Prince of Wales/Omāroro Reservoir: Evaluation of alternative access options

1 Introduction

On 28 August 2017, an alternative access workshop was held with representatives from Wellington Water Limited and CH2M Beca:

- Ulvi Salayev (Wellington Water Limited, Project Director)
- Stewart McKenzie (Wellington Water Limited, Principle Advisor – RMA and Environment)
- Matt Trlin (CH2M Beca, Senior Associate – Environments)
- Mhairi Rademaker (CH2M Beca, Planner)
- Simon Edmonds (CH2M Beca, Technical Director – Structural Engineering)
- Jamie Minchington (CH2M Beca, Senior Transport Engineer)
- Bill Wood (Marshall Day Acoustics, Noise expert)

The purpose of the workshop was to undertake a high-level assessment of potential alternative options for heavy vehicle access to the Prince of Wales/Omāroro Reservoir site for the duration of the projects construction period (estimated to be between 24 and 36 months).

2 Access options

The workshop looked at five potential access points: Rolleston Street, Bell Road (via a new access track cut from the Bell Road reservoir), Hargraves Street, Salisbury Terrace, and Westland Road (via a new access track) – See Overview Map for an overview of the options.

These five access points were developed into seven potential options: heavy vehicles entering and exiting at each of the five access points plus two options where heavy vehicles enter at one access point and exit at a difference point. Each of the options has a single access point for light vehicles.

3 Single access point options

The five single access point options are shown on Maps 1-5.

Assessment criteria used to assess each option are outlined in Section 4. An assessment of the options against these criteria is provided in Section 5.

A description of each option is provided below.

Option 1: Rolleston Street

Access from Rolleston Street is the base option.

Heavy vehicles will access the site via Wallace Street and Rolleston Street with a site access created at the top of Rolleston Street. It is assumed that heavy vehicles would approach the Rolleston Street/Wallace Street from the north.

This option brings trucks close to the main work site and does not require road trucks to travel through the site (a stabilised stopping and turning area would be created at the site access). Road trucks and off-road construction trucks/machinery are kept well separated.

Vehicle tracking assessment has shown that single body rigid trucks can enter and exit through the Rolleston Street/Wallace Street intersection without the need for active stop/go traffic management. A spotter would be required to ensure trucks exiting Rolleston Street stop back from the intersection if there is an incoming truck waiting to turn in. Larger and articulated trucks will require stop/go management to be in place.

Car parks will need to be temporarily removed from some sections of Rolleston Street, over the construction period, near the intersection with Wallace Street, on the curve, and at the top to facilitate safe truck movements. An initial assessment of the number of car parks needing to be removed is 20-23. The removal of car parks used by street residents can be mitigated by displacing existing coupon car parking.

Under Option 1, light vehicle access is from Salisbury Terrace with parking on the lower field to reduce vehicle movements on Rolleston Street and keep light vehicles separated from heavy vehicles.

Option 2: Bell Road

Under this option, heavy vehicles reach the site via Brooklyn Road – Bidwill Street – Bell Road and a new access track constructed from the Bell Road reservoir down to the Prince of Wales upper field.

Significant upgrades to Bidwill Street and Bell Road, including the Bidwill Street/Brooklyn Road intersection would be required under this option. The assessment in Section 3 assumes that the roads and intersections can be upgrades such that effects on other local traffic are less than minor.

Some traffic management may be required to facilitate vehicles turning right off Brooklyn Road (eg coming from Happy Valley landfill).

This option brings trucks close to the main work site and does not require road trucks to travel through the site (a stabilised stopping and turning area would be created at the site access). Road trucks and off-road construction trucks/machinery are kept well separated.

Like Option 1, light vehicle access is from Salisbury Terrace with parking on the lower field to keep light vehicles separated from heavy vehicles. Alternatively, light vehicles could access the site via Rolleston Street with dedicated off-street parking; however, this would restrict space on the upper field for construction activities and is not preferred.

The fatal flaw in this option is the ability to construct a track suitable for heavy vehicles including large, articulated road trucks down the slope between the Bell Road reservoir and the Prince of Wales Park upper field. Although it might be possible to engineer a suitable solution, it would come at the expense of further Town Belt land and established vegetation, resulting in significant adverse environmental effects.

Option 3: Hargreaves Street

This option is similar to Option 1, but has heavy vehicles continuing along Wallace Street to Hargreaves Street with a site access created at the top of Hargreaves Street. It is assumed that heavy vehicles would approach the Hargreaves Street/Wallace Street from the north.

More works would be required to create the access off the top of Hargreaves Street than Rolleston Street and the curve on Hargreaves Street might need to be widened.

This option brings trucks close to the main work site (but not as close as Options 1 and 2) and would require road trucks to travel across the upper playing field via a stabilised track. This option will introduce some conflict between road trucks and off-road machinery/trucks on the upper field. Road trucks and off-road construction trucks/machinery are kept well separated.

No vehicle tracking assessment has been undertaken for this option, but it is expected to be similar to Option 1 ie single body rigid trucks can enter and exit without the need for active stop/go traffic management but larger and articulated trucks will require stop/go management to be in place.

Car parks will need to be temporarily removed from some sections of Hargreaves Street, over the construction period, including from the curve to the top, to facilitate safe truck movements. No assessment of the specific number of car parks needing to be removed has been undertaken. For the purpose of this assessment, it is assumed that the effects on car parking will be no worse than Option 1: Rolleston Street.

Like Options 1 and 2, light vehicle access is from Salisbury Terrace with parking on the lower field to reduce vehicle movements on Hargreaves Street and keep light vehicles separated from heavy vehicles.

Option 4: Salisbury Terrace

Under this option, heavy vehicles would access the site via Wright Street and Salisbury Terrace, with an access constructed up onto the northern end of the lower field. It has been assumed that vehicles would access Wright Street from Hutchinson Road rather than Hargreaves Street/Wallace Street but this would depend of the ease of turning in and out of the southern end of Wright Street.

No vehicle tracking assessment has been undertaken for this option, but it is expected that rigid body trucks would not be able to exit Salisbury Terrace without crossing the centreline on Wright Street and more involved traffic management may be required than for other options.

Car parks will need to be temporarily removed from some sections of Salisbury Terrace and Wright Street, over the construction period, to facilitate safe truck movements. No assessment of the specific number of car parks needing to be removed has been undertaken. For the purpose of this assessment, it is assumed that the effects on car parking will be no worse than Option 1: Rolleston Street.

Construction of an access onto the lower field would require significant cutting into the lower field to create a suitable grade for heavy vehicles. Heavy vehicles, particularly those delivering construction materials and concrete, would have to track through the site onto the upper field. This would require a fully stabilised track to be constructed from the lower field to the main work site to allow road trucks to traverse the site. The existing access track between the upper and lower fields

would also likely need to be widened, in addition to being strengthened, to accommodate specialised heavy machinery and articulated trucks service access across the site. This track formation and stabilisation activity may increase the risk of related earthworks activity affecting the Papawai Stream. It also presents a conflict between road trucks and off-road machinery/trucks.

Light vehicle access is from Rolleston Street with parking on the upper field to reduce vehicle movements on Salisbury Terrace and keep light vehicles separated from heavy vehicles.

Options 5: Westland Road

The final potential access point is off Westland Road. Under this option, a new track would be constructed from Westland Road to the car park area at the end of Salisbury Terrace.

Heavy vehicles would access the site via Hutchinson Road, Westland Road, and the new access track. It has been assumed that vehicles would access Westland Road from Hutchinson Road/Adelaide Road rather than Hargreaves Street/Wallace Street but this would depend on the ease of turning in and out of the Hutchinson Road and Adelaide Road.

No vehicle tracking assessment has been undertaken for this option, but there are not expected to be any issues for vehicles coming to/from Hutchinson Road (in the Adelaide Road direction).

Car parks will need to be temporarily removed from Westland Road, over the construction period, to facilitate safe truck movements. No assessment of the specific number of car parks needing to be removed has been undertaken. This will, to some extent, be determined by the extent of track or road formation required to link Westland Road to the southern end of the lower playing fields on Prince of Wales Park. For the purpose of this assessment, it is assumed that the effects on car parking will be no worse than Option 1: Rolleston Street.

Construction of an access suitable for heavy vehicles between Westland Road and the southern end of the lower playing field would require significant earthworks through an area of Town Belt and may require the purchase and removal of the property at 1 Westland Road. This would likely result in significant adverse environmental effects including the loss of mature trees and native vegetation from the Town Belt.

Heavy vehicles, particularly those delivering construction materials and concrete, would have to track through the lower field site onto the upper field. This would require a fully stabilised track to be constructed from the lower field to the main work site to allow road trucks to traverse the site. The existing access track between the upper and lower fields would also likely need to be widened, in addition to being strengthened, to accommodate specialised heavy machinery and articulated trucks service access across the site. This track formation and stabilisation activity may increase the risk of related earthworks activity affecting the Papawai Stream It also presents a conflict between road trucks and off-road machinery/trucks.

Light vehicle access is from Rolleston Street with parking on the upper field to reduce vehicle movements on Salisbury Terrace and keep light vehicles separated from heavy vehicles.

4 Access Assessment Criteria

The following criteria were used to assess each option:

Criteria	Assessment Description
Traffic network:	The options potential effect on the traffic network and parking, in particular: • Disruption to local network, including traffic and pedestrian safety • Disruption to wider network, including traffic and pedestrian safety • Effect on parking • Requirement for temporary traffic management
Environmental	The options potential effect on natural and urban environmental values, in particular: • Natural environment (streams, vegetation, landscape and Town Belt amenity and natural values) • Urban environment (noise, number of potentially affected parties)
Social	The options potential effects on social infrastructure and facilities, in particular: • Effect on walkways, including access to walkways and established walkway tracks • Effect on community infrastructure (eg Harriers)
Construction Effectiveness and Efficiency	The options potential effect or impact on the ability to efficiency and effectively undertake construction activity within the site, in particular: • Effective traffic movements within site • Effective use of space • Additional works within site required to facilitate access • Restriction on traffic movements *Note: Health and safety implications were not specifically considered as part of this assessment, but could be considered to be part of each of the items outlined above.*
Cost	The options potential cost, taking account of the following: • Road upgrades • Site access construction cost • Traffic management cost • Extra maintenance remediation or restoration costs

Each option was scored on a 0-5 scale, with 0 representing an option that was assessed to have either:

- No effect or
- A negligible effect, or
- A significantly lesser cost when assessed against the base case (Option 1: Rolleston Street).

A score of 5 represented an option that was assessed to have either:

- A very high effect, or
- A significantly higher cost when assessed against the base case (Option 1: Rolleston Street).

5 Alternative access assessment table – single access point

Assessment Criteria	Identified Effect or Cost	Option 1: Rolleston Road (Salisbury for light vehicles)		Option 2: Bell Road (Salisbury for light vehicles)		Option 3: Hargreaves Street (Salisbury for light vehicles)		Option 4: Salisbury Terrace (Rolleston for light vehicles)		Option 5: Westland Road (Rolleston for light vehicles)	
Traffic network • Disruption to local network • Disruption to wider network • Effect on parking • Requirement for temporary traffic management	0 = negligible 1 = less than minor 2 = minor 3 = moderate 4 = high 5 = very high	• Minor disruption to local (Rolleston St) and wider (Wallace St and beyond) network • Parking to be temporarily removed along some sections of Rolleston Street (will be mitigated) • Single body rigid trucks able to turn in and out of Wallace St/Rolleston St intersection with spotter; larger articulated vehicles will require active intersection stop/go management	2	• Less than minor impact on local (Bell Rd and Bidwell St) network • Less than minor impact on wider (Brooklyn Rd) network from vehicles turning right into Bidwell St • Less than minor effect on parking on track off Bell Rd • Some TTM required (right turning from Brooklyn Rd	1	• Minor disruption to local (Hargreaves St) and wider (Wallace St and beyond) network • Parking to be to be temporarily removed along some sections of Hargreaves (potentially more difficult to mitigate than Option 1 however for the purpose of this assessment it is assumed that the effects will be no worse than Option 1 and able to be mitigated). • Single body rigid trucks (may be) able to turn in and out of Wallace St/Hargreaves St with spotter; larger articulated vehicles will require active intersection stop/go management. Largest vehicles may have to use alternative access if corner at top not navigable	2	• Minor disruption to local (Salisbury Tce, Wright St) and wider network • Parking to be temporarily removed along some sections of Salisbury Tce and Wright St (potentially more difficult to mitigate than Option 1 - however for the purpose of this assessment it is assumed that the effects will be no worse than Option 1 and able to be mitigated) • No median at Salisbury Tce/Wright St intersection – more difficult for trucks to enter/exit	2	• Less than minor impact to local or wider network • Parking to be temporarily removed along Westland Rd (potentially more difficult to mitigate than Option 1 - however for the purpose of this assessment it is assumed that the effects will no worse than Option 1, and able to be mitigated) • Three way intersection of Wright St, Westland Rd, and Hutchison Rd will require some TTM	1
Environmental • Natural environment (streams, vegetation, landscape and Town Belt amenity and natural values) • Urban environment (noise, number of potentially affected parties)	0 = negligible 1 = less than minor 2 = minor 3 = moderate 4 = high 5 = very high	• Less than minor/negligible effect on natural environment • Moderate noise effect on urban environment (≈80-90 properties on Rolleston St)	3	• **Very high effect** on natural environment and Wellington Town Belt • **Significant earthworks** required within Wellington Town Belt to construct access road and upgrade Bell Rd and Bidwell St intersection, including removal of high value vegetation between Bell Rd and POW Park • Few directly adjoining dwellings (≈9 at the top of Rolleston St and off Bell Rd)	5	• Minor to moderate effect on vegetation and Wellington Town Belt if road widening required at the top of Hargreaves St • Moderate noise effect on urban environment, but less affected than Rolleston St option (≈30-40 properties on Hargreaves St)	3	• **High effect** on natural environment and Wellington Town Belt • Large cut required to enable access from Salisbury Tce up to lower field • Additional works required on access track between upper and lower fields to provide for road trucks and the larger units required to bring in construction materials • Greater traffic intensity on access track will increase risk of effects on stream • Moderate noise effect (≈50 properties on Salisbury Tce and Wright St assuming vehicles head for Hutchison Rd)	4	• **High effect** on natural environment and Wellington Town Belt • Significant earthworks and vegetation clearance required to widen/upgrade Westland Rd and construct new road access to lower field car parking area • Potentially permanent effect if new access was left in place for better access to the park • Additional works required on access track between lower and upper fields to provide for road trucks and the larger units required to bring in construction materials • Greater traffic intensity on access track will increase risk of effects on stream • Less than minor-minor noise (≈10 properties on Westland Rd, could potentially use noise bund to minimise effects on 8 properties on Salisbury Ave)	4

Assessment Criteria	Identified Effect or Cost	Option 1: Rolleston Road (Salisbury for light vehicles)		Option 2: Bell Road (Salisbury for light vehicles)		Option 3: Hargreaves Street (Salisbury for light vehicles)		Option 4: Salisbury Terrace (Rolleston for light vehicles)		Option 5: Westland Road (Rolleston for light vehicles)	
Social • Effect on walkways • Effect on community infrastructure (eg Harriers)	0 = negligible 1 = less than minor 2 = minor 3 = moderate 4 = high 5 = very high	• Less than minor social effects • No additional tracks closed • Less than minor effect on Harriers (light vehicles using Salisbury Tce for access)	1	• Moderate social effects • Would require closure of the walkway between Bell Rd and POW (part of the City to Sea Walkway) • Less than minor effect on Harriers (light vehicles using Salisbury Tce for access)	3	• Less than minor social effects • No additional tracks closed • Less than minor effect on Harriers (light vehicles using Salisbury Tce for access)	1	• Minor social effects • No additional tracks closed • Minor effect on Harriers as access will be more difficult with more vehicles using Salisbury Tce	2	• Moderate-high social effects • No additional tracks closed (assuming footpath to Westland Rd can remain open) • Moderate effect on Harriers as access will be more difficult with more vehicles but may have permanent benefit if new access left in place • Moderate-high effect on 1 Westland Rd: May require temporary resident relocation or potential removal of a house at 1 Westland Rd	3
Construction Effectiveness and Efficiency • Effective traffic movements within site • Effective use of space • Additional works within site required to facilitate access • Restriction on traffic movements	0 = negligible 1 = less than minor 2 = minor 3 = moderate 4 = high 5 = very high	• Minor construction effect • Road trucks enter and exit site close to main work area (easy to access and exit the site) • Road trucks do not have to travel through the site • Minor works required in the site to create loading and turn around area near the top of Rolleston St • Bulk earth removal movements restricted to 9-3	2	• Less than minor construction effect • Road trucks enter and exit site close to main work area (easy to come and go) • Road trucks do not have to travel through the site • Minor works required in the site to create loading and turn around area near the top of Rolleston St • No time restriction on traffic movements	1	• **High Construction effect** • Road trucks enter and exit site further from main work area than Rolleston and Bell, but closer than other options • Road trucks need to travel across upper field – further to travel within site and significantly affects available space on the upper field associated with access/exit to Hargreaves St • Moderate works required in the site to create loading and turn around area near the top of Hargreaves St • Bulk earth removal movements restricted to 9-3	4	• **High construction effect** • Road trucks enter and exit site a long way from the main work area • Road trucks need to travel across both the upper and lower fields – further to travel within site and significantly affects available space on the lower field associated with access/exit to Salisbury Tce • Long length of clean track required within the site to get road vehicles to the reservoir site (otherwise all material needs to be double handled) • Bulk earth removal movements restricted to 9-3	4	• Moderate construction effect • Road trucks enter and exit site a long way from the main work area • Road trucks need to travel across both the upper and lower fields – further to travel within site and affects available space on the lower field associated with access/exit to Westland Rd • Long length of clean track required within the site to get road vehicles to the reservoir site (otherwise all material needs to be double handled)	3
Cost • Road upgrades • Site access construction cost • Traffic management cost • Extra maintenance remediation or restoration costs	0 = significantly less expensive 2 = base case (Rolleston Street) 5 = significantly more expensive	• Base Case • No road upgrades required • Low cost to create access onto the upper field • Low-moderate traffic management cost • Resurfacing of Rolleston St and Wallace St intersection (maintenance and post-construction)	2	• **Significantly more expensive** than base case • Significant cost to upgrade Bell Rd and Bidwell St and intersections • Significant cost to construct track down from Bell Rd reservoir • Low traffic management cost • Significant remediation cost for track down from Bell Rd reservoir, plus resurfacing affected sections of Bell Rd and Bidwell St	5	• Moderately more expensive than base case • Moderate cost to widen Hargreaves St • Low – moderate cost to create access onto the upper field • Moderate traffic management cost • Resurfacing of Hargreaves St and Wallace St intersection (maintenance and post-construction)	3	• **Moderately to significantly more expensive** than base case • No road upgrades required • Moderate to high cost to create access onto the lower field, • Moderate cost to create higher use access between fields • Moderate traffic management cost • Resurfacing of Salisbury Tce and Wright St (maintenance and post-construction)	4	• **Moderately to significantly more expensive** than base case • High cost to upgrade Westland Rd and construct access onto the lower field, • moderate cost to create higher use access between fields • Low traffic management cost • Possibly lower post-construction repaving required	4
Assessment score			**10**		**15**		**13**		**16**		**15**

6 Multiple access points

The workshop also looked at two options with separate ingress and egress locations: Rolleston Street/Salisbury Terrace and Rolleston Street/Westland Road, shown on Maps 6 & 7.

An assessment of the options is provided in Section 7. These combination options scored worse than the individual options.

A description of each option is provided below.

Option 6: Rolleston Street & Salisbury Terrace

This option uses both Rolleston Street and Salisbury Terrace as described in Section 0 and 0, with a one-way route through the site for road trucks. The assessment did not assign which access point would be ingress and which egress, but this would not change the assessment outcome.

Light vehicles would enter and exit the site from a single access point, close to where worker vehicle parking would be provided.

Option 7: Rolleston Street & Westland Road

This option uses both Rolleston Street and Westland Road as described in Section 0 and 0, with a one-way route through the site for road trucks. The assessment did not assign which access point would be ingress and which egress, but this would not change the assessment outcome.

Light vehicles would enter and exit the site from a single access point, close to where worker vehicle parking would be provided.

7 Alternative access assessment table – multiple access points

Assessment Criteria	Identified Effect or Cost	Option 6: Rolleston Road/Salisbury Terrace		Option 7: Rolleston Road/Westland Road	
Traffic network • Disruption to local network • Disruption to wider network • Effect on parking • Requirement for temporary traffic management	0 = negligible 1 = less than minor 2 = minor 3 = moderate 4 = high 5 = very high	• Minor disruption to local (Rolleston St, Salisbury Tce, and Wright St) and wider (Wallace St and beyond) network • Parking will need to be temporarily removed from some sections of Rolleston St and Salisbury Tce (Rolleston St will be mitigated but Salisbury Tce may be harder) • Single body rigid trucks able to turn in and out of Wallace St/Rolleston St intersection with spotter; larger articulated vehicles will require active intersection stop/go management • No median at Salisbury Tce/Wright St intersection – more difficult for trucks to enter/exit	2	• Minor disruption to local (Rolleston St) and wider (Wallace St and beyond) network • Parking will need to be temporarily removed from some sections of Rolleston St and Westland Rd (Rolleston St will be mitigated, Westland Rd will be more difficult to mitigate) • Single body rigid trucks able to turn in and out of Wallace St/Rolleston St intersection with spotter; larger articulated vehicles will require active intersection stop/go management • Three way intersection of Wright St, Westland Rd, and Hutchison Rd will require some TTM	2
Environmental • Natural environment (streams, vegetation, landscape and Town Belt amenity and natural values) • Urban environment (noise, number of potentially affected parties)	0 = negligible 1 = less than minor 2 = minor 3 = moderate 4 = high 5 = very high	• **High effect** on natural environment and Wellington Town Belt (at Salisbury Tce) • Large cut required to enable access from Salisbury Tce up to lower field, • Additional works required on access track between upper and lower fields to provide for road trucks and the larger units required to bring in construction materials • Greater traffic intensity on access track will increase risk of effects on stream. • Moderate noise effect on urban environment (≈80-90 properties on Rolleston St) • Moderate noise effect (≈50 properties on Salisbury Tce and Wright St assuming vehicles head for Hutchison Rd)	4	• **High effect** on natural environment and Wellington Town Belt (at Westland Rd) • Significant earthworks and vegetation clearance required to widen/upgrade Westland Rd and construct new road access to lower field car parking area • Potentially permanent effect if new access was left in place for better access to the park • Additional works required on access track between lower and upper fields to provide for road trucks and the larger units required to bring in construction materials • Greater traffic intensity on access track will increase risk of effects on stream • Moderate noise effect on urban environment (≈80-90 properties on Rolleston St) • Less than minor-minor noise (≈10 properties on Westland Rd, could potentially use noise bund to minimise effects on 8 properties on Salisbury Ave)	4
Social • Effect on walkways • Effect on community infrastructure (eg Harriers)	0 = negligible 1 = less than minor 2 = minor 3 = moderate 4 = high 5 = very high	• Minor social effects • No additional tracks closed • Minor effect on Harriers as access will be more difficult with more vehicles using Salisbury Tce	2	• Moderate-high social effects (at Westland Road) • No additional tracks closed (assuming footpath to Westland Rd can remain open) • Moderate effect on Harriers as access will be more difficult with more vehicles but may have permanent benefit if new access left in place • Moderate-high effect on 1 Westland Rd: May require temporary resident relocation or potential removal of a house at 1 Westland Rd	3
Construction Effectiveness and Efficiency • Effective traffic movements within site • Effective use of space • Additional works within site required to facilitate access • Restriction on traffic movements	0 = negligible 1 = less than minor 2 = minor 3 = moderate 4 = high 5 = very high	• **High construction effect** • Road trucks enter or exit site a long way from the main work area • Road trucks need to travel across both the upper and lower fields – further to travel within site and significantly affects available space on the lower field associated with access/exit to Salisbury Tce • Long length of clean track required within the site to get road vehicles to the reservoir site (otherwise all material needs to be double handled) • Bulk earth removal movements restricted to 9-3	4	• **High construction effect** • Road trucks enter and exit site a long way from the main work area • Road trucks need to travel across both the upper and lower fields – further to travel within site and affects available space on the lower field associated with access/exit to Westland Rd • Long length of clean track required within the site to get road vehicles to the reservoir site (otherwise all material needs to be double handled) • Bulk earth removal movements restricted to 9-3	4
Cost • Road upgrades • Site access construction cost • Traffic management cost • Extra maintenance remediation or restoration costs	0 = significantly less expensive 2 = base case (Rolleston Street) 5 = significantly more expensive	• **Moderately to significantly more expensive** than base case • No road upgrades required • Moderate to high cost to create access onto the lower field, • Moderate cost to create higher use access between fields • Moderate traffic management cost • Resurfacing of Rolleston St, Wallace St intersection, Salisbury Tce and Wright St (maintenance and post-construction)	4	• **Moderately to significantly more expensive** than base case • High cost to upgrade Westland Rd and construct access onto the lower field, • moderate cost to create higher use access between fields • Low traffic management cost • Possibly lower post-construction repaving required • Resurfacing of Rolleston St and Wallace St intersection (maintenance and post-construction)	4
Assessment score			**16**		**17**

8 Conclusions

Option 1: Rolleston Street is identified as the clear preferred option when assessed against alternative options for heavy vehicle access to the Prince of Wales/Omāroro reservoir project site.

Assessment Criteria	Option 1: Rolleston Rd	Option 2: Bell Rd	Option 3: Hargreaves St	Option 4: Salisbury Tce	Option 5: Westland Rd	Option 6: Rolleston/ Salisbury Tce	Option 7: Rolleston/ Westland Rd
Traffic Network	**2**	1	2	2	1	2	2
Environmental	**3**	5	3	4	4	4	4
Social	**1**	3	1	2	3	2	3
Construction Effectiveness and Efficiency	**2**	1	4	4	3	4	4
Cost	**2**	5	3	4	4	4	4
Assessment Score	**10**	15	13	16	15	16	17

In this regard, the Rolleston Street access is considered the appropriate site access for the project, relative to the alternatives available.

No other access option ranked as favourably across the assessment criteria categories. Option 1: Rolleston Street ranked:

- First: Cost as the least expensive option relative to the other options considered, and
- First equal: Environmental and Social along with Hargreaves Street, as one of two options with the least environmental and social effects, and
- Second: Construction Effectiveness and Efficiency, and
- Second equal: Traffic Network along with 5 of the 7 options considered, with minor effects on the traffic network.

Applying a weighting factor or sensitivity testing to any of these criteria is considered highly unlikely to change the outcome of this assessment.

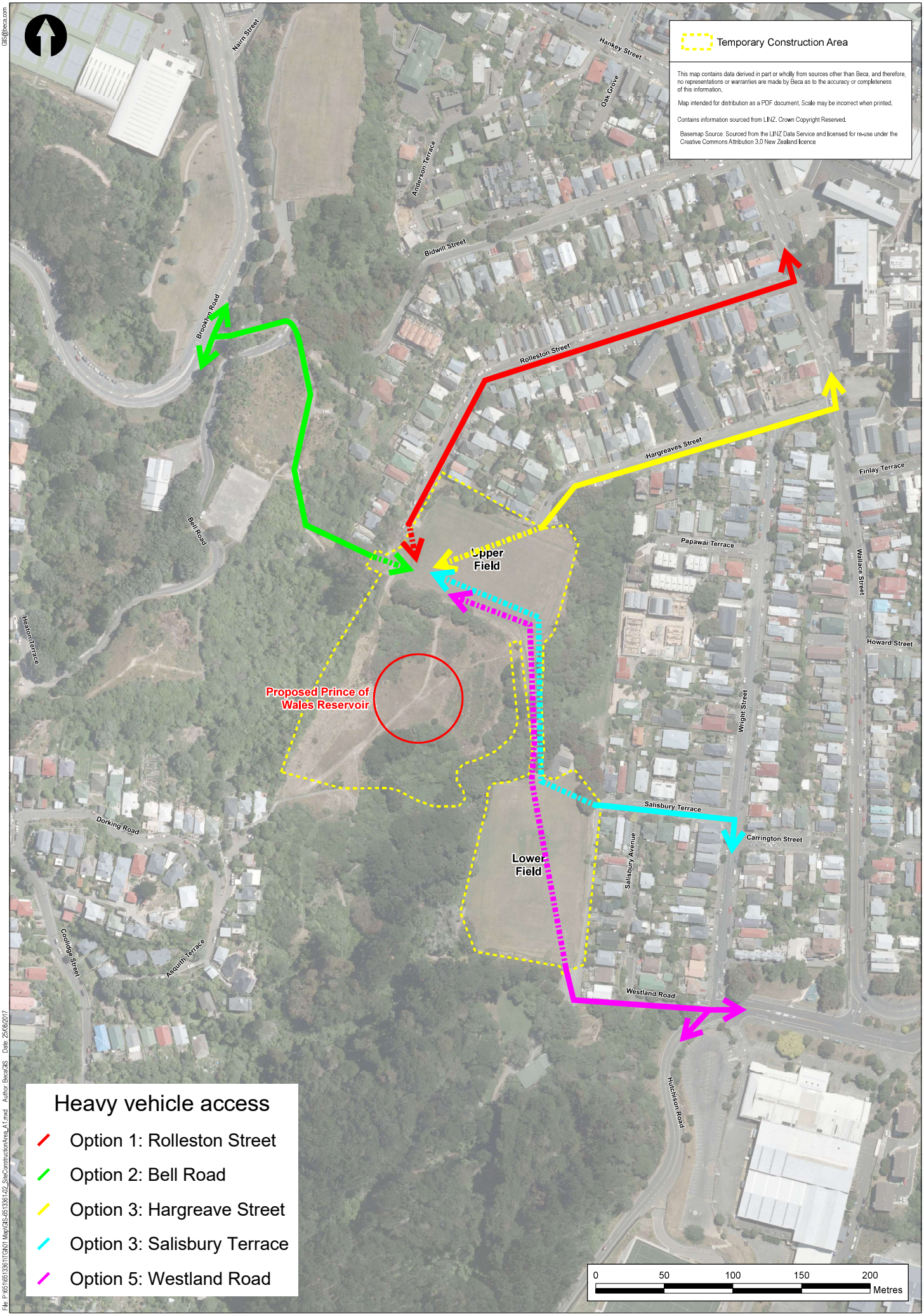
A Rolleston Street access option results in the best social and cost outcomes versus other alternative site access options.

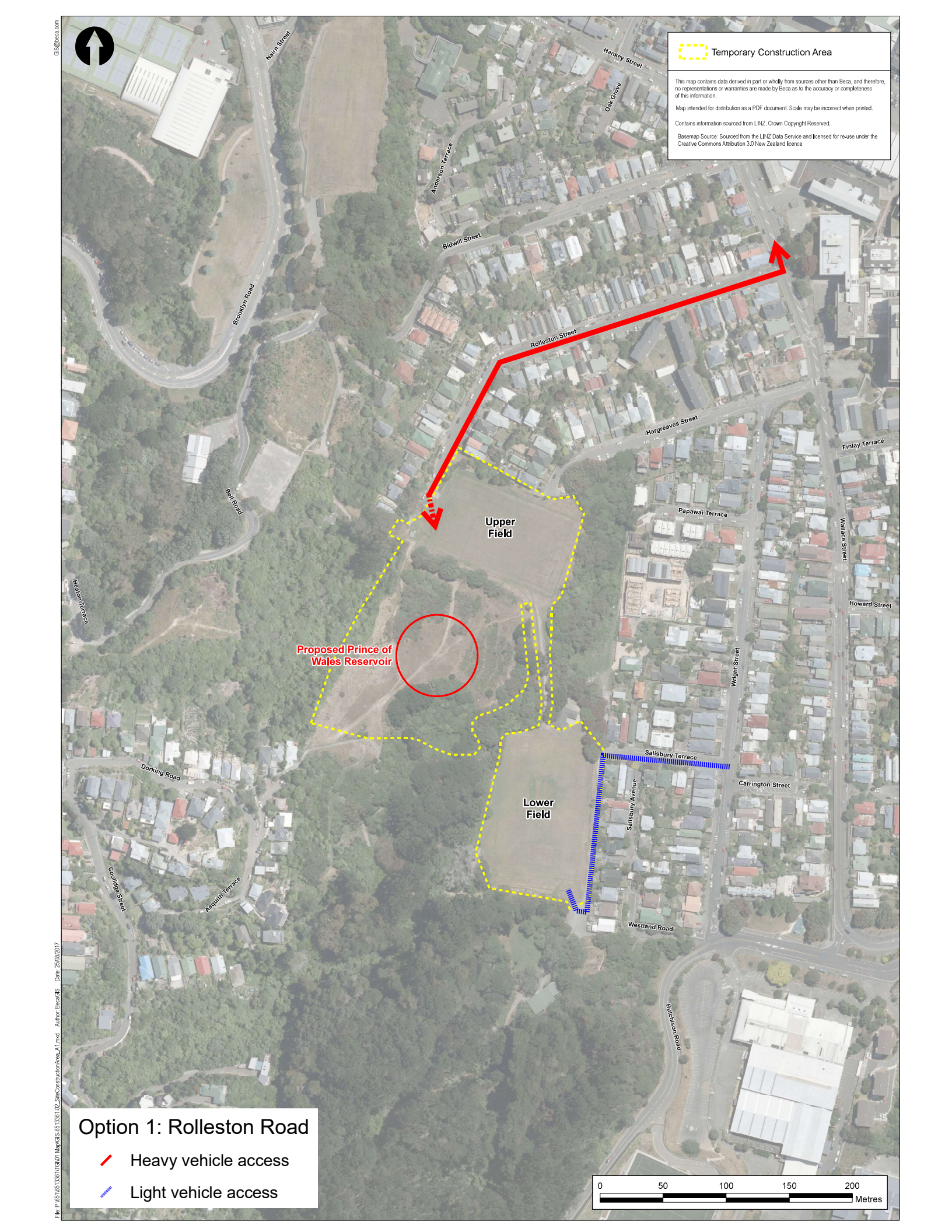
Although a Rolleston Street access will impact on more dwellings in terms of noise and general disruption than other options considered, its minimal effect on the sensitive Town Belt and established vegetation (especially when compared to Option 2: Bell Road and Option 5: Westland Road) results in a more favourable environmental score versus the alternatives considered.

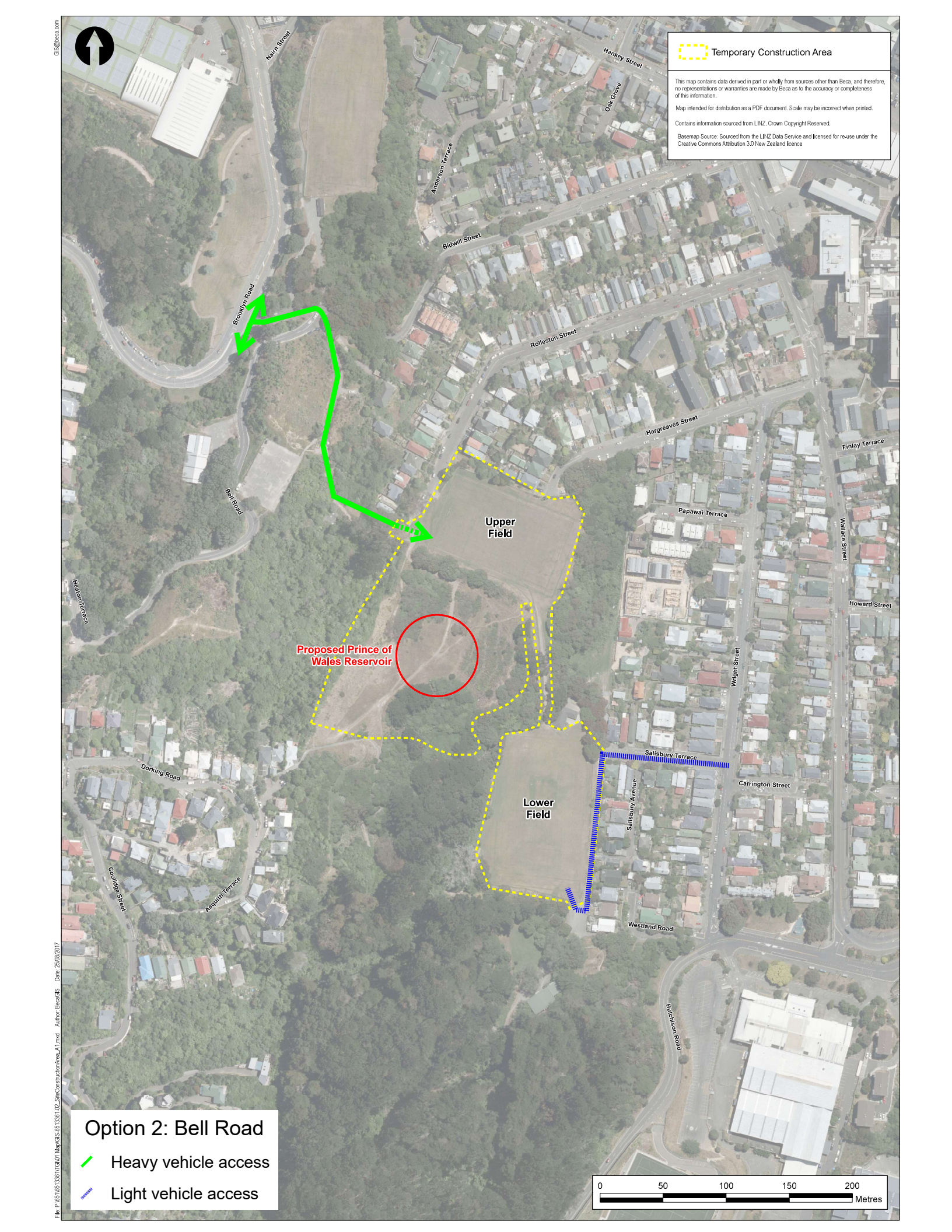
With regard to construction effectiveness and efficiency effects, the limitation on bulk earth movements to between 9am and 3pm, associated with the Rolleston Street access option, is also generally offset by not requiring road vehicles to track through the site, allowing for a more effective

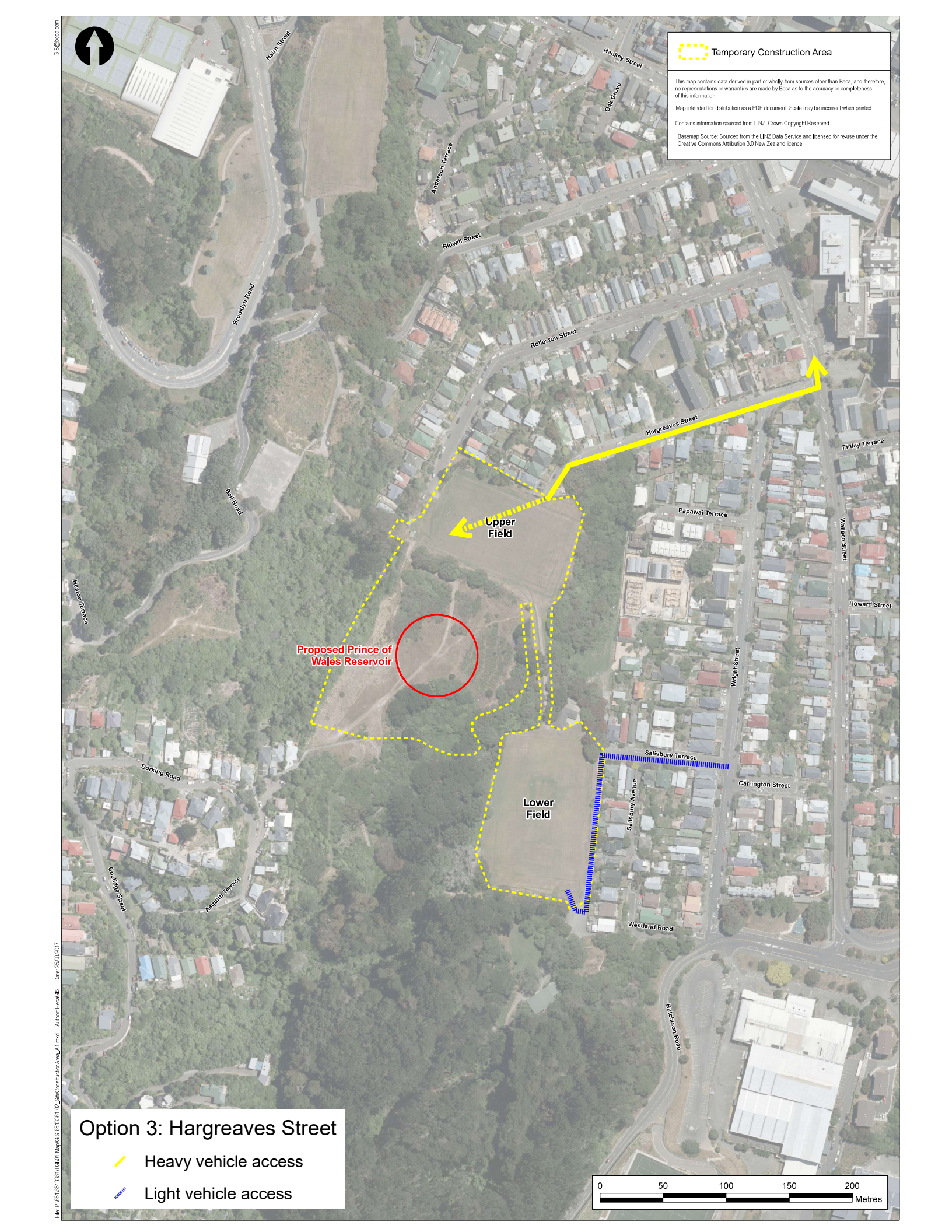
and efficient use, development and rehabilitation of the upper and lower playing fields during reservoir construction, while also removing the potential for conflicts with off-road machinery and lowering the risk of tracking dirt onto the road.

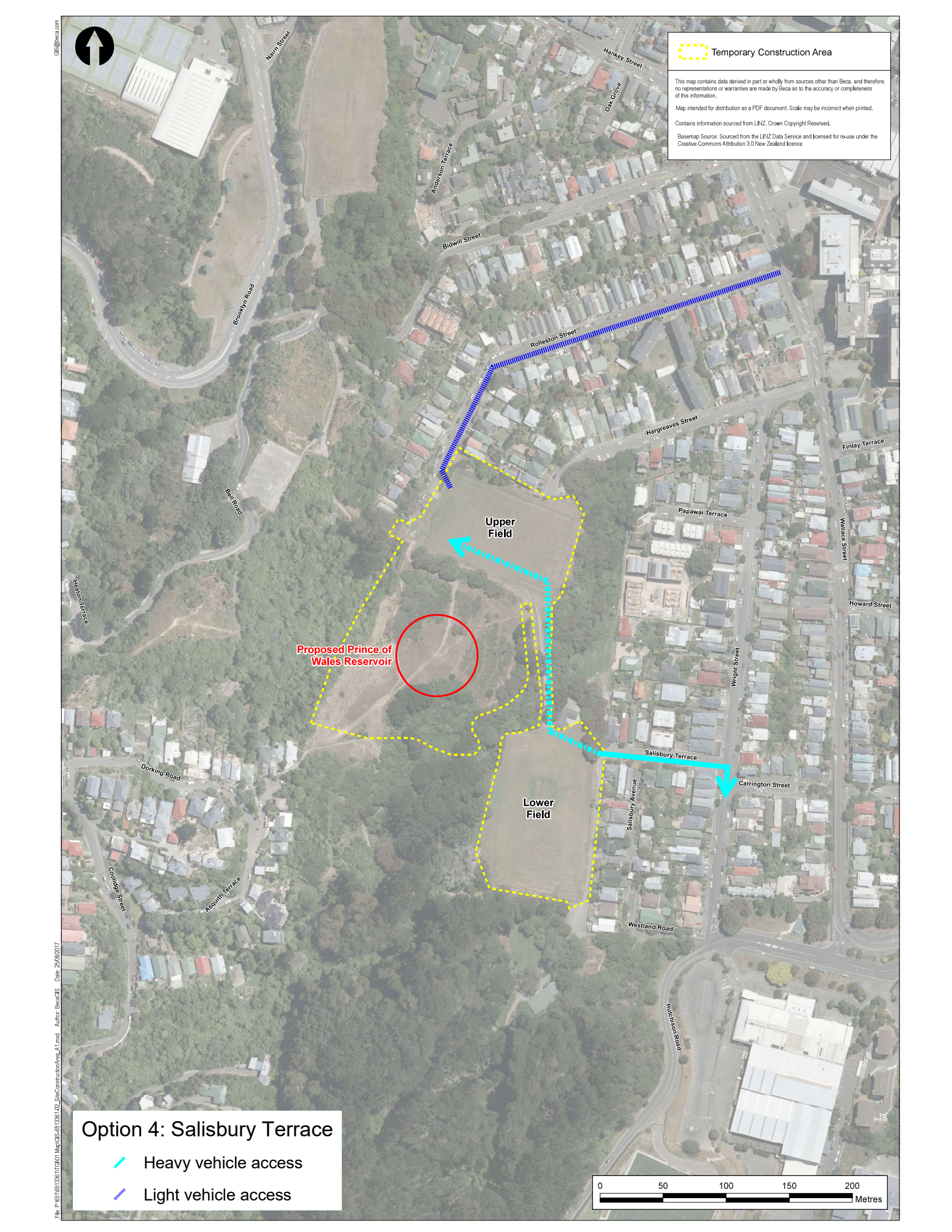
A Rolleston Street access will result in some disruption to the local road network, including parking. However, this effect is minor, not significantly dissimilar to the effects that other access options will have on the traffic network, and it is not significant enough to offset the potentially more significant environmental and cost effects that are associated with the other access alternatives.

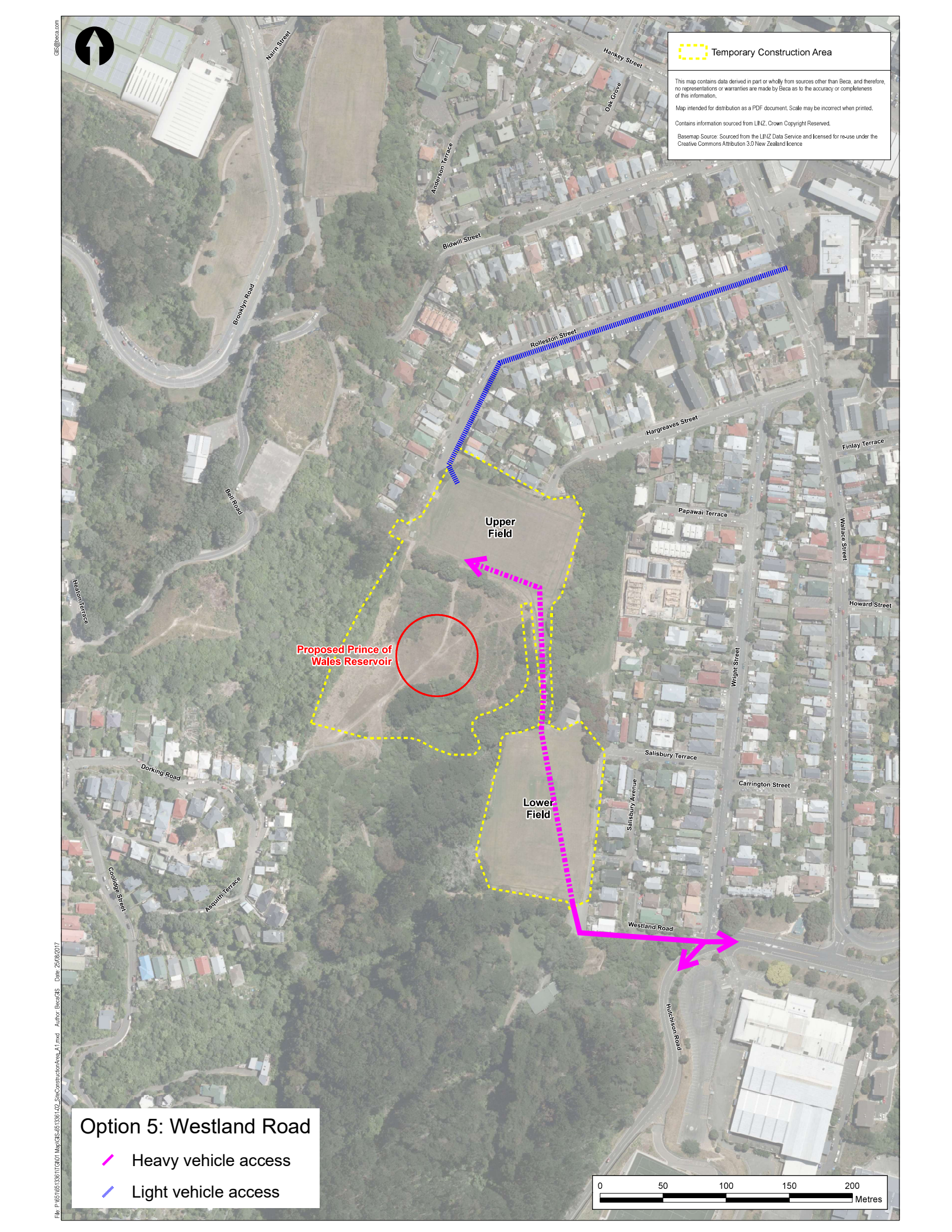

Temporary Construction Area
This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information.
Map intended for distribution as a PDF document. Scale may be incorrect when printed.
Contains information sourced from LINZ. Crown Copyright Reserved.
Basemap Source: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
Nairn Street
Hankey Street
Oak Grove
Anderson Terrace
Bidwill Street
Brooklyn Road
Rolleston Street
Hargreaves Street
Finlay Terrace
Bell Road
Papawai Terrace
Wallace Street
Howard Street
Heaton Terrace
Upper Field
Proposed Prince of Wales Reservoir
Wright Street
Salisbury Terrace
Carrington Street
Dorking Road
Lower Field
Salisbury Avenue
Coolidge Street
Asquith Terrace
Westland Road
Hutchison Road
Heavy vehicle access
Option 1: Rolleston Street
Option 2: Bell Road
Option 3: Hargreave Street
Option 3: Salisbury Terrace
Option 5: Westland Road
0
50
100
150
200
Metres
GIS@beca.com
Author: BecaGIS Date: 29/06/2017
File: P:\651\65133511\GIS\01 Maps\QGIS-651335102_SiteConstructionArea_A1.mxd

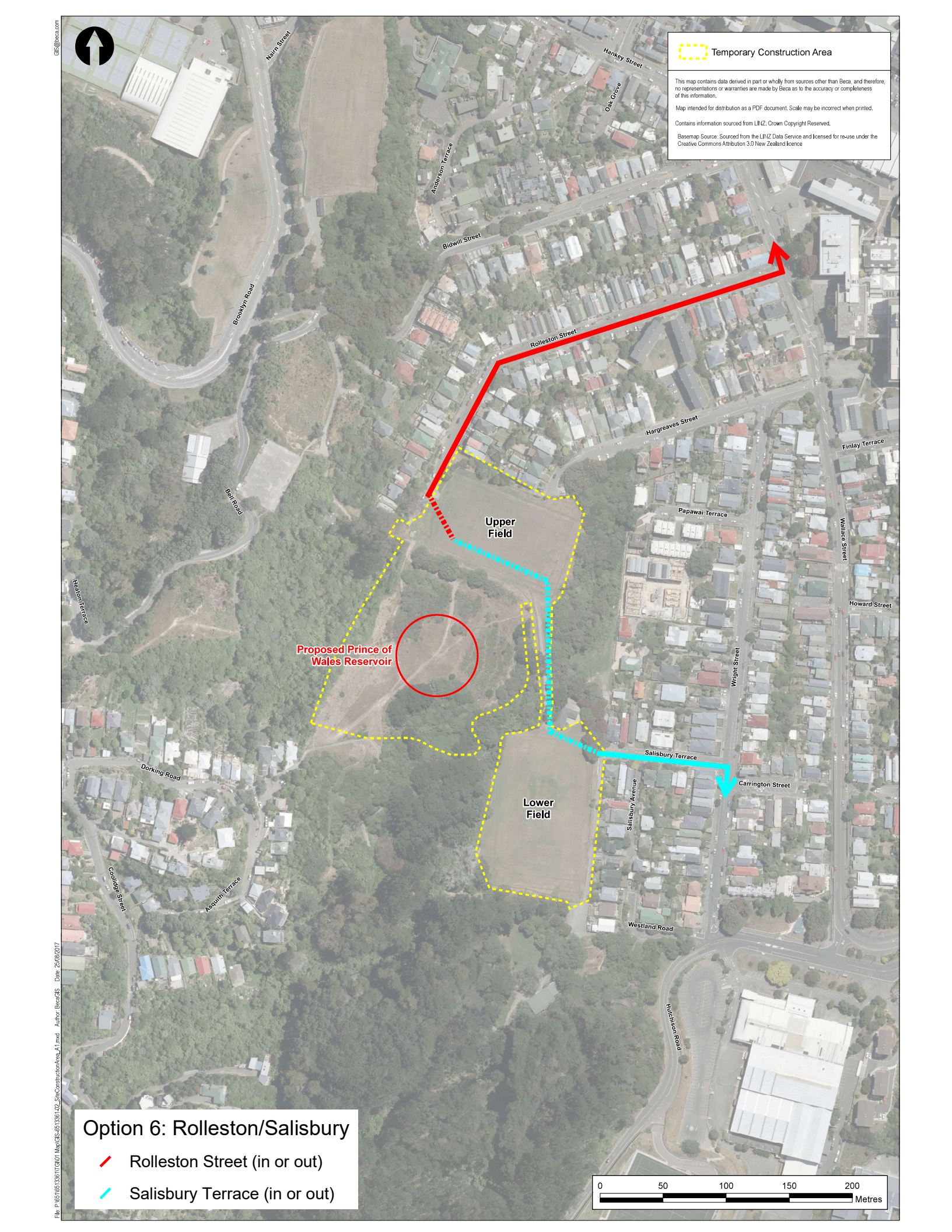

Temporary Construction Area
This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information.
Map intended for distribution as a PDF document. Scale may be incorrect when printed.
Contains information sourced from LINZ. Crown Copyright Reserved.
Basemap Source: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
Nairn Street
Hankey Street
Oak Grove
Anderson Terrace
Bidwill Street
Brooklyn Road
Rolleston Street
Hargreaves Street
Finlay Terrace
Bell Road
Papawai Terrace
Wallace Street
Howard Street
Heaton Terrace
Upper Field
Proposed Prince of Wales Reservoir
Wright Street
Salisbury Terrace
Carrington Street
Dorking Road
Lower Field
Salisbury Avenue
Coolidge Street
Asquith Terrace
Westland Road
Hutchison Road
Option 1: Rolleston Road
Heavy vehicle access
Light vehicle access
0
50
100
150
200
Metres
GIS@beca.com
File: P:\651\65133511\GIS\01 Maps\QGIS-651335102_SiteConstructionArea_A1.mxd Author: BecaGIS Date: 29/06/2017

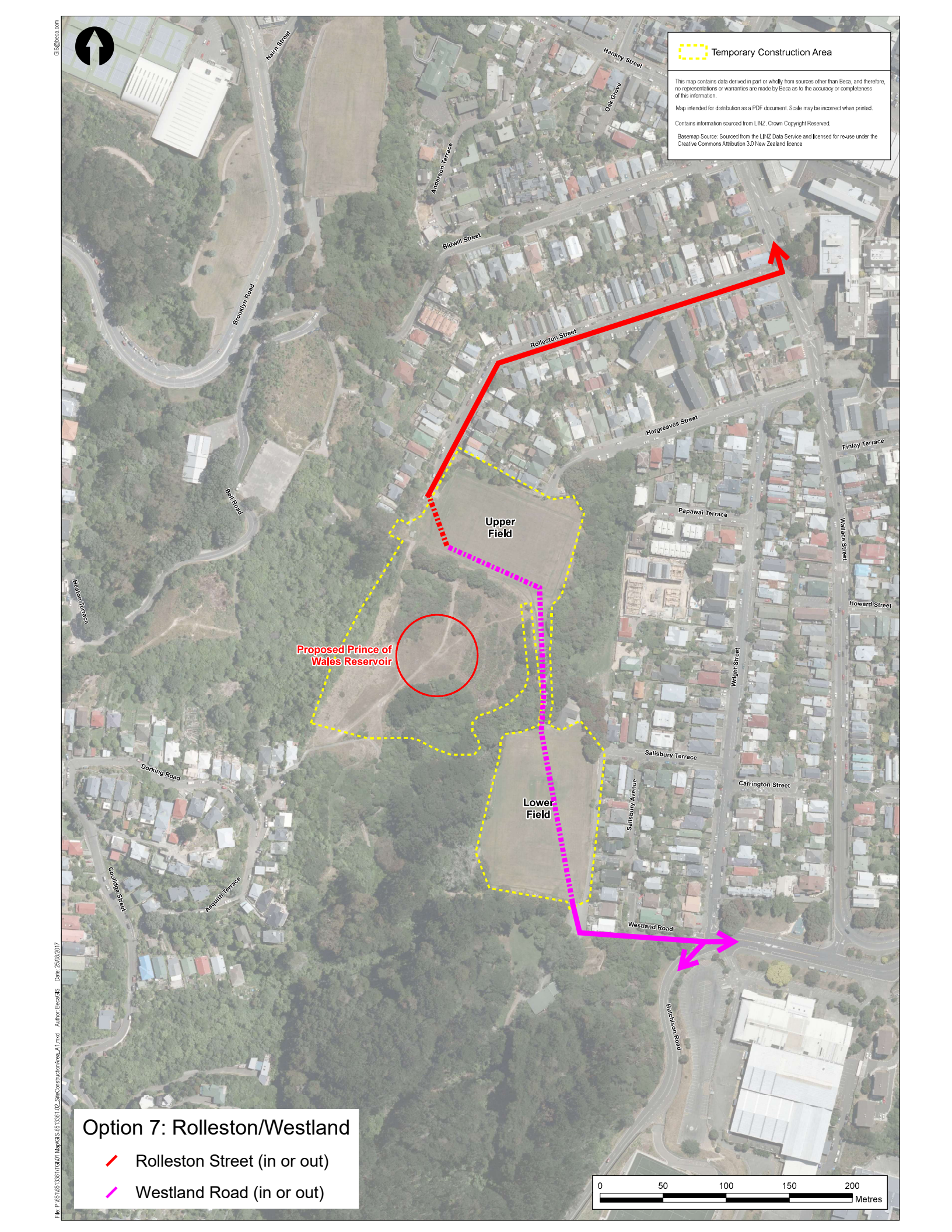

Temporary Construction Area
This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information.
Map intended for distribution as a PDF document. Scale may be incorrect when printed.
Contains information sourced from LINZ. Crown Copyright Reserved.
Basemap Source: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
Nairn Street
Hankey Street
Oak Grove
Anderson Terrace
Bidwill Street
Brooklyn Road
Rolleston Street
Hargreaves Street
Finlay Terrace
Bell Road
Papawai Terrace
Wallace Street
Howard Street
Heaton Terrace
Upper Field
Proposed Prince of Wales Reservoir
Wright Street
Salisbury Terrace
Carrington Street
Dorking Road
Lower Field
Salisbury Avenue
Coolidge Street
Asquith Terrace
Westland Road
Hutchison Road
Option 2: Bell Road
Heavy vehicle access
Light vehicle access
0
50
100
150
200
Metres
GIS@beca.com
File: P:\651\65133511\GIS\01 Maps\QGIS-651335102_SiteConstructionArea_A1.mxd Author: BecaGIS Date: 29/06/2017


Temporary Construction Area
This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information.
Map intended for distribution as a PDF document. Scale may be incorrect when printed.
Contains information sourced from LINZ. Crown Copyright Reserved.
Basemap Source: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
Nairn Street
Hankey Street
Oak Grove
Anderson Terrace
Bidwill Street
Brooklyn Road
Rolleston Street
Hargreaves Street
Finlay Terrace
Bell Road
Papawai Terrace
Wallace Street
Heaton Terrace
Howard Street
Upper Field
Proposed Prince of Wales Reservoir
Wright Street
Salisbury Terrace
Carrington Street
Dorking Road
Lower Field
Salisbury Avenue
Coolidge Street
Asquith Terrace
Westland Road
Hutchison Road
Option 3: Hargreaves Street
Heavy vehicle access
Light vehicle access
0
50
100
150
200
Metres
GIS@beca.com
File: P:\651\65133511\GIS\01 Maps\GIS-651335102_SiteConstructionArea_A1.mxd Author: BecaGIS Date: 26/06/2017


Temporary Construction Area
This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information.
Map intended for distribution as a PDF document. Scale may be incorrect when printed.
Contains information sourced from LINZ. Crown Copyright Reserved.
Basemap Source: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
Nairn Street
Hankey Street
Oak Grove
Anderson Terrace
Bidwill Street
Brooklyn Road
Rolleston Street
Hargreaves Street
Finlay Terrace
Bell Road
Papawai Terrace
Wallace Street
Howard Street
Heaton Terrace
Upper Field
Proposed Prince of Wales Reservoir
Wright Street
Salisbury Terrace
Carrington Street
Dorking Road
Lower Field
Salisbury Avenue
Coolidge Street
Asquith Terrace
Westland Road
Hutchison Road
Option 4: Salisbury Terrace
Heavy vehicle access
Light vehicle access
0
50
100
150
200
Metres
GIS@beca.com
File: P:\65106513\351T\GIS\01 Maps\QGIS-65135351-02_SiteConstructionArea_A1.mxd Author: BecaGIS Date: 29/06/2017


Temporary Construction Area
This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information.
Map intended for distribution as a PDF document. Scale may be incorrect when printed.
Contains information sourced from LINZ. Crown Copyright Reserved.
Basemap Source: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
Nairn Street
Hankey Street
Oak Grove
Anderson Terrace
Bidwill Street
Brooklyn Road
Rolleston Street
Hargreaves Street
Finlay Terrace
Bell Road
Papawai Terrace
Wallace Street
Howard Street
Heaton Terrace
Upper Field
Proposed Prince of Wales Reservoir
Wright Street
Salisbury Terrace
Carrington Street
Dorking Road
Lower Field
Salisbury Avenue
Coolidge Street
Asquith Terrace
Westland Road
Hutchison Road
Option 5: Westland Road
Heavy vehicle access
Light vehicle access
0
50
100
150
200
Metres
GIS@beca.com
File: P:\651\65133511\GIS\01 Maps\QGIS-651335102_SiteConstructionArea_A1.mxd Author: BecaGIS Date: 29/06/2017


Temporary Construction Area
This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information.
Map intended for distribution as a PDF document. Scale may be incorrect when printed.
Contains information sourced from LINZ. Crown Copyright Reserved.
Basemap Source: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
Nairn Street
Hankey Street
Oak Grove
Anderson Terrace
Bidwill Street
Brooklyn Road
Rolleston Street
Hargreaves Street
Finlay Terrace
Bell Road
Papawai Terrace
Wallace Street
Howard Street
Heaton Terrace
Upper Field
Proposed Prince of Wales Reservoir
Wright Street
Salisbury Terrace
Carrington Street
Dorking Road
Lower Field
Salisbury Avenue
Coolidge Street
Asquith Terrace
Westland Road
Hutchison Road
Option 6: Rolleston/Salisbury
Rolleston Street (in or out)
Salisbury Terrace (in or out)
0
50
100
150
200
Metres
GIS@beca.com
File: P:\651\65133511\GIS\01 Maps\QGIS-651335102_SiteConstructionArea_A1.mxd Author: BecaGIS Date: 29/06/2017



GIS@beca.com

File: P:\651\65133511\GIS\01 Maps\GIS-651335102_SiteConstructionArea_A1.mxd Author: BecaGIS Date: 29/06/2017