



Land Specialists

GREENHILL PARK RESIDENTIAL SUBDIVISION

STAGE 17

INFRASTRUCTURE DEVELOPMENT COMPLETION REPORT

CARRS ROAD, GREENHILL PARK

CHEDWORTH PROPERTIES LTD

Our reference: 19-30410-01

Prepared for Chedworth Properties Limited

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REVISION	Issued for Application	DATE	2 June 2022
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1.0 BACKGROUND

1.1 Introduction

This application relates to Greenhill Park Subdivision Stage 17 located south of Carrs Road and near the furthest southwest corner of the development..

Works included the following:

- Stage 17 subdivision roading (including Musselwhite Terrace, Earp Crescent & Cogar Terrace)
- Wastewater reticulation and lot connections
- Stormwater reticulation for roading and lot connections
- Watermain and lot connections
- Associated Streetlights
- Electrical reticulation for subdivision lots and street lighting
- Ultrafast Broadband reticulation
- Gas supply for subdivision development
- Concrete footpath construction
- Landscape planting

On the south side of Carrs Road Stage 16 development works for 55 residential lots plus 6 multi lots have been carried out under Hamilton City Council Subdivision Resource Consent 011.2018.6632, granted 05 September 2018 and 011.2019.7140.003 granted 12 November 2021.

This application is made on behalf of Chedworth Properties Ltd for Works Clearance from Hamilton City Council. Works clearance is sought in order to obtain certification pursuant to Section 224(c) of the Resource Management Act 1991 for Greenhill Park subdivision, Stage 17, LT 570352. A copy of the land transfer plan is included in Appendix 8.

This report addresses the key details associated with the Infrastructure provided.

1.2 Entities Involved with Development

The following companies have been involved with the construction of the Subdivision;

- Developer: Chedworth Properties Ltd
- Consultant Design Engineers: S&L
- Consultant Engineers and Surveyors: S&L
- Geotech Engineer Core50 Engineers
- Landscape Design Boffa Miskell
- Landscape Planting Native Awa
- Head Contractor: Online Contractors 2016 Ltd (OLC)
- Subcontractors & Suppliers:

Civil Materials Supply	Hynds
Stormwater and Wastewater Drainage	West Construction Ltd (WC)
Geotechnical Testing	Opus/WSP
Concrete Supply	Bowers Bros Concrete
Concrete kerbs	Waikato Construction
Carparks	Purrfect Paving
Footpaths	Purrfect Paving
Concrete Cutting	Ironman Concrete Cutting
Streetlights	Ibex Lighting
Power Reticulation	WEL Networks – (Subcontractors: Northpower and Bayonne)
Road Materials Supplier	Stevenson Resources, Gleeson Quarry – Huntly
Road Surfacing Contractor	Higgins Contractors
Road Signs	Directionz Ltd
Road Line Marking	Linemark
Gas	First Gas
Telecommunication	Ultrafast Fibre – (Subcontractor: Civtec)

1.3 Observation of Works

S&L undertook regular inspections of the works as the project progressed and reviewed the contractor’s quality assurance measures including test results. The progress of the construction was reviewed formally at weekly site meetings as well as discussions on site with the contractor.

The observation and supervision activities by S&L were undertaken to a level of CM3 (weekly site visits) as described in the IPENZ document “Guidelines on the Briefing and Engagement of Consulting Engineering Services” with additional inspections when required by the nature of the works under construction. S&L were able to maintain the level of observation during Covid level 3 lock down as S&L have a staff member who resides in Hamilton.

1.4 As-Built Data

A full set of as-built drawings and excel spreadsheets have been appended to this document in Appendix 9 and 10. These include the as built and asset value information required in accordance with the RITS. The as built data has also been included in this application in electronic format and a copy enclosed in final works clearance report for reference.

1.5 CCTV

CCTV inspections have been completed for the wastewater and stormwater lines. The footage has been provided to Hamilton City Council separately.

1.6 Design and Hamilton City Council Development Unit Design Acceptance

The following Approvals have been gained from the HCC Development Unit:

- Greenhill Park Stage 17 was designed by S&L Consultants and approved by HCC Development Unit.
- Greenhill Park Stage 17 Streetlighting was designed by Ibex Lighting and approved by HCC Development Unit.

1.7 Amendments to approved plans

Amendments from the approved plans have been made during construction as follows:

- Individual kerb cut outs on Road 4 have been replaced with a single 2m wide cut out covered with a wheel stop for the purpose of releasing runoff during a 1% AEP event.
-

2.0 EARTHWORKS

Earthworks have been carried out onsite under the supervision of S&L and Core50 Engineers. Core50 Engineers were engaged as the geotechnical engineer. The Core50 report of stage 17 subdivision earthworks and recommendations for building development is included in Appendix 1, detailing earthworks compliance with HCC RITS and NZ Standards.

3.0 ROADING INFRASTRUCTURE

3.1 Road Construction

Roads have been constructed in general accordance with the pavement shown on the approved engineering plans.

Review of the road construction is as follows:

3.2 Subgrade

The underlying natural soils comprise sandy silts of varying strengths. Significant subgrade improvement works have been carried out as follows:

- Much of the Stage 17 subgrade consists of imported hardfill for the backfill of the stormwater and sanitary sewer underground lines beneath.
- All areas in the road carriageway that have not been backfilled with hard brown rock have been undercut to a minimum depth of 0.5m below subgrade level and replaced with a subgrade improvement layer of compacted hard brown rock.
- Subsoil drains have been laid beneath kerbs discharging into catchpits

Testing of the subgrade improvement layer included proof rolling with no visible weave, stringing by way of GPS survey, and Clegg hammer testing to confirm that a CIV > 15 (CBR > 15) had been achieved for all roads in Stage 17. Results of the Clegg hammer testing are included in Appendix 2(a).

A GPS survey was undertaken throughout Stage 17 and checked against the design surface. Results are included in Appendix 2(a), confirming that design pavements depths have generally been achieved to RITS tolerances.

All road subgrades have been tested using clegg hammers, showing that CBR values over 15 have been consistently achieved on all roads. The results from the Subgrade Clegg Hammer testing are summarised below:

Subgrade Clegg Hammer Results Summary

Road 2 CH 160 - 320	Range CIV 21 - 36 Mean CIV 31	Min Inferred CBR 31*
Road 3 CH 250 - 460	Range CIV 22 - 43 Mean CIV 31	Min Inferred CBR 34*
Road 4 CH 10 - 150	Range CIV 22 - 37 Mean CIV 29	Min Inferred CBR 34*

*Note: CBR = 0.07(CIV)² formula applied in accordance with RITS

3.3 Subbase

Subdivision roading comprises of the following subbase types:

Road 2, 3 & 4	No subbase aggregate on minor local streets
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QA Supplied for the subbase included in Appendix 2(b) includes the following:

- Material testing sheets
- Stringing or survey in lieu of stringing
- Compaction testing of subbase aggregate with Nuclear Densometer
- Clegg Hammer Tests

3.4 Basecourse

Subdivision roading comprises of the following basecourse types:

Road 2, 3 & 4	230mm TNZ M/4 AP40 basecourse – Stevensons Tauhei
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QA Supplied for the basecourse included in Appendix 2(b) includes the following:

- Material testing sheets
- Stringing
- Compaction testing of the basecourse with Nuclear Densometer
- Clegg Hammer tests
- Benkelman Beam testing

Stringing

Stringing of the basecourse was carried out from kerbs prior to sealing. Results are included in Appendix 2(b) confirming that design pavements depths have generally been achieved to ITS tolerances.

Clegg Hammer

Clegg hammer testing has been undertaken on the subdivision roading basecourse showing compliance with RITS.

Nuclear Densometer

Nuclear densometer testing was carried out by WSP in order to confirm density.

Nuclear Densometer testing has been undertaken in accordance with RITS Section 3.8.2.5 & 3.8.3.4, Table 3-22. Results are included in Appendix 2(b).

The Target MDD for the TNZ M/4 AP40 pavement is 2.75t/m³ as per Opus MDD report (project number: 2-68015.00, lab reference: HA 7753_VHMDD).

Results are summarised below:

Basecourse NDM Results Summary

Road 2 CH 160 - 320	Min 95% of MDD (Target MDD 2.30t/m ³)	Mean 97% of MDD
Road 3 CH 250 - 460	Min 95% of MDD (Target MDD 2.30t/m ³)	Mean 97% of MDD
Road 4 CH 10 - 150	Min 95% of MDD (Target MDD 2.30t/m ³)	Mean 97% of MDD

3.5 Benkelman Beam Results

Benkelman beam tests were carried out by WSP on the basecourse surface following surfacing. Results are summarised below:

Basecourse Benkelman Beam Results Summary

	Deflection (mm)			
	Maximum (mm)	Minimum (mm)	%age over 1.8mm (A2)	Average (mm)
Road 2 CH 160 - 320	0.92	0.34	0	0.57
Road 3 CH 250 - 460	1.09	0.50	0	0.76
Road 4 CH 10 - 150	1.13	0.58	0	0.77

Results conform to the maximum and average deflection requirements of Section 3.8.3.5, Table 3-23 of the RITS for A2 (up to 10⁵ EDA) roads.

3.6 Road Surfacing

A summary of road surfacing details laid by Higgins is listed below:

Road Surfacing Summary

Road 1	Membrane Seal	Surface
Local Roads 2, 3 & 4	Grade four single coat first coat seal Residual Application Rate: 1.0L/m ²	30mm DG7

4.0 WATER INFRASTRUCTURE

4.1 Installation

The water supply reticulation completed by Online Contractors includes the following components:

- 150mm mPVC PN12RRJ principal main
- 63mm PE80 PN12.5 ridermain
- Associated fittings, valves and hydrants
- Residential connections to all lots

Quantities and installation locations are shown on as-built records appended to this document.

4.2 Testing and Disinfection

Online Contractors Ltd carried out all aspects of pressure testing of the supply lines and disinfection prior to livening, in accordance with the ITS and in the presence of HCC.

Testing included the following items:

- Water supply pressure test result
- Water Supply disinfection
- Water Supply E Coli test

The pressure test and the observation of FAC (Free Available Chlorine) was witnessed by HCC's testing officer. The E Coli test samples were collected as part of the testing and the samples have been reviewed by HCC Officer, L. Parkes and passed.

Pressure testing results, pipe laying checklists and Bacto Test results are included in Appendix 3.

5.0 WASTEWATER INFRASTRUCTURE

Supporting quality assurance documentation for Wastewater Infrastructure supplied by the contractor and reviewed by S&L is attached in Appendix 4.

The gravity sewerage system comprises installation of the following components:

- 225mm dia uPVC SN16 waste water main
- 150mm dia uPVC SN16 wastewater main
- 100mm dia uPVC SN16 sewer laterals and lot connections
- Associated manholes.

Testing and inspection includes the following:

- CCTV inspection which has been supplied separately to Council
- Inspection of Manhole Structures
- Pressure testing of Manhole Structures by West Construction observed by HCC
- Pressure testing of 225 dia and 150mm dia wastewater mains by West Construction observed by HCC
- As-builting by West Construction and S&L with final as-builts compiled by S&L.

6.0 STORMWATER INFRASTRUCTURE

6.1 Installation

In accordance with the approved design, stormwater from Stage 17 discharges into the Area K swales for treatment and conveyance:

- Swales 2A & 2B are located on the south side of Carrs Rd and flow north.

The primary system comprises of:

- uPVC & RCRRJ stormwater mains and headwalls
- uPVC laterals and lot connections
- Road catchpits and leads
- Manholes

Observation of the works was undertaken by S&L and includes:

- CCTV inspection which has been supplied separately to Council
- Inspection of all manhole structures, catch pits, outlets and inlets
- As-builting by Online Contractors and S&L Consultants with final as-builts compiled by S&L.

QA and checklists provided by the contractor and reviewed by S&L are included in Appendix 5.

6.2 Secondary flow paths

In accordance with the approved design, the stormwater from Stage 17 discharges into swales 2A & 2B for treatment and conveyance.

A piped drainage network has been designed to collect runoff from the road and lots with standard sumps. The pipes are designed to convey (without significant surcharge) the 50% AEP flows to the network of swales downstream. Each individual lot is provided with a piped connection to the main drainage system, in case on-lot soakage is not appropriate.

In events larger than a 50% AEP, secondary stormwater flows for Stage 17 will flow down the road shoulders to a low point within Road 4 and flow east across the road berm to spill into Swale 2B that extends from the southern side of Carrs Road near the Athier Ave roundabout to 360m south.

See attached as-built drawings 30410-01-S17-R1 and 30410-01-S17-SW1 in appendix 9 showing the location and direction of stormwater overland flow.

7.0 STREET LIGHTING, STREET MARKING AND SIGNAGE

Streetlights have been designed, supplied and installed by Ibex Lighting Ltd. All quality assurance documentation for the street lights is included in Appendix 7.

Signage has been installed by OLC subcontractor Directionz Ltd in accordance with approved drawings and RITS requirements.

Carriageway paint marking has been completed by OLC subcontractor Linemark Ltd and is in accordance with approved drawings and RITS requirements.

8.0 LANDSCAPING

8.1 Hard Landscaping

Hard landscaping works included in stage 17 include seats, bollards and rubbish bins.

8.2 Soft Landscaping

The landscape planting within the road reserves and the stormwater swales has been completed. An inspection by HCC Parks and Open Spaces has been completed.

9.0 NETWORK UTILITIES

Network utilities have been provided as follows.

9.1 Power

Electrical reticulation has been installed by WEL Networks for both street lighting and residential supply.

A WEL Networks works clearance statement is attached in Appendix 7.

9.2 Gas

First Gas has installed reticulation to enable future connection by individual lot owners. A completion Certificate is included in Appendix 7.

9.3 Telecommunications

Ultrafast Fibre has installed reticulation to individual lots. An acceptance letter is included in Appendix 7.

10.0 FINAL INSPECTION

A final inspection has been undertaken and was attended by Hamilton City Council's Development Engineers and associated staff from S&L, Online Contractors and Ibex Lighting.

A separate inspection by Parks and Open Spaces has also been completed.

APPENDIX 1

Earthworks QA Documentation

- Core50 Engineers Report on Subdivision Earthworks & Recommendations for Building Development



APPENDIX 2

Roading QA Documentation

Road Subgrade – 2(a)

- Drawing 30410-01-S17-BR1 (in lieu of strings)
- Clegg Hammer Tests

Road Basecourse 2(b)

- Nuclear Densometer Results
- Benkelman Beam Test Results
- Basecourse Strings
- TNZ M/4 AP40 Material Tests

Surfacing & RAMM Data 2(c)

- HCC pavement RAMM data
- Surfacing RAMM data

APPENDIX 2(a)

Roading QA Documentation

Road Subgrade

- Drawing 30410-01-S17-BR1 (in lieu of strings)
- Clegg Hammer Tests



APPENDIX 2(b)

Roading QA Documentation

Road Basecourse

- Nuclear Densometer Results
- Benkelman Beam Test Results
- Basecourse Strings
- TNZ M/4 AP40 Material Tests



APPENDIX 2(c)

Roading QA Documentation

Surfacing & RAMM Data

- HCC pavement RAMM data
- Surfacing RAMM data



APPENDIX 3

Water Construction QA Documentation

- Pipe Laying Checklists F6.2
- Final Inspection Checklist F6.3
- Laboratory Water Test Results
- Pressure Test Results



APPENDIX 4

Wastewater Construction and QA Records

- Wastewater Pipe Laying Checklist F5.2
- Wastewater Manhole Checklist F5.3
- Wastewater trench Backfill Summary Checklist F5.4
- Wastewater Final Inspection Checklist F5.6
- Pressure Test Results
- CCTV submission email
- Wastewater Backfill Compaction Test Results

APPENDIX 5

Stormwater Construction and QA Records

- Stormwater Pipe Laying Checklist F4.2
- Stormwater Manhole Checklist F4.3
- Trench Backfill Compaction Test Summary F4.4
- Stormwater Backfill Compaction Test Results
- Stormwater Catchpit Checklist F4.5
- Stormwater Final Inspection Checklist F4.6
- CCTV submission email

APPENDIX 6

Landscaping Certifications

- Landscaping final inspection form requested from HCC (Undertaken separately by Boffa Miskell)



APPENDIX 7

Network Utilities Certifications

- Ultrafast Fibre Completion Letter
- First Gas Completion Letter
- Street Light Product Warranty
- WEL Completion Letter
- Street light Suppliers Declaration of Conformity
- Streetlight Producer Statement
- Streetlight COC & ROI Certificates
- HCC Form Street Light RAMM Data

APPENDIX 8

Miscellaneous Check Lists and Producer Statements

- Subdivision Works Clearance Application Form
- Subdivision Certification Application Form
- Contractor Producer Statement Form (4.2)
- Land Transfer Plan LT 570352
- Schedule of Engineering Value
- Developers Tax Invoice
- Consultant Certification Statement Form (4.1)
- Asbuilt Statement Form

APPENDIX 9

As Built Drawings

- 30410-01-S17-WW1 Rev AB – Stage 17 Wastewater Asbuilt Plan
- 30410-01-S17-W1 Rev AB – Stage 17 Water Reticulation Asbuilt Plan
- 30410-01-S17-SW1 Rev AB – Stage 17 Stormwater Asbuilt Plan
- 30410-01-S17-R1 Rev AB – Stage 17 Roading Asbuilt Plan
- BM191029_130, 200 & 202, 500 to 514 & 600 Landscape and planting As Built plans

APPENDIX 10

Asset Spreadsheets – Hard copy

- Water asset sheets
- Wastewater asset sheets
- Stormwater asset sheets

