

SH16 Safety Improvements Stage 2 - Preliminary Site Investigation (Contaminated Land)

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

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Appendix A – Design Plans with HAIL Sites

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Appendix C – Auckland Council Preliminary Response

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Revision History

Revision N°	Prepared By	Description	Date
1	Hollie Griffith	Draft	01 May 2018
2	Curtis Blyth	Final	31 January 2019
3	Curtis Blyth	Updated following Section 92 Request for further information for Stage 1 consent	19 May 2020
4	Curtis Blyth	Updated with new Stage 2 design for consent	23 November 2021
5	Curtis Blyth	Updated with minor edits	1 February 2022
6	Curtis Blyth	Updated with minor edits	13 September 2022
7	Curtis Blyth	Updated with minor edits	25 October 2022

Note that this report was updated to Revision 4 with the inclusion of the [Stage 2 design only](#). This report was updated to a Beca report template from a Safe Roads Alliance (SRA) report template. In general, these Stage 2 design changes include the widening of the state highway alignment to include a new shared pedestrian path alongside the existing road alignment. These Stage 2 design changes have been considered in the assessment of contaminated land with the outcome that they have not resulted in changes to this contaminated land assessment or approach to managing contaminated soils. Revision 3 of this report was used for the consenting of Stage 1 and is still relevant for all Stage 1 works.

Document Acceptance

Action	Name	Signed	Date
Prepared by	Curtis Blyth		25 October 2022
Reviewed by	Phillip Ware CEnvP – Site Contamination Specialist		25 October 2022
Approved by	Peter Burgess		25 October 2022
on behalf of	Beca Limited		

This report has been reviewed by Phillip Ware, CEnvP Site Contamination Specialist. Phillip is a suitably qualified and experienced practitioner (SQEP) with over 20 years' experience as a contaminated land, hydrogeological and environmental consultant. He is a Technical Director and Technical Reviewer of contaminated soil, groundwater, and remediation projects across Australasia. Phillip is technically proficient in the science of contaminated land assessment and remediation, and has led projects across the UK, Europe, Australia, and New Zealand. Phil has been a Certified Environmental Practitioner Site Contamination Specialist since 2015.



Executive Summary

Land disturbance activities are proposed for a section of State Highway 16 (SH16), between Brigham Creek and Waimauku for works being undertaken to improve road and roadside safety. A Preliminary Site Investigation (PSI) is required 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 project is the second stage of the wider SH16 works, which has been split into the following stages and sections: Stage 1 – Waimauku to Kumeū (Section E), and Stage 2 – Kumeū to Brigham Creek (Sections A – D).

Stage 1 of this Project (Section E) has completed the detailed design and consenting phase. The Environment Court decision on an appeal in relation to the NoR has yet to be issued. This PSI focuses on Stage 2 - Kumeū to Brigham Creek.

The SH16 Brigham Creek to Waimauku Project: Stage 2 – Brigham Creek to Kumeū (the Project) will improve the safety, efficiency and active mode facilities along 4.3km of the State Highway 16 (SH16) corridor between the existing Brigham Creek intersection and the Kumeū Town Centre (**Figure 1**). The Project is being undertaken by Waka Kotahi NZ Transport Agency (Waka Kotahi). The Project includes safety mechanisms specifically designed to reduce the incidents of deaths and serious injuries (DSIs). The Project components include:

- Additional traffic lanes between Brigham Creek roundabout and Coatesville-Riverhead Highway
- A new two-lane roundabout at the intersection of Coatesville-Riverhead Highway
- Additional traffic lanes between Coatesville-Riverhead Highway and Taupaki Road
- Widened road shoulders
- Flexible median safety barrier between Brigham Creek roundabout and Taupaki Road
- A flush median between Taupaki Road and Kumeū
- A new 3 metre wide shared-use path between Brigham Creek and Kumeū
- Stormwater network improvements.

The majority of the project area is within the current designated state highway, with neighbouring properties utilised for an array of residential, commercial and rural land use activities, most notably horticultural activities.

This PSI involved the review of historical aerial photography from 1940 to 2017 (plus 2017 – 2022 for Revision 4 onwards, Stage 2 only) and publicly available information provided by Auckland Council including discharge consents. A site drive-by of the alignment was also undertaken. The information review identified several potentially contaminated sites included within and along the bounds of the project area. These properties are associated with the following Hazardous Activities and Industries List (HAIL) activities:

- HAIL A10 – Persistent pesticide application (horticultural setting):
 - 218, 291, 299, 300, 312, 324, 340, 350, 366, 407, 429, 436, 451, 464, 465, 482, 505, 550 SH16
 - 1404 and 1368 Coatesville- Riverhead Highway, and
- HAIL F7 – service stations including retail and commercial refuelling facilities:
 - 538 SH16 – associated with the neighbouring BP Service Station

The 21 properties identified above are within areas intercepted by project works involving small scale earthworks to provide suitable batters to the new alignment or for the installation of stormwater infrastructure and conveyance.

It was impractical to undertake intrusive investigation in the form of a Detailed Site Investigation (DSI) at the time of drafting this PSI due to the earthworks plan being subject to minor changes through detailed design, and obtaining site access. Earthworks within each identified HAIL site alongside the improvement works,

within the project footprint, are highly unlikely to exceed the Permitted Activity (PA) criteria under Regulation 8(3) of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS) 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. However, the anticipated timeframe of works will likely exceed the 2-month threshold outlined in Regulation 8(3) of the NESCS and therefore the works will not meet the PA criteria.

It is recommended a conservative discretionary activity consent is applied for under the NESCS with the provision of this PSI and a draft Contaminated Soils Management Plan (CSMP) as no intrusive sampling (and assessment in the form of a DSI) has been undertaken.

It is considered unlikely that contamination will be present that requires consent under the Auckland Unitary Plan (AUP), however, due to the restrictions in site access at this point, contaminant concentrations cannot be measured and therefore the possibility of "elevated" concentrations cannot be ruled out. A conservative approach to AUP approvals is to therefore apply for a discretionary consent under AUP E30 given the permitted activity provisions and requirements under the controlled activity status cannot be met (due to not having a Detailed Site Investigation to submit).

The draft CSMP will effectively manage and mitigate any risks posed to human health and environmental receptors by the potential contamination present.

Soil analysis is to be conducted on the proposed disturbance areas of HAIL sites to assist in providing information to disposal site operators and the leading contractor. This sampling will be confirmed when a contractor is involved and detailed design is concluded. Should the disposal sampling identify contamination outside that anticipated in the draft CSMP then the CSMP will be amended and approved by a Suitable Qualified and Experienced Practitioner (SQEP) and provided to Council.

1 Introduction

Beca Ltd has undertaken a PSI for a section of SH16, between Brigham Creek and Waimauku. This PSI focuses on Stage 2 - Kumeū to Brigham Creek and is required for work being undertaken to improve road and roadside safety to the State Highway Network

1.1 Background

This Project is designed to construct and improve safety measures to the State Highway Network with the aim to create a more forgiving transport system, helping to reduce the occurrence of crashes causing death and serious injury. A new shared use path and capacity upgrades are also proposed. The majority of land associated with the proposed works will be undertaken within the existing designation of the state highway.

The Project extends from the existing Brigham Creek intersection and the Kumeū Town Centre. The approximate length of the Project is 4.3 km.

1.2 Purpose and Scope

The purpose of the desk study was the following:

- Identify, based on reviewed records, areas of land either within or adjacent to the proposed works areas that have the potential to be contaminated as a result of current or historical activities, and that have the potential to impact the areas of works.
- Comment on the contaminated land consent requirement for the proposed works under the following legislation: Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS).

The scope of works included a desk-based review of historical background information. The following information sources were reviewed:

- Selected Auckland Council (AC) property files;
- AC Contaminated Site Enquiry Map;
- Historical aerial photographs from the AC GIS viewer and Retrolens; and
- A drive along the length of the alignment.

This assessment has been undertaken and reported in general accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines No. 1 – Reporting on Contaminated Sites in New Zealand (2011) and MfE Contaminated Land Management Guidelines No. 5 – Site Investigation and Analysis (2011).

2 Site Description

2.1 Site Location and Area

The Project extends from the end of the Auckland North-Western Motorway at the intersection (roundabout) of SH16, Brigham Creek Road and Fred Taylor Drive through to the posted speed limit change (70km/hr) east of Waimauku.

The corridor is divided into two stages comprising five sections, as highlighted in **Figure 1** below:

Stage 2:

- **Section A:** Brigham Creek roundabout through to Coatesville-Riverhead Highway intersection;
- **Section B:** Coatesville-Riverhead Highway intersection;
- **Section C:** Coatesville-Riverhead Highway intersection through to Taupaki Road / Old North Rd intersection;
- **Section D:** Taupaki Road / Old North Road intersection through to the posted speed limit change (80km/h and 60km/h) east of Old Railway Road intersection, Kumeū; and

Stage 1 (already consented):

- **Section E:** From Station Road intersection, Huapai to the posted limit change (100 km/h and 70km/h) east of Wintour Road, Waimauku.



Figure 1: The SH16 Brigham Creek to Waimauku Project area.

The highway runs through land utilised for an array of land use activities including; rural residential, residential, agricultural/ horticultural purposes and industrial/ commercial activities.

2.2 Proposed Works

The focus of this project is to improve safety in the area which will improve the wider transport network's efficiency. The proposed works involve shoulder widening and barrier improvements within the immediate border of the existing state highway.

The following works are proposed for each section of the Stage 2 corridor, with the most up to date plans included in **Appendix A**. Please note that the proposed works as presented in this PSI may be subject to minor changes through design finalisation.

- **Section A** (Brigham Creek roundabout through to Coatesville-Riverhead Highway intersection) – provide two lanes in each direction with median safety barrier and behind the road shoulders;
- **Section B** (Coatesville-Riverhead Highway intersection) – convert the existing priority-controlled intersection to a roundabout with consideration to safe accesses to adjoining residential and commercial properties;
- **Section C** (Coatesville-Riverhead Highway intersection through to Taupaki Road / Old North Rd intersection) – provide two lanes in each direction with median safety barriers and behind the road shoulders;
- **Section D** (Taupaki Road / Old North Road intersection through to the posted speed limit change (80km/h and 60km/h) east of Old Railway Road intersection, Kumeū) – provide flush median markings.

In addition to the above roading upgrades there will be stormwater infrastructure installations in certain areas of the alignment. These installations involve the construction of catch pits along the side of the road corridor and piping to various treatment swales and outfalls.

The total volume of earthworks cut across the ~4.3km Stage 2 site is ~14,348 m³, of which, where geotechnically suitable, will be reused onsite with an ~22,123 m³ of fill required for the design (i.e. Net fill of ~7,775 m³). Note these values are indicative only, pending completion of detailed design. The majority of earthworks are in the 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.

3 Environmental Setting

3.1 Surrounding Land Use

The surrounding land use of **Section A** (Brigham Creek roundabout through to Coatesville-Riverhead Highway intersection) is largely rural residential and lifestyle blocks. Much of the rural land is being utilised for agricultural and/or horticultural purposes with various greenhouses present. Located some distance back from the road (approximately 150m) at 193 SH16 is what appears to be a fill site.

Located within **Section B** (Coatesville-Riverhead Highway intersection) is the Boric Food Market, Blossom Café and Boric Orchards. Horticultural activities make up the majority of landuse within this section.

The surrounding land along **Section C** (Coatesville-Riverhead Highway intersection through to Taupaki Road / Old North Rd intersection) again consists of horticultural activities. The Soljans Estate Winery is located at 366 SH16.

Again, **Section D** (Taupaki Road / Old North Road intersection through to east of Old Railway Road intersection, Kumeū) is largely rural residential and lifestyle blocks. Phil Grieg Strawberry Gardens is located at 464 SH16, with Heart & Soul Early Learning Centre at 491 SH16. Juicy New Zealand Strawberries is located adjacent to the Heart & Soul Early Learning Centre and Kumeū Village Rest Home further down the road. A BP service station is located opposite the Old Railway Road intersection.

3.2 Topography

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.

3.3 Geology and Hydrogeology

Published information¹ for 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.

3.4 Sensitive Environmental Receptors

Brigham Creek is located approximately 600m up-road (easterly direction) of the Brigham Creek roundabout. Brigham Creek ultimately leads into the Waitemata Harbour. Several tributaries flow from Brigham Creek, these include; Ngongetepara Stream, Maimuka Stream, Karure Stream and Totara Inlet.

The Kumeū River is also a prominent river within the Project area and crosses through SH16 near the Old Railway Road intersection.

¹ Heron D. W. (custodian) 2014. Geological Map of New Zealand 1:250 000. Institute of Geological and Nuclear Sciences.

4 Information Search

4.1 Historical Aerial Photographs

Historical aerial photographs for the site have been sourced from Retrolens for the years 1940, 1950, 1961, 1972, 1988 and Auckland Council GeoMaps for the years 1999, 2010-2011 and 2017, and Google Earth for 2020. The aerial photographs have been reviewed to identify any changes in land use activities on the site and surrounding properties, with the following observations made in **Table 1**.

Historical aerial images are provided in **Appendix B**.

Table 1: Historical Aerial Photography Review

Year	Observations
1940	<ul style="list-style-type: none"> Some form of cropping/horticultural activities are present to the south of the Brigham Creek roundabout. From Brigham Creek to Kumeū the land use is largely rural, with several large agricultural production units present and various residential dwellings. SH16 is already fully established. At Kumeū the railway line begins to run parallel with SH16 and will continue to do so beyond the project area. Several structures are present along the road boundary, these appear to be smaller residential dwellings or sheds.
1950	<ul style="list-style-type: none"> From Brigham Creek to Kumeū no significant change has occurred. Upon entering Kumeū, several small cropping/ horticultural lots are present. Several (likely residential) structures remain along the roadside in Kumeū.
1961	<ul style="list-style-type: none"> The cropping/ horticultural activities south of the Brigham Creek roundabout are minimising in intensity. However, beyond the residential lots on the east of the Brigham Creek roundabout, another horticultural lot is present. Cropping activities and some small horticultural lots have been introduced along the northern road boundary between Brigham Creek and Kumeū. The activities appear to be moderately intensive. Several buildings remain along the road boundary at Kumeū, these appear to be industrial in nature.
1972	<ul style="list-style-type: none"> No significant changes are present. The cropping/ horticultural activities present between Brigham Creek and Kumeū appear to have intensified in nature. No further changes of significance are noted within the project area.
1988	<ul style="list-style-type: none"> Kiwifruit orchards appear to be fully established in the majority of the land surrounding the Brigham Creek roundabout. Cropping/horticultural activities have expanded to the south of the road boundary between Brigham Creek and Kumeū. In general, the land use activities in this area appear to be moderately intensive. Several structures, including greenhouses are present here. No further changes of significance are noted within the project area.
1999	<ul style="list-style-type: none"> Approximately 500m up road of the Brigham Creek roundabout a large area of soil disturbance is occurring. Again, horticultural activities dominate the area. No further changes of significance are noted within the project area.
2010-2011	<ul style="list-style-type: none"> Development on the Brigham Creek roundabout has commenced and appears to be almost, if not complete. The location where the soil disturbance was occurring in 1999 appears to be subject to landfilling activities. Several trucks are present, alongside industrial moving equipment.

2017	<ul style="list-style-type: none"> Development on the Brigham Creek roundabout has been completed. No further changes of significance are noted within the project area.
2020 (Stage 2 reviewed only)	<ul style="list-style-type: none"> No further changes of significance are noted within the project area. All existing land uses appear the same as previously observed.
2022 (Stage 2 reviewed only)	<ul style="list-style-type: none"> No further changes of significance are noted within the project area. All existing land uses appear the same as previously observed.

4.2 Auckland Council Information

A site contamination enquiry was made to Auckland Council on 12 March 2018, with a preliminary response received on 19 March 2018 (**Appendix C**). The response identified a large number of sites throughout the project area that have been registered as listed on the Hazardous Activities and Industries List (HAIL) and are therefore considered potentially contaminative.

Preliminary observations based on a GIS aerial photography review identified the following sites as a HAIL property (**Table 2**). It was noted in the response from Council that this did not constitute a full HAIL check. Several properties have been removed from the list received by Auckland Council due to them being outside the Project area. Note that the site locations below may contain multiple individual property titles.

Table 2: Auckland Council Contamination Enquiry

Site Location	HAIL Activity
218-220 SH16	Site is used for current/ historical horticultural activity, with glasshouses on site.
482 SH16	Site is used for current/ historical horticultural activity.
465 SH16	Site is used for current/ historical horticultural activity.
191 SH16	Site is used for current/ historical horticultural activity.
8 Kennedys Road	Site is used for current/ historical horticultural activity.
291 and 299 SH16	Site is used for current/ historical horticultural activity.
331 SH16 / 1368 Coatesville- Riverhead Highway	Site is used for current/ historical horticultural activity.
393-451 SH16	Site is used for current/ historical horticultural activity, including glasshouses.
464 SH16	Site is used for current/ historical horticultural activity.
482 SH16	Site is used for current/ historical horticultural activity.
300-455 SH16	Site is used for current/ historical horticultural activity, including glasshouses.

A full contaminated site response was obtained from Auckland Council on 5 April 2018 (**Appendix D**). The response stated that the following were reviewed in order to provide an assessment:

- Databases were searched for records of landfill, bore, air discharge, industrial and trade process consents, contaminated site discharge consents and environmental assessments within a 100m radius of the project area.
- No pollution incident files regarding spills/contamination were identified for the project area.
- Records in relation to individual horticultural sites in the region were not reviewed.

Table 3 below details the information provided by Auckland Council. Information not relevant to the Project area has not been included below.

Table 3: Auckland Council Contamination Site Response

Site Location	Consent ID	Purpose	Activity Description	Consent Status	Comments
161-169 SH16	#21152	Discharge of contaminants to land or water associated with the proposed land disturbance activities (remediation) by the removal of soil containing elevated contaminant concentrations.	Change of conditions dated 26/03/2009 to allow Remediation Action Plan (RAP) addendum which covers remediation of an additional site at Totara Creek Crossing. Contamination in fill to be removed from site.	Granted 23/04/2009. Now expired.	Site appears to be the now Brigham Creek and SH16 roundabout and therefore directly adjacent to the project area.
161-169 SH16	#21152	Discharge of contaminants to land or water associated with the proposed land disturbance activities (remediation) by the removal of soil containing elevated contaminant concentrations.	Change of conditions dated 26/03/2009 to allow Remediation Action Plan (RAP) addendum which covers remediation of an additional site at Totara Creek Crossing. Contamination in fill to be removed from site.	Granted 05/02/2009. Now superseded.	Site appears to be the now Brigham Creek and SH16 roundabout and therefore directly adjacent to the project area.

4.3 Site Walkover

Due to the extent of the project area a site walkover was unable to be undertaken as part of this PSI. However, a drive through the Project area was completed by a Beca Environmental Scientist on 19 March 2017 with the following observations made.

The majority of the potential HAIL activities noted throughout the Project area were orchards (including vineyards). Several barns/sheds were also noted near the alignment, likely associated with either current or historical orchard activities.

A winery was identified at 366 SH16. Further review identified the winery as The Soljans Estate Winery.

A BP service station was identified opposite the Old Railway Road intersection at 538 SH16.

4.4 Upgrades through existing road surface

Improvement works will tie in to, or involve the direct upgrade of, the existing road surface in most areas.

Gas works waste (coal tar) is not considered 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 NESCS and Auckland Unitary Plan E.30 Chapter will be undertaken.

5 Discussion

5.1 Summary of Information Search

The historical aerial review has identified several properties along the project area 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 also identified a number of sites (predominately those identified in our historical aerial review) as potentially contaminated. In total, 21 properties have been identified as potentially contaminated HAIL sites that will have minor earthworks undertaken within their boundary with the state highway. These properties are identified in **Appendix A**, which should be referenced in the first instance, and are listed in **Table 4** in Section 5.2 below.

5.2 Contaminants of Potential Concern

Review of the site historical information has identified the following properties associated with horticultural activities which may have resulted in the contamination of soils within the project area. Contaminants of potential concern associated with this activity have also been identified in **Table 4** below.

Table 4: Contaminants of Potential Concern

Site Address	Activity	HAIL Code	Contaminants of Potential Concern
<ul style="list-style-type: none"> • 218 SH16 • 291 SH16 • 299 SH16 • 300 SH16 • 312 SH16 • 324 SH16 • 340 SH16 • 1404 Coatesville-Riverhead Highway • 1368 Coatesville-Riverhead Highway • 350 SH16 • 366 SH16 • 407 SH16 • 429 SH16 • 436 SH16 • 451 SH16 • 464 SH16 • 465 SH16 • 482 SH16 • 505 SH16 • 550 SH16 	Horticultural activities specifically vineyards and orchards and associated commercial activities including wineries and growers.	A10 – persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds.	<ul style="list-style-type: none"> • Heavy metals (including Arsenic, Cadmium, Chromium, Copper, Lead and Mercury) • Acidic herbicides • Organophosphates • Organochlorines
<ul style="list-style-type: none"> • 538 SH16 (BP Service Station – further discussed below) 	BP Service Station	F7 – Service stations including retail and commercial refuelling facilities.	<ul style="list-style-type: none"> • Heavy metals (including Arsenic, Cadmium, Chromium, Copper, Lead and Mercury) • Total petroleum hydrocarbons (TPH)

- The site located at 161-169 SH16 and discussed in Section 5.1 above has not been included in **Table 4** as this site is not located within the project area (approximately 50m east) and is therefore not subject to land use activities that may create a potential exposure pathway for onsite or nearby receptors. In conjunction with this, the discharge consent issued by Auckland Council was for the ‘remediation of soil’ containing elevated contaminant concentrations. It is therefore considered unlikely that contaminants remain at concentrations considered a risk to human health under a commercial/ industrial land use scenario at this distance away from the site.
- The BP service station identified alongside Stage 2 SH16 is adjacent to the shoulder widening associated with the improvements and construction of a stormwater pipe outfall. This pipe is to be installed ~3m outside the service station boundary connecting a new treatment swale running alongside SH16 to the discharge outlet near Kumeū River. The works associated with the SH improvements 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. On the basis of this information, 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.

5.3 Exposure Pathway Assessment

The Conceptual Site Model (CSM) see **Table 5** below was developed in order to inform the assessment and describe the relationship between sources of contamination at the site, the human and environmental receptors that may be exposed to those contaminants in the context of the use of the site, and the pathways by which those receptors may be exposed.

Table 5: Conceptual Site Model

Source	Receptor	Pathway	Pathway Complete?
Potential contaminants from adjacent land uses as identified in Section 5.2 .	Construction workers	Exposure of workers to contaminants in soils and groundwater during site redevelopment – dermal contact, ingestion or inhalation of dust/vapours.	Potentially Complete Pathway - levels of contaminants may be present at concentrations that may pose a risk to human health in the locations where the Project area intercepts the sites identified as potentially contaminative.
	Future site users	Exposure of future site users to contaminants in soils – dermal contact, ingestion or inhalation of dust/vapours.	Incomplete Pathway - continuous hard standing surface means that no exposure to potential contaminants will occur.
	General public	Exposure of general public to contaminants in soils– dermal contact, ingestion or inhalation of dust/vapours.	Incomplete Pathway - continuous hard standing surface means that no exposure to potential contaminants will occur.
	Groundwater resources for public consumption	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – anticipated earthworks are considered unlikely to reach groundwater levels.

Surface
water

Sediment and runoff
directly into surface water
bodies present along the
project area.

**Potentially Complete
Pathway-** the exposure pathway
can be managed through
management plan controls.

6 Development Implications

6.1 Consents

6.1.1 National Environmental Standard

As discussed in **Section 2.2** the proposed works may be subject to change and at present, soil disturbance and disposal volumes within each identified HAIL are highly likely to be within the permitted activity volumes of Regulation 8(3) of the NESCS on a site-by-site, 'piece of land' basis, given the limited topsoil disturbance and re-battering of neighbouring properties. However, works are anticipated to last longer than the 2-month permitted activity threshold, therefore making it unlikely for the project to meet the permitted activity criteria.

The ability to sample soils that are likely to be disturbed during works was not possible at the time of drafting this PSI. Taking a conservative approach, it is therefore recommended a discretionary activity consent under the NESCS is applied for based on the provision of this PSI and no intrusive sampling (in the form of a DSI) being undertaken.

A draft Contaminated Soils Management Plan (CSMP) is provided as an appendix to the Assessment of Effects to support the NESCS discretionary activity application.

Sampling is to be undertaken on a site-by-site basis within the identified HAIL properties to be earth-worked along the project alignment once works are confirmed. These assessments will be isolated areas of neighbouring land where soil disturbance is to occur and will enable the correct disposal options to be understood prior to works commencing.

Appendix A provides indication of the properties that have been identified as HAILs and which have minor works occurring within their boundaries. The draft CSMP prepared and submitted with the consent application outlines all handling procedures associated with working within these HAIL sites.

6.1.2 Auckland Unitary Plan (AUP)

Soil disturbance throughout the entire project is likely to exceed the 200m³ threshold of a permitted activity under Rule E30.6.1.2(1b) of the AUP for a road project with multiple concurrent disturbance areas.

Given the inability to sample soils throughout the Project HAIL areas 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 DSI could be prepared.

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 impact 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.

Considering these factors, a discretionary activity consent under the AUP is required for the Project with a proposed condition of consent to allow sampling to be undertaken prior to soil disturbance onsite to inform handling and disposal requirements with the application of the overarching CSMP to guide onsite works.

6.2 Site Management Controls

The exposure pathway assessment has identified two potentially complete exposure pathways; ingestion and inhalation of contaminants by construction workers and the discharge of contaminants to nearby surface water receptors. A draft CSMP has been developed in order to manage and mitigate the potential risks to those on site during the works.

Sediment entering the surrounding surface water and sensitive environmental receptors could be sufficiently mitigated and managed through the implementation of specialist controls during proposed land disturbance works. Erosion and sediment control practices are outlined in the *SH16 Safety Improvements Stage 2 - Erosion and Sediment Control Plan* for the project.

6.3 Disposal Options

Soils excavated during the proposed works may require disposal off-site if they are structurally unsuitable for re-use. Each licensed landfill/managed fill and clean fill site within the Auckland Region is consented by Auckland Council and has specific acceptance criteria which dictate what materials can be accepted.

Soil sampling and analysis is to be conducted on material excavated within HAIL sites identified along the project's alignment. Acceptance of materials should be confirmed by landfill operators prior to commencement of earthworks. As no DSI will be undertaken, it is anticipated sampling of soil will be on a site-by-site basis aligned with the project staging. This process will effectively allow for the sampling and analysis of all potential contaminated sites and inform the appropriate disposal options for the contractor.

If shown to be appropriate for reuse (i.e. within background concentrations), soil from HAIL sites will be allowed to be reused in batter slopes or fill areas along the length of the alignment.

7 Conclusions

This desk-based study has identified 21 properties as being potentially contaminated which involve minor works within their boundaries or neighbouring their boundary. Twenty of these properties are associated with past or present horticultural land use, with the remaining HAIL property being the BP service station which only requires very minor works and is considered low risk.

All HAIL properties identified involve the disturbance of soil within 0-5m of their property boundary to obtain an appropriate batter slope for the widened road corridor or for stormwater conveyance.

NESCS permitted activity criteria for the disturbance and disposal of soil within the neighbouring horticultural properties are highly likely to be met on a case-by-case or 'piece of land' basis for each HAIL. However, due to works being over the two-month permitted activity threshold it is recommended a discretionary activity consent under the NESCS is applied for. Given the contaminants of concern are pesticides applied to the horticultural crops, and the exposure pathway is restricted to dermal contact and dust inhalation by construction works, it is unlikely the timeframe of soil exposure of this two-month threshold will generate any additional risk. In addition, the slopes will be stabilised to an erosion resistant state once design grade is obtained.

As the areas of HAIL activity are minor and associated with land use that commonly does not produce soil contaminant concentrations above those defined as "elevated" as per the Auckland Unitary Plan E30 rules consent is not thought to be required under the E30 rules of the AUP. Although it is considered not likely that contamination will be present that requires consent, due to the restrictions in site access at this point, contaminant concentrations cannot be measured and therefore the possibility of "elevated" concentrations cannot be ruled out.

A conservative approach to AUP approvals is to apply for a discretionary consent under E30 given the permitted activity provisions and requirements under the controlled activity status cannot be met (due to not having a DSI to submit).

The provision of the draft CSMP to support this discretionary activity approach will outline management procedures and mitigate any potential risk that may be present for works within the HAIL properties. This method will enable correct procedures to be followed for each identified site and allow sampling to be conducted to inform disposal option assessment. Should the disposal sampling identify contamination outside that anticipated in the draft CSMP then the CSMP will be amended and approved by a SQEP and provided to Council.

8 Limitations

This report has been prepared by Beca for Waka Kotahi (the Client). This report is prepared solely for the purpose of the assessment of potential soil contamination (Scope). The contents of this report may not be used for any purpose other than in accordance with the stated Scope.

This report is confidential and is prepared solely for Waka Kotahi. Beca accepts no liability to any other person for their use of or reliance on this report, and any such use or reliance will be solely at their own risk.

In preparing this report Beca has relied on key information including the following: historical aerial photographs from the Auckland Council GeoMaps and Retrolens, discharge consent information provided by Auckland Council, and Site Contamination Information provided by Auckland Council.

This report contains information obtained by inspection or other means of investigation. Unless specifically stated otherwise in this report, Beca has relied on the accuracy, completeness, currency and sufficiency of all information provided to it by, or on behalf of, the Client or any third party, including the information listed above, and has not independently verified the information provided. Beca accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the information provided. Publicly available records are frequently inaccurate or incomplete.

The contents of this report are based upon our understanding and interpretation of current legislation and guidelines (“Standards”) as consulting professionals, and should not be construed as legal opinions or advice. Unless special arrangements are made, this report will not be updated to take account of subsequent changes to any such Standards.

This report should be read in full, having regard to all stated assumptions, limitations and disclaimers.

A

Appendix A – Design Plans with HAIL Sites

GENERAL NOTES:

1. ALL NOTES HEREIN SHALL FORM PART OF THE CONTRACT.
2. ALL NOTES SHALL BE READ IN CONJUNCTION WITH THE CONTRACT SPECIFICATIONS AND ALL DESIGN DRAWINGS APPLICABLE TO THE CONTRACT.
3. ALL WORKS SHALL BE CONSTRUCTED AS DETAILED IN ALL DESIGN DRAWINGS AND IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT SPECIFICATIONS.
4. THE CONTRACTOR MUST CHECK ALL DESIGN DRAWINGS AND IDENTIFY ANY INCONSISTENCIES BETWEEN DESIGN DRAWINGS AND AGAINST THE CONTRACT SPECIFICATIONS, BASIS OF PAYMENT AND SCHEDULE OF PRICES IN ADVANCE AND PRIOR TO ANY CONSTRUCTION WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IF THERE ARE ANY INCONSISTENCIES.
5. THE CONTRACTOR MUST INFORM AUCKLAND COUNCIL'S ARBORIST FOR ANY WORK UNDER THE DRIPLINE OF THE TREES. NOTIFICATION SHALL BE MADE WELL IN ADVANCE OF ANY CONSTRUCTION WORKS.
6. SEE LANDSCAPE PLANS FOR ALL AREAS OF EXISTING GRASS AND/OR PLANTING AFFECTED DURING CONSTRUCTION.
7. SITE CLEARANCE SHALL BE CONDUCTED PRIOR TO COMMENCEMENT OF ALL CONSTRUCTION WORKS. REFER TO SITE CLEARANCE PLANS.

SETTING OUT NOTES:

1. SET-OUT INFORMATION FOR ROAD CENTRELINES, EDGE LINES AND KERB LINES WILL BE SUPPLIED TO THE CONTRACTOR IN 3D ELECTRONIC FORMAT. FOR KERB TYPES AND LOCATIONS, REFERENCE SHOULD BE MADE TO KERB AND BARRIER DRAWINGS.
2. THE CONTRACTOR MUST CHECK AND VERIFY ALL COORDINATES / LEVELS / DIMENSIONS / SETTING-OUT INFORMATION PRIOR TO COMMENCEMENT OF WORK AND REPORT DISCREPANCIES, IF ANY, IMMEDIATELY TO THE ENGINEER.
3. THE CONTRACTOR MUST TAKE ALL STEPS TO MAKE SURE THAT THE ENGINEER VERIFIES ALL LEVELS AND SETTING-OUT ON SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
4. THE CONTRACTOR MUST UNDERTAKE A SURVEY ON ALL CARRIAGEWAY, FOOTPATH, KERB AND CHANNEL TIE-INS TO PREVENT STORMWATER PONDING. EXTENTS OF WORK MAY EXTEND BEYOND THE LIMITS SHOWN IN THE DESIGN DRAWINGS WITH THE ENGINEER'S APPROVAL.

ROAD KERB AND CHANNEL, FOOTPATH, CENTRAL MEDIAN AND OTHER ROAD ELEMENTS

1. NEW KERB, CHANNEL AND TRAFFIC ISLAND KERBLINES ALONG SH16 SHALL BE SEMI-MOUNTABLE, (SM1 AND SM2 KERB PROFILE). FOR DETAILS AND EXTENTS OF KERB AND CHANNEL REFER TO BARRIER AND KERBING PLANS AND CIVIL WORKS DETAILS DRAWINGS.
2. NEW TRAFFIC ISLAND KERBING TO BE PAINTED REFLECTORISED WHITE IN ACCORDANCE WITH MOTSAM, PART 2 SECTION 2.08.03, RAISED ISLANDS.
3. NEW TRAFFIC ISLANDS INFILL TO BE 20MPa EXPOSED AGGREGATE CONCRETE INFILL WITH 4% BLACK OXIDE. SEE DETAIL 18 ON DRAWING 3235084-CP-3205.
4. NEW FOOTPATHS/SHARED PATHS AND PRAM CROSSINGS TO BE 20MPa CONCRETE 100mm DEEP OVER 100mm DEPTH OF COMPACTED BASECOURSE (AP40).
5. ALL SAWN CONCRETE JOINTS MUST BE SAWCUT NEATLY. SAWCUTTING SHALL GENERALLY BE SQUARE TO THE KERB AND CARRIAGEWAY ALIGNMENT. DRY CUTTING IS NOT PERMITTED.
6. BASECOURSE SHALL BE PLACED AND COMPACTED TO ACHIEVE A MINIMUM CLEGG IMPACT VALUE OF 12 FOR CONCRETE FOOTPATHS.
7. ALL PATH EDGES SHALL BE CONSTRUCTED FLUSH WITH THE ADJACENT GROUND TO AVOID CREATING PEDESTRIAN TRIP HAZARDS.
8. NEW PRECAST KERBS ADJACENT TO GRASS BERM OR PLANTING BEDS TO BE MORTAR POINTED BEFORE REINSTATEMENT WITH TOPSOIL, MULCH ETC.
9. BATTER SLOPES ARE EITHER 4H:1V, 3H:1V OR SLIGHTLY STEEPER DEPENDING ON THE ROADSIDE CONDITION AT THE LOCATION. FOR STEEPENED SLOPES, CONTRACTOR TO UNDERTAKE GROUND TESTING, HAND AUGERS AND / OR SHEAR VANES AT THE DIRECTION OF THE ENGINEER. ENGINEER THEN SHALL ASSESS THE FINDINGS AND INSTRUCT IF FURTHER SLOPE STABILISATION WILL BE REQUIRED.
10. FOR NEW WIRE ROPE MEDIAN BARRIER AND W-SECTION EDGE BARRIER LOCATIONS AND DETAILS, REFER TO BARRIER AND KERBING PLANS .

PROPERTY ACCESS:

1. ALL PROPERTY ACCESS ALONG THE CORRIDOR SHALL BE MAINTAINED AS EXISTING UNLESS NOTED OTHERWISE ON THE GENERAL ARRANGEMENT PLANS. TYPICALLY, DETAILED LAYOUTS SHALL FOLLOW EITHER DIAGRAM D OR AUCKLAND TRANSPORT TDM VEHICLE CROSSING DETAIL VX0103B FOR ALL RESIDENTIAL AND LIGHT COMMERCIAL PROPERTIES OR DIAGRAM E FOR HEAVY COMMERCIAL PROPERTIES ACCORDING TO WAKA KOTAHI PLANNING POLICY MANUAL, APPENDIX 5B ACCESSWAY STANDARDS AND GUIDELINES.
2. REFER TO PAVEMENT AND SURFACING DRAWINGS FOR PROPERTY ACCESS CONSTRUCTION MATERIALS AND DETAILS.

SURVEY:

1. THE SURVEY AND DESIGN IS IN TERMS OF NZTM COORDINATES AND NZVD 2016 VERTICAL DATUM.

SERVICES:

1. REFER TO UTILITY PLANS FOR LOCATION OF EXISTING AND NEW SERVICES .
2. CONTRACTOR MUST LIAISE WITH ALL SERVICE AUTHORITIES FOR LOCATION OF SERVICES AND OBTAIN ANY NECESSARY CONSENTS IN ADVANCE AND PRIOR TO ANY CONSTRUCTION WORKS.
3. CONTRACTOR TO CARRY OUT DETAILED DESIGN SERVICES LOCATION PRIOR TO ANY EXCAVATION WORKS.
4. ANY SERVICES DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED, TO THE SATISFACTION OF THE SERVICE PROVIDER, AT THE CONTRACTORS EXPENSE.

LEGEND

	EXISTING ROAD DESIGNATION BOUNDARY
	EXISTING PROPERTY BOUNDARY
	EXISTING POWER POLE (REFER TO UTILITY DRAWINGS FOR POLES TO BE REMOVED)
	EXISTING STREET LIGHTING COLUMN (REFER TO STREET LIGHTING DRAWINGS FOR COLUMNS TO BE REMOVED)
	EXISTING CELL PHONE TOWER ON BORIC LAND TO REMAIN
	EXISTING SPARK INTERNATIONAL CABLE
	NEW MASH TL-3 WIRE ROPE BARRIER
	NEW MASH TL-3 WIRE ROPE BARRIER END TERMINAL
	NEW MASH TL-3 W-BEAM BARRIER
	NEW MASH TL-3 W-BEAM BARRIER LEADING TERMINAL
	NEW MASH TL-3 W-BEAM BARRIER TRAILING TERMINAL
	NEW THRIE BEAM BARRIER
	NEW RETAINING WALL
	NEW 2.0m HIGH NOISE BARRIER (IN ACCORDANCE WITH WAKA KOTAHI STATE HIGHWAY NOISE BARRIER DESIGN GUIDE)
	NEW 2.5m HIGH NOISE BARRIER (IN ACCORDANCE WITH WAKA KOTAHI STATE HIGHWAY NOISE BARRIER DESIGN GUIDE)
	NEW TRAFFIC SIGN
	NEW EARTHWORKS IN CUT
	NEW EARTHWORKS IN FILL
	NEW CONCRETE FOOTPATH/SHARED PATH OR MEDIAN ISLAND (REFER TO DETAIL 18 ON PAVEMENT DRAWING 3235084-CP-3205 FOR ISLAND AND PAVEMENT TYPE H ON DRAWING 3235084-CP-3201 FOR FOOTPATH/SHARED PATH)
	NEW TACTILE GROUND SURFACE INDICATORS
	RECONSTRUCTED RESIDENTIAL VEHICLE CROSSING (REFER TO PAVEMENT TYPE F ON DRAWING 3235084-CP-3201)
	NEW RAISED TABLE (REFER TO PAVEMENT DRAWING 3235084-CP-3207)

No.	Revision	By	Chk	Appd	Date
D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22
A	PRELIMINARY DESIGN	AH	SP	NL	26.03.21



Original Scale (A1)	Design	A. HOLT	26.03.21	Approved For Construction*
NTS	Drawn	A. HOLT	26.03.21	
Reduced Scale (A3)	Dwg Verifier			Date
NTS	Dwg Check			

* Refer to Revision 1 for Original Signature



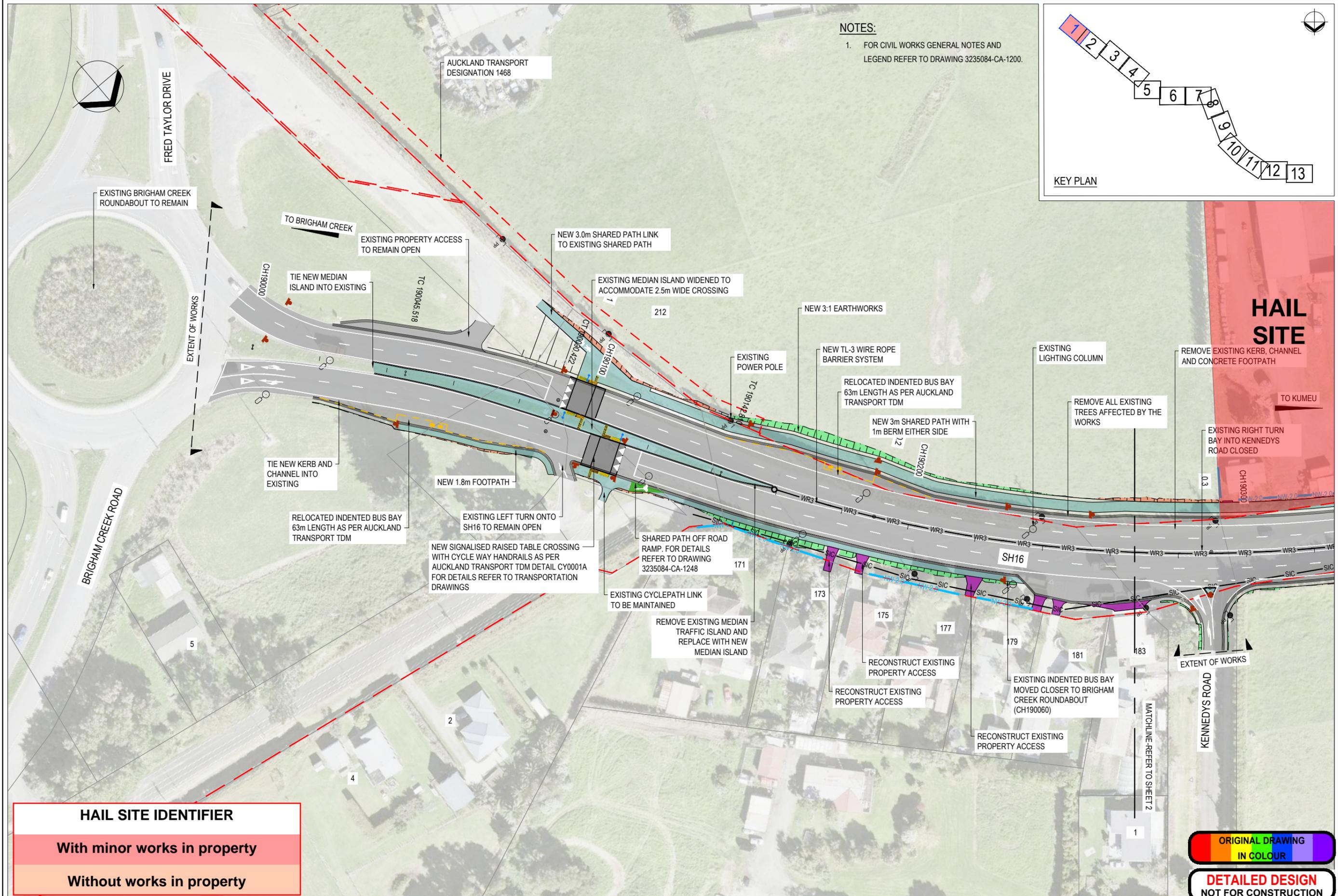
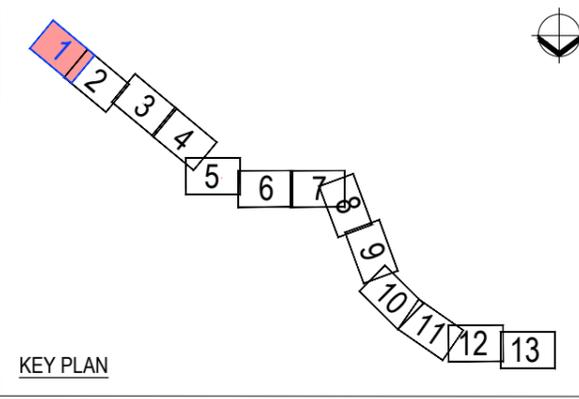
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STAGE 2
BRIGHAM CREEK TO KUMEU

Title: CIVIL WORKS
GENERAL NOTES
AND LEGEND

Discipline	CIVIL ENGINEERING
Drawing No.	3235084-CA-1200
Rev.	D



NOTES:
 1. FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.



HAIL SITE IDENTIFIER

With minor works in property

Without works in property

ORIGINAL DRAWING
IN COLOUR

DETAILED DESIGN
NOT FOR CONSTRUCTION

No.	Revision	By	Chk.	Appd.	Date
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D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

Drawing Original:

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 Reduced Scale (A3) 1:1000

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 Design Checked: A. HOLT 26.03.21

Approved For Construction: A. HOLT 26.03.21

Client:

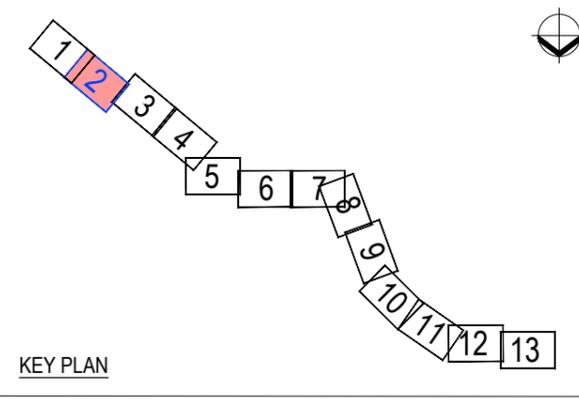
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Title: GENERAL ARRANGEMENT PLAN SHEET 1

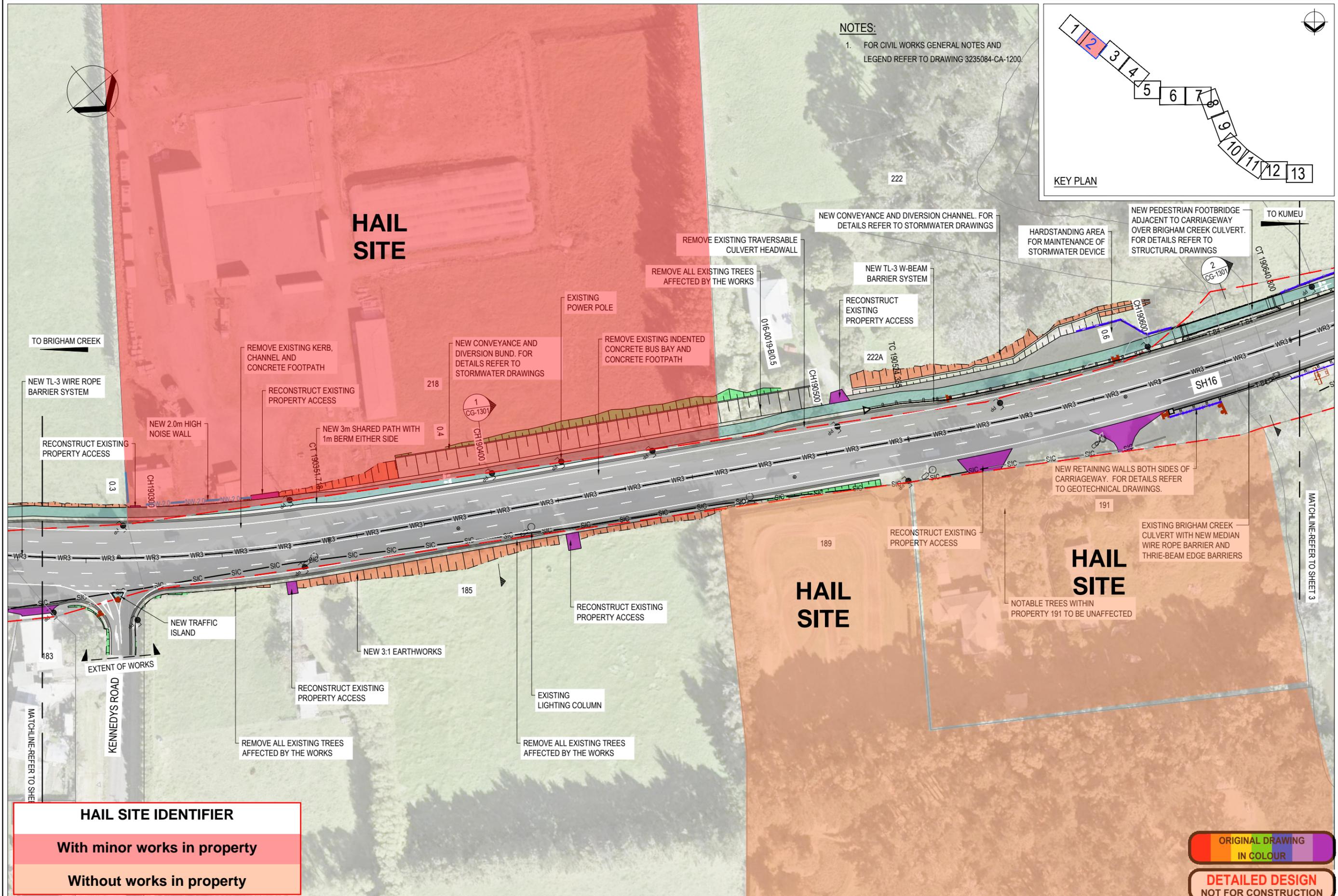
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Drawing No: 3235084-CA-1201

Rev: E



NOTES:
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No.	Revision	By	Chk.	Appd.	Date
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D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

Drawing Originator:

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Design Drawn: A. HOLT 26.03.21
 Design Checked: A. HOLT 26.03.21

Approved For Construction: [Signature] Date: 26.03.21

Client: WAKA KOTAHI NZ TRANSPORT AGENCY

Project: SH16 - SAFETY IMPROVEMENTS STAGE 2 BRIGHAM CREEK TO KUMEU

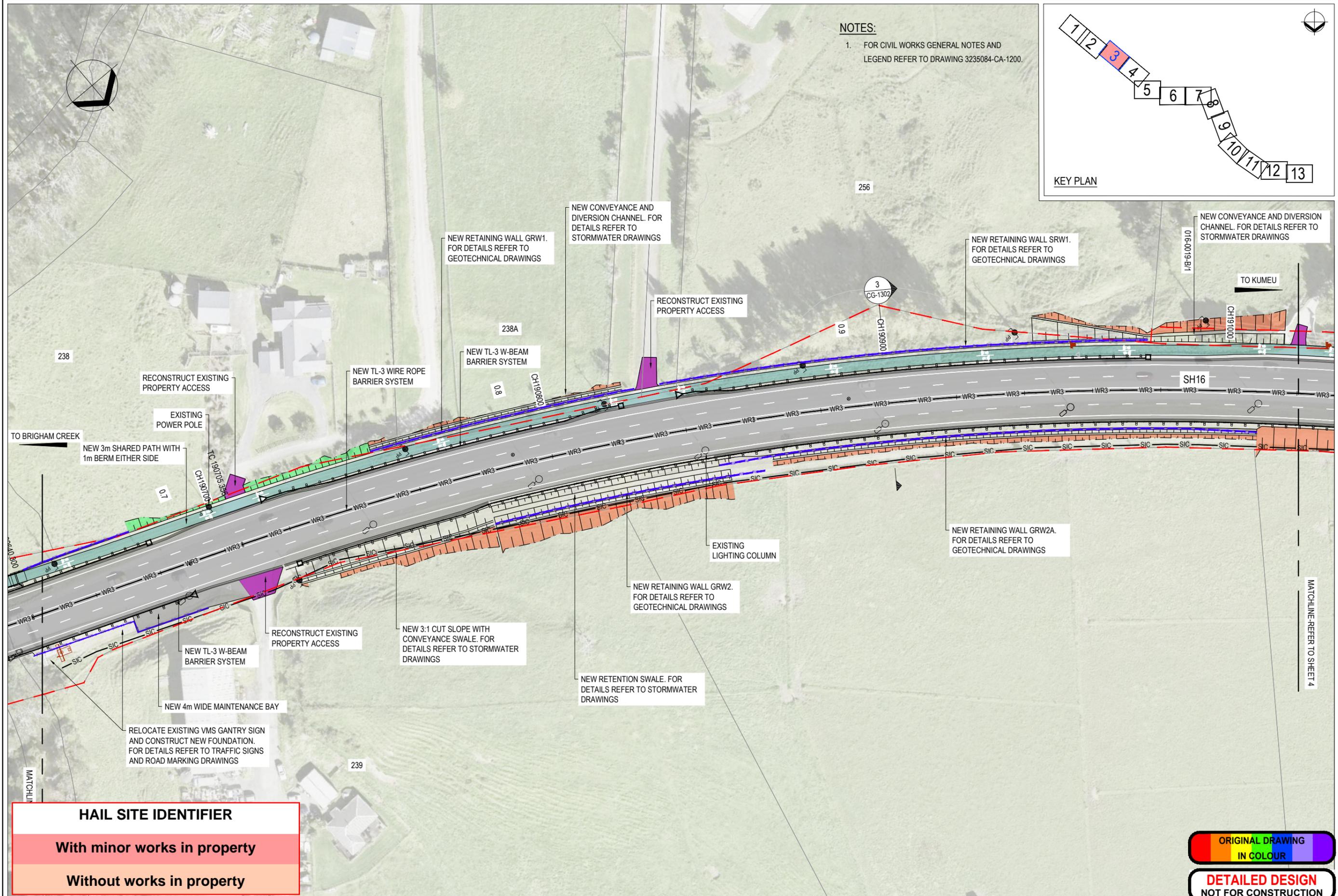
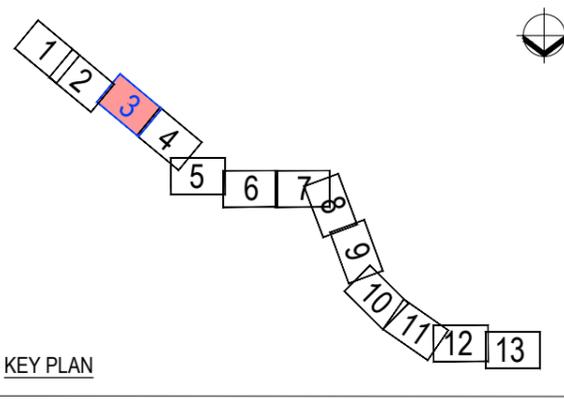
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Discipline: CIVIL ENGINEERING	Rev: E
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ORIGINAL DRAWING IN COLOUR

DETAILED DESIGN NOT FOR CONSTRUCTION

NOTES:
 1. FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.



HAIL SITE IDENTIFIER

With minor works in property

Without works in property

ORIGINAL DRAWING
 IN COLOUR

DETAILED DESIGN
 NOT FOR CONSTRUCTION

No.	Revision	By	Chk.	Appd.	Date
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D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

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Design Drawn: A. HOLT 26.03.21
 Design Check: A. HOLT 26.03.21

Approved For Construction: [Signature] 26.03.21

Client: WAKA KOTAHĪ NZ TRANSPORT AGENCY

Project: SH16 - SAFETY IMPROVEMENTS STAGE 2 BRIGHAM CREEK TO KUMEU

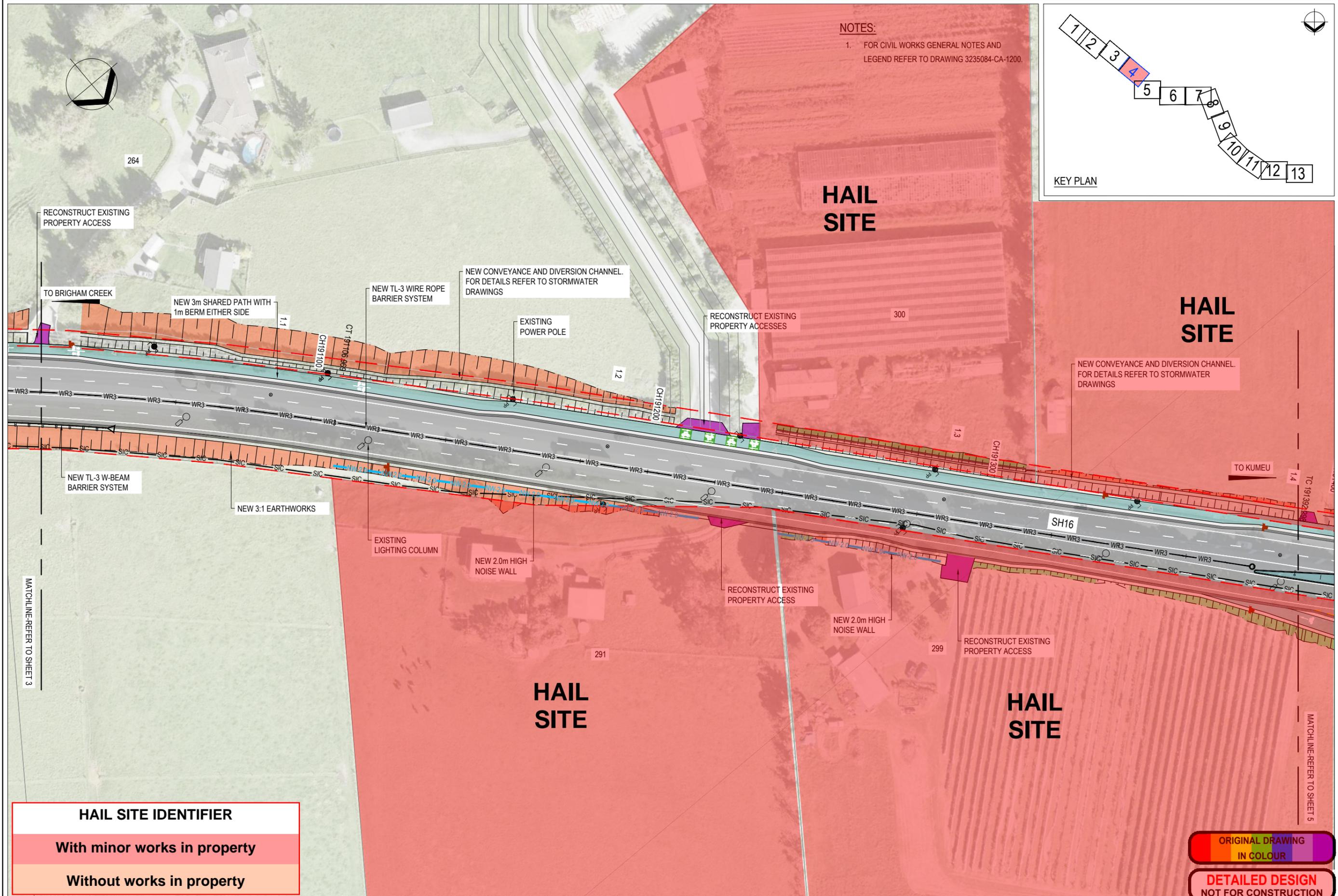
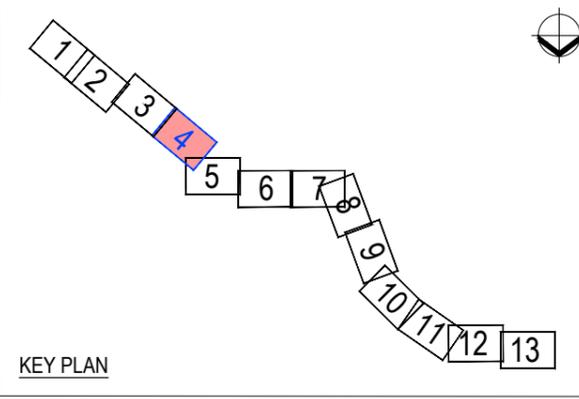
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Discipline: CIVIL ENGINEERING

Drawing No: 3235084-CA-1203

Rev: E

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No.	Revision	By	Chk.	Appd.	Date
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D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

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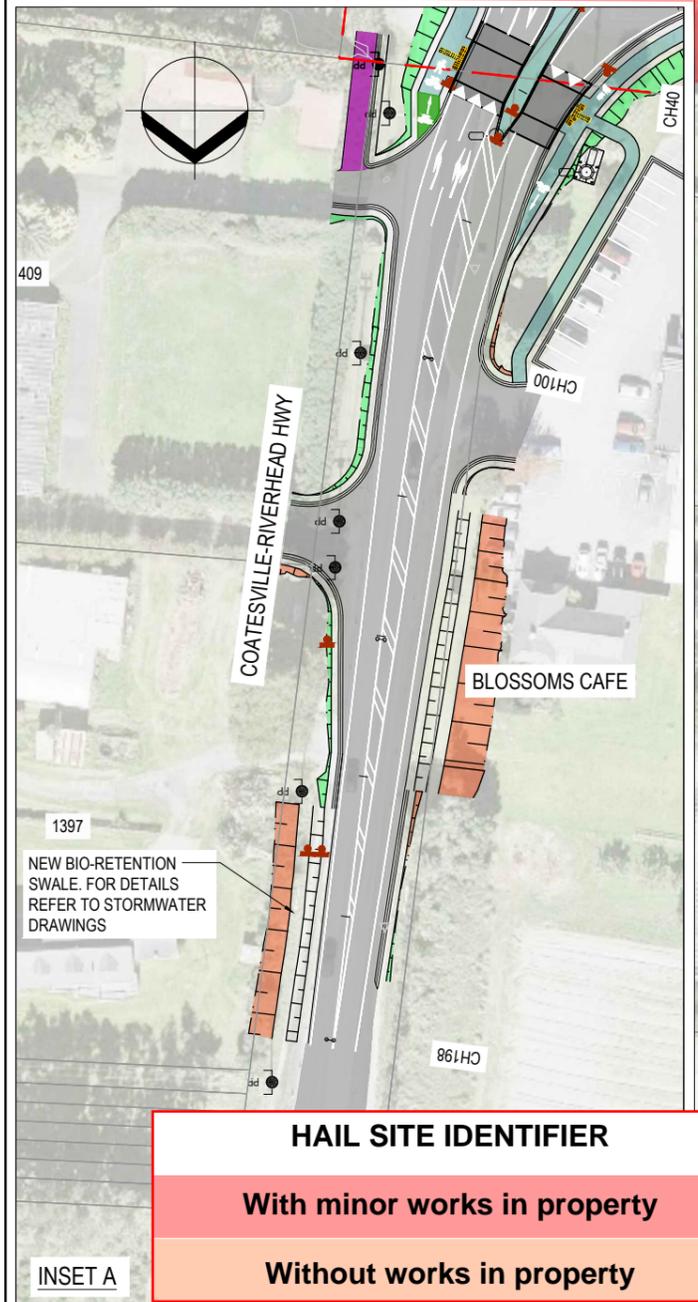
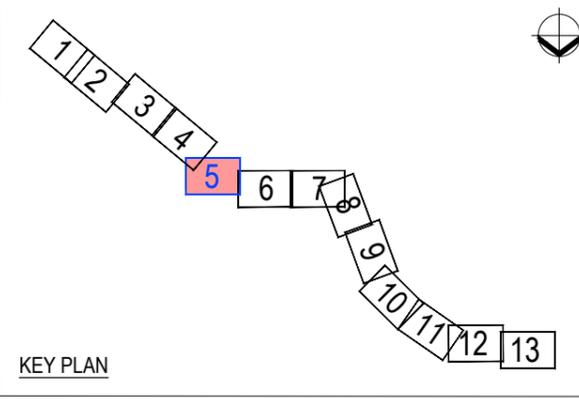
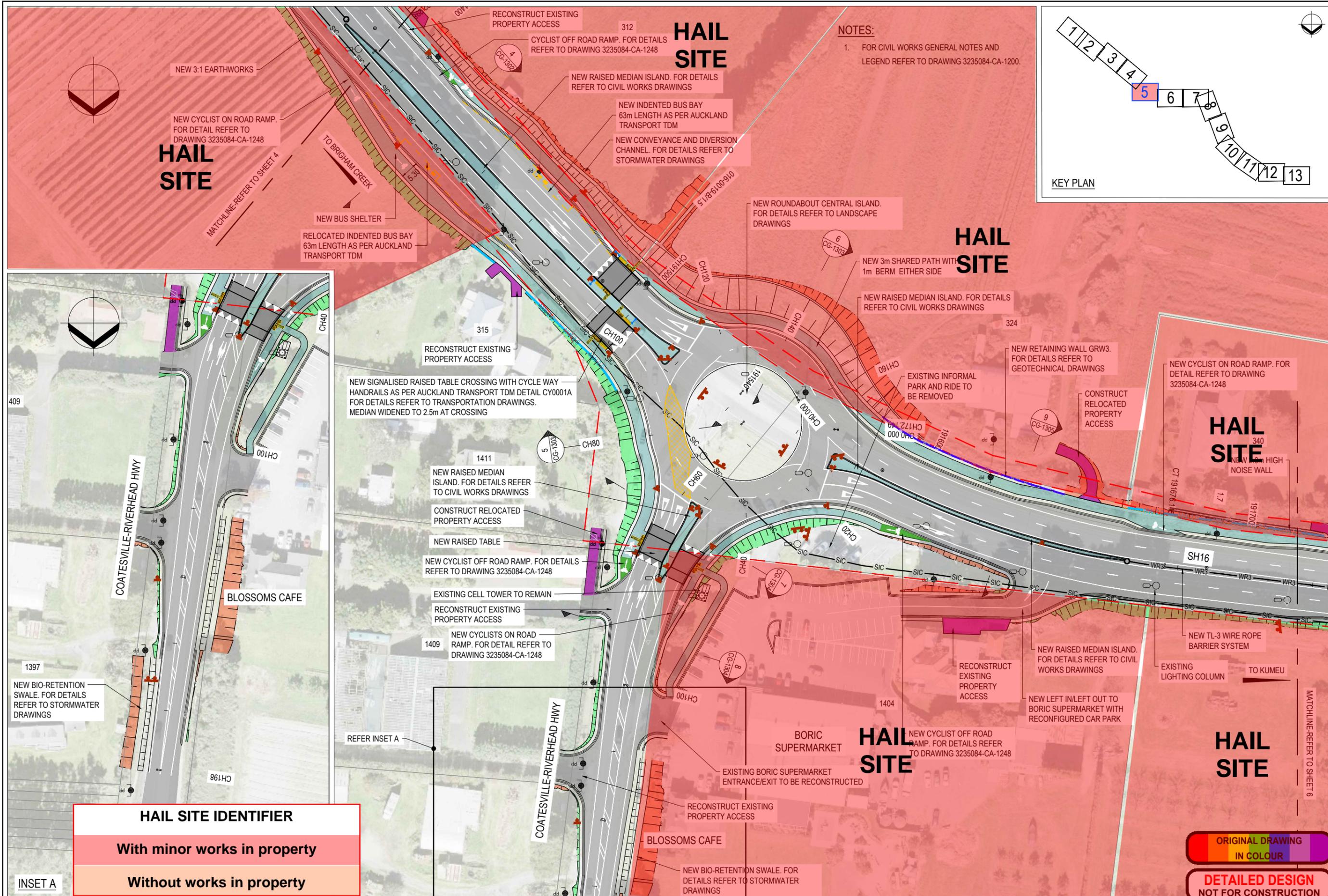
* Refer to Revision 1 for Original Signature

Client:

Project: SH16 - SAFETY IMPROVEMENTS STAGE 2 BRIGHAM CREEK TO KUMEU

Title: GENERAL ARRANGEMENT PLAN SHEET 4

Discipline	Rev.
CIVIL ENGINEERING	E
Drawing No.	3235084-CA-1204



NOTES:
 1. FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.

HAIL SITE IDENTIFIER
 With minor works in property
 Without works in property

No.	Revision	By	Chk.	Appd.	Date
E	DETAILED DESIGN	AH	SP	GC	25.08.22
D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

Drawing Originator: **Beca**

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Reduced Scale (A3)	Design Checker			
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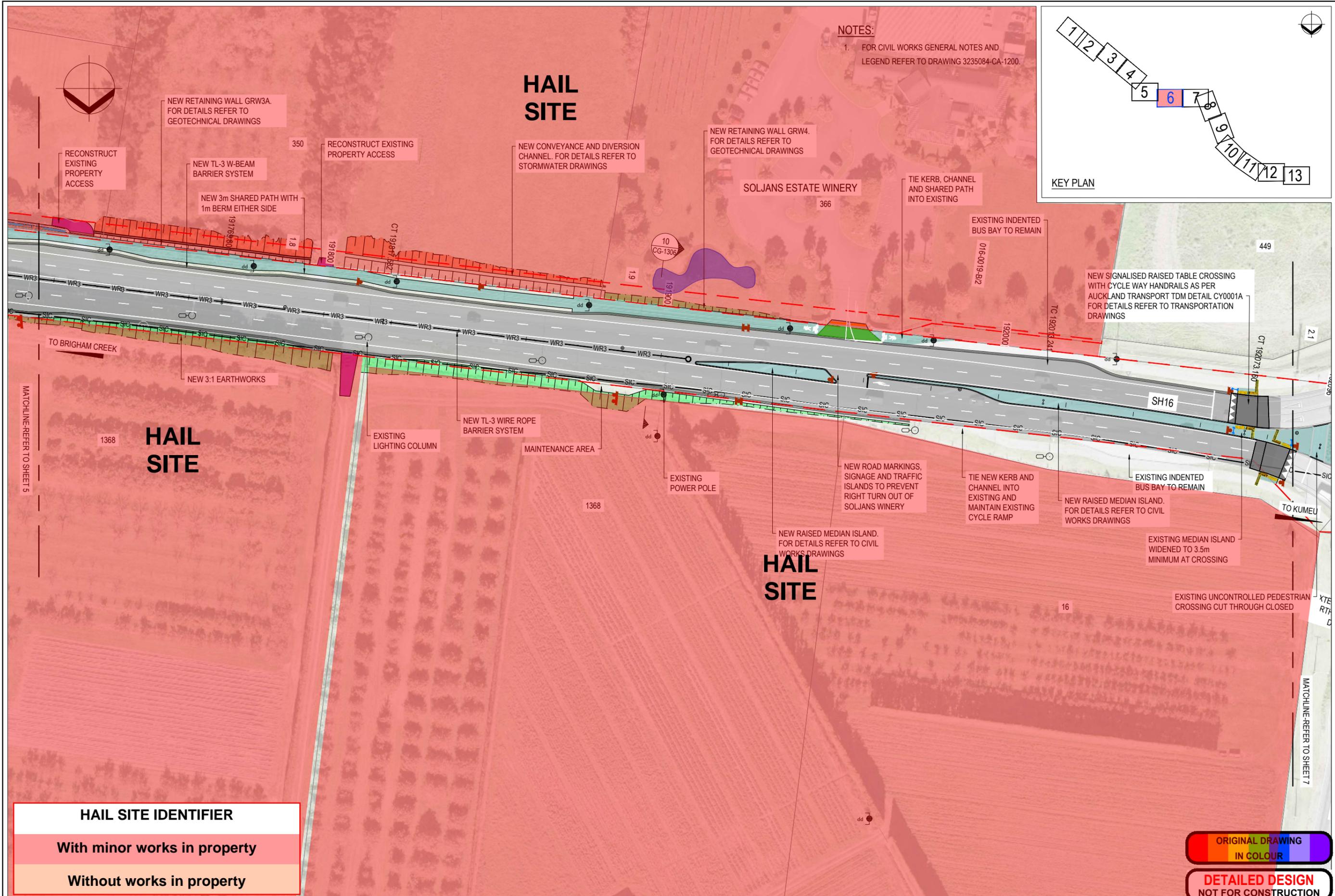
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Client: **WAKA KOTAHU**
 NZ TRANSPORT AGENCY

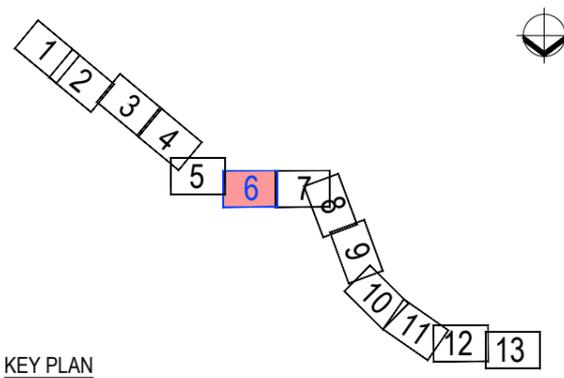
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Title: **GENERAL ARRANGEMENT PLAN SHEET 5**

Discipline: **CIVIL ENGINEERING**
 Drawing No: **3235084-CA-1205**
 Rev: **E**



NOTES:
 1. FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.



HAIL SITE

HAIL SITE

HAIL SITE

HAIL SITE IDENTIFIER

With minor works in property

Without works in property

No.	Revision	By	Chk.	Appd.	Date
E	DETAILED DESIGN	AH	SP	GC	25.08.22
D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

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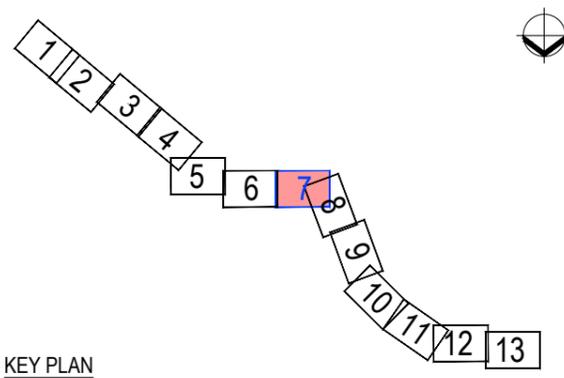
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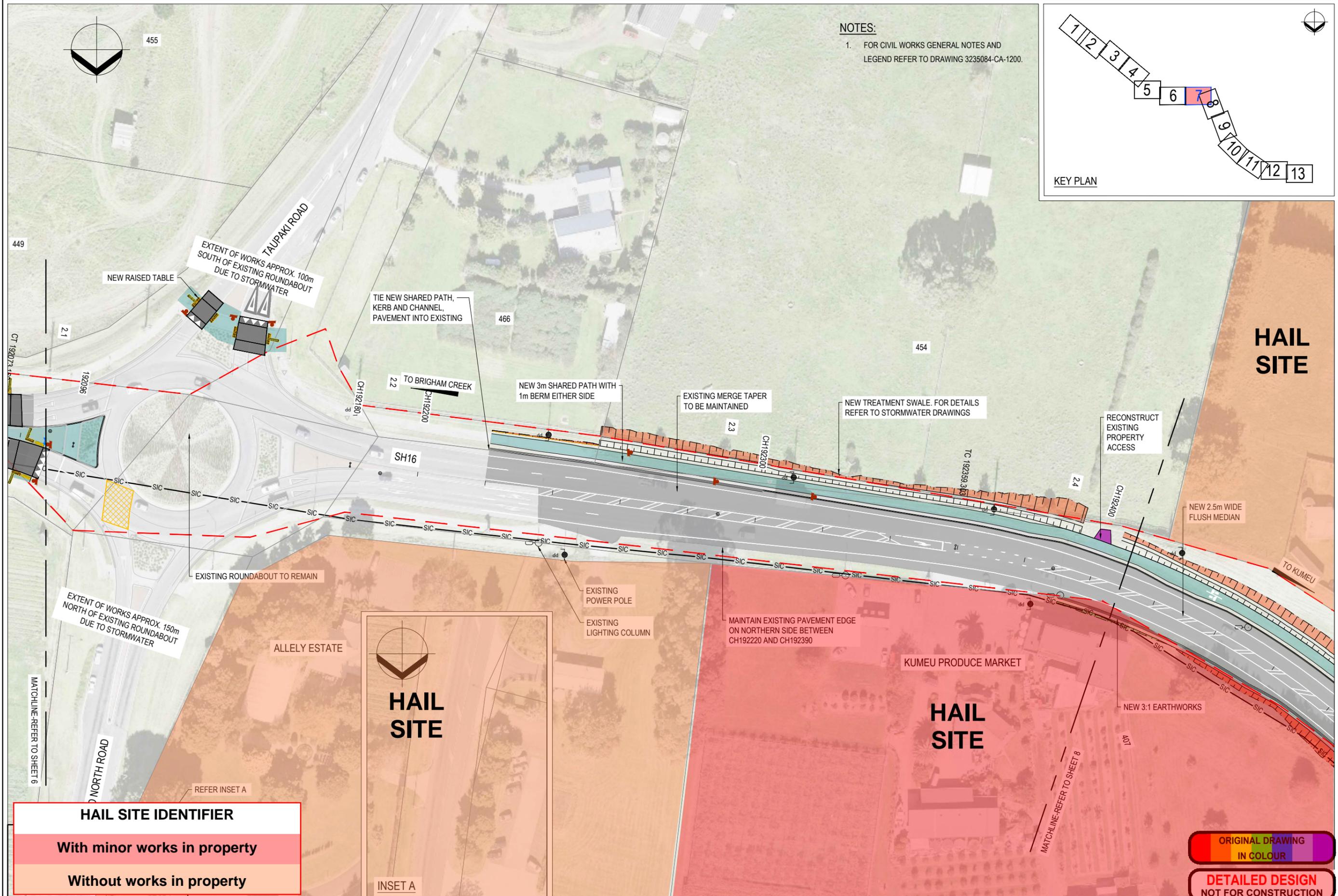
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Title: GENERAL ARRANGEMENT PLAN SHEET 6

Discipline	CIVIL ENGINEERING
Drawing No.	3235084-CA-1206
Rev.	E



NOTES:
 1. FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.



HAIL SITE IDENTIFIER

With minor works in property

Without works in property

ORIGINAL DRAWING
 IN COLOUR

**DETAILED DESIGN
 NOT FOR CONSTRUCTION**

No.	Revision	By	Chk.	Appd.	Date
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D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

Beca

Original Scale (A1) 1:500
 Reduced Scale (A3) 1:1000

Design Drawn: A. HOLT 26.03.21
 Design Check: A. HOLT 26.03.21

Approved For Construction: 26.03.21

WAKA KOTAHU
 NZ TRANSPORT AGENCY

Project: SH16 - SAFETY IMPROVEMENTS STAGE 2 BRIGHAM CREEK TO KUMEU

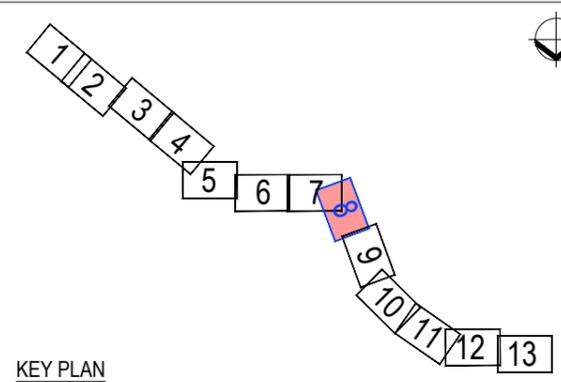
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Discipline: CIVIL ENGINEERING
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 Rev: E



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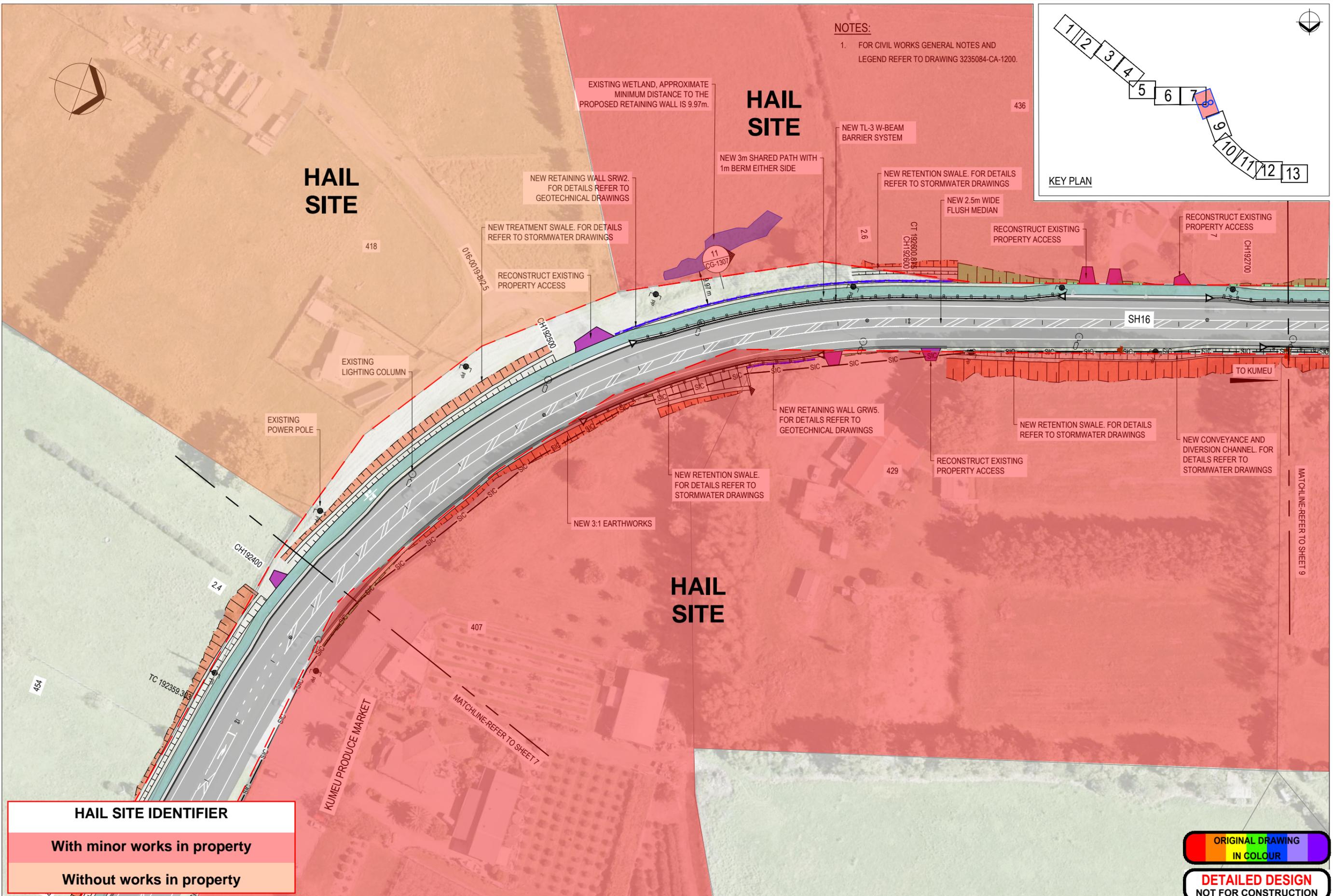
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HAIL SITE

HAIL SITE

HAIL SITE



HAIL SITE IDENTIFIER

With minor works in property

Without works in property

No.	Revision	By	Chk.	Appd.	Date
E	DETAILED DESIGN	AH	SP	GC	25.08.22
D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
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* Refer to Revision 1 for Original Signature

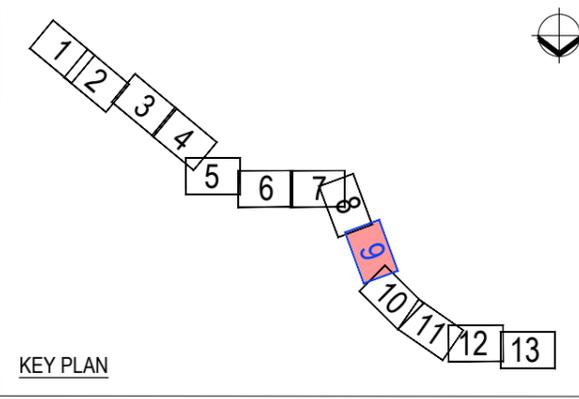
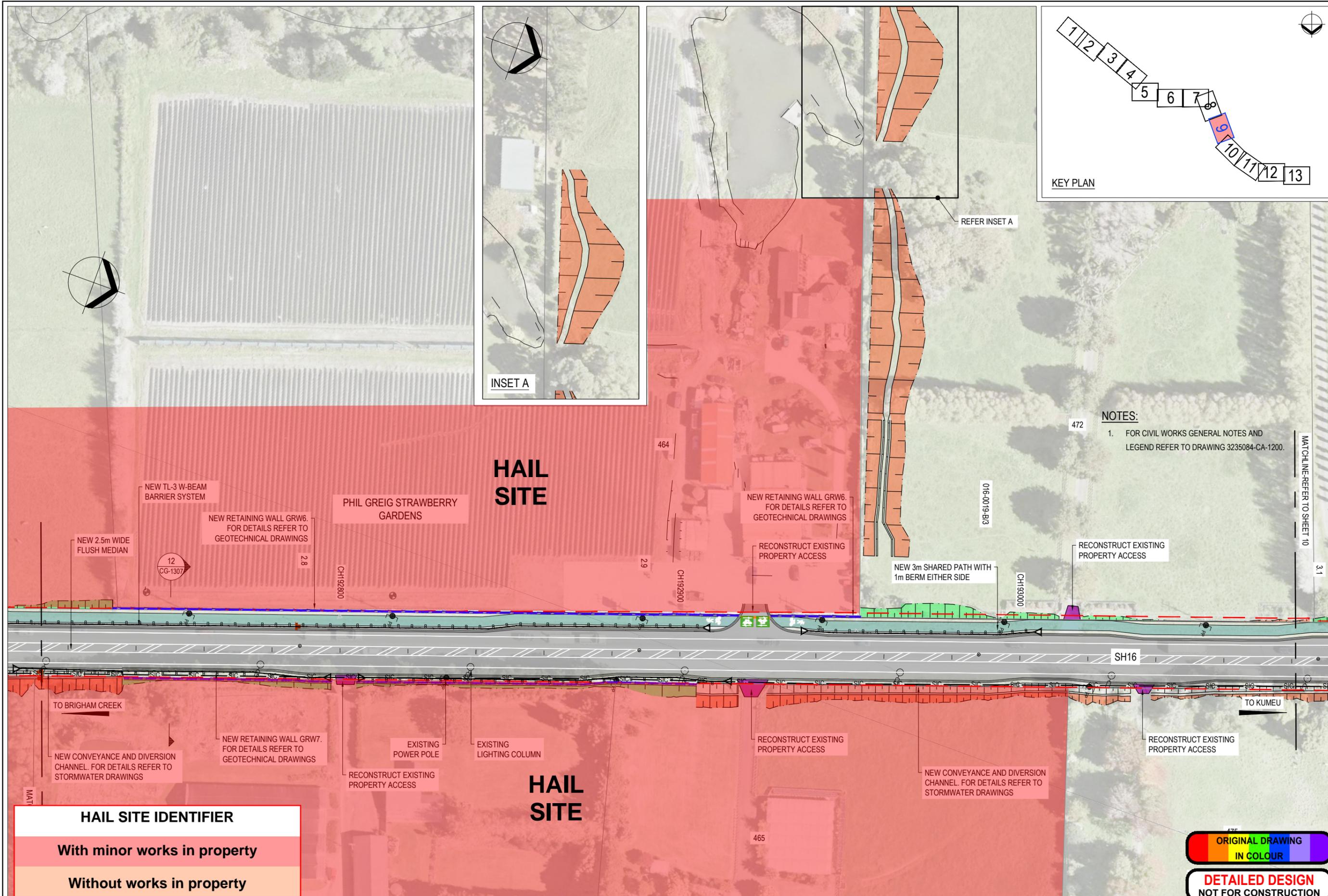
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Project: SH16 - SAFETY IMPROVEMENTS STAGE 2 BRIGHAM CREEK TO KUMEU

Title: GENERAL ARRANGEMENT PLAN SHEET 8

Discipline	Rev.
CIVIL ENGINEERING	E

Drawing No: 3235084-CA-1208



NOTES:
 1. FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.

HAIL SITE IDENTIFIER

With minor works in property

Without works in property

No.	Revision	By	Chk.	Appd.	Date
E	DETAILED DESIGN	AH	SP	GC	25.08.22
D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

Drawing Originator:

Original Scale (A1) 1:500
 Reduced Scale (A3) 1:1000

Design	A. HOLT	26.03.21	Approved For Construction*
Drawn	A. HOLT	26.03.21	Date
Design Verifier			
Design Check			

* Refer to Revision 1 for Original Signature

Client:

Project: SH16 - SAFETY IMPROVEMENTS STAGE 2 BRIGHAM CREEK TO KUMEU

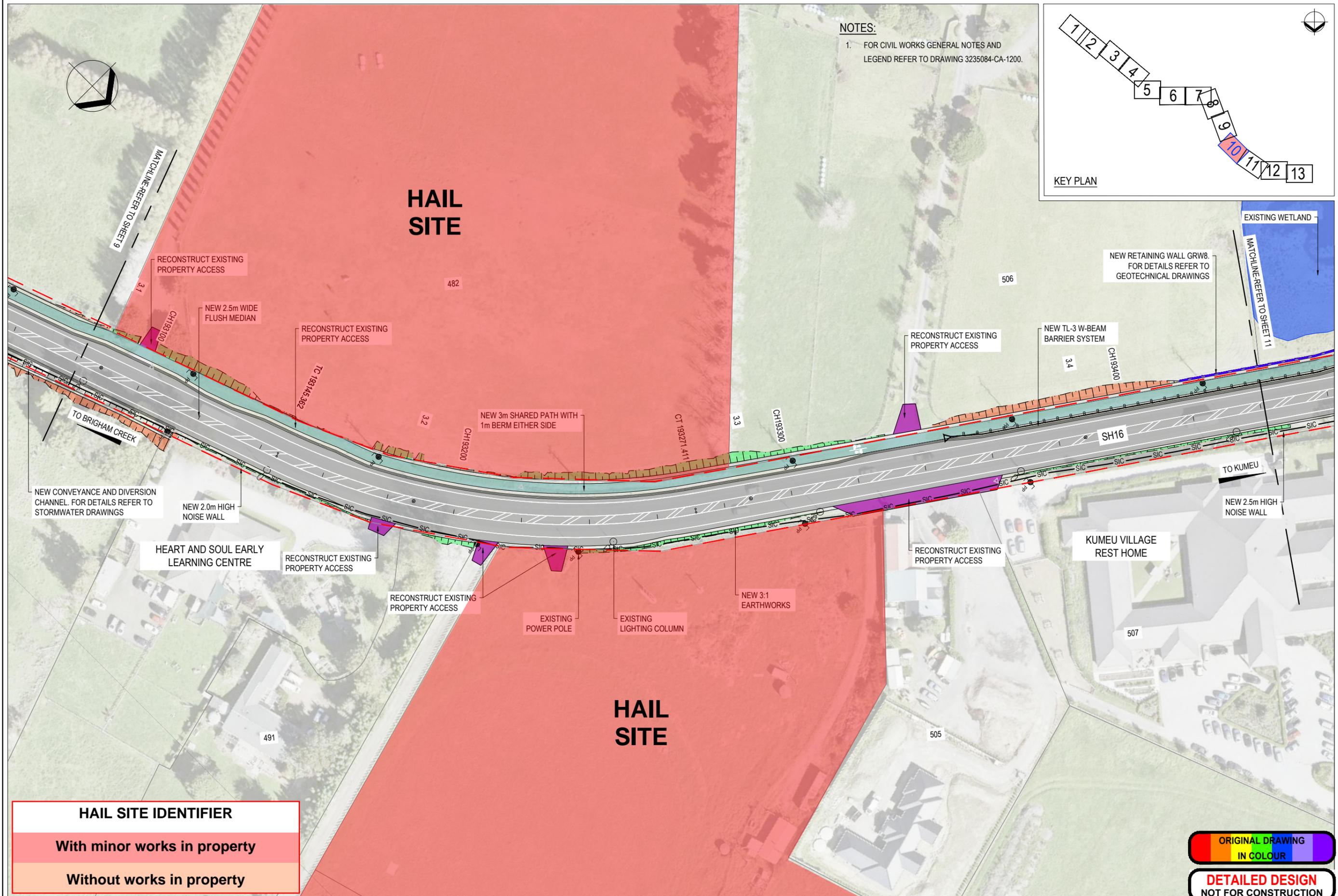
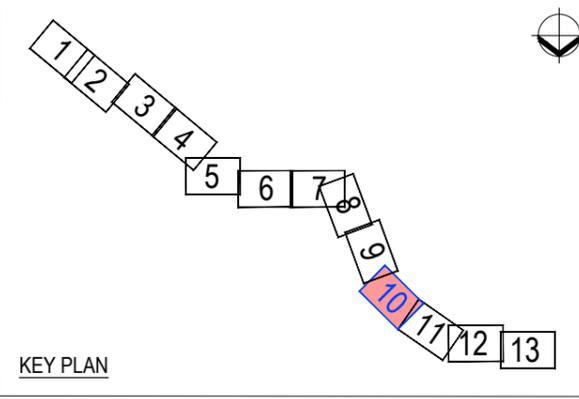
Title: GENERAL ARRANGEMENT PLAN SHEET 9

Discipline	CIVIL ENGINEERING
Drawing No.	3235084-CA-1209
Rev.	E



NOTES:

1. FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.



HAIL SITE IDENTIFIER

With minor works in property

Without works in property

ORIGINAL DRAWING
IN COLOUR

DETAILED DESIGN
NOT FOR CONSTRUCTION

No.	Revision	By	Chk.	Appd.	Date
E	DETAILED DESIGN	AH	SP	GC	25.08.22
D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

Drawing Originator:

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Design	A. HOLT	26.03.21	Approved For Construction*
Drawn	A. HOLT	26.03.21	Date
Design Verifier			
Design Check			

* Refer to Revision 1 for Original Signature

Client:

Project: SH16 - SAFETY IMPROVEMENTS
STAGE 2
BRIGHAM CREEK TO KUMEU

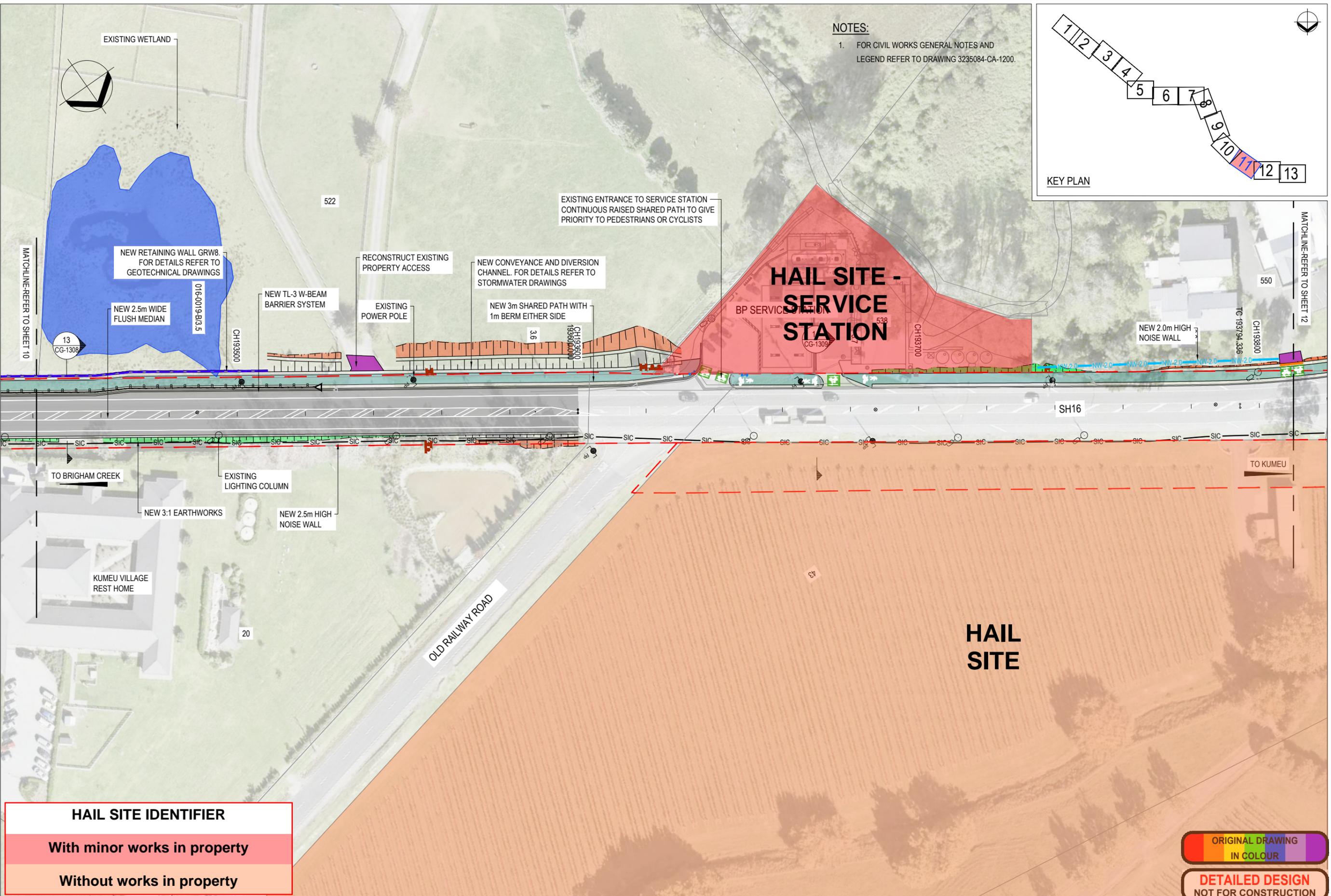
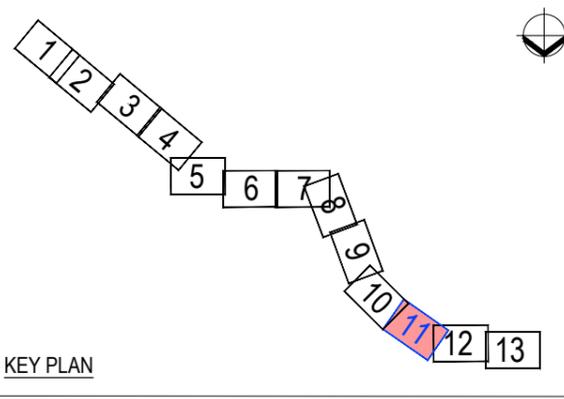
Title: GENERAL ARRANGEMENT
PLAN
SHEET 10

Discipline: CIVIL ENGINEERING

Drawing No: 3235084-CA-1210

Rev: E

NOTES:
 1. FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.



HAIL SITE IDENTIFIER
 With minor works in property
 Without works in property

ORIGINAL DRAWING
 IN COLOUR
 DETAILED DESIGN
 NOT FOR CONSTRUCTION

No.	Revision	By	Chk.	Appd.	Date
E	DETAILED DESIGN	AH	SP	GC	25.08.22
D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

Drawing Original:

Original Scale (A1)	Design	A. HOLT	26.03.21	Approved For Construction*
1:500	Drawn	A. HOLT	26.03.21	Date
Reduced Scale (A3)	Design Verifier			
1:1000	Design Check			

* Refer to Revision 1 for Original Signature

Client:

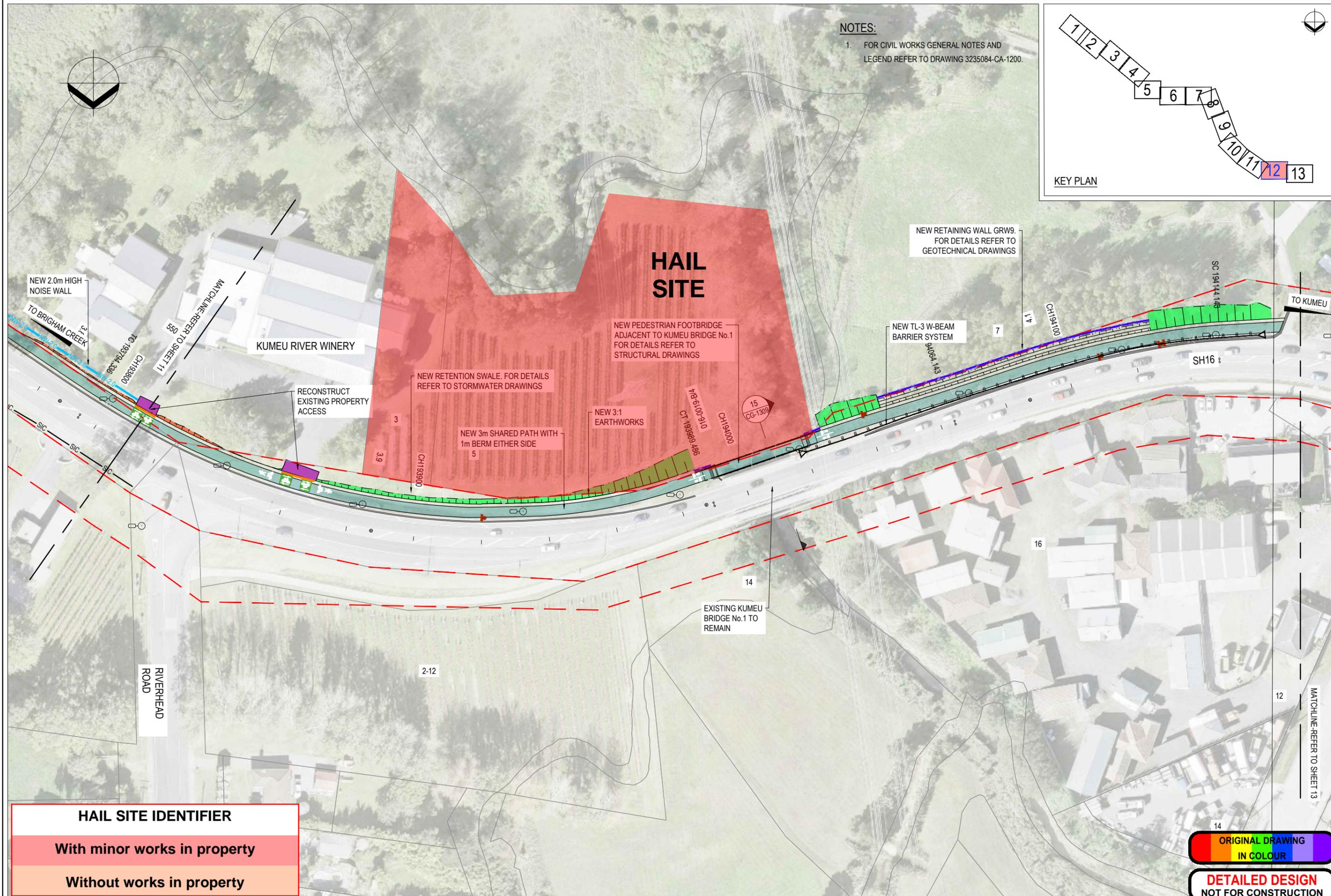
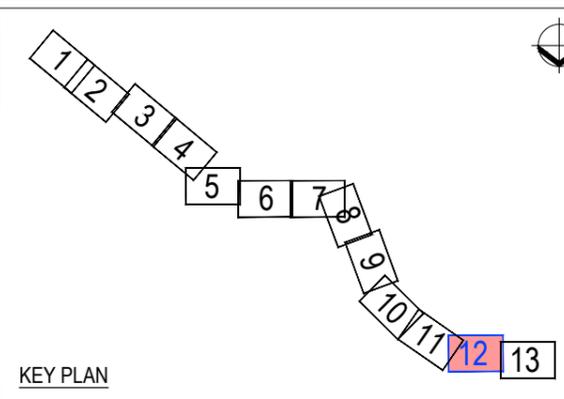
Project: SH16 - SAFETY IMPROVEMENTS
 STAGE 2
 BRIGHAM CREEK TO KUMEU

Title: GENERAL ARRANGEMENT
 PLAN
 SHEET 11

Discipline	CIVIL ENGINEERING
Drawing No.	3235084-CA-1211
Rev.	E

NOTES:

- FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.



HAIL SITE IDENTIFIER

With minor works in property

Without works in property

ORIGINAL DRAWING
IN COLOUR

DETAILED DESIGN
NOT FOR CONSTRUCTION

No.	Revision	By	Chk.	Appd.	Date
E	DETAILED DESIGN	AH	SP	GC	25.08.22
D	FOR CONSENDING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22

Drawing Originator:

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Design	A. HOLT	26.03.21	Approved For Construction*
Drawn	A. HOLT	26.03.21	Date
Design Checker			
Design Check			

* Refer to Revision 1 for Original Signature

Client:

Project: SH16 - SAFETY IMPROVEMENTS STAGE 2 BRIGHAM CREEK TO KUMEU

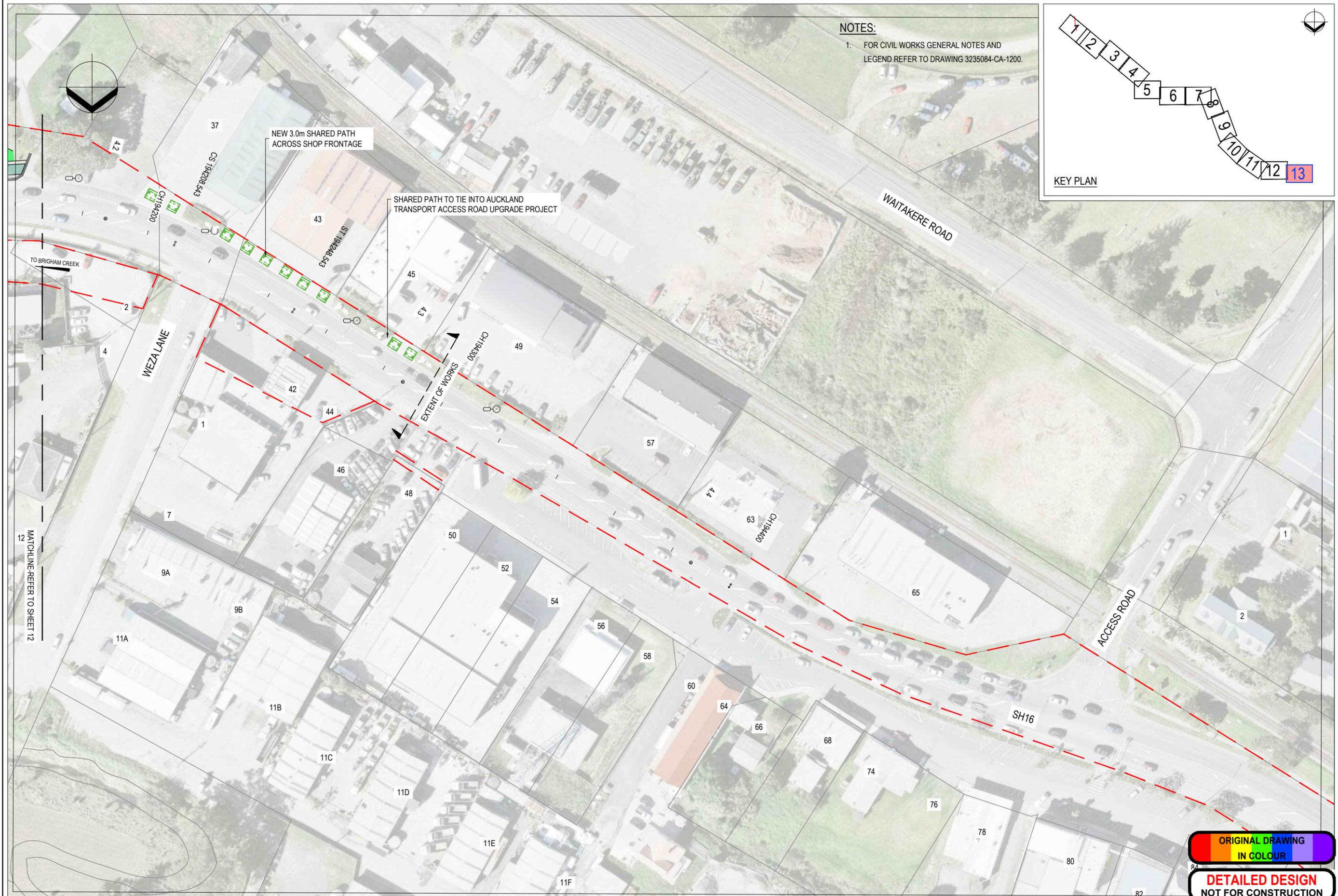
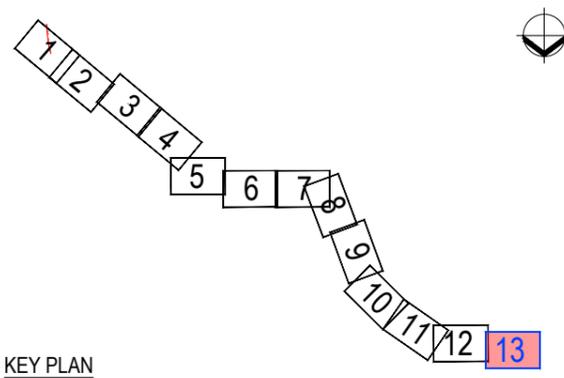
Title: GENERAL ARRANGEMENT PLAN SHEET 12

Discipline: CIVIL ENGINEERING

Drawing No: 3235084-CA-1212

Rev: E

NOTES:
 1. FOR CIVIL WORKS GENERAL NOTES AND LEGEND REFER TO DRAWING 3235084-CA-1200.



MATCHLINE-REFER TO SHEET 12

ORIGINAL DRAWING
IN COLOUR

**DETAILED DESIGN
NOT FOR CONSTRUCTION**

No.	Revision	By	Chk.	Appd.	Date
E	DETAILED DESIGN	AH	SP	GC	25.08.22
D	FOR CONSENTING	AH	SP	GC	01.08.22
C	DRAFT DETAILED DESIGN	AH	SP	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	SP	GC	19.01.22



Original Scale (A1)	1:500	Design	A. HOLT	26.03.21	Approved For Construction*
Reduced Scale (A3)	1:1000	Drawn	A. HOLT	26.03.21	Date
		Design Checker			
		Design Verifier			
		Design Check			

* Refer to Revision 1 for Original Signature



Project: SH16 - SAFETY IMPROVEMENTS
 STAGE 2
 BRIGHAM CREEK TO KUMEU

Title: GENERAL ARRANGEMENT
 PLAN
 SHEET 13

Discipline	CIVIL ENGINEERING
Drawing No.	3235084-CA-1213
Rev.	E

B

Appendix B – Historical Aerial Photographs

1940



70370



70370

Sourced from <http://satelands.net> and licensed by LINZ CC BY 3.0

1940



70370



70370



Sourced from <http://satelands.net> and licensed by LINZ CC BY 3.0

1940



@Sourced from <http://retrolens.nz> and licensed by UNZ CC-BY 3.0

1950

A 200184

A 200185

81 / 4161



Scanned from <http://satellite.gis.com> and Processed by UN7 CO BY 70

1950

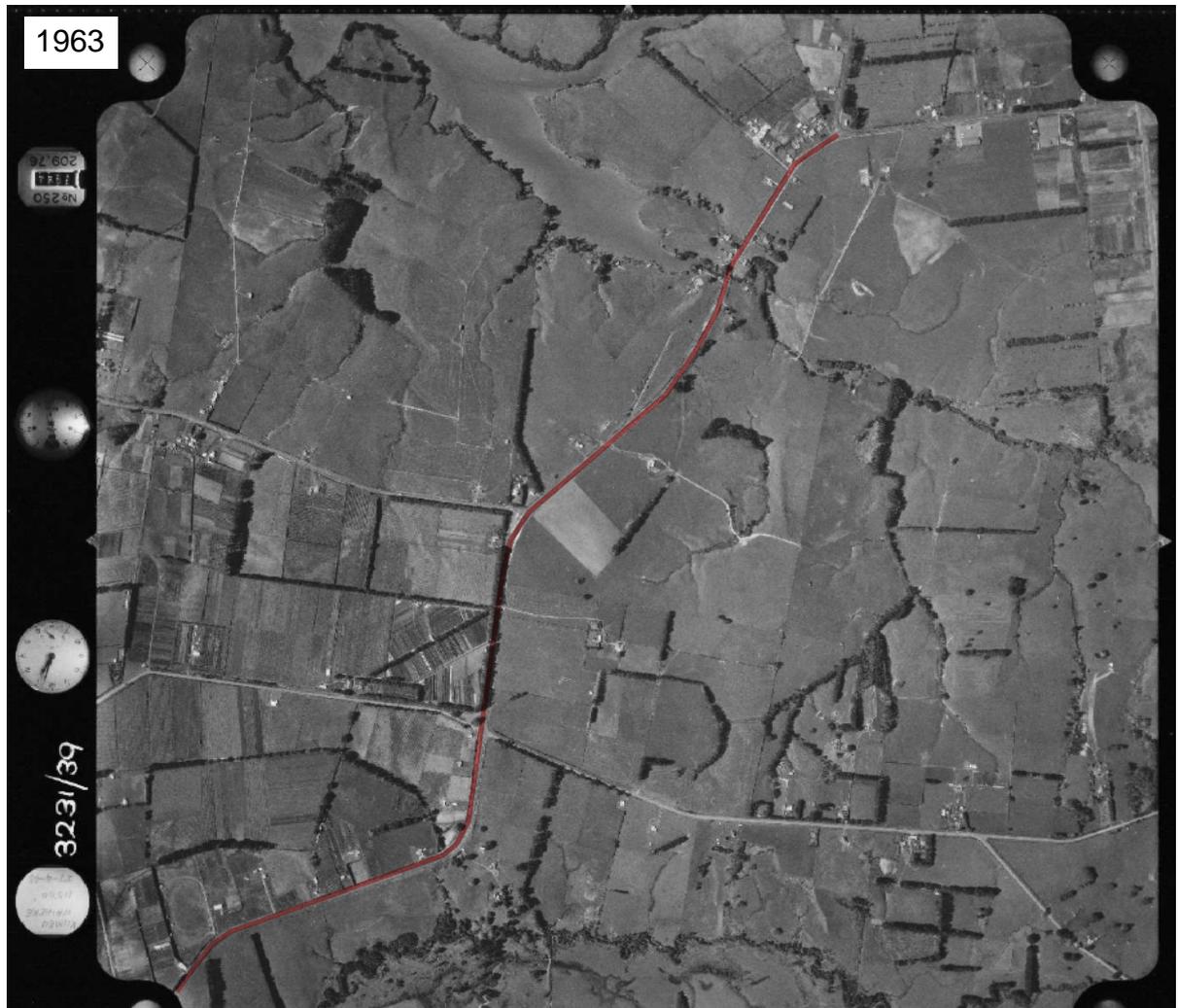
A 200185

A 200185

61 / 4161



Scanned from <http://satellite.gis.com> and Processed by UN7 CO BY 70



1972



N42
16500
4-4

3552



4598 / 2



Nr 250
209.76

1975



N42
16500
4-4

3552



4598 / 1



Nr 250
209.76

1981



1981



1988

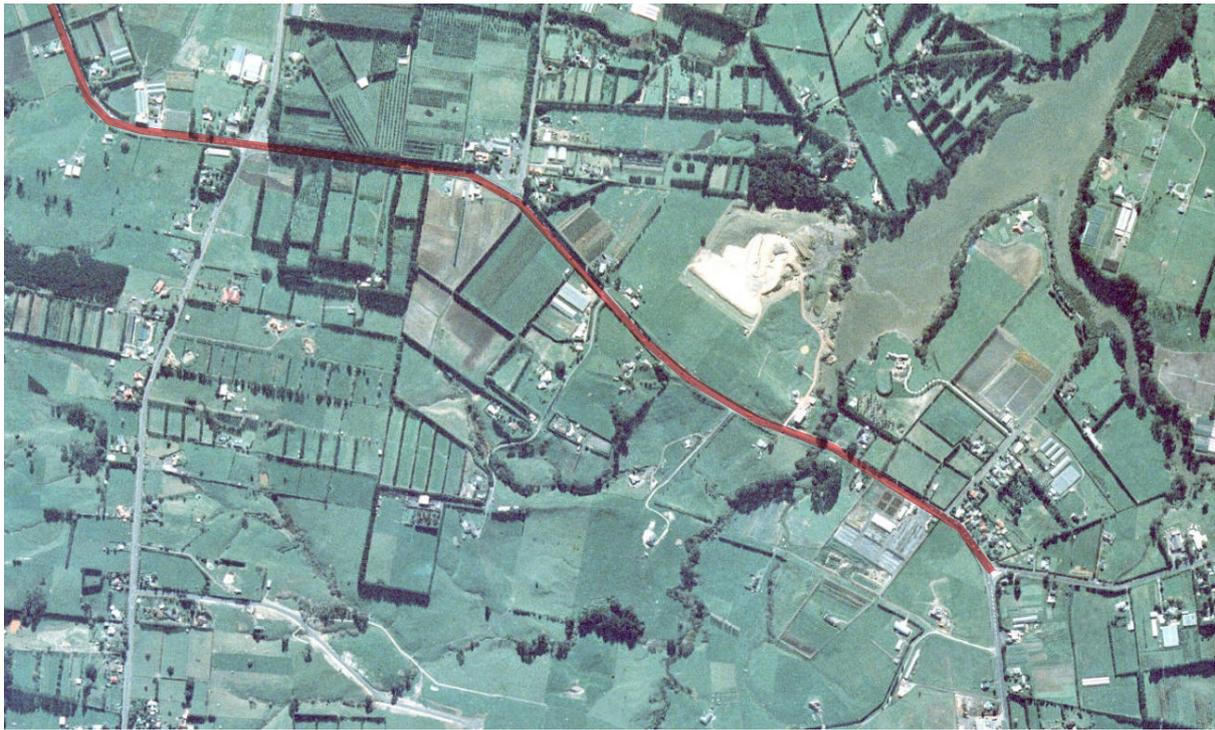


8

SN 8772 H/15

20-8-80
HERNDONVILLE
MAYAGUAY
12 500 FT





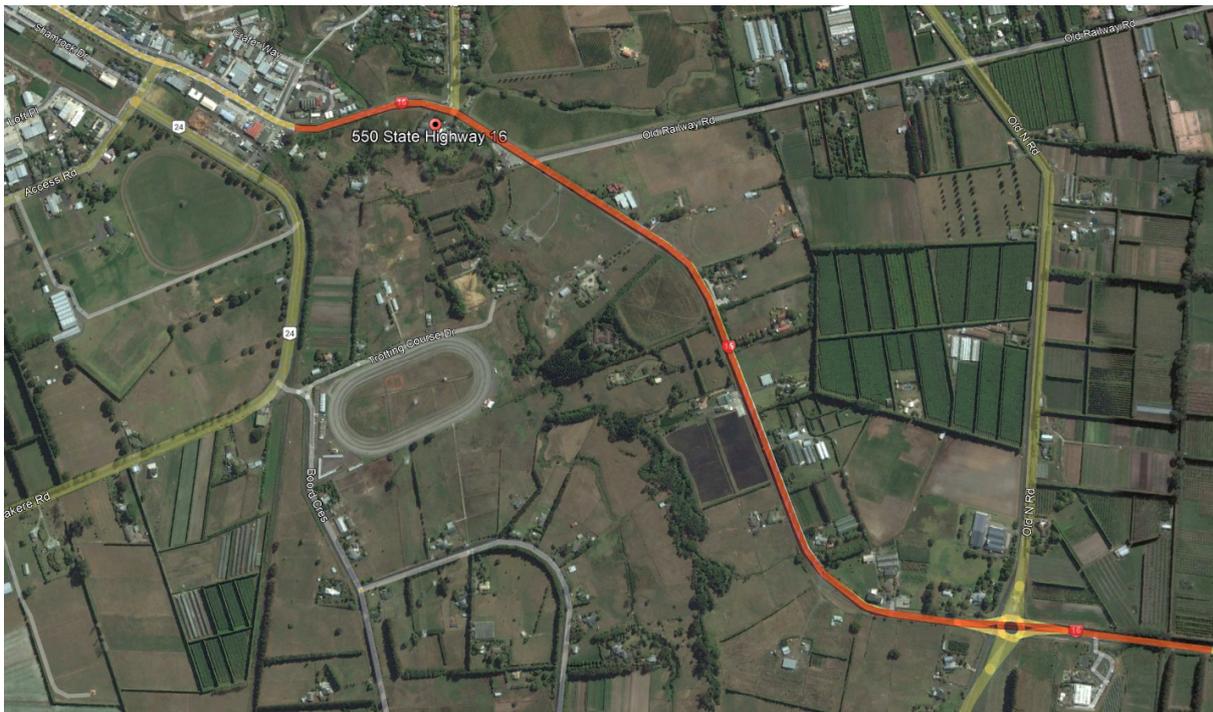
1999 – Auckland Council GIS Viewer



1999 – Auckland Council GIS Viewer



April 2010



April 2010



Stage 2 – June 2017 (Google Earth)



Stage 2 – June 2017 (Google Earth)



Stage 2 – June 2017 (Google Earth)



Stage 2 – June 2017 (Google Earth)



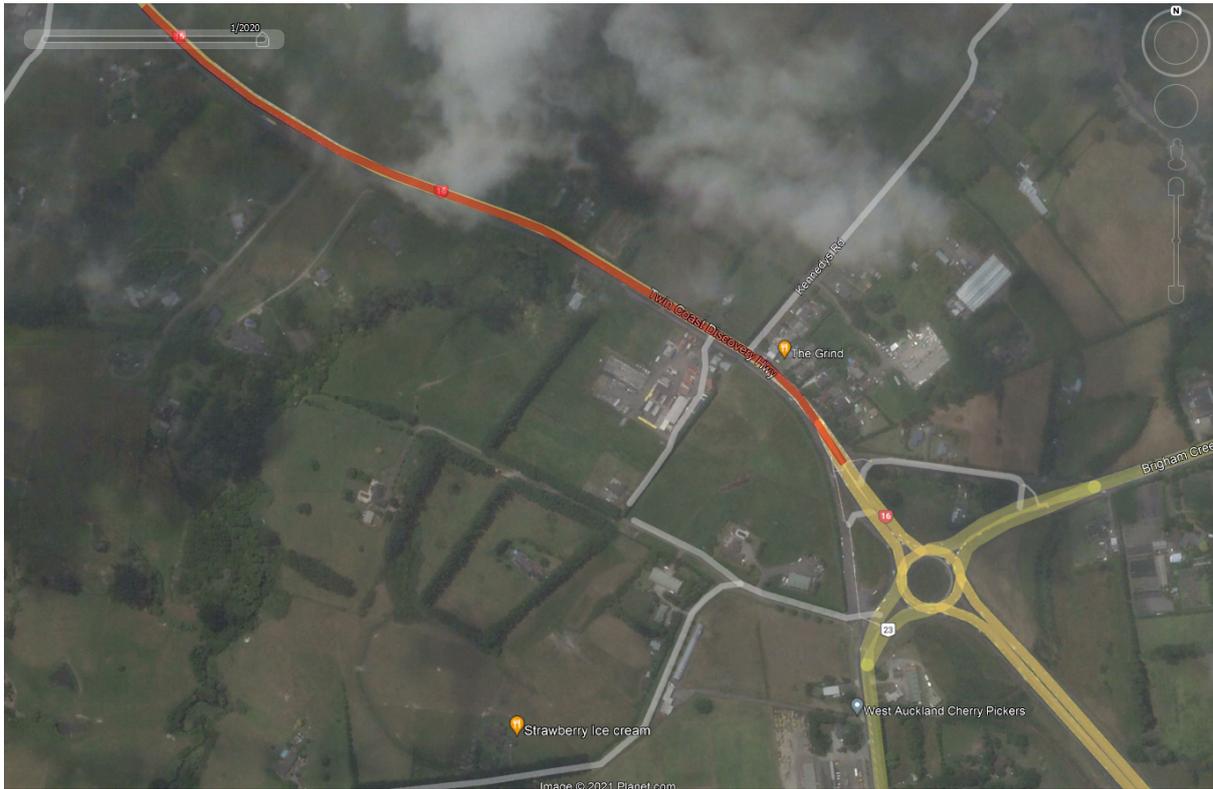
Stage 2 – January 2020 (Google Earth)



Stage 2 – January 2020 (Google Earth)



Stage 2 – January 2020 (Google Earth)



Stage 2 – January 2020 (Google Earth)



Appendix C – Auckland Council Preliminary Response

Curtis Blyth

From: Claire Lacina <claire.lacina@aucklandcouncil.govt.nz> on behalf of RECContamination <reccontamination@aklc.govt.nz>
Sent: Monday, 19 March 2018 9:23 AM
To: Hollie Griffith
Subject: RE: HAIL Enquiry

Hi Hollie,

This email is in response to your recent enquiry requesting available site contamination information that was held within the Environmental Health Unit of the Licensing and Compliance Services Department (LCS).

Due to the large number of sites for this enquiry, and as our records are property-specific, it will take a few weeks to get through our regulatory records for each property in relation to any identified or potential HAIL activities on each site.

As an initial starting point, please see the below information which has been identified using our GIS aerial photographs for historical horticultural and potential HAIL activity – please note this information does not encompass a full HAIL check. We recommend the property files are requested for the sites below to start. Please let me know if this timeframe is suitable for your request, and I will carry out the full HAIL assessment.

- 218-220 SH16: Our GIS records indicate this site as used for historical/current horticultural activity, with glasshouses on site.
- 5 Kennedys Road: Our GIS records indicate this site as possibly been used for historical horticultural activity.
- 17-19 Kennedys Road: Our GIS records indicate this site as used for historical/current horticultural activity, with glasshouses on site.
- 6 Joyce Adams Place: Our GIS records indicate this site as used for historical/current horticultural activity, with glasshouses on site.
- 529 to 751 SH16: Our GIS records indicate these sites as used for historical/current horticultural activity, including glasshouses.
- 32 Meryl Avenue: Our GIS records indicate these sites as used for historical/current horticultural activity, including glasshouses.
- 307 Matua Road: Our GIS records indicate these sites as used for historical/current horticultural activity.
- 307 Matua Road and 726 SH16: Our GIS records indicate these sites as used for historical/current horticultural activity.
- 45 Station Road: Our GIS records indicate this site as used for historical/current horticultural activity and winemaking facilities.
- 77 Nobilo Road: Our GIS records indicate these sites as used for historical/current horticultural activity.
- 223 Main Road: Our GIS records indicate these sites as used for historical/current horticultural activity.
- 94 Main Road: Our GIS records indicate possible fill and historical joinery factory, charcoal producing plant, and timber yard activities at this site.
- 550 SH16: Our GIS records indicate these sites as used for historical/current horticultural activity.
- 482 SH16: Our GIS records indicate these sites as been used for historical horticultural activity.
- 465 SH16: Our GIS records indicate these sites as been used for historical horticultural activity.
- 191 SH16: Our GIS records indicate these sites as been used for historical horticultural activity.
- 8 Kennedys Road: Our GIS records indicate these sites as been used for historical horticultural activity.
- 291 and 299 SH16: Our GIS records indicate these sites as been used for historical horticultural activity.
- 331 SH16 / 1368 Coatesville-Riverhead Highway: Our GIS records indicate these sites as used for current/historical horticultural activity.
- 393 to 451 SH16: Our GIS records indicate these sites as used for current/historical horticultural activity, including glasshouses.
- 464 SH16: Our GIS records indicate these sites as been used for historical horticultural activity.
- 482 SH16: Our GIS records indicate these sites as been used for historical horticultural activity.

- 300-455 SH16: Our GIS records indicate these sites as used for current/historical horticultural activity, including glasshouses.
- There is potential for fill to exist on the sites adjacent to the railway line.

Please note that only council's soil contamination records within the LCS department and GIS map have been checked. There may be other soil contamination information held within:

1. Contaminated Site Enquiry team: ContaminatedSites@aucklandcouncil.govt.nz
2. Property File for viewing reports or all relevant information relating to the property -Requested from the local service centre, by phone, 09 3010101.

Kind regards,

**Claire Lacina | Technical Officer – Environmental Health
Specialists Input | Resource Consents**
Ph 09 3522621 (Int 465621) | Mob 021 718 038
Auckland Council, Level 1, 35 Graham Street, Auckland
Visit our website: www.aucklandcouncil.govt.nz

From: Hollie Griffith [mailto:Hollie.Griffith@beca.com]
Sent: Monday, 12 March 2018 2:56 p.m.
To: RECContamination
Subject: HAIL Enquiry

Hi there,

Would you please be able to check if you have any information pertaining to a HAIL activity having been undertaken across the following site investigation area, also shown in the maps attached – State Highway 16 Brigham Creek to Factory Road.

A site contamination enquiry request form has already been sent out but I have been advised to check here as well.

Thanks for your help.

Kind regards,

Hollie Griffith

Environmental Scientist
Beca

Phone: +64 9 300 9000 Fax: +64 9 300 9300
DDI: +64 7 577 1151 Mob: +64 27 513 4057

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D

Appendix D – Auckland Council Contamination Response

5 April 2018

Beca Infrastructure Limited

PO Box 6345

Wellesley St

Auckland 1141

Attention: Hollie Griffith

Dear Hollie

Site Contamination Enquiry – SH16 Brigham Creek to Factory Road (ROAD)

This letter is in response to your enquiry requesting available site contamination information for the above site. The following details are based on information available from the former Auckland Regional Council records system and information currently held by the Auckland Council Natural Resources and Specialist Input Unit. The details provided below exclude any property information held by the former district/city councils.

No pollution incident files regarding spills/contamination were found for the above site. The general catchment file and site visit file were not searched. These files contain pollution incidents where the source of pollution was not traced to a particular site, site visits where no follow-up correspondence was required and some information from archived files.

If the above site is coastal or beside a river, it is possible that historic, unconsented reclamation may have occurred. The Auckland Council Specialists Unit Coastal Team may be able to provide further information.

The records reviewed as part of this Site Contamination Enquiry search do not identify individual horticultural sites in the region. However, there is a possibility that horticultural activities may have occurred at the site. The local Auckland Council customer service centre, specific to the area of the site may be able to provide relevant information where former horticultural sites have been mapped.

If you are concerned that a historic land use (such as filling) may have caused the underlying soils to become contaminated, it is recommended that you obtain an independent environmental assessment of the site. Staff from the Auckland Council Earthworks and Contaminated Land Team can provide advice on the results of any evaluation in terms of site remediation and/or potential consent requirements.

The former Auckland Regional Council and current databases were searched for records of landfill, bore, air discharge, industrial and trade process consents, contaminated site discharge consents, and environmental assessments within a 100m radius. Relevant details of the pollution incidents and identified consents are appended to this letter as an excel spreadsheet. **Please refer to the column labelled 'Property Address' on the spreadsheet to aid in identifying corresponding data on the map.**

The details provided are in accordance with the obligation to make information publicly available upon request. While the Auckland Council has carried out the search using its best practical endeavours, it does not warrant its completeness or accuracy and disclaims any responsibility or liability in respect of the information. If you or any other person wishes to act or to rely on this information, or make any financial commitment based upon it, it is recommended that you seek appropriate technical and/or professional advice.

In addition, further site specific pollution incidents may be held at the area office below. It is recommended that you contact the local customer service centre of the Auckland Council, specific to the

site being investigated: Ground Floor, Kotuku House, 4 Osterley Way, Manukau Central as they also may hold files with further relevant information.

I trust that this answers your query. If you wish to discuss the matter further, please contact **Andrew Kalbarczyk** on 301 0101. Should you wish to request any of the files listed above for viewing, please contact the Auckland Council Call Centre on 301 0101 and note you are requesting former Auckland Regional Council records (the records department requires three working days' notice to ensure files will be available).

Please note: the Auckland Council cost recovers officer's time for all site enquiries. A basic enquiry takes approximately 1 - 2.5 hours to search the files and databases in which information is held. As such an invoice for the time involved in this enquiry will follow shortly.

Yours sincerely,



Jared Osman
**Team Leader – Contaminated Air, Noise
Specialist Unit | Resource Consents**

