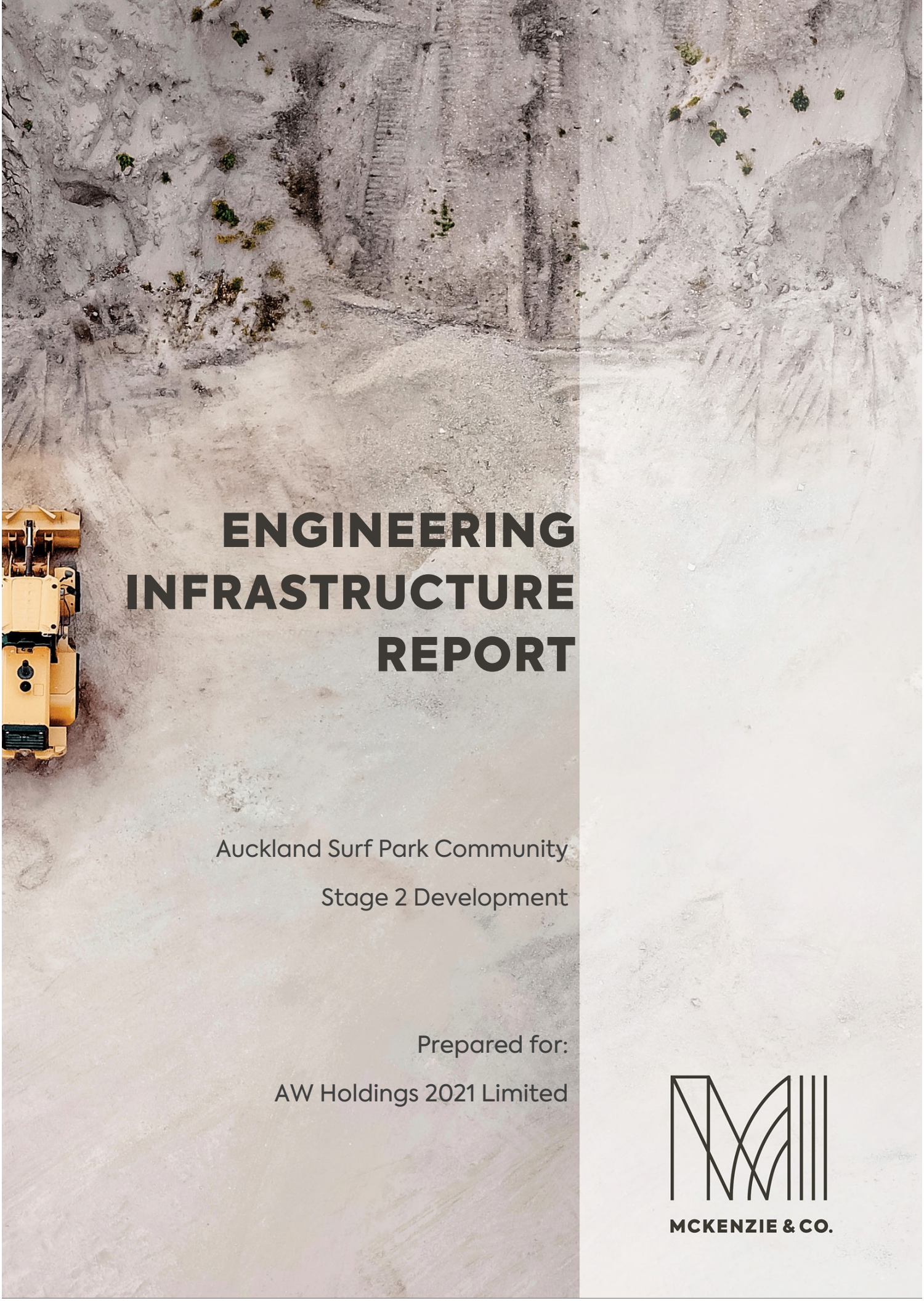

ENGINEERING INFRASTRUCTURE REPORT

Auckland Surf Park Community

Stage 2 Development

Prepared for:

AW Holdings 2021 Limited

MCKENZIE & CO.

DOCUMENT CONTROL RECORD

PROJECT: Auckland Surf Park Community –
Stage 2 Infrastructure Report

CLIENT: AW Holdings 2021 Limited

PROJECT LOCATION:

1350, 1320, Dairy Flat Highway, Dairy Flat;
89 & 105 Lascelles Drive, Dairy Flat;
253 & 237 Postman Road, Dairy Flat

FILE PATH:
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Revision	Date	Originator	Checker	Approver	Description
A	12/09/2025	ZW			DRAFT
B	07/11/2025	ZW	RR	SL	DRAFT
C	03/02/2026	NS	SL	SL	FOR CONSENT

CONTENTS

1 STATEMENT OF QUALIFICATIONS AND EXPERIENCE

James Kitchen

I am a Director of McKenzie & Co and a Chartered Professional Engineer (CPEng, MIPENZ). I hold a Bachelor of Engineering (Hons) from the University of Canterbury and have worked in civil engineering for more than 20 years across New Zealand, Australia, and the United Kingdom. My experience includes director oversight, senior design and project management roles for land development, infrastructure, and contract administration, with work spanning residential subdivisions, industrial developments, and transport projects.

I have led civil engineering inputs on a wide range of subdivision and infrastructure projects throughout Auckland. My role involves guiding concept design, detailed engineering, procurement, and construction delivery, supported by a strong understanding of local planning and regulatory frameworks. I bring a practical approach to design and project coordination, ensuring that technical decisions are grounded in local conditions and achievable construction practice.

I confirm that, in my capacity as reviewer of the substantive application, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Scott Lamason

I am a Senior Civil Engineer and Design Lead at McKenzie & Co, with a Bachelor of Engineering from Unitec and more than 20 years of experience in land development and subdivision engineering. My background includes senior roles in both consultancy and local government, where I have led multidisciplinary teams and provided direction on complex development projects across Auckland. My work covers detailed design, regulatory strategy, and project governance from concept through to approval.

My previous experience as Development Engineering Team Leader at Auckland Council has given me a clear understanding of local authority processes and engineering requirements. I have since managed civil inputs for residential, mixed-use, and infrastructure projects, supporting technical design, stakeholder engagement, and coordinated delivery. I bring structured judgement and practical insight to engineering assessment for the Auckland Surf Park project.

I confirm that, in my capacity as author and reviewer of parts of the substantive application, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Zhongxin Wang

I am a Senior Civil Engineer at McKenzie & Co and a Chartered Professional Engineer (CPEng, CMEngNZ). I hold a Bachelor of Engineering and a Master of Engineering from the University of Auckland. My experience covers civil design, earthworks, infrastructure planning, and flood assessment for land development projects across Auckland. I have worked in both greenfield and brownfield settings, developing practical solutions supported by strong analytical skills and proficiency in 12d modelling.

Before joining McKenzie & Co, I held engineering roles with Woods, Everest/Hollier Greig, and M8 Group, where I contributed to the planning, design, and construction phases of subdivision and infrastructure projects. I focus on clear communication and coordinated delivery, supporting efficient progression of technical work and constructive engagement with clients, contractors, and council officers.

I confirm that, in my capacity as author of parts of the substantive application, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Romeo Dela Cruz

I am a Senior Engineer at McKenzie & Co and a Chartered Professional Engineer (CPEng, CMEngNZ, IntPE(NZ)). I hold degrees in Civil Engineering and Geodetic Engineering from Feati University. I have extensive experience across land development and infrastructure engineering, with work covering detailed civil design, geometric road layout, three waters infrastructure, erosion and sediment control, and construction support.

Since joining McKenzie & Co in 2019, I have contributed to the delivery of subdivision projects throughout Auckland, providing engineering review and practical guidance on site-based matters. My background enables me to make sound design decisions and support effective coordination during construction, ensuring that engineering requirements are met consistently and efficiently.

I confirm that, in my capacity as author and reviewer of parts of the substantive application, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

2 INTRODUCTION

McKenzie & Co. Consultants have been engaged by AW Holdings 2021 Limited to provide an engineering infrastructure and utility services report in support of the proposed Stage 2 development of the Auckland Surf Park Community (ASPC).

This engineering report assesses the feasibility of providing infrastructure and utility services to the six lots comprising the Stage 2 development area, with a total combined area of approximately 54.2Ha. The report considers the provision of earthworks, access, stormwater management, wastewater disposal, water supply, and other utility services for a mix of residential and community-based developments envisaged by the ASPC Masterplan.

This report is prepared to support the applicant's Resource Consent application and addresses the engineering matters relevant to this proposal. It should be read in conjunction with the consent application plan drawings and other supporting documents.

3 BACKGROUND

Resource consent for Stage 1 of the ASPC was approved under the COVID-19 Fast-track

Consenting Act 2020 on 25 June 2024. The consented development is shown below in Figure 1111Figure 11 and comprises of:

- Earthworks and vegetation removal and subsequent extensive re-landscaping of the site focused around the stream;
- The construction and operation of a surf park which included a surfing lagoon, restaurant(s), market space and 70 visitor accommodation units consisting of a lodge and eco-cabins;
- A solar farm;
- A standard data centre;
- Roading including the collector anticipated by the structure plan; and
- Three waters infrastructure.

Figure 1111 - Consented Development (Source: Warren and Mahoney)

The servicing arrangement for Stage 1 involved:

Stormwater:

- New stormwater reticulation network including roadside swales and pipe/manhole network. Stormwater runoff to discharge to the stream.
- Development areas to be treated and attenuated by a robust stormwater network which

proposed three wetlands, one raingarden, landscape swales, and a series of tanks.

- The data centre was to construct underground rainwater harvesting tanks in the northwest corner of the site with an on-site piped stormwater system. GPTs constructed to treat tanker bays only, the majority of stormwater conveyed via concrete channel offsite for stormwater attenuation and water quality management in one of the proposed wetlands.

Wastewater:

- Private wastewater network proposed, drained via gravity to a pump station located within Surf Park lot.
- Onsite wastewater treatment plant proposed to treat wastewater flows generated by the development (excluding the data centre) and disposed via wastewater disposal fields.
- Data centre treated via onsite wastewater treatment device before discharging to stormwater network. Effluent discharged to the stormwater network and managed by others further downstream, with future plans to build a public wastewater network.

Water supply:

- Proposal for a connection with the Collector Road corridor to be vested at the same time as the road, with provision made to connect to the public water supply in both Dairy Flat Highway and Postman Road.
- Private ring main proposed within the Surf park site (excluding the data centre).
- For the data centre - collect water from roof runoff and discharge to 2x20,000L water tanks, augmented by water tankers carting in water if needed. Future plans to build a public water network in Dairy Flat Highway and Postman Road.

The Stage 1 servicing strategy has since been superseded by the Stage 2 proposal.

4 STAGE 2 PROPOSAL

The Stage 2 proposal comprises of:

- The expansion of the ASPC to include a hyperscale artificial intelligence data centre campus, three residential precincts, subdivision, a village centre, work-live precinct, industrial precinct, infrastructure (three waters, wastewater treatment pumpstation, roading etc) and ancillary activities; and,
- Variations to Stage 1 of the development consented under the COVID-19 Fast-track Consenting Act 2020.

A comprehensive description of the project is provided within the Assessment of Environmental Effects.

5 SITE DESCRIPTION

The Stage 2 development site comprises six individual lots located between Dairy Flat Highway, Lascelles Drive, and Postman Road in Dairy Flat. The site is currently used for a combination of agricultural purposes and existing residential dwellings. There are also portions of the site that are currently subject to the enabling Stage 1 earthworks.

The overall site is generally flat and well-drained, making it suitable for development. However, the northern portion of the site incorporates existing hills with existing ground slopes approaching 10% and steepens to the eastern part of the site up to 6.7%. This variation in topography will be a key consideration for the layout of building platforms and infrastructure.

The site is zoned as Future Urban Zone (FUZ).

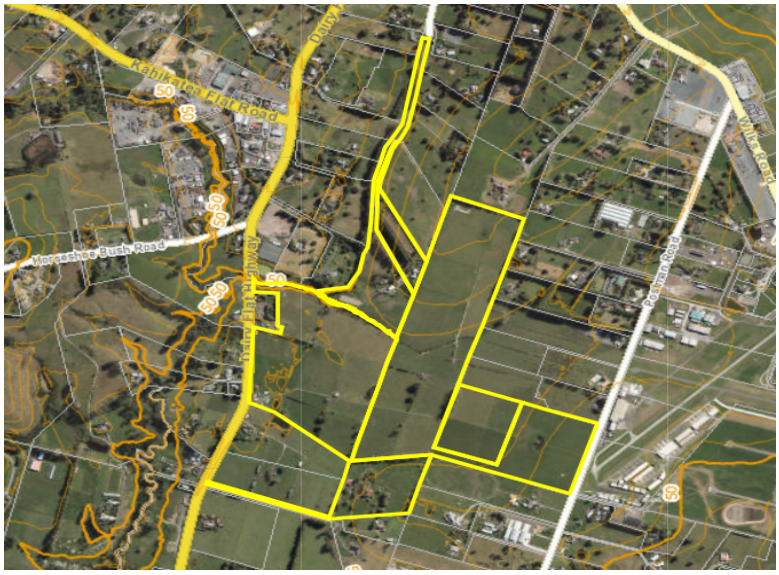

Figure 2222 - Site Location (Source: Geomaps 2025)

6 EARTHWORKS

A preliminary Earthworks Management Plan has been formulated for the Stage 2 development, guided by two core and interconnected principles: cut-fill balance and the integrated management of the site's complex overland flow paths (OLFPs). Initial earthworks will focus on establishing primary accessways, service corridors, and lot preparation. The variation in terrain, featuring steeper areas in the north and flatter areas in the south, presents an opportunity to utilise cut material from the northern portions for fill in the southern development areas, thereby minimising material import and export. These earthworks will be carefully staged to align with development phasing, with the total volume of cut and fill anticipated to be managed within permitted activity thresholds.

The site's complex overland flow scenario is a primary driver of the earthwork's philosophy, ensuring earthworks are not conducted in isolation but are intrinsically linked to stormwater management. Where feasible, major existing OLFPs will be preserved and formalised within green corridors, swales, or open drains to integrate them into the overall landscape and stormwater

design. The final site grading will be meticulously designed to safely convey all overland flows around building platforms and infrastructure, which will involve creating compensatory flow paths where original routes are interrupted by development. Furthermore, earthworks for building platforms, access roads, and other impervious areas will be designed to drain to specific treatment and detention devices, such as swales and rain gardens, to manage the quality and quantity of runoff at source before it enters the natural drainage system or affects downstream properties.

All earthworks will be executed in accordance with a comprehensive Erosion and Sediment Control Plan (3325-2-2300 series), critical given the site's complexity. This plan will detail measures including sediment fences, stabilised entranceways, and runoff diversions to prevent off-site sediment discharge, particularly into sensitive OLFPs. The final design will ensure all finished slopes are stable, appropriately vegetated, and contribute to the overarching stormwater management strategy. Refer to 3325-2-2000 series to achieve the earthwork detail which includes the final contours and cut/fill plan.

A draft Sediment and Erosion Control Plan has been provided with this application. Prior to the commencement of construction, a detailed plan will be submitted to the relevant authorities. This plan will specify the exact control measures required, taking into account the anticipated volume of earthworks for the season and the staging of the project.

6.1 Geotechnical Appraisal

A geotechnical factual report for the site has been prepared by Initia Geotechnical Specialists REF: P-001537 REV E – November 2025 (available on request).

The report concluded that the study area is suitable for comprehensive development. There were no significant geotechnical constraints identified, and it was considered that the low gradient topographical conditions would be optimal in inhibiting the earthworks across the site.

All matters contained in the geotechnical assessment will be addressed through the construction works. All geotechnical related construction works shall be undertaken in accordance with the recommendations, and under the supervision of geotechnical engineer.

A geotechnical completion report will be prepared at the completion of all civil works pertaining to this earthwork's application by a suitably qualified Geotechnical Engineer.

A Geotechnical Advice Memo has also been prepared by Initia Geotechnical Specialists (RF: P -001537, 17 May 2023). This further support to the earthworks for the proposed development, Refer to Appendix B.

6.2 Proposed Earthworks

Earthworks for the site consists of a cumulative area of approximately 51.3 Ha. The extent of earthworks is shown below in Figure 3333Figure 33.

The works proposed under this consent application, includes filling the existing farm detention ponds and general earthworks for the establishment of roads, carparks, permanent ponds, surf park pool, and building platforms.

A significant amount of the earthworks will be topsoil stripping, with minor reprofiling of the of the existing ground. The cut areas are in the north (proposed Northeast residential block and solar farm) and the east of the site, with some secondary excavation works related to the surf park pool area.

The earthworks balance has been achieved by the following actions:

Bulk Cut – Fill

The amount of bulk cut material taken and final shaping from the solar park area was influenced by the amount of fill material needed (including compaction factors) to fill wider surf park project area.

The earthworks philosophy within the fill areas is to undertake minor reshaping to keep the wider surf park areas as close as possible to the original ground levels and minimise fill.

Topsoil Strip and Respread Philosophy

Existing topsoil depths are reasonably deep in some isolated areas. The philosophy is to minimise topsoil removal off site after respreading process complete. Topsoil respread depths were varied based on proposed land use of project to maximise topsoil respread volumes on site.

Figure 3333 - Extent of earthworks, showing cut (orange) and fill (green) (Source: MCCL drawing set 2025)

A summary of the earthworks is included in below.

Table 1111 - Summary of earthworks

Area	Unit	Site Wide
Earthworks area	m^2	504,800
Net Cut Volume	m^3	275,922
Topsoil Strip Volume	m^3	86,982
Maximum Cut Depth	m	4.5
Net Fill Volume	m^3	282,546
Topsoil Respread Volume	m^3	86,982
Maximum Fill depth	m	4
Clay Deficit/(surplus)	m^3	6624
Bulk Trucks	Ea	1215
Topsoil Deficit/(surplus)	m^3	0
Bulk Trucks	Ea	0
Total Earthworks Volume (Cut + Fill)	m^3	558,468

6.3 Stage 1 Stream Works and Temporary Stream Crossing

Minor stream realignment and reshaping of the stream corridor was consented under Stage 1 of the development. No further stream works are proposed as part of the Stage 2 application.

A stream works methodology and staging plan for the previously approved Stage 1 stream works will be prepared by the earthworks contractor and provided to Council prior to commencement of those works.

A temporary stream crossing has been consented and established under Stage 1 to facilitate haul movements between the northern cut area and the surf park fill area. Existing farm culverts will be reused for this crossing. No new temporary crossings are proposed as part of Stage 2.

6.4 Erosion and Sediment Control

There are several key elements to the erosion and sediment control methodology as stipulated in GD-005. These include identifying the erosion and sediment risks, establishing control measures, monitoring and maintenance, and reporting.

The first step is to identify the erosion and sediment risks associated with the earthworks activities. This includes assessing –

- the nature of the site (refer section 5),
- the soil types (refer section 6.1),
- the topography, (refer section 5),
- the weather patterns, and the
- proximity to waterways. Based on this assessment, appropriate control measures can be established to manage the risks.

1 Employ sediment retention devices

A detailed description of the devices proposed are outlined below.

2 Get trained and develop experience

A competent contractor, with proven experience with E&S control practices, will be selected for these works.

3 Adjust the ESC Plan as needed

It is anticipated that regular site visits, weekly contractor meetings, and meetings with the council officers will ensure that the measures planned on site are robust, and up to date with the works program.

4 Assess and adjust ESC measures

In conjunction with item 3 above, ESC measures need to be inspected, monitored and maintained. E&S control will be an item on the contractors weekly site meeting agenda for discussion. Weather patterns will also be monitored during the earthworks period, and any urgent

preparations will be implemented prior to incoming inclement weather.

6.4.1 Catchments

The earthworks cover a working area of approximately 51.3 hectares. The site can be divided into thirteen earthworks areas, depending on typology, the nature of the works, and the timing of the works, each are to be treated by a sediment retention pond (SRP). There are three existing ponds, with the rest still to be constructed, these are detailed below in Table 2222Table 22, and shown visually in Figure 4444Figure 44.

Full details of the individual catchments are shown on drawings 3325-2-2300 to 3325-2-2305.

Table 2222 - Sediment retention pond areas

Catchment	Status	Catchment Area (m^2)
SRP 1	Proposed	30,470
SRP 2	Existing	50,076
SRP 3	Existing	48,525
SRP 4	Existing	42,676
SRP 5	Proposed	38,091
SRP 6	Proposed	19,246
SRP 7	Proposed	10,637
SRP 8	Proposed	49,931
SRP 9	Proposed	39,940
SRP 10	Proposed	34,255
SRP 11	Proposed	40,790
SRP 12	Proposed	38,091
SRP 13	Proposed	21,267

All sediment retention ponds have been placed outside of the 100-year Annual Recurrence Interval (ARI) footprint. Earth Diversion Bunds will divert flows to proposed Decanting Earth Bund (DEB), where sediment retention ponds cannot cater for flows.

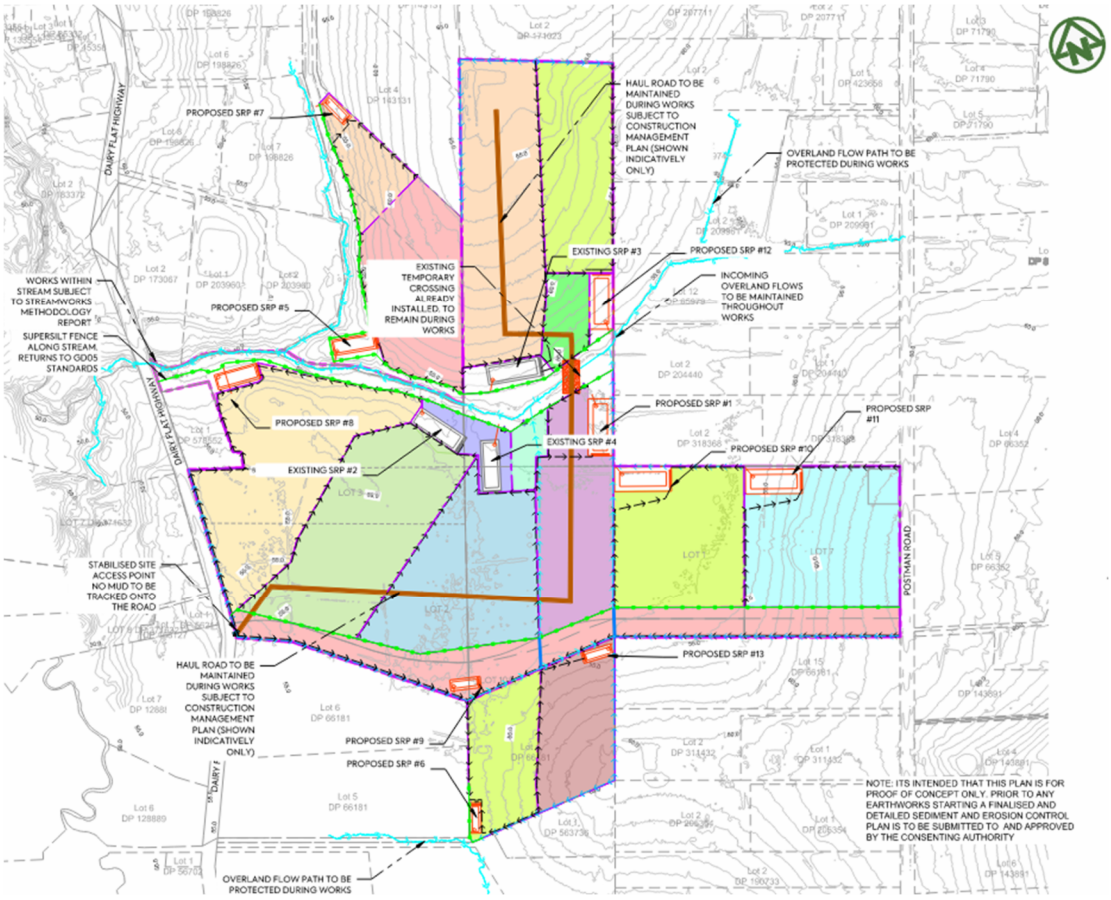

Figure 4444 - Erosion and Sediment control catchments

To control erosion and sediment, the typical sediment and erosion control measures stipulated in the Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region - Guideline Document 2016-005 (GD005) will be put in place.

The Erosion and Sediment Control methodology per GD-005 is discussed below.

6.4.2 Non-Structural Approaches

The following principles have been considered with respect to the site, in the preparation of this report and plans.

- Minimise disturbance – only the areas necessary to be earth worked to support the land use application, are proposed. The proposed earthworks utilise the existing contour as far as practical, and the cut/fill areas are planned to occur as close as possible to transport material the shortest distance possible. The Earthworks are anticipated to occur during the earthworks season only. The site has a relatively shallow gradient, and stockpiles can be managed within the site.
- Stage construction – The proposal has been split into different catchments, in accordance with the stages proposed. Refer to section 6.4.1 for catchment details. Some catchments will take longer to complete the enabling works (i.e. the Lagoon formation), and as such these are separated out where possible. It is intended that

each area will be earth worked in one stage for efficiency. As works are completed to finished levels, they will be progressively stabilised.

- Protect slopes – The site is generally very flat, so we do not anticipate that there are many slopes that will require specific attention. The only slopes requiring specific attention are –

    a. The solar farm area – there is earthworks occurring in this area to harvest cut material for the wider site. This area will capture sediment laden runoff with contour drains, where required to direct flows to the SRP.

    b. Stream re-shaping – the re-formation of the streams is to create more gentle slopes, shallower than the steep farm drain slopes that currently exist. Banks can be covered in coconut matting, where required, to stabilise these slopes.

- Protect receiving environment

All the discharges, with the exception of one catchment to the south, will discharge into the channel through the middle of the site. In addition to dirty water drains, a super silt fence will be installed along the banks of the stream, for the duration of the earthworks and civils operation. When works in the channel are being undertaken, a specific methodology plan will be prepared for approval by Auckland Council.

- Rapidly stabilise exposed areas

Vegetation, mulch, grassing, or other stabilizing techniques will be used to progressively stabilize the disturbed soils after each stage of earthworks and at certain milestones during each stage.

- Timing of Earthworks

Works are proposed to be substantially undertaken between October and April. Where earthworks outside of this period are required, this will be provisional on gaining winter works approval from Auckland Council.

The location of the surf park amenity buildings will require pre-loading, and as such fill will be required to be overfilled for a period of approximately 1 year (subject to confirmation by Geotechnical engineer, on completion of design). This will require stabilisation for this period, and/or E&S controls to remain in place while the preloading is in place.

6.4.3 Water Management Controls

Install perimeter controls and diversions

Clean water and dirty water diversion bunds will be installed as per the Erosion and Sediment Control plans.

Clean water from outside of the site will be excluded from the earthworks area by clean water diversion bunds. Council GIS indicate three areas of external water entering the site. These areas can readily be diverted with Cleanwater drains, to ensure water remains outside of the earthworks area.

Dirty water diversion bunds will be sized to convey flows from the 5% AEP storm event with a freeboard of 300mm and will be established prior to earthworks commencing.

Regular monitoring of the bunds will be undertaken to identify any areas of actual/potential erosion.

Contour drains are not proposed as part of the initial ESC establishment due to the relatively shallow gradients and small ESC sub-catchments. However, these may be implemented as works progress if they are shown to be beneficial.

A standard 4m x 10m x 150mm thick stabilised entrance will be maintained for the duration of the works to the earthworking areas.

Where required, upgrading of the existing farm tracks, or construction of new stabilised haul roads (100mm of GAP65 on a layer of geofabric) is also proposed between the stabilised entrance and the earthworking areas.

6.4.4 Soil and Surface Stabilisation

All areas will be topsoiled and grassed, after bulk earthworks operations, ready for Civil works to proceed in the future.

Future lot and berm areas will be progressively topsoiled, and grass seeded as they are completed.

Future road areas will be left with a v-channel cut 200mm above finished levels to protect the future subgrade. The area can be stabilised with straw mulch (or a shallow layer of aggregate where inspects show channels form/erosion occurring) until road construction commences.

Straw mulching will be utilised as short/medium term. E.g. for stabilisation of partially complete earthworks over the winter period.

Future building sites, where pre-loading is required, will be left stabilised with topsoil and grass, for future removal.

Stream works surfaces may be left with erosion matting, where required.

6.4.5 Sediment Control

It is proposed to divide the site into the catchments outlined in section 6.4.1.

Each catchment is proposed to be served by a single SRP. Any areas where grades do not enable flows into the SRP, can be serviced by a DEB. All SRPs have been modelled in 12d, to ensure they can be discharged into.

All treatment devices will be flocculent treated. Calculations will be provided within a Management Plan prepared prior to the pre-start meeting.

Earthworks areas shall be bound by a silt fence prior to commencing work.

6.4.6 Order of Works

Works are proposed to be undertaken, generally, in the following order:

1. Pre-start meeting held with Auckland Council, the Contractor and Consultant to confirm the ESC plan as proposed, the consent conditions and identify any areas for improvements and agreement to commence works.
2. Stabilised entranceway is established for machinery entry and exit the site, including a haul road into the northern part of the site.
3. Super silt fences constructed on the stream boundary.
4. Site perimeter clean water and dirty water diversion bunds are constructed.
5. New SRPs are constructed as required for their respective catchment areas.
6. As-builts of the physical erosion and sediment controls and forwarded to Auckland Council for approval.
7. Once approved, topsoil from the site will be stripped and stockpiled for future re-spreading.
8. Cut to fill operations will commence.
9. As finished levels are achieved the site will be progressively stabilised. Straw mulching may be applied as a short/medium term measure.
10. Removal of ESC controls will only be undertaken upon agreement from the Auckland Council monitoring officer.

6.4.7 Inspections and Maintenance

1. Once the ESC controls have been established and approved, daily inspections will be undertaken to assess their performance and areas for potential improvement.
2. ESC will form part of weekly contractor/consultant meetings to assess performance and areas for improvement.
3. Auckland Councils monitoring officer will also undertake routine monitoring of the site.
4. On completion of the earthworks, a final inspection will be held with an Auckland Council Natural Resources field officer, the contractor, client, and consultant to confirm that all works were carried out in accordance with the consent conditions and GD005 guidelines.

6.4.8 OLFP

OLFP matters have been addressed in the stormwater report.

7 ROADING

The roading network for the Stage 2 development is designed as a hierarchical system, with primary vehicle access for the development provided via a new Collector Road that branches from the existing external road network. This Collector Road connects into the site from two key points to ensure robust access and traffic distribution. The primary connection to Dairy Flat Highway is via a give way right-turn intersection, providing safe and efficient ingress and egress for southbound traffic. This was consented as part of Stage 1. A secondary connection to Postman Road is achieved via a proposed new Roundabout, which will effectively manage vehicle movements and slow traffic speeds at the neighbourhood entrance. This Collector Road then forms the primary internal spine, distributing traffic throughout the stage and providing efficient access to the hierarchical network of Local Roads and Residential Lanes that service individual lots.

The network is comprised of several road typologies as detailed in the referenced road layout drawings and below in Table 3333Table 33.

Table 3333 - Road typologies in the ASPC

Road Type	Location	Description	Ownership
Collector Road	Between Dairy Flat Highway and Postman Rd (connecting west to east).	20.2-21.1m wide, connects the development externally via Dairy Flat Highway and Postman Road.	Vested to Auckland Council
Spine Road	Between Collector Road and Residential Northwest (connecting South to North).	21.0m wide, functions as the primary internal collector road for the development.	Vested to Auckland Council
Internal Private Road	Industrial South	13.4m wide, provides access within the southern industrial development area.	Private
Internal Private Road	Industrial East	13.0m wide, provides access within the eastern industrial development area.	Private
Internal JOALs	Residential blocks (Northeast, Northwest, South)	8.0, 10.0, and 12.0m wide, designed to service the residential development	Private

		areas, with widths tailored to suit local access and service requirements.	

The design prioritises a multi-modal approach, integrating dedicated cycle lanes and shared smart paths within the road corridors, as detailed in the pedestrian/cycle movement diagram, to ensure safe and efficient movement for all users. The final road alignment and construction will be meticulously coordinated with the earthworks and stormwater management plans. This coordination is critical to ensure the finished road levels and associated verges actively manage the site's complex OLFPs, with swales and rain gardens seamlessly integrated into the landscaping zones of the road reserve to treat runoff at its source.

Refer to 3325-2-3000 series for roading details.

8 STORMWATER

8.1 Existing Infrastructure and Overland Flow Paths

The site is traversed by an existing east-west stream, a defining hydrological feature that influences the overall stormwater management strategyError! Reference source not found.. There is also a stream which runs north-south down the western side of the work live precinct. In addition to the two streams, the site's topography has established a network of OLFPs that convey stormwater runoff, particularly from the steeper northern areas across the flatter southern portions.

The fundamental principle for managing these features is to work with the natural hydrology to the greatest extent possible. Most of the existing stream corridor will be preserved in its natural state, protecting its ecological value and maintaining its function as a primary drainage conduit.

A portion of the stream located east of the proposed bridge (*Figure* 5) was previously consented for realignment under the Stage 1 Consent to accommodate the approved site layout and lot configuration. No additional stream works are proposed as part of the Stage 2 application. The realigned section has been consented using natural channel design principles, incorporating appropriate lining, riparian planting, and geomorphic form to create a stable and ecologically enhanced watercourse.

Figure 5- Location of previously approved stream diversion (Source: MCCL drawing set)

All other major existing overland flow paths will be identified, preserved, and integrated into the development's green infrastructure network. Where development unavoidably intersects an OLFP, the final site grading will be meticulously designed to safely convey flows around building

platforms and infrastructure via compensatory swales or open drains, ensuring no properties are adversely affected.

Figure 6666 - Existing OLFP (dark/light blue solid and dashed lines), Streams (cyan lines), Flood Prone Area (dashed blue area) and Floodplain (sky blue area). (Source: Geomaps, 2025)

8.2 Proposed Stormwater Management

The Auckland Council Unitary Plan and the Silverdale West Dairy Flat Industrial Area Structure Plan (April 2020) require holistically integrated stormwater management. The Silverdale West Dairy Flat Business Area Structure Plan Stormwater Management Plan (November 2018) outlines that the proposed site is in a SMAF 1 zone, requiring comprehensive hydrology mitigation and water quality treatment.

The management strategy for the Stage 2 development employs a centralised, catchment-scale approach. Constructed wetland, swales, and raingardens will serve as the primary stormwater treatment and detention device for the majority of the site. The wetland design incorporates a Permanent Water Volume (PWV) sized using the 90th percentile storm event to maintain aquatic ecosystem health, while stream protection is provided through additional detention volume based on runoff from the 95th percentile storm event. Notably, the wetland

design incorporates future climate resilience by applying a 3.8-degree climate change factor for detention storage calculations, exceeding the requirements of both GD01 and the NDC which only mandate detention for historical rainfall conditions.

The treatment train is designed for efficiency and effectiveness. Stormwater runoff from the majority of development areas will be collected through conventional piped networks and conveyed directly to the central wetland facility. This piped system ensures efficient capture and delivery of runoff from roofs, driveways, and roadways to the primary treatment device. The wetland will provide comprehensive water quality treatment and quantity control, ensuring post-development peak flow rates for all storm events up to and including the 95th percentile do not exceed pre-development rates. It will achieve the Unitary Plan's required 80% removal of Total Suspended Solids (TSS).

For those specific lots where site topography prevents gravity discharge to the central wetland, independent stormwater treatment devices will be implemented. These may include raingardens, proprietary treatment systems, or underground infiltration systems, designed to meet the same water quality and quantity performance standards as the main wetland system.

A Stormwater Management Plan (SMP) has been prepared which describes the developments stormwater management in detail. It also outlines the asset ownership, where all stormwater located within the road to vest will be owned by Auckland Council and maintained by Auckland Transport. All remaining stormwater infrastructure will be owned and maintained by the landowner that the infrastructure is located on and will remain private.

The previously consented Stage 1 realignment of a portion of the existing stream has been designed to be hydraulically integrated with the wetland system, creating a multi-functional asset that combines new engineering with the natural drainage corridor. This integrated strategy ensures compliance, effectively manages flood risk, and enhances the ecological value of the site.

1% AEP Flood proximity: A 2d flood modelling was undertaken by Woods Consultants Ltd. to analyse the character of the existing 100-year flooding within subject site. Upstream catchment flows, climate change factor and design terrain of Pre-development ground have been included in the modelling computation. The flood report demonstrates that the pre and post development scenarios do not exacerbate the upstream or downstream flood effects for the 10 and 100 year events. Refer to 3325-2-4000 series for more detail for the stormwater system.

9 WASTEWATER

Given the rural location of the development, there is currently no public wastewater network available for connection. Consequently, the site will be serviced by a dedicated, onsite wastewater treatment plant (WWTP) designed to treat effluent from the proposed development to a high standard that is suitable for onsite disposal via land or to stream.

The proposed development will be serviced by a low-pressure sewer (LPS) system. The proposed LPS system operates by collecting wastewater from each property via a small, underground grinder pump station located within the private lot. The grinder pump macerates solids into a slurry and pumps the wastewater through a small-diameter pressure pipe network.

For this development, individual private grinder pump stations will be installed on each lot. These stations will pump wastewater into the reticulated low-pressure sewer network, which conveys flows to a dedicated, centralized WWTP. The WWTP has been sized to accommodate the flows from the development.

Treated effluent from the onsite WWTP will be discharged to the existing stream traversing the site. Where practicable, discharge to land will be maximized in accordance with the principles of TP58 and in recognition of cultural values. Given the high quality of treatment, suitable for direct stream discharge, reduced setbacks for land application may be considered appropriate. In addition, the treated effluent could be reused for non-potable purposes such as landscaping irrigation, provided that adequate setbacks from water supply takes and bores are maintained. Its noted that as part of the treatment train, the Reverse Osmosis (RO) waste will not be suitable for direct discharge to the stream and instead will be discharged to irrigation fields. It's noted that while this RO waste stream is of high quality, the low flow within the stream is not suitable for this RO waste stream. The high quality RO waste stream is suitable for onsite disposal to irrigation fields.

The specific design parameters for the wastewater treatment system, including treatment technology selection, hydraulic load calculations, detailed discharge consent requirements, and operational management plans, are presented in a separate, dedicated Wastewater Management Report prepared by Apex. This subsequent report will provide the comprehensive detail required for the detailed design and consenting phase of the project.

A Water and Wastewater Report has been prepared by MCCL for the development, which details the proposed wastewater network and disposal methodology. Refer to 3325-2-5000 series for more detail for the wastewater system.

10 WATER SUPPLY

Similar to the above, the development is not currently serviced by a public watermain network. Therefore, a self-sufficient, onsite water supply system will be implemented to meet the potable and non-potable demands of the development.

The system will utilise a multi-source approach to ensure resilience and reliability. Primary supply will be drawn from a water bore, providing a consistent groundwater source. Stream water abstraction (as consented under Stage 1 of the development) and rainwater harvesting will provide supplementary sources, enhance the system's sustainability and reduce demand on the aquifer.

Centralised water treatment facilities will be established on-site to treat the raw water from these sources to the appropriate standards. The treatment train will be designed to produce potable water that meets the New Zealand Drinking Water Standards for consumption, and separate treatment lines may be considered for non-potable uses such as irrigation or toilet flushing, in accordance with Auckland Council's GD11 requirements.

The specific design parameters for the water supply system, including bore yield, stream abstraction rates, storage tank sizing, treatment technology selection, and network design, will be detailed in a separate, dedicated Water Supply Report prepared by Williamson Water and Land Advisory. This subsequent report will provide the comprehensive engineering detail required for the detailed design and consenting phase of the project.

A Water and Wastewater Servicing Report has been prepared by MCCL for the development, which details the proposed water demand and system design. Refer to 3325-2-6000 series for more detail for the watermain system.

11 UTILITY SERVICES

Utility services will be provided via underground infrastructure to minimise visual impact and align with the development's aesthetic. Electrical supply will be coordinated with the local network utility operator, with underground reticulation installed within road berms. A fibre-optic telecommunications network will be installed in shared trenches to future-proof the development. A combined utility trench will be constructed to efficiently accommodate all essential services. This integrated approach minimises excavation requirements, reduces construction impacts, and simplifies future maintenance access. The design and installation will comply with all relevant standards.

12 SAFETY IN DESIGN

Aspects of Safety in Design were considered as part of the overall design process. No particular areas of concern were noted.

13 SUPER LOT DEVELOPMENT

It is intended that the project be delivered as a single overall development phase. The site will be divided into super lots to allow construction across multiple areas to proceed concurrently with the wider development programme.

Although the overall development relies on a community-based water and wastewater supply, it is proposed that the super lots be subdivided, with section 224(c) certification granted, on the basis that a notional rural residential dwelling can be serviced within each super lot. This approach is consistent with the underlying zoning provisions.

In the same way, the super lots are proposed to be self-reliant for power, telecoms and stormwater disposal.

Subdividing the super lots will allow the super lots to be sold to individual developers, including the surf lagoon operator, residential developers, data centre operator etc, ahead of the commissioning of the water and wastewater treatment plant and supply bores. These systems typically require a substantial lead-in period to become operational.

Access to the super lots during this interim period will be provided via a temporary metalled construction access, rather than fully formed JOALS. All public roading will be constructed prior to the subdivision of the super lots.

A consent notice will be imposed on the super lot titles to ensure that purchasers are fully aware of their obligations to design, construct, operate, and commission the required infrastructure associated with their development.

This approach enables subsequent developers to secure finance and commence construction immediately without unnecessary delay, and avoids having a large development site sit un-worked while the infrastructure is being commissioned.

14 CONCLUSION

This Engineering Infrastructure and Utility Services Report demonstrates that the proposed Stage 2 development of the ASPC can be serviced with appropriate infrastructure in accordance with the Auckland Unitary Plan and relevant Council standards and guidelines. The design has adopted an integrated approach to stormwater management, utilising a central wetland device for treatment and detention, with supplementary measures for specific lots. The wastewater and water supply solutions provide self-sufficient systems with provisions for future connection to public networks. All utility services will be efficiently contained within a combined trench. The design has considered the site's constraints and opportunities, particularly regarding OLFPs and topography, and has proposed solutions that minimise environmental impact while providing functional servicing for the development.

APPENDIX A – Scheme Plan

APPENDIX B – Engineering Plans

APPENDIX C – Engineering Calculations

- Refer to SMP for stormwater calculations
- Refer to Water and Wastewater Servicing Report for Water and Wastewater Calculations
- Refer to Water Supply Memo for Water Demand Calculations