Appendix 6: Further information received following pre-hearing meetings

Content:

1G. McKinlay Surveyors - SUPER STAGED CONCEPT PLAN (Alternative) - Wairau Estate, Oakura – C-10. Prepared for Oakura Farm Park Limited. 21/01/19.

1H. Overlay Rules for to control the staging of development.

1I. PRIVATE PLAN CHANGE 48 WAIRAU ESTATE - Assessment of SH45 Access. Prepared for Oakura Farm Park by AMTANZ Ltd. 25/03/2019.

1J. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Plan – C-01- Sheet 1. Prepared for Oakura Farm Park Limited. 07/09/17.

1K. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Profile and Section – C-01- Sheet 2. Prepared for Oakura Farm Park Limited. 07/09/17.

1L. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Graphic – C-01- Sheet 3. Prepared for Oakura Farm Park Limited. 07/09/17.

1M. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Plan – C-01- Sheet 1 marked. Prepared for Oakura Farm Park Limited. 07/09/17.

1N. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Graphic – C-01- Sheet 3 marked. Prepared for Oakura Farm Park Limited. 07/09/17.

1O. Assessment of Private Plan Change Request Wairau Estate, Oakura Rezoning (Ref: NPDC PLC18/00048) against the provisions of Taiao, Taiora Environmental Management Plan for the Taranaki Iwi Rohe. Colin Comber. 24/03/2019.

2. Further information received Taranaki Iwi

2A. Letter on the Private Plan Change to the New Plymouth District Plan, Oākura Rezoning. Taranaki Iwi. 17/04/2019.

3. Further information received from Ministry of Education.

3A. Estimate of potential school capacity. Ministry of Education. 13/03/2019.

4. Further information received from Oakura School Board of Trustees.

4A. Oakura School Roll Count. Oakura School Board of Trustee. 20/03/2019.

5. Further information received from New Plymouth District Council.

1. Further information received from Applicant

1A. Applicant's response cover page

COMBER CONSULTANCY
RMA & ENVIRONMENTAL PLANNING

10 May 2019

New Plymouth District Council
84 Liardet St
New Plymouth 4310

Attention: Anna Stevens – Consultant Planner

Oakura Rezoning - PLC18/00048 – Applicants' response to further actions arising from Pre-Hearing Meetings

The below Dropbox Link provides access to documents relevant to the above.

https://www.dropbox.com/sh/cz4apdcvohu45hn/AAAYmtfX7LlXy1ctirH4OkAba?dl=0

I trust this package of information is self-explanatory. Please be in touch if there are further matters requiring my attention.

Yours sincerely

Colin Comber MNZPI
Planning Consultant

Copy to Oakura Farm Park Ltd per Mr and Mrs M McKie

1B. Applicant's response to further actions required arising from pre-hearing meetings summary table.

To: New Plymouth District Council

Attention: Anna Stevens, Consultant Planner

APPLICANT'S RESPONSE TO FURTHER ACTIONS REQUIRED ARISING FROM PREHEARING MEETINGS

Equestrian Prehearing Meeting held 28 January 2019	
Actions required	*Action Undertaken*
Applicant: To confirm amendment to Structure Plan showing bridle trail along State Highway 45 frontage/open space area	The attached concept plans EQ-01 and EQ-02 (Ref: McKinlay Surveyors O-160109 dated 21 January 2019) showing the bridal trail linking through to SH45/Wairau Road intersection will be tended as evidence to the upcoming Hearing for consideration by the Independent Commissioners'. **Refer Attachments A1 & A2**
NPDC: To supply applicant and TEN with NPDC standard for equestrian paths	Information awaited.
NPDC: Consider appropriateness of Wairau Stream tributary open space to change from 'esplanade strip' to 'esplanade reserve' – will be considered as part of Section 42A/Officer Report on Plan Change	N/A
Education Prehearing Meeting held 28 January 2019	
Actions required	*Action Undertaken*
Applicant: Undertake traffic counts and observations of afternoon movements at Oakura School and Playcentre on Donnelly Street, The Outlook, SH 45 and surrounds	The Applicant's Traffic Engineer has undertaken this required action – refer attached 'Oakura School Traffic Concerns' report dated 15 April 2019 prepared by AMTANZ. **Refer Attachment B**
Submitters: Oakura School Board of Trustees and Principal to provide further details on the projections of the school roll and the capacity of the school to meet these projections, including future plans and what this looks like	Information awaited.
NPDC: Liaise with Ministry of Education on their view on the Proposed Plan Change and future provision of education facilities in Oakura. In addition, Ministry to comment on its view on the current and future capacity of Oakura School.	Information awaited.

Kaitake Community Board Prehearing Meeting held 28 January 2019	
Actions required	*Action Undertaken*
Applicant: To confirm whether it is proposing a new/alternative staging plan, including whether plan provisions are proposed to link development of stages with provision of infrastructure (i.e. new roundabout and underpass on SH45). In addition, provide confirmation as to whether alternative roading patterns are available or proposed, such as new/alternative access via SH45.	The Applicant has prepared alternatives for the sequencing of development linked to the logical provision of infrastructure supported by Overlay Rules. These are set out in attached Super Staging Concept Plans C-09 and C-10 (Ref: McKinlay Surveyors O-160109 dated 21 January 2019) together with draft Overlay Rules. **Refer Attachments C1.1 - C1.3** A new/alternative access via SH45 has been investigated by the Applicant's Traffic Engineer. Refer report attached titled 'Assessment of SH45 Access' dated 25 March 2019 prepared by AMTANZ Ltd. This report will be tended as evidence to the upcoming Hearing for consideration by the Independent Commissioners'. **Refer Attachment C2**
Traffic Prehearing Meeting held 29 January 2019	
Actions required	*Action Undertaken*
Applicant: To confirm whether it is proposing a new/alternative staging plan, including whether plan provisions are proposed to link development of stages with provision of infrastructure (i.e. new roundabout and underpass on SH45).	A new/alternative access via SH45 has been investigated by the Applicant's Traffic Engineer. Refer report attached titled 'Assessment of SH45 Access' dated 25 March 2019 prepared by AMTANZ Ltd. **Refer Attachment C2** This report will be tended as evidence to the upcoming Hearing for consideration by the Independent Commissioners'.
Applicant: To provide drawings showing the full configuration of the proposed new roundabout and underpass together, including topography/elevation to demonstrate sight lines for the roundabout and underpass. To demonstrate complies with relevant guidelines and whether additional land not owned by NPDC or applicant would be required.	The new Roundabout is fully assessed and discussed in the Traffic Impact Assessment prepared by AMTANZ Ltd and included in the Request for Plan Change as lodged by the applicant in March 2018 – refer Appendix 9 (Ref: PLC18/00048) With regard to the Underpass, attached are Sheets 1-4 prepared by McKinlay Surveyors, demonstrating its physical viability located within the existing SH corridor. **Refer Attachments C3.1 – C3.4**

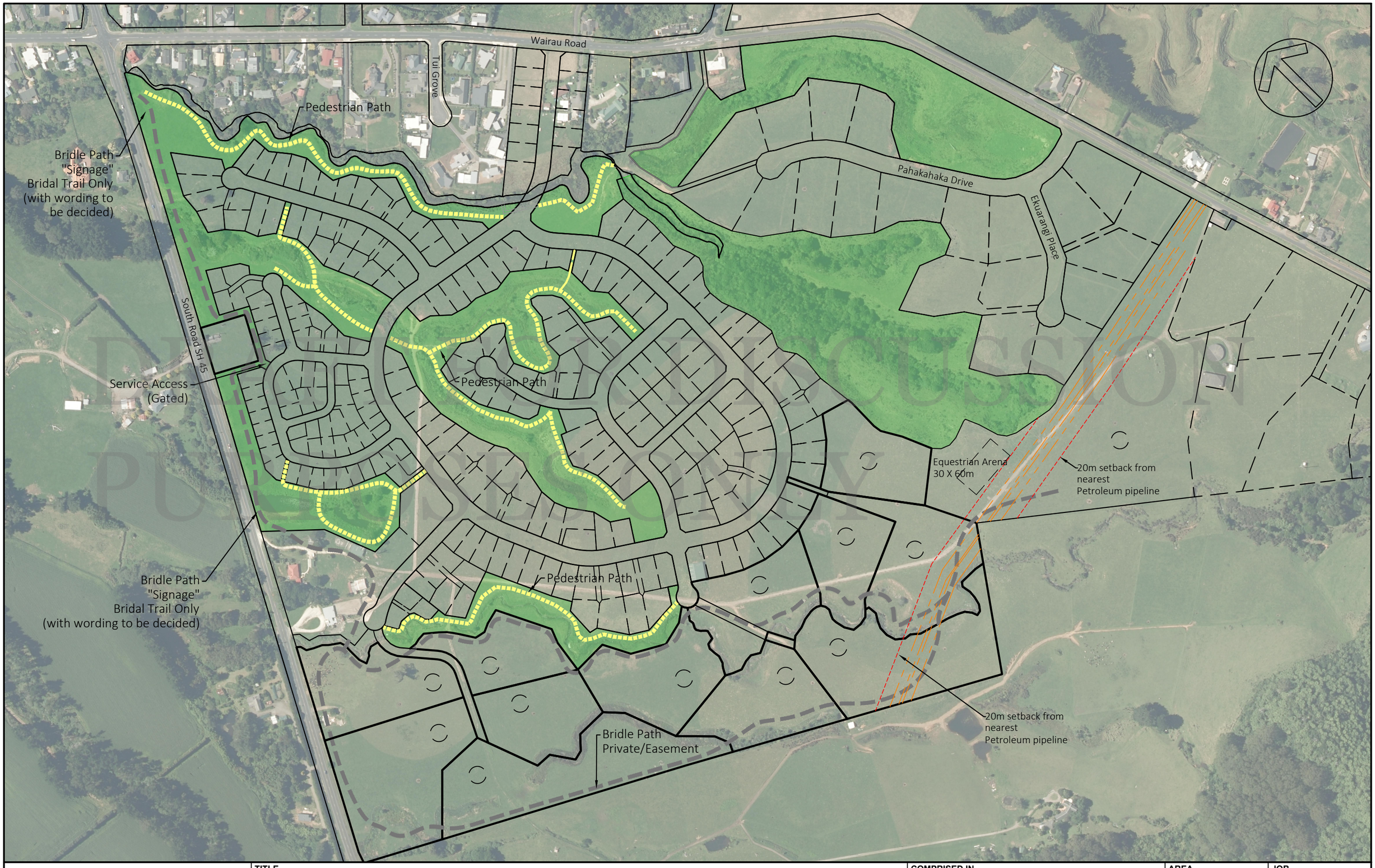
	These detailed investigations demonstrate both the proposed Roundabout and Underpass can be wholly located within existing road reserves.
Applicant: To provide NZTA, National Road Carriers Association and NPDC with initial plans and assessment of new/alternative access to subject site from SH45, including any traffic generation/model and compliance with guidelines/standards. To be provided by 8th February.	A new/alternative access via SH45 has been investigated by the Applicant's Traffic Engineer. The report titled 'Assessment of SH45 Access' dated 25 March 2019 prepared by AMTANZ Ltd was forwarded to NZTA, National Road Carriers Association and NPDC on 10 May 2019.
Submitters: NZTA and National Road Carriers Association to advise whether they support or oppose 'in-principle' the new/alternative access to subject site from SH45. To advise by 15th February.	Awaiting comment.
Submitter: NZTA to review general and transport objectives and policies to see whether they already sufficiently address requested changes to Policy 23.8 in Proposed Plan Change.	Response received – NZTA have confirmed per email dated 12 March 2019 (Hannah Thompson to NPDC per Anna Stevens, Boffa Miskell) that Operative District Plan general and transport objectives and policies sufficiently address NZTA concerns. (Ref: Submission 136)
Iwi and Hapu Prehearing Meeting held 29 January 2019	
Actions required	*Action Undertaken*
Applicant: Prepare table comparing the relevant parts of the Taiao Taiora – Iwi Environmental Management Plan with the proposed mitigation measures in the Plan Change. To be provided by 1st March	The Applicant's Consultant Planner has undertaken an assessment the Plan Change Request against the *Taiao Taiora – Iwi Environmental Management Plan* with the proposed mitigation measures in the Plan Change and provided this to Te Kahui o Taranaki. A copy of Assessment attached. **Refer Attachment D1**
Taranaki Iwi: Taranaki Iwi to review table provided by applicant and advise whether any gaps or other matters to be addressed. To advise by 8th March	Letter of response dated 17 April 2019 from Te Kāhui o Taranaki Iwi attached. **Refer Attachment D2**

Prepared by:

Colin Comber - MPNZI
Consultant Planner
colin@comberconsultancy.co.nz

10 May 2019

1C. McKinlay Surveyors - EQ-01- PEDESTRIAN/EQUESTRIAN LINKAGES - Wairau Estate, Oakura. Prepared for Oakura Farm Park Limited. 21/01/19.



McKinlay SURVEYORS
3 Young Street, PO Box 116
New Plymouth 4340
North Taranaki 06 758 5342
South Taranaki 06 278 4456
mckinlaysurveyors.co.nz

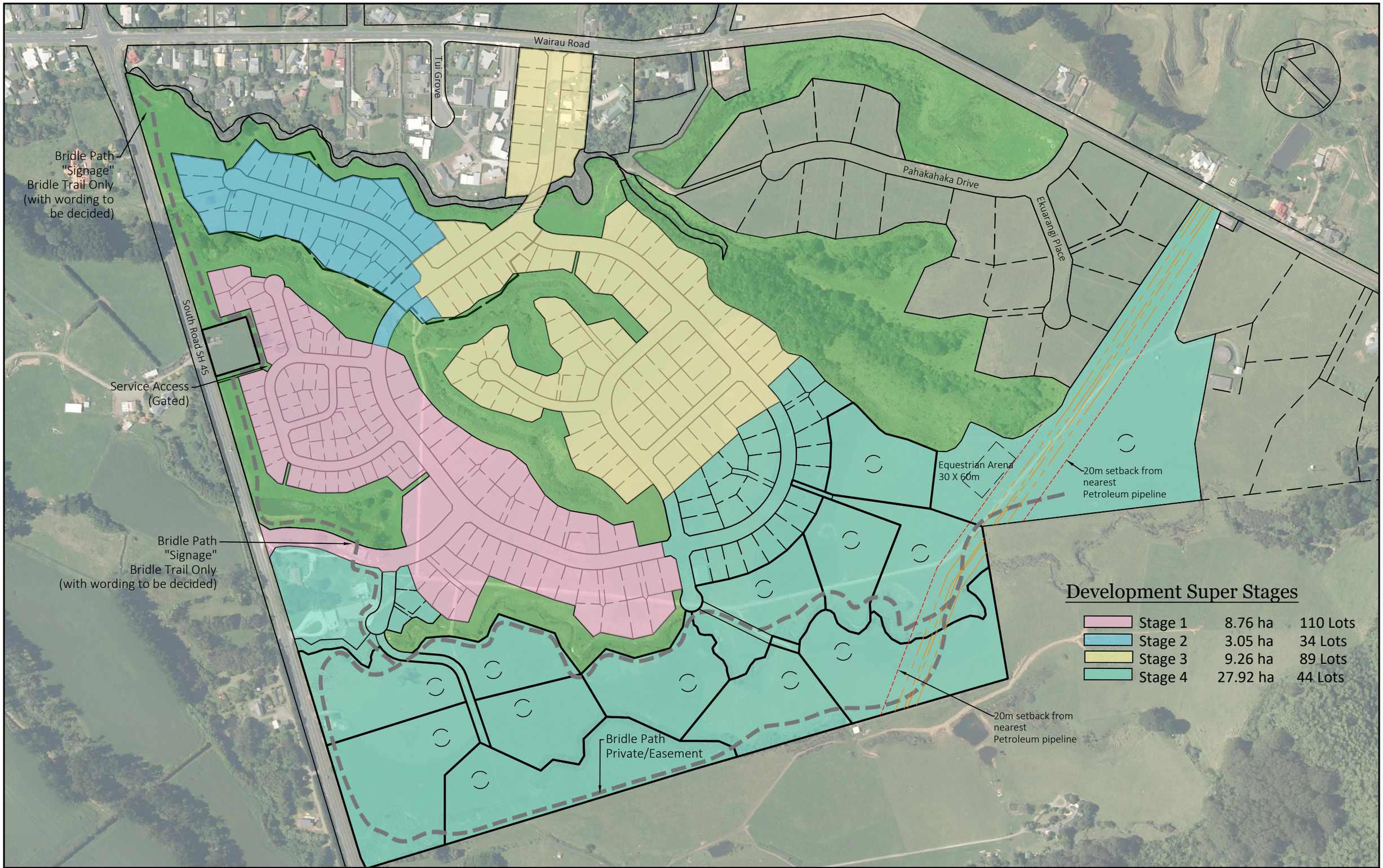
TITLE

PEDESTRIAN/EQUESTRIAN LINKAGES - Wairau Estate, Oakura

This plan is prepared only for the purpose of obtaining a Resource Consent under the Resource Management Act 1991. It should not be used for any other purpose. Areas and dimensions are approximate and are subject to change on final field survey.

COMPRISED IN Lot 29 DP 482991	**AREA** 66.3389ha	**JOB** O-160109
TERRITORIAL AUTHORITY New Plymouth District Council	**DATE** 21/01/19	**DRAWING** EQ-01
PREPARED FOR Oakura Farm Park Ltd	**SCALE** 1:4000 @ A3	**SHEET** 1 **OF** 1

1D. McKinlay Surveyors - EQ- 2- EQUESTRIAN LINKAGES - Wairau Estate, Oakura with SH45 Access. Prepared for Oakura Farm Park Limited. 10/05/19.



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TITLE EQUESTRIAN LINKAGES - Wairau Estate, Oakura with SH45 Access	**COMPRISED IN** Lot 29 DP 482991	**AREA** 66.3389ha	**JOB** O-160109
	TERRITORIAL AUTHORITY New Plymouth District Council	**DATE** 10/05/19	**DRAWING** EQ-2
This plan is prepared only for the purpose of obtaining a Resource Consent under the Resource Management Act 1991. It should not be used for any other purpose. Areas and dimensions are approximate and are subject to change on final field survey.	**PREPARED FOR** Oakura Farm Park Ltd	**SCALE** 1:4000 @ A3	**SHEET** 1 **OF** 1

1E. AMTANZ Ltd - Oakura School Traffic Commentary – 15-04-2019.

Comber Consultancy,
PO Box 517,
Taranaki Mail Centre,
New Plymouth 4340

AMTANZ Ltd
580 Wortley Rd
RD 9
Inglewood 4389
Ph: 0274884121

15th April 2019

Attention: Colin Comber

Re: Oakura School Traffic Concerns

Dear Colin,

Submissions to private plan change 48 (Wairau Estate) and the subsequent meeting with the school, play centre and ministry for education raised concerns regarding the traffic at the school. This prompted a site visit and traffic count to be undertaken. This letter outlines our findings and recommendations.

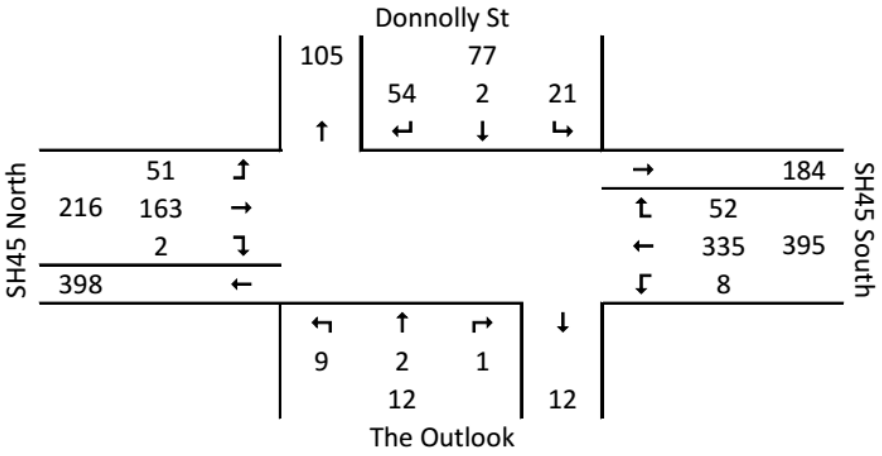
Oakura School is situated on Donnolly St some 150m from the State highway, the following aerial photograph shows the school and play centres location bounded in red and the surrounding road network.

Donnolly St is a no exit street but has paper roads leading from Donnolly St to Wairau Rd and another from the end of Hussey St to Butlers lane as shown in the following aerial photograph.

Donnolly St has a sealed width of 8m from the state highway to the school where it widens to 13.2m and turns through 90° and narrows to 5.7m.

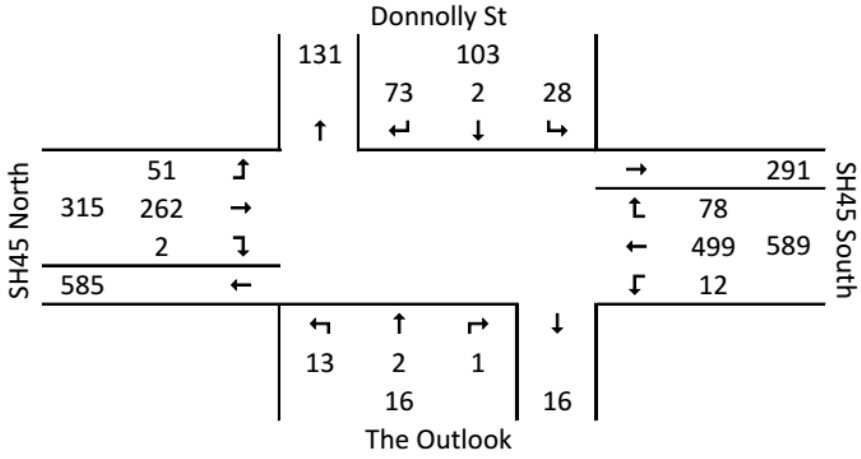
On the 26th November 2018 a turning count was undertaken for the a.m. peak hour (8:00-9:00) for the intersection of Donnolly St, The Outlook and state highway 45 (South Rd). The intersection takes the form of a giveway controlled cross roads a painted median finishes some 65m to the south and whilst there is a gap in the markings there are no right turn bays as shown below:

The results of the count are shown below:



The traffic was then modelled in SIDRA 8 the results indicated that all the movements are operating at a Level of Service (LOS) A.

The traffic flows were then increased to include the proposed traffic generation for Wairau Estate. The turning volumes on the SH45 South leg were adjusted in the same proportions as counted and the Donnolly St and The Outlook flows adjusted accordingly to give the following flows for the higher generation rate.



The output of the SIDRA analysis for the new flows indicates that the right turn movements out of both Donnolly St and The Outlook drop to a LOS B as does the straight through movement from The Outlook.

Following a pre-hearing meeting with the school, play centre and ministry for education a site visit was undertaken on the 20th February 2019 between 2:30 and 3:30 to observe traffic and pedestrian movements at the end of a school day. During this time we observed 20 pedestrians walk towards the school either from Donnelly St or Hussey St. We also observed one cyclist, 64 cars and two buses head towards the school. Departing from the school we counted 160 pedestrians, 62 cars and the two buses. There was some minor congestion around the pedestrian crossing with cars queuing to head towards the highway and we observed a queues of up to eight vehicles at the highway intersection, predominantly right turning vehicles. These queues were short lived and by 3:10 they started to drop substantially and by 3:15 the traffic had completely dispersed.

The width of the first section of Donnelly St at 8m restricts parking to one side otherwise there is insufficient room for two vehicles to pass freely. The widened section in front of the school is 84m in length with a 16m bus bay marked outside the school entrance leaving 68m available for parking. We observed that cars angle parked along this length at approximately 75° in accordance with Appendix 23 of the District Plan allowing for vehicles to parallel park on the opposite kerb a width of 2.8m is required which would allow 24 vehicles to park outside the school. There is sufficient space along the opposite kerb for 8 cars can be parked without obstructing any driveways.

After 90degree bend the road narrows to 5.7m with a 4.5m sealed shoulder for parking on the school side. The widened shoulder is 108m long but there is a 6.5m wide crossing part way along providing 101.5 m. Cars park at 90° to the road the district plan requires a minimum parking bay width of 2.8m

with a manoeuvring space of 7.5m behind for a right turn into the bay. Given there is only a road width of 5.7m if an allowance of 3m per vehicle is used then 33 vehicles can be parked along this length, it would appear that some of this is utilised by the staff at the school.

Additional kerb side parking is available on Hussey St and some on Donnolly St north of the school.

Disscussion

Whilst we have not been able to quantify the impacts on the school in terms of increased role from the proposed re-zoning we have used the existing traffic volumes to determine the future traffic patterns if the turning proportions remain the same. This indicates the effects on the intersection with State highway 45 are less than minor with the performance of three of the movements dropping to a LOS B which indicates there is still plenty of capacity in the intersection if the volumes increase seven more. We noted during the survey that queuing from the pedestrian crossing can block the intersection but only affects the left turn out and straight through movements from The Outlook both of which are very minor in nature.

There is currently ample parking around the school and surround local roads to cater for the afternoon pick up traffic and whilst we recognise the observations were made on a fine day the additional traffic on a wet day should also be able to be catered for. There are some delays as vehicles exit Donnolly St but these are short lived with the demand being dissipated with 15 minutes or so, these are likely to increase with an increase in the role but will remain for a short period of time. It may be beneficial to investigate restricting parking to one side of Donnolly St north of the school to help vehicle flows to the intersection.

We note that whilst Donnolly St is currently a “No Exit” street there are paper road connections to Wairau Rd and Butlers Lane and should congestion become a significant issue then one of these could be completed to provide another exit route. The paper road to Wairau crosses a very steep sided gulley and is probably impractical to construct, whilst paper road from Hussey St to Butlers Lane is flat and could easily be constructed.

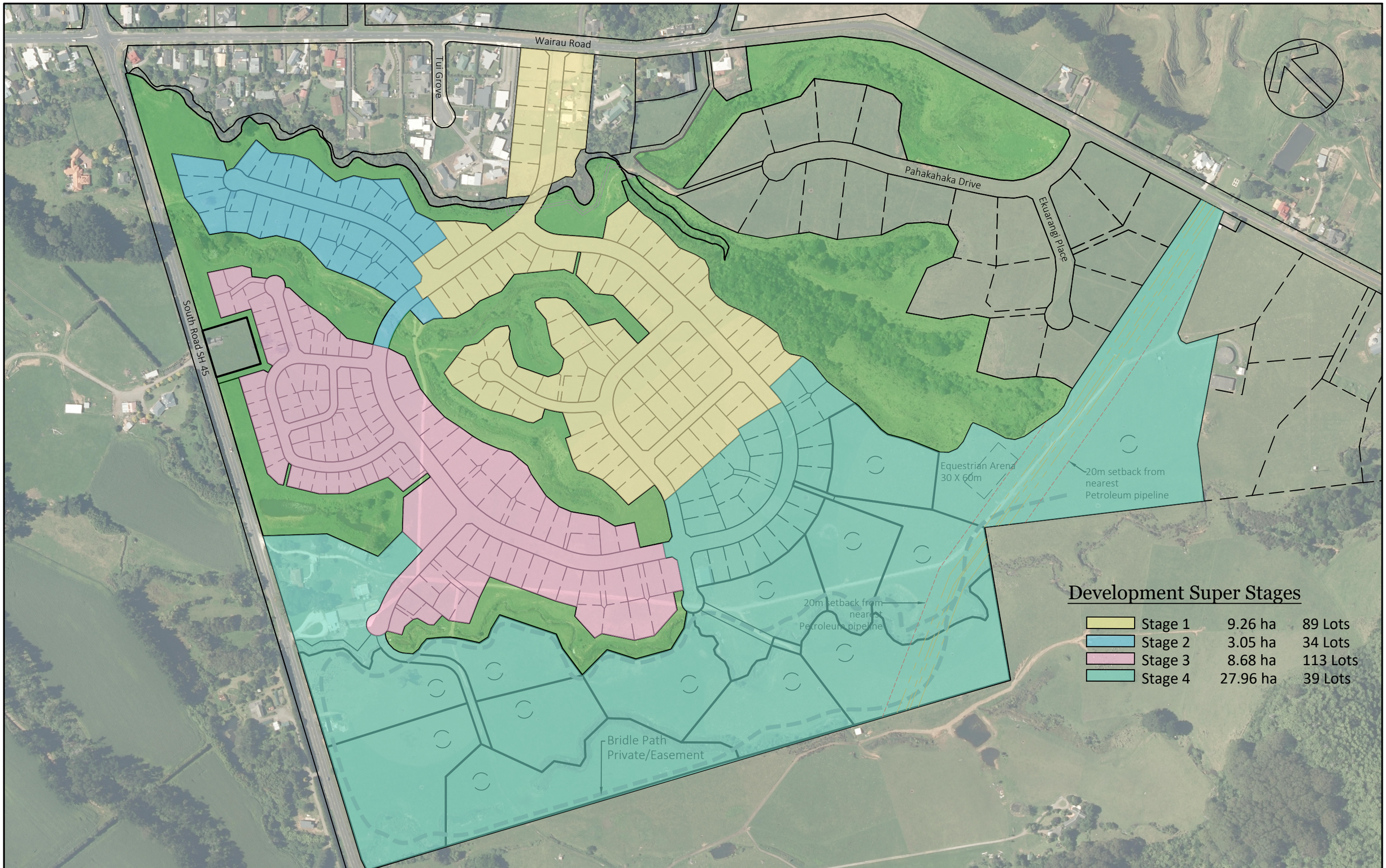
Conclusion

Whilst the proposed re-zoning will likely lead to an increase in roll it is hard to quantify the traffic modelling based on the existing situation indicates the intersection will cater for the potential growth with capacity to spare. Opening the connection to Butlers Lane would provide an alternative access and egress point which would relieve pressure on Donnolly St.

Yours sincerely,

Andrew Skerrett B.Eng
Director

1F. McKinlay Surveyors - SUPER STAGED CONCEPT PLAN - Wairau Estate, Oakura – C-09. Prepared for Oakura Farm Park Limited. 21/01/19.



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TITLE

SUPER STAGED CONCEPT PLAN - Wairau Estate, Oakura

This plan is prepared only for the purpose of obtaining a Resource Consent under the Resource Management Act 1991. It should not be used for any other purpose. Areas and dimensions are approximate and are subject to change on final field survey.

COMPRISED IN: Lot 29 DP 482991	AREA: 66.3389ha	JOB: O-160109
TERRITORIAL AUTHORITY: New Plymouth District Council	DATE: 21/01/19	DRAWING: C-09
PREPARED FOR: Oakura Farm Park Ltd	SCALE: 1:4000 @ A3	SHEET 1 OF 1

1G. McKinlay Surveyors - SUPER STAGED CONCEPT PLAN (Alternative) - Wairau Estate, Oakura – C-10. Prepared for Oakura Farm Park Limited. 21/01/19.

Wairau Road

Tui Grove

South Road SH 45

Pahakahaka Drive

Ekuararigi Place

Equestrian Arena
30 X 60m

20m setback from
nearest
Petroleum pipeline

20m setback from
nearest
Petroleum pipeline

Bridle Path
Private/Easement

Development Super Stages

Stage 1	8.76 ha	110 Lots
Stage 2	3.05 ha	34 Lots
Stage 3	9.26 ha	89 Lots
Stage 4	27.92 ha	44 Lots

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TITLE

SUPER STAGED CONCEPT PLAN (Alternative) - Wairau Estate, Oakura

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TERRITORIAL AUTHORITY New Plymouth District Council	**DATE** 21/01/19	**DRAWING** C-10
PREPARED FOR Oakura Farm Park Ltd	**SCALE** 1:4000 @ A3	**SHEET** 1 **OF** 1

1H. Overlay Rules for to control the staging of development.

Overlay Rules for to control the staging of development

Rule No.	Parameter	Conditions Permitted	Standards and Terms Controlled	Standards and Terms Discretionary	Matters over which control is reserved	Assessment Criteria COUNCIL has restricted the exercise of its discretion to these matters for land use consents
WAIRAU ESTATE STRUCTURE PLAN AREA						
OLXX	development and/or subdivision within the Wairau Estate Oakura Structure Plan (Appendix 32) Stages 1: no timing restrictions. Stage 2: development is restricted until such time as no less than 75% of the lots created on subdivision within Stage 1 have been sold by the subdividing owner with proof of transfer of ownership being evidenced by receipt of notification of the transfer of ownership by the COUNCIL. Stages 3 & 4: subdivision and/or development not to be commenced until such time as the traffic roundabout and pedestrian underpass are installed and operational at the Wairau Road/State Highway 45 intersection.	n/a Stage 1 - n/a Stage 2: 75% of the lots created on subdivision within Stage 1 have been sold by the subdividing owner with proof of transfer of ownership being evidenced by receipt of notification of the transfer of ownership by the COUNCIL. Stages 3 & 4: the traffic roundabout and pedestrian underpass at the Wairau Road/State Highway 45 intersection have been installed to the satisfaction an of the ROAD CONTROLLING	n/a n/a n/a	n/a does not meet the conditions for a permitted activity does not meet the conditions for a permitted activity	n/a n/a n/a	1) The extent of non-compliance with the Wairau Estate Oakura Structure Plan and how this affects the future comprehensive and integrated development and/or subdivision of the structure plan area and environmental outcomes including: - The degree to which the comprehensive and integrated development and/or subdivision of all the land within the Wairau Estate Oakura Structure Plan area can still be achieved where the development of Stage 2 is proposed ahead of less than 75% of the lots within Stage 1 having been sold and transferred into separate ownership; - The degree to which comprehensive and integrated infrastructure provisions are co-ordinated within the Wairau Estate Oakura Structure Plan area. - The degree to which site-specific characteristics of the Wairau Estate Oakura Structure Plan area have been addressed in the design and layout of the development and/or subdivision. 2) Where, due to circumstances beyond the control of the subdividing owner of Stages 3 and 4, the timing of the installation and development of the

		AUTHORITY and are operational.				traffic roundabout and pedestrian underpass has for any reason not been achieved at the time subdivision and development of Stages 3 and/or 4 is proposed: - The effect on the traffic safety and efficiency of the SH45/Wairau Road intersection, and - the necessity for any temporary or permanent roading improvements to the that intersection to achieve levels of traffic safety and efficiency to the satisfaction of the ROAD CONTROLLING AUTHORITY. 3) Financial contributions.
Note: The above sequencing of development applies to either Super Staging Concept Plans as prepared by McKinlay Surveyors – Ref: Job O-160109 Drawings C-09 and C-10 dated 21 January 2019.						

1I. PRIVATE PLAN CHANGE 48 WAIRAU ESTATE - Assessment of SH45 Access. Prepared for Oakura Farm Park by AMTANZ Ltd. 25/03/2019.

PRIVATE PLAN CHANGE 48
WAIRAU ESTATE

25 March 2019

Assessment of SH45 Access

Prepared for Oakura Farm Park by AMTANZ Ltd

Revision History

Revision N°	Prepared By	Description	Date
A	A Skerrett	Review of new access onto SH45	22-3-19
B	A Skerrett	Client comments incorporated	12-4-19

This report was prepared by AMTANZ Ltd solely for Oakura Farm Park Ltd. The scope of work and related responsibilities are defined in the Conditions of Engagement. The material in this report reflects industry standard judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. AMTANZ Ltd accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Document Acceptance

Action	Name	Signed	Date
Prepared by	Andy Skerrett		15-4-19
on behalf of	**AMTANZ Ltd**		

Table of Contents

Appendices:

1. INTRODUCTION.

Oakura Farm Park Ltd have requested Private Plan Change 48 from New Plymouth District Council to rezone land currently zoned as FUD and rural to residential to develop up to 399 lots at Oakura south west of New Plymouth.

The concept presented indicated an access from Wairau Rd to service the lots, with a potential to upgrade the State highway 45 and Wairau Rd intersection to a roundabout. In submissions on the plan change and at pre hearing meetings, it was suggested an alternative access directly onto State highway 45 would be beneficial. This report presents our investigations into a new access and the impacts on the likely traffic generation and their impacts on the Wairau Rd intersection.

2. NEW ACCESS LOCATION.

State highway 45 (South Rd) forms the western boundary of the bulk of the land proposed to be rezoned. For the purposes of this report we refer to the highway running north to south although in reality it runs more north east to south west. In this area the highway is a straight with a bend to the southern end and falls from the south to the north and has two small sag curves where culverts pass streams under the highway marked 1 and 2 on the aerial photograph below:

The location circled in red was selected as the new access as it meets the requirements of Austroads in terms of sight distance and provides a good link to the balance of the land under consideration.

State highway 45 consists of two sealed traffic lanes of 3.5m, there are sealed shoulders to each lane that vary in width but are typically 0.3m in width. Outside this there are grassed berms falling to water tables. There are three culverts passing under the highway two of which occur at the sag curves and the third taking the overflow from the pond immediately to the north of the proposed access location.

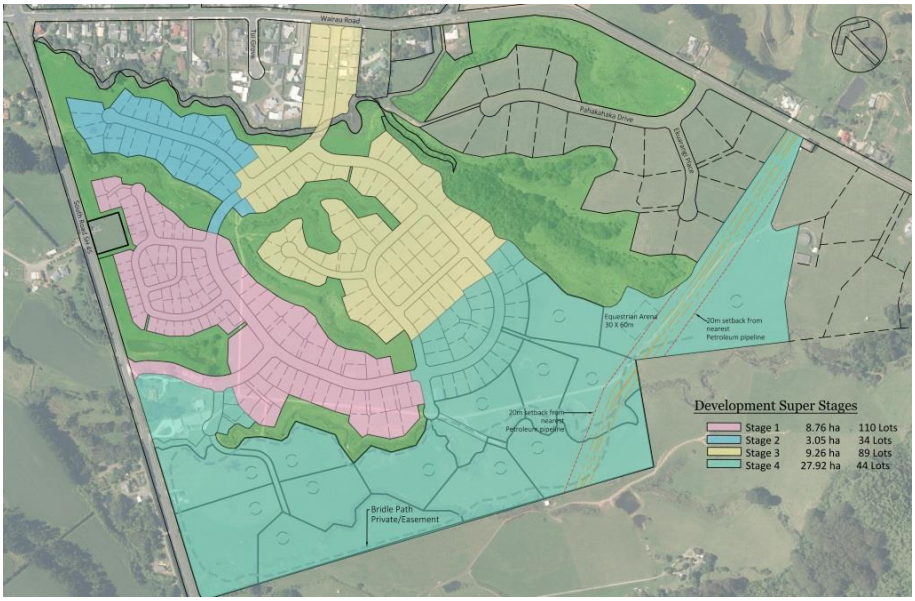
The sight distance to the south is limited by a left hand bend and has been measured at approximately 410m, a short sag curve occurs some 120m to the south of the intersection where a stream is culverted under the highway, as shown in the following photograph:

Whilst the road surface disappears past the crest curve following the culvert, vehicles remain visible for the full sight distance as demonstrated in the following photograph:

To the north a similar situation exists, with a crest curve at around 238m, but vehicles remain visible beyond this back to the Wairau Rd intersection as shown in the following photographs:

3. TRAFFIC VOLUMES.

The initial traffic impact assessment (TIA) was based on the maximum theoretical yield for the area at 399 lots. During the pre-hearing meetings a staging plan was tabled with a yield of 277 lots which was considered to be a more likely yield given the topography of the site as shown below.



In order to determine which access route traffic would utilise, the distance to the Wairau Rd intersection with SH45 was calculated for each lot via Upper Wairau Rd or the SH45 access. The result of this analysis indicated 65% of lots had a shorter route to the Wairau Rd intersection via Upper Wairau Rd. Given the number of intersections and longer potential delays to negotiate on the routes via Upper Wairau Rd the split was adjusted to 60:40 Upper Wairau Rd / SH45 access. To remain consistent with the TIA this split was then applied to the original 399 lots.

Traffic generation was treated in a similar manner to the original TIA with rates of 8.5 trips/lot/day, based on the rate calculated from the counts on Upper Wairau Rd, and the 10.4 trips/lot/day in the NZTA planning guide. Turning volumes match that recorded during the surveys. Below is the morning peak hour turning movements based on 8.5 trips/lot (see Appendix A).

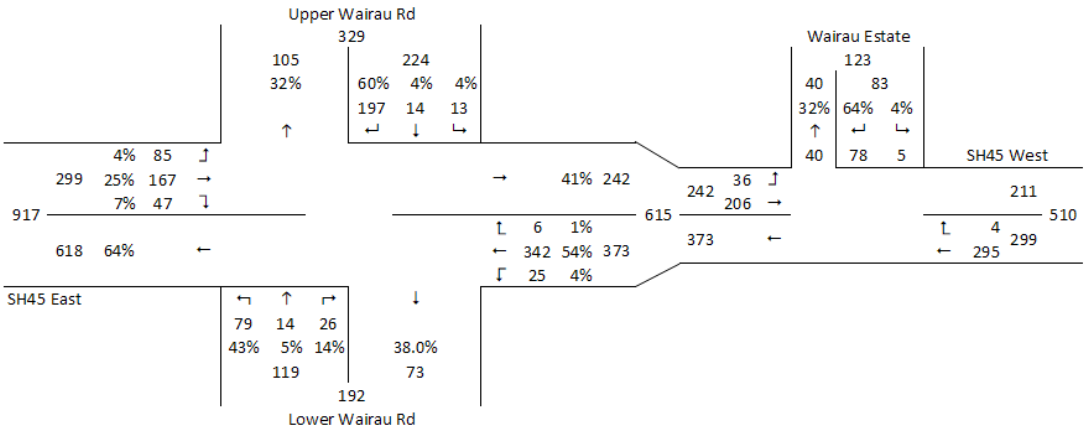


FIGURE 1 - A.M. PEAK HOUR MOVEMNTS @ 8.5 TRIPS/LOT

These turning movements were then used to model the Wairau Rd / State highway 45 intersection in Sidra 8 an industry standard lane based traffic modelling software.

The modelling indicates that the Wairau Rd intersection performs well with the crossing and right turning movements from Wairau Rd (both upper and lower) currently performing at Level of Service B. With the generation rate of 8.5 trips/lot the right turn out of Upper Wairau Rd drops to a LOS C with an increase average delay of 4.1 seconds to 16.2 seconds and the performance of that leg drops to LOS C with an increase in average delay for all movements of 3.8 seconds to 15.7 seconds. All other movements remain at LOS A or B.

With a trip generation rate of 10.4 trips / lot the performance of Upper Wairau Rd drops to LOS C for both the right turn out and straight through movements. The average delay for the right turn out increases by 5.7 seconds from the base case to 17.8 seconds. The straight through movement average delay increases by 5 seconds to 15.3 seconds, the performance of the leg drops from LOS B to C with an average delay of 17.2 seconds. All other movements remain at LOS A or B (see Appendix B for details).

4. DISCUSSION

The new access on State highway 45 would meet the requirements of Austroads in terms of design, the culvert to the west of the access which takes the form of a concrete box needs to be extended to cater for the widening of the shoulder in this vicinity. The intersection is shown in the concept drawings with a right turn bay (Appendix C), which whilst not necessary to cater for the right turning traffic is deemed necessary to assist the predominant right turn out manoeuver.

Whilst the new intersection meets the requirements for a 100kph road it may be prudent for the road controlling authority to consider implementing an 80kph limit from just west of the intersection. This will reduce the speed of vehicles entering the Wairau Rd intersection and the township of Oakura addressing one of the purposes of the proposed roundabout.

The location of the new access has been chosen so that should the Oakura FUD Area West, north of the highway, be developed a simpler access can be achieved at the same location, lending itself to the installation of a roundabout at that time if necessary.

The second access also has other benefits as it improves circulation around the sub division reducing the overall km travelled. It provides better access to the equestrian blocks on the western boundary of the plan change area thus reducing the need for horse trucks and floats to go through the residential areas. It improves access for emergency response services who typically don't like dead end roads as it decreases their access options.

NZTA are concerned that intersections are where the majority of crashes occur and by introducing a new intersection provides an opportunity for crashes to occur. However, we believe that if an intersection is designed to meet the current standards and follows NZTA's safety in design and safety audit procedures then the potential risk is acceptable. The risk can be lowered still further if the speed limited was reduced to 80kph.

With the change in traffic flows a roundabout is now not necessary at the Wairau Rd intersection to cater for the maximum potential 399 lots and will perform better still if the concept plan with 277 lots is the final development.

In the original concept the traffic volume from the plan change area exceeded that on Wairau Rd and it was proposed to change the priority of the intersection to the new road. With the SH45 intersection the traffic flows are more balanced and consideration should be given to keeping the priority to Wairau Rd and installing a right turn bay into the plan change area.

5. CONCLUSION

The access onto State highway 45 has some positive effects as listed below;

- it addresses some of the submitters concerns around traffic volumes on Wairau Rd,
- it removes the concerns regarding the roundabout,
    - in terms of the impacts on heavy commercial vehicles,
    - neighbouring properties,
- it provides better access for emergency services,
- it reduces the overall travel distances , and
- provides easier access to the equestrian lots.

Removing the roundabout at Wairau Rd will not address NZTA's concerns regarding the speed of traffic entering Oakura, the implementation of an 80kph zone on the approach to Wairau Rd will go some way to achieving this. NZTA are also concerned about introducing a new potential conflict point on the highway. However, this risk can be minimised through the design process and by implementing an 80kph speed limit.

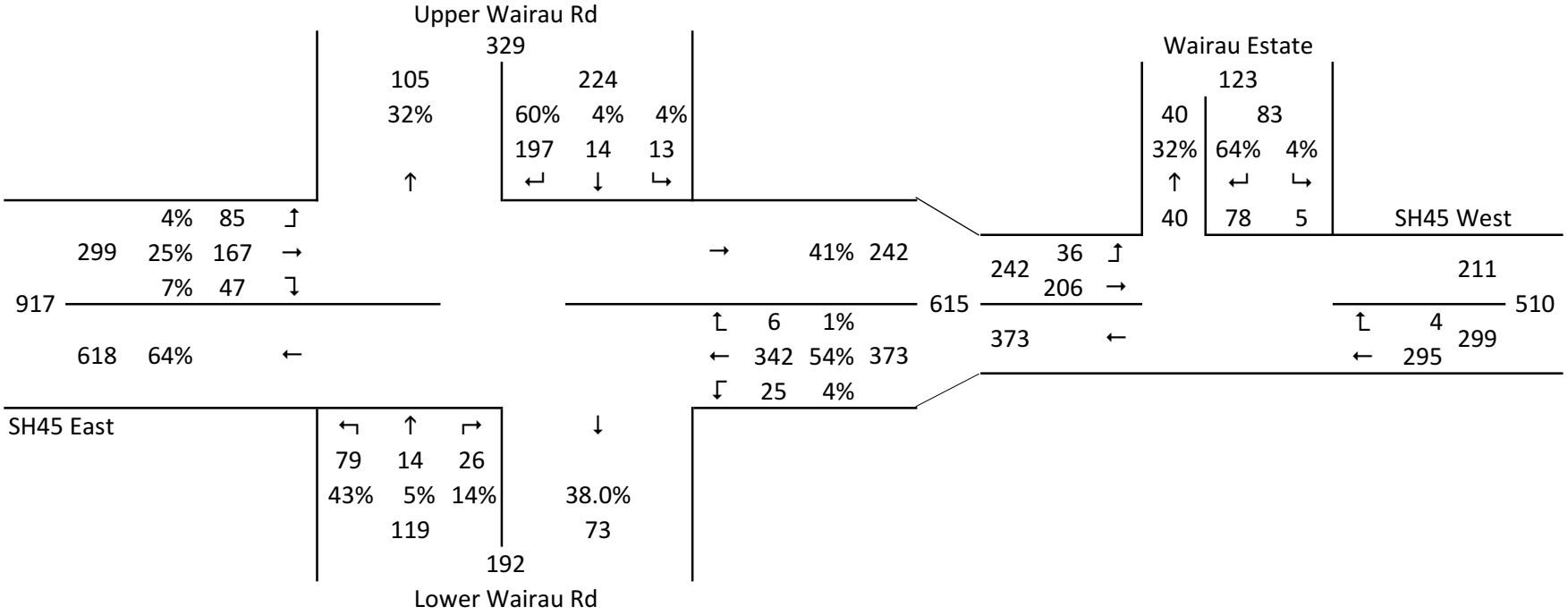
Overall we believe the benefits of implementing the second access outweigh the dis-benefits to the local road network.

Appendix A

Traffic Volumes

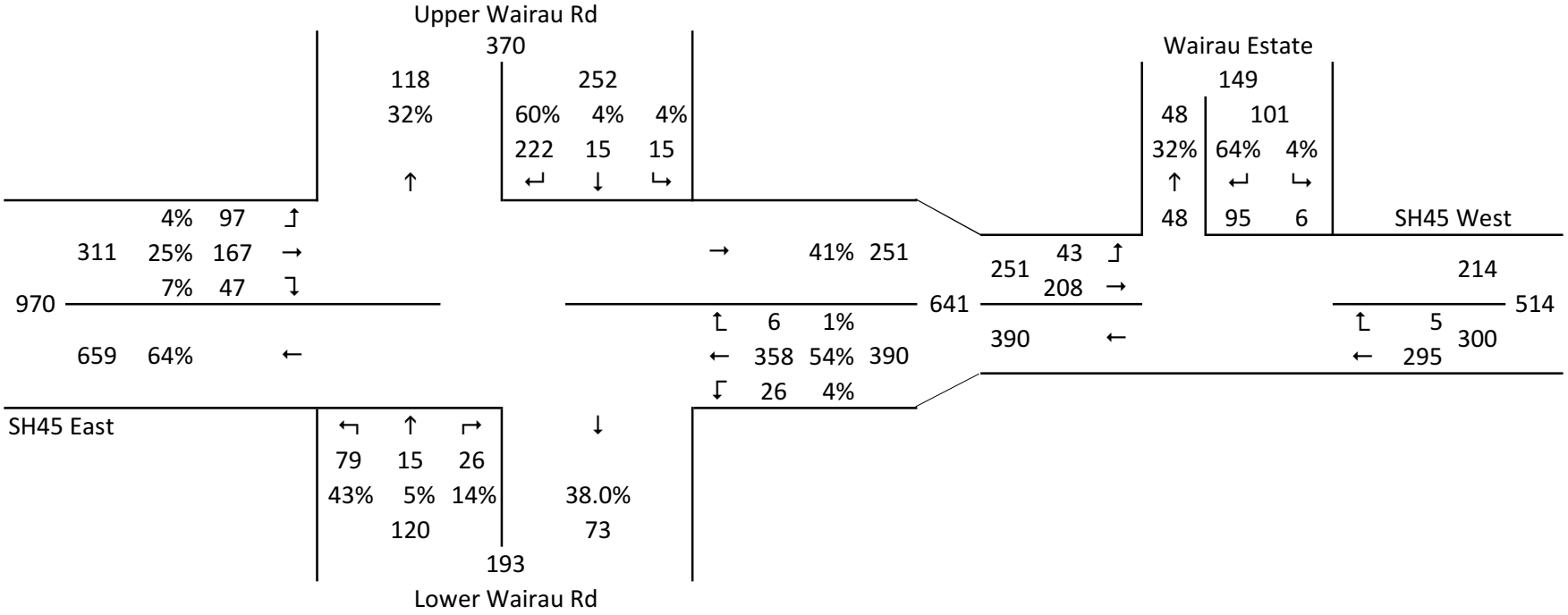
	Base	Growth	Add dev.	10 Yr Vol	am peak
Upper Wairau Rd	1150	115	355	1620	146
SH45 East	6250	1188	0	7438	669
Lower Wairau Rd	1850	185	0	2035	183
SH45 West	4600	874	0	5474	493

Wairau Estate		
Lots	399	
Trips/lot	8.5	
Daily traffic	3392	
AM peak	9%	
Pk hr	305	
Split 40:60		AM
SH45 access	1357	122
Wairau Rd	2035	183



	Base	Growth	Add dev.	10 Yr Vol	AM peak
Upper Wairau Rd	1150	115	355	1620	146
SH45 East	6250	1188	0	7438	669
Lower Wairau Rd	1850	185	0	2035	183
SH45 West	4600	874	0	5474	493

Wairau Estate		
Lots	399	
Trips/lot	10.4	
Daily traffic	4150	
AM peak	9%	
Pk hr	373	
Split 40:60		
SH45 access	1660	149
Wairau Rd	2490	224



Appendix B

SIDRA Anaylsis

MOVEMENT SUMMARY

Site: 101 [SH45 Access No dev]

Existing + 10 years growth on all legs
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Upper Wairau Rd												
1	L2	6	16.7	0.200	9.0	LOS A	0.6	4.6	0.53	1.00	0.53	43.0
2	T1	5	0.0	0.200	10.3	LOS B	0.6	4.6	0.53	1.00	0.53	43.0
3	R2	93	2.3	0.200	12.1	LOS B	0.6	4.6	0.53	1.00	0.53	41.5
Approach		104	3.0	0.200	11.9	LOS B	0.6	4.6	0.53	1.00	0.53	41.7
East: SH45 East												
4	L2	36	2.9	0.155	5.4	LOS A	0.5	3.5	0.21	0.17	0.21	47.3
5	T1	176	13.8	0.155	0.4	LOS A	0.5	3.5	0.21	0.17	0.21	48.0
6	R2	49	0.0	0.155	5.7	LOS A	0.5	3.5	0.21	0.17	0.21	47.0
Approach		261	9.7	0.155	2.1	NA	0.5	3.5	0.21	0.17	0.21	47.7
North: Lower Wairau Rd												
7	L2	83	1.3	0.147	8.9	LOS A	0.6	4.0	0.45	0.92	0.45	43.0
8	T1	8	0.0	0.147	11.5	LOS B	0.6	4.0	0.45	0.92	0.45	44.0
9	R2	27	0.0	0.147	12.1	LOS B	0.6	4.0	0.45	0.92	0.45	43.9
Approach		119	0.9	0.147	9.8	LOS A	0.6	4.0	0.45	0.92	0.45	43.3
West: SH45 West												
10	L2	5	0.0	0.165	5.3	LOS A	0.2	1.4	0.06	0.05	0.06	49.1
11	T1	284	2.6	0.165	0.1	LOS A	0.2	1.4	0.06	0.05	0.06	49.4
12	R2	21	5.0	0.165	5.5	LOS A	0.2	1.4	0.06	0.05	0.06	48.5
Approach		311	2.7	0.165	0.5	NA	0.2	1.4	0.06	0.05	0.06	49.4
All Vehicles		795	4.8	0.200	3.9	NA	0.6	4.6	0.23	0.34	0.23	46.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH45 Access @8.5/lot Max lots]

Existing + 10 years growth on all legs + SH45 Access for 399 lots @ 8.5 trips/lot
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Upper Wairau Rd												
1	L2	14	7.7	0.505	10.5	LOS B	2.4	17.0	0.68	1.11	1.04	41.3
2	T1	15	0.0	0.505	13.9	LOS B	2.4	17.0	0.68	1.11	1.04	41.2
3	R2	207	1.0	0.505	16.2	LOS C	2.4	17.0	0.68	1.11	1.04	39.5
Approach		236	1.3	0.505	15.7	LOS C	2.4	17.0	0.68	1.11	1.04	39.7
East: SH45 East												
4	L2	89	1.2	0.189	5.4	LOS A	0.6	4.3	0.23	0.22	0.23	46.9
5	T1	176	13.8	0.189	0.5	LOS A	0.6	4.3	0.23	0.22	0.23	47.5
6	R2	49	0.0	0.189	6.3	LOS A	0.6	4.3	0.23	0.22	0.23	46.5
Approach		315	8.0	0.189	2.8	NA	0.6	4.3	0.23	0.22	0.23	47.2
North: Lower Wairau Rd												
7	L2	83	1.3	0.177	9.4	LOS A	0.7	4.8	0.51	0.94	0.51	42.5
8	T1	15	0.0	0.177	13.1	LOS B	0.7	4.8	0.51	0.94	0.51	43.6
9	R2	27	0.0	0.177	13.5	LOS B	0.7	4.8	0.51	0.94	0.51	43.5
Approach		125	0.8	0.177	10.7	LOS B	0.7	4.8	0.51	0.94	0.51	42.9
West: SH45 West												
10	L2	26	0.0	0.205	4.9	LOS A	0.1	0.6	0.02	0.04	0.02	49.2
11	T1	360	2.0	0.205	0.0	LOS A	0.1	0.6	0.02	0.04	0.02	49.6
12	R2	6	16.7	0.205	6.1	LOS A	0.1	0.6	0.02	0.04	0.02	48.2
Approach		393	2.1	0.205	0.5	NA	0.1	0.6	0.02	0.04	0.02	49.5
All Vehicles		1068	3.5	0.505	5.7	NA	2.4	17.0	0.29	0.44	0.37	45.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH45 Access @10.4/lot Max lots]

Existing + 10 years growth on all legs + SH45 access for 399 lots @ 10.4 trips/lot
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Upper Wairau Rd												
1	L2	16	6.7	0.586	11.3	LOS B	3.1	21.7	0.72	1.16	1.22	40.7
2	T1	16	0.0	0.586	15.3	LOS C	3.1	21.7	0.72	1.16	1.22	40.6
3	R2	234	0.9	0.586	17.8	LOS C	3.1	21.7	0.72	1.16	1.22	38.7
Approach		265	1.2	0.586	17.2	LOS C	3.1	21.7	0.72	1.16	1.22	39.0
East: SH45 East												
4	L2	102	1.0	0.196	5.4	LOS A	0.6	4.5	0.24	0.22	0.24	46.8
5	T1	176	13.8	0.196	0.6	LOS A	0.6	4.5	0.24	0.22	0.24	47.4
6	R2	49	0.0	0.196	6.4	LOS A	0.6	4.5	0.24	0.22	0.24	46.5
Approach		327	7.7	0.196	2.9	NA	0.6	4.5	0.24	0.22	0.24	47.1
North: Lower Wairau Rd												
7	L2	83	1.3	0.185	9.5	LOS A	0.7	5.0	0.53	0.94	0.53	42.4
8	T1	16	0.0	0.185	13.6	LOS B	0.7	5.0	0.53	0.94	0.53	43.5
9	R2	27	0.0	0.185	13.8	LOS B	0.7	5.0	0.53	0.94	0.53	43.4
Approach		126	0.8	0.185	10.9	LOS B	0.7	5.0	0.53	0.94	0.53	42.8
West: SH45 West												
10	L2	27	0.0	0.214	4.9	LOS A	0.1	0.7	0.02	0.04	0.02	49.2
11	T1	377	2.0	0.214	0.0	LOS A	0.1	0.7	0.02	0.04	0.02	49.6
12	R2	6	16.7	0.214	6.2	LOS A	0.1	0.7	0.02	0.04	0.02	48.2
Approach		411	2.1	0.214	0.5	NA	0.1	0.7	0.02	0.04	0.02	49.5
All Vehicles		1129	3.4	0.586	6.3	NA	3.1	21.7	0.31	0.46	0.42	45.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix C

Drawings

PROJECT: Wairau Estate

TITLE: SH45 Access Overall View

DRAWING NO: 16-01-SK2

SCALE AT A3: NTS

REVISION. B

DATE. 23-01-19

AMTANZ Ltd

PROJECT: Wairau Estate

TITLE: SH45 Access Detailed View

DRAWING NO: 16-01-SK3

SCALE AT A3: NTS

REVISION. B

DATE. 23-01-19

AMTANZ Ltd

1J. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Plan – C-01- Sheet 1. Prepared for Oakura Farm Park Limited. 07/09/17.

0	07/09/17	ALD	Issued for comment	
NO	DATE	BY	REVISION	

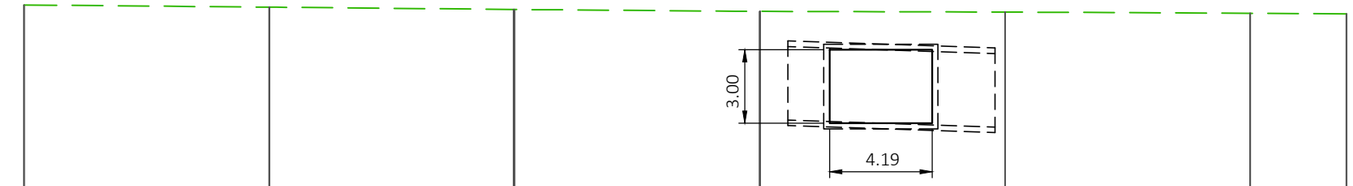
McKinlay SURVEYORS
1 Young Street, PO Box 116
New Plymouth 4340
New Plymouth 06-758-5342
Hawera 06-278-4456
mckinlaysurveyors.co.nz

TITLE
PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY
Plan

PREPARED FOR
Wairau Estate - Oakura Farmpark Limited

APPROVED: ALD	JOB: O-160109
DATE: 07/09/17	DRAWING: C-01
SCALE: 1:250 @ A3	SHEET: 1 OF 3

1K. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Profile and Section – C-01- Sheet 2. Prepared for Oakura Farm Park Limited. 07/09/17.



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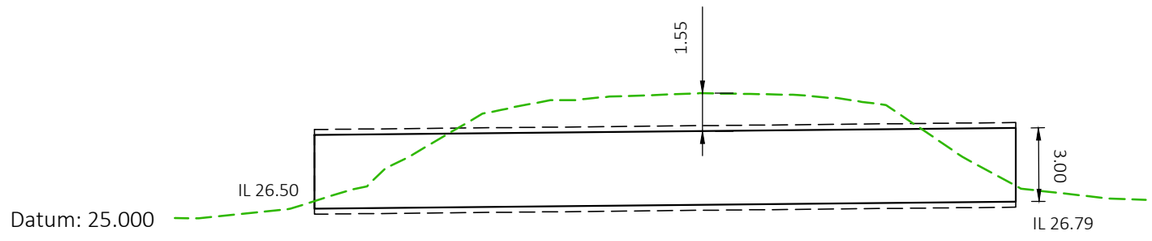
EXISTING LEVELS	31.39	31.30	31.22	31.19	31.14	
CHAINAGE	10.00	20.00	30.00	40.00	50.00	

SH 45 SOUTH ROAD LONG SECTION



EXISTING LEVELS	26.12	26.11	26.50	27.41	28.14	28.59	30.37	30.62	30.92	30.98	31.07	31.13	31.20	31.17	31.14	31.02	30.85	30.72	28.61	27.31	26.92	26.86
OFFSETS	-20.49	-19.57	-15.99	-13.01	-12.31	-11.41	-8.51	-7.35	-5.86	-4.46	-3.56	-1.93	0.00	1.93	3.58	4.86	6.27	7.21	10.19	12.47	15.84	17.33

Chainage 35

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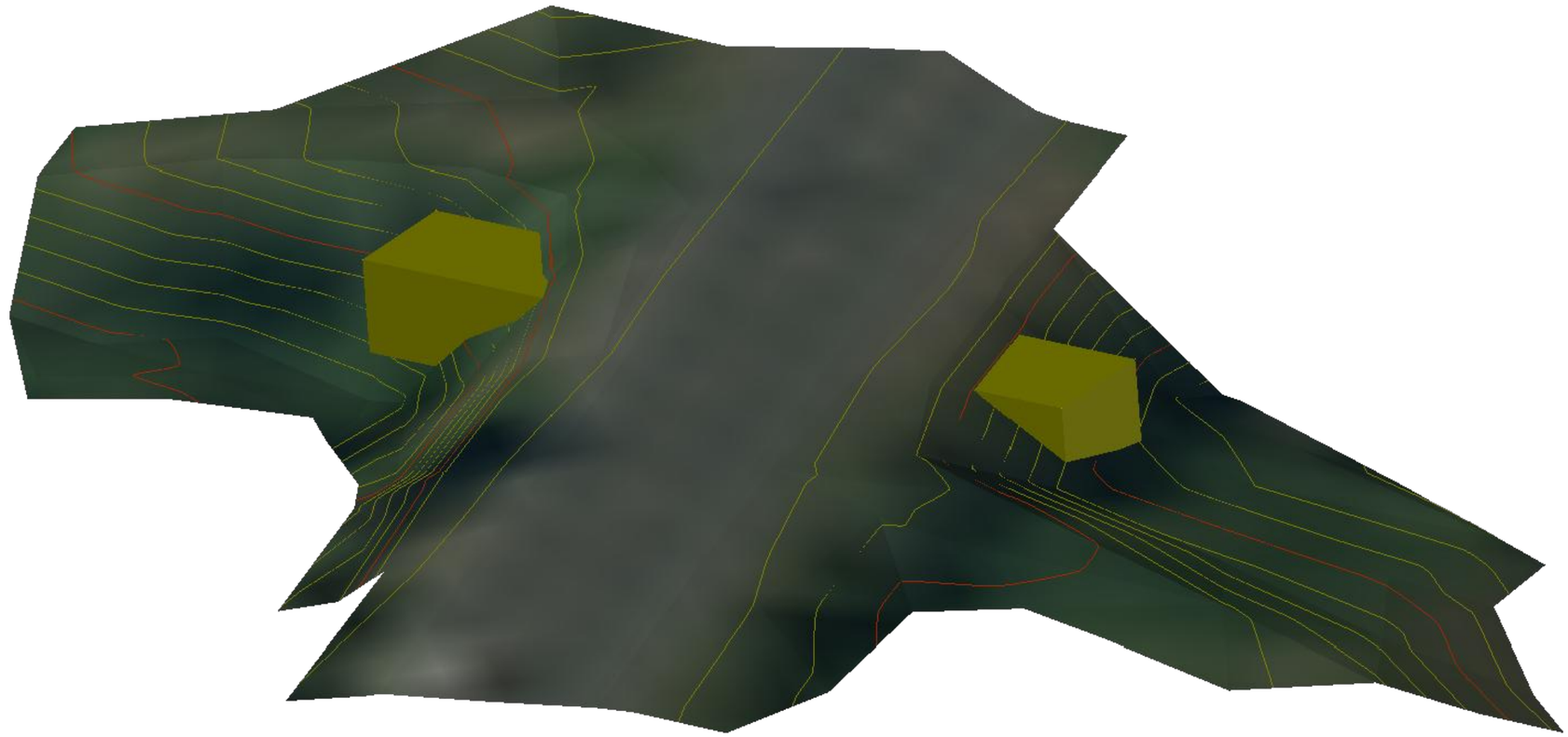
0	07/09/17	ALD	Issued for comment

TITLE: PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Profile and Section		APPROVED: ALD	JOB: O-160109
		DATE: 07/09/17	DRAWING: C-01
PREPARED FOR: Wairau Estate - Oakura Farmpark Limited		SCALE: 1:250 @ A3	SHEET: 2 OF: 3

1L. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Graphic – C-01- Sheet 3. Prepared for Oakura Farm Park Limited. 07/09/17.



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0	07/09/17	ALD	Issued for comment

TITLE
PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY
Graphic

PREPARED FOR
Wairau Estate - Oakura Farmpark Limited

APPROVED ALD	**JOB** O-160109
DATE 07/09/17	**DRAWING** C-01
SCALE	**SHEET** 3 **OF** 3

1M. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Plan – C-01- Sheet 1 marked. Prepared for Oakura Farm Park Limited. 07/09/17.

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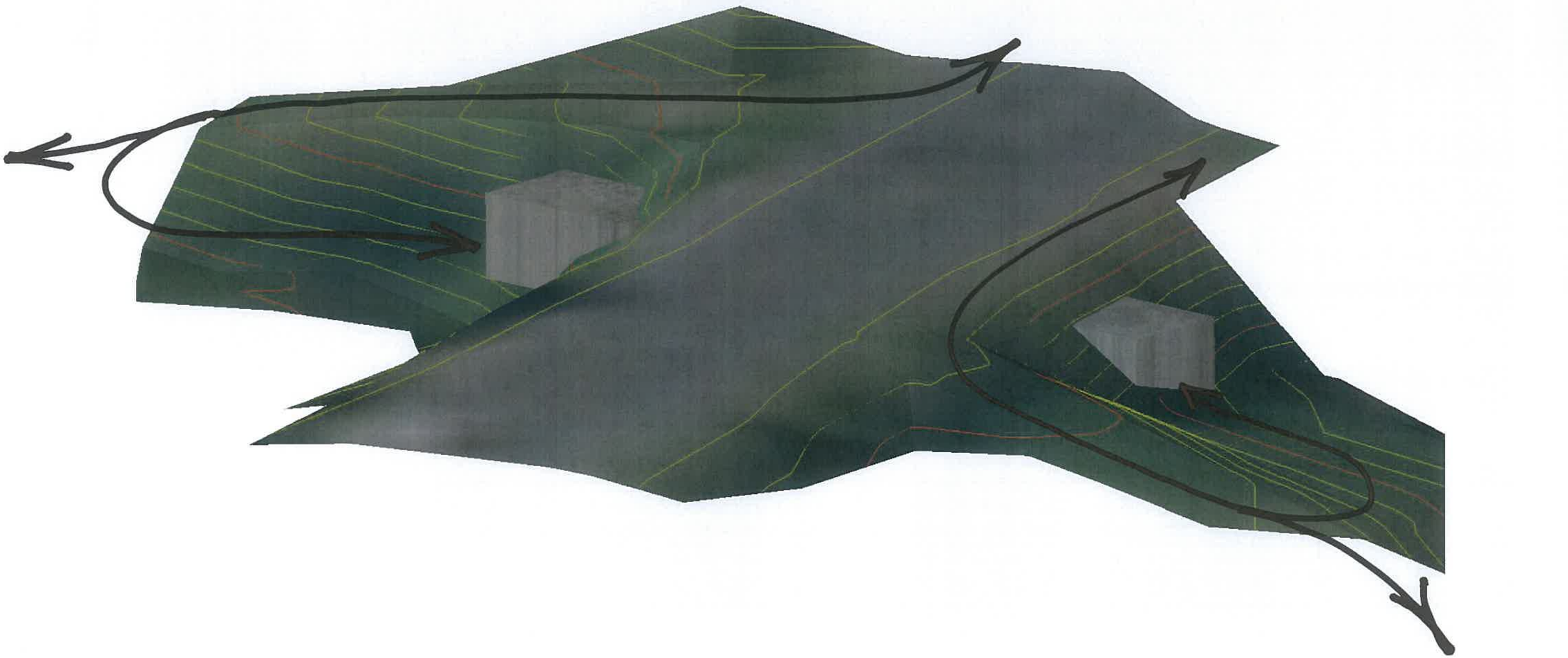
TITLE
PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY
Plan

PREPARED FOR
Wairau Estate - Oakura Farmpark Limited

APPROVED	ALD
JOB	O-160109
DATE	07/09/17
DRAWING	C-01
SCALE	1:250 @ A3
SHEET OF	1 3

1N. McKinlay Surveyors - PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY Graphic – C-01- Sheet 3 marked. Prepared for Oakura Farm Park Limited. 07/09/17.



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NO	DATE	BY	REVISION
0	07/09/17	ALD	Issued for comment

TITLE
PROPOSED SH 45 PEDESTRIAN UNDERPASS FEASIBILITY
Graphic

PREPARED FOR
Wairau Estate - Oakura Farmpark Limited

APPROVED	ALD
DATE	07/09/17
SCALE	
JOB	O-160109
DRAWING	C-01
SHEET OF	3 3

1O. Assessment of Private Plan Change Request Wairau Estate, Oakura Rezoning (Ref: NPDC PLC18/00048) against the provisions of Taiao, Taiora Environmental Management Plan for the Taranaki Iwi Rohe. Colin Comber. 24/03/2019.

Assessment of Private Plan Change Request

Wairau Estate, Oakura Rezoning (Ref: NPDC PLC18/00048)

against the provisions of

Taiao, Taiora

Environmental Management Plan for the Taranaki Iwi Rohe

1. Introduction

Oakura Farm Park Limited (OFPL) has proposed a Private Plan Change Request for land it owns at Wairau Road and SH45, Oakura. The proposal is for the rezoning of approx. 64ha of rural land for urban and rural lifestyle use.

The rezoning Request was formally lodged with the New Plymouth District Council in March 2018 and was publicly notified in June 2018 as a proposed change to the operative New Plymouth District Plan.

The Council has received submissions to the proposal including submissions from Ngati Tairi Hapu (Sub.111) and Te Kahui o Taranaki Iwi (Sub. 134).

The Request is to heard later in 2019 before an independent Hearing Commission appointed by the Council.

The applicant has been in consultation about the proposal with the Ngati Tairi Hapu since early 2016. A Memorandum of Understanding was entered in to between the OFPL and the hapu in October 2018. A copy is **attached.**

More recently OFPL, together with the Iwi and Hapu, participated in a pre-hearing meeting convened and facilitated by the Council, to consider the issues raised in Iwi and Hapu submissions.

One of the actions agreed from the pre-hearing meeting was for OFPL to prepare an assessment of the Request against the relevant provisions of *Taiao, Taiora*, *Environmental Management Plan for the Taranaki iwi Rohe.*

All documents relating to this matter, including the Request, Council reports, the Proposed Plan Change, submissions and further submissions can be accessed on the Council's website at http://www.newplymouthnz.com/Council/Council-Documents/Plans-and-Strategies/District-Plan/Operative-District-Plan/Plan-Changes-and-Private-Plan-Changes

Colin Comber MNZPI
24 March 2019

2. Statutory Acknowledgments

Appendix 2 of *Taiao, Taiora* sets out the Statutory Acknowledgment matters specific to Taranaki Iwi.

For the avoidance of doubt there are no statutory acknowledgment areas touching on the proposal.

3. Assessment

The following table identifies, with reference to the provisions of *Taiao, Taiora,* the relevant issues, objectives and policies against which the Request has been assessed.

Issue Area 11.2	
Papatuanuku	
	11.2.1 Summary of Relevant Issues
	6. Loss of wetlands and habitat; 9. Subdivision design and development; 12. Consideration of cultural values
11.2.2 Relevant Objectives	**11.2.3 Relevant Policies**
1. The mouri of Papatūānuku in the Taranaki Iwi rohe will be protected, cared for and restored; 2. Papaptūānuku will be lush, healthy and sustaining for all. Her native forest cover will be thriving and free of pests; 3. Wetlands and the surrounding lands of rivers will be restored with a natural diversity of ngāi tipu me ngāi kīrehe; Wetlands will be restored and expanded;	3. Whenua owned by Taranaki Iwi will be, where possible, actively managed to enhance its environmental value, including (but not limited to) the following: i. Fencing and planting native species for waterbodies; ii. Retiring areas of land being subjected to serious erosion and return it to areas of native vegetation; iii Pest control to prioritise invasive pest species having a serious negative impact on the whenua, reducing to levels where endemic ecosystems become resilient and re-established in our rohe; iv. Restoring and re-establishing wetland environments with resilient habitats where they have previously been degraded, destroyed or removed; v. Minimising unnecessary soil disturbance so that soil quality is maintained and any soil erosion into waterbodies is restricted; vi. All existing forest remnants are protected from browsing animals, other pests and built development with active management and plans for enhancement and extension of these remnants where possible;

	vii Land management techniques which reduce the impacts of that particular landuse on the environment; 4. Where possible, Taranaki Iwi will advocate that other landowners in the rohe manage their land as per Policy 11.2.3.3; (as above) 11. New urban development will be designed in a manner which reflects the environmental and cultural values of the site, including: i. Protecting sensitive areas; ii. The creation of wetlands on land-based systems for stormwater management; iii. In consultation with tangata whenua, incorporating the cultural values and histories into the names and design of the development; iv. Ensuring that the development does not result in increased levels of pests and predation in the area, including the consideration for excluding cats and other domestic pets with the potential for harm; v. Utilising low impact design techniques; vi. Creating walkable settlements that have provision for bikes and public transport; vii. Ensuring that if earth is brought into a site that it is free of weeds and other pests; viii. The design and density of the development will reflect and respect the natural landforms and natural processes of the site. 12. Any landscape assessments undertaken will consider the underlying cultural values as an important and inseparable element of that landscape;
Assessment	
The topography of the site is essentially flat but rises west to east more or less evenly as an inclined plane away from the State Highway. The site is predominantly in pasture and features several shallow gullies and streams (being tributaries of the Wairau Stream system) vegetated with a mix of indigenous and exotic trees, shrubs, flaxes and wetland plants[1]. The gully system runs generally east to west toward the State Highway. These natural features have been interrupted by the long-established arterial state highway formation and carry beyond the State Highway	

[1] Request for Private Plan Change – pg. 81 - Appx 7; Ecological Assessment – Para 4.1

(SH45) to the west and typically terminate at the coastal edge. This 'easy' topography means that the site will be able to be developed with minimal 'cut and fill' earthworks.[2]

Given the easy contour and orientation of the site for residential purposes it is proposed that development of the property will be undertaken with minimal soil disturbance. The gullies will be reserved from development and utilised for stormwater disposal from the local roads along with conservation and enhanced with supplementary planting of the natural vegetation. Stormwater detention ponds will be created within the gully system to ensure hydraulic neutrality within the development site is achieved.[3]

It is intended these natural areas, which will comprise some 15 percent of the site area (approx. 9ha)[4] will be fenced to exclude people and dogs etc from the natural wetland areas and to direct them to utilise the adjoining planned pedestrian and cycle network of pathways.[5]

While the Landscape and Visual Impact Assessment[6] (LVIA) has not specifically referenced any underlying cultural values of the Wairau Estate landscape, these values have been considered and taken into account in the proposed development through a combination of considerations, including the landscape and visual impact assessment.

The LVIA considers the proposed development will have little influence on the wider landscape about Wairau Estate and that any landscape effects will be limited predominantly to the site itself.[7] Rules included in the Proposed Plan Change include limiting building heights (maximum of 6m) and specified maximum reflectivity values for exterior claddings are designed to limit visual effects to no more than minor.[7]

The unnamed pa site (Ref: NZAA P19/340) adjoining the eastern edge of the structure plan area is located within a TRC Key Native Ecosystem (KNE) area. This area of approx. 10ha is also subject to a QEII covenant area, known as the McKie QEII covenant area (i.e. protected from development in perpetuity), and is outside the area of the proposed development and will be unaffected by the proposal.

[2] Request for Private Plan Change – pg. 15; Para 2.2.5
[3] Request for Private Plan Change – pg. 82 - Appx 8 Civil Engineering Assessment; Appx 4 – Stormwater Calculations
[4] Request for Private Plan Change – pg. 109 – Appendix 11.2.1 Wairau Estate Oakura Structure Plan – Yield Analysis
[5] Request for Private Plan Change – pg. 108 – Appendix 11.2. Wairau Estate Oakura Structure Plan
[6] Request for Private Plan Change – pg. 79 - Appx 5 Landscape and Visual Impact Assessment
[7] Request for Private Plan Change – pg. 79 - Appx 5 Landscape and Visual Impact Assessment pgs. 14 & 18

An extended process of consultation with Hapu[8] together with the Archaeological Assessment[9] was undertaken from the early planning stages of the project. This latter Assessment, taken together with mana whenua knowledge of the site, has established there are no known archaeological sites or Waahi Taonga/Sites of Significance to Maori within the area proposed for rezoning. Adopting a precautionary approach, and as recommended by archaeologist Ivan Bruce, the applicant will be undertaking all earthworks within the development area pursuant to a general authority to be obtained from Heritage New Zealand under the Heritage New Zealand Pouhere Taonga Act 2014. The attached Memorandum of Understanding between the Ngati Tairi Hapu and OFPL provides for, among other things, the Hapu to have naming rights of the primary street through the development and a stone carving to be erected in the locality that signifies the mana whenua of the Hapu in the area. In summary, the proposed development will be consistent with the majority of the policies within the *Papatuanuku* section of *Taiao, Taiora* which in turn will support the aspirations of Taranaki Iwi and the Ngati Tairi Hapu consistent with achieving the associated objectives.

Issue Area 11.3	
Ranginui raua ko Tawhirimatea	
	Relevance
	No discharges of contaminants to air are proposed. The intended disestablishment of dairy farming on the OFKL land will be positive for air quality and climate change.

Issue Area 11.4	
Tangaroa-ki-Tai	
	Relevance
	The proposed Wairau Estate is remote from the coastal environment and no direct or indirect adverse effects on Nga Tai a Kupe or Tangaroa-ki-Tai are anticipated.

[8] Request for Private Plan Change – pg. 78 - Appx 4 Record of Consultation
[9] Request for Private Plan Change – pg. 80 - Appx 6 Archaeological Assessment

Issue Area 11.5	
Tangaroa-ki-Uta	
	11.5.1 Summary of Relevant Issues
	1.Discharge of contaminants to waterbodies; 2.Removal, alteration of waterbodies through development; 5.Loss of access to and along water bodies; 8. Draining of wet lands.
11.5.2 Relevant Objectives	**11.5.3 Relevant Policies**
1. The mouri of Wai Māori in the Taranaki Iwi rohe will be protected, cared for and restored; 3.The relationship of Taranaki Iwi, hapū, marae/pā and whānau with wai is respected, enhanced and supported; 5.There will be no discharges (either point source or non-point source) that may adversely impact on water quality by 2040; 6. Stormwater is captured and treated, and where possible utilised as a resource. When released to streams, it is released in a manner aligned with natural flow regimes (i.e. in a manner that avoids excessive peaks) so that it avoids damage to ecosystems and increased erosion; 7.Waterways and wetlands are identified, and management responses, including exclusion of stock and planting of riparian margins, appropriate to the topography, vulnerability and environmental value of those water ways and wetlands, are put in place; 10.Fish passage and habitat in our waterbodies is not unnaturally constrained. Modified	1. Taranaki Iwi will seek strong and enforceable measures to achieve the environmental and cultural outcomes identified in its objectives. 2. Local and Central government will: a. include and provide for Taranaki Iwi cultural values in decision making around freshwater management; b. recognise and provide for the interconnectedness of wai, from the mountains to the sea; c. manage land use and waterbodies in an integrated manner and on a catchment basis; and d. make decisions on the management of waterbodies to enhance their quality to fishable standards. 3. Decision makers should consider the effects of an activity on the mouri of Tangaroa-ki-Uta when making decisions on applications and developing management and planning documents; 4. Promote and support access to water for the social, cultural, environmental and economic values of Taranaki Iwi; 5. Access to fresh water bodies to undertake customary activities and uses is enabled, protected and enhanced; and 6. Taranaki Iwi will oppose: a. any action or activities that will result in the degradation of the mouri of Tangaroa-ki-Uta;

waterbodies culverts, weirs and dams allow for native fish migration; and 11. No waterbodies and wetlands are exposed to the threat of excavation, quarrying and diversions.	b. discharges to water which do not pass through land or a wetland prior to release to water and are poor quality, contain contaminants and/or will contribute to adverse effects on the quality of the receiving water body; c. - d. - e. the creation of barriers to native fish passage along waterbodies; f. drainage of any part of a wetland; g. human activity adjacent to waterbodies which will result in sediment or waste discharge entering the waterbodies; h. activities that result in the loss of riparian vegetation; i. - j. dams over a metre high unless they allow for ease of fish passage, address sediment effects (such as downstream bed armouring) and do not alter the natural flows of the waterway to the detriment of endemic species present; and k. any culverts, weirs, floodgates, intake structures or other artificial structures that do allow for ease of fish passage. 9. Taranaki Iwi will promote and protect the intrinsic ecological and biodiversity values of waterbodies and set limits and targets that will ensure health and wellbeing of waterbodies; 10. Taranaki Iwi will support proposals and activities that will result in an enhancement of water quality and biodiversity within the rohe;
Assessment	
As previously described, the site features several shallow gullies and streams (being tributaries of the Wairau Stream system) vegetated with a mix of indigenous and exotic trees, shrubs, flaxes and wetland plants[10]. These waterbodies will be preserved and enhanced with the land adjoining being reserved from development. Stormwater detention ponds will be created within the gully system to restore/enhance biodiversity and to ensure hydraulic neutrality within the development site is achieved.[11] The design of the detention ponds is to be refined to ensure that excessive stormwater is not detained with the aim of achieving optimal ecological outcomes.	

[10] Request for Private Plan Change – pg. 81 - Appx 7; Ecological Assessment – Para 4.1
[11] Request for Private Plan Change – pg. 82 - Appx 8 Civil Engineering Assessment; Appx 4 – Stormwater Calculations

Potential adverse ecological impacts that may arise from subdivision and development within the site are discussed in the Ecological Impact Assessment.[12] These include effects from stormwater discharge and sediment from excavation, vegetation clearance and negative impacts from cats and dogs on wildlife. The Assessment concludes with a range of recommendations covering vegetation planting and management, stormwater detention design, fish passage through culverts, fencing out of the wetland areas and the prohibition of domestic cats from the development.[13]

The initiator of the Wairau Estate project, Oakura Farm Park Ltd (Mike McKie), has undertaken a range of rural and urban developments over a good number of years, the most recent being the adjoining 'The Paddocks' development. 'The Paddocks' development (large lot residential) has involved the retention of a significant area of land that has been covenanted in perpetuity under a QE II Covenant with extensive planting of indigenous vegetation. The development has a prohibition on domestic cats.

It is intended all the recommendations of the Ecological Assessment within the direct control of Oakura Farm Park Ltd will be implemented. The recommended prohibition on cats is being considered but experience at 'The Paddocks' has shown that an outright prohibition is difficult to achieve/enforce. The recommendation to require dogs to be walked on leashes in the proposed reserve areas will be a matter for the New Plymouth District Council to consider under its Dog Control Bylaws.

The actions that are intended to be undertaken by the OFPL in development of the site will achieve outcomes for the wai that will also assist Taranaki Iwi and Ngati Tairi Hapu in achieving the relevant objectives for Tangaroa-ki-Uta as set out in *Taiao*, *Taiora*

[12] Request for Private Plan Change – pg. 81 - Appx 7; Ecological Assessment – pg. 20 Section 6.
[13] Request for Private Plan Change – pg. 81 - Appx 7; Ecological Assessment – pg. 26 Section 8.

11.6 Issue Area	
Tane	
	11.6.1 Summary of Relevant Issues
	2. Native plant and animal species in decline due to removal, and land use changes resulting in modification of landscape and freshwater systems. 3. Inappropriate translocation of native species
11.6.2 Relevant Objectives	**11.6.3 Relevant Policies**
2. All waterbodies in the rohe will be planted with native species at least 5-20 m wide on either side and fenced to exclude livestock by 2030, with a focus on providing natural corridors of vegetation for extending habitat territory for fauna and enhancing biodiversity; 3. Remnant forest patches within the rohe will be protected from serious threats, and their value will be recognised and enhanced so that they thrive and flourish;	2. Taranaki Iwi will support initiatives that will lead to greater protection, enhancement and expansion of indigenous biodiversity within the Taranaki rohe; 6. Taranaki Iwi will actively promote species restoration that provides for sustainable cultural harvest when appropriate levels are reached;
Assessment	
The majority of the OFPL site is currently in pasture. The several gullies within the site, which will be retained as natural features within the proposed Wairau Estate, are vegetated with remnant native vegetation and a variety of exotic weed species.[14] As previously discussed, the restoration of the natural wetlands in the bottom of these gullies together with the planting of supplementary indigenous vegetation, as recommended in the Ecological Assessment, is proposed.[15] The retention and restoration of these natural gully systems will be consistent with the objective and policy outcomes that Taranaki Iwi aim to achieve as set out in *Taiao, Taiora.*	

[14] Request for Private Plan Change – pg. 81 - Appx 7; Ecological Assessment – pgs. 4-11 Section 4
[15] Request for Private Plan Change – pg. 81 - Appx 7; Ecological Assessment – pg. 26 Section 8.

11.7 Issue Area	**Relevance**
Rongo	Community focused food production is not a component of the Wairau Estate Oakura rezoning proposal.
11.8 Issue Area	
Taranaki Mounga	
	11.8.1 Summary of Relevant Issues
	5. New developments from human activity in and around the Mounga (mountain) can impact on the natural environment and the important cultural value Iwi associates with Taranaki Mounga.
11.8.2 Relevant Objectives	**11.8.3 Relevant Policies**
3. The korowai of native habitat will proliferate and flow down the sides of the Mounga towards the sea. 4.All water that flows from the mounga will be given active protection from the detrimental impacts of human activity, wider environmental degradation and invasive species to ensure waterbodies are maintained in a pristine state; 5.All waterbodies that start on the mounga, flowing to the sea, will be given riparian shelter and protection from erosion and contamination from land use by native vegetation as an extension of the ngahere on Taranaki Mounga;	4. Taranaki Iwi supports Project Mounga… 5.Decision-makers must consider the impacts of an activity on the essential character of Taranaki Mounga… and its connected eco-systems such as habitat corridors along waterbodies … located outside the National Park. 7. Taranaki Iwi will not support any residential subdivision and development within 5 km of the National Park boundaries; 10.Taranaki Iwi will support activities which extend the endemic habitat of the national park, that assist in its proliferation and enhance the natural values we associate with the mounga;
Assessment	
Taranaki Iwi support for and active involvement in Project Mounga is noted. The retention of the natural features of the OFPL land, which are remnant ecosystems formerly directly connected with Mounga, and their enhancement with indigenous plantings and stormwater detention areas to reinstate/enhance the naturally occurring wetlands on the site will help to ensure natural water quality is maintained. While land cultivation from earlier times has interrupted the continuity of some	

watercourses through the property the proposed works will nevertheless result in improvement to the natural environment, particularly in respect of flora and fauna and overall biodiversity.

The rezoning of the Oakura Farm Park Ltd land as residential and rural-style will ultimately result in residential development approx. 500m from the National Park boundary. The Park will remain buffered from Wairau Estate by the intervening land in rural and rural lifestyle uses.

It is noted that the long-establish nearby Oakura township is all within approx. 2.5kms of the National Park boundary. It has been the policy of the New Plymouth District Council since 2006 to plan for the growth of Oakura. At that time approx. 52ha of rural 'greenfields' land was identified adjoining the southern edge of the Oakura urban area for future growth; 12ha of this is within the Wairau Estate area. In more recent years these growth areas have been included (following due public RMA process) in the operative District Plan for Future Urban Development (FUD). All are less than 2.5km from the National Park boundary.

Choosing indigenous species endemic to the area for supplementary planting of the natural features, as recommended in the Ecological Assessment[16], will contribute to the areas of available wildlife corridors between the coastal edge and the Mounga thereby reconnecting and/or extending the endemic habitat of the National Park. It is intended the self-help possum control programme within the adjoining McKie KNE and QEII covenant area will be extended to the natural areas to be retained and enhanced within the proposed Wairau Estate. The ban on cats within the adjoining Paddocks development is being considered for Wairau Estate. The applicant is open to participating in a 'whole of community' approach to the question of controlling/eliminating predators (i.e. rodents, mustelids, cats and dogs) of indigenous fauna in Oakura and environs.

These various actions will help to provide an area, as a logical extension to the existing Oakura village, in which people can enjoy the natural environment in close proximity to where they are living, while at the same time helping to ensure the potential threats from predators to the natural environment are minimised or eliminated. This approach is consistent with the Iwi support for Project Mounga and the objective of a national park and environs that is able to be sustained and to flourish for the benefit and well-being of present and future generations.

[16] Request for Private Plan Change – pg. 81 - Appx 7; Ecological Assessment – pg. 26 Section 8.

4. Conclusions

This assessment has evaluated Private Plan Change Request Wairau Estate, Oakura Rezoning (Ref: NPDC PLC18/00048) against the provisions of *Taiao, Taiora An Environmental Management Plan* for the Taranaki iwi Rohe.

The overall conclusion is that the environmental outcomes that the residential and-rural residential proposal of Wairau Estate, Oakura Rezoning will be able to deliver will be largely consistent with the aspirations of Taranaki Iwi as expressed through the relevant objectives and policies in *Taiao, Taiora*.

Colin Comber MNZPI
24 March 2019

2. Further information received Taranaki Iwi

2A. Letter on the Private Plan Change to the New Plymouth District Plan, Oākura Rezoning. Taranaki Iwi. 17/04/2019.

Taranaki Iwi
me tōngai harakeke

P O Box 92, New Plymouth 4340
Tel: (06) 751 4285 | E-mail: puna@taranaki.iwi.nz
Web: www.taranaki.iwi.nz

17 April 2019

NPDC
Private Bag 2025
NEW PLYMOUTH

District Planning Team

By email: submissions@npdc.govt.nz

Tēnā koe,

Re: Letter on the Private Plan Change to the New Plymouth District Plan, Oākura Rezoning

BACKGROUND

1. Further to the private plan change for the Wairau Road Oākura Rezoning ("the Oākura Rezoning") Te Kāhui o Taranaki ("Taranaki Iwi") make the following formal statements.

2. As submitted in our letter of 10 August 2018, under the Resource Management Act 1991 authorities must take into account Iwi planning documents that are endorsed by Iwi authorities. Taiao Taiora is the environmental management plan of Taranaki Iwi and was endorsed by Te Kāhui o Taranaki in April 2018 and publicly launched in July 2018.

3. Taranaki Iwi further submitted that they are directly affected by the Oākura Rezoning and are in opposition due to potential adverse effects on the environment. We still wish to be heard on this matter.

PRE-HEARING MEETING

4. In the pre-hearing meeting of 29 January 2019 Taranaki Iwi stated that the Applicant's Assessment of Environmental Effects and/or technical reports did not include a Cultural Impact Assessment or sufficient application of Taiao Taiora. The Taiao Taiora engagement form was completed on 27 July 2018 at our request and referenced their technical reports without applying Taiao Taiora.

5. The Applicant's consultant Colin Comber agreed that they would overlay Taiao Taiora with their own technical reports. Please see the resulting Taiao Taiora Assessment Report attached.

6. Taranaki Iwi had a further meeting with Colin Comber on 8 March 2019 to review the Taiao Taiora Assessment Report and although the Report has provided some mitigation measures Taiao Taiora is clear on the following positions:

   Taranaki Mounga - Section 11.8.7
   Taranaki Iwi will not support any residential subdivision and development within 5km of the National Park Boundaries.

   Taranaki Mounga - Section 11.8.4
   Taranaki Iwi supports Project Mounga and will be prominently involved in that project at governance and operations level.

7. To that end, on 1 April 2019 the Trustees of Taranaki Iwi resolved the recommendation to continue in their opposition to the Oākura Rezoning but approve the Applicant's mitigation measures set out in their Taiao Taiora Assessment Report.

Noho ora mai,

Wharehoka Wano
Tumuwhakarito /CEO
Te Kāhui o Taranaki Iwi

3. Further information received from Ministry of Education.

3A. Estimate of potential school capacity. Ministry of Education. 13/03/2019.

Anna Stevens

From: Hans Konlechner <Hans.Konlechner@education.govt.nz>
Sent: Wednesday, 13 March 2019 3:37 PM
To: Anna Stevens
Subject: RE: Plan Change 48 pre-hearing education meeting report action query

Follow Up Flag: Follow up
Flag Status: Completed

Hello Anna

The following estimate of potential school capacity has been supplied to the Oakura School Board of Trustees.
You will see that the site is sufficiently large to accommodate over 1000 students. Please do be aware that we only have two schools of that size in Taranaki, both secondary schools.
It is unlikely that the community would see the construction of such a large school as appropriate.

Regards

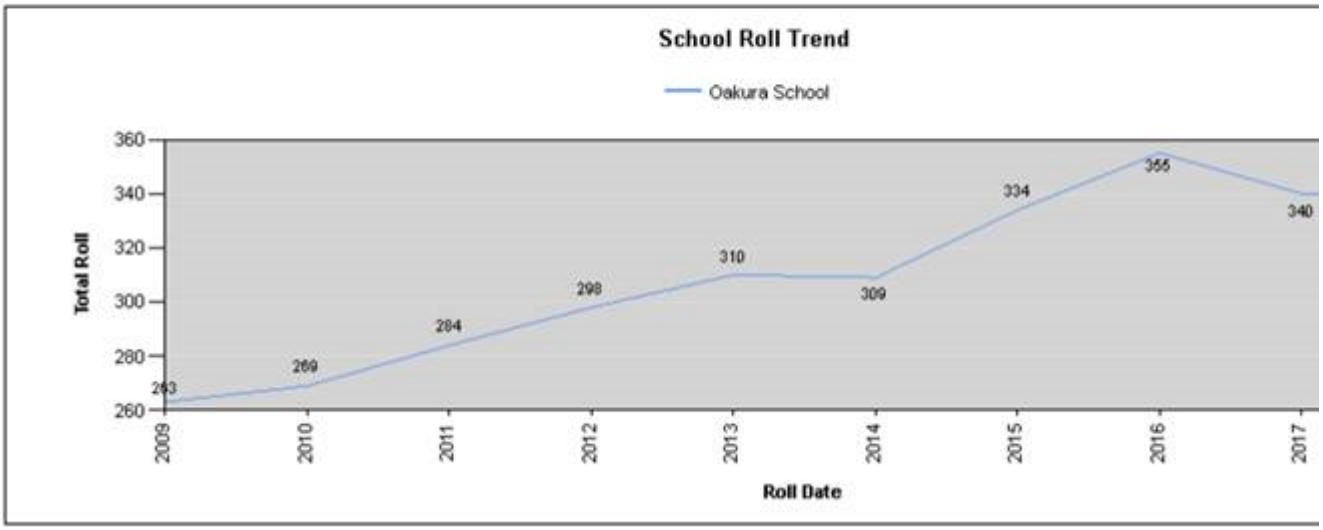
Hans Konlechner | Senior Adviser ECP
DDI +6467576459 | Mobile +64 27 587 5704
37 Dawson Street, New Plymouth

MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

School Information Report
2208 - Oakura School

School Roll Information

	Year																		
Roll Taken	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Roll	ORS H	ORS VH	OOZ	Māori Immersion
01/07/2018	41	39	49	45	52	45	43	27	0	0	0	0	0	0	0	341	1	0	4	0



In response to your Board's question about maximum site capacity, we have some information on our website which may be of use:

http://education.govt.nz/school/property/state-schools/funding/site-extensions/

In the link we give an overview of our recommended size for school sites used when we consider buying sites for new schools or to extend an existing school site:

- 14m² per student + 1 hectare for primary schools
- 15m² per student + 2.4 hectares for intermediate schools
- 18m² per student + 4 hectares for secondary schools.

This is a guide and many schools successfully operate on smaller sites of course, with some schools using community facilities, like sports complexes and reserves, to help deliver the curriculum.

Your Oakura school site has a net area of 26,500 sqm (2.650ha), so with rough order calculations, the site could carry over a thousand pupils.

Craig Maclean | Regional Property Advisor
DDI +6467576406 | Mobile +64 27 236 0750

From: Anna Stevens [mailto:anna.stevens@boffamiskell.co.nz]
Sent: Monday, 11 March 2019 5:18 p.m.
To: Hans Konlechner <Hans.Konlechner@education.govt.nz>
Subject: Plan Change 48 pre-hearing education meeting report action query

Hi Hans

Now that we have finalised the Plan Change 48 pre-hearing education meeting report I wanted to touch base with you regarding an anticipated action in the report. One of the agreed actions in the report, attached, states:

'NPDC: Liaise with Ministry of Education on their view on the Proposed Plan Change and future provision of education facilities in Oakura. In addition, Ministry to comment on its view on the current and future capacity of Oakura School.'

Are you able to please provide with me an update as to how you/ the Ministry are progressing with this action?

Regards

Anna

Anna Stevens | Planner

E: anna.stevens@boffamiskell.co.nz | D: +64 4 385 6152 | T: +64 4 385 9315

LEVEL 4, HUDDART PARKER BUILDING | 1 POST OFFICE SQUARE | WELLINGTON 6011 | NEW ZEALAND

www.boffamiskell.co.nz

4. Further information received from Oakura School Board of Trustees.

4A. Oakura School Roll Count. Oakura School Board of Trustee. 20/03/2019.

Anna Stevens

From: Milou <milou@farmventure.co.nz>
Sent: Wednesday, 20 March 2019 9:25 AM
To: Anna Stevens
Cc: Lynne Hepworth; Natasha Jackson
Subject: Re: Plan Change 48 pre-hearing education meeting action query
Attachments: OAKURA SCHOOL ROLL COUNT 2000.docx

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Anna,
This is the information we are able to give to you in regards to projection of the roll.
At the start of 2000 there were 197 students enrolled, this since has had a steady increase over the years with 2019 starting at 340 and likely to end the year with 370+.
This is all indicated in the document below.
At this steady roll growth it can be challenging to manage. This steady growth has occurred over time with housing infill and increased housing in our zoned area. Already the early childhood centres have bulging waiting lists. It concerns us to think we may be asked to attempt to manage a huge subdivision on top of this.
We have not been given clear information from the Ministry of Education, as to what our capacity is. Our School Community are concerned with the thought of this subdivision going a head, which is outlined in our submission.

Regards

Milou Barrett

Milou

On 11/03/2019, at 5:13 PM, Anna Stevens <anna.stevens@boffamiskell.co.nz> wrote:

> Hi Lynne, Milou and Natasha
>
> Now that we have finalised the Plan Change 48 pre-hearing education meeting report I wanted to touch base with you regarding an anticipated action in the report. One of the agreed actions in the report states:
>
> 'Oakura School Board of Trustees and Principal to provide further details on the projections of the school roll and the capacity of the school to meet these projections, including future plans and what this looks like'.
>
> Are you able to please provide with me an update as to how you are progressing with this action?
>
> Regards
>
> Anna

OAKURA SCHOOL ROLL COUNT 2000-2019

Year	1st March	Growth/ Decline	1st July	Max Roll Count - Dec	Growth/ Decline
2000	197		200	224	
2001	214	+15	226	235	+11
2002	223	+9	226	233	-2
2003	219	-4	228	245	+12
2004	244	+25	256	267	+22
2005	238	-6	247	278	+11
2006	251	+13	262	278	0
2007	255	+4	262	280	+2
2008	253	-2	264	282	+2
2009	247	-6	263	276	-6
2010	263	+16	269	287	+11
2011	268	+5	284	312	+25
2012	289	+21	298	325	+13
2013	296	+7	310	329	+4
2014	297	+1	309	329	0
2015	320	+23	334	359	+30
2016	344	+24	344	361	+2
2017	326	-18	340	361	0
2018	322	-4	341	357	-4
2019	340	+18	356	370	+13

The Ministry of Education audit NZ school rolls on the 1st March and the 1st July every year. The figures in this graph have been taken from these official documents.

The maximum roll count column is taken from school records – this is the greatest number of children attending the school in December each year

Highlighted figures are estimates based on our NE entrant list from our two early childhood providers.

5. Further information received from New Plymouth District Council.

5A. New Plymouth District Council. Parks Path and Track Manual. Version No.1 – 2012.

NEW PLYMOUTH
DISTRICT COUNCIL
newplymouthnz.com

PARKS
PATH AND TRACK MANUAL

version no.1 - 2012

- **Classification**
- **Design**
- **Construction**
- **Maintenance**
- **Baseline Inspection and Assessment**
- **Walkability Assessment**

Prepared By: Frame Group Limited Ref: FGL File 11/002 PO Box 147 211 Ponsonby Auckland in collaboration with New Plymouth District Parks staff
Adopted: 31 July 2012 Parks Senior Managers Meeting DM1338015

Table of Contents

Distribution and Revision Record

D/R	Distribution / Revision	Date	Details	Recipient / Name
D	Senior Landscape Architect	31.08.2012	1	T Hornby
D	Manager Parks Programmes	31.08.2012	2	S McGill
D	Manager Parks Operations	31.08.2012	3	S Robertson
D	Team Leader Parks Operations Horticulture and Arboriculture	31.08.2012	4	C.Marshall
D	Team Leader Parks Operations	31.08.2012	5	S. Crowe
D	Technical Officer Hard Landscape	31.08.2012	6	N. Hamill
D	Senior Parks Asset Analyst	31.08.2012	7	T. Pearce
D	Parks Asset Management Technical Assistant	31.08.2012	8	W. Lobb
D	Team Leader Programmes	31.08.2012	9	T. Christmas
D	Customer Response Officer	31.08.2012	10	K Schischka
D	Project Manager	31.08.2012	11	S. Skene
D	Let's Go Project Manager	31.08.2012	12	C. Whittleston
D	Senior Recreation Planner	31.08.2012	13	A. Crawford
D	Reserves Planner	31.08.2012	14	W. Dalgleish
D	Curator Pukekura Park	04.09.3012	15	C. Connolly
D	Bland and Jackson Surveyors	08/01/2014	16	Helen Johnson
D	Revolution Civil Engineering	13/9/2016	17	Chris Hanlon

Glossary of Terms

Access Width
The clear width available on a path, track or structure for the user to stand or walk.

Accessible Walk
A path or track or a series of paths and tracks that form a walking journey that has been assessed and is promoted as having a good level of walkability such that is suitable for persons that have impaired mobility.

Aggregate
A professional who practices the management and maintenance of trees.

Archaeology
Scientific study of material remains of past human life and activities.

Barrier
A structure that is positioned on the side of a bridge, boardwalk or viewing platform, or beside a track to prevent injury from falling.

Basecourse
A layer of pavement surface. Generally consisting of aggregate compacted to provide a stable base beneath the pavement surface.

Batter Slopes
The receding slopes formed by cut and fill excavations.

Benched
Type of track formation established by cutting into the slope to create a flat surface on which to walk

Boardwalk
A pedestrian bridge with an effective fall height of not more that 3.0m, and spans not greater than 2.5m.

Boxed Steps
Steps formed with the use of timber retaining and filled with soil and or metal.

Crime Prevention Through Environmental Design (CPTED)
A concept of design principles for minimizing criminal behavior and creating a safe environment, commonly termed "safe design", "designing out crime" or variations on these. CPTED theory is based on the concept that crime and fear of crime can be minimized through the effective planning and design in our built environment.
Further information on CPTED principles can be found at: /www.newplymouthnz.com/CouncilAtoZ/GraffitiRemoval/PreventGraffitiwithCPTED.

Cross Drain
Drains that discharge the side drain across the track with the use of a culvert or swale.

Cross Fall
The slope across the surface of a track.

Crowned
The surface of a track with a cross fall to both sides.

Culvert
Pipes installed under a track surface designed to carry water from side drains and streams from one side of a track to the other.

Cut
Excavation, which involves digging into the ground and the removal of material from a specific location.

Drainage
The removal of water from a given area with the use of drains.

Dripline
The area at ground level, which is under the canopy of a tree. An arboriculture term used as a guideline to determine the extent of tree roots.
Effective Fall Height
The measured Fall Height that has been adjusted to take account of the Fall Surface onto which a person may fall in the event of a fall from a structure or track. (Determined as per SNZ HB8630).

Fill
Earthworks, which involves the building up of level of material using additional soil material from elsewhere.

Geometric Design
The design of the alignment, width and grade of a track.

Geotextile
A permeable fabric, which has the ability to filter, or reinforce or protect soil from scour.

Gradient
The term used to describe the steepness of a track. Gradient can be expressed in terms of the slope angle (in degrees), the slope percentage (%), or as a rise and distance ratio (i.e. 1 in 6).

Grading Envelope
The term describing the proportion of particles in each size range required to meet the specified aggregate mix. A table provided to or by a quarry, which shows the sizes percentage of material that passes each standard sieve size.

Handrail
A railing provided for the purpose of offering support to users on steps and stairs.

Landing
A level area located at an intermediate level between flights of steps or stairs.

Monoslope
The surface of a track which has been formed with a cross fall to one side only, usually with no side drain to intercept water flowing from the uphill side of the track.
Mountain Bike Tracks

Mountain Bike Tracks
Mountain Bike Tracks have purposefully been excluded from this Path and Track Manual because there are a lot of specific issues and design features for the various grades of mountain bike track and the more extreme tracks contain stunts etc. It is intended to apply the International Mountain Bike Association (IMBA) standards and New Zealand Mountain bike Association guidelines where appropriate in terms of formal agreements with clubs…..

Outdoor Visitor Structures
Temporary or permanent structures intended for use by visitors on a site such as a boardwalk, bridge or viewing platform. Outdoor Visitor Structures are generally open to the elements (i.e. have no walls or roofs) and do not have any services or equipment.

Path
A route along which visitors traverse a park or reserve.

Path and Track Classification
A means of classifying paths and tracks according to the standard of track provided.

Pavement
Durable surfacing on a track, i.e. aggregate.

Resource Consent
An authority to carry out a Controlled Activity within a District Plan. Issued by Territorial Authorities under the Resource Management Act.

Retaining Wall
A wall structure used to support a soil slope above or below a track.

Sand Ladder
A flexible timber tread structure placed on dune sand access routes to provide a stable footing over the sand, especially through the dynamic fore-dune area at beach access tracks.

Side Drain
A channel provided on the edge of a track used to collect water and convey it along the edge of the track.

Steps/Stairway
A step is composed of a tread and a riser.

Tread

The part of stairway that is stepped on. The tread "depth" is measured from the outer edge of the step to the vertical "riser" between steps. The "width" is measure from one side to the other.

Riser

The vertical portion between each tread on the stair.

SNZ HB8630:2004 Tracks and Outdoor Visitor Structures
Standards NZ handbook providing guidelines for the design of Tracks and Outdoor Visitor Structures. Adopted for use by the Department of Conservation and many Territorial local Authorities in New Zealand.

Track
A route along which people traverse a park or reserve.

User Category
A category of users that have similar levels of physical capability and similar expectations of experience from their use of a path or track.

Wheel Strip
An inclined narrow ramp strip provided beside steps to enable bicyclists to dismount and more easily wheel bicycles up or down steps.

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1 Introduction

An extensive path and track network (76km) as at 31 July 2012, exists within the New Plymouth District (NPDC) and consists of a range of public paths, tracks, and bridle tracks. These routes for people need to cater for the varied needs of a wide spectrum of users. Users include urban residents for access from one place to another; people using the reserves for sporting activity, passive or active recreation such as, walking, running, bicycling and horse riding. The users of paths and tracks range from very fit and agile people to elderly and physically challenged people who require a high standard of path and track to enable them to safely access public open space.

This range of users of public paths and tracks gives rise to the need for a range of track types, styles and standards. Paths and tracks that are designed specifically to cater for the needs of one user category may be un-interesting and lacking in challenge for other visitors to the park. A government subsidized project started in 2009 to encourage people, including commuters, to walk and cycle, and branded as "Lets Go", has resulted in the extension of the renown Coastal Walkway and improvements to other paths and tracks to provide commuter linkages to and through various parks and reserves.

This manual provides a system of classification of paths and tracks, design standards, construction details, maintenance guidelines baseline inspection and assessment and walkability assessment.

For New Plymouth District Council, five track classes apply:

Class 1: Primary Path, Class 2: Secondary Path, Class 3: Track, Class 4: Bush Track and Class 5: Bridle Track.

Use of paths and tracks in public open spaces is important because it contributes to a number of beneficial outcomes within the District that include:

- The use of parks and corridors of public land as a conduit to provide direct walking and bicycling access to destinations that may otherwise be accessed by motor vehicle trips.
- The use of parks and reserves to provide for regular safe recreational walking opportunities close to residential areas.
- The use of tracks in parks and reserves for city residents and visitors to the city as extended recreational walking opportunities.
- The use of tracks for walking, running, and bicycling for exercise and fitness training.
- The use of tracks to access parts of reserves that provide scenic appreciation or passive enjoyment of natural environments.

The use of paths and tracks provide sites for a range of recreational and sporting activities including bicycling, walking and running events, and organized group activities.

2 Classification

The classification of paths tracks is undertaken in the context of the wide spectrum of track users and user types. The key is to provide a suitable capacity, standard and level of safety for the least capable user group expected on a particular track, whilst still maintaining the character and values of the parks environment and providing sufficient challenge that the more adventurous visitors seek and value within the reserves.

The Classification applied in this manual is modeled on the classification system contained within SNZ HB8630:2004 "Tracks and Outdoor Visitor Structures". adopted by the Department of Conservation, Regional Councils and a number of City Councils and District Councils as the guide for their track classification and standards.

2.1 New Plymouth District Council Path and Track Classification

For NPDC the following five classifications of paths and tracks apply:

- Class: 1. Primary Path
- Class: 2. Secondary Path
- Class: 3. Track
- Class: 4. Bush Track
- Class: 5 Bridle Track – equestrian use

Table 1 provides a detailed description of the parameters (location/users, standards and notes) for each of the five classifications.

Table 1 New Plymouth District Council Path and Track Classification and details description of parameters		
Class: 1. Primary Path		
Location/Users	**Standard**	**Notes**
Main high use access and commuter paths around the city. Commuter, Recreation and Neighbourhood bicycling routes. Very high level of use by visitors from a wide range of capability and types including unsupervised children, elderly people, people with disabilities and a wide range of fitness and physical ability.	**General**: Well formed firm path suitable for wheelchairs and buggies with small wheels and high use by pedestrians without the need for frequent surface maintenance. Suitable for access by park service vehicles. **Alignment**: Curved alignment, good visibility and application of CPTED principles (For Class 1, curve radius minimum 15m preferred, 7m absolute minimum, except at intersections. Site distance minimum 15m) **Formation**: Benched with single cross fall of 2% to 3% where adjacent to mowed grass and on reasonable level ground. Crowned with 2% to 3% cross fall in locations where track is benched or where a side drain exists on both sides.	Lighting provided in some areas. The installation of barriers can be minimized in many locations by providing a buffer zone of grass or garden between the path and fall hazards. Handrails with a gripable top rail are recommended on steeper grades to facilitate ease of use by the elderly. Sand ladders are not generally used for Class 1 paths. Some leaf litter on paths is tolerable, provided the depth of accumulation does not inhibit wheelchair or buggy use, or create a slipping hazard on slopes. Open cross drains or grade dips are not recommended for Primary Paths. Steps to be avoided.

Table 1 New Plymouth District Council Path and Track Classification and detailed description of parameters		
Class: 1. Primary Path		
Location/Users	**Standard**	**Notes**
Higher use paths in city park areas and urban parks and reserves providing links between park areas and main residential areas. Recreation and Neighbourhood bicycling routes. Moderately high level of use by visitors from a wide range of capability including young families, elderly people, and, in some cases, people with disabilities.	**Gradient**: Preferred maximum grade 1 in 12 (8%). Maximum can be increased to 1 in 8 (12%) where site boundary and topography constraints exist and where disabled access is not specifically provided for. Steps to be avoided. Where steps are used, a handrail is provided. **Width:** Minimum width 2.4m for Class 1)to provide comfortable two way use by groups. **Surface:** concrete, well defined edges. **Drainage:** Well drained surface which remains suitable for all types of footwear in all conditions. Free from ponded surface water. **Barriers:** Significant falls and hazards provided with a 1.1m high Type A barrier at the fall edge or fence to restrict access to the hazard area. Handrail provided in high use areas where gradient exceeds 1:8. (Barriers to 1.2m height for Class 1) **Signage:** All junctions of Primary Paths and some junctions with Secondary Paths provided with directional signage. **Vegetation Clearance:** Cleared to a height of 2.5m over the total width of the path surface. Minor encroachment by soft vegetation acceptable (for Class 1), clearance shall extend to 0.5m outside the path surface each side. **Lighting:** Lighting provided where Primary Paths are likely to be used frequently for night access.	

NOTE:
- SINGLE CROSS FALL OF 2% TO 3% WHERE ADJACENT TO MOWED GRASS AND ON REASONABLY LEVEL GROUND.
- CROWNED WITH 2% TO 3% CROSS FALL IN LOCATIONS WHERE TRACK IS BENCHED OR WHERE A SIDE DRAIN EXISTS ON BOTH SIDES.

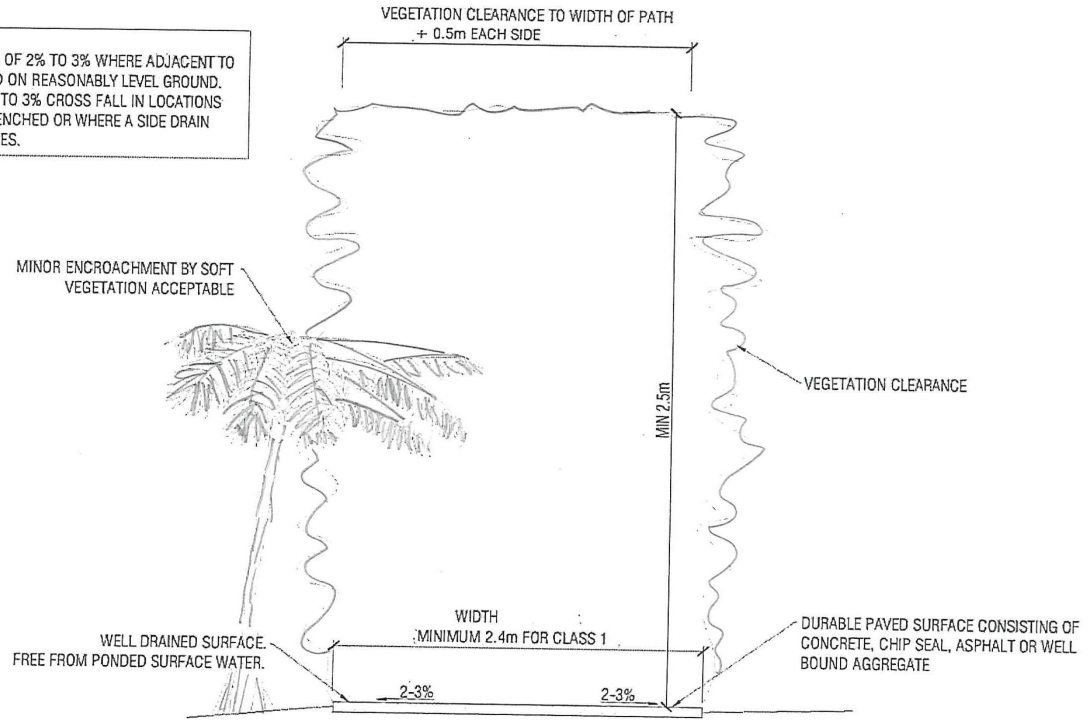


Figure 1 Class 1 Primary Path

Table 1 New Plymouth District Council Path and Track Classifications and detailed description of parameters		
Class: 2 Secondary Path		
Location / Users	**Standard**	**Notes**
Higher use paths in city park areas and urban parks and reserves providing links between park areas and main residential areas. Recreation and Neighbourhood bicycling routes. Moderately high level of use by visitors from a wide range of capability including young families, elderly people, and, in some cases, people with disabilities.	General: Well formed firm path suitable for high use by most pedestrians without the need for frequent surface maintenance. Suitable for access by small park service vehicles. Formation: Benched with cross fall of 2% to 3%, preferably with side drain or swale to intercept surface water flow. Gradient: Maximum grade 1 in 6 (17%) but preferably less than 1in 8 (12%). (For Class 2, length of path with gradient 1 in 10 (10%) or greater to be limited to 30 metres). Steps: Avoided if possible, but where necessary, maximum gradient 37 degrees, maximum riser height 190mm, with maximum 2.5m rise between landings. Steps provided with a handrail on one side. (For Class 2, a wheel strip is provided on steps) Width: 1.2m minimum. Generally at least 1.4m to provide comfortable two way use. (Minimum with 2.0m for Class 2) Surface: Durable surface generally consisting of well bound aggregate, but may consist of concrete, chip seal or asphalt in some locations. Free from loose stones, tripping hazards and ruts. Sand ladders are acceptable where necessary to ensure stable footing on dune sand areas. Drainage: Well drained surface which remains suitable for all types of footwear in all conditions. Free from ponded surface water. Barriers: Significant falls and hazards provided with a 1.1m high Type A barrier at the fall edge or a fence to restrict access to the hazard area.	The installation of barriers can be minimised in many locations by providing a buffer zone of garden between the path and a fall hazard. Sustained steep gradients should be avoided to enhance user friendliness and to deter high speed downhill bicycling. Handrails on steps should be suitable for gripping by hand. Barriers to be used only if there is no other passive means of isolating a fall hazard. Leaf litter on paths is tolerable, provided the depth of accumulation does not cause a tripping hazard or a slipping hazard on slopes.

Table 1 New Plymouth District Council Path and Track Classifications and detailed description of parameters		
Class: 2 Secondary Path		
Location/Users	**Standard**	**Notes**
	Signage: At most junctions with Primary Paths and some junctions with other Secondary Paths provided with directional signage. Vegetation: Cleared to a height of 2.5m over the total width of the path surface. Minor encroachment by soft vegetation acceptable, clearance shall extend to 0.5m outside the path surface each side).	A high standard of bound aggregate surface is necessary to resist pavement rutting from bicycle wheels.

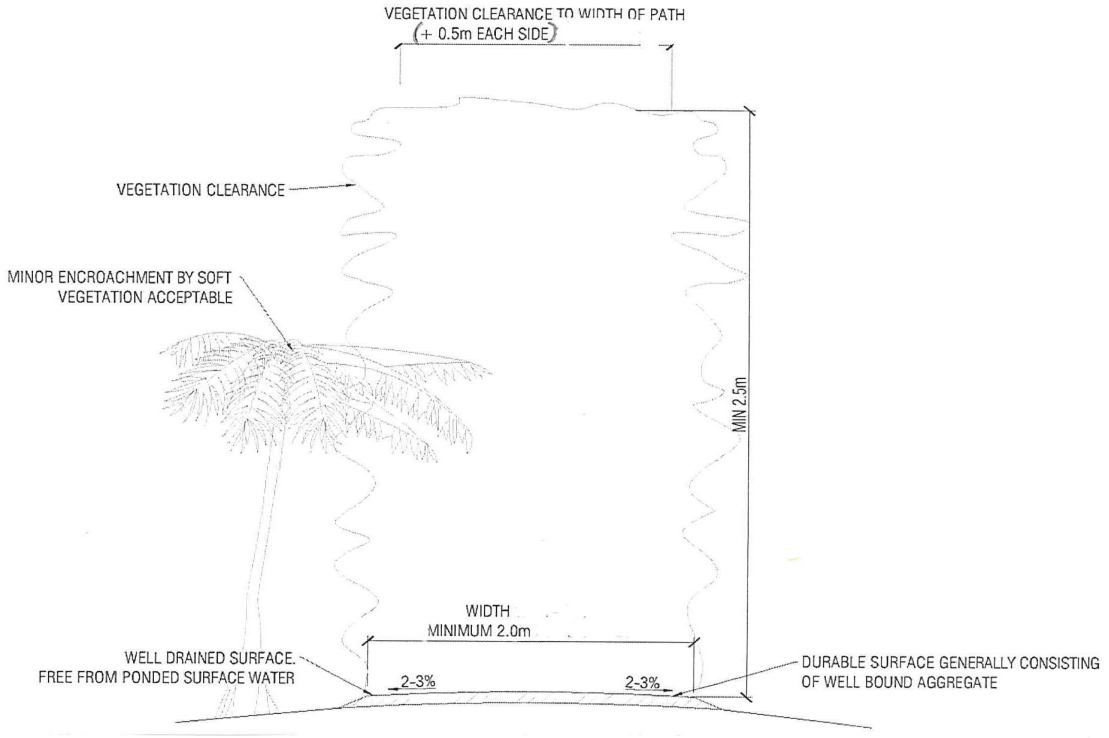


Figure 2 Class 2 Secondary Path

Table 1 New Plymouth District Council Path and Track Classifications and detailed description of parameters		
Class: 3 Track		
Location / Users	**Standard**	**Notes**
Paths in the lower use areas of the park providing connections to residential areas, links between park areas and loop walks. Recreation cyclists and Sports cyclists. Moderate level of use by visitors seeking a more remote and adventurous walk, including families with supervised young children and elderly people.	General: Formed firm path suitable for safe use by most pedestrians without the need for frequent surface maintenance. Formation: Benched on sloping ground and raised above adjacent ground in level topography to provide natural drainage. Preferably 2% to 3% cross fall with side drains. Mono-slope profile acceptable where grades less than 1 in 10 (10%) or surface water flow is minimal. Gradient: Maximum grade 1 in 6 (17%). (For Class 3, length of path with gradient 1 in 8 (12%) or greater to be limited to 30 metres). Steps: Avoided if possible, but where necessary, maximum gradient 37 degrees, maximum riser 190mm. Landings every 2.5m vertical rise. Width: 750mm minimum. Generally at least 1.2m to provide comfortable side by side use (for Class 3, a minimum 1.2m width is required). Surface: Durable surface generally consisting of well bound aggregate to ensure traction in all conditions. Natural ground or grass surface acceptable in areas where use is low and gradient is less than 1 in 8 (12%). Sand ladders are acceptable where necessary to ensure stable footing on dune sand areas. Drainage: Well drained surface which remains suitable for walking shoes. Free from mud or ponded surface water deeper than 5mm. Barriers: Significant falls and hazards immediately adjacent to the track provided with a 1.1m high Type A barrier at the fall edge. Signage: Provided only where necessary to indicate named walks, or to provide directional information to park areas or residential street access points.	Grade should be kept as low as possible, and preferably below 1 in 8 (12%) unless boundaries and topography preclude this. Natural ground track surface is not recommended on grades exceeding 1 in 8 (12%) because of the potential slipping risk in wet conditions. Width of Walking Tracks should generally not exceed 1.5m. Increasing width to enable large service vehicle access should be avoided. Leaf litter on walking tracks is tolerated, provided the depth of accumulation does not cause a tripping hazard or a slipping hazard on slopes.

Table 1 New Plymouth District Council Path and Track Classifications and detailed description of parameters		
Class: 3 Track		
Location / Users	**Standard**	**Notes**
	Vegetation: Cleared to a height of 2.0m over the total width of the track surface. Minor encroachment by soft vegetation acceptable. Occasional encroachment by branches, acceptable provided a 750mm minimum access width is maintained. (For Class 3, clearance to 2.5m height over a 1.2m width is required)	

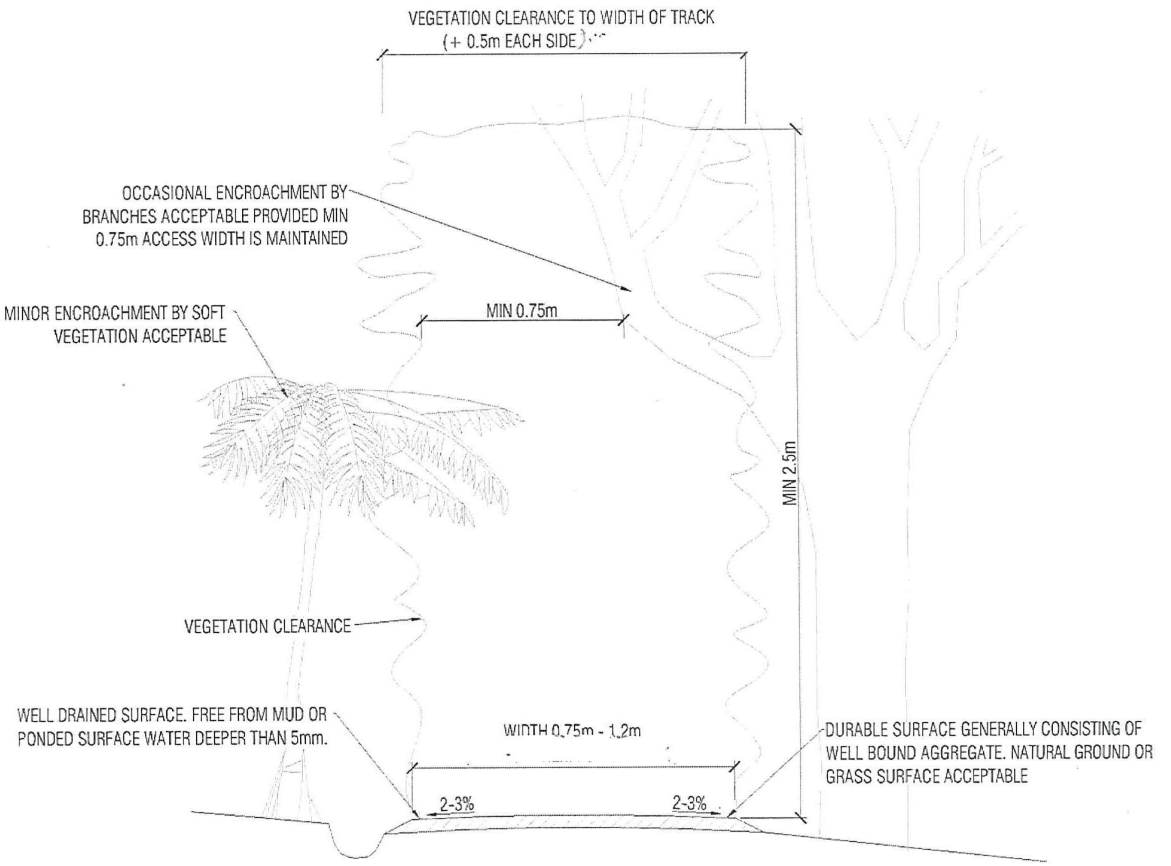


Figure 3 Class 3 Track

Table 1 New Plymouth District Council Path and Track Classifications and detailed description of parameters		
Class: 4. Bush Track		
Location / Users	**Standard**	**Notes**
Tracks in the more remote areas of parks and reserves or short links and loops within urban paths where a natural bush walking experience is preferred. Moderate to low use by people seeking a relatively comfortable bush walk experience, including families and confident walkers. Unlikely to be suitable for bicycles (off road and mountain bicycles), buggies or mobility scooters.	General: Defined track, generally on a formed surface, suitable for use by pedestrians of average agility. Unlikely to be suitable for access by park service equipment. Formation: Benched with crowned surface on sloping ground. Unformed on relatively level ground. Gradient: Maximum grade 1 in 6 (17%). Steps: Provided where necessary, maximum gradient 37 degrees, maximum riser 190mm. Landings every 4.0m of vertical rise. Width: Minimum 300mm. Typically 600mm where formed. Steps 600mm wide minimum. Surface: Generally compacted natural ground or grass. Aggregate surfacing provided where necessary to prevent formation of muddy sections or to provide slip resistance. Occasional roots and un-evenness tolerated. Drainage: Drained surface, free of ponded water in most conditions. Suitable for walking shoes. Free from mud or deep ponded surface water. Barriers: Generally not required unless there are significant hazards in close proximity to the track. Signage: Generally not provided, except for named tracks. Vegetation: Cleared to a height of 2.0m over the total width of the track surface. Minor encroachment by soft vegetation acceptable. Occasional encroachment by branches acceptable provided a 600mm minimum access width is maintained.	Users of Bush Tracks can be expected to be tolerant of more demanding track conditions and to be physically capable of accepting lower standards. Natural ground track surface is likely to be suitable provided the track surface is drained. Sand ladders not usually provided for Class 4 tracks unless necessary to reduce the risk of pedestrian damage to dune environments. Width of Bush tracks should be kept to a minimum to maintain an adventurous character. Leaf litter not cleared unless causing blockage of drainage.

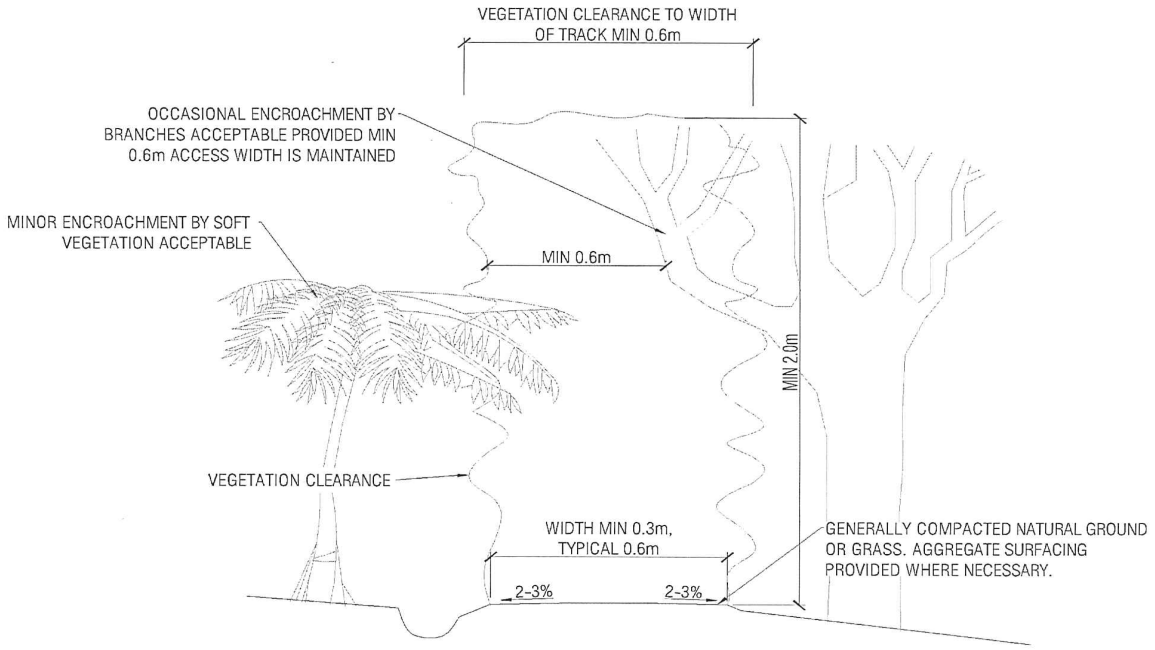


Figure 4 **Class 4 Bush Track**

Table 1 New Plymouth District Council Path and Track Classifications and detailed description of parameters		
Class: 5. Bridle Track (Exclusive Equestrian use or shared equestrian and walking use)		
Location / Users	**Standard**	**Notes**
Tracks in bush or open reserves provided for the exclusive use by visitors on horseback. Generally uni-directional loops beginning and ending at suitable horse float turning/parking areas. Moderate to low use by people seeking a relatively comfortable horse riding experience, including both novice and experienced riders. Signposted to prohibit use by pedestrians or cyclists. (except where dual use is specifically provided for).	General: Defined track, generally on a formed surface, suitable for use by horses. May be suitable for access by park service equipment and pedestrian access. Formation: Benched on sloping ground, with a cross fall of 2% to 3% to one or both sides. Unformed on relatively level ground. Gradient: Maximum grade 1 in 10 (10%). Maximum sustained grade 1 in 20 (5%). May have short steep sections on stable ground. No steps. Width: Minimum 3 metres. May reduce to 1.5m over short distances. Surface: Generally natural ground or grass but may have sand or compacted aggregate surfacing provided there are no loose stones of a size that is likely to damage horse hooves. Occasional roots, rocks and un-evenness tolerated. Drainage: Well drained surface, free of ponded water in most conditions. Soft ground acceptable. Barriers: Generally not required unless there are significant hazards in close proximity to the track or necessary to direct horses from prohibited areas. Signage: Directional signage at junctions. Pedestrian and cycle prohibition signage. Occasional direction signage on trail for uni-direct tracks. Vegetation: Cleared to 3.7m height over at least 3.0m width. Short narrow sections between trees acceptable provided there are no overhanging branches.	Equestrian users require different track surface conditions to those that are generally preferred by pedestrians and cyclists. Natural ground track surface is likely to be suitable provided the track surface is drained. Narrow sections on bridle tracks should be avoided because of the need for at least three metres clear width to enable horses with riders to pass and to enable horses to turn around if necessary. Leaf litter not cleared unless causing blockage of drainage.

Table 1 New Plymouth District Council Path and Track Classifications and detailed description of parameters		
Class: 5. Bridle Track (Exclusive Equestrian use or shared equestrian and walking use)		
Location / Users	**Standard**	**Notes**
		Shared equestrian/walking use is possible and several New Zealand Territorial Authorities have shared use walking/bridle tracks. The width parameters provided are still valid. Of key importance is visibility so that riders are not spooked by the sudden appearance of walkers in the opposite direction.

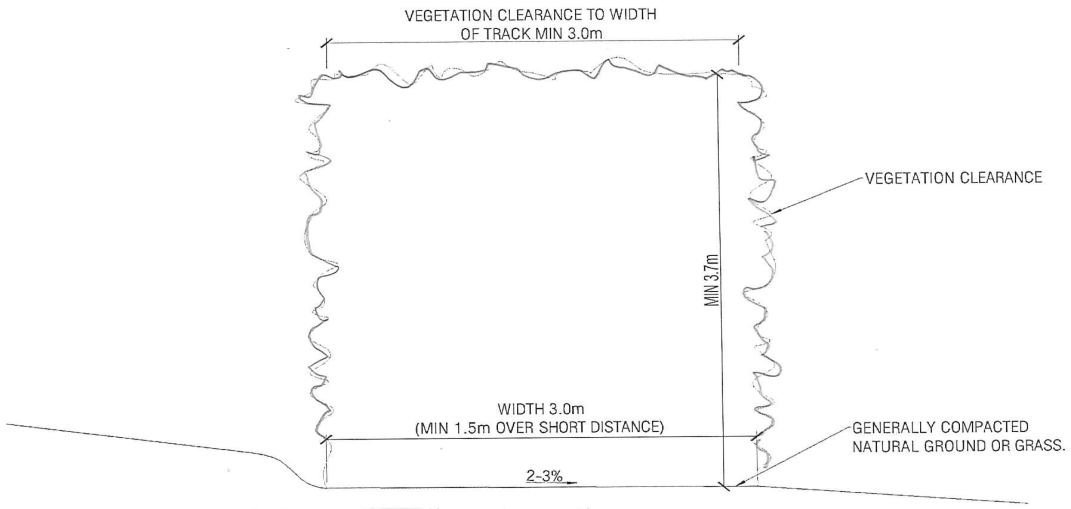


Figure 5 Class 5 Bridle Track

2.2 Path and Track User Categories

Table 2 provides an analysis of New Plymouth District Council path and track users, their characteristics and expectations and the class of path and track they are most likely to use.

Table 2
New Plymouth District Council – Evaluation of Path and Track User Categories

User Category	Characteristics	Expectations	NPDC Path and Track classification
Elderly Retired	Physically challenged, relatively low fitness Security prone and injury prone Some mobility scooters & wheelchairs Dogs on leads	Easy, safe walking opportunities. Easy grades, minimal steps Protected falls, handrails on steps Secure, dry, level footing Good security and visibility Short distances Water drinking bowls	Class:1 Primary path e.g. Coastal Walkway, Te Henui Walkway
Newly Retired	Fairly fit, able bodied Frequent users of familiar tracks High expectation of quality Good footwear Dogs on leads	Interesting walks in natural settings Challenging but not extreme Comfortable conditions (not muddy) Connectivity Water drinking bowls	Class:1 Primary path e.g. Huatoki Walkway Class: 2 Secondary path Class:3 Track Class: 4 Bush Track

Table 2 New Plymouth District Council – Evaluation of Path and Track User Categories			
User Category	**Characteristics**	**Expectations**	**NPDC Path and Track classification**
Young Family	Range of fitness Young children & pushchairs Safety conscious Dogs on leads	Interesting walks Pushchair friendly (no steps) Comfortable conditions (not muddy) Protected fall hazards Water drinking bowls	Class:1 Primary path e.g.Coastal Walkway, Te Henui Walkway
Active Fitness : Runners, Trail runners, Joggers, Orienteer's , Bicycle riders	High level of fitness Physically agile Frequent user of familiar tracks Well equipped High speeds	Very challenging Adequate distance All season accessible Not too crowded	All classes except Bridle tracks
Passive Exerciser	Average fitness Casual footwear Joggers	Fairly challenging Comfortable conditions (not muddy)	Class: 1 Primary path
Neighbourhood Cyclists	Reasonably fit Moderate speeds Average ability	Easy grades No steps Good quality surface Adequate width	Class: 1 Primary path Class2: Secondary Path
Sports Cyclists (Mountain bike riders)	Physically fit and high ability High speeds Seeking challenge (short-cutters) Frequent users of familiar tracks	Challenging Interesting Ample distance Good visibility and passing width Not too crowded	Track

Table 2 New Plymouth District Council – Evaluation of Path and Track User Categories			
User Category	**Characteristics**	**Expectations**	**NPDC Path and Track classification**
School Children	Reasonably fit and able Inattentive or oblivious to hazards Security prone	Easy, safe walking High level of security Directness of route Good quality surface (not muddy) Protected fall hazards	Class:1 Primary path e.g. section of Coastal Walkway
Walking Commuters	Reasonably fit Footwear often not designed for long walks	Easy, safe walking Directness of route Good quality surface (not muddy)	Class:1 Primary path e.g. section of Coastal Walkway Class: 2 Secondary path eg. Te Henui
Commuter Cyclists	Students and workers Reasonably fit Average ability and equipment	Easy, safe route Directness of route Good space High quality surfaces	Class:1 Primary path e.g. section of Coastal Walkway Class: 2 Secondary path

Table 2 New Plymouth District Council – Evaluation of Path and Track User Categories			
User Category	**Characteristics**	**Expectations**	**NPDC Path and Track classification**
Recreational Walker	Reasonably fit Weekend user Wide range of age	Interesting walks Some level of challenge Reasonable safety and comfort	Class:1 Primary path e.g. section of Coastal Walkway Class: 2 Secondary path Class:3 Track Class: 4 Bush Track
Recreational Cyclists	Average fitness	Average grades Good surfaces Reasonable space	Class: 1 Primary path Class: 2 Secondary path Class: 3 Track
Recreational Horse Riders	Passive riding (not racing) Beginner to intermediate level	Suitable surface for horses Exclusive use.	Class: 5 Bridle Track Can be for shared use. Shared equestrian/walking use is possible. The width parameters provided are valid. Of key importance is visibility so that riders are not spooked by the sudden appearance of walkers in the opposite direction.
Sports Cyclists (incl Mountain Bike riders)	Physically fit and high ability High speeds Seeking challenge (short-cutters) Frequent users of familiar tracks	Challenging Interesting Ample distance Good visibility and passing width Not too crowded	Not addressed in thus Path and Track Manual: Construction undertaken by clubs based on International Mountain Bike Association (IMBA) standards and New Zealand Mountain Bike Association guidelines.

3 Setting Out and Geometric Design Standards

3.1 Alignment

The alignment of a track plays an important part in determining the enjoyment, safety, ease of use and cost of the track. For cycle tracks, the alignment is a key factor in the ease with which a track can be ridden. The selection of the best alignment for a track often involves a compromise of these factors. The items that should be considered in finding an alignment for a new track or for the upgrading of an existing track are summarised in Table 3.

Table 3 – Track Alignment Selection Criteria

Issue	Objectives
Ease of Use	• Ensure the maximum grade recommendations are not exceeded (i.e. avoid steep grade sections). • Aim to avoid repetitive climbs and descents on the same section of track. • For cycle tracks, the careful selection of grade and curvature is a key factor in ensuring cyclists enjoy the ride.
Enjoyment and Aesthetics	• Use natural shapes (i.e. follow contour, avoid straight or uniform curvature, and uniform zig zag sections). • Anchor the alignment to natural features. • Visit the points of interest. • Provide view points. • Minimise track visibility from the distant landscape. • Aim to avoid continuously following boundary fences or roadways.
Environmental and Cultural	• Avoid the root plate of large trees. • Avoid areas of sensitive vegetation. • Avoid archaeological sites. • Aim to avoid following stream edges to minimise potential loss of sediment into streams unless there is a specific reason to follow the stream.
Safety	• Aim to avoid natural hazards (i.e. cliffs, deep water, etc) unless there is a specific reason to visit these features. • Aim to maintain sightlines to residential properties and roads where possible • Aim to avoid steep grades • Aim to avoid thick vegetation • Apply CPTED principles where possible
Cost	• Minimise the distance (i.e. use direct routes). • Minimise the required earthworks. • Aim to avoid steep slopes. • Aim to avoid unstable ground.

3.2 Formation

The track formation refers to the shaping of the ground on which the track passes. In level ground, little formation work is necessary to provide a suitable walking profile, but on sloping ground, formation work is necessary to achieve the required track access width and to ensure the track longitudinal grade is within the maximum limits. Table 4 describes track formation types that are appropriate for each track classification.

Table 4 – Track Formation

Classification	Comment
Primary Path	Benched with single cross fall of 2% to 3% where adjacent to mowed grass and on reasonably level ground. Crowned with 2% to 3% cross fall in locations where track is benched or where a side drain exists on both sides.
Secondary Path	Benched with cross fall of 2% to 3%, preferably with side drain or swale to intercept surface water flow.
Track	Benched on sloping ground and raised above adjacent ground in level topography to provide natural drainage. Preferably 2% to 3% cross fall with side drains. Mono-slope profile acceptable where grades less than 1 in 10 (10%) or surface water flow is minimal.
Bush Track	Benched with crowned surface on sloping ground. Unformed on relatively level ground.
Bridle Track	Benched with a cross fall of 2% to 3% to one or both sides so that the track surface drains in wet conditions. Well formed drainage provisions to ensure surface water is removed in all conditions

A crowned track should have a side drain on the upslope side to intercept surface water flow. It provides control of surface water and reduces the risk of damage to the pavement surface. Crowned track profiles should be used in all locations except where drainage runoff is low or there is adequate alternative protection to the track surface from scour resulting from water running down the track surface.

A single cross-fall (monoslope) track requires any surface water flow that occurs above the track to be passed over the track surface. Consequently, single cross-fall tracks are more prone to damage of the track pavement surface during storms and are more likely to result in sediment being washed off the track into water bodies. Single cross-fall tracks that are steeply inclined have a higher risk of surface water flowing down the track for extended distances rather than off the track surface.

A single cross-fall track profile is likely to be appropriate where:

- There is only a very small water catchment on the up-slope side of the track, such as near the top of a ridge.
- The track surface is hard paved or has a very well bound surface.
- Track grades are much less than 10%.

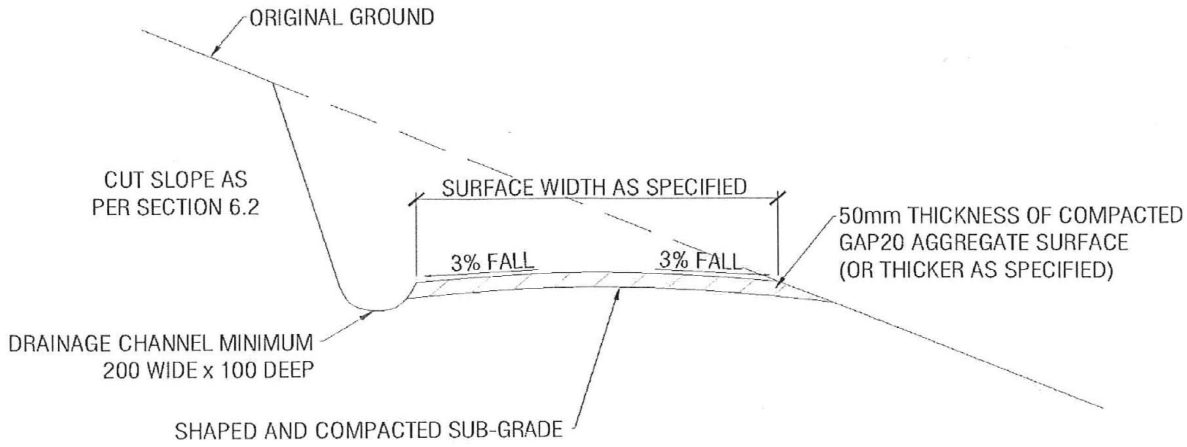


Figure 6 Typical Cut Formation (Crowned)

(FOR BENCHED TRACK ON CROSS SLOPES GREATER THAN 2:1)

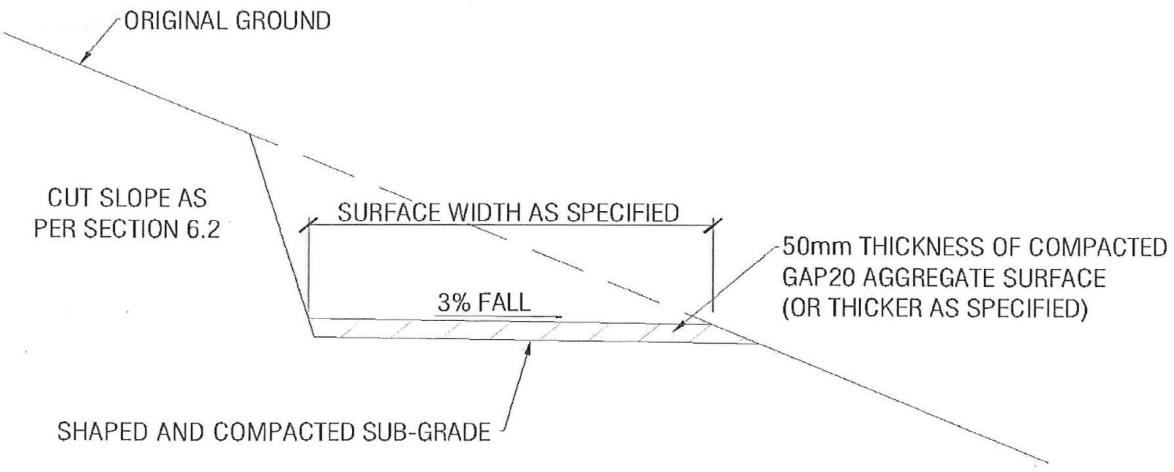


Figure 7 Typical Cut Formation (Monoslope)

(FOR BENCHED TRACK ON CROSS SLOPES GREATER THAN 2:1)

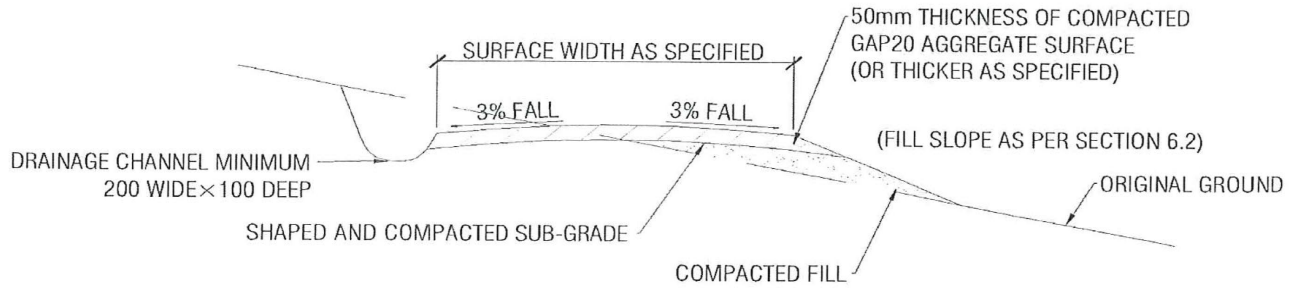


Figure 8 **Typical Cut/Fill Benched Formation (Crowned)**
(FOR BENCHED TRACK ON CROSS SLOPES LESS THAN 2:1)

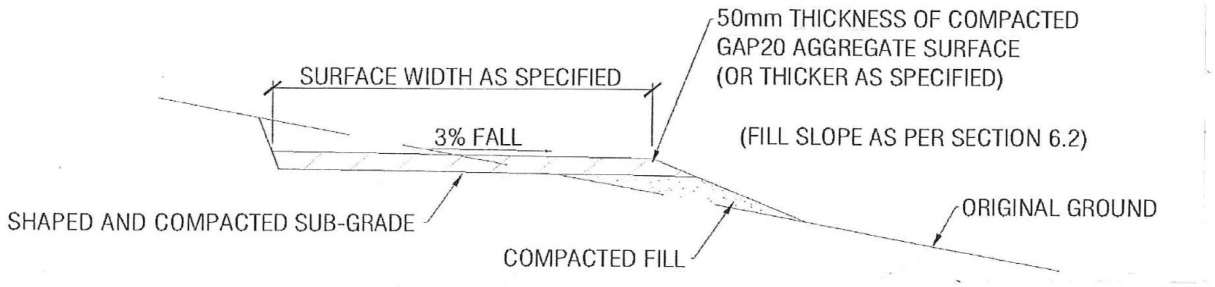


Figure 9 **Typical Cut/Fill Benched Formation (Monoslope)**
(FOR BENCHED TRACK ON CROSS SLOPES LESS THAN 2:1)

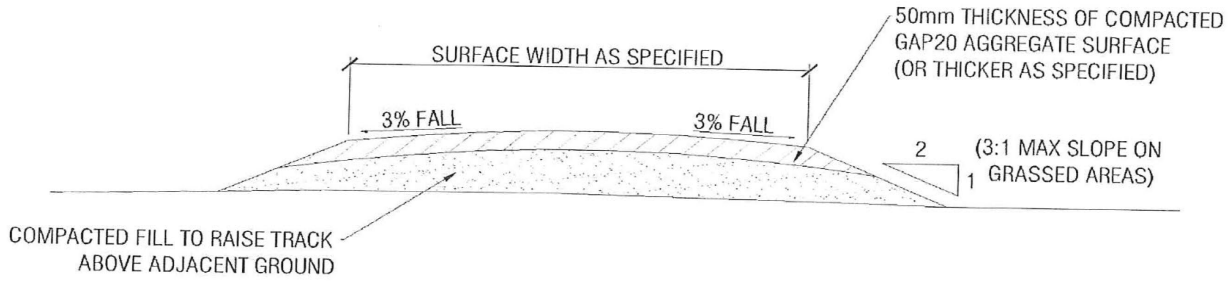


Figure 10 **Typical Filled Track Formation**

(FOR USE ON LEVEL OR POORLY DRAINED AREAS)

3.3 Gradient

The gradient of a track should be kept to the minimum that is practicable on the site. Keeping the gradient as low as possible and below specified maximum limits has the following advantages:

- Tracks with flat grades are more likely to be accessible to people who have mobility difficulties.
- Flatter track surfaces are likely to require less maintenance due to the reduced scuffing and slipping that occurs under normal use
- The erosion effect of water on the track and inside drains is significantly reduced when track gradient is minimised.

The maximum recommended gradient on any section of track should not exceed those shown in Table 5.

Table 5 – Recommended Maximum Gradient

Classification	Gradient
Primary Path	Preferred maximum grade 1 in 12 (8%). Maximum can be increased to 1 in 8 (12%) where site boundary and topography constraints exist and where disabled access is not specifically provided for. Steps to be avoided. Where steps are used, a handrail is provided. (For Class 1, a wheel strip should be provided on steps).
Secondary Path	Maximum grade 1 in 6 (17%) but preferably less than 1 in 8 (12%). (For Class 2, length of path with gradient 1 in 10 (10%) or greater to be limited to 30 metres).
Track	Maximum grade 1 in 6 (17%). (For Class 3, length of path with gradient 1 in 8 (12%) or greater to be limited to 30 metres).
Bush Track	Maximum grade 1 in 6 (17%).
Bridle Track	Maximum grade 1 in 10 (10%). Maximum sustained grade 1 in 20 (5%, 3 degrees)

Grades less than 1 in 12 should be provided wherever possible to facilitate wheelchair use and easy buggy and mobility scooter use.

Long sections of tracks with grades steeper than 1 in 6 should be avoided by either:

- Re-aligning the track to achieve a reduced grade over a longer route
- Correcting the grade by longitudinal cut and fill construction
- Installing sections of steps (Physically challenged people generally find well constructed steps easier to negotiate than steep sections of track)

In some instances where existing tracks have a steeper grade than the recommended grade, it may not be practical to reduce the track gradient because of proximity to property boundaries, historic features or protected native vegetation. In these circumstances an alternative is to maintain the existing gradient, but to provide additional drainage and a well bound or hardened track surface.

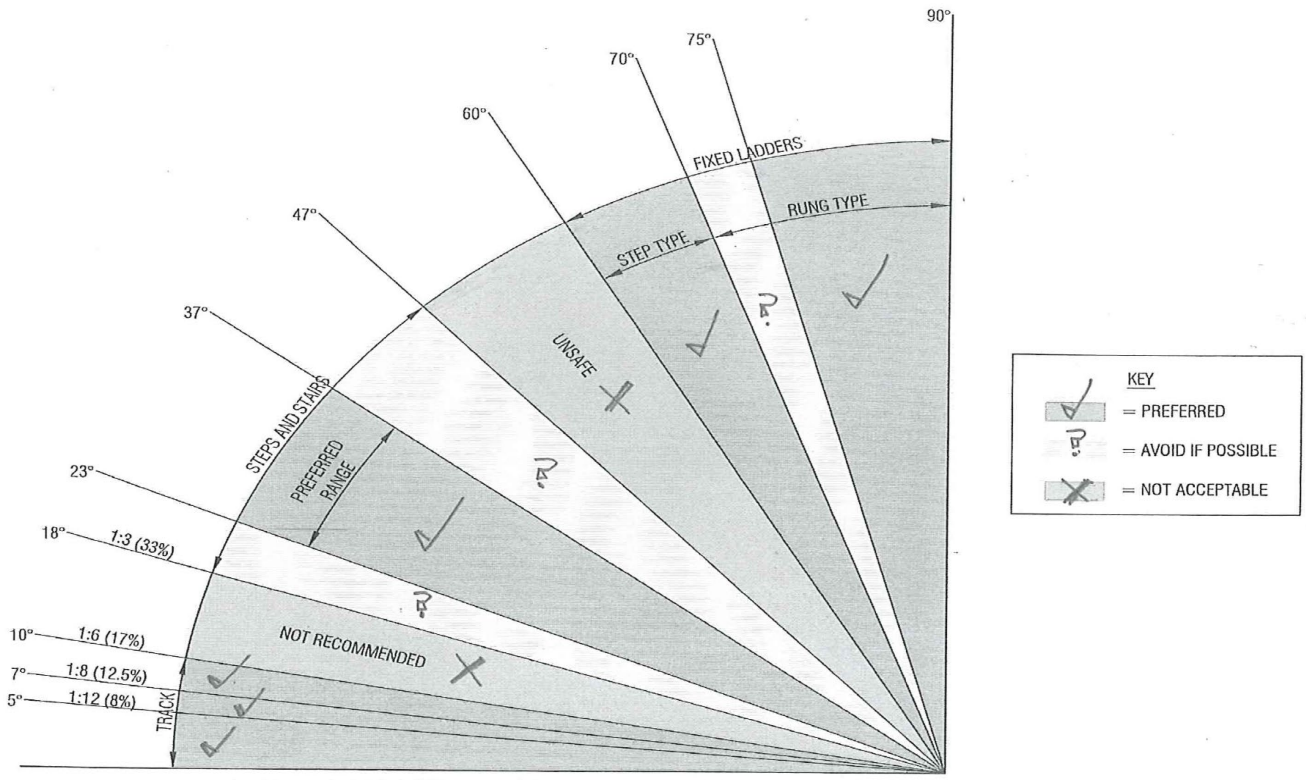


Figure 11 **Access Options For Varying Gradient**

3.4 Width

Track width should be sufficient to provide comfortable use by the expected users. The recommended minimum track width for each track classification is shown in Table 6.

Table 6 – Minimum Width	
Classification	**Track Width**
Primary Path	1.4m minimum. Generally 2.0m or greater to provide comfortable two way use by groups. (Minimum width 2.4m for Class 1).
Secondary Path	1.2m minimum. Generally at least 1.4m to provide comfortable two way use. (Minimum with 2.0m for Class 2).
Track	750mm minimum. Generally at least 1.2m to provide comfortable side by side use.
Bush Track	Minimum 300mm. Typically 600mm where formed. Steps 600mm wide minimum.
Bridle Track	3.0m minimum. Width reducing to 1.5m over short sections is acceptable.

A reduced width may be appropriate in certain locations or for short sections of track for the purpose of passing between close spaced trees or traversing steep cross slopes. A width of less than 600mm is suitable for single file walking provided it is possible for users to step off the track in most places to allow people coming the other way to pass. A width of 1200mm is sufficient for side by side walking, but on tracks where comfortable side by side walking is to be provided, an access width of more than the required minimum track width should be provided as indicated in Table 6.

Where there is combined walking and bicycling use, additional track surface width is essential to ensure safe passing of pedestrians by higher speed cyclists. The widths shown in Table 6 for the bicycling classes of tracks are minimums, and wherever possible greater than the minimum width should be provided.

The accessible deck width for boardwalk and bridge structures should be within the minimum widths shown in Table 6.

Existing tracks that are wider than necessary for the current user profile may be reduced in width to provide a better character to the park and to reduce the area of pavement maintenance. Some tracks may be provided with sufficient width to allow vehicle access for track or site maintenance or for fire control access purposes.

Where excessive vegetation wear is showing along the edges of a track, this is indicative that the track may have an insufficient width for the numbers of users or that the track may have a poor surface or poor drainage that encourages users to seek a better walking surface present on the track edge.

4 Environmental Issues

4.1 General

Because parks and reserves are often remnants of natural habitat or are important areas for fauna and flora, particular care is necessary when track construction work is undertaken in parks.

Anyone who is to undertake work in a park or reserve, including all Contractors, should be given a briefing on the specific requirements relating to the work and any conditions that are part of a resource consent for the work. Particular care should be taken to avoid or mitigate damage to any scenic, geological, vegetation or archaeological values of the site.

4.2 Resource Consent

Track construction, upgrade work and maintenance activity is governed by the Statutory Planning requirements of the Resource Management Act. A Resource Consent is required for any activity that is not a permitted activity (i.e. a controlled activity) under the Regional Plan or District Plan. The need for a Resource Consent may arise as a result of:

- Volume of earthworks exceeding permitted levels.
- Work within the drip line of significant trees.
- Work on or near an archaeological site.
- Work adjacent to or over a stream or in a coastal marine area.

When a Resource Consent has been obtained for the work, the conditions of the consent should be made available to those undertaking the work to ensure they are aware of the activities that are authorised on the site and the controls that are necessary on construction activities.

4.3 Historic Places Trust Authority

If any proposed track construction, upgrade works or maintenance activity is within a known or suspected archaeological site, then an authority for the proposed activity must be obtained from the Historic Places Trust prior to the commencement of any works. An application for authority to modify should include details of why the modification is necessary and describe what measures will be taken to minimise the extent of disturbance.

A copy of the authority should be provided to those undertaking the work so that they are aware of any conditions placed on the work. In some circumstances, this may require an archaeologist to be present whilst work is carried out in the vicinity of the archaeological site.

4.4 Cultural Sensitivity

Many parks and reserves contain places that are culturally significant to Maori. These values may extend beyond known archaeological sites and may include landscape features, water, fauna, flora, natural resources and place names that are regarded as precious and sacred or as having spiritual importance. Modification, disturbance or misuse of these things may be offensive to Maori and cause distress among their people.

To minimise the potential for causing offence to Maori, it is important to refer to relevant Memorandum of Understanding and consult with appropriate representatives of each affected iwi at an early stage of work planning for any work that may impact on sacred or spiritual values. Basic track surfacing maintenance is unlikely to affect issues of cultural significance; however track re-alignment, excavation of drainage trenches, re-direction of stream channels, earthworks and vegetation trimming may impact on items of cultural significance.

4.5 Work Area

Particular care should be taken to avoid damage to trees, plants or natural features adjacent to any track works site. This may be best achieved by installing marking tape or a string line clearly defining the work site boundary. The access of plant and vehicles outside of the track zone should be avoided.

Sites for storage of materials or equipment should be identified in locations that are free from surface roots of sensitive trees and where materials are unlikely to be washed off the site or into drainage systems in the event of an unexpected storm. Any storage sites should be cleared of surplus materials and rehabilitated after completion of the works. This may require top-soiling and planting of appropriate species to protect exposed soils from erosion.

Where there is a risk of soil being washed from earthworks on the site, silt fencing should be installed in appropriate locations to trap sediment. These fences should be left in place until well after the completion of the works and when vegetation growth has stabilised any exposed soil areas. Where silt retention fences have an accumulation of trapped sediment; the sediment should be dug out and disposed of appropriately before removal of the silt fencing.

4.6 Materials brought onto Site

All aggregates brought onto the site for the purpose of track formation or surfacing should be from a weed free source. The source site should be checked for weed presence. Similarly, the cartage and transport of materials should be controlled so as to minimise the potential for seed or weed contamination. Stockpiles at road-ends should be covered with tarpaulins to reduce the potential for wind blown seed contamination.

Where aggregate materials are to be stored on a parks site, they should be placed on an existing paved area or on a geotextile or similar membrane so that all remnants of the aggregate can be removed on completion of the works. In some instances, there may be merit in retaining a quantity of surplus material on site for future maintenance. In such circumstances, the location and storage of this material should be managed to prevent contamination or loss of this material.

4.7 Removal of Waste Material

All timber off-cuts, surplus materials and any waste should be removed from the site at the completion of the work. Waste is defined as all foreign material on the site. This includes spilt concrete, nails, wood, plastic and metal off-cuts. Disposal of foreign materials into a park and reserve adjacent to a track is not permitted.

Waste or rubbish being held at the site prior to removal should be stored in such a fashion that it cannot be blown about by the wind. No fires are permitted.

4.8 Archaeological Evidence

If any archaeological evidence in the form of mining relics, early coastal defence structure, shell, bone, charcoal, greenstone, hangi stone, or artefact is uncovered during any construction, work in the area must cease in that particular area and the appropriate authorities notified. This is likely to include the local iwi representative and/or the Historic Places Trust. Work in the vicinity of sites where archaeological evidence is uncovered should not re-commence until the site is given a clearance by the appropriate authority.

4.9 Vegetation

Any trees that are to be removed or trimmed should be clearly marked prior to commencement of the work. All other trees should be considered as protected and appropriate measures taken to ensure they do not suffer damage or accidental removal.

If any tree roots are uncovered in the course of the work, approval should be obtained from an Arborist or the Council Horticultural Officer prior to cutting any roots greater than 50mm in diameter. In this event, it may be necessary to take alternative steps which may involve adjusting the alignment and level of the track.

Any tree roots less than 50mm in diameter should be cut cleanly according to best arboriculture practice.

4.10 Refuelling

Re-fuelling of small petrol power tools and diesel plant is permitted within the work sites. Where possible, small plant should be moved to sites adjacent to roadways or onto paved areas prior to re-fuelling.

Care should be taken to minimise the potential for leakage or spillage of fuels or lubricants or any other substance that could be spilled. Spillages should be cleaned up immediately. If soil at the site is contaminated by a spillage the affected soil should be removed. All spillages should be reported.

Bulk fuels and oils should not be stored at parks work sites. Oil changes are not permitted on vehicles or machinery on the site. No machine should be allowed to work on site with an oil leak. Major repairs to machines should not be permitted on site.

5 Formation Earthworks Construction

5.1 General

Path and track formation work consists of the earthworks necessary to construct the track bench and the associated side drains.

Prior to commencement of earthworks, all vegetation and leaf litter should be removed from the track formation area. Where possible, leaf litter should be retained adjacent to the track for spreading over exposed earthworks on completion of the formation. This will reduce sediment runoff and also speed up revegetation of the exposed surfaces.

Where track is to be formed across grass areas, the grass turf should be removed before commencement of the formation earthworks. Construction of track by placing new soil on the top of existing grass and organic soil should be avoided because as the organic material decomposes, settlement of the track surface will take place.

In some situations it may not be feasible to remove the grass or topsoil prior to formation construction, especially where damage to adjacent tree roots may be a risk or where there are archaeological sites that may be damaged by excavation. In such circumstances an alternative is to cover the grass with a geotextile and to place track fill material over the geotextile. If this approach is used, some settlement may occur after construction as the organic material under the track decomposes.

5.2 Formation Earthworks

Prior to commencement of track formation earthworks, sufficient setting out pegs should be installed showing the alignment and level of the required finished formation. Earthworks should not commence until setting out of a full section is complete so that should any adjustment be necessary, it can be made without having to disturb more ground than is necessary. The setting out should be sufficient to ensure that the grades and width of the formation are within the guidelines as covered in Section 4.

Track formation earthworks at any location are likely to consist of one of the following:

- Re-shaping of the existing track formation, or
- Longitudinal cut and fill construction on the existing track alignment to modify the track gradient to meet the required track gradient criteria, or
- Formation on a new alignment involving bench formation and/or cut and fill construction.

There should be no leaf litter, organic material or vegetation other than tree roots in any track fill formation.

Fill material should be placed in level layers not exceeding 250mm loose depth and should be compacted using appropriate compaction equipment. Rolling of fill material with tracked power barrows or excavators tracks is not considered adequate for the purpose of compaction of placed fill material. Appropriate compaction equipment is as follows:

- powered tamper (wacker)
- vibrating plate compactor
- vibrating roller
- packer wheel mounted on a mini excavator

For the purpose of maintaining the health of trees with sensitive root systems, it may be necessary to take specific precautions near such trees. This may involve avoiding compaction near such trees and accepting that the track in such locations may settle.

Fill batter slopes should not be steeper than the following depending on the soil type:

- Sandy clay, pumice - 2.0 horizontal to 1.0 vertical.
- Brown clay and silty clay - 1.5 horizontal to 1.0 vertical.
- Irregular shaped rocks, stacked - 1.0 horizontal to 1.0 vertical

Cut batter slopes should not be steeper than the following:

- Sandy clay - 1.0 horizontal to 1.0 vertical.
- Brown clay and silty clay - 0.5 horizontal to 1.0 vertical.
- Rock – Up to vertical.
- Pumice – Vertical (to avoid water flow down the face)

Low batter slopes of up to 500mm high with steeper batter slopes may be acceptable in locations where flattening the batter may cause unwanted damage to vegetation of excessive earthworks.

Where track is constructed on a cross slope of less than the maximum fill batter slope (1.5 horizontal to 1 vertical for clay soils), the walkway bench may be constructed using combined cut and fill formation or fill formation as shown on the drawings. The excavated material from the inside of the formation bench may be used to fill the outer edge of the walkway bench provided it is compacted in place with suitable equipment.

Where the walkway is constructed on a cross slope of greater than the maximum fill batter slope (1.5 horizontal to 1 vertical for clay soils), a full cut formation (full bench) detail should be used as shown on the drawings. The material cut from this type of formation should be carted and compacted in place on ground having a slope of less than 50% or should be retained for use as fill over ground covered with roots, or as backfill for boxed steps and retaining walls. Under no circumstances is surplus excavated material to be side cast over the edge of the track bench onto steep ground.

Prior to placement of track surfacing, the strength of the track sub-grade should, wherever possible, be improved by the use of suitable compaction equipment such as vibrating rollers or plate compactors. Prior to placement of track surfacing aggregate, the track sub-grade should be shaped with the required cross-fall as specified in Table 4. Final shaping of the track sub-grade surface should take place after the installation of all culverts and cross drains.

Fill slopes should be left in a tidy condition. Any fill or cut batter slumping or minor subsidence which occurs after formation of the original track, should be removed as soon as possible so that the slumping does not interrupt or block the drainage system.

Where available, vegetation, organic soil or mulch should be spread over fill slopes to reduce the potential for damage from heavy rainfall and runoff. In grass areas, top soil and grass seed should be placed on the batter.

5.3 Vegetation Clearance

The vegetation clearance requirements for each of the track classifications are as described in Table 7. See also Figures 1-6 for cross section illustrations and dimensions.

Table 7 – Vegetation Clearance

Classification	Clearance Requirements
Primary Path	Cleared to a height of 2.5m over the total width of the path surface. (Ground level, clearance shall extend to 0.5m outside the path surface each side)
Secondary Path	Cleared to a height of 2.5m over the total width of the path surface. (Ground level, clearance shall extend to 0.5m outside the path surface each side).
Track	Cleared to a height of 2.5m over the total width of the path surface. Minor encroachment by soft vegetation acceptable. (Clearance to 2.5m height).
Bush Track	Cleared to a height of 2.0m over the total width of the path surface. Minor encroachment by soft vegetation acceptable. Occasional encroachment by branches acceptable provided a 600mm minimum access width is maintained.
Bridle Track	Cleared to 3.7m height over at least 3.0m width. Short narrow sections between trees acceptable provided there are no overhanging branches.

Any significant trees or plants along that route that are to be retained or are specifically protected, should be identified and any specific instructions relating to these trees should be clearly communicated prior to commencement of vegetation trimming. This is especially important in parkland containing specimen trees or rare vegetation. If considered necessary, important protected trees should be marked with tape to avoid inadvertent damage. If machinery is to be used in close proximity to protected trees, the risk of bark damage can be reduced by temporarily wrapping the tree trunks with carpet.

Cutting of tree roots should, where possible, be avoided. Where tree roots greater than 50mm are encountered in excavations, the advice of an arborist is required. If cutting of such roots is permitted, they should be cut cleanly with a saw or shears rather than being torn apart by excavation equipment.

Vegetation trimming should be carried out with clean sharp shears or pruning saws. Branches should be cut cleanly and squarely avoiding bark damage below the cut and to

avoid sharp projections that may be a hazard to park visitors. Trimmings should be removed and disposed of off the site for Class1; Primary Path and Class 2: Secondary Path. On other tracks, trimmings may be disposed of in the vegetation off the track, out of immediate view of visitors on the track.

Vegetation species for planting adjacent to tracks should be selected carefully to minimise the need for extensive pruning or future removal. Species that have spreading branches such as pohutukawa should not be planted in close proximity to the track. Similarly, flaxes and other stringy vegetation that may pose a tripping hazard should be positioned at least one metre from the surface edge of tracks. Removal of problematic species close to a track may be preferable to frequent pruning.

6 Pavement and Surfacing

6.1 Walking Surfaces

The walking surface provided on a track plays a significant part in the perceived quality of a track by the users, as well as the type and frequency of maintenance that is necessary. Due to the relatively high rainfall in the region, tracks that have any more than infrequent use, are likely to require some form of pavement surfacing. Track surfacing requires regular maintenance during its serviceable life and after a period of time will require replacement. The recommended surfacing options for each classification of track are included in Table 8.

Table 8 –Surface Options

Classification	Track Surface
Primary Path	Durable paved surface consisting of concrete, chip seal, asphalt or well bound aggregate. Maximum discontinuity on the surface of 5mm. Free from loose stones, accumulated leaf litter and moss/algae.
Secondary Path	Durable surface generally consisting of well bound aggregate, but may consist of concrete, chip seal or asphalt in some locations. Free from loose stones, tripping hazards and ruts.
Track	Durable surface generally consisting of well bound aggregate to ensure traction in all conditions. Natural ground or grass surface acceptable in areas where use is low and gradient is less than 1 in 8 (12%).
Bush Track	Generally compacted natural ground or grass. Aggregate surfacing provided where necessary to prevent formation of muddy sections or to provide slip resistance. Occasional roots and un-evenness tolerated.
Bridle Track	Compacted aggregate, or natural ground in well drained areas.

A high quality hardened surface should be provided on the paths and tracks that are intended for frequent bicycle, wheelchair, mobility scooter or push chair use. Durable aggregate surfacing should be provided on other tracks that receive frequent use.

6.2 Selection of Surface Materials

It is important that the correct track surface material chosen in the appropriate situation. This should be suitable for the track classification and User Group for all seasons and weather conditions. Table 9 describes track surface options for each track classification.

Table 9 –Surface Material Options

Classification	Surface Material	Comment
Primary Path	Concrete	Requires access for concrete transport or concrete pumping equipment. Helicopter transport of concrete is possible in remote locations. Should not be used where ground settlement is likely or over sensitive tree roots.
	Asphalt	Requires access to deliver hot mix. Can tolerate minor ground movement. Use with caution around trees.
	Chip Seal	Requires access for hot bitumen spraying equipment. Can tolerate medium ground movement.
	Aggregate	Can tolerate high ground movement. Not recommended where there is frequent wheelchair and buggy use.
Secondary Path	Aggregate	Generally suitable in most situations. Geocells or other stabilisation may be used where necessary to achieve stable surface.
	Paved Surface	Used in areas with frequent cycle, wheelchair, mobility scooter or push chair use. (Refer to options under Primary Path).
Track	Aggregate	To be used in most situations. Geocells or other stabilisation may be used where necessary to achieve a stable surface.
	Natural Ground	Can be used in dry, low traffic areas. Not recommended in wet areas with clay soils as this will become muddy and slippery.
Bush Track	Aggregate	Used on clay soils, and in high and medium used areas.
	Natural Ground	Suitable in low use, well drained sites.
Bridle Track	Aggregate	Used on higher use bridle tracks. Care necessary in selection of aggregate to avoid sharp stones that may lodge in hooves.
	Natural Ground	Used in well drained or low use areas where use is infrequent.

6.3 Natural Surfaces

The following natural track surfaces can be used as described in Table 10.

Table 10 – Natural Surface Options	
Surface Type	**Comments**
Grass	• Suitable on flat, low traffic areas where grass already exists. • Track markers are recommended in large open grassy areas. • Large amounts of foot traffic or steep grades will result in a muddy track. • Regular mowing may be necessary to ensure the track is defined. • Hardy grass species should be selected.
Compacted soil	• Suitable in low traffic areas with good drainage only. • Large amounts of foot traffic will wear the soil surface forming a concave track shape, which will eventually collect water. • Suitable drainage system should be provided as described in Section 8.
Weathered rock	• Suitable in locations where existing weathered rock is present. • Can be compacted with a crowned surface to form a suitable surface. • Suitable drainage should be provided as described in Section 8 to prevent the weathered rock from becoming wet and slippery.
Stabilised Soil	• Mechanically stabilised soil using turf reinforcement (geocells) or concrete “Gobi blocks” may be appropriate in high use grass areas or where the natural ground consists of un-cohesive sandy soils that will not bind naturally. • Chemical stabilisation of the natural soils with dust suppressant or similar products may be appropriate to achieve a well bound soil surface.

Where possible, natural track surfaces should be provided with a crowned surface, be compacted with vibrating compaction equipment and be provided with side drains.

6.4 Aggregate Surfaces

An aggregate surface can provide a cost effective, durable and safe walking surface provided the aggregate is well bound so that it forms a slip resistant surface rather than loose stones. The selection of a suitable aggregate for track surfacing is a major factor in providing a track surface that is comfortable and safe to walk on, durable and requiring minimal maintenance, and is suitable for wheelchair and buggy use. A good quality aggregate surface will have low maintenance and be resistant to some surface flooding. The key to obtaining a suitable aggregate is the selection of surfacing material with a well graded range of particle size including a portion of clay fines which will assist in the binding of the other aggregate particles. In almost all circumstances an aggregate with a 20mm maximum particle size will be suitable for walking tracks. If the track is also to act as a vehicle access roadway and the compacted pavement depth is greater than 150mm, then consideration should be given to applying an aggregate with a 40mm aggregate size as a sub-base followed by a 20mm maximum particle size aggregate as a running course.

Suitable aggregate surfacing material should be a well graded GAP20 aggregate having a maximum particle size of 20mm and a clay fines content of between 3% and 5%. The aggregate should be provided from a weed free source.
Taranaki sourced "Wiremu fines" aggregate meets these requirements.

The aggregate stone particles should be durable with at least 50% broken faces. Rounded particle river gravels or beach gravels are not acceptable as a track surfacing aggregate unless these materials are crushed and additional fines are added. Rounded river gravel or beach gravel is unlikely to bind to form a tight pavement surface. On sloping sections of walkway, such gravels are likely to result in a slipping hazard.

Aggregate for track surfacing should have a range of particle size distribution. If the particle size distribution (or grading curve) obtained by testing an aggregate sample is within the grading envelope defined in Table 11 it can be expected to compact and bind well to provide a good walkway surface.

Table 11 – Aggregate Grading Envelope

Sieve Size [mm]	% Passing Maximum	% Passing Minimum
19		100
13.2	99	82
9.5	90	64
4.75	75	44
2.36	65	34
1.7	60	28
1.18	52	23
0.6	45	13
0.3	35	10
0.15	28	7
0.075	20	5

It may be unreasonable to expect a supplier to provide an aggregate grading analysis for orders for small quantities of aggregate, due to the expense of testing. In these circumstances, the above grading envelope table should be used as a guide only. When large quantities of aggregate are being supplied, it is reasonable to expect the supplier to provide a grading analysis to demonstrate that the material being offered falls within the required grading envelope. To produce a suitable material may require blending to achieve a grading that falls within the envelope represented by Table 11.

Generally, aggregates produced for road pavements and for building foundations will lack the proportion of fines necessary to achieve a well bound walking track surface. It may be necessary to request additional clay and silt to be added to this material.

It is not usually possible to achieve good binding by placing a thin layer of additional aggregate over an already compacted layer. The minimum thickness of aggregate that can be properly placed in a single layer is not less than 2.5 times the largest stone (i.e. for 20mm aggregate, the minimum layer is 50mm). This layer should be placed and compacted in a single layer. If additional aggregate is required after compaction to ensure the required layer thickness is achieved, the original aggregate layer should be scarified with a hoe or rippers before placing the additional aggregate.

For maintenance purposes it is possible to lay thinner layers by using aggregate with a smaller aggregate size, or by scarifying the original aggregate surface before placing the next aggregate layer.

Methods used to place aggregate should be such that segregation of the aggregate is avoided. Working of the placed aggregate with rakes or blading should be avoided as this causes segregation of the large stones from the small particle sizes. Shovels or excavator buckets should be used to move material if this is necessary.

The track aggregate surface should be compacted immediately after placement with a plate compactor or other vibrating equipment. Where tracks are accessible by steel drum vibrating rollers, the use of this type of equipment will provide the best results for compaction.

Water should be sprayed onto the aggregate surface in dry conditions during compaction to ensure optimum compaction is achieved. Compaction is deemed to be complete when a well bound pavement surface is achieved which is free of voids or loose stone. Water is likely to be necessary if the aggregate is dry and does not bind. Care is necessary not to over water the aggregate because a well graded aggregate with clay content is prone to being saturated to above its optimum moisture content.

6.5 Concrete Surfaces

Concrete surfaces should be constructed as per the relevant principal standards. These are as follows:

- NZS 3109Concrete Construction
- NZS 3124Concrete Construction for Minor Works
- NZS 3402Reinforcing Bars

All concrete should be supplied from a certified batching plant complying with NZS 3109 and delivered to the site fully mixed ready for placement. In most circumstances, delivery of batching plant ready mixed concrete will be preferable to site batching and mixing of concrete. The quality control of concrete from such plants is much higher and a more reliable concrete consistency results. It is feasible and cost effective to deliver ready mixed concrete to relatively remote sites by using retardants in the mix to delay set time and by using helicopters with hoppers to deliver to the actual work site. Usually the cost of transport of redi-mixed concrete is offset by the significant saving in site labour and the need to transport suitable materials and equipment to the site for batching.

Any concrete mixed on the site should comply with NZS 3109 Concrete Construction. The material specifications, methods and techniques set out there-in should be observed in all respects. Site mixed concrete should only be used in circumstances where the cost of delivery of ready mixed concrete is prohibitive.

Concrete should have a 20mm max aggregate size and a 20MPa minimum compression strength at 28 days is to be used. Concrete strength of 20MPa will be suitable for most path surfacing situations. In certain circumstances where the concrete will be subject to high wear or loading from machinery or vehicles or from exposure to seawater, then higher strength concrete may be specified.

The cement used should be ordinary Portland cement (type O) except that with the approval of an engineer for a specific location, rapid hardening Portland cement (type RH) may be used.

An aggregate hardfill sub-base layer of 50mm minimum thickness should be provided on the compacted formation under any section of track that is to be provided with a concrete surface.

The edges of a concrete pavement should be formed using rigid edge formwork that is adequately supported at regular intervals to ensure that the formed edges do not bulge or tilt during concrete pouring. Proper support of edge formwork for concrete pavements is essential to ensure that the edges remain true to line. If 25mm thick edge timber is used then it should be supported at not more than 500mm spacing by pegs or pins driven into firm soil.

The minimum required thickness of a concrete path is 75mm. If maintenance vehicles such as tractor mounted mowers or light vehicles are likely to travel on the path, the

minimum thickness should be 100mm. Where heavy vehicles are likely to cross a path, a concrete thickness of 150mm should be provided. The edge formwork should be set at a level to enable screeding of the pavement surface to the required level and to ensure the required concrete slab thickness is achieved.

Concrete should be placed using suitable screeds and vibration equipment to ensure that the concrete is free from voids and has a dense surface free from air pockets.

Concrete walkway surfaces should be finished with a light broom finish, or alternative architectural finish such as exposed aggregate where this has been specified. An exposed aggregate finish is achieved by water blasting the new concrete surface using suitable high pressure water-blasting equipment or by adding Retinol concrete retardant (when exposing aggregate, appropriate environmental mitigation is necessary especially when near watercourses).

A trowelled or floated finish should not be used on a walkway because such a surface will become very slippery in wet conditions. Any additives such as colouring or retardants should be added to the concrete mix as per the manufacturer's specifications.

A concrete walkway should have trowelled or saw cut contraction joints, extending to a minimum depth of one quarter the concrete depth, evenly spaced along the length of the walkway at a maximum of 3m apart.

6.6 Asphalt Surfaces

Asphaltic concrete pavement should be constructed in accordance with Transit New Zealand Specifications. The specific specifications are as follows:

- TNZ M/10Asphaltic Concretes
- TNZ B/02Construction of Unbound Granular Pavement Layers 1997
- TNZ M/04Base Course Aggregate 2002
- TNZ P/09 Asphaltic Concrete Pavement Construction

The sub-grade on areas to be paved with asphaltic concrete should be shaped and compacted as per Section 6.2 of this manual before the placement of basecourse aggregate.

Areas to be paved with asphaltic concrete should have a compacted layer of aggregate pavement not less than 100mm thick. On weaker sub-grade material, the thickness of aggregate pavement should be increased. Preferably the sub-grade should be compacted to an equivalent bearing capacity of CBR 7. Any weak areas of sub-grade that cannot be compacted to achieve CBR 7 should be dug out and replaced with material that can be compacted to achieve the required bearing capacity. It is important to ensure that the pavement under asphaltic concrete surfacing has sufficient strength to last the life of the surfacing; otherwise premature failure of the asphalt surfacing may result.

Where specified, kerbing or concrete edge formation should be constructed prior to the placement of basecourse aggregate. Kerb and edge concrete should be given sufficient

time to gain strength before placement of aggregate. Generally it is necessary to have an edge against which to compact the basecourse for asphaltic concrete or alternatively the basecourse edge may taper in thickness beyond the proposed edge of the surfacing. In some urban park locations, a flush concrete edge or kerb can be considered for an asphalt track surface.

The granular basecourse aggregate layer of at least 100mm compacted thickness should be constructed as per TNZ M/04 and TNZ M/04 over the full width of formation to be asphalted. The thickness of the basecourse may be increased depending on the expected weight and amount of vehicular traffic and also on the strength of the sub-grade. In areas that are likely to be trafficked by heavy vehicles, a basecourse layer of 200mm to 250mm would be more appropriate. The advice of an engineer should be sought for such pavements.

Asphaltic Concrete should be mixed as per Mix 20 in TNZ M/10. It should then be laid and compacted generally in accordance with Transit New Zealand Specification P/09, except that a tack coat should not be used, and laying the asphalt will be manual using an appropriate means to ensure a minimum layer thickness after compaction of 30mm is achieved over all of the paved area.

6.7 Chip Seal Surfaces

Chip seal pavement should be constructed in accordance with Transit New Zealand Specifications. The specific specifications are as follows:

- TNZ B/02Construction of Unbound Granular Pavement Layers 1997
- TNZ M/04Base Course Aggregate 2002
- TNZ M/01Roading Bitumens1995
- TNZ M/06Sealing Chip2002
- TNZ P/03First Coat Sealing1995
- TNZ Q/01Chip Sealing1995
- TNZ T/05Size, Shape & Grading of Grades 1-4 Sealing Chip 1987

The sub-grade on areas to be chip sealed should be shaped and compacted as per Section 6.2 of this specification before the placement of basecourse aggregate.

Areas to be chip sealed should be compacted to an equivalent bearing capacity of CBR 7. Any weak areas of sub-grade that cannot be compacted to achieve CBR 7 should be dug out and replaced with material that can be compacted to achieve the required bearing capacity. It is important to ensure that the pavement under chip seal surfacing has sufficient strength to last the life of the chip seal, otherwise premature failure of the seal may result.

Where specified, kerbing or concrete edge formation should be constructed prior to the placement of basecourse aggregate. Kerb and edge concrete should be given sufficient time to gain strength before placement of aggregate. Generally it is necessary to have an edge against which to compact the basecourse for chip seal or alternatively the basecourse edge may taper in thickness beyond the proposed edge of the seal. In urban

park locations, a flush concrete edge or kerb can be considered for a chip sealed track so that the edge of the walking surface is defined and can be easily maintained.

A granular basecourse aggregate layer of at least 100mm compacted thickness should be constructed as per TNZ M04 and TNZ M/04 over the full width of formation to be sealed. The thickness of the basecourse may be increased depending on the expected weight and amount of vehicular traffic and also on the strength of the sub-grade. In areas that are likely to be trafficked by heavy vehicles, a basecourse layer of 200mm to 250mm would be more appropriate. The advice of an engineer should be sought for such pavements. If the track is to have pedestrian and very light maintenance equipment use only, a basecourse thickness of 100mm will suffice.

Chip seal should be constructed as per TNZ P/03 and TNZ Q/01. The seal should have a Grade 4 first coat chip seal to the specified width. For special effects, specific colour or type of sealing chip may be specified. A Grade 6 chip dry locking coat may be applied over the first coat chip seal. Application of a locking coat of Grade 6 chip immediately after chip sealing provides a locking coat to produce a smoother and better bound chip seal surface. Good chip seal surfacing results have been achieved on walkways using sealing chip that is less angular than that normally required for road sealing.

After spreading the chip, the surface should be rolled with appropriate equipment to ensure the chip is well adhered to the bitumen.

Surplus sealing chip should be swept and removed once a bound chip matrix has formed on the surface of the pavement. Care should be taken not to disperse surplus chip onto grass areas, planted garden beds, watercourses or lakes.

6.8 Geocells

Geocells are polymer cellular panels that provide confinement to aggregate or soil track surfacing that is placed within the cells. Geocells are effective for binding potentially loose aggregate or soils, especially in locations where the track grade is steep and the surface is prone to causing slipping.

The track formation on which geocells are to be placed should be formed with the appropriate cross fall and compacted to an even surface with a plate compactor before placement of the cellular panels. Panels should be placed over the required track area and connected as per the manufacturer's instructions. Cells should be filled with suitable aggregate and compacted with a plate compactor so that the cells are densely filled.

Because geocell track surfacing is more expensive than a simple aggregate surface, and is more difficult to re-shape or maintain, this option should only be used where a suitable surface cannot be achieved with available aggregate, or where it is impractical to bring suitable surfacing aggregate to the site.

7 Drainage Systems

7.1 Drainage Requirements

The surface drainage requirements for each of the path and track classifications are as described in Table 12.

Table 12 –Surface Drainage	
Classification	**Track Surface Drainage**
Primary Path	Well drained surface which remains suitable for all types of footwear in all conditions. Free from ponded surface water. All streams and drains culverted or bridged.
Secondary Path	Well drained surface which remains suitable for all types of footwear in all conditions. Free from ponded surface water.
Track	Well drained surface which remains suitable for walking shoes. Free from mud or ponded surface water deeper than 5mm.
Bush Track	Drained surface, free of ponded water in most conditions. Suitable for walking shoes. Free from mud or deep ponded surface water.
Bridle Track	Well drained surface, free from ponded water.

Suitable track surface drainage is achieved by ensuring the appropriate type of pavement surfacing and ensuring an appropriate cross fall is provided. Generally a cross fall of 3% to one or both sides should be provided.

The formation work during construction of any particular section of the track should be completed with side drainage installed before proceeding to the next section. It is essential that drainage is installed as the formation work proceeds to reduce the risk of storm-water running over new track formation and newly formed fill batter slopes.

Side drainage channels should be formed according to the following:

- Along the edge of the track where specified and where the ground is level or rises beyond the edge of the track.
- At least 100mm deep and 150mm wide.
- A longitudinal fall of at least 1% towards a side drain discharge point. A discharge point should be provided where-ever there is a low point in the track profile.
- Discharge points should be provided at 15m maximum intervals or closer where the track grade exceeds 1:10. Discharge points may consist of a cut out drain leading to lower ground away from the edge of the track or a 225mm diameter smooth walled culvert pipe under the track to direct water to lower ground on the opposite side of the track. The 225mm diameter allows for larger urban litter e.g. plastic soft drink bottles.

- Where it is not possible to discharge a side drain through a culvert or by providing a cut-out to lower ground (i.e. where the track is in a long cutting) it may be necessary to increase the spacing between discharge points and to reduce the risk of scour of the side drain by increasing the side drain width and providing angular rock armouring as outlined below.
- Where side drains have a gradient greater than 1 in 8 over a distance of more than 15m, angular rock protection should be placed in the drains to slow the water flow and reduce the risk of scour. Rocks used for scour protection should have a size range of 50mm to 100mm diameter. If necessary, increase the depth and width of the side drain to accommodate the rock without reducing the drain clear cross section.

7.2 Culverts

Culvert pipes are necessary for:

- Discharge of side drains across the track to low ground on the opposite side of the track.
- Passing streams and stormwater drainage channels under the track.

Culvert pipes should be sized to match the area of catchment that they are required to drain. Natural water channels and small streams that are not crossed by boardwalks or bridges should be passed under the track through appropriately sized culverts. Culverts for streams to pass under the track should be specified to match the stream channel taking into account the expected flood flows as well as the stream width and gradient. It is better to specify larger pipes than necessary for the flood flows because flow velocities in larger pipes will be lower and there is less risk of scour. Table 13 provides a guide to the size of culvert necessary for various catchment sizes.

Table 13 – Recommended Culvert Sizes

Location	Catchment Area	Culvert Diameter
Side Drain Discharge (up to 15m spacing)	up to 300 sq m	150 mm
Side Drain Discharge (where spacing is greater that 15m or where significant runoff is encountered)	up to 600 sq m	200mm or 250mm
Stream Cross Drains (sizes given for vegetated catchments. Where catchments include developed areas with paved surfaces, larger culvert sizes than those indicated should be provided)	up to 3 ha	300mm
	up to 5 ha	375mm
	up to 10 ha	450mm
	up to 15 ha	600mm
	up to 40 ha	900mm
	up to 75 ha	1200mm
	over 75 ha	Specific Design

Culvert pipes should consist of black PVC pipe with smooth internal walls and corrugated external walls. ("Nexus", "Farm Boss" or similar). Culvert pipes should be installed with a minimum 3% fall to the outlet and with sufficient length to pass under the track and extend beyond any fill without the risk of fill collapsing into the drainage channel.

Culverts on walking tracks should be installed with a minimum cover of fill material over the pipe of 150mm. Where maintenance vehicles are likely to access a track, the minimum cover over a culvert pipe should be equivalent to the culvert pipe diameter but need not be greater than 600mm.

Inlets to culverts that are provided to discharge side drains under the track should have a 200mm x 200mm x 250mm minimum depth sump at the culvert inlet which has an invert level at least 75mm below the culvert pipe invert. The purpose of the inlet sump is to provide a sediment trap to reduce the amount of sediment that is transported into the lake and streams. These sediment traps will require emptying as part of normal track maintenance.

The outlets of culvert pipes should discharge at ground level without a free fall from the end of the pipe. Where culvert outlets discharge onto steeply sloping or loose material, a geotextile or rock apron should be provided to prevent scour.

Culverts that end in a waterfall are more prone to cause scour and sediment release. On permanently flowing streams, flow velocity and water drops should be avoided as these can be a barrier to certain fish species.

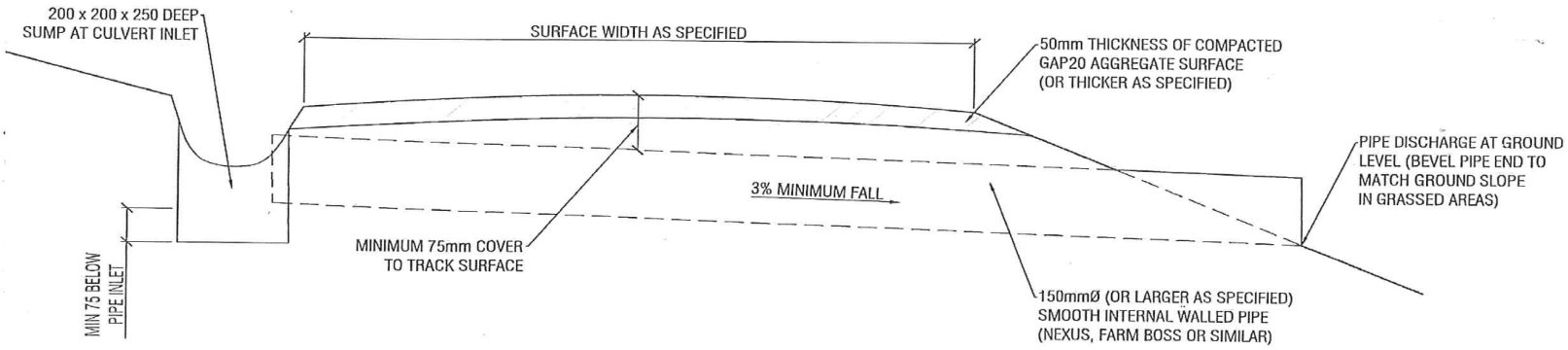


Figure 12 **Typical Track Culvert**

8 Steps

8.1 General

Step requirements for each of the track classifications are as described in Table 14.

Table 14 – Step Requirements	
Classification	**Comments**
Primary Path	• Steps should be avoided unless there is no other practical option. • If required, max step gradient should be 31 degrees, Maximum riser of 180mm. • Steps on paths shall be provided with a handrail on one side. • For Class 1C, a wheel strip is provided on steps
Secondary Path	• Avoided if possible • Maximum gradient 37 degrees • Maximum riser height 190mm • Maximum 2.5m rise between landings • Steps provided with a handrail on one side • For Class 2C, a wheel strip is provided on steps
Track	• Avoided if possible • Maximum gradient 37 degrees • Maximum riser 190mm. • Landings every 2.5m vertical riser
Bush Track	• Provided where necessary • Maximum gradient 37 degrees. • Maximum riser 190mm. • Landings every 4.0m of vertical rise
Bridle Track	• No steps

8.2 Step Geometry

Steps should not be constructed with a gradient of less than 18 degrees (32%). The maximum gradient of steps shall be as indicated in Table 14. Steps that are flatter than 18 degrees are uncomfortable to use because the step spacing is greater than a single stride, resulting in a one step up, one step along action when climbing such steps.

Each flight of steps should have a maximum vertical rise between landings of 2.5m, except on Bush Tracks where the maximum rise in each flight may be 4.0m. Landings should be at least 900mm long and should have a gradient of not more than 3%.

The riser and tread of all steps should be uniform within a single flight of steps.

The riser of each step should not exceed that shown in Table 14, and the tread should not be less that 250mm and not more than 600mm (ideally a step tread should be approximately 300mm).

8.3 Construction

Steps should be constructed from one of the following materials and to the specified width (steps should be constructed to the same width as the associated track):

- Timber boxed steps should be constructed with side stringers as per the standard drawings provided. Peg and board type timber steps are not acceptable.
- If stone steps, concrete steps or other steps are to be constructed, they shall follow the same geometric requirements noted above.

Timber boxed steps (excluding handrail) should be constructed from H5 treated timber, refer to Section 10.5. Because boxed step timber is exposed to a high decay hazard and the safety and integrity of the steps is dependant of the integrity of the timber, the additional cost of using H5 treated timber is justified by the additional life such steps will have.

All flights of steps on a particular section of track should be fully set out before commencement of construction to ensure that the geometric requirements are met.

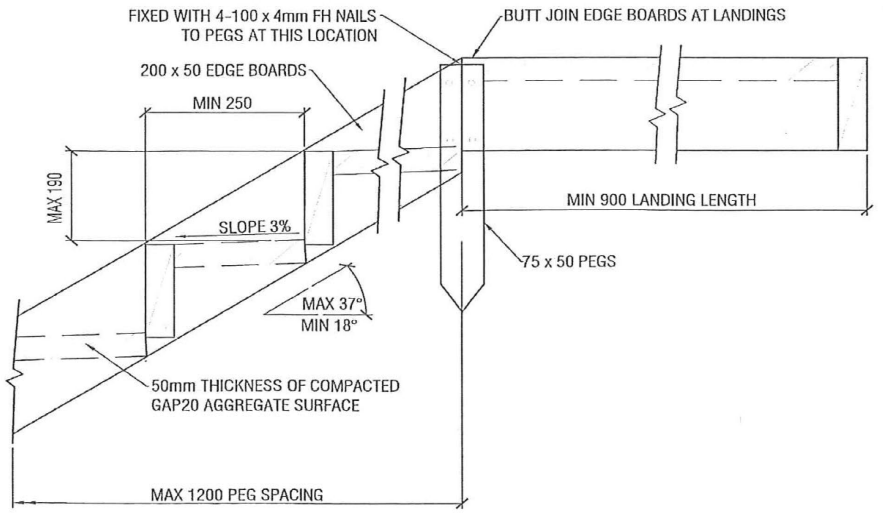
8.4 Boxed Step Filling

Boxed steps should be filled with compacted clay or imported clay or granular fill. There should be no vegetation in the fill material.

Fill material should be placed in level layers not exceeding 150mm loose depth and compacted using appropriate equipment. Care should be taken not to damage or deform the steps during compaction.

8.5 Boxed Step Surfacing

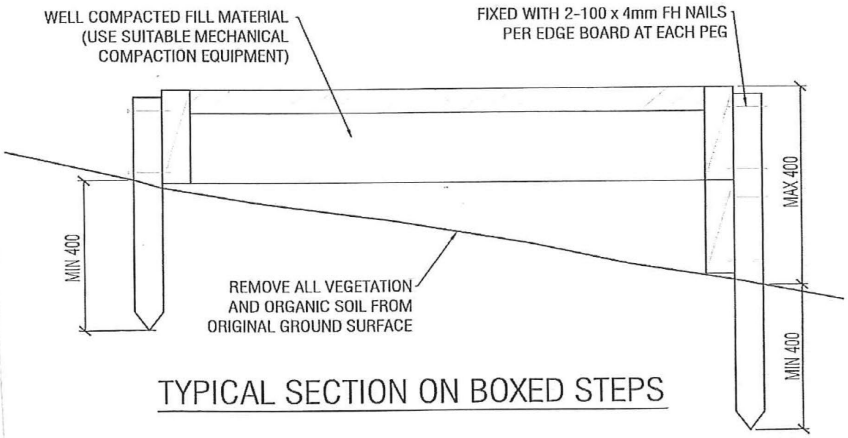
Boxed steps should be surfaced with aggregate, concrete or asphalt as specified in Section 7. Care should be taken to ensure that steps are filled to the level of the risers and to ensure that the surfaces have a 1% outward fall and are well compacted.



TYPICAL ELEVATION ON BOXED STEPS

GENERAL NOTES:

1. DRAINAGE CONTROL TO BE PROVIDED AT 5m MAXIMUM SPACING. THIS MAY CONSIST OF FLUMES OR CULVERTS THROUGH 150mm SMOOTH WALLED CULVERTS.
2. PROVIDE LANDING EVERY 12 STEPS. LANDING SHALL CONSIST OF AT LEAST 900mm LEVEL STEP.
3. ALL TIMBER TO BE H5 TREATED PINUS RADIATA.
4. STEPS SHALL HAVE UNIFORM LENGTH AND RISER HEIGHT WITHIN EACH FLIGHT BETWEEN LANDINGS.
5. IN LOCATIONS WITHIN 500m OF THE COAST, ALL BOLTS, NUTS AND WASHERS SHALL BE TYPE 316 STAINLESS STEEL.



TYPICAL SECTION ON BOXED STEPS

Figure 13 Typical Elevation and Section on Boxed Steps

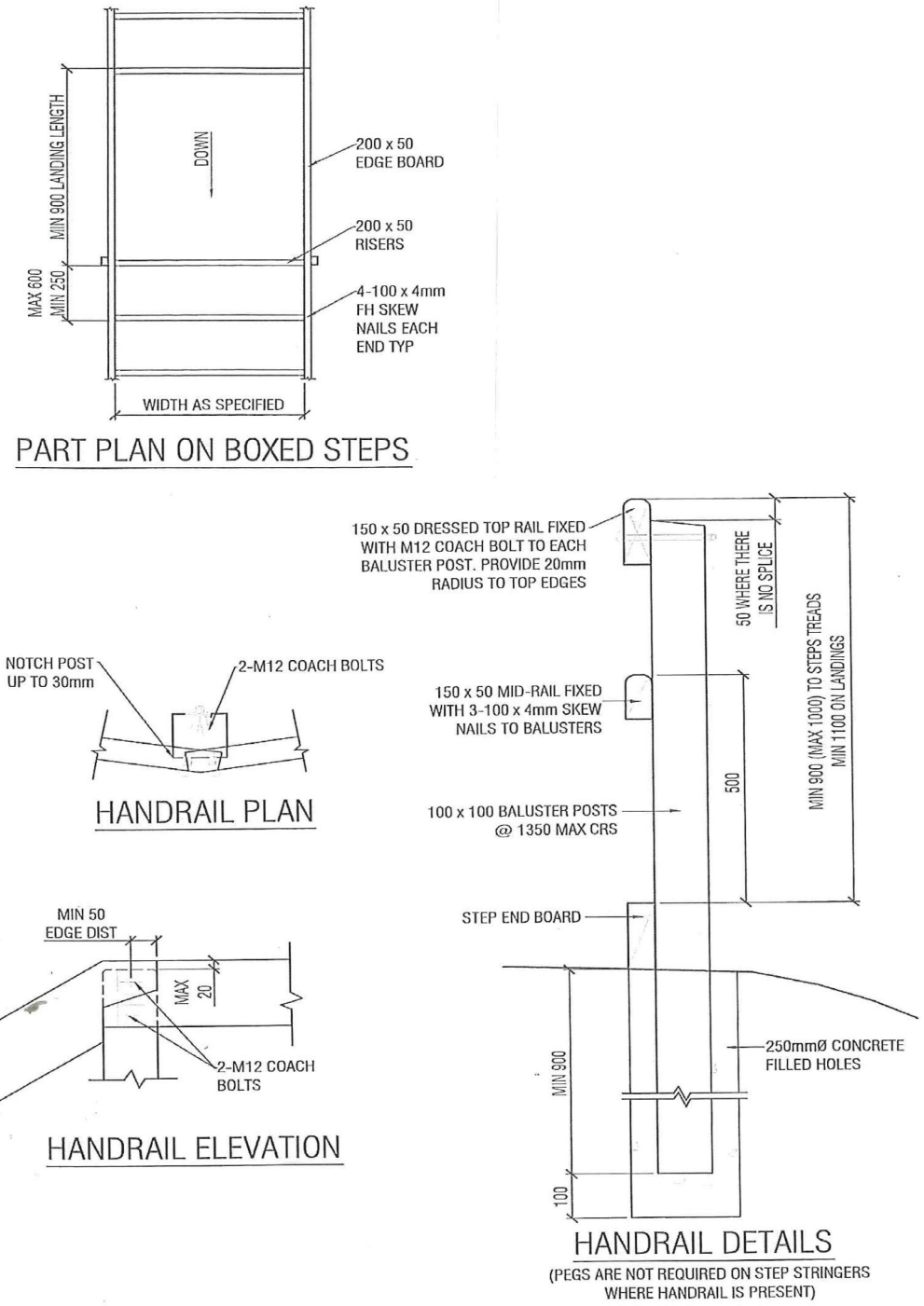


Figure 14 Part Plan on Boxed Steps / Handrail Plan / Handrail Elevation / Handrail Details

9 Minor structures

9.1 General

The following minor timber structures are covered by this manual:

- Handrails
- Barriers
- Timber boxed steps

9.2 Deck Width

The clear access width of the deck of boxed steps as well as boardwalks and bridges shall meet the minimum requirements shown in Table 6.

9.3 Handrail and Barrier Requirements

It is important to recognise the difference in purpose and requirements between handrails and barriers.

- Handrails are for the purpose of providing support for users on steps and on steep sections of track.
- Barriers are for the purpose of protecting users from a fall hazard represented by a combination of adverse fall height and adverse fall surface.

The handrail and barrier requirements for each track classification are as described in Table 15.

Table 15 – Handrail and Barrier Requirements

Classification	Handrail	Barrier
Primary Path	All steps should have a handrail installed on one side.	A barrier should be provided and shall extend the full length of the track, where a fall hazard represents a significant hazard to visitors.
Secondary Path	All steps should have a handrail installed on one side.	A barrier should be provided at any location where a fall hazard represents a significant hazard to visitors.
Track Bush Track	Not required.	A barrier should be provided at any location where a fall hazard represents a significant hazard to visitors taking into account the capability of users of walking tracks.

9.4 Handrails

Handrails shall be designed to have sufficient load capacity to carry the weight of a falling person.

Handrails should have a height from the top of the rail to the nose of the steps of between 900mm minimum and 1000mm maximum.

The top rail of a handrail should be graspable by a hand and should not have a "relevant width" as defined in the New Zealand Building Code D1/AS1 of more than 80mm.

Where children are expected to frequent a location, the provision of an intermediate handrail at approx 500mm height is recommended. This should be graspable in a similar way to the top rail.

9.5 Barriers

Barriers shall be designed to carry the loads as prescribed in the NZ Building Code.

Barriers should have a minimum height of 1100mm measured from the ground to the top of the top rail. The barrier baluster construction and infill geometry should confirm strictly with the Building Code requirements.

In some circumstances there may be a requirement for a handrail and a barrier in the same location, i.e. steps adjacent to a fall hazard. In such locations it suffices to provide a barrier with the required strength and infill properties and with a graspable top rail of height between 900mm and 1000mm.

9.6 Sand Ladders

Sand ladders shall be constructed from H5 treated timber. They shall be constructed to the width and design details provided by NPDC.
The sand level between sand ladder timbers shall be kept even and firm to provide an easy walking surface and a continuous support to timbers. Sand depth on sand ladders should not exceed 50mm.

Sand ladders shall be installed and maintained so that the maximum longitudinal gradient does not exceed 1 in 6 (17%) and the maximum cross slope is less than 1 in 8 (12%).

Sand shall not be excavated from dunes during construction or maintenance and care shall be taken not to disturb any native dune vegetation during sand ladder placement or maintenance. If correction of grade and cross slope is necessary, this shall be achieved by placing additional sand from an approved location, onto the dune formation.

An alternative to sand ladders on more stable sand dunes is the use of large geocells to confine the un-cohesive sand material and stabilise it under foot traffic. If sand is confined in this way, a suitable walking surface may be achieved by spreading fine surfacing material over the geocells.

9.7 Timber Details

Timber structures should be constructed as per the relevant principal standards. These are as follows:

- NZS3601Metric Dimensions of Timber
- NZS3603Timber Structures
- NZS3604Light Timber Frame Buildings
- NZS 3640Timber Preservation
- NZS3602Specifying Timber

(The species, grade, sizes, finish, treatment and moisture content of timber and wood based products should comply with the requirements listed in the relevant standards, at the time of enclosure or installation.)

The whole of the timber should be sound, well seasoned and maintain figured dimensions. Timber should comply with Table 16, according to its use and environment.

Table 16 – Timber Grade and Treatment

Location	Species	Grade	Treatment
Sawn timber not in contact with ground	Pinus Radiata	G8 or VSG8	H3.2
Sawn timber not in contact with ground but in the sea spray zone	Pinus Radiata	G8 or VSG8	H4
Sawn timber in contact with ground (or within 150mm of the ground) or fresh water	Pinus Radiata	G8 or VSG8	H5
Round or sawn piles or posts in contact with ground or fresh water	Pinus Radiata	NZS 3605	H5
Hardwood or specialty timber	Various	As specified by the designer	

Timber treatment should comply with the current requirements of the Timber Preservation Council. All treated timber should be branded with the appropriate Woodmark. It is preferred that timbers be treated at least 2 months prior to installation.

Cut faces of timber sections greater than 50mm thick should be treated with Metalex or similar field applied preservative treatment.

All nails should be 100x4.0mm FH galvanised steel.

All bolts should have the following details:

- Use type 316 stainless steel engineers bolts, nuts and washers in the following instances:
    - Marine wetting environment (any location below 2m above the mean high water spring level).
    - Marine spray environment (500m horizontally from the sea including harbours or 100m from tidal estuaries and sheltered inlets).
- Use hot dipped galvanised steel engineers bolts, nuts and washers in all other circumstances.
- Minimum bolt diameter for structural work should be 12 mm.
- On M12 bolts, washers should be minimum 50 x 50 x 5mm thick and M16 bolts, washers should be minimum 65 x 65 x 5mm thick. If stainless steel is used 3mm thick washers are acceptable.
- Square washers are required under the heads and nuts of all bolts.
- Thread protrusion past the nut should be a minimum of one thread pitch after tightening.
- All galvanised bolts in contact with treated timber shall be protected using General Purpose Grease in Pre Greased Holes. The contact faces of galvanised washers shall be coated with grease. All cut ends of galvanised components shall be treated with "dry galv" corrosion protection.
- Hot dipped galvanised and stainless steel components must not be in contact with each other.

Work generally should be in accordance with the best trade practice, and this should be deemed to include those methods, practices and processes contained in current syllabuses for the NZQA courses in carpentry.

Details not shown on the drawings should be formed according to the principles of NZS 3604. A thorough knowledge of the principles set out in "Builders Guide to NZS 3604" is recommended.

9.8 Structure Design

The design of bridges, boardwalks, staircases and viewing platforms shall be compliant with the New Zealand Handbook for Tracks and Outdoor Visitor Structures (NZS HB8630:2004). Such structures are subject to compliance with the Building Act: 2004 and the NZ Building Code.

10 Maintenance

10.1 Maintenance Inspection Frequency

Paths and Tracks should be inspected at the frequency show in Table 17

Table 17 – Inspection Frequency		
Classification	**Inspection Type**	**Inspection Frequency**
Primary Path	General park maintenance (by park maintenance team)	Monthly
	Normal track inspection	Twice yearly
	Asset Assessment	Annually
Secondary Path	General park maintenance (by park maintenance team)	Two monthly
	Normal track inspection	Twice yearly
	Asset Assessment	Annually
Track	General park maintenance (by park maintenance team)	Two monthly
	Normal track inspection	Twice yearly
	Asset Assessment	Annually
Bush Track	General park maintenance (by park maintenance team)	Six monthly
	Normal track inspection	Annually
	Asset Assessment	Annually
Bridle Track	General park maintenance (by park maintenance team)	Two monthly
	Normal track inspection	Twice yearly
	Asset Assessment	Annually

All tracks and structures should be inspected as soon as possible following a storm event when 100mm or greater depth of rain falls over a 48hrs hr period, or after an earthquake of magnitude greater than MM4 or a period of wind with gusts exceeding 100km/hr.

Residents of New Plymouth District or visitors may contact the Council Office to report incidents or hazards that they have observed on tracks in parks and reserves. These reports should be evaluated by a parks officer, and if considered necessary a special inspection to the incident or hazard site should be undertaken with urgency.

10.2 Maintenance Treatment Activity

The maintenance treatment applied to each walking track component should be dependent on the defect identified and should be as shown in Table 18.

Table 18 – Maintenance Treatment Activity

Track Component	Defect	Treatment Activity
Vegetation	Overhanging vegetation or vegetation covering track surface or structures.	Remove or trim vegetation clear of track and the deck of structures. Remove or spray vegetation encroachment over concrete or aggregate track surface
Aggregate and Natural Walking Surface	Ponded water or wet low areas on track surface.	Correct pavement drainage by re-establishing cross fall in track surface.
		Raise track surface by rotavating, adding like for like material, rotavate existing and new materials shaping with cross fall.
	Scour of surface	Correct pavement drainage by re-establishing cross fall in track surface.
		Add aggregate to re-surface the track pavement.
	Slippery surface	Scarify surface, reshape and compact to exposed aggregate surface.
		Re-surface aggregate pavement.
	Rough surface and/or exposed tree roots.	Add aggregate to re-surface the track pavement.
Hard Walking Surface (i.e. Concrete, Chip Seal, etc.)	Cracking	Repair cracks with crack filler
	Ponding water	Check and clear drainage or remove existing surface and re apply.
	Slippery surface	Waterblast slime from surface.
Drainage	Track side drains blocked	Clear side drains by removing accumulated material.
	Scour in side drain	Install additional side drain discharges.
		Place crushed rock in side drain as scour protection.
	Catch pits blocked	Clear accumulated material from catch pits.
	Culverts blocked	Clear culverts.
	Scour at culvert outlets.	Place crushed rock at culvert outlet.
		Install flume or drainage geotextile.

Track Component	Defect	Treatment Activity
Minor Timber Structures	Loose bolts and fixings	Tighten loose bolts and re-nail any loose fixings
	Broken deck timbers and rails	Replace broken timbers
	Uneven or buried sand ladders	Re-install to required grade and level
	Loose barrier or handrail posts	Ram tight in ground and tighten bolts
	Protruding nails or connectors	Remove or hammer flush with timber surface
	Graffiti on unpainted timber surfaces	Remove by sanding the surface to bare wood.

10.3 Vegetation Maintenance

Vegetation should be cleared to the width and height indicated in Table 7 to provide users with a clear, unimpeded view of the track surface.

Vegetation should be cut cleanly with sharp tools so that any adverse effect on vegetation health is minimised. Dense vegetation adjacent to the track should be trimmed randomly to avoid a trimmed hedge appearance. Branches should be cut perpendicular so that sharp protruding ends are avoided.

Vegetation trimmings should be removed from the reserve or, where there is sufficient vegetation cover near the track, the trimmings may be deposited within the vegetation in locations that are out of sight of track users.

10.4 Formation Maintenance

Any collapsed side batter slope material that has deposited onto the track surface or side drains should be removed. This should be either deposited in a location where it is unlikely to cause sedimentation of watercourses or damage to vegetation, or alternatively, it should be removed from the site.

Where slips have occurred above the track and the batter slopes appear unstable, or where slipping below the track has left unstable slopes, advice should be obtained on whether there is a need for retaining walls or other slope stabilisation measures.

Where the track formation level is to be raised to facilitate drainage, fill material should be placed and compacted on the existing formation. Fill material shall be placed as per Section 6.

10.5 Surface Maintenance

Refer to Section 7.4 for re-surfacing details for aggregate surfaced tracks. Maintenance and re-surfacing of aggregate surfacing should be carried out as per the application of aggregate surfacing for original track construction. The key issues are:

- Correction of drainage problems and re-shaping the existing track surface (where possible) should be undertaken before adding new aggregate.
- Selection of the appropriate material for maintenance
- Applying maintenance aggregate in a layer that is at least 2.5 times the maximum aggregate size (ie use GAP10 material for maintenance layers between 25mm and 50mm thick, use GAP 20 material for maintenance layers of 50mm thickness or more)
- Placement of thin layers of maintenance aggregate (less than 25mm should be avoided)
- Aggregate placed for maintenance should be compacted with a plate compactor as soon as it is placed.

10.6 Drainage Maintenance

Investigation should be carried out to determine the cause of any drainage problems prior to undertaking maintenance so that an effective correction treatment or maintenance activity can be selected.

Any investigation of a drainage problem should identify the following:

- The source of the water that is causing the problem (i.e. surface water, sub-surface water, flood water from streams etc).
- The estimated volume of water arising from the catchment area.
- The components of the existing drainage system and the reason why these are not functioning as required.
- The potential locations where additional drainage measures may be taken.

Side drains should be cleared to at least 200mm wide and 100mm deep and should match the adjacent track or stairway gradient.

If scouring of side drains is present either of the following options should be undertaken:

- Additional side drain discharge points should be provided by installing additional cut-outs or culverts, or
- Place crushed rock scour protection in the side drains. Rocks used for scour protection should have a size range of 50mm to 100mm diameter. If necessary, increase the depth and width of the side drain to accommodate the rock without reducing the clear cross section.

Culvert pipes should be kept clear of debris or soil by rodding or clearing with high pressure water.

Culvert inlet catch pits should be cleared when the level of accumulation of material in the catch pit near to the invert of the culvert pipe.

Where scour has occurred at the outlet of culvert pipes, a crushed rock or a geotextile apron should be installed immediately down-slope of the outlet.

Some drainage problems may require advice from an engineer to provide a suitable solution.

11 Baseline Inspection and Assessment Procedure

11.1 Inspection Purpose

The following outlines the procedure for the baseline inspection of NPDC paths and tracks. The principal objectives of baseline inspection are to:

- Collect track asset inventory data for future management and assessment purposes
- Assess track condition and assign a condition grade
- To assess compliance of the track with established track standards
- To identify maintenance requirements
- To enable prioritisation of maintenance recommendations
- To identify cost estimates for maintenance, renewal, replacement and augmentation. Baseline inspection of paths and tracks is to be carried out in relation to the classifications and standards contained in this manual.
-

11.2 Site Identification

Each path or track is to be identified with a unique identifier that is consistent with the NPDC Parks Asset Management System. Each path and track will be identified as a linear asset that could include:

- Link Identifier (alphanumeric)
- Start node (GPS)
- End node (GPS)
- Route Length (wheel measure on ground)
- Common Name

Asset identifiers shall be consistent with those used on the Council GIS system. Path and track links may be of any length. Links shall be defined as sections of track having:

- The same classification over the whole length
- The same surface over the whole length (bridges & boardwalks excepted)
- No branches in a link
- Similar physical characteristics over the link
-

11.3 Inspection Process

The inspection process will be carried out on foot. Suitable equipment carried by the inspector could include:

- Measuring wheel (for length measurement)
- Electronic level (for gradient measurement)
- Tape measure (for width measurement)
- Data logger
- GPS
- Digital Camera
- Rugged personal computer

Data will be collected on a data logger or rugged computer that has been suitably set up with the appropriate data fields.

At least one photograph per link with image number recorded.

The data tabulated in the definitions Section 12.5 will be recorded on the data logger.

(Note: If a data logger/GPS unit is used, collection of a GPS trace for each link may be possible)

Historic Reference:Park location and description.

11.4 Definitions

Table 19 – Track Inspection Parameters			
Item	**Description**	**Unit**	**Comments**
Link	Link Identifier		Unique alphanumeric
Park	Park or Reserve		Common Name
From / To	Node	Eg 5 to 8	Node number at each end of the link
Length	Track link length	Metres	Measured with a measuring wheel
Class	Track classification	1,1c,2, etc	Assigned by NPDC /Asset Management System
Grade % (Max, Average)	The maximum and average grade	Percent	Measured by level at the steepest section of the track and estimated average for the link
Surface Width (Average, Min, Max)	The average, min and max track surface width	Metres	Measured max & min, estimated average
Surface type	Type of track width	CO = Concrete AS = Asphalt CH = Chip seal AG = Crushed Aggregate GV = Natural gravel or rock	CL = Clay GR = Grass BS = Boxed steps ST = Structure RT = Tree Roots
Surface condition	Condition grade	1 to 5 as per PRAMS asset condition criteria. Remedial work needed and remaining life also recorded.	1 = very good 2 = good 3 = average 4 = poor 5 = very poor 0 = non existent
Drainage system	Type of track drainage	SD = side drain OC = open cross drains CT = crowned track surface MO = mono sloped track surface	
Drainage condition	Condition grade	1 to 5	As for track surface
Vegetation	Average clearance width	Metres	
Vegetation	Average clearance height	Metres	
Signage	Type of signage	DR = Directional at ends/ junctions MK = Markers IN = Interpretation	
Signage condition	Condition grade	1 to 5	As for track surface

Table 19 – Track Inspection Parameters			
Item	**Description**	**Unit**	**Comments**
Barrier height	Height to top of barrier/ handrail	Metres	Typical location. Measured to step nose on step
Barrier condition	Condition grade	1 to 5	As for track surface
Photo number	Photo file number		From digital camera

Other comments	Any notes of features or issues not covered in above data eg • Structures (Type, width, condition, materials) • Steps (Grade, width, step height, number, materials) • Hazards • Culverts (>150mm diameter)

11.5 Data Management

In the Office:
Download data logger
Catalogue photos (Photo files labelled with link identifier)

11.6 Urgent Action Report / Request for Service

If any issue is discovered that poses an immediate safety risk, the observer / person is required to take whatever steps that are safe and practical e.g. hazard tape or branches across the path or/bridge hand rails and report the need for immediate remedial action by telephone (06 7596060) or email to the Councils Contact Centre.

11.7 Baseline Data Assessment

The assessment of baseline inspection data will consist of:

- Comparison of recorded data with recommended parameters for the designated class of walkway or track
- Determining the required work necessary to bring tracks to the designated class.
- Evaluation of the range and average condition grades.

12 Walkability Assessment

12.1 Walkability Definition

A walkability assessment of a path or a track relates to the suitability for use by all walkers, but with particular attention to the needs of people with impaired mobility, including people with limb movement limitations, people in wheelchairs or those using other mobility equipment, people pushing prams and people who are generally unfit for walking.

A full walkability audit includes assessment of all the related factors that influence the potential use of a path or track by physically challenged persons including:

- Approachability: Can people get to the start of the route
- Accessibility: Can people move freely along the route
- Usability: The presence of toilets, seats, rest areas, information etc.

The purpose of assessing walkability is to:

- Identify the distribution and availability of Accessible Walks in the District that have a high level of suitability for mobility impaired walkers.
- To identify which paths and tracks have a high level of walkability so that the public can be properly informed.
- To identify the factors that may be addressed by NPDC to improve the walkability of selected paths and tracks to establish a route as an Accessible Walk.

It is understood that the people who have impaired mobility prefer good descriptions of paths and tracks indicating the presence and nature of steep grades and steps, rather than a single walkability rating. This is because mobility impaired people vary greatly in the types of conditions they can handle. It is also necessary for NPDC to have a form of walkability rating that can be logically applied to paths and tracks to enable evaluation of the overall suitability of these for inclusion in an Accessible Walk.

The following outlines the procedure for the walkability assessment of NPDC paths and tracks. The principal objective of a walkability assessment is to collect and evaluate the factors that influence the suitability of a path or track for use by mobility impaired persons.

12.2 Walkability Assessment Procedure

A walkability audit of a path or track could be carried out as part of a track inspection and assessment of individual track segments, or it could be undertaken separately, based on a specific Accessible Walks that may take in several track segments.

The procedure provided in this manual can be used for either approach. Some of the parameters collected are the same physical parameters collected as part of a track inspection, whilst others pertain to factors associated with the track. The process for conducting a walkability assessment is similar to the track inspection and assessment process.

12.3 Walk Identification

The walkway or track link to be assessed will be identified with a unique identifier (as used for track assessment) or a set of identifiers that are consistent with the NPDC Asset Management System. Where a set of tracks is to be assessed for walkability as an Accessible Walk, a walk "Walk Name" shall be assigned so that the walk can be easily referenced for communication with the public.

A set of tracks that form an Accessible Walk that has high level of walkability, should have the following characteristics:

- A common start and end point. (This recognises that most people with impaired mobility will arrive for their walk by vehicle. Some Walks will however have separate start and end points and will be used by persons being delivered and collected from the end points by others).
- Each track segment of the Accessible Walk shall have a similar level of walkability. This is to avoid users being prevented from completing their walk after having travelled some distance, due to them encountering conditions that are more challenging that those earlier encountered.
- A high level of safety and security as defined in CPTED principles.

12.4 Assessment Process

The walkability assessment process will be carried out on foot using similar equipment to that used for track inspection, ie:including:

- Measuring wheel (for length measurement)
- Electronic level (for gradient measurement)
- Tape measure (for width measurement)
- Data logger
- GPS
- Digital Camera

Assessment Data will be collected on a data logger that has been suitably set up with the appropriate data fields

The data tabulated in the definitions Section 12.5 will be recorded on the data logger.

(Note: If a data logger/GPS unit is used, collection of a GPS trace for each link may be possible)

12.5 Definitions

Table 20 – Track Walkability Assessment Parameters			
Item	**Description**	**Unit**	**Comments**
Walk Name	Common name	text	
Track Link(s)	Link Identifier(s)		Unique alphanumeric track identifiers
Walk Length	Total walk length	Metres	Measured with a measuring wheel
Approachability Factors			
Car Parking		text	Safe parking, mobility parks, car park grade, obstacles, kerb ramps etc
Public Transp.		text	Bus stops, shelter, proximity
Traffic Safety		text	Pedestrian crossings, traffic hazards etc
Security		text	Surveillance, graffiti
Information		text	Walk information, distance, time, gradient, steps etc, clarity
Approachability rating		1 to 5	1 = very good on all factors 2 = good on most factors, avg on others 3 = average suitability on most factors 4 = some factors poor 5 = not suitable for Accessible Walk
Accessibility Factors			
Grade % (Max, Average)	The maximum and average grade	Percent	Measured by level at the steepest section of the track and estimated average for the link
Surface Width (Average , Min)	The average & min track surface width	Metres	Measured min, estimated average
Surface type	Type of track width	CO = Concrete AS = Asphalt CH = Chip seal AG = Crushed Aggregate GR = Natural gravel or rock	CL = Clay GR = Grass BS = Boxed steps ST = Structure RT = Tree Roots
Surface condition	Condition grade	1 to 5	1 = very good 2 = good 3 = average 4 = poor 5 = very poor 0 = non existent
Steps	Number of steps	unit	
Steps	Condition	text	Riser height, uniformity
Obstructions		text	Trees, unprotected falls, obstacles, gates, bollards, vegetation
Alternatives		text	Alternative shorter return routes
Accessibility rating		1 to 5	1 = very good on all factors 2 = good on most factors, avg on others 3 = average suitability on most factors 4 = some factors poor 5 = not suitable for Accessible Walk

12.6 Data Evaluation

For each Accessible Walk, the rating for approachability, accessibility and usability provides an indication of the suitability of any Walk for use by persons with impaired mobility. Any assessed path or track that scores less than 3 for the accessibility rating should not be considered suitable for mobility impaired persons.

To be promoted as an Accessible Walk, all three ratings (approachability, accessibility and usability) should be 3 or better.

Walkability Assessment data should be used for the preparation of public information data on an Accessible Walk, providing where appropriate a description of facilities e.g.

Usability Factors			
Toilets		text	Proximity, standard, accessible
Seating		text	Seating frequency, comfort, safety, height, backs, arm rests
Picnic tables		text	Availability, condition, accessible
Fountains		text	Drinking water availability, accessibility
Attractions		text	Attractions, activities
Accessibility rating		1 to 5	1 = very good on all factors 2 = good on most factors, avg on others 3 = average suitability on most factors 4 = some factors poor 5 = not suitable for Accessible Walk