Appendix 1

Appendix 1a- Archaeological Management Plan

ARCHAEOLOGICAL MANAGEMENT PLAN: BEACHLANDS SOUTH – FAST TRACK

Prepared for Beachlands South Limited Partnership

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By

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Introduction

Purpose

Beachlands South Limited Partnership (BSLP) proposes to undertake earthworks and construction associated with the Beachlands South Development at 110 Jack Lachlan Drive and 620, 712, 758, and 770 Whitford-Maraetai Road, Beachlands (**Figure 1**).

An archaeological assessment of the proposed development has been prepared:

> Farley, G. June 2026. Beachlands South Fast Track: Archaeological Assessment. Clough & Associates report prepared for Beachlands South Limited Partnership.

The Archaeological Assessment identifies recorded archaeological sites within and adjacent to the Development Area and provides an assessment of potential effects associated with the proposed works.

An application for an archaeological authority under section 43(3)(i) of the Fast-track Approvals Act 2024 (FTAA) has been lodged prior to commencement of works. The authority will enable the appropriate management, recording, and mitigation of any archaeological material exposed during construction activities.

This Archaeological Management Plan (AMP) sets out procedures to be followed during earthworks and construction activities within and adjacent to known archaeological sites. It includes requirements for archaeological monitoring, investigation, recording, and reporting of archaeological material, as well as protocols for the unexpected discovery of archaeological remains, including kōiwi tangata (human remains) and taonga.

This archaeological management plan outlines the procedures to be followed during earthworks in the vicinity of the known sites and procedures for archaeological monitoring and the recording of any archaeological evidence before it is modified or destroyed. It also provides protocols for the exposure of unknown / discovered archaeological remains including kōiwi tangata (human remains) or taonga (Māori artefacts).

Project Archaeologist

The 'Project Archaeologist' referred to in this plan is the archaeologist approved under the Fast-track Approvals Act 2024 to undertake activities under the archaeological authority.

Some of the archaeological work may be undertaken by other qualified archaeologists under the direction of the Project Archaeologist. The general term 'Archaeologist' is used to denote either the Project Archaeologist or a qualified archaeologist working under their direction.

Māori Cultural Values

Archaeological sites of Māori origin hold cultural significance for mana whenua in addition to their archaeological value.

Contact details for relevant iwi representatives are included in this AMP. These representatives must be notified at least 48 hours prior to the commencement of archaeological monitoring works.

Protocols are provided that must be adhered to if archaeological remains of Māori origin are exposed. In carrying out the requirements of the authority the archaeologists will be guided by the Iwi representatives in matters of tikanga.

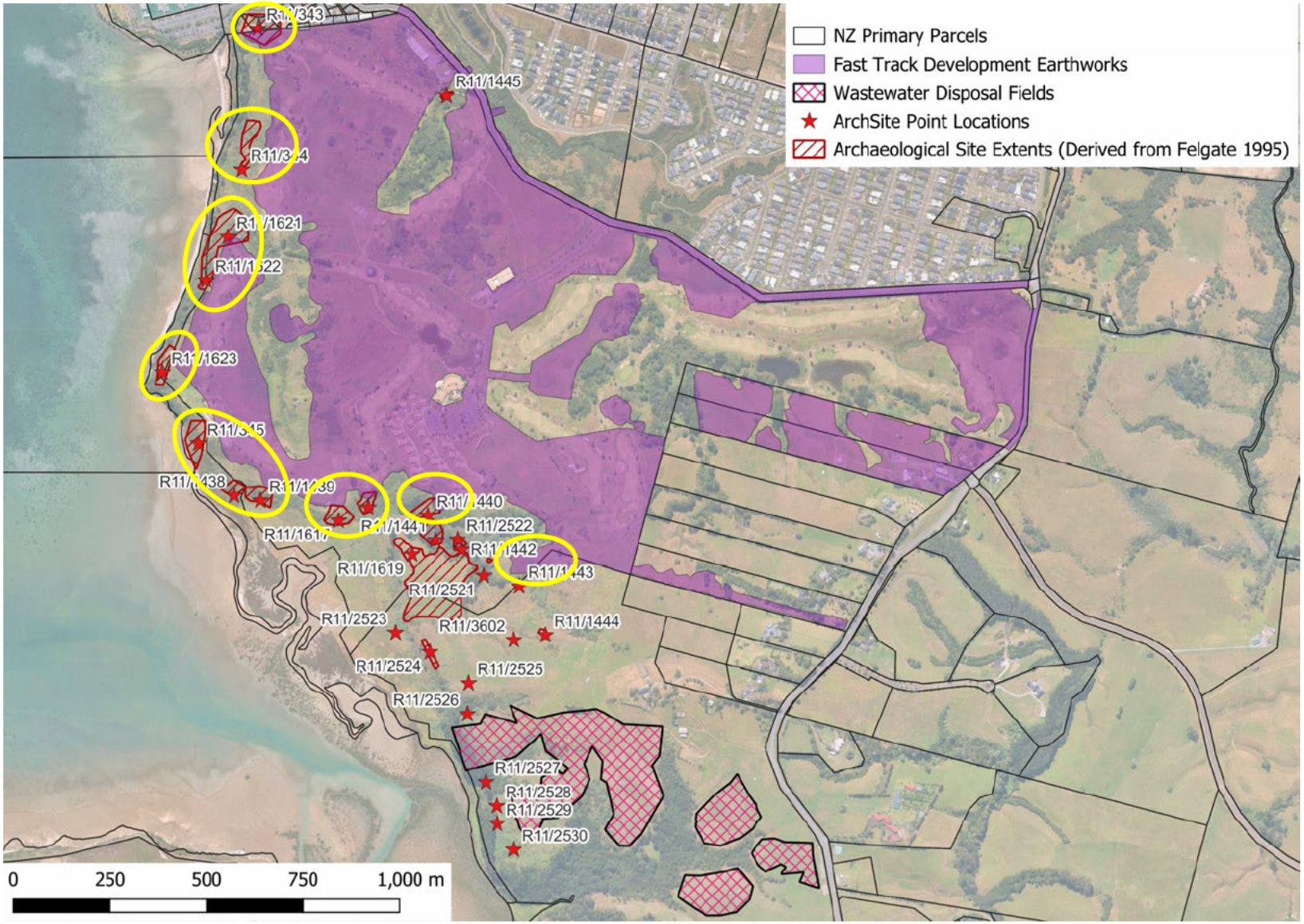

Figure 1. Aerial plan, overlaid with cut/fill information and archaeological sites, showing earthworks that must be monitored by an archaeologist outlined in yellow

Site Management

Pre-Start Requirements

1. Prior to the start of earthworks, the Project Archaeologist will be called to meet the Contractor(s) on site to brief them on the archaeological requirements.
2. The Project Archaeologist must ensure that the Contractor/Project Manager has received, read,l and and understood the archaeological authority and this AMP. Confirmation may be provided by signed acknowledgement or written/email confirmation copied to Heritage New Zealand Pouhere Taonga (HNZPT).
3. The Project Archaeologist must be given at least 2 weeks' notice prior to commencement of earthworks.
4. Known archaeological sites must be clearly identified, marked, and fenced prior to commencement of works to protect them from accidental damage. Fencing must be installed by the Authority Holder or Contractor.

Earthworks Phase

1. Archaeological monitoring will be undertaken by a suitably qualified archaeologist in areas of known or potential archaeological sensitivity, as identified in Figure 1.
2. Monitoring will continue until natural deposits are reached or until it is determined that archaeological material is unlikely to be present due to prior disturbance.
3. If archaeological features or deposits are identified, the Project Archaeologist must direct the Contractor to cease works within 20m of the discovery.
4. Any in situ archaeological deposits or features exposed during monitoring, that cannot be avoided, will be investigated, recorded and sampled by the archaeologist consistent with accepted archaeological practice and in accordance with the requirements of the Heritage NZ authority. Detailed notes of each feature and deposit will be made, photographs will be taken, and all subsurface features located will be detailed on the site plan. Stratigraphic drawings and photographs of features and deposits will be undertaken. Any artefacts will be retained for analysis and their positions marked on the site plan.
5. Additional Archaeologists will be brought to site as required to assist in the monitoring, and for the subsequent archaeological recording and sampling.
6. The Contractor must allow sufficient time and opportunity for the recording and sampling of any archaeological features or deposits encountered. The Archaeologist(s) will record the archaeological feature(s) or deposit(s) as quickly as possible so that earthworks can resume without undue delay.
7. If suspected archaeological deposits or features are identified at times or in areas where the archaeologist is temporarily not present, the Contractor must stop works (within 20m) and follow the procedure set out below.
8. Heritage NZ will be advised by the Project Archaeologist if any significant archaeological features or deposits are exposed that were not anticipated. This will trigger the stand down procedure set out below.

9. If archaeological remains relating to Māori occupation are exposed, the Project Archaeologist will inform the appropriate Iwi representatives (if not present).
10. If human bone (kōiwi tangata) or taonga (Māori artefacts) are encountered, the protocols set out below will be followed.

Procedures if Archaeological Sites are Exposed when the Archaeologist is not Present

If the Archaeologist is temporarily not present and remains are exposed that are potentially archaeological features or deposits (as described to the Contractor at the pre-start meeting), the following procedure should be adopted:

1. Works must cease within 20m of the discovery.
2. The archaeologist must be contacted immediately to confirm whether the material is archaeological.
3. If confirmed as archaeological, the area must be defined and excluded from works until investigation is complete.
4. All subsequent procedures must be undertaken in accordance with the Earthworks Phase of this AMP.
5. If human bone (kōiwi tangata) or taonga (Māori artefacts) are unearthed the protocols set out below will be followed.

Protocols Relating to Kōiwi Tangata (Human Remains)

If bone material is identified that could potentially be human, the following protocol will be adopted:

1. Earthworks/investigation should cease in the immediate vicinity while an Archaeologist establishes whether the bone is human.
2. If it is not clear whether the bone is human, work shall cease in the immediate vicinity until the University's reference collection and/or a specialist can be consulted and a definite identification made.
3. If bone is confirmed as human (kōiwi tangata), the Archaeologist will immediately contact Iwi representatives (if not present), Heritage NZ and the NZ Police.
4. The site will be secured in a way that protects the kōiwi as far as possible from further damage.
5. Consultation will be undertaken with all Iwi representatives as outlined in the authority, the Heritage NZ Regional Archaeologist and the authority holder to determine and advise the most appropriate course of action. No further action will be taken until responses have been received from all parties, and the kōiwi will not be removed until advised by Heritage NZ.
6. The Iwi representatives will advise on appropriate tikanga and be given the opportunity to conduct any cultural ceremonies that are appropriate.
7. If the Iwi representatives are in agreement and so request, the bones may be further analysed by a skilled bio-anthropological specialist prior to reburial, in line with the *Heritage NZ Guidelines Kōiwi Tangata Human Remains* (2014).

8. Activity in that place can recommence as soon the as the bones have been reinterred or removed and authorisation has been obtained from Heritage NZ.

Protocols Relating to Taonga (Māori Artefacts)

Māori artefacts such as carvings, stone adzes, and greenstone objects are considered to be taonga (treasures). These are taonga tūturu within the meaning of the Protected Objects Act 1975. Taonga may be found in isolated contexts, but are generally found within archaeological sites. If taonga are found the following protocols will be adopted:

1. The area containing the taonga will be secured in a way that protects the taonga as far as possible from further damage, consistent with conditions of the Authority.
2. The Archaeologist will then inform Heritage NZ and the Iwi representatives so that the appropriate actions (from cultural and archaeological perspectives) can be determined.
3. These actions will be carried out within the stand down period specified below, and work may resume at the end of this period or when advised by Heritage NZ or the Archaeologist.
4. The Archaeologist will notify the Ministry for Culture and Heritage of the find within 28 days as required under the Protected Objects Act 1975. This can be done through the Auckland War Memorial Museum or by emailing the Ministry of Culture and Heritage.
5. The Ministry for Culture and Heritage, in consultation with the tangata whenua, will decide on custodianship of the taonga (which may be a museum or the iwi whose claim to the artefact has been confirmed by the Māori Land Court). If the taonga requires conservation treatment (stabilisation), this can be carried out through the Ministry's Conservation Panel of Suppliers which consists of specialist conservators, heritage practitioners and representatives from the wider museum sector. This would be paid for by the Ministry. It would then be returned to the custodian or museum.

Post-Earthworks Phase

1. Any artefacts recovered and samples taken will be analysed and recorded by the appropriate specialists.
2. Any Māori artefacts will be notified to the Ministry for Culture and Heritage in accordance with the Protected Objects Act 1975.
3. The Project Archaeologist will provide a report to Heritage NZ within 20 days of the completion of archaeological work. This may be the final report if no or limited archaeological remains are found.
4. If more extensive remains requiring detailed analysis are found, the Project Archaeologist will complete a full monitoring report within 12 months of the end of the archaeological work, and will provide it to Heritage NZ and other parties identified in the Authority.

Research Aims and Methodology

Research Aims

The archaeological investigations associated with the Beachlands South Development aim to support the recording and recovery of archaeological information from sites affected by development works, with particular reference to previous investigations at site R11/343.

These aims seek to:

1. determine the nature and intensity of occupation within recorded site areas;
2. assess spatial variation in archaeological activity across the investigation area;
3. identify and record structural features such as pits, terraces, and occupation areas;
4. recover information relating to past activity through analysis of artefacts and midden deposits;
5. obtain environmental samples to assist in understanding site formation processes; and;
6. obtain additional radiocarbon dates where appropriate to assist in establishing chronological frameworks.

Research Methodology

During earthworks within the Beachlands South Development Area, the following investigation procedures will be carried out:

1. Topsoil removal and excavations will be monitored in areas of proposed ground disturbance near recorded archaeological sites to identify, record and appropriately manage any subsurface archaeological features or cultural material prior to further development.
2. Stratigraphic sequences will be recorded where exposed.
3. Manual investigation and recording of exposed features will be undertaken using standard archaeological techniques.
4. Investigation, sampling and recording of in situ archaeological features and deposits will be carried out consistent with accepted archaeological practice and in accordance with the requirements of the HNZPT authority.
5. Site plans detailing features, deposits, and site extents will be prepared using a total station unit or similar method.
6. Representative bulk samples (10 litres) of any midden deposits will be collected for analysis, including identification of shell, bone and charcoal remains.
7. Additional samples for soil (microfossil), and charcoal analysis will be collected where appropriate. Suitable shell and charcoal samples from secure contexts will be submitted for radiocarbon dating.
8. Sieving of excavated deposits will be undertaken where appropriate.
9. Artefacts will be classified and analysed by appropriate specialists to determine material type, origin, and date of manufacture where possible.
10. Selected artefacts will be photographed for inclusion in reporting
11. All artefacts that meet the definition of taonga tūturu in the Protected Objects Act 1975 will be notified to the Ministry for Culture and Heritage and following analysis will be deposited at a location authorised to hold taonga tūturu under the Protected Objects Act 1975 depending on the direction and requirements of MC&H.

12. A final report will be prepared in accordance with the requirements of the archaeological authority and will include results of investigations and analysis.

Archaeological Team and Other Contacts

Archaeological Team

Glen Farley will direct the project as the Section 45 archaeologist. Fieldwork will be carried out by him or under his supervision.

The archaeological team will include some or all of the following:

Name	Role	Responsibility
Glen Farley, MA	Co-Director	Manage project in field and prepare report
Jen Low, MA	Archaeologist	Monitoring, recording
Tom Clough-Macready, MArchP	Archaeologist	Monitoring, recording
Kirstin Roth, MArchP	Archaeologist	Monitoring, recording

Other qualified archaeologists and/or specialists may be brought in to the project if required. These may include specialists in particular categories of artefact or other remains.

Contact Details

Project Archaeologist	Glen Farley: [redacted]
Heritage NZ Regional Archaeologist	Greg Walter: [redacted]
Auckland Council	Chris Mallows (Cultural Heritage Implementation Team Leader): [redacted]
Iwi Representatives	Ngāti Tai Ki Tamaki: Jada MacFie [redacted]

Stand Down Periods

Depending on what is revealed by the earthworks, stand down periods may be required at various stages to allow for archaeological work to be carried out or for consultation with the appropriate parties may be required at various stages.

Stand down will require earthworks to cease only in the immediate vicinity of the feature or find, and work may proceed in other areas. The following maximum stand down periods will apply, but earthworks may be resumed earlier if the required work has been completed.

Timeframes need to be flexible enough to ensure that archaeological works are completed as necessary to ensure that the conditions of the authority are met.

Trigger	Stand Down Period	Requirements	Release
Archaeological feature, deposit or artefacts	Up to 2 days within each area where remains are found, but work may continue in areas where no remains are identified	Sufficient time must be allowed for the Archaeologist to investigate and record the remains.	Work resumes when the Archaeologist advises the Contractor that work is completed
Significant archaeological feature, deposit or artefacts[1]	Up to 3 days for a response from Heritage NZ, and up to 3 days for any detailed investigation required	The likely requirement is a mitigation investigation and/or recording by standard archaeological techniques, but this will be advised by Heritage NZ.	Work resumes when the Archaeologist advises the Contractor that work is completed
Human bone found	As agreed between the project manager, Heritage NZ and Iwi	Heritage NZ and NZ Police to be satisfied that kōiwi identification is correct. Iwi representative(s) to organise reinterment or removal of bones from site and appropriate cultural ceremonies.	Work resumes following reinterment or removal of bones from site and when authorisation from Heritage NZ has been received.
Taonga, or archaeological remains of Māori origin found that were not anticipated	Up to 3 days	Heritage NZ and Iwi representative(s) to be consulted on appropriate action. Archaeological recording as required	Work resumes when the Archaeologist or Heritage NZ advises the Contractor that work is completed

[1] i.e. with the potential to provide significant information through detailed investigation

Applicant's and Contractor's Responsibilities

Authority Holder's Responsibilities

Beachlands South Limited Partnership or their designated representative has the following responsibilities:

1. To advise Heritage NZ of the start and finish dates of any required archaeological work.
2. To ensure that sufficient time is provided to carry out any archaeological investigations required.
3. To provide sufficient site security to ensure that archaeological material on site is protected from unlawful excavation or removal.
4. To ensure that a copy of the archaeological Authority is kept on site and its contents are made known to all contractors and subcontractors.
5. To ensure that a copy of this Archaeological Management Plan is kept on site and its contents are made known to all contractors and subcontractors.
6. To ensure that the conditions and protocols outlined in the Authority and this document are observed by Contractors and subcontractors.
7. To provide a safe environment for the archaeologists to carry out their work.

Contractor's Responsibilities

The Contractor's responsibilities are as follows:

1. To meet the Project Archaeologist on site prior to the start of works for a briefing on the archaeological requirements.
2. To provide the Project Archaeologist with 2 weeks' notification that project earthworks are about to begin, and to ensure that an Archaeologist is present when earthworks begin in the areas requiring monitoring shown in Figure 1.
3. To comply with the protocols above if archaeological sites, kōiwi or taonga (pp.5-6) are exposed.
4. To allow the Archaeologists sufficient time to investigate and record any archaeological remains before resuming works in the immediate vicinity.
5. To ensure a safe working environment for the Archaeologists.

Dispute Resolution

Disputes fall into a number of categories but are usually the result of poor communication between the developer, subcontractors, Iwi representatives and the project archaeologists. Most can be avoided if sufficient detail of the archaeological issues and responsibilities is outlined in the tender document or work management documentation.

Common examples of a dispute are: that the subcontractors consider that the archaeologists are causing unacceptable delays, or that the archaeologists feel they have insufficient time to fulfil the obligations of the authority. In the event of a dispute relating to the Authority investigation the following procedure for resolution should be followed:

1. If the dispute relates to archaeological issues, a meeting between the Authority holder (or designated representative), Contractor or subcontractor and Archaeologists should be convened as soon as possible to attempt to resolve the dispute.
2. If the dispute relates to cultural issues, a meeting between the Authority holder (or designated representative), Contractor or subcontractor, Iwi representatives, and Archaeologists should be convened as soon as possible to attempt to resolve the dispute.
3. If the dispute cannot be resolved a further meeting of all parties with representatives of Heritage NZ will be arranged within 1 working day to resolve the dispute. Heritage NZ has ultimate responsibility for resolving issues relating to the conditions of the Authorities it issues.

Taonga tūturu (Māori artefacts) recovered from archaeological investigations are often deposited in local or national museums following archaeological analysis, and with the agreement of iwi. On other occasions iwi may prefer to retain ownership of artefacts and disputes can arise between different iwi with an interest in the area. Any disputes relating to the long term ownership and custody of taonga tūturu should be dealt with through the statutory processes of the Protected Objects Act 1975. The provisions of the Act require that all taonga tūturu are notified to the Ministry for Culture and Heritage within 28 days of the completion of archaeological fieldwork. Under s.11 and s.12 of the Act the Ministry for Culture and Heritage must notify all parties that have an interest in the taonga, and if competing claims for ownership are made and cannot be resolved the matter may be referred to the Māori Land Court for resolution.

Appendix 1b- Construction Management Plan

Construction Management Plan - Draft

Beachlands South Fast Track

Harrison Grierson Consultants Limited

Date: 29 May 2026

HG Project no.: A22515591.00

1.0 Introduction

This report has been prepared in support of a substantive application submitted by Beachlands South Limited Partnership ('BSLP') under the Fast-track Approvals Act ('FTAA'). The Project name is 'Beachlands South' and is included in Schedule 2 of the FTAA as a Listed Project with significant regional or national benefits. The Project location or Site is located across approximately 159.58 hectares of live zoned land and approximately 108.6 hectares Future Urban zoned land at 110 Jack Lachlan Drive, and 620, 712, 758 and 770 Whitford-Maraetai Road, Beachlands.

In summary, the Project will provide for the development of live zoned land at Beachlands into a comprehensively planned and public transport focussed community to achieve a well-functioning urban environment comprising residential dwellings, a hotel and conference venue, community and commercial activities, protected ecological restoration areas, walking and cycling networks, and community facilities, and enable the potential development of two schools, as well as all associated earthworks and all associated infrastructure including transport facilities, intersection upgrades and roading, telecommunications, power, and water supply, stormwater, and wastewater infrastructure (including any treatment or storage facilities, drainage, pipes, pump stations, outfalls and discharges). A portion of Future Urban zoned land will be used for wastewater management purposes.

Key elements of the Project include:

- Residential activities comprising approximately 2,200 dwellings in a variety of housing types, densities and vacant sites for future residential development;
- Establishment of a commercial local centre supported by employment opportunities within and around the periphery of the local centre and on the Whitford-Maraetai Road frontage comprising approximately 27,000m^2 of commercial GFA and 30,000m^2 of light industrial GFA;
- Education facilities comprising the development of both primary and secondary schools;
- Establishment of an Ecological Protected Area Network (EPAN) comprising approximately 88 hectares of land within the live zoned area being protected and approximately 55 hectares of land being replanted, restored, maintained and enhanced including preservation of streams and their margins;
- A series of open spaces including a suburban park, neighbourhood parks, the Fairway Reserve, golf course, esplanade reserve and riparian margins;

- Provision of public access to and along the coastal marine area and the creation of a quality coastal pathway;
- Public transport enhancements and integrations including expanded ferry passenger capacity;
- Staged road upgrades including the provision of pedestrian and cycling facilities along Jack Lachlan Drive, the upgrade of Whitford roundabout, a series of intersection upgrades; and
- Establishment of infrastructure to service the project including wastewater, water supply, stormwater, telecommunications and power.

The purpose of the Construction management plan (CMP) is document how the construction work is to be implemented based on the current engineering plans to be submitted in support of the Fast Track Consent. The CMP has been developed in response to identification and potential adverse effects during the construction phase. The objectives of the CMP are:

- to ensure compliance with the conditions of the approved resource consent and the relevant legislation
- to demonstrate management procedure to deal with any effects of construction activity on the environment
- to identify any work during the course of the construction that have the potential to impact on the immediate environment
- to ensure that potential risks associated with the project are properly managed
- to ensure the safety of public at all time during the construction works
- to outline potential issues and corrective procedure in consultation between the neighbours, public, contractor and Auckland Council

The Construction management plan (CMP) deals with the construction within the site from earthworks through to completion of the civil works. Due to the complexity of the external road upgrades separate CMP's will be provided to Council at the time of construction being provided by the appointed contractors who will provide details of their methodology for working within a live road corridor.

Additional CMP's will be provided at Superlot and building development by Build Partners dealing with the particular site constraints of their development and impacts on completed development being built on.

2.0 Site Details

Site address: 110 Jack Lachlan Drive, 620,712,758 and 770 Whitford Maraetai Road

Legal Description:

Lot 2 DP 501271 -110 Jack Lachlan Drive

Lot 100 DP 504488 - 620 Whitford Maraetai Road

Lot 4 DP 54105 – 712 Whitford Maraetai Road

Lot 9 DP 54105 – 758 Whitford Maraetai Road

Lot 10 DP 54105 – 770 Whitford Maraetai Road

Site Area: 268.1173 ha

3.0 Scope of Management Plan

This plan provides a holistic approach to:

- Provide an overview of the project and outline compliance with statutory obligations and approvals

- Defines the project objectives and goals of particular relevance to the construction phase
- Outline constraints specific to the construction phase and the project in general
- Outline the process for the identification and control of risk specific to the construction phase
- Outline health and safety procedure on site during construction
- Manage waste generated at the site or brought to the site
- Manage construction noise during construction phase

This plan aims to provide appropriate methodologies, process and controls required to achieve the development and environmental objectives and the requirements of the development.

4.0 Scope of Construction Works

The civil construction work would be carried out over a number of years with the majority of construction work within the earthworks seasons (October – April) and where permitted non earthworks activities during the winter seasons (May – September). The scope of work includes:

- Site establishment for construction activities
- Construction of erosion and sediment controls
- Remove existing topsoil within Sub catchments and stockpile outside works area.
- Undertake bulk earthworks
- Stabilise the site areas earth worked.
- Construction of civil works being drainage networks, water reticulation, utility services and roading
- Construction of the retaining walls

5.0 Construction Management

5.1 Site Establishment

Site establishment will involve securing the site and making it safe from the public and golf course users. Identification of the existing services within the development area will be required together with diversions or re-location as necessary. The following activities will be completed prior to the commencement of any construction work on site:

- A Hazard/Contact board will be displayed outside all the site entrances providing hazard indemnification and contact details of all key staff including onsite first aiders.
- Sign in and out system, this will be either paper based or electronic
- Induction register.
- A compliant/contact book will be kept on site, which will be used to record details of any complaints. This will include the name of the person making the compliant, the date, time and nature of the compliant and the action necessary to resolve to the compliant. The compliant book will be regularly reviewed by the constructor and the client's management team to ensure that any compliant are dealt with and resolved promptly
- Construction fences will be erected along the Stage boundaries with secure access to separate the public areas and the construction zone.
- Set up project site office, toilet facilities, storage and layout area.

The site office will be location will be determined by the Civil Contractor. Depending on the location the site office could be in either of the existing buildings located within the earthworks area or a more centralised position on the site. Access will be maintained for the duration of the work via the entrance points from Jack Lachlan Drive and 712 Whitford-Maraetai Road.

5.2 Access

Access to the development will change as the development progresses. The initial access is currently from 3 construction entrances to the site from Jack Lachlan Drive with one being the existing entrance to the golf course. The other two entrances are located within existing Consented area. All construction vehicles and trucks will access the site via these entrances.

An additional access will be created during the initial stage from 712 Whitford-Maraetai Road This access will act initially as access to the proposed waste water treatment plant and then as alternate access to the golf course while the existing access is reconfigured as public road.

As works progress subsequent stages access points will be formed from new constructed roads. The siting of the entrances on site will be adjusted to suit traffic safety to prevent accidents with local traffic.

To minimise the risk of silt contamination on the road all accesses will be formed in accordance with standard industry practice of a stabilised entrance. The Civil Contractor regularly monitor the accessway to ensure it functions correctly in addition should any dirt or debris fall onto the road this will be immediately cleaned up using spade and washed. A wheel wash facility will be installed if required, however this is not anticipated as there will be minimal materials being transported offsite.

5.3 Erosion and Sediment Management

To minimise silt discharges from the development site the erosion and sediment controls will follow the proposed Adaptive Management Plan. The measured adopted are set above the minimum requirements of Auckland Council Guidance Document 2016/005 “Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05) as the site discharges into two significant ecological areas (SEA) which the highest ecological values which are linked to the coastal environment.

The following principles shall be followed:

- Maximum area to be disturbed is 15 ha
- Maximum catchment for sediment retention ponds is 4ha and sized to 3.75% of catchment
- All sediment retention ponds and decanting earth bunds are to chemically treatment to increase sediment retention efficiency
- No working during inclement weather.
- Divert clean water away from the earth worked areas
- Conduct regular maintenance of devices installed
- Install additional measures prior to medium and high intensity events where practical.

Each of the above principals will be employed for the development . Erosion and sediment measures will be established prior to the commencement of the earthworks activities in accordance with GD05. This will ensure that no silt contaminated stormwater will enter receiving environment. Weekly formal inspection of the erosion and sediment control will be carried out by the Earthworks Contractor. Immediate maintenance and repair will be required if the erosion and sediment controls do not meet the Council standards.

Prior to any forecasted rain event all reasonable measures shall be undertaken to minimise sediment discharges from site, this may include the following

- All earthworks areas shall be compacted, and surface roughened to the extent that is practicable taking into account the slopes, stage of earthworks
- Install cut off drains
- Add stilling basins along diversion drains to slow down water discharge.
- Check all devices are operation correctly.

For detail information on the erosion and sediment control devices refer to the drawings and Erosion and Sediment Control Adaptive Management Plan.

5.4 Noise Management

Due to the proximity of Residential dwellings to the north of the development and those retained within the Golf Course the restrictions to working hours will imposed complying with the following documents

- Approved Resource Consent
- Auckland Unitary Plan Section E25.6.27
- NZS 6803:1999 Acoustic Construction Noise

As the proposed activity is long term in duration the specifications of NZS6803 are to be adopted and summarised below

Table 1: Recommended upper limits for construction noise in residential zones and dwellings in rural areas

Time of Week	Time Period	Long term duration (bBA) L_{eq}	L_{max}
Weekdays	0630-0730	55	75
	0730-1800	70	86
	1800-2000	65	80
	2000-0630	45	75
Saturdays	0630-0730	45	75
	0730-1800	70	85
	1800-2000	45	75
	2000-0630	45	75
Sundays and public holidays	0630-0730	45	75
	0730-1800	55	75
	1800-2000	45	75
	2000-0630	45	75

Heavy machinery, vehicles and power tools will be used during the construction work, noise generated from the construction activities will be managed to minimise any adverse effects on the neighbouring residential area. All plant will be regularly maintained to ensure that there are no excess noise emissions.

5.5 Dust and Odour Management

Dust and odour can create a nuisance effect during certain weather conditions, causing disturbance to neighbouring properties or may cause a health issue. Dust and odour will primarily be generated from work on site utilising single haul routes. If dust and odour become a problem, the contractors shall employ appropriate control measures to avoid, remedy and mitigate to minimise effects of excessive dust and odour on adjoining properties.

Dust control measures that can be implemented as required.

- Earthworks or any activity which generate dust shall be monitored closely along with weather conditions so any foreseeable issues will be minimised which could involve the following
    - Use dust suppression agents mixed with water
    - Work in alternate areas to avoid prevailing wind conditions
    - Cease works altogether
- Housekeeping will be maintained to minimise dust during construction phase which could involve the following
    - A water cart with sufficient water resource shall be available on short notice for the duration of the construction work. Where the water cart is unable to mitigate any hazard, earthworks shall cease until the dust hazard is mitigated.
    - Water spray will be used to manage dust from the development. Excavated areas would be watered as necessary and stabilized rapidly as required. Any areas of major dust source shall be kept damp during dry periods to minimise public nuisance.

- Trucks with excavated materials will be covered and cleaned down prior to leaving the site. Subcontractor will be required to ensure that dust created by their work activities does not affect the health of other workers, residents and the public.
- All storage areas, loading and unloading operations, blending or mulching processes and other activities carried out on site shall be conducted and managed in such a manner as to ensure that all dust and particulate emissions are kept to a practical minimum.

Site work shall be managed in such a manner to ensure that there shall not be any objectionable odour at or beyond the boundary of the site. Air filters, fuel filters and fuel injectors of the construction machinery will be maintained on a regular basis to the manufacture specifications to avoid excessive smoke and objectionable odour.

5.6 Archaeological and Heritage Protocols

Prior to the commencement of any earthworks, training will be given to all contractors regarding methods of identifying, reporting and managing features of archaeological significance. The following procedure will be adhered at all times during the earthworks and construction activities.

If kōiwi; (human skeletal remains) are discovered whilst undertaking construction work, then the following procedures shall be undertaken:

- construction work within a 20m radius of the site shall cease immediately including shutting down all earth disturbing machinery and stopping all earth moving activities
- secure the areas of discovery to provide sufficient buffer areas to ensure that the kōiwi remain undisturbed
- inform New Zealand Police, Auckland Council, Mana Whenua and Heritage New Zealand Pouhere Taoonga immediately
- no work shall recommence until approval from relevant parties has obtained

If any Māori cultural artefact/taonga tuturu, object defined in the Protected Objects Act 1975, lave cave or archaeological site is accidentally discovered, the following procedure shall be undertaken:

- immediately cease all works within 20m radius of the discovery
- secure the areas of discovery
- notified Auckland Council, Mana Whenua, and Heritage New Zealand Pouhere Taonga
- any Māori cultural artefact/taonga tuturu/object or archaeological areas within the project area should be left untouched
- no work shall recommence until assessment has been completed and approval is obtained from the relevant parties.

5.7 Waste Management

The aim of the waste management for the development is to minimise solid waste. Construction waste shall be managed to prevent contamination of soil or water at or near the site and to manage the disposal of waste in accordance with current legislation and good practice.

The following strategies will be applied for the waste management during the construction:

- encourage the reduction of waste at source by reusing products on site or using alternative suppliers with reduced packaging,
- ensure all reusable/recyclable waste is reused or recycled,
- ensure all solid waste is disposed of appropriately at regular intervals,
- provision of bins for the collection of domestic waste,
- disposal of waste materials to suitably licensed landfill sites
- disposal of hazardous waste at licensed recycling/landfill facilities.

No waste material is to be burned on the site or buried in any circumstance.

Construction sanitary waste will be collected and disposed of off-site in an appropriate manner. Portable units shall be located in positions are site and to be protected from traffic movements and not be located near watercourses.

The contractor shall ensure that all site personnel must be trained in waste management, how to minimise waste, recognise recyclable materials. Waste management requirements shall be included in site induction.

5.8 Hazardous Substances Management

A number of potentially hazardous substances will be in use throughout the development. It is not possible to eliminate the use of these substances so carefully management becomes integral to reducing the potential for adverse effects.

The construction work will involve the use of variety of construction plant and machinery. The majority of the machinery will be motorised and will require a regular supply of fuels and oils. These can become a pollutant if discharge to ground or water.

Other materials used in the construction process including concrete, bonding agents and degreasers can result in environmental impact if they are not managed carefully and are discharged to the environment in an uncontrolled manner.

A list of hazardous substances stored, handled or used during construction shall be recorded in the Material Safety Data Sheets (MSDS) and will be held on site. Practicable measures are undertaken to safely store hazardous substances and to ensure the potential spills minimised and to ensure if a spill does occur that appropriate remediation procedures are implemented.

In the event of any spill or leak to the environment or damage to bund or containment area, action shall be taken immediately to contain and minimise the spread of the spill. Spill response procedure initiated to clean up the site and the incident immediately reported to the Site Manager and Project Manager. Access to the site shall be restricted until the site is clean up. Any spill to land or water or any event where environmental harm has been or may be caused must be reported to the Harrison Grierson Consultants and Auckland Council immediately.

Procedures for the storage and handling of these substances will be developed including signage and secure lockup by the Earthworks Contractor. Spill management strategies include, but are not limited to the following:

- managing the transportation of hazardous substances to and from the site,
- no refuelling of vehicles or machinery over water,
- equipment will be regularly inspected and maintained for leaks or damage before they burst or fail
- a spill kit or alternative material will be available on site including containment and recovery equipment, personal protective equipment and relevant operator instructions/emergency procedure guides
- all personnel will be made aware of the location of the spill kit or clean up materials at the site induction
- regulatory authorities will be notified when a spill occurs that may result in environmental impact
- records will be kept in the event of a spill and will be made available to the appropriate authorities
- hazardous substances will be stored in covered and imperviously bunded areas
- hazardous chemical storage areas will be monitored to ensure the compliance with the relevant standards

6.0 Traffic Management

The construction will involve the daily vehicle and pedestrian movements within and around the subject site. This will interface with existing vehicle and pedestrian activity within the surrounding areas.

The construction activities will involve increased truck movements for the delivery of materials, transportation of contaminate waste material off site and other associated vehicle movements. While the majority of vehicle

movements will be contained within the construction site, local roads may be impacted with additional vehicle movement associated with the development.

Additional traffic impacts may include localized traffic restrictions and reduce speed areas as Jack Lachlan Drive is currently a 60km/hr road. Prior warning will be given to affected parties and residents prior to temporary restrictions being implemented. A draft Construction Traffic Management Plan will be provided with the application with a final version required as part of the consent conditions. A final Construction Traffic Management Plan for each stage will be developed by a traffic management coordinator and will be submitted to Auckland Transport/Council for approval prior to the commencement of the construction work of each stage.

There is sufficient area for on site for parking is provided for contractors and staff to avoid construction vehicles. The earthworks contractor shall liaise with any traffic control coordinator and all entry and exit from the site shall be in accordance with the Traffic Management Plan (TMP). The TMP is to cover the following as minimum:

- Location plan and traffic details for interface with external connecting roads
- Location plan and traffic movements within the site
- Details of the expected external traffic volumes on surrounding road as a result of Stage 1 of the project
- Proposed traffic management methods including any temporary speed and access restrictions
- Public notification and compliant procedure and safety measures

7.0 Health and Safety

7.1 Site Constraints

The development site borders the Beachlands residential and contains a working Golf Course, this combined with normal earthworks operations pose a number of constraints. The applicant wishes to continue golf course operations whilst undertaking earthworks.

7.2 Responsibilities

Under the Health and Safety at Work Act 2015 (HSWA) all workers are responsible for health and safety on site. Under HSWA the Person Conducting a Business or undertaking (PCBU) provide policies and procedures to ensure worker are safe. Each PCBU is responsible for their own policies and procedures for their staff. Each PCBU shall ensure their own plans align with the Earthworks contractors plans as they will be controlling work area.

Should the Principal and Harrison Grierson Consultants identify hazardous activities without appropriate controls they are to halt site works, inform the Earthworks contractor to arrange for controls to implemented before works recommence.

The guiding principle for Health and Safety responsibility on site is that all workers and responsible for themselves and ensure their work does not harm others in the workplace.

7.3 Site Security

The site will be secured by using appropriate fences with an access gate. It will be locked and secured out of construction hours. Construction warning signs will be installed on the site entrances. All visitors to the site will be required to report to the Site Manager and will be appropriately inducted and registered in a visitor's log book/ electronic record system.

7.4 Public/Contractor Safety

A Site-Specific Safety Plan will be prepared for the project by the Earthworks Contractor. All subcontractors will be required to submit their site specific safety plan prior to the commencement of work on site.

All staff and subcontractor will be required to complete a site-specific induction before the commencement of any work. The induction will cover the aspects relating to safety, emergency evacuation procedures, location of fist aid facilities, site hours, material handling, noise and dust management.

8.0 Emergency Procedures

In order to ensure that legal requirements (including conditions of the resource consent) and the CMP are being complied with, monitoring will be undertaken prior to construction, during construction and after construction to check that the activity specific controls have been implemented and to identify any potential and actual problem and rectify them.

There is a potential that unforeseen events may occur during the construction phase resulting in emergency action being required. All incidents occurred during the construction must be reported immediately to the Client Representative, Harrison Grierson Consultants, Civil Contractors Nominated Representative.

Emergency response and management equipment shall be made available at all time during construction. All staff and subcontractors shall be made aware of the location of the equipment, their responsibilities in emergency response situation and the procedure as part of the site induction.

In the event of a non-compliance with a resource consent condition, other statutory approval or other regulatory requirements and if an incident occurs that results in an adverse effect on environment the following actions shall be undertaken:

- Immediate action must be taken to stabilize the situation where safe to do so (i.e. cease work, deploy spill equipment etc.)
- All spills shall be contained, recovered and disposed appropriately
- Notify Auckland Council, Harrison Grierson Consultants and Civil Contractors Representative immediately
- Any affected parties shall be contacted as soon as practicable if an incident occurs that may affect any land outside the development site
- All necessary steps to mitigate the incident shall be taken. Other external agencies shall be contacted where appropriate.
- An incident report shall be prepared and retained as a record. The report shall include a description and location of the incident, date, time and detail; the likely cause of the incident; mitigation and remedial action taken; preventive action and monitoring results

9.0 Monitoring and Review

In order to ensure that this CMP is being implemented an on-going evaluation during construction is required. Monitoring will be undertaken to check that the activity specific controls have been implemented and to identify any potential or actual problems and rectify them as required.

Scheduled monitoring and performance evaluation is required throughout the construction work to ensure that all the work carried out on site comply with the approved resource consent conditions. The frequency of review is proposed as follows

1. A weekly inspections of site conditions, activities and general compliance with the resource consent condition will be carried out by the Harrison Grierson Consultants.
2. Environment audits will also be undertaken on a monthly basis during the construction period by the Harrison Grierson Consultants and Councils Monitoring Officers.
3. Additional inspections will also be undertaken in response to the following situations:
    - Upon receiving feedback on an environment issue,
    - Extreme weather – site control measures will be inspected immediately before, during and after extreme weather,
    - Immediately following spill or other incident or emergencies

In addition to formal monitoring, the following general site monitoring will be undertaken by the Site Manger on a daily basis:

1. Informal visual inspections in order to check compliance with the CMP and
2. Checking weather forecast and on-site weather conditions and any pre and post-storm inspections as required.

This CMP will be updated throughout the construction programme to reflect any changes to scope, and/or material changes associated with construction techniques or to respond to changes in the natural environment.

10.0 Limitations

10.1 General

This report is for the use Beachlands South Limited Partnership Fast Track Consent application and for Expert consenting panel to consider as part of its consideration of the application only and should not be used or relied upon by any other person or entity or for any other project.

This report has been prepared for the particular project described to us and its extent is limited to the scope of work agreed between the client and Harrison Grierson Consultants Limited. No responsibility is accepted by Harrison Grierson Consultants Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.

Appendix 1c- Flocculation Plan

Chemical Treatment Management Plan-Draft

Beachlands South Fast Track

Harrison Grierson Consultants Limited

Date: 29 May 2026

HG Project no.: A22515591.00

1.0 Introduction

This Sediment Control, Erosion Control and Chemical Treatment Management Plan (CTMP / Flocculation) has been prepared to satisfy the requirements of the Auckland Council for the rain based dosing of a sediment retention ponds proposed to be utilised to treat sediment laden runoff within a 268.11 ha-hectare area of land subject to land disturbing activities located at 110 Jack Lachlan Drive Beachlands.

2.0 Site Details

Site address: 110 Jack Lachlan Drive, 620,712,758 and 770 Whitford Maraetai Road

Legal Description:

Lot 2 DP 501271 -110 Jack Lachlan Drive

Lot 100 DP 504488 - 620 Whitford Maraetai Road

Lot 4 DP 54105 – 712 Whitford Maraetai Road

Lot 9 DP 54105 – 758 Whitford Maraetai Road

Lot 10 DP 54105 – 770 Whitford Maraetai Road

Site Area: 268.1780 ha

Earthworks site Area: 170.4750ha

3.0 Sediment Control Proposal

Prior to the removal of the ground cover and the commencement of the earthworks operation, the following sediment and erosion control measures shall be made operational:

(i) Sediment retention ponds and associated dewatering devices and spillways. All sediment ponds will be provided with the means to be flocculated with Poly Aluminium Chloride (PAC);

(ii) Cut-off drains/bunds;

(iii) Clean water diversion channels/bunds;

(iv) Silt detention fences.

Note, sediment retention ponds will not be dosed with PAC prior to the removal of ground cover / commencement of bulk earthworks operation.
All erosion and sediment control devices are to be constructed in accordance with the approved Sediment Control plans and the Auckland Council Guidance Document 2016/005 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region reprinted August 2023 (GD05)

4.0 Automatic Rain Activated System

The CTMP is based upon a rain activated PAC dosing system.

The system utilises a rainfall catchment tray, with the size determined by the catchment and required chemical dosing rate.

Rainwater captured by the catchment tray is piped into a header tank and then into a 400L displacement tank which floats in a larger chemical reservoir tank containing PAC filled to the level of an outlet pipe which discharges to a dirty water diversion approximately 8 metres upstream of the forebay of the SRP. The greater the rate of rainfall, the greater the rate of rainwater flow into the displacement tank and the greater the flow of PAC into the dirty water diversion. The header tank is designed to provide for no dosing during initial rainfall up to 12mm during dry conditions and for attenuation of PAC flow during the initial stages of a storm and after rain has ceased at the end of a storm event.

Below is a basic arrangment of the Rain activiated system.

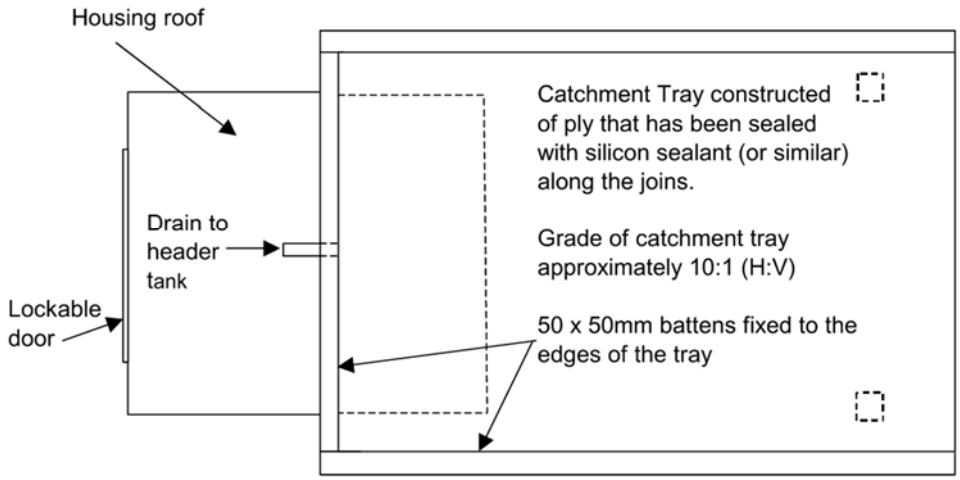

Fig 1: Rainfall Activated Flocculation System Catchment Tray – Plan View

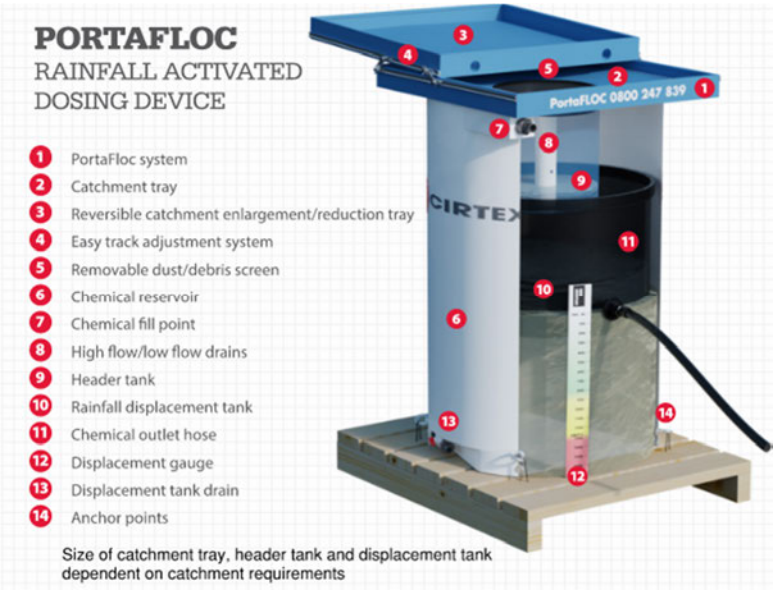

Fig 2 Example Rainfall Activated Flocculation Dosing Detail.

5.0 Batch Dosing Treatment

Under certain circumstances, it may be necessary to apply batch treatment of sediment control devices. Batch treatment requires that the runoff collected in the ponds be held there until the water clarity is satisfactory for it to be released. Batch dosing requires that the decant system be set up so that decants can be temporarily suspended above the water level

5.1 Criteria for Batch Treatment

The criterion to establish the need for batch dosing is the clarity of the water. Clarity is measured using a black disc lowered vertically into the water to be tested. A small black disc of 50-80mm diameter is attached to a 1m long stick with a centimetre scale starting at the disc. The disc is lowered into the water until it disappears, and then is raised until it just reappears. The depth of reappearance is recorded as the clarity of the water.

Water with a clarity of 100mm or greater is considered to be acceptable for discharge. Water with a clarity of less than 60mm should be batch dosed.

If the water has a clarity between 60-100mm after rainfall has ceased it should be left for 48 hours to settle. If the clarity has not reached 100mm after 48 hours, or if water has to be discharged within 48 hours because the pond is full, the stormwater should be batch treated

5.2 Application

The PAC dose should be applied evenly over the surface of the pond as quickly as practicable. It is best to apply the dose in one application, rather than going over the surface of the pond multiple times.

The total PAC dose may be applied in one of two ways.

(i) ***Spray***
The PAC can be applied to the surface of the pond using a sprayer that produces large drops.
(ii) ***Bucket***
Place no more than 1 litre of PAC in a 10 litre bucket, and throw the PAC onto the pond surface so that the PAC divides into drops before hitting the surface.

Following batch treatment and the settlement of the coagulated solids, the pond water can be discharged. Settlement generally requires 1-2 hours.

5.3 Timing of Batch Treatment

As the water in sediment retention ponds often develops marked temperature gradients during the day which can inhibit mixing of PAC, batch treatment shall be carried out in the early morning to optimise mixing of the PAC with the water and the subsequent settlement of coagulated solids.

If there is a possibility that a pond will overflow during a large rainstorm, as a result of surface stormwater inflows, batch treatment can be carried out while it is still raining. The clarity of the water in the pond should be determined, and if the surface clarity is less than 60mm then treatment can be undertaken.

6.0 Erosion and Sediment Control Devices to be treated

The sediment retention ponds and decanting earth bunds to be treated by P.A.C. have been numbered on drawings attached in Appendix D. The devices to be treated and land catchment areas of each are as follows

Table 1: Erosion and Sediment Control Devices to be treated

Device Name	Catchment - Earthworks Area	Device Name	Catchment - Earthworks Area	Device Name	Catchment - Earthworks Area
Pond A	3.9890	Pond AA	1.0164	DEB 20	0.1853
Pond B	2.8822	Pond AB	3.3933	DEB 21	0.2222
Pond C	2.0159	Pond AC	2.0981	DEB 22	0.1320
Pond D	3.7595	Pond AD	2.6339	DEB 23	0.2328
Pond E	1.7086	Pond AE	0.8396	DEB 24	0.2972
Pond F1	1.6643	Pond AF	1.5855	DEB 25	0.2703
Pond F2	2.9952	Pond AG	2.3170	DEB 26	0.1967
Pond F3	2.4061	Pond AH	1.8130	DEB 27	0.2396
Pond G	2.9877	Pond AI	3.2464	DEB 28	0.2829
Pond H	3.9837	Pond AJ	1.0056	DEB 29	0.2577
Pond I	3.6311	DEB 1	0.2812	DEB 30	0.3000
Pond J	0.5990	DEB 2	0.2153	DEB 31	0.0809
Pond K	2.6408	DEB 3	0.2968	DEB 32	0.0800
Pond K2	3.4934	DEB 4	0.2838	DEB 33	0.0704
Pond L	1.5077	DEB 5	0.2995	DEB 34	0.0714
Pond M	3.8263	DEB 6	0.2701	DEB 35	0.1790
Pond N	3.6412	DEB 7	0.2764	DEB 36	0.2898
Pond O	0.9766	DEB 8	0.1791	DEB 37	0.2973

Pond P	1.2865	DEB 9	0.2306	DEB 38	0.3000
Pond Q	3.1032	DEB 10	0.2726	DEB 39	0.2990
Pond R	3.4835	DEB 11	0.1716	DEB 40	0.1092
Pond S	1.9600	DEB 12	0.0951	DEB 41	0.1928
Pond T	3.1955	DEB 13	0.2989	DEB 42	0.2661
Pond U	3.8121	DEB 14	0.196	DEB 43	0.2586
Pond V	3.9834	DEB 15	0.2946	DEB 44	0.2990
Pond W	3.9409	DEB 16	0.2943	DEB 45	0.2998
Pond X	3.9429	DEB 17	0.164	DEB 46	0.1322
Pond Y	3.6956	DEB 18	0.2711	DEB 47	0.1295
Pond Z	1.3434	DEB 19	0.2366	DEB 48	0.0742

7.0 Determination of Dose Required

Due to the toxicity of unreacted aluminium to aquatic life it is desirable to determine the dose of PAC required to achieve effective coagulation and settlement by benching testing the Stormwater runoff from the site preferably near the receiving environment. The dosage regimen required will be determined at the time of pond construction and prior to major stripping of the catchment areas.

The bench testing will determine the P.A.C. level giving optimum coagulation and settlement ensuring that any reduction pH level is acceptable. The initial testing undertaken for LUC 60453761 found the required rates varied from 2ppm to 8ppm Al. For the initial sizing 6ppm has been used and will be verified on site prior to installation.

The dosage rate will determine the catchment tray sizing to be constructed.

This is to be established by a specialist in P.A.C. treatment employed by the contractor

Table 2: Preliminary Catchment Tray Sizings

Device Name	Catchment Tray Sizing	Device Name	Catchment Tray Sizing	Device Name	Catchment Tray Sizing
Pond A	4.49	Pond AA	1.14	DEB 20	0.21
Pond B	3.24	Pond AB	3.82	DEB 21	0.25
Pond C	2.27	Pond AC	2.36	DEB 22	0.15
Pond D	4.23	Pond AD	2.96	DEB 23	0.26
Pond E	1.92	Pond AE	0.94	DEB 24	0.33
Pond F1	1.87	Pond AF	1.78	DEB 25	0.30
Pond F2	3.37	Pond AG	2.61	DEB 26	0.22

Pond F3	2.71	Pond AH	2.04	DEB 27	0.27
Pond G	3.36	Pond AI	3.65	DEB 28	0.32
Pond H	4.48	Pond AJ	1.13	DEB 29	0.29
Pond I	4.08	DEB 1	0.32	DEB 30	0.34
Pond J	0.67	DEB 2	0.24	DEB 31	0.09
Pond K	2.97	DEB 3	0.33	DEB 32	0.09
Pond K2	3.93	DEB 4	0.32	DEB 33	0.08
Pond L	1.70	DEB 5	0.34	DEB 34	0.08
Pond M	4.30	DEB 6	0.30	DEB 35	0.20
Pond N	4.10	DEB 7	0.31	DEB 36	0.33
Pond O	1.10	DEB 8	0.20	DEB 37	0.33
Pond P	1.45	DEB 9	0.26	DEB 38	0.34
Pond Q	3.49	DEB 10	0.31	DEB 39	0.34
Pond R	3.92	DEB 11	0.19	DEB 40	0.12
Pond S	2.20	DEB 12	0.11	DEB 41	0.22
Pond T	3.59	DEB 13	0.34	DEB 42	0.30
Pond U	4.29	DEB 14	0.22	DEB 43	0.29
Pond V	4.48	DEB 15	0.33	DEB 44	0.34
Pond W	4.43	DEB 16	0.33	DEB 45	0.34
Pond X	4.43	DEB 17	0.18	DEB 46	0.15
Pond Y	4.16	DEB 18	0.30	DEB 47	0.15
Pond Z	1.51	DEB 19	0.27	DEB 48	0.08

8.0 Management and Maintenance Requirements for the Chemical Treatment System

8.1 Treatment System Capacity

Each catchment tray system will be set up to treat a minimum of 100mm of rainfall automatically.

8.2 Routine Management and Maintenance

The system will be managed and maintained by:

- Organising the volume of water in the header tank to avoid dosing away the initial stages of rainfall when site conditions are dry and no runoff is to be expected. This is done by siphoning water out of

the header tank to reduce the volume by 50% after 3 days without rain and by 100% after 6 days without rain;

- Observing the water quality in the silt treatment ponds. If the water in a pond is consistently clear, the header tank will be emptied after every rain event, and if the water remains, clear the rain water tray area will be reduced by 30%;
- Refilling the P.A.C. reservoir when the displacement tank reaches 50%. This is done by emptying the displacement tank and refilling the P.A.C. reservoir to the outlet level. A minimum of 4 x 200ℓ drains of P.A.C. are to be kept on site for refilling purposes;
- The contractor will install a rain gauge and record daily rainfall on the record sheet provided (attached);
- Recording all maintenance checks and actions on the record sheet provided (attached);
- Recording all maintenance checks and actions on the record sheet provided (attached); and
- Periodic check of P.A.C. systems and pond water quality.

The specialist will be engaged to conduct site visits at monthly intervals to check treatment systems, pH levels and visual quality of ponds and identify and specify any adjustments to be made.

9.0 Record Keeping and Council Reporting

A copy of all the rainfall and maintenance record for each system will be kept on site. A copy of these records will be provided to AC at the completion of each month should this be requested.

10.0 Responsibility of Monitoring and Maintenance

The civil works contractor will have the primary responsibility for monitoring and maintenance of the chemical treatment systems, for keeping records of rainfall and maintenance actions and forwarding copies of the rainfall and maintenance records to AC following the end of each month.

The specialist will have a supervisory role on any technical issues that may arise and visit the site monthly to check the treatment systems and quality of the water in the ponds to identify and specify changes required.

11.0 Limitations

11.1 General

This report is for the use Beachlands South Limited Partnership Fast Track Consent application and for Expert consenting panel to consider as part of its consideration of the application only and should not be used or relied upon by any other person or entity or for any other project.

This report has been prepared for the particular project described to us and its extent is limited to the scope of work agreed between the client and Harrison Grierson Consultants Limited. No responsibility is accepted by Harrison Grierson Consultants Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.

Appendix A – Monitoring and Maintenance Record

Stormwater Chemical Treatment System Monitoring and Maintenance Record								
Pond No.					**Month**			
Maintenance Person:								
Date	**Rain (mm)**	**CT Visual Check**	**% Header Full**	**Water Depth in Displacement Tank (cm)**	**PAC Tank Filled**	**Water Clarity (cm)**	**Pond Condition Notes (Clear, Slightly Turbid, Moderately Turbid, or Very Turbid) Any Other Problems**	**Initial**
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
13								
14								
15								
16								
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31								

Appendix B – Instructions for Monitoring of PAC Chemical Treatment Systems

A. REDUCING HEADER TANK WATER VOLUME

The header tank is used to regulate dosing during the initial stages of rainfall when site conditions are dry and no runoff is expected.

The volume of water is the header tank is to be lowered using the lowest of the three outlet tubes (drain).

- After 3 days without rainfall – reduce volume to 50%.
- After 6 days without rainfall – empty header tank to level at lowest outlet.

B. REFILLING THE PAC RESERVOIR

The chemical reservoir tank should be refilled when the white displacement tank is half full, or sooner if heavy rainfall is forecast. First, empty the displacement tank (bailing with a bucket or using a hand held pump is effective). Then, refill the chemical reservoir tank until the PAC level is at the lower edge of the outlet pipe.

C. OBSERVATION OF WATER QUALITY IN POND

Pond water quality should be monitored at least on a weekly basis. Clarity should be determined using the "black disk method" and recorded on the monitoring sheet. The pH of pond water should also be tested and recorded on the monitoring sheet. If the pH is less than 5.5, please contact the project manager for advice.

D. PERIODIC SYSTEM CHECKS

The rainfall catchment tray should be checked to see that it is not leaking and that debris (organic or otherwise) has not blocked the outlet of the tray.
The hoses from the header tank should be checked to ensure that they are not blocked.
The chemical dosing point should be checked to ensure that PAC will fall directly onto runoff beneath the pipe. Accumulation of bed load can result in the low flow channel shifting over the course of the earthworks operation.

E. MONITORING RECORDS

A separate sheet is provided for recording the monitoring items for each month. The information to be recorded includes:

<u>VISUAL CHECK</u>
Check the tray, plumbing and header tank hoses for leaks and blockages. Write "OK" if there are no issues or, if maintenance is required, write "M" and note the required maintenance in the "Notes" column.

<u>HEADER TANK WATER LEVEL (%)</u>
This is the distance between the lowest and middle outlet hoses. After more than 12mm of rainfall, this should be at 100% (at the bottom of the middle outlet hose). After less than 12mm of rain, the water level should be somewhere between the hose outlets (i.e. 0% – 100%).

In summer, the water level should be lowered to 50% after 3 days without rainfall. After 6 dry days, the header tank should be drained to 0%.

<u>DISPLACEMENT TANK DEPTH (cm)</u>
Measure depth of water in displacement tank in centimetres. Reduces to 0 when emptied.

PAC VOLUME ADDED

Record the volume of PAC added to the chemical reservoir tank. One drum of PAC is equivalent to 200L. Twenty litres of PAC is equivalent to 9cm of a 200L PAC drum. This can also be calculated from the change in water level in the displacement tank where 1cm = 4L of PAC.

POND CLARITY

Record the depth of pond clarity using the “black disk method” near the pond outlet.

Appendix C – Calculations

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

SEDIMENT POND A

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.989	ha
	stable(x0.6)	0	ha
	Total Area	3.989	Total ha
Catchment Runoff	ha x 500 m³	1994.5	m³
Required PAC	Total s/w m^3	186.93	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	224.31	Litre
Roof Size:	Required Rainwater/50L	4.49	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	53.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

SEDIMENT POND B

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	2.8822	ha
	stable(x0.6)	0	ha
	Total Area	2.8822	Total ha
Catchment Runoff	ha x 500 m³	1441.1	m³
Required PAC	Total s/w m^3	135.06	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	162.07	Litre
Roof Size:	Required Rainwater/50L	3.24	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	38.9	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
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SEDIMENT POND C

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	2.0159	ha
	stable(x0.6)	0	ha
	Total Area	2.0159	Total ha
Catchment Runoff	ha x 500 m³	1007.95	m³
Required PAC	Total s/w m^3	94.47	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	113.36	Litre
Roof Size:	Required Rainwater/50L	2.27	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	27.2	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
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SEDIMENT POND D

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.7595	ha
	stable(x0.6)	0	ha
	Total Area	3.7595	Total ha
Catchment Runoff	ha x 500 m³	1879.75	m³
Required PAC	Total s/w m^3	176.17	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	211.41	Litre
Roof Size:	Required Rainwater/50L	4.23	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	50.7	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND E

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.7086	ha
	stable(x0.6)	0	ha
	Total Area	1.7086	Total ha
Catchment Runoff	ha x 500 m³	854.3	m³
Required PAC	Total s/w m^3	80.07	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	96.08	Litre
Roof Size:	Required Rainwater/50L	1.92	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	23.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND F1

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.6643	ha
	stable(x0.6)	0	ha
	Total Area	1.6643	Total ha
Catchment Runoff	ha x 500 m³	832.15	m³
Required PAC	Total s/w m^3	77.99	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	93.59	Litre
Roof Size:	Required Rainwater/50L	1.87	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	22.5	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND F2

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	2.9952	ha
	stable(x0.6)	0	ha
	Total Area	2.9952	Total ha
Catchment Runoff	ha x 500 m³	1497.6	m³
Required PAC	Total s/w m^3	140.36	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	168.43	Litre
Roof Size:	Required Rainwater/50L	3.37	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	40.4	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND F3

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	2.4061	ha
	stable(x0.6)	0	ha
	Total Area	2.4061	Total ha
Catchment Runoff	ha x 500 m³	1203.05	m³
Required PAC	Total s/w m^3	112.75	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	135.30	Litre
Roof Size:	Required Rainwater/50L	2.71	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	32.5	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND G

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	2.9877	ha
	stable(x0.6)	0	ha
	Total Area	2.9877	Total ha
Catchment Runoff	ha x 500 m³	1493.85	m³
Required PAC	Total s/w m^3	140.00	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	168.01	Litre
Roof Size:	Required Rainwater/50L	3.36	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	40.3	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND H

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.9837	ha
	stable(x0.6)	0	ha
	Total Area	3.9837	Total ha
Catchment Runoff	ha x 500 m³	1991.85	m³
Required PAC	Total s/w m^3	186.68	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	224.01	Litre
Roof Size:	Required Rainwater/50L	4.48	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	53.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND I

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.6311	ha
	stable(x0.6)	0	ha
	Total Area	3.6311	Total ha
Catchment Runoff	ha x 500 m³	1815.55	m³
Required PAC	Total s/w m^3	170.15	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	204.19	Litre
Roof Size:	Required Rainwater/50L	4.08	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	49.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND J

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.599	ha
	stable(x0.6)	0	ha
	Total Area	0.599	Total ha
Catchment Runoff	ha x 500 m³	299.5	m³
Required PAC	Total s/w m^3	28.07	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	33.68	Litre
Roof Size:	Required Rainwater/50L	0.67	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	8.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND K

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	2.6408	ha
	stable(x0.6)	0	ha
	Total Area	2.6408	Total ha
Catchment Runoff	ha x 500 m³	1320.4	m³
Required PAC	Total s/w m^3	123.75	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	148.50	Litre
Roof Size:	Required Rainwater/50L	2.97	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	35.6	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND K2

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.4934	ha
	stable(x0.6)	0	ha
	Total Area	3.4934	Total ha
Catchment Runoff	ha x 500 m³	1746.7	m³
Required PAC	Total s/w m^3	163.70	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	196.44	Litre
Roof Size:	Required Rainwater/50L	3.93	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	47.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND L

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.5077	ha
	stable(x0.6)	0	ha
	Total Area	1.5077	Total ha
Catchment Runoff	ha x 500 m³	753.85	m³
Required PAC	Total s/w m^3	70.65	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	84.78	Litre
Roof Size:	Required Rainwater/50L	1.70	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	20.3	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND M

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.8263	ha
	stable(x0.6)	0	ha
	Total Area	3.8263	Total ha
Catchment Runoff	ha x 500 m³	1913.15	m³
Required PAC	Total s/w m^3	179.30	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	215.16	Litre
Roof Size:	Required Rainwater/50L	4.30	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	51.6	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND N

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.6412	ha
	stable(x0.6)	0	ha
	Total Area	3.6412	Total ha
Catchment Runoff	ha x 500 m³	1820.6	m³
Required PAC	Total s/w m^3	170.63	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	204.75	Litre
Roof Size:	Required Rainwater/50L	4.10	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	49.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND O

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.9766	ha
	stable(x0.6)	0	ha
	Total Area	0.9766	Total ha
Catchment Runoff	ha x 500 m³	488.3	m³
Required PAC	Total s/w m^3	45.76	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	54.92	Litre
Roof Size:	Required Rainwater/50L	1.10	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	13.2	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND P

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.2865	ha
	stable(x0.6)	0	ha
	Total Area	1.2865	Total ha
Catchment Runoff	ha x 500 m³	643.25	m³
Required PAC	Total s/w m^3	60.29	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	72.34	Litre
Roof Size:	Required Rainwater/50L	1.45	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	17.4	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND Q

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.1032	ha
	stable(x0.6)	0	ha
	Total Area	3.1032	Total ha
Catchment Runoff	ha x 500 m³	1551.6	m³
Required PAC	Total s/w m^3	145.42	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	174.50	Litre
Roof Size:	Required Rainwater/50L	3.49	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	41.9	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND R

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.4835	ha
	stable(x0.6)	0	ha
	Total Area	3.4835	Total ha
Catchment Runoff	ha x 500 m³	1741.75	m³
Required PAC	Total s/w m^3	163.24	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	195.89	Litre
Roof Size:	Required Rainwater/50L	3.92	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	47.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND S

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.96	ha
	stable(x0.6)	0	ha
	Total Area	1.96	Total ha
Catchment Runoff	ha x 500 m³	980	m³
Required PAC	Total s/w m^3	91.85	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	110.22	Litre
Roof Size:	Required Rainwater/50L	2.20	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	26.5	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND T

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.1955	ha
	stable(x0.6)	0	ha
	Total Area	3.1955	Total ha
Catchment Runoff	ha x 500 m³	1597.75	m³
Required PAC	Total s/w m^3	149.74	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	179.69	Litre
Roof Size:	Required Rainwater/50L	3.59	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	43.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND U

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.8121	ha
	stable(x0.6)	0	ha
	Total Area	3.8121	Total ha
Catchment Runoff	ha x 500 m³	1906.05	m³
Required PAC	Total s/w m^3	178.64	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	214.36	Litre
Roof Size:	Required Rainwater/50L	4.29	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	51.4	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND V

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.9834	ha
	stable(x0.6)	0	ha
	Total Area	3.9834	Total ha
Catchment Runoff	ha x 500 m³	1991.7	m³
Required PAC	Total s/w m^3	186.66	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	224.00	Litre
Roof Size:	Required Rainwater/50L	4.48	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	53.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND W

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.9409	ha
	stable(x0.6)	0	ha
	Total Area	3.9409	Total ha
Catchment Runoff	ha x 500 m³	1970.45	m³
Required PAC	Total s/w m^3	184.67	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	221.61	Litre
Roof Size:	Required Rainwater/50L	4.43	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	53.2	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND X

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.9429	ha
	stable(x0.6)	0	ha
	Total Area	3.9429	Total ha
Catchment Runoff	ha x 500 m³	1971.45	m³
Required PAC	Total s/w m^3	184.77	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	221.72	Litre
Roof Size:	Required Rainwater/50L	4.43	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	53.2	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

SEDIMENT POND Y

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.6956	ha
	stable(x0.6)	0	ha
	Total Area	3.6956	Total ha
Catchment Runoff	ha x 500 m³	1847.8	m³
Required PAC	Total s/w m^3	173.18	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	207.81	Litre
Roof Size:	Required Rainwater/50L	4.16	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	49.9	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND Z

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.3434	ha
	stable(x0.6)	0	ha
	Total Area	1.3434	Total ha
Catchment Runoff	ha x 500 m³	671.7	m³
Required PAC	Total s/w m^3	62.95	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	75.54	Litre
Roof Size:	Required Rainwater/50L	1.51	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	18.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
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SEDIMENT POND AA

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.0164	ha
	stable(x0.6)	0	ha
	Total Area	1.0164	Total ha
Catchment Runoff	ha x 500 m³	508.2	m³
Required PAC	Total s/w m^3	47.63	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	57.15	Litre
Roof Size:	Required Rainwater/50L	1.14	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	13.7	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND AB

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.3933	ha
	stable(x0.6)	0	ha
	Total Area	3.3933	Total ha
Catchment Runoff	ha x 500 m³	1696.65	m³
Required PAC	Total s/w m^3	159.01	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	190.81	Litre
Roof Size:	Required Rainwater/50L	3.82	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	45.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND AC

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	2.0981	ha
	stable(x0.6)	0	ha
	Total Area	2.0981	Total ha
Catchment Runoff	ha x 500 m³	1049.05	m³
Required PAC	Total s/w m^3	98.32	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	117.98	Litre
Roof Size:	Required Rainwater/50L	2.36	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	28.3	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND AD

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	2.6339	ha
	stable(x0.6)	0	ha
	Total Area	2.6339	Total ha
Catchment Runoff	ha x 500 m³	1316.95	m³
Required PAC	Total s/w m^3	123.43	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	148.11	Litre
Roof Size:	Required Rainwater/50L	2.96	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	35.5	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND AE

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.8396	ha
	stable(x0.6)	0	ha
	Total Area	0.8396	Total ha
Catchment Runoff	ha x 500 m³	419.8	m³
Required PAC	Total s/w m^3	39.34	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	47.21	Litre
Roof Size:	Required Rainwater/50L	0.94	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	11.3	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND AF

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.5855	ha
	stable(x0.6)	0	ha
	Total Area	1.5855	Total ha
Catchment Runoff	ha x 500 m³	792.75	m³
Required PAC	Total s/w m^3	74.30	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	89.16	Litre
Roof Size:	Required Rainwater/50L	1.78	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	21.4	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND AG

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	2.317	ha
	stable(x0.6)	0	ha
	Total Area	2.317	Total ha
Catchment Runoff	ha x 500 m³	1158.5	m³
Required PAC	Total s/w m^3	108.58	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	130.29	Litre
Roof Size:	Required Rainwater/50L	2.61	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	31.3	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND AH

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.813	ha
	stable(x0.6)	0	ha
	Total Area	1.813	Total ha
Catchment Runoff	ha x 500 m³	906.5	m³
Required PAC	Total s/w m^3	84.96	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	101.95	Litre
Roof Size:	Required Rainwater/50L	2.04	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	24.5	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND AI

RAINFALL TRAY SIZING

Dose rate. *AI/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	3.2464	ha
	stable(x0.6)	0	ha
	Total Area	3.2464	Total ha
Catchment Runoff	ha x 500 m³	1623.2	m³
Required PAC	Total s/w m^3	152.13	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	182.55	Litre
Roof Size:	Required Rainwater/50L	3.65	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	43.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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SEDIMENT POND AJ

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	1.0056	ha
	stable(x0.6)	0	ha
	Total Area	1.0056	Total ha
Catchment Runoff	ha x 500 m³	502.8	m³
Required PAC	Total s/w m^3	47.12	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	56.55	Litre
Roof Size:	Required Rainwater/50L	1.13	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	13.6	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 1

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2812	ha
	stable(x0.6)	0	ha
	Total Area	0.2812	Total ha
Catchment Runoff	ha x 500 m³	140.6	m³
Required PAC	Total s/w m^3	13.18	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	15.81	Litre
Roof Size:	Required Rainwater/50L	0.32	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 2

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2153	ha
	stable(x0.6)	0	ha
	Total Area	0.2153	Total ha
Catchment Runoff	ha x 500 m³	107.65	m³
Required PAC	Total s/w m^3	10.09	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	12.11	Litre
Roof Size:	Required Rainwater/50L	0.24	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	2.9	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 3

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2968	ha
	stable(x0.6)	0	ha
	Total Area	0.2968	Total ha
Catchment Runoff	ha x 500 m³	148.4	m³
Required PAC	Total s/w m^3	13.91	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.69	Litre
Roof Size:	Required Rainwater/50L	0.33	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 4

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2838	ha
	stable(x0.6)	0	ha
	Total Area	0.2838	Total ha
Catchment Runoff	ha x 500 m³	141.9	m³
Required PAC	Total s/w m^3	13.30	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	15.96	Litre
Roof Size:	Required Rainwater/50L	0.32	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 5

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2995	ha
	stable(x0.6)	0	ha
	Total Area	0.2995	Total ha
Catchment Runoff	ha x 500 m³	149.75	m³
Required PAC	Total s/w m^3	14.03	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.84	Litre
Roof Size:	Required Rainwater/50L	0.34	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 6

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2701	ha
	stable(x0.6)	0	ha
	Total Area	0.2701	Total ha
Catchment Runoff	ha x 500 m³	135.05	m³
Required PAC	Total s/w m^3	12.66	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	15.19	Litre
Roof Size:	Required Rainwater/50L	0.30	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.6	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 7

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2764	ha
	stable(x0.6)	0	ha
	Total Area	0.2764	Total ha
Catchment Runoff	ha x 500 m³	138.2	m³
Required PAC	Total s/w m^3	12.95	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	15.54	Litre
Roof Size:	Required Rainwater/50L	0.31	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.7	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 8

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.1791	ha
	stable(x0.6)	0	ha
	Total Area	0.1791	Total ha
Catchment Runoff	ha x 500 m³	89.55	m³
Required PAC	Total s/w m^3	8.39	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	10.07	Litre
Roof Size:	Required Rainwater/50L	0.20	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	2.4	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 9

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2306	ha
	stable(x0.6)	0	ha
	Total Area	0.2306	Total ha
Catchment Runoff	ha x 500 m³	115.3	m³
Required PAC	Total s/w m^3	10.81	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	12.97	Litre
Roof Size:	Required Rainwater/50L	0.26	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 10

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2726	ha
	stable(x0.6)	0	ha
	Total Area	0.2726	Total ha
Catchment Runoff	ha x 500 m³	136.3	m³
Required PAC	Total s/w m^3	12.77	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	15.33	Litre
Roof Size:	Required Rainwater/50L	0.31	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.7	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 11

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.1716	ha
	stable(x0.6)	0	ha
	Total Area	0.1716	Total ha
Catchment Runoff	ha x 500 m³	85.8	m³
Required PAC	Total s/w m^3	8.04	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	9.65	Litre
Roof Size:	Required Rainwater/50L	0.19	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	2.3	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 12

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.0951	ha
	stable(x0.6)	0	ha
	Total Area	0.0951	Total ha
Catchment Runoff	ha x 500 m³	47.55	m³
Required PAC	Total s/w m^3	4.46	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	5.35	Litre
Roof Size:	Required Rainwater/50L	0.11	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.3	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 13

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2989	ha
	stable(x0.6)	0	ha
	Total Area	0.2989	Total ha
Catchment Runoff	ha x 500 m³	149.45	m³
Required PAC	Total s/w m^3	14.01	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.81	Litre
Roof Size:	Required Rainwater/50L	0.34	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 14

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.196	ha
	stable(x0.6)	0	ha
	Total Area	0.196	Total ha
Catchment Runoff	ha x 500 m³	98	m³
Required PAC	Total s/w m^3	9.18	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	11.02	Litre
Roof Size:	Required Rainwater/50L	0.22	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	2.6	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

DEB 15

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2946	ha
	stable(x0.6)	0	ha
	Total Area	0.2946	Total ha
Catchment Runoff	ha x 500 m³	147.3	m³
Required PAC	Total s/w m^3	13.81	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.57	Litre
Roof Size:	Required Rainwater/50L	0.33	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
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DEB 16

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2943	ha
	stable(x0.6)	0	ha
	Total Area	0.2943	Total ha
Catchment Runoff	ha x 500 m³	147.15	m³
Required PAC	Total s/w m^3	13.79	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.55	Litre
Roof Size:	Required Rainwater/50L	0.33	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 17

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.164	ha
	stable(x0.6)	0	ha
	Total Area	0.164	Total ha
Catchment Runoff	ha x 500 m³	82	m³
Required PAC	Total s/w m^3	7.69	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	9.22	Litre
Roof Size:	Required Rainwater/50L	0.18	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	2.2	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 18

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2711	ha
	stable(x0.6)	0	ha
	Total Area	0.2711	Total ha
Catchment Runoff	ha x 500 m³	135.55	m³
Required PAC	Total s/w m^3	12.70	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	15.24	Litre
Roof Size:	Required Rainwater/50L	0.30	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.7	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 19

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2366	ha
	stable(x0.6)	0	ha
	Total Area	0.2366	Total ha
Catchment Runoff	ha x 500 m³	118.3	m³
Required PAC	Total s/w m^3	11.09	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	13.30	Litre
Roof Size:	Required Rainwater/50L	0.27	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.2	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 20

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.1853	ha
	stable(x0.6)	0	ha
	Total Area	0.1853	Total ha
Catchment Runoff	ha x 500 m³	92.65	m³
Required PAC	Total s/w m^3	8.68	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	10.42	Litre
Roof Size:	Required Rainwater/50L	0.21	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	2.5	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 21

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2222	ha
	stable(x0.6)	0	ha
	Total Area	0.2222	Total ha
Catchment Runoff	ha x 500 m³	111.1	m³
Required PAC	Total s/w m^3	10.41	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	12.49	Litre
Roof Size:	Required Rainwater/50L	0.25	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 22

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.132	ha
	stable(x0.6)	0	ha
	Total Area	0.132	Total ha
Catchment Runoff	ha x 500 m³	66	m³
Required PAC	Total s/w m^3	6.19	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	7.42	Litre
Roof Size:	Required Rainwater/50L	0.15	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 23

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2328	ha
	stable(x0.6)	0	ha
	Total Area	0.2328	Total ha
Catchment Runoff	ha x 500 m³	116.4	m³
Required PAC	Total s/w m^3	10.91	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	13.09	Litre
Roof Size:	Required Rainwater/50L	0.26	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 24

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2972	ha
	stable(x0.6)	0	ha
	Total Area	0.2972	Total ha
Catchment Runoff	ha x 500 m³	148.6	m³
Required PAC	Total s/w m^3	13.93	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.71	Litre
Roof Size:	Required Rainwater/50L	0.33	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 25

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2703	ha
	stable(x0.6)	0	ha
	Total Area	0.2703	Total ha
Catchment Runoff	ha x 500 m³	135.15	m³
Required PAC	Total s/w m^3	12.67	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	15.20	Litre
Roof Size:	Required Rainwater/50L	0.30	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.6	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 26

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.1967	ha
	stable(x0.6)	0	ha
	Total Area	0.1967	Total ha
Catchment Runoff	ha x 500 m³	98.35	m³
Required PAC	Total s/w m^3	9.22	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	11.06	Litre
Roof Size:	Required Rainwater/50L	0.22	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	2.7	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 27

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2396	ha
	stable(x0.6)	0	ha
	Total Area	0.2396	Total ha
Catchment Runoff	ha x 500 m³	119.8	m³
Required PAC	Total s/w m^3	11.23	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	13.47	Litre
Roof Size:	Required Rainwater/50L	0.27	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.2	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 28

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2829	ha
	stable(x0.6)	0	ha
	Total Area	0.2829	Total ha
Catchment Runoff	ha x 500 m³	141.45	m³
Required PAC	Total s/w m^3	13.26	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	15.91	Litre
Roof Size:	Required Rainwater/50L	0.32	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 29

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2577	ha
	stable(x0.6)	0	ha
	Total Area	0.2577	Total ha
Catchment Runoff	ha x 500 m³	128.85	m³
Required PAC	Total s/w m^3	12.08	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	14.49	Litre
Roof Size:	Required Rainwater/50L	0.29	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.5	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 30

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.3	ha
	stable(x0.6)	0	ha
	Total Area	0.3	Total ha
Catchment Runoff	ha x 500 m³	150	m³
Required PAC	Total s/w m^3	14.06	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.87	Litre
Roof Size:	Required Rainwater/50L	0.34	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 31

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.0809	ha
	stable(x0.6)	0	ha
	Total Area	0.0809	Total ha
Catchment Runoff	ha x 500 m³	40.45	m³
Required PAC	Total s/w m^3	3.79	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	4.55	Litre
Roof Size:	Required Rainwater/50L	0.09	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 32

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.08	ha
	stable(x0.6)	0	ha
	Total Area	0.08	Total ha
Catchment Runoff	ha x 500 m³	40	m³
Required PAC	Total s/w m^3	3.75	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	4.50	Litre
Roof Size:	Required Rainwater/50L	0.09	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.1	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 33

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.0704	ha
	stable(x0.6)	0	ha
	Total Area	0.0704	Total ha
Catchment Runoff	ha x 500 m³	35.2	m³
Required PAC	Total s/w m^3	3.30	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	3.96	Litre
Roof Size:	Required Rainwater/50L	0.08	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 34

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.0714	ha
	stable(x0.6)	0	ha
	Total Area	0.0714	Total ha
Catchment Runoff	ha x 500 m³	35.7	m³
Required PAC	Total s/w m^3	3.35	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	4.01	Litre
Roof Size:	Required Rainwater/50L	0.08	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 35

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.179	ha
	stable(x0.6)	0	ha
	Total Area	0.179	Total ha
Catchment Runoff	ha x 500 m³	89.5	m³
Required PAC	Total s/w m^3	8.39	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	10.07	Litre
Roof Size:	Required Rainwater/50L	0.20	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	2.4	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 36

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2898	ha
	stable(x0.6)	0	ha
	Total Area	0.2898	Total ha
Catchment Runoff	ha x 500 m³	144.9	m³
Required PAC	Total s/w m^3	13.58	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.30	Litre
Roof Size:	Required Rainwater/50L	0.33	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.9	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 37

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2973	ha
	stable(x0.6)	0	ha
	Total Area	0.2973	Total ha
Catchment Runoff	ha x 500 m³	148.65	m³
Required PAC	Total s/w m^3	13.93	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.72	Litre
Roof Size:	Required Rainwater/50L	0.33	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 38

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.3	ha
	stable(x0.6)	0	ha
	Total Area	0.3	Total ha
Catchment Runoff	ha x 500 m³	150	m³
Required PAC	Total s/w m^3	14.06	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.87	Litre
Roof Size:	Required Rainwater/50L	0.34	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 39

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.299	ha
	stable(x0.6)	0	ha
	Total Area	0.299	Total ha
Catchment Runoff	ha x 500 m³	149.5	m³
Required PAC	Total s/w m^3	14.01	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.81	Litre
Roof Size:	Required Rainwater/50L	0.34	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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DEB 40

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.1092	ha
	stable(x0.6)	0	ha
	Total Area	0.1092	Total ha
Catchment Runoff	ha x 500 m³	54.6	m³
Required PAC	Total s/w m^3	5.12	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	6.14	Litre
Roof Size:	Required Rainwater/50L	0.12	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.5	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

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Office / Region:	Auckland	Approved By	CJM

DEB 41

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.1928	ha
	stable(x0.6)	0	ha
	Total Area	0.1928	Total ha
Catchment Runoff	ha x 500 m³	96.4	m³
Required PAC	Total s/w m^3	9.03	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	10.84	Litre
Roof Size:	Required Rainwater/50L	0.22	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	2.6	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

DEB 42

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2661	ha
	stable(x0.6)	0	ha
	Total Area	0.2661	Total ha
Catchment Runoff	ha x 500 m³	133.05	m³
Required PAC	Total s/w m^3	12.47	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	14.96	Litre
Roof Size:	Required Rainwater/50L	0.30	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.6	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

DEB 43

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2586	ha
	stable(x0.6)	0	ha
	Total Area	0.2586	Total ha
Catchment Runoff	ha x 500 m³	129.3	m³
Required PAC	Total s/w m^3	12.12	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	14.54	Litre
Roof Size:	Required Rainwater/50L	0.29	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	3.5	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

DEB 44

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.299	ha
	stable(x0.6)	0	ha
	Total Area	0.299	Total ha
Catchment Runoff	ha x 500 m³	149.5	m³
Required PAC	Total s/w m^3	14.01	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.81	Litre
Roof Size:	Required Rainwater/50L	0.34	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

DEB 45

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.2998	ha
	stable(x0.6)	0	ha
	Total Area	0.2998	Total ha
Catchment Runoff	ha x 500 m³	149.9	m³
Required PAC	Total s/w m^3	14.05	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	16.86	Litre
Roof Size:	Required Rainwater/50L	0.34	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	4.0	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

DEB 46

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.1322	ha
	stable(x0.6)	0	ha
	Total Area	0.1322	Total ha
Catchment Runoff	ha x 500 m³	66.1	m³
Required PAC	Total s/w m^3	6.19	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	7.43	Litre
Roof Size:	Required Rainwater/50L	0.15	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.8	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

DEB 47

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.1295	ha
	stable(x0.6)	0	ha
	Total Area	0.1295	Total ha
Catchment Runoff	ha x 500 m³	64.75	m³
Required PAC	Total s/w m^3	6.07	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	7.28	Litre
Roof Size:	Required Rainwater/50L	0.15	m²

HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.7	Litre area of tank base

PAC FLOCCULATION CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	2/06/2026
Project No:	A.2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	CJM

DEB 48

RAINFALL TRAY SIZING

Dose rate. *Al/L* runoff		6.0	mg/l
1 Litre PAC at this dose will treat m³ s/w		10.67	m³ s/w
Catchment Area	bare	0.0742	ha
	stable(x0.6)	0	ha
	Total Area	0.0742	Total ha
Catchment Runoff	ha x 500 m³	37.1	m³
Required PAC	Total s/w m^3	3.48	LPAC
	s/w treated per L PAC		
Required Rainwater	LPAC x 1.2	4.17	Litre
Roof Size:	Required Rainwater/50L	0.08	m²

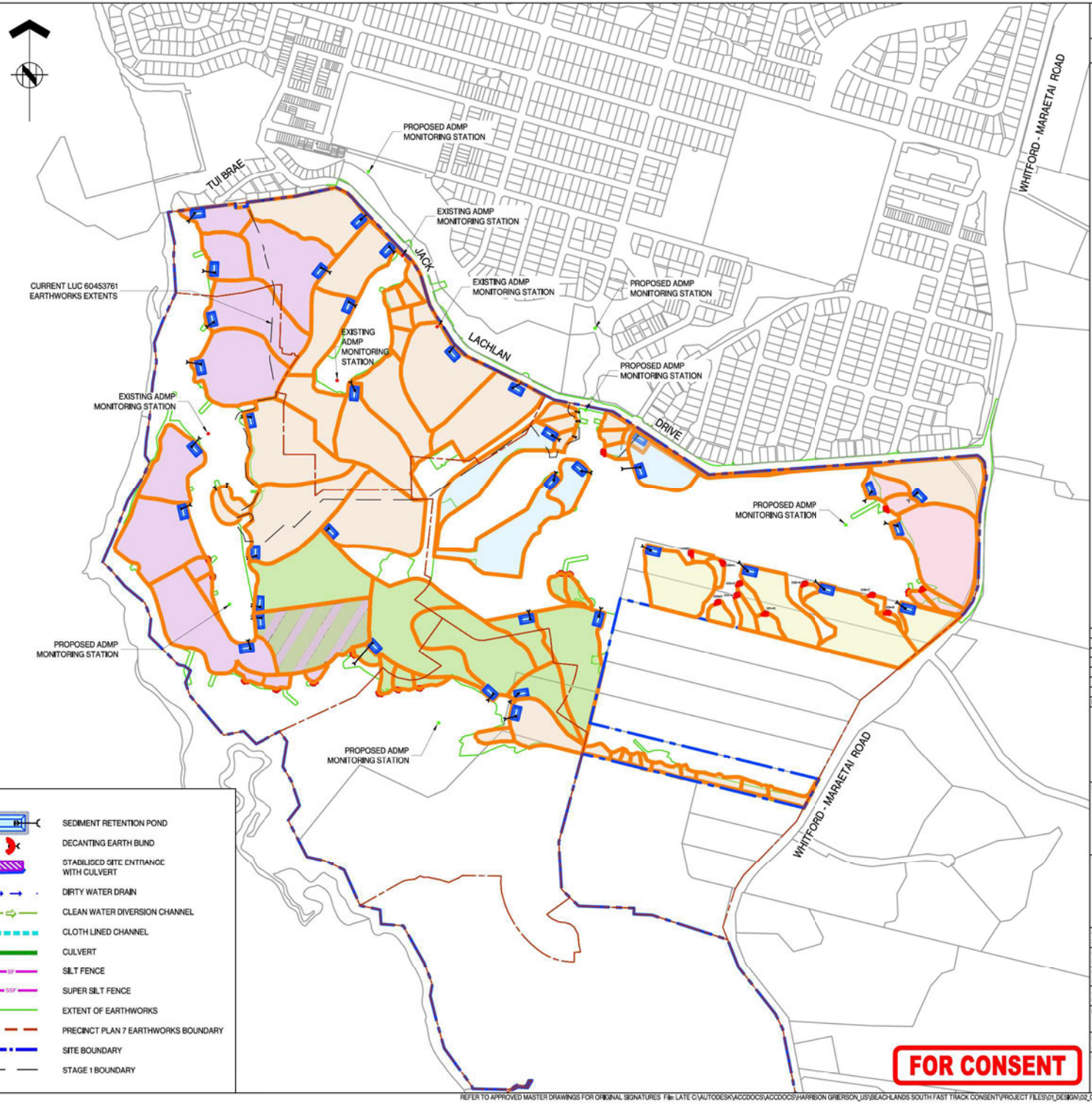
HEADER TANK

For the catchment the low flow pipe level should be set at

Roof size x 12	1.0	Litre area of tank base

Appendix D - Sediment and Erosion Control Plans

EROSION AND SEDIMENTATION POND	STAGE	AREA (ha)
POND A	1	3.9890 ha
POND B	1	2.8822 ha
POND C	1	2.0159 ha
POND D	1	3.7595 ha
POND E	1	1.7086 ha
POND F1	1	1.6643 ha
POND F2	1	2.9952 ha
POND F3	1	2.4061 ha
POND G	1	2.9877 ha
POND H	1	3.9837 ha
POND I	1	3.6311 ha
POND J	1	0.5990 ha
POND K	1	2.6408 ha
POND K2	2	3.4934 ha
POND L	1	1.5077 ha
POND M	2	3.8263 ha
POND N	3	3.6412 ha
POND O	3	0.9766 ha
POND P	3	1.2865 ha
POND Q	3	3.1032 ha
POND R	3	3.4835 ha
POND S	3	1.9600 ha
POND T	3	3.1955 ha
POND U	3	3.8121 ha
POND V	3 & 4	3.9834 ha
POND W	4	3.9409 ha
POND X	4	3.9429 ha
POND Y	4	3.6956 ha
POND Z	4	1.3434 ha
POND AA	4	1.0164 ha
POND AB	4	3.3933 ha
POND AC	5	2.0981 ha
POND AD	5	2.6339 ha
POND AE	5	0.8396 ha
POND AF	5	1.5855 ha
POND AG	6	2.3174 ha
POND AH	6	1.8130 ha
POND AI	6	3.2464 ha
POND AJ	6	1.0056 ha



LEGEND

- CATCHMENT BOUNDARY
- ESC - STAGE 1
- ESC - STAGE 2
- ESC - STAGE 3
- ESC - STAGE 4
- ESC-STAGE 5
- ESC-STAGE 6
- ESC-PREVIOUS STAGE
- STABILISED AREA
- EXISTING FRESHWATER ADMP MONITORING SITE
- PROPOSED FRESHWATER ADMP MONITORING SITE
- SEDIMENT RETENTION POND
- DECANTING EARTH BUND
- STABILISED SITE ENTRANCE WITH CULVERT
- DIRTY WATER DRAIN
- CLEAN WATER DIVERSION CHANNEL
- CLOTH LINED CHANNEL
- CULVERT
- SILT FENCE
- SUPER SILT FENCE
- EXTENT OF EARTHWORKS
- PRECINCT PLAN 7 EARTHWORKS BOUNDARY
- SITE BOUNDARY
- STAGE 1 BOUNDARY

FOR CONSENT

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND — ISO 9001 QUALITY ASSURED

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NOTES

1. ALL WORKS TO COMPLY WITH AUCKLAND COUNCIL ENGINEERING QUALITY STANDARDS AND ALL MATERIALS TO COMPLY WITH AUCKLAND COUNCIL REQUIREMENTS.
2. ALL EROSION AND SEDIMENT CONTROL MEASURES MUST BE OPERATIONAL PRIOR TO ANY WORKS COMMENCING.
3. A COPY OF THE SEDIMENT CONTROL PLAN SHALL BE AVAILABLE ON THE SITE DURING WORK HOURS AND ALL PERSONNEL INVOLVED IN EARTHWORK ACTIVITIES ON THE SITE (INCLUSIVE OF SUB-CONTRACTORS) SHALL BE FAMILIAR WITH THE PLAN REQUIREMENTS AS THEY RELATE TO EROSION AND SEDIMENT CONTROL.
4. ALL "CLEANWATER" RUNOFF FROM STABILISED SURFACES INCLUDING CATCHMENT AREAS ABOVE THE SITE SHALL BE DIVERTED AWAY FROM EARTHWORK AREA VIA STABILISED SYSTEM, SO AS TO PREVENT SURFACE EROSION.
5. ALL EROSION AND SEDIMENT CONTROL SHALL COMPLY WITH THE "EROSION AND SEDIMENT CONTROL GUIDE FOR LAND DISTURBING ACTIVITIES IN THE AUCKLAND REGION" ARC GUIDELINE DOCUMENT 2016/005 UPDATED JUNE 2016 AND ANY AMENDMENTS TO THIS DOCUMENT. (COPY AVAILABLE FROM AUCKLAND COUNCIL UPON REQUEST).
6. THE MAIN SILT CONTROL MEASURE FOR THIS SITE ARE:
   - 6.1. DIVERSION OF "CLEANWATER" FROM THE ABOVE CATCHMENTS AROUND THE EARTHWORKS AREA BY MEANS OF DIVERSION DRAINS AND/OR OTHER APPROVED METHOD.
   - 6.2. REMOVAL OF SEDIMENT FROM SILT LADEN WATERS USING "SILT FENCES".
   - 6.3. THAT THE SITE BE STABILISED AGAINST EROSION AS SOON AS PRACTICABLE AND IN A PROGRESSIVE MANNER AS EARTHWORKS ARE FINISHED OVER VARIOUS AREAS OF THE SITE.
   - 6.4. MAINTENANCE OF ALL SEDIMENT CONTROL FACILITIES AS REQUIRED.
   - 6.5. CUT-OFF DRAINS TO BE INSTALLED AT THE MAXIMUM INTERVAL OF 50m AT THE END OF EACH DAY TILL SLOPE STABILISED.
   - 6.6. SUPER SILT FENCES.
7. FURTHER SEDIMENT CONTROL WORKS MAY BE REQUIRED BY THE ENGINEER AS THE PROJECT ADVANCES. THESE WILL BE INSTALLED AS AND WHERE DIRECTED BY THE ENGINEER. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ENSURING THAT THE SITE HAS EFFECTIVE SILT DETENTION FACILITIES OPERATING AT ALL TIMES.
8. EARTHWORKS TO BE MANAGED TO ENSURE THAT MAXIMUM OPEN CATCHMENT AREA DRAINING TO SUPER SILT FENCES TO BE 1000m².
9. BULK EARTHWORKS CANNOT COMMENCE UNTIL ALL SEC ARE IN PLACE, AS BUILT APPROVED BY COUNCIL AND A WALK OVER HELD WITH AC AND ENGINEER.
10. MAXIMUM EXPOSED AREA FOR EARTHWORKS ACTIVITIES =
    100.0916 ha (CATCHMENTS A-AF + 1-39)
    TOTAL SITE AREA = 175.2268 ha

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

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PROJECT:
BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:
EROSION AND SEDIMENT CONTROL
OVERALL PLAN

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No.	SCALES	
A2515591.00	A1 1:5000 A3 1:10000	A1

DRAWING No: A2515591.00-2150 — REV A

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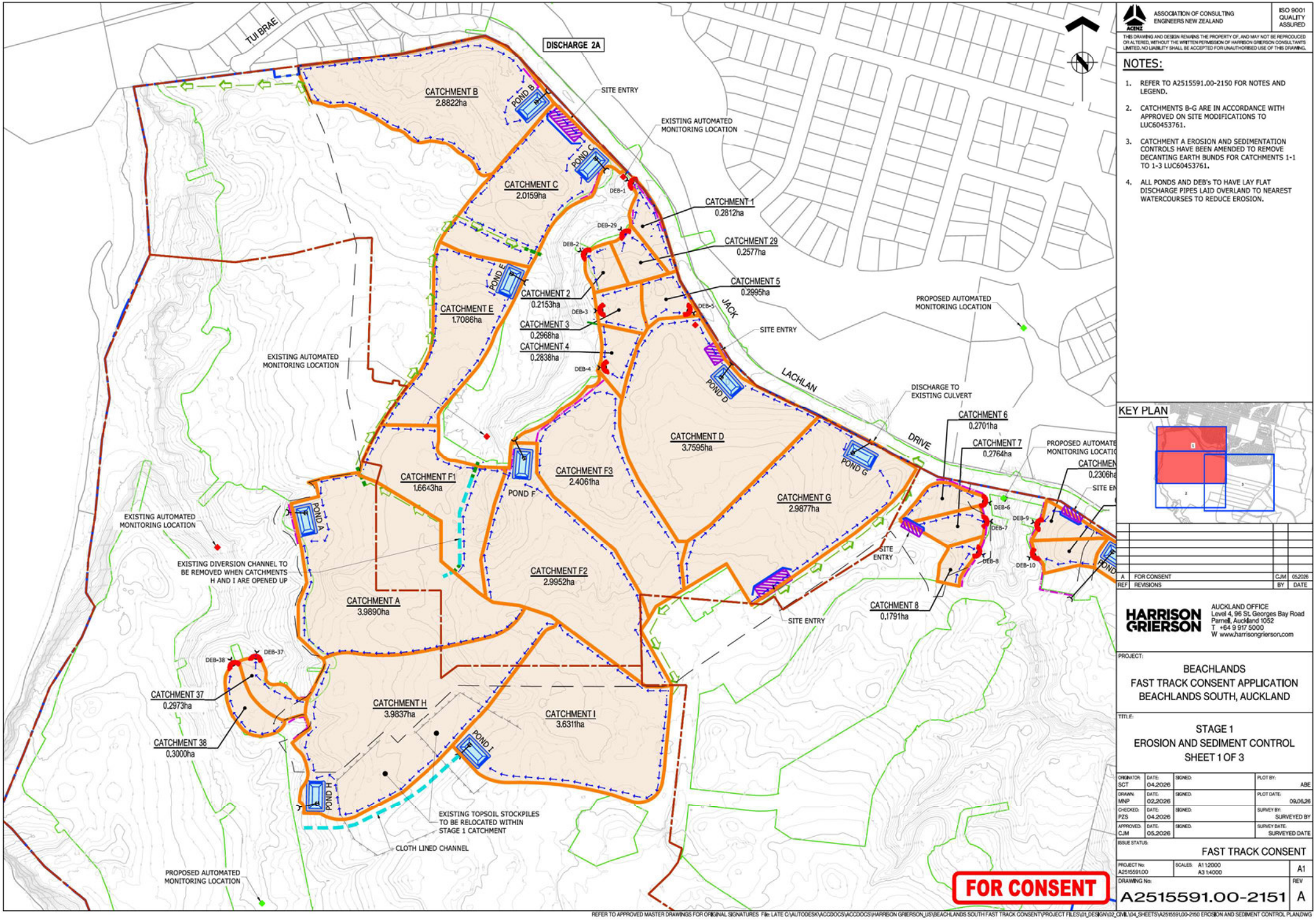

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

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NOTES:

1. REFER TO A2515591.00-2150 FOR NOTES AND LEGEND.
2. CATCHMENTS B-G ARE IN ACCORDANCE WITH APPROVED ON SITE MODIFICATIONS TO LUC60453761.
3. CATCHMENT A EROSION AND SEDIMENTATION CONTROLS HAVE BEEN AMENDED TO REMOVE DECANTING EARTH BUNDS FOR CATCHMENTS 1-1 TO 1-3 LUC60453761.
4. ALL PONDS AND DEB'S TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

HARRISON GRIERSON

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 1
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS:

FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2151		REV A

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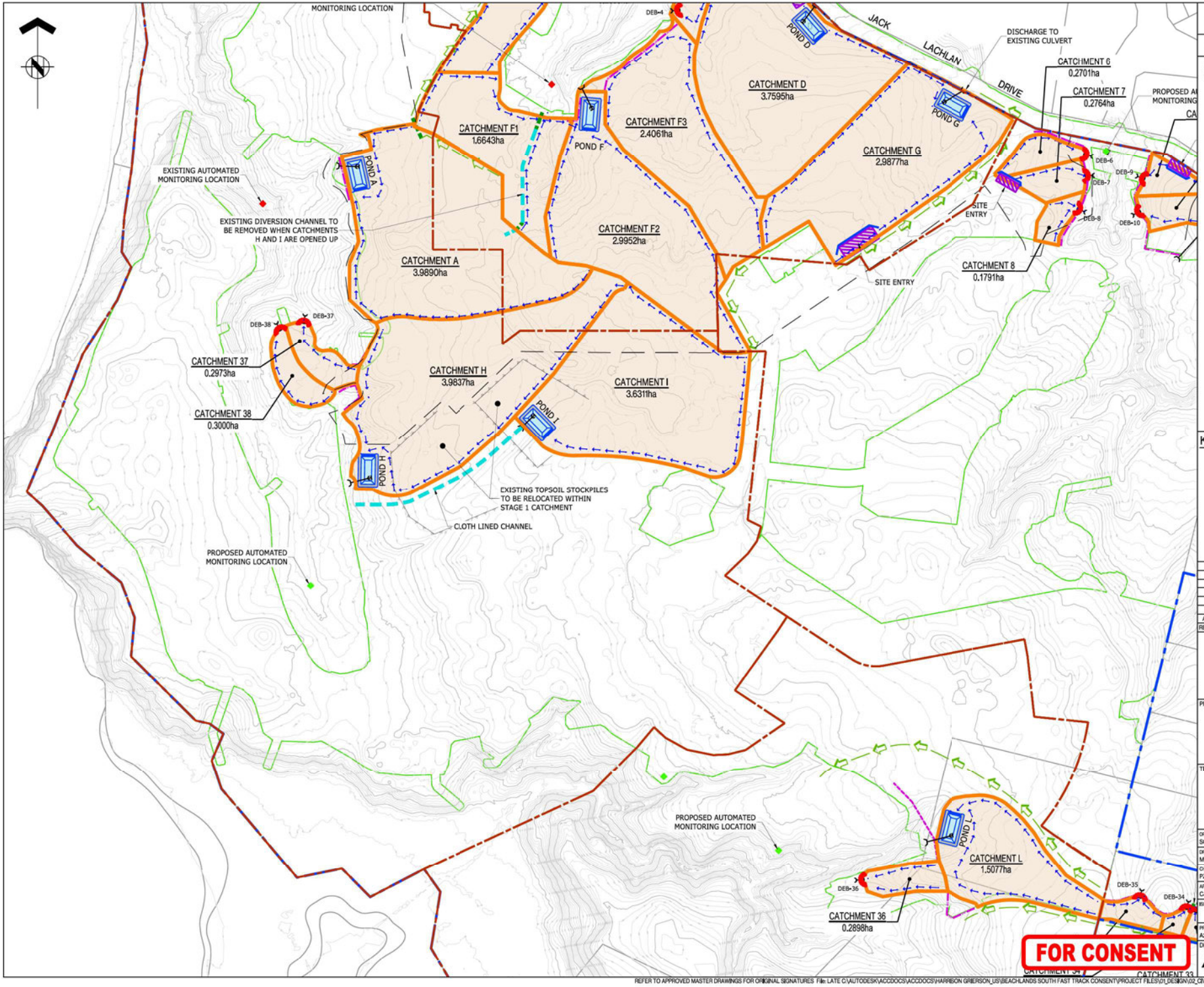

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NOTES:

1. REFER TO A2515591.00-2150 FOR NOTES AND LEGEND.
2. ALL PONDS AND DEB'S TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 1
EROSION AND SEDIMENT CONTROL
SHEET 2 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2152		REV A

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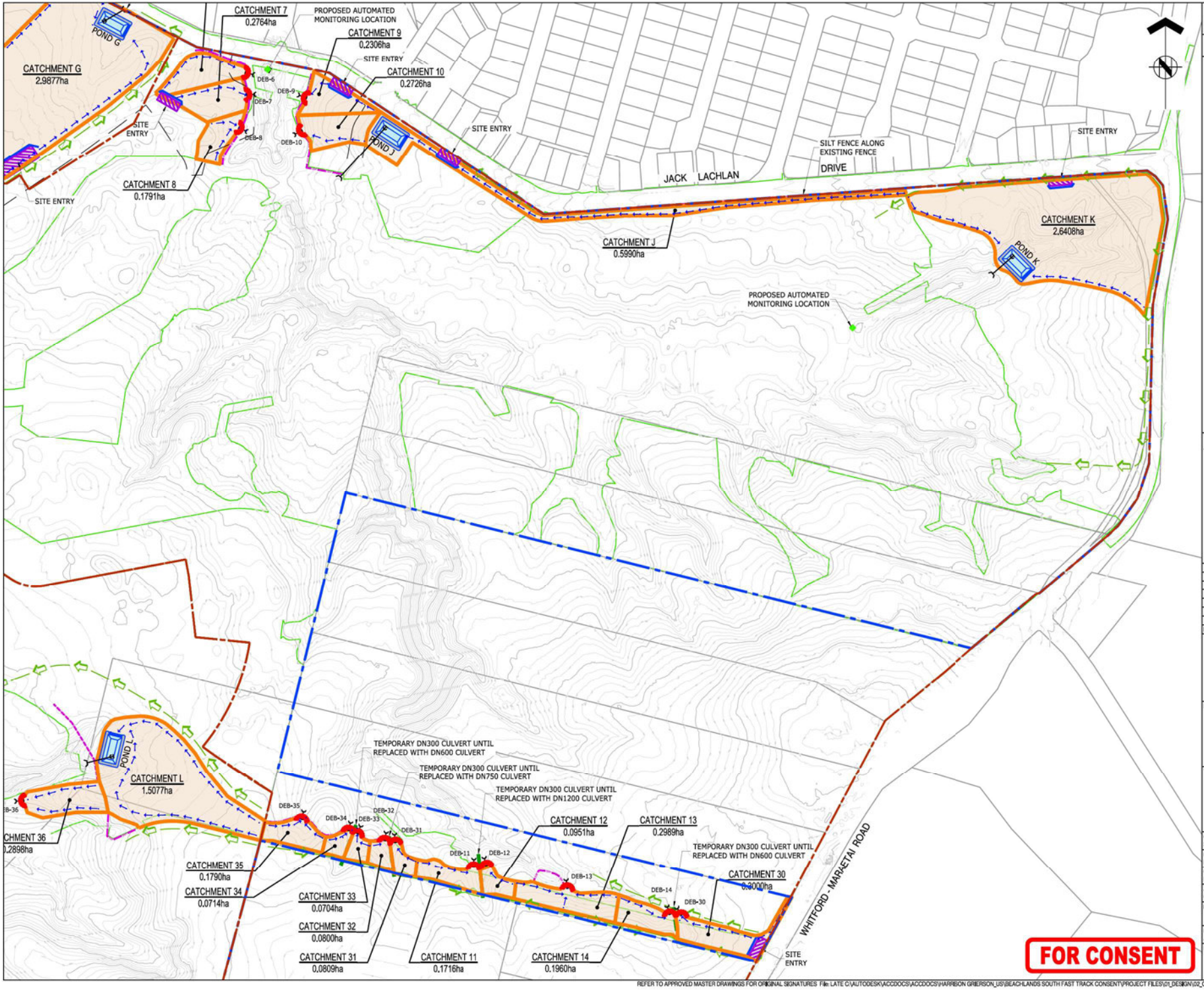

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NOTES:

1. REFER TO A2515591.00-2150 FOR NOTES AND LEGEND.
2. ALL PONDS AND DEB's TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05/2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 1
EROSION AND SEDIMENT CONTROL
SHEET 3 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS:

FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2153		REV A

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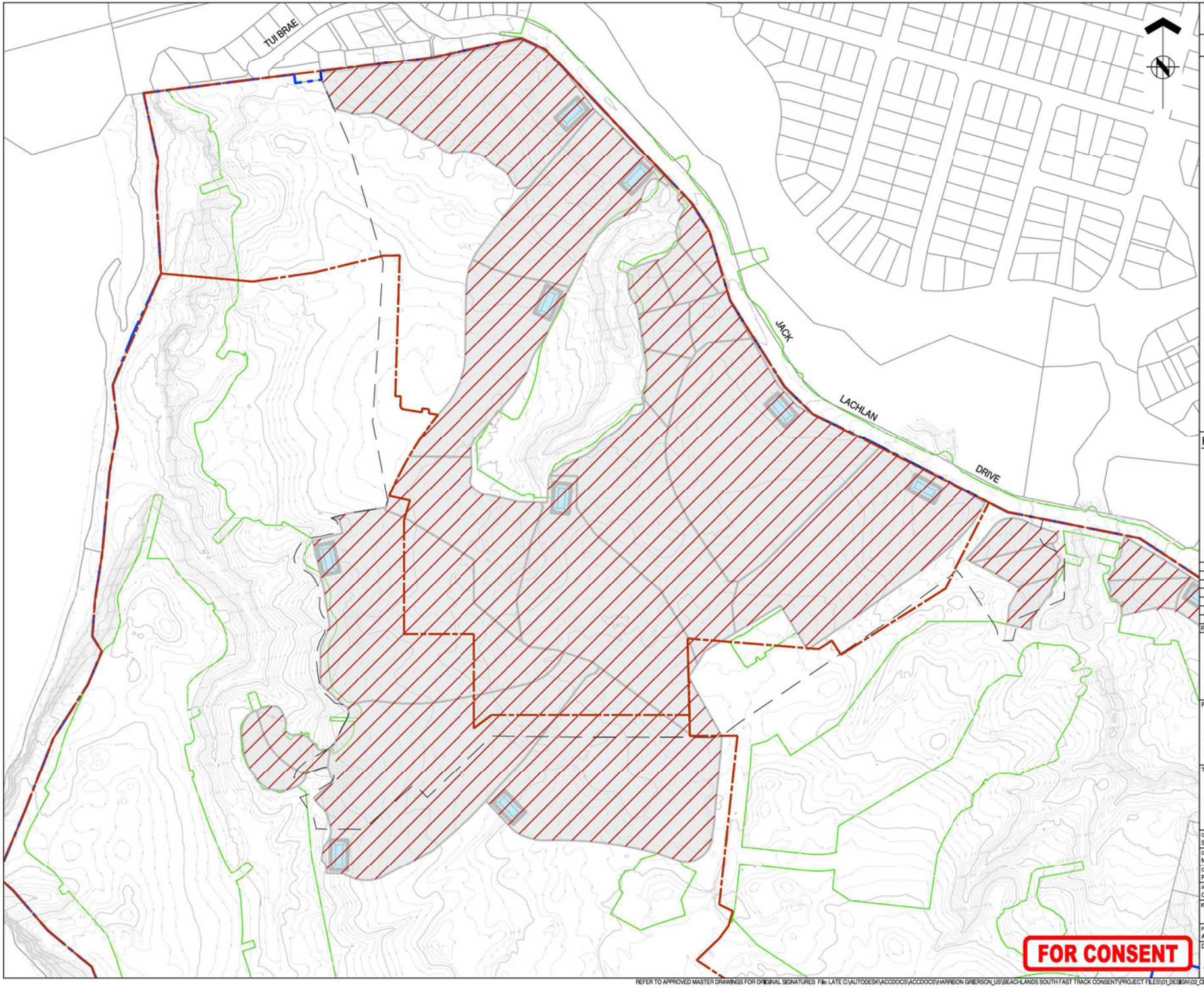

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NOTES:

1. REFER TO A2515591.00-2150 FOR NOTES AND LEGEND.
2. STAGE 1 AREA STABILISED - DEVICES WILL REMAIN IN PLACE UNTIL ALL CIVIL WORKS ARE COMPLETE.
3. ALL PONDS AND DEB's TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 2
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2154		REV A

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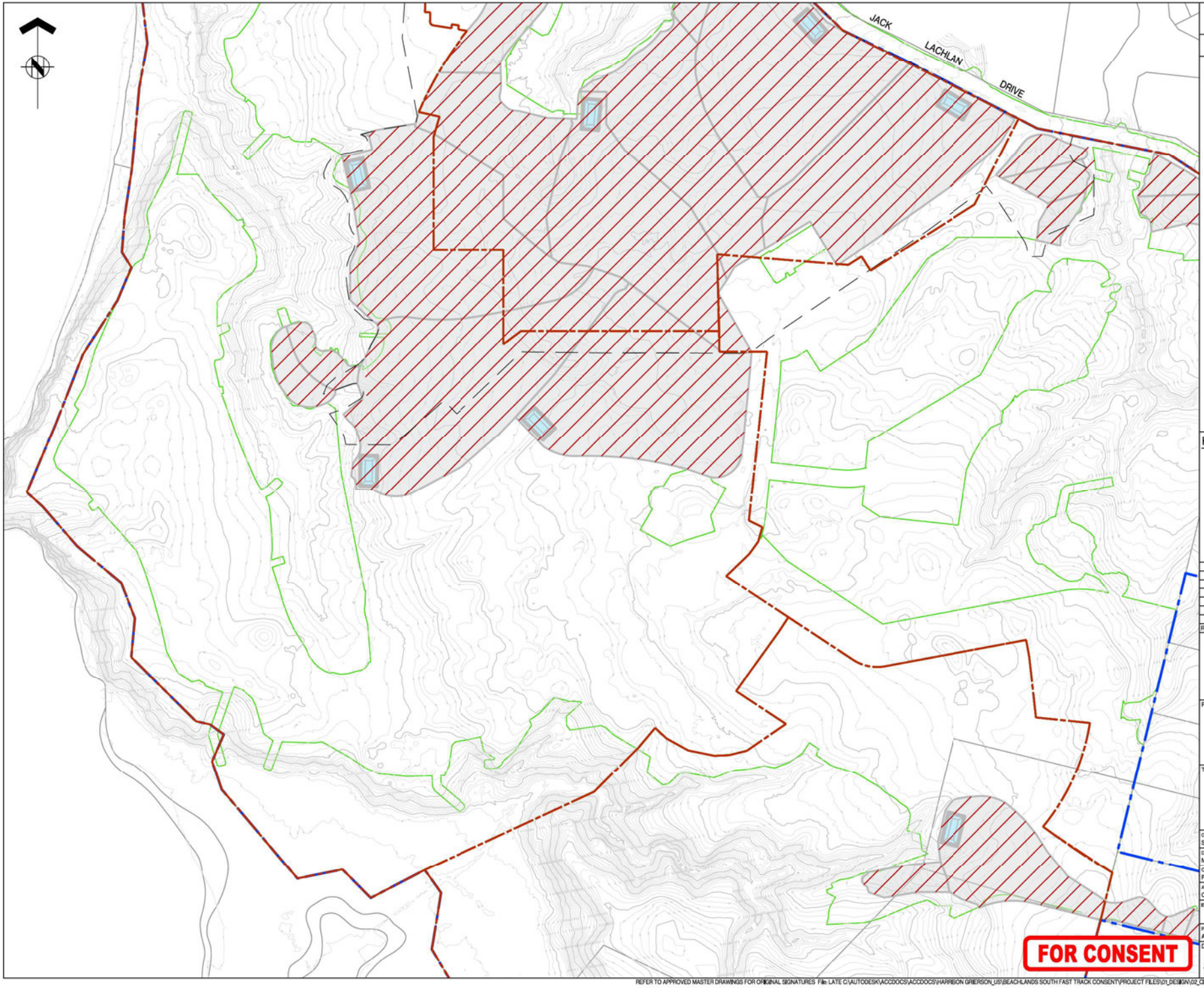

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NOTES:

1. REFER TO A2515591.00-2150 FOR NOTES AND LEGEND.
2. STAGE 1 AREA STABILISED - DEVICES WILL REMAIN IN PLACE UNTIL ALL CIVIL WORKS ARE COMPLETE.
3. ALL PONDS AND DEB's TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

HARRISON GRIERSON

AUCKLAND OFFICE
Level 4, 96 St. Georges Bay Road
Parnell, Auckland 1052
T +64 9 917 5000
W www.harrisongrierson.com

PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 2
EROSION AND SEDIMENT CONTROL
SHEET 2 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2155		REV A

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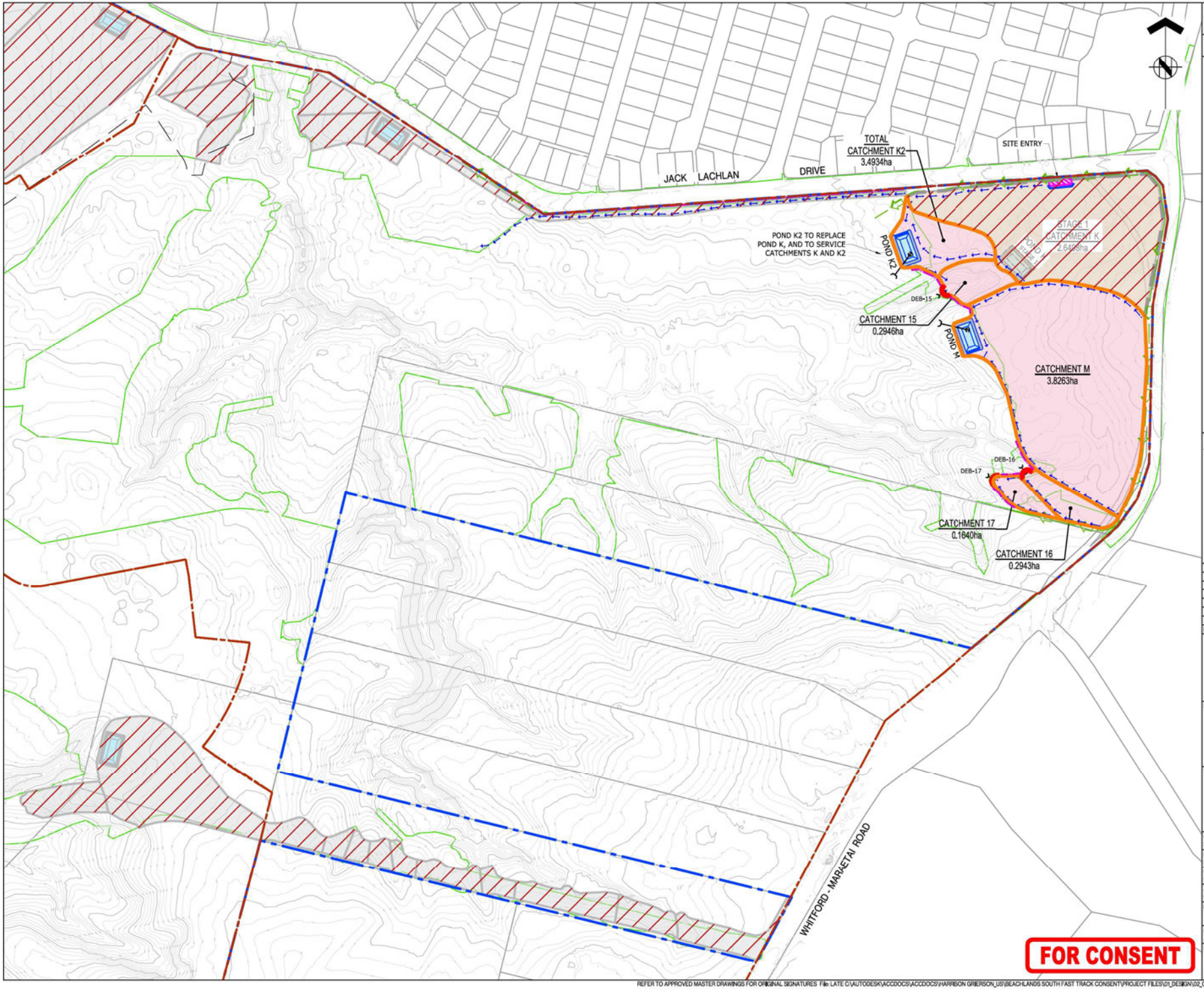

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2. STAGE 1 AREA STABILISED - DEVICES WILL REMAIN IN PLACE UNTIL ALL CIVIL WORKS ARE COMPLETE.
3. POND K2 IS SIZED FOR CATCHMENTS K AND 15.
4. ALL PONDS AND DEB's TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

REF	REVISIONS	BY	DATE
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BEACHLANDS
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BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 2
EROSION AND SEDIMENT CONTROL
SHEET 3 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
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APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2156		REV A

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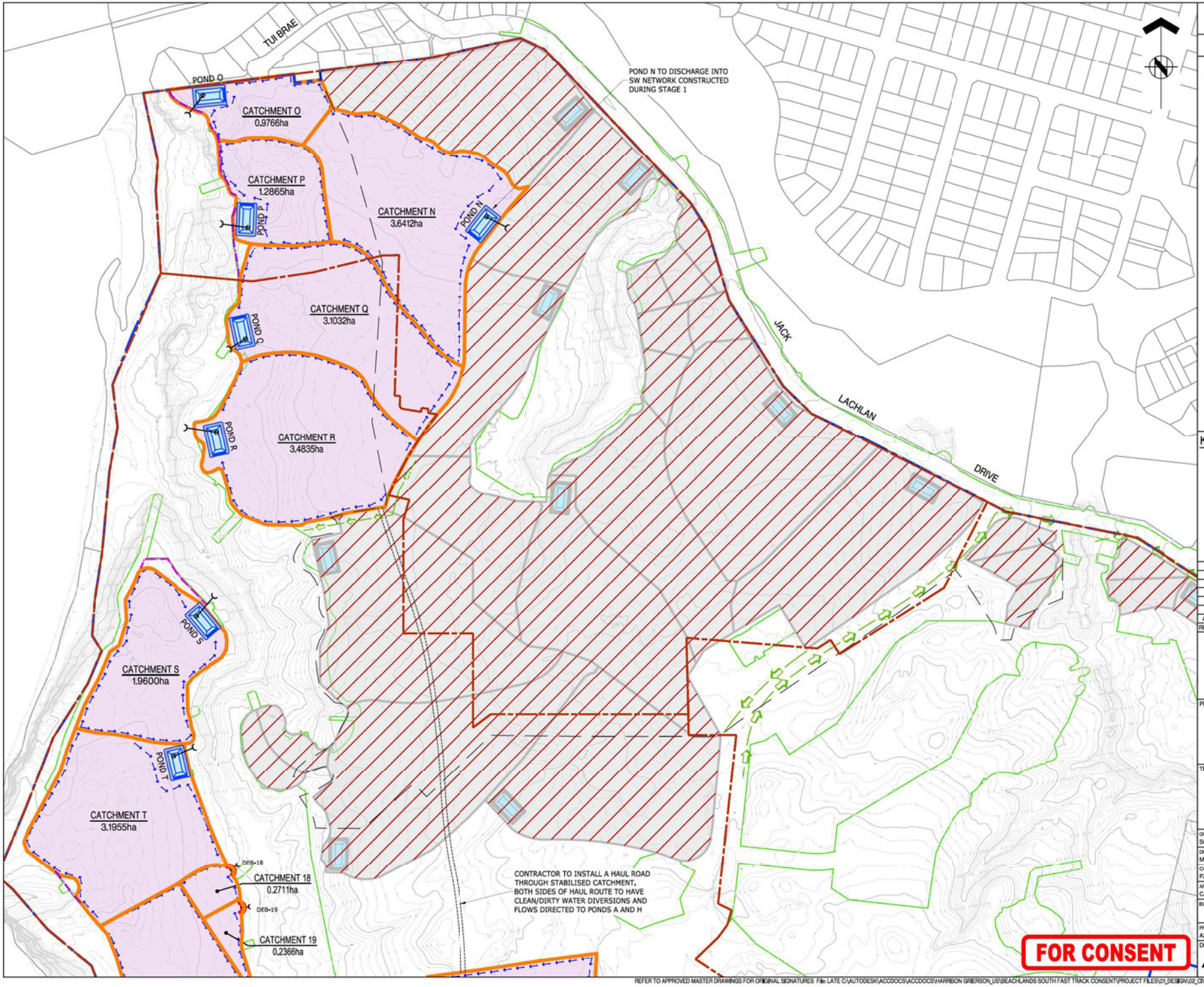

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PROJECT:

BEACHLANDS
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BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 3
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS:

FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2157		REV A

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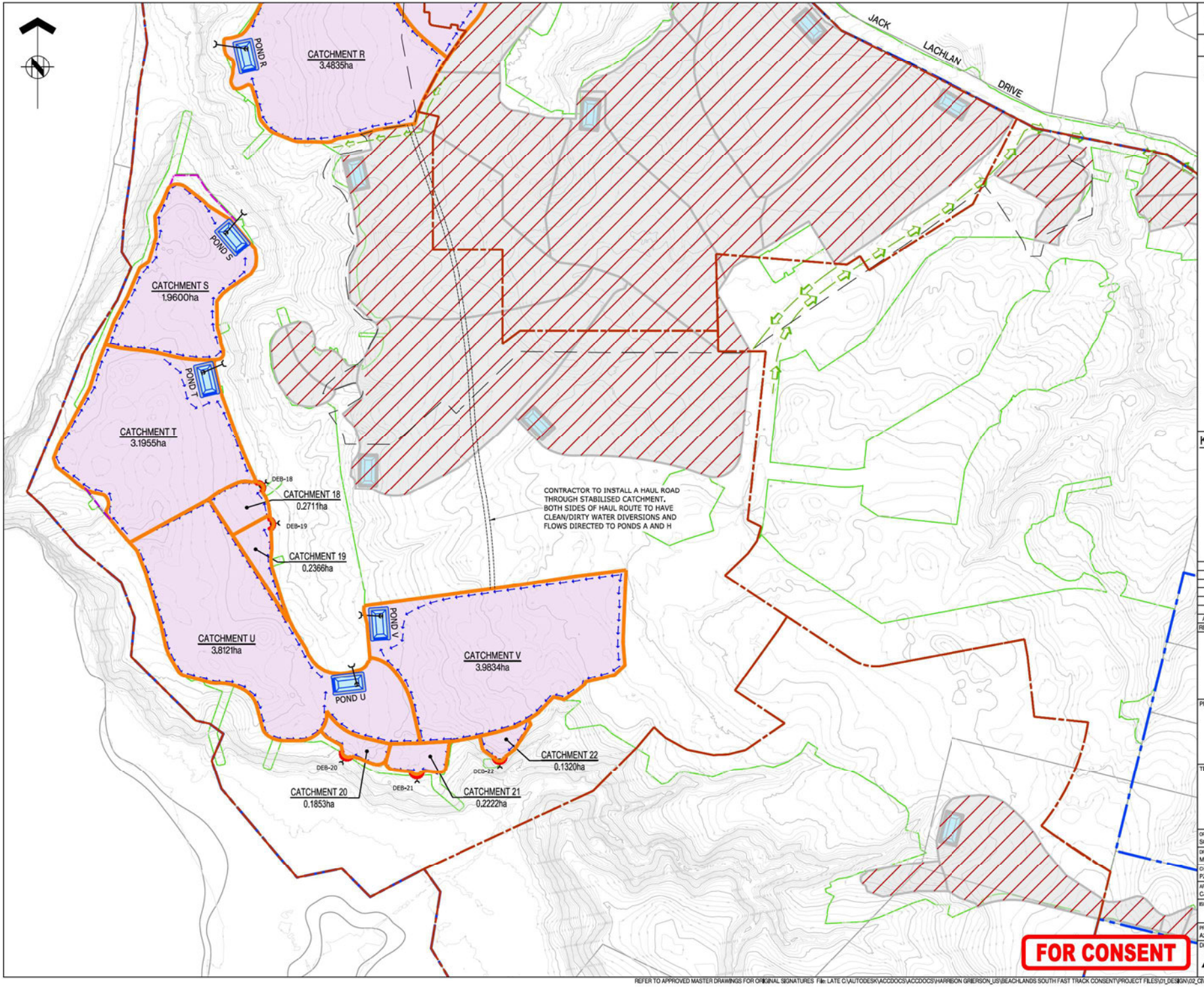

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TITLE:

STAGE 3
EROSION AND SEDIMENT CONTROL
SHEET 2 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
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ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2158		REV A

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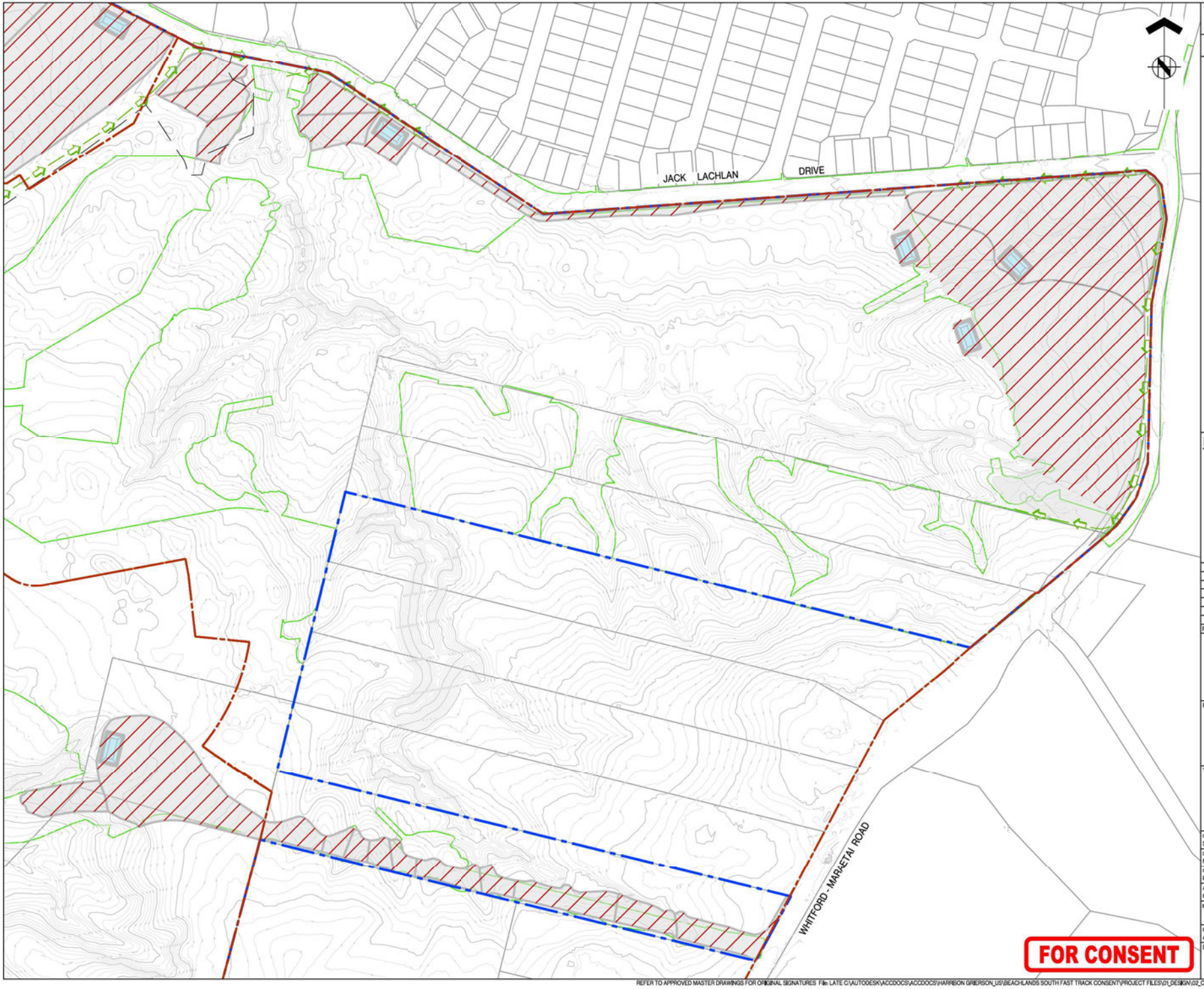

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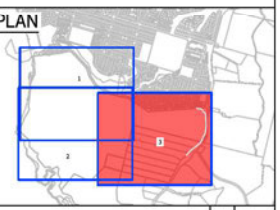
KEY PLAN



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PROJECT:

BEACHLANDS
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BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 3
EROSION AND SEDIMENT CONTROL
SHEET 3 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
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ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2159		REV A

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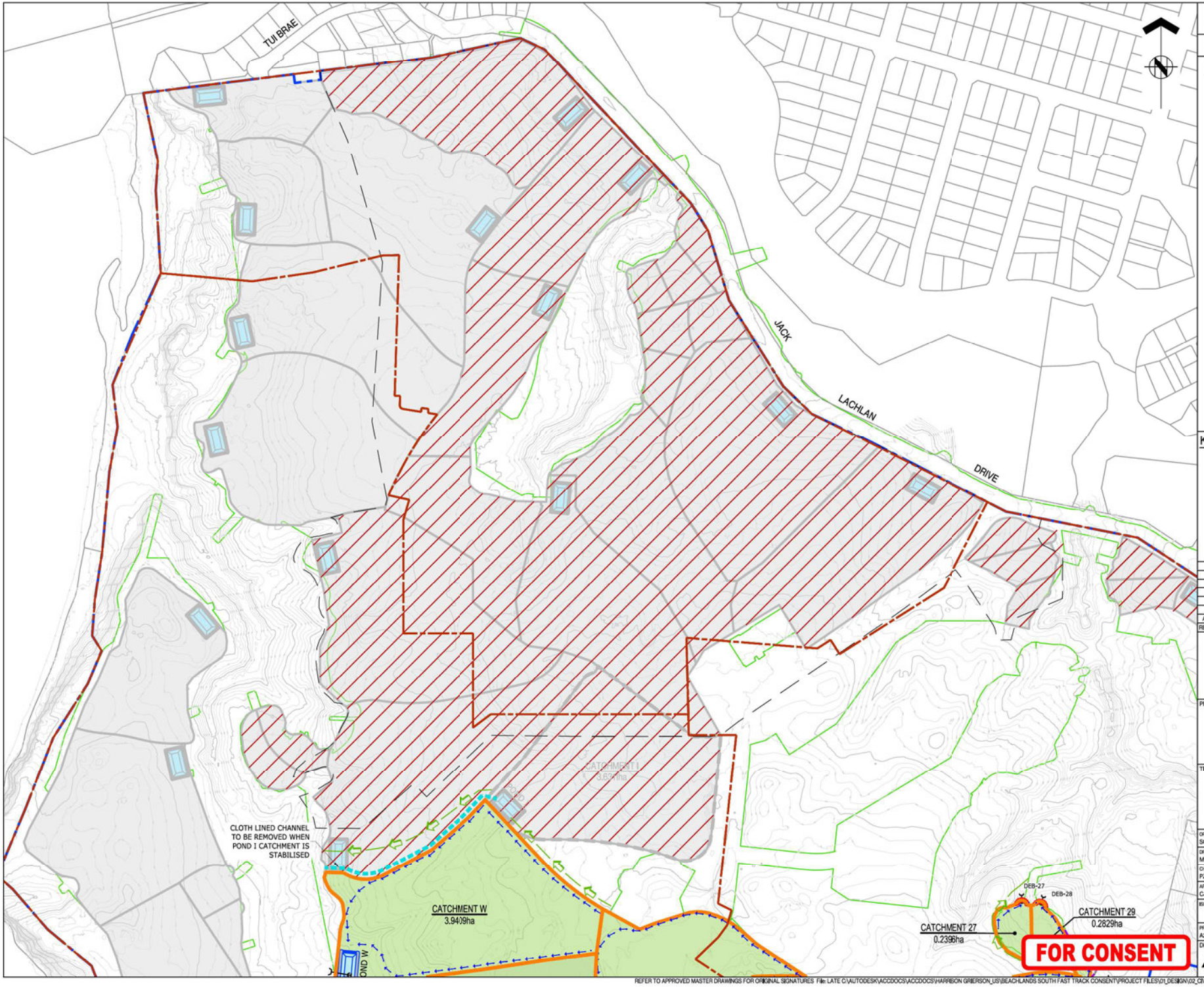

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KEY PLAN

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A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

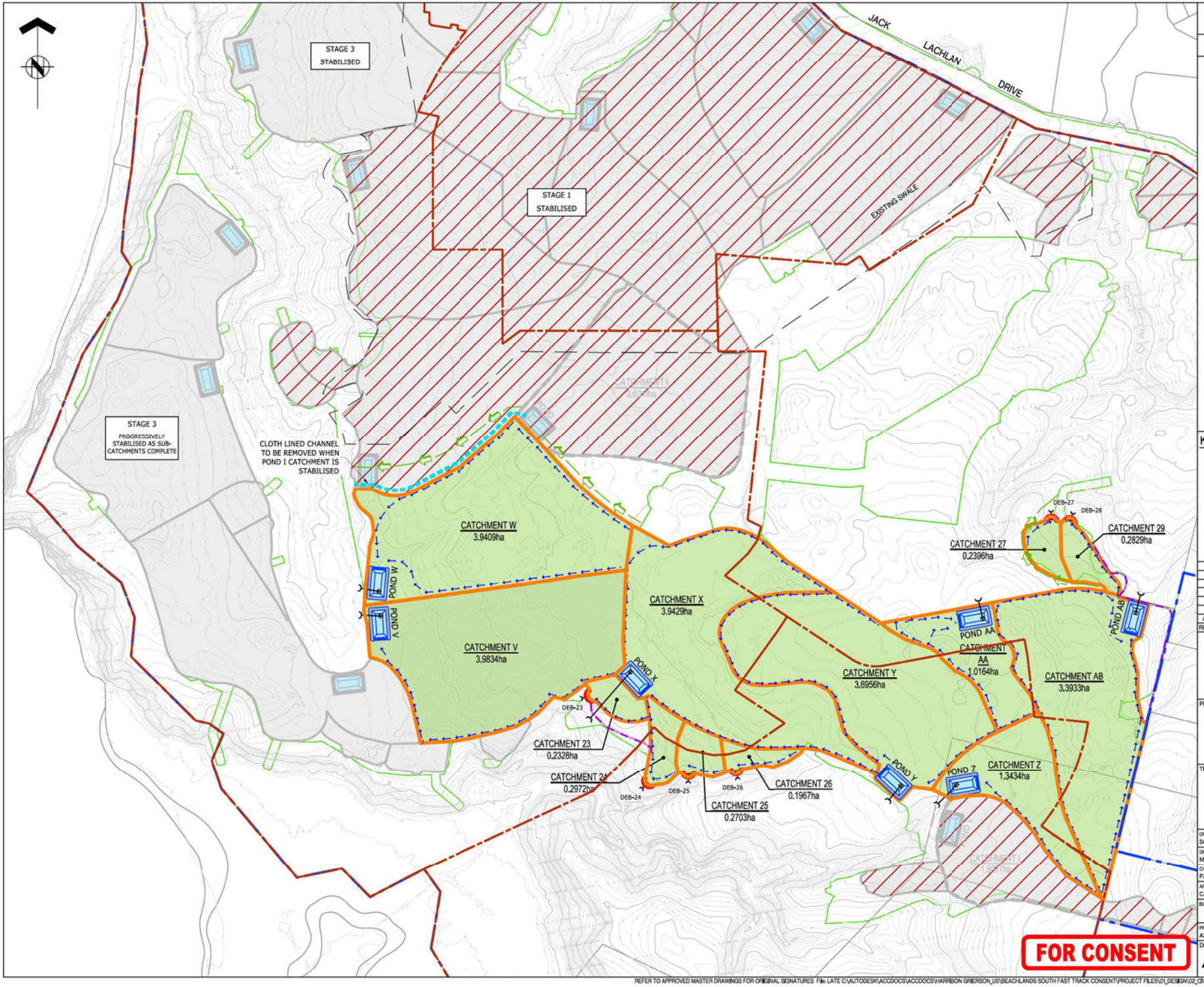
STAGE 4
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2160		REV: A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: L:\ATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 4
EROSION AND SEDIMENT CONTROL
SHEET 2 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
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ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2161		REV ----

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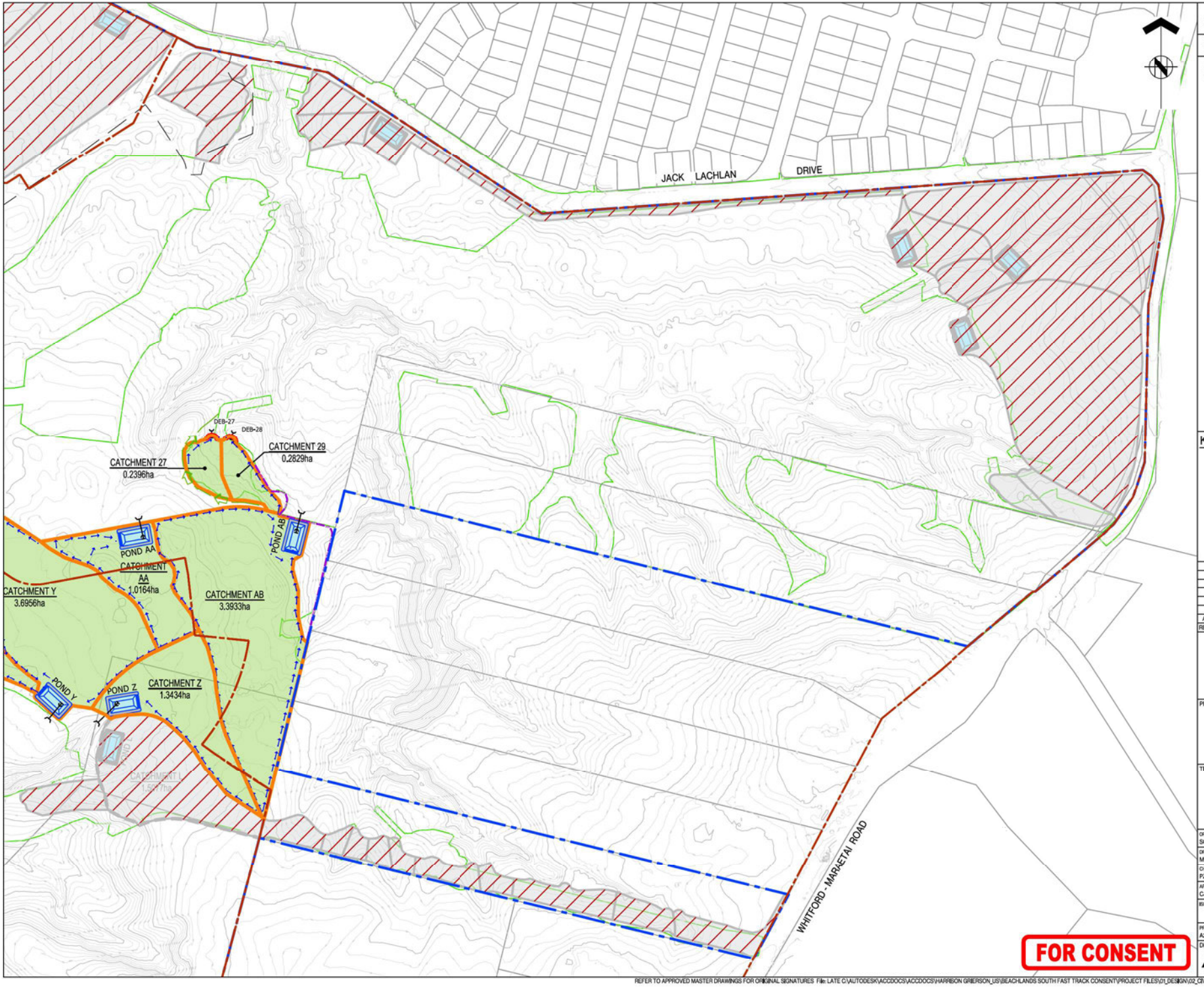

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TITLE:

STAGE 4
EROSION AND SEDIMENT CONTROL
SHEET 3 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
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ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2162		REV A

FOR CONSENT

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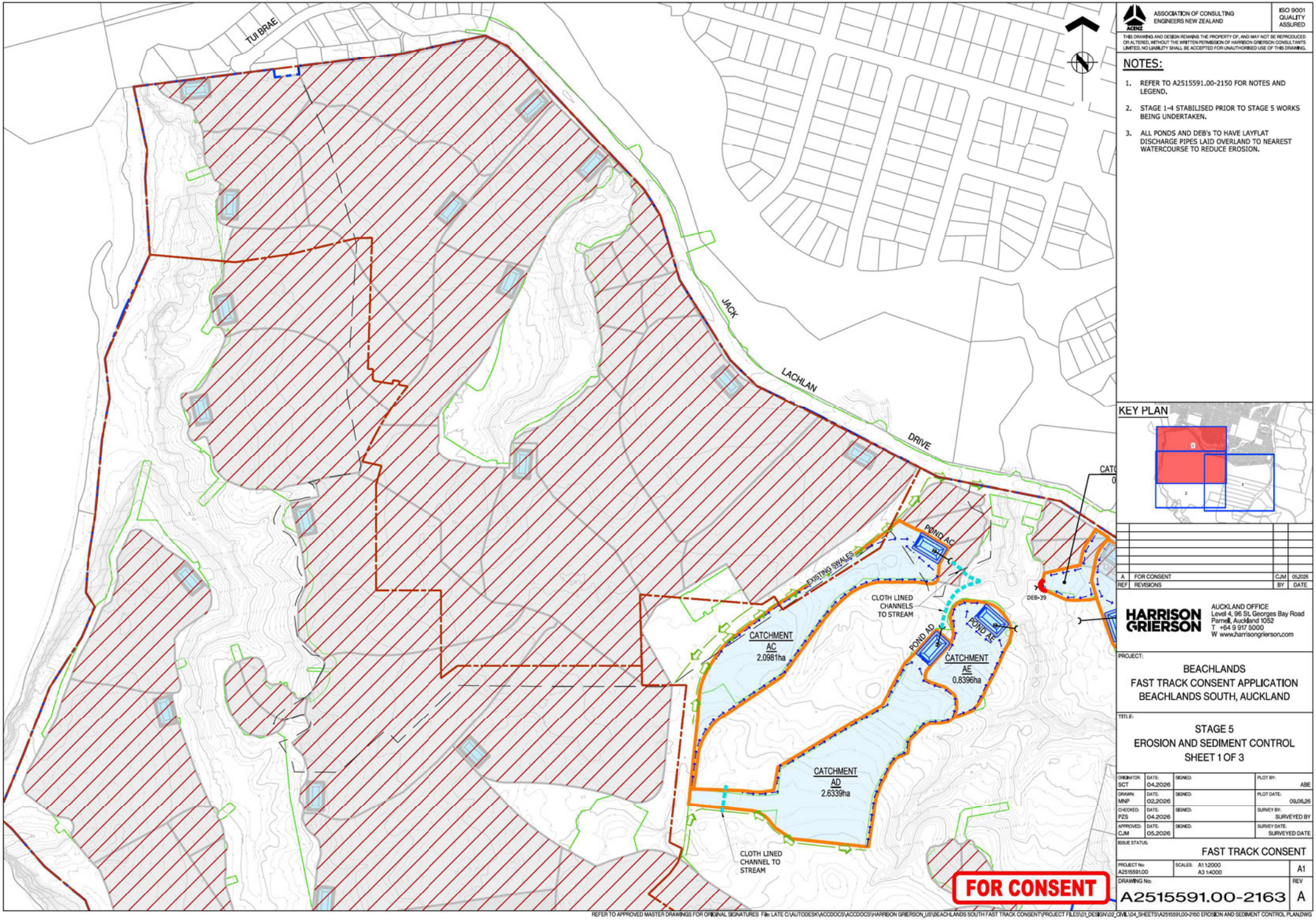

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NOTES:

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 5
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
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PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2163		REV A

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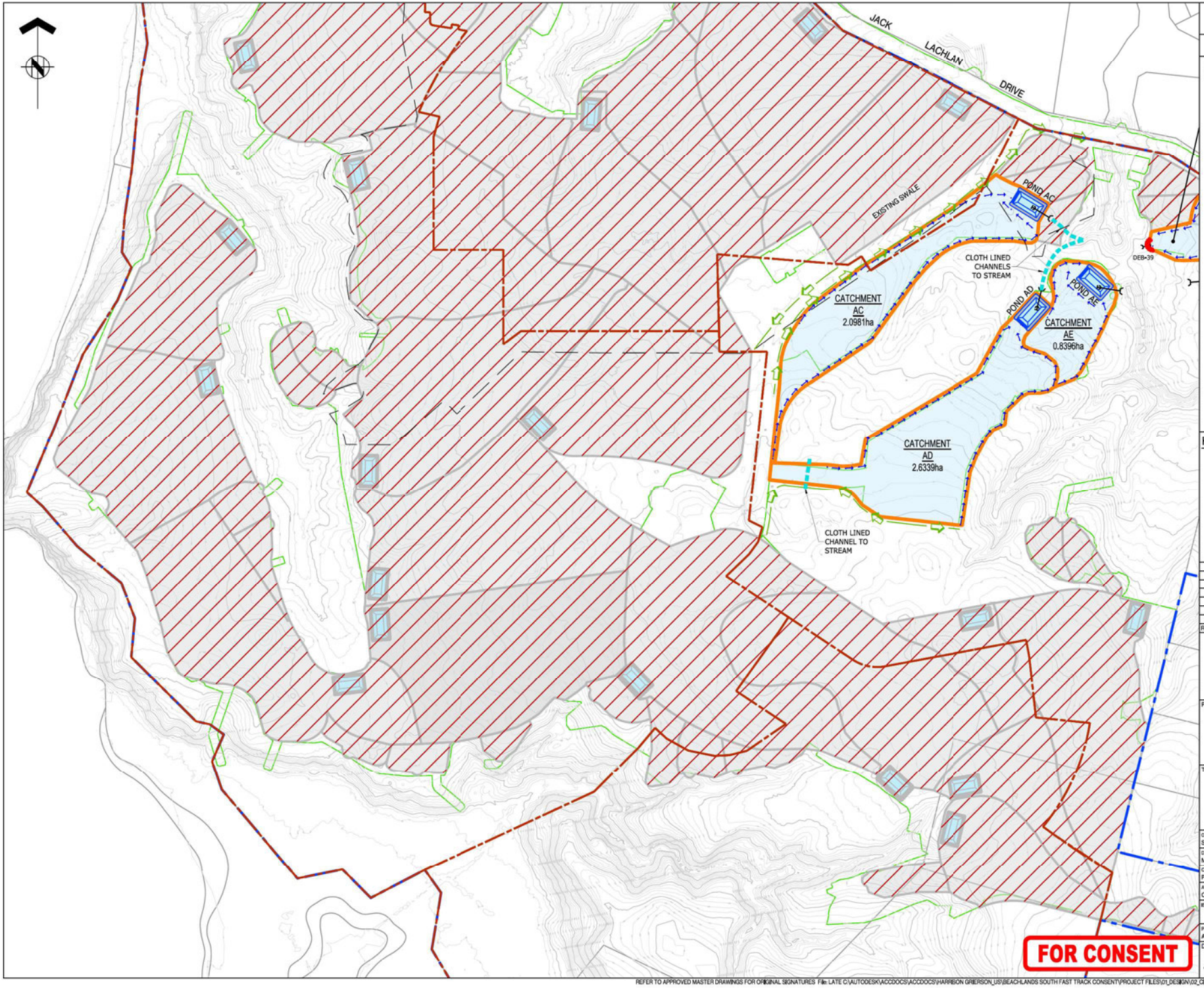

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PROJECT:

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TITLE:

STAGE 5
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SHEET 2 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
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ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2164		REV A

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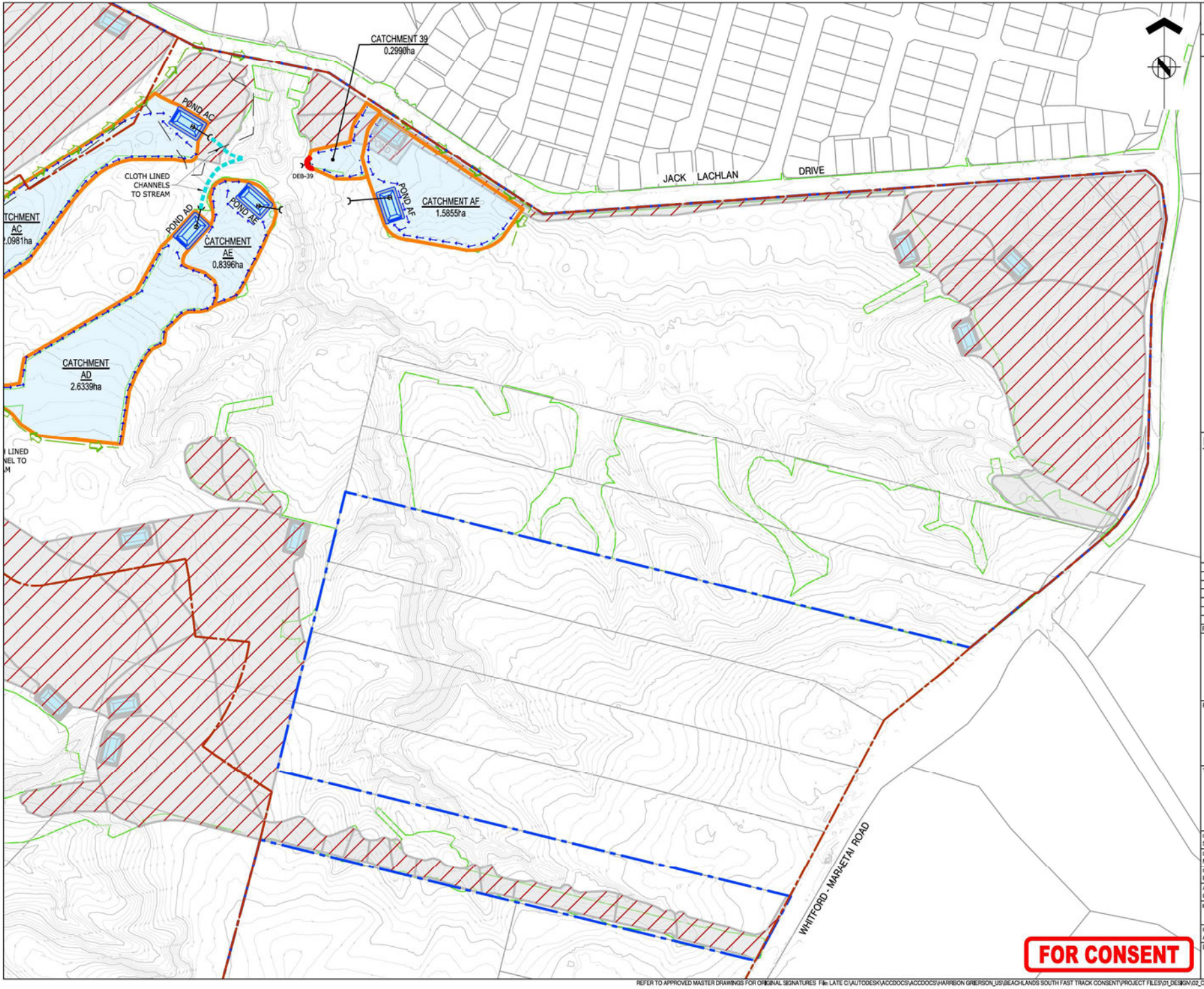

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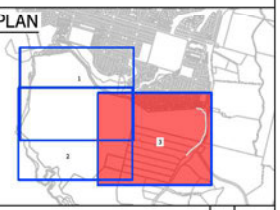
3. ALL PONDS AND DEB's TO HAVE LAYFLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSE TO REDUCE EROSION.

KEY PLAN



REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 5
EROSION AND SEDIMENT CONTROL
SHEET 3 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
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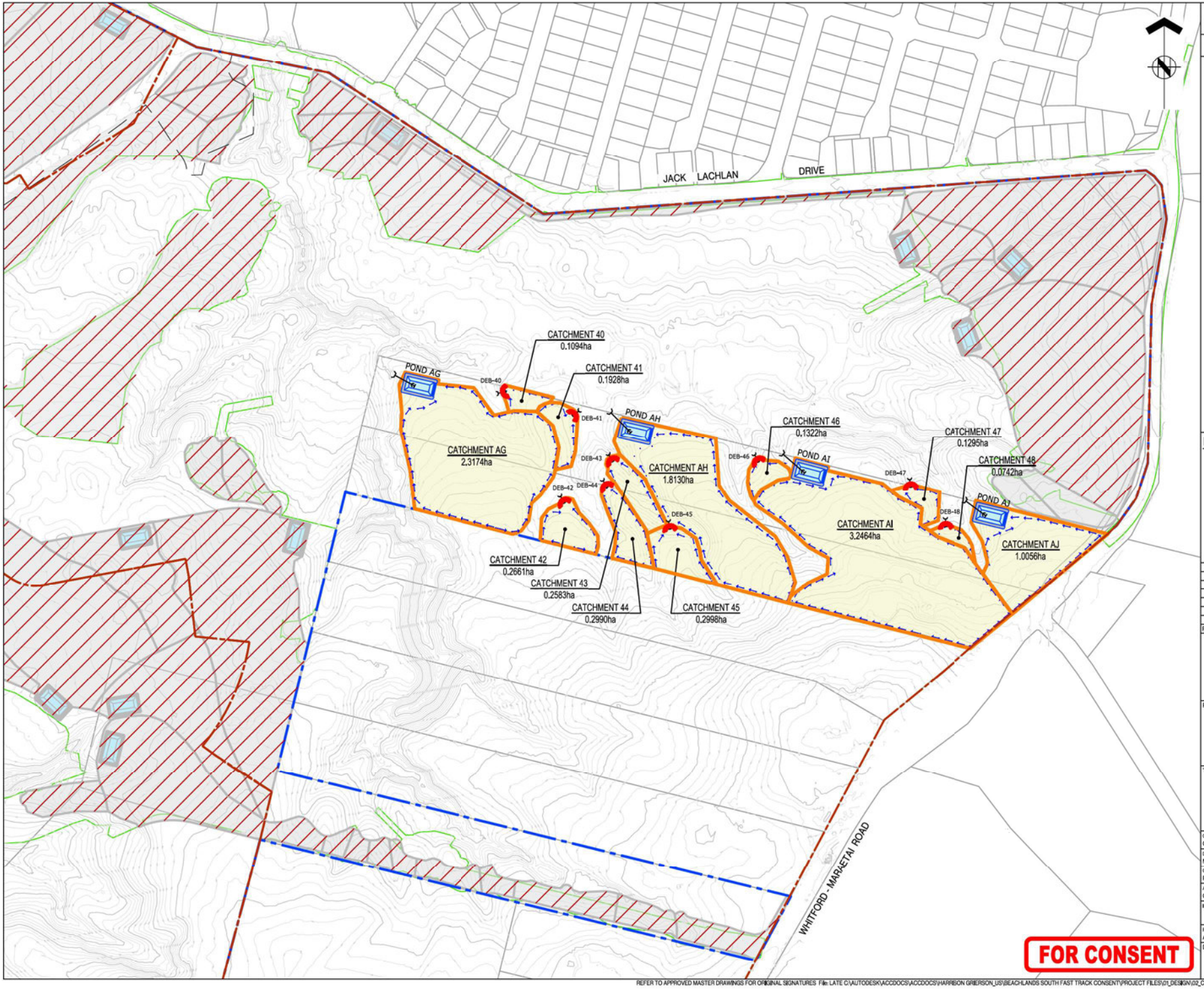

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KEY PLAN

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 6
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 1

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POND DETAILS									DECANT OUTLET DETAILS		
POND NAME	DIMENSIONS (m)			POND DEPTH (BASE TO PRIMARY SPILLWAY)	VOLUME (m3)	DEAD STORAGE DEPTH (m)	LIVE STORAGE DEPTH (m)	EMERGENCY SPILLWAY WIDTH (m)	*NO OF 150MM DIA T-BARS	RISER DIAMETER	OUTLET PIPE DIAMETER
	WIDTH	LENGTH									
POND A	20.2	74.1	CREST	2	1497.7	0.6	1.4	14.6	3	1050 Manhole	300mm
	7.9	53.5	BASE								
POND B	17.8	64.8	CREST	2	1085.0	0.6	1.4	10.6	2	150 upstand	150mm
	5.8	45.4	BASE								
POND C	15.7	56.2	CREST	2	757.5	0.6	1.4	7.4	2	150 upstand	150mm
	3.9	37.8	BASE								
POND D	19.7	72.3	CREST	2	1411.0	0.6	1.4	13.8	3	1050 Manhole	300mm
	7.5	51.9	BASE								
POND E	14.8	52.7	CREST	2	644.1	0.6	1.4	6.3	2	150 upstand	150mm
	3.2	34.8	BASE								
POND F	18.1	65.9	CREST	2	1127.6	0.6	1.4	11.0	2	150 upstand	150mm
	6.1	46.3	BASE								
POND G	18.1	65.8	CREST	2	1122.9	0.6	1.4	10.9	2	150 upstand	150mm
	6.0	46.2	BASE								
POND H	20.2	74.1	CREST	2	1497.7	0.6	1.4	14.6	3	1050 Manhole	300mm
	7.9	53.5	BASE								
POND I	19.4	71.2	CREST	2	1363.3	0.6	1.4	13.3	3	1050 Manhole	300mm
	7.2	51.0	BASE								
POND J	10.7	36.2	CREST	2	225.0	0.6	1.4	6.0	1	150 upstand	150mm
	-0.4	20.4	BASE								
POND K	17.3	62.6	CREST	2	993.2	0.6	1.4	9.7	2	150 upstand	150mm
	5.3	43.4	BASE								
POND K2	19.2	70.1	CREST	2	1311.3	0.6	1.4	12.8	3	1050 Manhole	300mm
	7.0	50.0	BASE								
POND L	14.2	50.2	CREST	2	566.6	0.6	1.4	6.0	2	150 upstand	150mm
	2.6	32.6	BASE								
POND M	19.8	72.8	CREST	2	1437.8	0.6	1.4	14.0	3	1050 Manhole	300mm
	7.6	52.4	BASE								
POND N	19.5	71.3	CREST	2	1368.6	0.6	1.4	13.3	3	1050 Manhole	300mm
	7.3	51.1	BASE								
POND O	12.4	42.9	CREST	2	368.9	0.6	1.4	6.0	1	150 upstand	150mm
	1.0	26.2	BASE								
POND P	13.5	47.4	CREST	2	484.5	0.6	1.4	6.0	1	150 upstand	150mm
	2.0	30.1	BASE								
POND Q	18.3	66.8	CREST	2	1166.2	0.6	1.4	11.4	3	1050 Manhole	300mm
	6.3	47.1	BASE								
POND R	19.2	70.1	CREST	2	1311.3	0.6	1.4	12.8	3	1050 Manhole	300mm
	7.0	50.0	BASE								
POND S	15.6	55.6	CREST	2	737.9	0.6	1.4	7.2	2	150 upstand	150mm
	3.8	37.3	BASE								
POND T	18.5	67.6	CREST	2	1200.5	0.6	1.4	11.7	3	1050 Manhole	300mm
	6.4	47.8	BASE								
POND U	19.8	72.7	CREST	2	1432.4	0.6	1.4	14.0	3	1050 Manhole	300mm
	7.6	52.3	BASE								
POND V	20.2	74.1	CREST	2	1497.7	0.6	1.4	14.6	3	1050 Manhole	300mm
	7.9	53.5	BASE								
POND W	20.1	73.7	CREST	2	1481.3	0.6	1.4	14.4	3	1050 Manhole	300mm
	7.8	53.2	BASE								
POND X	20.1	73.7	CREST	2	1481.3	0.6	1.4	14.4	3	1050 Manhole	300mm
	7.8	53.2	BASE								
POND Y	19.6	71.8	CREST	2	1389.7	0.6	1.4	13.5	3	1050 Manhole	300mm
	7.4	51.5	BASE								
POND Z	13.7	48.2	CREST	2	506.9	0.6	1.4	6.0	1	150 upstand	150mm
	2.2	30.8	BASE								
POND AA	12.5	43.5	CREST	2	382.8	0.6	1.4	6.0	1	150 upstand	150mm
	1.2	26.7	BASE								
POND AB	19.0	69.3	CREST	2	1275.5	0.6	1.4	12.4	3	1050 Manhole	300mm
	6.8	49.3	BASE								
POND AC	15.9	57.1	CREST	2	789.2	0.6	1.4	7.7	2	150 upstand	150mm
	4.1	38.6	BASE								
POND AD	17.3	62.4	CREST	2	988.7	0.6	1.4	9.6	2	150 upstand	150mm
	5.3	43.3	BASE								
POND AE	11.8	40.6	CREST	2	315.5	0.6	1.4	6.0	1	150 upstand	150mm
	0.5	24.2	BASE								
POND AF	14.5	51.2	CREST	2	597.7	0.6	1.4	6.0	1	150 upstand	150mm
	2.9	33.5	BASE								
POND AG	16.5	59.4	CREST	2	871.4	0.6	1.4	8.5	1	150 upstand	150mm
	4.6	40.6	BASE								
POND AH	15.1	53.9	CREST	2	680.9	0.6	1.4	6.6	1	150 upstand	150mm
	3.4	35.8	BASE								
POND AI	18.6	68.0	CREST	2	1220.3	0.6	1.4	11.9	1	150 upstand	150mm
	6.5	48.2	BASE								
POND AJ	12.5	43.2	CREST	2	377.2	0.6	1.4	6.0	1	150 upstand	150mm
	1.1	26.5	BASE								

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REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

EROSION AND SEDIMENT CONTROL
SRP TABLE

ORIGINATOR: CJM	DATE: 05.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 05.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 05.2026	SIGNED:	SURVEY BY: SURVEYED BY
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ISSUE STATUS:

FAST TRACK CONSENT

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DRAWING No: A2515591.00-2167		REV A

FOR CONSENT

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Appendix 1d– Adaptive Management Plan

Erosion and Sediment Control Adaptive Management Plan (ESCMP)

Beachlands South Fast Track

Beachlands South Limited Partnership

Date: 29 May 2026

HG Project no.: A2515591.00

1.0 Introduction

The purpose of the ESCAMP is to monitor the efficiency of the onsite erosion and sediment controls to monitor if the volume of sediments discharged from the site is resulting in adverse environment effects on the receiving environment, namely the Angiangi Crescent Stormwater Reserve and Waikopua Creek estuary.

If it is determined that the sediment discharges from the site are causing adverse environment effects, the Management Response portion of the Plan will be implemented to develop modifications and response to the site measures or procedures to prevent or mitigate the effects.

It is intended that the works will be undertaken over the course of several earthworks seasons and as such the ESCAMP will require review and modification as a live document as site development occurs to ensure that the components of the Plan remain relevant and results obtained are appropriate.

Any changes to this document will be agreed upon by all parties involved, (including but not limited to Auckland Council's ESC technical specialist and compliance monitoring officer as well as the consent holder's technical specialist and project manager), with appropriate certification by Council. Any changes to the ESCAMP will remain consistent with the intent of the relevant conditions and achieve the required environmental outcomes.

The ESCAMP covers:

- Site management structures, practices and procedures.
- Baseline Monitoring – Weather and stream
- ESC Monitoring:
- Rainfall event triggered manual turbidity monitoring
- Chemical Treatment monitoring
- Reporting
    - Site Audit
    - Event Reporting

- Annual Reporting
- Annual Review

2.0 Site Details

Site address: 110 Jack Lachlan Drive, 620,712,758 and 770 Whitford Maraetai Road

Legal Description:

Lot 2 DP 501271 -110 Jack Lachlan Drive

Lot 100 DP 504488 - 620 Whitford Maraetai Road

Lot 4 DP 54105 – 712 Whitford Maraetai Road

Lot 9 DP 54105 – 758 Whitford Maraetai Road

Lot 10 DP 54105 – 770 Whitford Maraetai Road

Site Area: 268.1780 ha

Earthworks site Area: 170.4750ha

3.0 Receiving Environment.

The current earthworks proposal discharges into Freshwater Significant Ecological areas (SEA) which have been identified for protection under the Auckland Unitary Plan (AUP) and the Marine SEA. The western SEA discharges into the marine environment which itself is an important environment. The eastern SEAs discharge through culverts under Jack Lachlan Drive through to the Angiangi Cresent Stormwater Reserve which discharge to the marine environment adjacent to Pine Harbour Marina.

According to the Tonkin and Taylor Ecology Effects assessment provided for the private plan change 88 (PC88) this identified the following

- The marine environment is of high value providing ecosystems for many of the threatened birds species.
- The terrestrial habitat contains vulnerable and endangered tree species.
- Fauna with the development site is at risk and declining both on land and within stream environments.

Due to the importance of the receiving environment the Tonkin and Taylor report proposes the following measures to reduce the severity of adverse effects of the change in land use for the earthworks phase, these being

- Inclusion of a minimum 10m buffer around all high value terrestrial habitats and wetlands that are within the EPAN, this is to be planted in future stages.
- Seasonal constraints on earthworks or vegetation clearance to avoid or minimise effects on eggs or chicks during the peak bird breeding season and to avoid important spawning and migration periods as appropriate.
- Salvage and relocation of lizards and fish and habitat features from development areas relocating into the EPAN
- Sediment and erosion protection management to minimise adverse effects on water quality into freshwater and coastal marine aquatic receiving environments.

4.0 Erosion and Sediment Control Plan Implementation

The construction of all erosion and sediment controls will be managed as follows:

The updated ESCP provided by the Civil Contractor will be submitted to Council for certification against Auckland Council Guidance Document 2016/005 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region reprinted August 2023 (GD05) and consent conditions.

- Once certified, Harrison Grierson Consultants will issue the approved ESCP to the Earthworks Contractor responsible for the implementation
- A pre-construction meeting will be held with Council where the sediment controls to be built will be discussed and specific direction given on construction.
- The location of the controls and requirements of the relevant ESCP will be confirmed on site with the construction team.
- The construction of the controls will be overseen by the appointed Earthworks Contractor or nominated person.
- Hold points for construction will be established for each control whereby the appointed Earthworks Contractor or nominated person will inspect the work completed, for example the installation of anti-seep collars or the installation of primary outlet.
- Each control will be 'as built' certified by the Earthworks Contractor to confirm compliance with the ESCP prior to bulk earthworks commencing in the catchment of the device(s).
- Copies of the "as-built" certifications will be submitted to Council.
- Monitoring of devices during the earthworks operation until catchments stabilised and devices removed.

5.0 Receiving Environment Monitoring

5.1 Baseline Monitoring

In some circumstances, establishing an understanding of the typical state of the receiving environment is an important aspect to setting thresholds and response for construction monitoring. The applicability of baseline monitoring varies between sites, and may comprise freshwater or coastal ecological assessments, sediment deposition and water quality at a point in time or variability across a range of climate conditions or events.

Baseline monitoring, will be completed prior to earthworks commencing to confirm pre-construction conditions and to support the consenting process in establishing the acceptability of the project and proposed approach to ESC. Appropriate thresholds can then be derived to be implemented during the construction phase.

Currently on site there is monitoring of the earthworks being undertaken for LUC 60453761. There was initial baseline monitoring of stream turbidity and freshwater quality, – refer to Appendix B for monitoring locations. Additional monitoring stations will be installed for the balance area as development progresses

Baseline monitoring and reporting will cover the following

- Stream Ecological Values
- Sediment quality
- Turbidity
- Aqua fauna – microvertebrates (MCI) and fish

The results of the monitoring will be incorporated into the final ESCAMP.

5.2 Catchment Analysis

A catchment analysis has resolved the sampling requirements into three key monitoring regimes. These are outlined in the plan attached to Appendix C.

The key parameters are outlined in the table below for the respective catchments. It is important to note that this analysis has dictated what type and density of data is required to best suit the Project's objectives

Parameter	Baseline Control Catchment	Active Earthworks Catchment	External Earthworks Catchment
Data Derived	Undisturbed catchment within control of the project. Will enable upstream data to compare with discharges from the earthworks catchment	Undisturbed catchment within control of the project. Will enable upstream data to compare with discharges from the earthworks catchment	Undisturbed catchment within control of the project. Will enable upstream data to compare with discharges from the earthworks catchment
Sampling Strategy	Monitor long term trends of upstream environment	Data will confirm % contribution into "external" receiving environment.	Data will confirm the % contribution from external sources (ie not part of the project).
Water Quality Parameters	Portable turbidity readings. Sechi (black disc) for clarity. 1 litre grab samples for >25mm(24hr) and 15mm (1hr) events Sample for pH, TSS, Turbidity and Volatile TSS	Continuous turbidity for FMS stations Portable turbidity readings. Sechi (black disc) for clarity. 1 litre grab samples for >25mm(24hr) and 15mm (1hr) events Sample for pH, TSS, Turbidity and Volatile TSS	Continuous turbidity for FMS stations Portable turbidity readings. Sechi (black disc) for clarity. 1 litre grab samples for >25mm(24hr) and 15mm (1hr) events Sample for pH, TSS, Turbidity and Volatile TSS
Data Recording	Hand held and portable monitoring captured on DW data sheets.	Fixed Monitoring – telemetry. Hand held and portable monitoring captured on data sheets.	Hand held and portable monitoring captured on data sheets.

Data will be compiled to enable "real time" (+/- 60mins) viewing to invited parties. In addition, the data will be viewable on the onsite computers at the site office with dashboards developed to illustrate key trends

5.3 Site Weather Station

A weather station adjacent to the site office will be installed. This will comprise of sensors to measure rainfall volumes, wind speed and direction along with temperature. The on-site system will enable augment weather forecasts providing localised data.

Fig: Envco – Digital Precipitation System

5.3.1 Rainfall Triggers

The following rainfall triggers will be set:

- >25mm rainfall over any 24-hour period; and
- >15mm rainfall over any 1 hour period.

Notification that the trigger event has occurred will be sent via email to Auckland Council.

5.3.2 Rainfall Forecasts

The Contractor will analyse rainfall modelling available and relate that modelling in order to better understand and relate available forecasts to the site. This approach will be used to predict when the heavy rain events are likely to occur and relevant action, which could include not opening up new earthworks areas in affected catchments. This can be summarised as the following actions:

- Pre warning with either MetVuw or Metservice to determine forecast rainfall.
- Utilising the onsite rain gauge for the trigger event warnings.
- A stabilisation strategy which sets up a process to be implemented when a trigger rainfall event is predicted. This includes an event decision tree to assist with understanding the response and ensuring that the appropriate response occurs.

The trigger points outlined above will be augmented with the following actions:

- "Watch" with rainfall events > 15mm over any 24-hour period.
- Undertake "Action" for events >24mm over any 24 hour period.
- "Escalate" for events >40mm over any 24 hour period.

The notification and documentation to include:

- Email to Auckland Council and Engineer confirming trigger event has occurred. Email within 24 hours of event.
- Post rainfall trigger event checklist for these events (Contractors checklist).
- Trigger event report to Auckland Council and Engineer no greater than 10 working days post trigger event.

The following actions are summarised below

Event Notification (24hrs prior)	During Heavy Rain Event	Post Heavy Rain Event Action
• Early identification, and monitoring of storm fronts; • Review whether it is possible to stabilise non essential areas	Watch (>15mm/24hr) • Check/repair perimeters; lower live storage in SRP(s) & DEB(s); stabilise stockpiles; Top up floc systems	Watch (>15mm/24hr) • Commence monitoring. • Brief maintenance team for proposed actions.

based on the timeframes required to achieve the stabilisation of the area prior to the event occurring. • Ensure erosion and sediment control measures are in place and fully maintained; • Movement of machinery away from streams and out of floodplains; • Undertake pre rain event inspections and advise o Harrison Grierson o Council Compliance Officer o Principal	Action (>25mm/24hr) • Stand-down non-essential excavation; • Protect device inlets and outlets; • Commence active monitoring.	Action (>25mm/24hr) • Inspect all devices within 12hrs following event; • Remove sediment; • Ensure devices have live storage volume. • Provide Trigger notification to Auckland Council and Engineer within 24 hrs via email. • Provide Adaptive Management Response report to Auckland Council and Engineer with 10 working days.
	Escalate (>40mm/24hr) • Suspend earthworks where safe • Undertake emergency checks; Coordinate with principal	Escalate (>40mm/24hr) • Undertake actions outlined above; • Reaudit effectiveness of ESCP; • Review staging; • Provide Trigger notification to Auckland Council and Engineer within 24 hrs via email • Provide Adaptive Management Response report to Auckland Council and Engineer with 10 working days. • Provide Adaptive Management Response report to Auckland Council and Engineer with 10 working days

5.4 Noise, Vibration and Dust Monitoring

In addition to the water quality sensors, a portable noise, dust and vibration sensor will be placed to key receptors. It is considered that the residents in Tui Brae are potentially affected

5.5 Coastal Monitoring

Following the rainfall trigger events, it is proposed to undertake visual monitoring of the coastal environment to assess discharges.

The sediment deposition monitoring will consist of a photographic survey of the immediate near-shore and inter-tidal receiving environments where low energy areas are likely to encourage sediment deposition. Photo points will be on a GPS register to ensure that the same points are visited on subsequent surveys.

The regular drone surveys will also provide a time series base for this dataset as well.

The monitoring information will be included in the Trigger Event Notification and the Adaptive Management Response. This will be provided to Auckland Council within 24hrs and 10 working days respectively

6.0 Device Monitoring.

Monitoring of Sediment Retention Ponds, Decanting Earth Bunds and silt fences will be undertaken during times of discharge in addition to the event based trigger monitoring.

6.1 Sediment Retention Pond Monitoring

6.1.1 Automated Sampling

Automated turbidity monitoring will be undertaken at the at the locations shown in Appendix B and key SRP's within seasonally exposed earthworks areas. Once portion of the catchment is completed (stabilised) then the monitoring station will be transferred to other key SRP's. This approach will provide a time-series analysis of the performance of SRP.

The sampling requirements for this SRP will comprise:

- Continuous turbidity readings (NTU Levels), at SRP outlets using an Envco turbidity sensor). Grab sampling and NTU reading at inlet. The measurements will be taken at the inlet prior to any chemical treatment and at the outlet pipe prior to discharge into the receiving environment. All other SRP and DEB's will have hand held turbidity monitoring at a minimum.
- Black disc clarity monitoring
- pH monitoring
- 1 litre grab samples taken at the inlet and outlet to augment the turbidity levels during trigger rainfall events.
- Samples will be tested for TSS, pH, Turbidity and Volatile TSS.

It is anticipated that a good relationship between continuous turbidity and TSS can be developed enabling a predictive component to the site performance.

6.1.2 Portable Sampling

All of the remaining SRP's will have monitoring deployed when the rainfall trigger events are activated.

- Undertaking handheld turbidity readings (NTU Levels), at both inlet and outlet of the DEBs using a Handheld Probe. The measurements will be taken at the inlet prior to any chemical treatment and at the outlet pipe prior to discharge into the receiving environment.
- Black disc clarity monitoring
- pH monitoring
- 1 litre grab samples taken at the inlet and outlet to augment the turbidity levels.
- Samples will be tested for TSS, pH, Turbidity and Volatile TSS.

One inlet and outlet measurement per discharge event will occur which will provide a simple efficiency calculation based on this NTU measurement

6.2 Decanting Earth Bund Monitoring

The following monitoring for Decanting Earth Bunds (DEBs) will be deployed when the rainfall trigger events are activated.

- Undertaking handheld turbidity readings (NTU Levels), at both inlet and outlet of the DEBs using a Handheld Probe. The measurements will be taken at the inlet prior to any chemical treatment and at the outlet pipe prior to discharge into the receiving environment.
- Black disc clarity monitoring

- pH monitoring
- 1 litre grab samples taken at the inlet and outlet to augment the turbidity levels.
- Samples will be tested for TSS, pH, Turbidity and Volatile TSS.

One inlet and outlet measurement per discharge event will occur which will provide a simple efficiency calculation based on this NTU measurement.

6.3 Silt Fence Monitoring

Discharge points of silt fences and super silt fences will be tested with a handheld turbidity probe. Sampling will be required for the trigger rainfall events.

6.4 Clarity Monitoring

As well as manual turbidity recording, manual clarity checks will be made at each SRP and DEB, using one of the following procedures:

6.4.1 Black disc

A 50-80mm diameter is attached to a 1m long stick with a centimetre scale starting at the disc is lowered vertically into the water to be tested until it disappears, and then is raised until it just reappears. The depth of reappearance is recorded as the clarity of the water; or the threshold to be achieved is 100mm from the surface of the water column.

6.4.2 pH Monitoring

pH will be recorded at each device receiving chemical treatment, using the following procedure:

1. Ensure that the pH meter has been calibrated and that the calibration has not expired.
2. Use the pond water (or water that is to be discharged) to rinse out a small container then half fill with water from the same source.
3. Immerse the pH meter in the water and leave for up to 1 minute or until the reading stabilises and doesn't change. Place the container in a shaded place (out of direct sunlight) while it stabilises.
4. Record the pH reading given on the meter along with the date, time, and source of the water.

The tolerance of the sampling is between 5.5 to 8.

6.5 TSS Removal Triggers

The benchmark efficiency trigger has been established at an average of 90% efficiency for the 2 year, 1 hour duration. This equates to approximately 85mm rain event. A series of actions has been developed therefore for the following two triggers:

- <90% TSS Removal (SRP Trigger 1); and
- <70% TSS Removal (SRP Trigger 2).

The actions are defined in Section 8 Action Responses.

6.6 Summary of Device Sampling

Summary Table of Device Sampling below.

Parameter	Sediment Retention Poond	Decanting Earth Bund	Silt Fence/ Super Silt Fence
Automated Turbidity Sensors		No automated sampling for DEB's (unless there are no SRP's being utilised).	No automated sampling for DEB's (unless there are no SRP's being utilised).
Handheld Turbidity Sensors	All other active SRP's will have inlet and outlet sampling on a regular basis when discharging as well as the rainfall trigger events.	All active DEB's will have inlet and outlet sampling on a regular basis when discharging as well as the rainfall trigger events	All active DEB's will have inlet and outlet sampling on a regular basis when discharging as well as the rainfall trigger events
Clarity Sampling	All SRP's will have inlet and outlet clarity readings with Sechi (black disc). On a regular basis when discharging as well as the rainfall trigger events.	All DEB's will have inlet and outlet clarity readings with Sechi (black disc). On a regular basis when discharging as well as the rainfall trigger events.	All SF/SSF's where possible will have outlet clarity readings with Sechi (black disc). On a regular basis when discharging as well as the rainfall trigger events.
Water Quality Sampling	All SRP's will have 1 litre samples for >25mm(24hr) and 15mm (1hr) events. Sample for pH, TSS, Turbidity and Volatile TSS	All DEB's will have 1 litre samples for >25mm(24hr) and 15mm (1hr) events. Sample for pH, TSS, Turbidity and Volatile TSS	Where possible from the major discharge point, all SF/SSF's will have 1 litre samples for >25mm(24hr) and 15mm (1hr) events Sample for pH, TSS, Turbidity and Volatile TSS

7.0 Site Inspection Monitoring

In addition to formal environmental monitoring, the following general site monitoring will be undertaken.

7.1 DAILY MONITORING

The Civil Contractor and other management personnel will conduct inspections (including all subcontractor activities), and issues will be noted. These inspections are informal visual inspections in order to check environmental performance. Monitoring the weather conditions on site will be undertaken constantly and noted in daily site records.

7.2 WEEKLY MONITORING

Formal site inspections are to be completed by the site team in conjunction with the environmental team. The frequency of these inspections may reduce to fortnightly depending on the stage of works.

DW's site-specific checklists will be implemented to check compliance with consent conditions and this CEMP. Issues will be noted if they present significant environmental risks (e.g. noisy works, works near waterways, sediment control device maintenance etc.) with corrective actions recommended/issued.

7.3 MONTHLY MONITORING

The Contract Manager will undertake a monthly site visit with the Contractors ESC representative, to confirm the environmental monitoring programmes and work procedures containing environmental controls are being implemented in accordance with the relevant management plans, and resource consent conditions.

A review of current Risk Register (aspects and impacts) will be carried out, updating the register as required. This will also include audits of the ITP required for the process steps in the construction and operation of the ESC devices.

The Contractors ESC representative will submit a site inspection and environmental performance report to the Harrison Grierson Consultants.

7.4 THE EROSION & SEDIMENT CONTROL TEAM (ESCT)

The planning and implementation of all the erosion and sediment control methodologies and measures will be undertaken by a dedicated, experienced team to ensure that all relevant aspects of works activities are taken into consideration as part of the decision-making process. This will ensure that adequate resources, commitment and expertise are provided to erosion and sediment controls from start to finish of the Project.

All people working on site, or with site environmental responsibilities, will be required to undertake a formal induction process. No one will be permitted to work on the site until they have completed the induction process. Part of this induction process will be based on erosion and sediment control.

For those directly involved in earth works activities, specific training on erosion and sediment control activities will be provided. These will be coordinated by the Contractors ESC representative and include:

- Understanding erosion and sediment control consent conditions;
- The construction, installation and maintenance of erosion and sediment control devices;
- Identification through regular inspections of erosion and sediment control measures and daily work related activities, of potential issues related to erosion and sediment control;
- The preparation and implementation of contingency plans directly associated with the erosion and sediment control measures proposed in this methodology; and
- Ensuring personnel with the right skills are available to the Project.

In the ongoing proactive nature of the proposed works the erosion and sediment controls to be employed on the site will be subject to ongoing assessment and adjustment throughout to ensure that a comprehensive and effective set of controls continues to be employed.

This team will also be part of the "ESC team" to enable the rapid response if required.

Auckland Council also have a regulatory role within the project and will undertake compliance monitoring of the earthworks activity and will apply a compliance score to the activity and associated control measures as outlined below.

8.0 Action Responses

8.1 Freshwater Receiving Environmental Trigger Event

Receiving environment thresholds are set out in the Section 6.5 above. The actions outlined in a T1 to T6 response will be adopted into site procedures. Full training to the project team will be provided by the Contractors ESC representative to all site personnel.

8.1.1 Level 1 Response

Trigger Event	Response by Civil Contractor
T1 Monitoring indicates there is <100mm of clarity in the water column or readings >250NTU (using handheld meter).	
Action 1	Investigate if there have been any breaches of site sediment controls.
Action 2	Investigate if all site sediment controls are operating in accordance with plans.
Action 3	Investigate if this incident is a one-off occurrence or likely to be repeated.
Action 4	If an incident is likely to be repeated with 48 hours , determine the onsite modifications that would be required to reduce or contain this sediment. These may include: - Reducing exposed area (eg Not opening up additional areas and /or stablise high sediment yield areas - Increasing SRP sizes or adding additional baffles - Batch dosing and/or raising the decant arms (if enough live storage available) - Modifying the Chemical Treatment Plans including a program of batch dosing and or - Undertaking temporary stabilisation of open areas with higher sediment yields (eg steeper slopes) utilising the practices outlined in GD05
T2 (Monitoring indicates that the pH is outside the range of 5.5 to 8.5)	
Action 1	Investigate to see if the problem is a result of site operations, or localised within the receiving environment.
Action 2	Investigate chemical treatment devices to ensure correct operation
Action 3	If devices are not operating correctly then rectify problem, or take offline and continue chemical treatment manually until such a time that the device can be fixed or replaced.
Action 4	If incident is likely to be repeated, determine the onsite modifications that would be required to ensure correct pH levels. These may include - Revision of the Chemical Treatment Plan, including retesting of site soil characteristics; &/or a change of chemical treatment device
T3 Turbidity Monitoring indicates >250NTU	

Action 1	Investigate if there have been any breaches of site sediment controls.
Action 2	Investigate if all site sediment controls are operating in accordance with plans.
Action 3	Investigate if this incident is a one-off occurrence or likely to be repeated.
Action 4	If incident is likely to be repeated, determine the onsite modifications that would be required to reduce or contain this sediment. These may include; - Reducing exposed area (eg Not opening up additional areas and /or stablise high sediment yield areas - Increasing SRP sizes or adding additional baffles - Batch dosing and/or raising the decant arms (if enough live storage available) - Modifying the Chemical Treatment Plans including a program of batch dosing and or - Undertaking temporary stabilisation of open areas with higher sediment yields (eg steeper slopes) utilising the practices outlined in GD05 or alternatives approved by Auckland Council.
Action 5	Provide Adaptive Management Response report to Auckland Council and Engineer within 10 working days of event.

Has there been a prolonged and elevated level of turbidity or evidence of fugitive sediment discharges? If yes – refer to Level 2 and 3 response.

8.1.2 Level 2 and 3 Response

Trigger Event	Site Response by Civil Contractor
Action 1	Investigate if there have been any breaches of site sediment controls
Action 2	Investigate if all site sediment controls are operating in accordance with plans
Action 3	Investigate if this incident is a one-off occurrence or likely to be repeated
Action 4	Determine, if the occurrence is likely to be repeated, if it is likely to be the subject of prevailing weather conditions and if the sediment is coming from neighbouring developments - If neighbouring developments are the cause the management response is to adjust the baseline concentrations to reflect other development influences - If the incident is likely to be the result of sediment control practices, determine the onsite modifications that would be required to reduce or contain this sediment. These modifications are to remain in place until turbidity levels are within range. These modifications may include o Reducing exposed area (e.g. not opening additional areas and /or stabilise high sediment yield areas; o Increasing SRP/DEB sizes o Modifying the Chemical Treatment plan including Batch dosing o If elevated discharges are still occurring within 48hrs of the peak event – undertake temporary stabilisation of open areas with high sediment yields (e.g. steeper slopes) utilising practices outlined in GD05 o Revising the sediment and erosion control approach (e.g. pausing bulk earthworks until ground conditions are acceptable for cut and fill placement).

Action 5	Provide Adaptive Management Response report to Auckland Council and Engineer within 10 working days of event.
T5 Observations in the watercourse or coastal marine area displays sediment deposition >10mm in depth over a length of 50m or 50m2 beyond discharge point respectively	
Action 1	Investigate if the loss is localised or widespread. This is at the direction of the ecologist as outlined in Action 8 below in Trigger 6
Action 2	If localised is the loss a result of a 'natural' event such as a bank slump.
Action 3	If the loss is widespread determine if the loss occurs upstream of the discharge point.
Action 4	If the loss occurs upstream of the discharge point investigate what upstream activities may have resulted in a sediment discharge that could result in this loss, and also determine if there is an increase in the loss downstream of the discharge point.
Action 5	Where the loss is downstream of the discharge point and appears attributable to the site discharges investigate whether the sediment discharges from the site have been in accordance within anticipated levels and have been below trigger levels.
Action 6	Investigate what changes could be made on site to reduce the discharge volume in subsequent earthwork stages.
Action 7	Provide Adaptive Management Response report to Auckland Council and Engineer within 10 working days of event.
T6 Has there been a loss of aquatic fauna or flora which requires ecological assessment?	
Action 1	Investigate if the loss is a result of sediment discharge, increased temperature or other change in water quality such as pH or the result of a discharge of contaminants. This is at the direction of the ecologist as outlined in Action 8 below.
Action 2	Investigate if the loss is localised or widespread.
Action 3	If localised is the loss a result of a 'natural' event such as a bank slump, localised loss of riparian vegetation or new stormwater discharge.
Action 4	If the loss is widespread determine if the loss occurs upstream of the discharge point.
Action 5	If the loss occurs upstream of the discharge point investigate what upstream activities may have resulted in this loss, and also determine if there is an increase in the loss downstream of the discharge point.
Action 6	Where the loss is downstream of the discharge point and appears attributable to the site discharges investigate whether the discharges from the site have been in accordance within approved levels and have been below any trigger levels.
Action 7	Investigate what changes could be made on site to reduce the discharge volume in subsequent earthwork stages.
Action 8	An ecologist is to be called in within 24 hours of the event to investigate effects and provide a report.
Action9	Provide Adaptive Management Response report to Auckland Council and Engineer within 10 working days of event.

8.2 Coastal Receiving Environment Trigger Event

Where effects of concern are identified in the coastal environment, the responses on site will be the same as for terrestrial effects. This is itemised a Level 2 or Level 3 response (T5 action).

In addition to any refinement of existing treatment measures, measures will include reducing open areas and/or installing additional controls. These potential responses need to be identified in the AMP as guided within Section 8.2. Any actual responses that are necessary must be described in the relevant Trigger Event Report.

Where exceedances of sediment deposition or loss of aquatic organisms are identified then the following will occur:

Trigger Event	Site Response by Civil Contractor
Action 1	Notify Council by email within 1 working day of a threshold exceedance;
Action 2	A marine ecologist is to be called in within 24 hours to review deposition for a Level 3 response, investigate effects and provide report
Action 3	Investigate if the loss is a result of sediment discharge or other change in water quality, including an effect not associated with the project;
Action 4	Investigate the extent of the ecological effects;
Action 5	Where the loss is downstream of the discharge point and appears attributable to the site discharges investigate whether the discharges from the site have been in accordance within anticipated site management (GD05);
Action 6	An ESC Specialist is to carry out and record in writing a full audit of the condition of all ESCs within the earthworks area discharging to the coastal environment as soon as practicable;
Action 7	Remedy any causes on site that may have contributed to a threshold breach as soon as practicable, and record what remedial measures were undertaken, including changes that can be made to the ESC devices to reduce the discharge volume;
Action 8	Where the ecologist determines that the adverse effects on the receiving environment are more than minor and not temporary, consult with the Auckland Council Compliance Monitoring Officer, detail what mitigation measures are proposed and the timeframes for implementing these, subject to approval by Council;
Action 9	Implement the mitigation measures approved by Council;

8.3 Device Monitoring Trigger Event

If monitoring of the SRP's and DEB's triggers a SRP T1 or SRP T2 event, the following actions will be initiated.

Trigger Event	Site Response by Civil Contractor
SRP T1 (<90% TSS Removal) Events when the device is discharging sediment-laden water from the outlet	
Action 1	Determine SRP and DEB Efficiency through inlet and outlet sampling. SRP T1 Trigger Event noted.
Action 2	Within 12 hours of trigger exceedance notify Engineer/Principal. As soon as practicably possible the erosion and sediment controls within the catchment to be checked, remedial actions identified and timeframes agreed.

<table>
<tr><td>Action 3</td><td>Undertake remedial actions within agreed timeframes. For example, SRP muck out, reassess chemical treatment, installation of baffles, reduce open catchment area.</td></tr>
<tr><td>Action 4</td><td>SRP T1 Only – Within 10 working days, or as agreed, of Trigger Exceedance, document all actions and provide a report to Engineer for information purposes.</td></tr>
<tr><td colspan="2">SRP T2 (<70% TSS Removal) Events when the device is discharging sediment-laden water from the outlet</td></tr>
<tr><td>Action 1</td><td>Determine SRP and DEB Efficiency through inlet and outlet sampling. SRP T2 Trigger Event noted.</td></tr>
<tr><td>Action 2</td><td>Within 12 hours of Trigger Exceedance notify Engineer/Principal & AC for information purposes and also notify ecologist (for Level 3 Response) to inspect watercourse. These inspections should include the relevant freshwater monitoring sites from the freshwater baseline report. These inspections should include biological monitoring, including macroinvertebrate and fish surveys, and compared against the baseline data presented in this report.
As soon as practicably possible the erosion and sediment controls within the catchment would be checked, remedial actions identified and timeframes agreed</td></tr>
<tr><td>Action 3</td><td>Within 24 hours of trigger exceedance, Contractors ESC representative to assess sediment discharge risk based on the following:
• Predicted rainfall for next 48 hour period;
• Monitoring records available for the SRP that is subject to the Trigger Exceedance;
• Location and nature of SRP contributing catchment area i.e. immediately next to stream system;
• Slope and Soil Type;
• Un-stabilised area extent; and
• Success of remedial actions already undertaken as above.
Risk assessment is based on the following
<table>
<tr><td>Prompt</td><td>Questions</td></tr>
<tr><td rowspan="2">Event</td><td>Has the rainfall event finished or is further rain recast for the next 48 hours?</td></tr>
<tr><td>What is the size of the event, greater than a 10 year return period?</td></tr>
<tr><td>Magnitude of exceedance</td><td>What is the size of the exceedance in real terms e.g. mg/m3 or NTUs? Is this significant</td></tr>
<tr><td rowspan="3">Catchment</td><td>What is happening at other devices in the catchment and elsewhere on site?</td></tr>
<tr><td>Is this discharge significant in regard to the size of the catchment?</td></tr>
<tr><td>What is the receiving environment?</td></tr>
<tr><td>Device History</td><td>How has the device performed previously?</td></tr>
<tr><td>Slope and Soil type</td><td>Is the catchment slope greater than 15 degrees and/or is the catchment based on soils that are susceptible to erosion.</td></tr>
<tr><td>Un-stabilised Area extent</td><td>Is the extent of un-stabilised area contributing to the SRP greater than 1.5 ha</td></tr>
<tr><td>Mitigation Actions</td><td>Will the proposed mitigation actions result in treatment achieving better than 70% sediment treatment? What is the success of these remedial measures already undertaken</td></tr>
</table></td></tr>
<tr><td>Action 4</td><td>Undertake remedial actions within agreed timeframes</td></tr>
<tr><td>Action 5</td><td>Inform Engineer/Principal of risk profile and management and associated actions within 24 hours of trigger exceedance</td></tr>
<tr><td>Action 6</td><td>Following sediment discharge risk assessment (within a 12 hour period), if SRP or DEB still discharging, undertake further inlet and outlet monitoring and re- check efficiency as above.</td></tr>
</table>

Action 7	If high risk then partial and/or full stabilisation, of contributing catchment to SRP, to address associated risk will be undertaken within 48 hours of Trigger Exceedance unless otherwise agreed with AC.
Action 8	Within 5 working days of trigger exceedance, or as agreed with Engineer report all monitoring, review, response and associated actions to Engineer and Erosion and Sediment Control Team
Action 9	Assess appropriateness of response when SRP or DEB next discharges and efficiency is determined
Action 10	Prepare and provide to Auckland Council a Trigger Event Report with adaptive management responses within 10 working days.

8.4 Chemical Treatment Monitoring

The specific set of monitoring and maintenance requirements for the various chemicals to be used are based on:

- Inspect chemical dosing systems and review maintenance records. Modify dosing system if under or over dosing observed;
- Review chemicals and dose rates and amend as necessary; and
- Report all monitoring, reviews undertaken and documentation of corrective actions.

The adaptive Chemical Treatment approach will ensure that dose rates are matched to the appropriate ground conditions.

In some instances, higher alkaline water from the SRP's and DEB's may require pH buffering using lime or other methods. This will be utilised to ensure that the pH is within the 5.5 to 8.5 range.

9.0 Reporting

9.1 Site Auditing

Daily inspections will be undertaken by the appointed Earthworks Contractor or nominated person.

An internal audit will be undertaken by the Earthworks Consultant or nominated person at least weekly. Any maintenance actions will be undertaken that day, or at least acknowledged to the Council Compliance Monitoring Officer during their audit.

Actions will be loaded into the Environmental Management system and Work Instructions with details and timeframes will be issued by the Harrison Grierson Consultants or nominated person, with specific actions and closeout timeframes.

For programmed Council inspections, Harrison Grierson Consultants, appointed Earthworks Contractor or nominated person will accompany the Council Monitoring Officer in all audits. Usually a member of the construction team will also be present.

As for internal audits, all ESC maintenance actions identified by the Council Monitoring Officer will be recorded into the Project ESC recording management system. Instructions with details and timeframes will be issued to the appointed Earthworks Contractor or nominated person, based on the Councils instructions. Both Harrison Grierson Consultants and appointed Earthworks Contractor or nominated person will report back the completion of those actions to the Council

9.2 Rainfall Trigger Event Report

Following a rainfall trigger event a report will be produced that will provide to Council and the Principal a summary of the performance of the SRPs, DEBs and overall ESC system observed during the rainfall event. The report will include

- A summary of the rainfall (total and intensity)

- A summary of the data acquired from the automated turbidity monitors associated with the trigger events
- A summary of the manual monitoring undertaken and comparison of manual monitoring results with automated results.
- Identification if a threshold exceedance occurred. This will outline what exceedance occurred, the extent of the exceedance, any actions taken to mitigate the effects of the event and a proposed management response if required.
- A record of any other matters which may have compromised the overall ESC performance during the rain event and the identified mitigation, maintenance and management response.

The rainfall trigger event report will be provided to Council and key stakeholders within 10 days of the rainfall trigger event.

9.3 Annual Report

An annual report containing monitoring results and an assessment of discharge compliance will be provided to Council and Principal by June 30 of each year. This report will contain the following details.

- A summary of the results of all monitoring within that period.
- A summary of any threshold exceedances that occurred and the response actioned.
- Any proposed changes or updates to the ESCMP to be submitted to the Council for certification in accordance with Consent Conditions. Certification from Council must be provided prior to any changes to the ESCAMP being implemented.

9.4 Annual Review

Prior to the recommencement of earthworks for each new construction season the Harrison Grierson Consultants shall

- Review the annual report and recommend changes to the ESCMP.
- Liaise with the appointed contractor to confirm recommendations or methodology changes to earthworks operations.
- Prepare any changes or updated to the ESCMP and submit to Council for certification.
- Brief the appointed contractor their responsibilities under this Adaptive Plan
- Prepare compliance documentation to capture all reporting required under this Adaptive Plan.

10.0 Limitations

10.1 General

This report is for the use Beachlands South Limited Partnership Fast Track Consent application and for Expert consenting panel to consider as part of its consideration of the application only and should not be used or relied upon by any other person or entity or for any other project.

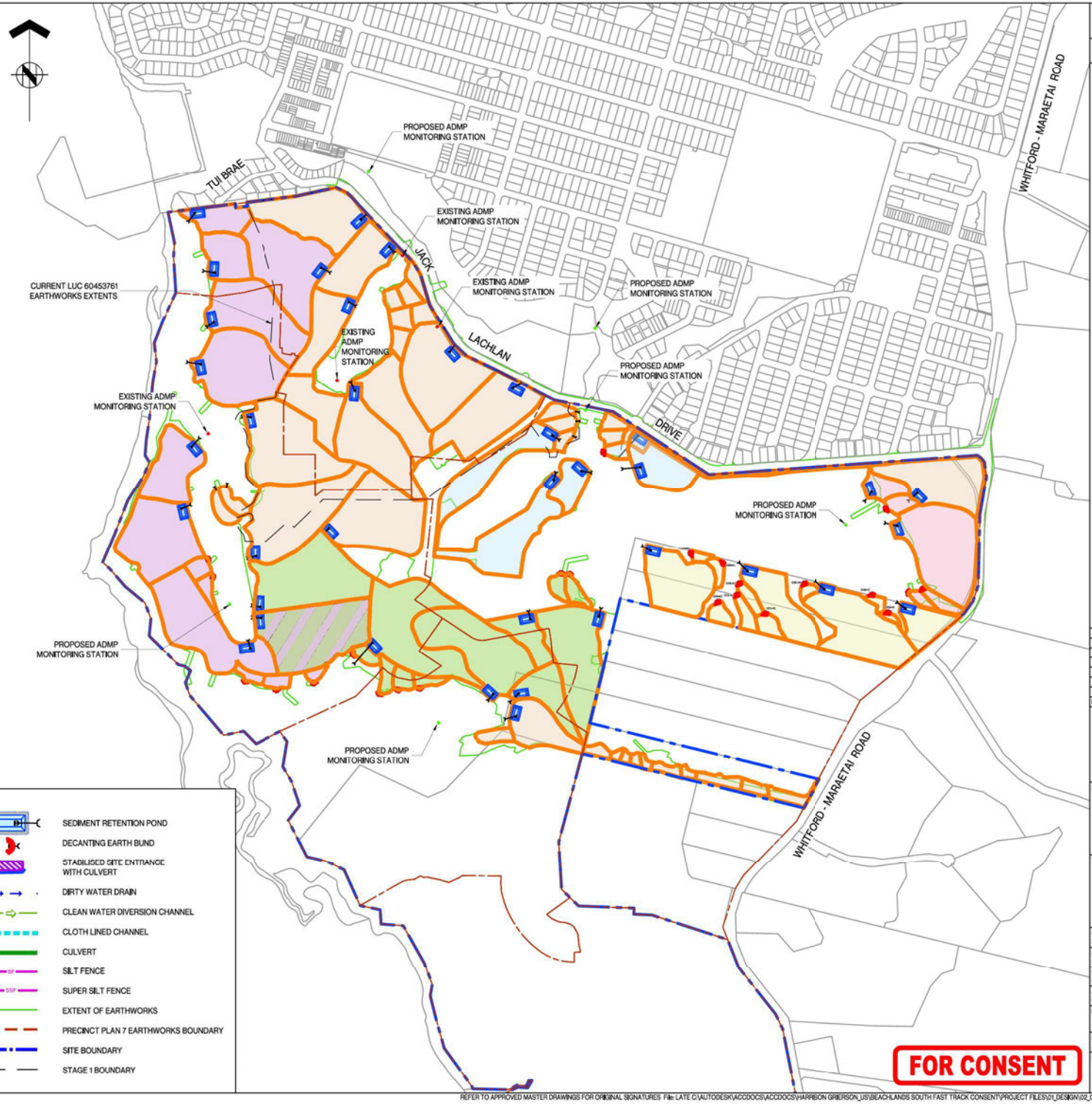
This report has been prepared for the particular project described to us and its extent is limited to the scope of work agreed between the client and Harrison Grierson Consultants Limited. No responsibility is accepted by Harrison Grierson Consultants Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.

Appendix A – Proposed Sediment and Control Plans

Auckland

Level 4, 96 St Georges Bay Road
Parnell, Auckland 1052

EROSION AND SEDIMENTATION POND	STAGE	AREA (ha)
POND A	1	3.9890 ha
POND B	1	2.8822 ha
POND C	1	2.0159 ha
POND D	1	3.7595 ha
POND E	1	1.7086 ha
POND F1	1	1.6643 ha
POND F2	1	2.9952 ha
POND F3	1	2.4061 ha
POND G	1	2.9877 ha
POND H	1	3.9837 ha
POND I	1	3.6311 ha
POND J	1	0.5990 ha
POND K	1	2.6408 ha
POND K2	2	3.4934 ha
POND L	1	1.5077 ha
POND M	2	3.8263 ha
POND N	3	3.6412 ha
POND O	3	0.9766 ha
POND P	3	1.2865 ha
POND Q	3	3.1032 ha
POND R	3	3.4835 ha
POND S	3	1.9600 ha
POND T	3	3.1955 ha
POND U	3	3.8121 ha
POND V	3 & 4	3.9834 ha
POND W	4	3.9409 ha
POND X	4	3.9429 ha
POND Y	4	3.6956 ha
POND Z	4	1.3434 ha
POND AA	4	1.0164 ha
POND AB	4	3.3933 ha
POND AC	5	2.0981 ha
POND AD	5	2.6339 ha
POND AE	5	0.8396 ha
POND AF	5	1.5855 ha
POND AG	6	2.3174 ha
POND AH	6	1.8130 ha
POND AI	6	3.2464 ha
POND AJ	6	1.0056 ha



LEGEND

- CATCHMENT BOUNDARY
- ESC - STAGE 1
- ESC - STAGE 2
- ESC - STAGE 3
- ESC - STAGE 4
- ESC-STAGE 5
- ESC-STAGE 6
- ESC-PREVIOUS STAGE
- STABILISED AREA
- EXISTING FRESHWATER ADMP MONITORING SITE
- PROPOSED FRESHWATER ADMP MONITORING SITE
- SEDIMENT RETENTION POND
- DECANTING EARTH BUND
- STABILISED SITE ENTRANCE WITH CULVERT
- DIRTY WATER DRAIN
- CLEAN WATER DIVERSION CHANNEL
- CLOTH LINED CHANNEL
- CULVERT
- SILT FENCE
- SUPER SILT FENCE
- EXTENT OF EARTHWORKS
- PRECINCT PLAN 7 EARTHWORKS BOUNDARY
- SITE BOUNDARY
- STAGE 1 BOUNDARY

FOR CONSENT

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND — ISO 9001 QUALITY ASSURED

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NOTES

1. ALL WORKS TO COMPLY WITH AUCKLAND COUNCIL ENGINEERING QUALITY STANDARDS AND ALL MATERIALS TO COMPLY WITH AUCKLAND COUNCIL REQUIREMENTS.
2. ALL EROSION AND SEDIMENT CONTROL MEASURES MUST BE OPERATIONAL PRIOR TO ANY WORKS COMMENCING.
3. A COPY OF THE SEDIMENT CONTROL PLAN SHALL BE AVAILABLE ON THE SITE DURING WORK HOURS AND ALL PERSONNEL INVOLVED IN EARTHWORK ACTIVITIES ON THE SITE (INCLUSIVE OF SUB-CONTRACTORS) SHALL BE FAMILIAR WITH THE PLAN REQUIREMENTS AS THEY RELATE TO EROSION AND SEDIMENT CONTROL.
4. ALL "CLEANWATER" RUNOFF FROM STABILISED SURFACES INCLUDING CATCHMENT AREAS ABOVE THE SITE SHALL BE DIVERTED AWAY FROM EARTHWORK AREA VIA STABILISED SYSTEM, SO AS TO PREVENT SURFACE EROSION.
5. ALL EROSION AND SEDIMENT CONTROL SHALL COMPLY WITH THE "EROSION AND SEDIMENT CONTROL GUIDE FOR LAND DISTURBING ACTIVITIES IN THE AUCKLAND REGION" ARC GUIDELINE DOCUMENT 2016/005 UPDATED JUNE 2016 AND ANY AMENDMENTS TO THIS DOCUMENT. (COPY AVAILABLE FROM AUCKLAND COUNCIL UPON REQUEST).
6. THE MAIN SILT CONTROL MEASURE FOR THIS SITE ARE:
   - 6.1. DIVERSION OF "CLEANWATER" FROM THE ABOVE CATCHMENTS AROUND THE EARTHWORKS AREA BY MEANS OF DIVERSION DRAINS AND/OR OTHER APPROVED METHOD.
   - 6.2. REMOVAL OF SEDIMENT FROM SILT LADEN WATERS USING "SILT FENCES".
   - 6.3. THAT THE SITE BE STABILISED AGAINST EROSION AS SOON AS PRACTICABLE AND IN A PROGRESSIVE MANNER AS EARTHWORKS ARE FINISHED OVER VARIOUS AREAS OF THE SITE.
   - 6.4. MAINTENANCE OF ALL SEDIMENT CONTROL FACILITIES AS REQUIRED.
   - 6.5. CUT-OFF DRAINS TO BE INSTALLED AT THE MAXIMUM INTERVAL OF 50m AT THE END OF EACH DAY TILL SLOPE STABILISED.
   - 6.6. SUPER SILT FENCES.
7. FURTHER SEDIMENT CONTROL WORKS MAY BE REQUIRED BY THE ENGINEER AS THE PROJECT ADVANCES. THESE WILL BE INSTALLED AS AND WHERE DIRECTED BY THE ENGINEER. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ENSURING THAT THE SITE HAS EFFECTIVE SILT DETENTION FACILITIES OPERATING AT ALL TIMES.
8. EARTHWORKS TO BE MANAGED TO ENSURE THAT MAXIMUM OPEN CATCHMENT AREA DRAINING TO SUPER SILT FENCES TO BE 1000m².
9. BULK EARTHWORKS CANNOT COMMENCE UNTIL ALL SEC ARE IN PLACE, AS BUILT APPROVED BY COUNCIL AND A WALK OVER HELD WITH AC AND ENGINEER.
10. MAXIMUM EXPOSED AREA FOR EARTHWORKS ACTIVITIES =
    100.0916 ha (CATCHMENTS A-AF + 1-39)
    TOTAL SITE AREA = 175.2268 ha

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

HARRISON GRIERSON
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Level 4, 96 St. Georges Bay Road
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T +64 9 917 5000
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PROJECT:
BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:
EROSION AND SEDIMENT CONTROL
OVERALL PLAN

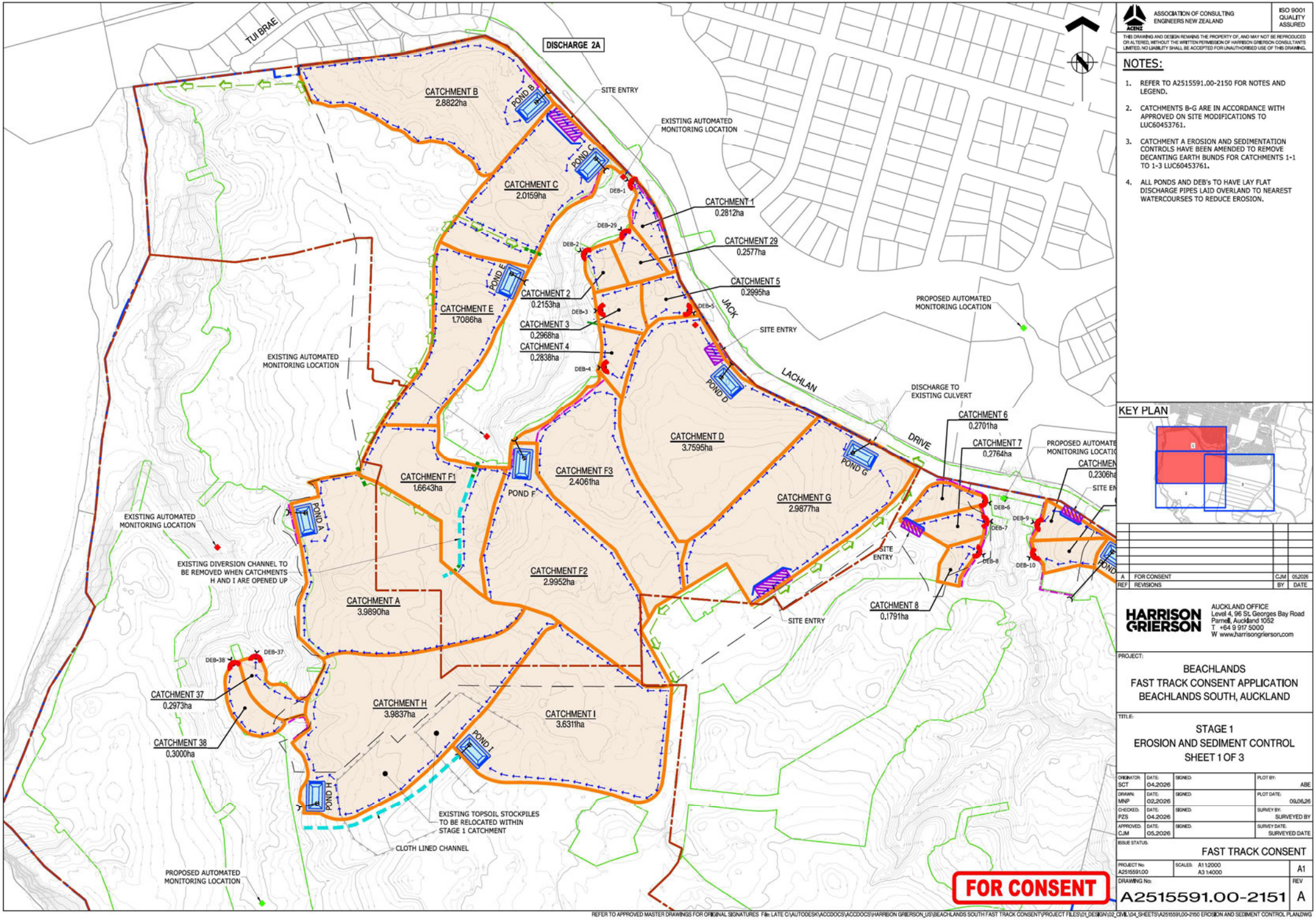
ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No.	SCALES	
A2515591.00	A1 1:5000 A3 1:10000	A1

DRAWING No: A2515591.00-2150 — REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: LATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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NOTES:

1. REFER TO A2515591.00-2150 FOR NOTES AND LEGEND.
2. CATCHMENTS B-G ARE IN ACCORDANCE WITH APPROVED ON SITE MODIFICATIONS TO LUC60453761.
3. CATCHMENT A EROSION AND SEDIMENTATION CONTROLS HAVE BEEN AMENDED TO REMOVE DECANTING EARTH BUNDS FOR CATCHMENTS 1-1 TO 1-3 LUC60453761.
4. ALL PONDS AND DEB'S TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 1
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

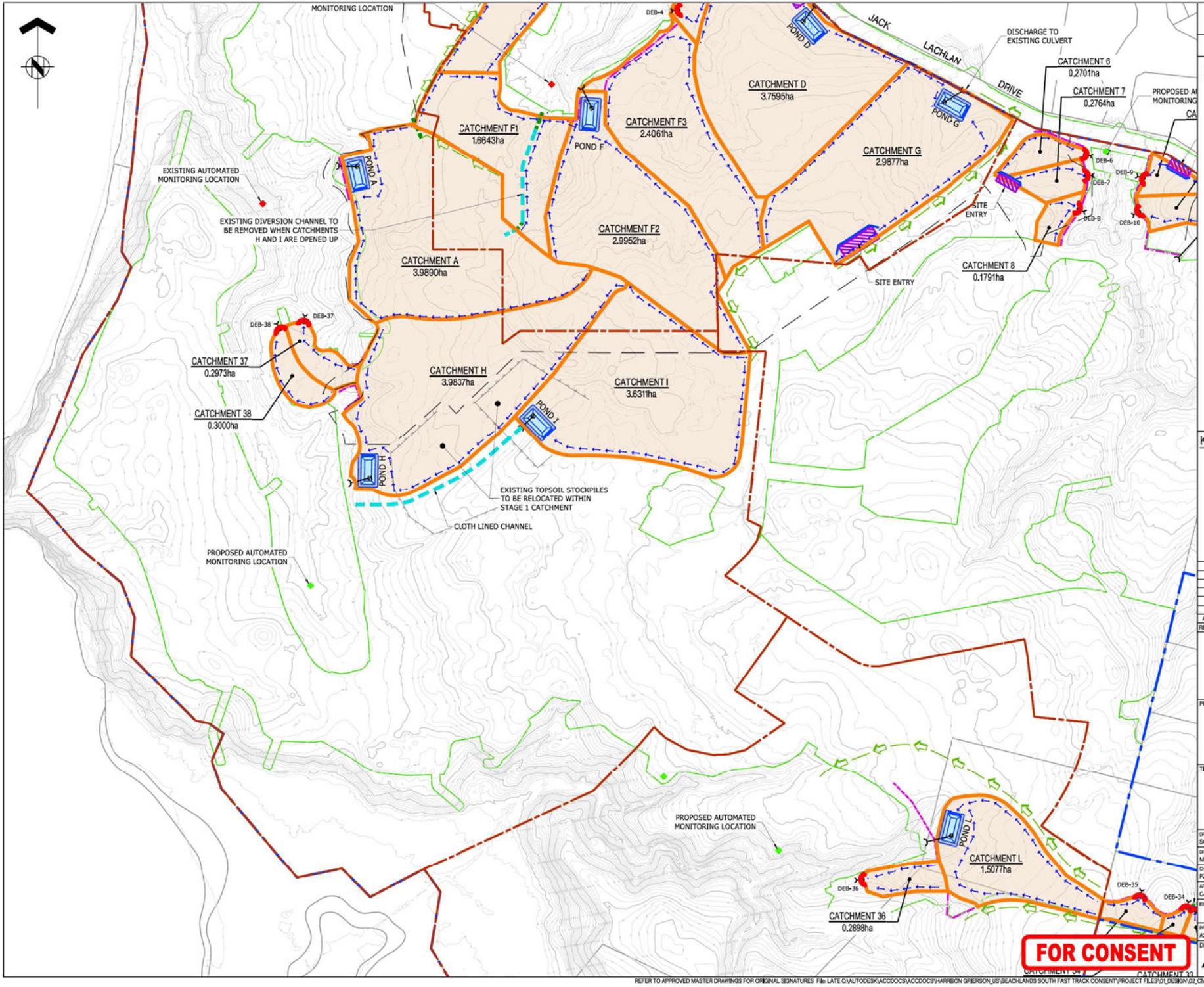
ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS:

FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2151		REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: L:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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NOTES:

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2. ALL PONDS AND DEB'S TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

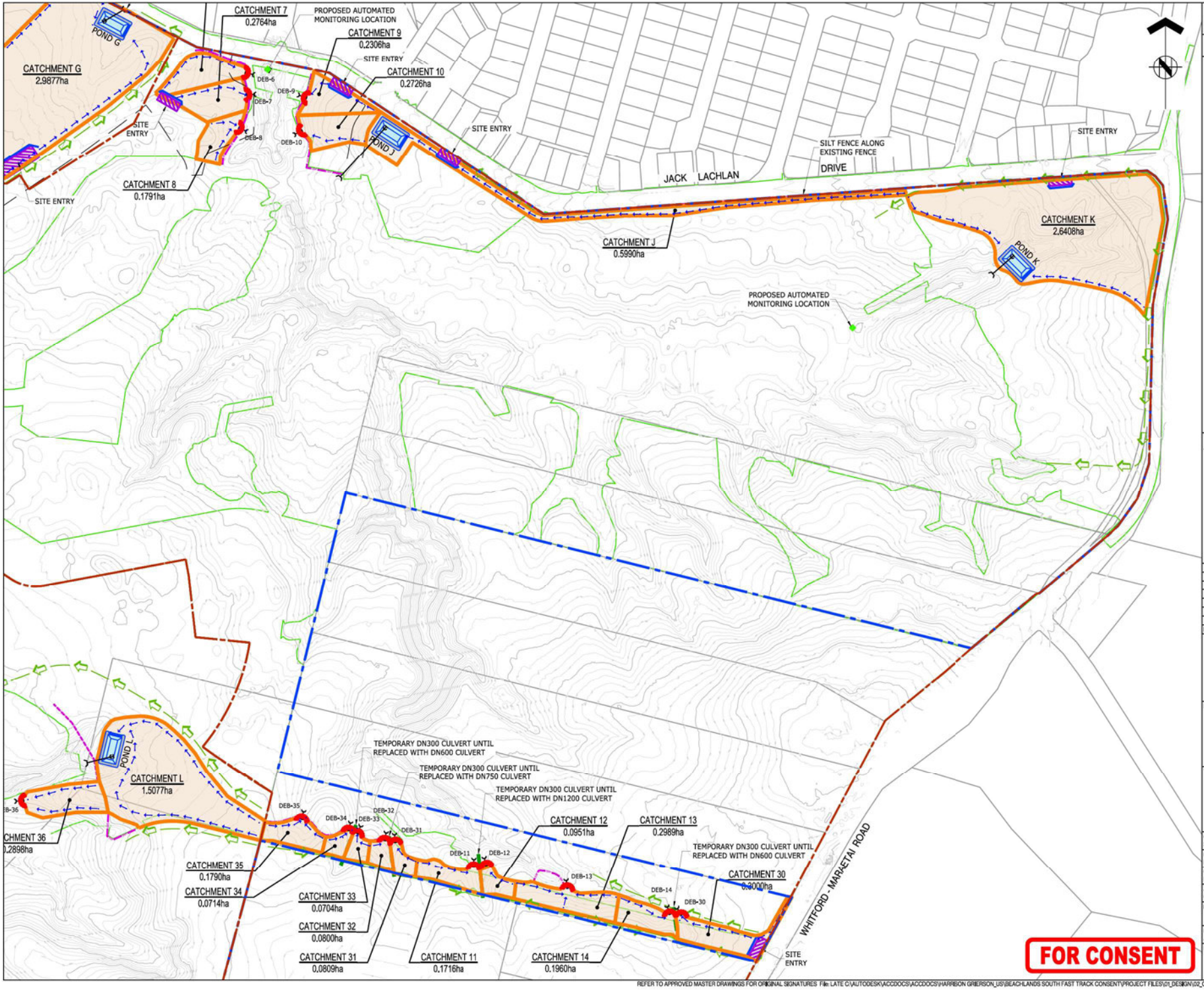
STAGE 1
EROSION AND SEDIMENT CONTROL
SHEET 2 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2152		REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: L:\ATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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KEY PLAN

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 1
EROSION AND SEDIMENT CONTROL
SHEET 3 OF 3

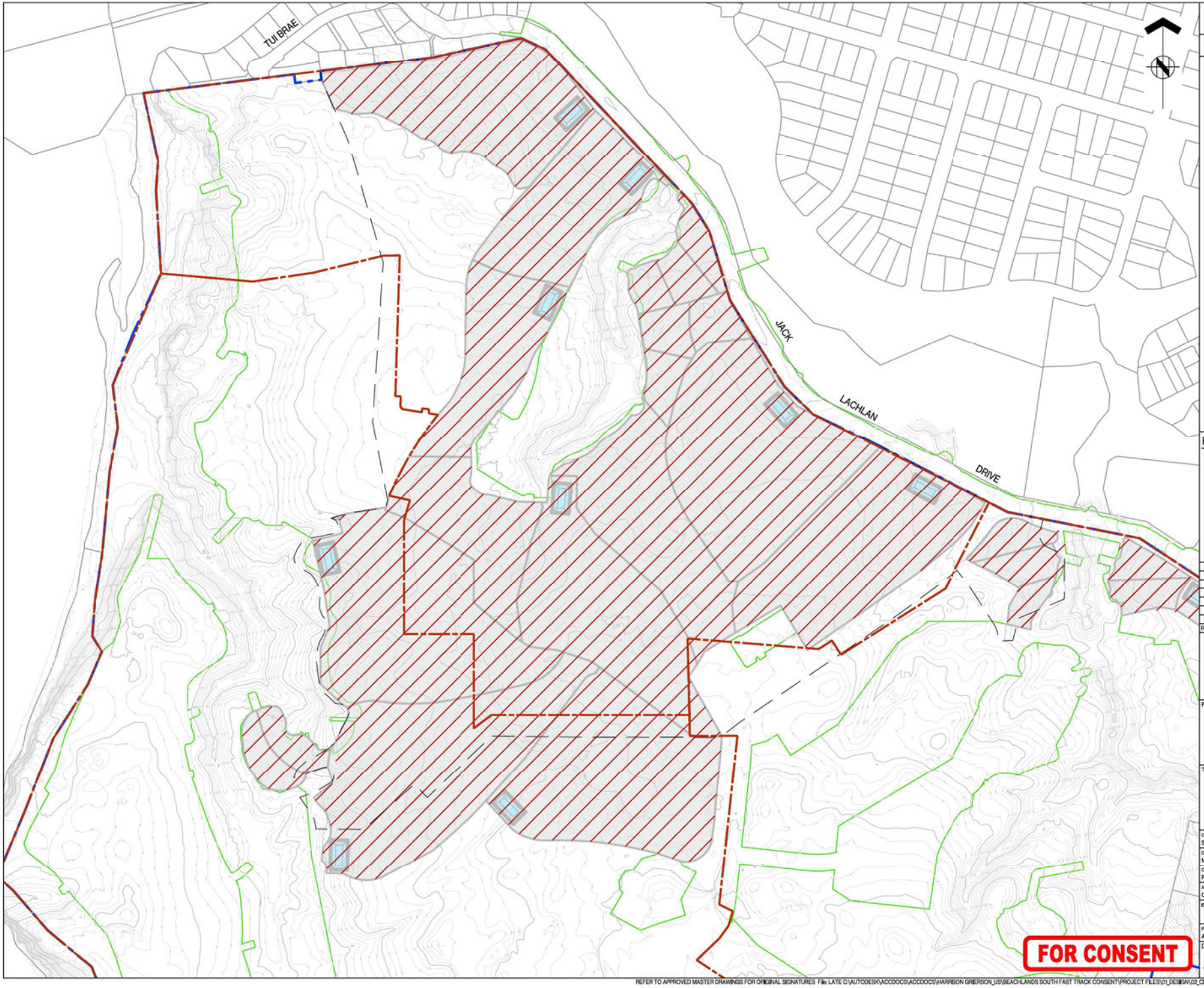
ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS:

FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2153		REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: L:\ATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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NOTES:

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2. STAGE 1 AREA STABILISED - DEVICES WILL REMAIN IN PLACE UNTIL ALL CIVIL WORKS ARE COMPLETE.
3. ALL PONDS AND DEB's TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

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A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 2
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2154		REV A

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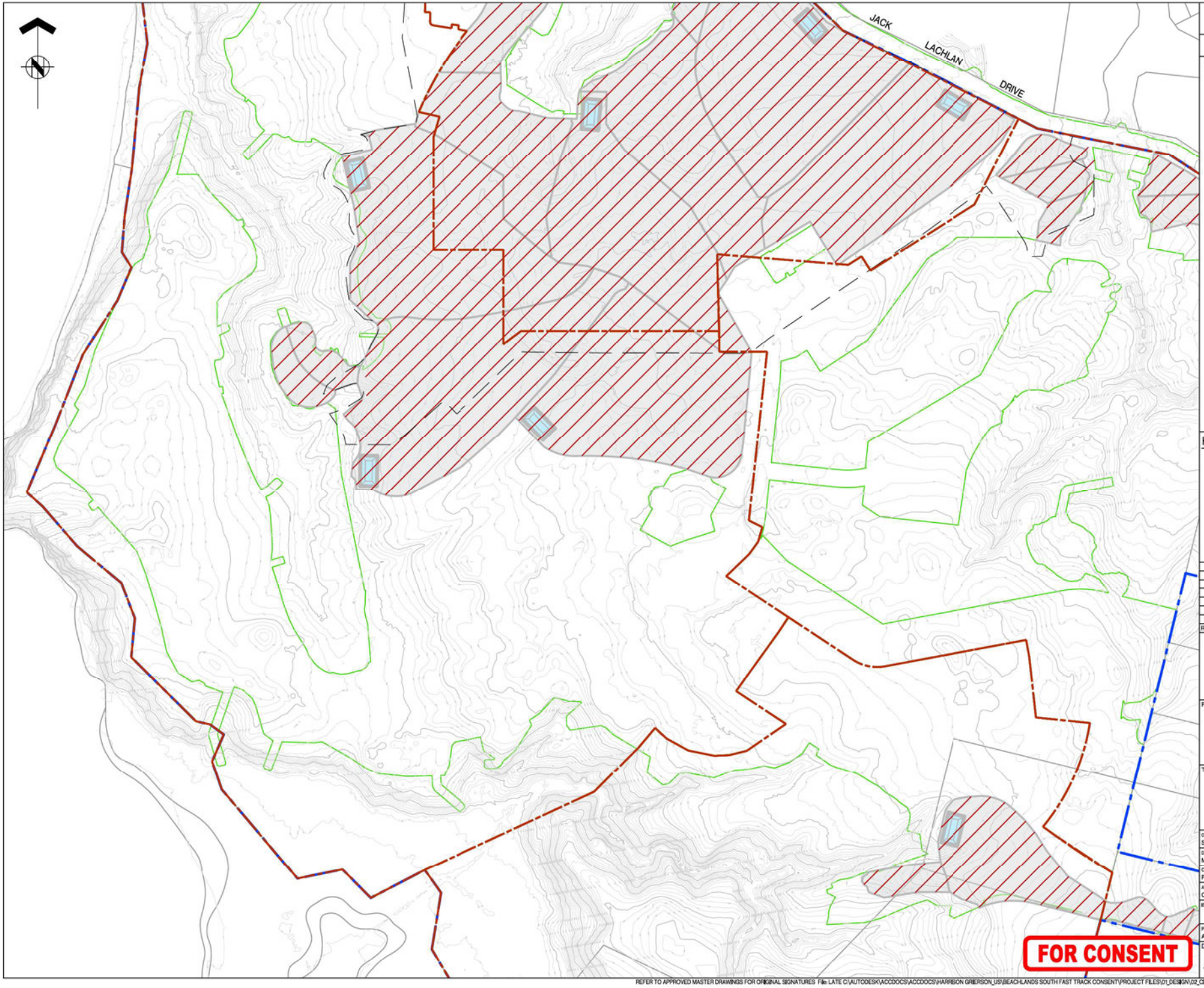

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NOTES:

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2. STAGE 1 AREA STABILISED - DEVICES WILL REMAIN IN PLACE UNTIL ALL CIVIL WORKS ARE COMPLETE.
3. ALL PONDS AND DEB's TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

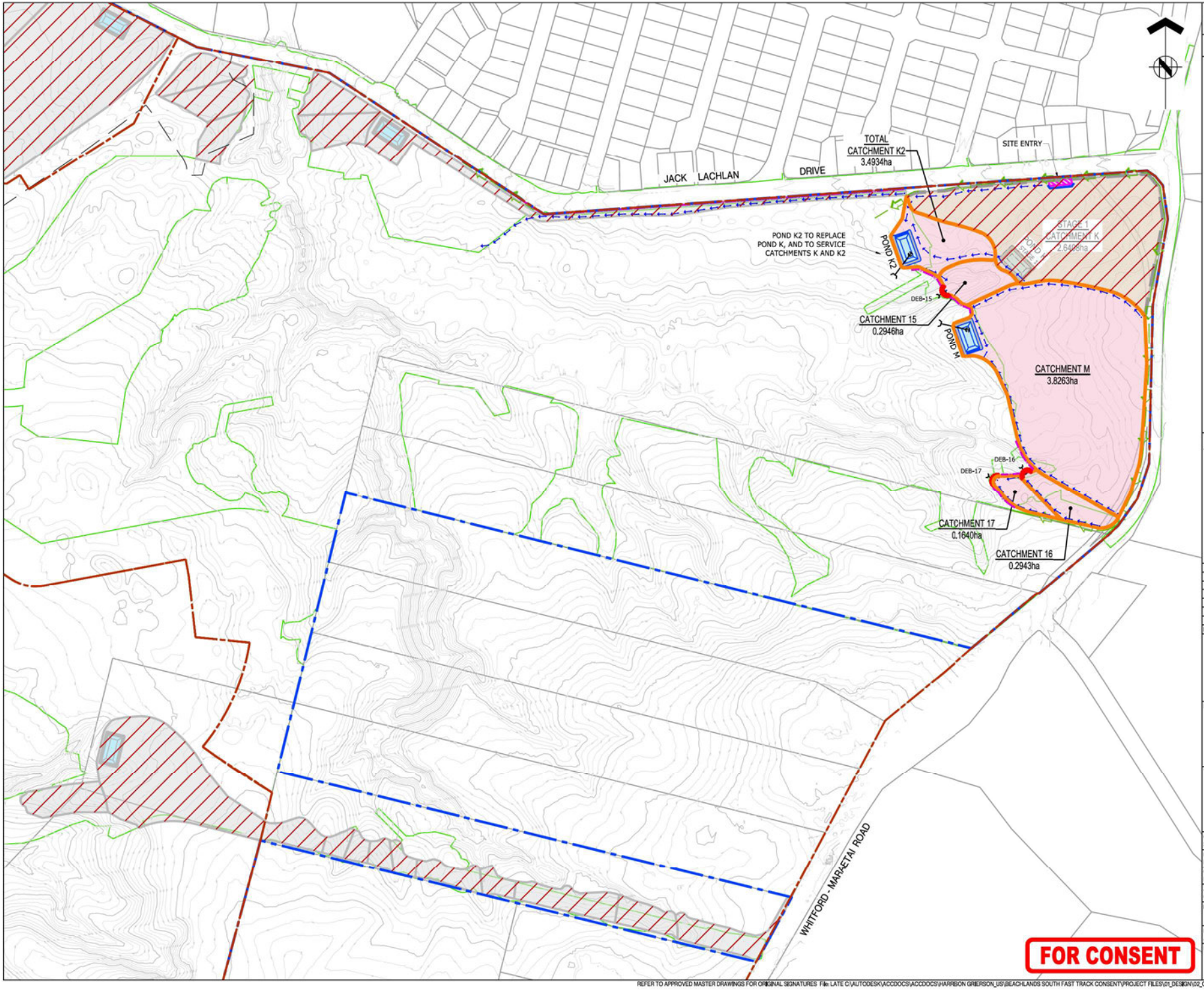
STAGE 2
EROSION AND SEDIMENT CONTROL
SHEET 2 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2155		REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: L:\ATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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NOTES:

1. REFER TO A2515591.00-2150 FOR NOTES AND LEGEND.
2. STAGE 1 AREA STABILISED - DEVICES WILL REMAIN IN PLACE UNTIL ALL CIVIL WORKS ARE COMPLETE.
3. POND K2 IS SIZED FOR CATCHMENTS K AND 15.
4. ALL PONDS AND DEB's TO HAVE LAY FLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSES TO REDUCE EROSION.

KEY PLAN

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

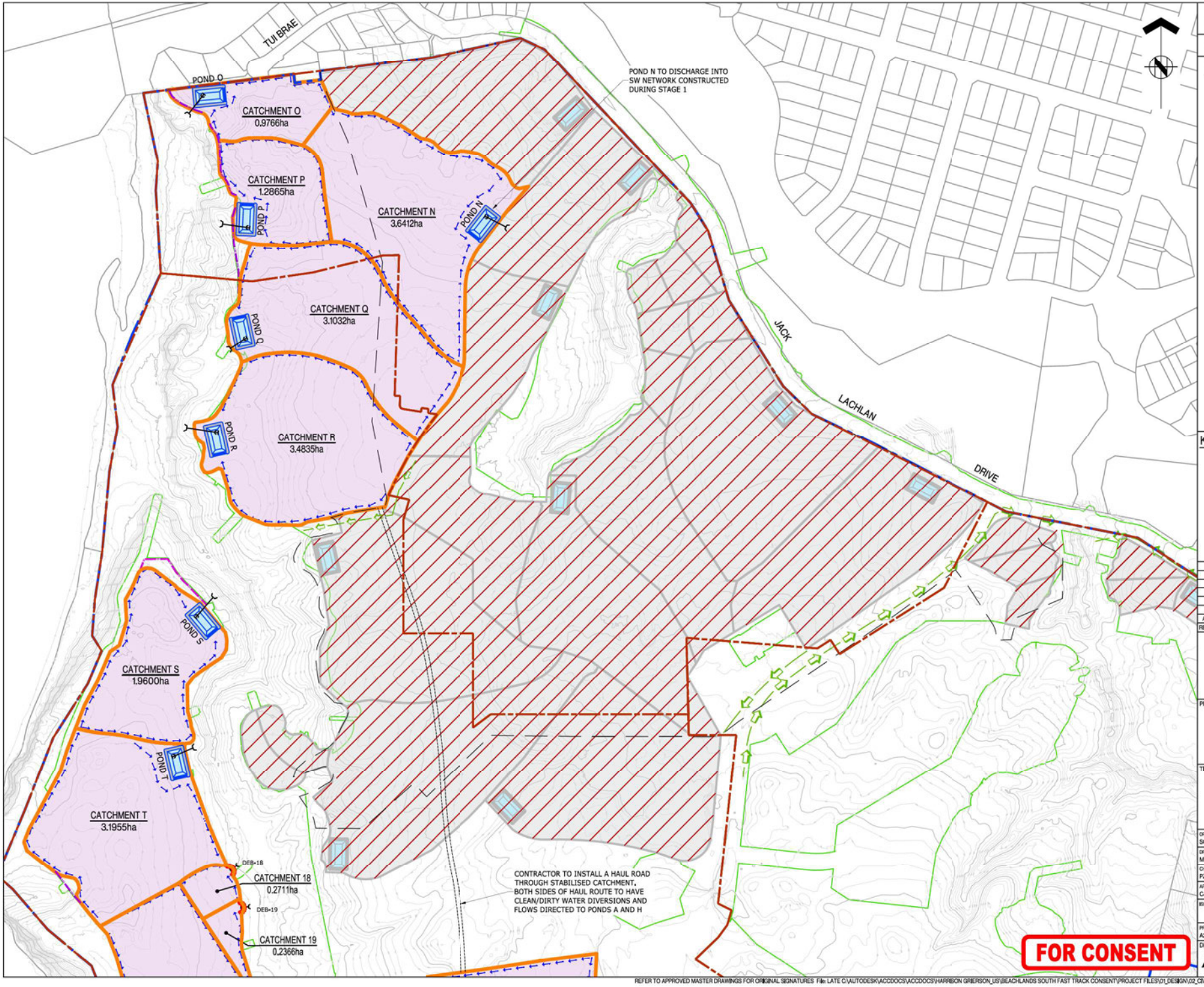
STAGE 2
EROSION AND SEDIMENT CONTROL
SHEET 3 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2156		REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: LATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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NOTES:

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2. STAGE 1 AREA STABILISED - DEVICES OUTSIDE FULLY STABILISED AREAS WILL REMAIN IN PLACE UNTIL ALL CIVIL WORKS ARE COMPLETE.
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KEY PLAN

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A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 3
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS:

FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2157		REV A

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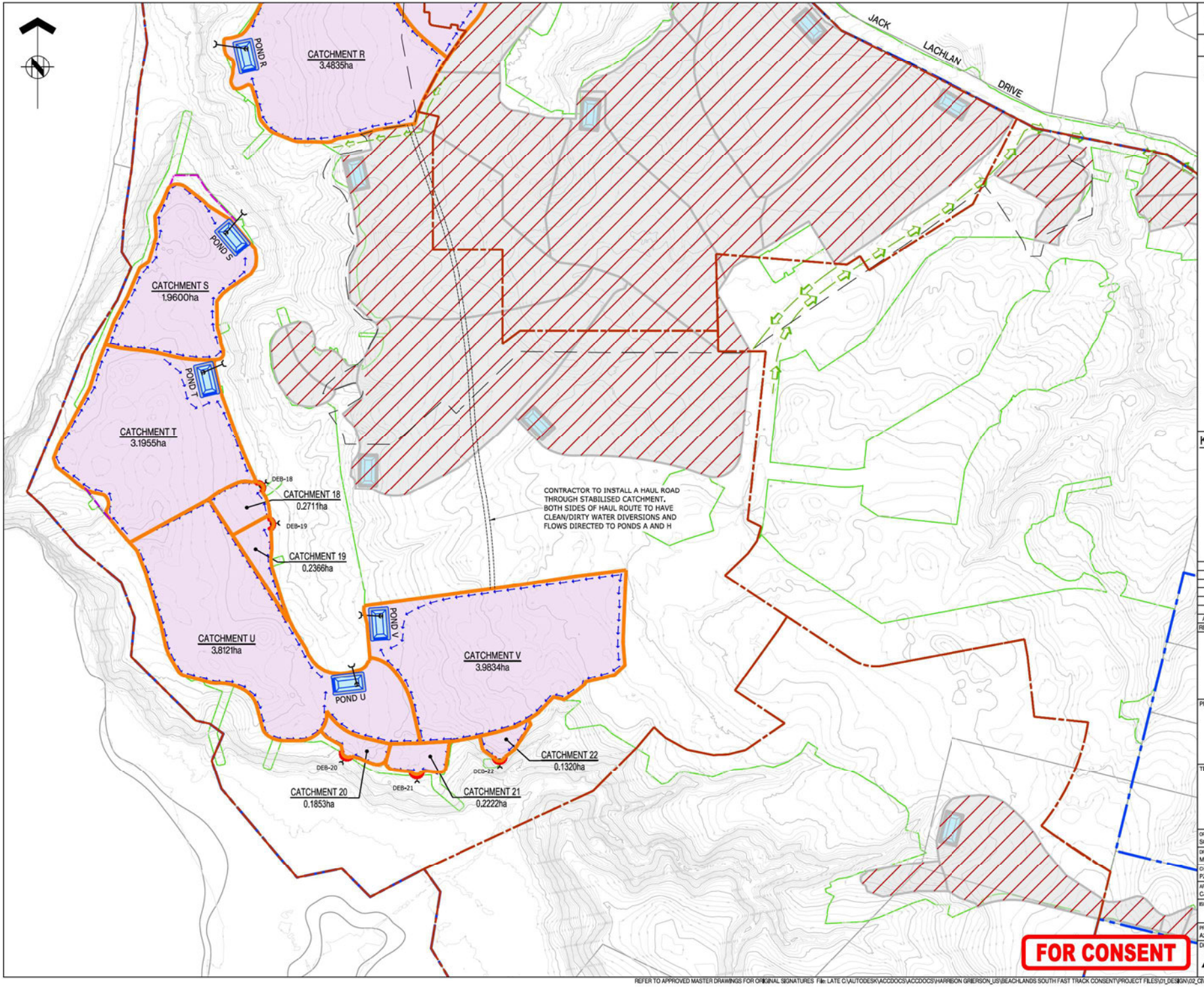

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KEY PLAN

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

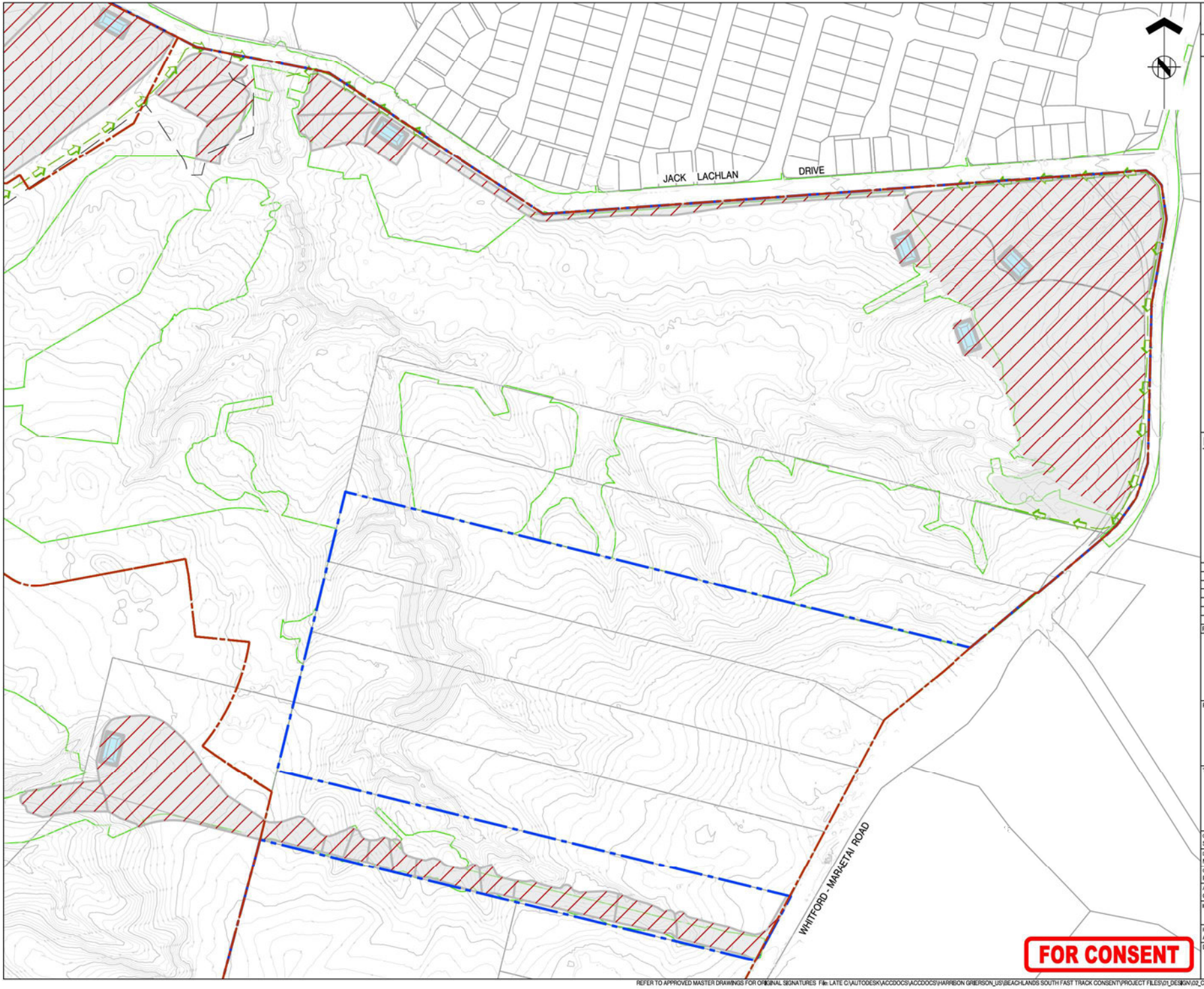
STAGE 3
EROSION AND SEDIMENT CONTROL
SHEET 2 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2158		REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: L:\ATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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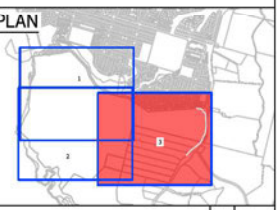
KEY PLAN



REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

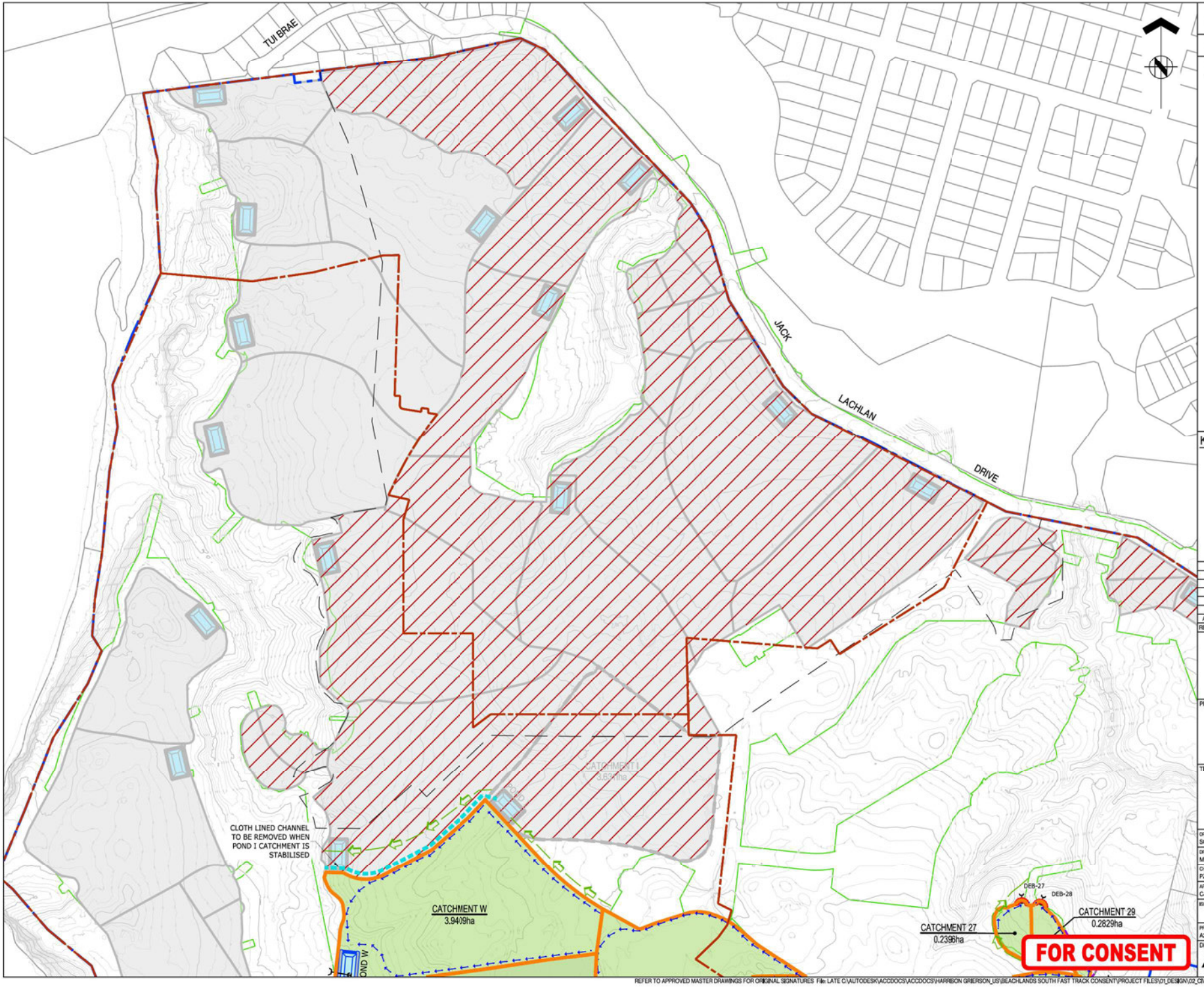
STAGE 3
EROSION AND SEDIMENT CONTROL
SHEET 3 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2159		REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: L:\ATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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NOTES:

1. REFER TO A2515591.00-2150 FOR NOTES AND LEGEND.
2. STAGE 3 AREA STABILISED - DEVICES WILL REMAIN IN PLACE UNTIL ALL CIVIL WORKS ARE COMPLETE.
3. ALL PONDS AND DEB's TO HAVE LAYFLAT DISCHARGE PIPES LAID OVERLAND TO NEAREST WATERCOURSE TO REDUCE EROSION.

KEY PLAN

REF	REVISIONS	BY	DATE
A	FOR CONSENT	CJM	05.2026

HARRISON GRIERSON

AUCKLAND OFFICE
Level 4, 96 St. Georges Bay Road
Parnell, Auckland 1052
T +64 9 917 5000
W www.harrisongrierson.com

PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 4
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 04.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2160		REV: A

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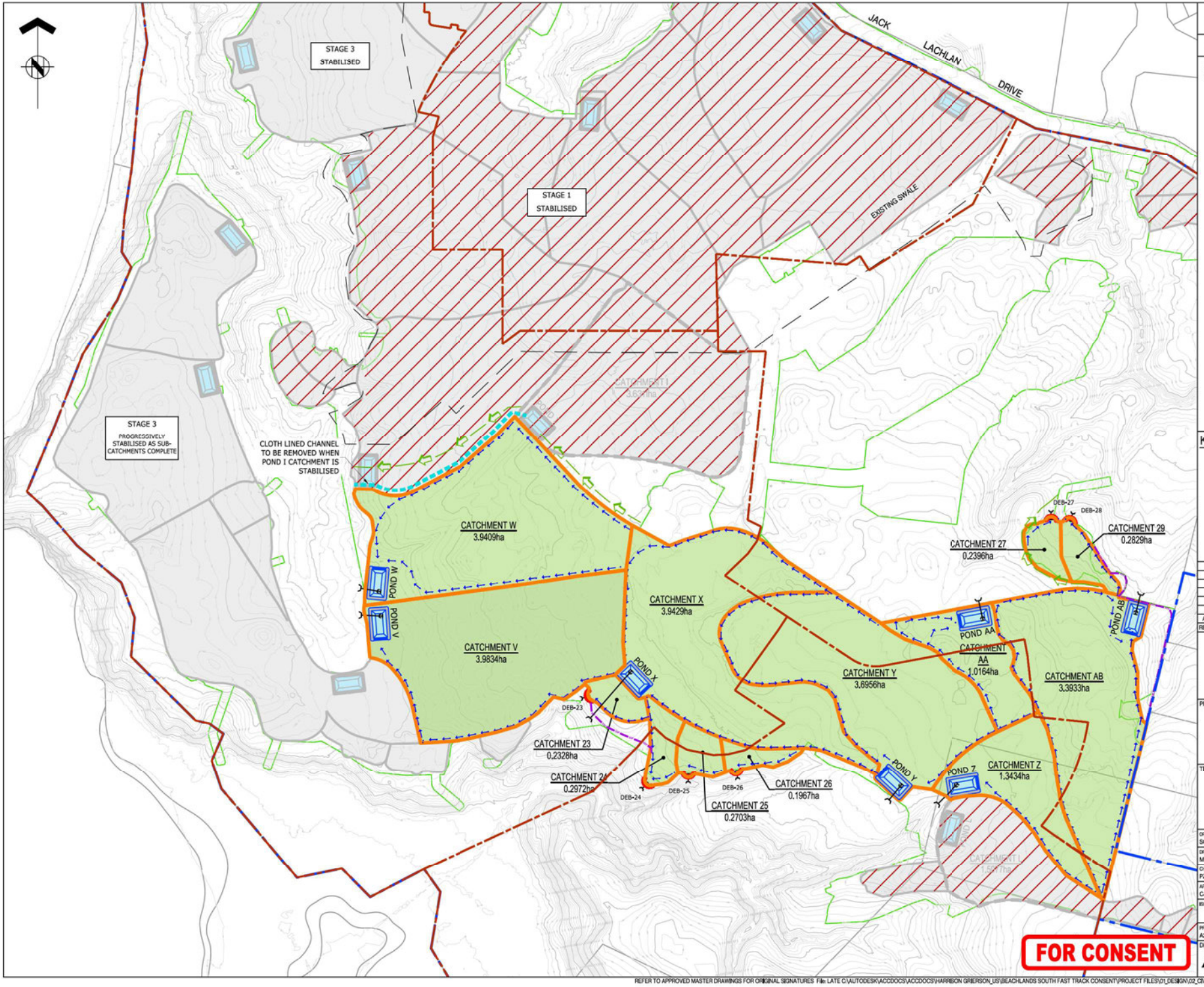

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BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 4
EROSION AND SEDIMENT CONTROL
SHEET 2 OF 3

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ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000, A3 1:4000	A1
DRAWING No: A2515591.00-2161		REV ----

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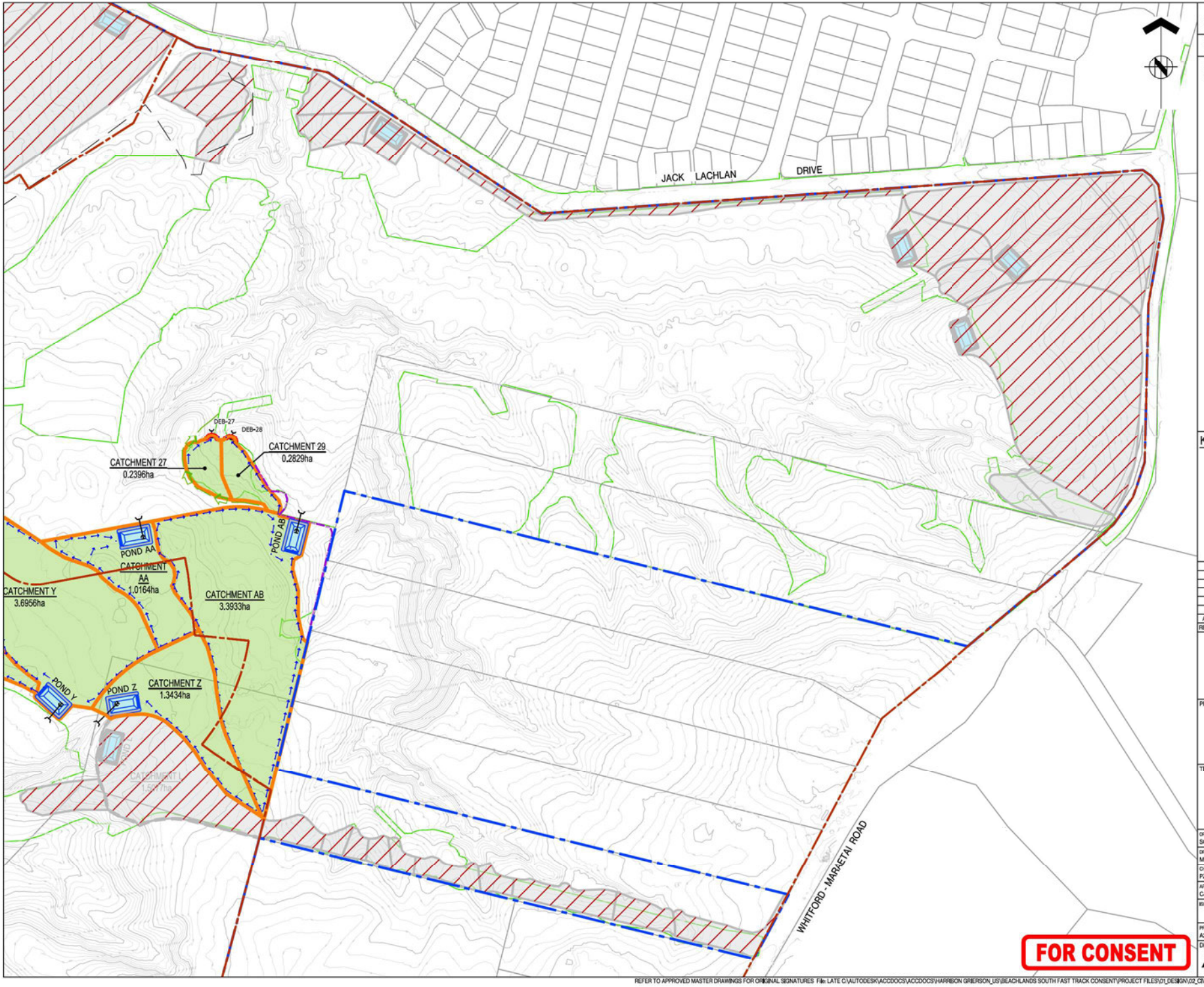

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DRAWING No: A2515591.00-2162		REV A

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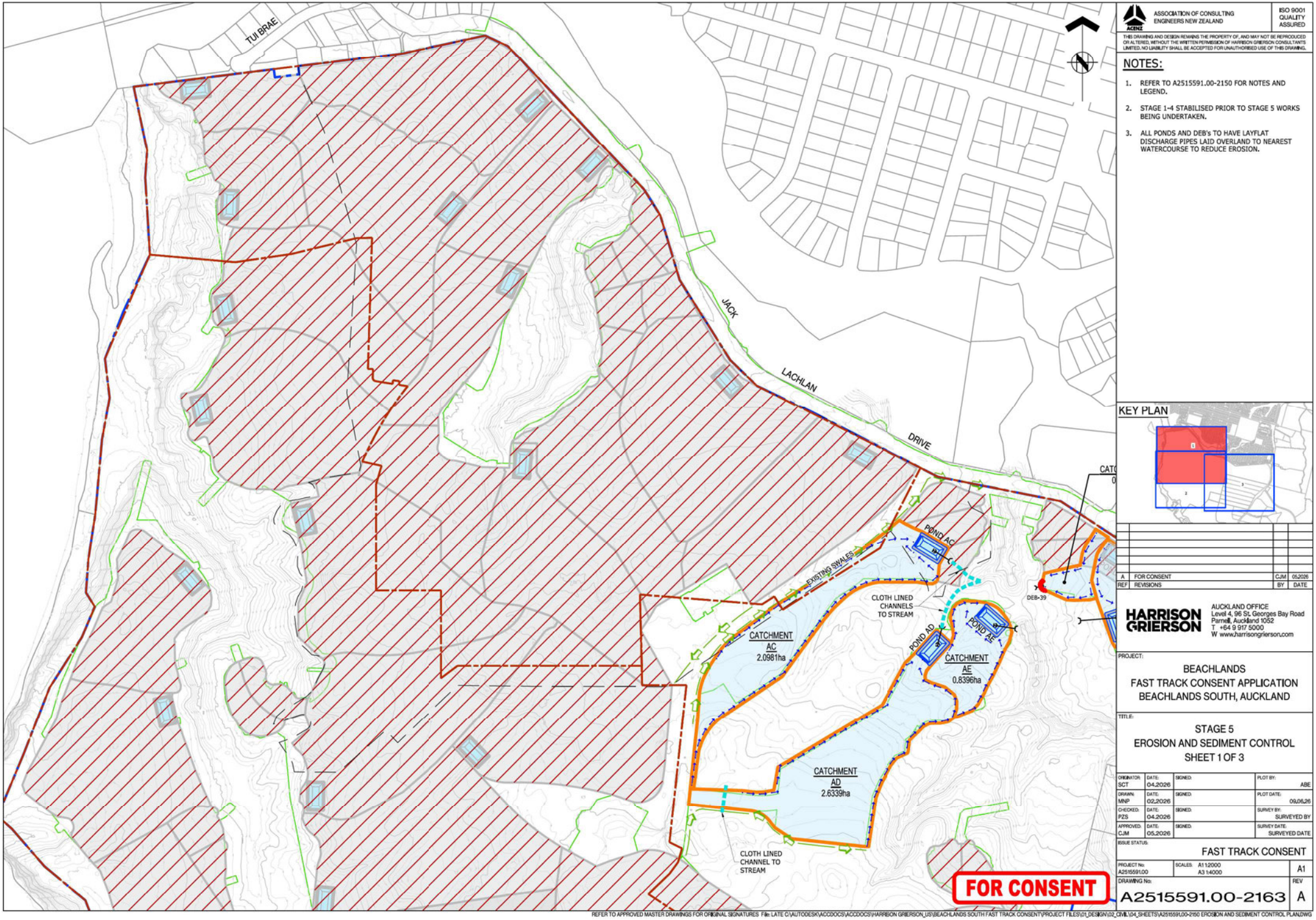

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TITLE:

STAGE 5
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 3

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DRAWING No: A2515591.00-2163		REV A

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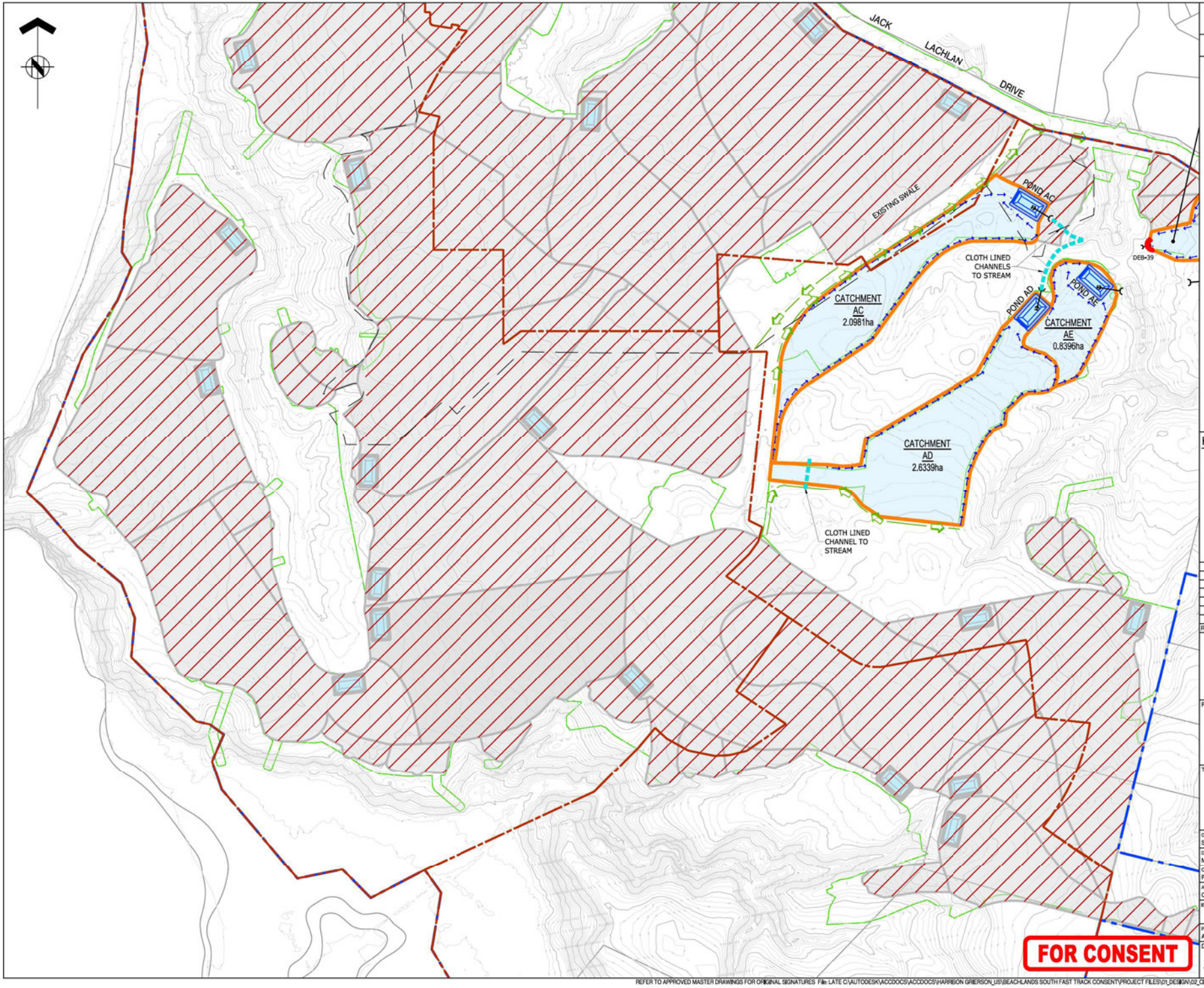

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STAGE 5
EROSION AND SEDIMENT CONTROL
SHEET 2 OF 3

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PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2164		REV A

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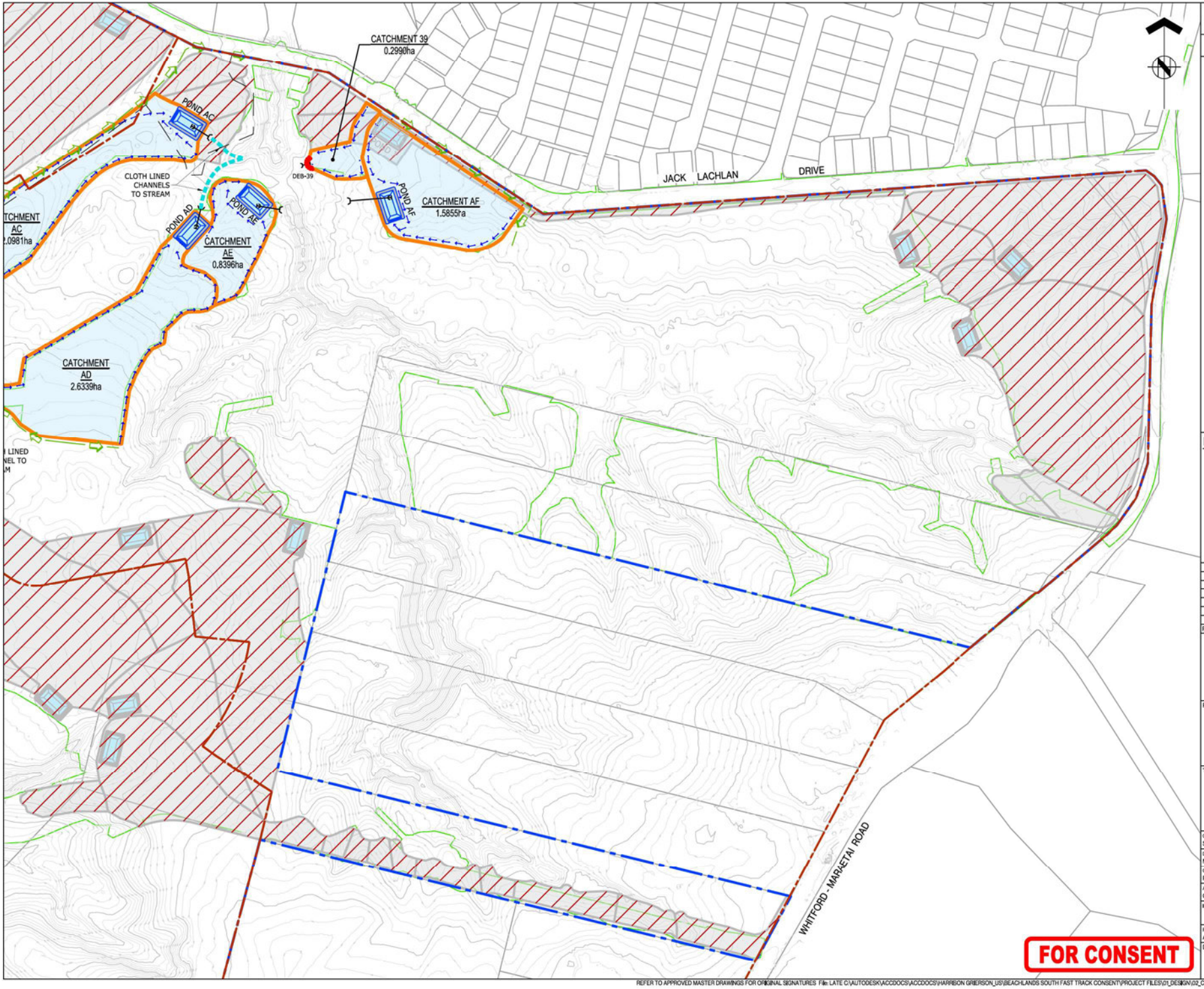

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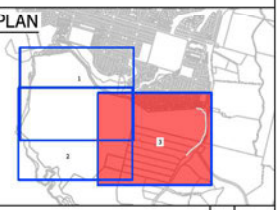
KEY PLAN



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A	FOR CONSENT	CJM	05.2026

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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 5
EROSION AND SEDIMENT CONTROL
SHEET 3 OF 3

ORIGINATOR: SCT	DATE: 04.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 02.2026	SIGNED:	PLOT DATE: 09.06.26
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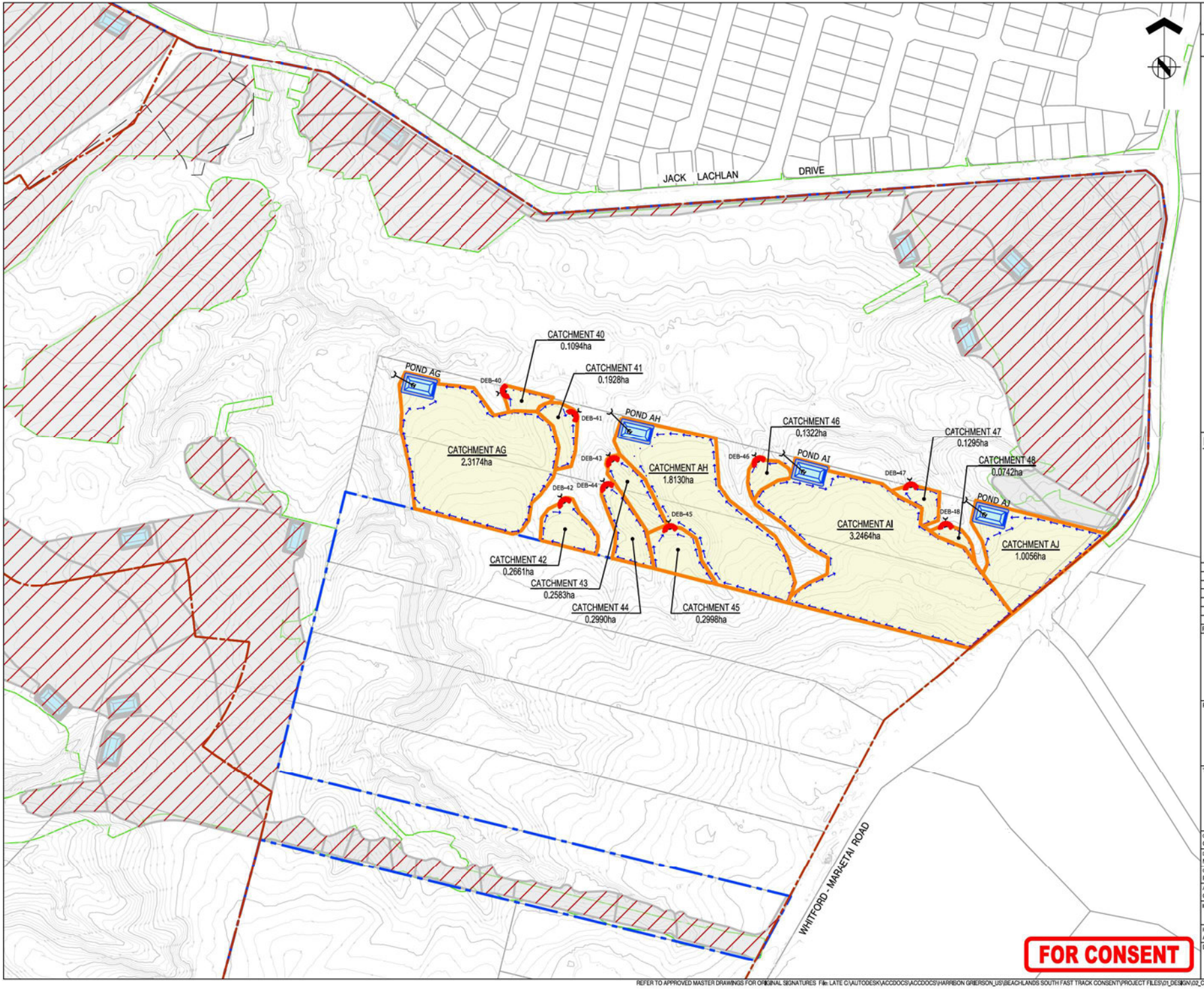
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1 1:2000 A3 1:4000	A1
DRAWING No: A2515591.00-2165		REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: L:\ATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG



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PROJECT:

BEACHLANDS
FAST TRACK CONSENT APPLICATION
BEACHLANDS SOUTH, AUCKLAND

TITLE:

STAGE 6
EROSION AND SEDIMENT CONTROL
SHEET 1 OF 1

ORIGINATOR: CJM	DATE: 05.2026	SIGNED:	PLOT BY: ABE
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ISSUE STATUS: FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: A1-1:2000 A3-1:4000	A1
DRAWING No: A2515591.00-2166		REV A

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POND DETAILS									DECANT OUTLET DETAILS		
POND NAME	DIMENSIONS (m)			POND DEPTH (BASE TO PRIMARY SPILLWAY)	VOLUME (m3)	DEAD STORAGE DEPTH (m)	LIVE STORAGE DEPTH (m)	EMERGENCY SPILLWAY WIDTH (m)	*NO OF 150MM DIA T-BARS	RISER DIAMETER	OUTLET PIPE DIAMETER
	WIDTH	LENGTH									
POND A	20.2	74.1	CREST	2	1497.7	0.6	1.4	14.6	3	1050 Manhole	300mm
	7.9	53.5	BASE								
POND B	17.8	64.8	CREST	2	1085.0	0.6	1.4	10.6	2	150 upstand	150mm
	5.8	45.4	BASE								
POND C	15.7	56.2	CREST	2	757.5	0.6	1.4	7.4	2	150 upstand	150mm
	3.9	37.8	BASE								
POND D	19.7	72.3	CREST	2	1411.0	0.6	1.4	13.8	3	1050 Manhole	300mm
	7.5	51.9	BASE								
POND E	14.8	52.7	CREST	2	644.1	0.6	1.4	6.3	2	150 upstand	150mm
	3.2	34.8	BASE								
POND F	18.1	65.9	CREST	2	1127.6	0.6	1.4	11.0	2	150 upstand	150mm
	6.1	46.3	BASE								
POND G	18.1	65.8	CREST	2	1122.9	0.6	1.4	10.9	2	150 upstand	150mm
	6.0	46.2	BASE								
POND H	20.2	74.1	CREST	2	1497.7	0.6	1.4	14.6	3	1050 Manhole	300mm
	7.9	53.5	BASE								
POND I	19.4	71.2	CREST	2	1363.3	0.6	1.4	13.3	3	1050 Manhole	300mm
	7.2	51.0	BASE								
POND J	10.7	36.2	CREST	2	225.0	0.6	1.4	6.0	1	150 upstand	150mm
	-0.4	20.4	BASE								
POND K	17.3	62.6	CREST	2	993.2	0.6	1.4	9.7	2	150 upstand	150mm
	5.3	43.4	BASE								
POND K2	19.2	70.1	CREST	2	1311.3	0.6	1.4	12.8	3	1050 Manhole	300mm
	7.0	50.0	BASE								
POND L	14.2	50.2	CREST	2	566.6	0.6	1.4	6.0	2	150 upstand	150mm
	2.6	32.6	BASE								
POND M	19.8	72.8	CREST	2	1437.8	0.6	1.4	14.0	3	1050 Manhole	300mm
	7.6	52.4	BASE								
POND N	19.5	71.3	CREST	2	1368.6	0.6	1.4	13.3	3	1050 Manhole	300mm
	7.3	51.1	BASE								
POND O	12.4	42.9	CREST	2	368.9	0.6	1.4	6.0	1	150 upstand	150mm
	1.0	26.2	BASE								
POND P	13.5	47.4	CREST	2	484.5	0.6	1.4	6.0	1	150 upstand	150mm
	2.0	30.1	BASE								
POND Q	18.3	66.8	CREST	2	1166.2	0.6	1.4	11.4	3	1050 Manhole	300mm
	6.3	47.1	BASE								
POND R	19.2	70.1	CREST	2	1311.3	0.6	1.4	12.8	3	1050 Manhole	300mm
	7.0	50.0	BASE								
POND S	15.6	55.6	CREST	2	737.9	0.6	1.4	7.2	2	150 upstand	150mm
	3.8	37.3	BASE								
POND T	18.5	67.6	CREST	2	1200.5	0.6	1.4	11.7	3	1050 Manhole	300mm
	6.4	47.8	BASE								
POND U	19.8	72.7	CREST	2	1432.4	0.6	1.4	14.0	3	1050 Manhole	300mm
	7.6	52.3	BASE								
POND V	20.2	74.1	CREST	2	1497.7	0.6	1.4	14.6	3	1050 Manhole	300mm
	7.9	53.5	BASE								
POND W	20.1	73.7	CREST	2	1481.3	0.6	1.4	14.4	3	1050 Manhole	300mm
	7.8	53.2	BASE								
POND X	20.1	73.7	CREST	2	1481.3	0.6	1.4	14.4	3	1050 Manhole	300mm
	7.8	53.2	BASE								
POND Y	19.6	71.8	CREST	2	1389.7	0.6	1.4	13.5	3	1050 Manhole	300mm
	7.4	51.5	BASE								
POND Z	13.7	48.2	CREST	2	506.9	0.6	1.4	6.0	1	150 upstand	150mm
	2.2	30.8	BASE								
POND AA	12.5	43.5	CREST	2	382.8	0.6	1.4	6.0	1	150 upstand	150mm
	1.2	26.7	BASE								
POND AB	19.0	69.3	CREST	2	1275.5	0.6	1.4	12.4	3	1050 Manhole	300mm
	6.8	49.3	BASE								
POND AC	15.9	57.1	CREST	2	789.2	0.6	1.4	7.7	2	150 upstand	150mm
	4.1	38.6	BASE								
POND AD	17.3	62.4	CREST	2	988.7	0.6	1.4	9.6	2	150 upstand	150mm
	5.3	43.3	BASE								
POND AE	11.8	40.6	CREST	2	315.5	0.6	1.4	6.0	1	150 upstand	150mm
	0.5	24.2	BASE								
POND AF	14.5	51.2	CREST	2	597.7	0.6	1.4	6.0	1	150 upstand	150mm
	2.9	33.5	BASE								
POND AG	16.5	59.4	CREST	2	871.4	0.6	1.4	8.5	1	150 upstand	150mm
	4.6	40.6	BASE								
POND AH	15.1	53.9	CREST	2	680.9	0.6	1.4	6.6	1	150 upstand	150mm
	3.4	35.8	BASE								
POND AI	18.6	68.0	CREST	2	1220.3	0.6	1.4	11.9	1	150 upstand	150mm
	6.5	48.2	BASE								
POND AJ	12.5	43.2	CREST	2	377.2	0.6	1.4	6.0	1	150 upstand	150mm
	1.1	26.5	BASE								

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BEACHLANDS SOUTH, AUCKLAND

TITLE:

EROSION AND SEDIMENT CONTROL
SRP TABLE

ORIGINATOR: CJM	DATE: 05.2026	SIGNED:	PLOT BY: ABE
DRAWN: MNP	DATE: 05.2026	SIGNED:	PLOT DATE: 09.06.26
CHECKED: PZS	DATE: 05.2026	SIGNED:	SURVEY BY: SURVEYED BY
APPROVED: CJM	DATE: 05.2026	SIGNED:	SURVEY DATE: SURVEYED DATE

ISSUE STATUS:

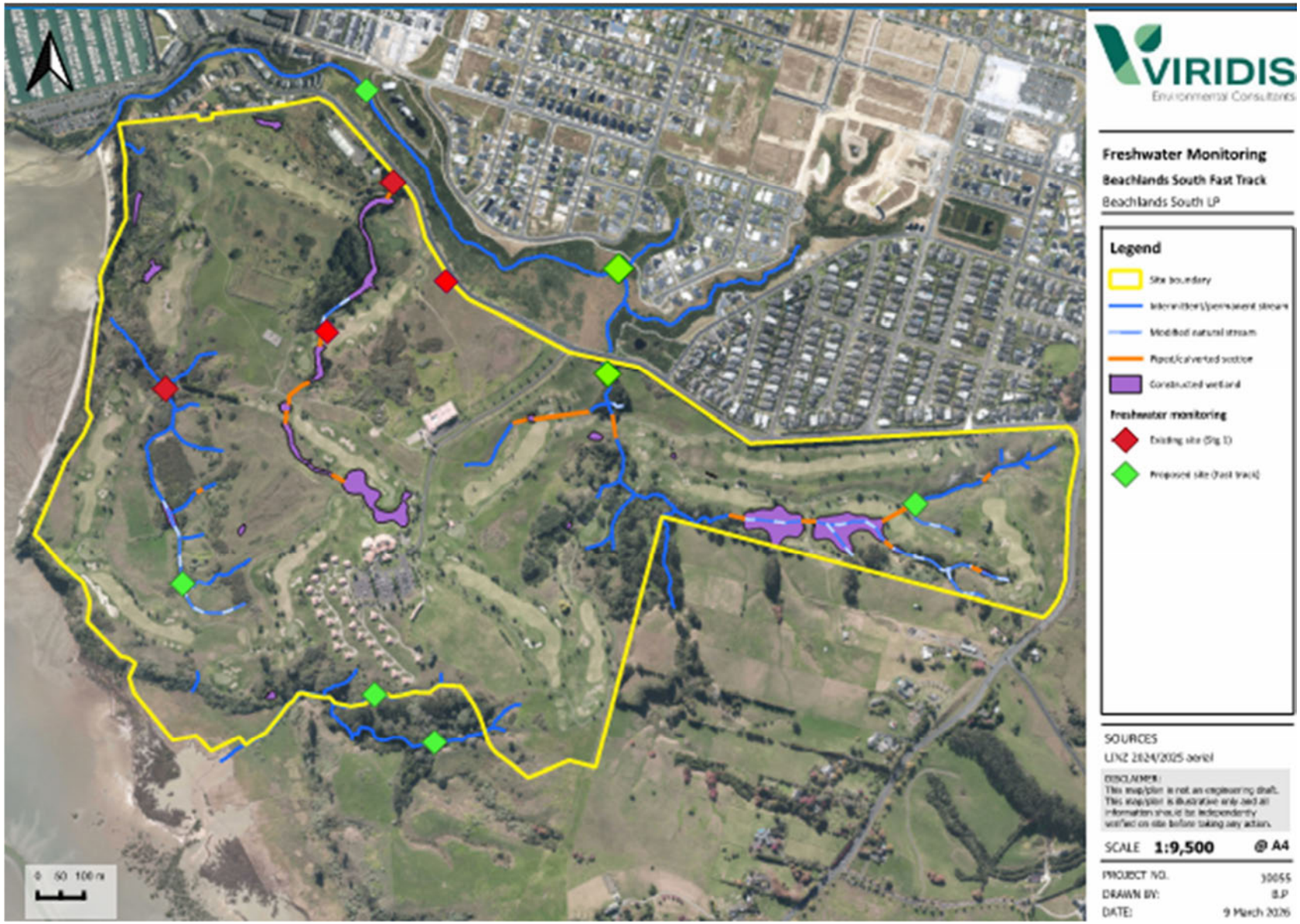
FAST TRACK CONSENT

PROJECT No: A2515591.00	SCALES: NOT TO SCALE	A1
DRAWING No: A2515591.00-2167		REV A

FOR CONSENT

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: LATE C:\AUTODESK\ACCDOCS\ACCDOCS\HARRISON GRIERSON_US\BEACHLANDS SOUTH FAST TRACK CONSENT\PROJECT FILES\01_DESIGN\02_CIVIL\04_SHEETS\A2515591.00-2150 EROSION AND SEDIMENT CONTROL PLAN.DWG

Appendix B – Baseline Monitoring Locations



Appendix C - Baseline Catchment Analysis

Appendix 1e -
USLE Calculations

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

INPUT CRITERIA - K PARAMETERS	
Silt (%)	10
Clay (%)	55
Sand (%)	35
Organic (%)	0%
K =	**0.250**

(from Nomograph)

K VALUE CORRECTIONS	
K Value	0.250
Organic Consent correction	0.1
Corrected K Value Exposed surface	0.462
Corrected K Value Pre/Post Earthworks	0.198

RAINFALL DATA	(mm)
2yr 24hr rainfall depth P24	80
2yr 6hr rainfall depth P6	50.24
R = (j/ha)	77.766

(daily 2-year ARI)
(factured)

USLE CALCULATIONS

Catchment	Area (ha	Lowest elevation	Highest Elevation	SlopeLength (m)	Slope % (s)	$65.41 \times s^2$	$s^2+10000$	m	LS
Pond A	3.99	21.59	35.30	279	4.910	1576.7535	10024.11	0.4	1.230
Pond B	2.88	15.55	18.56	279	1.080	76.2525	10001.17	0.3	0.261
Pond C	2.02	18.15	22.87	190	2.484	403.4525	10006.17	0.3	0.417
Pond D	3.76	22.82	34.02	194	5.773	2179.8769	10033.33	0.5	1.615
Pond E	1.71	25.49	29.23	219	1.710	191.2539	10002.92	0.3	0.322
Pond F1	1.66	26.10	27.63	195	0.783	40.1290	10000.61	0.2	0.162
Pond F2	3.00	25.85	39.04	299	4.417	1276.1331	10019.51	0.4	1.115
Pond F3	2.41	25.57	37.51	238	5.026	1652.1431	10025.26	0.5	1.504
Pond G	2.99	22.55	37.47	278	5.371	1886.7628	10028.85	0.5	1.765
Pond H	3.98	23.57	36.83	351	3.778	933.5589	10014.27	0.4	0.999
Pond I	3.63	36.71	39.64	246	1.189	92.5132	10001.41	0.3	0.265
Pond J	0.60	29.34	49.01	594	3.313	717.8213	10010.97	0.4	1.073
Pond K	2.64	44.99	55.82	179	6.059	2401.3616	10036.71	0.5	1.650
Pond L	1.51	47.56	56.44	199	4.463	1302.5895	10019.91	0.4	0.959
DEB 1	0.28	13.35	21.94	122	7.035	3236.8905	10049.49	0.5	1.662
DEB 2	0.22	16.67	22.05	65	8.229	4429.1345	10067.71	0.5	1.512
DEB 3	0.30	21.23	23.67	62	3.967	1029.6119	10015.74	0.4	0.525
DEB 4	0.28	21.50	23.65	63	3.392	752.4533	10011.50	0.4	0.449
DEB 5	0.30	22.24	22.97	67	1.087	77.2802	10001.18	0.3	0.171
DEB 6	0.27	18.59	25.00	106	6.068	2408.7163	10036.82	0.5	1.271

UNIVERSL SOIL LOSS EQUATION

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HARRISON GRIERSON

USL CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	1.36	0.3			0.41					
Pond A	During	4.0	4.9	279.2	77.77	0.462	1.230	rough irregular surface	1.00	0.9	0.7	111.05	0.7	75.0	90		19.43	7.77		19.29	7.63
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.51	0.7	75.0					0.26		
	Before					0.198		pasture	0.02	1.0	0.9	0.21	0.3			0.06					
Pond B	During	2.9	1.1	278.8	77.77	0.462	0.261	rough irregular surface	1.00	0.9	0.7	17.01	0.7	75.0	90		2.98	1.19		3.0	1.17
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.23	0.7	75.0					0.04		
	Before					0.198		pasture	0.02	1.0	0.9	0.23	0.3			0.07					
Pond C	During	2.0	2.5	190.1	77.77	0.462	0.417	rough irregular surface	1.00	0.9	0.7	19.02	0.7	75.0	90		3.33	1.33		3.3	1.31
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.26	0.7	75.0					0.05		
	Before					0.198		pasture	0.02	1.0	0.9	1.68	0.3			0.50					
Pond D	During	3.8	5.8	194.0	77.77	0.462	1.615	rough irregular surface	1.00	0.9	0.7	137.43	0.7	75.0	90		24.05	9.62		23.9	9.44
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.87	0.7	75.0					0.33		
	Before					0.198		pasture	0.02	1.0	0.9	0.15	0.3			0.05					
Pond E	During	1.7	1.7	218.7	77.77	0.462	0.322	rough irregular surface	1.00	0.9	0.7	12.47	0.7	75.0	90		2.18	0.87		2.2	0.86
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.17	0.7	75.0					0.03		
	Before					0.198		pasture	0.02	1.0	0.9	0.07	0.30			0.02					
Pond F1	During	1.7	0.8	195.3	77.77	0.462	0.162	rough irregular surface	1.00	0.9	0.7	6.10	0.7	75.0	90		1.07	0.43		1.1	0.42
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.08	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.93	0.3			0.28					
Pond F2	During	3.0	4.4	298.6	77.77	0.462	1.115	rough irregular surface	1.00	0.9	0.7	75.60	0.7	75.0	90		13.23	5.29		13.1	5.19
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.03	0.7	75.0					0.18		
	Before					0.198		pasture	0.02	1.0	0.9	1.00	0.3			0.30					
Pond F3	During	2.4	5.0	237.6	77.77	0.462	1.504	rough irregular surface	1.00	0.9	0.7	81.90	0.7	75.0	90		14.33	5.73		14.2	5.63
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.11	0.7	75.0					0.20		
	Before					0.198		pasture	0.02	1.0	0.9	1.46	0.3			0.44					

UNIVERSL SOIL LOSS EQUATION

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Office:	Auckland	Approved By:	CJM

HARRISON GRIERSON

USL CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
Pond G	During	3.0	5.4	277.8	77.77	0.462	1.765	rough irregular surface	1.00	0.9	0.7	119.33	0.7	75.0	90		20.88	8.35		20.73	8.20
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.62	0.7	75.0					0.28		
	Before					0.198		pasture	0.02	1.0	0.9	1.10	0.3			0.33					
Pond H	During	4.0	3.8	351.0	77.77	0.462	0.999	rough irregular surface	1.00	0.9	0.7	90.04	0.7	75.0	90		15.76	6.30		15.6	6.19
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.22	0.7	75.0					0.21		
	Before					0.198		pasture	0.02	1.0	0.9	0.27	0.3			0.08					
Pond I	During	3.6	1.2	246.4	77.77	0.462	0.265	rough irregular surface	1.00	0.9	0.7	21.77	0.7	75.0	90		3.81	1.52		3.8	1.50
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.30	0.7	75.0					0.05		
	Before					0.198		pasture	0.02	1.0	0.9	0.18	0.3			0.05					
Pond J	During	0.6	3.3	593.8	77.77	0.462	1.073	rough irregular surface	1.00	0.9	0.7	14.55	0.7	75.0	90		2.55	1.02		2.5	1.00
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.20	0.7	75.0					0.03		
	Before					0.198		pasture	0.02	1.0	0.9	1.21	0.3			0.36					
Pond K	During	2.6	6.1	178.7	77.77	0.462	1.650	rough irregular surface	1.00	0.9	0.7	98.60	0.7	75.0	90		17.26	6.90		17.1	6.77
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.34	0.7	75.0					0.23		
	Before					0.198		pasture	0.02	1.0	0.9	0.40	0.3			0.12					
Pond L	During	1.5	4.5	199.0	77.77	0.462	0.959	rough irregular surface	1.00	0.9	0.7	32.74	0.7	75.0	90		5.73	2.29		5.7	2.25
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.45	0.7	75.0					0.08		
	Before					0.198		pasture	0.02	1.0	0.9	0.13	0.3			0.04					
DEB 1	During	0.3	7.0	122.1	77.77	0.462	1.662	rough irregular surface	1.00	0.9	0.7	10.58	0.7	75.0	90		1.85	0.74		1.8	0.73
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.14	0.7	75.0					0.03		
	Before					0.198		pasture	0.02	1.0	0.9	0.09	0.3			0.03					
DEB 2	During	0.2	8.2	65.4	77.77	0.462	1.512	rough irregular surface	1.00	0.9	0.7	7.37	0.7	75.0	90		1.29	0.52		1.3	0.51
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.10	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.04	0.3			0.01					
DEB 3	During	0.3	4.0	61.5	77.77	0.462	0.525	rough irregular surface	1.00	0.9	0.7	3.53	0.7	75.0	90		0.62	0.25		0.6	0.24

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	4/06/2026
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USL CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.05	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.04	0.3			0.01					
DEB 4	During	0.3	3.4	63.4	77.77	0.462	0.449	rough irregular surface	1.00	0.9	0.7	2.89	0.7	75.0	90		0.51	0.20		0.5	0.20
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.04	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.01	0.3			0.00					
DEB 5	During	0.3	1.1	67.2	77.77	0.462	0.171	rough irregular surface	1.00	0.9	0.7	1.16	0.7	75.0	90		0.20	0.08		0.2	0.08
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.02	0.7	75.0					0.00		
	Before					0.198		pasture	0.02	1.0	0.4	0.04	0.3			0.01					
DEB 6	During	0.3	6.1	105.6	77.77	0.462	1.271	rough irregular surface	1.00	0.9	0.2	2.22	0.7	75.0	90		0.39	0.16		0.4	0.16
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.11	0.7	75.0					0.02		

	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
TOTAL	3.18	151.43	60.57	2.07	150.32	59.46

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INPUT CRITERIA - K PARAMETERS	
Silt (%)	10
Clay (%)	55
Sand (%)	35
Organic (%)	0%
K =	**0.250**

(from Nomograph)

K VALUE CORRECTIONS	
K Value	0.250
Organic Consent correction	0.1
Corrected K Value Exposed surface	0.462
Corrected K Value Pre/Post Earthworks	0.198

RAINFALL DATA	(mm)
2yr 24hr rainfall depth P24	80
2yr 6hr rainfall depth P6	50.24
R = (j/ha)	77.766

(daily 2-year ARI)

(factured)

USLE CALCULATIONS

Catchment	Area (ha	Lowest elevation	Highest Elevation	SlopeLength (m)	Slope % (s)	65.41 x s^2	s^2+10000	m	LS
DEB 7	0.28	20.69	25.77	99	5.144	1730.65066	10026.46	0.5	0.997
DEB 8	0.18	21.26	25.17	61	6.426	2700.70096	10041.29	0.5	1.039
DEB 9	0.23	21.48	27.58	86	7.122	3317.79146	10050.72	0.5	1.416
DEB 10	0.27	18.60	27.74	91	10.009	6552.46538	10100.18	0.5	2.374
DEB 11	0.17	50.60	55.22	68	6.834	3055.16527	10046.71	0.5	1.189
DEB 12	0.10	49.15	56.75	37	20.326	27024.6702	10413.16	0.5	4.642
DEB 13	0.30	56.18	60.93	81	5.856	2242.72221	10034.29	0.5	1.063
DEB 14	0.20	57.69	61.02	58	5.738	2153.90962	10032.93	0.5	0.877
DEB 29	0.26	18.74	22.51	70	5.417	1919.69917	10029.35	0.5	0.893
DEB 30	0.30	58.12	67.18	169	5.363	1880.97989	10028.76	0.5	1.373
DEB 31	0.08	49.79	55.23	48	11.444	8566.00666	10130.96	0.5	2.096
DEB 32	0.08	49.40	55.59	33	18.701	22875.4402	10349.72	0.5	3.810
DEB 33	0.07	49.35	55.61	36	17.293	19560.3073	10299.04	0.5	3.508
DEB 34	0.07	49.64	56.02	40	16.071	16892.911	10258.26	0.5	3.264
DEB 35	0.18	50.35	56.75	52	12.211	9753.84338	10149.12	0.5	2.431
DEB 36	0.29	40.28	44.30	96	4.177	1141.26113	10017.45	0.4	0.665
DEB 37	0.30	13.91	19.17	85	6.204	2517.84397	10038.49	0.5	1.172
DEB 38	0.30	15.23	17.88	97	2.723	484.988786	10007.41	0.3	0.371
DEB 39	0.30	20.92	27.09	105	5.873	2256.17486	10034.49	0.5	1.215

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USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.08	0.3			0.02					
DEB 7	During	0.3	5.1	98.8	77.77	0.462	0.997	rough irregular surface	1.00	0.9	0.7	6.24	0.7	75.0	90		1.09	0.44		1.08	0.43
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.08	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.05	0.3			0.02					
DEB 8	During	0.2	6.4	60.9	77.77	0.462	1.039	rough irregular surface	1.00	0.9	0.7	4.21	0.7	75.0	90		0.74	0.29		0.7	0.29
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.06	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.09	0.3			0.03					
DEB 9	During	0.2	7.1	85.7	77.77	0.462	1.416	rough irregular surface	1.00	0.9	0.7	7.39	0.7	75.0	90		1.29	0.52		1.3	0.51
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.10	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.18	0.3			0.05					
DEB 10	During	0.3	10.0	91.3	77.77	0.462	2.374	rough irregular surface	1.00	0.9	0.7	14.65	0.7	75.0	90		2.56	1.03		2.5	1.01
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.20	0.7	75.0					0.03		
	Before					0.198		pasture	0.02	1.0	0.9	0.06	0.3			0.02					
DEB 11	During	0.2	6.8	67.6	77.77	0.462	1.189	rough irregular surface	1.00	0.9	0.7	4.62	0.7	75.0	90		0.81	0.32		0.8	0.32
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.06	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.12	0.30			0.04					
DEB 12	During	0.1	20.3	37.4	77.77	0.462	4.642	rough irregular surface	1.00	0.9	0.7	9.99	0.7	75.0	90		1.75	0.70		1.7	0.69
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.14	0.7	75.0					0.02		

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USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.09	0.3			0.03					
DEB 13	During	0.3	5.9	81.1	77.77	0.462	1.063	rough irregular surface	1.00	0.9	0.7	7.19	0.7	75.0	90		1.26	0.50		1.2	0.49
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.10	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.05	0.3			0.01					
DEB 14	During	0.2	5.7	58.0	77.77	0.462	0.877	rough irregular surface	1.00	0.9	0.7	3.89	0.7	75.0	90		0.68	0.27		0.7	0.27
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.05	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.06	0.3			0.02					
DEB 29	During	0.3	5.4	69.6	77.77	0.462	0.893	rough irregular surface	1.00	0.9	0.7	5.21	0.7	75.0	90		0.91	0.36		0.90	0.36
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.07	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.11	0.3			0.03					
DEB 30	During	0.3	5.4	169.0	77.77	0.462	1.373	rough irregular surface	1.00	0.9	0.7	9.33	0.7	75.0	90		1.63	0.65		1.6	0.64
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.13	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.05	0.3			0.01					
DEB 31	During	0.1	11.4	47.5	77.77	0.462	2.096	rough irregular surface	1.00	0.9	0.7	3.84	0.7	75.0	90		0.67	0.27		0.7	0.26
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.05	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.08	0.3			0.03					
DEB 32	During	0.1	18.7	33.1	77.77	0.462	3.810	rough irregular surface	1.00	0.9	0.7	6.90	0.7	75.0	90		1.21	0.48		1.2	0.47
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.09	0.7	75.0					0.02		

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.07	0.3			0.02					
DEB 33	During	0.1	17.3	36.2	77.77	0.462	3.508	rough irregular surface	1.00	0.9	0.7	5.59	0.7	75.0	90		0.98	0.39		1.0	0.38
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.08	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.06	0.3			0.02					
DEB 34	During	0.1	16.1	39.7	77.77	0.462	3.264	rough irregular surface	1.00	0.9	0.7	5.27	0.7	75.0	90		0.92	0.37		0.9	0.36
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.07	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.12	0.3			0.04					
DEB 35	During	0.2	12.2	52.4	77.77	0.462	2.431	rough irregular surface	1.00	0.9	0.7	9.85	0.7	75.0	90		1.72	0.69		1.7	0.68
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.13	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.05	0.3			0.02					
DEB 36	During	0.3	4.2	96.2	77.77	0.462	0.665	rough irregular surface	1.00	0.9	0.7	4.36	0.7	75.0	90		0.76	0.31		0.8	0.30
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.06	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.11	0.3			0.03					
DEB 37	During	0.3	6.2	84.8	77.77	0.462	1.373	rough irregular surface	1.00	0.9	0.7	9.24	0.7	75.0	90		1.62	0.65		1.6	0.64
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.13	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.11	0.3			0.03					
DEB 38	During	0.3	2.7	97.3	77.77	0.462	1.373	rough irregular surface	1.00	0.9	0.7	9.33	0.7	75.0	90		1.63	0.65		1.6	0.64
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.13	0.7	75.0					0.02		

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.11	0.3			0.03					
DEB 39	During	0.3	5.9	105.1	77.77	0.462	1.373	rough irregular surface	1.00	0.9	0.7	9.30	0.7	75.0	90		1.63	0.65		1.6	0.64
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.13	0.7	75.0					0.02		

	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
TOTAL	0.50	23.87	9.55	0.32	23.69	9.37

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	12/05/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

INPUT CRITERIA - K PARAMETERS		
Silt (%)	10	
Clay (%)	55	
Sand (%)	35	
Organic (%)	0%	
K =	**0.250**	(from Nomograph)

K VALUE CORRECTIONS	
K Value	0.250
Organic Consent correction	0.1
Corrected K Value Exposed surface	0.462
Corrected K Value Pre/Post Earthworks	0.198

RAINFALL DATA	(mm)	
2yr 24hr rainfall depth P24	80	(daily 2-year ARI)
2yr 6hr rainfall depth P6	50.24	(factured)
R = (j/ha)	77.766	

USLE CALCULATIONS

Catchment	Area (ha	Lowest elevation	Highest Elevation	SlopeLength (m)	Slope % (s)	65.41 x s^2	s^2+10000	m	LS
Pond K2	3.49	48.25	55.83	293	2.589	438.27977	10006.70	0.3	0.492
Pond M	3.83	45.83	52.29	249	2.590	438.815	10006.71	0.3	0.469
DEB 15	0.29	34.21	43.88	85	11.402	8503.6029	10130.00	0.5	2.784
DEB 16	0.29	45.26	52.32	116	6.096	2430.4485	10037.16	0.5	1.338
DEB 17	0.16	48.21	50.25	87	2.352	361.71417	10005.53	0.3	0.314

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	12/05/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.48	0.3			0.14					
Pond K2	During	3.5	2.6	292.8	77.77	0.462	0.492	rough irregular surface	1.00	0.9	0.7	38.93	0.7	75.0	90		6.81	2.73		6.76	2.68
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.53	0.7	75.0					0.09		
	Before					0.198		pasture	0.02	1.0	0.9	0.50	0.3			0.15					
Pond M	During	3.8	2.6	249.4	77.77	0.462	0.469	rough irregular surface	1.00	0.9	0.7	40.66	0.7	75.0	90		7.12	2.85		7.1	2.79
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.55	0.7	75.0					0.10		
	Before					0.198		pasture	0.02	1.0	0.9	0.23	0.3			0.07					
DEB 15	During	0.3	11.4	84.8	77.77	0.462	2.784	rough irregular surface	1.00	0.9	0.7	18.56	0.7	75.0	90		3.25	1.30		3.2	1.28
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.25	0.7	75.0					0.04		
	Before					0.198		pasture	0.02	1.0	0.9	0.11	0.3			0.03					
DEB 16	During	0.3	6.1	115.8	77.77	0.462	1.338	rough irregular surface	1.00	0.9	0.7	8.91	0.7	75.0	90		1.56	0.62		1.5	0.61
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.12	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.01	0.3			0.00					
DEB 17	During	0.2	2.4	86.8	77.77	0.462	0.314	rough irregular surface	1.00	0.9	0.7	1.17	0.7	75.0	90		0.20	0.08		0.2	0.08
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.02	0.7	75.0					0.00		

	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
TOTAL	0.40	18.94	7.58	0.26	18.80	7.44

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	12/05/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

INPUT CRITERIA - K PARAMETERS	
Silt (%)	10
Clay (%)	55
Sand (%)	35
Organic (%)	0%
K =	**0.250**

(from Nomograph)

K VALUE CORRECTIONS	
K Value	0.250
Organic Consent correction	0.1
Corrected K Value Exposed surface	0.462
Corrected K Value Pre/Post Earthworks	0.198

RAINFALL DATA	(mm)	
2yr 24hr rainfall depth P24	80	(daily 2-year ARI)
2yr 6hr rainfall depth P6	50.24	(factured)
R = (j/ha)	77.766	

USLE CALCULATIONS

Catchment	Area (ha	Lowest elevation	Highest Elevation	SlopeLength (m)	Slope % (s)	65.41 x s^2	s^2+10000	m	LS
Pond N	3.64	22.65	25.05	220	1.089	77.568048	10001.19	0.3	0.244
Pond O	0.98	17.01	21.20	122	3.428	768.502903	10011.75	0.4	0.591
Pond P	1.29	15.05	24.95	92	10.778	7598.99602	10116.17	0.5	2.660
Pond Q	3.10	19.24	28.50	261	3.544	821.713226	10012.56	0.4	0.829
Pond R	3.48	17.29	29.23	225	5.307	1842.15586	10028.16	0.5	1.565
Pond S	1.96	17.60	17.77	188	0.090	0.53472919	10000.01	0.2	0.106
Pond T	3.20	18.89	24.61	191	2.992	585.655415	10008.95	0.3	0.496
Pond U	3.81	18.18	24.61	282	2.281	340.431718	10005.20	0.3	0.436
Pond V	3.98	18.48	39.01	290	7.090	3288.32633	10050.27	0.5	2.587
DEB 18	0.27	16.03	19.65	64	5.664	2098.57094	10032.08	0.5	0.905
DEB 19	0.24	16.92	18.64	123	1.395	127.243033	10001.95	0.3	0.237
DEB 20	0.19	13.57	18.08	54	8.372	4584.61934	10070.09	0.5	1.406
DEB 21	0.22	17.80	19.20	53	2.640	455.714859	10006.97	0.3	0.300
DEB 22	0.13	22.22	28.87	55	11.986	9397.54762	10143.67	0.5	2.431

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	12/05/2026
Project No:	A2515591.00	Completed B	ENW
Office:	Auckland	Approved By	CJM

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.25	0.3			0.07					
Pond N	During	3.6	1.1	220.4	77.77	0.462	0.244	rough irregular surface	1.00	0.9	0.7	20.11	0.7	75.0	90		3.52	1.41		3.49	1.38
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.27	0.7	75.0					0.05		
	Before					0.198		pasture	0.02	1.0	0.9	0.16	0.3			0.05					
Pond O	During	1.0	3.4	122.2	77.77	0.462	0.591	rough irregular surface	1.00	0.9	0.7	13.06	0.7	75.0	90		2.28	0.91		2.3	0.90
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.18	0.7	75.0					0.03		
	Before					0.198		pasture	0.02	1.0	0.9	0.95	0.3			0.28					
Pond P	During	1.3	10.8	91.9	77.77	0.462	2.660	rough irregular surface	1.00	0.9	0.7	77.46	0.7	75.0	90		13.56	5.42		13.5	5.32
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.05	0.7	75.0					0.18		
	Before					0.198		pasture	0.02	1.0	0.9	0.71	0.3			0.21					
Pond Q	During	3.1	3.5	261.3	77.77	0.462	0.829	rough irregular surface	1.00	0.9	0.7	58.21	0.7	75.0	90		10.19	4.08		10.1	4.00
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.79	0.7	75.0					0.14		
	Before					0.198		pasture	0.02	1.0	0.9	1.51	0.3			0.45					
Pond R	During	3.5	5.3	225.0	77.77	0.462	1.565	rough irregular surface	1.00	0.9	0.7	123.36	0.7	75.0	90		21.59	8.64		21.4	8.48
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.68	0.7	75.0					0.29		
	Before					0.198		pasture	0.02	1.0	0.9	0.06	0.30			0.02					
Pond S	During	2.0	0.1	188.0	77.77	0.462	0.106	rough irregular surface	1.00	0.9	0.7	4.71	0.7	75.0	90		0.82	0.33		0.8	0.32
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.06	0.7	75.0					0.01		

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	12/05/2026
Project No:	A2515591.00	Completed B	ENW
Office:	Auckland	Approved By	CJM

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.44	0.3			0.13					
Pond T	During	3.2	3.0	191.2	77.77	0.462	0.496	rough irregular surface	1.00	0.9	0.7	35.91	0.7	75.0	90		6.28	2.51		6.2	2.47
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.49	0.7	75.0					0.09		
	Before					0.198		pasture	0.02	1.0	0.9	0.46	0.3			0.14					
Pond U	During	3.8	2.3	281.9	77.77	0.462	0.436	rough irregular surface	1.00	0.9	0.7	37.60	0.7	75.0	90		6.58	2.63		6.5	2.58
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.51	0.7	75.0					0.09		
	Before					0.198		pasture	0.02	1.0	0.9	2.86	0.3			0.86					
Pond V	During	4.0	7.1	289.6	77.77	0.462	2.587	rough irregular surface	1.00	0.9	0.7	233.24	0.7	75.0	90		40.82	16.33		40.52	16.03
	Restoration					0.198		temporary grass	0.10	1.0	0.2	3.17	0.7	75.0					0.56		
	Before					0.198		pasture	0.02	1.0	0.9	0.07	0.3			0.02					
DEB 18	During	0.3	5.7	63.9	77.77	0.462	0.905	rough irregular surface	1.00	0.9	0.7	5.55	0.7	75.0	90		0.97	0.39		1.0	0.38
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.08	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.02	0.3			0.00					
DEB 19	During	0.2	1.4	123.3	77.77	0.462	0.237	rough irregular surface	1.00	0.9	0.7	1.27	0.7	75.0	90		0.22	0.09		0.2	0.09
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.02	0.7	75.0					0.00		
	Before					0.198		pasture	0.02	1.0	0.9	0.07	0.3			0.02					
DEB 20	During	0.2	8.4	53.9	77.77	0.462	1.406	rough irregular surface	1.00	0.9	0.7	5.90	0.7	75.0	90		1.03	0.41		1.0	0.41
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.08	0.7	75.0					0.01		

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	12/05/2026
Project No:	A2515591.00	Completed B	ENW
Office:	Auckland	Approved By	CJM

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.02	0.3			0.01					
DEB 21	During	0.2	2.6	53.0	77.77	0.462	0.300	rough irregular surface	1.00	0.9	0.7	1.51	0.7	75.0	90		0.26	0.11		0.3	0.10
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.02	0.7	75.0					0.00		
	Before					0.198		pasture	0.02	1.0	0.9	0.09	0.3			0.03					
DEB 22	During	0.1	12.0	55.5	77.77	0.462	2.431	rough irregular surface	1.00	0.9	0.7	7.26	0.7	75.0	90		1.27	0.51		1.3	0.50
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.10	0.7	75.0					0.02		

	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
TOTAL	2.30	109.40	43.76	1.49	108.59	42.95

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

INPUT CRITERIA - K PARAMETERS	
Silt (%)	10
Clay (%)	55
Sand (%)	35
Organic (%)	0%
K =	**0.250**

(from Nomograph)

K VALUE CORRECTIONS	
K Value	0.250
Organic Consent correction	0.1
Corrected K Value Exposed surface	0.462
Corrected K Value Pre/Post Earthworks	0.198

RAINFALL DATA	(mm)
2yr 24hr rainfall depth P24	80
2yr 6hr rainfall depth P6	50.24
R = (j/ha)	77.766

(daily 2-year ARI)
(factured)

USLE CALCULATIONS

Catchment	Area (ha	Lowest elevation	Highest Elevation	SlopeLength (m)	Slope % (s)	65.41 x s^2	s^2+10000	m	LS
Pond W	3.94	20.14	39.31	292	6.575	2827.30663	10043.22	0.5	2.345
Pond V	3.94	18.48	39.01	290	7.090	3288.32633	10050.27	0.5	2.587
Pond X	3.70	37.41	45.55	284	2.867	537.500192	10008.22	0.3	0.536
Pond Z	1.34	48.75	55.90	191	3.738	913.938782	10013.97	0.4	0.774
Pond AA	1.02	48.11	51.53	136	2.508	411.394689	10006.29	0.3	0.381
Pond AB	3.39	41.51	55.85	305	4.708	1450.0959	10022.17	0.4	1.211
DEB 23	0.23	34.11	34.85	72	1.025	68.7882941	10001.05	0.3	0.169
DEB 24	0.30	30.59	37.12	100	6.518	2779.12741	10042.49	0.5	1.359
DEB 25	0.27	32.15	38.54	61	10.503	7215.51701	10110.31	0.5	2.082
DEB 26	0.20	37.81	40.61	81	3.436	772.238725	10011.81	0.4	0.503
DEB 27	0.24	38.82	44.92	76	8.045	4233.85772	10064.73	0.5	1.577
DEB 28	0.28	38.21	39.74	101	1.518	150.72737	10002.30	0.3	0.235

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	2.56	0.3			0.77					
Pond W	During	3.9	6.6	291.6	77.77	0.462	2.345	rough irregular surface	1.00	0.9	0.7	209.20	0.7	75.0	90		36.61	14.64		36.34	14.37
	Restoration					0.198		temporary grass	0.10	1.0	0.2	2.85	0.7	75.0					0.50		
	Before					0.198		pasture	0.02	1.0	0.9	2.83	0.3			0.85					
Pond V	During	3.9	7.1	289.6	77.77	0.462	2.587	rough irregular surface	1.00	0.9	0.7	230.87	0.7	75.0	90		40.40	16.16		40.1	15.86
	Restoration					0.198		temporary grass	0.10	1.0	0.2	3.14	0.7	75.0					0.55		
	Before					0.198		pasture	0.02	1.0	0.9	0.55	0.3			0.16					
Pond X	During	3.7	2.9	284.0	77.77	0.462	0.536	rough irregular surface	1.00	0.9	0.7	44.87	0.7	75.0	90		7.85	3.14		7.8	3.08
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.61	0.7	75.0					0.11		
	Before					0.198		pasture	0.02	1.0	0.9	0.29	0.3			0.09					
Pond Z	During	1.3	3.7	191.3	77.77	0.462	0.774	rough irregular surface	1.00	0.9	0.7	23.55	0.7	75.0	90		4.12	1.65		4.1	1.62
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.32	0.7	75.0					0.06		
	Before					0.198		pasture	0.02	1.0	0.9	0.11	0.3			0.03					
Pond AA	During	1.0	2.5	136.4	77.77	0.462	0.381	rough irregular surface	1.00	0.9	0.7	8.75	0.7	75.0	90		1.53	0.61		1.5	0.60
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.12	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	1.14	0.30			0.34					
Pond AB	During	3.4	4.7	304.6	77.77	0.462	1.211	rough irregular surface	1.00	0.9	0.7	93.03	0.7	75.0	90		16.28	6.51		16.2	6.39
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.27	0.7	75.0					0.22		
	Before					0.198		pasture	0.02	1.0	0.9	0.01	0.3			0.00					
DEB 23	During	0.2	1.0	72.2	77.77	0.462	0.169	rough irregular surface	1.00	0.9	0.7	0.89	0.7	75.0	90		0.16	0.06		0.2	0.06
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.01	0.7	75.0					0.00		
	Before					0.198		pasture	0.02	1.0	0.9	0.11	0.3			0.03					
DEB 24	During	0.3	6.5	100.2	77.77	0.462	1.359	rough irregular surface	1.00	0.9	0.7	9.14	0.7	75.0	90		1.60	0.64		1.6	0.63
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.12	0.7	75.0					0.02		

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.16	0.3			0.05					
DEB 25	During	0.3	10.5	60.8	77.77	0.462	2.082	rough irregular surface	1.00	0.9	0.7	12.74	0.7	75.0	90		2.23	0.89		2.21	0.88
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.17	0.7	75.0					0.03		
	Before					0.198		pasture	0.02	1.0	0.9	0.03	0.3			0.01					
DEB 26	During	0.2	3.4	81.5	77.77	0.462	0.503	rough irregular surface	1.00	0.9	0.7	2.24	0.7	75.0	90		0.39	0.16		0.4	0.15
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.03	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.10	0.3			0.03					
DEB 27	During	0.2	8.0	75.8	77.77	0.462	1.577	rough irregular surface	1.00	0.9	0.7	8.55	0.7	75.0	90		1.50	0.60		1.5	0.59
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.12	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.02	0.3			0.01					
DEB 28	During	0.3	1.5	100.8	77.77	0.462	0.235	rough irregular surface	1.00	0.9	0.7	1.51	0.7	75.0	90		0.26	0.11		0.3	0.10
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.02	0.7	75.0					0.00		

	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
TOTAL	2.37	112.94	45.17	1.54	112.10	44.34

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

INPUT CRITERIA - K PARAMETERS	
Silt (%)	10
Clay (%)	55
Sand (%)	35
Organic (%)	0%
K =	**0.250**

(from Nomograph)

K VALUE CORRECTIONS	
K Value	0.250
Organic Consent correction	0.1
Corrected K Value Exposed surface	0.462
Corrected K Value Pre/Post Earthworks	0.198

RAINFALL DATA	(mm)
2yr 24hr rainfall depth P24	80
2yr 6hr rainfall depth P6	50.24
R = (j/ha)	77.766

(daily 2-year ARI)
(factured)

USLE CALCULATIONS

Catchment	Area (ha	Lowest elevation	Highest Elevation	SlopeLength (m)	Slope % (s)	65.41 x s^2	s^2+10000	m	LS
Pond AC	2.10	26.88	40.24	438	3.049	608.2343	10009.30	0.4	0.874
Pond AD	2.63	26.63	40.48	362	3.824	956.363127	10014.62	0.4	1.025
Pond AE	0.84	21.66	28.78	134	5.313	1846.14118	10028.22	0.5	1.209
Pond AF	1.59	31.19	36.62	146	3.707	898.849841	10013.74	0.4	0.690

UNIVERSL SOIL LOSS EQUATION

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

HARRISON GRIERSON

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	0.51	0.3			0.15					
Pond AC	During	2.1	3.0	438.1	77.77	0.462	0.874	rough irregular surface	1.00	0.9	0.7	41.53	0.7	75.0	90		7.27	2.91		7.21	2.85
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.56	0.7	75.0					0.10		
	Before					0.198		pasture	0.02	1.0	0.9	0.75	0.3			0.22					
Pond AD	During	2.6	3.8	362.2	77.77	0.462	1.025	rough irregular surface	1.00	0.9	0.7	61.08	0.7	75.0	90		10.69	4.28		10.6	4.20
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.83	0.7	75.0					0.15		
	Before					0.198		pasture	0.02	1.0	0.9	0.28	0.3			0.08					
Pond AE	During	0.8	5.3	134.0	77.77	0.462	1.209	rough irregular surface	1.00	0.9	0.7	22.98	0.7	75.0	90		4.02	1.61		4.0	1.58
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.31	0.7	75.0					0.05		
	Before					0.198		pasture	0.02	1.0	0.9	0.38	0.3			0.12					
Pond AF	During	1.6	3.7	146.5	77.77	0.462	0.874	rough irregular surface	1.00	0.9	0.7	31.38	0.7	75.0	90		5.49	2.20		5.5	2.16
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.43	0.7	75.0					0.07		

	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
TOTAL	0.58	27.47	10.99	0.37	27.27	10.78

UNIVERSL SOIL LOSS EQUATION

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

INPUT CRITERIA - K PARAMETERS	
Silt (%)	10
Clay (%)	55
Sand (%)	35
Organic (%)	0%
K =	**0.250**

(from Nomograph)

K VALUE CORRECTIONS	
K Value	0.250
Organic Consent correction	0.1
Corrected K Value Exposed surface	0.462
Corrected K Value Pre/Post Earthworks	0.198

RAINFALL DATA	(mm)
2yr 24hr rainfall depth P24	80
2yr 6hr rainfall depth P6	50.24
R = (j/ha)	77.766

(daily 2-year ARI)
(factured)

USLE CALCULATIONS

Catchment	Area (ha	Lowest elevation	Highest Elevation	SlopeLength (m)	Slope % (s)	65.41 x s^2	s^2+10000	m	LS
Pond AG	2.32	26.37	37.01	185	5.740	2155.23863	10032.95	0.5	1.567
Pond AH	1.81	34.29	53.82	242	8.079	4269.25013	10065.27	0.5	2.832
Pond AI	3.25	43.63	60.93	253	6.849	3067.85817	10046.90	0.5	2.305
Pond AJ	1.01	48.72	56.30	104	7.261	3448.77423	10052.73	0.5	1.605
DEB 40	0.11	25.76	29.33	56	6.352	2639.41664	10040.35	0.5	0.984
DEB 41	0.19	28.76	32.14	64	5.259	1809.09324	10027.66	0.5	0.827
DEB 42	0.27	32.96	35.51	67	3.824	956.6065	10014.62	0.4	0.521
DEB 43	0.26	30.92	36.45	93	5.942	2309.27144	10035.30	0.5	1.161
DEB 44	0.30	34.16	40.43	107	5.883	2264.17139	10034.62	0.5	1.226
DEB 45	0.30	36.97	43.84	85	8.054	4242.86839	10064.87	0.5	1.675
DEB 46	0.13	34.59	39.83	43	12.229	9781.49125	10149.54	0.5	2.203
DEB 47	0.13	40.60	43.96	46	7.265	3452.22609	10052.78	0.5	1.069
DEB 48	0.07	40.91	48.72	54	14.533	13815.0001	10211.21	0.5	3.234

UNIVERSL SOIL LOSS EQUATION

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

HARRISON GRIERSON

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
	Before					0.198		pasture	0.02	1.0	0.9	1.01	0.3			0.30					
Pond AG	During	2.3	5.7	185.4	77.77	0.462	1.567	rough irregular surface	1.00	0.9	0.7	82.19	0.7	75.0	90		14.38	5.75		14.28	5.65
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.12	0.7	75.0					0.20		
	Before					0.198		pasture	0.02	1.0	0.9	1.42	0.3			0.43					
Pond AH	During	1.8	8.1	241.7	77.77	0.462	2.832	rough irregular surface	1.00	0.9	0.7	116.23	0.7	75.0	90		20.34	8.14		20.2	7.99
	Restoration					0.198		temporary grass	0.10	1.0	0.2	1.58	0.7	75.0					0.28		
	Before					0.198		pasture	0.02	1.0	0.9	2.07	0.3			0.62					
Pond AI	During	3.2	6.8	252.6	77.77	0.462	2.305	rough irregular surface	1.00	0.9	0.7	169.41	0.7	75.0	90		29.65	11.86		29.4	11.64
	Restoration					0.198		temporary grass	0.10	1.0	0.2	2.30	0.7	75.0					0.40		
	Before					0.198		pasture	0.02	1.0	0.9	0.45	0.3			0.13					
Pond AJ	During	1.0	7.3	104.4	77.77	0.462	1.605	rough irregular surface	1.00	0.9	0.7	36.52	0.7	75.0	90		6.39	2.56		6.3	2.51
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.50	0.7	75.0					0.09		
	Before					0.198		pasture	0.02	1.0	0.9	0.03	0.3			0.01					
DEB 40	During	0.1	6.4	56.2	77.77	0.462	0.984	rough irregular surface	1.00	0.9	0.7	2.43	0.7	75.0	90		0.43	0.17		0.4	0.17
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.03	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.04	0.30			0.01					
DEB 41	During	0.2	5.3	64.3	77.77	0.462	0.827	rough irregular surface	1.00	0.9	0.7	3.61	0.7	75.0	90		0.63	0.25		0.6	0.25
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.05	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.04	0.3			0.01					
DEB 42	During	0.3	3.8	66.7	77.77	0.462	0.521	rough irregular surface	1.00	0.9	0.7	3.14	0.7	75.0	90		0.55	0.22		0.5	0.22
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.04	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.08	0.3			0.02					
DEB 43	During	0.3	5.9	93.1	77.77	0.462	1.161	rough irregular surface	1.00	0.9	0.7	6.79	0.7	75.0	90		1.19	0.48		1.2	0.47
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.09	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.10	0.3			0.03					

UNIVERSL SOIL LOSS EQUATION

Project:	Beachlands Fast Track	Date:	4/06/2026
Project No:	A2515591.00	Completed By:	ENW
Office:	Auckland	Approved By:	CJM

USLE CALCULATIONS

					USLE Parameters											NETT SEDIMENT LOSS					
Catchment	Period	Area (ha)	Slope (%)	Length (m)	R	K	Ls	C (surface type)	C	P	Time (years)	Gross Sediment Yield (t)	Sediment Delivery Ratio (%)	Sediment Control Device Efficiency - No CTP (%)	Sediment Control Device Efficiency - With CTP (%)	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
DEB 44	During	0.3	5.9	106.6	77.77	0.462	1.226	rough irregular surface	1.00	0.9	0.7	8.30	0.7	75.0	90		1.45	0.58		1.44	0.57
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.11	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.14	0.3			0.04					
DEB 45	During	0.3	8.1	85.3	77.77	0.462	1.675	rough irregular surface	1.00	0.9	0.7	11.37	0.7	75.0	90		1.99	0.80		2.0	0.78
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.15	0.7	75.0					0.03		
	Before					0.198		pasture	0.02	1.0	0.9	0.08	0.3			0.02					
DEB 46	During	0.1	12.2	42.9	77.77	0.462	2.203	rough irregular surface	1.00	0.9	0.7	6.59	0.7	75.0	90		1.15	0.46		1.1	0.45
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.09	0.7	75.0					0.02		
	Before					0.198		pasture	0.02	1.0	0.9	0.04	0.3			0.01					
DEB 47	During	0.1	7.3	46.3	77.77	0.462	1.069	rough irregular surface	1.00	0.9	0.7	3.13	0.7	75.0	90		0.55	0.22		0.5	0.22
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.04	0.7	75.0					0.01		
	Before					0.198		pasture	0.02	1.0	0.9	0.03	0.3			0.01					
DEB 48	During	0.1	14.5	53.7	77.77	0.462	1.675	rough irregular surface	1.00	0.9	0.7	2.81	0.7	75.0	90		0.49	0.20		0.5	0.19
	Restoration					0.198		temporary grass	0.10	1.0	0.2	0.04	0.7	75.0					0.01		

	Before (t)	During Without CTP (t)	During With CTP (t)	Restoration (t)	Difference without CTP (post vs prior) (t)	Difference with CTP (post vs prior) (t)
TOTAL	1.66	79.19	31.68	1.08	78.61	31.09

Appendix 1f– Erosion and Sediment Control Calculations (Ponds)

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	A

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.989	ha (5 max)
Required Volume	1495.88	m³

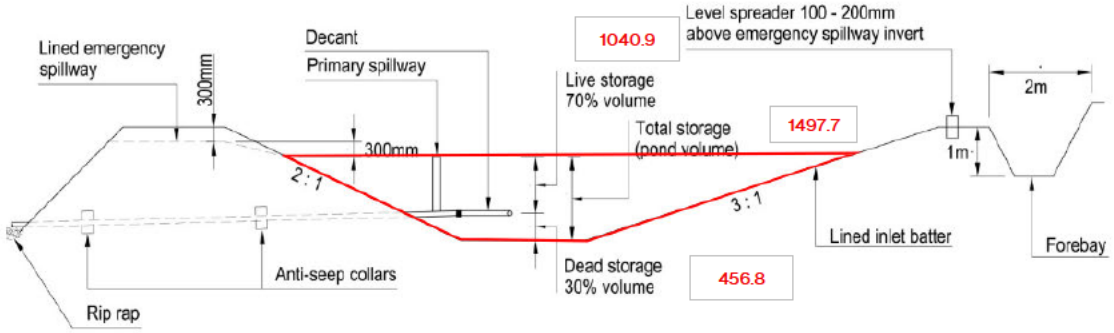
Pond Dimensions

Water Depth	2.0	m
Average Area Required	748	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	53.5	7.9	66.5	18.3	74.1	20.2		1497.7	456.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 1.59 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.59	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	14.61	Bottom of Weir Length (m)

Spillway width, L =	14.6	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	B

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	2.8822	ha (5 max)
Required Volume	1080.83	m³

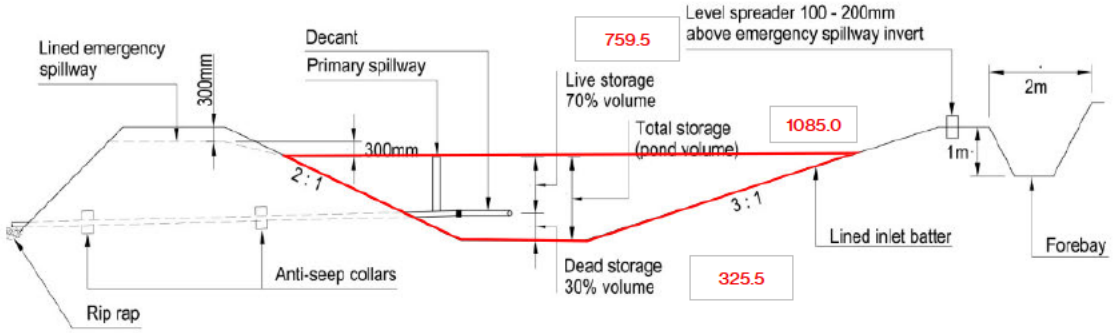
Pond Dimensions

Water Depth	2.0	m
Average Area Required	540	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	45.4	5.8	58.4	16.3	64.8	17.8		1085.0	325.5



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.15 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.15	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	10.56	Bottom of Weir Length (m)

Spillway width, L =	10.6	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	C

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	2.0159	ha (5 max)
Required Volume	755.96	m³

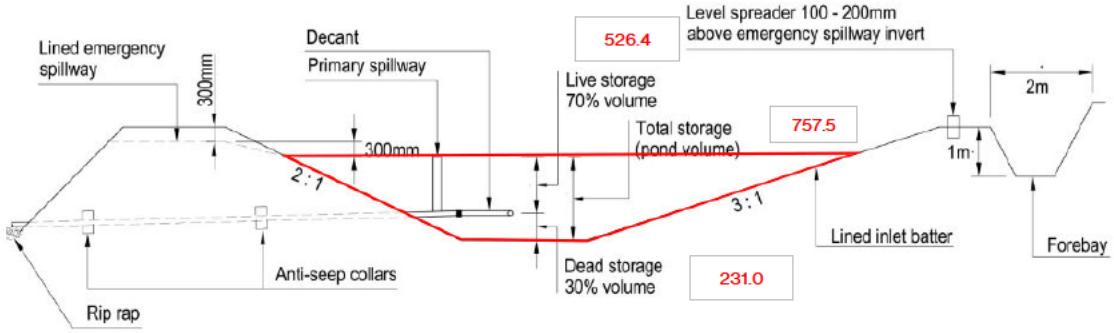
Pond Dimensions

Water Depth	2.0	m
Average Area Required	378	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	37.8	3.9	50.8	14.4	56.2	15.7		757.5	231.0



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.80 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.80	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	7.38	Bottom of Weir Length (m)

Spillway width, L =	7.4	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	D

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	3.7595	ha (5 max)
Required Volume	1409.81	m³

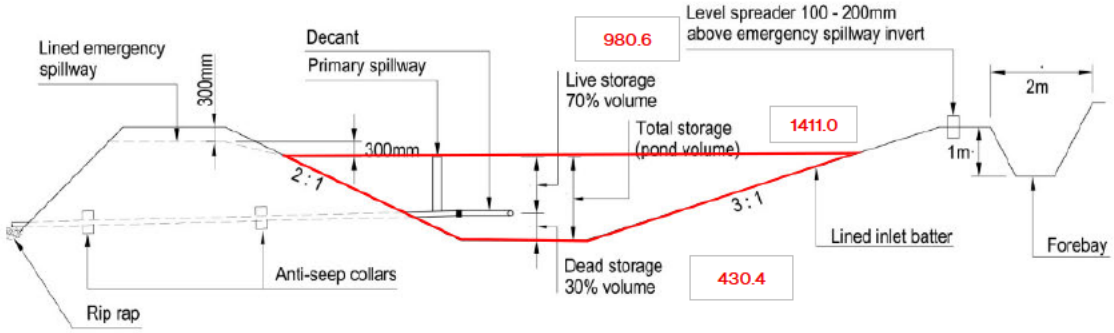
Pond Dimensions

Water Depth	2.0	m
Average Area Required	705	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	51.9	7.5	64.9	17.9	72.3	19.7		1411.0	430.4



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.50 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.50	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	13.77	Bottom of Weir Length (m)

Spillway width, L =	13.8	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	E

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	1.7086	ha (5 max)
Required Volume	640.73	m³

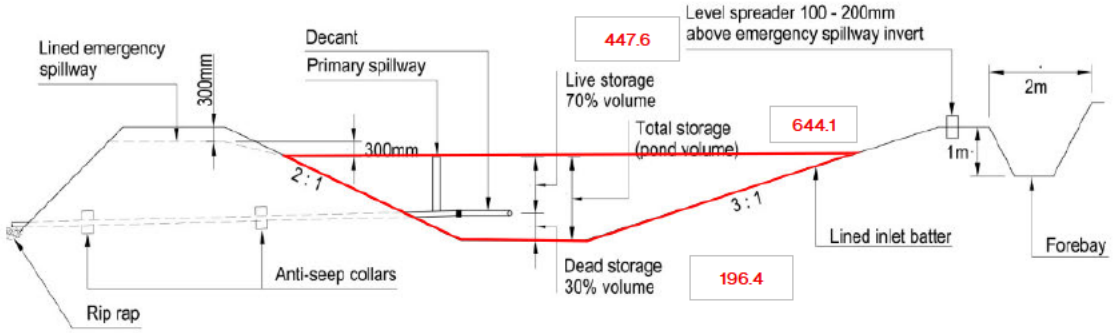
Pond Dimensions

Water Depth	2.0	m
Average Area Required	320	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	34.8	3.2	47.8	13.6	52.7	14.8		644.1	196.4



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.68 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.68	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	6.26	Bottom of Weir Length (m)

Spillway width, L =	6.3	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	F

Design Criteria

Catchment Slope %	<	18%	
Length of Site	>	200m	
Contributing Catchment Area	2.9952	ha (5 max)	
Required Volume	1123.20	m³	

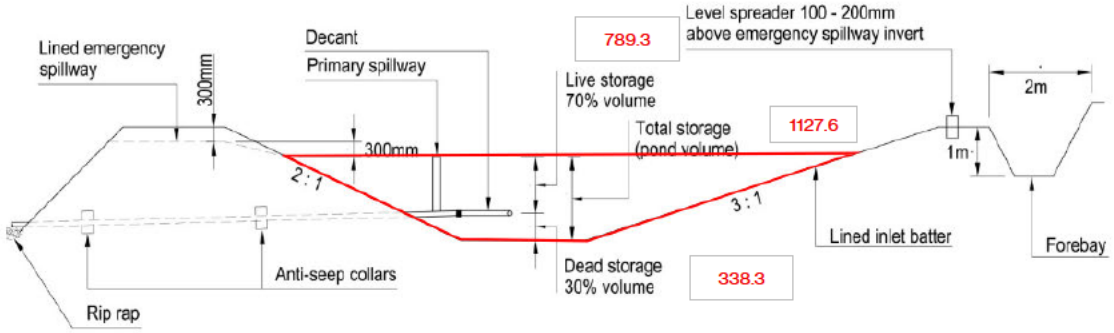
Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

Pond Dimensions

Water Depth	2.0	m
Average Area Required	562	m²

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	46.3	6.1	59.3	16.5	65.9	18.1		1127.6	338.3



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.19 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.19	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	10.97	Bottom of Weir Length (m)

Spillway width, L =	11.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	G

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	2.9877	ha (5 max)
Required Volume	1120.39	m³

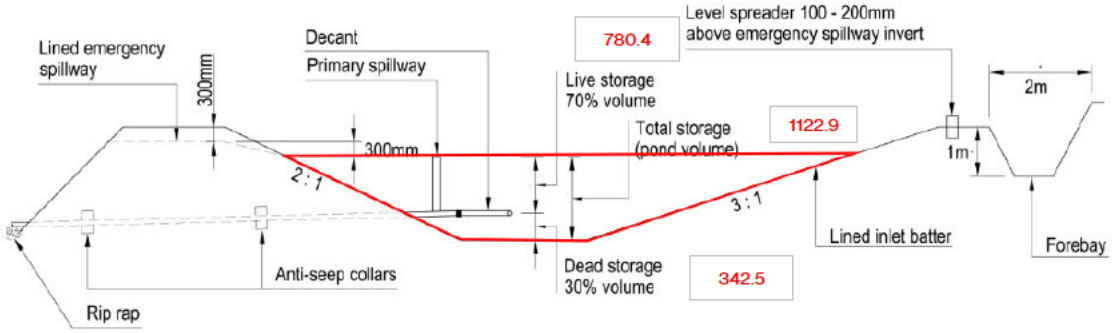
Pond Dimensions

Water Depth	2.0	m
Average Area Required	560	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	46.2	6.0	59.2	16.4	65.8	18.1		1122.9	342.5



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.19 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.19	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	10.94	Bottom of Weir Length (m)

Spillway width, L =	10.9	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	H

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.9837	ha (5 max)
Required Volume	1493.89	m³

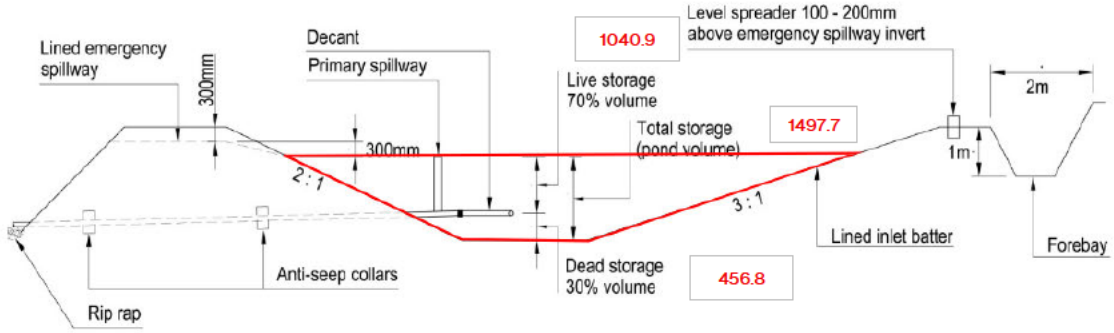
Pond Dimensions

Water Depth	2.0	m
Average Area Required	747	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	53.5	7.9	66.5	18.3	74.1	20.2		1497.7	456.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 1.59 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.59	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	14.59	Bottom of Weir Length (m)

Spillway width, L =	14.6	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	I

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.6311	ha (5 max)
Required Volume	1361.66	m³

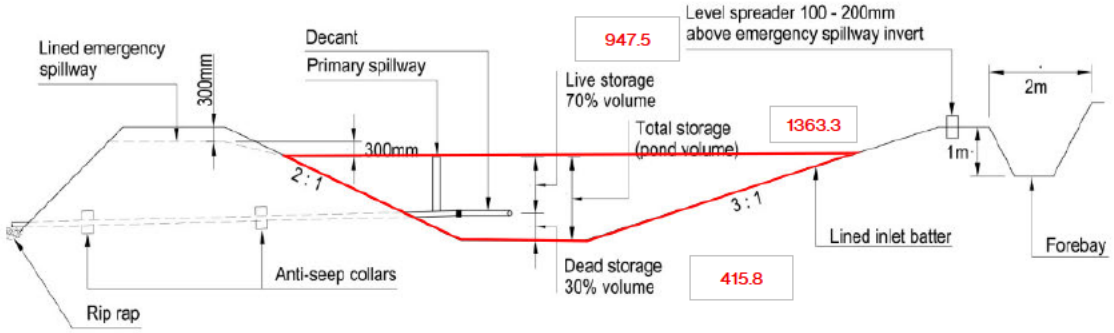
Pond Dimensions

Water Depth	2.0	m
Average Area Required	681	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	51	7.2	64	17.6	71.2	19.4		1363.3	415.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.45 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.45	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	13.30	Bottom of Weir Length (m)

Spillway width, L =	13.3	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	J

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	0.599	ha (5 max)
Required Volume	224.63	m³

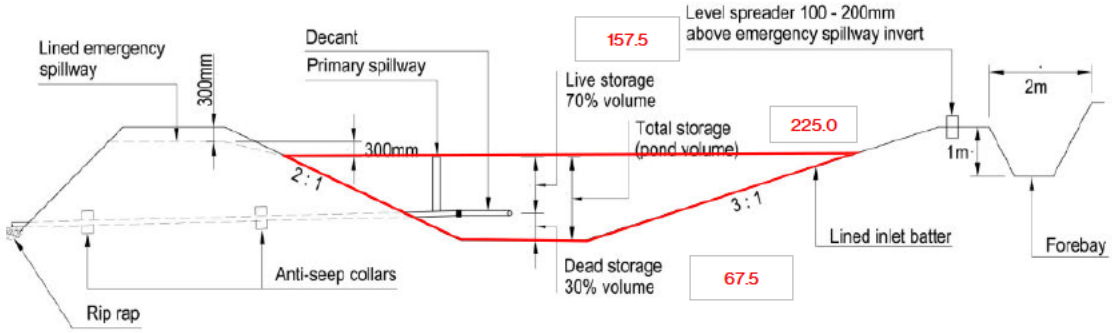
Pond Dimensions

Water Depth	2.0	m
Average Area Required	112	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	20.4	-0.4	33.4	10.0	36.2	10.7		225.0	67.5



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 0.24 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.24	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	2.19	Bottom of Weir Length (m)

Spillway width, L =	6.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.39 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	K

Design Criteria

Catchment Slope %	<	18%	
Length of Site	<	200m	
Contributing Catchment Area	2.6408	ha (5 max)	
Required Volume	990.30	m³	

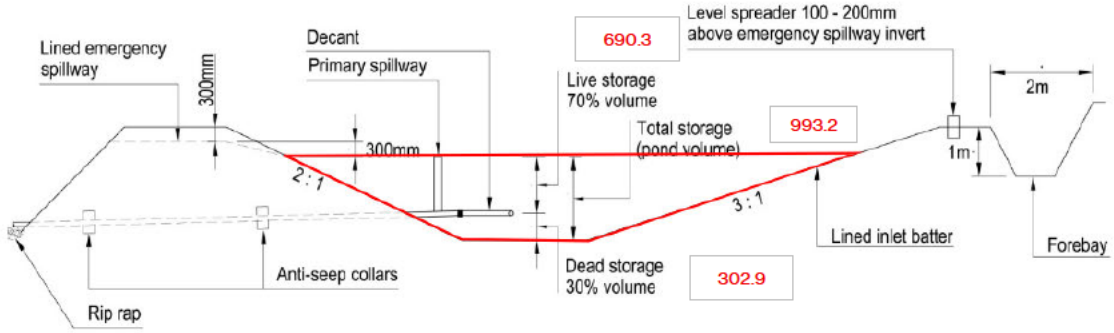
Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

Pond Dimensions

Water Depth	2.0	m
Average Area Required	495	m²

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	43.4	5.3	56.4	15.8	62.6	17.3		993.2	302.9



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.05 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.05	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	9.67	Bottom of Weir Length (m)

Spillway width, L =	9.7	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	K2

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.4934	ha (5 max)
Required Volume	1310.03	m³

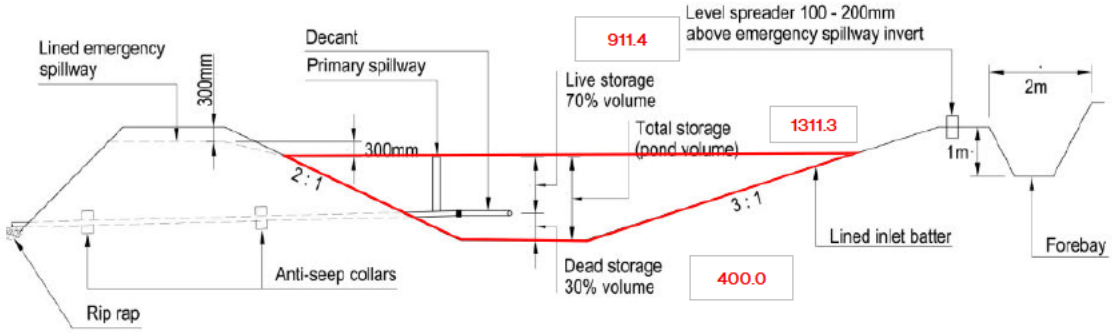
Pond Dimensions

Water Depth	2.0	m
Average Area Required	655	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	50	7.0	63	17.4	70.1	19.2		1311.3	400.0



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.39 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.39	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	12.79	Bottom of Weir Length (m)

Spillway width, L =	12.8	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	L

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	1.5077	ha (5 max)
Required Volume	565.39	m³

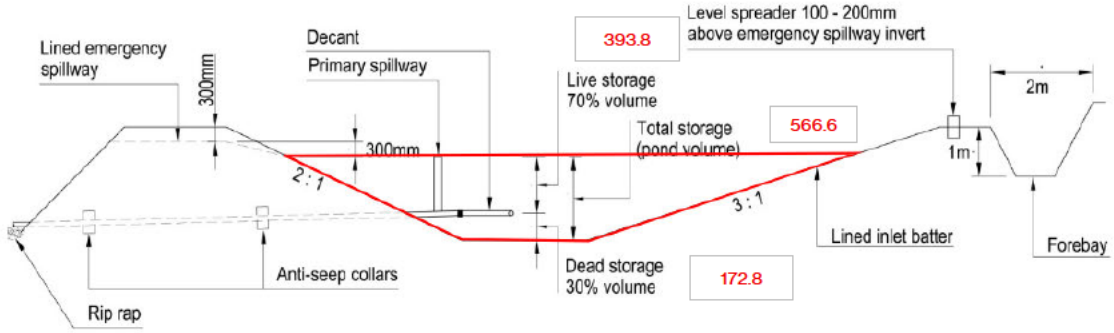
Pond Dimensions

Water Depth	2.0	m
Average Area Required	283	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	32.6	2.6	45.6	13.1	50.2	14.2		566.6	172.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.60 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.60	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	5.52	Bottom of Weir Length (m)

Spillway width, L =	6.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.46 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	M

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.8263	ha (5 max)
Required Volume	1434.86	m³

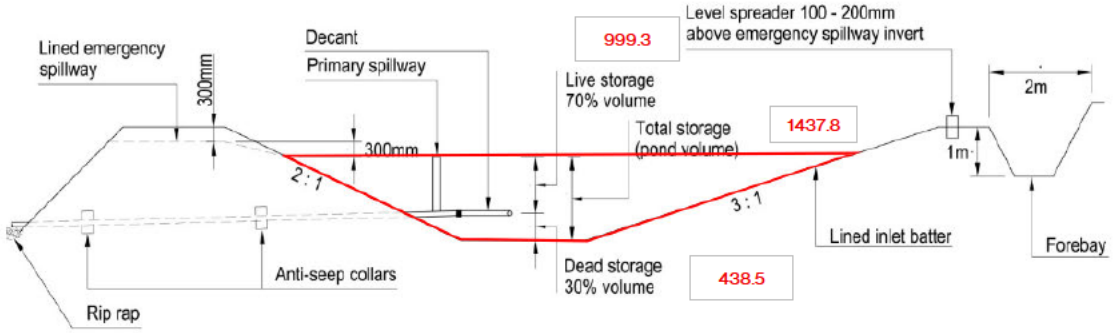
Pond Dimensions

Water Depth	2.0	m
Average Area Required	717	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	52.4	7.6	65.4	18.0	72.8	19.8		1437.8	438.5



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.53 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.53	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	14.01	Bottom of Weir Length (m)

Spillway width, L =	14.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	N

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.6412	ha (5 max)
Required Volume	1365.45	m³

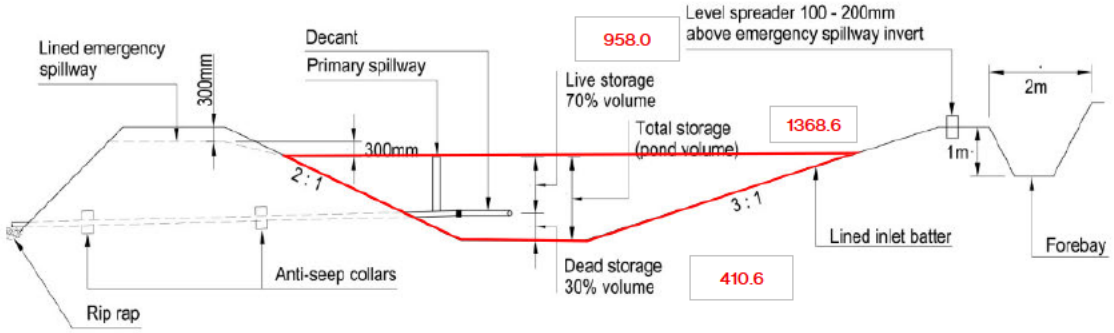
Pond Dimensions

Water Depth	2.0	m
Average Area Required	683	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	51.1	7.3	64.1	17.7	71.3	19.5		1368.6	410.6



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 1.45 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.45	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	13.34	Bottom of Weir Length (m)

Spillway width, L =	13.3	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	0

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	0.9766	ha (5 max)
Required Volume	366.23	m³

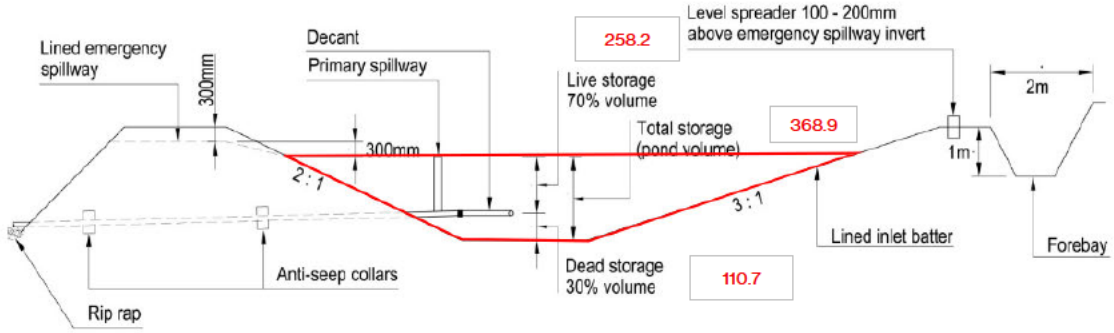
Pond Dimensions

Water Depth	2.0	m
Average Area Required	183	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	26.2	1.0	39.2	11.5	42.9	12.4		368.9	110.7



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 0.39 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.39	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	3.58	Bottom of Weir Length (m)

Spillway width, L =	6.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.42 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	P

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	1.2865	ha (5 max)
Required Volume	482.44	m³

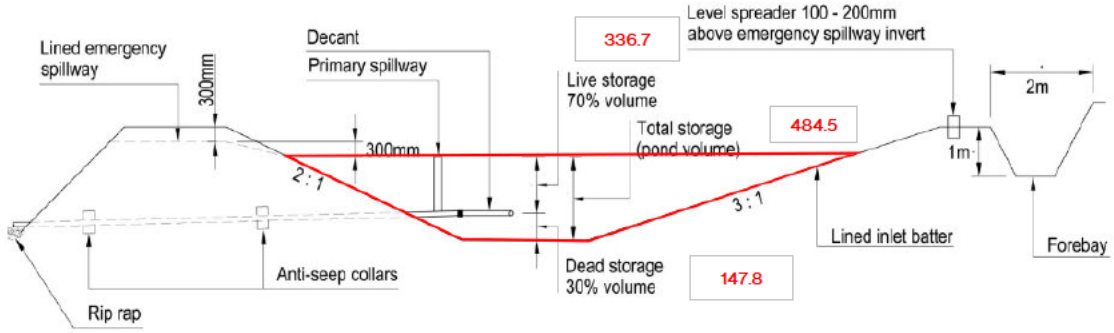
Pond Dimensions

Water Depth	2.0	m
Average Area Required	241	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	30.1	2.0	43.1	12.4	47.4	13.5		484.5	147.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.51 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.51	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	4.71	Bottom of Weir Length (m)

Spillway width, L =	6.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.44 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	Q

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.1032	ha (5 max)
Required Volume	1163.70	m³

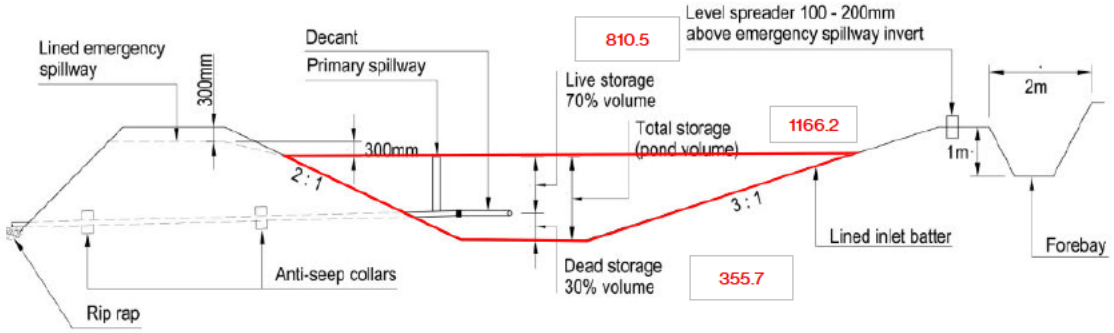
Pond Dimensions

Water Depth	2.0	m
Average Area Required	582	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	47.1	6.3	60.1	16.7	66.8	18.3		1166.2	355.7



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.24 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.24	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	11.36	Bottom of Weir Length (m)

Spillway width, L =	11.4	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	R

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.4835	ha (5 max)
Required Volume	1306.31	m³

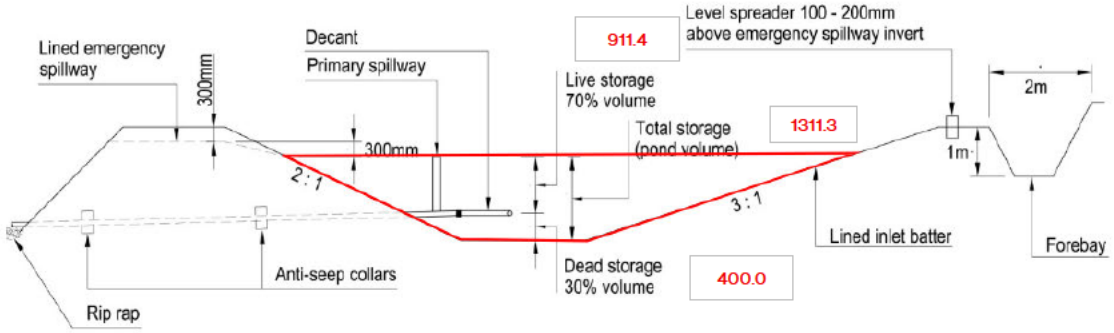
Pond Dimensions

Water Depth	2.0	m
Average Area Required	653	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	50	7.0	63	17.4	70.1	19.2		1311.3	400.0



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.39 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.39	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	12.76	Bottom of Weir Length (m)

Spillway width, L =	12.8	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	S

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	1.96	ha (5 max)
Required Volume	735.00	m³

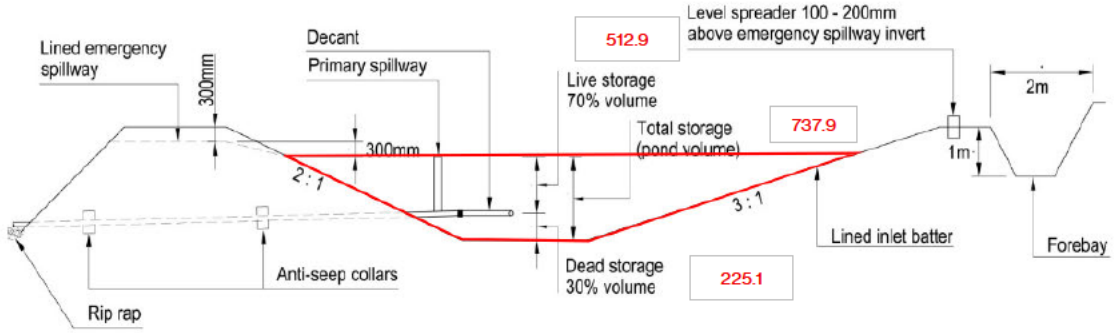
Pond Dimensions

Water Depth	2.0	m
Average Area Required	368	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	37.3	3.8	50.3	14.2	55.6	15.6		737.9	225.1



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 0.78 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.78	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	7.18	Bottom of Weir Length (m)

Spillway width, L =	7.2	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	T

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	3.1955	ha (5 max)
Required Volume	1198.31	m³

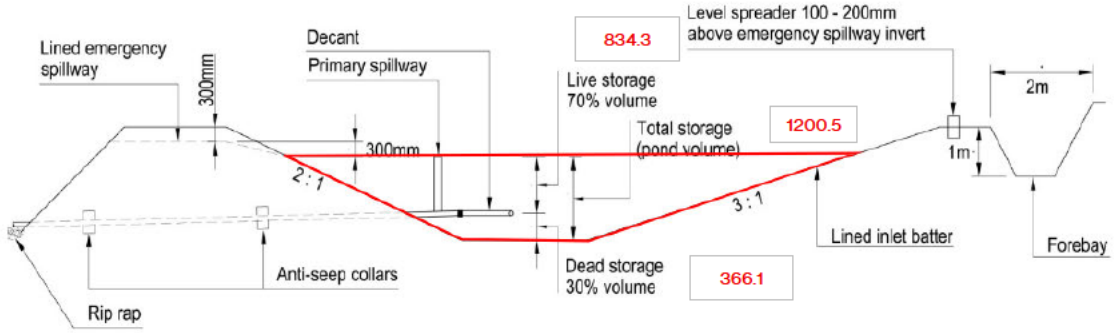
Pond Dimensions

Water Depth	2.0	m
Average Area Required	599	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	47.8	6.4	60.8	16.8	67.6	18.5		1200.5	366.1



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.27 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.27	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	11.70	Bottom of Weir Length (m)

Spillway width, L =	11.7	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	U

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.8121	ha (5 max)
Required Volume	1429.54	m³

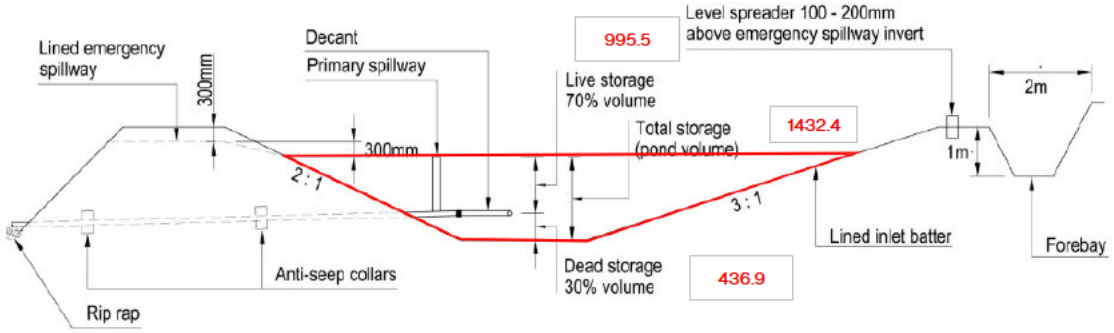
Pond Dimensions

Water Depth	2.0	m
Average Area Required	715	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	52.3	7.6	65.3	18.0	72.7	19.8		1432.4	436.9



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.52 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.52	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	13.96	Bottom of Weir Length (m)

Spillway width, L =	14.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	V

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.9834	ha (5 max)
Required Volume	1493.78	m³

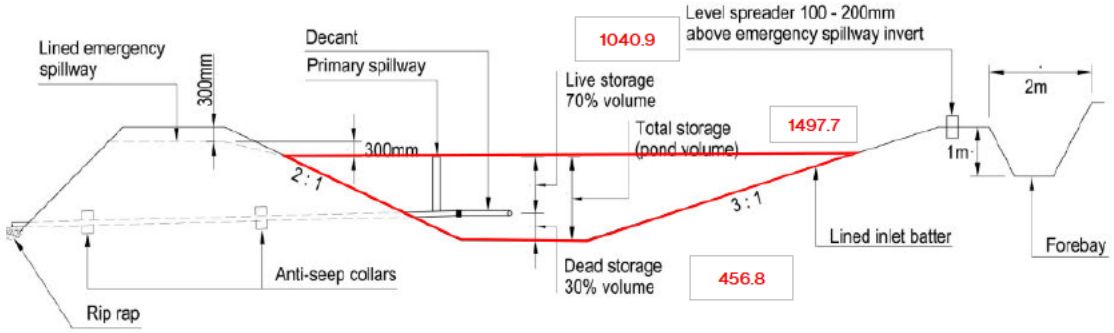
Pond Dimensions

Water Depth	2.0	m
Average Area Required	747	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	53.5	7.9	66.5	18.3	74.1	20.2		1497.7	456.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 1.59 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.59	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	14.59	Bottom of Weir Length (m)

Spillway width, L =	14.6	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	W

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.9409	ha (5 max)
Required Volume	1477.84	m³

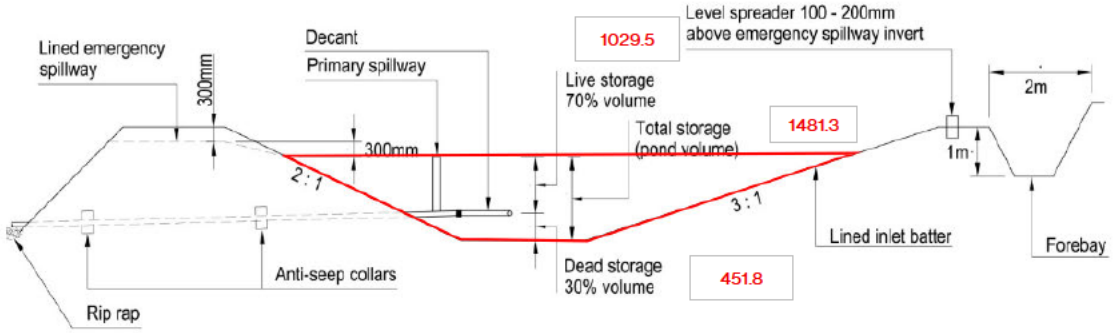
Pond Dimensions

Water Depth	2.0	m
Average Area Required	739	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	53.2	7.8	66.2	18.2	73.7	20.1		1481.3	451.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.57 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.57	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	14.43	Bottom of Weir Length (m)

Spillway width, L =	14.4	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	X

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.9429	ha (5 max)
Required Volume	1478.59	m³

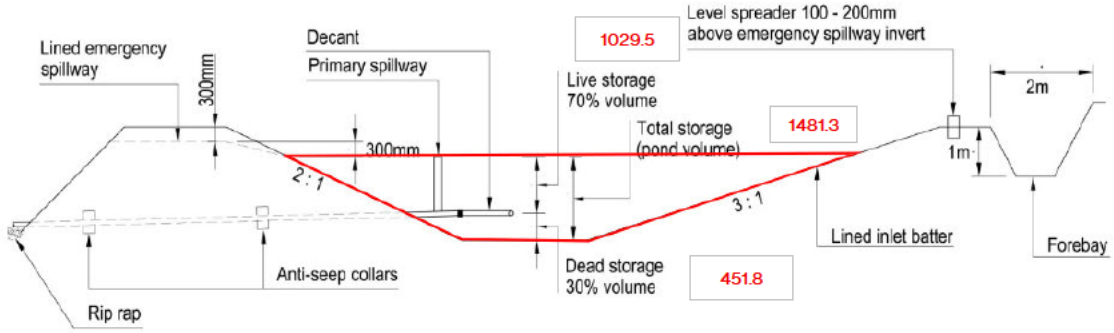
Pond Dimensions

Water Depth	2.0	m
Average Area Required	739	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	53.2	7.8	66.2	18.2	73.7	20.1		1481.3	451.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.57 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.57	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	14.44	Bottom of Weir Length (m)

Spillway width, L =	14.4	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	Y

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.6956	ha (5 max)
Required Volume	1385.85	m³

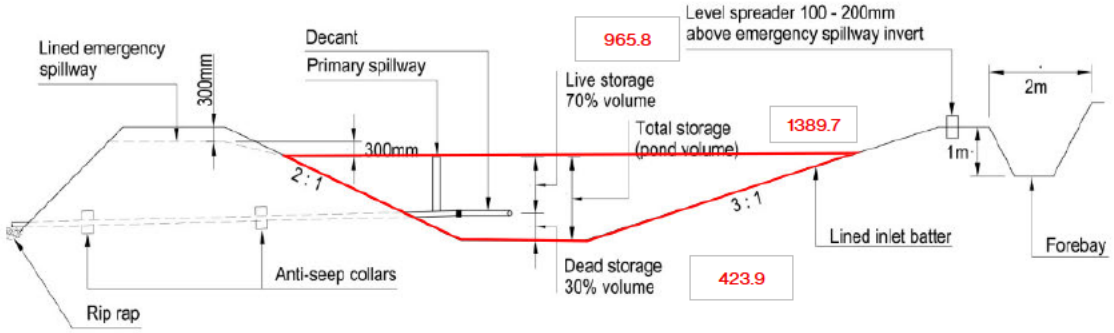
Pond Dimensions

Water Depth	2.0	m
Average Area Required	693	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	51.5	7.4	64.5	17.8	71.8	19.6		1389.7	423.9



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.47 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.47	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	13.53	Bottom of Weir Length (m)

Spillway width, L =	13.5	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	Z

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	1.3434	ha (5 max)
Required Volume	503.78	m³

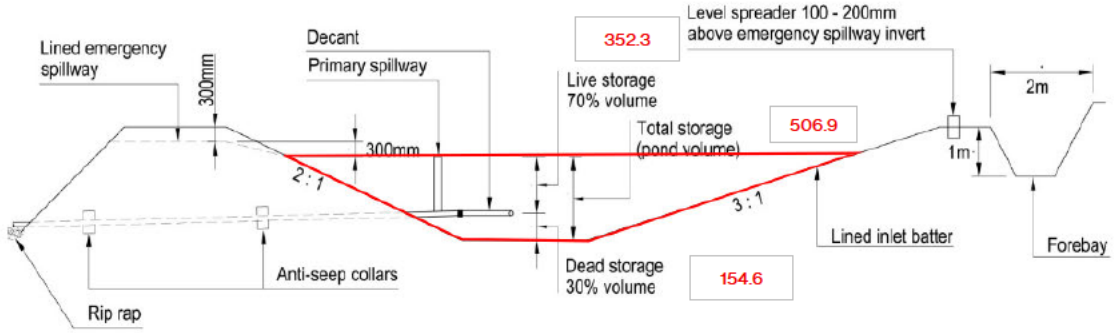
Pond Dimensions

Water Depth	2.0	m
Average Area Required	252	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	30.8	2.2	43.8	12.6	48.2	13.7		506.9	154.6



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 0.54 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.54	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	4.92	Bottom of Weir Length (m)

Spillway width, L =	6.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.45 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AA

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	1.0164	ha (5 max)
Required Volume	381.15	m³

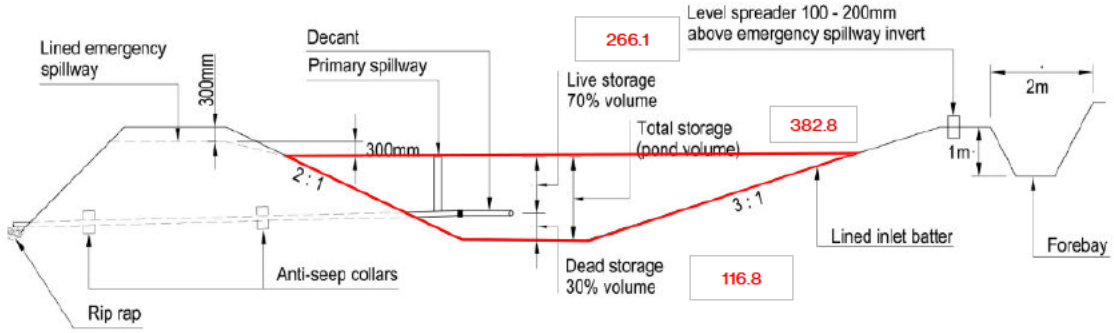
Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

Pond Dimensions

Water Depth	2.0	m
Average Area Required	191	m²

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	26.7	1.2	39.7	11.6	43.5	12.5		382.8	116.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 0.41 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.41	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	3.72	Bottom of Weir Length (m)

Spillway width, L =	6.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.42 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AB

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.3933	ha (5 max)
Required Volume	1272.49	m³

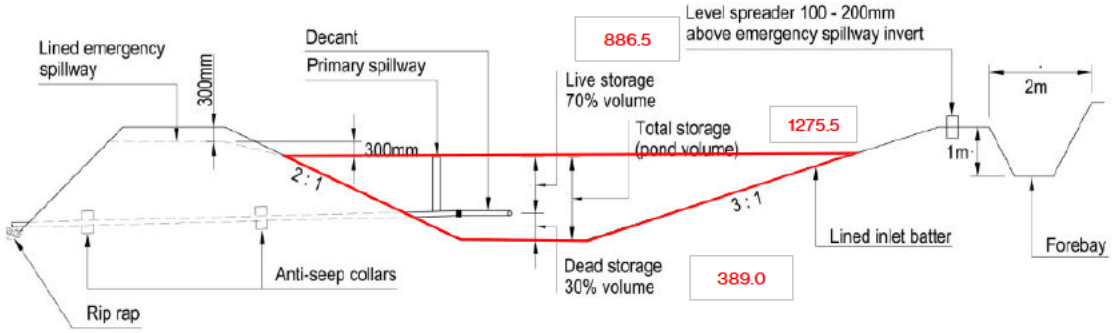
Pond Dimensions

Water Depth	2.0	m
Average Area Required	636	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	49.3	6.8	62.3	17.2	69.3	19.0		1275.5	389.0



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.35 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.35	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	12.43	Bottom of Weir Length (m)

Spillway width, L =	12.4	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AC

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	2.0981	ha (5 max)
Required Volume	786.79	m³

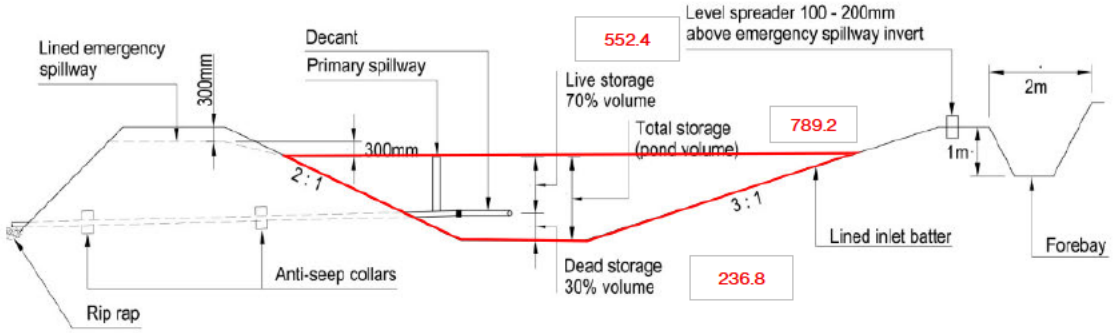
Pond Dimensions

Water Depth	2.0	m
Average Area Required	393	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	38.6	4.1	51.6	14.6	57.1	15.9		789.2	236.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.84 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.84	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	7.68	Bottom of Weir Length (m)

Spillway width, L =	7.7	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AD

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	2.6339	ha (5 max)
Required Volume	987.71	m³

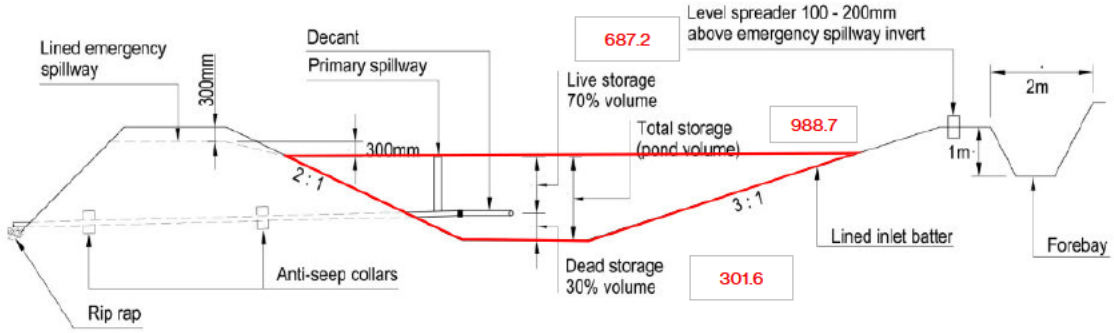
Pond Dimensions

Water Depth	2.0	m
Average Area Required	494	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	43.3	5.3	56.3	15.7	62.4	17.3		988.7	301.6



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from TP 108

I = 205 mm/hr

1% AEP flow = 1.05 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.05	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	9.65	Bottom of Weir Length (m)

Spillway width, L =	9.6	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AE

Design Criteria

Catchment Slope %	<	18%	
Length of Site	<	200m	
Contributing Catchment Area	0.8396	ha (5 max)	
Required Volume	314.85	m^3	

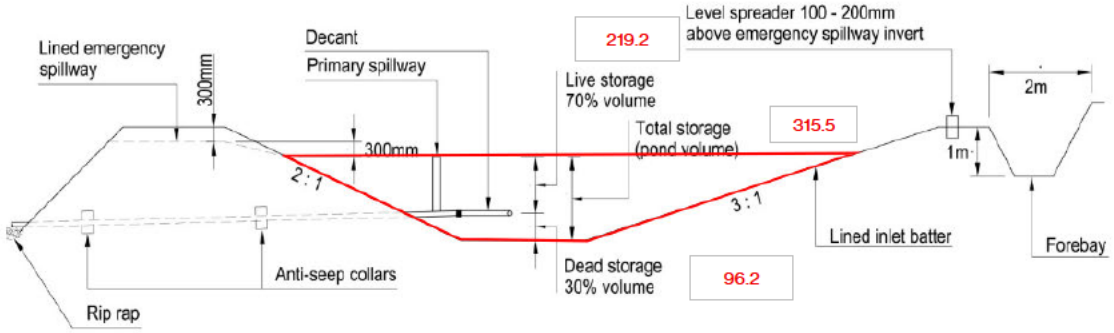
Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

Pond Dimensions

Water Depth	2.0	m
Average Area Required	157	m^2

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m^3)	(m^3)
4:1	24.2	0.5	37.2	11.0	40.6	11.8		315.5	96.2



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.33 m^3/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.33	Discharge (m^3/s)
	H =	0.15	Head (m)
	b =	3.07	Bottom of Weir Length (m)

Spillway width, L =	6.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.41 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AF

Design Criteria

Catchment Slope %	<	18%	
Length of Site	<	200m	
Contributing Catchment Area	1.5855	ha (5 max)	
Required Volume	594.56	m³	

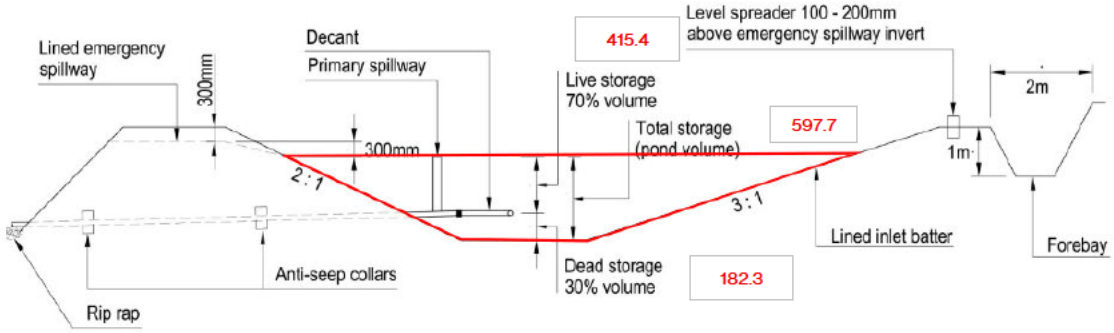
Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

Pond Dimensions

Water Depth	2.0	m
Average Area Required	297	m²

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	33.5	2.9	46.5	13.3	51.2	14.5		597.7	182.3



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.63 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.63	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	5.81	Bottom of Weir Length (m)

Spillway width, L =	6.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.46 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AG

Design Criteria

Catchment Slope %	<	18%
Length of Site	<	200m
Contributing Catchment Area	2.3174	ha (5 max)
Required Volume	869.03	m³

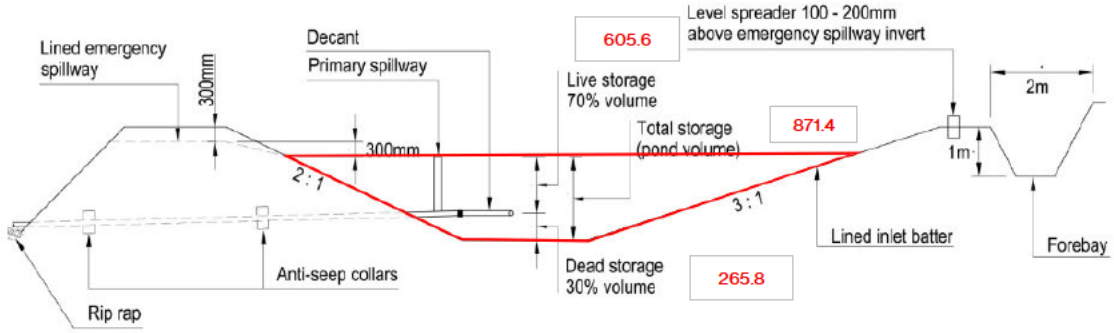
Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

Pond Dimensions

Water Depth	2.0	m
Average Area Required	435	m²

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	40.6	4.6	53.6	15.1	59.4	16.5		871.4	265.8



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.92 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.92	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	8.49	Bottom of Weir Length (m)

Spillway width, L =	8.5	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AH

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	1.813	ha (5 max)
Required Volume	679.88	m³

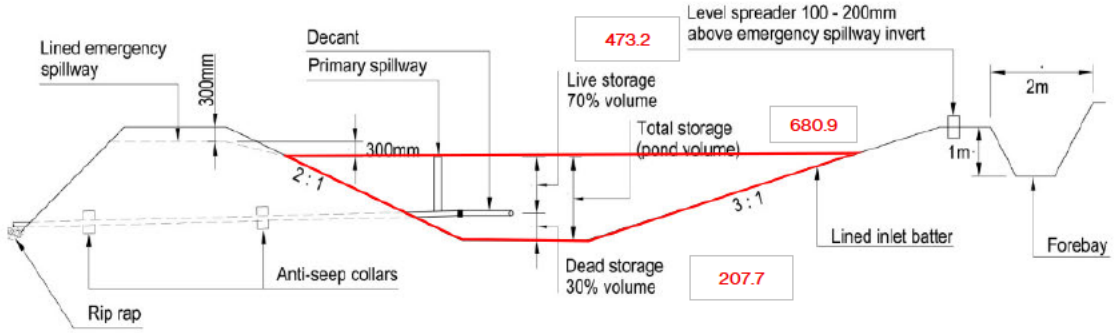
Pond Dimensions

Water Depth	2.0	m
Average Area Required	340	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	35.8	3.4	48.8	13.9	53.9	15.1		680.9	207.7



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.72 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.72	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	6.64	Bottom of Weir Length (m)

Spillway width, L =	6.6	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AI

Design Criteria

Catchment Slope %	<	18%
Length of Site	>	200m
Contributing Catchment Area	3.2464	ha (5 max)
Required Volume	1217.40	m³

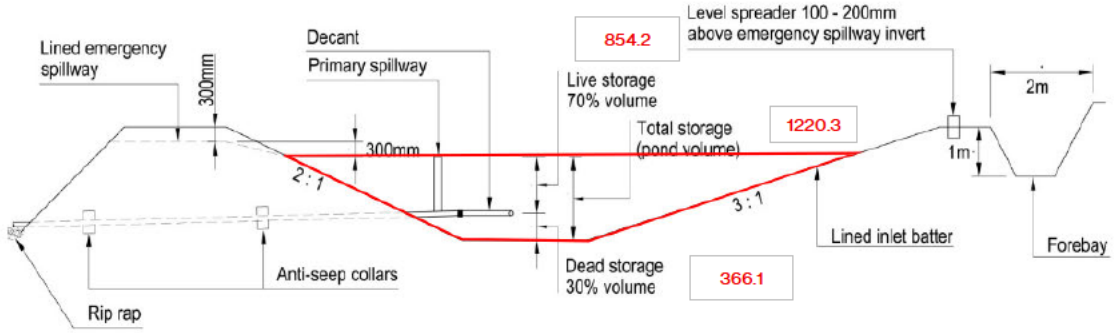
Pond Dimensions

Water Depth	2.0	m
Average Area Required	609	m²

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m³)	(m³)
4:1	48.2	6.5	61.2	16.9	68.0	18.6		1220.3	366.1



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 1.30 m³/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	1.30	Discharge (m³/s)
	H =	0.15	Head (m)
	b =	11.89	Bottom of Weir Length (m)

Spillway width, L =	11.9	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.47 m *(This is the height of the flow above the outlet manhole including freeboard)*

SEDIMENT RETENTION POND CALCULATIONS

HARRISON GRIERSON

Project:	Beachlands Fast Track	Date	4/06/2026
Project No:	A2515591.00	Completed by	ENW
Office / Region:	Auckland	Approved By	

POND NAME	AJ

Design Criteria

Catchment Slope %	<	18%	
Length of Site	<	200m	
Contributing Catchment Area	1.0056	ha (5 max)	
Required Volume	377.10	m^3	

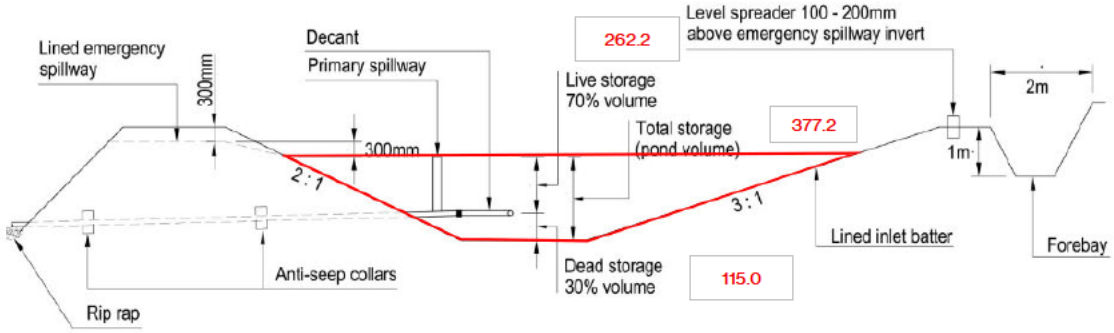
Pond Dimensions

Water Depth	2.0	m
Average Area Required	189	m^2

Notes (as per GD05): Max. height of any fill embankment should not be more than 2.6m. Ratio of SRP to be no less than 3:1 and no greater tha 5:1. SRP depths to be 1m - 2m. Emergency spillways to be trapezoidal & to accommodate 1% AEP with min bottom width of 6m or width of base, whichever is greater. AUP Rule I458.6.11.Earthworks Pond sizing is based 3.75% disturbed area upto maximum catchment of 4ha.

** Volumes are calculated from base to primary spillway level, Crest dimensions are 600mm above spillway to top of embankment*

L/W Ratio	*Base Dim. (m)		*Spillway Dim. (m)		Crest Dim. (m)			Volume	Dead Storage
Selection	Length	Width	Length	Width	Length	Width		(m^3)	(m^3)
4:1	26.5	1.1	39.5	11.5	43.2	12.5		377.2	115.0



SPILLWAY DESIGN

DESIGN FOR 1% AEP RAINFALL

The Peak Flow is calculated using the Rational Method:

• Runoff coefficient, C

Working Area

C = 0.7

• Rainfall Intensity, I

Calculate I from: TP 108

I = 205 mm/hr

1% AEP flow = 0.40 m^3/s

SPILLWAY DETAIL

Use Q = CLH3/2 to calculate the spillway height (H)

Where :	Q =	0.40	Discharge (m^3/s)
	H =	0.15	Head (m)
	b =	3.68	Bottom of Weir Length (m)

Spillway width, L =	6.0	m
Free board =	0.3	m
C =	1.6	*(Assume broad crested weir)*

Spillway Water Level 0.42 m *(This is the height of the flow above the outlet manhole including freeboard)*