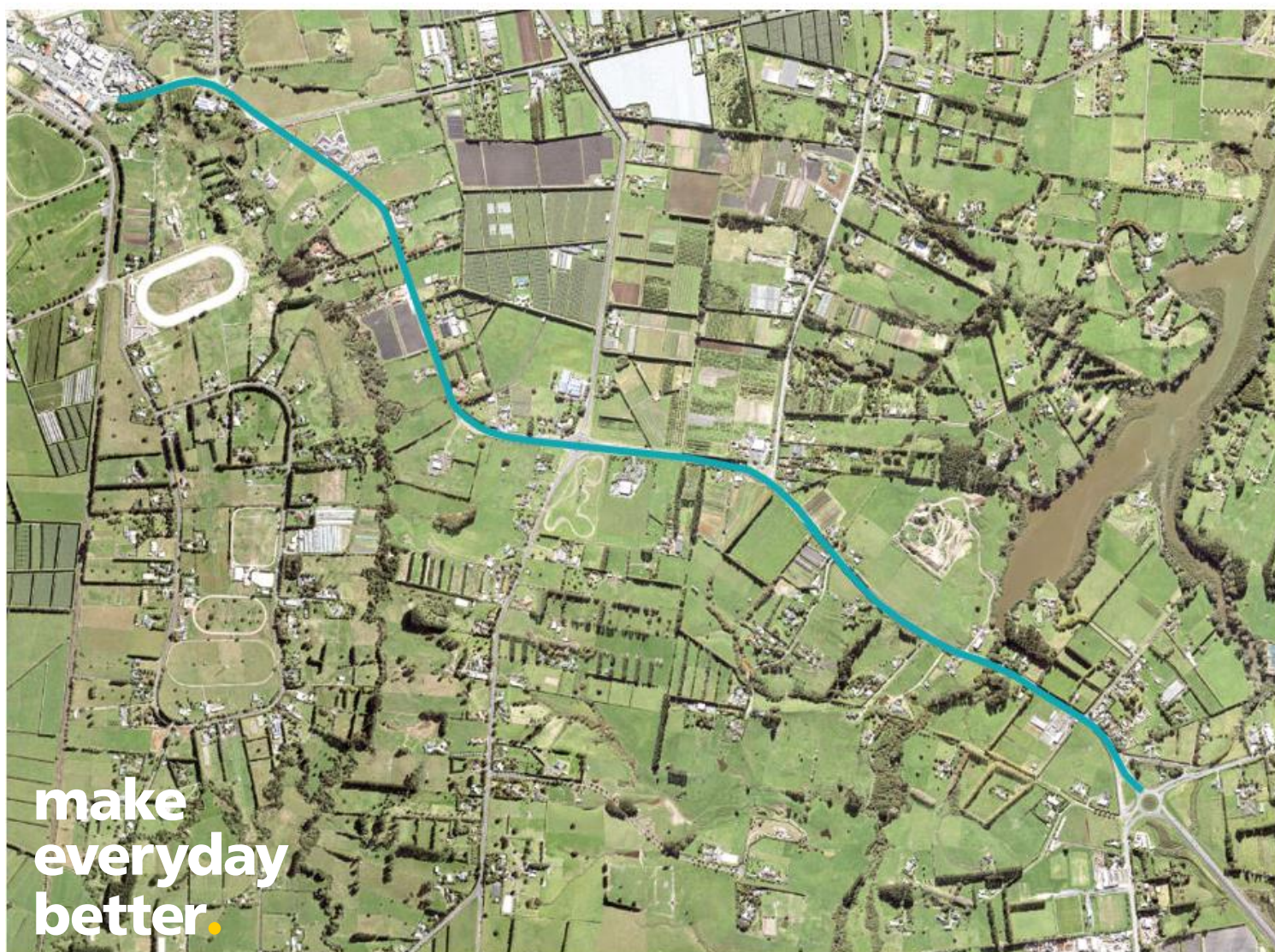


SH16 Brigham Creek to Waimauku Project - Stage 2 Brigham Creek to Kumeū

Assessment of Effects on the Environment

Prepared for Waka Kotahi NZ Transport Agency - Auckland
Prepared by Beca Limited

23 November 2022

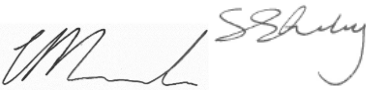


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on behalf of	Beca Limited		

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Executive Summary

Waka Kotahi is seeking to undertake safety, capacity, walking and cycling improvements to State Highway 16 (SH16) between the Brigham Creek Roundabout and Kumeū. These proposed improvements form Stage 2 of the wider SH16 Brigham Creek to Waimauku Project (the Project), which was identified as a section of rural state highway that qualifies for the Safe Roads and Roadsides Programme. The safety improvements involve retrofitting the corridor with safety mechanisms specifically designed to reduce the incidents of deaths and serious injuries and focus on short-term efficiency improvements to the corridor.

The SH16 Stage 2 Project corridor extends from the end of the Auckland North-Western Motorway at the intersection of SH16, Brigham Creek Road and Fred Taylor Drive (Whenuapai) through to Weza Lane (east of Kumeū), and is a total distance of approximately 4.3km. This SH16 corridor is zoned Strategic Transport Corridor within the Auckland Unitary Plan: Operative in Part (AUP:OP) and is also designated by Waka Kotahi NZ Transport Agency.

The SH16 corridor is also the only arterial road into the Kumeū-Huapai area and to centres of employment and commerce south and east of the state highway. These surrounding residential and commercial hubs place a huge reliance on the Project corridor to perform all movements for all modes of transport, including commuter, visitor and freight movements. The Project corridor experiences congestion on a daily basis, with a lot of traffic joining the SH16 corridor from Old North Road, Taupaki Road and Coatesville-Riverhead Highway, especially in the morning and evening traffic peaks.

The Project corridor also has an unforgiving highway environment and poor geometry. The historic crash record¹ for the corridor shows that there have been 2 fatal and 13 serious incidents resulting in 21 deaths or serious injuries (2 deaths and 19 serious injuries) over the 2009-2019 period². The majority of these crashes were due to a loss of control, resulting in head-on or run off road crashes. It is considered that the unforgiving highway environment and poor geometry, combined with high traffic volumes, increase the risk of head-on and run-off crashes.

The highway corridor does not currently support safe active modes. With the increasing traffic volume, active mode users will become even more exposed. The existing SH16 corridor presents an intimidating cycling route due to the high speed environment, un-signalised at grade crossings, and varying road shoulder widths. Corridor constraints provide some pinch points and narrow shoulders which present high risks to cyclists and pedestrians.

To address these issues along the corridor, Waka Kotahi is proposing to make the following changes to the road corridor:

- Install safety features along the highway. These include road side barriers, flexible wire rope median barrier, a flush median, wider shoulders, and will involve the upgrade of the Coatesville Riverhead Highway intersection with SH16 to a two lane roundabout to improve road safety and efficiency.
- The Project seeks to address short term efficiency improvements by widening the road corridor to four lanes from Taupaki Road Roundabout to Brigham Creek Road roundabout. This will enable minor efficiency improvements while wider transport infrastructure upgrades are established, such as the proposed alternative state highway led by Te Tupu Ngātahi - Supporting Growth.
- Install a 3m wide shared walking and cycling path along the south side of the highway to enable safe active mode choice.

¹ Recorded in Waka Kotahi Crash Analysis System (CAS) - <https://cas.nzta.govt.nz/>.1

² Whilst the crash records for 2020-2021 have been reviewed, the SSBC analysis period of 2009-2019 was retained as the more recent reduction in crashes is likely skewed due to Covid-19 lockdowns

This Assessment of Effects on the Environment Report (AEE) supports this Notice of Requirement (NoR) to alter Waka Kotahi designations 6766 and 6740 on SH16 and supports the application for the required resource consents for the proposed works.

The Project will have positive effects on road users' health and safety and social wellbeing by lowering the potential for injury or death. It will also support economic development by reducing the potential for delays in freight delivery and/or damage of goods. Reducing the risk of a crash also reduces the potential for spills, fire or other contamination to damage the surrounding environment.

Post construction, effects of vegetation loss as a result of road widening will be restored and enhanced through ecological planting and landscaping. Over 88,400 plants will be planted along the highway, which will result in an overall net gain in vegetation. Additionally, only 25% of the current corridor's stormwater runoff is treated. Through this Project, significant stormwater upgrades will be installed, focusing on natural infrastructure (e.g swales), to result in 90% of the corridor being treated. These outcomes will result in a significant environmental betterment to the surrounding area.

Various technical assessments have been undertaken to identify potential adverse effects on the environment and recommend appropriate avoidance, remediation and mitigation measures. These measures can be appropriately implemented through use of construction management practices and mitigation measures for noise, vibration, traffic, dust, as set out in a proposed Construction Management Plan and include adopting erosion and sediment control measures as set out in the Erosion and Sediment Control Plan for earthworks activities. A Contaminated Soils Management Plan will be adopted to manage any potential contaminated soil on identified HAIL sites during earthworks. An application under Section 44(a) of the Heritage New Zealand Pouhere Taonga Act 2014 has been applied for in parallel with this NoR, supported by an Archaeological Management Plan to manage and mitigate any potential effects on historic heritage and archaeology during the construction process. Various ecological surveys will be undertaken before construction to minimise the loss of native fish, herpetofauna, avifauna, or bats. Where private onsite wastewater systems are impacted by the Project, they will be upgraded to ensure they can function to meet the needs of existing users and in accordance with the relevant requirements of the AUP:OP. Consultation and engagement has been undertaken with affected parties, key stakeholders and interested iwi groups.

A statutory assessment forms part of the AEE and confirms that the Project is consistent with the relevant objectives and policies of the AUP:OP and relevant National Policy Statements. The overall effect of the Project is considered minor with the proposed mitigation implemented. The alteration to designations 6740 and 6766 will impact 59 properties and 86 land parcels (including local roads) which require temporary and/or permanent land requirements along the corridor to accommodate road widening and the proposed shared use path. It is considered that the land acquisition and temporary occupation will result in effects which are minor however these effects will be mitigated through compensation via the Public Works Act 1981 process.

Glossary of Terms

Abbreviation	Term
AC	Auckland Council
AEE	Assessment of Effects on the Environment
AT	Auckland Transport
AUP:OP	Auckland Unitary Plan: Operative in Part 2016
CHI	Auckland Council Cultural Heritage Inventory
CIA	Cultural Impact Assessment
CMA	Coastal Marine Area
CMP	Construction Management Plan
CNVMP	Construction Noise and Vibration Management Plan
CoPTTM	Transport Agency 'Code for Practice for Temporary Traffic Management'
CRH	Coatesville Riverhead Highway
CTMP	Construction Traffic Management Plan
CVA	Cultural Values Assessment
DP#	Discharge Point reference (Stormwater)
DSIs	Deaths and Serious Injuries
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
FSI	Fatal and Serious Incidents
GPS	Government Policy Statement
GPS 2018	Government Policy Statement on Land Transport 2018/19 – 2017/28
GPS 2021	Government Policy Statement on Land Transport 2021/22 – 2030/31
GRPA	Government Roding Powers Act 1989
HAIL	Hazardous Activities and Industries List
IIG	The Waka Kotahi Iwi Integration Group
LTMA	Land Transport Management Act 2003
MCA	Multi Criteria Analysis
NES	National Environmental Standard
NES:CS	Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
NES:FW	Resource Management (National Environmental Standards for Freshwater) Regulations 2020
NLTP	National Land Transport Programme
NoR	Notice of Requirement
NPS	National Policy Statement
NPS:FM	National Policy Statement for Fresh Water Management 2020
NPS:UD	National Policy Statement on Urban Development 2020
PBC	Programme Business Case
PSI	Preliminary Site Investigation
PRZ	Protected Route Zone

Abbreviation	Term
PWA	Public Works Act 1981
RMA	Resource Management Act 1991
s(#)	Section (number) in relation to legislation
SEA	Significant Ecological Area
Section A	SH16 Stage 2 Project Section A: Brigham Creek Road roundabout to Coatesville-Riverhead Highway intersection
Section B	SH16 Stage 2 Project Section B: Coatesville-Riverhead Highway intersection
Section C	SH16 Stage 2 Project Section C: Coatesville-Riverhead Highway intersection to Taupaki Road roundabout
Section D	SH16 Stage 2 Project Section D: Taupaki Road roundabout to Weza Lane, Kumeū
SH16	State Highway 16
SMAF	Stormwater Management Area: Flow
SRA	Safe Roads Alliance
SUP	Shared Use Path
SSBC	Single Stage Business Case
TPZ	Tree Protected Zone
TFUG PBC	Transport for Future Urban Growth Programme Business Case

1 Introduction

1.1 Report Purpose

This Assessment of Effects on the Environment (AEE) has been prepared by Beca Limited (Beca). It is a comprehensive assessment to support the Notice of Requirement (NoR), issued by Waka Kotahi NZ Transport Agency (Waka Kotahi) pursuant to Sections 181(1) and 168(2) of the Resource Management Act 1991 (RMA), to alter existing State Highway 16 (SH16) designations.

The alteration to the designations is required to undertake Stage 2 (Sections A – D, refer section 1.3.3 below) of the SH16 Brigham Creek to Waimauku Project ('the Project'). The Project comprises of road safety, efficiency and walking and cycling improvements between Brigham Creek and Kumeū.

This AEE forms part of the NoR and also supports the resource consent applications (lodged by Waka Kotahi in accordance with section 88 of the RMA) for the improvement works for the Project.

1.2 Waka Kotahi - NZ Transport Agency

Waka Kotahi is a Crown entity with its functions, powers and responsibilities set out in the Land Transport Management Act 2003 (LTMA) and the Government Roading Powers Act 1989. The primary objective of Waka Kotahi under Section 94 of the LTMA is to contribute to an effective, efficient, and safe land transport system in the public interest.

An integrated approach to transport planning, funding and delivery is taken by Waka Kotahi. This includes investment in public transport, walking and cycling, local roads and the construction and operation of state highways.

Section 96(1)(a) of the LTMA requires that Waka Kotahi exhibits a sense of social and environmental responsibility when undertaking its work. This statutory requirement is reflected in a raft of strategic and policy documents. One of the core position statements is that Waka Kotahi will responsibly manage the land transport system's interaction with people, places, and the environment.

Waka Kotahi is also a network utility operator approved as a requiring authority under Section 167 of the RMA.

The legal name for Waka Kotahi is the New Zealand Transport Agency. The corporate name Waka Kotahi is used throughout this AEE.

The Government Policy Statement on Land Transport 2021/2022 – 2030/31 (GPS 2021) outlines the four strategic priorities and investment principles for New Zealand's transport system for the 10 year period to 2031³. 'Safety' is a strategic priority for GPS 2021 with the primary outcome sought being "a transport system where no-one is killed or seriously injured". Therefore, improving the safety of New Zealand's transport system is a priority for Waka Kotahi. Waka Kotahi has a 'Road to Zero' approach which is 'New Zealand's Road Safety Strategy 2020-2030' to achieve Vision Zero, an Aotearoa where no one is killed or seriously injured on roads. One of the five focus areas under Road to Zero is "infrastructure improvements and speed management". The approach recognises that people make mistakes and crashes will still happen, but that these mistakes do not need to result in death or serious injury (DSI). It aims to improve the outcomes of these crash incidents, in particular reducing DSIs.

Waka Kotahi is working to achieve a safe road system through:

- Safe roads and roadsides – improving the level of safety built into our roads;
- Safe road use – alert users who stick to the road rules and look out for each other;

³ New Zealand Government Policy Statement on land transport 2021/22-2030/31

- Safe speeds – speeds that are right for each type of road; and
- Safe vehicles – choosing the safest vehicle you can afford.

‘Improving Freight Connections’ is a strategic priority for GPS 2021 with the primary outcome sought being “well-designed transport corridors with efficient, reliable and resilient connections which will support productive economic activity”. Therefore, Waka Kotahi also seeks to improve inefficiencies in the transport network to support continuity in economic activity / resilience.

‘Better Travel Choices’ is a strategic priority for GPS 2021 with the primary outcome sought being “to improve people’s transport choices in getting to places where they live, work and play, and to make sure our cities and towns have transport networks that are fit for purpose and fit for the future”. Therefore, Waka Kotahi also seeks to transition the transport network from a private-vehicle/freight centric network to a modern integrated system that includes all transport modes and aligns with the objectives of local, regional and central government.

1.3 Project Background

1.3.1 Transport for Future Urban Growth Programme 2016

The Transport for Future Urban Growth Programme Business Case (TFUG PBC) was undertaken to identify a preferred programme that responds to the scale and pace of growth in the Future Urban Growth Areas in Auckland. The TFUG PBC sought to enhance the liveability of Auckland and it undertook specific area based studies. One of these studies identified key issues in the North West of Auckland. It highlighted how SH16 is the only current access point into Kumeū and is a critical connection route in servicing the growth areas. The Supporting Growth Programme is developing the longer term transport plans to support future urban growth. However, the TFUG PBC also recommended a programme that would address state highway safety improvements.

1.3.2 Safe Roads and Roadsides Programme

In 2016, Waka Kotahi established the *Safe Roads and Roadsides Programme* to enable safety improvements to be made to over 90 high-risk rural state highways across New Zealand over six years. The improvements were aimed at making roads more forgiving of human error, helping to reduce the occurrence of crashes, and limiting their severity when they do happen. The programme aimed to reduce DSIs on New Zealand roads by 900 over 10 years by making over 400 kilometres of rural roads safer. Improving the safety of rural roads and roadsides was a key action of the government’s *Safer Journeys*, the national road safety strategy for the period 2010-2020, which was based on the Safe System approach which centred on creating a more forgiving road system that reduces the price we pay for human error.

The *Safe Roads and Roads Programme* was required because it was identified that around 8 out of 10 fatal and serious crashes on state highways occurred on rural roads and of those state highway crashes, 85 to 90% are run-off road, head-on and intersection crashes. The highest proportions of DSIs on all New Zealand roads are caused by head-on and run-off road crashes.

Each individual project selected for the *Safe Roads and Roadsides Programme* was identified as a section of the rural state highway network that is high-risk due to crash history, traffic volumes and road safety rating. On the selected sites, a combination of the following short-term engineering treatments was proposed to be implemented:

- Side barriers;
- Median barriers;
- Rumble strips;
- Curve improvements; and/or
- Improved road markings and signs.

All these treatments have been proven to reduce DSIs from head-on and run-off road crashes.

1.3.3 SH16 Brigham Creek to Waimauku Project description

The SH16 Brigham Creek to Waimauku project corridor was one of the sections of rural state highway identified for the *Safe Roads and Roadsides Programme*. This project was formed to improve the safety of this corridor as well as respond to issues relating to efficiency, resilience, access and travel choice within the surrounding area.

The whole corridor extends from the end of the Auckland North-Western Motorway at the intersection (roundabout) of SH16, Brigham Creek Road and Fred Taylor Drive (Route Station/Route Position (RS/RP) 016-0019/0.000) through to the posted speed limit change (to 70km/hr) east of Waimauku (016-0019/9.892), a total distance of approximately 10km.

A Single Stage Business Case (SSBC) was developed which focused on addressing safety issues on two distinct 'rural' sections of the SH16 Project corridor, which are separated by the Huapai-Kumeū townships. Works within the townships themselves were excluded (i.e. not part of the Project).

Project Sections:

During the SSBC process, the SH16 Brigham Creek to Waimauku project was divided into five sections, based on key characteristics, so a more detailed assessment of specific problems in each section could be undertaken. This allowed appropriate treatments and options to be developed and assessed.

The five sections of the SH16 Project corridor are outlined below:

- Section A: From Brigham Creek roundabout through to Coatesville-Riverhead Highway intersection;
- Section B: The Coatesville-Riverhead Highway intersection;
- Section C: From Coatesville-Riverhead Highway intersection through to Taupaki Road / Old North Road roundabout;
- Section D: From Taupaki Road / Old North Road roundabout through to Old Railway Road, east of Kumeū; and
- Section E: From Trigg Road, west of Huapai to Factory Road, east of Waimauku.

The SSBC, completed in 2017, identified safety and efficiency improvements for Sections A-D of the Project. In 2018, a Business Case Addendum considered the addition of a SH16 walking and cycling facility between Brigham Creek and Kumeū to the project. This recommended a new shared use path on the southern side of SH16 which extends from Section A to just past Section D in Figure 1 below, with the path connecting to another Auckland Transport proposed walking and cycling facility at Weza Lane and linking into the existing cycling facility along Fred Taylor Drive.

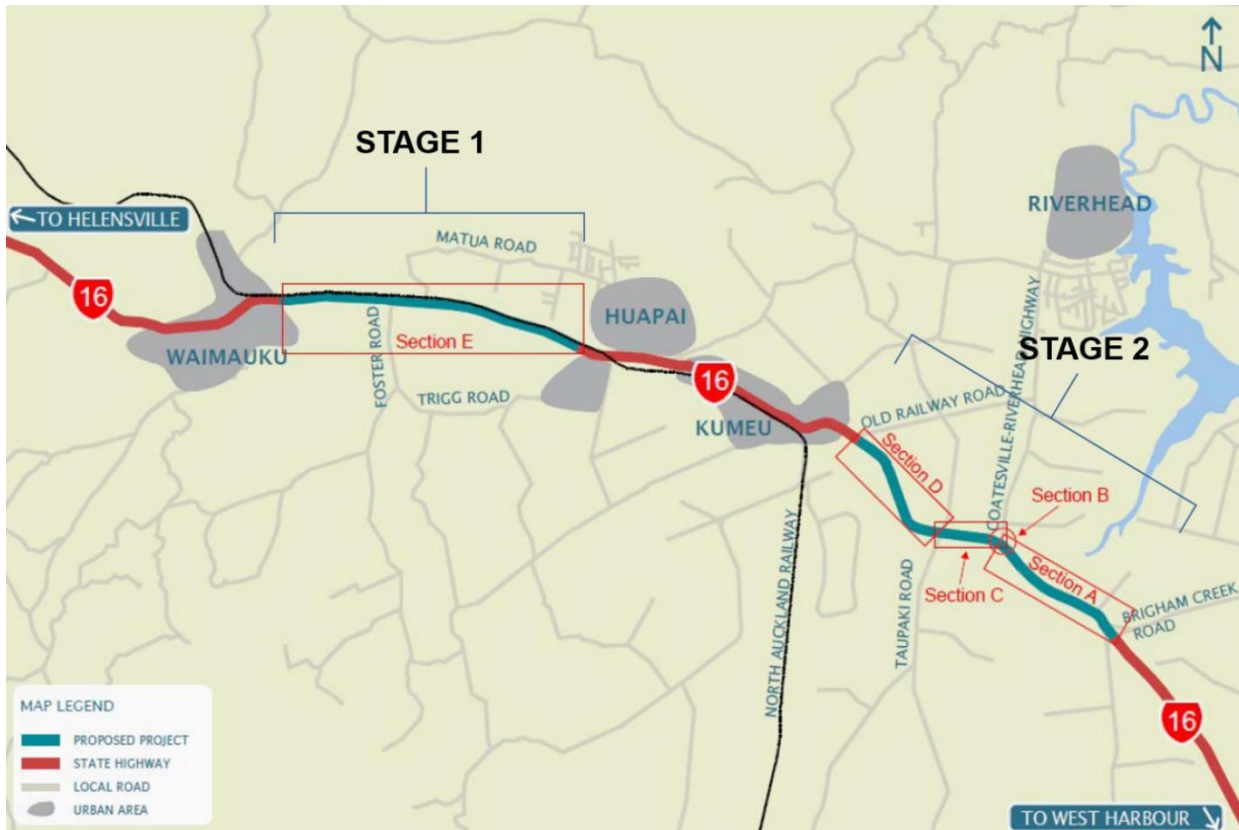


Figure 1: SH16 Bringham Creek to Waimauku Project Corridor Sections (Waka Kotahi, 2017)

Project Stages:

During Pre-Implementation, the SH16 Project was also divided into two delivery stages.

Stage 1 (Section E) was identified through the business case as a standalone section that could be isolated from the remainder of the works and delivered first as less land acquisition was required (this is known as SH16 Project Stage 1: Huapai to Waimauku). Stage 1 of this Project (Section E) has completed the detailed design and consenting phase. The Environment Court decision on an appeal from Weirong Chen was released on 2 November 2022 which confirmed the alteration to designation for Stage 1.

This remainder of this document focuses on the Project (i.e. SH16 Stage 2 Project, being Sections A - D from Bringham Creek to Kumeū).

1.4 SH16 - Stage 2 Project

The SH16 Stage 2 Project extent is illustrated in Figure 2 below.

The SH16 Stage 2 corridor was identified by the *Safe Roads and Roadsides Programme* as an area of rural highway that has an unforgiving highway environment and poor geometry. The highway also experiences high traffic volumes, which combined with the design of the road contribute to a recorded high number of head-on and run-off road crashes.

The SH16 Stage 2 Project involves upgrading 4.3 km of SH16 between Bringham Creek Road and Kumeū. The focus of this project is to improve safety in the area which will improve the wider transport network's efficiency. This will include widening the existing corridor to accommodate additional traffic lanes between Bringham Creek Roundabout and Taupaki Road Roundabout, a two lane roundabout at the intersection of Coatesville-Riverhead Highway, a 3m wide Shared Use Path (SUP), widened shoulders, median safety barriers, a flush median and stormwater network improvements.

SH16 is the only arterial route into Kumeū – Huapai, and parts of the corridor are already at capacity and experience significant congestion, especially in the morning traffic peak. Locals have reported concerns⁴ for the traffic congestion, particularly at the existing Taupaki Road Roundabout and the Coatesville Riverhead Highway intersection with SH16. The Coatesville Riverhead Highway intersection has a poor Level of Service (LOS) measurement of LOS F in the morning peak and is expected to worsen as the area is developed. As part of the Project, Waka Kotahi is proposing to upgrade the road to address short term capacity issues and improve the efficiency of the corridor. Other transport infrastructure investments are required to improve the long term capacity of the transport network. Te Tupu Ngātahi - Supporting Growth is proposing an Alternative State Highway that will enable a bypass around Kumeū-Huapai, and take the pressure of SH16 in the future.

SH16 currently does not have any safe walking and cycling facilities. Waka Kotahi proposes to install a 3m separated shared walking and cycling path on the south side of the project corridor. This will enable active mode travel choice and future proof the corridor as the surrounding area urbanises.

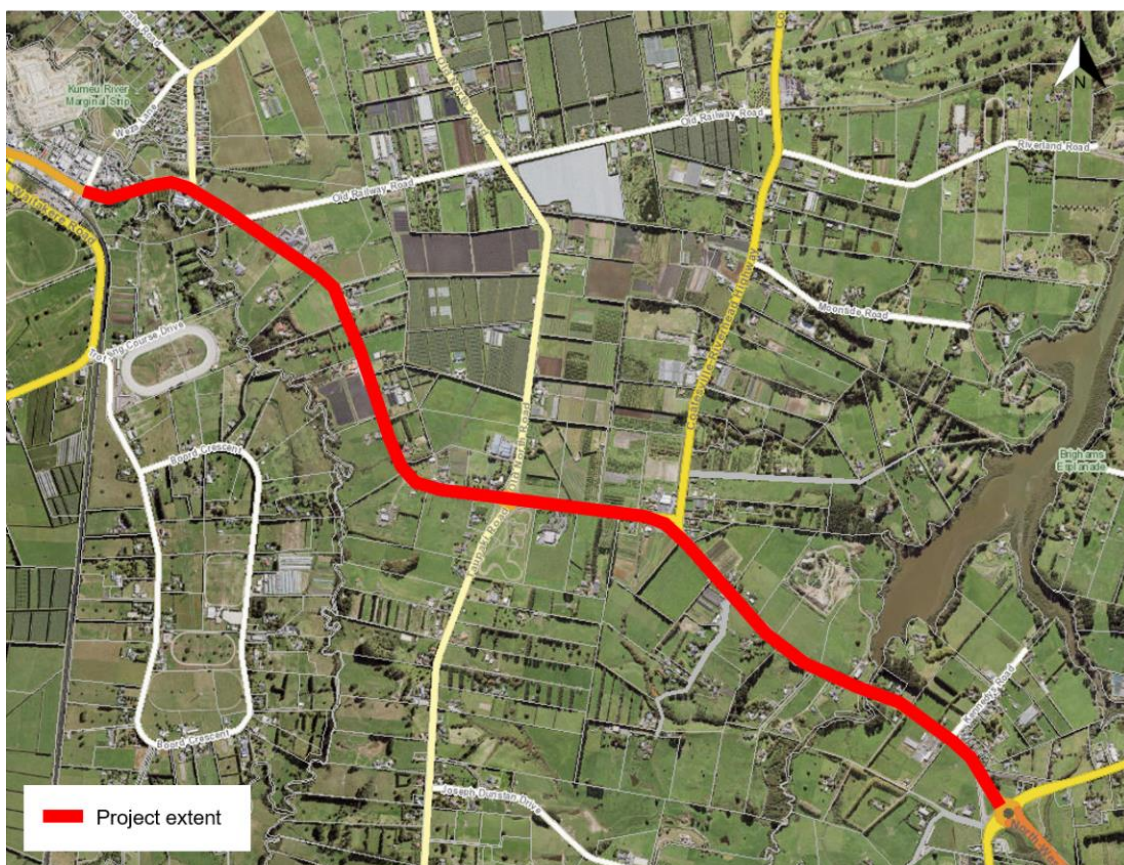


Figure 2: Stage 2 Project extent (Auckland Council Planning Maps, extracted 2020)

Full details of the proposed works are presented in the General Arrangement Plans (Appendix A) and Section 3 of this report (Project Proposal).

⁴ SSBC Appendix C – Consultation Summary, Safe Roads Alliance, March 2017, entitled 'SH16: Bringham Creek to Waimauku Consultation Summary Report'

1.6 Summary of ‘Consenting/Approval’ Requirements

This AEE supports the NoR served by Waka Kotahi to alter two existing designations (Waka Kotahi Designation 6740 and Designation 6766) in Auckland Unitary Plan – Operative in Part 2016 (AUP:OP). Once the alteration is confirmed, the expanded designation footprint will be included in the AUP:OP. The purpose of the NoR is to provide for the construction, operation and maintenance of the Project including safety, efficiency, walking and cycling improvements, and ancillary works. These include the removal of vegetation, stormwater treatment, environmental restoration and mitigation (e.g. planting and noise barriers), temporary construction and storage areas and other ancillary structures and activities associated with these works. No new designations are being sought.

This AEE also supports the Waka Kotahi application for various resource consents required for the construction, operation and maintenance of the Project under the AUP:OP, Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, and Resource Management (National Environmental Standards for Freshwater) Regulations 2020 – which are detailed in Section 4.

1.7 Assessment Methodology

This AEE includes an assessment of the relevant provisions of the following:

- Resource Management Act 1991;
- Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011;
- National Policy Statement for Freshwater Management 2020;
- Resource Management (National Environmental Standards for Freshwater) Regulations 2020; and
- Auckland Unitary Plan: Operative in Part 2016.

The NoR and resource consent requirements are described in more detail in Section 4 of this Report.

A number of technical assessments have been prepared to consider the actual and potential effects of the Project on specific environmental matters.

2 Purpose and Drivers for the Project

This section outlines the development process and need for the Project and the basis for the Project Objectives.

2.1 Need for the Project

2.1.1 SH16 Safety improvements

Safety is a key driver of the Project and is a key focus for the government, implementing strategies that seek to encourage well-designed roads and guide decision makers to improve the existing infrastructure to achieve a vision for safer road network for all New Zealanders. The inter-relationship between Vision Zero, the Safe System approach and New Zealand's Road to Zero – New Zealand's Road Safety Strategy are illustrated in Figure 3 and further explained below.



Figure 3 - New Zealand's approach to transport system safety (Source: Waka Kotahi webpage)

Vision Zero

Vision Zero is a world-leading approach to transport safety developed in Sweden by Claes Tingvall and others. This approach has been adopted by the New Zealand Government, whose vision is 'An Aotearoa where everyone, no matter their age or ability, can get around safely. An Aotearoa where no one is killed or seriously injured on our roads.' This is our 'why' at the heart of road safety in Aotearoa.

Safe System

By designing and operating the transport system for people, recognising we're vulnerable and we make mistakes. But these mistakes should not cost us our lives. This is our how for road safety in Aotearoa

Road to Zero

The Ministry of Transport implemented the 'Road to Zero' – New Zealand's road safety strategy in 2018 to support improvements in road safety outcomes. On average, one person is killed every day on New Zealand roads and another seven are seriously injured. Road to Zero tells us what Aotearoa needs to do to make improvements in road safety. It sets us on a path to achieve Vision Zero, because no loss of life is acceptable on our roads. It outlines principals on how roads should be designed and how they will make road safety

decisions. One of the five focus areas under Road to Zero is “infrastructure improvements and speed management”. Road to Zero has influenced the drivers for this Project.

Vision Zero for Tāmaki Makaurau

In 2019, Auckland Transport also released ‘Vision Zero for Tāmaki Makaurau: a transport safety strategy and action plan to 2030’. This recognises the transport system is built for humans, acknowledging that people make mistakes and human bodies are vulnerable to high-impact forces in the event of a crash. The strategy has a long term goal to eliminate transport deaths on Auckland roads by 2050. The Strategy places responsibility on the people who design and operate the transport infrastructure to provide a safe system. If DSIs are still occurring on a road network, it is up to the system designer to take further action to prevent DSIs.

SH16 Business Case Road safety analysis

The historic crash record for Stage 2 shows that there have been 2 fatal and 13 serious incidents resulting in 21 DSI casualties (2 deaths and 19 serious injuries) over the 2009-2019 period⁵. The more recent crash data from 2020-2021 may not reflect the most accurate statistics due to the Covid-19 lockdowns and was therefore not used. The majority of these Fatal and Serious Incidents (FSI) were due to a loss of control, resulting in head-on or run off road crashes. It is considered that the unforgiving rural highway design/geometry, combined with existing high traffic volumes, contribute to a high number of head-on and run-off road FSI crashes that result in a high probability of DSIs.

The Stage 2 improvement works are required to improve the safety of SH16 between the Brigham Creek Roundabout and Kumeū. This safety focus is important as the SH16 corridor is the primary link between the Kumeū and Huapai area and the rest of Auckland. SH16 performs all movement and access functions for all modes of transport, including commuter, visitor and freight movements.

The Project Corridor has been assessed using a New Zealand Roadside Assessment Programme (KiwiRAP) classification, this star rating method is a predictive measure of the personal safety of a longer length of road based on the road protection score (RPS) for each 100m section and typically averaged over 5km. The published 5km KiwiRAP star rating average across the SH16 corridor is 2 stars (1 being poor and 5 being good). When analysed at 100m segments, the Star rating across the corridor ranges from 1 to 4, with the majority of the route as 2 or 3 stars. The corridor has a 1-star rating for some 100m segments (generally at intersections with local roads).

The published One Network Road Classification (ONRC) for this corridor is Primary Collector but the eastern half (stage 2) of the corridor functions as a National (high volume) and the western half (stage 1) lends itself to a Regional classification. Based on the Safer Journeys – Safe Roads and Roadsides Programme Business Case (PBC) 2014, a KiwiRAP star rating of 3.5 has been adopted for this corridor. (Note that KiwiRAP rating is not assigned to a Primary Collector Road so adopting the PBC target made sense here). Therefore, given the national drive to improve road safety, the unforgiving nature of SH16, the high traffic volumes and low KiwiRAP rating in patches across the corridor, there was a need for Waka Kotahi to improve the design of the road to achieve better safety outcomes for all road users and contribute to the nation wide goal to reduce DSIs on New Zealand’s roads.

2.1.2 SH16 Transport Network Efficiency Improvements

The SH16 corridor is the only arterial road into the Kumeū-Huapai area and to centres of employment and commerce south and east of the state highway. These surrounding residential and commercial hubs place a huge reliance on the Project corridor to perform all movement and access functions for all modes of transport, including commuter, visitor and freight movements. The Project corridor experiences congestion on a daily

⁵ Waka Kotahi Crash Analysis System (CAS) - <https://cas.nzta.govt.nz/>.

basis, with a lot of traffic joining the SH16 corridor from Old North Road, Taupaki Road and Coatesville-Riverhead Highway, especially in the morning and evening traffic peaks⁶.

In 2017, Waka Kotahi undertook public consultation in the Project area. The community reported concerns regarding traffic congestion on SH16, particularly around the Taupaki Road Roundabout and Coatesville Riverhead Highway intersections.

In 2017, Flow Transportation Specialists (Flow) undertook traffic modelling and economic evaluation of the Project and an assessment of the various shortlisted design options⁷. A base model was used which reflected the traffic conditions in 2015 and was compared to actual 2015 traffic observations. The assessment also considered 2026 forecasts to evaluate the impacts of the Project. Flow's findings on the existing traffic environment are discussed below and were used to inform the SSBC. In 2021, Waka Kotahi had Flow Transportation Specialists update their model with a more recent 'SATURN model' used by Te Tupu Ngātahi - Supporting Growth. This updated model extended the traffic forecast from 2026 to 2028. The 2021 reconfirmed the same conclusions as the 2017 assessment.

SH16 Business Case Transport network Capacity analysis

Flow's transport assessment found that the Project corridor is most congested in the morning peak and is expected to experience more congestion in the future as the area urbanises. The existing Brigham Creek Roundabout is a constraint for traffic travelling east in the morning (towards the city). This affects travel time, as vehicles have to join the back of a queue and wait for the queue to slowly move through the roundabout due to the give-way control. Section A of the corridor is already at capacity based on 2015 data.

On the western side of the corridor, the Kumeū township is also a constraint for traffic travelling west in the afternoon between 4:00 to 6:00pm (into the township). Part of the disruption is caused by the traffic signal at the intersection of SH16 and Access Road. Queues into the township extend back along the SH16 corridor into Section D. Congestion is also reported around the Taupaki Road Roundabout as a result of widening through the double lane intersection and the downstream merge back to one lane.

The SH16 corridor was also assessed in regards to trip reliability, after some modelling, the corridor was found 34% unreliable. The unreliability of the road is understood as when a driver makes the same trip at the same time every day, and the trip duration will change each time. Therefore, when drivers plan their trips, they have to consider unexpected/ unreliable travel times.

Taupaki Road Roundabout

The morning peak (6:00 to 9:00am) has high levels of congestion experienced from 6:00am through Section D. These delays are generally a result of vehicles giving way to conflicting vehicles entering the Taupaki Road Roundabout (and onto SH16) from Taupaki Road, as well as the downstream merge to one lane when travelling eastwards to the city. The Taupaki Road Roundabout also has an overall LOS F in the morning peaks (6-7am³) with a 97 sec delay in 2015 and a 137 delay predicted for 2026. The evening peaks are a LOS C in 2015 with a 22 delay and a LOS E in 2026 with a 64sec delay. Further delays in the morning are then experienced on SH16 at the intersection of Coatesville Riverhead Highway, where there are heavy volumes of traffic entering the corridor.

⁶ SSBC Appendix D – Traffic Demand Modelling, Flow Transportation Specialists, August 2017, entitled 'Safe Roads Alliance: SH16 Corridor Option Evaluation'.

⁷ The design options are outlined in AEE Report Appendix D – Alternatives Assessment Report

Coatesville Riverhead Highway intersection

Coatesville Riverhead Highway intersection is a 'T' intersection with priority a 'stop' control. There is a right turn bay provided for SH16 traffic turning into Coatesville Riverhead Highway and a slip lane for left turning SH16 traffic onto Coatesville-Riverhead Highway. SH16 has an Annual average daily traffic (AADT) volume of 33,140 south of the intersection and AADT of 26,863 west of the intersection. Coatesville-Riverhead Highway has an estimated AADT of 7,700 vehicles per day with 5% being heavy commercial vehicles.

Table 1

Table 1 shows that the AADT north and south of the intersection has been gradually increasing every year with a 5 year growth rate of 5% and 7%, respectively.

Table 1: Coatesville Riverhead Highway AADT 2012-2016

	2012	2013	2014	2015	2016
AADT North of Coatesville Riverhead Highway	21,949	22,553	23,611	25,054	26,863
AADT South of Coatesville Riverhead Highway	25,420	26,575	28,093	30,668	33,140

The intersection has high volumes of traffic that is expected to grow. Vehicles that need to turn right from SH16 onto Coatesville Riverhead Highway have to give way to oncoming traffic travelling at 80km/hr, which can cause delays for traffic trying to find a safe gap to turn, especially during peak traffic periods. Vehicles wanting to turn right out of Coatesville Riverhead Highway onto SH16 have until recently had to give way to the vehicles waiting to cross SH16 into Coatesville Riverhead Highway, which caused even further delays and congestion along Coatesville Riverhead Highway. This also caused drivers to take greater risks when exiting the intersection. In May 2022, an interim safety improvement was implemented such that the right turn movement out of Coatesville Riverhead Highway onto SH16 has been restricted.

Flow concluded that the Coatesville Riverhead Highway intersection has an overall LOS F with a 146 sec delay in 2015 and a 284 sec delay in 2026 (morning peak only 6-7am⁸). The evening peaks had a LOS A. The SIDRA results indicate that the Coatesville Riverhead approach to SH16 is congested in 2017 at the time of the report, and that this congestion will increase in the future. With regards to the 2015 base model performance, queues are predicted in SIDRA to extend some 690 metres along Coatesville Riverhead Highway. This was similar to onsite observations in 2015.

Efficiency improvements required

Over the next 30 years, the north-west growth areas of Kumeū, Huapai, Whenuapai and Redhills are expected to provide approximately 30,000 new homes, required to house approximately 75,000 people. About one-third of these 30,000 new homes (approximately 8-9,000) are expected in the Kumeū-Huapai and Riverhead growth area by 2028-2032⁹, where SH16 will be the key access route (being the only existing arterial road).

Forecast vehicle trip demand for SH16 (northside to Brigham Creek roundabout) will increase by 115% between 2013 and 2046 (from 16,500 to 35,500 vehicle trips per day). The Project corridor is heavily congested and already at capacity in some sections of the corridor. The current road layout cannot accommodate the predicted growth of the surrounding network and is struggling to accommodate the current travel demand. Road layout

⁸ These are taken from SIDRA data 6-7am and would not capture all of the morning peak which would be from 6- 9am.

⁹ Auckland Future Urban Land Supply Strategy, Auckland Council, July 2017

changes are required to improve the efficiency of the network and reduce congestion as part of this SH16 Stage 2 Project.

Flow's traffic assessment did not consider forecasts beyond 2026, on the basis that the performance of the SH16 corridor in 2036 is saturated and that a larger infrastructure investment response is required to cater for anticipated transport demand beyond 2026/31. The proposed SH16 efficiency upgrades will not be enough to support the predicted growth by itself and will require the support of additional transport infrastructure in the surrounding road network. Te Tupu Ngātahi - Supporting Growth is proposing an Alternative State Highway that will enable a bypass around Kumeū-Huapai. This is expected to take significant pressure off the SH16 corridor and improve the efficiency and capacity of SH16. When the wider network is upgraded, traffic demand along SH16 is expected to decrease as there will be alternative routes. It is anticipated that the Alternative State Highway route will be implemented as part of the Supporting Growth Programme in approximately 15 – 20 years.

In addition to the safety driver of this project, short-term capacity improvements are required to help relieve current congestion and improve travel times while the wider network upgrades are planned and delivered.

2.1.3 SH16 Active Mode Improvements

SH16 is the only arterial road into Kumeū- Huapai, and its current form only supports motor vehicles. There are no continuous cycle lanes or footpaths along the corridor, and limited provision overall for these active modes of travel. With the increasing traffic volume, active mode users will become even more exposed. In addition, the Nga Haerenga/New Zealand Cycle Trail (NZCT) Kaipara Missing Link route crosses SH16 from Old North Road through to Taupaki Road. This route, and the surrounding rural road network, is utilised extensively by recreational cyclists and walkers. Social rides and walks organised by a variety of clubs/groups utilise SH16 and adjoining rural roads on a weekly basis. The rural road network to the north and south of SH16 is generally preferred due to significantly lower traffic volumes. One of the more common routes is a loop around Riverhead Forest utilising Old North Road, Taylor Road, SH16, and Riverhead Road. Another heavily utilised route is the connection from Brigham Creek Road, SH16, on to Coatesville-Riverhead Highway which provides the only route around the upper Waitematā Harbour. At grade crossings on SH16 and narrowing sections of the shoulder present the highest risk to recreational cyclists and walkers. Overall, the existing SH16 corridor presents an intimidating cycling route due to the high speed environment, un-signalised at grade crossings, and varying road shoulder widths. Corridor constraints provide some pinch points and narrow shoulders which present high risks to cyclists and walkers.

As the Project area's surrounding residential and commercial catchments grow, the increase in population density not only contributes to potential traffic demand, but also contributes to the demand for active mode facilities for access to places of employment and community facilities. The Project corridor would need to be upgraded to enable active modes.

The GPS 2021 encourages active mode choice which is currently unavailable along SH16 (except for on-road cyclists). Therefore, the provision of a separated shared use path away from oncoming vehicles will provide better travel choices for the local community which shall encourage and support mode shift to active modes. The shared path will link up to various existing and future public transport connections along the corridor to enable better accessibility and usability of the road transport corridor. The other potential benefits include contribution to better safety and travel time outcomes by reducing the number of single occupant vehicles on the state highway.

2.2 Project Objectives

2.2.1 Background to setting objectives

The New Zealand government released its '*Safer Journeys – Road Safety Strategy*' in March 2010. Safer Journeys was a national strategy to guide improvements in road safety over the period 2010-2020. The strategy set out a long-term vision for New Zealand of '*a safe road system increasingly free of death and serious injury*'. To support the vision, Safer Journeys introduced, for the first time in New Zealand, the world-leading Safe System approach to improving road safety.

The *Safe Roads and Roadsides Programme* was established in 2016 and was based on a strategy of reducing the number of New Zealanders that are killed or seriously injured on our roads annually, minimising the social harm and economic impact of road crashes.

In 2017, during the Business Case phase of the Project, Problem Statements and Project Objectives were identified for the Project as a whole (Stage 1 and 2) focusing on safety and efficiency. The project objectives were later refined through the SSBC phase to address the impact and intent of the GPS 2018 strategic priority for the provision of better travel choices, and again through the Pre-Implementation phase. The process of this refinement is outlined in Appendix B - Alternatives Assessment Report.

2.2.2 The Project Objectives

The Project Objectives are:

- Objective 1 – To improve safety on SH16 between Brigham Creek Road and Kumeū
- Objective 2 – To improve efficiency on SH16 between Brigham Creek Road and Kumeū
- Objective 3 – To provide transport infrastructure which supports modal shift.

Meeting the Project Objectives result in the following benefits:

- Reduction in DSI casualties on the SH16 Brigham Creek to Kumeū corridor
- Improved travel time on SH16 between Brigham Creek and Kumeū
- Increased access and travel choice within the corridor, with a focus on supporting a shift from private vehicle to active modes of travel.

2.3 Necessity Test

Section 171(1)(c) of the RMA requires particular regard to be had to whether the work and alteration to designation are reasonably necessary for achieving the objective of the requiring authority for which the alteration to designation is sought.

The proposed alteration to the designation is considered to be reasonably necessary for achieving the three Project Objectives (outlined above) and the best tool to use because:

- It enables Waka Kotahi to have the flexibility and ability to construct, operate and maintain the corridor and undertake the Project in accordance with the designation notwithstanding anything contrary to the AUP:OP
- It enables the works to be undertaken in a comprehensive and integrated manner
- It achieves certainty through identifying in the AUP:OP the location, nature and extent of the Project and the requiring authority's intended use of the land
- It protects the designated land from development and activities that would impede the project; and
- It enables the Requiring Authority to avoid, remedy and mitigate any adverse effects of the Project.

To address the identified existing problems in Section 2.1 and achieve the proposed Project Objectives, the Project Corridor requires upgrading to incorporate new safety, efficiency, walking and cycling improvements. The proposed work is considered reasonably necessary for achieving these objectives because:

- The use of wire rope median barriers (Section A and section C) will reduce the risk of head-on collision with another vehicle by providing physical separation
- Wider shoulders provide additional space for run off road recovery and the side barriers will reduce severity of run off road crashes as they allow vehicles to hit a more forgiving barrier than a tree, power pole, building or other structure;
- The use of a flush median (Section D) provide separation and flexibility of allowing right turn movements;
- The upgrade of the Coatesville Riverhead Highway intersection (Section B) to a roundabout will significantly improve the safety of the intersection by reducing vehicle speed through the intersection;
- The proposed four lanes of Section A-C and the upgrade of Coatesville Riverhead Highway intersection to a two lane roundabout will improve the efficiency of the corridor. The additional lanes and shoulder widening will further improve the efficiency and resilience of the highway by allowing traffic to flow around any traffic incident or maintenance;
- The proposed SUP may reduce the percentage of people in single occupancy vehicles; and
- The proposed SUP will create a safe separated space for pedestrians and cyclists that can support the modal shift away from private vehicle use to walking and cycling.

2.3.1 The Proposed Alteration to Designation

This NoR seeks to alter Designations 6740 and 6766. The alteration to these designations will impact 59 properties and 86 land parcels (including local roads) which require temporary and/or permanent land requirements, resulting in a total of 81,790m² of land required within the alteration area.

The proposed alteration to the designations will secure additional footprint to enable the construction, operation and maintenance of the following improvement works:

- Widening the SH16 carriageway to install the SUP along the majority of the Project length
- For sections A, B and C – construction of safety treatments, additional lanes, and a new roundabout; and
- For Section D – construction of safety treatments.

At locations along the SH16 corridor where an alteration to the designation is required solely for construction purposes, it is proposed that the Project corridor is surveyed following completion of the physical works and the designation is reviewed and rolled back where appropriate after the Project is completed.

Refer to Appendix C for the Designation Plans and schedule of affected properties. The Records of Title for the affected properties are contained in Appendix D.

3 Project Proposal

This section describes the physical works of the proposed safety, efficiency, walking and cycling improvements, and the anticipated construction activities. It is split into two sub-sections, with one detailing the proposed permanent works and the other detailing the proposed construction activities.

In summary, the proposed works include:

- Widening of the corridor to accommodate shoulder widening and installation of side barriers;
- Wire rope median barrier (Section A-C);
- Road widening for additional lanes (Section A, Section C);
- Intersection upgrades;
- Flush median (Section D);
- Utilities relocations;
- Retaining walls;
- Shared walking and cycling path, including new footbridges over Brigham Creek and Kumeū River;
- Pedestrian crossing facilities;
- Stormwater network improvements for flow management and water quality treatment; and
- Landscaping.

Refer to the General Arrangement Plans in Appendix A and Figure 4 below to see the nature and extent of the proposed permanent works.

16 Brigham Creek to Waimauku safety improvements – Stage 2

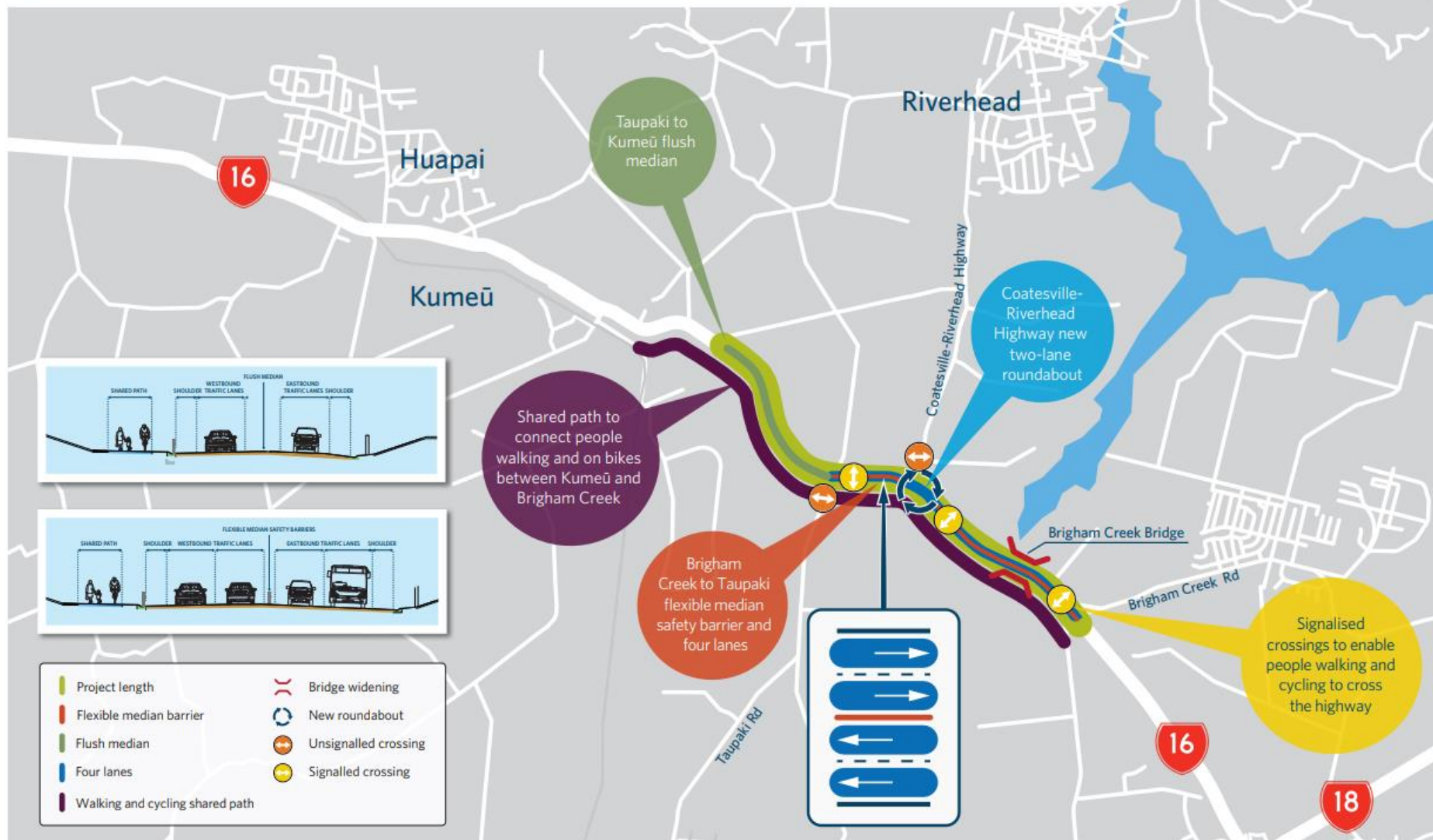


Figure 4: SH16 Stage 2 proposed permanent works

3.1 Permanent Works

The state highway improvement works will take place within Waka Kotahi SH16 designations 6740 and 6766 and over private land where an alteration to both designations is proposed (see Appendix C - Designation Plans and Schedule). As illustrated in Figure 1, the Project corridor is broken up into four sections (Sections A – D). The proposed permanent works within each section are listed in Table 2 below and seen in Figure 4 above. Each proposed element is described further in Section 3.1.1 to Section 3.1.7.

Table 2: Proposed works for each section of the Project corridor

Section	Proposed works
Section A: Brigham Creek roundabout to Coatesville Riverhead Highway	- The commencement of the works will be at the northern end of the existing roundabout traffic island on SH16. - The addition of an extra lane in each direction (from two lanes to four lanes total) with a 3 wire rope median safety barrier. - Signalised crossing on the north leg of Brigham Creek Roundabout with cycleway handrails. - Edge barriers at high risk locations. 3 wire rope barrier separating the state highway from the SUP at high risk locations. 1.5m shoulder width in most locations 3 m shared walking and cycling path along south of SH16 with 1m front berm and 1m back berm (berms to be planted with low maintenance low level planting). - Upgrade existing cycle crossing near Brigham Creek roundabout to a signalised crossing for pedestrians and cyclists. - Ground mounted variable message sign (VMS) will be relocated to suit the widened corridor. - New standalone 3m wide footbridge over the Ngongetepara Stream to accommodate the SUP. The bridge will not be attached to the existing SH16 Brigham Creek Culvert. 2m high noise wall from 171 SH16 to 179 SH16. 2m high L shaped noise wall outside 218 SH16. 2m high noise wall outside 264A SH16. 2m high noise wall outside 291 SH16. 2m high noise wall outside 299 SH16. - Two off road maintenance bays, located outside 222A and 239 SH16. - Relocated bus stops outside 212 SH16 and 5 Brigham Creek Road <i>Note:</i> <i>Brigham Creek culvert will not be widened or upgraded and the SH16 corridor will be positioned over the top of this structure with standalone pedestrian/cycle bridge along southern side of SH16.</i> <i>Overhead VMS will not be provided.</i> <i>Kennedys Road will be limited to left-in/left-out turning movements.</i> <i>All properties on this section of corridor will be limited to left-in/left out turning movements as a result of the installation of the median barrier.</i>

Section	Proposed works
Section B: Coatesville Riverhead Highway Intersection	- Two-lane roundabout at the existing intersection with walking and cycling facilities around the perimeter. 3m shared walking and cycling path along southern side of SH16 with 1m front berm and 1m back berm (berms to be planted with low maintenance low level planting). - Signalised raised safety platforms for pedestrians and cyclists to cross the road on the eastern leg of the roundabout. - Unsignalised raised safety platforms for pedestrians and cyclists on Coatesville Riverhead Highway on the northern leg of the proposed roundabout - Shared path located on the south side of SH16 from 299 SH16 to the crossing facility located outside 1411 Coatesville Riverhead Highway. - Shared path located around the corner of 1404 Coatesville Riverhead Highway (Boric Supermarket). 2m high noise wall outside 315 SH16. - Relocated bus stops outside 312 SH16 and 299 SH16. - Footpath installed on the south side. <i>Note:</i> <i>The roundabout will not be future proofed for a 4th leg connection.</i>
Section C: Coatesville Riverhead Highway to Taupaki Roundabout	- Installation of a 3 wire rope median safety barrier (turnaround locations are at roundabouts either end of Section C – one existing roundabout at Taupaki Road and one proposed roundabout at Coatesville Riverhead Highway). - Edge barriers at high risk locations. 3 wire rope barrier separating the road from the SUP at high risk locations. 1.0m shoulder width (where there is no roadside barrier). 1.2m shoulder width (where there is a roadside barrier). 3m shared walking and cycling path along south of SH16 with 1m front berm and 1m back berm (berms to be planted with low maintenance low level planting). - Signalised raised safety platform for pedestrians and cyclists to cross the road on the eastern leg of the Taupaki Road Roundabout. - Unsignalised raised safety platforms for pedestrians and cyclists on Taupaki Road on the southern leg of the Taupaki Road Roundabout roundabout 2m high noise wall outside 340 SH16. <i>Note:</i> <i>All properties on this section of corridor will be limited to left-in/left out turning movements as a result of the installation of the median barrier.</i> <i>No changes will be made to the Taupaki Roundabout.</i> <i>There are already two lanes in each direction in this section.</i>
Section D: Taupaki roundabout to Weza Lane	- One-lane retained in either direction with new painted 2.5m flush median. - Edge barriers at high risk locations. 3 wire rope barrier separating the road from the SUP at high risk locations.

Section	Proposed works
	1.0m shoulder width (where there is no roadside barrier). 1.2m shoulder width (where there is a roadside barrier). 3m shared walking and cycling path along south of SH16 with 1m front berm and 1m back berm (berms to be planted with low maintenance low level planting). - New standalone 3m wide footbridge over Kumeū River for the SUP. The bridge will not be attached to the existing SH16 Road bridge. 2m high noise wall outside 451 SH16. 2m high noise wall outside 550 SH16. <i>Note:</i> <i>Existing westbound lane merge from two lanes to one lane (i.e. lane drop) north-west of the existing SH16/ Taupaki Road roundabout to be retained as per the existing arrangement. The two-lane section will not be extended to include the horizontal curve with the merge relocated on the straight.</i> <i>All private property vehicle crossings to remain open to all movements.</i>

3.1.1 Pavement widening

The full length of the corridor will be widened to provide for the following lane rearrangements and the SH16 designations will be altered to cover the road pavement widening arrangements:

- 1.0m shoulder width (where there is no roadside barrier)
- 1.2m - 1.5m shoulder width (where there is a roadside barrier)
- Flush medians
- Wire rope median barriers
- 3m shared walking and cycling path along the south side of the SH16 corridor; and
- Two lanes in each direction from Brigham Creek Roundabout to Taupaki Roundabout.

This will provide sufficient space for the wire median barriers, flush medians and shoulders to accommodate passing, turning or stationary vehicles. Shoulder widening will assist to lower the current run-off road risk by providing additional space for driver recovery. It will provide resilience to the corridor by allowing distressed vehicles to stop off the carriageway and therefore minimise disruption to through traffic. The two additional lanes between Coatesville Riverhead Highway to Taupaki Roundabout will improve the efficiency of the state highway. A 3m shared walking and cycling path will provide a safe facility separated from the state highway for active mode travellers. Overall, there will be a 25% increase in impervious surface within the Project corridor. Refer to Appendix E for the Typical Cross Section Plans. Road widening will also involve a number of retaining walls to support the new road layout. Refer to Appendix F for the Retaining Wall Plans

3.1.2 Intersection upgrades

The existing T intersection at the Coatesville Riverhead Highway restricts traffic flow during peak traffic periods. Right hand turns from Coatesville-Riverhead Highway onto SH16 are difficult, which can lead to drivers making unsafe decisions when SH16 is congested. A 'No Right Turn' was implemented in May 2022 as an interim safety improvement. This intersection will be upgraded as part of this Project to a two-lane roundabout to improve both the safety and efficiency of this intersection.

3.1.3 Pedestrian crossing facilities

Pedestrian crossing facilities are proposed along the alignment to allow active mode users to cross the highway safely. On the north western leg of the Brigham Creek Road Roundabout, a new signalised crossing

will be installed, and the existing median island will be widened to accommodate a 3.5m wide island for pedestrians to wait.

A signalised pedestrian and cycling crossing point will be installed in the form of a raised safety platform on SH16 on the eastern leg of the proposed Coatesville Riverhead Highway Roundabout and the eastern leg of the Taupaki Road Roundabout.

A pedestrian crossing in the form of a non-signalised raised safety platform will be installed on Coatesville Riverhead Highway on the northern leg of the proposed roundabout and on Taupaki Road on the southern leg of the existing Taupaki Road roundabout.

3.1.4 Edge barriers

Roadside barriers will be installed at 13 high-risk areas, where there are bends in the road. These locations also include areas where a barrier is needed to separate the road carriageway from the SUP, to protect pedestrians and cyclists from any incidents. These barriers help reduce the severity of run-off road crashes. The barriers consist of a variety of 3 beam barriers and 3 wire rope barriers. For location details, see the General Arrangement Plans (Appendix A).

3.1.5 Median Treatments

75 per cent¹⁰ of people who die or are seriously injured on New Zealand roads have had a head-on collision or driven off the road. Median barriers (and road side barriers) stop vehicles before they hit something less forgiving, like a tree, power pole or oncoming vehicle. Flexible 3 wire rope median barriers will be installed down the centre of the state highway in Sections A and C. Median barriers are very effective at preventing and reducing the risk of head-on crashes. Wire rope barriers are often more forgiving than solid median barriers. See the General Arrangement Plans in Appendix A for the exact location of wire rope barriers.

The installation of median barriers will restrict drivers from making a right-hand turn from private properties across the state highway. There will be no turnaround facilities provided as the Brigham Creek Roundabout, Coatesville Riverhead Highway Roundabout and Taupaki Roundabout will act as turnaround facilities. There is 1.5km between Brigham Creek Roundabout and Coatesville Riverhead Highway Roundabout and 0.5km between Coatesville Riverhead Highway Roundabout and Taupaki Roundabout. This is sufficient distance based on the Waka Kotahi Road to Zero Speed and Infrastructure Programme Design Framework (November 2021) which recommends a 3 – 5km spacing distance. Therefore, additional turnaround facilities are not necessary.

A 2.5m flush median will be installed in Section D. Flush medians provide separation and flexibility of allowing right turn movements. They also create a separation between traffic lanes and allow time for correction, reducing the risk of head on collisions. Flush medians also create a safe space for vehicles to wait when trying to turn, without disrupting traffic, and have efficiency benefits for the community. The reason for choosing a flush median in Section D instead of a wire rope barrier like the rest of the corridor is that it provided safety and efficiency benefits but had less of an environmental impact, was lower in cost and was supported by the community as it maintained access. Further detail is outlined in Section 4.5 of the Alternatives Assessment Report provided as Appendix B of this AEE report.

3.1.6 Shared walking and cycling path

A 3m wide shared walking and cycling path will be provided along the southern side of the SH16 corridor and the designations will be altered to extend over this path. The southern side was selected (following an alternatives assessment) as it has less conflict points with side roads, providing a safer environment for

¹⁰ Waka Kotahi NZTA- Safe Roads – Side and Median barriers – ‘there are worse things to hit than a barrier’

pedestrians and cyclists and a better user experience with a longer path of uninterrupted travel. It connects with the existing Fred Taylor cycleway and with the Auckland Transport new shared path under construction at Access Road, Kumeū. It also avoids the group of notable trees at 191 SH16 and underground utility services which predominantly run along the northern side of the corridor.

An additional footpath will be installed on the north side of the highway from Kennedys Road to Brigham Creek Roundabout, where the bus stop will be relocated to. This will allow people to board and depart the bus, then use the crossing facility to cross the road into the SUP or walk further along to the residential properties between 171 to 183 SH16 or down Kennedys Road.

3.1.7 New foot bridges

There are no bridge widening works required, however two new foot bridges will be installed for the SUP. A 27m standalone footbridge is proposed adjacent to the Brigham Creek culvert over the Ngongetepara Stream and a 28m standalone footbridge is proposed adjacent to the Kumeū River No2 bridge. The foot bridges will be supported by their own piles and retaining wall abutments on the river banks. No works associated with these structures will be within the streams. The footbridges will be constructed from the road edge and riverbanks. The concrete piles will be approximately 10.3m long at Kumeū River and 10.4m long at Ngongetepara Stream. These piles will use steel casing during construction that will remain underground on completion. Utilities will be attached under the new footbridges. Refer to Appendix G for the Structures Plans.

At Kumeū River, in addition to the main piles to support the SUP, approximately 12 bore piles may be required under the proposed SUP bridge to support slope stability (7 on the western stream bank and 5 on the eastern bank). These piles will be 600mm in diameter, 8.5m long, and will be located a minimum of 4m from the stream edge on the eastern bank and a minimum of 5.5m on the western bank. The bore piles will also have ground anchors at a 45 degree angle, embedded approximately 5m into the bedrock. Refer to the Structures Plans in Appendix G. The partial removal of the rock walls at Kumeū River may be required to install these piles.

Similarly, at the Ngongetepara Stream, approximately 4 bore piles may be required on each bank under the proposed SUP bridge to support slope stability (8 in total). These piles will be 600mm in diameter, 6m long and will be located a minimum of 3.5m from the stream edge on each bank. The bore piles will also have ground anchors at a 45 degree angle, embedded approximately 5m into the bedrock.

It is not known at the time of lodgement if these additional supporting piles at Kumeū River and Ngongetepara Stream will be required. Therefore, they have been included in the design and may be removed later.

3.1.8 Utilities relocations

There are existing utility assets within the Project extent, some of which will be impacted by the proposed works. Vector, Transpower, Spark, Vodafone, Chorus, Vocus and Watercare have all been engaged with to understand the location of their utilities along the alignment and if/where they need to be relocated.

Relocation of overhead powerlines will be required in some locations. Where requested by the providers, we will be installing additional service ducts as part of the Project. This includes future proofing for services such as power and communication.

Table 3 below provides a summary of the utility providers, existing asset locations and whether any relocations or protections are required to undertake the SH16 works. No works are proposed within proximity of the Southern Cross International Cable, which runs along the northern side of the project corridor.

Table 3: Utility relocations

Owner	Asset	Existing location	Relocation/protection required?
Chorus	Poles, overhead crossings, underground comms ducts and direct buried comms cables	Along the Northern side of SH16, most of the comms cables are in ducts which are within the same trench as the Spark International Cable, yet some that are buried should run closely to the ducts. Poles on both sides of the corridor with overhead crossings. Recently installed underground fibre connection between Brigham Creek roundabout to Brigham Creek stream on southern side with road crossings to northern side.	Some existing ducts will be covered by the new shared path or carriageway on the southern side. Full removal and relocation of existing poles and undergrounding of existing overhead crossings from Brigham Creek roundabout to Riverhead Road. New manholes/pits/joints. Relocated cables installed in ducts within a shared trench in the berm along the northern side and under the SUP on the southern side. Future proofing ducts to be installed within the same shared trench on both sides.
FX Cables Vocus	Existing 32 mm cable and existing manholes	Along Southern side of SH16 mostly in existing berm or footpath, crosses to northern side at property 212 SH16.	Full relocation from Brigham Creek roundabout to Riverhead Road. The relocated cables will be installed in ducts within a shared trench under the SUP along the southern side.
Spark	Existing Southern Cross submarine international cable	Along the Northern side of SH16 from Brigham Creek roundabout and Riverhead Road	No relocation required. Asset must be protected at all times during construction. Spark has advised that no excavations shall be undertaken within 0.5m vertical clearance or 1m lateral clearance, and any constraint points will be raised with Spark and resolved on case by case basis.
Transpower	Henderson-Maungatapere 110kV line and Henderson-Marsden 220kV line crossing SH16 (North-South) and existing towers	Between Weza Lane and Riverhead Road. Tower is within property 7 Main Road Kumeū 0810	No relocation required. Transpower has provided design and vertical clearance guideline around the existing overhead transmission line. Careful management of these works shall be addressed in a Construction Management Plan as required in the proposed designation conditions.
Vector Electricity	Existing power pole, timber stay pole, light pole, transformers, overhead electricity cables, underground Comms, LV, MV and HV cables.	Poles located on both sides of SH16, overhead electricity cables mainly along southern side of SH16 and some on northern side with crossings above SH16. Transformers generally mounted on poles. Existing connection transitions	Vector Power to be relocated underground on southern side except for at Taupaki Roundabout. Undergrounded power cables will be installed on the northern side. Terminal Poles to be installed at the start and end of each undergrounding section.

Owner	Asset	Existing location	Relocation/protection required?
		from overhead to underground west of Old Railway Road.	Service Poles installed to retain overhead crossings and existing connections to properties. Existing pole mounted transformers removed and replaced by ground transformers, new switches and pits will be installed mostly along the northern side. Future proofing ducts (3x150mm 33kv, 1x100mm comms and 1x50mm DTS comms) to be installed for the full length from Brigham Creek to Riverhead Road, another 3x150mm 33kv and 1x50mm DTS comms ducts between Old Railway Rd and Riverhead Rd, and a spare 1x150mm 11kv duct between Old Railway Rd and Weza Lane. The new underground cables will be installed in ducts within a shared trench under the new berm on northern side, new futureproofing ducts will be installed on the southern side under new carriageway/shoulder.
Vector Gas	100mm MP4 PE Gas mains, HP ST Gas mains, Other Gas mains that provide property connections (50mm PE, 10mm PE, 32mm PE, 25mm PE)	Medium pressure gas main runs along Northern side of SH16 between Brigham Creek Roundabout then crosses to southern side at 300 SH16. High pressure gas main runs along the east side of Taupaki Road and Old North Road (on both sides near the roundabout).	Medium pressure gas main (MP4) relocated out of the new carriage way and installed in the shared trench in berm on the northern side. High pressure gas main (HP) will not be relocated, depth and location of the HP main to be confirmed via Vector locate service to resolve potential clashes with proposed stormwater assets.
Vodafone	Fibre cables and access pits	Existing fibre cables on Brigham Creek Road, southern side of SH16 (between Brigham Creek roundabout and Taupaki roundabout), and east side of Old North Road. Access pits located on west corner of Brigham Creek roundabout and on east corner of Old North Road/SH16. New connection recently installed along the old line between Brigham Creek roundabout	Full relocation from Brigham Creek roundabout to Old North Road and tied into existing access pits. The relocated cables will be installed in ducts within a shared trench under the new shared path along the southern side.

Owner	Asset	Existing location	Relocation/protection required?
		and Coatesville Riverhead highway.	
Watercare	Critical Watermain (365 PE, 450PE, 390CLS, 431ELS, 355 PE, 280 PE etc), Non-Critical Watermain (150 AC along SH16 , 150 CLS crossings, and 15/20/25 PE to properties), Wastewater lines Valves, Hydrants and Water Meter	Critical watermain along Northern side of SH16 from Brigham Creek roundabout and Old North Road. Non-critical watermain along both sides of SH16 from Brigham Creek roundabout to property 222 SH16 Wastewater pipes along west side of Old North Road and onto southern side of SH16 until north of Weza Lane.	No relocation of critical watermain. Non-critical local watermain upgraded (under 100mm) and all are to be relocated and upgraded The new watermain will be installed within a shared trench either under the new shared path along the southern side or in berm along the northern side. Existing hydrants/pits will be relocated or replaced to suit. Wastewater line near Kumeū No.2 Bridge will be relocated onto the new footbridge.

Refer to Appendix H for the proposed Utility Plans.

3.1.9 Stormwater network improvements for flow management and water quality treatment

The Project will involve upgrading the stormwater infrastructure along the SH16 corridor. Stormwater drainage has been designed in accordance with the AUP:OP to manage the change in impervious area, road alignment, provide stormwater quality improvements as well as minimising the impact on the stream environments. The purpose of the Project is primarily for safety improvements and there are a number of constraints within the network which have had an impact on the stormwater design. The project will involve a 25% increase in impervious area to the road carriageway, which is 29,190m².

The stormwater strategy prioritises stormwater treatment devices for the on site management of water from rain events. There will be three types of stormwater devices: bio-retention swales, planted conveyance swales and propriety devices. The preferred option is for vegetated bio-retention swales and vegetated swales where space allows. These options will provide stormwater treatment and flow control. The design focuses on the integration of the stormwater system along the alignment with the surrounding streams and channels. Where space along the corridor is limited propriety stormwater treatment devices will be used to capture and treat stormwater before discharging.

The existing stormwater network consists of a combination of piped networks, roadside drains and swales. It involves mostly untreated stormwater discharging into nearby water courses or farm drains through outlet structures. The Project involves a new stormwater management system that aims to treat most of the existing and all of the new impervious area with a design based on a 3.8-degree temperature increase by 2110- 2120. Refer to Appendix I for more details on the proposed stormwater design, a summary is provided as follows.

The Project stormwater design objectives are:

- Cater for the increase in stormwater runoff discharge without increasing flooding conditions to properties upstream or downstream of the road designation with respect to the pre-development condition
- Provide stormwater quality treatment to provide an overall betterment in the stormwater runoff quality from the existing condition; and
- Provide flow control in areas where hydrology mitigation is required as identified on the planning maps to protect and improve downstream stream health.

Primary and Secondary Conveyance:

Secondary flow from the carriageway has been contained within the road carriageway between kerbs or within roadside conveyance channels and/or swales.

Clean water diversion drains on either side of the road corridor have been relocated or established, where required, and replicate the existing roadside open channels. These drains divert clean runoff from upstream external catchments, so it does not contribute the additional runoff on the road carriageway, therefore keeping the pipe network and treatment devices to a minimum and not overloading with clean water runoff. No redirecting of catchments is proposed.

New manholes and pipes for conveyance will be typically located behind barriers, where possible. Catchpit spacing is typically 40m, depending on the slope of the area, to meet the requirement of keeping the 10 year event stormwater runoff from encroaching into the live traffic lane.

At the SH16 crossing over Ngongetepara Stream (CH190630) a kerb and channel is proposed. There is a sag point on the east side of the stream crossing on SH16 where a stormwater megapit has been sized for secondary flow to discharge to Ngongetepara Stream.

Stormwater treatment:

90% of the Project corridor (both new and existing impervious surfaces) is proposed to be treated before discharge. Where the new and existing impervious area cannot be separated, all the stormwater runoff will be treated where possible. Runoff from the shared path is considered 'clean water' and does not require treatment. This will be achieved by collecting and treating the road surface runoff through a combination of natural green infrastructure and proprietary treatment devices proposed along the corridor. Refer to the Stormwater Design Plans in Appendix I.

A combination of treatment swales with varying base widths will be used and are proposed to be vegetation where possible. Proprietary treatment devices (such as Stormwater360) are proposed where the site is constrained by land, other service or operational requirements. Retention swales have been adopted where treatment and hydrology mitigation is required and where the topography and site constraints are suitable.

Clean water diversion drains on either side of the road corridor have been designed to replicate the existing roadside open channels where required. This will divert clean runoff from the upstream external catchment, so it does not contribute the additional runoff on the road carriageway, therefore keeping the pipe network and treatment devices to a minimum and not overloading with clean water runoff.

There are some areas that cannot be treated or provide limited treatment, these are listed below. Refer to Figure 5 below for the DP locations.

- DP1 Outfall A: 1,750m² of new and existing impervious area which is not treated due to site constraints. This is at a sag point above Ngongetepara Stream due to topographical and geotechnical limitations, site access for maintenance and safety due to the location on SH16.
- DP5 Outfall J: 701m² of new and existing impervious area which is not treated due to site constraints.
- DP11 Outfall Q: 3,515m² of existing impervious area which is not treated due to site constraints (note: this does not require stormwater treatment as there is no new or redeveloped road at this location)
- DP11 Outfall R: 509m² of existing impervious area which is not treated due to site constraints (note: this does not require stormwater treatment as there is no new or redeveloped road at this location)
- DP12 Outfall P: 408m² of new impervious area. There is currently stormwater treatment provided for this area, however the size of the device is unknown. It is expected that it will be able to treat the stormwater runoff from the additional area.

Discharge to streams:

The stormwater management system will involve discharging into several streams in the corridor. All outlet structures will be specifically designed to ensure that adequate energy dissipation is designed and that the effects of the discharge do not cause scour/erosion within the immediate receiving environment. In addition to the stormwater network and existing streams, stormwater runoff discharges to several properties across the corridor. The Project has taken the opportunity to redirect the stormwater discharge to these private properties to a public stormwater network or stream. The Project will involve discharging treated stormwater into the below streams. These locations are listed below and shown in Figure 5.

- Ngongetepara Stream at the Brigham Creek Culvert (DP1)
- A stream located south of 1356 Coatesville Riverhead Highway (DP4)
- A stream located on 429 SH16 / 436 SH16 (DP6)
- Kumeū River - 472 SH16 (DP7)
- Kumeū River - 538 SH16 (DP8)
- Kumeū Bridge number 2 (DP11)



Figure 5: Location of proposed and decommissioned discharge points

Retention and detention:

Hydrology mitigation is proposed around Kumeū Bridge, 538 SH16 and 436 SH16. At these locations hydrology mitigation volumes are provided using retention storage volume under the retention swale with check dams.

Culverts:

No existing cross culverts under SH16 will be altered. However, a number of stormwater culverts will be altered or installed along the road edge to maintain access to private properties. These culverts will be minimum 375Ø with a minimum of 400mm cover. Where this minimum cover cannot be achieved, a reinforced slab will be provided. These will typically be fitted with headwalls and wingwalls when located behind a barrier or a sufficient distance away from the carriageway. Where there is no road side barrier, a mountable or traversable grate has been provided. The culverts will allow a managed flow of stormwater into the stormwater networks without compromising the safe access to private property.

3.1.10 Vegetation removal

The widening of the SH16 corridor for additional lanes, the SUP and supporting infrastructure will result in the removal of 159 trees or tree groups within the Project extent comprising:

- 67 Trees/tree groups within the existing designations will be removed
- 92 trees/tree groups outside of the existing designations but within the new designation boundary will be removed.

Refer to Appendix J for the Site Clearance Plans.

3.1.11 Landscape and ecological planting

As noted in the SH16 Urban and Landscape Master Plan (refer Appendix K), the overall landscape planting strategy aims to enhance the underlying landscape elements, patterns and processes adjacent to the road corridor. The removal of existing trees and vegetation is required to enable the Project works. Landscaping is proposed to mitigate the effect of the required tree removals and to seamlessly tie the state highway landscape into the surrounding landscape, provide consistency with Stage 1 (being SH16 from Huapai to Waimauku) and create a 'stitching' of vegetation patterns across the alignment. The planting proposed also has ecological benefits. Desired landscape and ecological planting design outcomes are:

- Design planting to improve water quality and habitats along streams and rivers
- Design stormwater treatment devices to minimise impact on water quality (addressing cultural concerns)
- Restore connections between areas of native vegetation to increase habitat and biodiversity levels
- Make use of natural regeneration processes
- Make reference to natural vegetation patterns e.g. streamside corridors.
- Establishing larger native forest pockets and clusters of native trees in larger designation areas has been considered. These will provide stepping stones between bush areas (forming habitat corridors) and natural features which will enhance the ecological qualities of the SH16 corridor
- Include endemic eco-sourced native species and replacement trees along the rural boundary of the corridor within the planting plans
- Consider safety through 'Crime Prevention Through Environmental Design'
- Maintain sightlines by setting planting back from edge of pathways and layering plant species to enable clear sightlines
- The design approach for waterways includes native planting to enhance the existing vegetation patterns, biodiversity and 'stitch' the landscape across the alignment. Landscape treatments are integrated with the stormwater systems to achieve both water treatment and biodiversity outcomes. The Project will achieve a linear ecological corridor that provides opportunities for movement of fauna through the area.

The proposed landscape and ecological planting will cover 41,539m² and will include approximately 88,400 plants. The key landscape features proposed for the project are outlined below, refer to the Landscape and Ecological Planting Plans in Appendix L for more details:

- Hydro seeded grasses
- Wetland/Riparian Planting mix: which includes Wharawhara, Toetoe, Jointed twig rush, Purei, Pukio, Toetoe Whatu-manu, Common spike-rush, Wiwi, Wharariki
- Swale planting mix: which includes Pukio, Purei, Wharariki
- High native revegetation: which includes Toe toe, Kanono, Karamu, Manuka, Harakeke, Whauwhaupaku, Mingimingi, Karo
- Low native revegetation: which includes Dwarf Toe toe, Coprosma, Wharariki
- Amenity planting mix: which includes Turutu, Wharariki, Red Tussoc, Puki, Dwarf Toe toe
- A number of trees along the corridor including Titok, Ti Kouka, Rewarew, Mahoe, Metrosideros Maori Princess, Kohukohu, Pauahou, Nikau palm, Kowha, Puriri, Rimu

3.1.12 Noise Walls

New Zealand Standard 6806:2010 Acoustics – Road-traffic noise- new and altered roads (NZS6806) has been applied to the Project. The existing noise environment at all protected premises and facilities (PPFs) is controlled by traffic on SH16. The existing noise environment is already above desirable noise levels. Although the Project will not result in any discernible change to the noise levels experienced by adjacent land uses, Waka Kotahi has applied NZS6806 and is proposing to reduce the noise effects from SH16 on identified affected dwellings. 2m high timber noise walls are proposed to reduce noise volumes for affected dwellings. Locations are illustrated on the General Arrangement Plans provided in Appendix A.

3.1.13 Redesign and relocation of private vehicle access

The proposed road widening and SUP will require the redesign and relocation of some private vehicle access. This section of SH16 has been declared a limited access road. Access to and from a State Highway limited access road is controlled by Waka Kotahi in accordance with the Government Rounding Powers Act 1989 (sections 88-98). Waka Kotahi is therefore, legally able to determine the location and design standard of driveways along this section of the SH16 corridor. This includes varying the location of any driveway to integrate with the Project. All landowners who will require changes to their driveways have been engaged with. The driveway designs proposed by Waka Kotahi will align with the principles set out above, with the safety of all road users considered.

3.1.14 Altered private vehicle accessway design

Accessways have been designed on a case by case basis and there are instances where driveway regrading extends outside of road designation. In general, the accessways have been designed to meet the requirements of Diagram D shoulder widths (noting that the median barrier and flush median preclude the requirement for shoulder widening to the opposite lanes) as per Table 4 (in accordance with *NZTA Planning Policy Manual, Appendix 5b Accessway Standards and Guidelines*, and an AADT of >10,000 VPD). The following accessways have been designed generally in accordance with Diagram E shoulder widths (noting that the median barrier and flush median preclude the requirement for shoulder widening to the opposite lanes).

- 218 SH16
- 239 SH16
- Shared Accessway at CH191220
- 1404 Coatesville-Riverhead Highway (Boric Supermarket)
- 366 SH16 (Soljans Estate Winery)
- 407 SH16 (Kumeū Produce Market)

- Shared Accessway at CH192500
- 429 SH16
- 464 SH16 (Phil Greig Strawberry Gardens)
- 451 SH16 (Commercial Mushroom Farm)
- 489 SH16 (Heart and Soul Early Learning Centre)
- SH16 522
- 538 SH16 (BP Kumeū)

Table 4: Accessway Type

Accessway type	Usage	Equivalent Car Movements (ECM)	Heavy Vehicle Movements (per week)
Diagram D	Private Accessway	1-30/day	1 or more
Diagram E	Private Accessway	31-100/day	1 or more

3.1.15 Works near and within wetlands

Wetland at 436 SH16

There is a wetland located at 436 SH16. This wetland is located approximately 16m from the existing roadside edge. There is no land requirement adjacent to this location and no work proposed within this wetland. However, vegetation clearance will be required within a 10m setback of the wetland to install a retaining wall positioned 9.97m from the wetland as seen in Figure 6Error! Reference source not found. below.

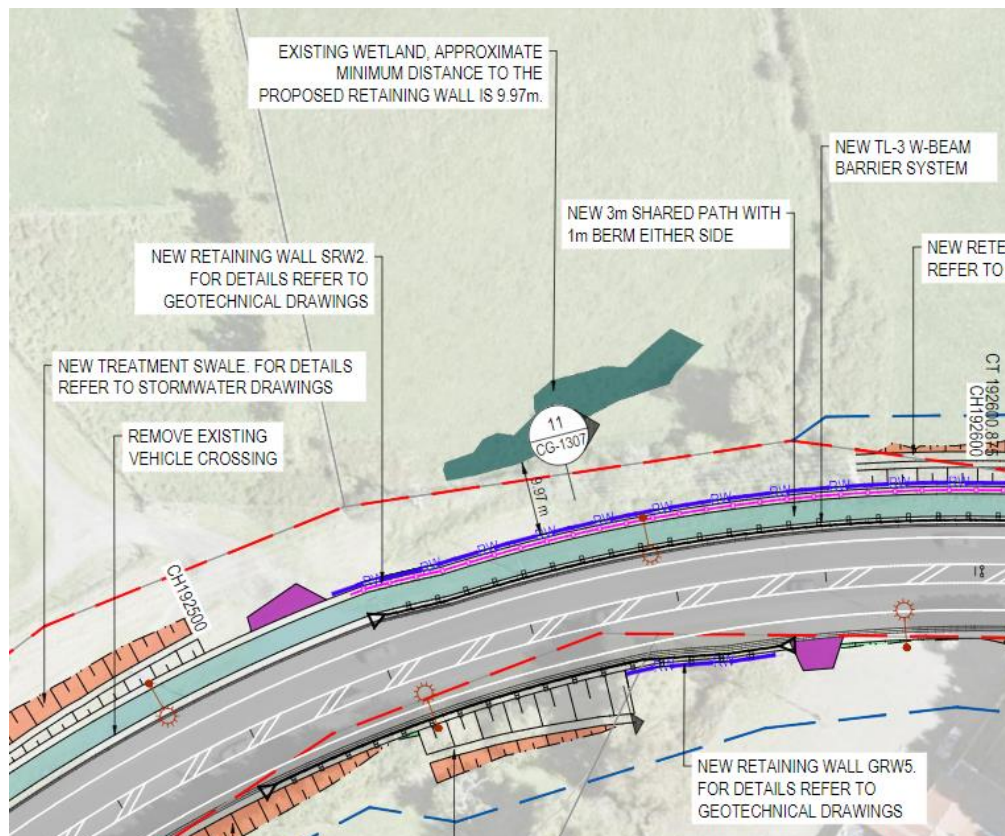


Figure 6: Works near the wetland at 436 SH16 (refer to the General Arrangement Plans in Appendix A for more details)

Wetland at 522 SH16

There is a wetland located at 522 SH16. The Project will encroach into a small area of this wetland. The SUP will run along the southern side of the SH16 corridor where the wetland extends up to the boundary between the private property and SH16 corridor. The majority of the wetland sits in a depression further south into the property.

The wetland extent is delineated within the Ecological Impact Assessment (ECIA) contained in Appendix M, based on the RMA definition for 'Wetlands' and field investigations. The area of wetland affected by the Project will be 83m² in total. This area may be affected by temporary construction works for the construction of the SUP and retaining wall seen in Figure 7 and any earthworks adjacent to the wetland.

The retaining wall that will support the SUP will be installed in the north-west toe of the wetland. The retaining wall and SUP will have a minor encroachment into the wetland extent measuring approximately 5m², with the wetland mainly being affected by the temporary occupation during construction. Most of the area of wetland affected is pasture grass and exotic rush. A 1.4m high fence will be installed on top of the retaining wall to safeguard people from falling below the SUP which will also be within the wetland.

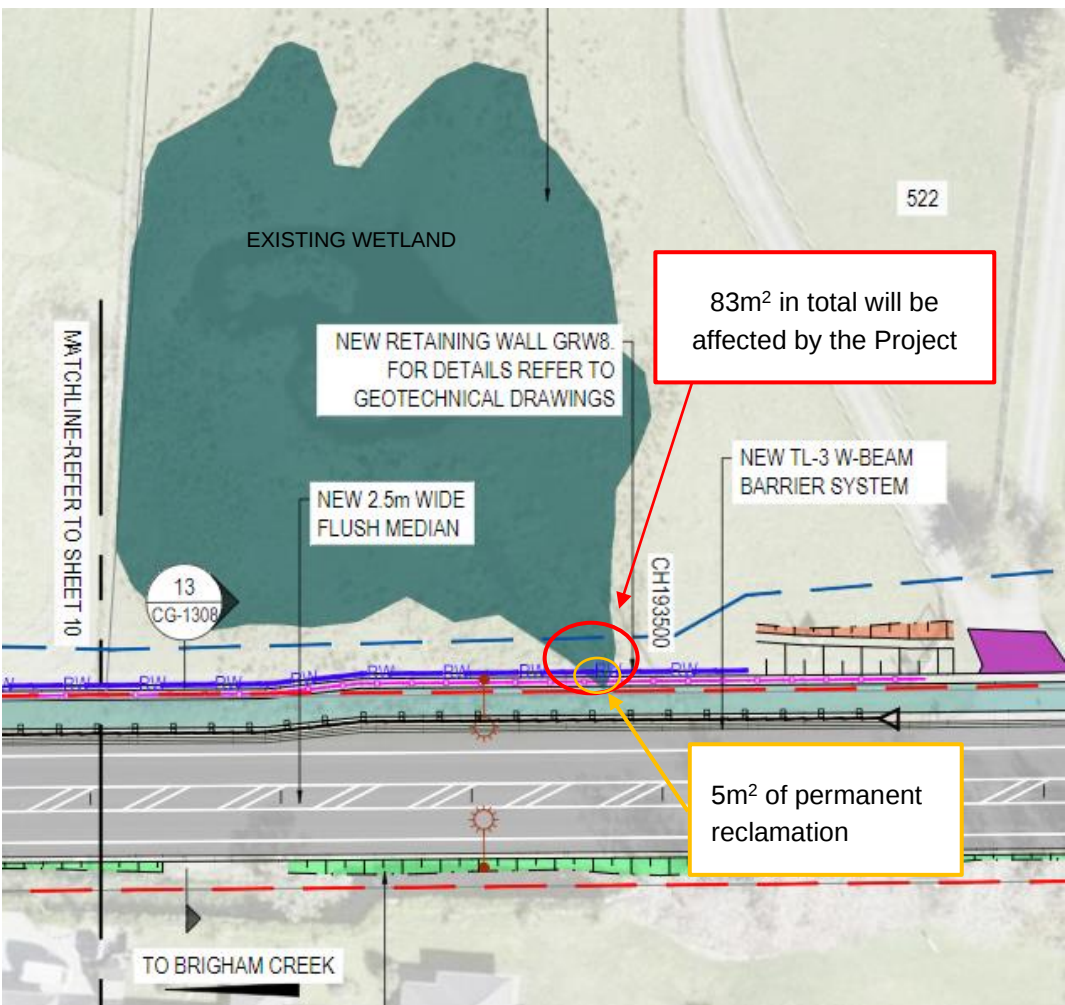


Figure 7: proposed works within the wetland at 522 SH16 (refer to the General Arrangement Plans in Appendix A for more details)

3.1.16 Bus stop relocation

The existing bus stop around Brigham Creek Roundabout will be removed due to the road widening. Two new bus stops will be installed outside 212 SH16 and 5 Brigham Creek Road near Brigham Creek Roundabout.

The bus stops near Coatesville Riverhead Highway will need to be decommissioned due to the road widening for the proposed roundabout layout. New bus stops will be established outside 312 SH16 and 299 SH16.

The bus stop at Taupaki Road Roundabout will remain unchanged.

3.1.17 Lighting

Most luminary and lamp lights along the corridor will be removed and replaced with LED luminary lights. In total 174 lighting columns are proposed as part of this Project, 128 of them will be brand new columns. Refer to the Utilities Plans in Appendix H for the proposed road lighting changes. The existing and proposed lights have been designed to meet the relevant standards for lighting on the side of roads including:

- AS/NZS 1158: Lighting for Roads and Public Spaces (2005)
- NZTA M30: Specification and Guidelines for Road Lighting Design (2014)
- ECP34: New Zealand Electrical Code of Practice for Electrical Safe Distances (2001)
- Auckland Transport's TDM – Street Lighting Vol 4 Chapter 12 (2021)
- New Zealand Heavy Haulage Association – Road Design Specifications for Overdimension Loads
- AS/NZS 3000 Wiring Rules (2007)
- EDE4200: Auckland Transport Road Lighting Vector Pole Bracket Assembly
- AS/NZS 4282: Control of the Obtrusive Effects of Outdoor Lighting
- The Auckland Unitary Plan (section E24)

3.2 Construction Methodology

Construction of the proposed safety, efficiency, walking and cycling improvements has the potential to generate adverse effects on the natural environment, temporary effects on the operation of the existing road network including access to private properties along the alignment. An indicative constructability methodology has been considered based on best practice to manage potential effects that arise from construction activities. The final construction methodology will be determined by the appointed contractor who will undertake the construction works.

Construction works are proposed to be undertaken during the day and at night-time across the entire Project extent. Night-time works may include constructing footbridge works and other online works such as median barriers and road resurfacing. Construction along the alignment will be staged. Four possible sections are identified to prioritise completion of the works along the route in a manner that would achieve sequential commissioning of the new alignment from east to west as follows:

SP	Description	Chainage
A	Coatesville / Riverhead roundabout	191,420 – 191,700 ^{Note *}
B	Brigham Creek Road to Coatesville / Riverhead roundabout	190,000 – 191,420
C	Coatesville / Riverhead roundabout to Taupaki roundabout	191,700 – 192,140
D	Taupaki roundabout to Kumeū	192,140 – 194,275

Note*: These chainages have been selected for the following reasons:

- Elevated levels of the proposed roundabout closely tie into existing road levels at these locations
- These chainages allow for the full construction of access to the business park
- These chainages allow for the full construction of the pavement undercut on the eastbound approaches to the roundabout

- Ultimately the Contractor will determine the final execution of staging based on their detailed methodology along the route.

A Construction Management Plan (CMP) further detailing the proposed methodology and sequencing will be completed by the contractor, prior to the commencement of works.

The CMP will include a Construction Traffic Management Plan (CTMP), which will set out specific details of construction traffic management. The Contractor will be required to keep two lanes of traffic available at most times with no more than 1km of highway to be constructed at once. Shifting of lane traffic and sequential construction of new lanes will likely be the method employed to ensure two lanes of traffic can be maintained. When works require lane closures, it will, where possible, take place at night or during off-peak hours. All other traffic management will be in accordance with the Transport Agency Code of Practice for Temporary Traffic Management (CoPTTM).

The key construction activities associated with the proposed works are summarised as follows:

- Traffic management
- Implementation of environmental controls
- Site clearance and tree removals
- Utilities services relocations
- General earthworks
- Footbridge construction and culvert extension works
- Retaining wall construction
- Pavement widening and surfacing
- Barrier installations
- Street lighting installations
- Road-marking and signage installation
- Noise wall construction, and
- Landscaping.

3.2.1 Timing of earthworks

The earthworks should be completed during the Auckland Council's earthwork season (1st October – 30th April). Should earthworks be required outside this period the contractor may be required to apply to the Auckland Council for permission to complete works through winter (this will be stipulated in a resource consent condition if determined applicable by Council).

Staging of earthworks will allow for both the duration of exposed soils to be minimised and planning around the construction of the roadway and stabilisation to follow. It is likely works will occur on a section-by-section basis, excavating in front of the construction activities and allowing the hard fill placement to continually stabilise exposed areas as works progress.

3.2.2 Construction yards

Approximately 4000m² of land will be required to establish construction working space to accommodate the contractor's site offices, parking, material laydown and storage. Following a desktop review of the alignment, a satellite laydown area (approximately 2000m²) has been identified adjacent the Brigham Creek roundabout. Along the remainder of the alignment potential construction yard sites and laydown areas will be identified by the contractor as the selection of sites will be informed by their specific choice of methodology and experience. Additionally, the appointed contractor will obtain any land agreements and resource consents required by their site selection.

A central yard for the Contractors' site offices, parking, material laydown and an area for temporary stockpiles of cut to fill material close to the centre of the contract works will be required. The contractor will select a suitable location and obtain any necessary property agreements and resource consents for the central yard.

A haul road between 3m to 3.5m will be established along the corridor which will accommodate construction vehicle movements that are likely to include the following at each plant (heavy machinery) location, 8-10 utes, 4-10 cartage trucks (10 tonne), 1 Hiab truck (7 tonne), and delivery vehicles.

Entranceways into the worked areas will be directly off SH16. All entranceways will be required to be stabilised at points where site access is off public roads. This stabilised entrance will be built in accordance with Auckland Council's *Guidance Document Erosion and Sediment Control* (GD05, 2016). The purpose of stabilised entranceways is to prevent the exit points of the site becoming a source of sediment and reduce the tracking of sediment onto SH16.

3.2.3 Earthworks

The Project will require the road to be widened (some areas more than others to accommodate additional lanes). Earthworks will be required to remove the existing highway shoulders to obtain the desired grade for the widened highway corridor followed by hardfill placement and stabilisation where appropriate. In general, most earthworks are programmed to be completed in a staged manner and at the discretion of the contractor depending on the overall construction programme. The project earthworks will require approximately 14,348m³ cut and approximately 22,123m³ of fill. Note these numbers are indicative only. Appendix N also shows the proposed Earthwork Plans.

A 'Contaminated Land' Preliminary Site Investigation (PSI) report (refer Appendix O) was undertaken for the corridor and identified some potentially contaminated sites within and along the Project extent. These activities are predominantly associated with horticulture and the potential use of pesticide application. Contaminant concentrations of these areas are unknown as no sampling has been undertaken. A Contaminated Soil Management Plan has been prepared in Appendix P which outlines how earthworks will be managed on these potentially contaminated sites.

3.2.4 Erosion and sediment control

Erosion and sediment control (ESC) measures will be implemented prior to the commencement of construction and earthwork activities. These will be in accordance with the Erosion Sediment Control Plan set out in Appendix Q. These measures are in general accordance with GD05. They include the following erosion and sediment controls:

Erosion Controls

- Timing of earthworks
- Management of site access points
- Minimising exposed areas
- Limiting site length
- Stabilisation and Reinstatement
- Dust Control
- Management and minimisation of stock piling
- Watercourse protection

Sediment Controls

- Clean water diversion
- Damming and diverting methodologies
- Slope protection
- Decanting earth bunds or sediment retention ponds
- Dewatering
- Silt Fences and Super Silt Fences
- Stormwater protection

3.2.5 Retaining walls

Construction of the retaining walls is considered to be relatively straight forward, provided that any potential interfaces with existing services are resolved. Generally, the construction of the walls will be carried out integrally with the earthworks. In many cases, the construction of the retaining walls is necessary for the completion of earthworks required to locate the new service trenches.

3.2.6 Construction of the pedestrian bridges

Small satellite offices and storage for tools and some material will be required at each of the pedestrian bridges. These areas will each allow for a container type office and storage, and parking of 2 or three light vehicles plus a small truck. The western approaches are the preferred location for the satellite offices for the bridges as it is likely the eastern approach to at least the Brigham Creek Bridge will be used for crane pads. These will likely be established after the piling operations on the western banks. The areas required for satellite offices and crane pads at the bridges (including access) are as tabulated below.

Table 5: Satellite offices and crane pad locations

Brigham Creek Bridge	Eastern river bank	Pad for piling rig and lifting crane	Area of land within the road reserve required for maintenance access road and swale as shown on the drawings.
	Western river bank	Pad for piling rig and satellite office	Area of land within the road reserve from the riverbank to the property access at property 238 SH16.
Kumeū No. 1 Bridge	Eastern river bank	No occupation required	No occupation within private property. The locations of the cranes and beam transporter will occupy the entire road width due to the relatively narrow width of the existing road bridge.
	Western river bank	Pad for piling rig and satellite office	Area of land within the road reserve from the riverbank to the first property access west of the bridge.

3.2.7 Vegetation alteration

Vegetation removal is required to facilitate the road widening and construction of road infrastructure. To mitigate effects on landowners, riparian areas and improve the visual amenity of the corridor, planting will be undertaken. Vegetation removal and proposed mitigation planting is discussed in Sections 3.1.10 and 3.1.11 with a supporting effects assessment provided in Section 8.

3.2.8 Streamworks

A number of new outfalls are required along the project length that will be in close proximity to waterways. These areas of work will not require in-stream works, however will need to consider earthworks in close proximity to the watercourses, and potential stormwater management. These areas, listed in section 3.1.9, will incorporate dam and divert methodology, a staged construction approach, cut and cover methodology and potential use of isolated silt fences where required. Furthermore no mixing of construction materials, refuelling or maintenance of equipment will occur within 10m of a stream or wetland and best site management practice will be used to avoid any contaminants from construction works discharging into the water

The dam and divert methodology creates a dry area for works to be undertaken within the watercourse. Prior to works commencing, all ecological assessments or approvals will be undertaken in accordance with the Construction Management Plan or Environmental Management Plan(s). In the first instance, culvert replacements will be undertaken during a dry weather window to avoid potential periods of high flow from rainfall events. Additionally, seasonal timing will be considered for all intermittent watercourses which will allow works to be undertaken when the watercourse is likely dry. Dam and divert methodology will include:

- Construction of a dam upgradient of site works via either a driven steel sheet, sand bags or earth bund upon geofabric.
- Implementation of a pump with the ability to convey water around the works area through pipe, or, implementation of a gravity pipe from the dam (if site gradient allows so).
 - The pump inlet will either be placed within a pumping eye or floated to avoid sediment being sucked into the pump.
 - The discharge point of any discharged water may require stabilisation with pinned geofabric should scour be observed.
- Pumping or diversion of water will continue until water can be redirected through the new culvert.

Storm response contingency involves the removal of all equipment and material from the watercourse flowpath and the pinning of geofabric over exposed soils.

3.3 Land Requirements

Given the nature of the proposed improvements and scale of the construction to be undertaken, additional land beyond the existing SH16 designations is required at certain locations along the state highway corridor. Some of the land required is already owned by the Crown for roading purposes or local roads managed by AT as the road controlling authority.

The land requirement for the Project, including that required for construction purposes, is shown on the Designation Plans contained in Appendix C and listed on the Schedule provided with these plans. The Project has been designed to avoid and minimise the amount of third party land required where possible. When existing Waka Kotahi land holdings and local road parcels are excluded, the alteration to designations 6740 and 6766 will affect 86 land parcels as set out below.

Approximately 81,790m² of land is required for the Project works, split over 71 land parcels and 15 road parcels. This land is required for both temporary construction works and permanent changes including pavement widening of the road shoulder, additional lanes, the SUP, the proposed roundabout at Coatesville Riverhead Highway, and providing for network utilities or stormwater infrastructure (refer to the Designation Plans in Appendix C).

3.3.1 Properties Required

The following properties subject to partial land requirement are:

- | | |
|-------------------------------|--|
| • 43 Main Road, Kumeū | • 238A State Highway 16, Kumeū |
| • 37 Main Road, Kumeū | • 238 State Highway 16, Kumeū |
| • 7 Main Road, Kumeū | • Taupaki Esplanade Reserve at Ngongetepara Stream |
| • 5 Main Road | • 222a State Highway 16, Whenuapai, Auckland |
| • 550 State Highway 16, Kumeū | • 222 State Highway 16, Whenuapai, Auckland |
| • 43 Old Railway Road, Kumeū | • 218 State Highway 16, Whenuapai, Auckland |
| • 538 State Highway 16, Kumeū | • 212 Fred Taylor Drive, Whenuapai, Auckland |
| • 522 State Highway 16, Kumeū | • 171 State Highway 16, Whenuapai, Auckland |
| • 506 State Highway 16, Kumeū | • 173 State Highway 16, Whenuapai, Auckland |
| • 482 State Highway 16, Kumeū | • 175 State Highway 16, Whenuapai, Auckland |
| • 472 State Highway 16, Kumeū | • 177 State Highway 16, Whenuapai, Auckland |
| • 464 State Highway 16, Kumeū | • 179 State Highway 16, Whenuapai, Auckland |
| • 436 State Highway 16, Kumeū | • 2-6 Kennedys Road, Whenuapai, Auckland |
| • 418 State Highway 16, Kumeū | • 189 State Highway 16, Whenuapai, Auckland |
| • 454 Taupaki Road, Kumeū | • 191 State Highway 16, Whenuapai, Auckland |
| • 466 Taupaki Road, Kumeū | • 239 State Highway 16, Kumeū |
| • 366 State Highway 16, Kumeū | • 291 State Highway 16, Kumeū |
| • 350 State Highway 16, Kumeū | • 299 State Highway 16, Kumeū |
| • 340 State Highway 16, Kumeū | • 315 State Highway 16, Kumeū |
| • 324 State Highway 16, Kumeū | • 1411 Coatesville-Riverhead Highway, Kumeū |

- 312 State Highway 16, Kumeū
- 300 State Highway 16, Kumeū
- 296 State Highway 16, Kumeū
- 292 State Highway 16, Kumeū
- 288 State Highway 16, Kumeū
- 284 State Highway 16, Kumeū
- 280 State Highway 16, Kumeū
- 276 State Highway 16, Kumeū
- 272 State Highway 16, Kumeū
- 268 State Highway 16, Kumeū
- 264 State Highway 16, Kumeū
- 256 State Highway 16, Kumeū
- 260 State Highway 16, Kumeū
- 246 State Highway 16, Kumeū
- 238A State Highway 16, Kumeū
- 1409 Coatesville-Riverhead Highway, Kumeū
- 1397 Coatesville-Riverhead Highway, Kumeū
- 1404 Coatesville-Riverhead Highway, Kumeū
- 407 State Highway 16, Kumeū
- 429 State Highway 16, Kumeū
- 451 State Highway 16, Kumeū
- 465 State Highway 16, Kumeū
- 475 State Highway 16, Kumeū
- 489 State Highway 16, Kumeū
- 491 State Highway 16, Kumeū
- 493 State Highway 16, Kumeū
- 26 Old Railway Road, Kumeū
- 505 State Highway 16, Kumeū
- 20 Old Railway Road, Kumeū

The land requirements are on the boundary of these properties (adjacent to the existing state highway corridor) and do not include any buildings. Land requirements do not preclude the overall existing functions of impacted properties as the area primarily contains paddocks, trees, driveways and business frontages.

Not all of the above land will need to be acquired by the Crown. Some land is only temporarily required for construction, primarily to provide access offline to the road reserve where construction or upgrading of pavement widening, the SUP and retaining structures will take place.

Pre-lodgement engagement has been undertaken with landowners and Waka Kotahi will discuss with each landowner whether land acquisition is necessary.

It is proposed to roll back the designation where land is no longer required for ongoing operation and maintenance of the SH16 corridor once construction is complete.

4 Statutory and Consenting Requirements

The RMA is the legislation governing resource consents and designations. The purpose of the RMA is to promote the sustainable management of natural and physical resources. Unless an activity is permitted in the RMA, or a National Environmental Standard (NES), Regional Plan or District Plan, it will require authorisation by way of resource consent and / or designation.

In this section, the relevant statutory matters and consenting requirement for the Project are set out but not assessed. The assessment of the Project in relation to these matters is provided in Section 8.

4.1 Resource Management Act 1991

The key statutory matters under the RMA of relevance to the Project are:

- Purpose and Principles of the Act (Part 2); including sections 5-8
- Applications for Resource Consents; including section 88 and Schedule 4
- Notification of Applications (Part 6); including sections 95 – 95E
- Consideration of Applications for Resource Consents (Part 6); including sections 104, 104B, 105, 107 and 108, and
- Notices of Requirement for a designation (Part 8); including sections 168 and 171.

4.2 Notice of Requirement

There are five (5) New Zealand Transport Agency designations and one (1) Auckland Transport designation within the Project corridor, the details of them are listed in Section 5.1.1 of this report. This AEE supports the NoR to alter only Designation 6740 at the south-eastern end of the Project corridor and Designation 6766 being the SH16 designation covering the majority of the corridor. The alteration to these existing designations involves an expansion of the designation footprints to cover both the temporary and permanent works for the road widening, new SUP and associated infrastructure.

4.2.1 Designation 6740

In order to undertake the proposed works, Waka Kotahi is seeking to alter Designation 6740 in accordance with Section 181 of the RMA. Designation 6740 – North end of Fred Taylor Drive to Ngongetepara Stream, Brigham Creek' in the AUP:OP covers SH16 between Brigham Creek Road roundabout and the Brigham Creek Culvert. There is no stated designation purpose. The proposed works between these points will extend beyond the existing designation extent, on both the northern and southern side of the existing road corridor. These works will require an alteration to the nearest designation being 6740 to include the proposed area of land requirement.

Designation 1468 is an Auckland Transport designation located on the south-west side of Brigham Creek Road Roundabout for the purpose of 'State Highway 16 (Westgate to Whenuapai)'. The Waka Kotahi Designation 6740 will expand and overlap a small portion of Designation 1468.

4.2.2 Designation 6766

In order to undertake the proposed works, Waka Kotahi is seeking to alter Designation 6766 in accordance with Section 181 of the RMA. Designation 6766 in the AUP:OP extends over SH16 from Brigham Creek, Hobsonville to SH1 Wellsford (see Figure 8). The designated purpose is "State Highway 16" and there are no conditions nor lapse date on this existing designation. The proposed works between Brigham Creek and Kumeū will extend beyond the existing designation extent, on both the northern and southern side of the

existing road corridor. These works will require an alteration to Designation 6766 to include the proposed area of land requirement.

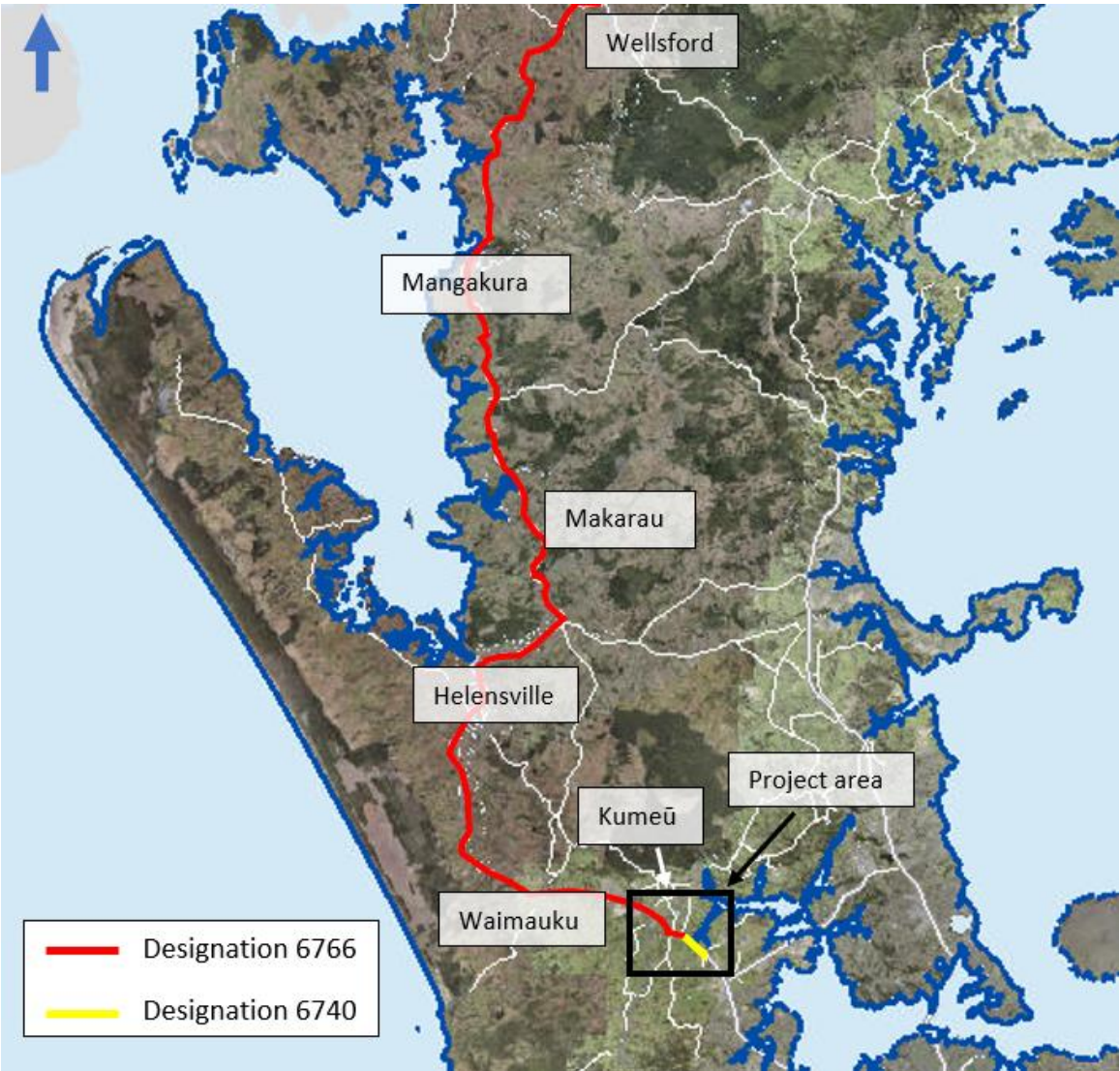


Figure 8 - Designation 6766 (red) (Auckland Council Geomaps)

4.2.3 Designation Plans

To accommodate both temporary construction works and the permanent operational components of the Project, approximately 81,790m² of land alongside the existing SH16 corridor is required to be included in Designation 6740 and 6766. The Designation Plans (refer to Appendix C) detail the location of the properties / land parcels impacted by the alteration to the Waka Kotahi designations.

4.2.4 RMA Section 181 - Alteration to Designation

In accordance with Section 181(1) of the RMA, Waka Kotahi as the requiring authority can give notice to Auckland Council (as the territorial authority) of its requirement to alter designations 6740 and 6766.

Under RMA Section 181(2), alterations are subject to Sections 168 to 179 and treated as a new designation unless the criteria set out in Section 181(3) can be met. This NoR has not been made under 181(3) as 181(3)(b) requires approval of directly affected landowners. Engagement with the directly affected landowners is ongoing. Therefore, in accordance with 181(2) this application is to be treated as a new application and is subject to Sections 168 to 179.

4.3 Resource Consents Sought

This section identifies resource consents required for the construction, operation and maintenance of the Project and the corresponding reasons for consent. For completeness, it also identifies a range of Permitted activities relevant to the Project. Resource consents are required pursuant to the following:

- Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES:CS); and
- Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NES:F).
- Auckland Unitary Plan – Operative in Part 2016 (AUP:OP)

4.3.1 National Environmental Standards Resource Consents

Table 6 and Table 7 list a range of resource consents required and applied for by Waka Kotahi. This AEE supports all resource consents sought by Waka Kotahi to construct, operate and maintain the Project, whether specifically set out in the tables below or not.

Table 6: Resource consents sought under National Environmental Standards

Activity	Regulation	Activity Status	Comments
NES:CS 2011			
Soil disturbance of HAIL sites.	Regulation 11(1)	Discretionary	Earthworks within each identified HAIL alongside the improvement works are highly unlikely to exceed the Permitted Activity criteria under Regulation 8(3) of the NES:CS 2011 for the disturbance and disposal of soil on a case-by-case or 'piece of land' basis given the small work areas adjacent to the road corridor within each HAIL site. However, the anticipated timeframe of works will likely exceed the 2-month threshold outlined in Regulation 8(3) of the NES:CS and therefore works will not meet the Permitted Activity criteria. A conservative approach will be taken and a Discretionary Activity will be applied for under Regulation 11(1), as no Detailed Site Investigation (DSI) will be undertaken to confirm any contaminants. It was impractical to undertake intrusive investigation in the form of a DSI at the time of drafting the PSI / consent application due to the earthworks plan being subject to minor changes through detailed design and challenges obtaining access to multiple sites. A Contaminated Soils Management Plan (CSMP) has been prepared to manage any effects of potentially contaminated soil on human health which can be found in Appendix P.

Activity	Regulation	Activity Status	Comments
NES:FW 2020			
Construction of specified infrastructure (1) <i>Vegetation clearance within, or within a 10 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.</i>	Part 3 - Subpart 1: Regulation 45	Discretionary ¹¹	Approximately 200m ² of vegetation will be cleared within a 10 m setback of the wetland at 436 SH16 (which has been assessed as a natural wetland) for the construction of specified infrastructure. Approximately 83m ² of vegetation within the wetland at 522 SH16 and 597m ² of vegetation within a 10m setback of the wetland will be cleared for the construction of specified infrastructure. Resource consent is not required under the NPS:FW and NES:F for this work as the wetland at 522 SH16 is not a natural wetland (refer to Section 10 – Statutory Assessment for further details).
(2) <i>Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.</i>			Earthworks will be required within a 10m setback of the wetland at 436 SH16 to construct a retaining wall and SUP. The earthworks will occur 9m from the closest part of the wetland. Earthworks will be required within the edge of, and within a 10m setback of, the wetland at 522 SH16 for the construction of the specified infrastructure (i.e. road widening and SUP). As noted above, this wetland is not a natural wetland and no consent is required for these earthworks under the NPS:FW and NES:F.
(4) <i>The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing</i>			The construction of the specified infrastructure within 100m of the wetland at 522 SH16 will result in stormwater runoff from the road adjacent to the wetland being collected and diverted into a treatment swale further north-west along the road away from the wetland. As noted above, this wetland is not a natural wetland and no consent is required for the diversion of water away from the wetland under the NPS:FW and NES:F.

¹¹ Under the NES:FW, the Project is considered 'Specified infrastructure'. In relation to part (a) of the specified infrastructure definition in the NES:FW, the Civil Defence Emergency Management Act 2002 defines "lifeline utility" as an entity named or described in Part A of Schedule 1, or that carries on a business described in Part B of Schedule 1. Part B of Schedule 1 includes an entity that provides a road network (including state highways). The state highway network (including the SH16 transport corridor) is therefore considered to be included within part (a) of the specified infrastructure definition as it is infrastructure that delivers a service operated by a "lifeline utility" (i.e. an entity that provides the state highway network).

Activity	Regulation	Activity Status	Comments
<i>specified infrastructure.</i>			

4.3.2 Auckland Unitary Plan Regional Resource Consents

Table 7: Regional resource consents sought under the AUP:OP

Consent	Plan Ref	Status	Comments
E3 Lakes rivers streams and wetlands			
New structures and the associated bed disturbance or depositing any substance, reclamation, diversion of water and incidental temporary damming of water Any activities not complying with the general permitted activity standards in E3.6.1.1 or the specific activity standards in E3.6.1.14 to E3.6.1.23	E3.4.1(A44)	Discretionary (outside overlays)	This section refers to the soil disturbance to the wetland at 522 SH16 and structures over the Ngongetepara Stream and Kumeū River. The Project will involve road widening and the installation of a SUP adjacent to a wetland at 522 SH16. The Project has been designed to avoid the wetland as far as practicable. 78m² of the wetland will be affected by the temporary soil disturbance to facilitate the construction of the SUP and retaining wall. 5m² of the wetland will be reclaimed at the location of the SUP and retaining wall. A new fence will be installed on top of the retaining wall to safeguard people from falling which will also be located in the wetland. E3.4.1(A44) applies to new structures where reclamation or disturbance is associated with those new structures (in this case, the retaining wall that is connected to the SUP in the wetland) in, on or over a stream or wetland. Retaining walls are considered structures. 5m² of the wetland area will be reclaimed to accommodate the retaining wall structure will support the SUP. E3.6.1.1.(4) ensures that machinery must not sit directly on the wetted cross-section of the bed at the time of the works. No machinery will be required in the wetland at 522 SH16. The construction of the SUP and retaining wall may be able to be undertaken from the existing road side (however the construction methodology will be determined by the contractor). Human disturbance will be required in the wetland to install construction fencing and a permanent fence on completion of the Project.

Consent	Plan Ref	Status	Comments
			No machinery will be required in any stream beds across the alignment. The Project will comply with rest of the permitted activity standards in E3.6.1.1 for the following reasons: The proposed structures around any streams will not, after reasonable mixing, result in any of the listed effects in water bodies outlined in E3.6.1.1(1) The structures will not result in an increase of existing flood levels up to and including the 1 per cent annual exceedance probability (AEP) flood plain. The activity will not result in any erosion or land instability. No explosives will be used in the stream bed. Mixing of construction materials and refuelling or maintenance of equipment will not occur within 10m of the bed and best site management practice will be used to avoid contaminant discharging into the water. The structures will not affect any sites scheduled in the Historic Heritage Overlay or the Sites and Places of Significance to Mana Whenua Overlay. The activity will enhance public access along streams and wetlands. E3.6.1.14 is relevant to the project for new structures in streams and wetlands. The proposed structures comply with E3.6.1.14 for the following reasons: The new SUP is considered a structure over the streams, it will not progressively encase or otherwise modify the bed of a river or stream. No part of the structure is within the stream bed. Scour protection will be required at both the Kumeū River and the Ngongetepara Stream. Scour protection at Kumu River will extend approximately 5m out from the edge of the structure on the south side and 3m on the northern side, on the banks of Kumeū River. Scour protection will be required for the SUP structure at Ngongetepara Stream, this will extend approximately 5m out from

Consent	Plan Ref	Status	Comments
			the edge of the structure on the south side and approximately 2m to the northern side. Due to the approximate lengths of the scour protection, it is likely they may slightly exceed 5m and will not comply with E3.6.1.14(b). Consent under E3.4.1(A44) is therefore sought. During construction bed disturbance upstream or downstream of the structure must not exceed 10m either side, excluding the length of the structure. Fish passage will not be obstructed as there will be no structures in any stream bed. The structures will not cause more than minor bed erosion, scouring or undercutting up or downstream. There will be no structures in the bed of the stream (aside from minor riprap which is covered under AUP:OP Chapter E8 provisions and not E3). The 1per cent annual exceedance probability (AEP) flood will be accommodated by the SUP structure and by an overland flow path without increasing flood levels up stream or downstream. During construction, bed disturbance upstream and downstream of the new SUP structures will not exceed 10m either side of the structures or for the new SUP in the wetland at 522 SH16. Construction material and ancillary structures will be removed from the bed following completion of the activity. The 1per cent annual exceedance probability (AEP) flood has been accommodated by the structure and will not increase flood levels up stream or downstream of the structure. Calculation of flow rates will be made using the Auckland Council <i>Technical Publication 108: Guideline for stormwater runoff modelling in the Auckland Region</i>, April 1999. E3.6.1.16 is also relevant for bridges, a bridge for the SUP will be required over the Ngongetepara Stream and the Kumeū River. Compliance with E3.6.1.14 is set out above. Compliance will be achieved with

Consent	Plan Ref	Status	Comments
			E3.6.1.16 (2) as no piles will be located in stream bed. All piles will be on the stream bank.
E4 Other discharges of contaminants			
Discharge of water and/or contaminants (including washwater) onto or into land and/or into water from any of the following: cleaning, maintenance and preparation of surfaces of buildings, and associated structures; construction, repair, maintenance, upgrade or removal of network utility infrastructure; or construction, repair, maintenance, upgrade or removal of any component of the stormwater or wastewater network	E4.4.1(A11)	Controlled	The proposal involves removing stormwater outfalls in a few places across the alignment (including in Brigham Creek), and there may be discharge of from these activities. The only requirements are that discharges must not enter any areas identified in the Wetland Management Areas Overlay, Natural Lake Management Areas Overlay or Natural Stream Management Areas Overlay. None of these overlays are within the project corridor and thus the activity can comply with the Controlled activity standards.
E8 Stormwater - Discharge and diversion			
All other diversion and discharge of stormwater runoff from impervious areas not otherwise provided for	E8.4.1(A10)	Discretionary	The Project will not comply with E8.4.1(A5) as compliance with E8.6.4.1 (3) cannot be achieved. The works will not comply with hydrological mitigation in E10.6.3.1.1(1) when discharging to the tributary of Huruhuru Stream, Kumeū River and tributaries of Kumeū River. When discharging into Brigham Creek, the discharge is below RL1.7m therefore, this is a permitted activity (E10.4.1 – A1). The Project will comply with E8.6.4.1(2) as all ancillary road areas will be contained within the existing designations. The Project will comply with E8.6.1 General Standards. Specifically, the proposed design will not cause flooding or the inundation of buildings in the 1 or 10 per cent AEP. Around 246 SH16, the road is

Consent	Plan Ref	Status	Comments
			within the flood plain where the surrounding properties are flooded. The increase in impervious area is marginal at this location and the increase in water level will be minimal, not making the impact on the surrounding buildings any worse. No ground soakage is proposed. A discretionary activity is therefore sought under E8.4.1(A10). Lastly, the catchments discharging to the stream receiving environments also have less than 5,000m² increase in impervious area and under AUP E8, SMAF is not required of increases less than 5,000m².
E9 Stormwater quality - High contaminant generating car parks and high use roads			
Development of a new or redevelopment of an existing, high use road that does not comply with the relevant permitted or controlled activity standards.	E9.4.1(A9)	Restricted Discretionary	Under the AUP:OP, SH16 is classified as a high use road with more than 5000 vehicles per day. Therefore, stormwater runoff from the road carriageway is to be treated to an acceptable level before discharging to the receiving environment under E9. Where the new or redeveloped area cannot be kept separate from the existing road discharge, it is proposed that all the road runoff is treated, where the existing drainage network is being modified. This runoff will flow through a treatment device, provided it is practical to do so given the site and operational constraints. However, as a result the project cannot comply with E9.6.2.2(1) for a controlled activity as the Project will not treat all impervious areas along the corridor. . Overall, Waka Kotahi is proposing to treat approximately 90% of the total impervious road area (67,373m² of treated area out of 75,242m² total impervious area). The stormwater runoff from the SUP is considered 'clean water' and therefore does not require stormwater treatment. However, when it discharges to the road this has been considered in the treatment requirements. All stormwater management devices will be designed and sized in accordance with Auckland Council's Guidance Document <i>Stormwater Management Devices in the Auckland Region</i> (GD01), as well as a Best Practical Option approach. This can not be met in all locations (E9.6.2.2) and therefore

Consent	Plan Ref	Status	Comments
			requires a restricted discretionary consent under E9.4.1(A9)
E26 Infrastructure – Vegetation Management			
Vegetation alteration or removal that does not comply with Standards E26.3.5.1 to E26.3.5.4	E26.3.3.1 (A77)	Restricted Discretionary	Vegetation clearance will not comply with E26.3.5.2. for the following reasons: - Will result in the removal 62 trees over 6m in height or 600mm in girth outside the existing designation. - More than 50m² of riparian vegetation will be cleared at each stream. Refer to Table 16 for details of riparian vegetation clearance. - The project will result in the removal of more than 250m² of vegetation outside the legal road or the formation width of the road in a rural zone.
E26 Infrastructure – Earthworks			
Greater than 2,500m ² where the land has a slope equal to or greater than 10 degrees other than for maintenance, repair, renewal, minor infrastructure upgrading	E26.5.3.2(A106)	Restricted Discretionary	A total of approximately 27,000m ² of earthworks is required on a slope greater than 10 degrees.
Greater than 2,500m ² within the Sediment Control Protection Area other than for maintenance, repair, renewal, minor infrastructure upgrading	E26.5.3.2(A107)	Restricted Discretionary	Approximately 12,000m ² of earthworks will be required in the Sediment Control Protection area defined as: - Brigham Creek: approximately 4,000m² - Stream at 256 SH16: approximately 3630m² - Stream at 429 SH16 and 436 SH16 (including the wetland): approximately 1930m² - Wetland at 522 SH16: approximately 1540 m² - Kumeū River: approximately 900m²
E30 Contaminated land			
Discharges of contaminants into air, or into water, or onto or into land not meeting controlled activity Standard E30.6.2.1	E30.4.1(A7)	Discretionary	Soil disturbance throughout the entire project is likely to exceed the 200m ³ threshold of a permitted activity as stated by Rule E30.6.1.2(1b) of the AUP for a road project with multiple concurrent disturbance areas.

Consent	Plan Ref	Status	Comments
			Given the inability to sample soils throughout the identified HAIL sites or within the footprint of the pipe realignment, no assessment of the soil against the permitted activity soil acceptance criteria (Table E30.6.1.4.1) could be undertaken and subsequently, no Detailed Site Investigation (DSI) could be prepared. Therefore, it is likely contaminants will be discharged to land through disturbance and require a discretionary consent under E30.4.1(A7) Additionally, the presence of gas works waste (coal tar) is considered not to be present within the road (at a 'more likely than not' level of certainty) based on the date in which it was constructed and proximity to Auckland central. The position currently held by Auckland Council and Auckland Transport is that the need for closer assessment via the consenting process would be triggered when concentrations exceed the Soil Contaminant Standard (SCS) for Industrial Outdoor workers, i.e. at >35ppm BaP equivalent. Sampling will be undertaken prior to work commencing for assistance in determining disposal options of this material. Should any indicators of coal tar be present from the analysis of samples at this time, then this will be raised as a consenting issue and the appropriate assessment under the NES:CS and Auckland Unitary Plan Chapter E.30 will be undertaken.

4.3.3 Permitted Activities

The following AUP:OP Permitted Activity standards (refer to Table 8 below) have been identified as achievable. If at detailed design finalisation or during construction phase these standards below are unable to be complied with, the required approvals will be sought.

Table 8: Permitted activities under the AUP:OP

Consent	Plan Ref	Status	Comments
Erosion control structure less than 30m in length when measured parallel to the direction of	E3.4.1(A34)	Permitted	The Project will involve discharging treated stormwater runoff into streams. The outfalls will have riprap aprons that will run down the stream bank and stop in the stream bed to slow and

Consent	Plan Ref	Status	Comments
water flow complying with the standards in E3.6.1.14			dissipate the water flow before entering the stream to reduce erosion and scouring. The proposed apron in the stream bed will comply with E.6.1.14 for the following reasons. During construction bed disturbance upstream or downstream of the riprap structure will not exceed 10m on either side of the riprap. The structure will only obtain a small extent of the stream bed on the side of the stream, this will not prevent the passage of fish upstream or downstream. The structure is designed to reduce erosion and scouring of the stream bank and bed from stormwater flow. Therefore, no more than minor bed erosion, scouring or undercutting will be caused. Small coffer dams will be used to construct the ripraps. All construction material and ancillary structures will be removed from the stream bed on completion of the stream works. The ripraps are small in scale. The 1per cent annual exceedance probability (AEP) flood will be accommodated by the riprap, and will not increase the flood levels upstream or downstream of the structure.
E4 Other discharges of contaminants			
Discharge of water and/or contaminants (including washwater) onto or into land and/or into water from any of the following activities: (a) concrete/asphalt laying or reworking; (b) drilling (excluding bore development and testing); (f) road construction activities (g) construction, repair, maintenance, upgrade or removal of any component of the stormwater or wastewater network that does not	E4.4.1 (A1)	Permitted	Any discharge associated with the roading construction will be a permitted activity as best practice erosion and sediment control measures will be adopted. Additionally, the discharge will not, after reasonable mixing, give rise to any effects on water bodies listed in E4.6.1(1). The discharge will not cause erosion or scouring at the point of discharge or alter the natural course of any water bodies. The discharge will not include washwater used for the external cleaning of a reticulated water supply system. Any discharges will be in accordance with best management practice to minimise the contaminants to the extent practicable. The above standards can be met. At Brigham Creek, there are two existing stormwater outfalls in the stream that will be removed. Best practice erosion and sediment control or cofferdams will be used to ensure no discharge of contaminants enter the stream and thus comply with the permitted activity standards.

Consent	Plan Ref	Status	Comments
border, span or otherwise extend over any water body; (j) dust suppression;			
E5 On site and small-scale wastewater treatment and disposal			
On site and small-scale wastewater treatment and disposal	E5.6.2.1	Permitted	To be confirmed on a case by case approach. Information on the existing private wastewater systems on neighbouring properties has been collected via Auckland Council property files and/or landowner engagement. This has assisted with confirming the location of many (yet not all) systems on neighbouring land, as well as Project team analysis of whether the proposed works (including stormwater network improvements) will impact on the functioning or <i>Auckland Council Technical Publication 58</i> compliance (e.g. required setback distances) of the existing private wastewater systems within the Project extent. It has been confirmed (based on the information collected) the existing private wastewater system at the properties located at 238 SH16, 264 SH16, 264A SH16, 1404/1368 Coatesville Riverhead Highway and 340 SH16 will be impacted because of the Project. Engagement with the landowners of these properties is ongoing in terms of impact and potential remedial work (refer Section 8.3.12 of this AEE Report). Waka Kotahi will be responsible for all onsite service relocations including the design, installation, and any resource consent requirements that may be necessary where the remedial works cannot achieve compliance with TP 58 / AUP:OP Permitted Activity standards due to site specific constraints. Remedial works and resource consents for wastewater treatment and disposal systems is unlikely to be required for all other properties.
E7 Taking using damming and diversion of water and drilling			
Dewatering or groundwater level control associated with a groundwater diversion permitted under the Unitary Plan	E7.4.1(A17)	Permitted	Dewatering of groundwater will be required when installing retaining walls and piling for the new footbridge abutments at Brigham Creek and Kumeū River. Dewatering or groundwater level control may be required for service and utility relocations, which will need trenches that could range from 750mm to 1500mm in depth. Generally, groundwater will be between 1m and 3m beneath the ground surface. Given groundwater varies across the alignment, we can

Consent	Plan Ref	Status	Comments
			apply a conservative groundwater level of 1m below the surface. Thus, dewatering will be required for piling, retaining walls and trenching activities. To meet the permitted activity standards, the water take must not be for a period of more than 10 days where it occurs in peat soils, or 30 days in other types of soil or rock. This construction timeframe will be met due to the progressive open and closed methodology that can be used.

4.4 Other relevant legislation

The RMA is the legislation governing resource consents and designations. The following legislation is also relevant:

- Land Transport Management Act 2003 (LTMA), as the Project relates explicitly to provision of land transport, and the LTMA sets out the planning framework for land transport (including providing for the Long Term Plan¹²)
- Public Works Act 1981, which enables Waka Kotahi to compulsorily acquire land, should it be required for the construction/operation of the Project
- Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA), which seeks to protect and preserve items of historical and cultural heritage within and around the Project area; and
- Wildlife Act 1953, which sets out the framework for protecting wildlife that is identified within this Act.

4.4.1 Heritage New Zealand Pouhere Taonga Act 2014

Section 5.1.5 outlines that there are a number of archaeological sites along the corridor, mainly clustered around Bringham Creek. An Archaeological Authority from Heritage New Zealand has been applied for to undertake any works that may affect the existing and unknown archaeological sites.

4.5 RMA s176 written consent for works within Auckland Transport Designation

On the southwestern side of Bringham Creek Roundabout is an Auckland Transport designation (Designation 1468). The purpose of this designation is 'Road Widening' for 'State Highway 16 (Westgate to Whenuapai)'. This was a rollover designation from the legacy Auckland Council District Plan (Waitakere Section) 2003 into the AUP:OP (legacy Designation NZTARW2, once held by NZ Transport Agency and transferred to Auckland Transport as the road controlling authority for the new Fred Taylor Drive). The Project will involve a small amount of earthworks within this designation and a small portion of the SUP will remain within the corner of

¹² The 'Auckland Transport Alignment Project 2021-2031 Investment Programme' has identified projects that it will spend the Long Term Pan Transport budget on, including this SH16 Project.

Sensitivity: General

Designation 1468, see

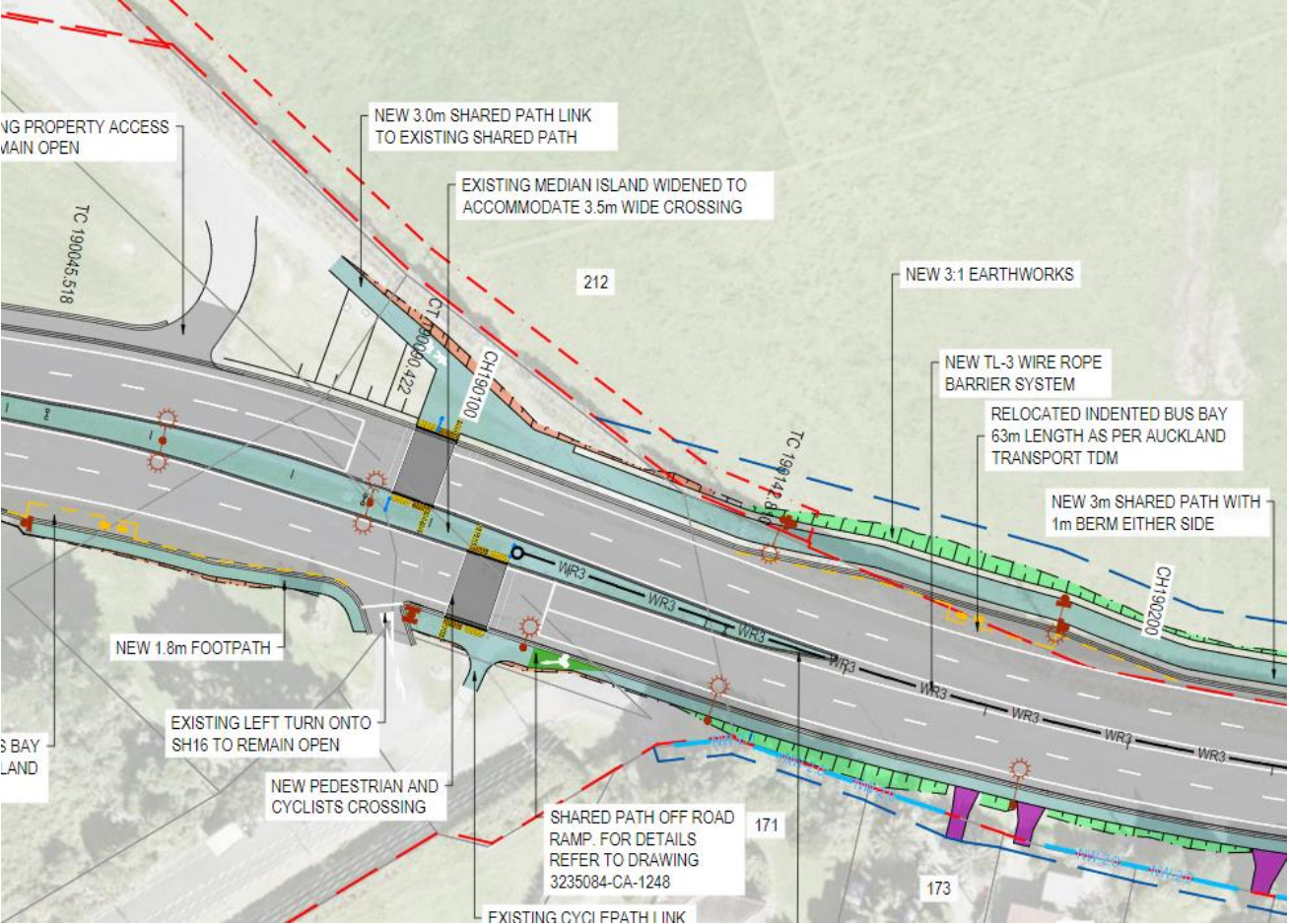


Figure 9.

Under section 176(1)(b) of the RMA, no person may, without prior written consent of the requiring authority of that designation, do anything in relation to the land that is subject to the designation that would prevent or hinder a public work or project or work to which the designation relates. Waka Kotahi has requested written consent from Auckland Transport to undertake these works within Designation 1468.

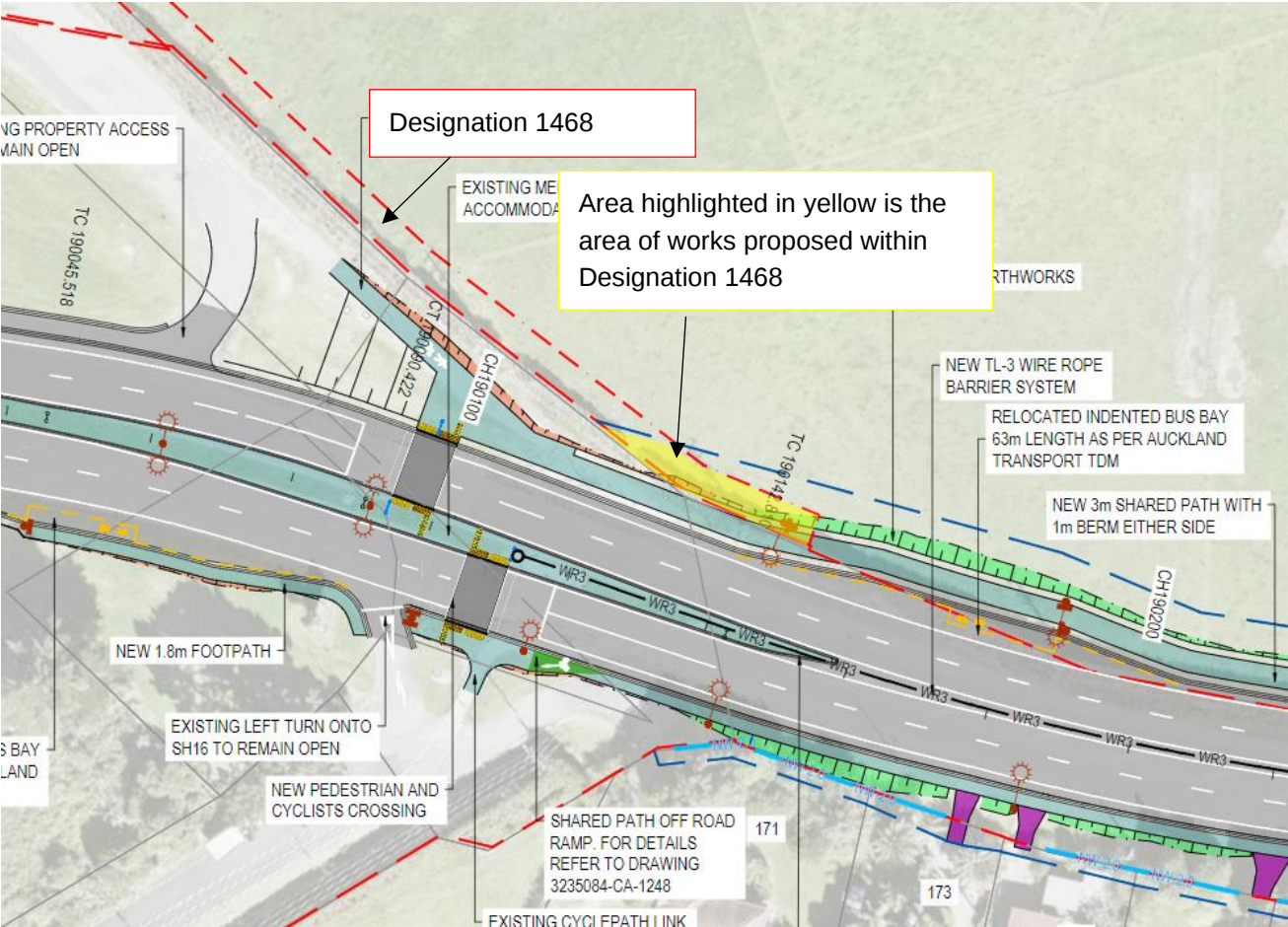


Figure 9: Area of proposed works within Auckland Transport's Designation 1468

4.6 RMA s176A Outline Plan submission

The physical works for the Project will provide for the ongoing operation and safety of the State Highway at this location.

Prior to and during construction, Outline Plans will be submitted to Council (in accordance with Section 176A of the RMA) and environmental management plans will be prepared as required to demonstrate how the environmental and performance outcomes (identified in this AEE) will be achieved. These will be required through the set of conditions that will rest with both the confirmed designation and granted resource consents.

5 Existing Environment

5.1 The Project Corridor

This application for Stage 2 works applies to Sections A – D, which includes 4.3km of SH16 between the Brigham Creek roundabout and Weza Lane (east of Kumeū). This corridor is zoned Strategic Transport Corridor in the AUP:OP and is also designated by Waka Kotahi (refer Section 5.1.1 below for further details). It provides an important link into the north-west Auckland communities, connecting services, facilities and employment centres.

The area of the proposed alteration to the designation consists of rolling countryside including rural lifestyle blocks with some pastoral land, vineyards and commercial operations. At the north-western end of the corridor, there is a petrol station, retirement village, Juicy New Zealand Strawberries, a church and an early childcare centre. Kumeū River Wines and the Phil Greig Strawberry Farm is located at the south-western end of the corridor. In the centre of the corridor are a few food markets including Boric Food Market and the Kumeū Produce Market, as well as Soljans Estate Winery, another early childhood centre and Allely Estate (which is commonly known as a wedding venue). Towards the south-eastern end of the corridor is a small residential area on Kennedy Road and the Grind Café which is Future Urban Zone and is expected to urbanise over time.

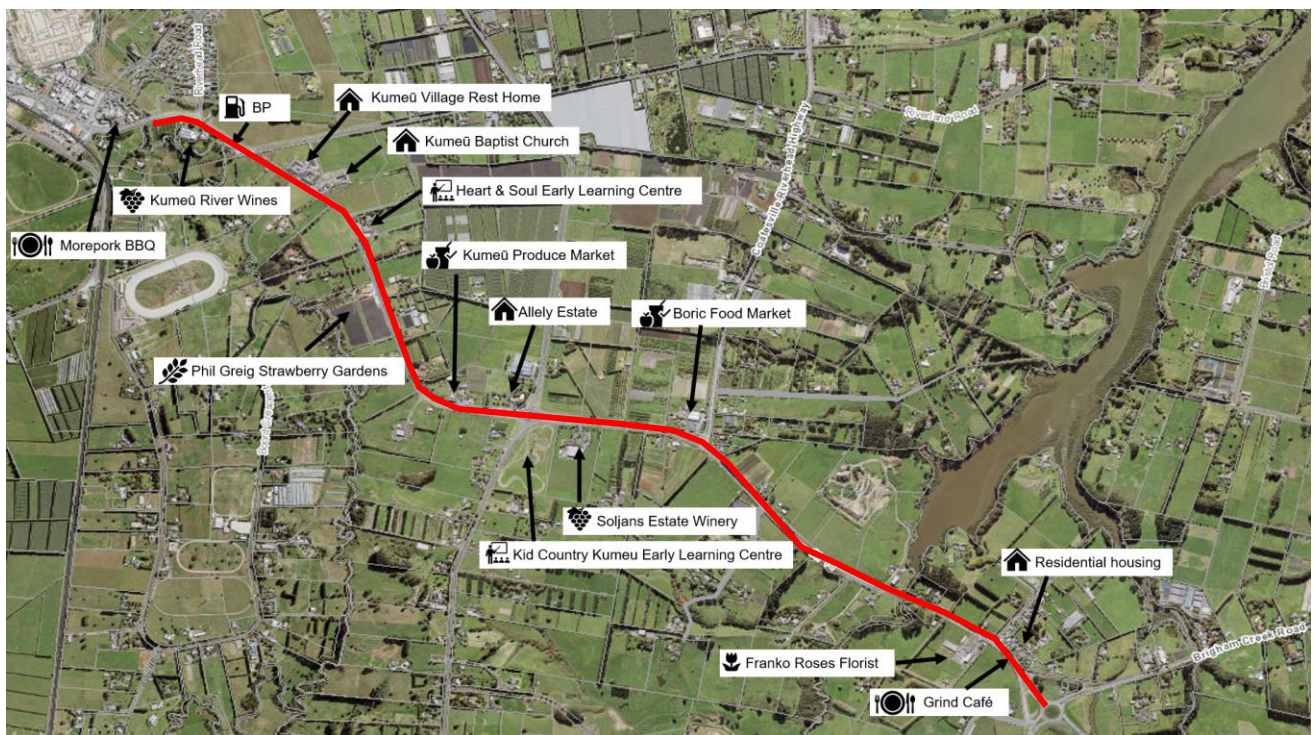


Figure 10: Local businesses and community facilities along the Project corridor

In general, the topography of the site appears to be largely flat. There are several gully systems present in the surrounding land, typically forming an undulating topography.

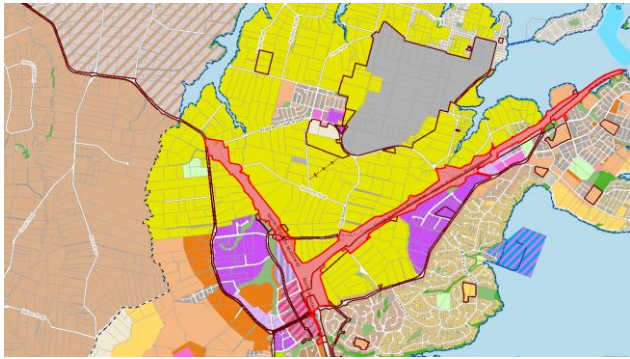
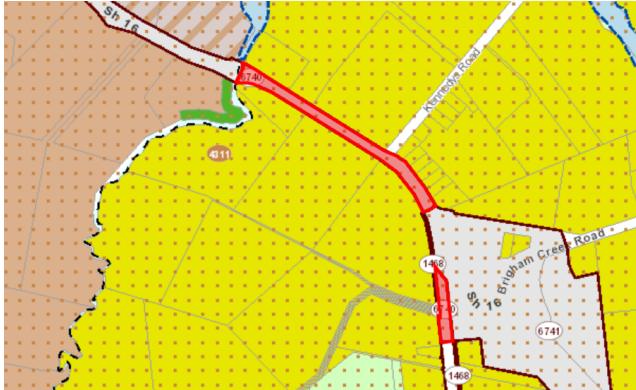
The underlying geology of the Project area is recorded as being the Puketoka Formation and consists of pumiceous mud, sand and gravel with muddy peat and lignite: rhyolite pumice, including non-welded ignimbrite, tephra and alluvia. This is largely consistent across the Project area.

The posted speed limit along the corridor is 80km/hr which reduces to 50km/hr (for approximately 100m of the project corridor) prior to entering the Kumeū township.

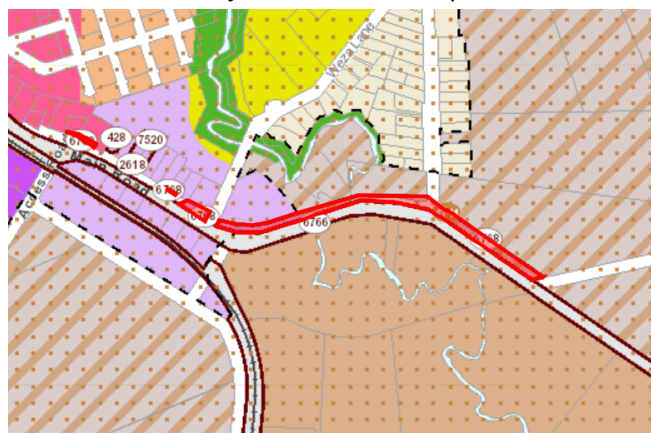
5.1.1 Existing designations within the Project corridor

There are five existing Waka Kotahi designations within the Project extent. Designation 6766 is the main designation that overlays most of the Project corridor. The designation purpose is for “State Highway 16”. The project will also involve work within designations 6740, 6741, 6772, and 6768. See Table 9 for a full list of the designations in the Project corridor.

Table 9: List of existing Waka Kotahi designations in the Project corridor

Designation ID and Name	Purpose of Designation	Designation Conditions / Lapse Date Commentary
6741: State Highway 16 and 18 - Westgate to Whenuapai and Hobsonville <i>This designation extends over the SH16 / Bringham Creek Road roundabout</i>	NA	Conditions: relate to access, maintenance, outline plans and management plans, heritage, ecological impact mitigation etc. Lapse date: Designation has been given effect to 
6740: State Highway 16 - North end of Fred Taylor Drive to Ngongetepara Stream, Bringham Creek' <i>This designation extends from the SH16 / Bringham Creek Road roundabout to Bringham Creek</i>	NA	Conditions: no conditions Lapse date: Designation has been given effect to 
6766: State Highway 16 - Hobsonville to Wellsford <i>This designation extends from Bringham Creek to Kumeū township (i.e. the western edge of Project)</i>	NA	Conditions: no conditions Lapse date: Designation has been given effect to 

Designation ID and Name	Purpose of Designation	Designation Conditions / Lapse Date Commentary
6772: Road Widening - State Highway 16 Whenuapai to Taupaki	Road widening. 1) State Highway 16 from eastern side of Lot 10 DP 65765 to Taupaki Road: a) 15m from the centre line (south side only); and b) 4.88m from the existing road boundary (south side only).	Conditions: Appropriate sedimentation and erosion control measures shall be employed for any earthworks on the designated site. <i>Note that major earthworks may require a consent from the Auckland Council</i> Lapse date: Five years from being operative in the Unitary Plan unless given effect to prior. As the Plan has been operative in part since 15 November 2016, this designation was due to lapse on 15 November 2021, however Waka Kotahi lodged an application to extend the lapse date and Council has recently confirmed the new lapse date of 10 March 2027.
6768: State Highway 16 Road Widening - Kumeū/Huapai	Road widening	Conditions: no conditions Lapse date: Five years from being operative in the Unitary Plan unless given effect to prior. This designation was due to lapse on the 31 August 2022, however Waka Kotahi lodged an application to extend the lapse date and Council has recently confirmed new lapse date of 31 August 2027.



There is only one other (non-Waka Kotahi) designation within the Project corridor. It is a small Auckland Transport designation on the south-west side of Brigham Creek Roundabout (Designation 1468) for the purpose of 'Road Widening' at 'State Highway 16 (Westgate to Whenuapai)', see Figure 11 below. As mentioned in Section 4.5 the Project will involve a small amount of earthworks within this designation and a

Sensitivity: General

small portion of the SUP will remain within the corner of Designation 1468, see

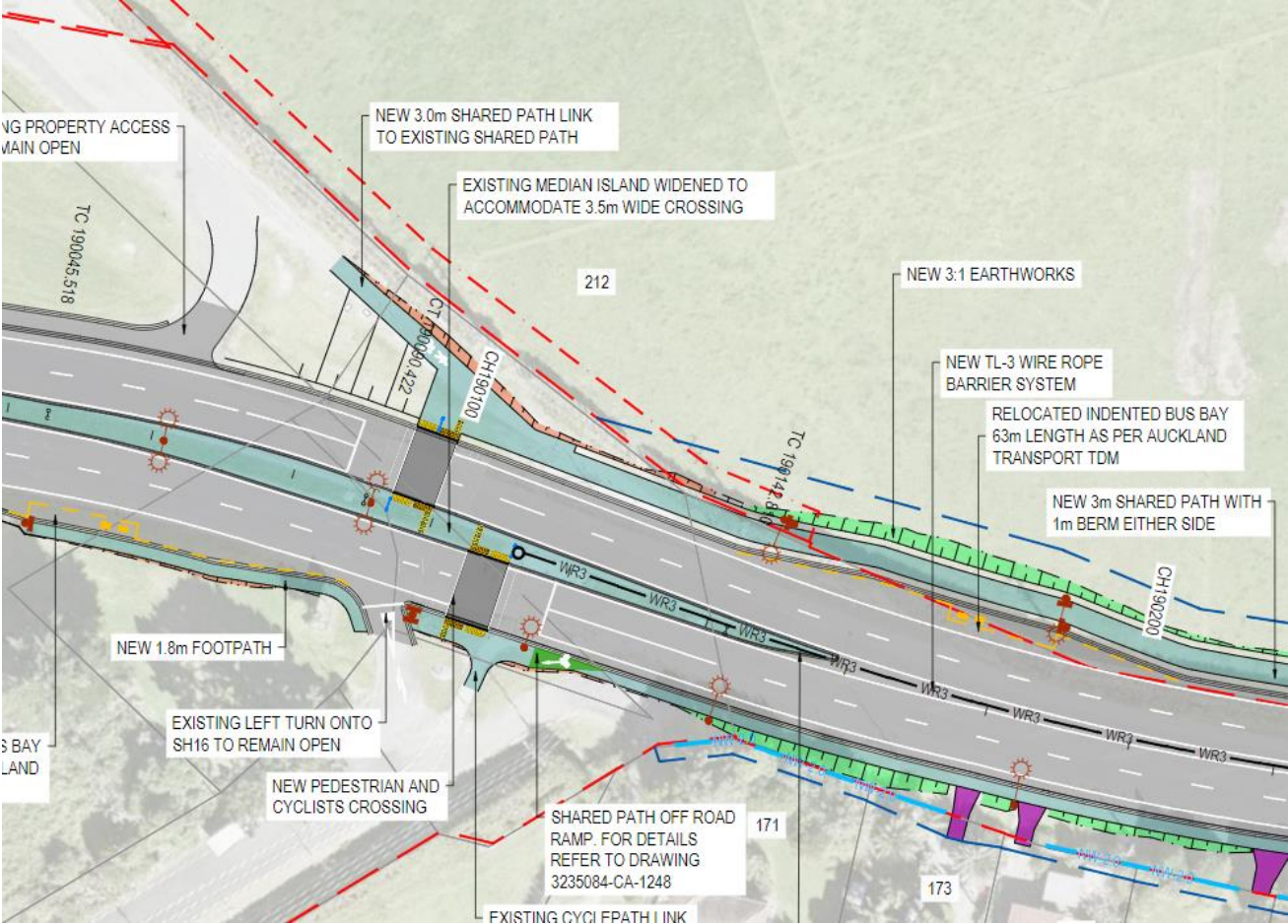


Figure 9. The Auckland Transport designation will remain the priority/primary designation where there is any overlap with the altered designation 6740.

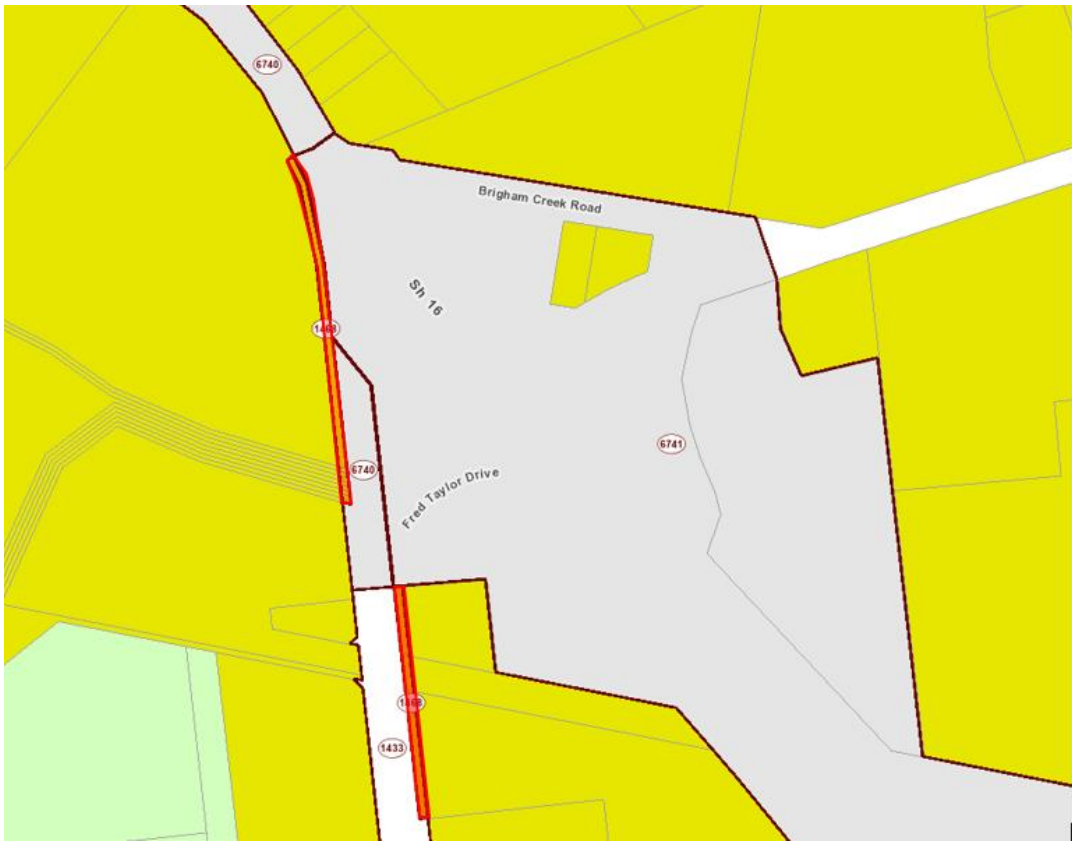


Figure 11: Extent of Auckland Transport Designation 1468 on the south-west side of Brigham Creek roundabout (in red)

5.1.2 Relevant Zones and Overlays

Within the Project extent

The majority of the proposed state highway improvement works will take place within the existing Waka Kotahi SH16 designations (6741, 6740, 6766) which have an AUP:OP underlying zone of Strategic Transport Corridor. Some works are also proposed within the Waka Kotahi SH16 road widening designations 6772 and 6768, which have an underlying AUP:OP zone of Rural - Countryside Living Zone and Rural - Mixed Rural Zone respectively.

Work outside the Waka Kotahi existing SH16 designations and Strategic Transport Corridor will be undertaken in land zoned Rural – Countryside Living, Rural – Mixed Rural, Future Urban Zone, Open Space - Conservation Zone and Local Roads.

There is an Open Space - Conservation Zone located next to the Ngongetepara Stream at the south-eastern end of the Project corridor. This Open space is labelled in the AUP:OP maps as Taupaki Esplanade Reserve No 22433-L100 and consists of large trees and riparian vegetation bordering the stream.

Land zoned as Future Urban Zone on the south-eastern end of the alignment (in Whenuapai) is planned to be intensified as part of Auckland Council's *Future Urban Land Supply Strategy* (July 2017). The land will be released for development in stages, with Future Urban Zone land in the Project area earmarked for 'live zoning' between 2028 - 2032.

The entire Project corridor is within a High-Use Aquifer Management Area Overlay and under a Macroinvertebrate Community Index – Rural. A small section of the corridor (at the north-western end) is under a High-Use Stream Management Area overlay, the same area is under a Stormwater Management Area Control - Flow 1.

Adjacent to the Project

To the north of the Brigham Creek Culvert is Brigham Creek. This is a Significant Ecological Area under the AUP:OP (SEA-M2-57b). It provides important habitat for highly diverse and productive flora and fauna, including migration pathways for native freshwater fish, and roosting and nesting sites for coastal birds. Brigham Creek (a Coastal Marine Area) is adjacent to, but outside of, the Project works extent.

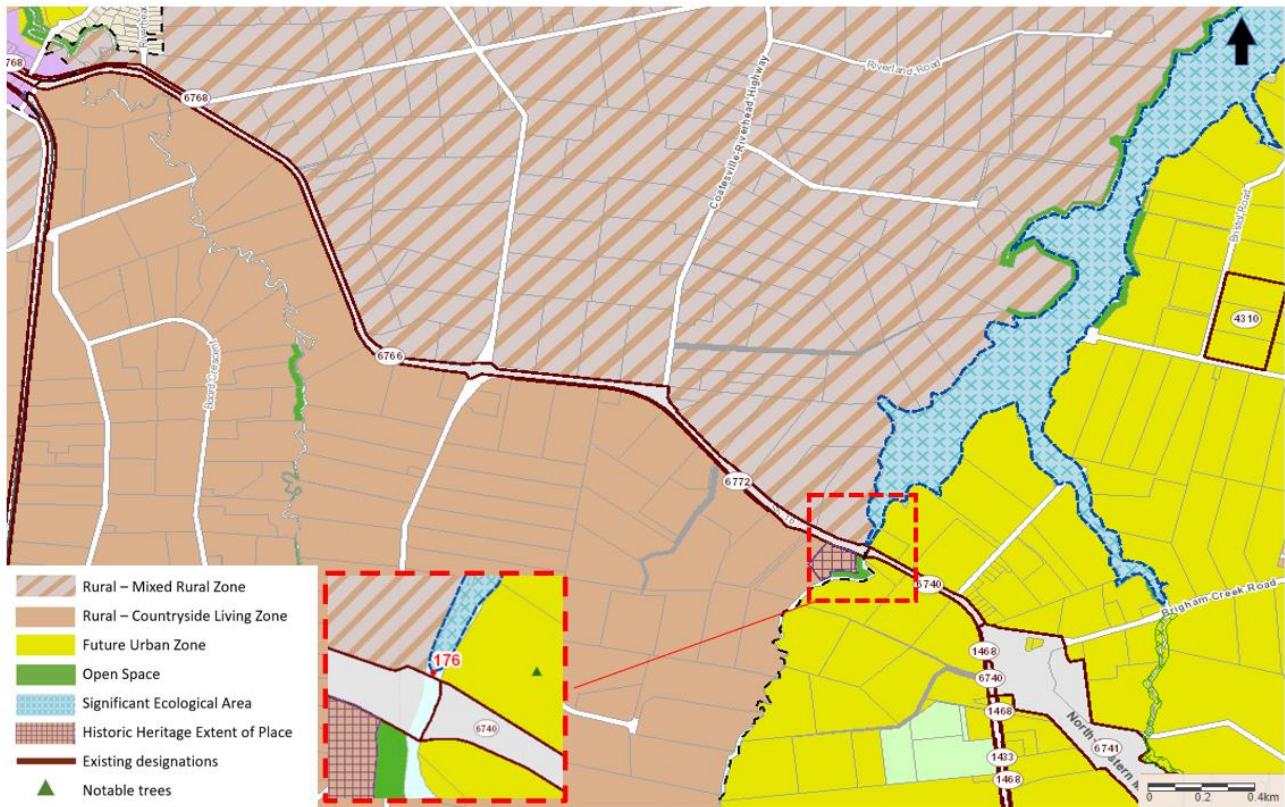


Figure 12: AUP:OP zoning and overlay map

5.1.3 Stormwater Catchment Description

The works extends through two stormwater catchments as shown in the image below. These catchments are as follows:

Redhills Catchment (Orange catchment in Figure 13 below):

- Extent of SH16: Brigham Creek Roundabout to Taupaki Road Roundabout
- Discharge location: This catchment drains to Ngongetepara Stream and into the Waitemata Harbour via Brigham Creek

Taupaki Catchment and Kumeū-Huapai Catchments (part of), sub-catchment of the Kaipara-Kumeū Catchment (Purple catchment in Figure 13 below):

- Extent of SH16: Taupaki Road Roundabout to Kumeū
- Discharge location: This catchment drains to Kumeū River into the Kaipara Harbour.

The Redhills Catchment zoning is 36% Rural Countryside Living Zone and 63% is a form of urban or future urban development zone, with the remaining 1% comprising of the SH16 road corridor.

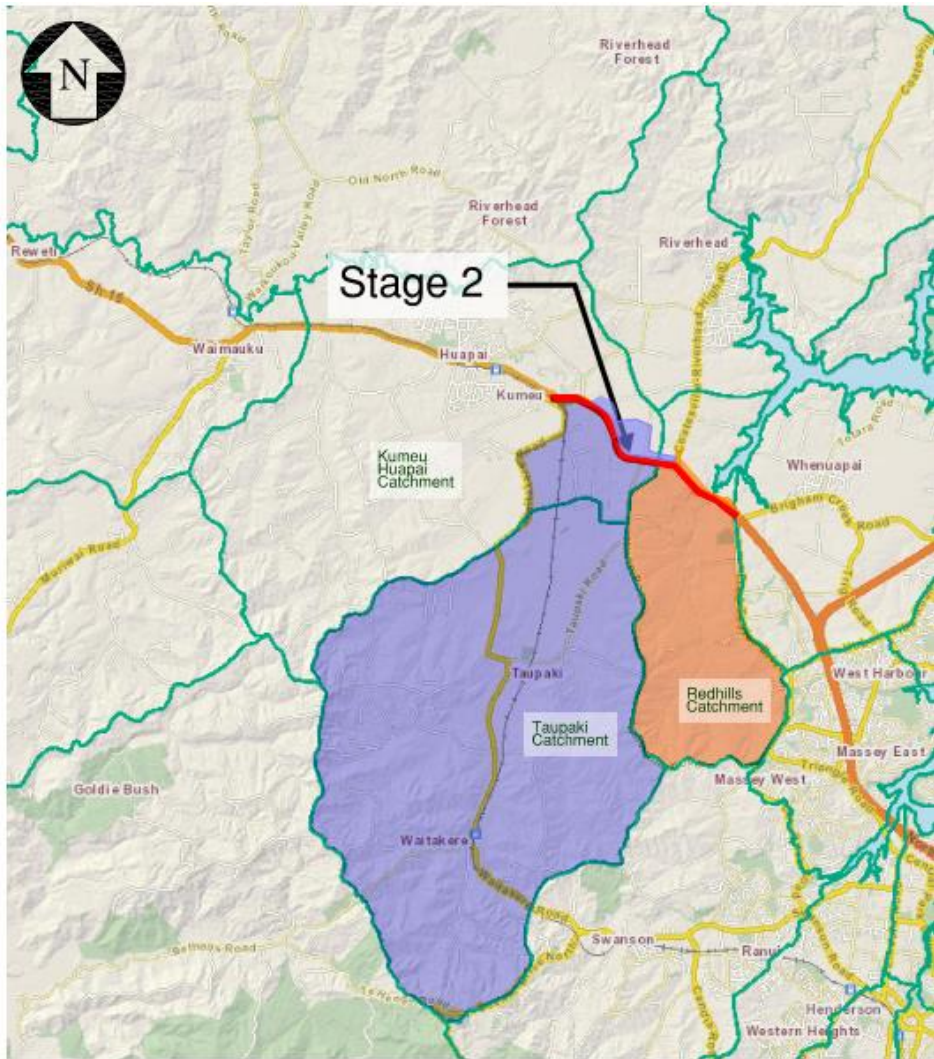


Figure 13: Catchments Upstream of Stage 2. Redhills catchment is shown in orange and the Taupaki Catchment is shown in purple. Extent of Stage 2 shown in Red

The existing stormwater network consists of a combination of piped networks, roadside drains and open channels, which is based on information from RAMM data, Auckland Council GEOMap stormwater assets and topographical survey. The existing primary stormwater is generally discharged into nearby water courses or farm drains through outlet structures. There are a number of existing discharge points which discharge to private properties, then into water courses. This includes discharge to the following properties:

- 256 SH16
- 324 SH16 (opposite Coatesville Riverhead Highway)
- 299 SH16
- 1536 Old North Road
- 464 SH16 (stormwater from SH16 discharges to an existing pond, which is privately owned)
- 538 SH16 (BP)
- 7 Main Road

Stormwater runoff is mostly untreated along the project corridor. As built pdf drawings were obtained for the SH16/Taupaki Rd/Old North Road Intersection upgrade in 2012. This indicates some level of treatment through a grassed swale on the western side of Taupaki Road on SH16. The treatment through here is limited, as the upstream catchment is captured in catchpits and pipework, and the crossfall of SH16 is typically a single crossfall, falling away from the grassed swale. There are no other records from Waka Kotahi of stormwater treatment provided within the extent of SH16 for this Project.

5.1.4 Natural Environment

According to the AUP:OP Planning Maps, the predominant natural features are the two watercourses that intersect the corridor. These include the Ngongetepara Stream, which is a tributary of Brigham Creek, and the Kumeū River, including a tributary (refer to Figure 14 below). The Ngongetepara Stream flows south to north through the Project Site into Brigham Creek, and eventually discharges into the Waitematā Harbour inlet. The stream has a catchment area of approximately 1200 ha (Auckland Council Geomaps). A small section of the banks of the Ngongetepara Stream that runs under SH16 is overlain by the Public Open Space - Conservation Zone aforementioned which appears to hold a grove of developed native bush. In addition to the watercourses identified in the AUP:OP, a Watercourse Classification has been undertaken by Beca (detailed in the Ecological Impact Assessment in Appendix M) to identify the status of seven watercourses within the Project corridor. These watercourses are outlined in detail in the Ecological Impact Assessment in Appendix M.

Brigham Creek and the wider Waitematā Harbour inlet is a Significant Ecological Area (SEA-M2-57b, Marine 2). The area provides important habitat for highly diverse and productive flora and fauna, including migration pathways for native freshwater fish, and roosting and nesting sites for coastal birds. This coastal marine area extends up Brigham Creek tributary and ends approximately 18 metres from the current road edge. The area is identified as a muddy, mangrove-lined inlet. The Project will not encroach into this area.

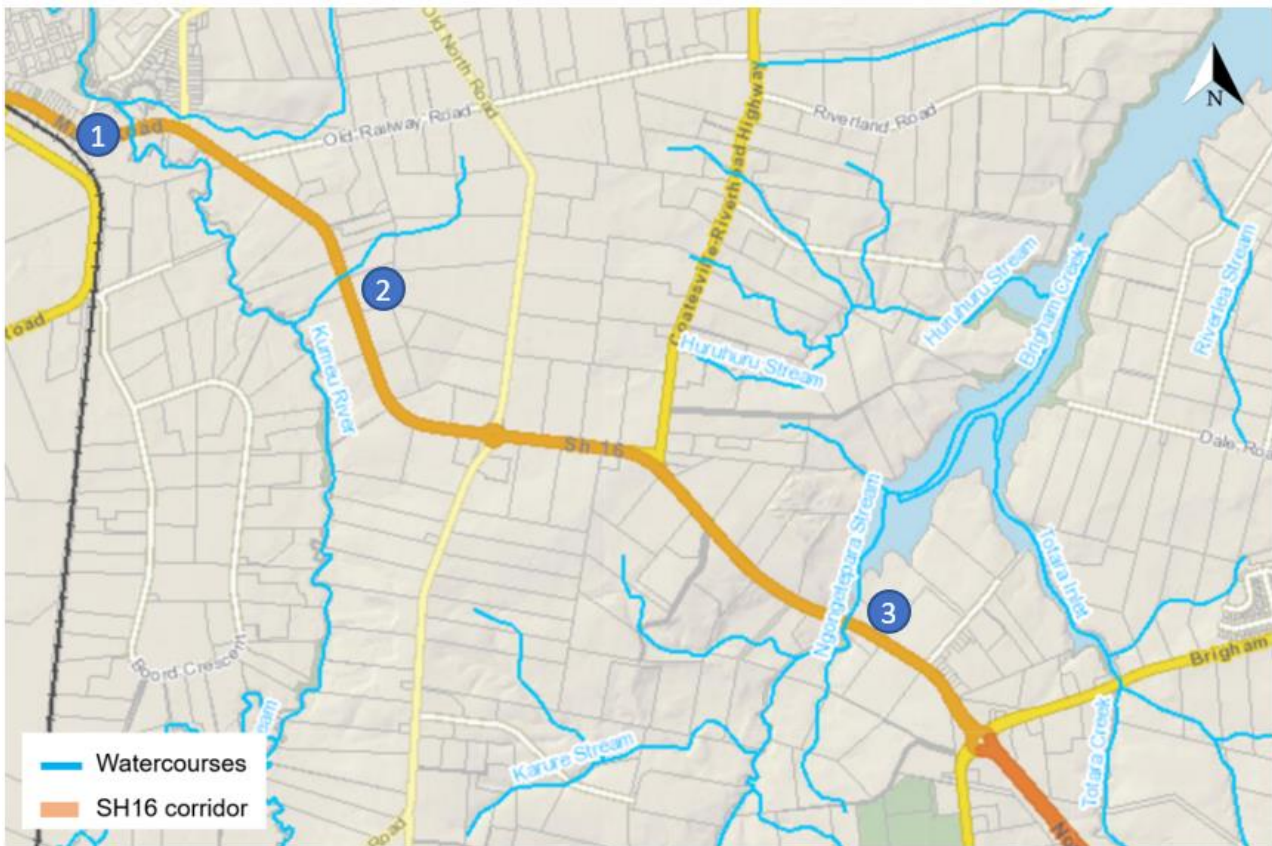


Figure 14: Watercourses surrounding the SH16 corridor. The watercourses intersecting the corridor are: 1) Kūmeu River, 2) a tributary of Kūmeu River, and 3) Ngongetepara stream (which is a tributary of Brigham Creek) (AC Planning Maps, 2021)

Three tributaries of the Kumeū River also fall within the Project Site, namely the Ahukuramu Stream and two un-named tributaries. They have an upstream catchment area of approximately 4566 ha and ultimately flow into the Kaipara Harbour (LAWA, 2021). Each tributary has several overland flow paths associated with them that have been extensively modified as a result of SH16 and horticultural land use (orchards). The overland flow paths drain the surrounding orchards and paddocks south of the motorway and many have been

channelised, straightened, and diverted to accommodate flows from surrounding areas and the state highway itself.

The Ecological Impact Assessment (contained in Appendix M) confirmed that there are six watercourses and two wetlands within 100m of the Project corridor. These are highlighted in Figure 15 below.

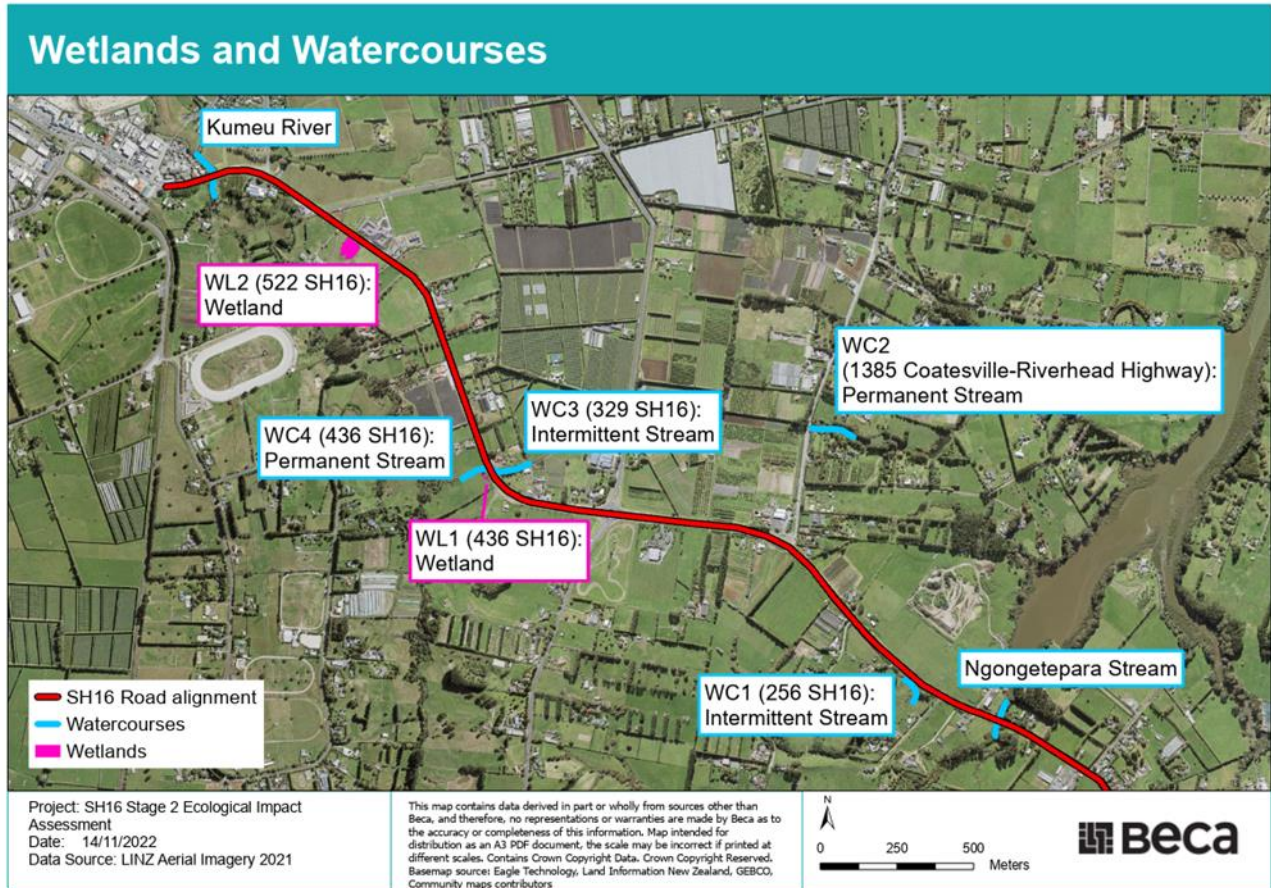


Figure 15: Locations of the confirmed watercourses and wetlands across the SH16 Site (Source: Beca ECIA 2022).

Wetland at 436 SH16:

The wetland at 436 SH16 is a palustrine wetland which sits within a shallow depression and is approximately 179 m². The contributing catchment is approximately 1.22 hectares. It is likely being fed by seepage emerging from the surrounding sloped landscape and follows a natural flow pathway running parallel to SH16, towards the tributary of the Kumeū River. This wetland is located approximately 16m from the existing roadside edge.

The vegetation within the wetland is degraded, and consists of soft rush (*Juncus effusus*), kikuyu grass (*Cenchrus clandestinus*), and creeping buttercup (*Ranunculus repens*). The wetland is not fenced and shows extensive evidence of grazing and pugging.



Figure 16: Picture of the natural wetland at 436 SH16. The vegetation running diagonal across the image indicates the location of the wetland. The picture is taken looking south toward Brigham Creek. SH16 is located up on the bank to the left.

Wetland at 522 SH16:

The wetland at 522 SH16 is a palustrine swamp wetland located within a paddock at where it sits in a large, flat drainage basin. It is approximately 2,780 m² in size, with an area of open water in the centre. The catchment is largely pervious and is approximately 3.15ha. The road currently discharges overland flows to an open channel on the southern side of the road towards the BP Petrol Station at 538 SH16. This flows north through the eastern side of the wetland, and continues to flow parallel to the road (past the wetland). A pipe appears to drain water from the wetland and is connected to a dug-out channel adjacent to the wetland. The wetland is dominated by creeping bent (*Agrostis stolonifera*) which is commonly associated with grazed pasture and roadside vegetation, along with, birdsfoot trefoil (*Lotus corniculatus*), creeping buttercup, perennial ryegrass (*Lolium perenne*), white clover (*Trifolium repens*), Yorkshire fog (*Holcus lanatus*), *Isolepis reticularis*, jointed rush (*Juncus articulatus*), soft rush, as well as large patches of water pepper (*Persicaria hydropiper*) and marsh bedstraw (*Galium palustre*) (see Figure 17). The wetland is not fenced to exclude stock, which has resulted in grazed and degraded vegetation. It is understood (from Project Ecologist observations) that the landowner is currently mowing the wetland vegetation. There are also both emergent and free floating macrophytes in the open water area.



Figure 17: Picture of the wetland at 522 SH16 taken from the road.

Terrestrial Vegetation:

An onsite survey of the vegetation was carried out by Peers Brown Miller (PBM) in May 2022 and PBM has provided a description of the vegetation in Appendix S. The Ecological Impact Assessment has also assessed the vegetation along the corridor which is outlined in Appendix M. Overall the vegetation along the corridor is of varying quality, and consists of a combination of pest plant, native, exotic species and pasture grass from the edges of farmland. Terrestrial vegetation within the road reserve / designation (but outside of specified stream and wetland sites) predominantly consists of rank grass with isolated patches of roadside trees and shrubs, or scattered, individual trees. The roadside trees are disconnected from large forests in the landscape, with stretches of farmland or residential land separating them. Any large, mature trees are mostly exotic species, such as poplars, pin oaks (*Quercus ellipsoidalis*), sweetgum (*Liquidambar styraciflua*), Japanese cedar (*Cryptomeria japonica*), and pine (*Pinus radiata*), which were likely planted to act as shelterbelts.

Several pests are also present, including tree privet (*Ligustrum lucidum*), Chinese privet, black wattle, monkey apple (*Acmena smithii*), and willow, phoenix palm (*Phoenix canariensis*), and Chinese fan palm (*Livistona chinensis*). A single kauri tree (*Agathis australis*) is located at 436 SH16, and has a conservation status of Threatened: Nationally Vulnerable due to the spread of Kauri dieback. There are also several kanuka (*Kunzea* sp.) and manuka (*Leptospermum scoparium*) along the alignment.

Wildlife

Both the Ngongetepara Stream and Kumeū River have a high diversity of fish, with four native species recorded between 2007 – 2014 in the Ngongetepara catchment, and eight native species recorded between 1991 and 2015 in the Kumeū River catchment. Of the species found, two have a conservation status of At-Risk: Declining, the longfin eel (*Anguilla dieffenbachii*) and inanga (*Galaxias maculatus*). The Kumeū River also provides important spawning habitat for the redfin bully (*Gobiomorphus huttoni*).

There are no records of herpetofauna found within the SH16 site extents according to iNaturalist and DOC, but several plague skinks (*Lampropholis delicata*), a pest species in Auckland (Auckland Council, 2020), have been recorded between approximately 200 m – 2 km from the Site. Plague skinks occupy a diverse range of habitats, including highly modified urban environments, and are therefore likely to be present on Site. Additionally, Coppers skinks (*Oligosoma aeneum*), which has a conservation status of At-Risk: Declining, share a similar niche to plague skinks and may be present in low numbers.

No bats have been recorded within the SH16 site extents according to iNaturalist and DOC. However, one long-tailed bat has been recorded approximately 2 km from the Site in 2020. Potential bat habitat is limited to the Ngongetepara Stream, and any large, roadside trees along the SH16 Site.

The Buller's shearwater bird (*Ardenna bulleri*) and Caspian tern (*Hydroprogne caspia*) have been recorded approximately 2 km away from the Project area. However, they will not utilise the project footprint due to their habitat preferences as coastal birds.

5.1.5 Historic Heritage

The Project corridor is rich with historic heritage (including natural, built and recorded archaeological sites), which are outlined below.

Natural Heritage:

The AUP:OP maps identify a group of Notable Trees (ID 1808) located on private property at 191 SH16 (Pt Lot 1 DP 38693), adjacent to the Brigham Creek culvert, see to Figure 18, area bounded in green. The group of heritage trees are also recorded under the AUP:OP Cultural Heritage Inventory (CHI) as CHI 12896 and are associated with the reported historic building identified as CHI 3379, being an 1880s homestead formerly associated with the Sinton family. At the commencement of the Project's pre-implementation phase, Schedule 10 of the AUP:OP indicated that there was a group consisting of 16 trees including totara (*Podocarpus totara*),

kauri (*agathis australis*), rimu (*dacrydium cupressinum*) and karaka (*corynocarpus laevigatus*). However, a recent Plan Change (Plan Change 29: Amendments to Schedule 10 Notable Trees, notified November 2019) resulted in a reduction to the number of trees identified in the ID 1808 group at 191 SH16 from 16 trees to 11 trees. An Arboricultural Assessment was undertaken to assess the effects of the Project on the notable trees. The arborist confirmed that there should be 12 notable trees in this group.



Figure 18: Location of scheduled heritage items around Brigham Creek. Source: Auckland Council GEO Maps

Built Heritage:

At the eastern end of the Project area near Brigham Creek Road in Section A, there is an early 20th century timber weatherboard villa at the junction of SH16 and Kennedys Road (CHI 3713). There is also a reported historic site, which is the site of a 1912 church that used to stand at the corner of SH16 and Brigham Creek Road (CHI 3711). The church has been relocated to 7 Clark Lane, Hobsonville.

Around Brigham Creek there are three historic buildings. To the south-west of Brigham Creek (on the southern side of SH16) there is a Historic Heritage Overlay Extent of Place (ID 525) over the entire property located at 238 SH16, refer to Figure 18, area bounded in purple. The site is scheduled as the site of the former Sinton House. In the late 19th and early 20th centuries the land around Brigham Creek was owned by the Sinton Family who used the land for stores, a slaughter house and agriculture. The building is late 19th century timber villa with early 20th century bungalow additions and later rear ancillary extensions.

To the south-east of Brigham Creek (on the southern side of SH16) there is another historic building, a pre-1900 timber building associated with Alexander Sinton at 222A SH16 (CHI 3486).

To the south-west of Brigham Creek (on the northern side of SH16), there is also a former 1880s homestead of the Sinton family located on the property at 191 SH16. This homestead belonged to Janet Sinton and is directly opposite to 222A SH16 (CHI 3379).

Archaeology:

North of SH16 on the eastern side of Brigham Creek, or in the creek itself, are four archaeological sites. The first is R11/2081 (CHI 13589), the site of the historic Great North Road bridge across Brigham Creek. Its known features consist of holes in the stream bed indicative of former bridge piles, and a modern weir that may conceal remains of an earlier weir. R11/2079 (CHI 13587) is a shell midden approximately at the boundary of 191 SH16 and 8 Kennedys Road. R11/2080 (CHI 13588) is a historic 'turnaround' area used by scows servicing the Sinton store and butchery, being the last wide point of Brigham Creek before the bridge. The fourth site is CHI 20452, which is not recorded on the NZAA database. It consists of the store and butchery built by Noble Johnston and is recorded at 191 SH16, though its exact location is not confirmed.

On the western side of Brigham Creek, south of SH16, the scheduled historic building at 238 SH16 is also a recorded archaeological site (R11/2828). To the north of SH16 on the western side of Brigham Creek are two archaeological sites on 239 SH16 (CHI 20450 and 20451). This is the site of the first Sinton homestead and site of the 1890s Sinton slaughterhouse. Further to the north is a maritime site (CHI 185), being the site of a former bridge over Brigham Creek.

On the north-western end of the Project corridor, at Old Railway Road, is the location of a recorded archaeological site (R10/1487, CHI 15093) which marks the location of the Portage Railway. This was a short-lived rail line which ran from Harkins Point, Riverhead, and the Kumeū Station between 1875 and 1885. This excluded portion is still clearly visible and shows clearly on the current contours in the area. Near the entrance to the Kumeū township there are three historic buildings within 200m of SH16. One is a house at 7 Main Road (CHI 16385), which may originally have been a railway house. Another is the Kumeū Railway Goods Shed at 37 Main Road (CHI 13242), this was built in 1908. This structure is also scheduled in the AUP:OP as a Category B historic heritage place (schedule 14.1 ID 483). The third house is the 19th century Masonic Lodge at 74 Main Road (CHI 16388).

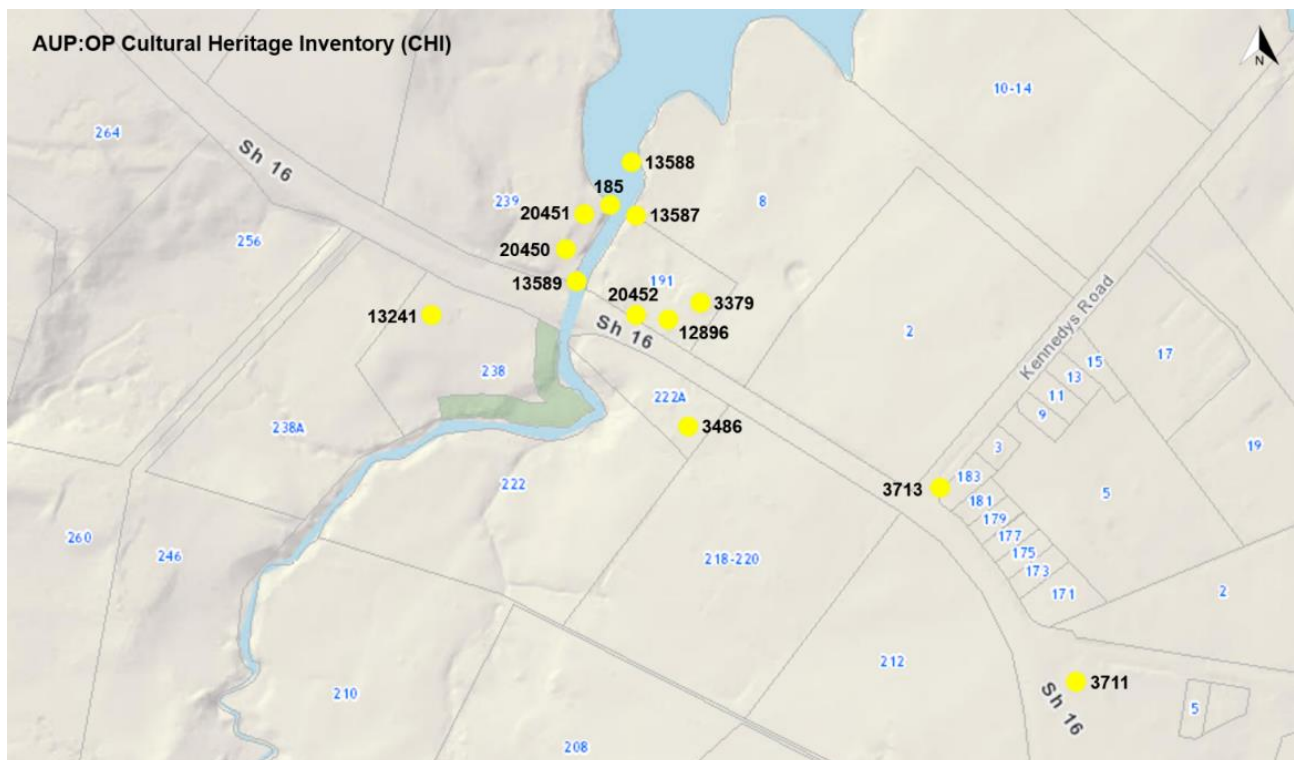


Figure 19: Cultural Heritage Inventory (CHI) sites in yellow (Auckland Council Planning Maps, extracted 2020)

5.1.6 Contaminated Land

The majority of the Project corridor is zoned rural, where there are many sites with agricultural and horticultural activities present. Agricultural, horticultural and vinicultural properties can use pesticides and be considered potentially HAIL sites under the NES:CS. Given the existing rural environment, a Preliminary Site Investigation (PSI) Report (Beca, February 2022) has already been undertaken (refer to Appendix O), and includes a historical aerial review of the corridor, which has identified several properties that have been subject to potentially contaminative activities associated with horticultural activities, specifically orchards and vineyards. In association with such activities, several commercial buildings have been identified, including wineries, grower's sheds and cafes. The contamination assessment undertaken by Auckland Council and the PSI identified the following sites as potentially contaminative based on a historical aerial review and a site walk over:

218 SH16	1404 Coatesville- Riverhead Highway	451 SH16
291 SH16	1368 Coatesville- Riverhead Highway	464 SH16
299 SH16	350 SH16	465 SH16
300 SH16	366 SH16	482 SH16
312 SH16	407 SH16	505 SH16
324 SH16	429 SH16	538 SH16 (BP Service Station)
340 SH16	436 SH16	550 SH16

A Detailed Site Investigation will be undertaken prior to excavation and construction works commencing. A condition to this effect has been included.

5.1.7 Existing noise environment

Long duration noise level surveys were undertaken in June and July 2021, at two locations adjacent to the Project corridor. Loggers were installed and measured noise levels continuously. The measured data was analysed and 24-hour noise levels determined. These results are shown in Table 10 below and indicate the road corridor already experiences a medium to high level of noise (i.e. over 64dB).

Table 10: Noise level survey results

Location	Survey dates	dB LAeq(24h)
291 SH16	23 – 30 June 2021	64
315 SH16	2 – 7 July 2021	66

420m of the south-eastern end of the alignment (from Brigham Creek Roundabout to 191 SH16) is within the 'Aircraft Noise Overlay', associated with the flightpath of the Whenuapai Air Base.

5.1.8 Social environment

There are a number of community facilities along the Project corridor. One is the Kumeū Rest Home located at 507 SH16, which is known for offering private luxury rest home, hospital and dementia care to all its residents. The Kumeū Baptist Church is located at 495 SH16 right next door to the rest home. Along the Project corridor, there are two early learning centres. Heart and Soul Learning is a family-owned and operated centre located at 489 SH16. Kid Country Kumeū Early Learning Centre is another centre located just off the Taupaki Road roundabout at 455 Taupaki Road. There are also a few food stores along the Project corridor. The Boric Food Market is a popular boutique food grocery store located on the corner of the Coatesville Riverhead Highway Intersection with SH16 at 1404 Coatesville Riverhead Highway. The Kumeū Produce Market sells primarily fresh produce and is located 407 SH16.

5.1.9 Cultural

The project area has two iwi interested in the land, this includes Ngāti Whātua o Kaipara and Te Kawerau ā Maki. Ngāti Whātua o Kaipara progressively extended their control over the Kaipara area from 1680's onwards until European settlement. This includes the Brigham Creek to Kumeū Project area. The Kaipara region (Aotea) was selected by the Crown as the first place for the Native Land Court to operate, from 1864, the Native Land Court granted land to individuals, rather than to Iwi and hapū, this made those lands more susceptible to partition, fragmentation, and alienation. Ngāti Whātua also lost significant areas of land as a result. Following colonisation of the area land was progressively cleared of kauri forest and gum extracted. Later it was used for either pastoral farming or horticulture.

There is a Statutory Acknowledgement area over the north-western half of the Project corridor. The Statutory acknowledgment belongs to Te Kawerau ā Maki, which extends around to most of west Auckland and up to Riverhead and Dairy Flat. Further south of the Project corridor is a recorded midden, likely associated with Waka Tauranga (Canoe Landing site - R11/2085). Ngāti Whātua o Kaipara have highlighted that the surrounding Waitemata Harbour was an important pre-European waterway, with links across the Waitemata to the Kaipara, North or South, for trade, war parties and general communication. The rich history of portage and the midden illustrate the historic presence mana whenua has around Kumeū and Brigham Creek.

SH16 is located to the south of Te Oneone Rangatira, an area of great significance to Iwi. The coast where souls pass over on their way to Spirits Bay, the start of their new journey. It has been home for centuries, evidenced by the many Pa garden remnants and midden of old. The rivers and coast have provided and continue to provide kaimoana to feed whanau. Traveling further on SH16 you will reach Reweti Marae, one of the five marae of the Kaipara and home to mana whenua of Waimauku and Muriwai. The Kumeū River and Ngongetepara Stream are both significant transport corridors for Iwi linking the Waitemata and Kaipara Harbours. The waterways are important portage routes and were a source of kaimoana for the travellers and local settlements in the area.

5.2 Surrounding Environment

The Project corridor is bordered by the Kumeū and Huapai Township to the north-west and the Brigham Creek Roundabout to the south-east. Both Kumeū and Huapai have undergone significant residential development and growth in recent years, and this is set to continue with the land surrounding these townships identified as a Future Urban Zone. Kumeū currently contains a range of small businesses, a community centre, Kumeū Montessori Preschool and an industrial area situated on the south side of the town. Kumeū is supported by the Huapai settlement to the west, which primarily contains a residential suburban/lifestyle block population. Huapai is part of the wider Kumeū wine growing industry and contains a range of community facilities including a local fire station, church, preschool, and primary schools. The Brigham Creek Roundabout is a key intersection providing access to Whenuapai, Westgate and Central and South Auckland (via the north-western motorway).

Whenuapai is a smaller community located east of the project corridor, along Brigham Creek Road. Although the town is not located directly adjacent to the proposed works, access to the businesses and facilities in the western towns are heavily reliant on SH16. Whenuapai is a Future Urban Zoned area under the AUP:OP, and it is anticipated to experience significant residential growth in the future that would use SH16. Riverhead is another residential community located to the north of the corridor with people joining onto SH16 from Coatesville-Riverhead Highway to travel south.

The Stage 2 corridor provides a key link to the surrounding area, the local communities and many businesses are heavily reliant on the state highway. Public transport is available via the 122, 125 and 125X bus line which provides connections north to Helensville and south towards Massey. There are two school buses that are operated by Richies Buses which travel from Waiuku along SH16 before existing SH16 at Riverhead Road to

travel through Coatesville. This includes Route 210 to Albany and Long Bay College and Route 205 to Rangitoto College.

The Supporting Growth Programme have identified areas for future urban growth across Auckland, and the SH16 corridor is located within the North West growth area. The Supporting Growth Programme is planning and delivering the transport networks needed to support growth over the next 30 years. The works being proposed as part of this SH16 Stage 2 Project are short-term works focused on addressing existing safety and access concerns of the corridor, ahead of longer-term plans under development by the Supporting Growth Programme.

6 Assessment of Alternatives

Section 171(1)(b) of the RMA requires a territorial authority when considering a notice of requirement to consider the effects on the environment of allowing the requirement, having particular regard to whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work.

The following section of this report provides a brief summary of the consideration of alternatives for the Project. The full Assessment of Alternatives Report is contained within Appendix B of this AEE Report.

6.1 Assessment of Alternatives Methodology

6.1.1 Corridor Long List Methodology

A long list of corridor treatments (safety; efficiency) and multi modal options were generated and assessed on an 'Adopt' or 'Reject' basis against the Project Investment Objectives. In 2021, these were reviewed and retested against the refined Project Objectives in terms of contribution to desired Project outcomes. This assessment is set out in Appendix A of the Alternatives Assessment Report contained in Appendix B of this AEE Report.

6.1.2 Corridor Short List Methodology

A short list of corridor options were generated and assessed using a Multi Criteria Analysis (MCA) Framework which was developed for the Project. The MCA criteria reflected the Project Objectives and were largely based on the four well-beings: Cultural, Social, Environmental and Economic. These four well-beings address the matters set out under Part 2 of the RMA. Table 11 below outlines the 7-point scoring system that was utilised for the assessment. A gradual scale ranging from -3 for 'significant adverse effect' to +3 'significant positive effect' was used to score the options. A neutral score will be similar to a do minimum scenario.

Table 11: MCA scoring matrix

Rating	Definition	Score
Significantly Positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly Positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly Adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately Adverse	Moderate adverse impact that may be managed or mitigated	-2
Significantly Adverse	Significant adverse impact with serious long term effects	-3

The full details of the methodology used is outlined in Section 3 of the Alternatives Assessment Report contained in Appendix B of this AEE Report.

6.1.3 Localised Options Methodology

Subsequent to the long and short list options assessments, a range of localised options were also assessed through the seven-point MCA process. Each of the following assessment processes used a bespoke MCA Framework that was developed by the Project team in partnership with Mana Whenua to enable a robust and transparent design refinement process. This is described in more detail within the Section 5 of the Assessment of Alternatives (refer Appendix B).

Discharge Point 7' (DP7)

The same 7-point scoring system used for the corridor-wide alternatives assessment was applied to the localised stormwater design option assessment.

The options were assessed against the Do Minimum (baseline) option in accordance with the Waka Kotahi Updated MCA Guidance published in August 2020. The baseline is the current stormwater management situation at this location with no project development in place.

The Do Minimum (baseline) option is not assessed in its own right, as it would score 'neutral' as it is being scored against itself.

The options assessment involved input from several Subject Matter Experts including Civil Engineering, Contaminated Land Management, Construction Management, Cost Management, Property, Environmental, Ecology, Operations and Maintenance, Mana Whenua, Environmental, Planning, Stakeholder, Management, and Project Management.

Noise Mitigation

The assessment method in *New Zealand Standard NZS 6806:2010 Acoustics - Road-traffic noise - New and altered roads* requires consideration of a number of noise mitigation options depending on the scale of a project. These options are subject to an integrated design process, in which the costs and benefits of the mitigation are considered to find the Best Practical Option (BPO). A noise mitigation BPO workshop was held to assess the effects on various identified sensitive receivers, 'protected premises and facilities' (PPF), to consider the BPO for noise mitigation across the alignment in accordance with NZS6806:2010. Commercial and business uses are not PPFs as they are not considered to be noise sensitive and are therefore excluded from the assessment.

This includes an assessment of several different scenarios which are then compared to find the BPO.

There were 12 assessment areas along the corridor that were assessed in the workshop. Three main BPOs were developed, however all three options were not necessarily considered for each assessment area, and certain areas required an additional 'option'. The noise mitigation BPO assessment involved input from several Subject Matter Experts including, Acoustics, Built Heritage, Property, Operations and Maintenance, Civil Engineering, Landscape and Visual, Urban Design, Environmental, Planning, and Project Management.

Project design interface with the wetland at 522 SH16

The same 7-point scoring system used for the corridor-wide alternatives assessment detailed in Section 6.1.2 was applied to the localised wetland design option assessment.

The options were assessed against the Do Minimum (baseline) option in accordance with the Waka Kotahi Updated MCA Guidance published in August 2020.

The baseline is the current SH16/wetland situation at this location with no project development in place.

The assessment involved input from a number of SMEs including, Road Safety Engineering, Civil Engineering, Transport Planning, Environmental Planning, Construction Management, Property, Environmental, Ecology, Mana Whenua, Social Impact, Landscape and Visual Impact, Operations and Maintenance, Cost Management, Stakeholder Management, and Project Management.

6.2 Long and Short List Options

6.2.1 The Long list

The long list of corridor safety treatments included various median treatments, roadside treatments (i.e. shoulder widening, barriers), and other treatments (curve realignment, intersection improvements, signage improvements, walking and cycling facilities). The long list of efficiency treatments (such as the provision of additional lanes, a flush median, intersection changes) were bespoke to each section of the corridor.

The long list treatment assessment, including the rationale for the suite of safety and efficiency treatments 'adopted' for further consideration, is provided in the Assessment of Alternatives in Appendix B of this AEE Report.

6.2.2 Walking and Cycling MCA

The long list of walking and cycling options that could provide for the movement of active modes in a potentially safer manner along SH16 included several 'forms' for a new walking and cycling facility including a shared use path, separated pedestrian facility, separated cycle facility and an on-road cycle lane. An off-road, shared use path, that provides for both walking and cycling was adopted as the preferred form and taken forward to the short list options assessment as it caters for pedestrians and targets less experienced / new cyclists who may try an off-road facility which provides a safer environment than on-road cycling. Three short list 'location' options were considered for a shared walking and cycling path. These options included:

- CW1: Two shared paths along each side of the SH16;
- CW2: One shared path along the northside of SH16; and
- CW3: One shared path along the south side of SH16.

These options are detailed in Assessment of Alternatives in Appendix B. An assessment of the options was undertaken against the Investment objectives in 2018. In 2021 the three options were revisited and retested and CW3 was the preferred options taken forward for final design.

Overall, Option 3 was preferred as it improves Safety, will provide less Technical and Property challenges than Option 1, was viewed positively by mana whenua and was Financially a stronger option than Option 1 and Option 2.

6.2.3 Section B- Coatesville Riverhead Highway Intersection

Four short list options were assessed at the Coatesville-Riverhead Highway Intersection. These four options are shown in the plans in Appendix B and are listed below.

- Option 1: Roundabout
- Option 2: Signalised seagull
- Option 3: Signalised intersection
- Option 4: Slip lane

The recommended option (Option 1), being a roundabout, was selected as it scored the best against the project objectives (safety, efficiency and modal shift).

The roundabout option is considered to be more consistent with the intersection designs at Taupaki Road and Brigham Creek Road and with the existing corridor treatments in this peri-urban environment. The 2-lane roundabout will require 4-laning of SH16 to the west to tie-in with the new 2-lane roundabout at the Taupaki Road intersection. It integrates well with the proposed SH16 4-lane capacity improvement option between the Coatesville Riverhead Highway intersection and the Brigham Creek Road roundabout. The implementation of the roundabout also provides an opportunity to improve the existing bus stop facility with a formed and marked bus stop bay in front of Boric Food Market on State Highway 16.

6.2.4 Section A-C Short list options

Section B: SH16/ Coatesville Riverhead Highway Intersection

For Section B, a roundabout was selected as the preferred option (as outlined in Section 6.2.3 above).

Section C: Coatesville Riverhead Highway Intersection to Taupaki Road Roundabout

Due to the proposed two lane roundabout at the Coatesville Riverhead Highway intersection (Section B) and the existing two lane roundabout at the Taupaki Road intersection, it was determined that there was only one practical option for Section C: Coatesville Riverhead Highway Intersection to Taupaki Road Roundabout.

The option included two lanes each way which will allow for efficient traffic flow between the two roundabouts, plus the installation of a median barrier which was considered appropriate given the two roundabouts act as a turnaround facility placed 700m apart.

This option of providing additional lanes to improve efficiency outweighed all other possible options.

Therefore, this option was added for Section C and was assessed during the Section A-C options assessment.

6.2.5 Section A-C: Brigham Creek Road to Taupaki Road Roundabout

As noted above, the form of the options for Section A-C were determined by what was preferred for Section B and Section C.

Three shortlisted options were considered for Section A-C, from Brigham Creek Roundabout to Taupaki roundabout, with each option including road widening to allow for the installation of median barriers, plus the 'common' elements (shoulder widening, side barriers, shared use path on south side, roundabout at Section B: SH16/Coatesville Riverhead Highway intersection, plus two lanes each way through Section C):

- Option 1: Existing layout of the corridor, with the addition of median barriers, minor road widening
- Option 2: This option comprises the existing westbound corridor layout, and provides for an additional lane eastbound, with the addition of median barriers
- Option 3: This option provides for 2 lanes in each direction, with the addition of median barriers

Overall, Option 3 (additional lanes each direction with median barriers) was selected as the recommend option as it scored the best against the project objectives (safety and efficiency). Whilst Option 3 had mixed scores against all other criteria when compared with Options 2 and 3, the identified adverse effects can be mitigated through design and works management.

6.2.6 Section D - Taupaki Road Roundabout to Kumeū Town Centre

From Taupaki Road Roundabout to Weza Lane on the south end of Kumeū, five different design options were brought forward to the short list. Each of these five options include the 'common elements' (shoulder widening, side barriers, shared use path on south side). These options are detailed in the plans in Appendix H of the Alternatives Assessment (refer to Appendix B to this AEE):

- Option 1: Existing layout of the corridor with addition of double yellow line median
- Option 2: Existing layout of the corridor with addition of wide centreline
- Option 3: Existing layout of the corridor with addition of flush median
- Option 4: Existing layout of the corridor with addition of wire median (turnarounds required)
- Option 5: Existing westbound corridor layout, and provides for an additional lane eastbound, with the addition of wire median (turnarounds required).

Overall, Option 3 (existing layout of the corridor with addition of flush median) was selected as the recommended option as it scored positively against the project objectives (safety and efficiency) and would improve the safety of the corridor more than Options 1 and 2. Whilst Options 4 and 5 scored better against

safety, Option 3 scored better against all other criteria. In terms of non-scored criteria, Option 3 is less expensive than Options 4 and 5 and was also supported by the community.

6.3 Localised Options Assessment

The 'localised options assessments' relates to specific areas along the project corridor that face more localised challenges. The assessments seeks to understand issues, impacts and identify a design that can mitigate the environmental challenges at these localised areas. This is described in more detail within the section 5 of the Assessment of Alternatives (Appendix B).

6.3.1 Stormwater Options Assessment for DP7

DP7 is located between Taupaki Road / SH16 roundabout and Kumeū Township, on the western side of SH16 on 464 and 472 SH16. The stormwater from the wider stormwater catchment and SH16 currently discharges to 464 SH16 through a piped stormwater network and overland flow path.

There is an existing 450Ø stormwater pipe which conveys water from the eastern side of the SH16 to the west. Stormwater runoff also travels along the open channels on the western side of SH16 into a grated manhole and flow through an existing 450Ø stormwater pipe and discharge to the pond 464 SH16. The outlet pipe from the pond to Kumeū River is located in the southwest corner of the pond.

Six different design options were considered in the alternatives assessment these are:

- Option 1: Stormwater conveyance through pipes and discharge directly to the pond at 464 SH16.
- Option 2: Stormwater treatment through SW360 Filter, before discharging into the pond within 464 SH16 then to Kumeū River.
- Option 3: Swale to be constructed at 472 SH16 on then discharge via the pond at 464 SH16 then to Kumeū River.
- Option 4: Treatment via a retention swale (overland flow / open channel at 472 SH16) before discharging into the Kumeū River via a new outfall required to Kumeū River.
- Option 5: Treatment and conveyance of stormwater through a retention swale then a pipe at 474 SH16 Prior to discharging to Kumeū River.
- Option 6: Stormwater treatment (SW360 Filter) and discharge to Kumeū River through a stormwater pipe at 472 SH16.

Option 4 was the preferred option. It was the only option with a positive score for Technical Stormwater Design solution. The treatment and conveyance of stormwater through a retention swale channel prior to a new outfall at Kumeū River will avoid the use of the stormwater pond (and subsequent stormwater pond upgrades). The avoidance of hard infrastructure resulted in a neutral score against Constructability and Cost compared to the other scores that received a negative score. From a Cultural perspective, Option 4 was the preferred option as it provided two levels of inground treatment before entering the stream noting mauri of water and tikanga need to rejuvenate mauri of water from contaminants through filtration of Papatūānuku (ground-based/'natural' mechanisms). It is assumed that the discharge outfall for Option 4 will be designed to meet permitted activity standards of the AUP:OP. Any negative ecological effects can be mitigated through design and restoration planning if riparian vegetation clearance is needed.

6.3.2 Noise Mitigation Best Practical Option Assessment

There were 12 assessment areas along the corridor that were assessed in the workshop. These areas are listed in Table 12 below. Three main options were considered for each assessment area. These included a 2 - 2.5m barrier (fence), installing PA10 30mm along the assessment area of SH16 (reduce road noise) and the last options was a combination of the first two options; PA10 30mm and a 2m barrier. Where the areas fell within Category A, a do minimum option was chosen, which involved no mitigation measures.

Table 12: Options considered and preferred options for Noise BPO

Area Name	Address	Best Practical Option
East 1	181-173 SH16	Option 1: 2m barrier – This will achieve a noise level reduction of 2-3 dB at the most affected houses, reducing their noise level generally to be within Category A or B
East 2	191-239 SH16	Do minimum - PPFs fall within Category A.
East 3	299 and 291 SH16	Option 1: 2m barrier – as Option 3 (with PA10 surfacing) was not an acceptable solution for short lengths and Option 1 achieved a better noise reduction than Option 2. Option 1 (2m barrier) will reduce the noise levels slightly at the upper floor, but noticeably at the ground floor.
East 4	316 SH16, 1411, 1409, 1403 and 1397 Coatesville Riverhead Highway	Option 2: 2.5m barrier – This will reduce the noise level to within Category B. An alternative road surface is not feasible due to the intersection requiring high shear and skid resistance.
East 5	331 SH16	Do minimum - PPFs fall within Category A
East 6	16 Old North Road, 393-429 SH16	Do minimum - Majority of PPFs fall within Category A, exception being 429 SH16 which falls within Category B yet located on a road curve and therefore a noise barrier and/or low noise road surface treatment were not feasible.
East 7	465 and 457 SH16 451 SH16	Do minimum – PPFs fall within Category A Option 1: 2m barrier – Whilst the noise barrier only provides a 2db noise reduction, it will move this property from Category B with no mitigation, to a Category A.
East 8	491 and 489 SH16	Option 1: 2m barrier – This will reduce noise levels by nearly 6 dB so the dwellings fall into Category A.
East 9	505 and 507 SH16 (Kumeū Retirement Village)	Option 2: 2.5m barrier – This will reduce noise levels so the building can fall into Category B. Further investigation of any existing building insulation will determine whether internal ventilation can be provided as an alternative, so no mitigation would be required.
East 10	21-23 Riverhead Road	Do minimum - PPFs fall within Category A
West 1	218 SH16	Option 1: 2m barrier – This would achieve a small noise level reduction of slightly more than 3 dB, which would reduce noise levels to within Category B. An alternative road surface is not feasible due to the intersection requiring high shear and skid resistance.
West 2	222A SH16	Do minimum - No mitigation recommended as a 2m barrier would reduce the historic value by blocking views to the building, and only achieve limited noise levels reductions of less than 2 dB.
West 3	238 and 256 SH16	Do minimum - No mitigation recommended as a 2.5m barrier would reduce the historic value by blocking

Area Name	Address	Best Practical Option
		views to the building, and only achieve limited noise levels reductions of less than 2 dB.
West 4	264 and 300 SH16 264A SH16 (minor dwelling)	Do minimum - PPFs fall within Category A. Option 1: 2m barrier - This will have a significant positive effect given that it provides a 6db noise reduction and has a neutral effect from most disciplines' perspective. The noise wall will move this property from Category B with no mitigation, to a Category A.
West 5	340 SH16	Option 1: 2m barrier – The 2m barrier is recommended as it provide sufficient noise reduction to put the dwelling into Category A.
West 6	436 SH16	Do minimum - No mitigation is recommended as noise at 436 SH16 is predicted to reduce as a result of the Project. An alternative road surface is not feasible due to the intersection requiring high shear and skid resistance.
West 7	550 SH16	Option 1: 2m barrier – This will significantly reduce noise levels (by nearly 7 dB) to put the dwelling into Category A.
West 8	7 Main Road	Do minimum - PPFs fall within Category A.

6.3.3 Localised Option Assessment for Project design interface with a Wetland

During the preliminary design phase, the Project Ecologist completed a watercourse classification assessment (refer Ecological Impact Assessment, September 2022) to identify all the watercourses (streams and wetlands) potentially impacted by the Project's preliminary design. Two wetlands were confirmed within the Project extent, located within 436 SH16 (Wetland 1) and 522 SH16 (Wetland 2). Whilst the wetland at 436 SH16 is a 'natural wetland' under the National Policy Statement for Freshwater Management (NPS:FM) definition, the wetland at 522 SH16 is not (as per the Statutory Assessment in Section 10 of this AEE Report).

During the detailed design phase in January 2022, the project team confirmed the design would not affect the wetland at 436 SH16 but would have a direct impact on the wetland at 522 SH16 (Wetland 2). Although the NPS:FM and NES:F regulations do not apply to Wetland 2, the Project Team undertook an assessment of alternatives to determine the extent to which the wetland could be avoided or impacts minimised.

Nine design options were developed and considered for this Localised Option Assessment for the design interface with the wetland at 522 SH16:

- Option 1 – SUP South side existing alignment (i.e. per the early draft detailed design)
- Option 2a – North side SUP (long) existing alignment
- Option 2b – North side SUP (short) existing alignment
- Option 3 – SUP South side around wetland
- Option 4 – SUP Bridge existing alignment
- Option 5 – SUP Boardwalk existing alignment
- Option 6 – SUP South Realigned alignment
- Options 7a – North side SUP (long) realigned alignment
- Option 7b – North side SUP (short) realigned alignment

To determine a preferred option, consideration was balanced between the project team recommendation, site investigation data, wetland classification and consenting risks.

The wetland was assessed as having low ecological value (refer to Ecological Impact Assessment by Beca dated November 2022). It is not a natural wetland for the purpose of the NPS:FM or NES:F, however consideration has been given as to whether it can be avoided. Consideration was also given to the potential ecological value the wetland after reasonable restoration (fencing and native vegetation planting). The wetland could be restored to provide native habitat and have improved ecological functionality. However, the wetland is owned by a private landowner and even if the landowner agreed to restoration, the wetland would still be isolated within a highly modified, rural land usage landscape, and would likely be exposed to continuous weed invasion.

Option 1 would require partial reclamation of the wetland where the SUP (and associated retaining wall) would extend into it. This would only affect 83m² of the wetland area located at the north-western corner. The extent of the reclamation has been reduced as far as practicable by measures such as the use of retaining walls rather than batter slopes. Option 1 performed best against the Project Objectives of safety, efficiency, and infrastructure that supports modal shift. This option also scored the best in relation to against the Property criterion, in relation to Landscape and Visual Effects and performed the best against the Operations and Maintenance Criterion. This Option could also include planting of wetland and riparian planting mix.

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7 Consultation and Engagement

Engagement has been ongoing with partners (including Auckland Council, Auckland Transport, Mana Whenua), key stakeholders, affected landowners and the wider community.

Various methods of engagement have been utilised. Feedback from this engagement has been essential in developing and influencing key aspects of the Project and stakeholders have been advised on how their feedback has been used by the Project team to date.

This Section provides an overview of the engagement purpose, objectives, context, and the stakeholder and community engagement activity completed from 2016 through to lodgement of the NoR and resource consent documentation in November 2022.

7.1 Purpose and Objectives

The purpose of the consultation and engagement to date has been to:

- Inform stakeholders and directly affected landowners about the Project including its benefits and potential effects
- Gather knowledge and feedback from stakeholders and directly affected landowners to inform the project so that it is fit for purpose and meets their needs, and
- Engage with mana whenua as they are partners with Waka Kotahi and key stakeholders of the Project.

7.2 Context

The Project has been informed by the following engagement activities that have been undertaken throughout the life of the Project:

1. The Transport for Future Urban Growth (TFUG) Programme Business Case. In developing the programme business case two rounds of public consultation, stakeholder engagement and a series of hui with iwi across Auckland was undertaken. The feedback from these engagements was incorporated into the preferred programme, which recommended safety improvements on SH16 be prioritised for further business case investigation.
2. The SH16 SSBC. Between 2016-2018, in developing the SSBC there was stakeholder, mana whenua and public engagement on options considered in the business cases, including specific public consultation on the SUP.
3. Interim safety solution. In 2021 public feedback was sought on proposal to ban right turns from Coatesville-Riverhead Highway onto SH16 to improve safety while work continued on the Project.
4. Detailed Design of SH16 Stage 2. Recent engagement undertaken in 2021-2022 has focussed on mana whenua partners, stakeholders and affected landowners where feedback was sought on the Stage 2 detailed design.

A more detailed summary is outlined in the sub-sections below.

7.3 Summary of Mana Whenua consultation and engagement

The project team has presented the Project to the wider Waka Kotahi Northern Iwi Integration Group (IIG) and two interested iwi nominated themselves for further engagement beyond this platform, being Ngāti Whatua o Kaipara and Te Kawerau āMaki. The project team has met with Ngāti Whatua o Kaipara and Te Kawerau ā Maki on several occasions and conducted a site visit with both iwi groups (as part of Stage 1). Mana whenua have been engaged on Stage 2 of the Project regarding landscape planting, stormwater and cultural artwork. Huis with both iwīs have been occurring since November 2018. Nga Maunga Whakahii O Kaipara (the

development trust that represents Ngāti Whatua O Kaipara) prepared a Cultural Values Assessment in 2018 for the SH16 Project outlining the history of the area and potential cultural effects of the Project. Both iwi groups have also been involved with alternatives assessment workshops and optioneering (during the SSBC and detailed design phases) including developing the criteria for the MCA and scoring of options from a cultural perspective. More recently in 2022, high workloads have limited the ability of both iwi groups to provide input; however, both have indicated their general comfort with the Project and will continue to be offered opportunities to be involved as the Project progresses. Any interest or feedback provided by the two groups have been considered and incorporated throughout the design process (where possible) and are also detailed in Table 13.

Table 13: Key feedback from Mana whenua

Partner Engagement	Key feedback and timings
Ngāti Whatua o Kaipara (represented by Nga Maunga Whakahii O Kaipara)	General project hui were held with Ngāti Whatua o Kaipara on the 9 March 2018, 1 August 2018, 27 May 2019, 27 May 2019, 11 June 2020, 24 July 2020 to 16 October 2020, 20 November 2020, 15 January 2021, 25 August 2022 and 1 November 2022. A summary of the feedback received during this engagement is summarised below. Supportive of the project due to safety and congestion issues along this important access route to their land, services and provide work for our people. This is a portage route with waterways leading up to the Kaipara Harbour. Preference for design and interpretation to be focussed on the shared use path as people are travelling at a slower pace and are able to connect with this. Waka Kotahi should look into adopting dual names for these carriageways¹³ which have meaning for where they are taking people. SH16 does not evoke the ideas of people having moved through this space for centuries from the Waitematā through to Kaipara. Noted that General Authority is not a good approach as it needs to be more focussed recognising existing sites and avoiding these. However, given that there are no known Māori cultural heritage sites within the project extent General Authority is considered acceptable. Native planting should be retained where possible along the alignment and Ngāti Whatua support the proposed restoration native planting plans. Ngāti Whatua o Kaipara requested consideration of appropriate maintenance in the planting plans to ensure the envisioned vegetation plan is successful. They suggested low maintenance planting on the roundabouts to limit maintenance (where access to roundabouts is difficult/unsafe). Encouraged riparian planting to be improved wherever possible through the Project. Encouraged natural stormwater treatment over hard infrastructure. Supported providing fish passage for any stream culverts that will be upgraded or altered through the Project. Coatesville Riverhead highway is of cultural importance due to this previously being a portage route, waka would come up here, then be hauled across to connect with the Kaipara. They have aspirations for quality of the waterways and this is a key area of interest for them.

¹³ Waka Kotahi note this feedback is a nationwide ongoing discussion and isn't solely related to the SH16 Stage 2 project corridor.

Partner Engagement	Key feedback and timings
Te Kawerau āMaki <i>(represented by Te Kawerau ā Maki Tiaki Trust)</i>	A hui was held on the 25 August 2022 to discuss the landscape design, stormwater outcomes and consenting strategy and discuss any feedback or concerns they had. Te Kawerau ā Maki could not attend this meeting. General project hui were held with Te Kawerau ā Maki on the 26 April 2018, 31 July 2018, 20 December 2018, 29 May 2019, 24 Feb 2020, 10 August 2020, 16 October 2020, 20 November 2020 and 15 January 2021. Supportive of the project as Te Kawerau ā Maki are landowners nearby and this is a key arterial route to the northwest that needs to be safe for their people and manuhiri (visitors). Indicated interest in design and narrative opportunities along the route as there are limited areas in the area that acknowledge tangata whenua (email dated 16 December 2021). Noted that General Authority is not a good approach however given that there are no known Māori cultural heritage sites within the project extent General Authority is considered acceptable. Have a particular interest in the stormwater design and understanding the effects on discharge to streams, and has a preference for natural treatment where possible. Supportive of the native planting approach. Indicated in a hui on the 10 August 2020 that they would like to prepare a CVA. Confirmed in a hui late 2021 that they no longer wished to prepare a CVA. Indicated in an email April 2022 that they are at capacity, there is no need to provide a CIA and they are comfortable with the Project. Received letter October 2022 stating not opposed to the Project and would like to stay involved as Project progresses from design to construction phase.
Key engagement with both iwi	On 1 April 2020 a meeting was held to discuss opportunities for cultural expression along the alignment. 20 November 2020 to discuss landscaping and stormwater management and seek feedback from both iwi. On the 11 January 2021 the Urban and Landscape Design Master Plan (ULDMP) and Planting Philosophy was sent to both iwi for feedback. A meeting was then held on the 15 January 2021 with both iwi to discuss the ULDMP and Planting Philosophy. Both Ngāti Whatua o Kaipara and Te Kawerau ā Maki noted that Ngongetepara Stream and Kumeū River are both significant transport corridors for iwi linking the Waitematā and Kaipara. They supported the inclusion of the narrative in the ULDMP around portage between the Kumeū River and the Kaipara Harbour. They supported the idea for a gateway to the Kaipara region at the boundary of Ngāti Whātua o Kaipara rohe as you enter Kumeū. Additional minor amendments were requested to the cultural section of the ULDMP. On 23 November 2021 a hui was held to discuss the Waka Kotahi process to revisit the alternatives assessment. Assessment scores were then received in January 2022 by Te Kawerau ā Maki.

7.4 Summary of key stakeholder consultation and engagement

A summary of the groups consulted with can be found in Table 14 below. The table lists the dates of physical meetings however engagement also included emails and/or phone calls with the listed stakeholders.

Table 14: Stakeholder Engagement

Stakeholder Engagement	Engagement timing
Rodney Local Board	August 2016, March 2017, May 2017, February 2018, May 2018, September 2018, September 2022. Regular communications with local board chair Phelan Pirrie from 2018 to the beginning of 2022.
Auckland Council (PRR00037836)	Pre-application engagement with Auckland Council Planner and Environmental Specialists included: • Ecologists - June 2021 (site walkover) • Heritage - August 2021 (Email re: Project heritage specialists to be commissioned); • Stormwater – 10 September 2021 • Contaminated Land – 24 September 2021 • Heritage and Archaeology – 28 October 2021 • Senior Planner – June 2021 (site walkover), 5 November 2021 • Parks Planning 15 September 2022, 3 October 2022 • Land Advisory Services – 4 October 2022
Auckland Transport	Engagement with Auckland Transport has included: • 12 July 2022 (Project introduction and discussion of local road interfaces with the Project) • July 2022 (Emails with Stormwater contact and Network Development – Public Transport Development contact) 12 July 2022 (Meeting on stormwater design) • 9 August 2022 (Memo sent to AT to outline where the Project stormwater interfaces with AT corridor assets) • 23 August 2022 (Emailed stormwater design information) • 26 August 2022 (Received AT email with comments on stormwater design) • 20 September 2022 (Received AT email with comments from civil design and standards team) • 5 October 2022 (Meeting with Consent Planning and Acquisition team) • 17 October 2022 (Emailed detailed design plans to AT Consent Planning and Acquisition team to confirm design, works in AT designation and request RMA s176 written approval) • 31 October 2022 (draft arborist and site clearance plans shared in relation to vegetation removal on local roads).,
Department of Conservation	May 2022 (project overview meeting, confirming no interface with conservation land or Coastal Marine Area).
Heritage NZ	August 2021 (Email re: Project heritage specialists); February 2022 (Meeting)
Fire and Emergency NZ	June 2017 (meeting to provide an update on the project and other Safe Roads projects) September 2018 (project overview meeting) July 2022 (project overview meeting to share and seek feedback on the draft detailed design)

Stakeholder Engagement	Engagement timing
St John NZ	July 2022 (project overview meeting to share and seek feedback on the draft detailed design)
NZ Police	April 2018 (meeting to provide an update on the project and other Safe Roads projects) June 2022 (project overview meeting to share and seek feedback on the draft detailed design)
Bike Auckland	August 2018 (meeting to seek feedback on options for walking and cycling path) April 2020 (email to update on the Project that shared path is included) April 2021 (email update to request feedback on the draft design for pedestrian crossings at Coatesville-Riverhead roundabout) June 2022 (project overview meeting to share and seek feedback on the draft detailed design) November 2022 (project update meeting to share detailed design plans prior to lodgement)
Heavy Haulage	October 2020 (meeting to provide an overall update on the Project and seek feedback on the draft detailed design for Stage 1) June 2022 (project overview meeting to share and seek feedback on the draft detailed design)
National Road Carriers	August 2020 (meeting to provide an update on the project and other Safe Roads projects) June 2022 (project overview meeting to share and seek feedback on the draft detailed design)
Blind Low Vision NZ	June 2022 (project overview meeting to share and seek feedback on the draft detailed design)
Walking Access NZ	September 2018 (sought feedback on options for walking and cycling path)
Living Streets Aotearoa	August 2018 (sought feedback on options for walking and cycling path)

7.4.1 Utility Providers

There are multiple network utility providers with assets and interests along the corridor including:

- Chorus
- Vocus
- Vector
- Watercare
- Transpower
- Spark
- Vodafone.

All utility providers have been made aware of the proposed works through meetings and email correspondence since 2020 (for some since 2018 prior to the separation of Stage 1 and 2 delivery) and consultation with each is ongoing. Some of the existing utility assets need to be relocated due to the construction of new roading infrastructure and it was decided to use this opportunity to underground existing overhead power lines to reduce roadside hazards. The proposed design is collaborative and also takes into account the requirements of each utility and provides for future capacity where requested. For example,

Chorus and Vector are including extra ducts pipes to enable the installation of fibre and electricity supply in the future. Overall, all network utility owners are generally supportive of the Project.

On 20 October 2022, Waka Kotahi sent requests for affected party approval / written letters of support to all providers listed above. Waka Kotahi have reach agreement in principle with all these providers. Written Approval for the Project from Transpower New Zealand Limited was provided on 17 November 2022 and from Spark on the (refer Appendix R) However, no formal response has been received before the lodgement of this NOR from any other utility providers.

7.4.2 Summary of landowner consultation and engagement

All landowners identified as directly affected by permanent and/or temporary land requirements for the alteration to designation (67) have been notified by either letter or email correspondence with an information sheet on the overall project and a request to contact the Project team. All landowners that responded were offered a meeting and the Project team have met with the landowners of 55 properties on at least one occasion. Those that did not respond (4 landowners) were sent at least three letters and/or emails in April, May and September 2022 and were door knocked.

Landowners within the Project Corridor who are not affected by a land requirement but may be impacted by changes near their property have been identified as project neighbours (for example the 13 landowners at Kennedys Road who will no longer be able to turn right onto SH16 due to the median barrier). Project neighbours were sent addressed letters outlining this impact and inviting them to the public information session to find out more about the Project.

Most landowners were supportive of the project overall though some were concerned at the impact to their property. Key feedback and queries were related to:

- Overall support for the shared path, undergrounding power lines, safety improvements including the flush median, the new roundabout and additional lane capacity between Brigham Creek Road and Taupaki Road
- Safe entry and exit from driveways
- Concerns about tree removal because of potential impacts of privacy, safety and loss of vegetation that was perceived to provide noise mitigation and was identified as valuable to them in a rural environment
- The amount of their land affected
- Shading and dominance effects from noise walls
- Reinstatement of fences and replacement planting
- Whether the project would include reticulated water supply, wastewater and fibre.

Some landowners (both those directly affected by land requirement and project neighbours) were not supportive of the median barrier due to the length of detour this required and the additional time this would take given the congestion through this area. In particular, it was requested by one landowner that the ability to turn right from SH16 into Kennedys Road be retained.

Some landowners also requested additional footpaths and/or a pedestrian crossing between Taupaki Road roundabout and the Kumeū town centre.

Some landowners also raised concerns that the Project would not cater for the continual growth in the area and recent developments; however, this is outside of the scope of this Project given transport network plans to support future urban growth are being delivered through the Supporting Growth Programme as addressed in Section 2.1.1.

Overall, Waka Kotahi has met and worked with landowners to address their concerns. The Project design has subsequently been updated to address those concerns as far as practical.

7.4.3 Wider community

Community engagement has occurred on multiple occasions and feedback received throughout this time has been considered and integrated into the final detailed design. In general, there is community support for the project as safety and congestion along this route remain of high concern. There is also support for the SUP. During public consultation on walking and cycling in 2018, 81% of people said they supported plans for a separated SUP. This, along with the GPS 2018 and feedback from other stakeholders, led to the inclusion of the walking and cycling path between Brigham Creek roundabout and Kumeū.

The most common piece of feedback received from the community is regarding the speed of progress of the Project and to stress that improvements need to be implemented urgently.

Community consultation is summarised in Table 15 below.

Table 15: Community engagement

Community Engagement Phase/Timing	Description
Early 2016 (TFUG)	- Information days were held and community feedback was sought on potential improvements to the transport network in the Northwest future urban growth area (identified in the Future Urban Land Supply Strategy (FULSS)) - People identified the need to improve road infrastructure and make SH16 intersections safer - Some people also suggested that roads in the Northwest should be made available to walking, cycling, horse riding and paraplegic activities.
December 2016 (SSBC)	- Three open days were held and community feedback was sought on the concept design for the project. 157 feedback forms were received and around 230 people attended the three days. Feedback assisted the concept design of short listed options - The first two open days targeted the regular users of the corridor, residents, commuters, and business users. The third open day targeted recreational cyclists and the event took place at two cafes which cyclists regularly visit as part of their Sunday cycle ride. - Many people (43%) indicated preference for a roundabout at the intersection of Coatesville-Riverhead Highway and SH16 - A mix of positive and negative feedback was received on the proposed design between Taupaki Road Roundabout and Kumeū. Congestion was a common concern and people recommended additional lanes in this section - People raised the need for safe pedestrian crossings at the bus stops outside Soljans Estate Winery and the Coatesville-Riverhead Highway intersection.
September 2018 (SSBC)	- Three open days were held (together with Te Tupu Ngātahi Supporting Growth) with a focus on seeking feedback on walking and cycling and speed along the corridor - Around 316 people attended public information days held over three days and 309 gave written or verbal feedback 81% of people said they supported plans for a separated SUP.
April 2021 (SH16 Stage 2)	Feedback was sought on the proposal to ban right turns from Coatesville-Riverhead Highway onto SH16 as an interim measure to improve safety while work continued on the Project

Community Engagement Phase/Timing	Description
	• 508 people provided feedback, many of whom also commented on the wider project emphasising the need to just get on with the project and progress the permanent improvements as quickly as possible • A roundabout was still the preferred option with 89% of those who commented on a permanent solution supportive of a roundabout.
May 2022 (SH16 Stage 2)	• The Project team attended a Te Tupu Ngātahi event held at Te Manawa in Westgate to answer queries.
October 2022 (SH16 Stage 2)	• A public information session was held to inform the local community of the design and provide an opportunity to ask questions before lodgement • For those unable to attend this event the design plans were published on the Project website prior to lodgement and people could contact the project team to ask questions

8 Assessment of Effects on the Environment

8.1 Overview

This section includes an assessment of the actual and potential effects associated with the construction and operation of the proposed works. This section has been prepared in accordance with Schedule 4 of the RMA and the relevant matters of control and discretion from the AUP-OP.

Once completed, the Project will result in a range of actual or potential permanent effects, which includes:

Positive Effects from improvements to road safety and efficiency and walking and cycling connections
A net gain of enhanced riparian and wetland planting will enable treated stormwater runoff.

In addition, there is a range of temporary effects that have the potential to arise during construction, this includes:

- Transport effects
- Community effects
- Heritage effects
- Construction noise and vibration effects
- Earthworks
- Ecological effects
- Arboricultural effects
- Landscape and visual effects
- Effects on network utilities
- Effects on the Open Space – Conservation Zone at Taupaki Esplanade Reserve Effects on private wastewater services
- Cultural effects.

There is also a range of operational effects that have the potential to arise from the completed Project, this includes:

- Transport effects
- Traffic noise
- Stormwater effects
- Permanent watercourse and ecological effects
- Landscape and visual effects
- Cultural effects.

This section also includes proposed measures to avoid, remedy or mitigate potential adverse effects on the environment.

8.2 Positive Effects

8.2.1 Road Safety and Efficiency Improvements

SH16 is one of the highest-risk rural roads in the country. The proposed works will improve the safety of the SH16 corridor. Between 2020 and 2021, it has been reported that two people were seriously injured, 19 with serious injuries and 26 people obtained minor injuries on this stretch of road. This makes it one of the highest-risk rural roads in the country. The works include installation of a new roundabout at Coatesville-Riverhead Highway, side barriers, median barriers, a flush median and widened shoulders which will reduce the risk and severity of head-on and run-off road accidents. The proposed works are predicted to reduce DSIs over a 10 year period by 62%. Section 2.1.1 of this report highlights how most of the fatal crashes reported were a result

of loss of control or head on collisions. The installation of median barriers along most of the corridor will significantly reduce the risk of the fatal crashes. Reducing the possibility and severity of a crash occurring will have positive effects on road users' health, safety and social wellbeing by lowering the potential for serious injury or death. Reducing the possibility and severity of a crash also has positive economic effects by lowering the potential for delays in freight delivery and general road users and/or damage of goods or DSIs. Environmentally, reducing the risk of a crash also reduces the potential for spills, fire or other contamination to and/or damage of the surrounding environment.

As well as safety improvements, the project will improve efficiency in the short-term on this busy section of state highway through the addition of extra lanes between Brigham Creek and Taupaki Road roundabout. Efficiency benefits are represented by predicted improvements to travel time for motorists travelling during the morning and afternoon peaks which are discussed below based on a previous transport assessment undertaken by Flow Transportation Specialists in 2017 and 2021¹⁴.

The positive road safety and efficiency improvements are summarised below in relation to each of the four sections of the project extent (Sections A-D):

Section A (Brigham Creek Road to Coatesville Riverhead Highway):

- The relevant works in Section A include an additional lane in each direction, a median barrier and wider shoulders
- The works will improve the safety rating for this stretch of the corridor from a 2 to 3.5 or greater KiwiRAP star rating¹⁵. The KiwiRAP is a way to measure DSI risk. The increase of 1.5 KiwiRAP rating indicates a positive result in a safer road design to reduce DSIs
- The extra lanes in each direction (four lanes total) are predicted to result in an improved travel time eastbound direction (towards the city centre) of 55 seconds in the morning peak (referred to as 'AM') and 5 seconds increase in the afternoon peak (referred to as PM)
- The predicted westbound (towards Kumeū) travel times includes an improvement of 305 seconds in the PM (noting there is a predicted 5 second increase in the AM travel times). These improvements are attributed to the additional lanes in each direction
- The wider shoulders and additional lanes will allow at least one lane to remain in use in the event of a crash or maintenance to reduce congestion and disruptions to the road network.

Section B (Coatesville Riverhead Highway Intersection with SH16):

- The relevant works in Section B include a new roundabout at the intersection of Coatesville-Riverhead Highway and SH16
- The roundabout will contribute to the reduction in DSIs as it will reduce the chance of head-on and side impact crashes, and lower vehicle speeds (as people will need to slow down as they are approaching the roundabout and prepare to give way or stop), compared to the existing intersection.

Section C (Coatesville Riverhead Highway to Taupaki Road):

- In terms of safety benefits, this section is included in the 62% 10 year predicted DSI stated above for Section A. This option has improvements to eastbound AM travel time (travelling towards the city) of

¹⁴ SSBC Appendix D – Traffic Demand Modelling, Flow Transportation Specialists, August 2017, entitled 'Safe Roads Alliance: SH16 Corridor Option Evaluation'. In 2021, Waka Kotahi had Flow Transportation Specialists update their model they used for the 2017 assessment with a more recent SATURN model used by Te Tupu Ngātahi - Supporting Growth. The 2021 assessment reconfirmed the same conclusions as the 2017 assessment at a high level.

¹⁵ The Project Corridor has been assessed using a New Zealand Roadside Assessment Programme (KiwiRAP) classification, this star rating method is a predictive measure of the personal safety of a longer length of road based on the road protection score (RPS) for each 100m section and typically averaged over 5km. Refer to Section 2.1.1 for more details

10 seconds and no change to PM. Westbound AM travel time (travelling towards Kumeu) has no change however, there is an improvement of 10 seconds in the PM westbound direction. The additional two lanes in this section contribute to the upstream travel time benefits in Section A for westbound direction and Section D for westbound direction.

Section D (Taupaki Road to Kumeū Township):

- This option reduces the 10 year predicted DSI by 50% for this section and results in a total increase of 0.7km of 3.5 or greater KiwiRAP star rating. There are no notable efficiency improvements for this section.

8.2.2 Roundabout treatment:

The proposal includes a new roundabout at Coatesville Riverhead Highway. Given the intersection proposes multi lane approaches, consideration for design treatments to encourage speed reduction will increase safety for pedestrians and cyclists crossing the intersection.

The design concept focuses on utilising hard materials such as river rounds, rock rip rap, feature boulders and paved elements to provide a concept that reduces vehicles accessing/parking on the roundabout and long term maintenance. The use of these materials enables clear sightlines across the roundabout and provides a visual cue for speed reduction on approaches to the roundabout. The concepts provide space to integrate patterns and/or colour on the outer surface and a central space for cultural artwork or sculptures if desired for this key intersection of the corridor.

8.2.3 Walking and Cycling Improvements

There is currently no continuous footpath for pedestrians along the Project corridor as it has previously supported a predominately rural catchment. The surrounding area has been experiencing recent development and the Northwest is predicted to have significant growth over the next 20 years. As SH16 has gotten more congested over the years, it has also become unsafe for road cyclists. Therefore, the provision of safe access and improved walking and cycling facilities are needed now to support modal shift. A SUP will encourage people to cycle in a safe space away from the highway. The path may reduce the amount of people in cars and reduce the pressure on the local road network and contribute to the national effort to combat climate change. The proposed SUP will link into the existing cycle lane along Fred Taylor Drive and onto the existing footpath in the Kumeū Township. It will also link into the proposed cycle facility being implemented with Auckland Transport's SH16/Access Road Upgrade Project.

The Project includes five new pedestrian and cyclist crossing facilities:

1. A signalised crossing on the western leg of Brigham Creek Roundabout (which will be monitored post implementation to determine if a raised platform is required at this location).
2. A signalised crossing with raised safety platform along SH16, on the eastern leg of the proposed Coatesville Riverhead Roundabout
3. A signalised crossing with raised safety platform along SH16, on the eastern leg of the existing Taupaki Road Roundabout
4. A raised and unsignalised crossing point on Coatesville Riverhead Highway
5. A raised and unsignalised crossing point on Taupaki Road.

These will provide safe crossing facilities for pedestrians and cyclists using the SUP, to access bus stops and other local amenities.

8.2.4 Stormwater Treatment

Currently, only 25% of the Project runoff is treated. Not all runoff from existing road surface can be captured and treated through this Project, as there are some sections of the existing carriageway edge which are left unchanged at the western end of the Project. There are also some areas where it is not practical to achieve 100% of treatment due to site constraints. However, Waka Kotahi is still proposing to treat approximately 90% of the total impervious road area (67,373m² of treated area out of 75,242m² total impervious area). This will include a lot of the existing road surface and will be a significant improvement to water quality on the surrounding environment from the current scenario.

8.2.5 Landscaping and ecological planting

The removal of existing trees and vegetation along the corridor is required to enable the Project works. Landscaping is proposed to mitigate the effect of the required tree removals and to seamlessly tie the state highway landscape into the surrounding landscape, provide consistency with Stage 1 (being SH16 from Huapai to Waimauku) and create a 'stitching' of vegetation patterns across the alignment. The proposed landscape planting will cover 41,539m² and will include approximately 88,400 plants. The planting will include 210 45-litre grade sized specimen trees and another 64 25-litre grade sized trees. The plants will range in size once matured and will consist of native species. The planting proposed also has ecological benefits by increasing the area of vegetation and creating green corridors for habitat.

The overall landscape planting strategy aims to enhance the underlying landscape elements, patterns and processes adjacent to the road corridor. Refer to section 3.1.11 for more details.

8.3 Construction Effects

The following sections will outline the potential adverse effects from the construction of the Project and any proposed mitigation.

8.3.1 Arboricultural Effects

The Project works required to establish the permanent changes to State Highway 16 and adjoining roads will result in the permanent removal of up to 159 trees/tree groups within the Project area. An Arboricultural Assessment has been undertaken by Peers Brown Miller Ltd and is attached in Appendix S which assesses the effects these Project works will have on vegetation along the corridor.

Vegetation Removal

Vegetation removal has been assessed as a worst-case scenario which assumes that all vegetation impacted by Project works footprint will be removed. Less vegetation will likely be removed, as the contractor will put strategies in place to minimise vegetation loss as far as practicable. Therefore, the vegetation removal outlined for this Project assumes the worst case scenario. The proposed vegetation removal is outlined as follows and is outlined in more detail within Appendix S which includes a complete schedule of all the trees/tree groups:

- 67 trees/tree groups will be removed within the existing designation boundary. These trees can be removed as of right by Waka Kotahi
- There are 21 trees/tree groups identified as being less than 6m in height, non pest plant species, and within the altered designation area. Out of these, three are located outside of the rural zoning. Therefore, a total of 18 trees/tree groups require a regional resource consent due to non-compliance with the AUP:OP Standard E26.3.5.2.(6)
- 71 trees/tree groups are identified as being greater than 6m in height, non pest plant species, and within the altered designations. Nine of these are within Future Urban Zoning, so are not protected

under the regional plan. Therefore, there are a total of 62 trees/tree groups proposed for removal which require regional consent due to the non-compliance with the Standards E26.3.5.2.(1 and 3).

- Vegetation removal of predominately pest plant species, is proposed around the six identified water courses and two wetlands due to road widening, installation of the SUP and the construction activities
- Vegetation removal and alteration within the local road reserve and outside the designation areas include, a group of trees within the road reserve of Coatesville Riverhead Highway (to be removed) and a large Magnolia tree and Cabbage tree (works within the root zone of these two trees) on the western side of Coatesville Riverhead Highway.

Effects Assessment

The removal of vegetation has the potential to cause ecological, landscape and amenity effects. These effects are addressed in sections 8.3.2 and 8.4.7 below. Other than the loss of one threatened kauri tree, there is minimal loss of botanical value associated with removing roadside vegetation.

The proposed vegetation removal will not result in an increase to natural hazard risks. Sections of the project require vegetation removal to install infrastructure that will improve the resilience of the infrastructure network in this area, such as upgrading the stormwater networks.

The arborist has identified trees beyond the designation boundary that will likely have their tree root zones within the construction footprint. Mitigation measures will be undertaken to protect these trees where possible.

Measures to avoid, remedy or mitigate potential adverse effects on the environment:

The following replanting measures will be employed to avoid remedy or mitigate effects arising from the removal of vegetation:

- Where practicable vegetation alteration will be minimised or avoided, the extent of which will not be known until a Contractor confirms construction methodology.
- The Project includes a comprehensive planting plan that spans the length of the corridor. In total, these plans include over 88,400 new plants, with 210 45-litre and 64 25L grade sized specimen trees. Although some of the proposed planting will take years to develop a canopy, the new vegetation cover will enhance the indigenous biodiversity cover and values of the corridor and result in positive net gain in vegetation.
- The proposed planting plan includes a greater number and diversity of vegetation.
- The following works methods and tree protection measures will be implemented to avoid, remedy or mitigate effects on vegetation that could be retained or where construction works may occur within the root zones only:
- Pre-commencement meetings to discuss protection methods around trees that could be retained through specific construction methodology.
- Protective fencing will be installed wherever practicable at the root zone edge of trees being retained. This fencing shall remain in place for the duration of the project (when works are being carried out in adjacent areas) in order to best protect the subject trees. The fencing is to be rent-o-style 1.8 metre steel mesh sections.
- Avoiding specific construction activities within the protective fencing area.
- Onsite supervision by a suitably qualified and experienced arborist.
- Implementation of bio-security protocols will be undertaken to control the removal of soil and kauri tree material so as to minimise and limit the spread of the Kauri Dieback Disease. A Kauri tree near the stream on 436 SH16 is proposed to be removed.

- Tree Owner Approval (TOA) is sought for the alteration and removal of trees within the local road reserve outside of the proposed designation and on land owned by Council.

Standard tree protection measures will be put in place during the construction period ensuring that any impact on retained trees is less than minor.

8.3.2 Ecological Effects

An ECIA has been prepared and is found in Appendix M. The ECIA assesses the potential adverse effects below:

- Loss of terrestrial vegetation (temporary and permanent)
- Loss of wetland habitat (temporary and permanent)
- Loss of riparian habitat (temporary and permanent)
- Loss of fauna habitat (temporary and permanent)
- Alteration of benthic habitat (permanent)
- Alteration in hydrological input (permanent)
- Reduction in fish passage (temporary)
- Degradation of aquatic or wetland ecosystem from sediment runoff (temporary)
- Injury or mortality of fauna (during construction)

The ECIA also assesses the ecological value of the corridor which will identify the level of effects the Project will have on the ecology along SH16. In order to reduce the potential ecological effects several mitigation and management measures are proposed. With the adoption of the following mitigation measures the overall ecological effects will be less than minor. These include:

- Erosion and sediment control
- Planting of riparian vegetation
- Fish Management Plan
- Herpetofauna survey
- Avoidance of avifauna breeding season
- Bat Roost Survey; and
- Wetland restoration planting.

Effects on Streams:

Sedimentation:

As outlined in section 8.3.5, there is a range of work proposed around each stream, and Kumeū River and Ngongetepara Stream which will involve the installation of a new pedestrian bridge. Minor works are proposed in the stream bed to install the riprap at the discharge locations at the Ngongetepara Stream, the stream at 429 and 436 SH16 and the Kumeū River. Minor works in the Ngongetepara Stream is also required to remove the existing outfall. As a result of the stream bed disturbance, there is the possibility of local and temporary increase in turbidity and suspended solid concentrations during construction, thereby reducing the water quality of the stream. High sediment concentrations can have adverse effects on aquatic ecology, including smothering instream organisms, reducing the abundance and diversity of macroinvertebrates, and harming the current fish population as many fish are visual feeders.

Additional supporting piles may be required at Ngongetepara Stream and Kumeū River under the proposed new SUP bridges. Approximately 12 bore piles may be required at Kumeū River (7 on the western stream bank and 5 on the eastern bank). These piles will be located a minimum of 4m from the stream edge on the eastern bank and a minimum of 5.5m on the western bank. The partial removal of the rock walls at Kumeū River may be required to install these piles. Similarly, at Brigham Creek, approximately 4 bore piles may be

required on each bank under the proposed SUP bridge to support slope stability (8 in total). These piles will be 600mm in diameter and will be located a minimum of 3.5m from the stream edge on each bank. The bore piles will also have ground anchors at a 45 degree angle, embedded approximately 5m into the bedrock. Given the close nature of these works to the stream, there is the potential for sedimentation in the streams.

As outlined in section 3.1.9, there are a number of places where the Project will discharge to a stream environment, which in most cases involves riprap down the stream bank to slow the water flow before entering the stream. The only place where riprap will be required in the streambed is at the three discharge points at Ngongetepara Stream due to the steep slope of the bank. The riprap will be placed 1m above the stream bed and extend 1m into the stream.

Measures to avoid, remedy or mitigate potential adverse effects:

To mitigate the potential adverse effects of sedimentation in streams, all works will be undertaken in accordance with an Erosion and Sediment Control Plan which is outlined in Appendix Q to reduce the potential for sediment discharge to enter or spread in the receiving environment. This includes implementation of sediment control measures in accordance with the Auckland Council best practice guidance (GD05).

The piling work can be undertaken from the stream bank and existing road. Piling work does not typically generate large volumes of earthworks. Therefore, using silt fences around the work area will suffice in capturing any sedimentation or runoff before entering the streams. A site-specific Erosion and Sediment Control Plan has been created to manage works at Ngongetepara Stream and Kumeū River. These can be found in Appendix Q. It is unknown at the time of lodgement if these additional supporting piles will be required. Therefore, they have been included in the design and may be removed. Therefore, any effects associated with the piles are the worst case scenario.

Coffer dams will be used for the installation of the ripraps at Ngongetepara Stream, this will divert water away from the impact area and reduce sedimentation in the stream during construction.

Permanent Alteration of Benthic Habitat:

The installation of riprap aprons as part of stormwater network improvements will permanently alter a small portion of the benthic composition of the Ngongetepara Stream, the stream at 429 and 436 SH16 and the Kumeū River.

The impacts include increasing the number of large cobbles and /or boulders of the benthic composition, which can alter the stream flow profile and result in positive effects associated with increased habitat diversity. However, the amount of riprap to be placed in the streambed of each stream is relatively small given their impact reaches, and they will not be placed throughout the full cross section of any of the streams. The effects of this are considered less than minor.

Riparian vegetation loss

The temporary loss of riparian vegetation during construction will be addressed by the reinstatement of native vegetation within the altered designation boundary. The temporary and permanent riparian vegetation loss is provided in Table 16 below, along with mitigation planting.

The loss of riparian vegetation will negatively impact stream function by reducing connectivity with adjacent habitats, shading, bank stabilisation, and the filtration of surface water runoff. However, as a similar composition and density of bankside vegetation is present throughout the impact reach of each stream, the relatively small extent of riparian vegetation loss will produce limited impacts on stream function.

Measures to avoid, remedy or mitigate potential adverse effects:

Much of the effects associated with vegetation loss will be temporary, as all areas cleared during construction will be actively replanted according to the landscape design, and is expected to provide an improved native value within 5 – 10 years following its reinstatement. During replanting, any pest plants will be removed before reinstating the native vegetation.

As seen in Table 16, the area of restoration planting for the stream up Coatesville Riverhead Highway is less than the estimated area of riparian vegetation loss. However, the vegetation to be lost consists mostly of herbaceous weeds and a few young lilly pilly trees and cabbage trees, and would have provided minimal ecosystem benefits to begin with. Additionally, it is expected that the 50 m² of native revegetation will improve the native composition and ecological function of the riparian habitat compared to its current state within 5 – 10 years following reinstatement.

Table 16: Temporary and permanent riparian vegetation loss Stream

Riparian vegetation loss				
Stream	Description	Loss Type	Area	Restoration planting
Ngongetepara Stream	Mix of well-established shrubs and large trees, including both native and exotic species.	Temporary	362 m ²	756 m ²
		Permanent	263 m ²	
1385 Coatesville Riverhead Highway	Mostly herbaceous weeds, and few trees.	Temporary	51 m ²	50m ²
		Permanent	44 m ²	
429 SH16	Herbaceous plants, grass pasture, shrubs few trees present	Temporary	230 m ²	276 m ²
		Permanent	26 m ²	
436 SH16	Mostly of blackberry and Chinese privet, with some shrubs and a small tree immediately adjacent to the road	Temporary	59 m ²	213 m ²
		Permanent	25 m ²	
Kumeū River	Mix of well-established shrubs and large trees, including both native and exotic species.	Temporary	269 m ²	348 m ²
		Permanent	70 m ²	

The ECIA concludes that the overall temporary loss of vegetation will be less than minor when considering the proposed restoration planting, which will result in a net gain of native riparian planning that will provide stronger ecosystem services to the stream and stream habitat.

Road side vegetation removal:

Terrestrial vegetation within the road reserve / altered designation will be cleared across the SH16 corridor for the construction of the Project. These details are outlined in section 8.3.1 above.

Vegetation along the road corridor, contains mostly rank grass and roadside trees and shrubs. The removal of terrestrial vegetation can reduce the provision of ecosystem services, such as stormwater filtration, fauna habitat provision, and protection from wind and heat, although this was provided at a low level to begin with. Other than the loss of one kauri tree, there is minimal loss of botanical value associated with removing roadside vegetation.

Measures to avoid, remedy or mitigate potential adverse effects:

Over 88,400 new plants will be planted along the corridor, including 210 45-litre and 64 25L grade sized specimen trees. This will improve habitat value and enhance the ecological condition of the roadside corridor.

Construction effects on the wetland and 436 SH16:

The natural wetland at 436 SH16, is located 16m from the edge of the road and is approximately 179m². It is likely being fed by seepage emerging from the surrounding sloped landscape and follows a natural flow pathway running parallel to SH16, towards the tributary of the Kumeū River. The wetland at 436 SH16 is considered to have low ecological value due to its use as a livestock paddock, degraded vegetation and invasive weed presence.

After multiple workshops, the Project was redesigned to avoid the temporary occupation of this wetland during construction.

The NES:FW requires a consent for vegetation removal within 10m of a natural wetland. Vegetation removal within a 10m setback of this wetland is proposed, resulting in a total of 200m² of vegetation loss. The vegetation surrounding this wetland and proposed to be removed consists of degraded pasture grass and exotic roadside grass. The reduction in terrestrial vegetation around the wetland will reduce the physical extent of the buffer between the wetland and the road, as well as the capacity of the remaining terrestrial vegetation to act as a protection buffer to the wetland. However, the level of filtration and shading provided by the grass was limited to begin with, and its partial removal will not produce a discernible decrease in buffering function for the wetlands. Furthermore, although a portion of the wetland buffers will be permanently lost, the loss is small.

Measures to avoid, remedy or mitigate potential adverse effects:

Through the proposed landscape planting, a new wetland buffer will be replanted of approximately 200m². There will be no permanent loss of vegetation within the wetland buffer. The wetland riparian planting will include Wharawhara, Toetoe, joint twig rush, Purei, Pukio and Toetoe Whatu-manu and will add stronger ecological value to the wetland and wetland buffer than the exiting roadside grass.

No temporary occupation of the wetland is proposed and any construction effects such as sedimentation will be appropriately managed through the implementation of the ESCP, which is found in Appendix Q and discussed in Section 8.3.4 of this AEE.

Construction effects on the wetland at 522 SH16:

The wetland at 522 SH16 covers a much larger footprint than the wetland at 436 SH16 and it is much closer to the existing state highway corridor. While most of the wetland is setback from the road in a large depression in the land, the north western corner of the wetland extends out into the road berm. The SUP will be constructed adjacent to the wetland, and 83m² of the wetland will be affected by construction associated with human disturbance for the construction of the SUP, retaining wall and any earthworks adjacent to the wetland. A fence will be erected on top of the retaining wall to safeguard people from falling. This fence will also occupy the wetland. Construction of the fence on top of the retaining wall may require limited foot access within the wetland section that is within the designation alteration area.

The Project was designed to avoid the wetland as far as practicable and minimise effects on the wetland, however the SUP still needs to run parallel to the road being a linear infrastructure project, therefore the temporary works in the wetland cannot be avoided. Slope embankments were originally proposed, however a retaining wall has since been chosen as the preferred design support structure for the SUP to minimise effects and further reclamation and loss of the wetland. This will result in a 5m² permanent loss of the wetland area. The ECIA concluded that the area proposed to be affected is of low ecological value consisting of pasture grass and exotic rush. The ECIA also notes that the overall state of the wetland is degraded, is mowed and is used for grazing livestock.

The reduction of the physical extent of the wetland can decrease the wetland's capacity to provide ecosystem services, such as the ability to buffer surface water from the road corridor and to act as fauna habitat. The extent of the wetland that will be permanently affected by the Project is approximately 3% of the total wetland.

Given it does not currently have high quality vegetation to act as an effective buffer, this effect is considered less than minor.

This wetland is not a 'natural wetland' under the NPS:FM (refer to Statutory Assessment in Section 10) and therefore the NPS:FM and NES:F regulations do not apply. Notwithstanding this, the proposed encroachment (i.e. the installation of the SUP and retaining wall) requires a consent under the AUP:OP for the 5m² of reclamation (i.e. permanent filling of a wetland) associated with a structure. The ECIA concluded that the 5m² permanent loss of the wetland will have negligible effects on the ecosystem health of the wetland that is not considered to have high habitat value.

The Project also proposes to remove 597m² of the terrestrial vegetation along the edge of, but outside this wetland during construction. Of that, 242m² will be temporarily lost and 355m² will be permanently lost due to the occupation of the SUP. The terrestrial vegetation proposed to be removed consists predominantly of roadside grass, with some pasture grass from the farmland and is assessed as having low ecological value. The permanent vegetation loss is approximately 14% of the overall wetland buffer. The reduction in roadside vegetation around the wetland is not considered to affect the wetland as it currently does not provide a strong functional buffering service.

The ecological and habitat values associated with the wetland are considered to be low. The wetland is degraded and used as a grazing paddock for the landowner's stock. The proposed wetland planting would enhance the ecological values of the wetland.

Measures to avoid, remedy or mitigate potential adverse effects:

On completion of the Project the 78m² of the wetland temporarily lost to construction activities will be replanted with wetland planting including Wharawhara, Toetoe, joint twig rush, Purei, Pukio and Toetoe Whatu-manu. In addition, high native revegetation is proposed closest to the SUP consisting of Toetoe, Kanono, Karamu, Manuka, Harakeke, Whauwhaupaku, Mingimingi, Karo. This will remediate the disturbed wetland area and result in a net gain of wetland value and ecological health, given the existing wetland is significantly degraded from grazing stock and contains grass and exotic rush.

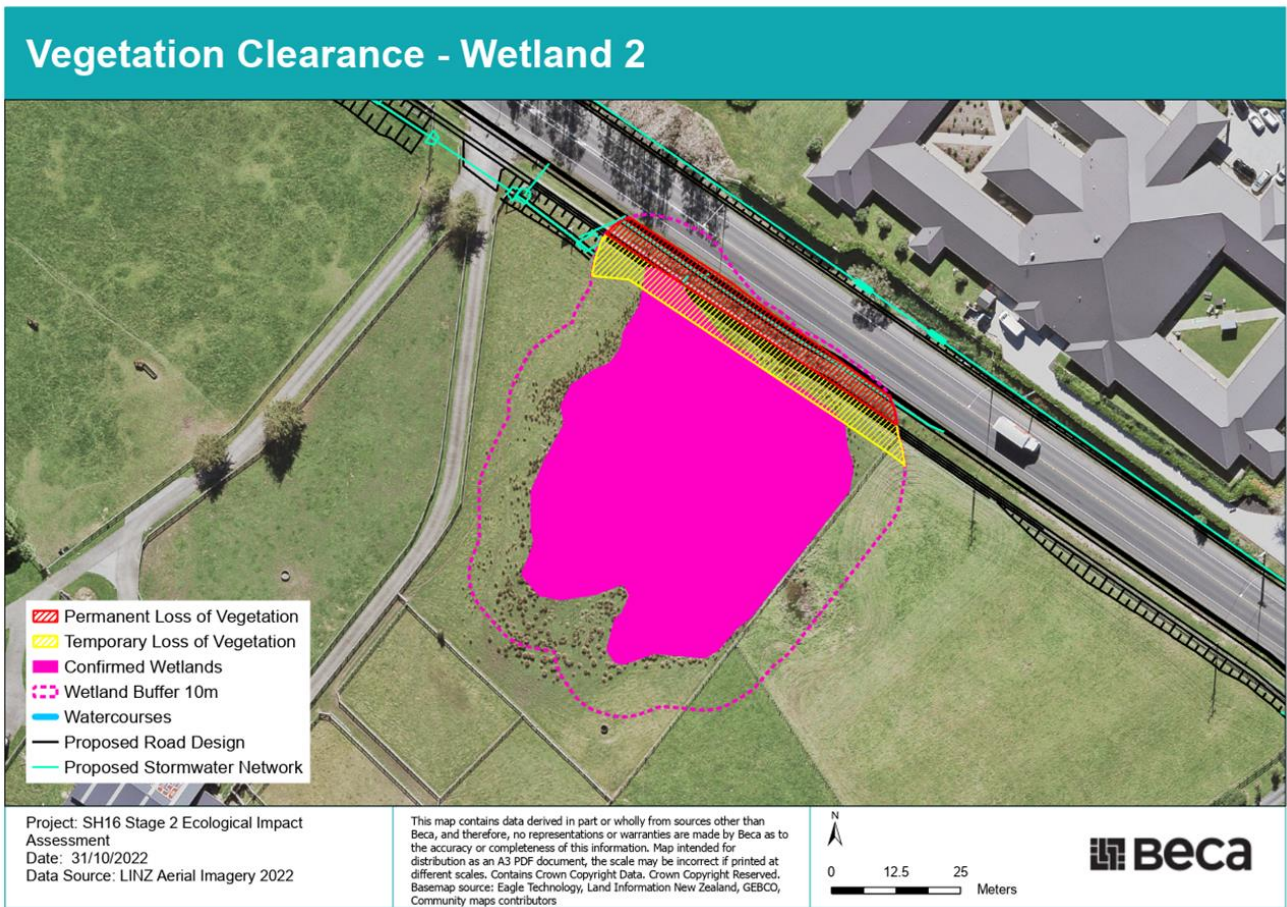


Figure 20: temporary and permanent loss of vegetation around the wetland at 522 SH16.

The Project will also replant the wetland buffer. Figure 20 shows the temporary and permanent loss of vegetation in and around the wetland. Post-construction, 309m² of the wetland buffer will be enhanced with the same wetland riparian planting and high native revegetation as outlined above. Refer to the Landscape and Ecological Planting Plans in Appendix L for more details.

Although there will be a net loss of the vegetation buffer due to the occupation of the SUP, the proposed restoration will replace the pasture grass with high value vegetation that is expected to provide an improved ecological value within 5 – 10 years following its establishment. The effects associated with the permanent loss of some of the low value pasture grass will have an overall positive effect as the proposed 309m² restoration planting will enhance the wetland's ecological value and provide stronger buffering services than what currently exists. This buffer may expand naturally over time as well.

Although 83m² of the wetland will be temporarily lost during construction, the enhanced vegetation in and around the wetland may allow the wetland extent to naturally expand over time and result in a net gain of the wetland. Overall, it is unlikely that the temporary loss of the wetland corner will significantly impact the ecological values and function of this already low value and degraded wetland. With the proposed enhancement and restoration planting in and around the wetland's northern boundary, the wetland is expected to achieve a 'net gain' of ecological value and the effects are transitory.

Death or injury to fish

There is a potential injury or /mortality risk to fish during construction from the use of coffer dams for the installation of ripraps in the stream edges and removal of outfalls. Eels are especially at risk as they burrow into sediments when disturbed. However, the in-stream works are confined to small areas (1m out into the stream at Ngongetepara Stream at each discharge location), and it is expected that the construction will be

undertaken from the banks to minimise disturbance to the stream. The use of coffer dams (or similar) allows aquatic life to be kept well away from the impact zone to minimise death or injury to aquatic life. No piling for the SUP bridges at Kumeū River or Ngongetepara Stream are proposed in the stream bed.

Measures to avoid, remedy or mitigate potential adverse effects:

To ensure the appropriate management of works around streams, a Native Fish Management Plan will be developed prior to construction and implemented to minimise any potential impacts to native fish within the Ngongetepara Stream, the stream at 429 SH16, 436 SH16, 1385 Coatesville Riverhead Highway, and the Kumeū River. This management plan will outline the procedures to salvage and safely relocate the native fish out of the impact zone prior to works being undertaken. The plan will detail permitting requirements, habitat isolation, fish capture methodologies and timing, pest management, release sites, post-relocation monitoring, and incidental kill and harm minimisation protocols. It is considered with the implementation of the Native Fish Management Plan, death or injury to fish during construction can likely be avoided and the effects will be less than minor.

Herpetofauna

Although no copper skinks were found in the surveys undertaken, there are some locations along the corridor, particularly around the stream at 429 SH16, where copper skink habitat is present. A precautionary approach will be taken to avoid any possibility of injuries / mortality to copper skinks, should any skinks be present.

Measures to avoid, remedy or mitigate potential adverse effects:

Prior to any vegetation clearance within the whole Project area, the area should be surveyed by a herpetologist, with a permit approved by the Department of Conservation. If native herpetofauna are confirmed to be present the herpetologist must be onsite to oversee vegetation clearance in order to search for and rescue any native lizards found, before relocating them to an alternative location nearby. A Lizard Management Plan may be required as a condition of herpetologist's wildlife permit.

Effects on Avifauna

Avifauna nesting, foraging and roosting habitat exists within the road reserve / designation across the SH16 corridor, and at each of the streams and wetlands within the SH16 vicinity. Vegetation clearance will reduce the physical extent of available avifauna habitat. However, this will be restored post construction. The construction will also create disturbance via noise and movement, which can result in short-term avoidance behaviour from native avifauna. The area extents that will be impacted only represents a small proportion of similar avifauna habitat within the wider surrounding landscape. The connectivity of the vegetation from the roadside, streams, and wetlands will not be severed from the wider landscape during works. As such, other avifauna habitat can be found nearby for avifauna to relocate to.

Measures to avoid, remedy or mitigate potential adverse effects:

To avoid any death or injury to native nesting birds and their eggs or chicks during construction, tree felling as part of any vegetation clearance should be avoided during peak breeding season. For native passerine species such as fantails and silvereyes, this is August to March. If tree felling within the breeding season cannot be avoided, the trees must be inspected for nests by a qualified ecologist one week prior to the planned felling. If the active nests of any native bird species protected under the Wildlife Act 1953 are found, the tree cannot be felled and must be clearly marked and cordoned off until the nesting birds have fledged, or the nest has been naturally abandoned.

Avifauna will likely temporarily relocate to nearby habitat that is not limited in the surrounding SH16 rural landscape. If the outlined mitigation measures are adopted, the overall effects on avifauna are considered less than minor.

Bats

No bats have been recorded within the SH16 corridor extent according to iNaturalist and DOC. However, one long-tailed bat has been recorded approximately 2 km from the corridor in 2020. Therefore, the possibility of bat roosting within the Project extent cannot be ruled out.

The proposed works associated with riparian vegetation clearance could potentially cause the injury or mortality of native bats roosting within the riparian vegetation during the day, including the threatened long tailed bat. However, the likelihood of this is low, as only some vegetation within the proposed clearance area is expected to be able to host roosting bats, and among these, even less trees are expected to be active.

Measures to avoid, remedy or mitigate potential adverse effects:

Despite the risk being low, to avoid death or injury to native bats roosting during the day, tree felling as part of riparian vegetation clearance should be overseen by a specialist bat ecologist, certified by the Department of Conservation. Any trees to be felled that have a DBH >15cm¹⁶ will be assessed for roost features using the roost identification criteria from the Bat Roost Protocol. If any Moderate or High value roost trees are found (as defined by an ecologist), then they must be monitored for bat activity for a minimum of two nights immediately prior to felling. If bat roosts are confirmed, then the tree must be clearly marked and cannot be removed, and the Department of Conservation must be informed.

8.3.3 Archaeology and built heritage effects

Archaeological Heritage Effects

An Archaeological Assessment has been prepared and is found in Appendix T. The report identified archaeological constraints within the project corridor and provides mitigation measures to manage any effects identified. Archaeological sites within a 200m buffer around the Project corridor were identified, these include:

- 16 historic heritage sites, 12 of which will not be affected by the proposed works.
- 7 of those sites are recorded archaeology sites:
 - 4 are former structures
 - 1 was a boat structure
 - 1 was a former railway line
 - 1 midden deposit.

The only area where there are recorded archaeological sites in the vicinity of proposed works is in the area adjacent to Brigham Creek in Section A and adjacent to the BP Station in Section D. Four of these sites were identified as potentially affected by the project. An assessment of the effects on these sites is provided below.

238 SH16 - Former Sinton Homestead (CHI 13241):

The property is scheduled under the AUP:OP. The house was built pre 1900s and has been modified since then, but it still retains archaeological and other historic heritage values. Its archaeological values have been reduced by the significant alterations made to the house. Excavations will encroach a few meters into the property for the construction of the SUP and road widening. Any associated subsurface archaeological features are likely to be in the vicinity of the house rather than close to the road. The potential to uncover archaeological deposits is considered very low. The detailed design of the project has reduced the footprint of the works which extend into this property, which has reduced the potential for archaeological material to be uncovered.

¹⁶ Matures trees with stems >15 cm diameter at breast height (DBH)

239 SH16 - Former Sinton homestead (CHI 20451 and CHI 20450) and 191 SH16 - Former Sinton Store (CHI 20452):

Two recorded heritage sites associated with the Sinton family are located close to the proposed works. This includes the site of the first Sinton homestead at 239 SH16 with the historic slaughter house on site, and the site of the Sinton Store at 191 SH16. Both of these sites have been recorded on the basis of historical records rather than physical evidence and it is not known what, if any, remains relating to the house and store would have survived later roading, building and landscaping works. However, the possibility that remains have survived cannot be excluded, and as there will be some minor encroachment into these properties a cautious approach will be taken. Stormwater infrastructure will slightly encroach into 239 SH16, and these works will be monitored closely by a qualified Archaeologist.

Brigham Creek Bridge/Culvert – the former bridge (CHI 13589):

This is the recorded site of the earlier 19th century bridge and an earlier weir across the stream. It is not known whether any remains of the bridge have survived apart from holes in the creek bed indicating the locations of former bridge piles. It is considered possible that remains of the old bridge and road may be present on the banks on either side, although the possibility of this is considered low. The works in the area will involve the removal of the existing stormwater outfall and the construction of a new riprap outfall. Excavations for the SUP piles will include piles in the stream bank and the construction of stormwater infrastructure that will require excavations at a depth of approximately 400mm.

Former portage railway line (R10/1487):

The railway was known as the Portage Railway and opened on 29 October 1875 and closed in 1885. It followed the traditional waka portage named Te Toanga Waka between Riverhead and the Kumeū River. Earthworks are also proposed in the vicinity of the former portage rail line in Section D, and in particular on the southern side of the BP Station at 538 SH16. Works in the area include the formation of a diversion swale and a new stormwater line with riprap outfall. There are no known remains of the rail line in this location, but the possibility cannot be ruled out entirely.

222A State Highway 16, Whenuapai – Alexander Sinton House (CHI ref 3486):

A historical building is located at 222A SH16 (which is discussed in detail below in the built heritage section). There is a small shed located on the property that likely replaced an earlier structure from the 19th century. The shed is proposed to be removed, a diversion channel will be created through the shed's location, which will require the excavation of up to 0.5m. Any archaeological features uncovered within these excavations would likely need to be removed by the works. Potential remains that could be uncovered in this location include the moderate potential of postholes, and a low to moderate potential for buried deposits, such as rubbish pits.

Measures to avoid, remedy or mitigate potential adverse effects:

In addition to any requirements under the RMA, the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA) protects all archaeological sites whether recorded or not. They may not be damaged or destroyed unless an Authority to modify an archaeological site has been issued by Heritage NZ.

While there are no confirmed archaeological remains within the area of proposed works, the possibility that pre-1900 remains may be exposed cannot be excluded near the sites listed above. An application under Section 44(a) of the HNZPTA has been applied for in parallel with this NoR. It will cover all works within this Project as a precaution.

An Archaeological Management Plan has been prepared in Appendix U to support the Authority application. It sets out procedures to managing the potential effects on historic heritage and archaeology during the construction process. It will outline pre-start briefings of contractors, monitoring of works in archaeologically sensitive areas, the investigation and recording of any remains affected, and procedures to be followed if archaeological sites, taonga tuturu (Māori artefacts) or kōiwi tangata (human remains) are exposed during

works. The Authority will be obtained before any earthworks are carried out. Monitoring of all excavations will be carried out by a qualified Archaeologist, to determine the extent of pre-1900 archaeological remains and ensure the correct processes are followed if remains are found.

Summary of effects:

Overall, the proposed works have avoided where possible any impacts upon archaeological sites. There is some, but limited, potential to affect archaeological sites, particularly around Brigham Creek. Any adverse effects are likely to be less than minor given the limited extent of works that may affect any archaeological sites. With the HNZPTA Authority and Archaeological Management Plan in place, any archaeological effects will be appropriately managed and recorded if discovered to build a stronger understanding on the history relating to the Brigham Creek area and the former portage rail.

Built Heritage Effects

There are three sites that hold built heritage values along the project corridor, all associated with the Sinton Family around Brigham Creek. Plan Heritage has completed an assessment of effects of the Project on built heritage, this can be found in Appendix V – Built Heritage Assessment. The proposed works and any potential effects on these buildings and proposed mitigation are discussed below.

238 SH16 Former Sinton Homestead:

The proposal will result in an alteration to the scheduled historic heritage ‘Extent of Place’ over 238 SH16. Due to the proposed road widening, the SUP will encroach a few meters into the site and the designation will be altered to acquire 657m² of 238 SH16. Excavations will be limited within the altered designation boundary. A conservation plan was prepared by Dave Pearson Architects for the Sinton House that includes a number of recommended policies to ensure long-term retention of heritage values. The policies demonstrate they are focussed on changes to the house structure and there are no specific policies relating to the retention of the surroundings areas of the house. The house is set back 26m from the existing road boundary. Therefore, the house which is the primary feature of the historic heritage place will not be affected by the minor encroachment of earthworks and presence of the SUP path on the property.

There is existing boundary vegetation along the highway which can be seen from analysis of historical photos to be associated with later (20th century) activity on the site and has no particular historical association with the establishment of the homestead. This vegetation is relatively recently established and will be removed to accommodate the road widening and the SUP. Given the late establishment of the vegetation, it is considered the removal of the vegetation will have less than minor effects on the context values of the historic heritage place. The landscaping plans propose to mitigate the loss of vegetation by planting a mix of high native revegetation¹⁷ within the new designation boundary. There will be no effects on any of the other values for which the place is recognised.

Overall, the built heritage assessment concludes there will be no effects on the built heritage values of 238 SH16. The place will continue to be associated historically with the Sinton family, and it remains on its original site, supporting the wider context values attached to the historical development around Brigham Creek. On completion of works, the improved amenity of the SUP will provide an opportunity for SUP users to view the place safely. This will potentially result in an increased appreciation of the nearby historic heritage place. This opportunity could be enhanced through designed locations for heritage interpretation (noting this would be a separate future project).

191 SH16, Taupaki 0892 – Janet Sinton Homestead (former)

¹⁷ High native revegetation includes a mix of the following plants: Toe toe, Kanono, Karamu, Manuka, Harakeke, Whauwhaupaku, Mingimingi, Karo

Another historical building is located at 191 SH16 (CHI ref 3379), 150m further east of 238 SH16. This was Janet Sinton's house. The homestead has been previously evaluated by Auckland Council and recommended for inclusion in Schedule 14.1 as a Category B historic place, and although it has not yet been scheduled under the AUP:OP, for this Project they have been assessed as though they are scheduled. The building is hidden behind mature vegetation and cannot be seen well from the road. The Project works are primarily on the southern side of SH16 in this location and will not affect any building on this site and thus there are no built heritage effects on 191 SH16.

222A State Highway 16, Whenuapai – Alexander Sinton House

Another historical building is located at 222A SH16 (CHI ref 3486) which was the homestead of Alex Sinton, who was the son of Janet Sinton. This site is located across the highway from 191 SH16. This house has also been previously evaluated by Auckland Council and recommended for inclusion in Schedule 14.1 as a Category B historic place and although not yet scheduled under the AUP:OP they have been assessed as though it has been. The main building that holds the heritage value of the site is set back approximately 26m from the road boundary, well clear of any excavations. There will be no changes to this building and thus no built heritage effects.

There is a mid-20th century shed located on the north-west corner of 222A SH16 that will be affected by the proposed off road maintenance parking facility and new stormwater infrastructure and will be removed. It was assessed to determine whether it might be an early pre-1900 structure associated with the Sinton Family, and to assess what specific value it contributes to the property. It is assessed as having low-moderate historic heritage values, as a surviving ancillary farming structure with limited historical connections to the Sinton Family. Due to its poor condition, it is unlikely to be relocatable and therefore will be demolished as part of this Project. Its removal will be mitigated through low level photographic recording and drawings if required, to a level equivalent to Level 3 of HNZPT guidelines 2018 – recording of built structures. The loss of the old farming shed is considered to be less than minor and can be recorded to help build a stronger understanding of the history of the Sinton Family.

Summary of effects:

Overall, the Project will not significantly adversely affect the historic built heritage values associated with the Sinton family around Brigham Creek. Minor adverse effects arising from the loss of existing mature vegetation due to the construction of the SUP can be adequately addressed through replanting along new boundaries. Therefore, any effects on built heritage values will be less than minor.

There is also an opportunity for the installation of heritage interpretation along the SUP around Brigham Creek as a separate project. This will provide education opportunities to the public about the Sinton Family and may enhance appreciation for the heritage values associated with 238, 222A and 191 SH16.

Measures to avoid, remedy or mitigate potential adverse effects:

Regardless, any adverse effects on built heritage can be mitigated through the following recommendation:

- Construction risks to built heritage is clearly explained to the contractors
- Demolition of the shed at 222a SH16 will be mitigated through low level photographic recording and drawings if required, to a level equivalent to Level 3 of HNZPT guidelines 2018 – recording of built structures, and
- That any construction management plan includes risk assessment and protection measures to control potential risk of damage or nuisance from construction activities on built heritage.

Natural Heritage Effects (Notable Trees) (CHI 12896)

There is a group of 12 notable trees located on 191 SH16. The original design was anticipated to affect some of the notable trees due to the road widening and may have required the removal of some. To avoid this, during the preliminary design phase, the road alignment was shifted further south and away from the notable trees to limit any potential adverse effects on the trees (as a result the shed on 222A SH16 will be affected instead). Further consideration was taken to redesign the proposed stormwater connections to reduce open trench excavations that could affect the root system of the notable trees. The proposed design does not include any works within 191 SH16. However, there is still a risk that the roots of the notable trees extend into the designation and subsequent works area.

An Arboricultural Assessment has been undertaken to assess any effects on the notable trees, this assessment can be found in Appendix S. The potential effects and mitigation of this report are discussed below.

The proposed road edge near the notable trees will remain the same and no changes are proposed to the existing stormwater pipe to avoid any open trenching near the tree roots. Figure 21 below shows that Tree number 9 is the only tree to have its Tree Protected Zone (TPZ) encroach into the Project works area. The TPZ of this tree is 11.28m. However, with reference to the AUP rules/definitions, the Protected Route Zone (PRZ) for this tree is 8m. Therefore, no works are proposed within the PRZ of any of the trees for the upgrading of the Highway.

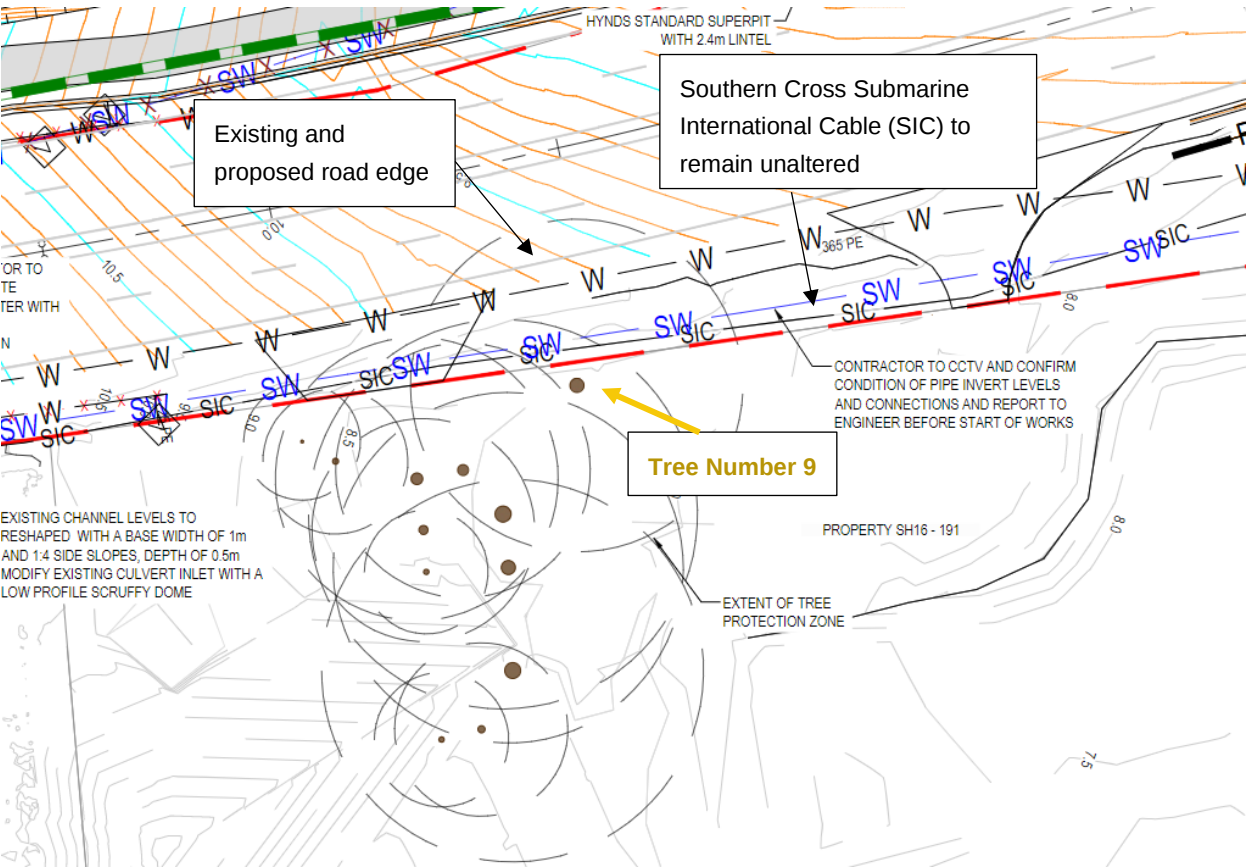


Figure 21 21: TPZ in relation to the proposed works. The notable trees are numbered in orange

It is not likely that significant root structures of Tree 9 (or any other notable trees) are located beneath the road because of the distance between the road and the trees, and because these trees have good access to permeable ground on all other aspects. Any potential roots located beneath the road would remain largely undisturbed because there will be no requirement to excavate beneath the existing basecourse material (removal and replacement of asphalt).

There is an existing stormwater pipe within the TPZ of some of the notable trees, this will continue to be used. CCVT investigations will be undertaken to determine the condition of the pipe by the contractor. If the pipe is in poor condition, it will be abandoned.

Measures to avoid, remedy or mitigate potential adverse effects:

It is considered that adverse effects on the trees can be avoided. However, Section 4 of the Arboricultural Assessment Report outlines some Tree Protection Methodologies that should be followed to ensure the works are undertaken in accordance with modern arboricultural standards and to ensure the preservation of the Notable trees at 191 SH16. These are outlined in Appendix S.

8.3.4 Earthworks

The approximate volume of earthworks is 14,348m³ of cut, where geotechnically suitable, will be reused onsite with 22,123m³ of fill required for the design. The majority of earthworks is proposed in the road corridor and immediate shoulder of the current alignment, with works required to provide suitable batter slopes on both sides of the alignment. Work outside of the designation is limited to shallow topsoil stripping in areas to provide suitable batters to neighbouring properties or connections of stormwater infrastructure. This section will discuss the potential adverse effects associated with erosion and sediment and potentially contaminated land.

Erosion and Sediments Effects

Earthworks have the potential to cause adverse effects from erosion of bare soils and sediment runoff causing sedimentation in local streams. Given the large scale of soil disturbance required, careful management of earthworks will be required to manage the effects of erosions and sediment on the surrounding environment.

Measures to avoid, remedy or mitigate potential adverse effects:

To manage these potential effects works will be staged to minimise the areas of exposed soil open at any one given time. An Erosion and Sediment Control Plan (ESCP) (refer Appendix Q) has been prepared which outlines the potential effects associated with the land disturbing activities proposed and makes recommendations of the principles and practices necessary to mitigate the impact of these activities on receiving environments. This report has been prepared in general accordance with Auckland Council Guidance Document: Erosion and Sediment Control (GD05, 2016) and proposes a range of measures to be utilised throughout the Project corridor to mitigate potential sedimentation effects on neighbouring properties and local streams.

The majority of the proposed earthworks are within the altered extent of the roading designation. The Project area is on generally flat ground with six watercourses being either bridged or culverted along the alignment. Due to the linear nature of the Project following the road corridor, sediment runoff will be predominantly controlled or treated with bunds, silt fences and erosion controls (stabilisation) along the road shoulder.

A key focus of the erosion and sediment controls along the alignment will be placed on stormwater inlet protection, diverting clean water flows away from the works, managing sediment on impervious surfaces and protection of laydown areas. Silt fences will be the primary treatment device along the side of the works where required, particularly where any upgrade works are to occur for stormwater infrastructure. Decant earth bunds may be required at the base of long lengths of exposed soil if planned to remain open for a longer period of time. Below is a list of all the proposed erosion and sediment controls proposed. Refer to the ESCP for more details on each of these processes and the recommended monitoring and maintenance.

Erosion Controls

- Timing of earthworks
- Management of site access points
- Minimising exposed areas
- Limiting site length
- Stabilisation and Reinstatement
- Dust Control
- Management and minimisation of stock piling
- Watercourse protection

Sediment Controls

- Clean water diversion
- Damming and diverting methodologies
- Slope protection
- Decanting earth bunds or sediment retention ponds
- Dewatering
- Silt Fences and Super Silt Fences
- Stormwater protection

There are some locations along the alignment where new stormwater outfalls or aprons will be installed or upgraded. This will involve minor earthworks on the side of the stream bed. Cofferdams, driven steel sheets, sand bags or earth bund to dam the water away from the construction area and prevent sedimentation of the stream. All ecological assessments and processes will be undertaken throughout this process.

A site-specific ESCP for Brigham Creek SUP Bridge is provided in Appendix A of the ESCP (refer Appendix Q). The pedestrian bridge to be constructed alongside Brigham Creek Bridge does not require a large volume of earthworks. This area requires piling for the bridge foundations and ground anchors, and construction of a new retaining wall abutments. As such, silt fences will likely suffice in treating any small volumes of sediment runoff produced from this area of works given its confined nature. It is anticipated the majority of machinery movements for these works will be undertaken from the existing stabilised surface of the state highway with smaller areas stabilised with hardfill progressively.

A site-specific ESCP for Kumeū No.1 SUP Bridge is also provided in Appendix A of the ESCP. The pedestrian bridge to be constructed alongside Kumeū No.1 bridge does not require a large volume of earthworks, since it is restricted to the embankments each side of the bridge. Being similar to Brigham Creek SUP Bridge, this area requires piling for the bridge foundations and ground anchors, and construction of new retaining wall abutments. As such, silt fences will suffice in treating any small volumes of sediment runoff produced from this area of works given its linear and confined nature. It is anticipated the majority of machinery movements for these works will be undertaken from the existing stabilised surface of the state highway with smaller areas stabilised with hardfill progressively.

Overall, the potential adverse erosion and sedimentation effects of the proposed earthworks activity will be less than minor with the adoption of the processes outlined in the ESCP.

Contamination Land Effects

A Preliminary Site Investigation report (PSI) was prepared in order to identify land either within or adjacent to the project area that has the potential to be contaminated as a result of current or historical land use activities. This PSI can be found in Appendix O. No Detailed Site Investigations (DSI) was undertaken, as the ability to sample soils that are likely to be disturbed during works was not possible at the time of drafting the PSI as the sites to be earth-worked were not yet confirmed. It is proposed to undertake a DSI prior to any works commencing and a condition of consent is offered in this regard.

The assessment comprised a review of historical aerial photography, Auckland Council information including discharge consents and a site walkover to identify any possible contamination issues and areas requiring further investigation, remediation and management to avoid, remedy or mitigate any potential adverse contamination effects.

The historical aerial review has identified several properties along the Project corridor that have been subject to potentially contaminated activities associated with horticultural activities, specifically orchards and vineyards. In association with such activities, several commercial buildings have been identified, including wineries, grower's sheds and cafes. In total, 21 properties have been identified as potentially contaminated

HAIL¹⁸ sites that will have minor earthworks undertaken within or near the boundaries of these sites. These properties are listed below:

- | | | |
|------------|--------------------------------------|------------|
| • 218 SH16 | • 1404 Coatesville Riverhead Highway | • 451 SH16 |
| • 291 SH16 | • 1368 Coatesville Riverhead Highway | • 464 SH16 |
| • 299 SH16 | • 350 SH16 | • 465 SH16 |
| • 300 SH16 | • 366 SH16 | • 482 SH16 |
| • 312 SH16 | • 407 SH16 | • 505 SH16 |
| • 324 SH16 | • 429 SH16 | • 538 SH16 |
| • 340 SH16 | • 436 SH16 | • 550 SH16 |

These sites (except 538 SH16) all contain horticultural activities, specifically vineyards and orchards and associated commercial activities including wineries and growers. These sites are classified as A10 HAIL activities. The contaminants of potential concerns are heavy metals (including Arsenic, Cadmium, Chromium, Copper, Lead and Mercury), Acidic Herbicides, Organophosphates and Organochlorines.

The site walkover undertaken by a Beca Environmental Scientist as part of the PSI also identified 538 SH16 (BP Service Station) as a potential contaminated site. The service station identified is adjacent to the proposed road widening for the SUP and construction of a stormwater pipe and outfall. The pipe is to be installed approximately 3m outside the service station boundary connecting a new treatment swale running alongside SH16 to the discharge outlet into Kumeū River (behind the BP station). These works only involve shallow excavations (<0.5m deep) within what is likely existing basecourse material associated with the roadway tie-in into the service station entrance. Additionally, this service station has recently been upgraded (in 2021) with new pavement and basecourse in the area of proposed SH16 works. Given the service station forecourt has a perimeter channel to prevent hydrocarbon spills offsite and the buried hydrocarbon tanks within the service station are below the depth of proposed works, it is highly unlikely that there is a risk of hydrocarbon contamination within the proposed SH16 works area. It is therefore considered 'more likely than not' that the HAIL H classification (inferred as HAIL F7) is not applicable to the proposed SH16 works. The BP service station has been added as a HAIL site on a precautionary basis. The desktop assessment conducted has identified the majority of HAIL sites are from passive sources (horticultural sprays) and the works associated with the road widening only affect the borders of these properties with the state highway corridor. Given the activity producing the risk is generally concentrated on crops within these respective HAIL sites, it is unlikely that the minor disturbance works along the boundaries of these properties will contain elevated contaminants that present a human health risk or environmental discharge risk.

If these HAIL sites are disturbed, the PSI identified two potential contamination exposure pathways, one being ingestion and inhalation of contaminants by construction workers and the second being discharge of contaminants to nearby surface water receptors.

Measures to avoid, remedy or mitigate potential adverse effects:

To manage this risk and prevent these exposure pathways, a Contaminated Soils Management Plan (CSMP) has been prepared which outlines all handling procedures associated with working within the HAIL sites to mitigate these effects. This CSMP is found in Appendix P. The surrounding waterway will be managed through the sediment control practices outlined in the SH16 Improvements Erosion and Sediment Control Plan for the Project.

During construction, soil sampling will take place before excavations on all identified HAIL sites (listed above) that will determine if the material can be reused onsite or needs to be disposed of at an appropriate licensed landfill facility.

¹⁸ Contaminated land activities that are listed on the 'Hazardous Activities and Industries List' (HAIL)

Overall, the PSI considered that the proposed work areas are suitable for the proposed land use or can easily be made suitable with standard management and mitigation measures. The potential contamination effects will be managed appropriately through the adoption of the CSMP and the ESCP and are considered to be less than minor.

8.3.5 Transport Effects

The construction work may have the potential to temporarily disrupt private and commercial vehicles, public transport, pedestrians and cyclists. Potential effects during construction include:

- Disruption to the flow of traffic along State Highway 16 and surrounding local roads causing temporary delays in travel time
- Temporary relocation or reduction to access for existing properties along State Highway 16 and adjoining roads
- Temporary relocation of existing bus stops and diversion of bus routes that travel along State Highway 16. This includes three public bus routes (Bus 122, 125, 125X) and two school routes (Route 210 to Albany and Long Bay College and Route 205 to Rangitoto College)
- Temporary reduction in corridor space for cyclists causing potential safety risks
- Temporary loss or relocation of existing pedestrian access and temporary reduction of corridor space for informal pedestrian access causing potential safety risks

Measures to avoid, remedy or mitigate potential adverse effects on transport:

A Construction Traffic Management Plan (CTMP), based on the Code of Practice for Temporary Traffic Management, will be prepared by the contractor prior to construction, which will set out specific details of construction traffic management. This will also include site specific Traffic Management Plans (TMP) tailored to manage specific site constraints.

The following outlines specific mitigation strategies to address temporary transport effects:

- Construction along the alignment will occur in a staged sequential manner from east to west by means of separable portions which are likely to be, Brigham Creek Road to Coatesville Riverhead Highway, Coatesville Riverhead Highway intersection with State Highway 16, Coatesville Riverhead Highway to Taupaki Road and Taupaki Road to Kumeū. This will minimise the impact of construction works on the road network which will be limited to the specific section of the alignment being constructed. This will be determined once a contractor is appointed
- In the event that construction works would require a lane to be closed on the highway the works will be undertaken between 7pm and 7am to minimise traffic effects and ensure disruptions occur during low traffic times. The alteration to designation for temporary construction space is required to minimise lane closure requirements. Detours will be organised where appropriate
- To minimise traffic delays for through traffic the Contractor will monitor and manage the traffic management on the highway
- Where required, cyclists and pedestrians will be accommodated along the highway during these works through Site Specific Traffic Management Plans (SSTMP)
- Consultation with landowners and business operators impacted by the construction works and circulation of information on construction works, timing and implementation of the above measures to the wider community.

Construction works will occur temporarily and with the implementation of standard construction management methodology and mitigation strategies. Therefore, any potential adverse effects on general traffic, site access, existing bus routes, cyclists and pedestrians will be less than minor.

8.3.6 Open Space – Conservation Zone

The Project will involve temporary construction works to install a new permanent stormwater outfall and scour protection (riprap) within the esplanade reserve at Ngongetepara Stream that is owned and managed by Auckland Council and zoned Open Space – Conservation under the AUP:OP (refer to Figure 22). The esplanade reserve adjoins 238 SH16 to the west and Ngongetepara Stream to the east.

The stormwater runoff from SH16 around Brigham Creek/Ngongetepara Stream will be collected and directed into new stormwater pipes. Due to the location of a retaining wall, one of the pipes will encroach into the Open Space Zone on Lot 3 DP 326070 as depicted in Figure 22 below. The pipe will discharge the water onto riprap before entering the stream below. The pipe will encroach into the Open Space Zone by approximately 2m and the riprap further towards the stream will encroach by approximately 3m.

A Land Owner Approval application to Auckland Council Land Advisory Services will be lodged in parallel with this Notice of Requirement.

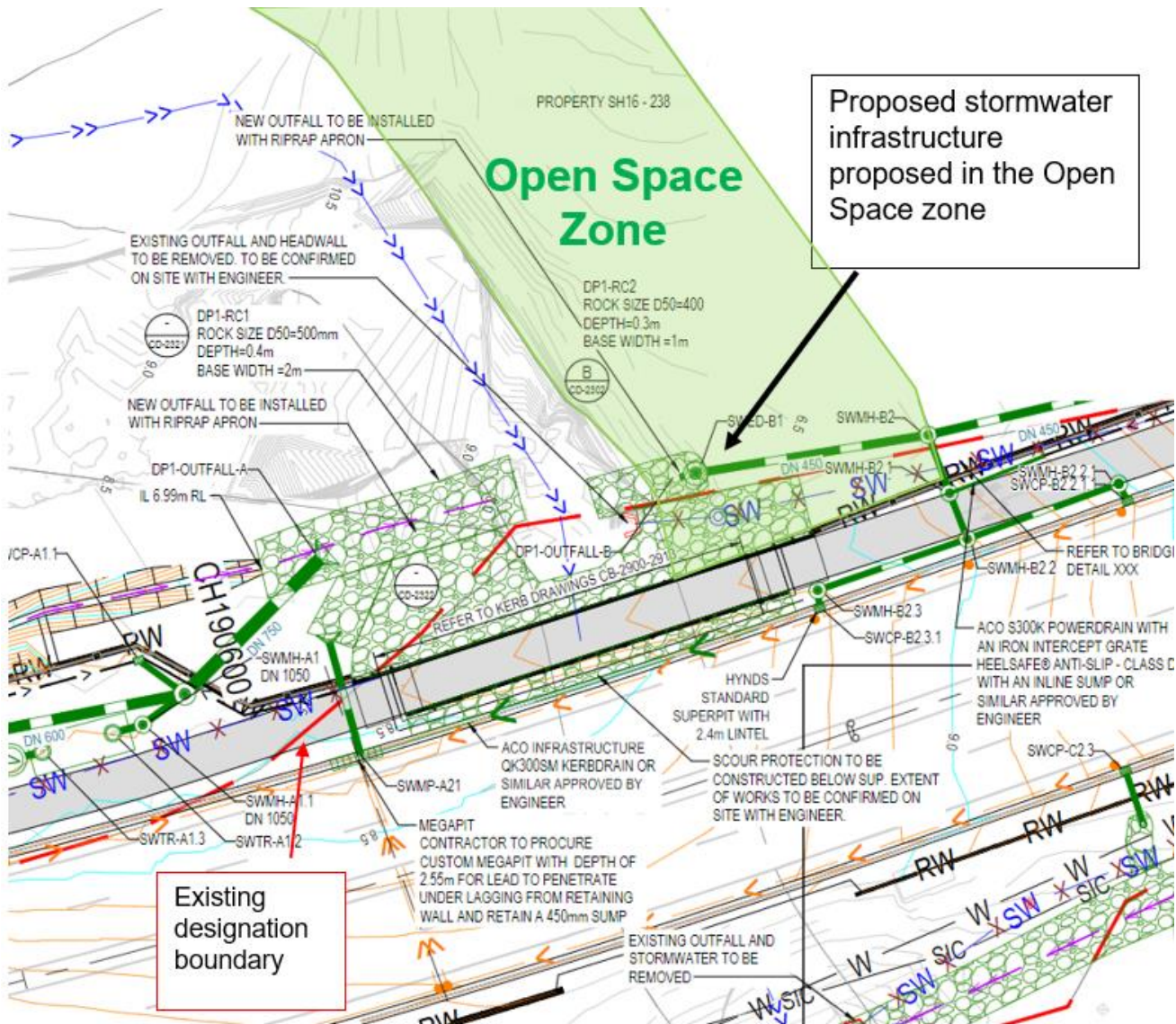


Figure 22: Stormwater infrastructure proposed within the Open Space - Conservation

Temporary occupation for construction of the stormwater infrastructure will be required. The construction works have the potential to generate adverse effects on the values of the zone¹⁹.

Measures to avoid, remedy or mitigate potential adverse effects on the open space zone:

A general Construction Management Plan (CMP) will be prepared prior to works commencing which will detail specific methods to manage and mitigate potential construction effects on the surrounding environment. An Erosion and Sediment Control Plan has been prepared which must be implemented prior to works commencing to mitigate potential effects of erosion and sediment deposition on the watercourse. Riparian planting as set out in the Landscape and Ecological Planting plan will be undertaken following completion of works to enhance the ecological and landscape values of the works area.

Following the implementation of these mitigation measures, any adverse construction effects on the amenity values of the open space zone will be less than minor.

8.3.7 Community effects

This section of SH16 forms the main connector between the motorway and Kumeū town centre and surrounding communities in the Northwest. It is a key route for those accessing work, education, recreation or other community services in wider surrounding areas such as Auckland CBD, Hobsonville, Greenhithe, Massey and Albany. It is also a key component of the Upper North Island State Highway network and is an over dimension route utilized by oversize vehicles. Currently the community experiences delays and congestion along this stretch of highway.

During construction, access to local business and community services along the corridor such as the BP service station, Kumeū Produce Market, early childhood centres, wineries and produce/horticultural farms may be disrupted. This will be due to traffic delays on the corridor, changes to access (noting access will be maintained throughout construction) and turning restrictions across the corridor.

Residents who traverse this section of SH16 may experience temporary traffic disruptions due to construction on the corridor and potential temporary traffic management. This may impact carrying out daily activities such as commuting for work, education and recreation and accessing community services in other locations on the North Shore, Northwest Auckland or further afield.

The amenity of residential areas may be temporarily affected due to dust, noise and changes to existing screening from road (noting this is at a property specific, not community level).

Measures to avoid, remedy or mitigate potential adverse effects on the community:

The temporary effects on the community during the construction of the project can be appropriately managed. A CMP will be prepared prior to the start of construction which will include details of how the community and stakeholders (including directly affected and adjacent owners and occupiers of the land) will be communicated with throughout the Construction Works.

Access and trip disruptions including measures to avoid disruptions during peak travel time including peak early childhood centre pick up and drop off will be managed by the Site Specific Construction Traffic Management Plan (SSCTMP) as per the proposed conditions of the designation. This will allow the contractor to work with properties where access is directly affected and manage traffic during peak travel times to minimise community disruption.

¹⁹ "The Open Space – Conservation Zone applies to open spaces with natural, ecological, landscape, and cultural and historic heritage values" - Auckland Unitary Plan Operative in part, H7 Open Space zones

Construction effects on residential amenity can be managed by noise and dust management plans, consultation with landowners (CMP and CNVMP) and a landscape management plan.

Overall, any potential construction effects can be managed with the development and implementation of the appropriate management plans outlined above and communication with the community and affected land owners / occupiers.

8.3.8 Cultural Effects

Te Kawerau ā Maki and Ngāti Whātua ō Kaipara hold mana whenua in the Kumeū area and have matters they are specifically interested in with regards to the construction and operation of the Project. In addition, a section of the Project area (from Taupaki Road and Old North Road west towards Kumeū town) is located within the Te Kawerau ā Maki Claims Settlement Act 2015 statutory acknowledgement area²⁰.

Te Kawerau ā Maki

For Te Kawerau ā Maki, the matters generally fall into the following categories:

- Art, mana whenua signs, naming: would like to have a collaborative approach and explore opportunities for light treatments at bridges, railings etc, and any naming opportunities.
- Planting; Planting plan to include native plants and procurement through the nursery at Kaipara.
- Earthworks; to be designed in accordance with GD05. The construction footprint is to be minimised.
- Stormwater concept and management; to be designed in accordance with GD01. The modification of water is to be avoided whilst bridge widening, and daylighting of streams is encouraged.

In relation to their Statutory Acknowledgement, Te Kawerau ā Maki have a significant ancestral and customary relationship with Te Awa Kumeū, which is the main waterway in the upper Kaipara River catchment that runs through the Project area. Te Kawerau ā Maki have provided a written letter briefly explaining their history in the area and confirming they are not opposed to the Project. A copy of this letter is provided to Council in Appendix R. Notwithstanding, the Project will treat the majority of stormwater runoff from the proposed new impervious areas before discharging to a stream or the stormwater network and native plant species are specifically chosen to assist with the treatment of stormwater which will flow into Te Awa Kumeū.

Nga Maunga Whakahii O Kaipara

Nga Maunga Whakahii O Kaipara (the development trust that represents Ngāti Whātua ō Kaipara) prepared a Cultural Values Assessment (CVA) for the SH16 Project (refer Appendix W). The CVA identifies their matters of interest which fall within four mana whenua values;

- Kaitiaki & Mauri
 - Preference for riparian planting/fencing
 - Preference for native planting
 - Preference for rain gardens & wetlands
 - Preference for earthworks (GD05) and stormwater (GD01) standards
 - Consultation for soil removal
 - Incorporation of Mauri model of decision making
 - Preference for pest & weed control
- Taonga
 - Karakia to bless the site
 - Cultural induction
 - Accidental discovery protocol – including taonga & koiwi
- Cultural Heritage/Footprints, Naming Opportunities, & utilising Te Aranga design principles
- Whanau

²⁰ A Statutory Acknowledgement is a formal recognition by the Crown of the mana of tangata whenua over a specified area. It recognises the particular cultural, spiritual, historical and traditional association of an iwi with the site, which is identified as a Statutory Area.

- Importance of inclusion of Rewiti Marae
- Interest in employment opportunities for local mana whenua
- Indicated interest in procurement for plants i.e. providing plants from their nursery

Measures to Avoid, Remedy or Mitigate Effects on Cultural Values

The Project has been designed to address most matters raised by both mana whenua in order to ensure their cultural values are acknowledged and upheld. This includes the following:

- The unique iwi identity and relationship is acknowledged and reflected in documentation and urban design which will be ongoing as the Project progresses through further design and construction
- Native riparian planting will be provided along all swales, wetlands and stream crossings. The planting mixes, locations and species which have been selected in collaboration with mana whenua. The mix of proposed plants aim to achieve quick canopy closure and therefore reduce the need for weed maintenance
- The Project will collect and treat the majority of stormwater runoff from the proposed new impervious areas before discharging to a stream or the stormwater network through treatment swales and proprietary treatment devices. This will significantly improve the water quality of the surrounding catchments and contribute to enhancing the mauri of the waters of awa Kumeū and of Te Wai Roa ō Kahu
- Mana whenua will be offered to do a karakia blessing as part of the project opening event and be involved in the cultural induction. The accidental discovery protocol will be followed in the event of discovering cultural material
- Consultation and communication have been undertaken to date with Rewiti Marae and will continue through into construction
- In terms of employment opportunities and plant procurement, this will be considered through the construction tender. The construction footprint has been minimised by way of design of the works
- Earthworks have been designed with GD05 and the stormwater concept and management are to be designed with GD01.

In summary, the Project has incorporated design and mitigation measures to minimise effects on the cultural values of Te Kawerau ā Maki and Ngāti Whātua o Kaipara. With early and ongoing engagement and continued partnership the cultural values of mana whenua can continue to be acknowledged and upheld.

8.3.9 Construction Noise and Vibration Effects

Construction works will generate temporary noise and vibration effects which can disrupt the amenity values of surrounding residences and businesses. Marshall Day Acoustics has undertaken an assessment of the potential noise and vibration effects that may be generated during construction, and this assessment is contained in the Assessment of Acoustics Effects (refer Appendix X).

Temporary noise and vibration effects will likely arise from the following anticipated activities:

- Use of plant and heavy machinery (a detailed list is contained in Appendix X)
- Construction vehicle movements
- Night-time works where daytime works would cause traffic disruption
- Retaining wall installation and the use of earthmoving equipment and vibratory rollers for road widening

In summary, most of the construction works can comply with the permitted noise levels of the AUP:OP, where dwellings are located more than 25m away. Where this is not possible, management and mitigation will need to be implemented.

In order to achieve compliance with the night-time noise limit, a large setback distance would be required if line of sight is maintained. For many of the dwellings along the corridor this means that construction noise

levels would exceed the night-time noise limit by a considerable margin, and management and mitigation will need to be implemented. This may extend from two nights to up to 10 nights, depending on the works required and the line-of-sight from the receiving dwelling to the works.

In regard to construction vibration, there are several dwellings within 14m of a potential vibratory rolled area. These receivers are 175, 218, 291, 340, 407A and 507 SH16. Two commercial buildings appear within 6m of the alignment edge, the Grind Café at 1 Kennedys Road and The Kumeū Produce Market at 407A SH16. The Sinton heritage buildings at 191, 222A and 238 SH16 are all between 25 and 30 metres from the proposed works.

Measures to avoid, remedy or mitigate potential adverse effects:

A Construction Noise and Vibration Management Plan (CNVMP) will be prepared containing information regarding noise performance standards, predicted levels, affected receivers, on-site management, mitigation options, communication procedures, and complaints procedures. The CNVMP will be implemented on site for the duration of the construction works. It is considered a living document that will be kept up to date regarding actual timing/equipment use and methodologies, should these change throughout the construction process

The following outlines specific mitigation strategies to address temporary noise and vibration effects:

- Engagement with affected receivers
- Temporary noise barriers (sheets of plywood or noise curtains)
- Avoidance of unnecessary noise and vibration through site management and additional measures
- Progressive staging of construction works so dwellings will only be affected for a limited time when works are in the vicinity
- To manage vibration effects, use of alternative compaction methods, use of a static roller and in certain locations undertaking a pre-construction building condition survey to enable the determination of liability due to damage that may be caused due to and during the vibratory rolling
- A Construction Noise and Vibration Management Schedule which will be based on actual predicted noise levels for the dwelling in question, including any terrain shielding present, and take account of the actual duration of the works to be undertaken that will then inform the Best Practicable Option for noise mitigation in that location.

Overall, the proposed works can be constructed in such a way that any adverse construction noise and vibration effects will be temporary, and can be mitigated or managed using the above strategies so that effects are minor and not unreasonable.

8.3.10 Landscape and Visual Effects

The Project will disrupt the rural lifestyle amenity of the area during construction. Earthworks, construction machinery and vegetation removal will have landscape and visual effects.

Measures to avoid, remedy or mitigate potential adverse effects:

The construction of the Project will be staged in sections along the highway limiting visual effects associated with construction activities to small sections at a time. Any landscape and visual effects will be temporary.

There will be a loss of 159 trees/tree groups, that are of varying quality. While the removal of rank grass and 159 trees/tree groups across 4.3 km of road will not affect the underlying character and composition of a predominately rural landscape, it is expected to produce at least a partial change in condition at the roadside level. To mitigate this loss, Waka Kotahi proposes to plant over 88,400 new plants, which will result in a positive net gain in vegetation across the alignment. As these plants establish over time, the ecological, biodiversity and amenity values of the wider area will be enhanced.

8.3.11 Services and Network Utilities

The Project has the potential to affect existing services and utilities within the road corridor. All network utility providers have been made aware of the works and are generally supportive of the proposed works. Transpower has provided an Affected Party Approval.

Measures to avoid, remedy or mitigate potential adverse effects:

The Project team is aware of all services in the road corridor and has tried to avoid them where possible. Of the providers with assess in the road corridor, the following required specific consideration:

- Spark has a Southern Cross Submarine International Cable (SIC) cable that runs along the northern side of the alignment. To ensure that there are no disruptions to the SIC cable, no excavations shall be undertaken within 0.5m vertical clearance or 1m lateral clearance of the cable, any constraint points will be raised with Spark and resolved on a case by case basis
- Transpower's Henderson-Maungatapere 110kV line and Henderson-Marsden 220kV line cross SH16 from 7 Main Road to 16 Main Road. Transpower has provided design and clearance guidelines around the existing asset. The contractors will be able to achieve the minimum vertical separation requirements specified in NZECP34:2000. The construction around the powerline will be detailed in the CMP, which will be reviewed by Transpower prior to construction.
- The Vector medium pressure gas main runs along Northern side of SH16 between Brigham Creek Roundabout then crosses to southern side at 300 SH16. This will need to be relocated out of the new carriage way. It will be installed in the shared trench in berm on the northern side of the highway. The high pressure gas main runs along the east side of Taupaki Road and Old North Road (on both sides near the roundabout). This will not be relocated. The depth and location of the high pressure main will be confirmed via Vector locate services to resolve potential clashes with proposed stormwater assets

This infrastructure is accommodated in the road improvement design. Caution will be taken around all utilities. No adverse effects are anticipated to services and network utilities.

8.3.12 Effects on private wastewater facilities

The extent of the Project works along the alignment will impact some existing wastewater systems located on private properties which would permanently affect their function.

An investigation of Council property file information was conducted for each site impacted by a land requirement to identify the location of any existing private onsite wastewater systems. This information was then used to determine whether the Project works would directly impact an existing wastewater system or cause a non-compliance with the standards in E5 On-site and small scale wastewater treatment and disposal, of the AUP:OP. Five properties have been identified where the Project works will impact the existing wastewater systems. 14 properties have been identified where the Project works may impact the existing wastewater systems. Further consultation is being undertaken to determine the exact location and extent of these systems where property file information could not identify. Consultation with these property owners is ongoing. These properties are listed in Table 17 below.

Measures to avoid, remedy or mitigate potential adverse effects:

To mitigate the impact of the Project works on existing onsite wastewater systems, an upgrade of the impacted systems is proposed. A specific condition is proffered (refer Appendix Y) to enable a process to ensure sites identified will have their systems upgraded or an alternative remedial solution explored.

In summary, whilst the Project will impact some existing onsite private wastewater systems along the alignment, these systems will be upgraded to ensure they will function to meet the needs of existing users and

in accordance with the relevant requirements of the AUP:OP. Adverse effects will therefore be temporary and are considered Minor.

Table 17: Impact on existing onsite wastewater systems

Impact on Wastewater Systems	Properties Identified
Wastewater system is impacted and will be upgraded	238 SH16
	264 SH16
	264A SH16
	1404/1368 Coatesville Riverhead Highway
	340 SH16
Wastewater system may be impacted and consultation is ongoing	171 SH16
	218-220 SH16
	222A SH16
	299 SH16
	315 SH16
	324 SH16
	350 SH16
	418 SH16
	429 SH16
	436 SH16
	522 SH16
	1411 Coatesville Riverhead Highway
	1397 Coatesville Riverhead Highway
	26 Old Railway Road

8.4 Operational Effects

The following section will outline the potential permanent adverse effects of the Project that will be caused from the ongoing operation of the Project corridor.

8.4.1 Stormwater Effects

A Stormwater Design Report has been provided in Appendix I which outlines the details of the proposed stormwater design. The stormwater design typically follows the requirements in the AUP:OP, Waka Kotahi and Local Authority design requirements and guidelines. Please note in some areas, where the design standards and guidelines cannot be achieved, the Best Practical Option (BPO) has been adopted. This could be a result of:

- Site and operational constraints
- Requirements to provide for and protect other utility services
- The function of the road as overland flow paths to convey stormwater runoff from surrounding land uses which the road controlling authority has limited ability to control
- Safety and operational constraints of the road or discharges;
- Topographical limitations and geotechnical and structural requirements.

The stormwater design has been developed with consideration of the following elements and effects for the proposed stormwater management facilities:

- Flood risks to the road
- Flood risks to others
- Secondary flow
- Carriageway drainage and cross drainage, including fish passage requirements
- Hydrology Mitigation (Retention, detention) and stormwater quality
- Erosion and Scour Protection.

Projects like these can cause adverse effect on flooding surrounding streams and the existing stormwater networks if not design appropriately to manage stormwater effects. Effects can include:

- An increase in flooding effects when increasing the impervious surface area
- An increase in untreated stormwater
- Increased pressure on stormwater infrastructure in large rainfall events, leading to the flooding of the road and unsafe driving conditions for road users.

The effects have been carefully considered in the stormwater design and are addressed in the mitigation section below. The overall, effects of flooding and effects on culverts are discussed first.

Flood risk to the road:

The overall increase in impervious surface area for the proposed road widening works and SUP for the entire area of the Project will only result in a minor increase to peak flows.

The existing road vertical geometry is not proposed to be modified significantly, and the effects of the proposed widening works on the overland flow paths of the road is considered to be negligible. This is due to the proposed new conveyance channels and swales that will move flows appropriately and provides effective retention and detention where needed.

Culverts:

There are a number of existing culverts along the alignment (refer to Appendix I for a list of these culverts). The existing culverts are to remain in place and in operation during and after the Project. The proposed design has been reviewed to understand the impact of the Project on these structures (although no modelling has been carried out). The proposed design option does not make the impact of flooding / upstream water levels any worse for these existing culverts. Therefore, they will remain in place, even though they currently do not meet the current design standards.

Most of the existing culverts across the corridor are potentially undersized when compared with current design standards. Increasing these culverts to accommodate a larger flow is not within the scope of works for this Project, being focused on safety improvements. However, as previously stated the project will not increase the upstream flooding risk of these culverts. Where an existing cross culvert connects into a pipe network, it is proposed that these culverts be replaced and upgraded to a suitable size where required.

The existing culverts are expected to be under capacity and will overtop the road under the 10% AEP design rainfall event. It is expected that the additional increases in flow from the road widening will have an insignificant effect on upstream flood levels at these overflow locations. The head water level (HWL) will be confirmed in the next stage of design when the culvert details and inverts are surveyed.

Measures to avoid, remedy or mitigate potential adverse effects

The following section will discuss the design approach taken to mitigate potential adverse effects on the environment from stormwater.

Stormwater design considerations to manage effects

Discharging to some surrounding streams is included within the Project design. All outlet structures will be specifically designed to ensure that adequate energy dissipation is achieved and that the effects of the discharge do not cause scour/erosion within the immediate receiving stream environments. This will be achieved through the use of riprap and rock lined channels.

All swales will be designed in accordance with appropriate guidelines and shall not pose a hazard to road users. All treatment swales are to be planted to minimise the footprint.

Where piped networks are proposed, new inlets are spaced such that gutter flow will not encroach into the nearest traffic lane in a 10% AEP event.

During large rainfall events, secondary stormwater flows will typically be contained within the road carriageway and designed such that one lane remains open for traffic each way during a 1% AEP storm event. However, this is not achievable in all locations of the corridor due to existing flooding issues.

Where the finished road surface is proposed to be OGPA; recessed catchpits, splay pits or metropit are proposed. This is to retain a shoulder of 1.5m across the Project and eliminate the risk of a surface level change due to the OGPA and catchpit apron that may cause obstacles for road cyclists, resulting in a crash.

Stormwater Treatment effects

Currently only 25% of stormwater runoff from the Project corridor is treated. Waka Kotahi is proposing to treat approximately 90% of the total impervious road area (67,373m² will be treated out of 75,242m² total impervious area), a lot of this includes existing the impervious area. If the new and existing impervious area cannot be separated, all the stormwater runoff will be treated where possible. This is achieved by collecting and treating the road surface runoff through a combination of natural green infrastructure and proprietary treatment devices. Treatment swales with varying base widths are the proposed primary treatment device. Proprietary treatment devices (such as Stormwater 360) are proposed where the site is constrained by land, other services or operational requirements. The treatment swales and retention swales are designed to GD01 guidelines to provide a residence time of 9 minutes or more to treat the road runoff. The proposed treatment will be sufficient in mitigating adverse effects on the water quality of surrounding environments. This is a significant improvement from the existing treatment situation and will ensure an overall decrease in contaminants from the highway entering the surrounding waterways.

There are two locations where new impervious area cannot be treated. At DP1 near Ngongetepara Stream, there is 1750m² of both new and existing impervious area that will not be treated. This is due to topographical and geotechnical limitations, site access for maintenance and safety due to the location on SH16 where there is a dip in the road. Due to the constrained nature of this area, there are no other treatment options suitable at this location. At DP4 up Coatesville Riverhead Highway, 701m² of new and existing impervious area will also not be treated due to site constraints.

These untreated sections of new impervious areas would have less than minor ecological effects on the streams. These areas are small in scale and runoff into these streams is currently untreated. Therefore, there will still be a significant decrease in untreated water in these streams as a result of this Project. Aside from these two locations, the Project will treat most new impervious area as well as most of the existing impervious area. The Project will result in an overall improvement to surrounding water quality.

Hydrological Mitigation - Retention and Detention:

Hydrologic Mitigation is provided where additional impervious area discharges to a stream environment. Hydrology mitigation is required at discharge points: DP6, DP8 and DP11 as we are discharging into a stream environment (refer to Figure 5 for DP locations). At these locations we have additional impervious areas from both road widening and the new shared path. In assessing the design options to achieve hydrology mitigation,

consideration of the site constraints, topographical limitations, operational requirements, safety and existing service have been taken into account. Hydrology mitigation volumes are provided using retention storage volume under the retention swale with check dams. In some locations where existing utilities are located, primarily the Southern International Cable (SIC) and the 450Ø critical watermain, retention cannot be achieved. At these locations the detention requirements have been increased to allow the required retention volumes, meeting the overall hydrology mitigation volumes where practical. Refer to the Stormwater Report in Appendix I for the details on the exact hydrological retention achieved.

Overall, all discharge points receive adequate hydrological mitigation except Discharge Point 1 at Ngongetepara Stream (Brigham Creek). The base of the stream at this location is typically RL1.3m, however two of the discharge points from the pipe network are higher up the stream embankments due to the incised banks to the stream. The discharge from the SH16 stormwater network is also located at the downstream end of Redhills Catchment, immediately before it discharges to Brigham Creek, a tidal area. Due to the location within the catchment, level and proximity to the tidal area, SMAF is not required at this location. However, as there are some swales in this area, as small amount of detention is achieved in this area.

The Hydrology Mitigation requirements, where required on the project, are to meet the SMAF 1 requirements. This equates to 5mm runoff depth for retention and 18.5mm runoff depth for detention for the impervious area over which the hydrology mitigation is required. Hydrology mitigation is required for additional impervious surfaces greater than 5,000m² of road, therefore for this project this includes the additional road area and the shared path. It is noted that in AUP E8.6.2.3 for the diversion and discharge of stormwater runoff from impervious areas up to 5,000m² that no SMAF requirements are triggered. Detention and retention volume for hydrology mitigation (as required) are to be incorporated into natural devices where practical to eliminate the need of constructing dedicated devices. These volumes will be provided for in swales with check dams, retention swales, wetlands and ponds, bioretention devices or infiltration trenches.

The design capacity for all new primary systems shall generally be sufficient for the 10% AEP peak flows and shall meet NZTA guidelines and standards. Effects of climate change (3.8°C temperature increase to 2110, Version 3 September 2021) shall be allowed for in the design. New inlets should be placed such that gutter flow will not encroach into the nearest traffic lane in a 10% AEP event.

The total detention volume achieved is constrained by the footprint and constructability. The proposed design does not completely meet the required detention volume under the AUP, but the design is expected to result in an overall betterment of the downstream stream health.

Hydrology mitigation is required at three discharge points near Taupaki Road Roundabout, 438 SH16 and Kumeū River Bridge (DP6, DP8 and DP11). Additional impervious areas from both road widening and the new SUP are proposed at these locations. In assessing the design options to achieve hydrology mitigation, consideration of the site constraints, topographical limitations, operational requirements, safety and existing service have been taken into account. Hydrology mitigation volumes are provided using retention storage volume under the retention swale with check dams, the results are outlined in detail in the Stormwater Report in Appendix I. In some locations where existing utilities are located, primarily the Southern International Cable (SIC) and the 450Ø critical watermain, retention cannot be achieved. At these locations the detention requirements have been increased to compensate for the required retention volumes, meeting the overall hydrology mitigation volumes where practical.

8.4.2 Permanent hydrological effects on watercourses

Permanent Increase in Hydrological Input to Ngongetepara Stream

Hydrological input into Ngongetepara Stream will permanently increase due to additional discharge from an increase in impervious surface area within the SH16 project corridor (captured by DP1). However, the amount of hydrological input will be small, particularly when compared to the size of the stream, and will not produce a

discernible change in stream hydrology. Furthermore, water quality will not be affected as current discharge into the stream is untreated, but 88% of the discharge at this location will be treated following the completion of works.

Permanent Increase in Hydrological Input to the stream at 1385 Coatesville Riverhead Highway:

Hydrological input into this stream will permanently increase due to the redirection of excess discharge from the SH16 project corridor into the watercourse. However, as the amount of discharge is small relative to the size of the watercourse, and will be treated, it will not produce a discernible change in the hydrology or water quality of the stream. The effects are considered less than minor.

Permanent Increase in Hydrological Input to the stream at 429 SH16:

Hydrological input into this stream will permanently increase due to additional discharge from an increase in impervious surface area from road widening near the watercourse (captured by DP6), and between Coatesville Riverhead Highway and Taupaki Road (captured by DP5). However, the hydrological input to the stream from the discharge will be small, particularly following stormwater design mitigation and the use of retention swales, and will not produce a discernible change in stream hydrology. Water quality will not be affected as the discharge from DP5 is treated, and there will be an increase in the percentage of treated discharge from DP6 compared to existing levels (76% of discharge is currently treated, but 94% will be treated following the completion of works).

Permanent Increase in Hydrological Input to the stream at 436 SH16:

Hydrological input into this stream will also permanently increase due to additional discharge from an increase in impervious surface area from road widening (captured by DP6). However, as the amount of hydrological input will be small with the proposed stormwater design mitigation and the use of retention swales, and will not produce a discernible change in stream hydrology. Furthermore, water quality will not be affected as currently only 76% of discharge into the stream is treated, but 94% will be treated following the completion of works.

Permanent Increase in Hydrological Input to the Kumeū River:

Hydrological input into the Kumeū River will permanently increase due to the installation of the new outfalls at 472 SH16, the BP Station, and at 7 Main Road, which will capture additional discharge from the cross catchment (that was originally flowing to a private pond) and capture discharge from the road corridor more effectively. The level of increase will be small, and will not produce a discernible change in the hydrology of the Kumeū River. The water quality of the Kumeū River will not change from baseline levels, as discharge from the bridge at Kumeū River is considered to be clean water and all other discharge will be treated.

Stormwater effects on the natural wetland at 436 SH16:

There is an existing open channel located on the north eastern side of the wetland, which conveys flow from the existing swale on SH16 to the permanent tributary of Kumeū River. Auckland Council GeoMaps also shows the wetland to be located within the 100 year flood plain. The level of the wetland varies from RL27.5 to 26m. A review has been undertaken to assess the existing swale outfall and the proposed works in relation to the wetland. The installation of the SUP and road widening will result in an increase in impervious area, and thus an increase in stormwater runoff through the outfall and channel near the wetland at 436 SH16. The existing channel is located approximately 5m east of the wetland with an invert of RL 27.09 at the upstream end, with a depth of 0.5m. Currently, stormwater is spilling over this channel and into the wetland in the 10- and 100 year rainfall events. The Project will involve an 8.5% increase in impervious area within the catchment of this wetland, this increase is expected to be minimal and not expected to affect the wetland. However, with the consideration of climate change, an increase in stormwater flows in the channel is expected to spill into the wetland for the 10 and 100 year events. However, it is already overspilling into the wetland now. As a result of the minor increase in impervious area and mainly climate change, there will be an increase of flows into the

wetland of 0.12m³/s in the 10 year flood event and 0.2m³/s in the 100 year flood event. The effects of this are considered less than minor given the minor increase in flows and the wetland is already in the 100year flood plain and may already be inundated in these events.

Stormwater design effects on the wetland at 522 SH16:

The construction of the SUP will result in the diversion of stormwater runoff from the road to a treatment swale north west of the wetland before discharging into the Kumeū River. The road corridor only contributes a small amount of discharge to the wetland, and is unlikely to be driving the wetland hydrology as it is fed by a mix of surface water and groundwater. The wetland sits within a large depression in the land, and the water from the surrounding slopes and landscape will still drain towards the wetland post-construction. The total upstream catchment which discharges to the wetland is reduced by a total of 1,169m², which is a 3.7% reduction.

The Project may improve the water quality of the wetland. The wetland currently receives untreated stormwater runoff from the road. The wetland water quality and overall ecosystem health could benefit from having a decrease in untreated road runoff entering the wetland.

Overall, the decrease in discharge to the wetland from the Project is considered less than minor and would not affect the overall health and function of the wetland. The minor decrease in discharge is negligible and in the long term will result in an increase of water in the wetland level with climate change.

8.4.3 Transport Effects

The Project will make permanent changes to the State Highway 16 corridor which can impact the safe and efficient operation of it and the way people travel through it. To ensure road users understand the proposed road safety improvements, new road signage will be placed along the corridor. Refer to Appendix Z for the Traffic Signs and Road Markers Plans. Further transport effects are discussed below.

Vehicle Crossings

Permanent physical changes to State Highway 16 and adjoining roads will impact existing vehicle access to sites along these road corridors. This will occur both temporarily during construction works and permanently where access needs to be relocated to accommodate new road infrastructure.

Potential permanent effects arising from these changes may include:

- Loss of safe vehicle ingress and egress to properties causing potential conflict with other vehicles, cyclists or pedestrians
- Traffic delay within the corridor from vehicles turning into and exiting sites

Measures to avoid, remedy or mitigate potential adverse effects:

Specific and inherent features of the Project design are included to mitigate these potential effects on the safety.

Specific mitigation strategies/measures include:

- A shoulder is provided at each crossing to allow vehicles space for turning into their crossings. All crossings on the southern side of the alignment will have the SUP traversing their crossings. Vehicles must give way to pedestrians, therefore the shoulder provides them a space area to wait for any pedestrians or cyclists to cross away from the 80km/hr highway traffic
- The shoulder will reduce any rear end crashes of cars turning into private vehicle crossings and encourage a vehicle to give way to SUP users
- Integration and reinstating of existing lawfully established vehicle crossings into the project design.

At identified sites (324 SH16, 340 SH16 and 418 SH16), access has been redesigned to address specific site constraints.

Features of the Project that inherently provide remediation include:

- Maintenance of two lanes each way from Brigham Creek Road to Taupaki roundabout which allows for continuous flow of traffic where traffic is entering or exiting sites
- No right turn movements from Brigham Creek Road to Taupaki roundabout
- Flush median from Taupaki to Weza Lane in Kumeū to allow for right turn movements
- SUP providing refuge for cyclists and pedestrians while vehicles are entering/exiting sites and the vehicles have the right of way.

There is one crossing along the alignment that vehicles have the right of way which is at 366 SH16. This site accommodates Soljans Estate Winery. The Winery has a right turn bay to allow eastbound vehicles to pull into a median bay to wait before crossing the west bound traffic lane and into the winery. Signage will be installed to tell pedestrians to give way to vehicles turning into the driveway. It would be unsafe for vehicles to give way at this location as they would have to cross two lanes of traffic and give way to pedestrians, which could result in them blocking traffic lanes

The Project will provide mitigation, both specific and inherent within the alignment design, that will minimise potential safety and efficiency effects on users of the corridor and existing properties.

Overall, accessways will be designed to minimise conflict between road users and vehicles using the accessways and reduce safety concerns.

Turnaround facilities

The Project involves the installation of a physical median barrier to prevent head on collisions and satisfy a key Project driver to improve safety. Physical median barriers are installed from Brigham Creek Road to the Taupaki Road Roundabout.

A permanent effect of this design is a slight increase in travel distance for some road users (with the longest travel distance being 3.08km). Road users will need to travel further to reach their destination as they will need to utilise a turn around facility instead of crossing the centreline as they currently do.

Measures to avoid, remedy or mitigate potential adverse effects:

To mitigate this potential effect, the two existing roundabouts at Brigham Creek Road and Taupaki Road as well as the proposed roundabout at Coatesville Riverhead Highway will act as turn around facilities for road users. The Project has been designed to meet the current Waka Kotahi Road to Zero Speed and Infrastructure Programme Design Framework (November 2021) which recommends that turnaround facilities achieve a typical spacing of approximately 3 - 5 km. In this case, the Project turn arounds achieve the following:

- 1.5km from Brigham Creek Roundabout to Coatesville Riverhead Highway Roundabout
- 0.5km from Coatesville Riverhead Highway Roundabout to Taupaki Road Roundabout

Whilst this may cause slight increases in usual travel distance for regular users of this section of SH16, road users' safety will significantly improve due to the installation of the median barrier. In addition, the existing and proposed turnaround facilities will achieve the minimum spacing requirements set out in the Waka Kotahi Road to Zero Speed and Infrastructure Programme Design Framework. The slight increase in detour distance will therefore be appropriate within this roading context.

In summary, the Project will integrate two existing roundabouts and introduce a new roundabout which will provide safe turnaround facilities to support the safety improvement of physical median barriers and in a manner that will not compromise efficiency overall. Therefore adverse effects will be less than minor.

8.4.4 Traffic Noise

Transport noise and vibration can cause a range of impacts on people and communities including annoyance and interference with daytime activities such as work, study and domestic living. The Project will involve widening of the existing State Highway 16 corridor which can result in permanent increased traffic noise at sensitive receivers along the alignment. Marshall Day Acoustics has undertaken an assessment of the potential effects from the operational noise associated with traffic. This assessment can be found in Appendix X.

Noise Assessment Methodology:

Computer noise modelling has identified the potential level of permanent noise effects arising from the operation of the altered State Highway 16. Waka Kotahi applies NZS 6806:2010 as a matter of good practice. This assessment has been undertaken in accordance with New Zealand Standard NZS 6806:2010.

The assessment method in NZS 6806 requires consideration of noise mitigation options depending on the scale of a project. These options are subject to an integrated design process, in which the costs and benefits of the mitigation are considered to find the Best Practical Option (BPO).

A noise mitigation BPO workshop assessed the effects on various identified sensitive receivers. These sensitive receivers include dwellings and educational facilities and are identified as 'protected premises and facilities' (PPF). Commercial and business uses are not PPFs and are excluded from the assessment. In an urban area, all PPFs within 100 metres of the alignment shall be assessed and in a rural area PPFs within 200m from the alignment are assessed. The Project traverses both urban and rural areas so both distances have been applied where relevant.

PPFs were grouped into 18 assessment areas, 10 on the eastbound side of SH16 and 8 on the westbound side. The full list and location of all these PPFs can be found in Appendix X.

Noise Effects Assessment:

The noise report concludes that the change in noise as a result of the project would be unnoticeable and therefore a negligible difference. Irrespective of this finding, the existing noise levels for some PPFs is high and therefore, Waka Kotahi has investigated mitigation in accordance with NZS 6806. PPFs within each assessment area were assessed against Category A, B and C under NZS6806 as listed in Table 18. PPFs identified within Category A achieve reasonable noise levels and therefore not require noise mitigation. PPFs within Category B and C have been assessed to determine if noise mitigation could improve the noise level. Noise mitigation options were selected with the intent to achieve the Category A. If not achieved, then mitigation was assessed against Category B. However, where it was not practicable to comply with Categories A or B then mitigation should be implemented to ensure the internal criterion in Category C is achieved internally through the building. Each PPF is modelled to identify what category they met, and thus which PPFs require mitigation.

Table 18: NZS 6806 assessment criteria categories

Category	Criterion	Altered roads
A	Primary	64db
B	Secondary	67db
C	Internal	40db*

* This criterion applies only for those habitable rooms and following the implementation of the Project and all structural mitigation such as road noise barriers or specific low noise road surface.

12 of the 18 total assessment areas identified one or more PPFs that fell into Category B or C, where potential permanent noise effects could be more than minor or unreasonable. These sites were therefore assessed for mitigation. These areas are listed in Table 19 below.

Table 19: Assessment areas requiring noise mitigation

Area Name	Address
East 1	181-173 SH16
East 3	299 and 291 SH16
East 4	315 SH16
East 7	451 SH16
East 8	491 and 489 SH16
East 9	507 and 505 SH16
West 1	218 SH16
West 3	238 SH16
West 4	264A SH16
West 5	340 SH16
West 6	506 – 455 SH16
West 7	550 SH16

Measures to avoid, remedy or mitigate potential adverse noise effects:

In accordance with NZS 6806:2010, several mitigation options were developed to determine the Best Practical Option (BPO) or mitigation measures for each of the 18 assessment areas.

The process to determine the BPO involves the following steps:

1. The acoustic consultant develops mitigation options for individual assessment areas as appropriate.
2. These mitigation options are provided to, and reviewed by, relevant persons in the Project team (e.g. representatives for the urban design team, planning, construction etc) for comment and feedback.
3. Feedback on the options is provided in a round table discussion, enabling fine tuning of the initial mitigation options. Often, at that time, the team develops further mitigation options that will need to be tested by the acoustic consultant. A workshop with the project team was held on 25 November 2021.
4. The preferred mitigation representing the BPO is chosen by the team to be put forward to community consultation and any consenting authority.
5. Following consenting, during the detailed design and prior to construction, the detailed and final mitigation will be tested by the acoustic consultant to test if it represents the BPO at that time to ensure that the outcome is at least equivalent to that put forward with the preferred mitigation option.

Three main options or mitigation measures were considered for each assessment area including:

- A 2 - 2.5m barrier (fence),
- Installing PA10 30mm along the assessment area of SH16 (reduce road noise)²¹, or
- A combination of the first two options; PA10 30mm and a 2m barrier.

The noise barriers were assessed as the best practical option to reduce the road traffic noise for PPFs. The BPO process enabled the project team to recommend which PPFs should receive noise mitigation in the form of a 2m high noise barrier. With noise barrier mitigation in place, the number of PPFs predicted to receive

²¹ PA10 30mm was found to not be a practical solution on a high use road as it does not provide appropriate skid resistance on corners and would degrade quicker on a high use road.

undesirably high noise levels would be reduced from 1-6db. The BPO outcomes are discussed in detail in Appendix X and outlined in Table 20 below. This was an indicative BPO and the actual provision, specific design and materials, were subject to feasibility and feedback received during landowner engagement. Not all landowners wanted a noise wall.

Table 20: Best practical noise mitigation option

Assessment Area	Address	Best Practical Option
East 1	181-173 SH16	Option 1: 2m barrier – This will achieve a noise level reduction of 2-3 dB at the most affected houses, reducing their noise level generally to be within Category A or B.
East 2	191-239 SH16	Do minimum - PPFs fall within Category A. No mitigation required.
East 3	299 and 291 SH16	Option 1: 2m barrier – as Option 3 (with PA10 surfacing) was not an acceptable solution for short lengths and Option 1 achieved a better noise reduction than Option 2. Option 1 (2m barrier) will reduce the noise levels slightly at the upper floor, but noticeably at the ground floor.
East 4	315 SH16, 1411, 1409, 1403 and 1397 Coatesville Riverhead Highway	Option 2: 2m barrier – This will reduce the noise level to within Category B. An alternative road surface is not feasible due to the intersection requiring high shear and skid resistance.
East 5	331 SH16	Do minimum - PPF falls within Category A. No mitigation required.
East 6	16 Old North Road, 393-429 SH16	Do minimum - Majority of PPFs fall within Category A, exception being 429 SH16 which falls within Category B yet located on a road curve and therefore a noise barrier and/or low noise road surface treatment were not feasible.
East 7	465 and 457 SH16 451 SH16	Do minimum - PPFs fall within Category A. No mitigation required. Option 1: 2m barrier -. This will reduce noise levels by nearly 2 dB so the dwelling falls into Category A.
East 8	491 and 489 SH16	Option 1: 2m barrier – This will reduce noise levels by nearly 6 dB so the dwellings fall into Category A.
East 9	505 507 SH16 (Kumeū	Do minimum - PPFs fall within Category A. No mitigation required.

Assessment Area	Address	Best Practical Option
	Retirement Village)	Option 2: 2.5m barrier – This will reduce noise levels so the building can fall into Category B. Further investigation of any existing building insulation will determine whether internal ventilation can be provided as an alternative, so no mitigation would be required. Following land owner consultation, 507 SH16 confirmed they did not want a noise wall so the BPO is Do Minimum - no mitigation.
East 10	21-23 Riverhead Rd	Do minimum - PPFs fall within Category A. No mitigation required.
West 1	218 SH16	Option 1: 2m barrier – This would achieve a small noise level reduction of slightly over 3 dB, which would reduce noise levels to within Category B. An alternative road surface is not feasible due to the intersection requiring high shear and skid resistance.
West 2	222A SH16	Do minimum - No mitigation recommended as a 2m barrier would reduce the historic value by blocking views to the building, and only achieve limited noise levels reductions of less than 2 dB.
West 3	238 and 256 SH16	Do minimum - No mitigation recommended as a 2.5m barrier would reduce the historic value by blocking views to the building, and only achieve limited noise levels reductions of less than 2 dB.
West 4	264 and 300 SH16	Do minimum - PPFs fall within Category A. No mitigation required.
	264A SH16 (minor dwelling)	Option 1: 2m barrier - This will have a significant positive effect given that it provides a 6db noise reduction and will move this property from Category B with no mitigation, to a Category A with mitigation.
West 5	340 SH16	Option 1: 2m barrier – The 2m barrier is recommended as it provide sufficient noise reduction to put the dwelling into Category A.
West 6	436 SH16	Do minimum - No mitigation is recommended as noise at 436 SH16 is predicted to reduce as a result of the Project. An alternative road surface is not

Assessment Area	Address	Best Practical Option
		feasible due to the intersection requiring high shear and skid resistance.
West 7	550 SH16	Option 1: 2m barrier – This will significantly reduce noise levels (by nearly 7 dB) to put the dwelling into Category A.
West 8	7 Main Road	Do minimum - PPFs fall within Category A. No mitigation required.

Overall, the noise report concludes that the noise effects from the Project, based on the change in noise level, are negligible with overall noise level decreases of 1 to 2 decibels once the surrounding transport infrastructure is operative. Some PPFs currently receiving high noise levels will experience a reduction of up to 6 decibels with the use of barriers. With barrier mitigation in place, the number of PPFs predicted to receive undesirably high noise levels would be reduced (and be generally restricted to double storey PPFs where barriers are ineffective for the upper floor). Therefore, permanent operational noise effects are deemed to be less than minor.

8.4.5 Landscape and Visual Effects

The Project includes a SUP which provides a separated facility for pedestrians and cyclists between Kumeū and Brigham Creek Road. The SUP runs parallel adjacent to the road corridor and provides for views to the adjacent rural landscape which includes rural residential lots, pastureland and orchards and is transitioning to urban.

Widened highway footprint and subsequent vegetation removal:

The Project involves a road widening that will increase the highway footprint. This will result in visual change to the existing landscape of the corridor due to the removal of vegetation associated with road widening and the installation of the SUP. However, it is noted this will be temporary as revegetation is proposed as discussed below.

Measures to avoid, remedy or mitigate potential adverse effects:

On completion of the project, landscape planting is proposed to mitigate the loss of vegetation removal. However, the vegetation will take 5-10 years to form a mature canopy. This will result in a visual change to the landscape of the corridor during this time. Although there will be a change to the landscape, the Project has aimed to improve the amenity along the corridor with a well designed SUP and carefully chosen planting to enhance the road corridor. Where the new footprint impacts on the adjacent landscape – planting has been proposed to create a linear green corridor and provide a buffer to the neighbouring properties. The SH16 'green corridor' is formed through the planting of high native revegetation plant species along most cut and fill embankments. Clusters of larger trees will be placed along the corridor to create different levels of vegetation canopies, to enhance layering of the planting.

The planting will mitigate the visual effects of the embankments that are constructed through the widening of the SH16 road and SUP corridor. The planting will also help to create a planted buffer between rural residential properties and the road/SUP path to enable some level of privacy.

Lower native revegetation planting and amenity planting mixes provide lower growing plant species. These planting mixes are proposed at the key nodes along the corridor i.e. at roundabouts, bridges, intersections. These mixes provide visual enhancement at the major intersections and allow clear sightlines through the area for all users.

The proposed landscaping plans indicate the planting mixes, locations and species which have been selected in collaboration with Mana Whenua. Plant species are specifically chosen to assist with treatment of stormwater, soften stream edges, and reduce the visual effects of the constructed embankments. The proposed layout and planting plan has been designed to consider Crime Prevention through Environmental Design (CPTED) issues. This includes consideration for setting back planting from the edge of pathways and layering plant species to enable clear sightlines.

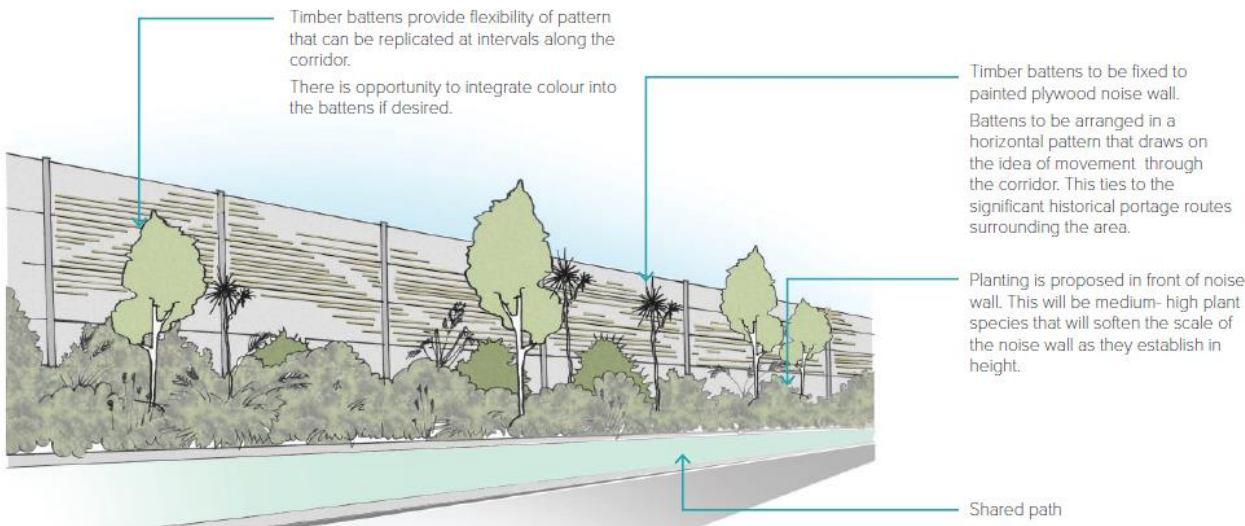
Noise Barriers:

Existing noise levels from operational traffic are proposed to be managed by noise barriers in certain locations, this is outlined in Section 8.4.4. These barriers are 2m high and can span for as long as 90m long. These large physical barriers can alter the landscape of the road corridor and block views to the surrounding rural landscapes.

Measures to avoid, remedy or mitigate potential adverse effects:

Whilst the installation of these noise barriers are proposed within the Designation footprint, they comply with the AUP:OP maximum height for structures and can be constructed as a permitted activity. Nonetheless, when considering the existing rural character of the SH16 corridor, it is important that the materiality of the noise barriers is appropriate to reduce the visual prominence of these structures. For these reasons, timber has been proposed as the preferred material for the noise walls. Timber provides a softer appearance within the corridor. With support from various planting typologies, there is an opportunity to further reduce the visual effects of the structures through planting species adjacent to the walls.

CONCEPT 1



CONCEPT 2

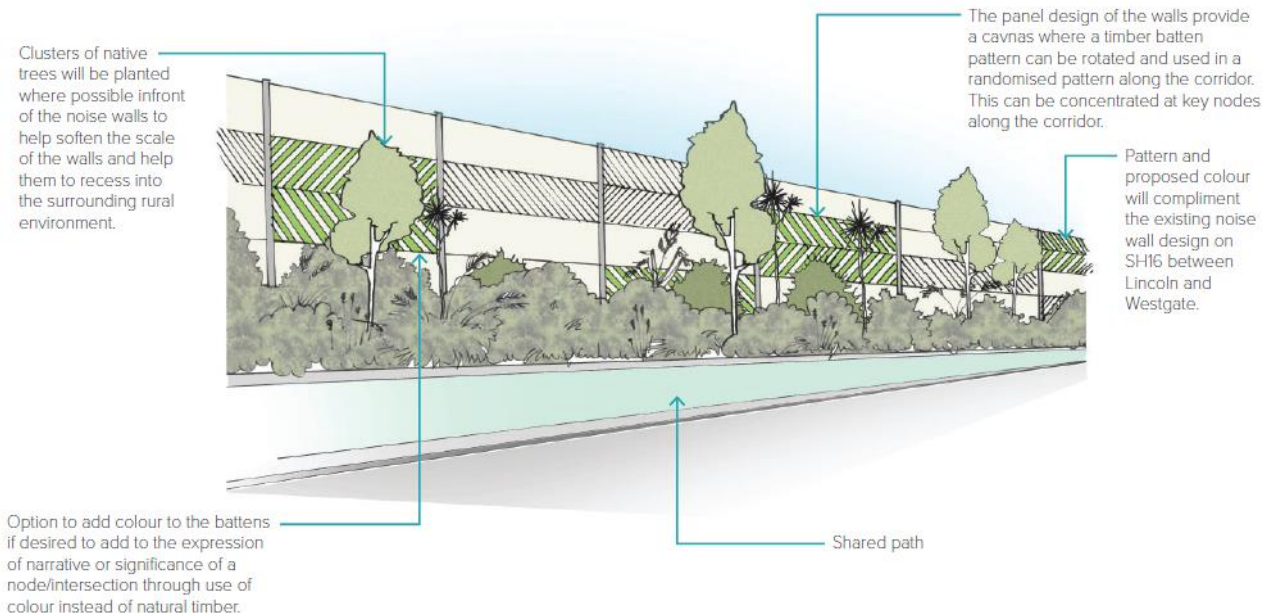


Figure 23: Concept design for the noise walls

Bridges and retaining wall structures:

The proposed two SUP bridges at Brigham Creek and Kumeū River will result in additional structures over the stream environments. Retaining walls will be required throughout the corridor to support the SUP and road embankments. This is an existing State Highway environment where these types of structures already exist. However, the proposed landscape design considers the integration of the proposed two new pedestrian bridges and retaining walls into the surrounding landscape (which already includes these structures).

Measures to avoid, remedy or mitigate potential adverse effects:

Landscape planting will be used to integrate the proposed shared path bridge abutments into the stream corridors to reduce the visual impacts of the structures and naturalise stream edges that may be disturbed by the construction works. The design approach to waterways will include native riparian planting along all stream and swale edges within the designation to enhance the existing vegetation patterns and thereby provide planted connections across the highway. This approach provides for increased legibility of the valleys and links with the existing vegetation patterns.

The landscape design includes the strategic placement of planting (where space allows) and consideration of climbing plant species that can grow up the face of walls.

Fencing:

Where the road corridor widening is required, private fencing will be temporarily removed to enable the works. Whilst this can create a temporary visual change for the community, the fencing will be reinstated on a like for like basis prior to works completion.

Measures to avoid, remedy or mitigate potential adverse effects:

The Project proposes to replace fences that are removed during construction and will be reinstated to match the existing fencing with adjacent property boundary fences. This will likely be standard farm fencing to integrate with the rural character of the area. Where noise barriers are proposed, boundary fencing will be reinstated to tie in with the noise wall and will be consistent boundary coverage.

Design considerations for the SUP at driveway and intersections:

Safety and CPTED has been considered through the landscaping plans along SUP, this has included:

- A minimum 500mm planting offset from path edge to prevent trip hazards.
- Phormium Tenax is not to be planted within 2m of the path.
- Plants within 2m of the pathway to have a maximum height of 1m to enable clear sight lines.

Lighting Effects:

The existing lights along the corridor are old High Pressure Sodium lights that are not hooded and have poor control of light spill in all directions. Most luminary and lamp lights along the corridor will be removed and replaced with LED Luminary lights, with the addition of new light poles in some locations. Refer to Appendix H – Utility Plans for the location of proposed lighting and to section 3.1.17 for the proposed lighting design standards. Light poles are proposed to illuminate both the state highway corridor and the SUP to improve the visibility and safety of all road users at any time of the day. Many of the existing poles will be removed (due to road widening) and replaced. Overall, there will be 128 new light poles along the corridor. There are a number of potential lighting effects that could result from an increase in lighting along the corridor, including:

- Skyglow, which results from light directed into the sky either directly or by reflection from objects;
- Glare, which is a measure of the brightness of a light source with respect to the brightness of the background against which it is viewed; and
- Light trespass or spill light, which is a measure of the light that is not directed to the task and spills into neighbouring properties.
- Light spill on sensitive habitat environments (e.g streams, wetlands, vegetation).

Most existing residential dwellings along the corridor are setback well away from the proposed new designation boundary and would not be affected by the new lighting. However, there is a row of housing at 171-183 SH16 (containing 7 dwellings) that is located close to the existing road boundary. Three additional streetlights will be installed outside this row of houses which would result in an increase of lighting from the existing lighting environment. Most of these dwellings are set back approximately 10m or more from the proposed new road boundary, except 175 SH16 which is set back 7.5m and 183 SH16 which has a business built up to the road boundary. This is “The Grind Café” which is not operative at night and would therefore not be affected by light spill. 315 SH16 is located on the corner of the proposed Coatesville Riverhead Highway Roundabout, which will involve an increase in new light poles to improve the safety of the intersection at night. This dwelling will be located approximately 8m from the new road boundary. There is existing mature vegetation around these dwellings that already act as a buffer from the current lighting. However, most of this vegetation will be removed during construction, potentially exposing the dwellings to light spill.

There are also potential habitat sensitive environments along the corridor that can be affected by lights, such as wetlands located at 436 SH16 and 522 SH16, and larger stream environments at Kumeū River and Ngongetepara Stream (where there is also denser vegetation along the stream reserve).

Design standards and Guidelines:

Chapter E24 of the AUP:OP controls some aspects of the potential lighting effects. The corridor has been classified as a Strategic Transport Corridor Zone, which places the lighting category as Lighting Category 4 (High Brightness). The requirements for spill light for both horizontal and vertical illuminance at the boundary of the road shall not exceed 10 lux at night above the background level (E24.6.1.a and Table E24.6.1.2). The requirements for spill light for vertical illuminance at a neighbouring window are required not to exceed 4 lux at night (E24.6.1 b and Table E24.6.1.3). Glare, defined as a threshold increment percentage, must not exceed 15% based on adaption luminance of 10cd/m2 (E24.7 and Table E24.6.1.4). Glare, defined as an absolute

luminous intensity from each luminaire, shall not exceed 2,500 cd when viewed from a dwelling (E24.8 and Table E24.6.1.6).

Furthermore, the NZTA M30 Streetlighting guidelines provide further lighting requirements that are generally more stringent technically than those in the AUP:OP. One exception is that the requirement for light spill assessments requires a maximum of 10 lux measured 3m inside the boundary (measured away from the road).

The Auckland Transport Technical Design Manual – Chapter 12 has further requirements that are generally more stringent technically than those in the AUP:OP. This includes control over the amount of light directed into the sky to address skyglow issues, as well as glare control and spill light limitations.

Measures to avoid, remedy or mitigate potential adverse effects:

The existing lighting is being upgraded with new LED luminaires, with good control of light (zero direct light up in the sky and minimal spill light into neighbouring properties). Although, a lot of the vegetation along many properties will be being removed. The anticipated light spill at a point measured 3m away from the designation boundary lines will be less than 10 lux, and the anticipated spill light at residential windows is less than 4 lux (vertical), making the designs compliant with the AUP:OP standards and NZTA M30 guidelines. This is irrespective of any vegetation shading or fences. As discussed above, the closest dwellings to the road are 7.5m from the new road boundary and will receive less than 4lux of light spill. Therefore, any effects on residence at night will be less than minor, despite vegetation buffers being removed.

The lights will comply with the Glare standards under E24 of the AUP:OP, luminaires limit glare to road users to less than 15% (and in fact target a glare rating of less than 12%). The designed luminaires will also limit glare to residences to less than 2500cd. Therefore, there are no effects from glare.

Although there will be an increase in the number of lighting poles along the corridor, they will be better designed than the existing lights to direct light down at the road and minimise light spill on the surrounding environments. This is important to minimise effects on sensitive habitat environments, such as streams, wetlands and clusters of vegetation. Lighting controllers will be installed, as per the NZTA street lighting design standards to allow light to be dimmed/alterd throughout the life of the assets so lighting effects on sensitive environments can be managed over time.

Overall, the design has been carried out to generally meet the requirements of both NZTA M30 and the AT-TDM, with specific departures requested, associated with the placement of lighting adjacent to bus-stops, and a minor increase in the permissible glare ratings to drivers (though still less than that required in the AUP:OP). The departures will not affect the lighting effects on surrounding residents and habitat sensitive environments, the lighting effects will be less than minor.

8.4.6 Cultural Effects

As discussed in Section 8.3.8 above, both Ngāti Whātua o Kaipara and Te Kawerau ā Maki have an interest in the Project due to the cultural values they hold over the area. The mix of native planting proposed around watercourses, wetlands and along the Project corridor to mitigate vegetation loss, will assist with treatment of stormwater before discharging into the existing waterways including Te Awa Kumeū, improve ecology and biodiversity, soften stream edges and reduce the visual effects of the constructed embankments and bridge structures. Ongoing maintenance of established replanting will be undertaken to ensure the improvements in water quality, ecological and amenity values along the corridor will be achieved and maintained which align with the matters of interest for both Ngāti Whātua o Kaipara and Te Kawerau ā Maki.

9 Notification Assessment

A Notice of Requirement for an alteration to the existing designation and regional resource consents are being sought concurrently. The following section provides an assessment of the notification provisions in relation to both applications.

9.1 Alteration to Designation Notification Assessment

Section 169 of the RMA sets out the process that Council must follow in considering the need to notify a NoR made under section 168. The notification assessment for a NoR is set out in section 149ZCB(1) to (4), 149ZCC(1) to (4), 149ZCE and 149ZCF. Using modifications as set out in section 169((1)(b), these provisions are assessed below.

9.1.1 Section 149ZCB Public Notification of requirement at territorial authority's discretion

- (1) *The territorial authority may, in its discretion, decide whether to require the territorial authority to publicly notify an application or a notice.*
- (2) *Despite subsection (1), the territorial authority must publicly notify an application or a notice if—*
 - (a) *the territorial authority decides (under section 149ZCE) that the activity that is the subject of the application or notice will have, or is likely to have, adverse effects on the environment that are more than minor; or*
 - (b) *the requiring authority requests public notification of the application or notice; or*
 - (c) *a rule or national environmental standard requires public notification of the application or notice.*
- (3) *Despite subsections (1) and (2)(a), the territorial authority must not publicly notify the application or notice if—*
 - (a) *a rule or national environmental standard precludes public notification of the application or notice; and*
 - (b) *subsection (2)(b) does not apply.*
- (4) *Despite subsection (3), the territorial authority may publicly notify an application or a notice if the territorial authority decides that special circumstances exist in relation to the application or notice.*

Assessment:

Section 8 of this AEE concludes that any actual and potential adverse environmental effects will be minor in relation to specific sites within the alteration to designation, and less than minor beyond the alteration to designation.

Waka Kotahi NZ Transport Agency, as the requiring authority, requests that the notice not be publicly notified.

There is no rule or national standard which requires public notification of this alteration to designation.

There are no special circumstances that require public notification.

Therefore, this Notice of Requirement can proceed **without public notification**.

9.1.2 Section 149ZCC Limited Notification of notice of requirement

- (1) *If the territorial authority decides not to require the territorial authority to publicly notify an application or a notice, the territorial authority must, in relation to the activity,—*
 - (a) *decide if there is any affected person (under section 149ZCF); and*
 - (b) *identify any affected protected customary rights group or affected customary marine title group.*
- (2) *The territorial authority must give limited notification of the application or notice to any affected person unless a rule or national environmental standard precludes limited notification of the application or notice.*
- (3) *The territorial authority must give limited notification of the application or notice to an affected protected customary rights group or affected customary marine title group even if a rule or national environmental standard precludes public or limited notification of the application or notice.*
- (4) *In subsections (1) and (3), the requirements relating to an affected customary marine title group apply only in the case of applications for accommodated activities.*

Assessment:

The following owners/occupiers have been identified as a potentially affected person under section 149ZCF as adverse effects on them have been determined to be **minor** in relation to construction noise and vibration effects, and impact on private onsite wastewater systems. Table 21 lists these properties and their individual assessment.

Table 21: Potentially affected persons

Properties	Effect/s	Assessment
175 SH16 218 SH16 291 SH16 340 SH16 507 SH16	Construction Vibration	These residential receivers are within 14m of a potential vibratory rolled area. Use of vibratory rollers is the main source of vibration and operated at a distance less than 14m this could cause minor effects on these properties. When a contractor has been appointed and equipment, timing and staging is better understood, these facts will be included in the CNVMP. To determine the most appropriate and best practicable option for mitigation and management for each dwelling, a Schedule be prepared prior to works in the vicinity. This plan will be based on actual predicted noise levels for the dwelling in question, including any terrain shielding present, and take account of the actual duration of the works to be undertaken. Consultation with the affected residents will then enable an appropriate response, ranging from management such as timing of works, through mitigation in the form of temporary barriers or choice of equipment, to the offer of temporary relocation in extreme cases.
407A SH16 (Kumeu Produce Market) 1 Kennedy's Road (The Grind Café)	Construction Vibration	These commercial receivers are located within 6m of a potential vibratory rolled area. Use of vibratory rollers is the main source of vibration and operated at a distance less than 6m cause minor effects on these business operators. When a contractor has been appointed and equipment, timing and staging is better understood, these facts will be included in the

Properties	Effect/s	Assessment
		CNVMP. To determine the most appropriate and best practicable option for mitigation and management for each building, a Schedule be prepared prior to works in the vicinity. This plan will be based on actual predicted noise levels for the dwelling in question, including any terrain shielding present, and take account of the actual duration of the works to be undertaken. Consultation with the affected operators will then enable an appropriate response, ranging from management such as timing of works, through mitigation in the form of temporary barriers or choice of equipment, to the offer of temporary relocation in extreme cases.
Dwellings located with 25m of construction night works	Construction Noise	In order to achieve compliance with the night-time noise limit, a large setback distance would be required if line-of-sight is maintained. For many of the dwellings this means that construction noise levels would exceed the night-time noise limit by a considerable margin, and management and mitigation would need to be implemented. Construction will move along the alignment progressively. Each dwelling will only be affected for a limited time when works are in the vicinity. This may extend from two nights to potentially up to 10 nights, depending on the works required and the line-of-sight from the receiving dwelling to the works. Management of noise effects will be undertaken in line with the CNVMP and standard construction methodology can be adjusted to assist in reducing potential construction noise, however effects on these sites at night will be minor.
238 SH16 264 SH16 264A SH16 1404/1368 Coatesville Riverhead Highway 340 SH16	Private Onsite Wastewater System	The Project works along the alignment will impact these existing wastewater systems located on private properties. These wastewater systems will need to be upgraded which will be proposed to landowners. Engagement is ongoing. Therefore, effects will be minor.

It is concluded that adverse effects of the construction and operational works, community effects and impact on private onsite wastewater systems on all other owners/occupiers of sites along the Project corridor will be **less than minor**.

There are no identified affected customary rights group or customary marine title group.

As per the assessment above, the potential adverse environmental effects will be minor in relation to the above listed properties within the alteration to the designation.

There are no affected protected customary rights group or affected customary marine title group for this Project.

Waka Kotahi NZ Transport Agency, as the requiring authority, requests that the notice be **Limited Notified** to the potentially affected persons identified above.

9.1.3 Section 149ZCF Territorial authority to decide if person is affected

- (1) The territorial authority must decide that a person is an affected person, in relation to an activity, if the adverse effects of the activity on the person are minor or more than minor (but are not less than minor).*
- (2) The territorial authority, in making his or her decision,—*
 - (a) may disregard an adverse effect of the activity on the person if a rule or national environmental standard permits an activity with that effect; and*
 - (b) in the case of a controlled activity or a restricted discretionary activity, must disregard an adverse effect of the activity on the person if the activity does not relate to a matter for which a rule or national environmental standard reserves control or restricts discretion; and*
 - (c) must have regard to every relevant statutory acknowledgement made in accordance with an Act specified in Schedule 11.*
- (3) Despite anything else in this section, the territorial authority must decide that a person is not an affected person if—*
 - (a) the person has given, and not withdrawn, approval for the activity in a written notice received by the authority before the authority has decided whether there are any affected persons; or*
 - (b) it is unreasonable in the circumstances to seek the person's written approval.*

Assessment:

As per the assessment above, the potential adverse environmental effects will be minor in relation to the above listed properties within the alteration to the designation.

All identified affected landowners have been contacted and written approval is not anticipated prior to lodgement.

Transpower has provided an affected party approval.

The proposal is within the Te Kawerau ā Maki statutory acknowledgment area. Engagement has indicated that Te Kawerau ā Maki are not opposed to the Project NoR or consenting. A written letter of support has been provided and is contained in Appendix R.

9.2 Resource Consent Notification Assessment

Sections 95A to 95G of the RMA set out the steps the consent authority must follow to determine whether an application for resource consent or Notice of Requirement should be publicly or limited notified.

9.2.1 Public Notification – Section 95A

Public notification is not considered necessary for the following reasons:

Step 1: mandatory public notification in certain circumstances

Section 95A(3)(a): The applicant does not request public notification.

Section 95A(3)(b): Notification is not sought under section 95C.

Section 95A(3)(c): The application does not include a proposal to exchange reserve land.

Step 2: if not required by step 1, public notification precluded in certain circumstances

Section 95A(5)(a): The application is not precluded from public notification by a rule or national environmental standard.

Section 95A(5)(b): The application is not for a controlled activity or any boundary activity.

Step 3: if not precluded by step 2, public notification required in certain circumstances

Section 95A(8)(a): The application is not for an activity that is subject to a rule or national environmental standard that requires public notification.

Section 95A(8)(b): An assessment of effects on the environment has been undertaken in section 8 of this report which concludes that, after mitigation, adverse effects will be negligible or less than minor.

Step 4: public notification in special circumstances

Section 95A(9): There are no special circumstances that would warrant public notification. The Project is focused on an existing road corridor and primarily involves road widening for additional traffic lanes and a SUP.

Therefore the Project and the resource consents can proceed **without public notification**.

9.2.2 Limited Notification – Section 95B

Step 1: certain affected groups and affected persons must be notified

Section 95B(2)(a): there are no affected customary rights groups

Section 95B(2)(b): There are no works within the Coastal Marine Area. However, Ngāti Whātua o Kaipara and Te Kawerau ā Maki Te Kawerau ā Maki have been consulted on the Project on several occasions and conducted a site visit with both iwi groups (as part of Stage 1). Both iwi groups have also been involved with alternatives assessment workshops. More recently in 2022 high workloads have limited the ability of both iwi groups to provide input; however, both have indicated their general support for the Project.

Section 95B(3)(a): The proposal is within the Te Kawerau ā Maki statutory acknowledgment area. Engagement has indicated that Te Kawerau ā Maki are not opposed to the Project NoR or consenting. A written letter of support has been provided and is contained in Appendix R.

Section 95B(3)(b): Te Kawerau ā Maki have been engaged with and have indicated their general comfort with the Project and are therefore not considered affected parties for the purpose of Section 95B(3)(b). See Section 7.2.1 of this report for more details.

Step 2: if not required by step 1, limited notification precluded in certain circumstances

Section 95B(6)(a): The application is not precluded from limited notification by a rule or national environmental standard.

Section 95B(6)(b): The application is not only for a controlled activity under a district plan.

Step 3: if not precluded by step 2, certain other affected persons must be notified

Section 95B(7): In the case of a boundary activity, determine in accordance with section 95E whether an owner of an allotment with an infringed boundary is an affected person. The proposal does not involve any boundary activities.

Section 95B(8): In the case of any other activity, determine whether a person is an affected person in accordance with section 95E. Section 8 of this AEE concludes that any actual and potential adverse environmental effects in relation to the resource consent matters will be **less than minor**.

Section 95B(9): Notify each affected person identified under subsections (7) and (8) of the application.

Step 4: further notification in special circumstances

Section 95B(10): There are no special circumstances that would warrant limited notification.

Therefore, no persons are considered affected by the Project and the resource consents can proceed **non-notified**.

10 Statutory Assessment

This section provides an assessment of the Project against all of the statutory documents identified in Section 2 above.

10.1 Resource Management Act 1991

The key statutory matters under the RMA of relevance to the Project are:

- Part 2, which establishes the purpose and principles of the Act (sections 5-8);
- Section 104, which sets out the principal matters, subject to Part 2, that a consent authority shall have regard to (and other matters it must disregard) when considering an application for resource consent and any submissions received;
- Section 105, which relates to matters relevant to applications for discharge permits;
- Sections 166 to 186, which set out the process and procedure for a requirement for a designation or alteration to designation.

10.1.1 Part 2 – Purpose and Principles

The purpose of the RMA, set out in Section 5 of the Act, is to promote the sustainable management of natural and physical resources. Any decision on the proposed works must be consistent with the purpose and principles set out in Part 2 of the RMA and have regard to the matters contained in Section 104 of the RMA.

Section 104(1) of the RMA sets out the matters to which a consent authority must, subject to Part 2 of the RMA, have regard to when considering an application for resource consent. The broader principles of the RMA are set out in Sections 6-8 of the RMA. Having regard to Part 2 of the RMA, it is considered that the proposal will achieve sustainable management of natural and physical resources for the reason outlined below against the relevant provision.

Table 22: Assessment against Part 2 of the RMA

RMA provision	Assessment
<i>Section 6(a) – the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development</i>	The Project will cross six streams. Only minor disturbance to the stream is required for the installation of riprap on the stream edge to prevent the erosion of the stream bed overtime at discharge locations. The area of disturbance is small. An erosion and sediment control plan has been created to outline the procedures to manage effects of earthworks through the project. Although, the project will encroach a small area of the wetland at 522 SH16 to construct and operate the SUP, the SUP will not affect the natural character of the wetland, as the ECIA has determined the wetland to have low ecological value and the Project proposes to enhance the quality of the wetland with wetland planting. The installation of a SUP and road safety improvements is not considered inappropriate development and will largely stay within the road corridor.

RMA provision	Assessment
	The wetland at 436 SH16 has been avoided through careful design and will not be used for temporary occupation during construction.
<i>Section 6(d) – the maintenance and enhancement of public access to and along the coastal marine area, lakes and rivers.</i>	The Project will enhance public access along the Ngongetepara Stream and Kumeū River through the instalment of a SUP.
<i>Section 6 (e) – the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga</i>	Mana whenua have been engaged with from the early developments of the project provided key feedback on the design. They were involved in the alternatives assessment when they expressed their preferences for designs that had the least implication on the natural environment. There is an opportunity to incorporate mana whenua story telling into the design of the SUP at Ngongetepara Stream, and/or the proposed new roundabout and into the design of the noise walls.
<i>Section 6 (f) – the protection of historic heritage from inappropriate subdivision, use, and development:</i>	The three heritage buildings around Brigham Creek will not be affected by the Project. The minor loss of extent of the Natural Heritage Overlay at 238 SH16 is considered to have less than minor effects. There are no archaeological remains anticipated to be located in the excavated area by the road and the building that is scheduled. The mid 20 th century shed located at 222A SH16. It is assessed as having low-moderate historic heritage values, as a surviving ancillary farming structure with limited historical connections to the Sinton Family. Due to its poor condition, it is unlikely to be relocatable and therefore will be demolished. Its removal will be mitigated through low level photographic recording and drawings if required, to a level equivalent to Level 3 of HNZPT guidelines 2018 – recording of built structures.
<i>Section 6(h) – the management of significant risks from natural hazards.</i>	The Project will not exacerbate any risk from natural hazards as flooding effects will be negligible. If the existing flooding is of concern, measures such as warning signs and flood water depth markers can be installed.
<i>Section 7(f) – the maintenance and enhancement of the quality of the environment.</i>	The project will capture all stormwater runoff from the new imperious area and some of the existing corridor and treat it. This will maintain and enhance the quality of water being discharged into the surrounding environment.
<i>Section 7(i) – the effects of climate change.</i>	The Project will improve the highway, encourage network efficiency and the SUP will encourage active modes that may reduce single use vehicle trips and lower local green house gas emissions.

With regard to Section 8 of the RMA, the proposed works have not been identified as affecting any matters relating to the Treaty of Waitangi. Consultation with mana whenua is outlined in Section 7 of this report. Mana

whenua will be offered the opportunity to work with the Project contractors to ensure cultural values are protected.

10.1.2 104 Consideration of applications

When considering an application, a consent authority must have regard to the matters set out in section 104. Of particular relevance is *104(1)(ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity.*

Overall, there will be a loss of 159 trees/tree groups, that are of varying quality. The Project includes a comprehensive planting plan that spans the length of the corridor to offset the vegetation loss. Over 88,400 new plants are proposed to be planted with 210 45-litre grade sized specimen trees and another 64 25-litre grade sized trees. Although some of the proposed planting will take years to develop a canopy, the new vegetation cover will enhance the indigenous biodiversity cover and values of the corridor and result in positive net gain in vegetation.

Section 8.3.2 outlines how wetland planting is proposed in and around the wetland at 522 SH16 which will enhance the existing quality of the wetland and provide a stronger vegetation buffer around the wetland to offer strong protection to the wetland.

Overall, most riparian planting that will be lost during construction will be replanted with additional riparian planting to enable a net gain of native riparian planting along the stream edges where possible.

10.1.3 Section 105 and 107 - Matters Relevant to Discharge Permits

Consent is sought to discharge stormwater. S105 requires the consent authority to, in addition to the matters in section 104(1), have regard to—

- (a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
- (b) the applicant's reasons for the proposed choice; and
- (c) any possible alternative methods of discharge, including discharge into any other receiving environment.

All stormwater discharged will be treated. Therefore, in places where the discharge will enter streams, water will be treated to reduce any contaminants entering the water. As discussed above in section 8, most of the stormwater runoff from the new impervious area will be treated before discharging into streams or the public stormwater system, which is a significant improvement from the existing situation. The proposed discharge locations are considered to be the best practicable option given topography, the location of the two watercourses and nature of the catchment within which the Project is located.

In regards to Section 107, the discharge will not contravene Section 15 or 15A of the Act and will not discharge contaminants into the water, as most of the stormwater runoff from new impervious areas will be treated as part of this Project. The Project may contribute towards a decrease in contaminants from the road in surrounding waterways. The discharge will not result in the production of any contaminants listed in Section 107 (1)c-g.

10.1.4 Section 171 – Recommendation by the Territorial Authority

Section 171 is relevant for assessing those Project components (and their land use effects) to be authorised by a designation. These Project components include:

- Construction, operation and maintenance of the safety improvement works;
- The installation of a 3m wide SUP along the southern side of the project corridor.

- Road widening to accommodate additional lanes, flush medians and wider shoulders.
- Upgrade of the existing T intersection at Coatesville Riverhead Highway to a two lane roundabout
- The installation and upgrade of stormwater infrastructure

When considering a requirement, section 171(1) of the RMA requires a territorial authority to consider the effects on the environment of allowing the requirement, subject to Part 2, having particular regard to a range of specified matters. These are:

- The relevant provisions of any policy statement or plans: These are considered in Section 4 of this AEE and summarised below in 10.3 to 10.5;
- Whether adequate consideration has been given to alternative sites, routes, methods of undertaking the works: This is considered in Section 6 of this report and Appendix B. It is concluded that adequate and robust consideration has been given to reasonable alternatives that achieve the Project objectives;
- Whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority: The designation and works are necessary for the reasons outlined in Section 2 and summarised below;
- Relevant “other matters” that the territorial authority considers reasonably necessary in order to make a recommendation on the requirement.

The proposed works are reasonably necessary for achieving the Project objectives, as the Project will increase the safety of the corridor by reducing the number and severity of FSI (and associated DSIs); improve the efficiency of the road corridor with the additional lanes and the proposed Coatesville Riverhead Highway roundabout; and encourage a modal shift by providing the choice of an active travel mode. This was discussed in more detail in Section 2 of this Report. Overall, with regard to Section 171(1) of the RMA, it is considered that:

- The Project is consistent with the relevant provisions of the RMA;
- Adequate consideration has been given to alternative sites, routes, or methods of undertaking the work; and
- The designation and proposed works are reasonably necessary to achieve the Project Objectives of Waka Kotahi.

10.2 Heritage New Zealand Pouhere Taonga Act 2014

In addition to any requirements under the RMA, the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA) protects all archaeological sites whether recorded or not, and they may not be damaged or destroyed unless an Authority to modify an archaeological site has been issued by Heritage NZ.

While there are no confirmed archaeological remains within the area of proposed works, the possibility that pre-1900 remains may be exposed relating to R11/3432, CHI 3486 (Alexander Sinton’s homestead), R11/2828, CHI 13241 (Sinton House, former), R11/2081, CHI 13589 (bridge), and R10/1487, CHI 15093 (old railway line) cannot be excluded. Therefore as a precaution, Authority under Section 44(a) is being sought in conjunction with this NoR and resource consent applications.

The conditions of the authority are likely to include archaeological monitoring of preliminary earthworks in the Brigham Creek area and in the vicinity of Old Railway Road where the recorded sites are located, and procedures for recording any archaeological evidence before it is modified or destroyed.

An archaeological management plan has been prepared to support an Authority application, which sets out procedures for pre-start briefing of contractors, monitoring of works in archaeologically sensitive areas, the

investigation and recording of any remains affected, and procedures to be followed if archaeological sites, taonga tūturu (Māori artefacts) or kōiwi tangata (human remains) are exposed during works.

10.3 National Policy Statements

10.3.1 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

The NES for Contamination came into effect on 1 January 2012 and is of relevance to this Project given the requirement to undertake earthworks within areas of potentially contaminated land.

The purpose of the NES for Contamination is to:

- Provide a nationally consistent set of planning controls and soil contaminant values; and
- Ensure that land affected by contaminants in soil is appropriately identified and assessed before it is developed – and if necessary, the land is remediated, or the contaminants are contained to make the land safe for human use.

A Preliminary Site Investigation was undertaken for the Project (Appendix O) and is assessed in detail in section 8.3.4 of this AEE. A desktop assessment of the likely soil contaminants has been undertaken and concludes that it's possible that there is some contamination along sections of the Project alignment given the current and historical Horticultural use of the rural area and existing service stations. A Contaminated Soil Management Plan has been prepared (refer Appendix P) to manage any contaminants within the project corridor and mitigate any adverse effects on human health.

10.3.2 National Policy Statement for Fresh Water Management

The NPS:FM is relevant to this Project. The NPS:FM²² provides for the health and protection of freshwater. The NPS:FM sets out the objectives and policies for freshwater management under the RMA. The NPS:FM is built around the concept of integrating 'Te Mana o te Wai' into the way freshwater is managed. *"Te Mana o te Wai is a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and wellbeing of the wider environment. It protects the mauri of the Wai. Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community"*.

There are several freshwater streams and wetlands found within the Project corridor. These have been classified within the ECIA contained in Appendix M. This section outlines the wetland definition and policy interpretation which has informed the classification and statutory assessment of the wetland areas (i.e. those considered to be a wetland under the RMA) in terms of whether they are considered to be a 'natural wetland' under the NPS-FM.

Definition of a Natural Wetland:

Clause 3.21 (1) of the NPS-FM states:

"natural wetland" means a wetland (as defined in the Act) that is not:

- (a) a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or
- (b) a geothermal wetland; or

²² NPS-FM, which was approved by gazette notice number 2020-go3443 on 3 August 2020 to come into force on 3 September 2020.

(c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain derived water pooling.”

Wetland Policy Interpretation:

The definition of a ‘natural wetland’ pursuant to clause 3.21 of the NPS-FM contains three specific exclusions that may apply to a wetland feature which could result in it not being classified as ‘natural wetland’ under the NPS-FM. If one of these exclusions apply, then no further consideration would be required of the policy direction on natural wetlands within the NPS-FM or the regulations pertaining to natural wetlands within the NES:F, Part 3, Subpart 1 – Natural Wetlands.

Interpretation of the definition (including exclusions) is set out to support the wetland classifications below.

Exclusion a) – A wetland constructed by artificial means

The Exclusion a) term ‘constructed by artificial means’ is not defined within the NPS-FM, nor is there any case law that determines the exact meaning of the exclusion. The plain meaning of the words as defined in the Cambridge dictionary²³ is as follows:

- Construct – “to build something or put together different parts to form something whole” (examples include ‘To construct a new bridge/building’)
- Constructed – this is past tense of ‘Construct’ – “built (or made, or created) something” (examples included ‘Ditches’)
- Artificial – “made by people / humans (or man-made)”
- Means – “a method, or way of doing something”.

The plain and ordinary meaning of ‘constructed by artificial means’ is therefore a wetland feature that was created as a result of man-made methods or human activities. The words do not imply that any specific intent / purpose is required. The definition of constructed is quite broad and covers the creation of something.

Exclusion b) – A geothermal wetland

Exclusion b) has been interpreted to mean that ‘a wetland that is not a geothermal wetland’ is considered a natural wetland. In other words, the NPS-FM policy relating to natural wetlands does not cover geothermal water.

Exclusion c) - Any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain derived water pooling

Exclusion c) contains two limbs.

Limb one of exclusion c) is ‘improved pasture’ dominated by over 50% of exotic species. This requires an investigation of vegetation present within the wetland.

Clause 3.21 (1) of the NPS-FM contains a definition of ‘improved pasture’:

“improved pasture means an area of land where exotic pasture species have been deliberately sown or maintained for the purpose of pasture production, and species composition and growth has been modified and is being managed for livestock grazing”

Breaking down the definition, land is only ‘improved pasture’ if

- 1) exotic pasture species have been deliberately sown for the purpose of pasture production OR maintained for the purpose of pasture production (through farming practices such as fertilisation, weed control, grazing strategies);

²³ Searchable online at <https://dictionary.cambridge.org/dictionary/english/>

and

2) species composition and growth has been modified; AND is being managed for livestock grazing.

In other words, you must demonstrate the land is improved pasture by assessing whether it meets test 1 and test 2 above.

Limb two of exclusion c) is 'temporary rain-derived water pooling'. This is not defined in the NPS-FM.

The plain and ordinary meaning of the words in Limb 2(c) as defined in the Cambridge dictionary²⁴ is as follows:

- Subject to – the phrasal verb 'subject something to something' means *"to make something experience"*; the idiom 'subject to something' means *"likely to experience or suffer from something"*; and 'likely' means *"it will probably happen"*.
- Temporary – *"not lasting or needed very long"* with synonyms being *"short-lived"* – yet this is a comparative adjective (rather than an opposite adjective) that may be used to compare one thing with another (for e.g. to compare temporary to permanent).
- Derived – *"coming from or caused by something"*

Case Law²⁵ makes it clear that *"On its face the temporary rain-derived water pooling requirement in the definition seems quite simple in its application. It appears to us to require that any area under consideration is subject to only temporary pooling from water derived from rain as compared to the situation where the area is permanently under water derived from rain or any other source such as underlying ground water."*

Wetland Classification under NPS:FM:

The below sets out the wetland classification for both Wetland 1 and Wetland 2.

Wetland 1:

Based on the above policy interpretation and application of the exclusions based on the findings within the ECIA, it is considered that the wetland located at 436 SH16 is a 'natural wetland'. This is because:

- The wetland shows (from a review of historic aerial imagery) that since from at least 1963 there has been a definite shift in vegetation composition compared to the surrounding pasture.
- The wetland follows a dendritic pattern i.e. follows a flow path and suggests that it is naturally-occurring
- The direction of flows is away from SH16, and therefore reduces the risk of the impoundment effect associated with SH16, such that SH16 does not appear to have been a drive in the wetlands formation (i.e. it is not likely to have been constructed by artificial means).
- It is not a geothermal wetland.
- Vegetation plot data analysis indicates the wetland is dominated by soft rush (*Juncus effusus*) and creeping buttercup (*Ranunculus repens*); it is not possible to assess the area as being dominated by pasture species.

Wetland 2:

Based on the above interpretation of exclusion a) within the policy and the findings reported within the ECIA, it is considered that the wetland located at 522 SH16 has been 'constructed by artificial means' and is therefore excluded from the definition of 'natural wetland' in the NPS: FM. This is because the wetland has been created as a result of man-made land modifications in this location, which is evident from the following:

²⁴ Searchable online at <https://dictionary.cambridge.org/dictionary/english/>

²⁵ The decision of *Greater Wellington Regional Council v Adams* [2022] NZEnvC 25 [135]

- Prior to human settlement, the SH16 Project corridor is likely to have been covered by puriri dominated broadleaf forest (WF7), kakikatea-pukatea dominated forest (WF8), and Kauri, podocarp, broadleaved forest (WF11) (Singers & Rogers, 2014)
- The original forest within the Rodney Ecological District (including at 522 SH16) has undergone extensive historical vegetation clearance and land modification for farming (McEwen, 1987) and development.
- Historic road plans and aerial photographs illustrate that SH16 (including its predecessors) was installed some 86 years ago as early as 1936 (as shown in the Archaeological Assessment).
- By 1940, the site had been cleared of forest vegetation and had been developed into pasture. SH16 / predecessor is already present through the landscape. The wetland does not follow a dendritic pattern, instead SH16 may have been impounding the natural drainage of the paddock.
- In 1950, the site remained as pasture and showed the presence of at least one (if not two) drainage channels cutting through the now Wetland 2 area. One drainage channel extended under SH16 before a confluence with a tributary of the Kumeu River.
- In 1963, the site remained in pasture with the presence of one drainage channel cutting through the now Wetland 2 area. The imagery shows a darker colouration that suggests the colonisation of low stature vegetation.
- In 1975, the site remained in pasture and aerial imagery showed there is no distinct vegetation compared to the surrounding pasture.
- In 1996, the aerial imagery showed a farm pond / sediment pond had been constructed within the centre of the now Wetland 2 area, with an area of open water smaller than that present today.
- There have been a series of historic modifications to the site dating back at least 82 years (as shown on the aerial images dating back to 1940), and possibly dating back as far as 86 years (as shown on the historic road plans).
- More recent land modifications appear to have included property development and the installation of the driveway for 522 SH16.

Furthermore, Waka Kotahi maintenance contractors regularly mow the state highway verge including the terrestrial vegetation buffering the north-west edge of the wetland feature.

It is reasonable to conclude that that these modifications (i.e. earthworks for road development, artificial drains and excavation to create a farm pond / sediment pond) have altered the natural drainage patterns and possible groundwater levels within the site that may have resulted in the formation of Wetland 2.

This wetland is therefore not considered to be a Natural Wetland under the NPS-FM as it has been constructed by artificial means. It is the result of human activities including the earthworks associated with the development of SH16, construction of the drain and the farm pond. As such, the NPS:FM does not apply to Wetland 2 at 522 SH16, and the NES:F regulations do not apply.

Although exclusion a) already applies, it is noted for completeness that exclusion c) also likely applies to Wetland 2, i.e. that the wetland is dominated by exotic pasture and subject to temporary rain-derived pooling. This is based on the following:

- A large majority of the wetland (14 out of the 21 vegetation plots) are clearly dominated by exotic pasture species and a further two plots (i.e. plots 18 and 21) did not pass the Rapid Vegetation Test. Further, the Dominance Test and Prevalence Index results were marginal with the overall pasture result being “N - 49%” (meaning 16 out of the 21 vegetation plots are or are very close to being pasture).
- The site is subject to practices that form part of a suite of pasture management techniques, including the pasture being grazed by sheep, and the pasture being mowed in summer months.
- Surface water within the farm pond and margins was observed on several occasions, yet the site was also noted to dry up completely during the summer 2020/2021 drought in Auckland. As such, it is difficult to conclude that the site is permanently under water.

Therefore the improved pasture exclusion is also likely to apply. Yet the effect of exclusion a) in the NPS:FM is that even if a given area otherwise meets the definition of a natural wetland, if that area has been constructed by artificial means, it is excluded from the natural wetland classification. As such, the NPS:FM does not apply to Wetland 2 at 522 SH16, and the NES:F regulations do not apply.

Statutory Assessment of Wetlands:

The relevant objectives and policies of the NPS-FM seek to ensure that the health and wellbeing of water bodies and freshwater ecosystems are protected, the health and needs of people, such as drinking water are enabled, while allowing the ability for people to provide for their social, economic, and cultural wellbeing. The proposal is assessed against the relevant policies of the NPS-FM in Table 23 below:

Table 23: Assessment against the relevant objectives and policies in the NPS-FW

NPS-FM Objectives and Policies	Assessment
Objective 1 to ensure that natural and physical resources are managed in a way that prioritises: (a) first, the health and well-being of water bodies and freshwater ecosystems (b) second, the health needs of people (such as drinking water) (c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future”	The majority of runoff from new impervious area and some existing impervious surfaces will be treated before it is discharged to surrounding streams. Currently there are no treatment systems. Therefore, the Project will result in a decrease in contaminates entering streams and improve the ecological wellbeing of the streams. The Project will allow for North-West, Auckland to provide for their social and economic wellbeing by improving the efficiency and safety of the road corridor. The SUP will provide a healthy active mode travel alternative than what is currently provided. Wire rope median barriers were not used in section D where there are more businesses to maintain access. This allowed continued access to these properties to maintain social and economic wellbeing.
Policy 1: <i>Freshwater is managed in a way that gives effect to Te Mana o te Wai</i>	The Project has adopted mana whakahaere in the Project, Te Kawerau ā Maki was involved in the options assessment for the localised stormwater assessment for DP7 which involved assessing various stormwater options. The preferred option of Te Kawerau ā Maki was to avoid hard stormwater infrastructure and treat the stormwater runoff through a treatment swale before discharging to the Kumeū River. This option was adopted for the final design as it enables tikanga, the need to rejuvenate mauri of water from contaminants through filtration of Papatūānuku (ground-based/’natural’ mechanisms). The Project proposes to collect most of the stormwater runoff from new impervious areas and some of the existing impervious areas and treat it before it is either discharged into the stormwater network or into nearby streams and land. Treatment of stormwater runoff is not currently provided for within the Project corridor. Therefore, the quality of water discharged into the streams will be improved water quality of the surrounding stream network will be improved as a result of the Project.
Policy 2: <i>Tangata whenua are actively involved in freshwater management (including decision making processes), and Māori freshwater values are identified and provided for.</i>	Ngā Maunga Whakahii o Kaipara Development Trust and Te Kawerau o Maki have been engaged through the project. Te Kawerau o Maki was involved in the Alternatives Assessment process, particularly around the stormwater DP7 options assessment. Their preferred option for natural treatment of stormwater was adopted as the preferred option as it did not use

NPS-FM Objectives and Policies	Assessment
	any hard infrastructure and treated runoff effectively through an in-ground treatment detention swale.
Policy 5: <i>Freshwater is managed through a National Objectives Framework to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.</i>	The current discharge into nearby streams is not treated. The Project will involve collecting and treating stormwater runoff and thus improving the water quality of streams along the corridor.
Policy 6: <i>There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.</i>	The proposal does not result in any loss of extent of the natural wetland at 436 SH16 (Wetland 1). 200m² of vegetation clearance is proposed within a 10m setback from the wetland, this area consists mainly of road side grass. On completion of the Project, 200m² of wetland riparian planting is proposed that will improve the ecological value of the wetland and wetland buffer compared to the existing roadside grass. The restoration of the wetland buffer will be promoted through this Project. The wetland at 522 SH16 (Wetland 2) is not a natural wetland and the NPS:FM does not apply. Nonetheless, it is noted that in total, only 78m² of the wetland will be temporarily affected by the Project. This area may be reduced where construction methodology does not require occupation of some or all of the wetland. The overall 83m² proposed to be affected will result in the vegetation removal of pasture grasses and exotic rush. The area is assessed as having low ecological value. The area of the wetland affected by temporary works will be replanted with enhanced wetland riparian planting that will increase the ecological value of the wetland. The 5m² permanently lost to the SUP will be offset by restoration planting around the natural wetland that will in time result in a net gain of wetland and will support the wetland boundary to expand overtime. The restoration planting will result in a new wetland boundary and there will be no loss of the wetland extent. Overall, replacing the pasture grass and exotic rushes in the wetland with native riparian wetland planting will result in an improved ecological value in the wetland.
Policy 7: <i>The loss of river extent and values is avoided to the extent practicable.</i>	There will be no loss of a river extent throughout the project corridor. Works around streams and rivers will be required and minor earthworks will be required in the Ngongetepara Stream, the stream at 429 and 436 SH16 and the Kumeū River to install small ripraps to slow the discharged water before it enters the stream. The riprap will protect the stream from erosion and scouring. The area proposed to be disturbed in the stream bed is relatively small in scale (extending 1m out into the stream at Ngongetepara Stream and will be placed 1m above the stream bed to limit bed disturbance). Any effects on freshwater species and/or sedimentation in the stream will be mitigated through the

NPS-FM Objectives and Policies	Assessment
	use of coffer dams (or similar). Any effects during construction will be less than minor and temporary.
Policy 8: <i>The significant values of outstanding water bodies are protected.</i>	There are no outstanding water bodies that will be affected by this Project.
Policy 9: <i>The habitats of indigenous freshwater species are protected.</i>	To protect the habitat of freshwater species, appropriate erosion and sediment control measures will be implemented to ensure no freshwater species are affected by suspended sediment. There will be minor works in the streambed to install riprap at some discharge locations. Cofferdams will be used to install the riprap and ensure no wildlife will be caught in the impact area.
Policy 15: <i>Communities are enabled to provide for their social, economic, and cultural wellbeing in a way that is consistent with this National Policy Statement.</i>	The Project will allow for North-West, Auckland to provide for their social and economic wellbeing by improving the efficiency and safety of the road corridor. The SUP will provide a healthy active mode travel alternative than what is currently provided. Wire rope median barriers were not used in Section D of the corridor where there are more business and residents. This allowed continued access to these properties to maintain social and economic wellbeing.

Natural inland wetland:

Section 3.22 of the NPS-FM also contains direction around natural inland wetlands. There is one natural inland wetland near the project corridor. It is located at 436 SH16 and will not be directly affected by the project. The following section assesses the project against section 3.22 of the NPS-FM.

Table 24: Assessment against Section 3.22 of the NPS-FM

NPS-FM Section 3.22 Policy	Assessment
3.22 Natural inland wetlands	
(1) Every regional council must include the following policy (or words to the same effect) in its regional plan(s): “The loss of extent of natural inland wetlands is avoided, their values are protected, and their restoration is promoted, except where: (a) the loss of extent or values arises from any of the following: (i) the customary harvest of food or resources undertaken in accordance with tikanga Māori (ii) restoration activities (iii) scientific research (iv) the sustainable harvest of sphagnum moss (v) the construction or maintenance of wetland utility structures (as defined in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020)	The natural wetland at 436 SH16, is located 16m from the edge of the road. Vegetation clearance will be required within a 10m setback of the wetland to install a retaining wall positioned 9.97m from the wetland. 200m² of vegetation clearance is proposed within a 10m setback from the wetland, which will facilitate the construction of specified infrastructure. The wetland at 436 SH16 is considered to have low ecological value due to its use as a livestock paddock, degraded vegetation and invasive weed presence. Through the proposed landscape planting, a new wetland buffer will be replanted of approximately 200m². There will be no permanent loss of vegetation within the wetland buffer. The wetland riparian planting will include Wharawhara, Toetoe, joint twig rush, Purei, Pukio and Toetoe Whatu-manu and will add stronger ecological value to the wetland and wetland buffer than the exiting roadside grass. No temporary occupation of the wetland is proposed and any construction effects such as sedimentation will be appropriately managed through the implementation of the

NPS-FM Section 3.22 Policy	Assessment
(vi) the maintenance or operation of specified infrastructure, or other infrastructure (as defined in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (vii) natural hazard works (as defined in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020); or (b) the regional council is satisfied that: (i) the activity is necessary for the construction or upgrade of specified infrastructure; and (ii) the specified infrastructure will provide significant national or regional benefits; and (iii) there is a functional need for the specified infrastructure in that location; and (iv) the effects of the activity are managed through applying the effects management hierarchy.”	ESCP, which is found in Appendix Q and discussed in Section 8.3.4 of this AEE Overall, there will be no loss of this wetland, and its values will be promoted through the restoration planting in the wetland buffer. The permanent loss of 5m² of the wetland at 522 SH16 is required for the purpose of constructing specified infrastructure. This wetland is not a natural wetland so this policy does not apply. Notwithstanding, the loss is not inconsistent with the policies for the reasons outlined below. In terms of 3.22(1)(b)(i), the following activities that would occur within the natural wetland are necessary to the project as follows: – The construction of the 4.5 km SUP – Earthworks – Installation of retaining wall The works above are associated with the upgrade of the SH16 Stage 2 corridor (which falls within the definition of specified infrastructure) and are necessary to meet the Project objectives to allow a modal shift towards active modes of travel. Under 3.22(1)(b)(ii), the SUP will provide regional benefits by allowing a modal shift and improve safe accessibility around the local community. The shift towards active modes is encouraged through the GPS and will reduce the number of vehicles on the road and the associated carbon emissions. The addition of the SUP will contribute towards a national movement to reduce the effects of climate change. SH16 is currently the only arterial road leading into Kumeū and further north. Allowing modal choice along this route improves the usability of this key regional route. Under Section 3. 22(1)(b)(iii) there is a “functional need” for the works to occur in the environment. The NPS:FM defines functional need as <i>“the need for a proposal or activity to traverse, locate or operate in a particular environment because the activity can only occur in that environment”</i>. Functional need in this context is therefore fundamentally concerned with the practical need to traverse or locate the Project within the extent of wetlands. The concept hinges on the direction that the Project <i>‘can only occur in that environment’</i>. This Project involves upgrading the existing SH16 to include a SUP along the southern side of the SH16. Therefore, the SUP location must run parallel to the highway which will not avoid a small extent of the wetland. The High Court’s recent decision in <i>Poutama Kaitiaki Charitable Trust and D & T Pascoe v Taranaki Regional</i>

NPS-FM Section 3.22 Policy	Assessment
	<i>Council (Mt Messenger case)</i> is the leading case on functional need.²⁶ The Mt Messenger project was required to connect two fixed points 6km apart. Despite there being in theory an infinite number of route possibilities for the project, it could only occur in the relevant environment because other potential routes were constrained by impracticalities (distance, cost, terrain, constructability and environmental considerations). The Court stated that in each case a “context and fact specific inquiry” is required. SH16 is similar as it is also a linear infrastructure project. Although an options assessment was undertaken that proves there are alternative design options to avoid the wetland, none of them are practical and pose significant cost constraints. Option 6 in the localised wetland options assessment was the best alternative option to avoid the wetland. However, it is not a feasible option due to the effects of cost, constructability and impacts on efficiency. Option 6 would cost an additional 1.6 million when compared to the current design. Therefore, the Project has a functional need to be located in the edge of the wetland as there are no feasible/practical options to avoid the wetland. Please refer to the Alternative Assessment in Appendix BD for more details on all the options considered to avoid the wetland. 3.22(1)(b)(iv) requires the effects of the activity to be managed through the “effects management hierarchy” which is defined under Subpart 3, Section 3.21 of the NPS:FM. The Project can be managed through the effects hierarchy which is outlined in Section 8.3.2 of this AEE and further down in this table. Overall, although there will be a temporary and minor permanent loss of the wetland extent, the Project will protect the wetlands values and promote restoration. Enhanced native wetland planting is proposed along the wetland that will offset the wetland loss and enhance the wetland
(2) Subclause (3) applies to an application for a consent for an activity: a) that falls within any exception referred to in paragraph (a)(ii) to (vii) or	The works within the 10m setback from the wetland at 436 SH16 will not result in any loss of extent or values of the wetland.

NPS-FM Section 3.22 Policy	Assessment
b) of the policy in subclause (1); and would result (directly or indirectly) in the loss of extent or values of a natural inland wetland.	
(3) Every regional council must make or change its regional plan(s) to ensure that an application referred to in subclause (2) is not granted unless: a) the council is satisfied that the applicant has demonstrated how each step of the effects management hierarchy will be applied to any loss of extent or values of the wetland (including cumulative effects and loss of potential value), particularly (without limitation) in relation to the values of: ecosystem health, indigenous biodiversity, hydrological functioning, Māori freshwater values, and amenity value; and b) any consent is granted subject to: (i) conditions that apply the effects management hierarchy; and (ii) a condition requiring monitoring of the wetland at a scale commensurate with the risk of the loss of extent or values of the wetland.	An assessment against effects management hierarchy is provided in the following rows. The works within the 10m setback from the wetland at 436 SH16 will not result in any loss of extent or values of the wetland.
4.21 (1) In clauses 3.21 to 3.24	
Effects management hierarchy, in relation to natural inland wetlands and rivers, means an approach to managing the adverse effects of an activity on the extent or values of a wetland or river (including cumulative effects and loss of potential value) that requires that:	
a) adverse effects are avoided where practicable; and	Overall, there are three key considerations under this direction: avoiding the loss of natural inland wetland extent, protecting their values, and promoting their restoration. The wetland at 436 SH16 was avoided through design. 200m² of vegetation within a 10m setback of the wetland will be cleared during construction, which mainly consists of roadside grasses. On completion of the Project, the 200m² will be replanted with riparian wetland planning including Wharawhara, Toetoe, joint twig rush, Purei, Pukio and Toetoe Whatu-manu. This will add stronger ecological value to the wetland than the exiting roadside grass. Overall, there will be no permanent loss of vegetation within the wetland buffer.

NPS-FM Section 3.22 Policy	Assessment
b) where adverse effects cannot be avoided, they are minimised where practicable; and	The effects have been minimised through design.
c) where adverse effects cannot be minimised, they are remedied where practicable; and	The effects have been remedied through replacement landscape and ecological planting.
d) where more than minor residual adverse effects cannot be avoided, minimised, or remedied, aquatic offsetting is provided where possible; and	The effects have been remedied 3.22(1)(c).
e) if aquatic offsetting of more than minor residual adverse effects is not possible, aquatic compensation is provided; and	The effects have been remedied 3.22(1)(c).
f) if aquatic compensation is not appropriate, the activity itself is avoided	The effects have been remedied 3.22(1)(c).

10.3.3 National Policy Statement on Urban Development

The National Policy Statement on Urban Development came into effect in 2020. It recognises the national significance of having well-functioning urban environments that meet the diverse needs of changing communities. It ensures there is sufficient development capacity to meet the different needs of growing communities. The relevant objectives and policies of the NPS-UD are set out in Table 25 below. Having regard to the relevant objectives and policies of the NPS-UD it is considered the Project is consistent with the NPS-UD for the reason outlined in Table 25:

Table 25: Assessment of Relevant NPS-UD Policies and Objectives

NPS- UD Objectives and Policies	Assessment
<i>Objective 1: New Zealand has well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future.</i>	The Project will enable the current and future residents around Kumeū and the wider Northwest Auckland to provide for their economic wellbeing by improving road network efficiency and accessibility for both vehicles and active modes to get to work. One of the main project objectives is to improve road safety for all road users, by separating oncoming traffic lanes with wire rope barriers and flush mediums; replacing the unsafe Coatesville Riverhead Highway T intersection with a roundabout; and creating a separate pathway for active modes which will allow a safe travel alternative that can positively contribute to all user's health. The Project is therefore consistent with Objective 1 of the NPS-UD.
<i>Objective 8: New Zealand's urban environments:</i> <i>a.) support reductions in greenhouse gas emissions; and</i>	The project is consistent with Objective 8 and Policy 1 as the proposed SUP will support a reduction in greenhouse gas emission by improving active mode transportation alternatives and thereby improving resilience to climate change. The SUP

NPS- UD Objectives and Policies	Assessment
<i>b.) are resilient to the current and future effects of climate change.</i>	will also improve accessibility for all people between housing, jobs, and community services by way of active transport.
<i>Policy 1: Planning decisions contribute to well-functioning urban environments, which are urban environments that, as a minimum:</i> <i>c.) have good accessibility for all people between housing, jobs, community services, natural spaces, and open spaces, including by way of public or active transport; and</i> <i>e.) support reductions in greenhouse gas emissions; and</i> <i>f.) are resilient to the likely current and future effects of climate change.</i>	

10.4 Auckland Planning Documents

10.4.1 Auckland Unitary Plan (Operative in Part) – Regional Policy Statement (AUP-OP – RPS)

The objectives and policies of the Regional Policy Statement (RPS) that are considered relevant to this application are outlined and commented on in Table 26 below.

Table 26: Assessment Against the Auckland Regional Policy Statement under the AUP:OP

Reference	RPS Relevant Objective / Policy	Comment
B3 - Infrastructure, transport and energy		
B3.2.1. Infrastructure Objectives	Infrastructure is resilient, efficient and effective. The benefits of infrastructure are recognised, including: (b) enabling economic growth; (c) contributing to the economy of Auckland and New Zealand; (d) providing for public health, safety and the well-being of people and Communities; (3) Development, operation, maintenance, and upgrading of infrastructure is enabled, while managing adverse effects on: (a) the quality of the environment and, in particular, natural and physical	The Project will strengthen the existing state highway by enabling appropriate roading upgrades that will improve the efficiency of the network by adding double lanes in each direction from Section A-C, improving road efficiency for people and freight. One of the key drivers for the Project is improving road safety. A series of road safety improvements are proposed to reduce DSIs of road users. The SUP will improve user's safety by providing a separated space from the road for active modes and encourage people to learn to cycle. The SUP will encourage active modes and contribute to user's health.

Reference	RPS Relevant Objective / Policy	Comment
	resources that have been scheduled in the Unitary Plan in relation to natural heritage, Mana Whenua, natural resources, coastal environment, historic heritage and special character; (b) the health and safety of communities and amenity values (5) Infrastructure planning and land use planning are integrated to service growth efficiently.	The project has been designed to avoid damage to or loss of the notable trees at 191 SH16, to ensure their heritage values can be retained. The extension of the existing designation over the historical heritage overlay on 238 SH16 will result in a loss of the extent of the overlay. The area of the overlay that will be lost to the SUP is not considered to be of any significant historical value. A General Archaeological Authority from HNZPT has been applied for that will enable the appropriate management of any effects on historical heritage and archaeological values. The SUP has been carefully designed to minimise any effects on the area's natural character, through landscaping plans and the use of materials that will blend into the surrounding environment. Kumeū – Huapai and the wider North West Auckland are expected to see significant growth over the next 30 years. The installation of the SUP will future proof the road to improve accessibility and usability of the road, allowing the project to be integrated to service growth efficiently.
B3.2.2. Infrastructure Policies	(1) Enable the efficient development, operation, maintenance and upgrading of infrastructure.	The Project consists of the upgrade of SH16 to improve the safety of road users and improve the efficiency of the road network.
	(3) Provide for the locational requirements of infrastructure by recognising that it can have a functional or operational need to be located in areas with natural and physical resources that have been scheduled in the Unitary Plan in relation to natural heritage, Mana Whenua, natural resources, coastal environment, historic heritage and special character.	SH16 is an existing state highway. There are some scheduled, natural and historic heritage features along the highway. In order to upgrade the existing state highway with safety and efficiency improvements, and future-proof the road with a SUP to meet national directions, there is an operational need to disrupt and reduce the historic heritage extent of place at 238 SH16. The building scheduled will not be affected. The proposed upgrades must be linear to the road and therefore cannot avoid the scheduled property in the road corridor. The notable trees at 191 SH16 were avoided through design.
	(6) Enable the development, operation, maintenance and upgrading of infrastructure in areas with natural and physical resources that have been scheduled in the Unitary Plan in relation to natural heritage, Mana Whenua, natural resources, coastal environment, historic heritage and special	Any effects on the loss of the historic heritage values around Bringham Creek

Reference	RPS Relevant Objective / Policy	Comment
	character while ensuring that the adverse effects on the values of such areas are avoided where practicable or otherwise remedied or mitigated.	will be mitigated by applying for a General Archaeological Authority from HNZPT.
B3.3.1. Transport Objectives	(1) Effective, efficient and safe transport that: (a) supports the movement of people, goods and services; (b) integrates with and supports a quality compact urban form; (c) enables growth; (d) avoids, remedies or mitigates adverse effects on the quality of the environment and amenity values and the health and safety of people and communities; and (e) facilitates transport choices, recognises different trip characteristics and enables accessibility and mobility for all sectors of the community.	The project will support the movement of more people goods and services, by enabling active modes and increasing the capacity and efficiency of the road network. Adverse effects on the environment are avoided where possible or mitigated. Replacement planting is proposed to restore and offset riparian vegetation removal. An Erosion Sediment Control Plan will be implemented to avoid any effects on the surrounding environment from earthworks. The majority of stormwater runoff from all new impervious surfaces and some of the existing road corridor is proposed to be collected and treated.
B3.3.2. Transport Policies	<i>Managing transport infrastructure</i> (1) Enable the effective, efficient and safe development, operation, maintenance and upgrading of all modes of an integrated transport system. (2) Enable the movement of people, goods and services and ensure accessibility to sites. (4) Ensure that transport infrastructure is designed, located and managed to: b.) provide effective pedestrian and cycle connections. <i>Managing effects related to transport infrastructure</i> (6) Require activities sensitive to adverse effects from the operation of transport infrastructure to be located or designed to avoid, remedy or mitigate those potential adverse effects. (7) Avoid, remedy or mitigate the adverse effects associated with the construction or operation of transport infrastructure on the environment and on community health and safety.	The installation of the SUP will enable better travel choices than what is currently available. In Section D, a flush medium will be used instead of wire rope barriers to maintain access to existing shops and businesses. Maintaining this accessibility is important to the local community. The Noise and Vibration Assessment identified a number of sensitive receivers located close to the road corridor that will be affected by operational noise. 2m high noise walls will be installed to reduce the effects of the road on affected residents. In terms of managing construction noise and vibration, a CNVMP will be prepared specifying mitigation measures such as, engagement with affected receivers, temporary noise barriers (sheets of plywood or noise curtains) and avoidance of unnecessary noise and vibration through site management and additional measures. When a contractor has been appointed and equipment, timing and staging is better understood, these facts will be included in the CNVMP.

Reference	RPS Relevant Objective / Policy	Comment
B4 Natural heritage		
B4.5.1. Notable trees Objectives	(1) Notable trees and groups of trees with significant historical, botanical or amenity values are protected and retained.	The preliminary Project design was altered to shift the alignment and road widening away from the notable trees at 191 SH16 to ensure they would not need to be removed. The proposed design does not include any works within 191 SH16.
B4.5.2. Notable trees Policies	(4) Avoid development that would destroy or significantly adversely affect the identified values of a notable tree or group of trees unless those effects are otherwise appropriately remedied or mitigated.	The proposed road edge near the notable trees will remain the same and no changes are proposed to the existing stormwater pipe within the road reserve to avoid any open trenching near the tree roots. It is not likely that significant root structures of the notable trees are located beneath the road because of the distance between the road and the trees, and because these trees have good access to permeable ground on all other aspects. Any potential roots located beneath the road would remain largely undisturbed because there will be no requirement to excavate beneath the existing basecourse material (removal and replacement of asphalt). It is considered that any damage to the notable trees will be avoided and the values of the trees are retained.
B.5 Historic heritage and special character		
B5.2.1	(1) Significant historic heritage places are identified and protected from inappropriate subdivision, use and development. (2) Significant historic heritage places are used appropriately and their protection, management and conservation are encouraged, including retention, maintenance and adaptation	Sinton House (Former) is largely unaffected by the proposal and it is retained on the current site. This is also the case for 191 SH16 (Janet Sinton House), and the main dwelling for Alex Sinton House (former) at 222A SH16, although the mid-20 th century shed at 222A is recommended to be recorded and then demolished as relocation is not feasible and assessed as having little to moderate historic heritage value.
B5.2.2. Policies	Protection of scheduled significant historic heritage places (7) Avoid where practicable significant adverse effects on significant historic heritage places. Where significant adverse effects cannot be avoided, they should be remedied or mitigated so that they no longer constitute a significant adverse effect	The development does not generate significant adverse effects on identified and scheduled historic heritage places. The loss of some mature vegetation can be remedied or mitigated through replacement boundary planting. Any reduced contextual experience could also be mitigated through the use of historical interpretation within the public realm, to provide historical visual references.

Reference	RPS Relevant Objective / Policy	Comment
	Use of significant historic heritage places (9) Provide for the occupation, use, seismic strengthening, development, restoration and adaptation of significant historic heritage places, where this will support the retention of, and will not detract from, the historic heritage values of the place	The shared pathway provides for much better and safer opportunities for SUP users to stop and appreciate the historical nature of the Sinton House site (and other, nearby sites) at specific locations, where views might be maintained from higher ground, or alternatively supported through historical interpretation.
B6. Mana Whenua		
B6.2.1. Objectives	(1) The principles of the Treaty of Waitangi/Te Tiriti o Waitangi are recognised and provided for in the sustainable management of natural and physical resources including ancestral lands, water, air, coastal sites, wāhi tapu and other taonga. (2) The principles of the Treaty of Waitangi/Te Tiriti o Waitangi are recognised through Mana Whenua participation in resource management processes.	The Principals of the Treaty of Waitangi have been recognised in the way that the Project will reduce the discharge of contaminants from stormwater runoff into surrounding water bodies by collecting and treating most of the runoff first. The project has chosen retention swales to treat water naturally as opposed to hard infrastructure. No works are proposed in the Coastal Marine Area. The project team has presented mana whenua with opportunities for participation in the project development. The project team has met with Ngāti Whātua o Kaipara and Te Kawerau ā Maki on several occasions and conducted a site visit with both iwi groups. Nga Maunga Whakahii O Kaipara (the development trust that represents Ngāti Whātua o Kaipara) prepared a Cultural Values Assessment in 2018 for Stage 1 of the project, outlining the history of the area and potential cultural effects of the Project. Both iwi groups have been involved with alternative assessment workshops. Due to high workloads, both iwi groups were unable to provide a CVA for stage 2 but have indicated their general comfort with the Project.
B6.2.2. Policies	(2) Provide opportunities for Mana Whenua to actively participate in the sustainable management of natural and physical resources including ancestral lands, water, sites, wāhi tapu and other taonga in a way that does all of the following: (c) provides for timely, effective and meaningful engagement with Mana Whenua at appropriate stages in the resource management process, including development of resource management policies and plans;	
B7. Natural resources		
B7.2.2. Policies Indigenous biodiversity	(5) Avoid adverse effects on areas listed in the Schedule 3 of Significant Ecological Areas – Terrestrial Schedule and Schedule 4 Significant Ecological Areas – Marine Schedule.	There will be no works in the SEA on the north side of Brigham Creek Culvert and any effects on the SEA are avoided through the implementation of the ESCP, outlined in Appendix Q.
B7.3. Freshwater systems	(4) Avoid the permanent loss and significant modification or diversion of lakes, rivers, streams (excluding ephemeral streams), and wetlands and their margins, unless all of the following apply:	There will be a permanent loss of 5m ² and a temporary loss of 78m ² of wetland vegetation at 522 SH16 for establishing a walking and cycling infrastructure within the wetland extent. The temporary loss may be able to be avoided or reduced

Reference	RPS Relevant Objective / Policy	Comment
	(a) it is necessary to provide for: (i) the health and safety of communities; or (ii) the enhancement and restoration of freshwater systems and values; or (iii) the sustainable use of land and resources to provide for growth and development; or (iv) infrastructure; (b) no practicable alternative exists; (c) mitigation measures are implemented to address the adverse effects arising from the loss in freshwater system functions and values; and (d) where adverse effects cannot be adequately mitigated, environmental benefits including on-site or off-site works are provided.	where construction works do not require occupation of the wetland area (i.e. the construction methodology will be determined by the contractor). The effects of this are addressed in Table 24 above. In summary, the loss of the wetland at 522 SH16 will be offset and enhanced through wetland riparian planting along the wetland after construction is completed.

B9. Toitū te tuawhenua- Rural Environment

B9.2.2. Policies	(1) Enable a diverse range of activities while avoiding significant adverse effects on and urbanisation of rural areas, including within the coastal environment, and avoiding, remedying, or mitigating other adverse effects on rural character, amenity, landscape and biodiversity values.	The Project works have been designed carefully to minimise any effects on the natural and rural character of the area through native planting plans, and the use of materials that will blend into the surrounding environment.
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10.4.2 Auckland Unitary Plan (Operative in Part) – Objectives and Policies

The objectives and policies of the AUP:OP that are considered relevant to this application are outlined and commented on in Table 27 below.

Table 27: Assessment of Relevant AUP:OP District Policies and Objectives

Reference	Relevant Objective / Policy	Comment
D17 Historic Heritage Overlay Objectives		
D17.2. Objectives	(1) The protection, maintenance, restoration and conservation of scheduled historic heritage places is supported and enabled. (2) Scheduled historic heritage places are protected from inappropriate subdivision, use and development, including inappropriate modification, relocation, demolition or destruction. (3) Appropriate subdivision, use and development, including adaptation of scheduled historic heritage places, is enabled.	The significant heritage elements of the Sinton House historic heritage place are not affected by the proposed modifications. Changes to the front boundary of 238 SH16 will not affect original driveways or other landscape features, which can be seen to be relatively modern in their construction. The proposed modifications are appropriate because they avoid significant adverse effects on identified values. Additionally, the improved facilities for cycling and walking will allow greater opportunity to appreciate the scheduled historic heritage place and the

Reference	Relevant Objective / Policy	Comment
		non-scheduled but associated historical places of interest nearby. Moderate adverse effects arising to historic heritage context values for 222A SH16 can be mitigated through historic building recording for the shed, and through new landscaping and planting as proposed in Appendix L. Any changes to the 191 SH16 boundary are minor in nature and do not adversely affect historic heritage values associated with the place or notable trees.
D17.3. Policies	Use and development, including adaptation (3) Enable the use, development and adaptation of scheduled historic heritage places where: (a) it will not result in adverse effects on the significance of the place; (b) it will contribute to the ongoing maintenance and enhancement of the historic heritage values of the place; (c) it is in accordance with good practice conservation principles and methods; (d) it will not result in cumulative adverse effects on the historic heritage values of the place; (e) it will support the long-term viability, retention or ongoing use of the place; and (f) it will not lead to significant adverse effects on the surrounding area.	As noted above, no adverse effects will occur that will affect the significance of the identified places, and those which do occur can be remedied or mitigated through replacement landscaping. The proposed works are not contrary to the policies and principles set out in the conservation Plan for the Sinton House. Cumulatively the effects of the Project on the historic heritage buildings around Brigham Creek will not result in a reduction of significance for 238 SH16 Sinton House (former), or 222A and 191 SH16. While there will be temporary construction effects, which can be appropriately ameliorated, the long-term viability of the place is not affected by the proposal, and there will not be significant adverse effects on the surrounding area in relation to built heritage.
	(4) Enable the use of scheduled historic heritage places, whether or not the use is otherwise provided for in the zone, where it does not detract from the heritage values of the place and will not otherwise have significant adverse effects.	On completion the works will not result in adverse effects on identified historic heritage values for the three sites. The ongoing use of the site has potential benefit through the SUP.
	(7) Require the assessment of the effects for proposed works to scheduled historic heritage places, including where one or more places are affected, to address all the effects on: (a) the heritage values of the place/s; (b) the significance of the place; and	The assessment of built heritage effects in Appendix V fulfils this purpose.

Reference	Relevant Objective / Policy	Comment
	(c) the setting and the relationship between places. Demolition or destruction (13) Avoid the total or substantial demolition or destruction of features (including buildings, structures or archaeological sites) within scheduled historic heritage places where it will result in adverse effects (including cumulative adverse effects) on the overall significance of the scheduled historic heritage place to the extent that the place would no longer meet the significance thresholds for the category it has been scheduled. (14) Avoid the total or substantial demolition or destruction of: (a) the primary features of Category A* and Category B scheduled historic heritage places; (b) the non-primary features of Category A and A* scheduled historic heritage places; and contributing features within Historic Heritage Areas; unless: (i) the demolition or destruction is required to allow for significant public benefit that could not otherwise be achieved; and (ii) the significant public benefit outweighs the retention of the feature, or parts of the feature, or the place; or (iii) the demolition or destruction is necessary to remove a significant amount of damaged heritage fabric to ensure the conservation of the scheduled historic heritage place	Although the proposal affects the 'primary feature' of Sinton House as a default (this being the whole extent of place), it will not actually impact on the building itself, or any historical landscaping elements of interest. The removal of the modern street boundary landscaping does not affect the values for which the place is primarily recognised. Janet Sinton Homestead (191 SH16) is the least affected, as the Project was redesigned to ensure 191 SH16 and the notable trees on 191 SH16 were mostly outside the proposed altered designation and works area. The demolition of the mid-20th century ancillary shed on 222A SH16 (Alex Sinton Homestead) can be mitigated through building recording to level III as described in the Heritage New Zealand archaeological guidance series 1: Recording of buildings and standing structures (HNZ 2018). This provides appropriate mitigation to balance any adverse effects that may arise from demolition and any loss of context for 222A SH16.
D13. Notable Trees Overlay		
D13.2. Objective	(1) Notable trees and notable groups of trees are retained and protected from inappropriate subdivision, use and development.	The Project design was shifted further south to avoid the notable trees on 191 SH16. The trees will be protected throughout the project.
E1. Water quality and integrated management		
E1.2. Objectives	3) Stormwater and wastewater networks are managed to protect public health and safety and to prevent or minimise adverse effects of contaminants on freshwater and coastal water quality.	Most of the stormwater runoff proposed to be discharged to streams will be treated. Given all runoff currently discharging to these streams is untreated, the Project will result in fewer contaminants in freshwater streams.

Reference	Relevant Objective / Policy	Comment
E1.3. Policies	(2) Manage discharges, subdivision, use, and development that affect freshwater systems to (a) maintain or enhance water quality, flows, stream channels and their margins and other freshwater values, where the current condition is above National Policy Statement for Freshwater Management National Bottom Lines and the relevant Macroinvertebrate Community Index guideline in Table E1.3.1 below; or (b) enhance water quality, flows, stream channels and their margins and other freshwater values where the current condition is below national bottom lines or the relevant Macroinvertebrate Community Index guideline in Table E1.3.1 below.	No sampling has been undertaken, but most runoff proposed to be discharged to freshwater streams will be treated, resulting in a significant reduction in potential contaminants entering the streams.
	(3) Require freshwater systems to be enhanced unless existing intensive land use and development has irreversibly modified them such that it practicably precludes enhancement.	The Project corridor already discharges stormwater into the various streams along the corridor. As part of the Project, the majority of the stormwater that will be discharged into a stream will be treated, which will reduce contaminants from the highway entering the stream and may enhance the existing water quality.
	(9) providing for the management of gross stormwater pollutants, such as litter, in areas where the generation of these may be an issue. Minimise or mitigate new adverse effects of stormwater runoff, and where practicable progressively reduce existing adverse effects of stormwater runoff, on freshwater systems, freshwater and coastal waters during intensification and redevelopment of existing urban areas by all of the following: (a) requiring measures to reduce contaminants, particularly from high contaminant-generating car parks and high-use roads; (b) requiring measures to reduce the discharge of gross stormwater pollutants;	
E3 Lakes, rivers, streams and wetlands		
E3.2. Objectives	(1) Auckland's lakes, rivers, streams and wetlands with high natural values are protected from degradation and permanent loss.	There will be no permanent loss of any stream or the natural wetland at 436 SH16. The loss of the wetland at 522 SH16 will be offset and enhanced through wetland

Reference	Relevant Objective / Policy	Comment
		riparian planting along the wetland after construction is completed.
	(4) Structures in, on, under or over the bed of a lake, river, stream or wetland are provided for where there are functional or operational needs for the structure to be in that location, or traverse that area.	There is a functional need for the SUP to be located over streams and in a very small portion of the wetland at 522 SH16 for installation of the SUP. Alternative options were investigated to avoid the wetland. Refer to Appendix B for more details on the options considered. The Alternatives Assessment concluded that there were no practical alternatives to avoid the wetland. The Project therefore has a functional need to locate in the wetland as the SUP must run parallel to the existing highway and cannot avoid the wetland.
	(6) Reclamation and drainage of the bed of a lake, river, stream and wetland is avoided, unless there is no practicable alternative.	
E3.3. Policies	(2) Manage the effects of activities in, on, under or over the beds of lakes, rivers, streams or wetlands outside the overlays identified in Policy E3.3(1) by: (a) avoiding where practicable or otherwise remedying or mitigating any adverse effects on lakes, rivers, streams or wetlands; and (b) where appropriate, restoring and enhancing the lake, river, stream or wetland.	The Project will involve an overall net gain of indigenous riparian planting around most streams along the project corridor, enhancing the ecology around the streams as the vegetation matures. Enhancement via wetland riparian planting is proposed along the northern edge of the wetland at 522 SH16 which will significantly improve the existing degraded wetland where mainly pasture grasses are present.
	(3) Enable the enhancement, maintenance and restoration of lakes, rivers, streams or wetlands.	
	(9) Provide for the excavation or other disturbance, and the depositing of any substance in, on or under the bed of a lake, river, stream or wetland, where it complies with all of the following: (a) there is no practicable alternative method or location for undertaking the activity outside the lake, river, stream or wetland; (b) the activity is required for any of the following: (ii) to maintain and/or enhance public access to, over and along any lake, river, stream or wetland and associated margins (iv) for the operation, use, maintenance, repair, development or upgrade of infrastructure;	As above, alternative options were investigated to avoid the wetland. Refer to Appendix B for more details on the options considered. The Alternatives Assessment concluded that there were no practical alternatives to avoid the wetland.

Reference	Relevant Objective / Policy	Comment
	(c) the disturbance avoids significant adverse effects and avoids, remedies or mitigates other adverse effects on Mana Whenua values associated with freshwater resources, including wāhi tapu, wāhi taonga and mahinga kai.	
E 11 Land disturbance		
E11.2. Objectives	(1) Land disturbance is undertaken in a manner that protects the safety of people and avoids, remedies or mitigates adverse effects on the environment.	The construction of the Project will involve approximately 14,348m ³ cut and approximately 22,123m ³ of fill. An assessment of earthworks effects is outlined in section 8.3.4 of this report. An ESCP will be implemented to manage and mitigate the effects from land disturbance. The Project will also be constructed in stages to minimise the amount of exposed soil at one time.
	(2) Sediment generation from land disturbance is minimised.	Earthworks will be kept to a minimum within and around the existing highway.
E11.3. Policies	(1) Avoid where practicable, and otherwise mitigate, or where appropriate, remedy adverse effects on areas where there are natural and physical resources that have been scheduled in the Plan in relation to natural heritage, Mana Whenua, natural resources, coastal environment, historic heritage and special character.	Earthworks will be required in the historic heritage extent of place overlay at 238 SH16. The earthworks will be limited to the area along the proposed new designation boundary which is set back away from the existing dwelling which is the primary historic heritage feature of the site.
	(2) Manage land disturbance to: (a) retain soil and sediment on the land by the use of best practicable options for sediment and erosion control appropriate to the nature and scale of the activity; (b) manage the amount of land being disturbed at any one time, particularly where the soil type, topography and location is likely to result in increased sediment runoff or discharge; (c) avoid, remedy or mitigate adverse effects on accidentally discovered sensitive material; and	A ESCP will be implemented and is found in Appendix Q which will ensure best practice erosion and sediment management is adopted.
	(4) Enable land disturbance necessary for a range of activities undertaken to provide for people and communities social, economic and cultural well-being, and their health and safety.	The land disturbance for this Project is necessary to improve the safety, efficiency and resilience of the existing highway, which will allow people to provide for their social, economic and cultural well-being. People's health and

Reference	Relevant Objective / Policy	Comment
		safety is provided for through active mode facilities (SUP) and the proposed safety improvements for road users.
	(6) Require that earthworks are designed and undertaken in a manner that ensures the stability and safety of surrounding land, buildings and structures.	A Construction Noise and Vibration Management Plan will be prepared to manage any vibration effects on surrounding buildings.
E25 Noise and Vibration		
E25.2. Objective	(1) People are protected from unreasonable levels of noise and vibration.	A Construction Noise and Vibration Management Plan will be prepared outlining the noise and vibration management measures that will be implemented to mitigate and manage noise and vibration effects during construction. These include timing of works, engagement with affected receivers, choice of equipment, temporary noise barriers (sheets of plywood or noise curtains). In terms of vibration effects, alternative ways of compaction may need to be used around the heritage buildings. If practicable, a static roller will be used instead. If this is impracticable in certain locations, a pre-construction building condition survey will be carried out. This will enable the determination of liability due to damage that may be caused due to and during the vibratory rolling.
	(4) Construction activities that cannot meet noise and vibration standards are enabled while controlling duration, frequency and timing to manage adverse effects.	
E25.3. Policies	(2) Minimise, where practicable, noise and vibration at its source or on the site from which it is generated to mitigate adverse effects on adjacent sites	Noise barriers will be provided along the road boundary of identified affected receivers to reduce the existing operational road traffic noise. Refer to Section 8.4.4 for more details.
	Construction, demolition and maintenance activities (10) Avoid, remedy or mitigate the adverse effects of noise and vibration from construction, maintenance and demolition activities while having regard to: (a) the sensitivity of the receiving environment; and (b) the proposed duration and hours of operation of the activity; and (c) the practicability of complying with permitted noise and vibration standards.	
E26 Infrastructure		
E26.2.1. Objectives	(3) Safe, efficient and secure infrastructure is enabled, to service the needs of existing and authorised proposed subdivision, use and development.	The existing highway is proposed to be upgraded with road safety features to reduce the risk of DSIs on the highway and provide a safe separated walking and cycling facility to support the existing local communities.
	(4) Development, operation, maintenance, repair, replacement, renewal, upgrading and removal of infrastructure is enabled.	The Project will support the upgrading of an existing state highway.
E26.2.2. Policies		The Project will improve the efficiency of the highway and will reduce congestion to improve the travel time of local

Reference	Relevant Objective / Policy	Comment
	(1) Recognise the social, economic, cultural and environmental benefits that infrastructure provides, including: (a) enabling enhancement of the quality of life and standard of living for people and communities; (b) providing for public health and safety; (c) enabling the functioning of businesses; (d) enabling economic growth; (e) enabling growth and development; (f) protecting and enhancing the environment; (g) enabling the transportation of freight, goods, people; and	communities and improve the transportation of goods and freight. The SUP will provide safe active mode choice to people. In section D, where there are more commercial businesses, a flush median was chosen over a hard median barrier to maintain people's access to businesses. Overall the project will improve people's health and safety and allow people to provide for their social and economic wellbeing.
	(2) Provide for the development, operation, maintenance, repair, upgrade and removal of infrastructure throughout Auckland by recognising: (a) functional and operational needs; (b) location, route and design needs and constraints; (d) the benefits of infrastructure to communities with in Auckland and beyond;	Currently, the project corridor is the only arterial route into Kumeū and beyond from Auckland central. Therefore, the proposed upgrades to this major transportation route will be significant for the local communities. As the highway is already existing, the project has a functional need to locate mainly within and directly parallel to the highway due to physical surrounding constraints.
	(6) Require the development, operation, maintenance, repair, upgrading and removal of infrastructure to avoid, remedy or mitigate adverse effects, including, on the: (a) health, well-being and safety of people and communities, including nuisance from noise, vibration, dust and odour emissions and light spill; (b) safe and efficient operation of other infrastructure; (c) amenity values of the streetscape and adjoining properties; (d) environment from temporary and ongoing discharges; and (e) values for which a site has been scheduled or incorporated in an overlay	The projects will manage construction noise and vibration effects on people with a CNVMP. Identified affected sensitive receivers from operational noise of the highway will have 2m high noise walls installed outside their properties to reduce road noise. The project will also implement a CSMP to ensure the appropriate management of any contaminated soil. Careful consideration of planting has been chosen to protect the corridor's amenity values and enhance the SUP's experience. Timber noise walls have been chosen to soften the appearance of them on the rural landscape. As discussed above, the values of the historic heritage along the corridor will

Reference	Relevant Objective / Policy	Comment
		be protected and an Archaeological Authority will be implemented to ensure the appropriate recording of any material accidentally discovered during land disturbance.
	(5) Consider the following matters when assessing the effects of infrastructure: (a) the degree to which the environment has already been modified; (b) the nature, duration, timing and frequency of the adverse effects; (c) the impact on the network and levels of service if the work is not undertaken; (d) the need for the infrastructure in the context of the wider network; and (e) the benefits provided by the infrastructure to the communities within Auckland and beyond.	The project is largely proposed within or directly adjacent to the existing highway which is already significantly modified for roading purposes. Any effects associated with construction will be temporary in nature. The projects will be staged in sections to limit the disruption to one localised area at a time. The safety and efficiency improvements are needed to reduce DSIs along the alignment and contribute to minor efficiency improvements while wider transport infrastructure is provided, like the Alternative State Highway that Te Tupu Ngātahi Supporting Growth are working on.
E27 Transport		
E27.2. Objectives	(1) Land use and all modes of transport are integrated in a manner that enables: (a) the benefits of an integrated transport network to be realised; and (b) the adverse effects of traffic generation on the transport network to be managed. (2) An integrated transport network including public transport, walking, cycling, private vehicles and freight, is provided for. (5) Pedestrian safety and amenity along public footpaths is prioritised.	The project will contribute to network efficiency improvements and enable active mode choice to encourage less single vehicle trips and more active mode transportation. The separated SUP will prioritise pedestrian and cyclists' safety and has been carefully designed through landscaping and lighting design principles to enhance the amenity along the SUP.
E27.3. Policies	(20) Require vehicle crossings and associated access to be designed and located to provide for safe, effective and efficient movement to and from sites and minimise potential conflicts between vehicles, pedestrians, and cyclists on the adjacent road network	Accessways will be redesigned to meet the new widened road edge in many places, there are some instances where the driveway regrading will exceed outside the proposed designations to ensure the appropriate design is in accordance with Diagram D and E under the <i>NZTA Planning Policy Manual, Appendix 5b Accessway Standards and Guidelines</i>, and an AADT of >10,000 VPD. Accessways will be designed to minimise conflict between road users

Reference	Relevant Objective / Policy	Comment
		and vehicles using the accessways and reduce safety concerns. Widened shoulders are provided to allow vehicles a safe space to pull into to slow down before turning into an access way.
E30. Contaminated land		
E30.2. Objective	(1) The discharge of contaminants from contaminated land into air, or into water, or onto or into land are managed to protect the environment and human health and to enable land to be used for suitable activities now and in the future.	Any potential adverse effect will be managed as outlined in Section 8.3.4 and 10.3.1 of this report.

10.5 Other matters

10.5.1 Government Policy Statement on Land Transport 2021

The Government Policy Statement on Land Transport (GPS) sets out how money from the National Land Transport Fund is allocated towards achieving the Government's transport priorities. The GPS sets out the priorities for the following 10-year period. The Project is consistent with the GPS on Land Transport. The 2021 GPS outlines four strategic priorities, three of which are relevant to this Project and directly align with two of the Project Objectives. The relevant priorities are listed below:

Table 28: Strategic priorities of the GPS on Land Transport 2021

Strategic priorities	Assessment
Safety: Developing a transport system where no-one is killed or seriously injured. This will be delivered by - Reduced numbers of deaths and serious injuries - A safer transport network	Project Objective 1 seeks to improve safety on SH16 between Brigham Creek Road and Kumeū. The proposed road widening to allow wire rope medium barriers, wider shoulders, medium flush, installation of a roundabout and a separated walking and cycling path protected from the road corridor will contribute to a reduction in DSIs on the road and align with the strategic direction of improving road safety.
Better Travel Options priority: Providing people with better travel options to access places for earning, learning, and participating in society - This will be delivered by increasing available and access to active mode travel options - Reduced greenhouse gas emission	Project Objective 3 seeks to provide transport infrastructure which supports modal shift. The addition of the proposed SUP will encourage modal shift by providing better travel options in and around Kumeū. The SUP can contribute to a reduction in greenhouse gas emissions by transforming the existing road network to a lower carbon network.
Climate Change priority: Transforming to a low carbon transport system that supports emissions	

Strategic priorities	Assessment
reductions aligned with national commitments, while improving safety and inclusive access. ○ This will be delivered by reducing green house emission ○ Making active mode travel more attractive ○ Encouraging modal shift.	The Project seeks to address short term efficiency improvements by widening the road corridor to four lanes from Brigham Creek Road Roundabout to Taupaki Road Roundabout. This will enable short term efficiency improvements while wider transport infrastructure upgrades are established, such as the proposed Alternative State Highway route led by the Supporting Growth Programme.

11 Conclusion

The Purpose of the Project seeks to improve road safety, efficiency and walking and cycling facilities between Brigham Creek and Kumeū. The Project is part of the Stage 2 improvements to the SH16 corridor between Brigham Creek and Waimaku. This AEE forms part of the NoR and supports the application for the required resource consents for the improvement works of the Project.

Stage 2 of the Project corridor has an unforgiving highway environment and poor geometry. The historic crash record for Stage 2 shows that there have been 2 fatal and 13 serious incidents resulting in 21 DSI casualties (2 deaths and 19 serious injuries) over the 2009-2019 period. The majority of these FSI were due to a loss of control, resulting in head-on or run off road crashes. It is considered that the unforgiving highway environment and poor geometry, combined with high traffic volumes, contribute to a high number of head-on and run-off FSI crashes.

The SH16 corridor is also the only arterial road into the Kumeū-Huapai area and to centres of employment and commerce south and east of the state highway. These surrounding residential and commercial hubs place a huge reliance on the project corridor to perform all movement for all modes of transport, including commuter, visitor and freight movements. The project corridor experiences congestion on a daily basis, with a lot of traffic joining the SH16 corridor from Old North Road, Taupaki Road and Coatesville-Riverhead Highway, especially in the morning and evening traffic peaks.

The road does not currently support active modes. With the increasing traffic volume, active mode users will become even more exposed. The existing SH16 corridor presents an intimidating cycling route due to the high speed environment, un-signalised at grade crossings, and varying road shoulder widths. Corridor constraints provide some pinch points and narrow shoulders which present high risks to cyclists and walkers.

To address these issues along the corridor, the Project proposes to install safety features. These include road side barriers, wire rope median barrier along the centre line from Section A-C, wider shoulders, and will involve the upgrade of the Coatesville Riverhead Highway to a two lane roundabout to improve road safety. The Project seeks to address minor efficiency improvements by widening the road corridor to four lanes from Section A-C. This will enable minor efficiency improvements while wider transport infrastructure upgrades are established. The Project will also involve installing a 3m wide shared walking and cycling facility along the south side of the highway to enable safe active mode choice. The project will have significant positive effects on road users' health and safety and social wellbeing by lowering the potential for injury or death. It will also support economic development by lowering the potential for delays in freight delivery and/or damage of goods and environmentally, reducing the risk of a crash reduces the potential for spills, fire or other contamination to and/or damage of the surrounding environment.

No stormwater runoff along the corridor is currently treated. The Project proposes to capture the majority of stormwater runoff from any new impervious areas and some existing areas (except one small area due to site constraints) and treat it before it is discharged into the stormwater system or nearby streams and land. This is a significant improvement from the existing situation and may reduce the number of contaminants from the road entering the surrounding water bodies.

The adverse effects associated with the Project have been assessed in terms of actual and potential effects through both construction and operation, and against the relevant provisions of relevant legislation and policy documents. The proposed works are also reasonably necessary to achieve the Project objectives. Effects arising from the Project works will be negligible or less than minor with the implementation of proposed mitigation. Affected driveways will be reinstated or relocated. Accordingly, it is our opinion that Auckland Council are able to accept the NoR and grant the resource consents sought.



Appendix A – General Arrangement Plans

B

Appendix B – Alternatives Assessment Report

C

Appendix C – Designation Plans and Schedule of Affected Properties



Appendix D – Record of Titles

E

Appendix E –Typical Cross Section Plans

F

Appendix F – Retaining Wall Plans

G

Appendix G – Structures Plans (Shared Use Bridges, Barrier Beams)

H

Appendix H – Utility Plans

Appendix I –Stormwater Report and Plans

J

Appendix J – Site Clearance Plans

K

Appendix K – Urban and Landscape Design Master Plan



Appendix L – Landscape and Ecological Planting Plans

M

Appendix M – Ecological Impact Assessment

N

Appendix N – Earthworks Plans



Appendix O – Preliminary Site Investigation Report (Contaminated Land)

P

Appendix P – Contaminated Soil Management Plan



Appendix Q – Erosion and Sediment Control Plan

R

Appendix R – Written Approvals

S

Appendix S – Arboricultural Assessment



Appendix T – Archaeological Assessment

U

Appendix U – Archaeological Management Plan



Appendix V – Built Heritage Assessment



Appendix W – Cultural Values Assessment



Appendix X – Acoustic Assessment



Appendix Y – Proposed Draft Conditions

Z

Appendix Z –Road Markers Plans
