will connect to the existing wastewater system. However, it is likely a pump station will be required regardless of the connection location chosen.
- This assessment has only considered the existing wastewater network operation with the additional demand from the proposed development. It does not account for any additional developments and their impact on the wastewater network.

- The ESSS 2020 – Calibration Network has been used for this assessment and is not yet calibrated. A wet weather response was identified in the Helpet PS catchment which contributes to the Selwyn Road PS which is not currently represented in the model. Therefore, peak wet weather flows to Selwyn Road PS and the upstream network may be under predicted.

8 References

SDC. (20 February 2012). *Engineering Code of Practice - Part 6: Wastewater Drainage*. Rolleston: Selwyn District Council.

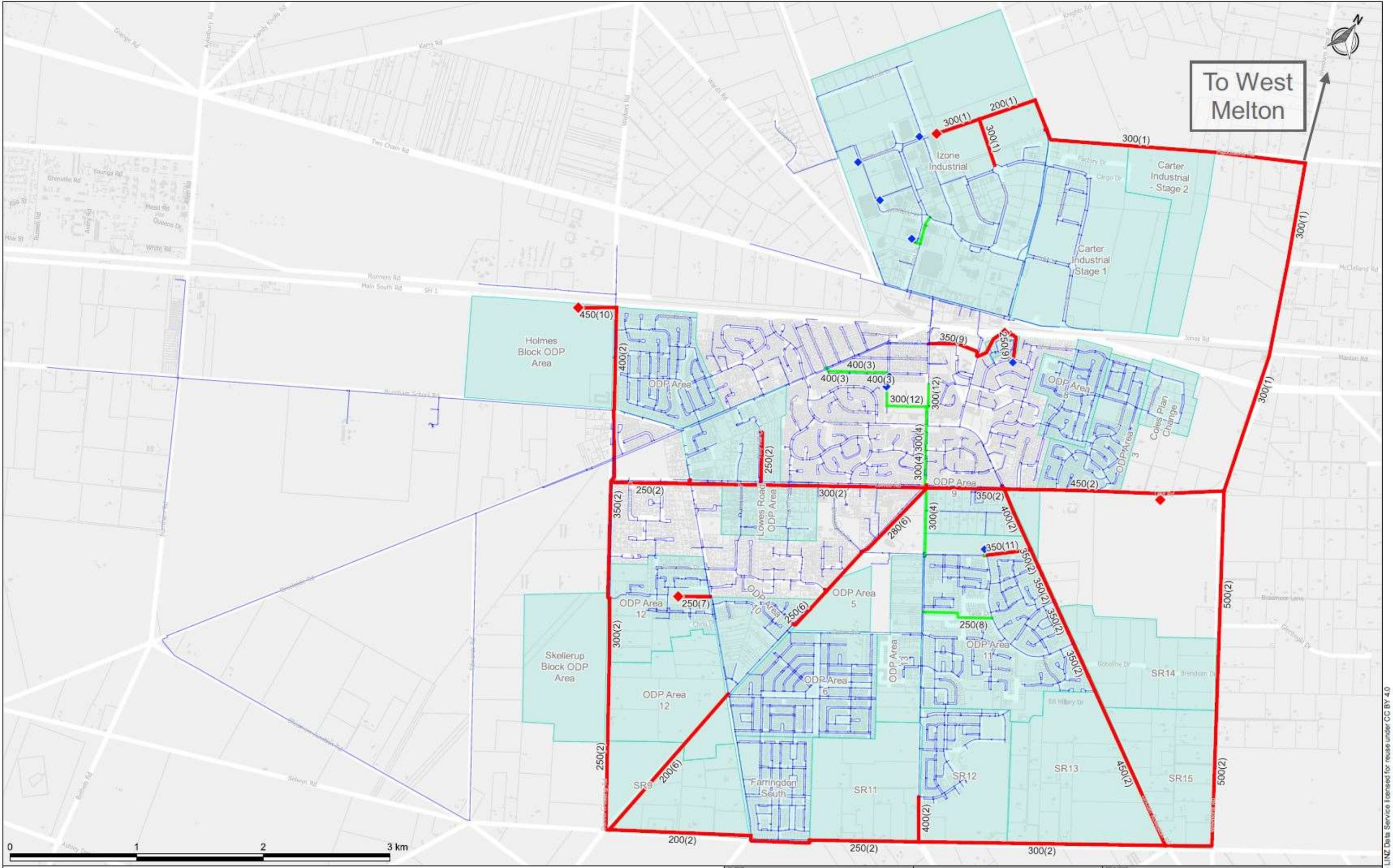
9 Disclaimers and Limitations

This report ('**Report**') has been prepared by WSP exclusively for Rolleston Industrial Developments Ltd ('**Client**') in relation to Skellerup South Plan Change wastewater capacity assessment ('**Purpose**') and in accordance with the Short form Agreement with the Client. The findings in this Report are based on and are subject to the assumptions specified in the Report and the Offer of Services email from Charlotte Mills to Tim Carter & Bruce Van Duyn dated 03 September 2021 (subject "FW: Skellerup South Plan Change - Offer of Service"). WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

In preparing the Report, WSP has relied upon data, surveys, analyses, designs, plans and other information ('**Client Data**') provided by or on behalf of the Client. Except as otherwise stated in the Report, WSP has not verified the accuracy or completeness of the Client Data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in this Report are based in whole or part on the Client Data, those conclusions are contingent upon the accuracy and completeness of the Client Data. WSP will not be liable in relation to incorrect conclusions or findings in the Report should any Client Data be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

Prepared by:	Reviewed by:	Approved for Release by:
		
Brendon Schicker	**Charlotte Mills**	**Sue Harrison**
Team Leader - Water	Principal Environmental Engineer	Project Director

APPENDIX B | SDC WATER SUPPLY MASTERPLAN



LEGEND

Growth Projections
- 2050+

WS Mains - DN(Scheme#)
- New
- Upsized
- Existing

Sources
- New / Upgrades
- Existing

CLIENT: Selwyn District Council

wsp
Christchurch Water
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PO Box 1482
Christchurch 8140
New Zealand

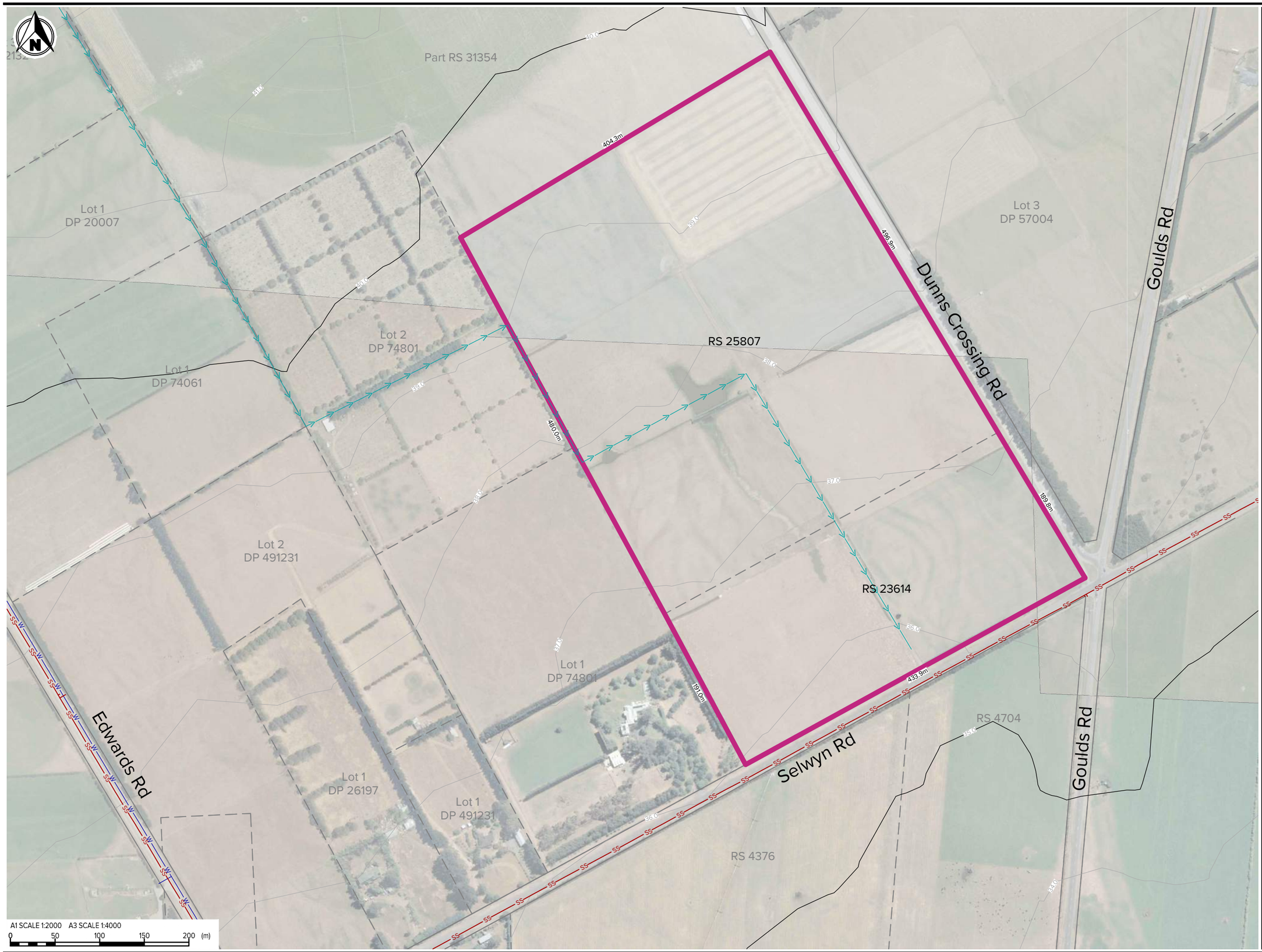
DRAWN	APPROVED			
SJD	DJ			
SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
1 of 1	1:27,665	3-C1831.07 / 00150	01/04/2021	R1

PROJECT: Selwyn District Council
Water Supply Master Planning 2020 - 2050

SHEET: Rolleston Master Planning & Water Supply Upgrades

Original Sheet Size: A3 [W = 420, H = 297] Plot Date: 2021-04-01 12:48:24 by Dellis, Simon (chsxd1) File Ref: \\corp.pbwan.net\ANZ\Projects\NZ\3c\3-C1831.07 Update Selwyn Water Master Planning to 2\Home\500 Work in Progress\503 Reporting Outputs\SDC Growth Reporting Rolleston Only 2021-03-31.qgz

APPENDIX C | EXISTING SITE PLAN & LiDAR CONTOURS



LEGEND

- Site Boundary
- Legal Road Boundary
- Abuttal Boundary
- Existing Easement Boundary
- Existing Contour Major (5.0m)
- Existing Contour Minor (1.0m)
- Existing Water Race
- Existing Sewer Main
- Existing Water Main

Territorial Authority:	Selwyn District Council
Application Address:	Selwyn Road, Rolleston
Comprised In:	CB27B/97, CB8B/345
Zone:	Rural - Residential
Registered Owner:	Rolleston Industrial Developments Ltd
Total Area:	28.43 ha
Legal Description:	RS 23614, RS 25807,

NOTES

1. Areas and dimensions are subject to final survey.

Rev#	Description	Drawn	Date
A	Preliminary Issue	CPS	7.10.21

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Scale A1 1:2000
Scale A3 1:4000
Designed CPS
Approved TMcL
Date 7.10.2021

Client: **ROLLESTON INDUSTRIAL DEVELOPMENTS LTD**

Project: **SKELLERUP SOUTH PLAN CHANGE**

Drawing Title: **EXISTING SITE PLAN & LiDAR CONTOURS RS 23614, RS 25807**

Status: **FOR INFORMATION**

Drawing No. **15084-AP-001** Rev **A**

FILE: O:\1. Projects\DS15000\15084 - Skellerup South Plan Change\05 Information Management\03 Engineering\02 CAD\15084-AP-001.dwg PLOTTED: 8/10/2021 3:58:27 p.m. BY: Eugenio Alvarez