Mangawhai Village and Mangawhai Heads Infrastructure Plan - Transportation

Prepared for Kaipara District Council

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MWH®

BUILDING A BETTER WORLD

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Executive Summary

MWH New Zealand Ltd were commissioned by Kaipara District Council to undertake the transportation section of the Mangawhai Town Infrastructure Plan.

The Mangawhai area is currently split between two distinct urban areas, Mangawhai Village and Mangawhai Heads, which are currently separated by an estuary and undeveloped land. The area's charm and close proximity to Auckland has attracted an increasing number of permanent and part time residents. This population increase has mainly happened around the towns existing infrastructure with additional links added as needed to facilitate development.

The town has two very distinct traffic conditions. Holiday periods and weekends during the summer sees a heavy influx of tourist visitors and holiday home owners, and at other times the town maintains an occupancy rate of less than 50%. During the off-peak periods there is little to no issue with the roading network, including parking facilities.

Issues do exist on the network that effect full time residents, even during the period of significantly lower traffic volumes.

- Pram crossings – often misaligned or are missing making it difficult to cross for someone with impaired movement or pushing a stroller.
- Missing footpath links – sections of footpath are missing from key, well used routes.
- No cycling facilities – no cycle paths or parking at key locations. Cyclists, many of whom are children, are required to use footpath or the road.
- Road safety – statistically more crashes occur outside of the peak periods, indicating the lower traffic volumes and road familiarity that contribute to crashes more than increased number of out-of-town visitors,

With the exception of the lack of cycling facilities, the recommendations contained in the report relate to pedestrian amenity and safety or general road safety, which can be implemented in small standalone packages of work that have little effect on overall network function.

During summer peak traffic conditions the town's infrastructure really struggles to cope particularly,

- Parking – parking capacity and/or discipline is an issue at all of the town's major destinations including the beach, Wood Street, Mangawhai Village Centre and boat ramps.
- Network Capacity – intersection capacity is shown to struggle during the peak traffic conditions. Most intersections are not necessarily at the point of requiring intervention but over the coming years this will be likely.
- Major developments such as Estuary Estates are likely to have a major influence on the year round traffic conditions with more full time residents taking advantage of the increased work opportunities. This will increase the year round strain on the transportation network, and will cripple some of the existing problem areas during holiday periods.
- A number of residents, most of which will likely be used to the facilities of larger metropolitan areas will expect improved recreational area access, either via more parking spaces or alternative methods of travel such as cycling.
- The town's main route, Molesworth Drive is used as a NZ Transport Agency bypass route. This has the potential to cause significant disruption if it is utilised during the holiday period, with a potential for more than 20,000 vehicles per day passing through the town.

A more strategic approach needs to be taken for the major works items, an approach that will be dependent on cost constraints, public opinion and stakeholder engagement. The town's road network currently operates well within a generally accepted level of service, in all but the worst of conditions, prioritising improved amenity facilities may prove to be the most efficient use of limited public finances as detailed.

- Introducing parking management solutions at the beach carpark or increasing the number of parking bays.
- Formalising car/pedestrian spaces at Wood Street.
- Improving traffic flow through Mangawhai Village Centre and additional pedestrian facilities.
- Begin implementing a shared path route, at least incorporating it into any proposed upgrade works.
- Protecting the existing road corridor boundaries and paper roads from further development encroachment should be considered a priority. This will help reduce bad will if property boundaries need to be moved to accommodate a future project.

Kaipara District Council

Mangawhai Wastewater Scheme Condition Assessment

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1 Introduction

MWH were commissioned by Kaipara District Council to undertake the Transportation section of the Mangawhai Town Infrastructure Plan.

Mangawhai area is currently split between two distinct urban areas, Mangawhai Village and Mangawhai Heads that are currently separated by an estuary and undeveloped land. Mangawhai is located on the east coast and is well known for its exceptional beaches and kiwi seaside character. The area's charm and close proximity to Auckland has attracted an increasing number of permanent and part time residents. This population increase has mainly happened around the towns existing infrastructure with new links added as needed to facilitate new developments.

The towns infrastructure operates with few capacity issues in the off-speak times, however during the summer peaks, where the town's population can increase by over 200%, many areas of the transportation network struggle to operate to an acceptable level of service. The development is likely to maintain the current intensity or even increase pace due to the following factors:

- Construction of the NZ Transport Agency's "Holiday Highway" will make journeys north faster and safer, making the already relatively short journey to Mangawhai even more attractive.
- High house prices in Auckland could make Mangawhai a desirable permanent area for commuters. With the North of Auckland being only 80 minutes away during period of low congestion.
- Proposed developments such as Estuary Estates have the potential to encourage more Mangawhai based businesses, increasing employment opportunities.

Due to this KDC want to assess the current traffic situation and table suggestions on how to improve the existing issues and plan for the future.
With cycling and walking high on the national agenda for promoting environmentally friendly transport and support healthy the study will look at how none motorised transportation can be encouraged and accommodated in a safe environment.

Key Council documentation and visions have been referred to in the development of the reports, these are summarised below

Mangawhai Design Guidelines

The Mangawhai Design Guidelines support the objectives and policies within the Operative Kaipara District Plan 2013 and were created to form a tool for "implementing strategies outlined within the Mangawhai Structure Plan" 2005.

The overall purpose is to promote sustainable responses to key issues that face the area including: increased local traffic and roading pressures; higher demands for (and on) reserves and open space, and; beach and harbour access issues. The guidelines aim to maintain landscape character and amenity value by promoting development that reflects settlement patterns particular to the area. Conserving, protecting and enhancing landscape (and habitat) values is also promoted through best practice and low impact design principles for the development of subdivisions and public open space.

The following considerations are applicable to this Traffic Management and Public Open Space Study and Options Plan

Open spaces and pedestrian and cycling routes these should be well connected, visible, usable, signposted and accessible to all. "'Claiming' or 'privatisation' of reserve areas by residents' gardens or overflow uses from abutting dwellings" should be discouraged.

Vehicle Parking

The location and design of car parks should not interrupt the blurred line between private and public space, which is typical to the area. Car parks should be permeable and designed in accordance with its sustainable drainage principles.

Street Design

Road design should "seek to replicate the qualities of existing streets within the Mangawhai Area" such as 'shared surface' roads (where appropriate to ensure a cycle and pedestrian friendly environment), wide carriageways, large open grass verges and a strong relationship between dwellings and the street. Roads should also adhere to the document's low impact design principles.

KDC District Plan

Mangawhai is the fastest growing area in the District, both for rural residential and holiday accommodation. The Council anticipates Mangawhai becoming the largest community in the District. On-going subdivision and development at Mangawhai (including provision of infrastructure) will need to be managed so that Mangawhai's high natural character and landscape, amenity, recreation and ecological values are maintained and enhanced.

A Vision for the Future of the Kaipara District

The Long Term Plan identifies:

- Mangawhai - fully serviced urban centre located in an outstanding coastal environment, Kaipara's largest town.
- District Plan Chapter 3A – Mangawhai Growth Area.

Transport Network - Roads

An Infrastructure Plan will be developed to ensure that upgrading of the road network shall proceed in tandem with the staged development of the Mangawhai Structure Plan Area. Development of arterial and collector roads will be funded through development contributions. The remaining upgrades will be provided by developers through works or financial contributions as conditions of consent.

The Infrastructure Plan will ensure that the arterial and collector roads proposed through the Otamatea Ward and Mangawhai Urban Area Roading Development Contributions Policy will accommodate the level of development able to be achieved through the Implementation Plan.

Pedestrian and Cycle Access

An appropriate number of pedestrian and cycle links will be formed to provide efficient access through the Mangawhai Structure Plan Area. Subdivision design within the residential and business zones will be expected to achieve pedestrian friendly streets and safe, 'Crime Prevention through Environmental Design' (CPTED) linkages between Mangawhai Park and golf course, esplanade reserves, business areas and other community facilities. Safe cycle and pedestrian access will be established within the Mangawhai Structure Plan Area connecting Mangawhai Village, Wood Street business, Mangawhai Park and the Heads recreation reserve.

In addition to the council's policies the International approach to safety has been referenced in the compilation of the safety recommendation and used to guide some of the future capacity upgrades. A summary of Safe System Principles are listed below.

International Safe System Principles

While the specifics of Safe System approaches adopted varied between countries, the OECD review found they typically share the following features:

- Aim to develop a road transport system better able to accommodate human error.
- Incorporate strategies for better management of crash forces, with an early strategy being road network improvements in conjunction with posted speed limits and long-term strategies being related to vehicle improvements.

- Rely on strong economic analyses to understand the scale of the trauma problem, and direct investment into programmes and locations that will provide the greatest potential benefit.
- Include comprehensive, multi-agency, management and communications structures.
- Align safety management decision making with broad societal goals around economics and environmental health.
- Embrace the ethos of shared responsibility for safety.

2 Report Scope

This report takes an overview of the existing and future transportation infrastructure within the study area and seeks to offer recommendations that are in line with the principles of the District Plan and recognised design guideline and best practise.

The suggestions made will require refinement through a design process to optimise the solution to best suit community and site constraints.

2.1 Referenced Documents

Table 2-1: Referenced Information/Documents

Author/Source	Document/Report Title	Year
Opus	Mangawhai Traffic Management and Public Space Strategy	2016
MWH	Mangawhai Village Safety Assessment Study Moir Street, Molesworth Drive and Insley Street	2016
KDC	MTP Growth Principles	2016
Opus	Tube Counts (Peak Traffic Volumes)	2015
KDC	MTP Survey Results	2015
MWH	Estuary Drive – Moir Point RSA	2015
KDC	District Plan	
RAMM	Historic Traffic Counts	
KDC	Mangawhai Village Market Temporary Traffic Management Report	2016
KDC	MTP Medium Density Nodes	2016
KDC	MTP Business Extension Zones	2016

3 Arterial Corridor Function

3.1 Local Traffic

The study area is split into two distinct urban areas, Mangawhai Village and Mangawhai that are located either side of the estuary. The areas are linked by Molesworth Drive that is classified as an Arterial Route. The presence of the estuary makes adding in alternative links between the two areas expensive due to the required causeway and bridge.

As such Molesworth Drive is likely to continue providing the only direct link between the areas. The current configuration of Molesworth was constructed in the early 1970, the existing alignment has remained almost exactly the same, with the exception of some intersection upgrades and other localised improvements.

Mangawhai is the primary destination for traffic entering from the North or South, with State Highway 1 providing the primary route for onward traffic. North of Mangawhai Langs Beach is the only town that is quicker to visit by travelling through the study area, South there are no townships that are reached quicker by travelling through the study area.

Holiday traffic once in the study area tends to stay there for the length of the vacation and congragate at the local amenities and services, some of the main journey desinations are:

- Mangawhai Heads Beach (Picnic Bay)
- Boat Ramps (Sellers and Alamar)
- Mangawhai Community Park
- Wood Street
- Mangawhai Village and the weekend markets
- Estuary's beaches
- Camp sites
- Local walking trails
- Varios bars, resturants, clubs
- Golf and bowling clubs

The arterial routes of Moir/Moleswoth and Mangiwhai Heads Road are all single lane carriagways with a combination of sealed and unsealed shoulders. This configuation is wide enough to accommodate traffic demands, including the current peak traffic of almost 12,000vpd, however the proliferation of private and business accesses, side roads and on street parking movements often leads to localised traffic congestion.

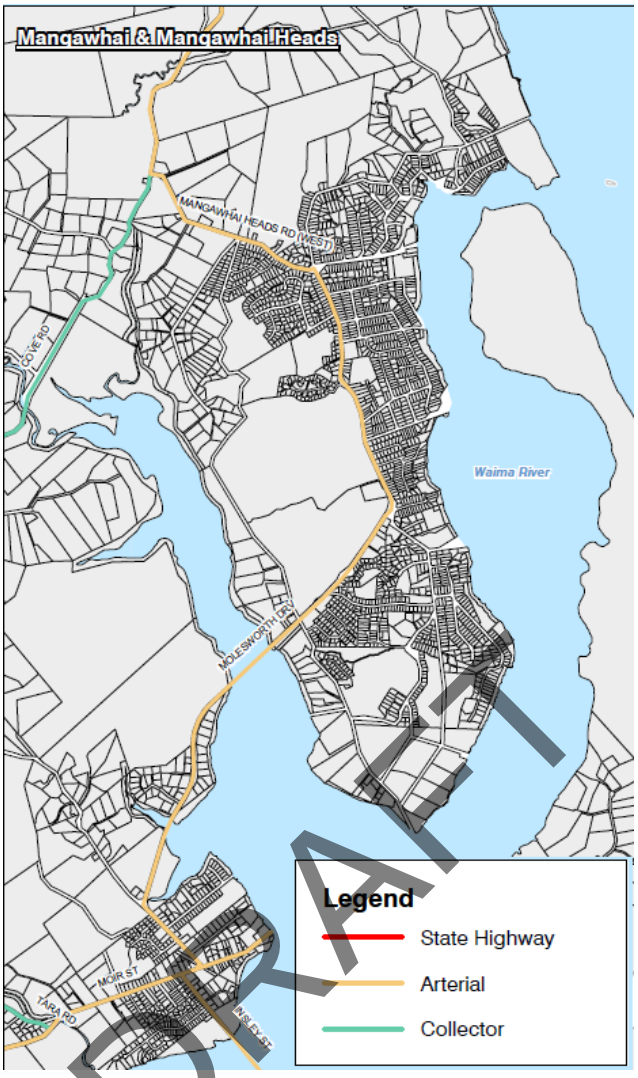

Figure 3-1: Study Area Road Hierarchy

3.2 Through Traffic – Including Twin Coasts

The amount of peak traffic using the study area as a link to another destination during peak period is likely to be relatively low compared to the local traffic. This is mainly because so few destinations are better served by this route, the exception to this are Langs Beach, Waipu Cove and people traveling the Twin Coast Highway.

During off peak periods the approximately 25% of the traffic that travels on Molesworth Drive continues on Mangawhai Heads Road (East).

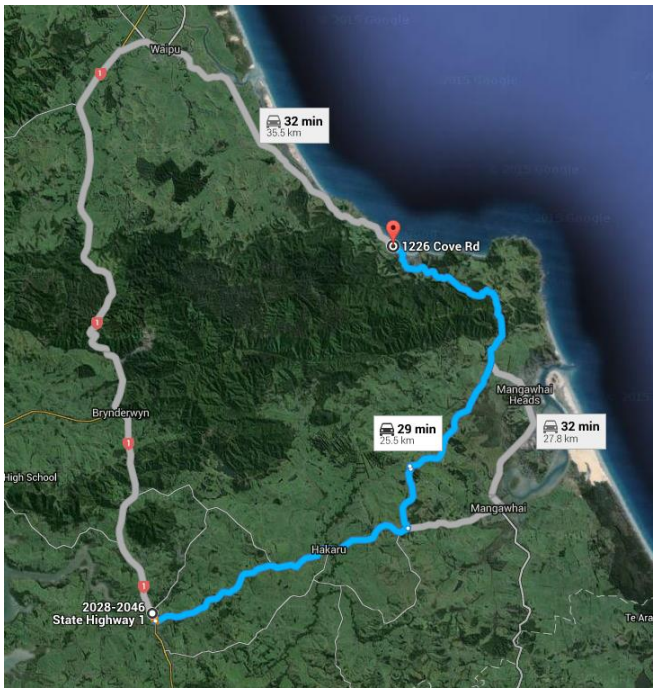

Figure -3-2: Langs Beach Travel Times

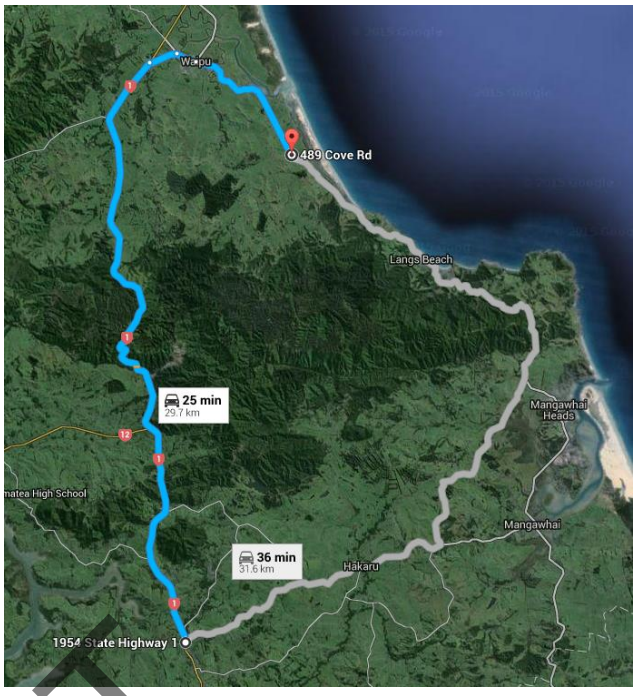

Figure 3-3: Waipu Cove Travel Times

3.3 State Highway 1 Bypass

The arterial roads through the study form a current part of the state highway bypass designated routes, which is used for a variety of reasons from expected closures following an accident or to allow scheduled maintenance. When in operation this adds significant volumes of traffic to the local road network, if this happened during a holiday peak day the delays and congestion would be significant. State highway traffic travelling through a holiday town is far from ideal, especially given the study areas intention to raise the use of walking and cycling as methods of transport.

3.3.1 Alternative Route – Cove Road

Currently the bypass is used only for southbound traffic and is required, on average, three to four times a year. The NZ Transport Agency are constantly monitoring the suitability of the bypass routes, with the possibility of using it for northbound traffic. The recommendations contained in this report have been discussed with the NZ Transport Agency to ensure they do not compromise the effectiveness of the route.

Briefly discussed with the NZ Transport Agency's Senior Planning and Investment Manager Martin Taylor was the option to bypass Mangawhai, using Cove Road to avoid the urban areas completely. To assess the validity of the alternatives the NZ Transport Agency granted access to their TomTom Traffic Data login. The TomTom Traffic Data records travel speeds between fixed marker location, as such allows a high level assessment of the potential reduction in travel times that could be realised by using Cove Road as the SH bypass.

The Cove Road route is shown to have the lower travel time, which is to be expected given the amount of speed restrictions there are on the existing bypass. No assessment of the geometric standards of the Cove Road but given the relatively low overall traffic speed on the route it is probably of a low overall standard. It may require warning signage and some localised realignments to make the road safe for the volumes of traffic that would be diverted from SH1.

Using Cove Road may become even more appealing to the NZ Transport Agency once some of the larger developments are complete, for example Estuary Estates is likely to introduce two

roundabouts on Molesworth Drive, this may be complemented with another one or two roundabouts as volumes and safety enhancements dictate. This is discussed further in section 6 Network Congestion.

The current main obstacle to using Cove Road as a bypass route is the two one lane bridges that would need to be upgraded. Whilst the bridge close to Mangawhai Heads Road could potentially be upgraded using large box culvert the other bridge is larger and be a significant cost to replace.

3.4 Speed Limit

Whilst a speed limit review is not part of this assessment and it being conducted as a separate exercise led by the NZ Transport Agency, it is entirely likely that traffic speeds will need to be limited to 50km/h once Estuary Estates begins to become populated.

3.4.1 Existing Traffic Speeds (Arterial Route)

Assessing the validity of the Cove Road bypass alternative to the current situation presents data that gives some insight into the existing traffic speeds through Mangawhai.

However the data needs to be used with caution because of the way that it is gathered. TomTom data is most likely to be collected from tourists and people not familiar with the study area, as such it will not collect data from users who are familiar with the road network. Excessive speed is often displayed by road users who know the roads well, especially if they have historic knowledge of higher speed limits. The sample size is also extremely small compared to the daily traffic volumes.

The data demonstrates that the sample drivers followed the speed limit changes accurately, the speeds may be slightly above the posted speed limit on the approach to the Community Park. Although this is difficult to say with any certainty.

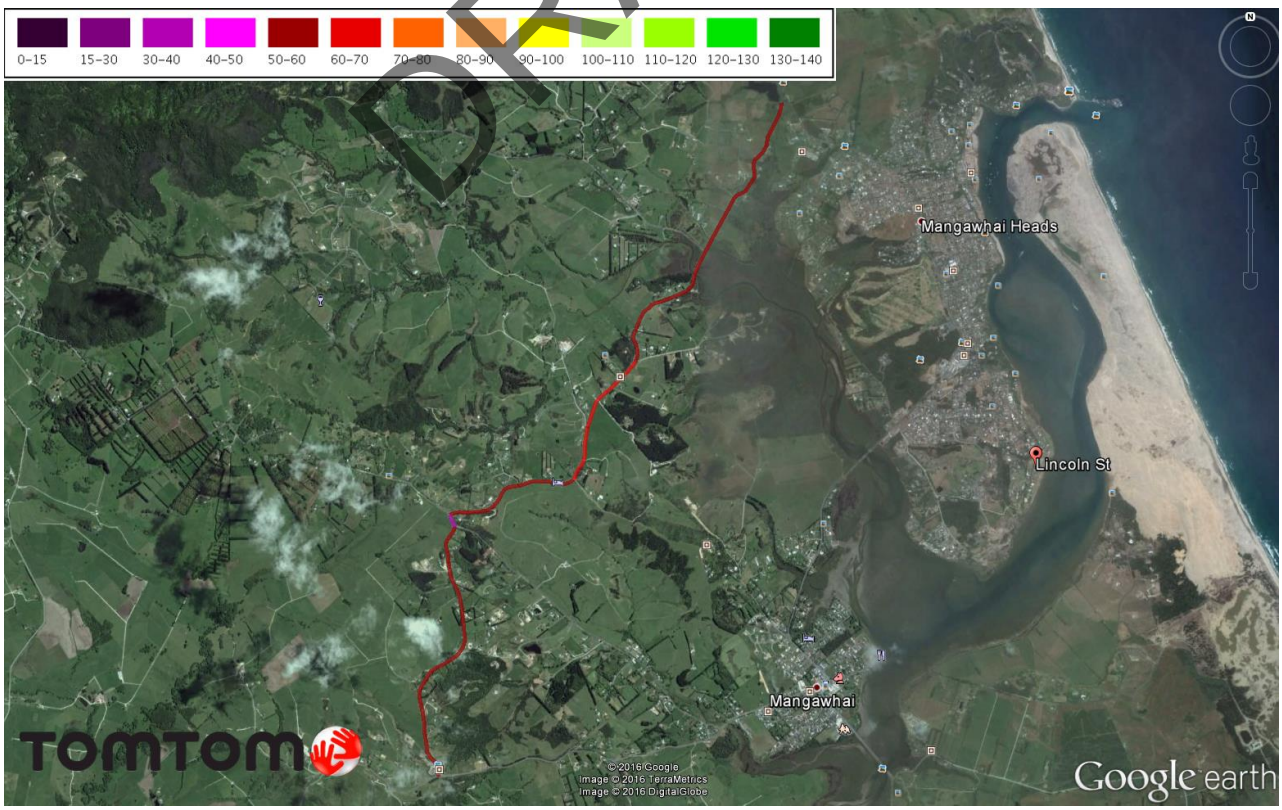

Figure 3-4: Existing Traffic Speeds

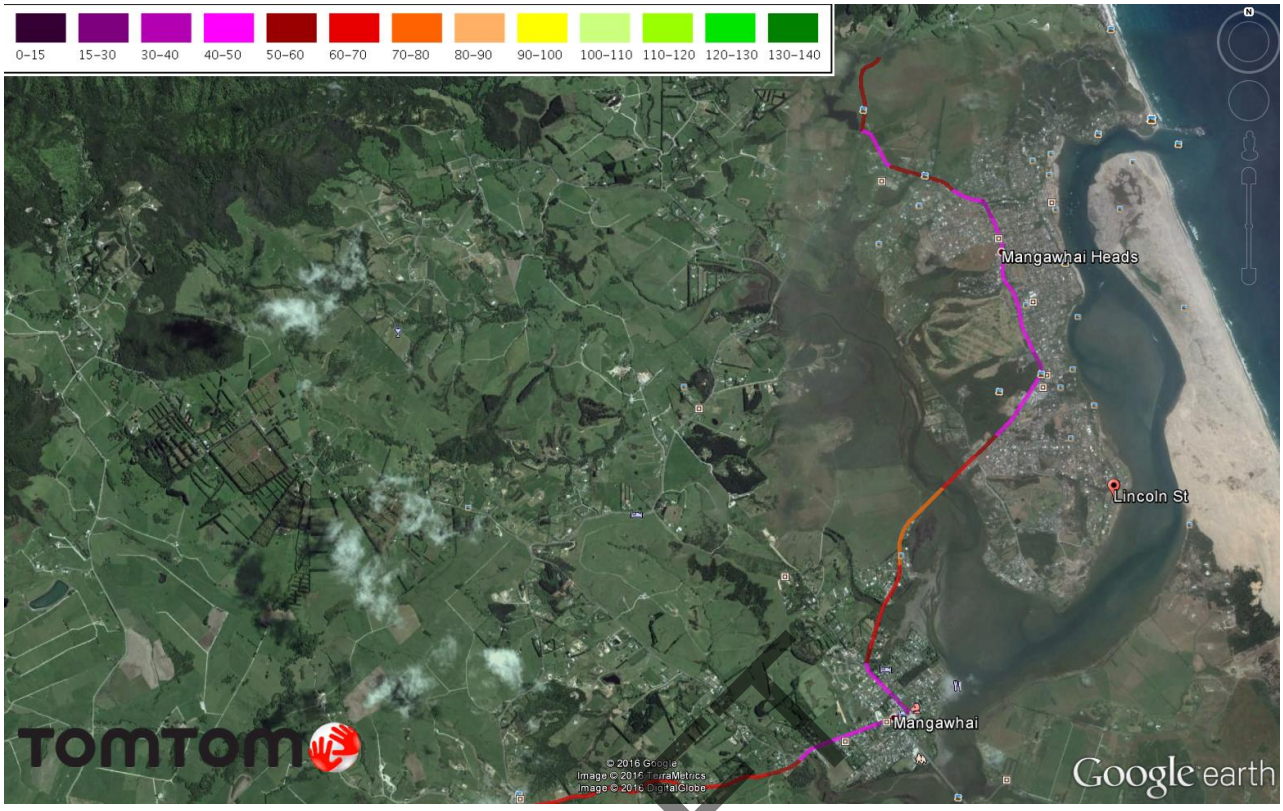

Figure 3-5: Existing Traffic Speeds

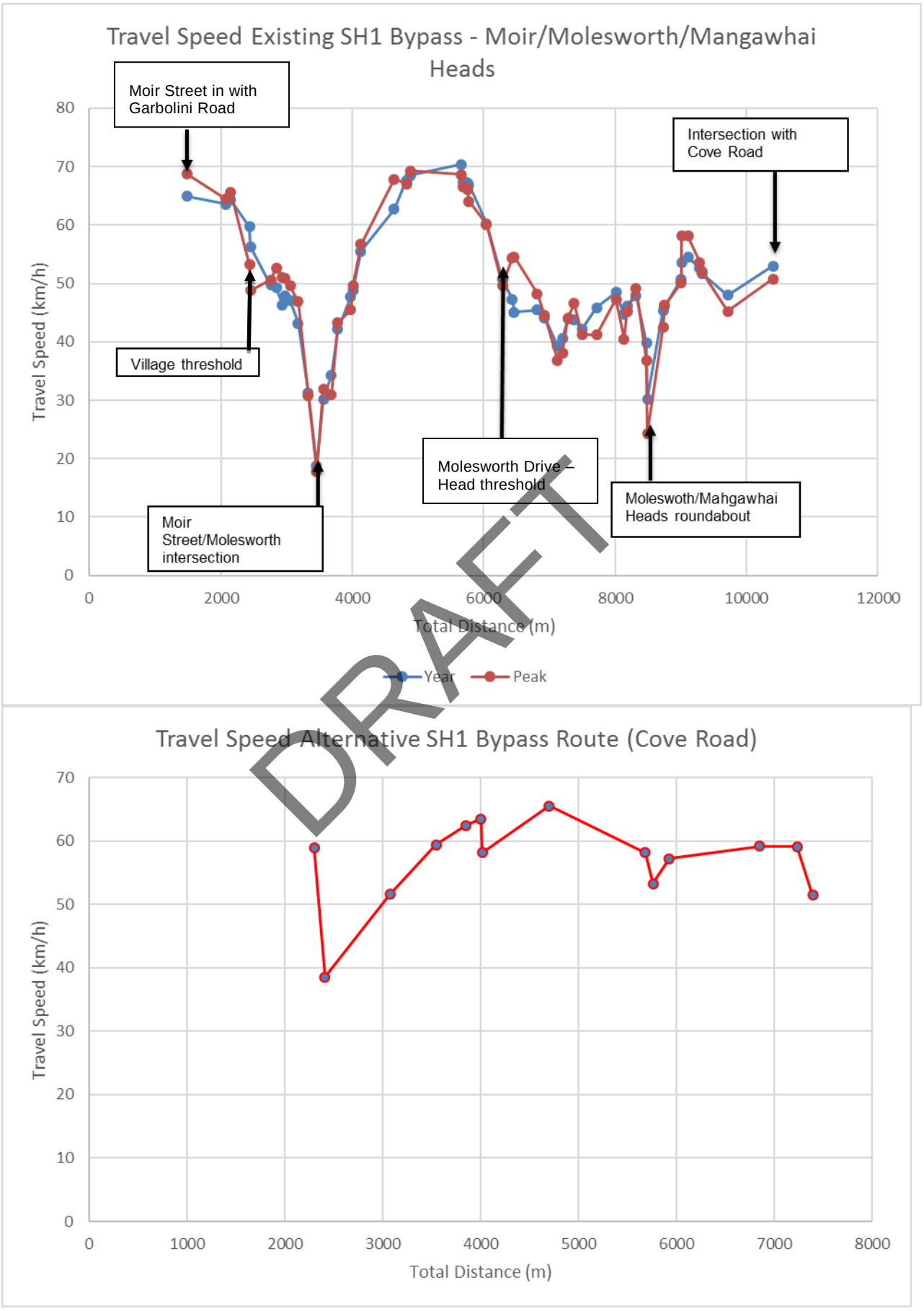

Figure 3-6: Travel Speed Existing and Alternative

4 Safety

The high level overview of the network safety has been based on a combination of on-site observation, recorded crash data and local anecdotal evidence.

The crash data obtained from the CAS database has indicated that there are several clusters of crashes or repeating patterns in the study area. However crash data is only one metric of assessing road safety, the current thinking is documented under the International Safe System approach. Where traditional method of crash reduction studies involves recommending treatments to resolve only the problems that have been identified through the study of historical crashes. The Safe System approach encourages the identification of crashes that may result from the status quo and recommend preventative measures with the goal of creating a more forgiving road environment with an emphasis on preventing serious and fatal injury crashes.

As a result, some treatments recommended would be unjustified purely based on crash records and would therefore fail to achieve a benefit cost ratio.

The Safe System approach has been adopted by the NZ Transport Agency and various other regional Road Controlling Authorities, in essence it identifies a system of interrelated factors that contribute to the occurrence of every road crash. It places special emphasis on the road user as the vulnerable party, who will inevitably make mistakes when operating within the road system. The philosophy motivates road engineers to assume the role of system designer to create safer roads and roadsides that are predictable to road users and forgiving of their mistakes.

If road users are not operating within the road system as intended then the responsibility falls back on the system designer to re-engineer the system, better aligning it to the ultimate target of zero fatalities and serious injuries. We are therefore encouraged not to prematurely dismiss from consideration those crashes that involve alcohol or excessive speed, and general human and vehicle factors, but rather envision and design a transport system that would have addressed the crashes, reduced their severity and removed the risk of trauma to third parties.

4.1 Network Concerns and Safety

4.1.1 The NZ Transport Agency Crash Analysis System

According to the data recorded in the NZ Transport Agency's Crash Analysis System there has been 30 recorded crashes within the study area during the period 2010 to 2016, the spread of crashes is illustrated in Figure 4-2.

Four clusters of accidents have been identified and are summarised below:

- Molesworth Drive – approximately 230m south of the intersection with Thelma Road (approximate location of estuary crossing. 5 crashes within a relatively small area.
- Molesworth Drive – Old Waipu Road - 2 crashes both involving loss of control caused by excessive speed at the bend in the road.
- Mangawhai Heads Road - 2 crashes both involving loss of control caused by excessive speed at the bend in the road.
- Wood Street – 3 crashes, poor observation and judgements – two travelling too fast.

The data indicates that a broad variety of factors and locations have caused the crashes, however two factors are significantly above the historic national average, these are crashes involving excessive speed and/or raised alcohol levels.

Table 4-1: Crash Factors

Factor	Mangawhai 2010 to 2015	National Average 2008 to 2013
Alcohol or drugs	43%	14%
Travelling too fast	40%	15%

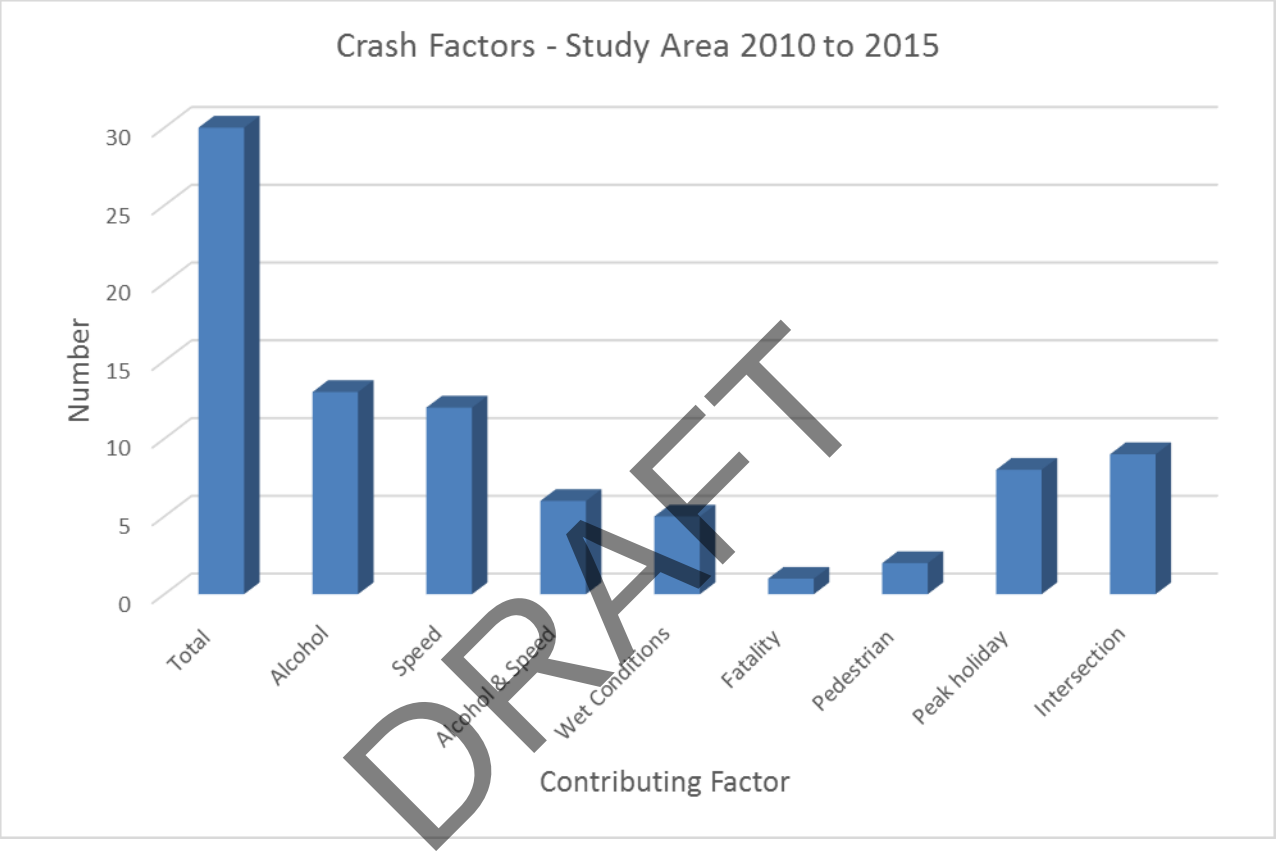

Figure 4-1: Crash Factors – Study Area 2010 to 2015

4.1.2 Traffic Speeds

Traffic speeds have been demonstrated to contribute to a disproportionate amount of road crashes, with 40% of all crashes are in part attributed to excessive speeds. With the exception of two accidents on Wood Street all the crashes have been on the roads that serve the dual purpose of local road and arterial route, namely Moir Street, Molesworth Drive and Mangawhai Heads Road.

Both these routes have maintained a feel that is consistent with many rural communities, however traffic volumes and development density have increased rapidly that requires slower traffic speeds. Sections of lower speed limits are in places along both routes, however there is often nothing to provide visual distinction between the different speed environments.

With development set to continue, with several significant sub divisions currently in planning or implementation the need to restrict speeds is increasingly important. Controlling speeds will also aid the development of other key strategies, such as increased connectivity for pedestrians and cyclists.

4.1.3 Alcohol or Drugs

Alcohol was a factor in some 43% of all crashes within the study area, this is significantly above the national average of 14%. The national average probably has little relevance to rural communities or holiday destinations where a combination of spread out communities, lack of public transport and out of town visitors leads to an increased instances of drink driving. With such a large proportion of accidents alcohol related it is clear that a cultural shift could help reduce the accident rate.

Whilst little can be done to the physical characteristics of the road environment to reduce instances of drink driving, the following methods have been shown to contribute to a cultural shift in attitudes.

- Regular police check points, set up with booze buses to process suspected drunk drivers.
- Regular enforcement of current Alcohol Control Area Bylaws.
- Increase police presence.
- Increase advertising.
- Providing an alternative means of transport during key weekends/events.

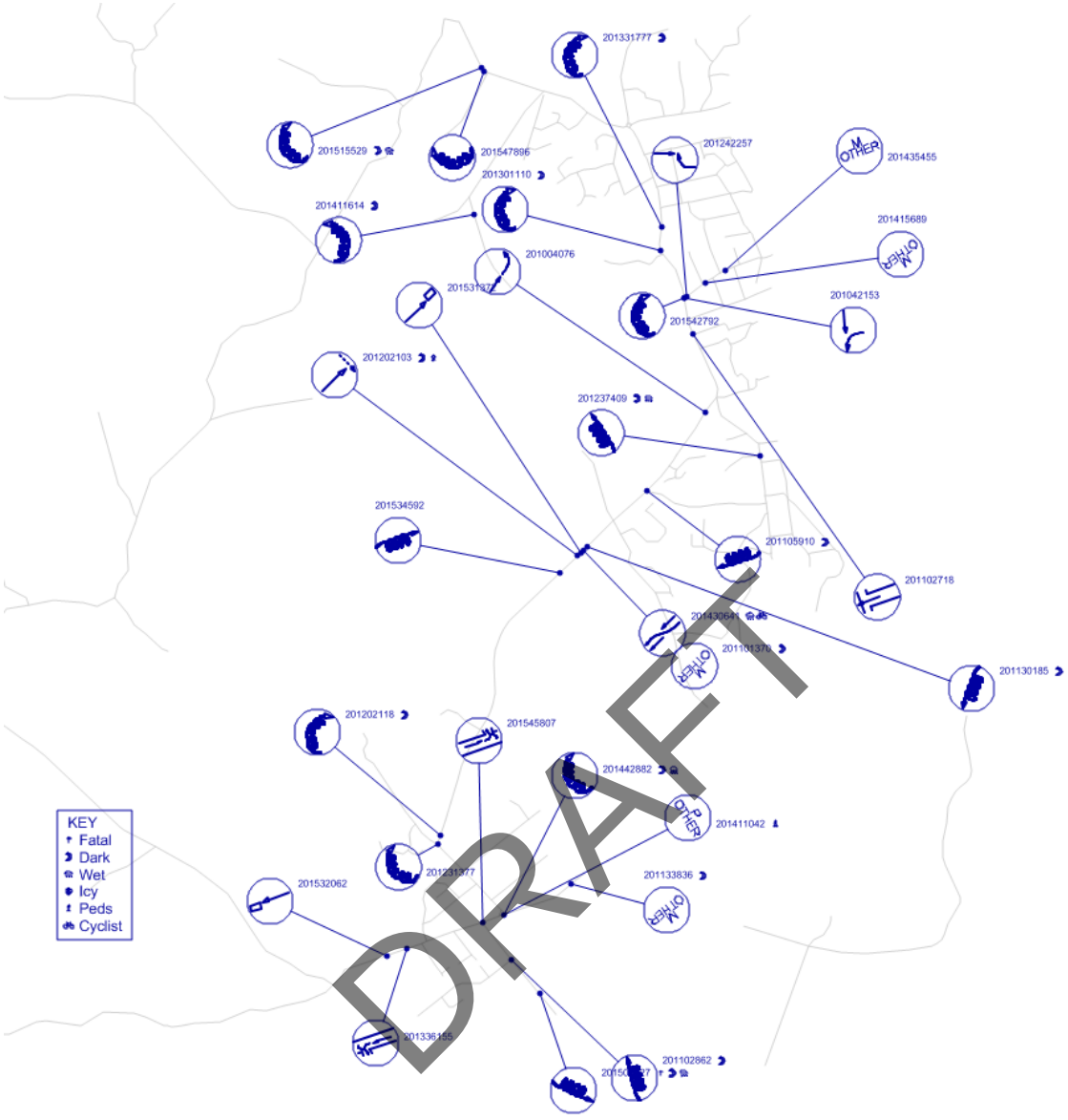

Figure 4-2: Crash Locations 2010 to 2016

4.2 Wood Street (Excluding Intersection)

Refer Appendix A – Drawings Z80506993/SK71 to SK79

Wood Street runs through a commercial zone then continues into a residential area and links up with Robert Street and eventual links to the busy leisure areas next to the estuary. The combination of residential, retail and through traffic generates over 6000 vehicles per day during peak periods.

The retail area generates a strong demand for parking, this demand often exhausts the provisions closest to the shops, this sometimes leads to free for all behaviour that often makes visibility difficult for pedestrians and motorists alike. The road corridor is generally poorly defined with little distinguish between areas for pedestrians, space for parked and manoeuvring vehicles. All this contributes to erratic vehicle movements with little to protect the pedestrian.

A project is on-going to assess options for regenerating the Wood Street retail area in the short and long term. This section assesses the immediate safety concerns and recommends solutions.

4.2.1 Petrol Station

A small petrol station is located on the corner of Wood Street and Fagan Place. The station is adequately sized for serving the local residents during the off peak periods, however it struggles to cope with the volume and type of traffic it attracts during the busier periods. The proximity to shops and the direct route to both the town's boat ramps means there is a relatively large number of boat and trailers visiting the station. The forecourt area is small and the entrance can become blocked by one poorly positioned boat and trailer, this causes traffic to back up on Wood Street, sometimes all the way back on to Molesworth Drive. Anecdotal evidence indicated that this level of congestion is rare, occurring twice during the 15/16 summer period, however some form of congestion is common.

The exit onto Fagan Place do not provide enough room for longer vehicles turning onto Wood Street. This requires the larger vehicles to block the entire entrance to Fagan Place to allow their turning movement to be completed.

Long term consideration should be given to relocating the petrol station to a site away from Wood Street. Possibly located along Molesworth where it could then be sized to accommodate boat and trailers.

4.2.2 Wood Street Parking Orientation

Currently the parking at the front of the shops is skewed parking, this has some advantages, as it is generally easier to exit when reversing onto a road and can be accommodated in a narrower corridor than perpendicular parking. In this case, skewing the parking makes it much more difficult for vehicles to turn right into, even though this movement is more difficult it does not prevent it and was commonly observed during onsite observation. Because of this and the wide available corridor, perpendicular parking would be the safer orientation.

If placing time restriction on the current car park off Fagan Place was desirable it would be worth issuing permits to local businesses that allow all day parking. This will give local businesses a convenient place to park that is a short (half covered) walk to work without monopolising the spaces in highest demand (Wood Street).

4.2.3 Pedestrian Safety

Pedestrian Safety at the intersection with Molesworth Drive is detailed in 4.5.7 Molesworth Drive/Wood Street

Along the Northern edge of Wood Street a concrete footpath connects from Molesworth Drive and continues the full length of Wood Street up to the intersection with Robert Street. There are some issues with the footpath that prevent it from providing a good connection, all of these issues are relevant to the Wood Street commercial area only.

- The footpath in front of the petrol station is often used for parking by the customers, the access and entrance to the station represents most of the footpath over this length.
- Exit from the petrol station often requires vehicles to block the junction entrance and the pedestrian desire line.
- The skewed parking in front of the retail area includes for a footpath between the front of the parked vehicles and shops, however in a bid to maximise parking spaces the end parking spaces are below the standard bay length, this often leads to the parked vehicle having the nose obstructing the footpath.

4.2.3.1 Southern Edge of Wood Street

A concrete footpath connects to the Molesworth Drive footpath and continues for 85m along Wood Street and comes to an end shortly before it reaches the building containing the bait and tackle shop. The safety issues are:

- No formal pedestrian facility is provided in front of the Bait/Tackle and Liquor shop's hard-standing area, this area is used for parking but provides no marked bays. The lack of bays and wide expanse of this area encourages unpredictable manoeuvres. The pedestrian desire line is behind the parked vehicles.
- Parking bays are provided in front of the next retail area, however the footpath is away from the desire line and pedestrians often walk behind the parked cars to gain a more direct route.

4.2.3.2 Pedestrian Crossings

Currently there is no pedestrian crossings (formal or informal), however there is a painted area that indicates a crossing location, but has no legal standing.

The current road is both wide and at times busy with parking and retail on both sides of the street, as such some form of pedestrian crossings should be provided. The exact locations should best suit a combination of the busiest pedestrian desire lines and site constraints.

4.2.3.3 Vehicle Speeds

Two of the three recorded crashes in Wood Street have excessive speed as a contributing factor and generally speeds were observed to be in excess of a target speed in off-peak times. To provide a safe welcoming environment a target speed of 30kph should be adopted through this area. This should be encouraged through increased side friction and street-scaping that promotes a shared feel to the road corridor.

4.2.4 Wood Street Recommendations

Table 4-2: Wood Street Recommendations

Issue	Effect	Options	Recommendation
Queuing traffic entering petrol station.	Queuing traffic on Wood Street causes vehicles to cross into oncoming lane to avoid stationary vehicle.	Provide space for queuing traffic on Wood Street. Relocate petrol station. Do nothing.	Using some of the wide pedestrian area in front of the Four Square for queuing vehicles provides a solution that is readily implementable. Relocating petrol station is ultimate option but is unlikely in the short term.
Traffic exiting petrol station can block Fagan Place, including footpath.	Reduces visibility and requires pedestrians to circumvent obstruction (in most cases walking on the carriageway).	Relocate petrol station. Do nothing.	No easy short term options to resolve this issue.
Skewed parking.	Can be difficult to entre skewed parking for traffic from opposing direction.	Re-orientate parking to be 90degs to traffic flow. Do nothing.	Re-orientate parking.
Various footpath issues.	Pedestrians are required to use carriageway and/or other areas of hard-standing in lieu of formalised footpath.	Provide continuous footpaths for the entire length of the commercial area on both sides of the road. Do nothing.	Gaps in the footpath infrastructure should be joined up. It is noted that agreement will need to be reached with property owners regarding using private property for public

Issue	Effect	Options	Recommendation
			infrastructure.
Pedestrian crossings.	Wood St is a busy wide road that has parking and retail both sides but has no formalised crossing locations.	Provide control crossings (zebra/lights). Provide uncontrolled crossings (kerb buildouts/refuges). Do nothing.	Installed uncontrolled crossing(s). These provide better traffic flow that controlled crossings and can be used to introduce side friction.
Traffic Speed.	Excessive speed increase the probability and severity or road traffic accidents.	Enforce lower speed limits. Increase side friction. Narrow traffic lanes through remarking edge lines. Installed raised tables. Introducing street-scaping to visually change the character of the corridor.	Narrow lanes through remarked edge lines. Add side friction. Changed street-scaping.

4.3 Molesworth Village

The road infrastructure of Molesworth Village serves two conflicting purposes, it provides access into the town and the various businesses, community and residential premises and also the main route to Mangawhai Heads and beyond.

This dual function operates sufficiently in the off-season and most weekdays, however has significant issues at other times.

A separate report “Mangawhai Village Safety Assessment Study – Moir Street, Molesworth Drive and Insley Street” has recently been completed that examined the key issues with the Village function. This highlighted the following issues.

- Busy pedestrian area with lack of adequate facilities
- No cycling provisions
- Public space and poor parking discipline
- Moir Road/Molesworth intersection function.
- Town threshold and excessive speed
- Insley Street/Moir Street intersection function
- Petrol Station’s traffic circulation

Significant improvements to the safety through the Village is difficult because the corridor provides the only viable link to Mangawhai Head and also serves as a State Highway bypass route meaning intersection and traffic lanes need to be configured to accommodate large vehicles.

An alternative traffic layout is discussed in Section 6 Network Congestion that would allow the Village amenity to be improve through lower traffic volumes and increased none-motorised user links.

4.3.1 Pedestrian Safety

Footpaths are provided along both sides of the main roads within the Village boundaries that provide sufficient width for the current pedestrian numbers. The main issues are:

- Lack of crossing facilities on Moir Street.
- Property accesses are often wider then they need to be, this makes it more difficult for pedestrians to have confidence in a vehicles trajectory when it crosses the footpath.
- Dropped crossings are often in an incorrect location that either does not match the desire line or leads pedestrians to cross at an unsafe location i.e. at the widest points of junction mouths.

4.3.2 Cycling Provision

Like the rest of the study area there are no formal cycling provisions in Mangawhai village, however it is a popular destination and start point for cycling journeys. There is a daily cycle bus from Mangawhai Heads to the school located on Insley Drive, this attracts an average of 8 to 10 children per day. The footpaths are often utilised for cycling during holiday periods. It is noted that whilst the footpaths are currently not dual use there appears to be civilised sharing of space, with cyclists moving at a very slow pace when required.

As with pedestrians there is no dedicated crossing from one side of Moir Street to the other.

See section 5 Cycling/Pedestrians further commentary of cycling related issues.

4.3.3 Insley Street

See section 4.7.1 Insley Street.

4.3.4 The Insley/Moir Street Intersection

The intersection between Insley Street and Moir Street is T-intersection with Moir Street being the priority road. The intersection has a splitter island to provide pedestrians crossing Insley Road a safe refuge.

No specific safety improvements are proposed beyond the slight reshaping of the intersection that is detailed in the “Mangawhai Village Safety Assessment Study”.

4.3.5 Petrol Station

The lack of formal pedestrian provisions past the petrol station entrance is covered by the Mangawhai Village Safety Assessment Study

Whilst the petrol station does not suffer the same issues as the Wood Street station because the larger forecourt area is adequate for the existing patronage usage/numbers. It does require traffic that is accelerating away from the Insley/Moir street intersection to immediately decelerate when a vehicle in front immediately slows to enter the petrol station. This unexpected action increases the risk of nose to tail collisions.

4.3.6 Town Threshold

The lack of town presence at the village boundary does not compliment the 50km/h posted speed limit within the village, this lack of visual change in environment contributes to higher traffic speeds.

4.3.7 Intersection of Moir Street and Molesworth Drive

The intersection between Moir Road and Molesworth Drive is a T-intersection with a left turn slip from Moir Street onto Molesworth. The intersection is configured with a standard layout with the through lane having priority, however this does not align with the dominant traffic flows.

The Mangawhai Village Safety Assessment Study makes recommendations that will alter the intersection function to better align with the dominant traffic flows. As such this intersection will not be considered further in the Unsafe Intersections portion of this report. See Section 6 Network Congestion for further detailed recommendations.

4.4 Molesworth Village Recommendations

Table 4-3:Molesworth Village Recommendations

Issue	Effect	Options	Recommendation
Pedestrian.	No crossing facilities on Moir Street or mid-block on Molesworth Drive. Dropped crossing are not always aligned in the safest pedestrian passage.		Install pedestrian improvements as detailed in Mangawhai Village Safety Assessment Study.
Cycling.	No cycling provision through town, currently has frequent use by school cycling bus from Mangawhai Heads.	See section 5.1 Cycling for details of proposed cycling provisions.	See section 5.1 Cycling for details of proposed cycling provisions.
Insley Street/Moir Street Intersection.			
Petrol Station.	Pedestrian issues are detailed in the Mangawhai Village Safety Assessment Study. Location of petrol station requires vehicles turning out from Insley Street to slow if vehicle in front enters station.	Install footpath along front of petrol station.	Install as detailed in Mangawhai Village Safety Assessment Study.
Town Threshold.	Lack of town threshold doesn't reinforce the change in speed environment.	Install town threshold.	Install town threshold as detailed in Mangawhai Village Safety Assessment Study.
Moir Street/Molesworth Drive Intersection.	Layout not aligned with dominate traffic flows causing frequent queuing traffic but not a significant safety issue.	Alter priorities to align with dominant traffic flows. Install roundabout. Do nothing.	Alter layout to allow Moir/Molesworth to have right of way. See report section 7.2 Insley Molesworth Link for alternative long term traffic management concept.

4.5 Intersections

A high level assessment of the main intersections has been conducted to assess existing concerns and recommend retro-fit solutions. In some instances the improvements may not align with the long term strategy of changes that are required for increasing traffic demand. For these location the improvements contained in this section are offered as a solution to immediate issues and will be generally low cost.

As the Mangawhai network has experienced rapid growth the infrastructure layout and systems have not evolved at the same pace. As volumes increase areas that used to function safely can become dangerous, a prime example of this is intersections.

Negotiating intersections is one of the most complex and demanding tasks a driver faces. To successfully execute a vehicle manoeuvre through an intersection, the driver must assimilate the information, make a decision and execute the desired action. One limitation is that humans are serial processors and the cognitive task-load at intersections can be quite large. Common items a driver must consider when approaching an intersection include:

- Monitoring and adjusting speed.
- Maintaining lane position.
- Being aware of other vehicles.
- Attending to signals or signs.
- Scanning for pedestrians, cyclists, people in wheelchairs and blind or visually-impaired people.
- Decelerating for a stop.
- Searching for path guidance.
- Selecting proper lane.

To allow drivers time to process the large amount of information the intersection needs to provide clear and accurate visual guides.

Common types of accidents and contributing factors are listed below.

Distribution of Crash Types at Intersection:

- Crossing/turning.
- Rear end/obstruction.
- Lost control and bend.
- Overtaking crashes.
- Pedestrian crashes.

Driver/Vehicle Factors of Crashes at Intersection:

- Failed to give way.
- Poor observation.
- Alcohol.
- Excess speed.
- Poor judgement.
- Poor handling.
- Pedestrian factors.
- Incorrect lane/position.

Where possible the treatment options that are suggested in this section are to be easily implemented retro-fit solutions that can offer benefit without significant design and capital outlay.

However raising traffic demands may require complete remodelling of intersection types to provide the capacity needed for the future, in most cases the safest option that provides improved capacity for both peak and none peak traffic is roundabouts. Further analysis and narrative on this is contained in section 6 Network Congestion.

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4.5.1 Insley Street/Moir Road

See Section 4.3 Molesworth Village.

4.5.2 Moir Road/Molesworth Drive

See Section 4.3 Molesworth Village.

4.5.3 Molesworth Drive/Old Waipu Road

The intersection between Molesworth and Old Waipu Road is a T-intersection with a separate right turn bay for vehicles turning from the South. The intersection is constructed on the outside of a bend that has super-elevation in the region of 6%. Concrete power poles are located on the outside of the bend and pose a significant hazard to loss of control vehicles.

There have been two crashes in the vicinity of this intersection as a result of loss of control at the bend. Excessive speed and suspected elevated alcohol levels were noted as contributing factors.

Roundabouts have a lower crash rate when compared to other types of intersections higher priority. At this stage it is not proposed to install a roundabout at this location as several other locations require roundabouts to accommodate future traffic flows. The overuse of roundabouts will lead to increased driver frustration and increase journey times.

This intersection has a high accident risk potential and should be carefully monitored to track any future safety issues.

Table 4-4: Molesworth Drive/Old Waipu Road Risk Potential

Issue	Effect	Options	Recommendation
The inside of the bend has guardrail along but not on the outside of the bend. Guardrail is set too low at Northern, perhaps due to subsequent overlays.	Errant vehicle may not be restrained or be overturned.	Reinstall guardrail to correct height. Do Nothing.	Ensure guardrail is set to manufacturer's recommended installation height.
A power poles with none frangible base is located close to the carriageway edge on the outside of the bend.	Both recorded crashes in this location have been due to loss of control, the concrete post represents a significant hazard.	Relocate pole. Underground service. Install guardrail. Install local crash cushion. Do nothing.	Significant works would be required to underground the electricity lines and the current post location is too close to the road edge allow a guardrail to be effective. CSP Raptor crash cushion will reduce severity but is a visually unappealing device.

Issue	Effect	Options	Recommendation
			
Visibility from Old Waipu road is above the minimum required by normal road design standards, but it is noted that vegetation will be required on a regular basis to maintain the sight distances.	None at present.		Maintain vegetation maintenance to provide required visibility.
The intersection has good conspicuity to traffic approaching from the south, however in certain circumstances the intersection is hard to identify for motorists traveling from the north and is easily hidden by traffic further upstream.		Install warning signs. Do nothing	Install new PW-17 and PW-25 signs on approach to intersection.
The intersection is located within the 50kph speed limit but little or no side friction is present to provide	Nothing to distinguish the lower speed environment from the 80kph sections of road will leads to speeds in	Install kerbs through intersection. Use low level planting to create visual restriction.	Careful use of low level planting can be used to provide a narrower feel to the road – deferred until effect of gated Village threshold is known – see 4.7.2 Molesworth Drive (Village Threshold).

Issue	Effect	Options	Recommendation
continued visual indication of the lower speed environment.	excess of the posted speed limit.	Install raised pavement markers.	

4.5.4 Estuary Estates

Currently Estuary Estates development is in the planning stage, however when completed it is proposed to be up to 500 residential units, plus a mix of commercial and retail space to provide for both the new development and the surrounding area.

The development is proposed to have two entries onto the northbound lane of Molesworth Drive.

A traffic assessment was conducted by KEA Consultants Ltd in 2007, this assessment recommended both intersections should be single lane roundabouts, this recommendation is discussed in section 6 Network Congestion.

No design information is available for the two Estuary Estate intersections but road safety audit should be a requirement of future designs.

4.5.5 Molesworth Drive/Moir Point Road

The intersection between Molesworth and Moir Point Road is location on a tight radius bend that curves from North to West with a radius of approximately 100m. To accommodate the tight radius the road is constructed with a steep super-elevation that from visual inspection is in excess of 6%. The entry onto Moir Point Road from Molesworth Drive is a basic T-intersection that currently does not have dedicated right turn provision. Molesworth Drive inclines from South to North.

Moir Point Road approach falls towards the limit line with a left hand bend that circumvents a car park that serves a Real Estate's business. It appears the majority of this car park is within the highway boundary. Prior to Moir Point intersecting with Molesworth Drive there is a number of minor accesses and side roads connecting in close proximity to each other, this includes Heather Street, a shared accessway, car park/business premises and private property access. In addition to this is a pedestrian crossing.

The 1.5m footpath has recently been installed on the Molesworth approaches to the intersection and a central island constructed to provide refuge when crossing Moir Point Road. The footpath is well utilised by both pedestrians and families on bikes. This demand is expected to remain high and probably grow as the Mangawhai Activity Zone, Museum and Historic Village finish their development stages.

The main safety concerns with the intersection are:

Table 4-5: Molesworth Drive Safety Concerns

Issue	Effect	Options	Recommendation
Steeply sided drop-off on the western side of Moir Point Road.	Errant vehicle is likely to overturn or hit tree.	Install guardrail. Reshape earthworks to 1:4 maximum slope.	Install guardrail. Reshaping earthworks would require large amounts of fill and would extend the road footprint significantly.

Issue	Effect	Options	Recommendation
Steep downward approach from the North.	Increased speed on approach to intersection, requires active braking intervention to prevent vehicle speed from raising over 50kph.	Re-grade approach. Raise Intersection. Improve signage to raise awareness of intersection. Do nothing.	Improve signage. Large earthworks and high costs involved altering approach road vertical alignment. On-site observations indicate speed limit is well observed.
No right turn provisions	Right turning traffic is required to queue in the traffic lane, increasing the risk of nose to tail impacts or rapid evasive manoeuvres causing vehicles to run off the sides of the road. Queuing traffic may feel pressure to make unsafe turn to get away from the live lanes.	Install right turn provision. Install roundabout. Do nothing.	Consideration should be given to installing roundabout, right turn bay would be cheaper to construct but safety enhancements are less pronounced.
Footpath too narrow to accommodate pedestrians and cyclist.	Path used by both cyclists and pedestrians, conflict could occur because of lack of facility width.	Widen path to 3m share facility. Build separate cycleway. Do nothing.	Widen path to 3m shared facility as part of proposed cycleway/footpath.
Multiple minor intersections occurring on Moir Point Road directly before the intersection.	Right turning vehicles will predominately be watching oncoming traffic when making turn, hazards from side roads may be seen too late.	Close of minor intersections/accesses. Install roundabout to control speeds. Do nothing.	Preferred option is to install roundabout. Otherwise adopt Do Nothing

4.5.6 Molesworth Drive/Estuary Drive/Thelma Road

The current intersection is a cross roads with Estuary Drive and Thelma Road connecting onto Molesworth Drive. The posted speed limit at this location is 50kph.

All the approaches to the intersection are straight, relatively flat with good visibility from the approach roads and through lanes.

There have been five crashes within 200m of this intersection, however none of these have been attributed to the intersection or turning vehicles. The crashes do indicate that vehicle speeds exceed the posted speed limit. The straight, open alignment contributes to the excessive speeds.

There are no formed pedestrian provisions with the unsealed shoulder acting as the only footpath.

The main safety issues at this intersection are due to vehicles traveling faster than the mandated speeds limit and increased number of traffic movement due to being four way intersection.

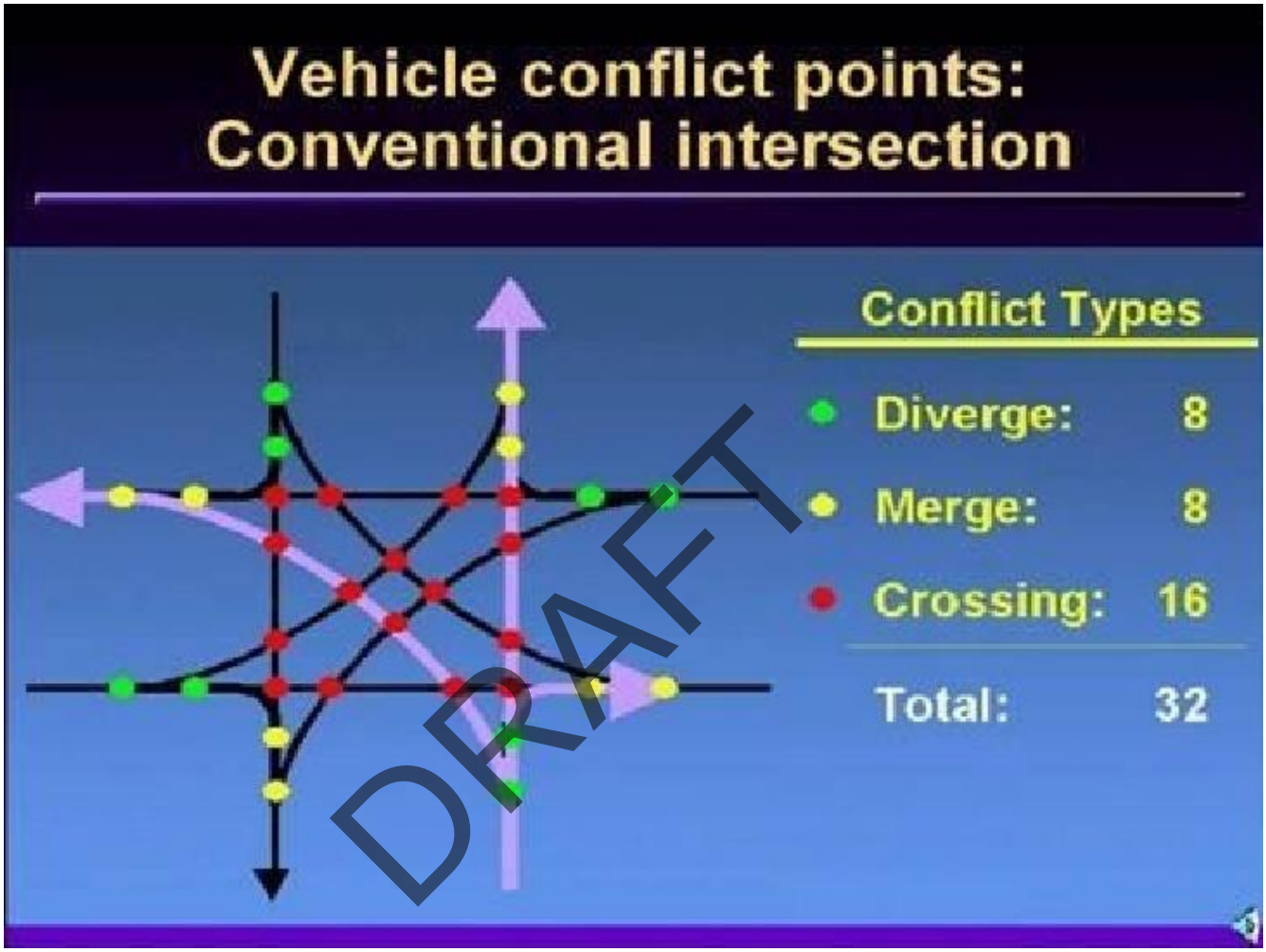


Figure 4-3: Four-way Intersection Conflict Points

Table 4-6: 4-way Intersection Conflict Points

Issue	Effect	Options	Recommendation
Approach speeds.	Higher speeds lessen reaction times and increase chance and severity of crashes.	Reduce traffic speeds increasing side friction. Change intersection to roundabout. Do nothing.	In the short to medium term it is recommended that side friction, an option to achieve this is provide a footpath behind a barrier kerb.
Four way intersection movements.	Increased number of traffic movements is statistically proved to cause more accidents.	Stagger intersection and install right turn lane into Estuary Drive.	Proposed to do nothing until the effect of the increased traffic flows are known.

Issue	Effect	Options	Recommendation
	It is noted that traffic flows on Thelma Road are very low with significant development unlikely unless a paper road is developed to link both ends of Thelma Road (currently either end of separated by almost 2km of undeveloped land).	Change intersection to roundabout. Do nothing.	Long term option will likely require a roundabout.
No pedestrian provisions.	Pedestrians are forced to walk on the unsealed shoulder next to the live traffic lanes.	Install footpath/shared path behind barrier kerb. Widen road embankment and construct footpath separated from carriageway. Do nothing.	Install footpath/shared path behind barrier kerb.

4.5.7 Molesworth Drive/Wood Street

Molesworth Drive has been recently upgraded to provide a right turn bay into Wood Street, site observations taken over the Auckland anniversary weekend indicate that the stacking length of the right turn bay is sufficient for normal traffic flows.

The Wood Street approach to the intersection is currently a wide intersection mouth that accommodates one lane entering Wood Street and a two lane exit that cater for left and right turning vehicles onto Molesworth Drive.

The recently installed Right Turn bay on Molesworth Drive will have significantly reduced the risk of nose to tail collisions.

However there is room for improvement on the Wood Street leg of the intersection, key to this is a splitter island to provide pedestrian refuge when crossing. The intersection carries large volumes of traffic during the peak holiday seasons that makes crossing three lanes hazardous.

The District Plan – Mangawhai Growth Area states a new master plan is to be developed for the Wood Street commercial area. To ensure the area performs to the desired function, any improvements to the intersection should be developed in conjunction with the master plan to ensure facilities complement one another.

Table 4-7 Molesworth Drive/ Wood Street Recommendations

Issue	Effect	Option	Recommendation
Right turning traffic from golf club service access conflicts with traffic in the deceleration lane of RTB.	Right turning bay has short holding length, traffic could extend up to access location during peak times. Increased risk of collision due to	Relocate access. Do nothing.	Discussions should be undertaken with land owners to explore options to move access further south.

Issue	Effect	Option	Recommendation
	diverging traffic.		
Wide junction mouth of Wood Street that cuts through main South/North pedestrian route.	Increased risk of pedestrian related accidents.	Install splitter island on Wood Street. Install pedestrian barriers to encourage crossing at narrower section of Wood St. Do nothing.	Install splitter island either as part of junction retro-fit or as part of a roundabout option.

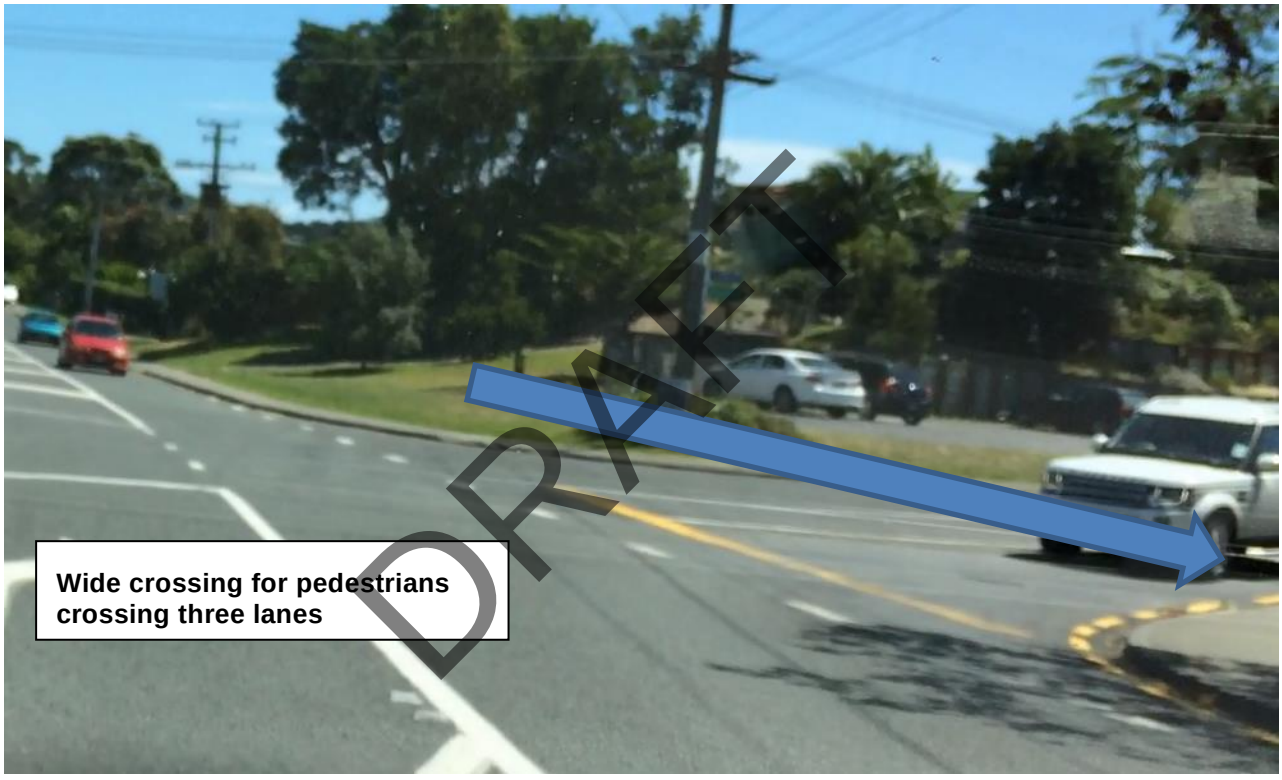


Figure 4-4: Molesworth Drive/Wood Street

4.6 Network Safety Concerns

The below does not provide an exhaustive list of safety concerns within the Mangawhai study area and only mentions items that have been observed during various other site investigations.

4.6.1 Guardrail

4.6.1.1 Existing Guardrail (Molesworth Drive)

Refer Appendix A – Drawing Z80506993/SK024

Guardrail is installed at various identified hazards, mostly on the higher speed sections of roads, such as Molesworth Drive. From site observation the length of the guardrail is often not sufficient to prevent an errant vehicle from leaving the carriageway, passing the start of the guardrail and continuing to the hazard.

Straight end terminals (fish tails) are currently installed on some sections of guardrail. These end terminals are known to pose a significant risk to motorists because the terminal section becomes

a spearing hazard, with evidence to show they have penetrated the vehicle cabin during a road traffic crash. It is noted that the NZ Transport Agency have banned their use on any new installation and are currently in the process of removing them from all state highways. The southbound approach to Tara Creek Bridge, just beyond the Community Park, has fish tails installed on its guardrail. This location is also noted as having the largest number of crashes clustered within a given area.

It is recommended that the guardrail is extended to fully protect the hazard (bridge ends and water hazard), and installed with the appropriate end terminals. All of the identified guard rails in the study area are W-section type, at the date of this report two compliant end terminals are currently on the market. These are CSP's X350 and Ingal's ET2000.

4.6.2 Non-frangible Posts

A large proportion of the electrical mains supply is carried on overhead lines that are supported on concrete posts. The posts are all non-frangible, this solid type of construction often leads to high trauma crashes, especially when coupled with speeds in excess of 50kph. Some of these poles are very close to the road edge.

Option for reducing the hazard to the motorists are:

Table 4-8: Non-frangible Post Options

Treatment	Effect	Recommendation
Relocating utility poles.	This option is especially useful where an individual post or small cluster of posts represent an identified hazard. Relatively high capital costs.	Assess on a case by case basis where an identified safety concern exists.
Reducing the number of utility poles.	Where individual lighting columns are located next to other services there may be an opportunity to reduce the number of poles.	Site observation reveal few opportunities.
Placing cables underground.	Eliminates the hazard but would be significant capital costs, the cost allocation would need to be agreed with the utility operator who would be very unlikely to fund unless it formed part of their scheduled network upgrades. This measure should be specified on all future developments unless there are constraints that prevent underground services.	New development should be served by underground services where possible.
Installing guard rail.	Guard rails systems shield motorists from striking the poles. Devices such as guardrail, concrete barriers or crash cushions and wire rope safety barrier can be used. Barriers can also be a crash hazard. They have a greater likelihood of being impacted as they are inevitably longer than the original hazard and closer to the traffic. The costs and benefits in converting a small number of severe utility pole crashes into potentially a higher number of less severe crashes. Guardrails will not absorb the force of the	Consider on high risk utility poles, likely to be close to road edge, close to intersection or on outside of bend.

Treatment	Effect	Recommendation
	impact if the protected hazard is so close to the road edge that the barrier's designed deformation range is not achievable.	
Installing frangible poles.	Frangible poles can be effective in reducing the severity of pole related crashes. These types of utility poles are specifically designed to collapse or break away on impact and reduce the severity of potential injuries. Two common types of frangible poles are: Slip-base type poles. Impact absorbent type poles.	Consider on high risk utility poles, likely to be close to road edge, close to intersection or on outside of bend.

4.7 Speed Limit Thresholds

Within the study area the majority of roads are 50km/h with a few exceptions.

- Insley Road – town threshold 100km/h to 50km/h (just outside study area).
- Moir Road – town threshold 70km/h to 50km/h.
- Molesworth Drive – change from 50km/h to 80km/h leaving Mangawhai Village.
- Molesworth Drive – change from 80km/h to 50km/h entering Mangawhai Heads.
- Mangawhai Heads Road – town threshold 50km/h to 70km/h.

All of the above locations have had more than one crash in the last five years. With the exception of Moir Road threshold some or all of the crashes have listed excessive speed as a contributing factor.

Each site has its own set of features that are discussed in more detail below one thing that is common to all four sites is the lack of any discernable change in road characteristics on either side of the speed threshold. The change in speed limit on the Moir Street approach to the village benefits by being closer to a built up area, this helps provide visual delineation from the preceding high speed rural environment. This is likely to be a key factor in why there are no speed related accidents entering the village from this direction.

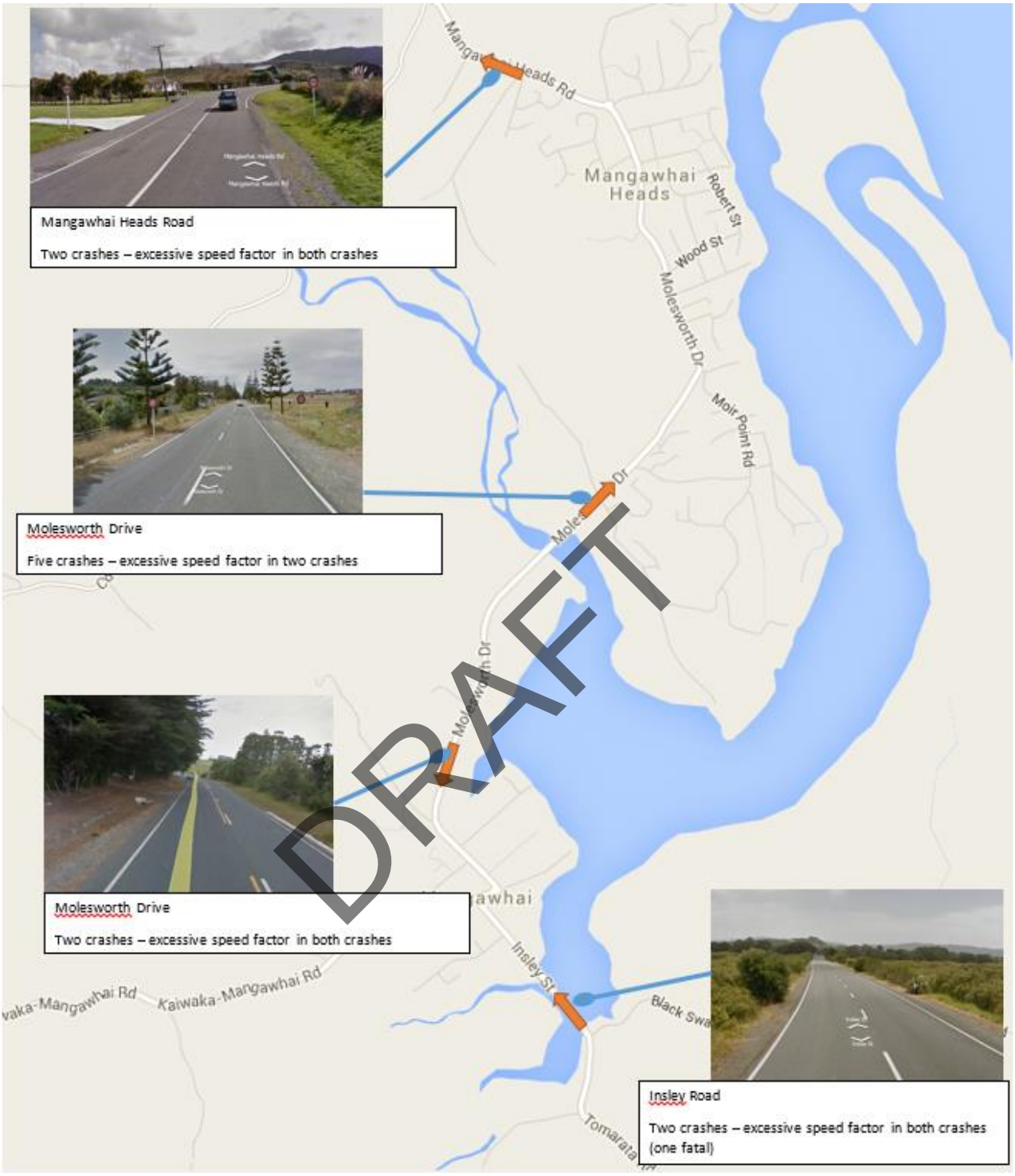


Figure 4-5: Accident Study Area

4.7.1 Insley Street

Refer Appendix A – Drawing Z8050699/SK021

Insley Street is the site of the only fatal crash within the study area, from the accident data the crash happened in 2015 and within the town's 50kph limit. The crash log indicates that both alcohol and excessive speed were factors.

Whilst the speed limit is marked with gated regulatory 50kph signs and further reinforced with another set of gated 50kph signs backed with "Magical Mangawhai" boards that add visual

presence, the road environment does not change beyond the signs, this could contribute to speeds creeping up beyond the speed limits.

At the first set of 50kph signs is the start of a 1950s bridge with concrete parapets that has no end protection. It is highly likely that the majority of vehicles will be still travelling at 50kph as they reach the bridge parapet. Because of the rigid construction with a blunt end the parapets represent a significant hazard.

Table 4-9: Insley Street

Treatment	Effect	Recommendation
Install threshold signage.	Raise awareness of change in speed environment.	Recommended.
Introduce pinch point through kerbed build out, frangible shrub or line markings planting.	Reinforce speed limit change as part of threshold treatment.	Installing kerbed pinch point will cause carriageway to be too narrow for cyclists and vehicles to run side by side. Road formation is not wide enough to allow for cyclist route around the back of a build out.
		Shrub planting reduce visibility to Old Waipu Intersection (not appropriate at this location).
		Use line making to achieve effect of build out.
Add edge lines to make the lanes feel narrower.	Aids perception of narrower lanes.	Add edge line to western side of road on approach to threshold.
Install kerb and channel.	Placement of kerb and channel can be used to make road feel more constrained.	Road is built on causeway, adding kerb and channel will make it too narrow for cyclists.
Vertical carriageway shifts (speed humps etc).	Use on rural thresholds is shown to cause more problems than existed previously.	Not suitable for rural road.
Relocated Speed Limit Boundary.	Speed limit changes at entrance to bridge, most vehicles will be travelling in excess of 50kp/h as they enter the bridge as they coast to lower speed. Relocated in advance of bridge would allow more time for gentle braking/coasting to reduce speed.	Consideration should be given to relocating 50kph in advance of bridge or introducing an intermediate speed of 70kph.
Add guardrail on approach of bridge.	Protects against end of impact with bridge parapet. Will add side friction to slow motorists.	Recommended.

4.7.2 Molesworth Drive (Village Threshold)

Refer Appendix A – Drawing Z8050699/SK023

Entering the village from Mangawhai Heads there is a change in speed limit 150m in advance of the Old Waipu intersection. The speed limit change is demarked by gated speed limits signs.

There are no visual changes to the road environment either side of the traffic signs, with an open rural road feel continued until the village's development commences some 300m further and out of sight from the limit change.

Table 4-10: Molesworth Drive (Village Threshold)

Treatment	Effect	Recommendation
Install threshold signage.	Raise awareness of change in speed environment.	Recommended.
Introduce pinch point through kerbed build out, frangible shrub or line markings planting.	Reinforce speed limit change as part of threshold treatment.	Installing kerbed pinch point will cause carriageway to be too narrow for cyclists and vehicles to run side by side. Carriageway is not wide enough to allow for cyclist route around the back of a build out.
		Shrub planting reduce visibility to Old Waipu Intersection.
		Use line making to achieve effect of build out.
Add edge lines to make the lanes feel narrower.	Aids perception of narrower lanes.	Add edge lines.
Install kerb and channel.	Placement of kerb and channel can be used to make road feel more constrained.	Assess if new edge lines achieve the same effect. Drainage improvements are required to allow use of kerb and channel.
Vertical carriageway shifts (speed humps etc).	Their use on rural road thresholds is shown to cause more problems than existed previously.	Not suitable for rural road.
Change intersection types.	Changing intersection to roundabout would offer improved intersection capacity and slow traffic speed on the approach.	See 4.5.3 Molesworth Drive/Old Waipu Road and 6 Wood Street. | Fagan Place. | End. | Footpath on western side to provide pedestrian access to medical centre and retirement village. Network Congestion.

4.7.3 Molesworth Drive (Heads Threshold)

Refer Appendix A – Drawing Z8050699/SK025

Entering the Mangawhai Heads from the village there is a change in speed limit just before the Thelma Road/Molesworth Drive/ Estuary Drive intersection. The speed limit change is demarked by gated speed limits signs.

There are no visual changes to the road environment either side of the traffic signs, with an open rural road feel continued as far as the eye can see.

There has been five crashes within close proximity to the change in speed limits, two of which list excessive speed as a factor.

It is noted that the intersection volume is likely to increase due to residential development being undertaken down Estuary Drive and the continued development of the museum site that can be accessed from Thelma Road.

Table 4-11: Molesworth Drive (Heads Threshold)

Treatment	Effect	Recommendation
Install threshold signage.	Raise awareness of change in speed environment.	Recommended.
Introduce pinch point through kerbed build out, frangible shrub or line markings planting.	Reinforce speed limit change as part of threshold treatment.	Add missing section of footpath from the Tara Creek Bridge to Estuary Drive will provide a visual demarcation from the 70kph to 50kph environment.
Add edge lines to make the lanes feel narrower.	Aids perception of narrower lanes.	Add edge line to western side of road on approach to threshold.
Install kerb and channel.	Placement of kerb and channel can be used to make road feel more constrained.	Assess if new edge lines achieve the same effect. Drainage improvements are required to allow use of kerb and channel.
Vertical carriageway shifts (speed humps etc).	Use on rural thresholds is shown to cause more problems than existed previously.	Generally not suitable for rural road thresholds.
Change intersection types.	Changing intersection to roundabout would offer improved intersection capacity and slow traffic speeds on the approach.	See 4.5.6 Molesworth Drive/Estuary Drive/Thelma Road and 6 Wood Street. | Fagan Place. | End. | Footpath on western side to provide pedestrian access to medical centre and retirement village. Network Congestion.

4.7.4 Mangawhai Heads Road (Heads Threshold)

Refer Appendix A – Drawing Z8050699/SK028

The change from 100kph to 70kph threshold on Mangawhai Heads Road is located about 400m from the intersection with Cove Road, the threshold is located on the entrance of a 100m curve that will have a design speed of between 50km/h to 70km/h depending on existing road cross fall. The site feels to have a cross fall of 3-4% which gives a design speed of approximately 50km/h.

Various properties and accesses are located on the outside of the bend, some have direct access to Mangawhai Heads Road.

There has been two loss of control crashes on the bend that had excessive speed as a factor.

Table 4-12: Mangawhai Heads Road (Heads Threshold)

Treatment	Effect	Recommendation
Install curve advisory signage.	Raise awareness of curve and safe speed environment.	Recommended.
Introduce pinch point through kerbed build out, frangible shrub or line markings planting.	Reinforce speed limit change as part of threshold treatment.	Installing kerbed pinch point will cause carriageway to be too narrow for cyclists and vehicles to run side by side. Road formation is not wide enough to allow for cyclist route around the back of a build out.
		Use line making to achieve effect of build out.
Add edge lines to make the lanes feel narrower.	Aids perception of narrower lanes.	Add edge line to western side of road on approach to threshold.
Install kerb and channel.	Placement of kerb and channel can be used to make road feel more constrained.	Adding kerb and channel to eastern side (inside of curve) would cause difficulties due to multiple access on western side. Making it difficult for service vehicles to stop away from the carriageway (postage, refuge).
Vertical carriageway shifts (speed humps etc).	Use on rural thresholds is shown to cause more problems than existed previously.	Not suitable for rural road.
Relocated Speed Limit Boundary.	Change to 100kph happens just prior to approx. 100m radius curve. Multiple properties and accesses on outside of bend.	Consideration should be given to relocating 70kph limit beyond curve and property accesses.
Realign curve.	Realign curve to have a higher design speed.	Not recommended to facilitate higher speeds, better to reduce speeds on approach to built-up (or developing areas).

5 Cycling/Pedestrians

5.1 Cycling

5.1.1 Recreational Cycling

Mangawhai's high proportion of holiday homes and popularity as a leisure destination means recreational cyclists make up a large proportion of the cyclist mix, typically this covers a wide assortment of demographics from families with young children, adults of all ages and older children and teenagers.

To provide a safe route for recreational cyclists it is well documented that this is best achieved by providing off road cycling facilities. To make the facility as appealing and user friendly as possible it should connect as many desirable destinations are possible.

Figure 5-1: Recreational Cycle Use

5.1.1.1 Shared Path Design Principles

The design principles shared paths are:

- The designs should cater for the volumes and the directional split of cyclists and pedestrians that use and will use the path.
- Shared paths need to be wide enough to comfortably accommodate expected volumes of both cyclists and pedestrians. Guidance notes are available for assessing the path width and capacity, this needs to be carefully considered to forecast the demand based on attractive cycling provisions being put in place. For the purpose of this report a shared cycle lane width of 3m is assumed.
- Designs should be sensitive to the environment.
- Where paths are located close to water, over water or along banks extra safety considerations should be taken into count.
- Recreational shared paths can be unsealed to fit in with the park or coastal environment, however the surface should be smooth and without loose material that becomes a hazard.

5.1.2 Sports Cyclists

Sport cyclists have different criteria to recreational cyclists in that their primary route is on the carriageway. To cater for this the improvements need to concentrate on improving the road conditions. Providing for road sport cyclists requires an understanding of the characteristic needs of the group. Generally road cyclists are made up of people into sport or simply cycling for their own enjoyment. Road cycling trips are typically up to three times longer than utility, commuter or

education cycling trips. The cyclists are likely to travel through the Mangawhai area on a direct route to the surround road network.

5.1.2.1 On-Road Cycling Design Principles

The design principles for on road cycling facilities are:

- The design should seek to provide a high quality road surface which can accommodate a typical sport cycle speed of over 30 km/h.
- On-going maintenance is important to address pot holes and edge breaks. To maintain a clean surface, clear of broken glass, the cycleway should be more regularly swept.
- The design should seek to provide generous road, shoulder and cycle lane widths to accommodate road cyclist who often ride side by side. This is especially needed on roads with high speeds (above 50 km/h), particularly on arterial and rural roads. The Austroad's recommended widths for cycle lanes and shoulder widths are tabulated below. If parking is present the cycle lane widths should be wider.

Table 5-1:Recommended Widths for Cycle Lanes

Speed Limit	50kph or less	70kph	100kph
Shoulder Width	1.5	1.9	2.5

Providing wide shoulders on the main routes, like Molesworth Drive will likely lead to increased traffic speeds, as such any increase would need to be provided in conjunction with coloured surfacing and on road cycleway markings to reintroduce side friction.

Options exist to increase awareness without physical alterations to infrastructure, such as running a "Share the Road" campaign using media, signage and education to raise awareness of cyclists.

On the most popular recreational cycle routes a reduction in speed limits could be considered.

Figure 5-2: Example "Share the Road" sign as used by Gisborne District Council

5.1.3 Cycle Parking

Secure cycle parking facilities are an essential part of a cycle network. Cycle parking needs to be provided in a location that is convenient, and visible to the public for security reasons.

To encourage more people to cycle, a number of strategically placed secure cycle parking facilities should be located at key destinations. Good parking provision can add creativity, de-clutter spaces and un-block footpaths from badly parked cycles. There are many off the shelf options available for cycle racks, however opportunity exists to add detailing that is representative of the Mangawhai area and community. On-going monitoring will be required to adapt to the changing numbers of cyclists and planned for so that parking provision is well thought out and can be adapted to the changing needs of the town. This will avoid an over or under supply of cycle parking facilities.

Different parking facilities are appropriate for different circumstances depending on the location, estimated length of stay and likely users. This guideline focuses on the design principles for short and long stay cycle parking.

5.1.3.1 Cycle Parking/Short Term:

Design principles.

For short term parking the main principles are:

- Place cycle stands close to key destinations and in prominent areas. This will increase the attractiveness of cycling and the security of the facility.
- Cycle stands need to be designed to provide stability in windy conditions or on a sloping footpath. They should cater for and provide stability to different styles of cycles (including cargo and electric bikes), so that both the frame and a wheel can be secured, such as the wide hoop stand. Ideally stands will not be secured by the front-wheel only.
- The design of cycle stands should be attractive, practical, easy to use, robust and easy to maintain.
- Ideally cycle stands will provide basic weather protection and basic cycle service facilities.
- Cycle stands need to be placed so parked bikes do not interfere with pedestrians and where they are not hit by moving vehicles.
- The number of cycle stands ideally will allow for spare spaces even at peak times. The space provided should allow for stands to be progressively added as cycle numbers grow.
- Innovative designs can help them compliment the environment.

Figure 5-3: Themed Cycle Parking

5.1.3.2 Cycle Parking/Long Term:

Design principles

For long term cycle parking (above two hours) the design principles are:

- Long term parking should be in places where people are likely to leave their cycles for longer than two hours (eg: commercial centres and community facilities). Individual businesses are also encouraged to provide secure, covered parking with adequate facilities to encourage employees to cycle to work.
- Long term parking facilities should be covered and provide restricted access where possible.
- Electric parking facilities with charging points can be considered in popular locations to facilitate the growing trend of electric cycles (long term aim).

5.1.4 Treatment Options

Whilst the exact treatment types will be determined through the investigation and design stages three broadly defined treatments are proposed and mainly cater for the recreational cyclists.

- Off road - shared path located in the existing road corridor, this is proposed to be 3m wide and will accommodate a modest number of pedestrian and cyclists. This treatment makes up the bulk of the proposed cycle route and almost entirely forms the link between the Village and the Heads.
- Off road cycleway - in places existing services make constructing a 3m wide shared path prohibitively expensive. In this case a separate cycleway will be located on the other side of the road to the current footpath. The cycleway will be 1.5m to 2m wide depending on available space.
- On-road cycleway – whilst on-road cycleways are a popular treatment in many New Zealand towns they are often ignored in favour of an off road option, official or not, by less confident cyclists. Because of this it is not deemed appropriate to use this treatment extensively where there is land within the current highway boundary that can be utilised for off-road facilities. The exception to this is very low volume roads that have a narrow corridor or in the case of Wood Street where the number of pedestrians and other facilities make this a difficult option to accommodate. With appropriate traffic calming and formalised accesses and parking the traffic speeds through Wood Street will be low.
- Off-road cycleway - located away from road corridor, this is an attractive option for recreational cyclists and can provide the opportunity to visit sites that are either inaccessible by cars or are serviced by narrow road corridors that are not conducive to adding cycling facilities. It is not immediately clear if the topography will allow for a functional off-road cycling route.

5.1.5 Destinations

Table 5-2: Cycleway Destinations

Destination	Commentary	Cycling Facility
Mangawhai Beach School and Kindergarten.	Currently a cycle bus operates to picks up an average of 8 pupils a day.	Start/end of proposed cycleway.
Mangawhai Domain - Sports ground, function centre and Sunday country market. Domain walking track.	Improved access for cyclists is in keeping with the Domain's recreational function.	Short term uncovered cycle rack or similar.
Mangawhai Village - retail including specialist and	Busy shopping area with poor facilities for both cycling and	Two cycle parking facilities, one close to the main

Destination	Commentary	Cycling Facility
boutique shops, cafes, commercial and Saturday farmers market. Pohutukawa walking track.	pedestrians.	shopping area and another close to the council buildings. Depending on demand covered parking may be desirable because of the longer term usage. Four pedestrian/cycle crossings (2 Moir Street, 1 Insley Street and 1 Molesworth Drive).
Estuary Estates - large future housing, commercial, leisure and retail area.	Likely to become a major trip generator for both all modes of transport. Internal facilities within development are not currently known, however the District Plan states "Subdivision design within the residential and business zones will be expected to achieve pedestrian friendly streets and safe".	Provide a shared cycle/pedestrian crossing at each entry into estate.
Mangawhai Activity Centre (MAZ), Community - Museum, activity park, historic village plus Back Bay & Last of the Summer Wine walking tracks.	As facilities develop this is likely to become a major attraction for cyclists, has Mangawhai Activity Centre facilities that specifically cater for active families and children alike.	Cycle/pedestrian crossing close to museum site. Cycle parking at museum and Mangawhai Activity Centre.
Information Site, Golf Club and Bowls Club.	Sites are frequented by tourists and visitors.	Pedestrian/cycling crossing. Not council development but cycle parking should be encouraged.
Wood Street commercial area - various retail, commercial and food establishments.	Busy shopping area that is close to various types of holiday accommodation.	On-road cycling facility through retail area, gated thresholds to reduce traffic speeds, two sets of cycle parking and formalised accesses/parking to reduce erratic vehicle movements.
Boat ramp, Wild Life Reserve and leisure activities.	Beach access that is very popular with families with younger children.	Visually unobtrusive bike racks.
Boat ramp and camp site.	Access to southern end of busy camp site.	Off-road cycle link and cycle parking.
Mangawhai beach.	Busy beach frequented by large number of physically active people.	Off-road cycle link and cycle parking.

Providing a cycling network that services the destinations listed in Table 5-2 is mostly achievable within the existing road corridors by either widening the current footpath to 3m or by constructing a new section of shared use path. Some service relocations are likely, especially large concrete

power poles that currently sit behind the kerb. It is noted that for the majority of the proposed route the services are located on the opposite side of the road.

Two areas where more specific engineering works are required prior to constructing the shared path are listed in section 5.1.6 Shared Path Engineering Issues.

5.1.6 Shared Path Engineering Issues

5.1.6.1 Estuary Drive and Bridge Crossing

The bridge that currently crosses the estuary just south of Estuary Drive was originally a 7.3m wide bridge built in the 1950s, it has since been modified to accommodate the current footpath. The current footpath is too narrow to allow for shared use.

In the short term it should be signed with “cycleway ends’ or use a “cyclists give way to pedestrians” information sign to manage behaviours over the structure. If the route proves to be popular it would warrant investigating installing a wider clip-on structure. This decision will need to be made following a structural assessment of the existing bridge to ensure it can resist the extra forces. It may prove to be cheaper to build a separate light weight structure for pedestrians and cycling.

From the end of the bridge to Estuary Drive the road is too narrow to accommodate a shared path with a grassed separation. With development already underway close to the toe of the existing slope significant widening may require slope stabilisation to lessen the earthwork footprint. An alternative is to install kerb and channel and have the footpath directly adjacent to the shoulder edge and narrow the shared path to 2.5m. Even doing this will require a small retaining wall. Having a barrier kerb next to the road will also help to keep traffic speeds down at this location.

North of Estuary Drive the road corridor is wide enough to have physical separation between the carriage and the path.

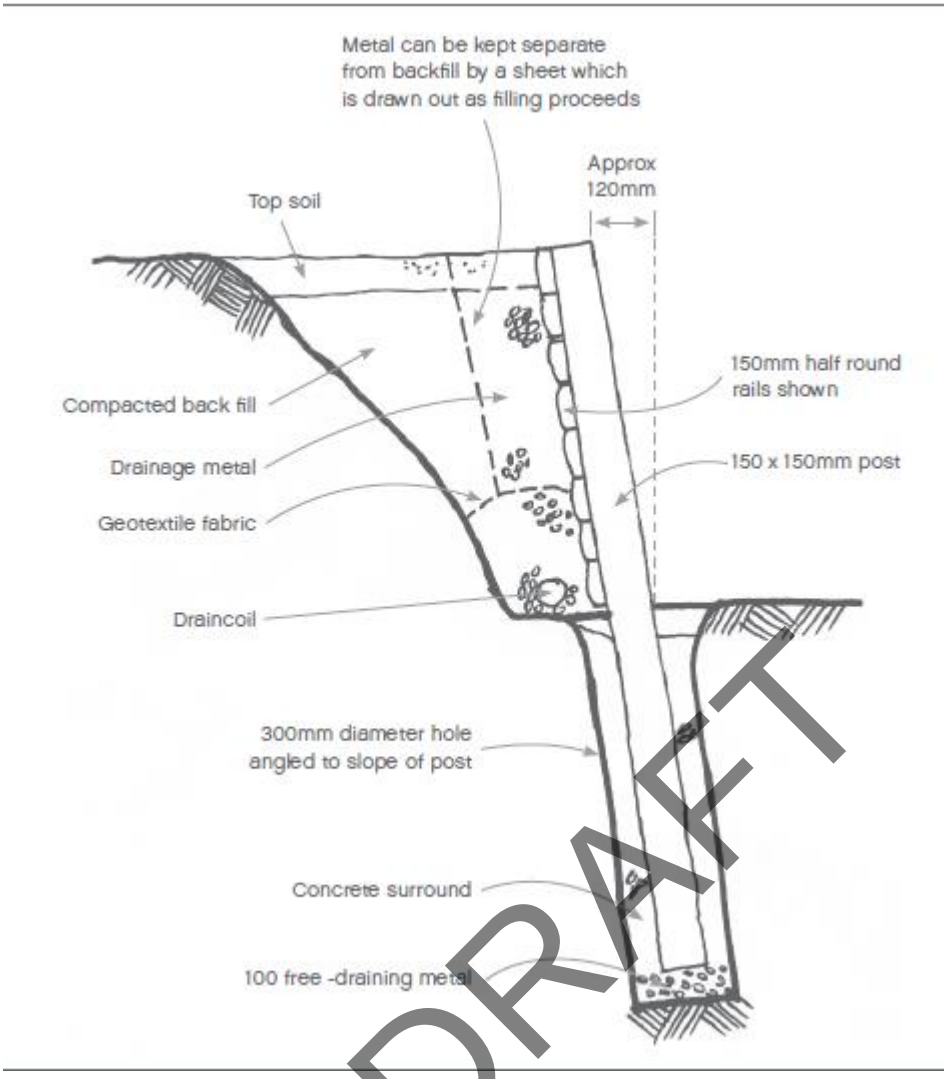


Figure 5-4: Example Small Timber Retaining Wall

5.1.6.2 Camp Ground to Mangawhai Heads Car park (Picnic Bay)

One of the key destinations for any shared facility is the beach at Mangawhai Heads, however the existing road is narrow in places and constraints on both sides of the road.

An option was explored to try to find an off-road facility along the top of the cliff edge. During this investigation a parallel investigation was being undertaken by Frame Consulting. Their investigation was concerned with the provision of a recreational footpath from the Alamar reserve to the Picnic Bay car park. Frame Consulting confirmed that the cliff edge is only suitable for 1.2m path, making it inappropriate for shared use.

Widening Wintel Street as the only option. For most of the length widening the footpath should be achievable with limited amount of earthworks. Over one section the road is very close to the top of a cliff edge. Over this length the road is already retained by gabion basket retaining wall. There may be the option to build to the seaward side edge of the gabion basket and achieve a 2.2m wide shared path. As a safety measure, the path will also require a pedestrian fence set to a minimum 1.5m high above the footpath level.

5.1.7 Recommendations

Refer Appendix A – Drawings Z8050699/SK001 to SK011

It is extremely unlikely that a full cycling network can be implemented as a single project, but rather it will be introduced in segments as funding and demand allow.

Priority should be given to strengthening the route between the two urban areas as this will benefit the residents year round and provide the spine for any offshoots and links that serve the destinations. Currently the route is used daily for cyclist making the journey, as such incremental improvements can be implemented with the benefits realised immediately.

The first improvement should be to connect the footpath at Mangawhai Activity Centre to the Tara Creek Bridge, this is not the lowest cost section it has the greatest safety benefit to both pedestrians and cyclists. It should also help to control traffic speeds through the area with the greatest number of crashes.

Improvements that are interconnected to other should be integrated into one package of work, for example, Wood Street as part of the revitalisation improvements and Mangawhai Village and part of the safety improvements.

Table 5-3: Shared Path Recommendations

Section	Likely Demand	Relative Cost	Safety Enhancement	Issues
Domain to Village (Moir Street).	High destination for both full time residents and visitors (Sunday Market).	Medium/low Land available but some pole relocations required.	Medium/low – mostly within 50kph speed limit with berm wide enough to accommodate cyclists.	Loss of on-street parking on market days, other parking does exist but will require enforcement to prevent parking on share facility.
School to Village (Insley Street).	High – daily cycling bus runs from the Heads.	Medium/low – Land available but some pole relocations required.	Medium/Low – footpath provides facility at present.	None.
Village (Moir/Molesworth).	Key urban area with retail and businesses. Visitor and residents (commuting).	Medium/high– works can be accommodated within road reserve, but works in urban area normally more expensive due to constraints and construction finishes.	Medium – no crossing facilities over busy Moir Street. Cyclists currently use footpaths during busy periods, potential pedestrian/cyclist conflicts.	None identified at high level assessment.
Village to Tara Creek Bridge.	High – key link.	Low – corridor width wide enough to accommodate, no service relocation identified.	Medium/Low – space available for cyclists behind table drain.	None identified at high level assessment.

Section	Likely Demand	Relative Cost	Safety Enhancement	Issues
Tara Creek Bridge.	High – key link.	Low – proposed do nothing.	None – do minimum.	Problem of shared use on path only wide enough for pedestrians. Manageable at current volumes.
Tara Creek Bridge to Estuary Drive.	High – key link.	Medium/high – small timber retaining structure likely to allow path to be widened to allow minimum 2.5m shared path.	No footpath currently exists from the end of the Tara Creek Bridge to Estuary Drive, the same section of road also has the largest cluster of crashes. Priority should be given to providing a path through this section with a shared facility being the preferable treatment is existing constraints and earthworks allow.	
Estuary Drive to MANGAWHAI ACTIVITY CENTRE.	High – Mangawhai Community Park, including dedicated off road cycling facility.	Low/Medium – enough road reserve to allow a separation between path and road.	From Estuary Drive to the entrance of the MANGAWHAI ACTIVITY CENTRE no formal path is provided. Unlike the preceding section there is enough to construct a path with a separation from the carriageway.	Estuary Drive left turn slip is removed to accommodate path. Left turn slips are required less with change in turning priorities (right turn no longer has priority).
Mangawhai Activity Centre to Wood Street.	High – Key Link.	Medium/low – Land available but some pole relocations required.	Medium/Low – footpath provides facility at present.	None identified at high level assessment.
Wood Street.	High – busy retail area and through route to estuary beaches.	Low – on road is line markings only. Off-road section beyond commercial area is accommodated in berm.	High – changed street scene to reinforce lower speeds and less erratic manoeuvres.	Needs to work with long term plans for Wood Street Area.
North Avenue.	Medium/Low	Low – corridor	Medium/Low –	None identified at

Section	Likely Demand	Relative Cost	Safety Enhancement	Issues
	– higher demand if used as alternative to Mangawhai Heads East.	width wide enough to accommodate, no service relocation identified.	footpath provides facility at present.	high level assessment.
Wood Street to Mangawhai Heads Road.	Medium – Proposal offers alternative, longer route.	Medium High – narrow corridor near Greenview Drive.	Medium/Low – footpath provides facility at present.	Retaining wall required, may require land purchase.
Mangawhai Heads Road (West).	Medium – medium density housing, expanding population.	Medium/low – land available behind existing footpath.	Medium/Low – footpath provides facility at present.	None identified at high level assessment.
Mangawhai Heads Road (East).	Medium – link to campsite, this is likely to be a strong generator of cycle journeys but other more favourable routes exist for most journeys.	Medium/High constrained cross section in places.	Medium – cyclists are likely to use other lower volume routes.	Westbound carriageway may need to be narrowed to accommodate separate cycleway (1.5/2.0m).
Alamar Crescent to Mangawhai Heads Road.	Start of Alamar Crescent.	Turning head at bottom of Mangawhai Heads Road.	Key family recreation area, could reduce safety for children if cycling space overlaps general recreational area. Provides route away from traffic for children exploring shore line.	Off-road section path, also identified (as pedestrian only in Opus's Mangawhai Traffic Management & Public Space Strategy). Recommend increasing width to provide Shared Use.
Mangawhai Head Road to Wintle Street.	High if Wintle Street link finished.	Low – off-road section.	Key family recreation area, could diminish safety for your children if space is confined. Provides route away	Demand will only be realised if the Wintle Street link is completed.

Section	Likely Demand	Relative Cost	Safety Enhancement	Issues
			from traffic for exploring shore line.	
Wintle Street.	High – beech key destination.	High – this depends on land costs and extent/size of retaining wall. May be possible to use inexpensive timber retaining wall.	The off-road section of shared path is required to terminate at Wintle Street due to the topography being unsuitable for a shared path. The only option from this point onwards it using Wintle Street. Whilst this is a prime destination the issues identified in section 5.1.6.2 Camp Ground to make the cost hard to justify without figures to support the expense.	Land purchase of moving of boundaries is likely in places.

5.2 Pedestrians

There is a variable level of pedestrian activity across the study area with the main activity concentrating around the commercial areas of Wood Street and Mangawhai Village. Almost all routes in the study area demonstrated occasional to regular usage catering for a variety of users, such as young families, groups of recreational walkers (all ages), parents with push chairs, people making short journeys from parked cars and people using walking as their form of transport.

Most locations have some pedestrian facilities but the quality and usefulness varies from street to street, which is to be expected from a town that has seen rapid growth in resident and holiday maker numbers over a relatively short period (10 years). With pedestrian numbers only set to increase further a strategy needs to be developed for the retro fitting of pedestrian features, adding new footpaths, providing better accessibility features and safer crossing locations.

Figure 5-5: Typical Road Corridors

5.2.1 General Network Deficiencies:

5.2.1.1 Lack of Continuous Safe Pedestrian Footpath from Mangawhai Heads to the Village

A footpath is currently in place for the majority of the route along Molesworth Drive, however a key section is missing from the link, just south of Estuary Drive intersection. Over this length is an unsealed shoulder that serves as the only viable footpath. This section of Molesworth Drive is constrained by the estuary which makes the retro fitting of a footpath difficult without reclamation works.

It is noted that this section of Molesworth Drive has experienced five road crashes over the last five years, this is the only distinguishable cluster in the study area, and one of these crashes involved a pedestrian who expectantly entered the carriageway from the shoulder.

Road corridor width is limited in this location and a short term option to provide a safe zone for pedestrians is to extend the guard rail back from Tara Creek Bridge, the approximate length required is 150m. Whilst this is a viable option there are associated risks such as an increase in nuisance crashes and increased maintenance costs, primarily associated with vehicle impacts.

A long term solution is to widen the road embankment to allow the formation of a footpath/cycleway with a separation from the carriageway edge. The requirements for widening to facilitate a shared footpath/ cycleway is further detailed in section 5.1.6 Shared Path Engineering Issues

5.2.1.2 Abrupt Changes in Footpath Width

Footpaths generally have consistent width along their length but there are instances of rapid changes in width or crossfall that are hazardous for pedestrians with mobility issues or runners, especially during time of reduced light.

Any abrupt changes in footpath width should be removed to reduce the risk of trips/falls.

Figure 5-6: Abrupt Change in Footpath Width

5.2.1.3 Pram Crossing/Pedestrian Cut Down are Not in Safest Location

Sections of kerbing with low upstand are often provided at known pedestrian crossing desire lines, the commonly applied term for this is pram crossings. Pram crossings are an essential aid for anyone with mobility restrictions and allow prams and wheelchairs to cross between various footpaths with relative ease. Pram crossings are provided on most intersections or areas with known crossing demands. They are often provided in unsafe locations or where they do not align the pedestrian's desire line. Some noticeable examples of this are.

- Intersection of Wood Street/Molesworth, the current crossing locations are provided at the widest crossing distance (junction mouth).

- Molesworth Drive/Mangawhai Heads Road roundabout, location of pram crossing don't match crossing location on the roundabout splitter islands.
- Moir Street/Molesworth Drive, the current crossing locations are provided at the widest crossing distance (junction mouth) and does not match the major pedestrian desire line.

As an immediate action, all intersections should be assessed to categorise the number and locations of all dropped crossings that require relocating.

Figure 5-7: Misaligned Pram Crossings

5.2.1.4 Very Few Official Pedestrian Crossing Locations

There is a definite need to improve the facilities for pedestrians to cross mid-block, there is only one formalised crossings within the study area. This is located opposite the entrance to the Mangawhai Activity Centre. There is an indicative pedestrian crossing on Woods Street but this only provides a guide rather than active traffic management/ refuge.

Pedestrian Islands are present at some key intersections, such as the Roundabout at Mangawhai Heads Road and Molesworth Drive, Molesworth Drive and Moir Point Road and Molesworth Drive and Moir Street.

Key areas that should be considered for immediate installation of pedestrian crossings are Wood Street Shops (including the intersection with Molesworth Drive), Moir Street Shops and Molesworth Drive near the Hub shopping area.

5.2.1.5 Obstruction from Vegetation

Vegetation growing into road corridor require pedestrians to move onto the carriageway or shoulder to proceed. As part of the council's maintenance regime obstructions should be removed/trimmed to provide adequate space for pedestrians to pass without having to use the live lanes. There are a few instances where vegetation obstructs the visibility at key locations, a prime example of this is the pedestrian crossing on the northbound approach to Molesworth Drive/Mangawhai Heads Roundabout.

Figure 5-8: Restricted Visibility to Pedestrian Crossing Location

5.2.2 New Footpath Recommendations

Refer Appendix A – Drawings Z8050699/SK090 to SK092

A survey was conducted of all roads in the study area to identify what pedestrian provisions were currently provided. It has been assumed that all roads with footpath are providing at least the minimum level of function with the exception that some pram crossings and other minor localised provisions may need amending in the future.

In an ideal world all road corridors would be retro-fitted with footpaths that are accessible to all levels of mobility, however this requirement has to compete with many other infrastructure upgrades, as such the new footpath links have been categorised into three tiers. The higher tiers are expected to deliver improvements to a greater number of users or serve an area known to have mobility impaired residents. Most road corridors can accept a footpath with little earthworks, however some sites are more constrained and may well never have off-road pedestrian facilities, for example Albert Street. In these cases alternative well-formed links should be provided on adjacent streets.

Table 5-4 catalogues the roads or section of road that are currently without a dedicated footpath provision, or in the case of the sub-arterial routes lacking footpaths on both sides.

Table 5-4: New Footpath Links

	High priority – will either establish a network link, safety, accessibility or serve attractive destination
	Medium priority – serves growing population node, improves network linkage
	Cul-de-sacs or other low volume roads what have flat berms suitable for pedestrians

Road	Start	End	Comment
Mangawhai Village – South or Estuary			
Kainui St.	Pearson St.	Cul De Sac.	Wide corridor with flat berms, very low volume road.
Leslie St.	Moir St.	Cul De Sac	Wide corridor with flat berms, very low volume road.
Moir Street.	Moir Street Footbridge.	Existing FP No 52 (Bennetts Chocolatier).	Footpath on northern side, connecting with pedestrian bridge.
Pearson St.	Molesworth Drv.	End Of Seal.	Wide corridor with flat berms
Pearson St.	End Of Seal.	End Of Metal.	Wide corridor with flat berms, traffic and pedestrian volumes low.
Mangawhai Heads – North of Estuary			
Alamar Cres.	North Ave.	Beach Access Rhs.	Off road shared path – part of shared path link.
Alamar Cres.	Beach Access Rhs.	Cul De Sac	Off road shared path.
Albert St.	Findlay St.	Wood St.	Footpath would require significant earthworks, Ellen Street is viable alternative route that is only a short detour.
Breve St.	Moir Point Rd.	End Of Road.	Low volume cul-de-sac road, wide existing berms. Low priority.
Cheviot St.	Moir Point Rd.	Suffolk St.	Can form part of a footpath link from Molesworth to the nature reserves and Moir Point Walkway down Lincoln Street.
Cheviot St.	Suffolk St.	Lincoln St.	Narrow carriageway, corridor wide enough to accommodate footpath.
Cheviot St.	Lincoln St.	Cul De Sac.	Narrow carriageway, corridor wide enough to accommodate footpath.
Claude St.	Wintle St.	Concrete Ends.	Short cul-de-sac with narrow corridor, pedestrian and vehicle numbers expected to be low.
Cullen Street.	Mangawhai Heads Road.	Seal Ends.	Road corridor wide enough to accommodate footpath, moderate traffic volumes.
Dey St.	North Ave.	Wharfdale Cres.	Wide corridor, close to existing services so should encourage walking at alternative to using car for the short

Road	Start	End	Comment
			journey.
Dey St.	Wharfdale Cres.	Olsen Ave (West).	Wide corridor, close to existing services so should encourage walking at alternative to using car for the short journey.
Doris St.	Wintle St.	Cul-De-Sac.	Very low volume route.
Ellen St.	Findlay St.	Wood St.	Street provides parking for Wood Street shops, footpath should be provided to allow safe movement from car park to shops.
Estuary Drive.	50/70 Speed Sign / End Of Seal.	Park Avenue.	Area is currently being developed for residential, as volumes increase footpath should be provided.
Estuary Drive.	Park Avenue.	Moir Point Rd.	Area is currently being developed for residential, as volumes increase footpath should be provided.
Estuary Drive.	Moir Point Rd.	Christian Camp Ent.	Area is currently being developed for residential, as volumes increase footpath should be provided.
Eveline St.	Molesworth Drv.	Eveline St Extn.	Cul-de-sac with berms wide enough to accommodate footpath, low volume road. Links through to Heather Street and walkway to Estuary.
Eveline St.	Eveline St Extn.	Cul De Sac.	
Eveline St Extension.	Eveline St.	End.	
Findlay St.	Molesworth Drv.	Ellen St.	Can be accommodated in road reserve, close to Wood Street shops, walking should be encouraged.
Findlay St.	Ellen St.	Albert St Signpost.	
Harbourview St.	Olsen Ave (West).	Cul-De-Sac.	Wide corridor with flat berms. Very low traffic volumes. Links to walkway to Alamar Crescent.
Heather St.	Moir Point Rd.	Cul-De-Sac.	Wide corridor with flat berms, walkway to Estuary at end of walk.
Jack Boyd Drive.	Start Central Island.	End Central Island 1.	Developing area, footpaths should be installed as lots fill up, may be required to go behind drainage trenches.
Jack Boyd Drive.	End Central Island 1.	Start Central Island 2.	
Jack Boyd Drive.	Start Central Island 2.	End Central Island 2.	
Jack Boyd Drive.	End Central Island 2.	End Cul De Sac.	
Jack Boyd Drive Service Lane.	Jack Boyd Drive.	End Of Seal At Estuary.	Narrow service lane, very low traffic volumes.
Jordan Street.	Moir Point Rd.	Dead End.	Wide corridor with flat berms. Footpath to extend as development continues. Area currently developing for residential use.
Lincoln St.	Cheviot St.	Cul-De-Sac.	Section of narrow corridor on steeply sloping side. Some demand with

Road	Start	End	Comment
			reserve accessible and Moir Point Walkway.
Moir Point Road.	Molesworth Drive.	Pohutukawa Place.	Corridor wide enough to accommodate footpath. Links up to existing footpath a Pohutukawa Place.
Moir Point Rd.	Suffolk St.	Seabreeze Rd.	Corridor wide enough to accommodate footpath, links up existing lengths of footpath. Residential numbers raising.
Moir Point Rd.	Seabreeze Rd.	Devon St.	
Moir Point Rd.	Jordan St.	End Seal.	
Moir Point Rd.	End Seal.	Estuary Drive.	
Molesworth Drive	Tara Creek Bridge	Estuary Drive	Retaining needed to accommodate path, see section 5.1.6.1 Estuary Drive and Bridge Crossing for engineering issues. Widened to allow future shared path.
Molesworth Drive	Estuary Drive	Mangawhai Activity Centre	Footpath constructed with as much separation from carriageway as possible. Future route of possible shared path.
Olsen Ave (West).	Molesworth Drv.	Dey St.	Wide corridor, cul-de-sac but close to existing services so should encourage walking at alternative to using car for the short journey. Has walkway link to Alamar Crescent.
Olsen Ave (West).	Dey St.	End Of Seal.	
Pearl St.	Wintle St.	End Of Seal.	Constrained corridor but would accommodate footpath. Area developing for residential use. Close to Beach so walking to be encouraged.
Robert St.	Wood St.	Cul De Sac	Cycleway to be added on opposite side of street to existing footpath. Part of shared path link.
Suffolk St.	Moir Point Rd.	Cheviot St.	Wide corridor with flat berms. Connection to Lincoln Street nature reserve link.
Thelma Rd South.	Molesworth Drv.	50/50kph Speed Sign.	Constrained corridor that will require some earthworks. Low volume road with little chance of future development due to being flanked by estuary and Mangawhai Park.
Thelma Rd South.	50/50kph Speed Sign.	Culvert Across Road.	
Thelma Rd South.	Culvert Across Road.	End Of Road.	
Wintle Street.	Mangawhai Heads Road (East).	End.	Footpath already on one side, site constraints make alterations to width difficult. See section 5.1 Cycling for adding additional.
Wharfdale Cres.	Molesworth Drv.	Dey St.	Wide corridor with flat berms, links to walkway to Alamar Crescent. Any.
Wharfdale Cres.	Dey St.	North Ave.	
Wood Street.	Fagan Place.	End.	Footpath on western side to provide pedestrian access to medical centre and retirement village.

6 Network Congestion

6.1 Long Term Traffic Growth

Following the traffic modelling used in the following section the KDC produced document MTP Growth Outlook was produced. Whilst this does not provide traffic figures or resulting intersection demand the figures reported as the high growth rate is considered to be consistent with the modelling results reported in this report section.

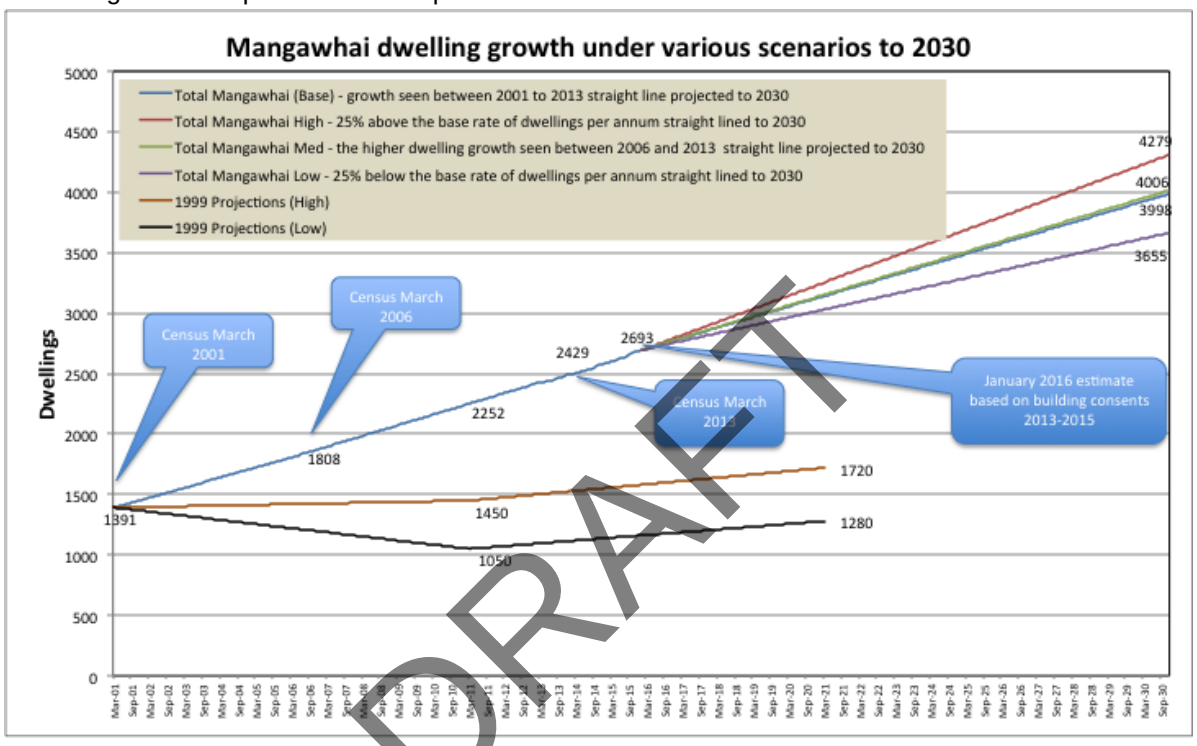


Figure 6-1: MTP Growth Rate – Growth Rates

6.2 Study Area

The intersections included in the study are listed below and illustrated in Figure 6-2.

1. Molesworth Drive and Moir Street.
2. Molesworth Drive and Proposed Estuary Estate South Access Road.
3. Molesworth Drive and Proposed Estuary Estate North Access Road.
4. Molesworth Drive and Thelma Road/Estuary Drive.
5. Molesworth Drive and Moir Point Road.
6. Molesworth Drive and Wood Street.

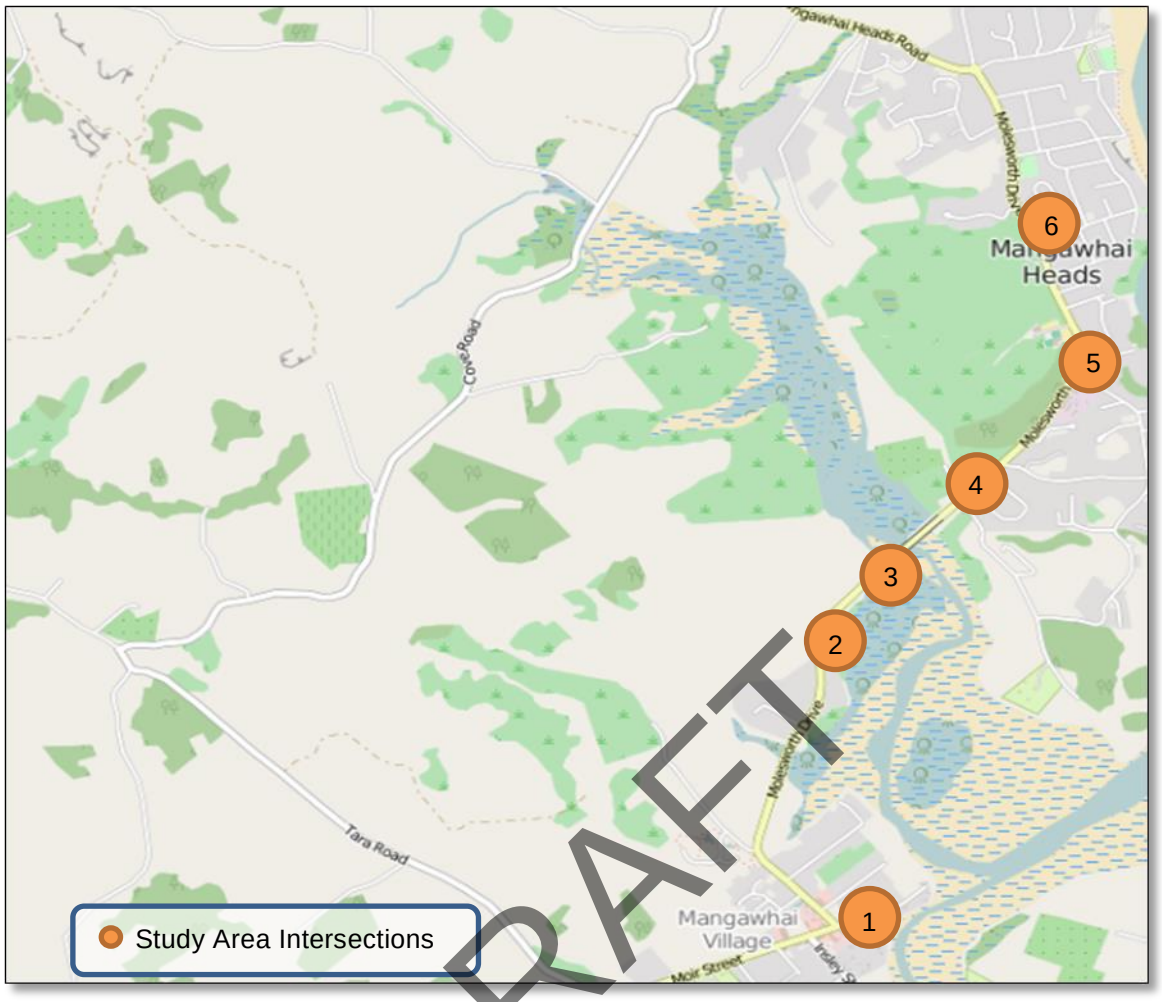


Figure 6-2: Study Area

6.3 Data

The following data was used to support the traffic forecasting and intersection capacity analysis tasks conducted as part of this project.

1. 2015 Peak season 24-Hour tube counts along Molesworth Drive, Moir Street, and Wood Street.
2. 2016 Non-Peak season AM and PM peak turning movement counts at the intersections of Molesworth Drive with Moir Street, Moir Point Road, and Wood Street.

6.4 Methodology

The following approach was adopted to conduct the traffic forecasting for this project.

1. Identify locations for which peak season 24-hour tube count data was available.
2. Utilise Off-season AM and PM peak turning movement counts to develop directional and percent turning movement proportions. It should be noted that turning movement counts were not available for the intersection of Molesworth Drive and Thelma Road/Estuary Drive.
3. Apply the directional and turning movement splits to the peak season peak hour (higher of AM and PM) tube counts to develop 2015 peak season peak hour turning movement volume estimates for all study area intersections.

4. Assuming a 2% annual growth rate, develop 2018 and 2025 Background peak season peak hour turning movement volumes for all study area intersections.
5. Review the July 2007 Traffic Planning Assessment report prepared by KEA Consultants Limited to extract trip generation estimates for the proposed Estuary Estates.
6. Using Google Earth, estimate the gross area of two proposed developments located off Estuary Drive and Moir Point Road. Calculate trip generation estimates for these developments by comparing their gross areas with the proposed Estuary Estates development.
7. Develop 2018 site plus background and 2025 site plus background traffic forecasts whilst accounting for background growth as well as trips generated by the developments mentioned above.
8. In addition to the peak season forecasts, off-season 2025 site plus background forecasts were also developed using the method described above by using the off-season turning movement counts collected in February 2016.

6.5 Intersection Capacity Analysis

SIDRA 6.1 was utilised to analyse the six study intersections for the following scenarios:

1. 2015 Peak season peak hour.
2. 2018 Peak season background (Multiple intersection layout options).
3. 2018 Peak season site plus background (Multiple intersection layouts options).
4. 2025 Peak season background (Multiple intersection layout options).
5. 2025 Peak season site plus background (Multiple intersection layout options).
6. 2025 Non-Peak season site plus background (Multiple intersection layout options).

A summary of existing and forecast traffic volumes for all six study intersections is provided in Table 6-1. Delay and queue summaries for all analysed scenarios are provided in Table 6-2 and Table 6-7.

Table 6-1: Peak Hour Traffic Volume Summary

Intersection	Approach	Movement	2015 Existing	2015 Existing (Off Season)	2018 Background	2018 Site Plus Background	2025 Background	2025 Site Plus Background	2025 Site Plus Background (Off Season)
Molesworth Drive and Moir Street	Eastbound	Left	433	282	460	957	528	1026	841
		Through	42	27	44	44	51	51	33
	Westbound	Through	48	13	51	51	59	59	16
		Right	19	5	20	46	23	48	32
	Southbound	Left	10	5	10	22	12	24	18
		Right	479	244	508	1095	584	1171	884
Molesworth Drive and Estuary Estates South Access	Eastbound	Left				257		257	257
		Right				257		257	257
	Northbound	Left				225		225	225
		Through	519		550	849	632	931	299
	Southbound	Through	582	50	618	960	710	1052	403
		Right				225		225	225
Molesworth Drive and Estuary Estates North Access	Eastbound	Left				257		257	257
		Right				257		257	257
	Northbound	Left				225		225	225
		Through	519		550	882	632	963	331
	Southbound	Through	582	50	618	928	710	1019	370
		Right				225		225	225
Molesworth Drive and Thelma Road	Northbound	Left	25	25	27	27	30	30	30
		Through	473	167	502	1016	577	1091	718
		Right	45	16	48	122	55	130	94
	Southbound	Left	94	29	100	174	115	189	110
		Through	557	189	592	1041	680	1129	679
		Right	25	25	27	27	30	30	30
	Eastbound	Left	21	4	22	22	26	26	5
		Through	25	25	27	27	30	30	30
		Right	11	21	11	11	13	13	26
	Westbound	Left	11	21	11	96	13	98	111
		Through	25	25	27	27	30	30	30
		Right	45	16	48	133	55	140	105
Molesworth Drive and Moir Point Road	Northbound	Through	473	167	502	1035	577	1110	736
		Right	45	16	48	114	55	121	86
	Southbound	Left	94	29	100	100	115	115	35
		Through	547	168	580	1077	667	1163	701
	Westbound	Left	11	21	11	38	13	40	53
		Right	210	43	223	223	257	257	52
Molesworth Drive and Wood Street	Northbound	Through	322	91	342	593	393	644	362
		Right	361	102	383	665	440	722	406
	Southbound	Left	163	47	173	173	198	198	57
		Through	476	142	505	874	580	949	541
	Westbound	Left	165	47	175	303	201	329	185
		Right	148	42	157	157	180	180	51

Table 6-2: Peak Hour Analysis - Molesworth Drive and Moir Street

Approach	Movement	2015 Existing		2018 Background		2018 Site Plus Background (Modified Priority Rule)		2025 Background		2025 Site Plus Background (Modified Priority + EB Left Turn Lane)		2025 Site Plus Background (Modified Priority Rule)		2025 Off-Season Site Plus Background (Modified Priority Rule)	
		Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)
Westbound	Through	0.1	0.0	0.1	0.0	21.9	5.0	0.1	0.0	35.9	8.0	35.9	8	10.0	1.0
	Right	4.8	0.0	4.8	0.0	32.5	5.0	4.8	0.0	50.5	8.0	50.5	8	15.3	1.0
Eastbound	Left	4.7	5.0	4.7	6.0	12.2	86.0	4.8	7.0	5.2	21.0	41.2	212	5.0	16.0
	Through	0.2	5.0	0.2	6.0	52.6	86.0	0.2	7.0	22.2	2.0	103.5	212	21.1	16.0
Southbound	Left	6.2	13.0	6.6	15.0	4.9	23.0	9.0	27.0	4.9	29.0	4.9	29	4.8	14.0
	Right	8.6	13.0	9.3	15.0	4.8	23.0	12.9	27.0	4.8	29.0	4.8	29	4.7	14.0

Table 6-3: Peak Hour Analysis - Molesworth Drive and Estuary Estates South Access

Approach	Movement	2018 Site Plus Background (With Slip Lanes)		2025 Site Plus Background (With Slip Lanes)		2025 Site Plus Background (1 Lane Roundabout)		2025 Off-Season Site Plus Background (1 Lane Roundabout)	
		Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)
Eastbound	Left	3.5	0	3.5	0	299.6	270	15.3	30
	Right	17.9	13	17.3	12	304.5	270	20.1	30
Northbound	Left	2.0	0	2.0	0	51.3	194	7.0	31
	Through	5.3	27	5.0	26	51.4	194	7.0	31
Southbound	Through	10.4	48	9.6	46	106.8	325	11.6	45
	Right	11.4	6	11.2	5	111.3	325	16.1	45

Table 6-4: Peak Hour Analysis - Molesworth Drive and Estuary Estates North Access

Approach	Movement	2018 Site Plus Background (With Slip Lanes)		2025 Site Plus Background (With Slip Lanes)		2025 Site Plus Background (1 Lane Roundabout)		2025 Off-Season Site Plus Background (1 Lane Roundabout)	
		Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)
Eastbound	Left	3.5	0	3.5	0	301.0	271	21.0	39
	Right	21.8	17	20.7	15	305.9	271	25.9	39
Northbound	Left	2.0	0	2.0	0	77.5	253	8.2	38
	Through	6.2	33	5.7	32	77.6	253	8.3	38
Southbound	Through	10.2	46	9.6	45	83.4	269	11.2	42
	Right	11.5	6	11.2	5	87.9	269	15.8	42

Table 6-5: Peak Hour Analysis - Molesworth Drive and Moir Street

Intersection	Approach	Movement	2015 Existing		2018 Background (Roundabout)		2018 Site Plus Background (Two-Lane Roundabout)		2025 Background (Roundabout)		2025 Site Plus Background (2-Lane Roundabout)		2025 Site Plus Background (1-Lane Roundabout))		2025 Off-Season Site Plus Background (1-Lane Roundabout)	
			Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)
Molesworth Drive and Thelma Road	Northbound	Left	8.8	3.0	3.7	12.0	3.9	7.0	3.9	15.0	4.0	7.0	114.9	342	4.9	27.0
		Through	1.0	3.0	3.7	12.0	3.4	19.0	3.9	15.0	3.6	22.0	114.9	342	4.9	27.0
		Right	9.7	3.0	8.2	12.0	8.8	19.0	8.4	15.0	9.0	22.0	119.4	342	9.4	27.0
	Southbound	Left	5.6	2.0	3.6	15.0	3.7	6.0	3.9	20.0	3.8	7.0	123.4	393	4.6	23.0
		Through	0.3	2.0	3.6	15.0	3.2	19.0	3.9	20.0	3.5	22.0	123.4	393	4.6	23.0
		Right	8.2	2.0	8.1	15.0	8.7	19.0	8.4	20.0	8.9	22.0	127.9	393	9.2	23.0
	Eastbound	Left	11.2	5.0	7.0	2.0	9.3	2.0	8.0	2.0	10.3	3.0	22.6	8	11.4	3.0
		Through	28.2	5.0	7.0	2.0	9.0	2.0	8.0	2.0	10.1	3.0	22.6	8	11.4	3.0
		Right	28.7	5.0	11.5	2.0	14.5	2.0	12.5	2.0	15.5	3.0	27.1	8	15.9	3.0
	Westbound	Left	16.7	2.0	7.4	2.0	12.4	11.0	8.6	3.0	16.3	14.0	88.8	52	10.6	10.0
		Through	31.5	2.0	7.4	2.0	12.1	11.0	8.6	3.0	16.0	14.0	88.8	52	10.6	10.0
		Right	36.8	2.0	11.9	2.0	17.6	11.0	13.1	3.0	21.5	14.0	93.3	52	15.1	10.0

Table 6-6: Peak Hour Analysis - Molesworth Drive and Moir Point Road

Approach	Movement	2015 Existing		2018 Background (Roundabout)		2018 Site Plus Background (Roundabout)		2025 Background (Roundabout)		2025 Site Plus Background (4-Lane Section+Roundabout)		2025 Site Plus Background (1 Lane Roundabout)		2025 Off-Season Site Plus Background (1 Lane Roundabout)		2025 Off-Season Site Plus Background (NB Right Turn Lane)	
		Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)
Westbound	Left	17.5	13.0	6.2	7.0	15.1	5.0	8.0	10.0	16.5	12.0	408.3	205	7.0	3.0	7.1	1.0
	Right	27.8	13.0	9.8	7.0	24.8	19.0	11.7	10.0	20.7	12.0	411.9	205	10.6	3.0	106.1	8.0
Northbound	Through	1.1	3.0	5.0	15.0	10.1	60.0	6.5	22.0	6.0	35.0	113.2	345	3.4	22.0	0.0	0.0
	Right	10.2	3.0	9.6	15.0	9.5	3.0	11.0	22.0	9.8	8.0	117.7	345	7.9	22.0	9.6	2.0
Southbound	Left	4.8	3.0	3.2	15.0	8.6	89.0	3.4	20.0	3.4	7.0	29.0	189	3.7	17.0	4.8	1.0
	Through	0.0	3.0	3.2	15.0	8.3	89.0	3.4	20.0	3.0	23.0	29.0	189	3.7	17.0	0.0	1.0

Table 6-7: Peak Hour Analysis - Molesworth Drive and Wood Street

Approach	Movement	2015 Existing		2018 Background (Roundabout)		2018 Site Plus Background (4-Lane Section + Roundabout)		2025 Background (SB Slip Lane + Roundabout)		2025 Site Plus Background (4-Lane Section + Roundabout)		2025 Site Plus Background - (1 Lane Roundabout)		2025 Off-Season Site Plus Background - (1 Lane Roundabout)	
		Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)	Delay (s/veh)	Queue (m)
Westbound	Left	7.4	2.0	8.2	12.0	8.1	11.0	12.2	20.0	8.3	12.0	15.0	31	7.4	8.0
	Right	136.2	35.0	12.7	12.0	13.1	6.0	16.8	20.0	13.6	7.0	19.5	31	11.9	8.0
Northbound	Through	1.2	9.0	4.6	22.0	3.3	14.0	6.3	34.0	3.6	16.0	202.1	567	3.3	19.0
	Right	11.7	10.0	9.1	22.0	8.6	14.0	10.8	34.0	8.8	17.0	206.6	567	7.8	19.0
Southbound	Left	4.9	5.0	14.1	40.0	11.5	12.0	19.4	63.0	12.3	24.0	797.5	1098	11.1	27.0
	Through	0.1	5.0	14.1	40.0	59.1	133.0	20.1	63.0	39.4	95.0	797.5	1098	11.1	27.0

6.6 Intersection Layout Options

Based on an analysis of several intersection options, two ultimate intersection layouts have been identified for the six study intersections, one based on the peak season, peak hour conditions and the other based on off-season peak hour conditions.

6.6.1 Molesworth Drive and Moir Street

Refer Appendix A – Drawings Z80506993/SK050

This intersection will require an eastbound left turn lane and reconfiguration of the give-way rules to provide priority to Molesworth Drive as shown in Figure 6-3. All movements at this intersection operate at an acceptable Level of Service (LoS) except the westbound right and through movements which operate at LoS F and E, respectively, during the peak season peak hour period. In order to ensure that all movements operate at LoS D or better, a one-lane roundabout will be needed at this location.

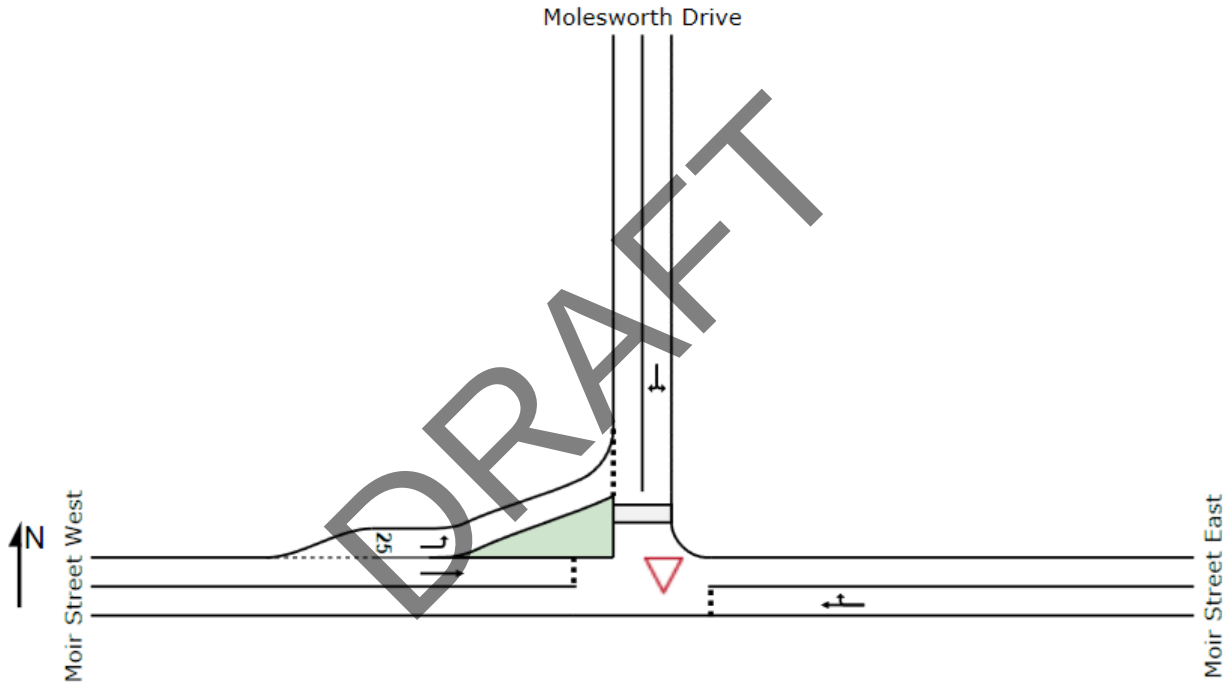


Figure 6-3: Molesworth Drive and Moir Street Ultimate Layout

6.6.2 Molesworth Drive and Estuary Estates Access Roads

Refer Appendix A – Drawings Z80506993/SK041

Appendix A – Drawings Z80506993/SK052

Figure 6-4 and Figure 6-5 shows the required configurations for the Estuary Estates Access roads based on peak season (left image) and off-season (right image) peak hour conditions. As shown in the figures below, the typical off-season peak hour conditions require a one-lane roundabout to adequately accommodate year 2025 Site plus Background traffic volumes. However, the peak season traffic volumes are significantly higher and hence require a two lane roundabout with exclusive left and right turn lanes.

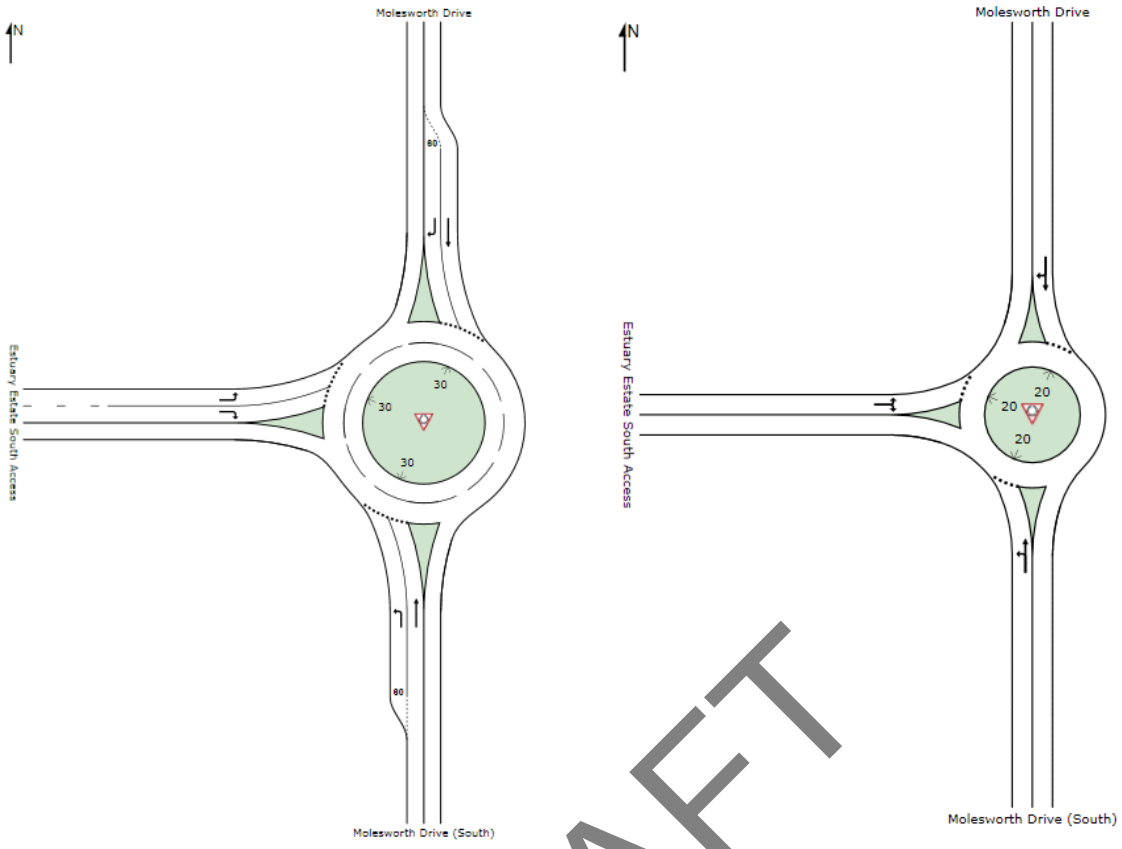


Figure 6-4: Molesworth Drive and Estuary Estate South Access

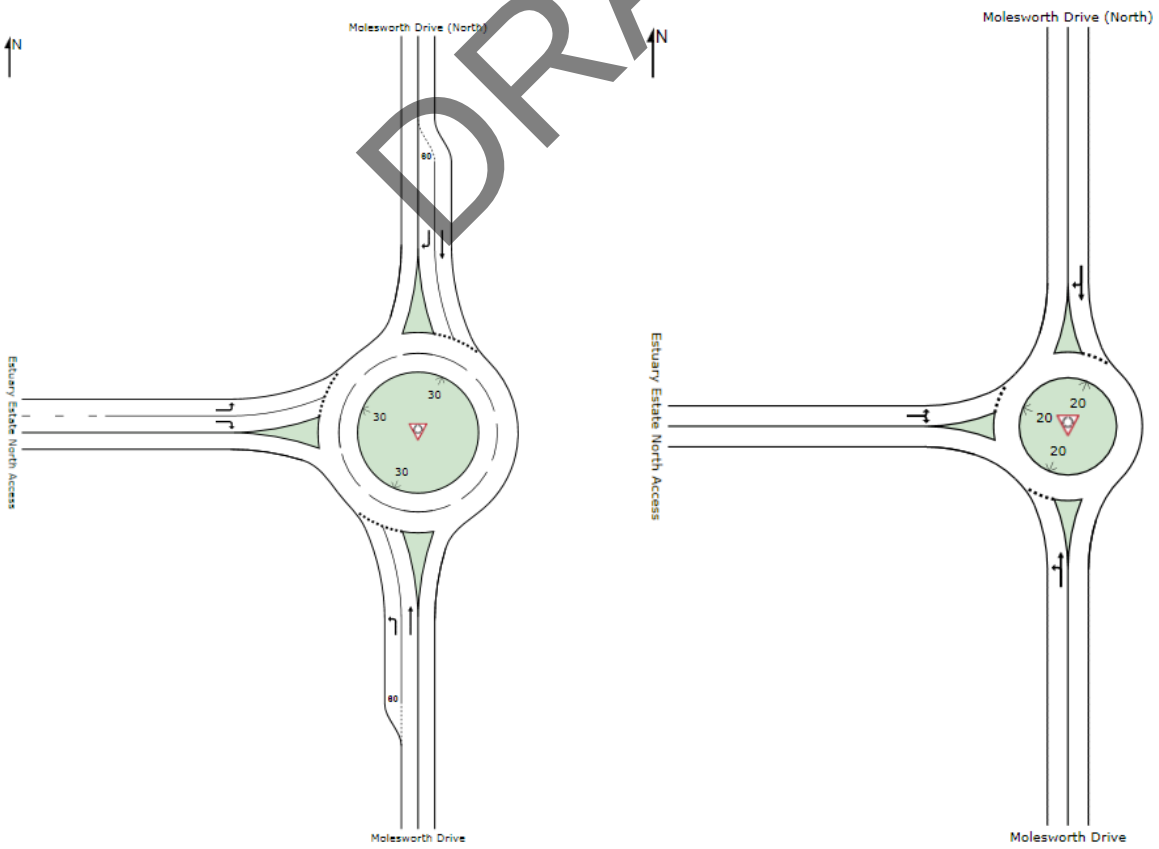


Figure 6-5: Molesworth Drive and Estuary Estate North Access

6.6.3 Molesworth Drive and Thelma Road/Estuary Drive

Refer Appendix A – Drawings Z80506993/SK042

Appendix A – Drawings Z80506993/SK053

Figure 6-6 shows the required configurations for this location roads based on peak season (left image) and off-season (right image) peak hour conditions. As shown in the figures below, the typical off-season peak hour conditions require a one-lane roundabout to adequately accommodate year 2025 Site plus Background traffic volumes. However, the peak season traffic volumes are significantly higher and hence require a two lane roundabout with two lane exits along Molesworth Drive.

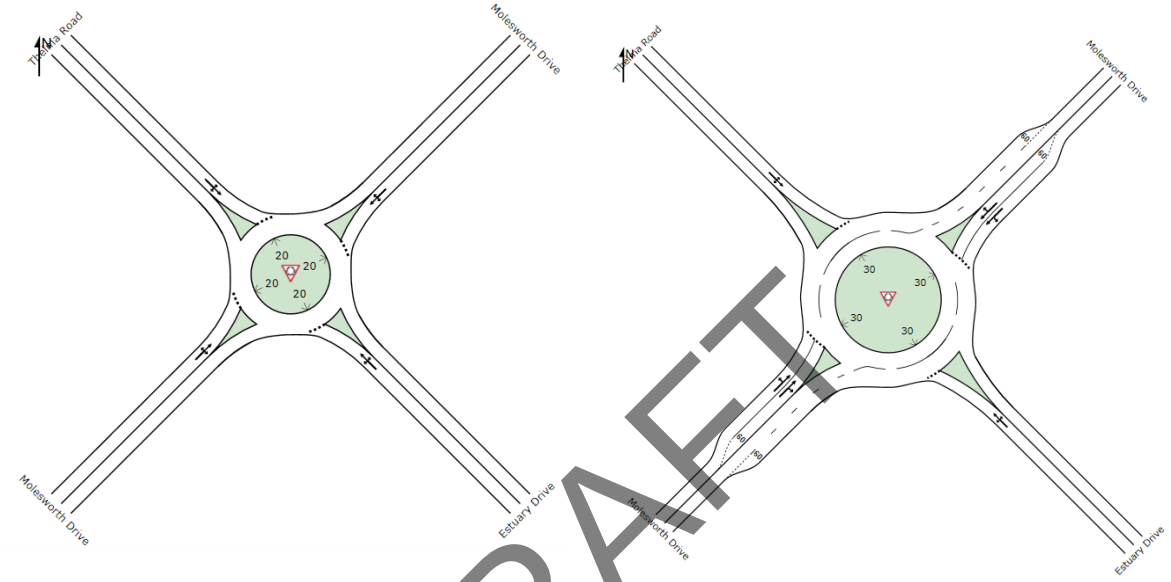


Figure 6-6: Molesworth Drive and Moir Point Road

6.6.4 Molesworth Drive and Moir Point Road

Refer Appendix A – Drawing Z80506993/SK043

Appendix A – Drawing Z80506993/SK054

Figure 6-7 shows the required configurations for this location roads based on peak season (left image) and off-season (right image) peak hour conditions. As shown in the figures below, the typical off-season peak hour conditions require a one-lane roundabout to adequately accommodate year 2025 Site plus Background traffic volumes. However, the peak season traffic volumes are significantly higher and hence require a two lane roundabout with two lane exits along Molesworth Drive.

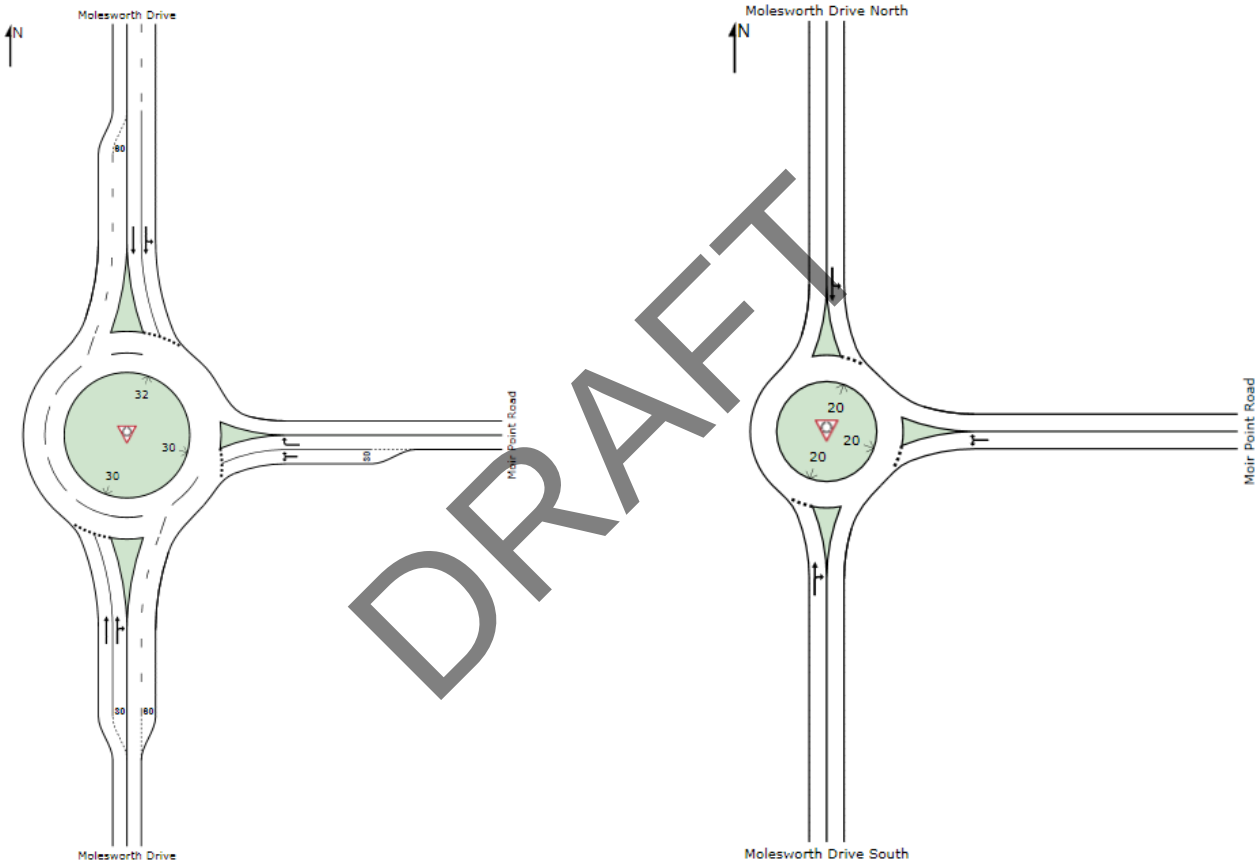


Figure 6-7: Molesworth Drive and Moir Point Road

6.6.5 Molesworth Drive and Wood Street

Refer Appendix A – Z80506993/SK044

Appendix A – Z80506993/SK055

Figure 6-8 shows the required configurations for this location based on peak season (left image) and off-season (right image) peak hour conditions. As shown in the figures below, the typical off-season peak hour conditions requires a one-lane roundabout. However, the peak season traffic volumes are significantly higher and hence require a two lane roundabout with two lane exits and a southbound slip lane along Molesworth Drive.

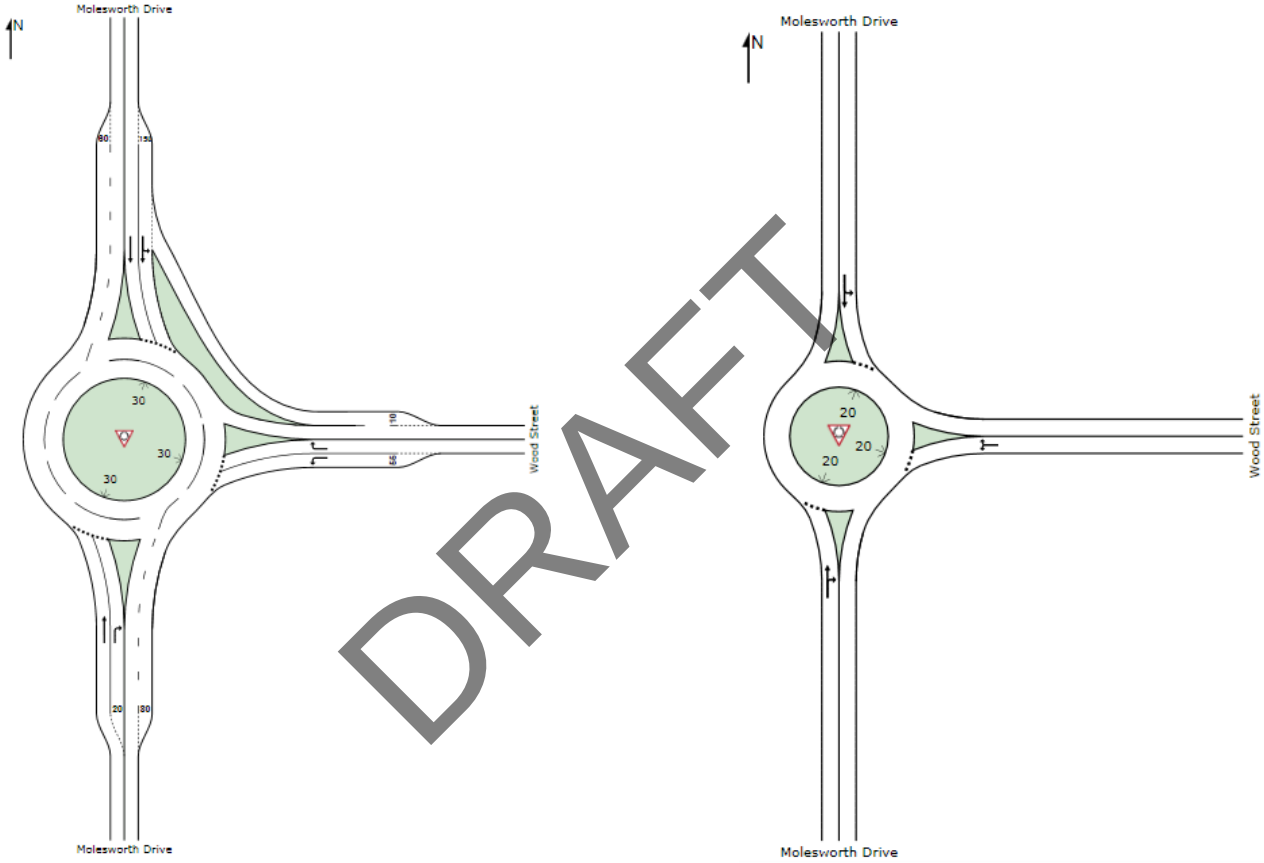


Figure 6-8: Molesworth Drive and Wood Street

6.7 Summary

Six key intersections along Molesworth Drive were analysed as part of this study with the objective of identifying required mitigation measures or intersection upgrades to accommodate the forecast traffic growth primarily due to the proposed developments along the corridor.

The analysis was conducted for the peak holiday season peak hour and off-season peak hour conditions. In the absence of peak season turning movement count data, tube count data for the closest locations and for the same period was utilised to calculate peak season turning movement volumes. Future year traffic forecasts were developed assuming a 2% annual average traffic growth rate in addition to traffic generated by proposed developments including the Estuary Estates.

Analysis for the following scenarios was conducted using SIDRA 6.1:

1. 2015 Peak season peak hour.

2. 2018 Peak season background (Multiple intersection layout options).
3. 2018 Peak season site plus background (Multiple intersection layouts options).
4. 2025 Peak season background (Multiple intersection layout options).
5. 2025 Peak season site plus background (Multiple intersection layout options).
6. 2025 Off-season site plus background (Multiple intersection layout options).

Based on the analysis, intersection configurations were proposed for the ultimate year traffic conditions for both the peak season as well as off-season traffic forecasts.

This study indicates that Molesworth Drive will have to be upgraded significantly if it is to be designed based on peak season traffic conditions which last for approximately 15 days a year. Designing the intersections for off-season conditions may cause short term congestion at the study area intersections. However, this analysis is based on several assumptions which include using tube counts from locations located in the proximity of the study area intersections.

6.8 Recommendation

Using the high level data available it is not possible to propose definitive design solutions for each intersection, however it is clear that designing for the peak traffic will lead to a series of very expensive intersection treatments that would be under-utilised for the majority of the year.

It is clear that intersection works are required if the rate of traffic growth used in this report is realised, the traffic growth rate produces similar rates to those conducted by KDC and reported in the MTP Growth Principles (2016).

Two intersections stand out as candidates for further investigation.

- Molesworth Drive and Moir Point Road – See section 4.5.5 Molesworth Drive/Moir Point Road for existing safety concerns. Traffic volumes turning onto Moir Point Road are likely to increase due to the development currently underway at the end of Moir Point Road.
- Molesworth Drive and Estuary Drive – See section 4.5.6 Molesworth Drive/Estuary Drive/Thelma Road. Traffic volumes turning onto Moir Point Road are likely to increase due to the development currently underway at the end of Moir Point Road and the development of the Community Park area.

7 Future Development

7.1 Ribbon Development

As Mangawhai has developed the Molesworth Drive corridor has become the arterial route for most, if not all development plus provides a key North/South link to Waipu and beyond. A large number of collector roads and private accesses directly connect with the main arterial route

Any development allowed to grow alongside a rural highway, will generate traffic and pedestrian movements that can lead to crashes. Vehicles turning into or out of premises cause particular problems, especially when the vehicles have to cross an opposing stream of traffic. Pedestrians crossing or walking along the road near such developments are also frequently involved in crashes. Research in developed countries shows that the crash rate on a rural highway doubles at about 15 businesses/km or 6 accesses/km, for the majority of the arterial link this intersection density is exceeded. Service roads with properly designed junctions are a possible solution the existing development layout makes this extremely difficult without significant disruption to properties and businesses.

Wood Street redevelopment and Estuary Estates are both built or planned to be built off the main traffic route. The retail and commercial centre of Mangawhai Village is built on both sides of Insley Street, Moir Road and Molesworth Drive, this problem is further compounded by the presence of two major intersections. There are opportunities to improve safety and traffic function that are discussed in

Mangawhai Village Safety Assessment Study there is always going to be potential for traffic related safety and congestion instances due to conflict between manoeuvring vehicles and through traffic.

With the further planned improvements for the other retail areas it could be desirable to attempt to remove as much traffic from Mangawhai Village.

7.2 Insley Molesworth Link

Ref: Appendix A - Drawing Z8050699/SK057

To allow Molesworth Village to be developed into an environment that has high amenity value and is safe for all users the current arterial route from Insley Street to destinations further North should be redirected away from the town centre. This would allow for the introduction of more pedestrian friendly facilities, and street scape enhancements. Options to completely bypass Mangawhai Village would be extremely expensive with a road connecting to Tomarata Road at the intersection with Clarke Road and looping around the West of the village, this route would require two crossings over the estuary.

A shorter link that primarily removes the Insley/Moir/Molesworth dogleg would be a more viable option that would remove none destination traffic from the Village centre. The bypass would commence at the Insley/Moir street intersection, which would require upgrading to signal control and reconnect into Molesworth Drive at and Longview Street. The Longview Street intersection would be upgraded to a four leg roundabout.

Whilst the new link would bring immediate benefit to the village centre by improved amenity values and significantly reducing traffic congestion at the Insley Street intersection it is unlikely to be anything more than a medium to long term solution due to the capital costs and land purchase negotiations required prior to construction.

7.2.1 Insley/Moir Street Intersection

For the majority of intersection upgrades signalisation has been avoided as a way of improving capacity, the reasons for this are explained in section 6 Network Congestion. However for the layout illustrated on drawing SK56 and SK57 signals are proposed at the Insley Street intersection, the reasons for this are.

Benefits:

- Location of the petrol station's entrance is too close to the intersection to make an uncontrolled intersection work safely, with too many conflicting movements happening at one intersection.
- Pedestrian phase on the signals allow for safe crossing over busy road.
- Approaches from Moir Street could be vehicle activated to ensure that flow of traffic from Insley Street to the new link would achieve maximum capacity.
- Intersection should fit within existing road reserve.

Disadvantages:

- Additional maintenance and servicing requirements.
- Does not offer the same traffic speed control as a roundabout.
- Signals are required to operate even in period of low traffic volumes that leads to driver frustration and possible red light jumping.

It is noted that an uncontrolled intersection could operate if the petrol station was relocated as part of the new link road works, although the same concerns that are mentioned in section 4.5.6 Molesworth Drive/Estuary Drive/Thelma Road would apply, namely the amount of possible movements from a four-way intersection raises the probability of a crash.

7.2.2 Intersection at Molesworth Drive/Longview Street

Ref: Drawing Z80506993/SK056

Proposed at the intersection between the new link road, Molesworth Drive and Longview is a four leg roundabout. A four-way connection is proposed at this location to allow traffic entering the village from the south to have a direct link to the northern portion of the Village.

A lower cost solution would be to close the existing section of Molesworth Drive and used the signal at Insley/Moir as the only entry/exit to the village. This would reduce connectivity with the village for visitors from the North (Mangawhai Village) by introducing a short diversion of 300m to Molesworth Drive. Given there are a significant number of retail businesses within the section of Molesworth Drive careful consideration is required to assess the adverse effect to walk-in businesses.

7.2.3 Alternative Insley/ Molesworth Drive Link

Whilst drawings Z80506993/SK056 and SK057 illustrate a possible alignment other routes should be investigated if the project continued to investigation stage.

One alternative alignment is extend Molesworth drive through the boat yard and around the back of the village connecting to Insley Road close to the Mangawhai Beach School. This alignment benefits from causing less disruption to the older part of the village and the Saturday market.

However it will not remove traffic from Molesworth Drive that fronts various retail, leisure and cafés outlets.

Ultimately the optimum alignment option will be a product of public and stakeholder engagement, capital cost, geotechnical and environmental issues, traffic forecast and modelling, future village development, amenity value and road safety.

7.3 Cove Road Link (Old Waipu Road)

A continuation of the Insley/Molesworth link via the paper road that currently exists between Old Waipu and Cove Road could be developed to allow a bypass to Mangawhai Heads. Currently there is no justification for the development of such a route, with a low proportion of traffic using Molesworth Drive/Mangawhai Heads Road as a route to other destination further north.

If the urban areas continue to develop and expand at a similar pace that has been experienced over the last 10 years it could be possible that development starts to push out beyond Cove Road, if this happens an alternative route would become a viable option. It is recommended that the council maintain control of the existing paper road and restrict development that could prevent future projects encroaching into the paper road. Further spread of the urban areas beyond Cove Road would require a change in the District Plan zoning.

The length of a new road link required to connect Molesworth to Cove Road is approximately 1.5km.

7.4 Road Widening Option Analysis

The key decision to be made for Molesworth Drive is if widening will be required in the future and if so what form this widening should take. A number of options have been assessed using a multi-criteria assessment (MCA) approach. The options considered were:

Table 7-1: Midblock Pavement Widening Options

Midblock Widening Options		
Option		**Description**
1	Do minimum	Widen to 8m on northbound side, 3.5m lanes + 0.5m shoulder
2	2 lane + shoulders	Widen to 10m on northbound side, 3.5m lanes + 1.5m shoulders for cycling or parking
3	2 lane + flush median	Widen to 11m on northbound side, 3.5m lanes + 0.5m shoulder + 3m median
4	2 lane + solid median	Widen to 11m on northbound side, 3.5m lanes + 0.5m shoulder + 3m median
5	4 lane + no median	Widen both sides to 15m, 4 x 3.5m lanes + 0.5m shoulder
6	4 lane + flush median	Widen both sides to 18m, 4 x 3.5m lanes + 0.5m shoulder + 3m median
7	4 lane + solid median	Widen both sides to 17m, 4 x 3.5m lanes + 0.5m shoulder + 2m median

Table 7-2: Multi Criteria Analysis Scoring System

MCA Scoring			
Criteria Achievement	**Essential**	**Important**	**Desirable**
High	20	10	4
Medium	15	7.5	3
Low	10	5	2
Hardly at all	5	2.5	1
Not at All	0	0	0

Using this approach the options are tested against a number of criteria and scored according to how well the option achieves that criteria. The scores are also weighted according to how important that criteria is. The basic scoring system used summarised in Table 7-2.

A key limitation on the assessment is the uncertainty over the extent of the population and traffic growth over the next 10 years. The assessment assumes all developments either underway or in planning will be realised to their full extent. Assumed back ground growth of 2% per annum.

The option scores are shown in Table 7-3. The highest scoring, and also preferred possibility is Option 4: a two way, two lane facility with 3m (nominal) flush median, 3.5m lanes and 0.5m shoulders with or without kerb and channel depending on corridor width and location of footpaths/cycleways. .

Table 7-3: Option Scores

	Pavement Widening Multi-Criteria Analysis		Option1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
	Criteria		Do Minimum	2 lane + shoulders, 10m	2 lane + flush median, 11m	2 lane + solid median, 11m	4 lane, no median, 15m	4 lane + flush median	4 lane + solid median
		seal width (m)	8	10	11	11	15	18	17
1	lowest Cost	Essential	20	15	10	10	5	0	0
2	midblock peak capacity to 10 years	Essential	10	10	20	20	20	20	20
3	extent of land acquisition	Essential	20	15	10	10	5	0	0
4	traffic Safety thru moderate speed & separation	Essential	10	5	20	20	0	15	15
5	compatible with future links	Important	5	7.5	7.5	7.5	2.5	2.5	2.5
6	minor intersection peak hour turning	Important	2.5	2.5	7.5	7.5	0	5	5
7	midblock capacity beyond 10 years	Important	0	0	5	5	10	10	10
8	Accessible crossing for pedestrians	Important	7.5	5	10	10	0	5	5
9	All-day Level of Service	Important	2.5	5	7.5	7.5	10	10	10
10	Minimise noise and emissions	Important	5	5	7.5	7.5	2.5	2.5	2.5
11	Improves bus LOS	Important	2.5	7.5	5	5	7.5	7.5	7.5
12	safe separation for cyclists, easy turning	Important	0	7.5	5	2.5	0	2.5	5
13	fits proposed intersection upgrades	Desirable	4	1	3	3	2	4	4
14	minimises lighting costs	Desirable	4	3	2	2	1	1	1
15	minimises impact on services	Desirable	4	3	2	2	1	1	1
16	Quality private access	Desirable	2	3	4	0	1	2	0
			99	95	126	119.5	67.5	88	88.5

8 Picnic Bay Car Park

The car park that predominately services the beach at Mangawhai Heads is known to experience periods of over capacity, during these periods all available space that can physically accommodate a vehicle is utilised, even if the space is currently marked to prohibit parking.

The area currently allocated for parking has changed little over the last 10 years, but is now formalised with circulating carriageway and parking bays defined with a combination of permeable and impermeable surfacing. Whilst the number of spaces have not significantly increased over the last 10 years the traffic volumes and facilities have grown considerably. Therefore there is a need to identify ways to manage the parking either via providing more spaces, reducing demand or increasing vehicle turn-over.

Figure 8-1: 2006 Parking Provision

Figure 8-2: Current (2016) Parking Provision

8.1 Maximising Number of Spaces

When determining the requisite number of parking spaces conventional practice is not to provide parking supply to meet demand on the busiest day of the year as this approach would be uneconomical because parking supply would exceed demand for all but one day of the year.

The accepted practice is to adopt a level of supply to satisfy the parking demand that will only be exceeded for a number of hours or days each year. This demand is most often taken to be equivalent to the 85th percentile hourly utilisation level experienced throughout the year. Where this is difficult to accurately determine, the peak hour demand on the tenth (or fifteenth) busiest day of the year is used. Cases where overflow will have a significant detrimental effect on adjacent areas, a higher level of supply may be appropriate.

8.1.1 Maximise Current Hard-Standing Area

Refer Appendix A – Drawing Z805069933/SK101

The current layout utilises skewed parking with each parking bay set back approximately 35 degrees from perpendicular, this provides for good entry/exit from the parking spaces and aids for smooth traffic circulation. There is the potential to increase the number of available bay without any significant work to the existing area of hard-standings, by remarking the bays as perpendicular spaces. This has the potential to increase the spaces available within the main parking area by 30% giving a total of 148 parking spaces.

The increase will come at the expense of both the traffic flow for circulating traffic and make manoeuvring more difficult for all vehicles, especially longer vehicles such as Utes, people carriers and recreational vehicles. To provide sufficient manoeuvring width the landscaping within the separating strips would need to be de-vegetated to allow nose over parking, this will detract from the aesthetics of the area.

Figure 8-3: Revised Parking Layout

8.1.2 Utilise all Available Land

Refer Appendix A – Drawing Z805069933/SK102

The car park and immediately surrounding land is located on a flat plateau which is encircled with steeply sloping ground in all directions. To the North the ground raises quickly from the back of the existing footpath, in all other directions the topography slopes downwards the estuary or beach. This makes expanding the current plateau difficult and costly with retaining walls and other engineering features required to stabilise the slopes. Two grassed areas to the east and west of the car park could be converted to parking with little earthworks beyond excavating for the pavement construction.

- Eastern area – flat grassed area that currently provides space for picnic benches and a mobile coffee/refreshments stall. The space is regularly used during the peak holiday periods, however even during the peak the amount of people using the area for congregating is fairly low. Site observations at three separate times indicates a number between 10 to 15 people. The total grassed area is approximately 560m2.
- Western area (Helipad) – flat grassed area that is currently separated from the surrounding ground by way of a low single rope fence. The area is reserved for emergency services helicopter landing, as such an alternative location is required before this site can be utilised for alternative uses.

A proposal, that would require further investigation, is to relocate the helipad onto the eastern area. According to the Civil Aviation Authority of New Zealand's - Advisory Circular Aerodrome Design: Heliports the size of the area reserved as helipad is 1.5 x length of expected helicopter. The Westpac rescue helicopters are currently 13m, giving a required diameter of 20. The site also offers multiple approach paths for use during different wind directions.

The beach end of Wintel Street is often used for parking during the busiest periods with cars using the footpath or berm to park. Some of this could be formalised to provide spill over parking, namely the

spaces on the northern edge of Wintel Street where the parking can be accommodated outside of the traffic lanes.

Any parking restrictions that are intended to prevent encroachment onto the footpath should be enforced on a regular basis to discourage the practise. Vehicles blocking the path make it inconvenient and potentially dangerous for pedestrians, especially families with young children. The footpaths will not be constructed for regular vehicle loading and will be susceptible to premature failure.

If all the above changes are implemented it would create an additional 88 spaces, this would provide approximately 80% more parking capacity, with a total of 195 formalised spaces.

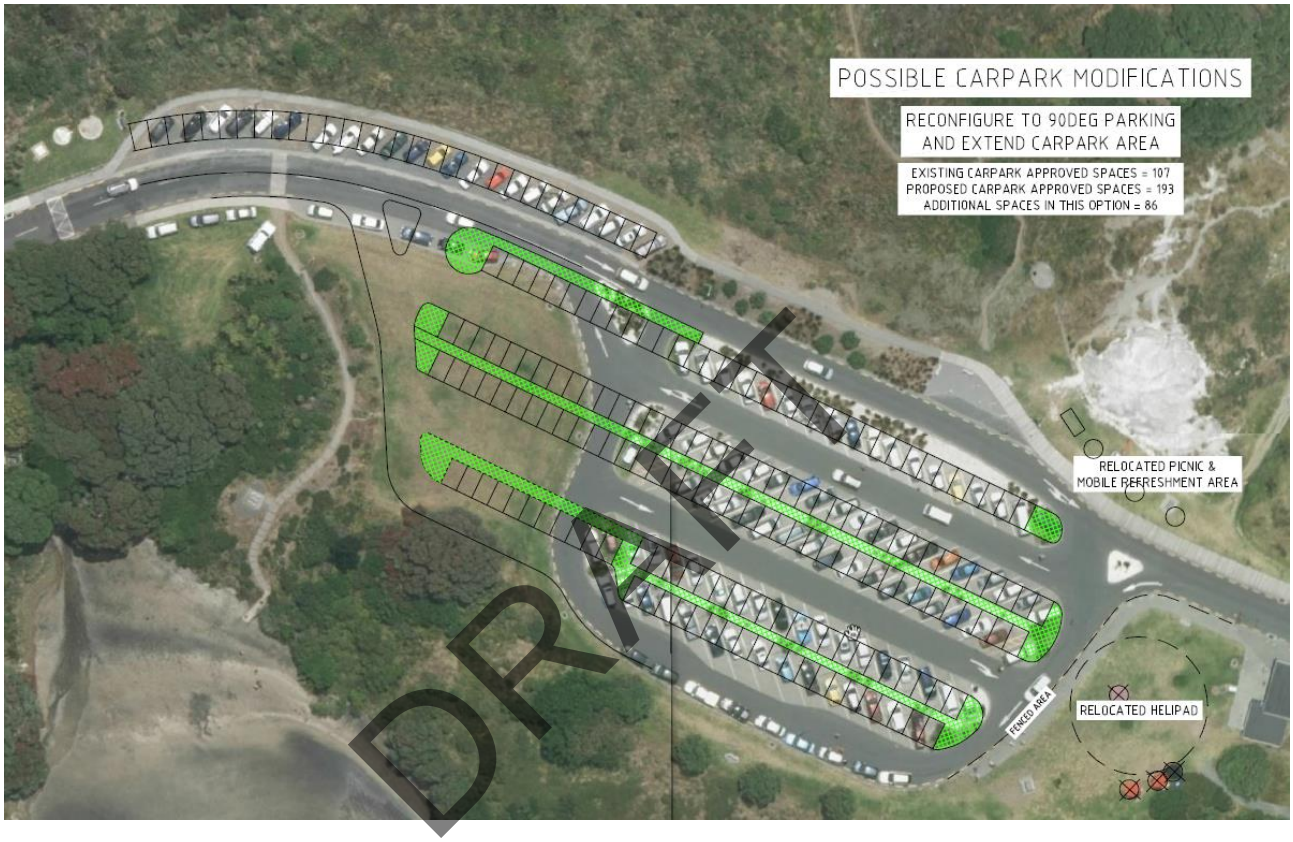


Figure 8-4: Extended Car Park

8.2 Parking Management

8.2.1 Active Traffic Management

Various products are available that monitor the number of vehicles entering and existing a facility to calculate available spaces and transmit the information to an electronic information board to alert drivers. To provide a safe turn-around place for vehicles the data boards would need to be located close to the Mangawhai Heads Road roundabout. Having this so far from the car park (approximately 2:30 minutes travel time) would make the system unreliable and would likely be ignored.

8.2.2 Web Cam

A web cam is an inexpensive way of giving holiday makers an opportunity to view the status of the car park prior to visiting the beach at the Heads. If the car park is at capacity it provides early opportunity to visit some of the regions other beaches, for example Langs or Waipu Cove.

8.2.3 Free Timed Parking

Time limited parking would ensure that there is a greater turn-over of car park patrons, this would allow for an increased number of visitors each staying for a maximum time that would be defined following

consultation with the community. The parking requirements are only stressed at certain times of the year the signs should be installed using flip-down signage that can be covered up during quieter periods of the year.

One method to allow easy enforcement of timed parking restriction is disc parking, this is a system of allowing time-restricted free parking through display of a parking disc or clock disc showing the time at which the vehicle was parked. A patrolling parking attendant can inspect the disc to check if the maximum duration has been exceeded.

Upon arrival the parking disc is set and put on display behind the front windshield. The disc has a thumb wheel at the upper side that makes the clock face turn around its centre point, allowing it to show different clock times. The latest departure time is calculated from the displayed arrival time on the parking disc based on the indicated maximum parking time.

The system is common in Europe however no examples of the system could be identified in New Zealand so would be a pioneering system that may require education to effectively introduce. Parking discs would need to be easily available for a gold coin donation, or sufficient fee to cover their manufacture.

An opportunity would exist to approach local businesses about using the rear of the discs for advertising to help cover the costs of providing enforcement and education.

Figure 8-5: Example of Parking Disc

8.2.4 Paid Parking

Paid parking is an option that would ensure that a steady turn-over of parking is maintained and may encourage a greater use of vehicle sharing. This is likely to be an unpopular initiative and as such it is vital that a parking study is conducted to establish the justification of the pay parking proposal so that it is not seen as solely for the purpose of revenue raising.

Common triggers for the introduction of pay parking are:

- Insufficient turnover of parking spaces is identified resulting in illegal parking.
- Where a high demand is indicated by continuous usage of at least 70% of available during busy periods.
- Where studies reveal insufficient off-street parking facilities within reasonable walking distance from developments generating high short-term parking demand.

The current parking provisions do fulfil these requirements however, nevertheless they will be an unpopular measure at a beach destination.

8.2.5 Shuttle Bus

A shuttle bus operated over the peak summer period for two consecutive years, 2013/14 and 2014/15 with a drop off point at the beach car park. Over the two years the numbers remained fairly static with 330 to 350 passengers during each period.

The bus operator noted that whilst the service was used for a number of destinations the majority of trips ended at the beach with the campground contributing the most passengers.

The service was jointly subsidised by Kaipara District Council and Northland Regional Council. The bus was discontinued after 14/15 due to low uptake of the service that resulted in an unacceptably high subsidising burden to the two authorities.

The daily passenger figures are listed below.

Table 8-1: Shuttle Bus Figures

Date	Passenger No (13/14)	Passenger No 914/15)
27-Dec	12	2
28-Dec	5	13
29-Dec	25	15
30-Dec	18	40
31-Dec	35	65
1-Jan	29	23
2-Jan	41	36
3-Jan	24	12
4-Jan	15	18
5-Jan	24	19
6-Jan	13	22
7-Jan	13	19
8-Jan	5	22
9-Jan	15	16
10-Jan	30	17
11-Jan	24	14
12-Jan	3	
13-Jan	5	
Total	336	353

The passenger figures are low and showed little signs of increasing even though extra advertising was used to promote the facility.

A short park and ride option may be more popular with beach goers, but this would require forming an additional car park that was relatively close to the beach, to make it an attractive alternative regular pick-ups would be necessary. Park and ride has the benefit of allowing families to use their car to transports all items required for a day at the beech directly to the bus pick-up location.

Finding available space for a park and ride facility would be difficult, the obvious location is the area of hard-standing located at the end of Mangawhai Heads Road. This area is already heavily utilised during the required durations with little or no spare capacity and even if the entire area was reserved for park and ride the number of spaces is less than 30.

8.2.6 Cycling Links

Wintel Street is the only trafficable road to the heads, the road corridor is narrow in parts and often gets large motor homes travelling on it making cycling an unattractive option for all but confident cyclists.

A proposed cycle link that follows an off road route is a possibility, this was discussed further in section 5.1 Cycling.

8.2.7 Recommendations

There is unlikely to be any one viable solution that will satisfy future peak demand, however a combination of the following recommendation would significantly increase the access to the heads:

- Expanding car park to utilise all available land to provide an extra 88 spaces
- Providing better cycling links
- If demand continues to rise, consider reintroducing the local bus service.
- Web Cam to help inform potential visitors of current status.

8.3 Mangawhai Village Parking

The parking in the village functions satisfactorily during off peak season, with the facilities generally better defined than areas of Wood Street. However the area becomes stressed on Saturdays due to the farmers market that operates weekly through-out the year.

During market operations Moir Street is used for on street parking, extending as far back as Kagan Avenue on both sides of the road. Leslie Street is also used for on street parking.

Figure 8-6: Moir Street - Market Day Parking

It is observed that during the same period the car parks at four square and surrounding retail building were also at capacity.

Approximately 50% of the on street parking on Molesworth Drive were vacant over the same period and there was also a low occupancy rate in the car park behind “The Hub” that is accessed from Dune View Drive.

Unlike other areas of Mangawhai that suffer from parking issues through-out the holiday periods the majority of the Village problems are confined to market days, as such the recommendation below are tailored to the infrequent demand. If the Village commercial area is likely to increase in size and traffic the recommendations may need to be revisited to provide more robust solutions. .

Figure 8-7: Molesworth Drive – Market Day Parking

If the proposed shared path is extended as far as the Mangawhai Domain the berm may become too narrow to allow safe parking.

8.3.1 Molesworth Drive Parking

During busy market days the parking on Molesworth Drive is under-utilised with motorists preferring to try and find space on Moir Street. This is probably due to a number of factors such as increased walking distance, parking not in line of sight from market, lack of pedestrian crossing points on Molesworth Drive and Moir Street.

The distance from the market is between 200m to 300m from the Molesworth Drive this translate to a three to five minute walk at a comfortable pace. Famers' market typical patrons are not expecting a quick shopping experience due to the social environment that is inherent in buying direct from multiple farmers and producers. The time taken to walk from the car is unlikely to be a major contributor to the length of the shopping experience. Returning to a car loaded with heavy or awkwardly shaped items may be more of a concern. To overcome this a dedicated short term pick-up area could be operated close to the market site. This would need some form of volunteer staffing to encourage users to adhere to the given short term duration.

Increased signage to highlight the provisions on Molesworth Drive (including the parking spaces behind The Hub) could be erected to improve awareness of the already formed parking spaces.

8.3.2 Relocate Saturday Market

8.3.2.1 Mangawhai Domain

Currently a county market is held at the domain on a Sunday, whilst there was some on-street parking attributed to the market the majority of the vehicles were parked in the grassed area just inside the Domain's entrance. Relocating to the domain makes use of the one public space that could accommodate the parking demand. There may be opposition from other businesses within the Village who currently benefit from increased trade whilst visitors make the journey for retail and leisure. Local residents may also view the market as a local asset regardless of the traffic congestion it creates.

8.3.2.2 Out of Town Relocation

The market could be relocated to another venue that is away from the Village, however there are not many public spaces that would be suitable. The Historic Village would offer a similar feel of the currently used historic buildings, however the off road parking would quickly become overwhelmed by the number of market patrons and providing on street parking either formal or informal would represent a greater road hazard than the same situation along Moir Street. This is due to the higher traffic volumes and speed, on Molesworth Drive compared to Moir Street (west of Insley Street intersection).

8.3.3 Increased Parking Spaces

There are no areas of council owed land within the Village centre that are suitable for conversion to car park. To expand the amount of off-street parking the council would be required to either rent or purchase land, Figure 8-8 illustrates three sites that currently are underutilised or free from development.

Table 8-2: Molesworth Drive Addition Off Street Parking Options

Location	Benefits	Disadvantages	Recommendation
Moir Street – next to Bennetts	Closet to market, making it likely that it will be well utilised on market days. Could offer overflow parking to surrounding businesses Away from arterial route traffic	Introduces another intersection into the already congested market day traffic	From the options tabulated Moir Street (next to Bennetts) provides the best location, however all sites could offer the required additional parking within a short walk from the main pedestrian generators. If an overflow car park is to be formed the main selection criteria is likely to be landowner agreement/costs.
Moir Street	If current boat storage facility operates below maximum capacity it may be possible to rent the roadside portion and relocate the security fence to allow both facilities to operate within the existing site footprint. Existing hard-standing is suitable for parking with little to no re-surfacing.	Has the potential to disrupt the Moir/Molesworth intersection. Existing hardware store will reduce conspicuity? which will reduce usage by visitors to the area Pedestrians are required to cross multiple accesses to reach market	
Cnr Moir Street and Molesworth Drive	Access can be located far enough from Moir/Molesworth intersection to not interfere with traffic flows.	Furthest from the market, may be under-utilised. Pedestrians required to cross busy arterial link.	

Figure 8-8: Potential Off-street Parking Facilities

8.3.4 Moir Street Parking

During busy periods Moir Street is used for parallel parking. The road corridor width is sufficient for parked cars to be clear of the traffic lanes, however the driver's side doors protrude into the traffic lanes when open.

The parking behaviour, in the most part, is fairly well ordered with no observed evidence of vehicles overhanging the berm into the carriageway, because of this there is an argument for making this a formalised provision.

For the infrequent demand a fully formalised treatment of indented parking bays backed with kerb and channel may appear to be an obviously under-utilised provision, installing kerb and channel will also require significant work to the existing storm water provisions, with the swales on both sides probably requiring converting to reticulated system.

Consideration should be given to providing a treatment that is more structurally robust than parking on the grassed berm, but does not require extensive drainage works and retains the existing street scape. For example a flush channel block laid along the edge of the carriageway to help prevent edge break, behind the block a form of permeable surface that is laid to the same gradients as the existing shallow swale. This has the benefit of preventing rutting and on-going maintenance issues with the road side berm whilst having few visual differences from the existing street scene.

Figure 8-9: Moir Street - Reinforced Grass Parking Area

8.3.5 Disable Parking

Currently there are no disable parking bays that are close to the market site, one or two bays should be allocated and monitored to assess demand. The obvious space for this would be the skewed parking directly in front to the village hall.

8.3.6 Recommendations

Given the current constraints there is limited options to increase the number of parking spaces in Mangawhai Village without purchasing private land. Land purchase for a facility that is only going to be required for 10% of even the peak season may be difficult to justify on a cost/benefit ratio. If a site can be developed at a low cost and additional council operated off road facility would be the best option.

Raising the usage of the Molesworth Drive parking is the best solution to adding effectively extra capacity without any changes to the road environment. Whilst the parking is not well sign posted it is believed that most drivers will pass the parking while travelling from the Heads to the Village, as such will know it is available. New signage is likely to have little effect, with the parking continuing to be a last resort when Moir Street is full.

Moir Street is likely to remain the favoured parking area, a semi-formalisation should be considered to reduce road maintenance issues. As part of this works an assessment of intersection visibility should be undertaken and if parking is identified as causing a hazard it should be locally restricted to allow to safe sight distance.

8.4 Boat Ramps

In 2016 Opus prepared the Mangawhai Traffic Management and Public Space Strategy: 2016, which assess the infrastructure and public amenity requirements of the Alamar Reserve area, including the boat ramps at Sellers Road and the main boat ramp off Alamar Road.

As part of this report a range of well detail concept plans and options are detailed that seek to formalise the existing car and trailer parking. The recommendations appear to provide regimented provisions that will enhance the aesthetics and amenity of the area.

Since the report issue, KDC have conducted a forecast of Mangawhai growth potential, the figures are published in the MTP Growth and Development Outlook report and gives a range of growth forecasts that are higher than assumed in the Opus report.

As such the provisions illustrated in the report could well be inadequate for the revised figures.

Before any further development of a design option, the provisions should be reassessed against the revised forecast figures to check the number of trailer parks required.

9 Risk Assessment

Whilst this report attempts to detail the key traffic issues within the study area and draw conclusion where possible it is noted that all solutions are based on high level assessment that may prove to be unsound during further detailed investigation and design.

Issues that may prevent development of the options as presented

- Long term traffic forecast are higher/lower than estimated
- Developments take a different format than expected
- Climate change makes areas near the coast undesirable for development
- Geotechnical/hydro geological issues
- Topographic constraints not readily identified from site observation
- Public opinion/consultation process
- Availability of land
- Cultural issues
- Design development
- Capital cost

These issues will need to be addressed during the next stages of investigation, Table 9-1 summaries some of the risks.

Table 9-1: Risk Assessment

Risk Assessment					
Criteria	**Risk**	**Likely**	**Consequence**	**Comment**	**Action**
Congest	Lower traffic volume than predicted occurs	Med	Low	Intersections works to be driven by rising traffic flows, easy to defer.	Monitor
Congest	Higher peak traffic volumes than predicted occur	Med	Med	Increased congestion in peak periods, congestion could slow development	Monitor and investigate
Congest/safety	Higher than expected development on either side of	Low	Med	Early introduction of flush median may be required to allow turning movements (none intersection)	Monitor, develop land purchase strategy

Risk Assessment					
Criteria	**Risk**	**Likely**	**Consequence**	**Comment**	**Action**
	arterial route				
Amenity/safety	Low uptake of cycling facilities	Med	Med	Poor public perception of management of public funds and road reserve usage	Introduce in sections, to monitor numbers.
Congest/safety	Estuary Estates/ other developments fundamentally change traffic characteristics	Med	Low	Introducing new retail/commercial areas and more employment opportunities may change traffic destinations and/or encourage out of town traffic. However given there is only one arterial route an increase in traffic volumes is a safe assumption	Monitor
Cost	Ground improvement, services diversion, land costs significantly raise project costs	Med	High	Investigations during design stage will identify issues	Confirm via investigations
Perception	Private property sections extend into road reserve	High	Med	Moving property boundaries will require negotiation to limit hostility to projects	Council lead all land negotiations
Safety	Accident happens at area identified as hazardous	Med	Med	Specific areas of pedestrian safety have been identified	Give priority to safety related projects

10 Recommendations

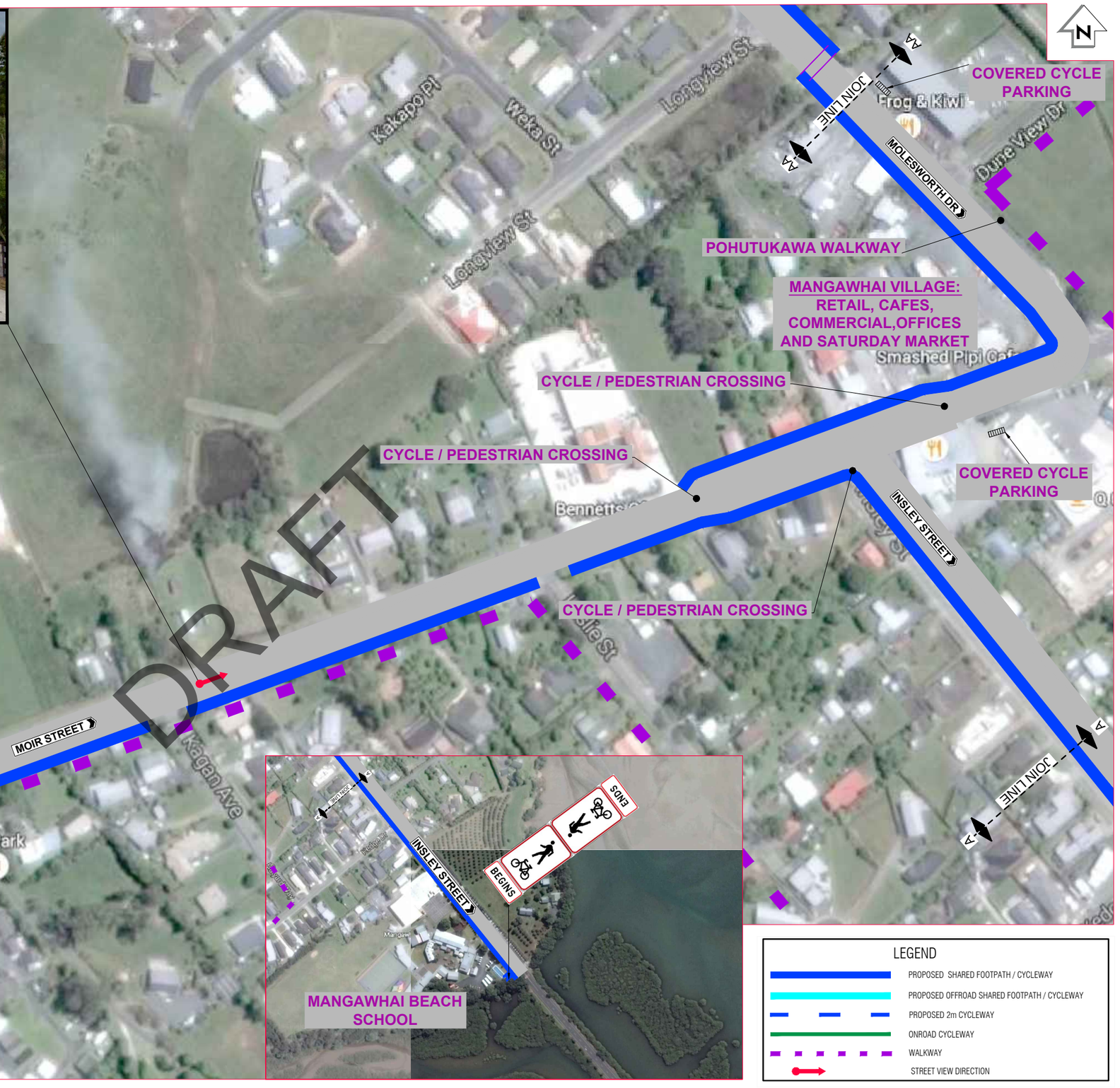
Each report section contains the recommendations relevant to specific issues. However in the most part the recommendations are made in isolation of each other and are based on each projects individual merits. Uncertainty over the factors listed in section 9 Risk Assessment and budget constrains mean careful planning is needed before deciding what projects to continue into the investigation and design stage.

Consultation with stakeholders will be key to progressing most projects to ensure they deliver the best outcomes for the region. Priority should be given to projects that return an immediate improvement, either through safety, amenity or network resilience.

Protecting the existing road corridor boundaries and paper roads from development encroachment should be considered a priority. Whilst it may be many years until some of the recommendations are required or desired it is important to maintain the existing corridors. During the assessments undertaken to complete this report it is was noted that a significant number of property sections appear to extend into the road reserve, whilst occupation of the land does not affect ownership it will still require negotiation to resolve amicably.

It is important for the council and the stakeholders to decide on an overview of desired projects and keep this in mind when planning maintenance and other network improvements works. For example if intersection is due for major maintenance it may provide the ideal opportunity for implementing traffic management improvements. Likewise, any new footpath or footpath maintenance conducted on the route on the shared path may provide the ideal opportunity to construct/widen to accommodate shared use.

Appendix A Drawings



LEGEND

- PROPOSED SHARED FOOTPATH / CYCLEWAY
- PROPOSED OFFROAD SHARED FOOTPATH / CYCLEWAY
- PROPOSED 2m CYCLEWAY
- ONROAD CYCLEWAY
- WALKWAY
- STREET VIEW DIRECTION

DO NOT SCALE - IF IN DOUBT, ASK

200 mm 150 100 90 80 70 60 50 40 30 20 10 0

ORIGINAL SIZE A1

REV	REVISIONS	GS DRAWN	JC CHECKED	JC APPROVED	DATE
A	FOR REVIEW				23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTRUCTURE PLAN SHEET 1 OF 11

Status Stamp: FOR REVIEW

Date Stamp: 23/02/2016

SCALES (A1) N.T.S

Drawing No.: Z80506993

Sheet No.: SK 001

Rev.: A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

LEGEND

- PROPOSED SHARED FOOTPATH / CYCLEWAY
- PROPOSED OFFROAD SHARED FOOTPATH / CYCLEWAY
- PROPOSED 2m CYCLEWAY
- ONROAD CYCLEWAY
- WALKWAY
- STREET VIEW DIRECTION

REV	REVISIONS	GS DRAWN	JC CHECKED	JC APPROVED	DATE
A	FOR REVIEW				23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

KAIPARA DISTRICT COUNCIL
TOWN CENTER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTUCTURE PLAN SHEET 2 OF 11

Status Stamp: FOR REVIEW
Date Stamp: 23/02/2016
SCALES (A1) N.T.S
Drawing No.: Z80506993
Sheet No.: SK 002
Rev.: A

XREFS : Client_logo, A1_MWH_logo, I_Model, G_Model, X_Model, not checked A1

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ESTUARY ESTATE:
FUTURE HOUSING, COMMERCIAL, LEISURE AND RETAIL AREA

B

JOIN LINE

B

Sunbeam

MOLESWORTH DR

C

JOIN LINE

C

BACK BAY WALKWAY

DRAFT

LEGEND

- PROPOSED SHARED FOOTPATH / CYCLEWAY
- PROPOSED OFFROAD SHARED FOOTPATH / CYCLEWAY
- PROPOSED 2m CYCLEWAY
- ONROAD CYCLEWAY
- WALKWAY
- STREET VIEW DIRECTION

DO NOT SCALE - IF IN DOUBT, ASK

200 mm 150 100 90 80 70 60 50 40 30 20 10 0

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT
Kaipara te Oranganui Two Oceans, Two Harbours

MANGAWHAI
TOWN CENTER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTRUCTURE PLAN SHEET 3 OF 11

Status Stamp: FOR REVIEW
Date Stamp: 23/02/2016
SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 003	A

XREFS : Client_logo, A1_MWH_logo, I_Model, G_Model, X_Model, not checked A1

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

ESTUARY ESTATE:
FUTURE HOUSING, COMMERCIAL, LEISURE AND RETAIL AREA

Tara Creek

C

JOIN LINE

C

MOLESWORTH DR

CONSTRAINED SECTION USE INFORMATION SIGN "CYCLIST GIVE WAY TO PEDESTRIANS"

EXISTING BRIDGE

D

JOIN LINE

D

SHARE PATH NEXT TO CARRIAGEWAY TO LIMIT EARTHWORK WIDTH TO BE DETERMINED

LEGEND

- PROPOSED SHARED FOOTPATH / CYCLEWAY
- PROPOSED OFFROAD SHARED FOOTPATH / CYCLEWAY
- PROPOSED 2m CYCLEWAY
- ONROAD CYCLEWAY
- WALKWAY
- STREET VIEW DIRECTION

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTRUCTURE PLAN SHEET 4 OF 11

Status Stamp: FOR REVIEW

Date Stamp: 23/02/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 004	A

XREFS : Client_logo, A1_MWH_logo, I_Model, G_Model, X_Model, not checked A1

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DO NOT SCALE - IF IN DOUBT, ASK

200 mm 150 100 90 80 70 60 50 40 30 20 10 0

ORIGINAL SIZE A1

CYCLE PARKING

CYCLE PARKING

MUSEUM AND HISTORIC VILLAGE

MOLESWORTH DR

D

JOIN LINE

D

E

JOIN LINE

E

Tiatiama Rd

Tiatiama Rd

Sarah C Design

Estuary Dr

Seaforest Rd

Norfolk Dr

Kawau Ln

Nautical Heights

North Glass

Auto & Marine

MANGAWHAI ACTIVITY CENTRE
AND COMMERCIAL AREA

DRAFT

LEGEND

- PROPOSED SHARED FOOTPATH / CYCLEWAY
- PROPOSED OFFROAD SHARED FOOTPATH / CYCLEWAY
- PROPOSED 2m CYCLEWAY
- ONROAD CYCLEWAY
- WALKWAY
- STREET VIEW DIRECTION

REV	REVISIONS	GS DRAWN	JC CHECKED	JC APPROVED	DATE
A	FOR REVIEW				23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTRUCTURE PLAN SHEET 5 OF 11

Status Stamp: FOR REVIEW

Date Stamp: 23/02/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 005	A

XREFS : Client_logo, A1_MWH_logo, I_Model, G_Model, X_Model, not checked A1

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

CYCLE PARKING

INFORMATION SITE AND BOWELS CLUB

JOIN LINE

JOIN LINE

MOLESWORTH DR

Mangawhai Golf Club

Bammas Surf Sport / Leisure

Findlay St

Awatea St

Evaline St

Elen St

Mangawhai Lodge

Moir Point Rd

Harvest Cafe

Northcliffe

DRAFT

LEGEND

- PROPOSED SHARED FOOTPATH / CYCLEWAY
- PROPOSED OFFROAD SHARED FOOTPATH / CYCLEWAY
- PROPOSED 2m CYCLEWAY
- ONROAD CYCLEWAY
- WALKWAY
- STREET VIEW DIRECTION

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

Kaipara te Oranganui Two Oceans Two Harbours

MANGAWHAI
TOWN CENTER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTRUCTURE PLAN SHEET 6 OF 11

Status Stamp: FOR REVIEW

Date Stamp: 23/02/2016

SCALES (A1) N.T.S

Drawing No.: Z80506993

Sheet No.: SK 006

Rev.: A

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JOIN LINE

JOIN LINE

Campbell Park Youth Camp

Northern Golf Car Centre

Greenview Dr

MOLESWORTH DR

WOOD STREET COMMERCIAL AREA

CYCLE PARKING

CYCLE PARKING

WOOD ST.

Pinewood Pl

Jessie St

Robert St

Albert St

Ellen St

Bammas Surf Sport | Leisure

Hook Cafe

DRAFT

N

LEGEND

- PROPOSED SHARED FOOTPATH / CYCLEWAY
- PROPOSED OFFROAD SHARED FOOTPATH / CYCLEWAY
- PROPOSED 2m CYCLEWAY
- ONROAD CYCLEWAY
- WALKWAY
- STREET VIEW DIRECTION

DO NOT SCALE - IF IN DOUBT, ASK

200 mm 150 100 90 80 70 60 50 40 30 20 10 0

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTRUCTURE PLAN SHEET 7 OF 11

Status Stamp: INFORMATION

Date Stamp: 23/02/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 007	A

XREFS : Client_logo, A1_MWH_logo, I_Model, G_Model, X_Model, not checked A1

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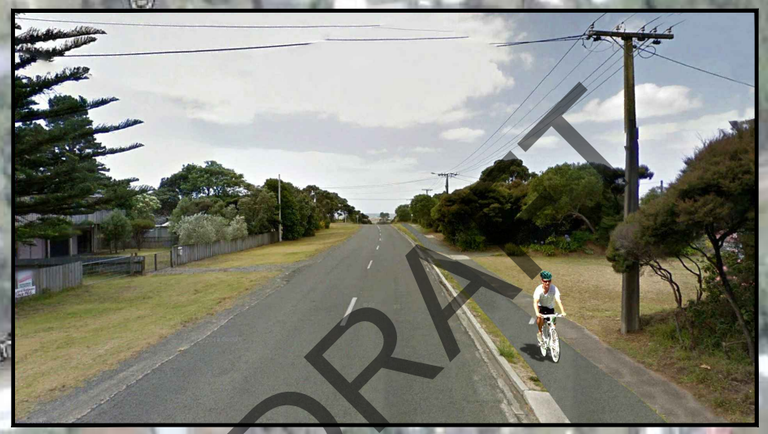

JOIN LINE

JOIN LINE

JOIN LINE

MOLESWORTH DR

NORTH AVE

Olsen Ave

Sailrock Dr

Coastal Cow Backpackers

Reel Magic Fishing Charters

BOAT RAMP AND WILD LIFE RESERVE - BEACH ACCESS AND LEISURE ACTIVITIES

CYCLE PARKING

Campbell Park Youth Camp

Holiday Cres

DRAFT

N

LEGEND

- PROPOSED SHARED FOOTPATH / CYCLEWAY
- PROPOSED OFFROAD SHARED FOOTPATH / CYCLEWAY
- PROPOSED 2m CYCLEWAY
- ONROAD CYCLEWAY
- WALKWAY
- STREET VIEW DIRECTION

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTRUCTURE PLAN SHEET 8 OF 11

Status Stamp: INFORMATION

Date Stamp: 23/02/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 008	A

XREFS : Client_logo, A1_MWH_logo, I_Model, G_Model, X_Model, not checked A1

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTRUCTURE PLAN SHEET 9 OF 11

Status Stamp	FOR REVIEW
Date Stamp	23/02/2016
SCALES (A1)	N.T.S
Drawing No.	Z80506993
Sheet No.	SK 009
Rev.	A

XREFS : Client_logo, A1_MWH_logo, 1_Model, G_Model, X_Model, not checked A1

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DO NOT SCALE – IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTER PLAN

MANGAWHAI VILLAGE TO HEADS
SHARED PATH INFRASTRUCTURE PLAN SHEET 10 OF 11

Status Stamp: FOR REVIEW

Date Stamp: 23/02/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 010	A

XREFS : Client_logo, A1_MWH_logo, I_Model, G_Model, X_Model, not checked A1

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

N

Pearl St

Wade St

Picnic Bay Bach

MAIN BEACH CARPARK

A

A

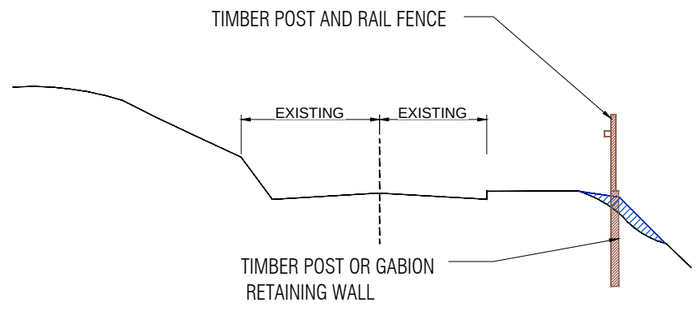
K

JOIN LINE

K

DRAFT

WIDEN FOOTPATH TO THE EDGE OF EXISTING RETAINING STRUCTURE , SOME LOCALIZED NEW RETAINING WALL REQUIRED.
MAXIMUM WIDTH OF SHARED PATH LIKELY TO BE LESS THAN 2.5m



SECTION A-A

LEGEND

- PROPOSED SHARED FOOTPATH / CYCLEWAY
- PROPOSED OFFROAD SHARED FOOTPATH / CYCLEWAY
- PROPOSED 2m CYCLEWAY
- ONROAD CYCLEWAY
- WALKWAY
- STREET VIEW DIRECTION

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
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DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

KAIPARA DISTRICT COUNCIL
PROPOSED CYCLEWAY

MANGAWHAI VILLAGE TO HEADS
SHEET 11 OF 11

Status Stamp: FOR REVIEW
Date Stamp: 23/02/2016
SCALES (A1) N.T.S
Drawing No.: Z80506993
Sheet No.: SK 011
Rev.: A

XREFS : Client_logo, A1_MWH_logo, I_Model, G_Model, X_Model, not checked A1

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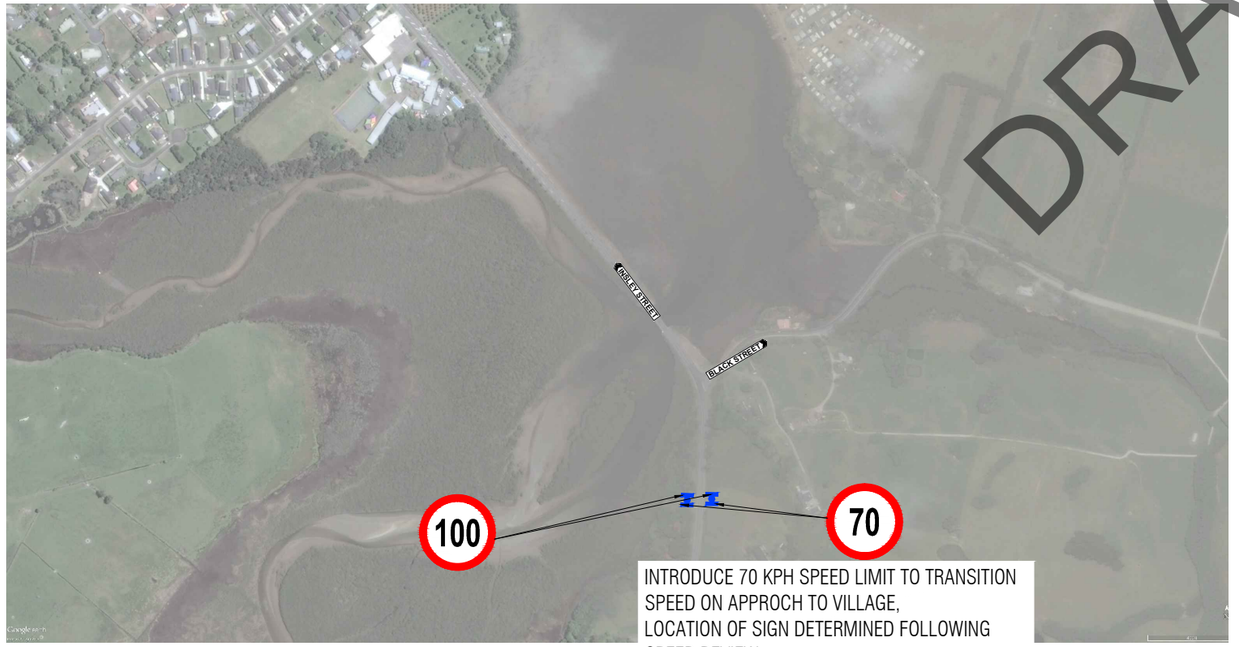
DO NOT SCALE – IF IN DOUBT, ASK

ORIGINAL SIZE A1



INTRODUCE 70 KPH SPEED LIMIT TO TRANSITION SPEED ON APPROCH TO VILLAGE, LOCATION OF SIGN DETERMINED FOLLOWING SPEED REVIEW

LEGEND

- TRAFFIC SIGN
- LANE MARKING
- GUARD RAIL

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	PRASHANT JALVI	12/04/2016
DRAWING CHECK	JAMES COUFIELD	18/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

Kaipara Te Oranganui Two Oceans Two Harbours

MANGAWHAI
TOWN CENTRE PLAN

NETWORK SAFETY ENHANCEMENTS
SHEET 1 OF 8

Status Stamp: INFORMATION

Date Stamp: 12/04/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 021	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

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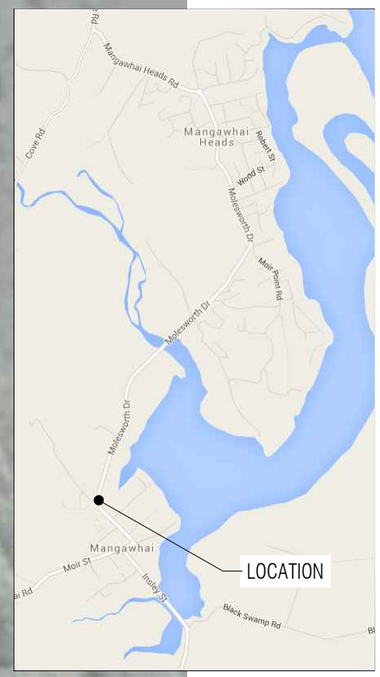
DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1



N

LEGEND

GUARD RAIL

TRAFFIC SIGN

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	PRASHANT JALVI	12/04/2016
DRAWING CHECK	JAMES COUFIELD	XX/Xx/Xx
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

NETWORK SAFETY ENHANCEMENTS
SHEET 2 OF 8

Status Stamp: INFORMATION

Date Stamp: 12/04/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 022	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

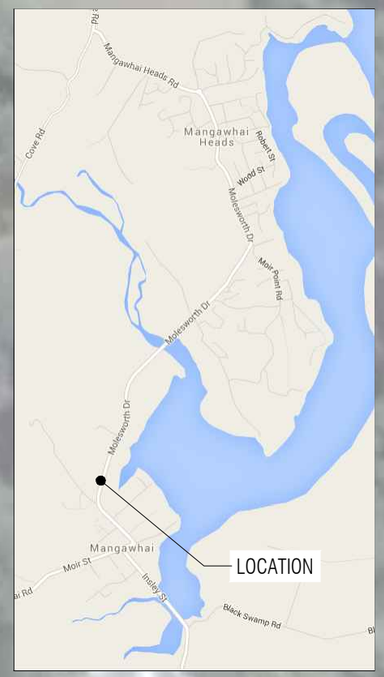
MOLESWORTH DR

50
Welcome to Mangawhai

50
Welcome to Mangawhai

70
50

70
50



DRAFT

Image © 2016 DigitalGlobe

LEGEND

TRAFFIC SIGN

LANE MARKING

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	PRASHANT JALVI	12/04/2016
DRAWING CHECK	JAMES COUFIELD	18/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

NETWORK SAFETY ENHANCEMENTS
SHEET 3 OF 8

Status Stamp: INFORMATION

Date Stamp: 12/04/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 023	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

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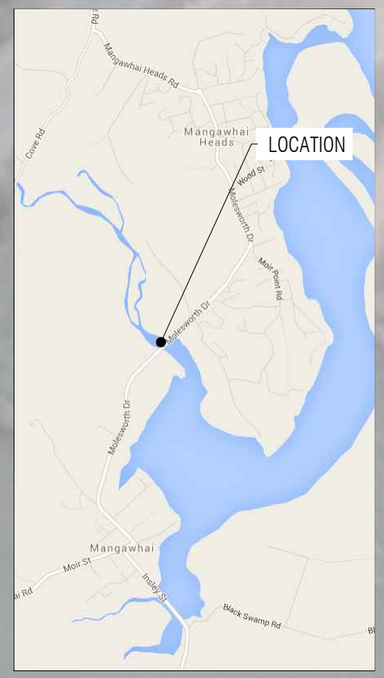
DO NOT SCALE – IF IN DOUBT, ASK

ORIGINAL SIZE A1

EXAMPLES OF APPROPRIATE END TREATMENT

INGAL'S ET 2000

CSP'S X350



MINIMUM TREATMENT
INSTALL APPROPRIATE END TREATMENT
TO EXISTING LENGTH OF GUARDRAIL

EXISTING INFORMAL CAR PARKING AREA PREVENTS INSTALLATION OF DESIRED LENGTH GUARDRAIL. ASSESSMENT SHOULD BE CONDUCTED TO ASSESS COMMUNITY VALUE AGAINST ROAD SAFETY.

DRAFT

TARA CREEK

DESIRABLE TREATMENT
EXTEND GUARDRAIL TO PROVIDE SUFFICIENT PROTECTION FROM HAZARD

EXTEND GUARDRAIL TO PROVIDE SUFFICIENT PROTECTION OF HAZARD

MOLESWORTH DR

LEGEND

- INFORMAL CAR PARKING
- DESIRABLE TREATMENT GUARD RAIL
- MINIMUM TREATMENT APPROPRIATE END TREATMENT ON EXISTING GUARD RAIL

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	Prashant Jalvi	12/04/2016
DRAWING CHECK	JAMES COUFIELD	XX/Xx/Xx
APPROVED	-	-

MWH

KAIPARA DISTRICT
Kaipara te Oranganui — Two Oceans Two Harbours

MANGAWHAI
TOWN CENTRE PLAN

NETWORK SAFETY ENHANCEMENTS
SHEET 4 OF 8

Status Stamp: INFORMATION
Date Stamp: 12/04/2016
SCALES (A1) N.T.S
Drawing No.: Z80506993
Sheet No.: SK 024
Rev.: A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Network Safety Enhancements\CAD\Sketch\4-12-2016\XXXXXXX_SK024

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	PRASHANT JALVI	12/04/2016
DRAWING CHECK	JAMES COUFIELD	18/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

NETWORK SAFETY ENHANCEMENTS
SHEET 5 OF 8

Status Stamp: INFORMATION

Date Stamp: 12/04/2016

SCALES (A1) N.T.S

Drawing No.: Z80506993

Sheet No.: SK 025

Rev.: A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Network Safety Enhancements\CAD\Sketch\4-12-2016\XXXXXXX_SK025

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

N

LEGEND

- SHARED PATH
- LANE MARKING
- KERBLINE
- FENCE

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	PRASHANT JALVI	12/04/2016
DRAWING CHECK	JAMES COUFIELD	18/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

Kaipara te Oranganui Two Oceans Two Harbours

MANGAWHAI
TOWN CENTRE PLAN

NETWORK SAFETY ENHANCEMENTS
SHEET 6 OF 8

Status Stamp: INFORMATION

Date Stamp: 12/04/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 026	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Network Safety Enhancements\CAD\Sketch\4-12-2016\XXXXXXX_SK026

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	PRASHANT JALVI	12/04/2016
DRAWING CHECK	JAMES COUFIELD	18/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

NETWORK SAFETY ENHANCEMENTS
SHEET 7 OF 8

Status Stamp: INFORMATION

Date Stamp: 12/04/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 027	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Network Safety Enhancements\CAD\Sketch\4-12-2016\XXXXXXX_SK027

DO NOT SCALE – IF IN DOUBT, ASK

200 mm 150 100 90 80 70 60 50 40 30 20 10 0

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	PRASHANT JALVI	12/04/2016
DRAWING CHECK	JAMES COUFIELD	18/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

NETWORK SAFETY ENHANCEMENTS
SHEET 8 OF 8

Status Stamp: INFORMATION

Date Stamp: 12/04/2016

SCALES (A1) N.T.S

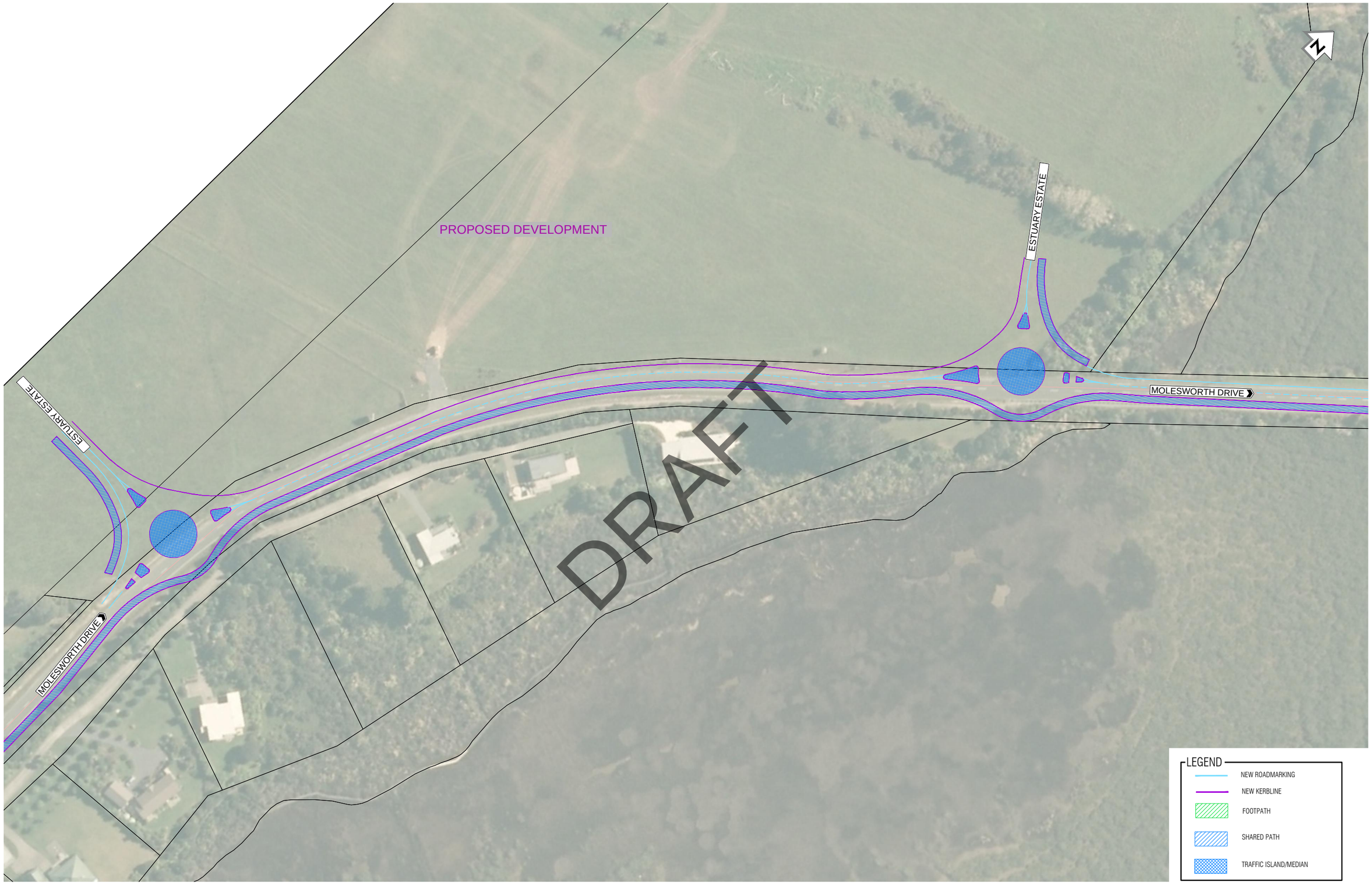
Drawing No.	Sheet No.	Rev.
Z80506993	SK 028	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Network Safety Enhancements\CAD\Sketch\4-12-2016\XXXXXXX_SK028

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1



REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	DV			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	Dnyanada Vyawhare	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

FUTURE NETWORK CAPACITY ENHANCEMENT - OFF PEAK
ESTUARY ESTATE / MOLESWORTH DRIVE

Status Stamp: INFORMATION
Date Stamp: 25-02-2016
Scales: NTS
Drawing No.: Z80506993 SK041
Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc

DO NOT SCALE – IF IN DOUBT, ASK

200 mm 150 100 90 80 70 60 50 40 30 20 10 0

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	P JALVI	12/4/2016
DESIGN CHECK	-	-
DRAWN	PRASHANT JALVI	12/04/2016
DRAWING CHECK	JAMES COUFIELD	
APPROVED	-	-

MWH

KAIPARA DISTRICT
Kaipara te Oranganui Two Oceans, Two Harbours

MANGAWHAI
TOWN CENTRE PLAN

FUTURE NETWORK CAPACITY ENHANCEMENT - OFF PEAK
ESTUARY DRIVE / MOLESWORTH DRIVE

Status Stamp: INFORMATION

Date Stamp: 12/04/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 042	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\03.Estuary Drive\SK042

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	DV			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	Dnyanada Vyawhare	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

FUTURE NETWORK CAPACITY ENHANCEMENT - OFF PEAK
MOIR POINT DRIVE / MOLESWORTH DRIVE

Status Stamp: INFORMATION
Date Stamp: 03-01-2016
Scales: NTS
Drawing No.: Z80506993 | SK043 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\Moir Point\SK043

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

RELOCATE SERVICE ACCESS AWAY FROM ROUNDABOUT

MOLESWORTH DRIVE

WOOD STREET

TIE IN DETAILS DEPENDS ON FUTURE WOOD STREET REJUVENATION WORK

DRAFT

LEGEND
- NEW ROADMARKING
- NEW KERBLINE
- SHARED PATH
- FOOTPATH
- CYCLEWAY
- TRAFFIC ISLAND/MEDIAN

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	AA			03.2016

SURVEYED		
DESIGNED	P JALVI	03.2016
DRAWN	Dnyanada Vyawhare	03.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

FUTURE NETWORK CAPACITY ENHANCEMENT - OFF PEAK
WOOD STREET / MOLESWORTH STREET

Status Stamp: INFORMATION

Date Stamp: 04-03-2016

Scales: NTS

Drawing No.: Z80506993 | SK044 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\Wood Street\SK044

DO NOT SCALE - IF IN DOUBT, ASK

200 mm 150 100 90 80 70 60 50 40 30 20 10 0

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENER PLAN

NETWORK CAPACITY ENHANCEMENTS - OFF PEAK
OVERVIEW SHEET 1 OF 4

Status Stamp: INFORMATION

Date Stamp: 29/04/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 046	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

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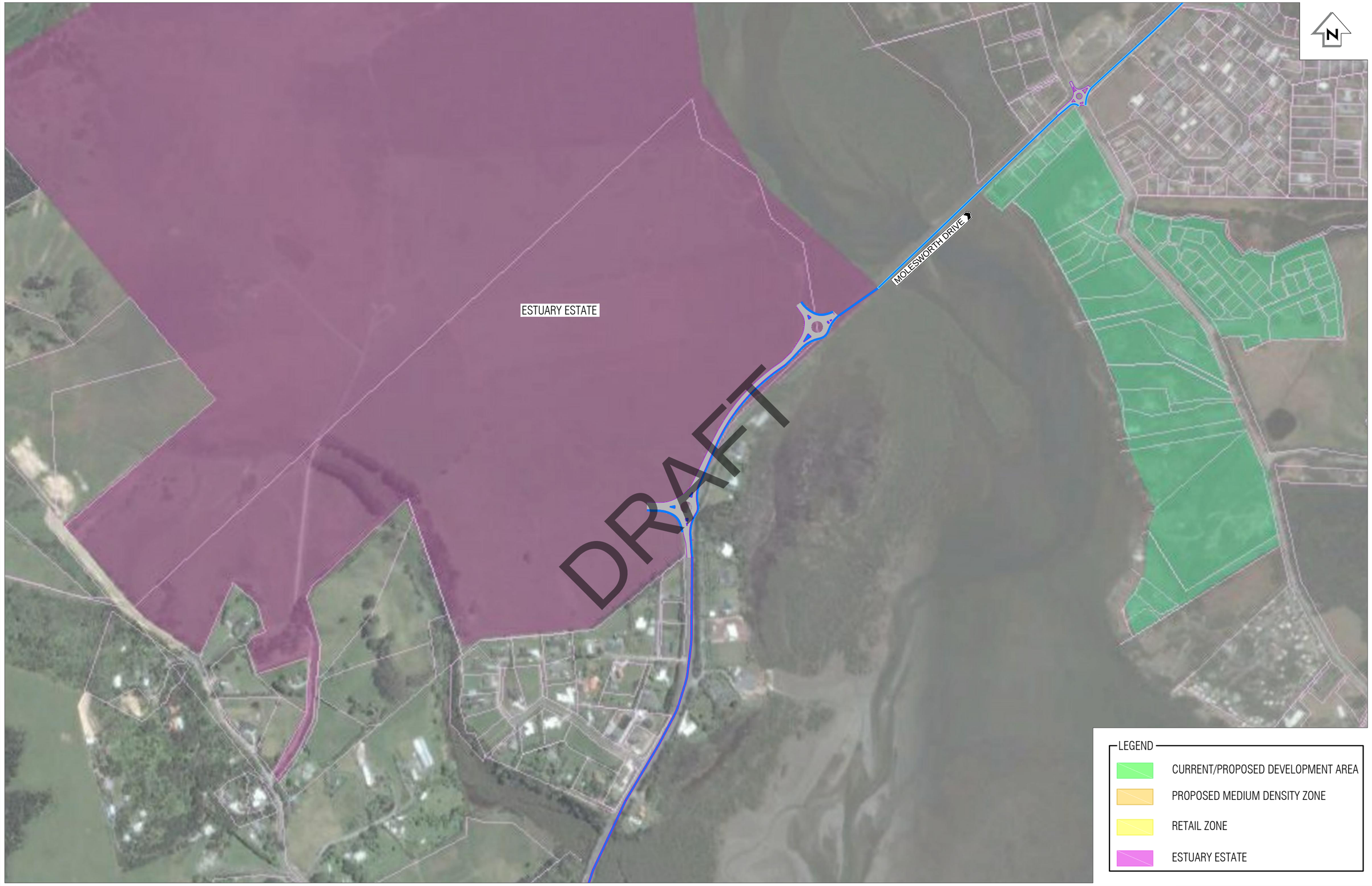
DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1



REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENER PLAN

NETWORK CAPACITY ENHANCEMENTS - OFF PEAK
OVERVIEW SHEET 2 OF 4

Status Stamp: INFORMATION

Date Stamp: 29/04/2016

SCALES (A1) N.T.S

Drawing No.: Z80506993

Sheet No.: SK 047

Rev.: A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT

MANGAWHAI
TOWN CENER PLAN

NETWORK CAPACITY ENHANCEMENTS - OFF PEAK
OVERVIEW SHEET 3 OF 4

Status Stamp: INFORMATION

Date Stamp: 29/04/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 048	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\SharedPath\SK 048

DO NOT SCALE - IF IN DOUBT, ASK

200 mm 150 100 90 80 70 60 50 40 30 20 10 0

ORIGINAL SIZE A1

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	-	-
DESIGN CHECK	-	-
DRAWN	SHWETA SHAHANE	08/04/2016
DRAWING CHECK	PRASHANT JALVI	14/04/2016
APPROVED	-	-

MWH

KAIPARA DISTRICT
Kaipara te Oranganui Two Oceans Two Harbours

MANGAWHAI
TOWN CENER PLAN

NETWORK CAPACITY ENHANCEMENTS - OFF PEAK
OVERVIEW SHEET 4 OF 4

Status Stamp: INFORMATION

Date Stamp: 29/04/2016

SCALES (A1) N.T.S

Drawing No.	Sheet No.	Rev.
Z80506993	SK 049	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\SharedPath\SK 049

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV			DRN	CHK	APP	DATE
A	CONCEPTUAL		AA			03.2016

REVISIONS

SURVEYED		
DESIGNED	P JALVI	03.2016
DRAWN	A ALURE	03.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

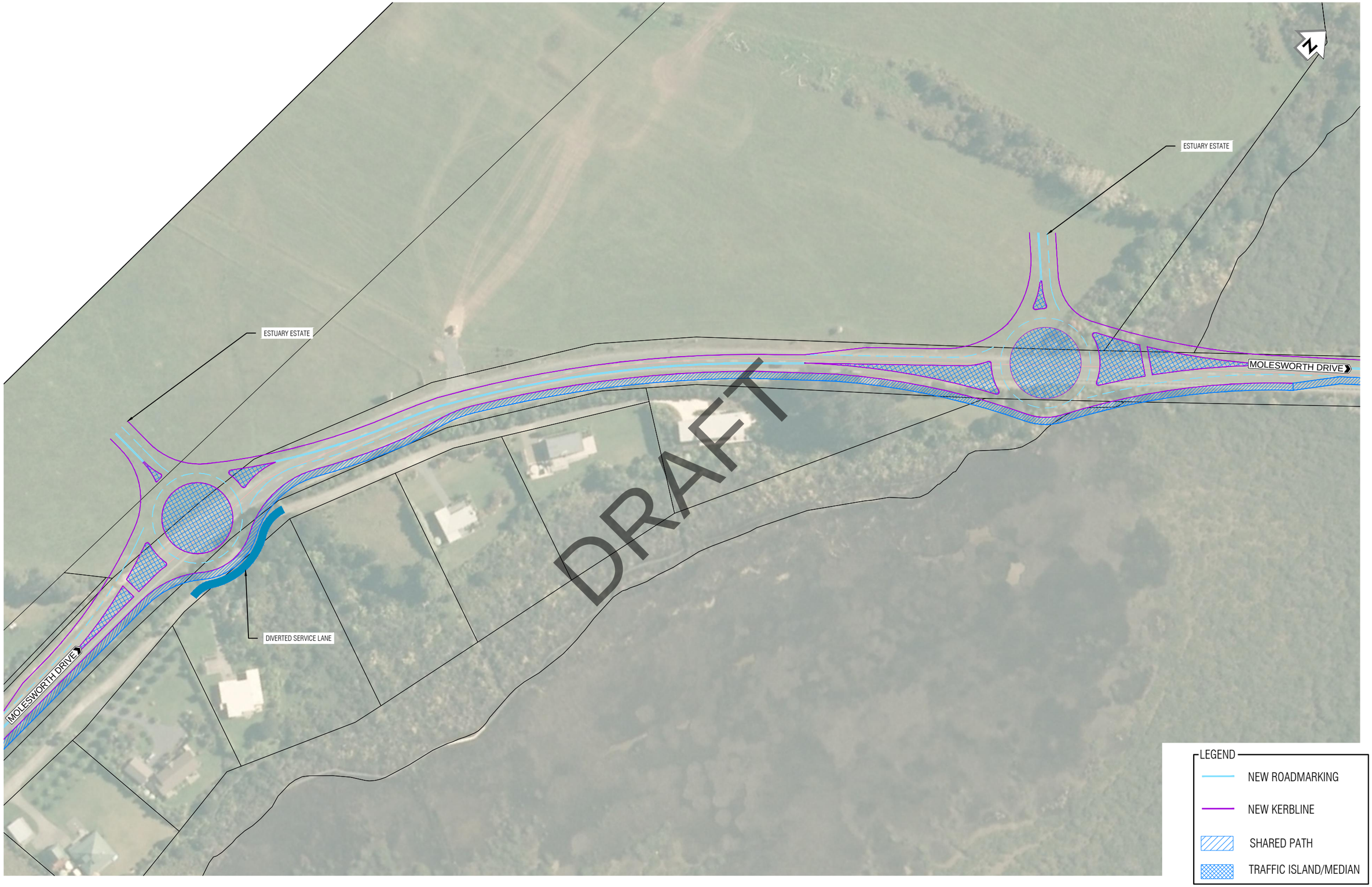
FUTURE NETWORK CAPACITY ENHANCEMENT - PEAK
MOIR STREET / MOLESWORTH DRIVE

Status Stamp: INFORMATION
Date Stamp: 04-03-2016
Scales: NTS
Drawing No.: Z80506993 | SK 050 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\Moir Street\SK051

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1



REV	REVISIONS	DV DRN	CHK	APP	DATE
A	CONCEPTUAL	DV			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	Dnyanada Vyawhare	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

FUTURE NETWORK CAPACITY ENHANCEMENT - PEAK
ESTUARY ESTATE / MOLESWORTH DRIVE

Status Stamp: INFORMATION
Date Stamp: 25-03-2016
Scales:
Drawing No.: Z80506993 | SK052 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\Estuary Estate\SK052

DO NOT SCALE - IF IN DOUBT, ASK

200 mm 150 100 90 80 70 60 50 40 30 20 10 0

ORIGINAL SIZE **A1**

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	FOR REVIEW	GS	JC	JC	23/02/2016

	Name	Date
SURVEYED	-	-
DESIGNED	P JALVI	12/4/2016
DESIGN CHECK	-	-
DRAWN	PRASHANT JALVI	12/04/2016
DRAWING CHECK	JAMES COUFIELD	
APPROVED	-	-

MWH

KAIPARA DISTRICT
Kaipara te Oranganui Two Oceans, Two Harbours

MANGAWHAI
TOWN CENTRE PLAN

FUTURE NETWORK CAPACITY ENHANCEMENT - PEAK
ESTUARY DRIVE/ MOLESWORTH DRIVE

Status Stamp: **INFORMATION**

Date Stamp: **12/04/2016**

SCALES **(A1)** N.T.S

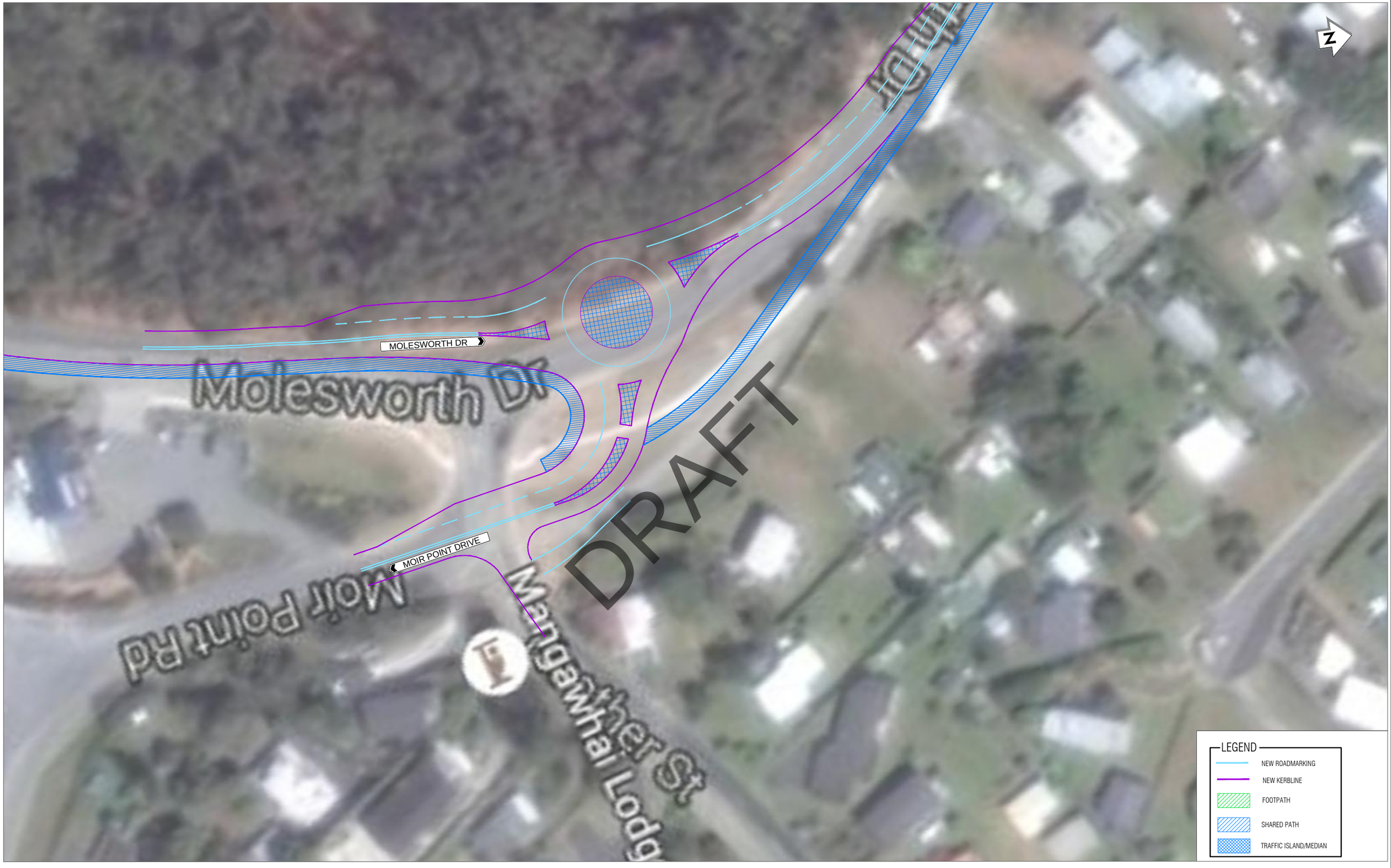
Drawing No.	Sheet No.	Rev.
Z80506993	SK053	A

XREFS : I_Model, Kaipara DC LOGO, orig A1_MWH_logo, X_Legend_SK, X_SK_Model

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\03.Estuary Drive\SK053

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1



REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	DV			

SURVEYED		
DESIGNED	P JALVI	03.2016
DRAWN	Dnyanada Vyawhare	03.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

FUTURE NETWORK CAPACITY ENHANCEMENT - PEAK
MOIR POINT DRIVE / MOLESWORTH DRIVE

Status Stamp: INFORMATION

Date Stamp: 03-01-2016

Scales: NTS

Drawing No.: Z80506993 SK054 Rev. A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\Moir Point\SK054

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

RELOCATE SERVICE ACCESS AWAY FROM ROUNDABOUT

MOLESWORTH DRIVE

WOOD STREET

DRAFT

TIE IN DETAILS DEPENDS ON FUTURE WOOD STREET REJUVENATION WORK

LEGEND

- NEW ROADMARKING
- NEW KERBLINE
- SHARED PATH
- TRAFFIC ISLAND / MEDIAN

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	AA			03.2016

SURVEYED		
DESIGNED	P JALVI	03.2016
DRAWN	Dnyanada Vyawhare	03.2016
CAD REVIEW	A	
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

FUTURE NETWORK CAPACITY ENHANCEMENT - PEAK
WOOD STREET / MOLESWORTH DRIVE

Status Stamp: INFORMATION

Date Stamp: 04-03-2016

Scales: NTS

Drawing No.: Z80506993 | SK055 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\Wood Street\SK055

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

RELOCATE HISTORIC BUILDING

LONGVIEW STREET

MOLESWORTH STREET

INSLEY STREET

MOIR STREET

STORM WATER POND

N

DRAFT

10 0 10 20m
SCALE 1:500

LEGEND
- NEW ROADMARKING
- NEW KERBLINE
- SHARED PATH
- FOOTPATH
- TRAFFIC ISLAND/MEDIAN

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	MCS			22.04.2016

SURVEYED		
DESIGNED	Prashant J	22.04.2016
DRAWN	Mohammad Abdullah	22.04.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

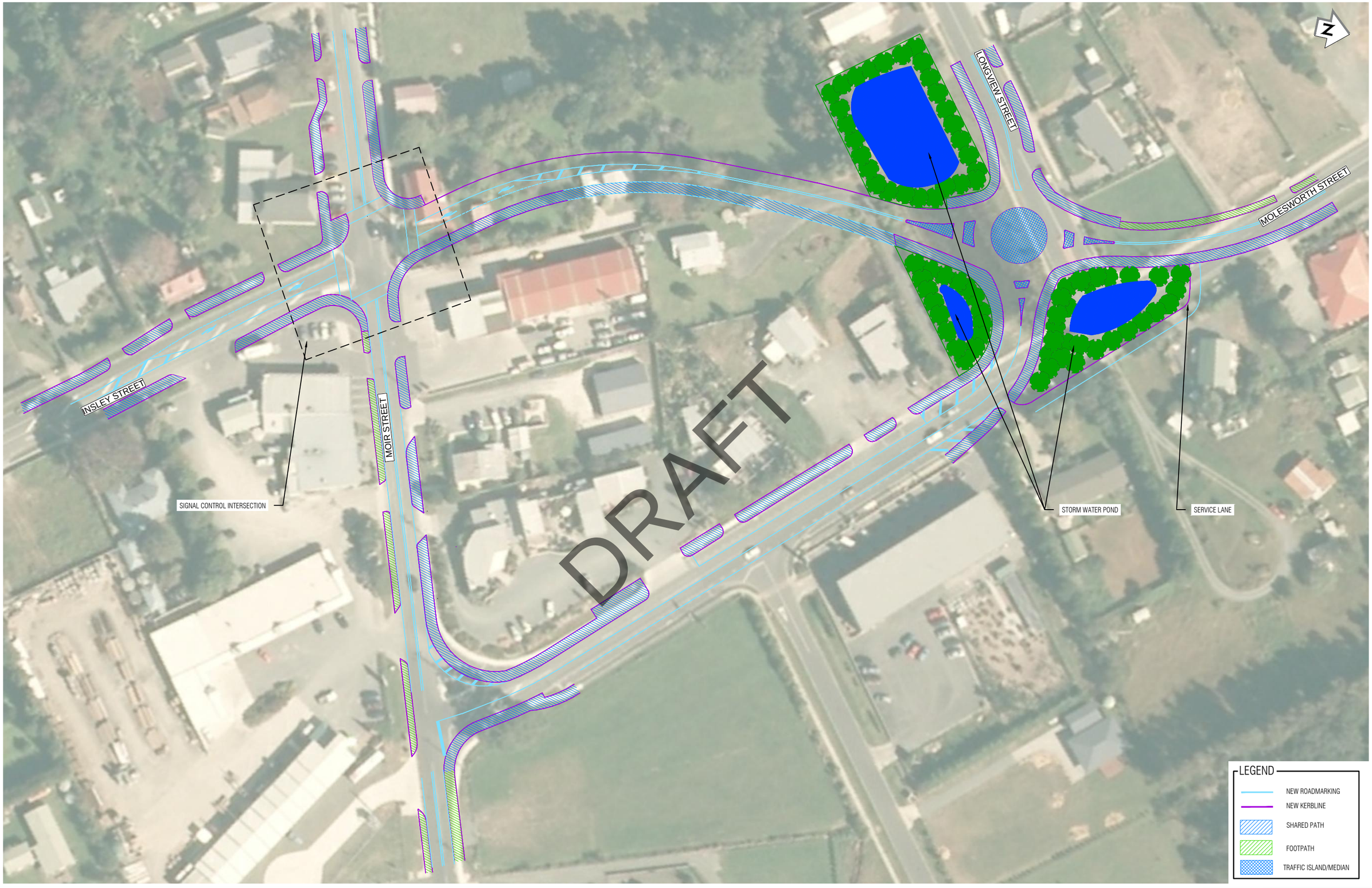
FUTURE NETWORK CAPACITY ENHANCEMENT
INSLEY STREET / MOLESWORTH DRIVE REDUCED CONNECTIVITY

Status Stamp: INFORMATION
Date Stamp: 22-04-2016
Scales: NTS
Drawing No.: Z80506993 SK056 Rev. A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\Insley Realignmet

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1



REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	AA			03.2016

SURVEYED		
DESIGNED		
DRAWN	Anuradha Alure	03.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

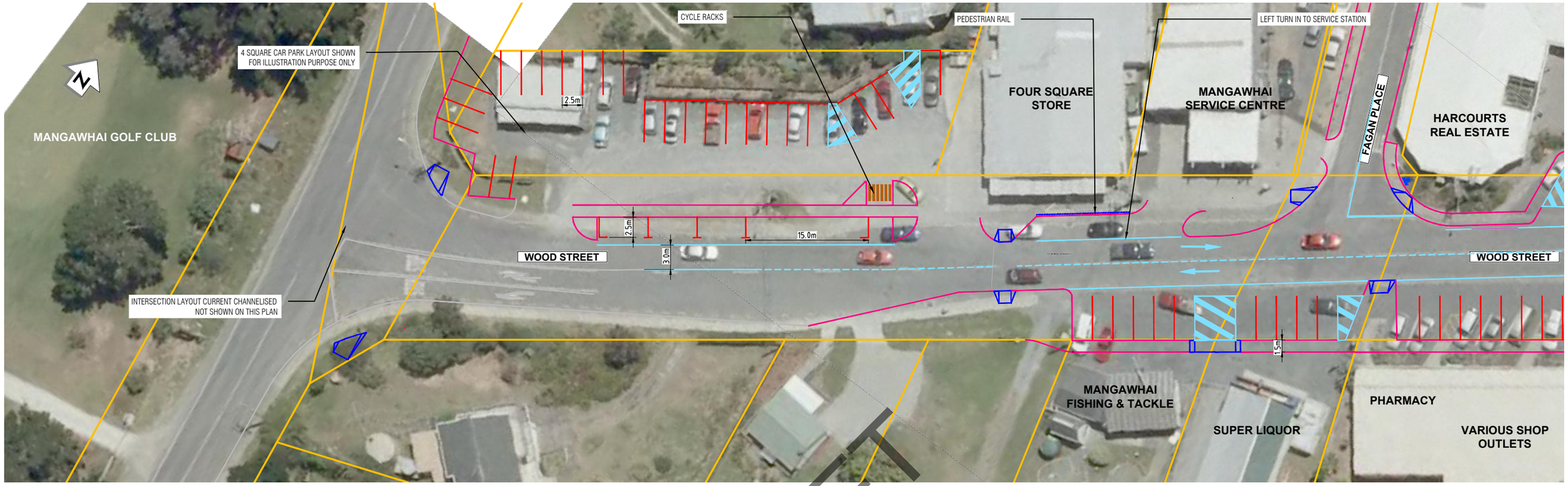
FUTURE NETWORK CAPACITY ENHANCEMENT
INSLEY STREET / MOLESWORTH DRIVE MAXIMUM CONNECTIVITY

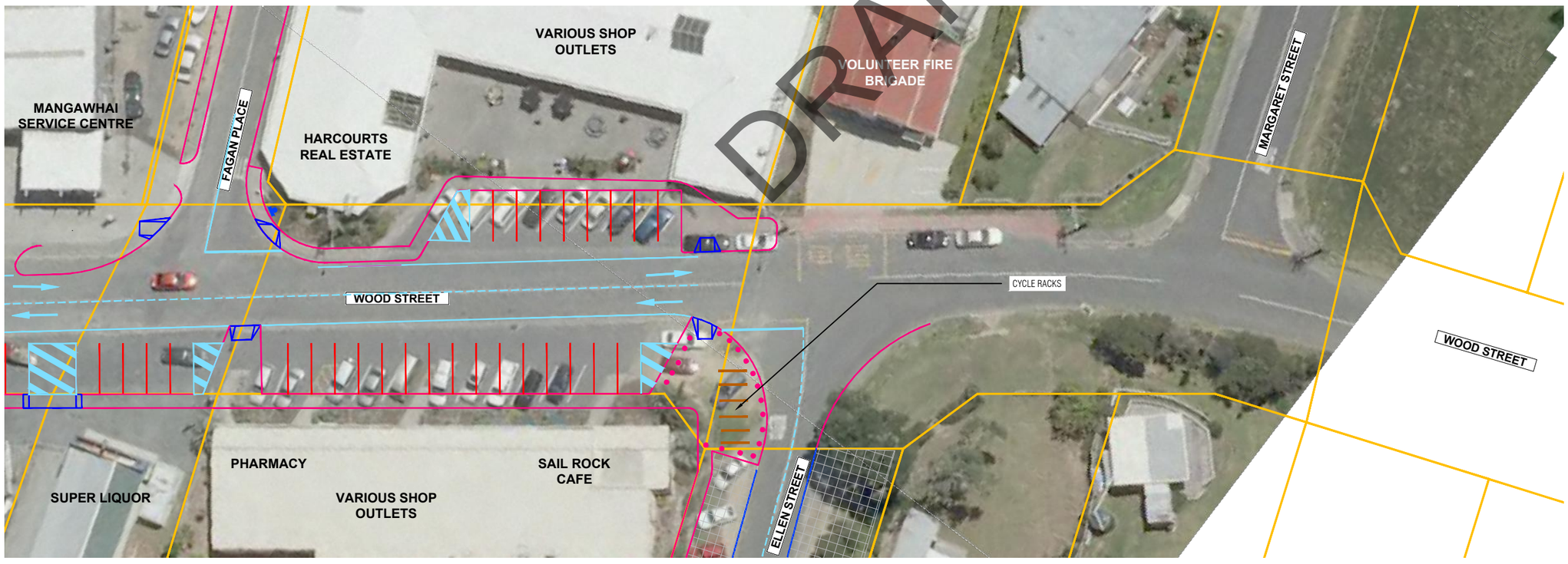
Status Stamp: INFORMATION
Date Stamp: 04-03-2016
Scales: NTS
Drawing No.: Z80506993 SK057
Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Molesworth Drive Intersection Analysis\CAD\Misc\Insley Realignmet

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1





DRAFT

PARKING SPACES FOR OPTION 2: 71

LEGEND

- ROAD
- KERB
- PARKING
- CYCLE RACK
- CONCRETE V CHANNEL
- PROPERTY BOUNDARIES
- PRAM CROSSING
- BOLLARD
- PARKING SIGN
- LIGHT POLE

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	IRM			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	P JALVI	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

WOOD STREET IMPROVEMENTS
OPTION 2 - SHEET 1 OF 3

Status Stamp: INFORMATION

Date Stamp: 05-02-2016

Scales: 1 : 250 (A1) 1 : 500 (A3)

Drawing No.: Z80506993 | SK074 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Mangawhai Parkings Improvements\CAD\OPTION2\SK074

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

EXISTING RETAINING WALL

FAGAN PLACE 2x3m LANES UNMARKED TO HELP MAINTAIN LOW SPEED

TRIM VEGETATION TO IMPROVE VISIBILITY FOR REVERSING CARS

WIDEN EXISTING FOOTPATH

PROPOSED PEDESTRIAN RAMP MAXIMUM 5% GRADE

CHECK CAR PARK LIGHTING UPGRADE TO STANDARD

GOBI BLOCKS OR OTHER PERMEABLE PAVING

DECORATIVE LOW PLANTING

6.0m

0.6m

5.4m

DRAFT

LEGEND

- ROAD
- KERB
- PARKING
- CYCLE RACK
- CONCRETE V CHANNEL
- PROPERTY BOUNDARIES
- PRAM CROSSING
- BOLLARD
- PARKING SIGN
- LIGHT POLE

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	IRM			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	P JALVI	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

WOOD STREET IMPROVEMENTS
OPTION 2 - SHEET 2 OF 3

Status Stamp: **INFORMATION**

Date Stamp: **05-02-2016**

Scales: 1 : 250 (A1) 1 : 500 (A3)

Drawing No.: Z80506993 | SK075 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Mangawhai Parkings Improvements\CAD\OPTION2\SK075

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE **A1**

EXTEND FOOTPATH BEHIND PARKING

EXTEND EXISTING UNSEALED SURFACE. VISUAL AMENITY CAN BE IMPROVED BY USING HONEYCOMB PLASTIC MESH TO RETAIN STONE/GRAVEL COUPLED WITH DECORATIVE LOCAL STONE. THIS WILL ALSO REDUCE MATERIAL MOVEMENT.

GOBI BLOCKS OR OTHER PERMEABLE PAVING

CONCRETE V CHANEL

LEGEND

- ROAD
- DRIVEWAY
- KERB
- PARKING
- CYCLE RACK
- CONCRETE V CHANNEL
- PROPERTY BOUNDARIES
- PRAM CROSSING
- BOLLARD
- PARKING SIGN
- LIGHT POLE

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	IRM			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	P JALVI	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

WOOD STREET IMPROVEMENTS
OPTION 2 - SHEET 3 OF 3

Status Stamp: **INFORMATION**

Date Stamp: **05-02-2016**

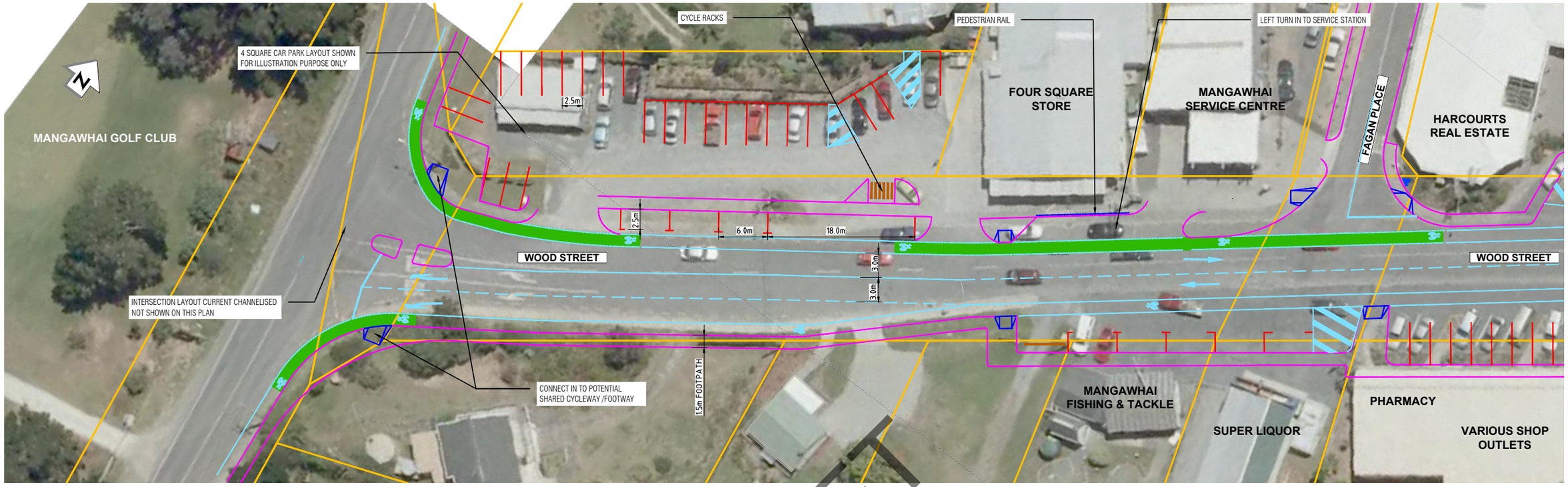
Scales: 1 : 250 (A1) 1 : 500 (A3)

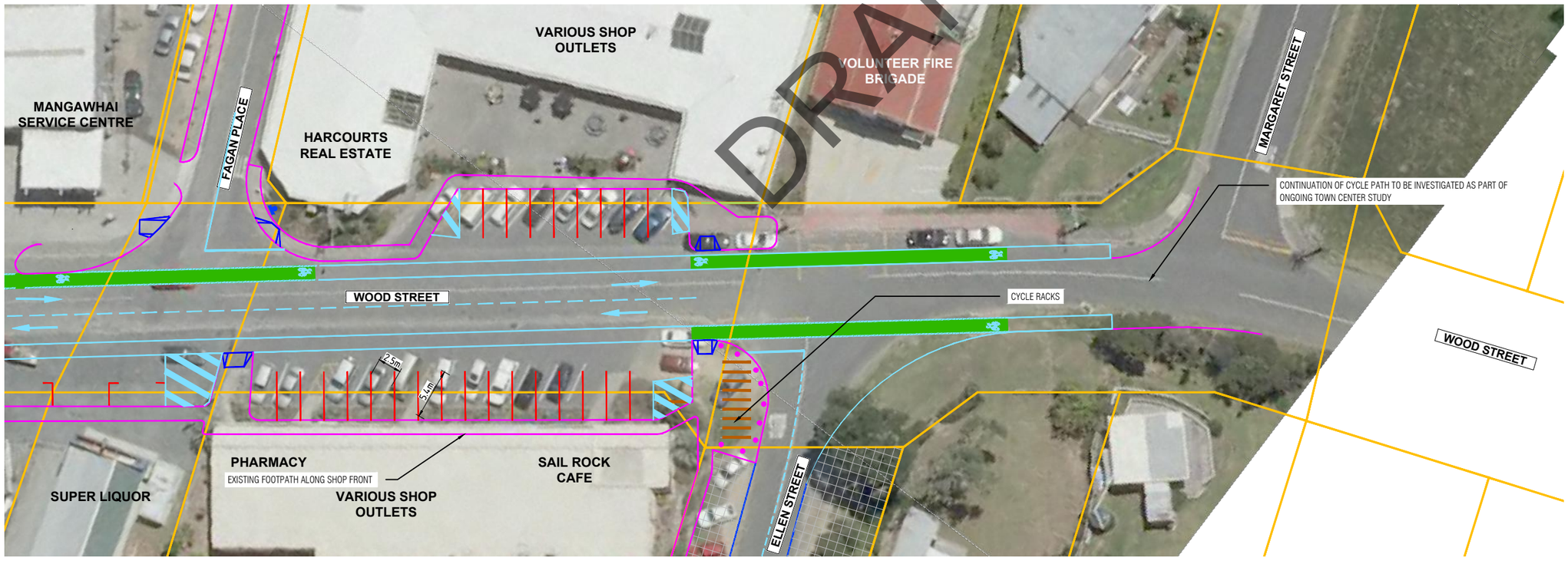
Drawing No.: Z80506993 | SK076 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Mangawhai Parkings Improvements\CAD\OPTION2\SK076

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1





DRAFT

PRKING SPACES FOR OPTION 3: 83

LEGEND

- ROAD
- DRIVEWAY
- KERB
- PARKING
- CYCLE RACK
- CONCRETE V CHANNEL
- PROPERTY BOUNDARIES
- PRAM CROSSING
- BOLLARD
- PARKING SIGN
- LIGHT POLE

REV	REVISIONS	IRM	DRN	CHK	APP	DATE
A	CONCEPTUAL					

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	P JALVI	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

WOOD STREET IMPROVEMENTS
OPTION 3 - SHEET 1 OF 3

Status Stamp: **INFORMATION**

Date Stamp: **05-02-2016**

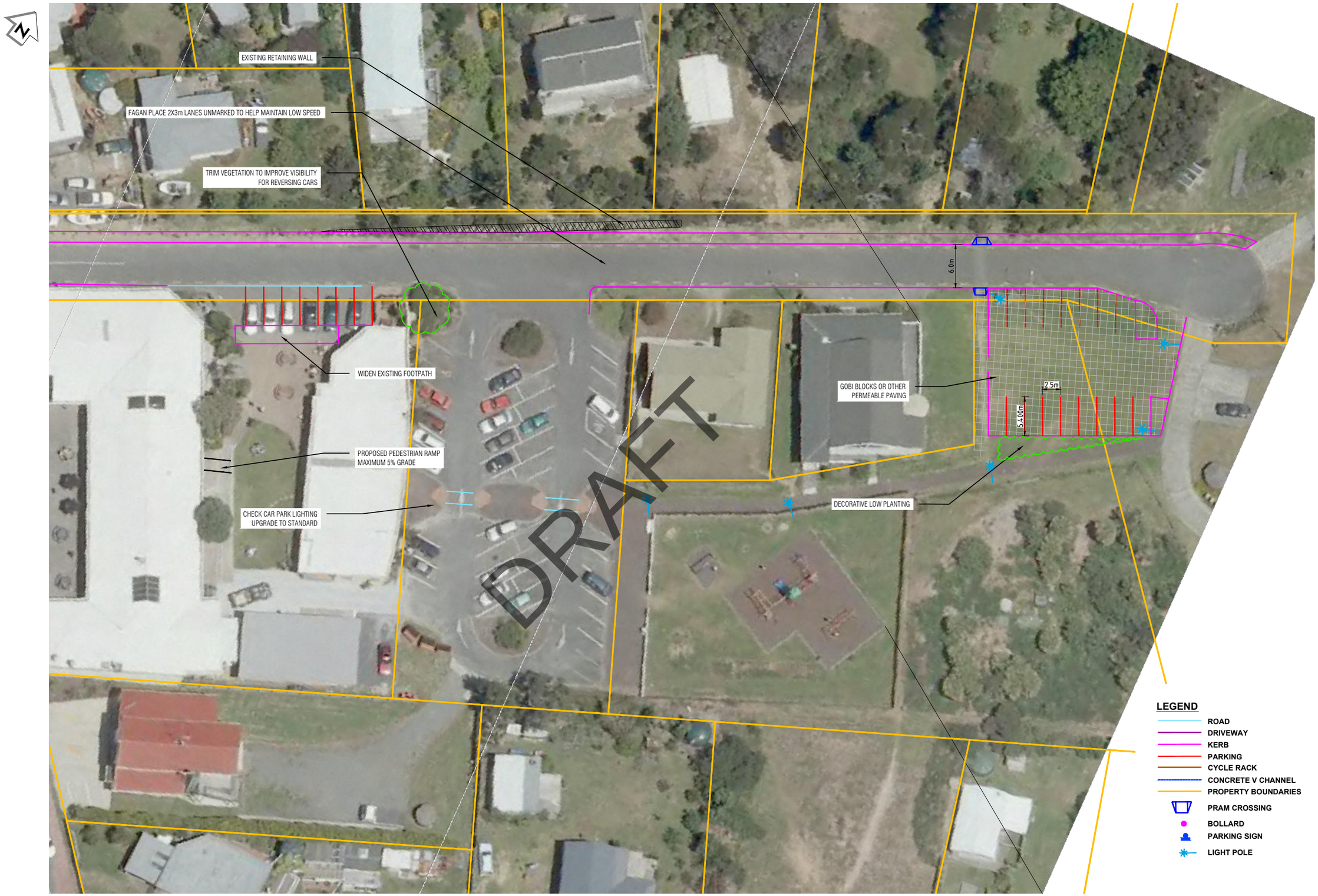
Scales: 1 : 250 (A1) 1 : 500 (A3)

Drawing No.: Z80506993 | SK077 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Mangawhai Parkings Improvements\CAD\OPTION3\SK077

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1



REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	IRM			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	P JALVI	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

WOOD STREET IMPROVEMENTS
OPTION 3 - SHEET 2 OF 3

Status Stamp: **INFORMATION**

Date Stamp: **05-02-2016**

Scales: 1 : 250 (A1) 1 : 500 (A3)

Drawing No.: Z80506993 | SK078 | Rev.: A

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE **A1**

EXTEND FOOTPATH BEHIND PARKING

EXTEND EXISTING UNSEALED SURFACE. VISUAL AMENITY CAN BE IMPROVED BY USING HONEYCOMB PLASTIC MESH TO RETAIN STONE/GRAVEL COUPLED WITH DECORATIVE LOCAL STONE. THIS WILL ALSO REDUCE MATERIAL MOVEMENT.

GOBI BLOCKS OR OTHER PERMEABLE PAVING

CONCRETE V CHANEL

LEGEND

- ROAD
- DRIVEWAY
- KERB
- PARKING
- CYCLE RACK
- CONCRETE V CHANNEL
- PROPERTY BOUNDARIES
- PRAM CROSSING
- BOLLARD
- PARKING SIGN
- LIGHT POLE

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	IRM			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	P JALVI	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

WOOD STREET IMPROVEMENTS
OPTION 3 - SHEET 3 OF 3

Status Stamp: **INFORMATION**

Date Stamp: **05-02-2016**

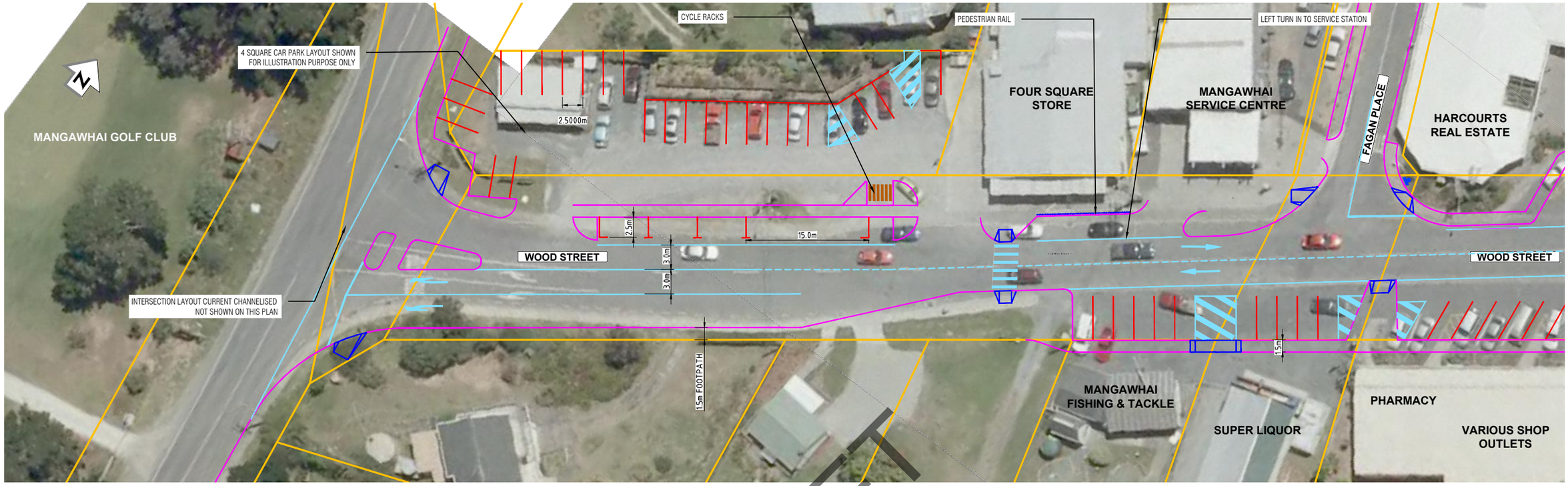
Scales: 1 : 250 (A1) 1 : 500 (A3)

Drawing No.: Z80506993 | SK079 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Mangawhai Parkings Improvements\CAD\OPTION3\SK079

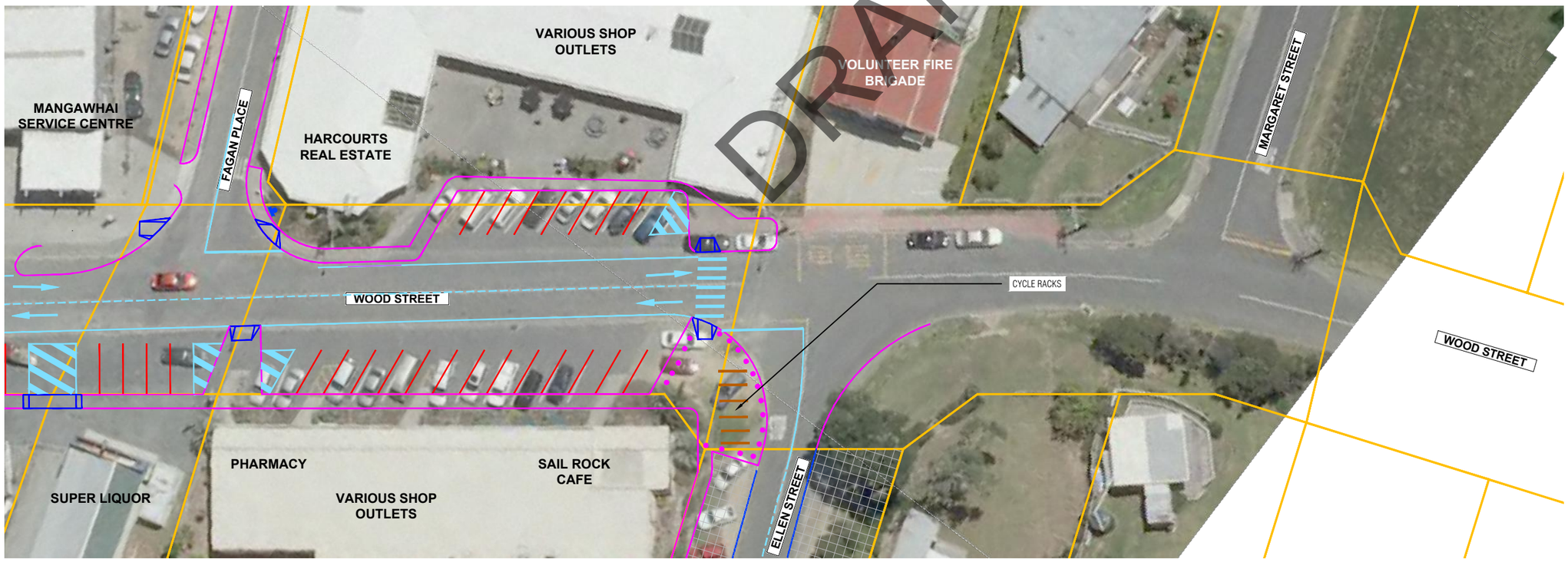
DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1



CONTINUED BELOW

CONTINUED ABOVE



PARKING SPACES FOR OPTION 1: 85

LEGEND

- ROAD
- KERB
- PARKING
- CYCLE RACK
- CONCRETE V CHANNEL
- PROPERTY BOUNDARIES
- PRAM CROSSING
- BOLLARD
- PARKING SIGN
- LIGHT POLE

REV	REVISIONS	IRM DRN	CHK	APP	DATE
A	CONCEPTUAL				

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	P JALVI	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

WOOD STREET IMPROVEMENTS
OPTION 1 - SHEET 1 OF 3

Status Stamp: **INFORMATION**

Date Stamp: **05-02-2016**

Scales: 1 : 250 (A1) 1 : 500 (A3)

Drawing No.: Z80506993 | SK071 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Mangawhai Parkings Improvements\CAD\OPTION1\SK071

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

EXISTING RETAINING WALL

FAGAN PLACE 2X3m LANES UNMARKED TO HELP MAINTAIN LOW SPEED

TRIM VEGETATION TO IMPROVE VISIBILITY FOR REVERSING CARS

WIDEN EXISTING FOOTPATH

PROPOSED PEDESTRIAN RAMP MAXIMUM 5% GRADE

CHECK CAR PARK LIGHTING UPGRADE TO STANDARD

GOBI BLOCKS OR OTHER PERMEABLE PAVING

DECORATIVE LOW PLANTING

6.0m

0.6m

5.4m

DRAFT

LEGEND

- ROAD
- KERB
- PARKING
- CYCLE RACK
- CONCRETE V CHANNEL
- PROPERTY BOUNDARIES
- PRAM CROSSING
- BOLLARD
- PARKING SIGN
- LIGHT POLE

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	IRM			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	P JALVI	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

WOOD STREET IMPROVEMENTS
OPTION 1 - SHEET 2 OF 3

Status Stamp: **INFORMATION**

Date Stamp: **05-02-2016**

Scales: 1 : 250 (A1) 1 : 500 (A3)

Drawing No.: Z80506993 | SK072 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Mangawhai Parkings Improvements\CAD\OPTION1\SK072

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE **A1**

REV	REVISIONS	DRN	CHK	APP	DATE
A	CONCEPTUAL	IRM			

SURVEYED		
DESIGNED	P JALVI	02.2016
DRAWN	P JALVI	02.2016
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

MANGAWHAI
TOWN CENTRE PLAN

WOOD STREET IMPROVEMENTS
OPTION 1 - SHEET 3 OF 3

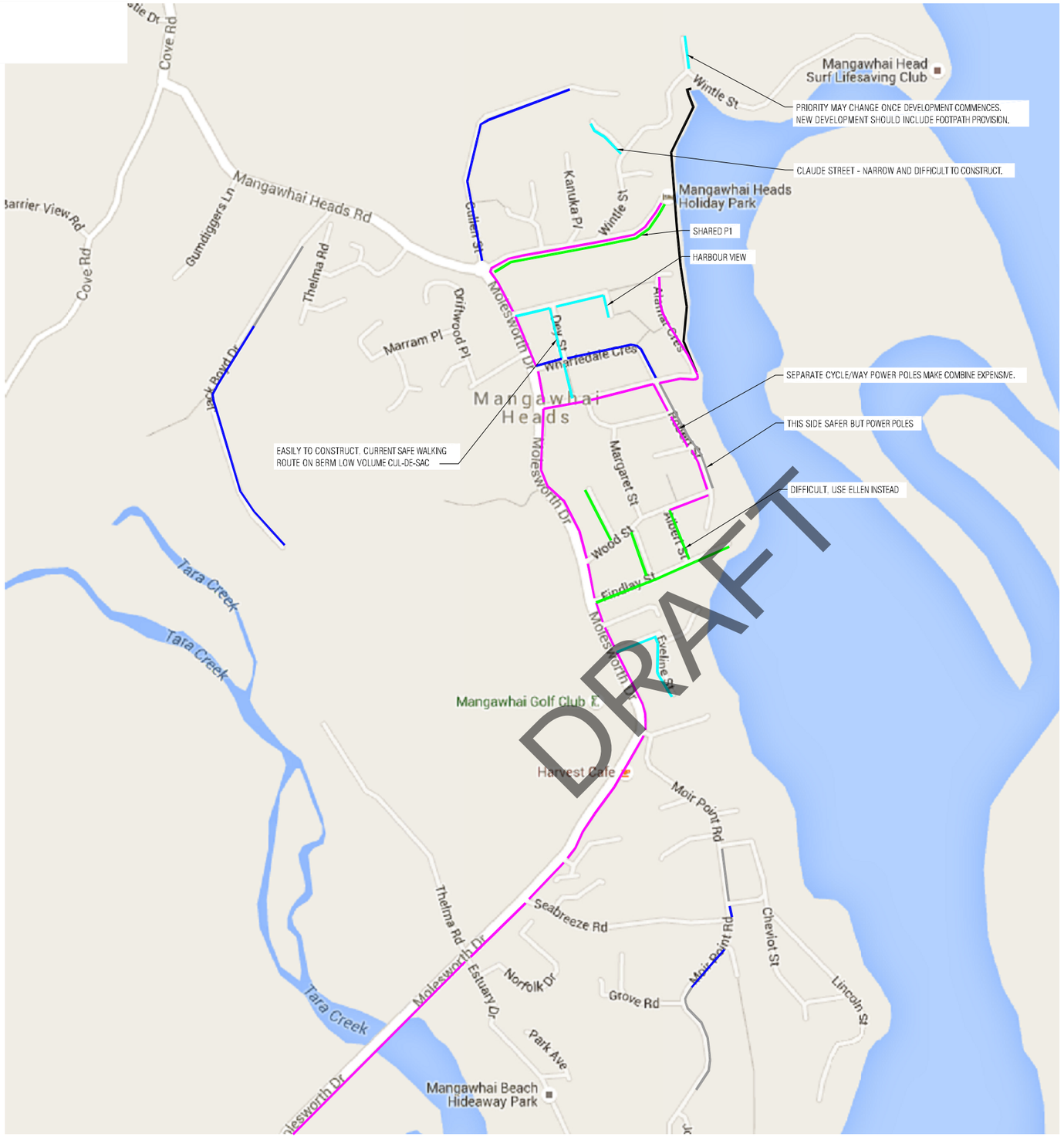
Status Stamp: **INFORMATION**

Date Stamp: **05-02-2016**

Scales: 1 : 250 (A1) 1 : 500 (A3)

Drawing No.: Z80506993 | SK073 | Rev.: A

M:\Engineering and Delivery\AP\Clients\Kaipara District council\Projects\Mangawhai Parkings Improvements\CAD\OPTION1\SK073



DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified by Elisha Morris on 18/04/2016

REV	REVISIONS	DRN	CHK	APP	DATE
1	FOR REVIEW	EM	JC	JC	18/04/2016

SURVEYED	-	DATE
DESIGNED		-
DRAWN	ELISHA MORRIS	18-04-2016
CAD REVIEW	-	-
DESIGN CHECK	JAMES CAUFIELD	18-04-2016
DESIGN REVIEW	-	-
APPROVED	JAMES CAUFIELD	18-04-2016
PROF REGISTRATION:		

MWH

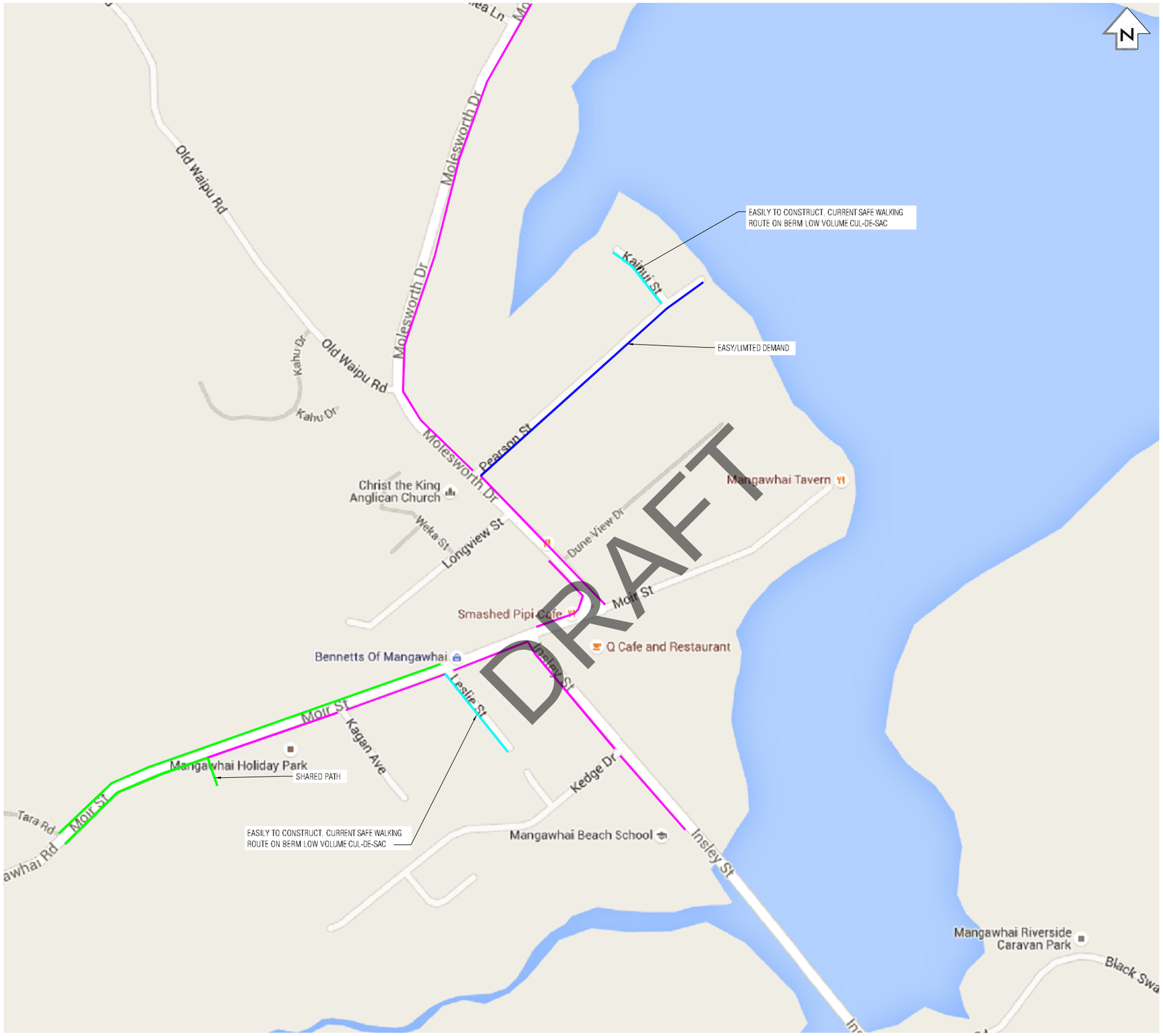
Client: KAIPARA DISTRICT

KAIPARA DISTRICT COUNCIL
TOWN CENTRE PLAN

NEW PEDESTRIAN LINKS
SHEET 1 OF 3

Status Stamp: FOR INFORMATION
Date Stamp: 18/04/2016
Scales:
Drawing No.: Z80506993 - SK090
Rev.: 1

C:\Users\morrisel\Desktop\Projects\Footpath map Mangawhai\Mangawhai Heads 1.dwg



DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified by Elisha Morris on 18/04/2016

REV	REVISIONS	DRN	CHK	APP	DATE
1	FOR REVIEW	EM	JC	JC	18/04/2016

SURVEYED	-	DATE
DESIGNED		-
DRAWN	ELISHA MORRIS	18-04-2016
CAD REVIEW	-	
DESIGN CHECK	JAMES CAUFIELD	18-04-2016
DESIGN REVIEW		-
APPROVED	JAMES CAUFIELD	18-04-2016
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

KAIPARA DISTRICT COUNCIL
TOWN CENTRE PLAN

NEW PEDESTRIAN LINKS
SHEET 2 OF 3

Status Stamp: **FOR INFORMATION**

Date Stamp: **18/04/2016**

Scales:

Drawing No.: Z80506993 - SK091

Rev.: 1

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified by Elisha Morris on 18/04/2016

REV	REVISIONS	DRN	CHK	APP	DATE
1	FOR REVIEW	EM	JC	JC	18/04/2016

SURVEYED	-	DATE
DESIGNED		-
DRAWN	ELISHA MORRIS	18-04-2016
CAD REVIEW	-	-
DESIGN CHECK	JAMES CAUFIELD	18-04-2016
DESIGN REVIEW		-
APPROVED	JAMES CAUFIELD	18-04-2016
PROF REGISTRATION:		

MWH

Client: KAIPARA DISTRICT

KAIPARA DISTRICT COUNCIL
TOWN CENTRE PLAN

NEW PEDESTRIAN LINKS
SHEET 3 OF 3

Status Stamp: **FOR INFORMATION**
Date Stamp: **18/04/2016**
Scales:
Drawing No.: Z80506993 - SK092
Rev.: 1

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POSSIBLE CARPARK MODIFICATIONS

RECONFIGURE TO 90DEG PARKING

EXISTING CARPARK APPROVED SPACES = 107
PROPOSED CARPARK APPROVED SPACES = 148
ADDITIONAL SPACES IN THIS OPTION = 41

WEB CAM - POSSIBLE LINK TO KDC & SURF WEBSITES

200 mmØ NOT SCALE – IF IN DOUBT, ASK

0 10 20 30 40 50 60 70 80 90 100 150

ORIGINAL SIZE A1

Last modified by Elisha Morris on 29/04/2016

REV	REVISIONS	DRN	CHK	APP	DATE
1	FOR REVIEW	EM	JC	JC	18/04/2016

SURVEYED	–	DATE
DESIGNED		–
DRAWN	ELISHA MORRIS	18-04-2016
CAD REVIEW	–	
DESIGN CHECK	JAMES CAUFIELD	18-04-2016
DESIGN REVIEW		–
APPROVED	JAMES CAUFIELD	18-04-2016
PROF REGISTRATION:		

MWH

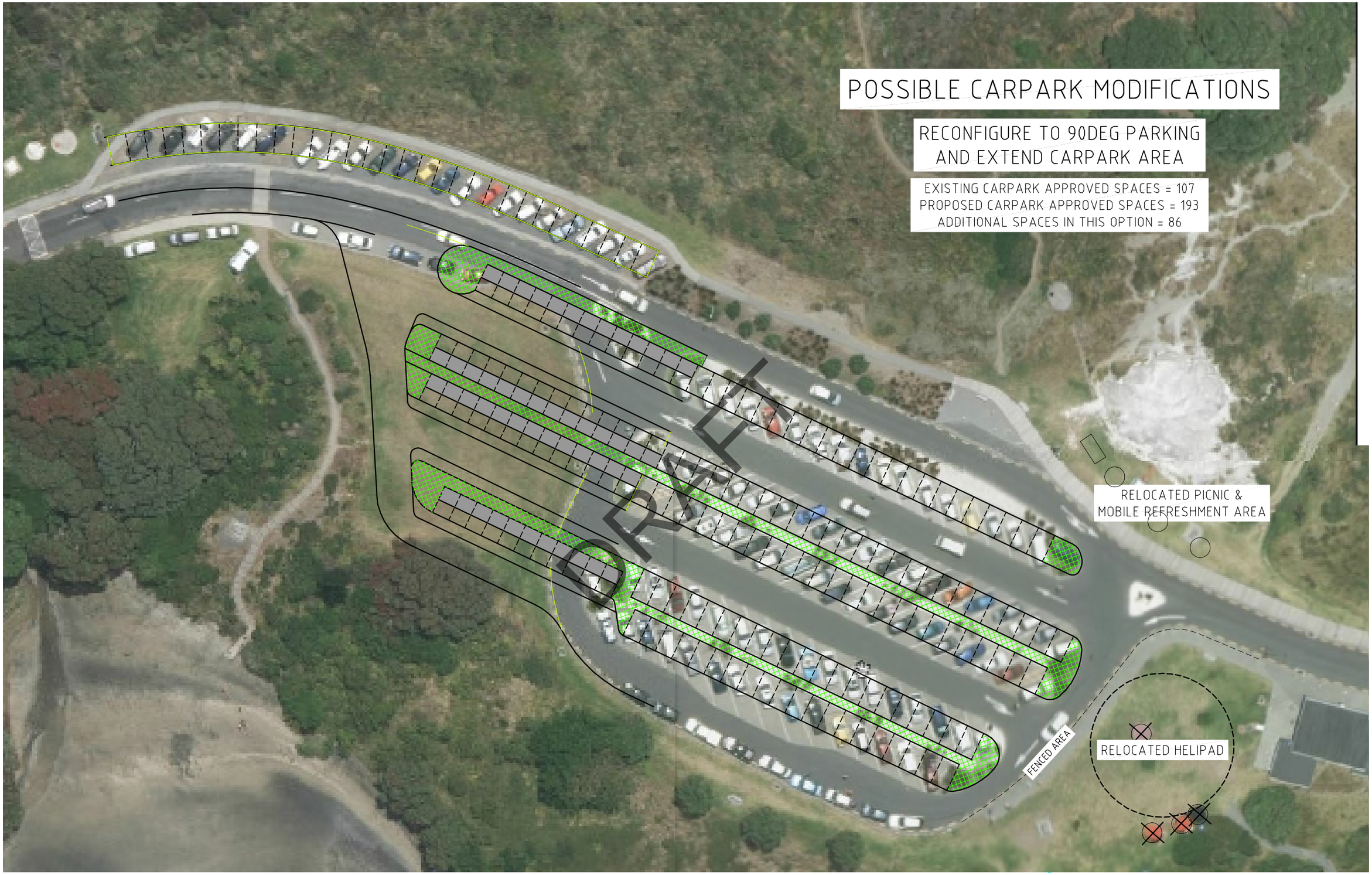
Client:

KAIPARA DISTRICT COUNCIL
TOWN CENTRE PLAN

MANGAWHAI HEADS CARPARK
OPTION 1

Status Stamp: **FOR INFORMATION**
Date Stamp: **18/04/2016**
Scales:
Drawing No.: Z80506993/SK101
Rev.: 1

P:_2012 Onwards\Kaipara District Council\80506993 Town Centre Plan\CAD\Picnic Bay Carpark\FIGURE 1.dwg



200 mmØ NOT SCALE – IF IN DOUBT, ASK

0 10 20 30 40 50 60 70 80 90 100 150 200

ORIGINAL SIZE **A1**

Last modified by Elisha Morris on 29/04/2016

REV	REVISIONS	DRN	CHK	APP	DATE
1	FOR REVIEW	EM	JC	JC	18/04/2016

SURVEYED	–	DATE
DESIGNED		–
DRAWN	ELISHA MORRIS	18–04–2016
CAD REVIEW	–	
DESIGN CHECK	JAMES CAUFIELD	18–04–2016
DESIGN REVIEW		–
APPROVED	JAMES CAUFIELD	18–04–2016
PROF REGISTRATION:		

MWH

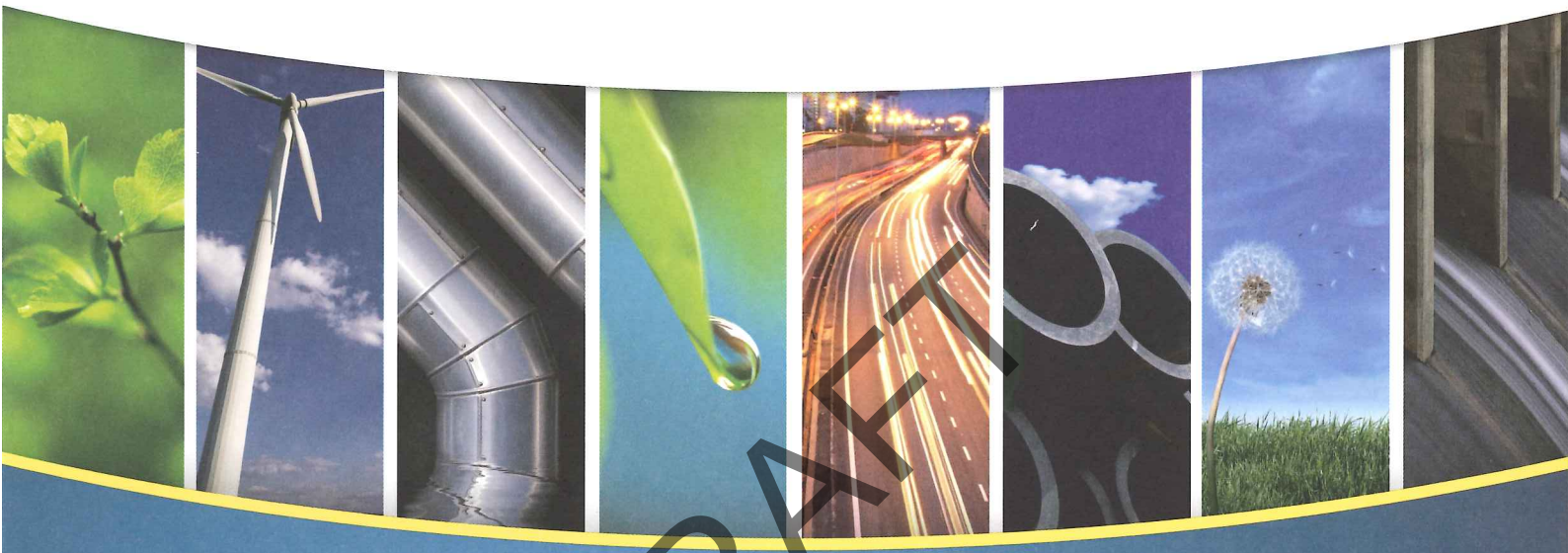
Client:

KAIPARA DISTRICT COUNCIL
TOWN CENTRE PLAN

MANGAWHAI HEADS CARPARK
OPTION 2

Status Stamp: **FOR INFORMATION**
Date Stamp: **18/04/2016**
Scales:
Drawing No.: Z80506993/SK102
Rev.: 1

P:_2012 Onwards\Kaipara District Council\80506993 Town Centre Plan\CAD\Picnic Bay Carpark\FIGURE 2.dwg



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