



Job# S1660-J05390

**Bream Bay Business Hub - Stage 1
551 Marsden Point Road
Ruakaka**

Engineered Earthworks Plan



12 August 2022

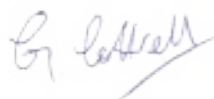
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TMC Consulting Engineers Ltd.

Engineered Earthworks Plan

Engineered Earthworks Plan for
Bream Bay Business Hub - Stage 1,
at:
551 Marsden Point Road, Ruakaka

Prepared by:



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Engineered Earthworks Plan

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1. PRELIMINARY AND GENERAL

1.1 INTRODUCTION

Purpose

This Engineered Earthworks Plan (EEP) has been prepared by TMC Consulting Engineers Ltd. (TMC) for HKRS Holdings Ltd. (the “Client”) in accordance with instructions received from them with regard to the above property.

The purpose of this Engineered Earthworks Report is to provide:

- General information on previous site investigations and onsite soils;
- Earthworks fill materials and specification;
- An engineered earthworks construction methodology;
- A construction quality assurance (CQA) plan for the engineered earthworks; and
- The principal requirements for final documentation upon completion of the bulk earthworks.

Proposal

The consented proposal is for a 2 stage subdivision. Stage 1A is proposed to create two lots and Stage 1 is proposed to create 20 light industrial allotments, three new roads, a private right of way, and a pedestrian walkway. Two drainage reserves and a local purpose reserve are also proposed.

Refer Construction issue plans.

Site Location

The parent property (legally described as Pt Section 8 Blk VII Ruakaka SD & Section 41 Blk VII Ruakaka SD) is located between Port Marsden highway (SH 15) and Marsden Point Road near Ruakaka township. Port Marsden highway (SH 15) borders the north-western boundary, Marsden Point Road borders the eastern boundary and McEwan Road borders the north-eastern boundary.

The total property (including both titles) is sized at approximately 709,870 m² and is irregular in shape.

The Bream Bay coastline is approximately 1.1km to the east of the eastern property boundary.

The property is currently accessed via a driveway directly off Marsden Point Road to the east and another driveway from McEwan Road to the north.

Refer Construction issue plans.

Site Description

The central portion of the property is predominantly flat and low-lying with some raised undulating hills/mounds/dunes scattered around the eastern, northern, and western boundary areas.

The central low-lying area is generally below 5 m One Tree Point (OTP) datum, gradually falling towards the south-western property boundary to a minimum elevation of approximately 2 m OTP datum. The raised undulating hills/mound/dune areas are generally elevated above 5 m to a maximum of 19 m OTP datum.

The Stage 1 subdivision development is in the south-eastern corner of the parent property. The Stage 1 area coverage is presently in pasture and being used for grazing stock. Marsden Point Road borders the development area along the eastern boundary. An existing farm track runs north-south through the centre of the Stage 1 area.

The Stage 1 area generally consists of a moderately undulating area in the north-eastern / eastern portion of the development area which is elevated between 6 – 11 m above OTP. The remainder of the Stage 1 development area to the west and south-eastern corner is generally flat and low-lying, elevated between 3 – 6 m above OTP.

The extent of the site and the specific areas related to the earthworks are provided in the Construction issue plans.

1.2 SCOPE OF WORKS

Bulk Earthworks

The consented earthworks are required for the site development (that partially lies within a flood susceptible area), to create; building platforms, access ways and stormwater attenuation ponds for the new Bream Bay business hub.

The purpose of the bulk earthworks is the removal of unsuitable in-situ materials and filling with engineer approved compacted fill material to the specified design levels.

Initially, approximately 39,140 cubic metres (m³) of excavation will be undertaken over an area of approximately 33,700 square metres (m²) within a constructed wetland on the western property boundary to counter balance the flood displacement that will result from the placement of fill material at the business hub site.

The excavation of the wetland will be followed by works within the business hub site which will first involve the stripping of approximately 80,600 m³ of peat and other unsuitable material.

This will be followed by 33,800 m³ of cut and 144,680 m³ of fill earthworks including importation of an additional 80,600 m³ cubic metres of fill to replace the unsuitable material.

These works will occur over an area of approximately 130,800 m².

Construction Documentation

In accordance with the earthworks consent, the location and nature of the earthworks shall be undertaken in general accordance with the Macroventures (now Vecta Ltd.) drawings titled:

- a) "FILLING WITHIN RIVER HAZARD ZONE 100 YEAR FLOOD EXTENT (RL4.19m)" DWG Number RC200, Revision B, dated 07/09/2021;
- b) "CUT TO COUNTER FLOOD DISPLACEMENT" DWG Number RC205, Revision B, dated 07/09/2021;
- c) "Bulk Earthworks Peat/Unsuitable Material Strip" DWG Number RC210, Revision B, dated 07/09/2021; and
- d) "Bulk Earthworks Cut To Fill" DWG Number RC215, Revision B, dated 07/09/2021.

Refer updated drawings; "Construction issue" plans.

In addition to the above, the development shall proceed in accordance with the following documents:

- i. TMC Consulting Engineers entitled "Preliminary Factual Geotechnical Report" reference S1660-JO4627 Rev 01 dated 2 September 2021;
- ii. TMC Consulting Engineers Subdivision Suitability Report" reference S1660- JO5009 dated 18 February 2022; and
- iii. TMC Consulting Engineers Letter Response ref S1660-J-05009 dated 12 May 2022.

1.3 CLIENT SUPPLIED & OTHER INFORMATION

In preparing this EEP, we have also reviewed and reference the following documentation:

Document Type	Reference
Resource Consent	Whangarei District Council (WDC): <i>Council Reference SD2200045 and PID165276, HKRS Holdings Ltd, 551 Marsden Point Road, Ruakaka</i> . Roger Quinton, Date: 2 June 2022
Resource Consent	Northland Regional Council (NRC): <i>Council Reference AUT.043297.01.01, HKRS Holdings Ltd, 551 Marsden Point Road, Ruakaka</i> . Paul Maxwell, Date: 24 January 2022
Construction Management Plan	Vecta Limited: <i>P0318-CMP BBBH-Stages 1A & 1, Construction Management Plan for Bream Bay Business Hub – Stages 1A & 1 Civil Works Construction (Bulk Earthworks)</i> . Aaron Parker, Date: 10 August 2022
Earthworks Plans	Macroventures Ltd. (07/09/2021 and as amended 10/08/22). HKRS Holdings Ltd Development of Bream Bay Business Hub – Stage 1 Resource Consent Engineering Plans, Civil Engineering – CONSTRUCTION ISSUE. Drawn: AP. Job Ref: P0318.
Preliminary Factual Geotechnical Report	TMC Consulting Engineers. (02/09/2021). <i>Preliminary Factual Geotechnical Report, 551 Marsden Point Rd, Ruakaka</i> . Job Reference: S1660-J05009 Rev 01.
Subdivision Suitability Report	TMC Consulting Engineers. (19/02/2022). <i>Geotechnical Investigation and Assessment Report for a Proposed 21 Lot Subdivision – Bream Bay Business Hub Stage 1, at: Pt Section 8 Blk VII Ruakaka SD, 551 Marsden Point Road, Ruakaka</i> . Job Reference: S1660-J04627 Rev 01.
Letter	TMC Consulting Engineers. Letter Response ref S1660-J-05009 dated 12 May 2022.
Engineering Standards	Whangārei District Council Environmental Engineering Standards 2010 Edition
New Zealand Standard	NZS 4431:1989. <i>Code of Practice for earth fill for residential development</i> .
Test Reports	Geocivil Whangarei Laboratory, dated: 10/03/2020, 7/10/2020 and 21/10/2020

This EEP must be read in conjunction with the above documentation and is based solely on our fieldwork investigations and the supplied / 3rd party available information to TMC at the time of report writing. TMC cannot warrant the accuracy, validity, etc. of any of the supplied / 3rd party available information.

1.4 DEFINITIONS & RESPONSIBILITIES

In regard to these bulk earthworks, in addition to the definitions provided in NZS 4431:1989 Code of Practice for earth fill for residential development, construction stakeholders and key staff are as follows:

HKRS Holdings Ltd.	Client / Consent holder / Earthworks
Contracts Manager – Karl Hansen (Hansen Drainage & Earthworks) 027 432 7877 karl@hansende.co.nz Project Manager/Site Supervisor – Richard Hansen (Hansen Drainage & Earthworks) 027 432 7879 richard@hansende.co.nz	
Vecta Ltd.	Client's land development Advisor and Surveyor
Client's Engineering Representative – Aaron Parker 021 226 9399 aaron.parker@vecta.co.nz	
TMC Consulting Engineers Ltd.	Construction Inspections, Testing and Advice
Inspecting Engineer / Manager – David Taylor david@tmcengineers.co.nz Overseeing Engineer – Gareth Cottrell gareth@tmcengineers.co.nz	

Refer also: Construction Management Plan, that with regard to these Bulk earthworks provides applicable construction management information as follows:

- Project plan
- Erosion & sediment control
- Equipment onsite
- Health & safety and traffic management
- Hours of work
- Insurances
- Acid sulphates
- Dust control
- Complaints procedure
- Contaminant spillage
- Onsite monitoring
- Contingency provisions

2. SITE INVESTIGATION

2.1 SITE INVESTIGATIONS

For the purposes of this EEP, the following summary information is provided.

Site Investigations

Previous site investigations and reporting as follows:

- A preliminary factual geotechnical report was prepared by TMC Consulting Engineers. (02/09/2021) Job Reference: S1660-J04627 Rev 01. ; and
- A Subdivision Suitability Report was prepared by TMC Consulting Engineers. (19/02/2022) Job Reference: S1660-J05009 Rev 01.

In summary as follows:

Geology

Local geology at the Stage 1 site is shown and described on the GNS Science New Zealand Geology Web Map, Scale 1:250,000, as being of two groups, summarily described as below;

- Tauranga Group (Q1a): Unconsolidated to poorly consolidated mud, sand, gravel and peat deposits of alluvial, colluvial and lacustrine origins, present throughout the western and southern low-lying areas of the development site.
- Karioitahi Group (Q1d): Loose to poorly consolidated sand in fixed parabolic and local transverse dunes; minor sand, mud and peat in interdune deposits, present in the raised hills/mounds around the northern and eastern development areas.

The soils map of the area indicates that the development site is within an area of Marsden sand (MD) + Ruakaka peaty sandy loam (RK). Sutherland, C. F.; Cox, J. E.; Taylor, N. H.; Wright, A. C. S. 1981: Soil map of Hukerenui-Whangarei area (sheets Q06/07, R06/07), North Island, New Zealand. Scale 1:100,000 *N.Z. Soil Bureau Map 187*.

Groundwater

Groundwater levels were as follows:

- generally shallower (between 0.4 – 1.0 m bgl) in the low-lying areas, i.e., generally within the Tauranga Group (Q1a) geology, and
- deeper (estimated as being >4.0m bgl) in the elevated dune areas, typically associated with the Karioitahi Group (Q1d) geology.

2.2 SITE SOILS ENCOUNTERED

The Borehole (BH) and Test Pit (TP) investigations undertaken encountered loose to dense SAND with up to 1.5m of Sandy PEAT / PEAT / Peaty TOPSOIL overlying in the low-lying areas of the development, within the Tauranga Group (Q1a) Geology.

Based on SBT inferences, the deeper CPT investigations generally encountered Silty SAND & Sandy SILT, SAND, SAND & Silty SAND with up to approximately 1.5m of 'Soft CLAY / ORGANIC SOIL' overlying. Some isolated interbedded layers of CLAY & Silty CLAY were also identified at depth within some CPTs.

The natural subsurface conditions encountered by all intrusive methods during the investigations are considered to be both generally consistent with the published geological information, and across the investigative methods.

3. **EARTHWORKS FILL MATERIAL AND SPECIFICATION**

3.1 **SOURCE MATERIAL TYPE**

The Client / consent holder currently operates a sand quarry on the property. It is proposed to use selected materials from this source, and another local borrow site at Sime Road (Windblown SAND as below), as fill for the bulk earthworks.

Laboratory test reports for these materials have been provided as follows: Geocivil Whangarei Laboratory, dated: 10/03/2020, 7/10/2020 and 21/10/2020, and are attached in the appendices.

Source samples have been tested in accordance with NZS 4402:1986 Test 2.8.1; *'Determination of the particle size distribution- wet sieving method'*.

A summary of these tests Tabulated as follows:

Test report	Sample No. / Ref	Classification and Description
W20-132 issued 13/03/2020	1	SAND, fine to medium, some gravel, minor silt
	2	SAND, fine to medium, some silt
	3	SAND, fine to medium, traces of silt
	4	SAND, fine to medium, traces of silt
Prelim 7/10/2020	Windblown	SAND, moist, brown
	Road Mill	SAND, moist, brown
	Onsite stockpile	SAND, moist, brown
W20-839 issued 21/10/2020	Windblown	SAND, fine to medium,moist, pale grey
	Road Mill	SAND, fine to medium,moist, pale grey
	Onsite stockpile	SAND, fine to medium,moist, pale grey

From the above and discussions with the Client the SAND sourced on site is encountered as two types; Windblown SAND from the elevated dune areas, and as SAND with some silt content when excavated from deeper sources.

The site filling construction methodology has been designed accordingly for these materials.

3.2 EARTHWORKS SPECIFICATION

General

Earthworks will be undertaken in general accordance with NZS 4431:1989 and the specification.

Refer also; Section 5, 'Quality Assurance' for the; Inspection, Sampling and Testing requirements, etc.

For the bulk earthworks, the following specification for the fill materials is provided.

Source

The fill material shall be sourced as proposed and identified in Section 3.1 above. Other sand type materials may be used as and if required (including from external sources), subject to the approval of the Overseeing Engineer or their Agent, who is familiar with both this site and the contents of this EEP.

Soil Type

The fill materials shall be identifiable as a soil type whose general properties have been determined and confirmed by testing as described in Section 3.1.

The materials shall be free of any vegetable matter or other deleterious material.

Bulk materials will be visually inspected at both the source site(s) and at the fill placement area to ensure compliance. On the bulk earthworks site, any non-conforming materials identified shall be removed from the construction area and replaced with compliant fill to the approval of the Inspecting Engineer.

Water content

Due to the free draining nature of the fill materials it is unlikely that sourced materials will have an excessive moisture content. However this will be monitored by visual inspection throughout the works at both the source site(s) and at the fill placement area to ensure compliance. Replacement of any non-conforming materials shall be as detailed previously.

Similar procedures and care will apply when the windblown sand is being used to reduce exposure of the materials and ensure that they are not lost from the construction site during inclement weather conditions. Refer also, Section 4.2 Earthworks Construction.

Proof Rolling Trial Panel and Compaction

Compaction trials of each sand type placed shall be carried out and will be used to determine the number of compaction rolls required to compact to the required standard and Scala relationship for that material.

The trial shall comprise the spreading and compaction of a minimum of three layers of sand and Scala testing of the 3 layers combined, maximum layer thickness before compaction 0.9 m. Minimum trial pad dimensions; 3m x 10m, or as directed by the Engineer.

Scala results are to be provided to the Engineer with a plan showing location and depth below finished level of layers being tested and the testing dates.

Compaction shall be achieved by rolling with appropriate compaction plant of types to be determined and approved by the Inspecting Engineer, subsequent to the successful completion of proof rolling tests.

Following the completion of satisfactory proof rolling tests, the placed, compacted and tested fill materials may be incorporated into the works subject to the approval of the Inspecting Engineer

A proof roll shall be carried out at the final surface of the bulk earthworks before placement of any subdivision topsoils, etc., but after successful scala testing of the layer below has been completed.

Any yielding or otherwise unsatisfactory areas of the earthworks which become evident during such testing shall be treated in accordance with the Engineer's instructions

The number and type of plant required for processing, conditioning and compacting found to be required and the methodology agreed as a result of the trials may not subsequently be changed without the prior approval of the Engineer.

Fill Layer Thickness

The thickness of each layer shall be limited to ensure that the bottom of each layer is adequately compacted. Based on the specified fill materials and discussions with the Client, it is anticipated that the thickness of each layer of fill before compaction shall be of the order of 0.3 m. Confirmation of this layer thickness will be determined during the proof rolling tests, and the approval of the Inspecting Engineer.

Fill layer thickness may be increased, all being subject to additional proof rolling tests, to the satisfaction of the Engineer, that the specified compaction is obtained with thicker layers.

Compaction Criteria

Compaction criteria and testing requirements for the placed fill materials are detailed in Section 5.4.

4. ENGINEERED EARTHWORKS: CONSTRUCTION METHODOLOGY

4.1 GENERAL

A copy of the approved engineering plans and a copy of the resource consent conditions, Inspection and Test Plan, approved corridor access request and the above letter are to be held onsite at all times during construction. All personnel working on the site shall be made aware of and have access to the resource consent and accompanying documentation.

The consented earthworks are required for the site development (that partially lies within a flood susceptible area), to create; building platforms, access ways and stormwater attenuation ponds for the new Bream Bay business hub.

The purpose of the bulk earthworks is the removal of unsuitable in-situ materials and filling with engineer approved compacted fill material to the specified design levels and profiles.

Planning the Earthworks

A pre start meeting is required to be undertaken with the consent holder's representative, contractor(s) or agents for the consent holder and the Development Engineer prior to any works being undertaken on the site to the satisfaction of the Development Engineer or delegated representative.

Earthfill operations should be planned to be carried out in a systematic manner, where areas of cut and fill are clearly identified and confirmed before that work commences.

It is anticipated that the Client and the Inspecting Engineer will meet at the commencement of each working day to confirm areas of working and areas to be inspected and tested, etc. These areas will be identified on a shared site plan that will be developed throughout as the work progresses to completion, and thereafter the finalisation of the 'as built' plans,

Site Preparation, Protection and Temporary Works

See Section 1.3, 'Client Supplied & Other Information', "*Construction Management Plan*".

Bulk Earthworks Methodology

In summary the proposed bulk earthworks will consist of the following operations:

- Excavation and removal of unsuitable materials; and
- Placement and compaction of the fill materials, together with final shaping to the specified design levels.

The methodology for each of these earthworks operations is explained below.

4.2 EARTHWORKS CONSTRUCTION

EXCAVATION AND REMOVAL OF UNSUITABLE MATERIALS

Initially 39,140 cubic metres (m³) of excavation will be undertaken over an area of 33,700 square metres (m²) within a constructed wetland boundary to counter balance the flood displacement that will result from the placement of fill material at the business hub site.

Thereafter, the works comprise the stripping and removal of approximately 80,000 m³ of peat and other unsuitable material from the business hub site.

Plant utilised for this earthworks operation likely to comprise 360° tracked excavators, bulldozers and dumptrucks.

The peat type, etc. materials stripped from these work areas during these excavation operations will be removed to be stockpiled separately for disposal and / or re-use as appropriate within the property. After satisfactory peat, etc. stripping from the earthworks construction site, the placement of these materials elsewhere is outwith the workscope of this EEP.

Stripping cut levels are shown on the drawings attached.

It is important to remove the entire layer of unsuitable material.

Undercut site to be surveyed once TMC have confirmed unsuitables are stripped.

Inspection requirements for the stripping of these materials are detailed in Section 5.4.

PLACEMENT AND COMPACTION OF THE FILL MATERIALS

144,680 m³ of fill earthworks including importation of an additional 80,600 m³ cubic metres of fill to replace the unsuitable materials.

Plant: On site excavation using tracked excavators, with the won fill loaded to dump trucks for haul to the filling areas.

Placement of Fill

Shallow groundwater in areas of the property. In the water affected zone, the first maximum of 1m of fill to replace the unsuitable material can be placed in one layer and spread evenly and compacted as conditions allow.

At depth, it is anticipated that the fill to be utilised will be from the Windblown SAND source.

As some of the placed sand fill will be below water level, there is possibility of liquefaction caused by rollers. The Client / Consent holder should seek to avoid any liquefaction by his choice of compaction equipment and its method of operation regarding when vibrations of rollers is used.

No vibration compaction is allowed on the first layer of fill. No testing will be required for this layer until sufficient layers have been placed above to enable confinement and secondary indirect compaction from over lying layers.

Visual inspection at the surface of this layer shall be carried out to ensure settlement similar to placement of hydraulic fill has occurred before placement of overlying layers. The Client / Consent holder shall dewater as necessary to control the water level in the excavation so that good compaction is achieved. A proof rolling test may be ordered by the Engineer.

Plant utilised for this stage likely to comprise 360° tracked excavators, dumptrucks, bulldozers and compaction equipment.

Bulk Fill Compaction

Once out of the water affected zone, fill lifts to be reduced to the anticipated 0.3 m. Vibrations and a higher standard of compactive effort can be applied directly to each lift.

Plant as above.

Construction site Drainage and Pumping

The Client / Consent holder is responsible for staging works and managing the drainage and any pumping of the site that may be required.

Shaping

Trim and compact the fill to design geometry and final level.

Plant likely to comprise 360° tracked excavators, dumptrucks, bulldozers and compaction equipment.

5. CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

5.1 GENERAL

This CQA Plan provides: the administration, inspection, testing and reworking procedures for the bulk earthworks, being necessary to achieve the requirements of the earthworks design, specification and filling construction together with NZS 4431:1989. *Code of Practice for earth fill for residential development*.

Qualifications of the Engineer and accreditations of the testing laboratory are also provided.

5.2 ADMINISTRATION, REPORTING AND RECORDS

Operation of CQA Plan

The Inspecting Engineer shall in conjunction with the Client / Consent holder monitor the materials, workmanship and procedures used in the works in accordance with the CQA Plan.

The Client / Consent holder shall undertake quality control and assurance activities and shall supply any necessary results, etc. to the Engineer, in accordance with this EE Plan

Formal Site Meetings

As a minimum, formal site meetings shall be held at monthly intervals, presided over and minuted by the Engineer, or their Agent. Attendees to (in general), include representatives from the following:

- | | |
|---------------------------------|--|
| • HKRS Holdings Ltd. | Client / Consent holder / Earthworks |
| • Vecta Ltd. | Client's land development Advisor and Surveyor |
| • TMC Consulting Engineers Ltd. | CQA: Inspections, Testing and Advice |

The Client shall provide suitable facilities for the holding of such meetings.

Additional meetings may be required from time to time. These shall be arranged at the discretion of the CQA Engineer.

Daily Records

The Inspecting Engineer will keep a daily record that shall include;

- details of the areas worked and inspected;
- the locations, details and results of earthworks testing;
- details of any non-conformances identified; and
- a record of the Engineers instructions / advice for any remedial work, etc. to achieve conformance.

Weekly Records

The Client / Consent holder shall complete a weekly diary record covering activities relating to the previous week, detailing; all work carried out including plant and manpower hours, subcontractors, and records of any works ordered by the CQA Engineer.

Copies of these diary records shall be made available to the CQA Engineer. Such diary records shall be submitted to the CQA Engineer at the beginning of the following week. The format of such records shall be prepared and approved by the Engineer before work commences on site.

Monthly Reports

Monthly progress reports shall be prepared by the Client / Consent holder and submitted to the CQA Engineer. Reports shall be submitted monthly thereafter, each within 5 days after the last day of the period to which it relates. Reporting shall continue until the Client / Consent holder has completed all work comprising the bulk earthworks. The report shall include:

- Detailed descriptions of progress; cut / filling activities, areas worked and dates. Mark up on drawings of progress and proposed next work area.
- Photographs showing the status of construction and progress on the site.
- Details of records of the Contractor's personnel and plant for the above.
- Any problems encountered during construction at the site, records and details of any reworking undertaken.

Overseeing Engineer

In accordance with the consent, the Engineer shall be a suitably qualified Chartered Professional Geotechnical Engineer (CPEng) who is familiar with both this site and the contents of this EEP.

Survey Information

Setting out shall be as shown on the plans. All elevations shall be in terms of chart datum (CD). Set-out to be undertaken and confirmed by a suitably experienced surveyor in writing. Any boundary peg or survey mark disturbed by the Works shall be relocated by a Registered Surveyor.

As-built Information and Plans

The Contractor shall be responsible for supplying sufficient information regarding the date, location, volume and source of fill placed within the site to enable the Clients Surveyor to prepare as-built plans and records.

As-built drawings will be prepared by the Clients Surveyor in accordance with the requirements described in Section 6.1.

The as-built information shall be certified by a suitably qualified person approved by the Engineer and shall be delivered to the Engineer for review prior to the issuing the Earthworks Completion Report.

5.3 INSPECTIONS

The Engineer will undertake regular daily inspections of the ongoing works in accordance with this EEP and the CQA Plans for the duration of the bulk earthworks.

Should an inspection find evidence of non-conforming materials or workmanship, or results at variance with the CQA plan, the non-conformance will be noted and communicated back to the Client / Consent holder with the Engineers requirements for any remedial work, etc. to achieve conformance.

5.4 TESTING AND SAMPLING

Testing

Scala Testing

The Scala tests shall be in accordance with NZS 4402:1986, Test 6.5.2.

Scala results are to be provided to the Engineer with a plan showing location and depth below finished level of layers being tested, the date and if the test is a result of any rework.

The Scala shall be used in the first instance to test the compacted fill and shall provide strengths equal to or above the requirements in the Table below.

Scala's to be carried out on the trial pad to a minimum depth of 600mm from the compacted surface. The first 200mm to be ignored as it will be likely be disturbed.

Scala testing requirements for the compacted sand fill are detailed in the following Table.

PROOF ROLLING TRIAL PANELS		
Frequency	Maximum layer thickness (before compaction)	Scala blows per 100 mm
Minimum compaction trials of each sand type. 1 trial per 10,000m ³ , or as instructed by the Engineer.	0.9 m Minimum trial pad dimensions; 3m x 10m, or as directed by the Engineer.	Average 5 blows
BULK EARTHWORKS: COMPACTED FILL		
Frequency	Fill level above / below groundwater	Scala blows per 100 mm equal or greater
Not required	Below groundwater	N/A
Upon filling commencement above groundwater 1 scala test per 20 m grid. This requirement may be lessened for further filling, depending on results, and subject to Engineer approval.	Up to a maximum 1.0 m above groundwater	Average 4 blows, first 0.3 m above groundwater. Thereafter, average 5 blows
	Subsequent maximum 1.0 m fill lifts	Average 5 blows
	Final fill layer, maximum 1.0 m lift	Average 5 blows

Scala testing requirements for the compacted sand fill

Plate Testing

For additional testing surety, it is proposed that a third-party accredited contractor will undertake plate testing when the final fill layer has been placed and compacted. The testing results shall be provided to both the Engineer and the Client / consent holder for review, etc., and incorporation in the Earthworks Completion Report.

Sampling

The Client / Consent holder shall give the Engineer the option of being present when any sampling of materials for subsequent testing is undertaken.

In addition, the Engineer may also arrange or undertake random or targeted verification sampling and testing using the nominated IANZ accredited laboratory.

The object of testing by the nominated IANZ laboratory is to indicate to the Client / Consent holder and the Engineer whether the materials and workmanship complies with the fill specification requirements.

Independent Laboratory

Where sampling and/or testing is required to be performed by an IANZ registered laboratory, the laboratory shall be registered with International Accreditation New Zealand (IANZ) for the relevant test.

6. FINAL DOCUMENTATION

With regard to the bulk earthworks described above;

6.1 AS BUILT SURVEY AND PLANS

In accordance with the conditions of the WDC consent, the consent holder must submit a certified and dated 'Asbuilt' plan of completed works and services in accordance with Council's Environmental Engineering Standards 2010 Edition. This condition shall be deemed satisfied once the as built have been approved by Councils' Development Engineer or delegated representative.

In accordance with the Whangārei District Council Environmental Engineering Standards 2010, a set of drawings and a schedule of asset information shall be submitted as per Section 1.11.1 of this standard. These shall clearly and accurately show the as-built locations and details of all reserves infrastructure provided as part of the work, including any modifications made to existing systems.

As-built drawings may be checked on site for accuracy on completion of the subdivision or development. A certificate of completion for the works will not be issued until acceptable as-built drawings have been produced. The drawings shall identify assets that have been removed or decommissioned.

6.2 EARTHWORKS COMPLETION REPORT

In accordance with the conditions of the WDC consent, a Geotechnical / Earthworks Completion Report is to be provided following earthworks confirming the suitability of earth fills in terms of NZS4431:1989, the suitability of land areas for building development and foundation design requirements.

The report will include collation of all testing and all other relevant quality records, to include any non-conformances and rectification thereof.

A robust liquefaction assessment shall be undertaken as part of the Geotechnical / Earthworks Completion Report. Appropriate geotechnical foundation design recommendations shall be provided in the Geotechnical Completion Report based on an assessment of the liquefaction assessment results. A matrix / Table of geotechnical recommendations for each new lot will be included.

6.3 EARTHWORKS CERTIFICATION

Following completion of the earthworks, the consent holder must submit for approval a completed 'statement of professional opinion as to suitability of land for building development' (form EES-PO1) including a detailed site plan of any areas of or ground stabilisation, cut or fill, from a Chartered Professional Engineer.

Any site restrictions shall be included and confirmation that the land is suitable for building development, to the satisfaction of the Development Engineer or delegated representative. This Form EES PO1 (and associated reports, plans and similar) will be registered against the relevant titles via a consent notice.

APPENDICES

Table of Contents

Plans:
Construction issue plans
Lab Testing of Fill Materials:
Geocivil Whangarei Laboratory, dated: 10/03/2020
Geocivil Whangarei Laboratory, dated: 7/10/2020
Geocivil Whangarei Laboratory, dated: 21/10/2020

TEST REPORT

Lab Job No: 8292-002
Your ref.: -
Date of Issue: 21/10/2020
Date of Re-Issue: -
Page: 1 of 5

Test Report No.
W20-839

PROJECT: Sand Quarry - Grading Analysis
CLIENT: Hansens Drainage and Earthworks Ltd
62 Pyle Rd, One Tree Point Whangarei 0171
ATTENTION: Karl Hansen
TEST METHODS: Determination of the particle size distribution- wet sieving method
NZS 4402:1986 Test 2.8.1

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets

Alex Millar

A. Millar

Administrator

D. Krissansen

D. Krissansen

Approved Signatory



All tests reported
herein have been
performed in accordance
with the laboratory's
scope of accreditation

-CPT - Aggregates Testing - Soil Testing -

This report shall not be reproduced except in full, without written approval of the laboratory

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-002
Client: Hansen Earthworks
Location: Windblown
Date Received: 30/09/2020
Report No: W20-839
REF: -

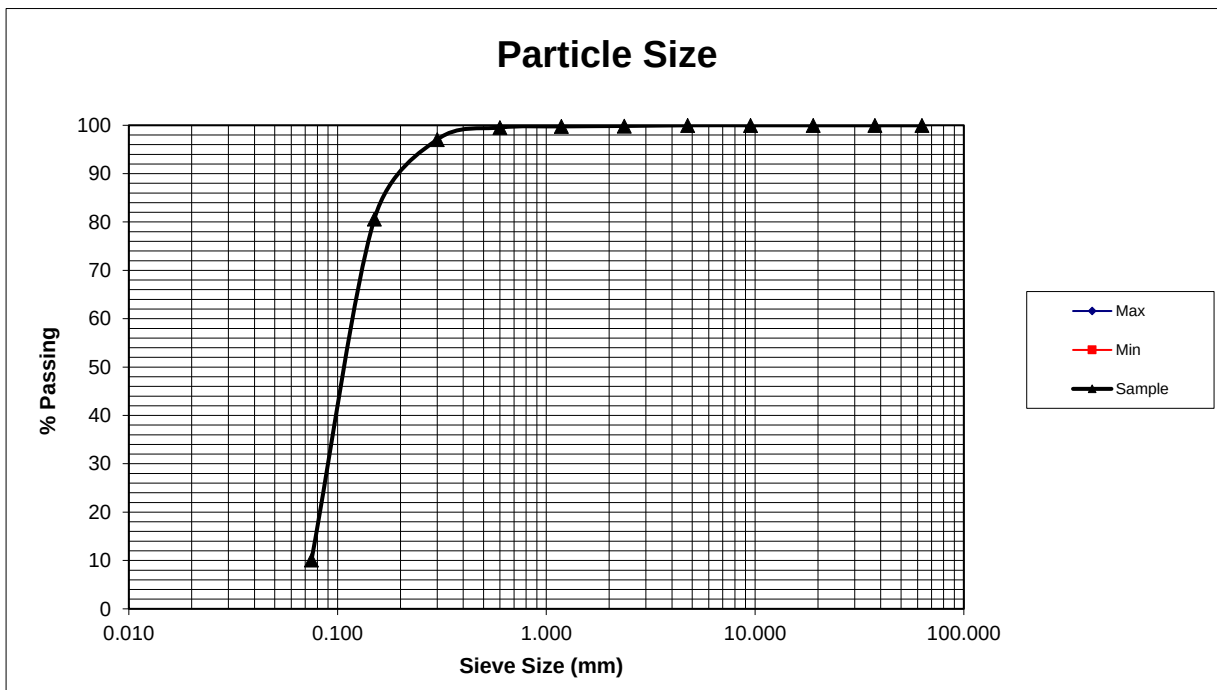
Sample No: 20-926
Tested By: N.K
Date: 7/10/2020
Checked By: A.M
Date: 21/10/2020
Page: 2 of 4

Sampling Method: Sampled by client – Sampling not accredited
Date Sampled: -
Sampled By: Client

Test Details:
History:

Description of Sample: SAND, fine to medium, moist, pale grey.

Sieve Size	% Passing		
	Max	Min	Sample
100	-	-	100
63			100
37.5			100
19			100
9.5			100
4.75			100
2.36			100
1.18			100
0.6			100
0.3			97
0.15			81
0.075			10



The percentage passing the finest sieve was obtained by difference

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-002
Client: Hansen Earthworks
Location: Road Mill
Road Mill
Date Received: 30/09/2020
Report No: W20-839
REF: -

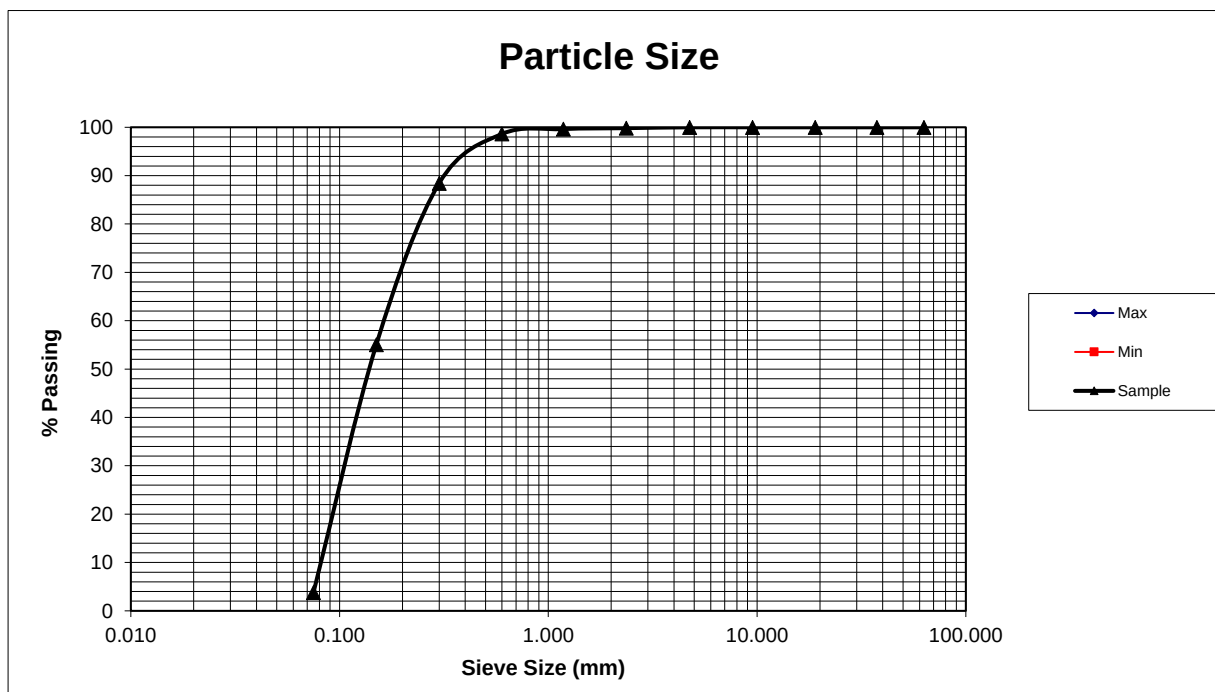
Sample No: 20-927
Tested By: N.K
Date: 7/10/2020
Checked By: A.M
Date: 21/10/2020
Page: 3 of 4

Sampling Method: Sampled by client – Sampling not accredited
Date Sampled: -
Sampled By: Client

Test Details:
History:

Description of Sample: SAND, fine to medium, moist, pale grey.

Sieve Size	% Passing		
	Max	Min	Sample
100	-	-	100
63			100
37.5			100
19			100
9.5			100
4.75			100
2.36			100
1.18			100
0.6			99
0.3			88
0.15			55
0.075			4



The percentage passing the finest sieve was obtained by difference

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-001
Client: Hansen Earthworks
Location: onsite stockpile
Onsite stockpile
Date Received: 30/09/2020
Report No: W20-839
REF: -

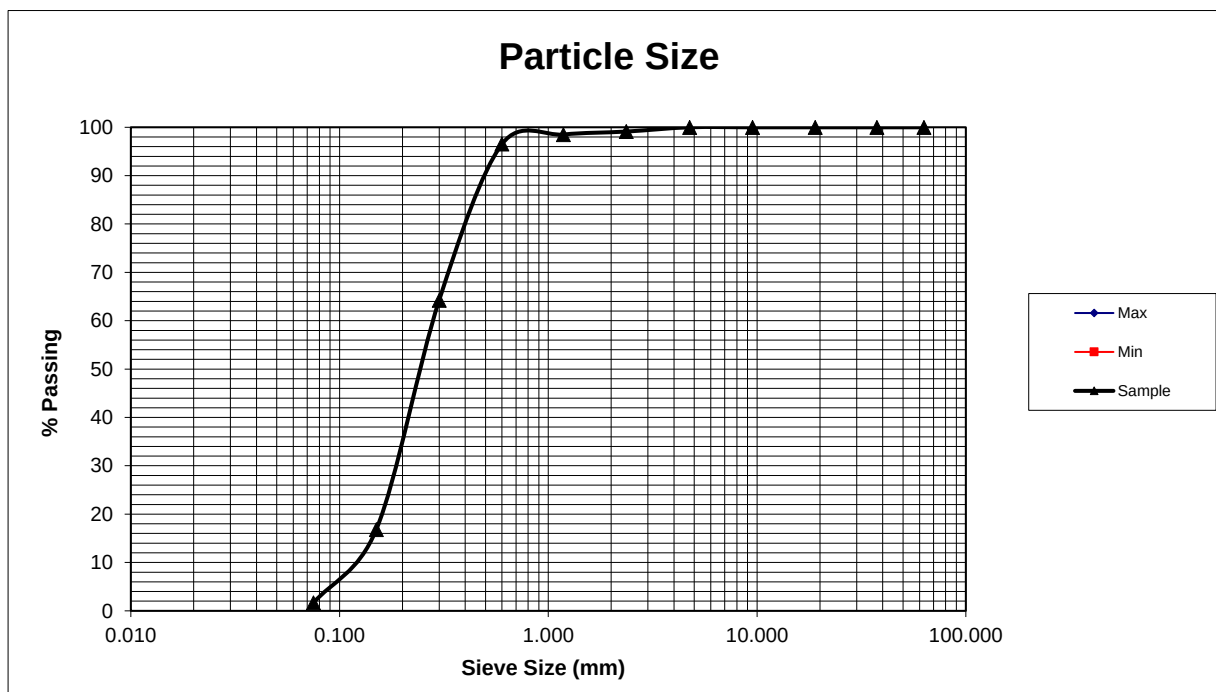
Sample No: 20-928
Tested By: N.K
Date: 7/10/2020
Checked By: A.M
Date: 21/10/2020
Page: 4 of 4

Sampling Method: Sampled by client – Sampling not accredited
Date Sampled: -
Sampled By: Client

Test Details:
History:

Description of Sample: SAND, fine to medium, moist, pale grey.

Sieve Size	% Passing		
	Max	Min	Sample
100	-	-	100
63			100
37.5			100
19			100
9.5			100
4.75			100
2.36			99
1.18			99
0.6			97
0.3			64
0.15			17
0.075			2



The percentage passing the finest sieve was obtained by difference

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-002
Client: Hansen Earthworks
Location: Windblown
Windblown

Sample No: 20-926
Tested By: N.K
Date: 7/10/2020

Date Received: -
Report No:
REF: -

Checked By:
Date:
Page:

Sampling Method: Sampled by client – Sampling not accredited
Date Sampled: -

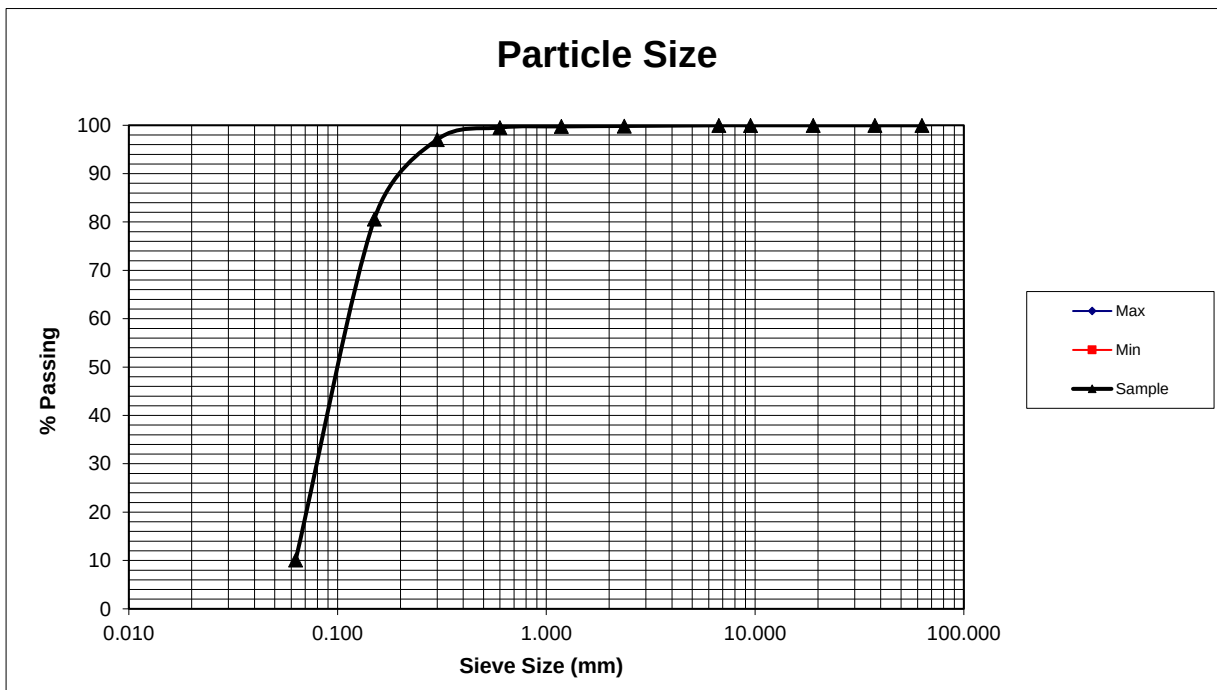
Sampled By: Client

Test Details:
History:

*All tests are
PRELIMINARY and
are subject to
change in
reported results*

Description of Sample: SAND, moist, brown

Sieve Size	% Passing		
	Max	Min	Sample
100	-	-	100
63			100
37.5			100
19			100
9.5			100
6.7			100
2.36			100
1.18			100
0.6			100
0.3			97
0.15			81
0.063			10



The percentage passing the finest sieve was obtained by difference

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-002
Client: Hansen Earthworks
Location: Road Mill
Road Mill

Sample No: 20-927
Tested By: N.K
Date: 7/10/2020

Date Received: -
Report No: -
REF: -

Checked By:
Date:
Page:

Sampling Method: Sampled by client – Sampling not accredited
Date Sampled: -

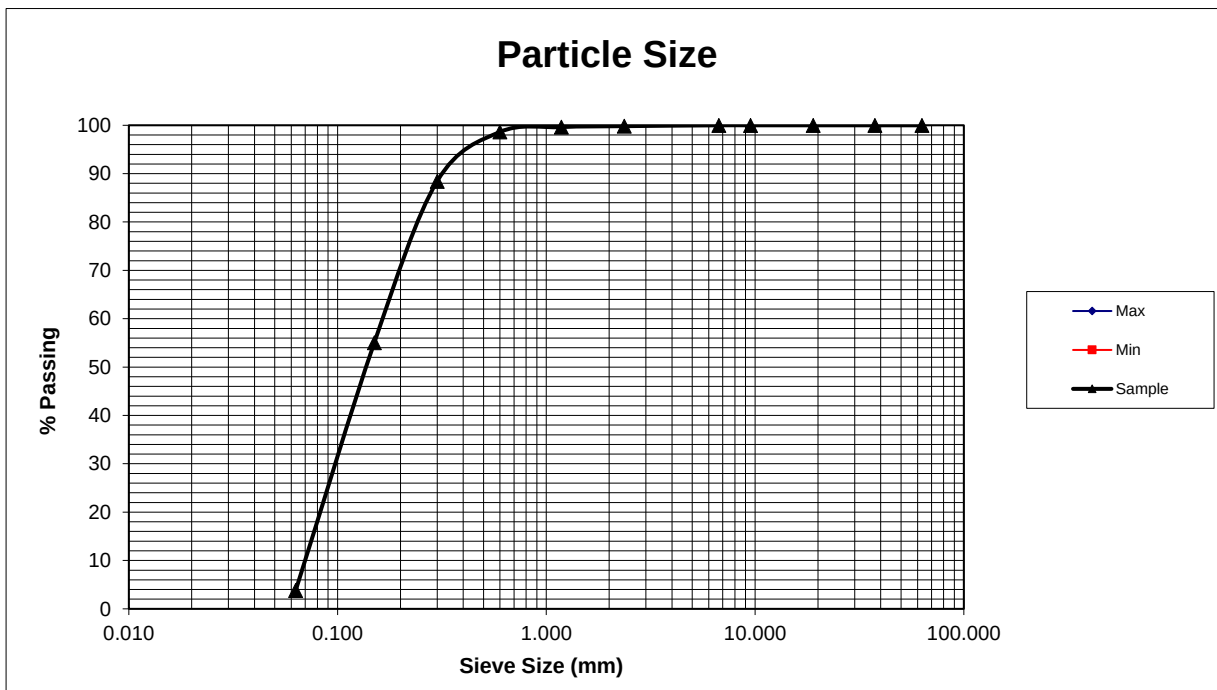
Sampled By: Client

Test Details:
History:

*All tests are
PRELIMINARY and
are subject to
change in
reported results*

Description of Sample: SAND, moist, brown

Sieve Size	% Passing		
	Max	Min	Sample
100	-	-	100
63			100
37.5			100
19			100
9.5			100
6.7			100
2.36			100
1.18			100
0.6			99
0.3			88
0.15			55
0.063			4



The percentage passing the finest sieve was obtained by difference

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-001
Client: Hansen Earthworks
Location: onsite stockpile
Onsite stockpile

Sample No: 20-928
Tested By: N.K
Date: 7/10/2020

Date Received: -
Report No: -
REF: -

Checked By:
Date:
Page:

Sampling Method: Sampled by client – Sampling not accredited
Date Sampled: -

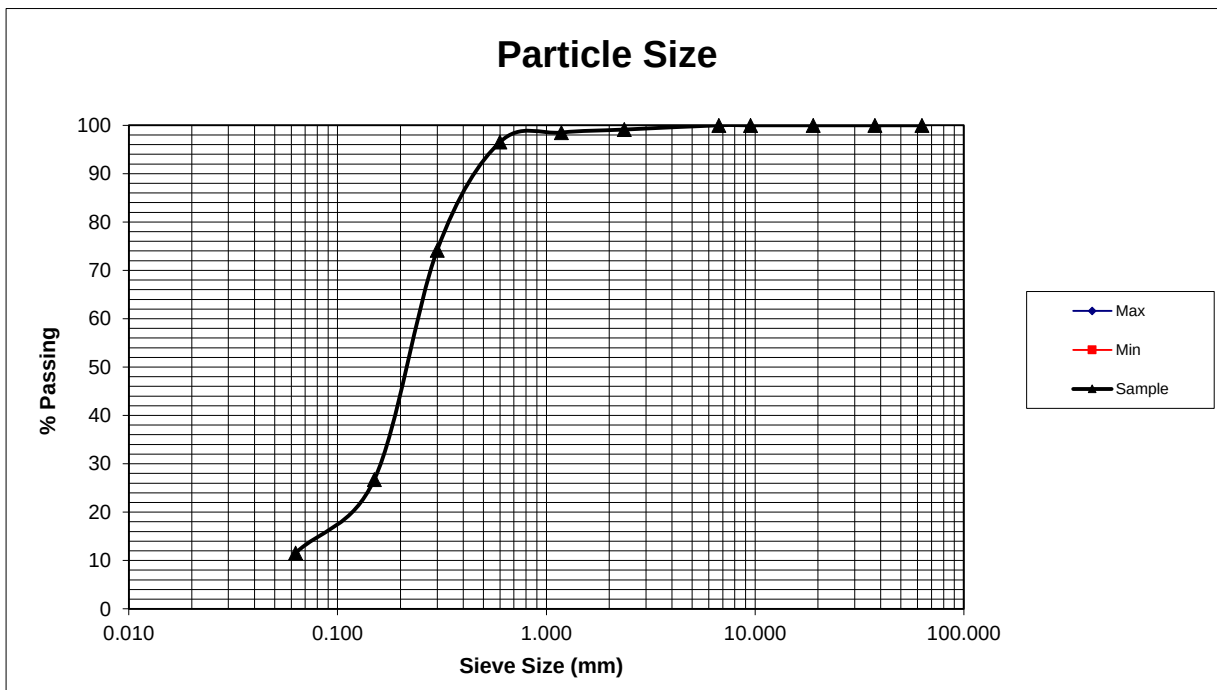
Sampled By: Client

Test Details:
History:

*All tests are
PRELIMINARY and
are subject to
change in
reported results*

Description of Sample: SAND, moist, brown

Sieve Size	% Passing		
	Max	Min	Sample
100	-	-	100
63			100
37.5			100
19			100
9.5			100
6.7			100
2.36			99
1.18			99
0.6			97
0.3			74
0.15			27
0.063			12



The percentage passing the finest sieve was obtained by difference

TEST REPORT

Lab Job No: 8292-002
Your ref.: -
Date of Issue: 13/03/2020
Date of Re-Issue: -
Page: 1 of 5

Test Report No.
W20-132

PROJECT: Hansen DE, Sand PSD
CLIENT: Hansens Drainage and Earthworks Ltd
62 Pyle Rd, One Tree Point Whangarei 0171
ATTENTION: Karl Hansen
TEST METHODS: Determination of the particle size distribution- wet sieving method
NZS 4402:1986 Test 2.8.1

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets


G. Breckon

Laboratory Technician


D. Krissansen

Approved Signatory



All tests reported
herein have been
performed in accordance
with the laboratory's
scope of accreditation

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

Determination of fines content of soil

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-002
Client: Hansen DE
Location: -
Date Received: DS
Report No: W20-132
REF: sample 1, DS

Sample No: 20-187
Tested By: F.C. / N.K.
Date: 3/03/2020
Checked By: G.B
Date: 11/03/2020
Page: 2 of 5

Sampling Method: Unknown
Date Sampled: unknown

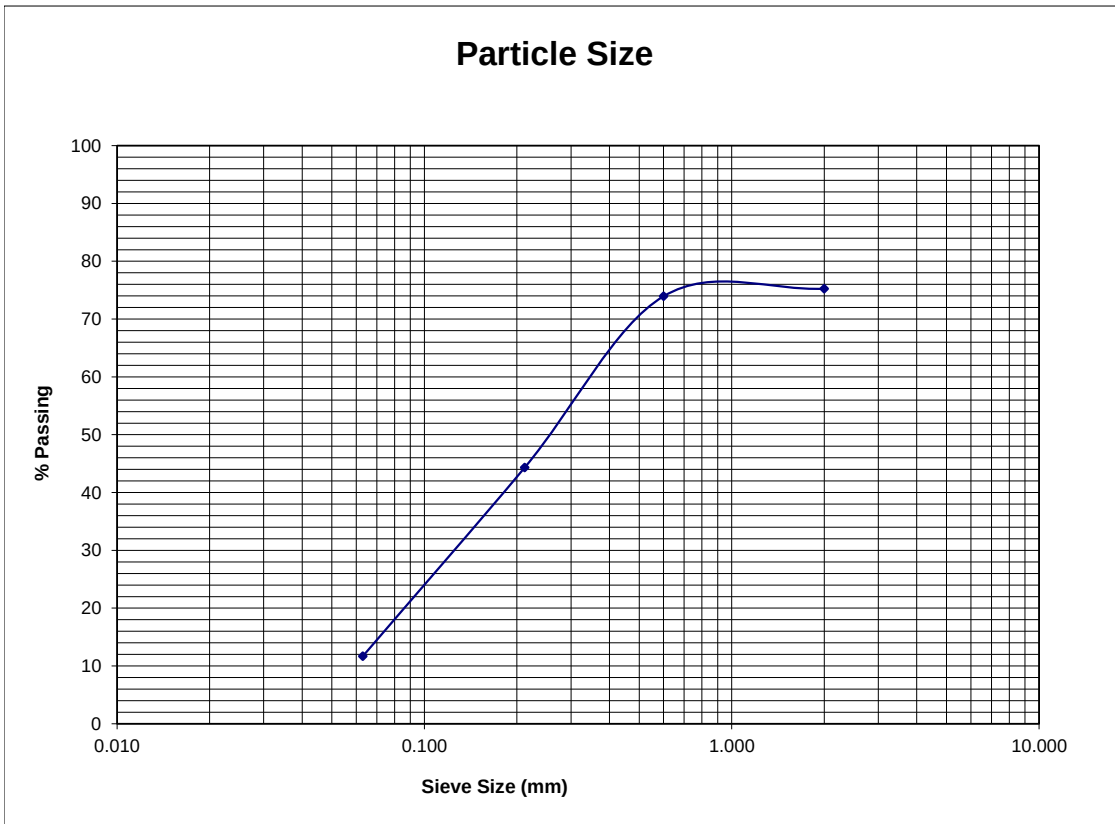
Sampled By: Client

Test Details: Wet sieving method
History: Natural state

Description of Sample: SAND, fine to medium, some gravel, minor silt

	% Passing
Sieve Size	Sample
2.00	75
0.600	74
0.212	44
0.063	12

*Shells, gravels and organics



The percentage passing the finest sieve was obtained by difference

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

Determination of fines content of soil

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-002
Client: Hansen DE
Location: -
Date Received: 2/03/2020
Report No: W20-132
REF: sample 2, DSC

Sample No: 20-188
Tested By: F.C. / N.K.
Date: 3/03/2020
Checked By: G.B
Date: 11/03/2020
Page: 3 of 5

Sampling Method: Unknown
Date Sampled: unknown

Sampled By: Client

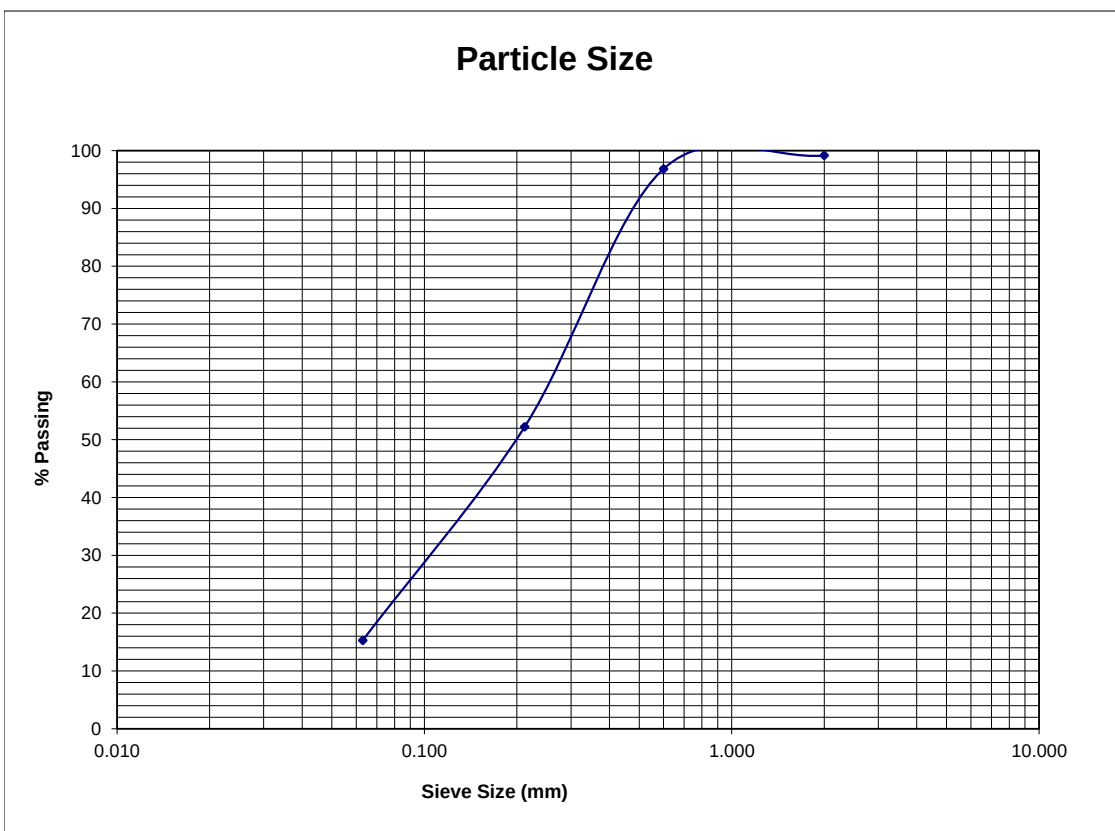
Test Details: Wet sieving method
History: Natural state

Description of Sample: SAND, fine to medium, some silt

Sieve Size	% Passing Sample
2.00	99
0.600	97
0.212	52
0.063	15

*Gravels and organics

*Gravels and organics



The percentage passing the finest sieve was obtained by difference

D.Krissansen

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

Determination of fines content of soil

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-002
Client: Hansen DE
Location: -
Date Received: PS
Report No: W20-132
REF: sample 3, PS

Sample No: 20-189
Tested By: F.C.
Date: 3/03/2020
Checked By: G.B.
Date: 11/03/2020
Page: 4 of 5

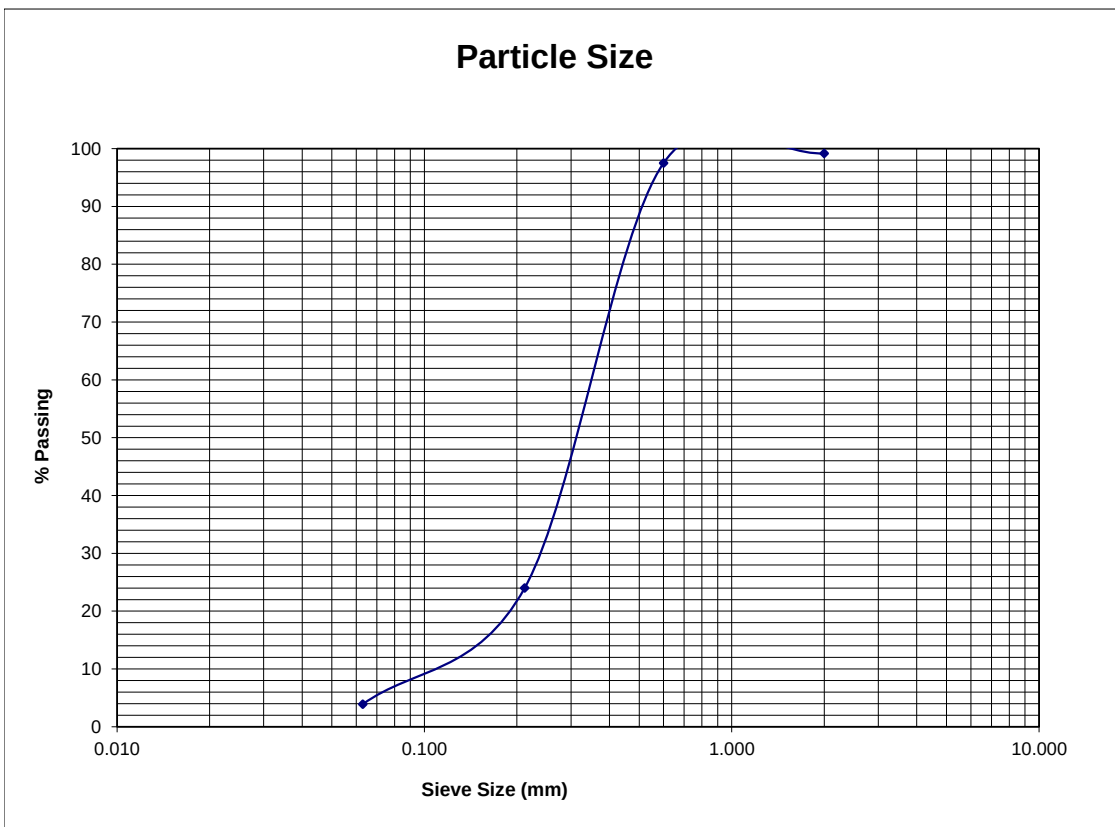
Sampling Method: Unknown
Date Sampled: unknown

Sampled By: Client

Test Details: Wet sieving method
History: Natural state

Description of Sample: SAND, fine to medium, traces of silt

Sieve Size	% Passing Sample
2.00	99
0.600	98
0.212	24
0.063	4



The percentage passing the finest sieve was obtained by difference

DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

Determination of fines content of soil

NZS 4402:1986 Test 2.8.1

Lab Job No: 8292-002
Client: Hansen DE
Location: -
Date Received: 2/03/2020
Report No: W20-132
REF: sample 4, PSC

Sample No: 20-190
Tested By: F.C.
Date: 3/03/2020
Checked By: G.B.
Date: 11/03/2020
Page: 5 of 5

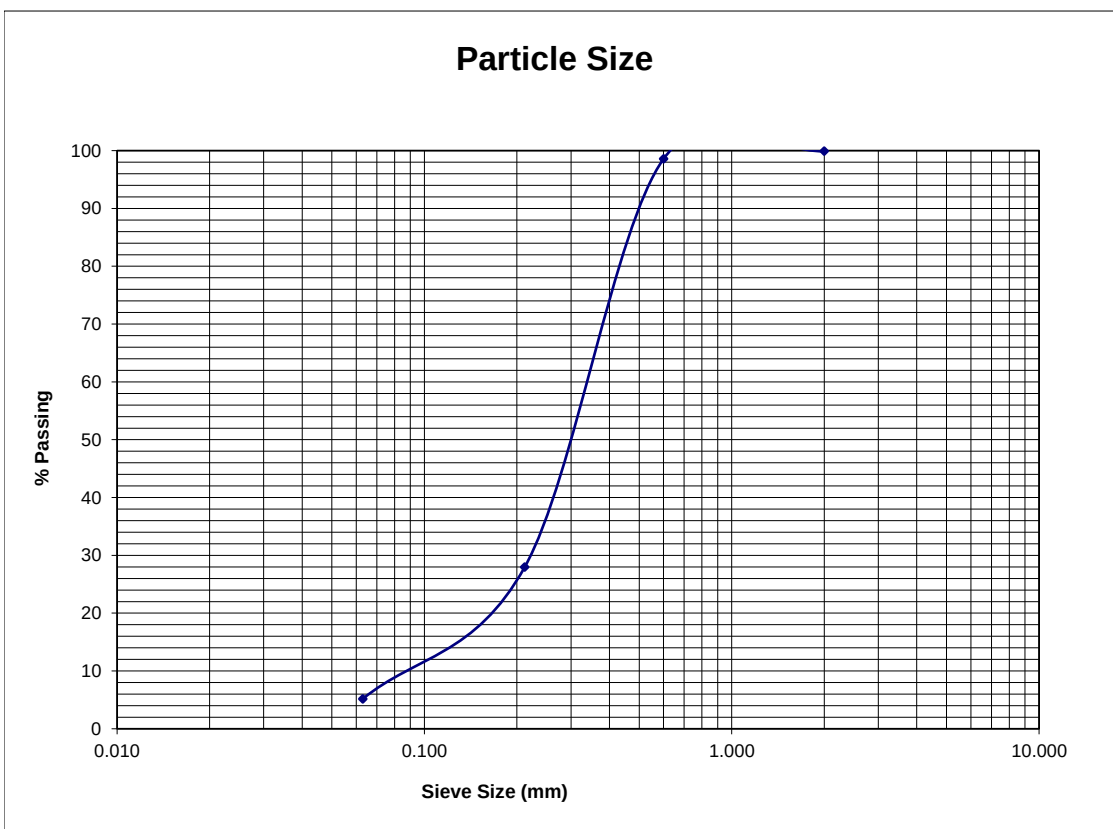
Sampling Method: Unknown
Date Sampled: unknown

Sampled By: Client

Test Details: Wet sieving method
History: Natural state

Description of Sample: SAND, fine to medium, traces of silt

Sieve Size	% Passing Sample
2.00	100
0.600	99
0.212	28
0.063	5



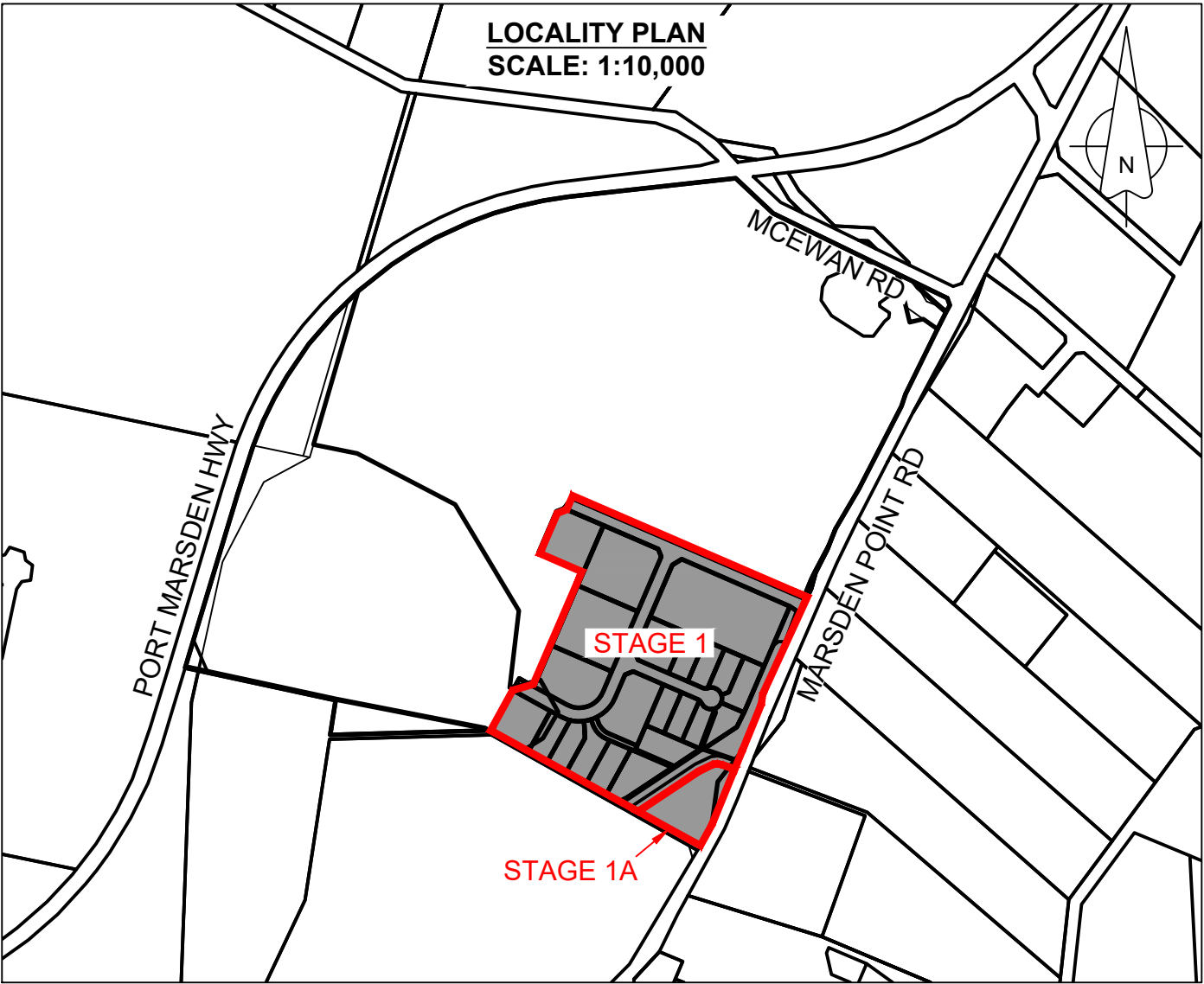
The percentage passing the finest sieve was obtained by difference

D.Krissansen

CIVIL ENGINEERING DESIGN FOR EARTHWORKS CONSENT BREAM BAY BUSINESS HUB - STAGE 1

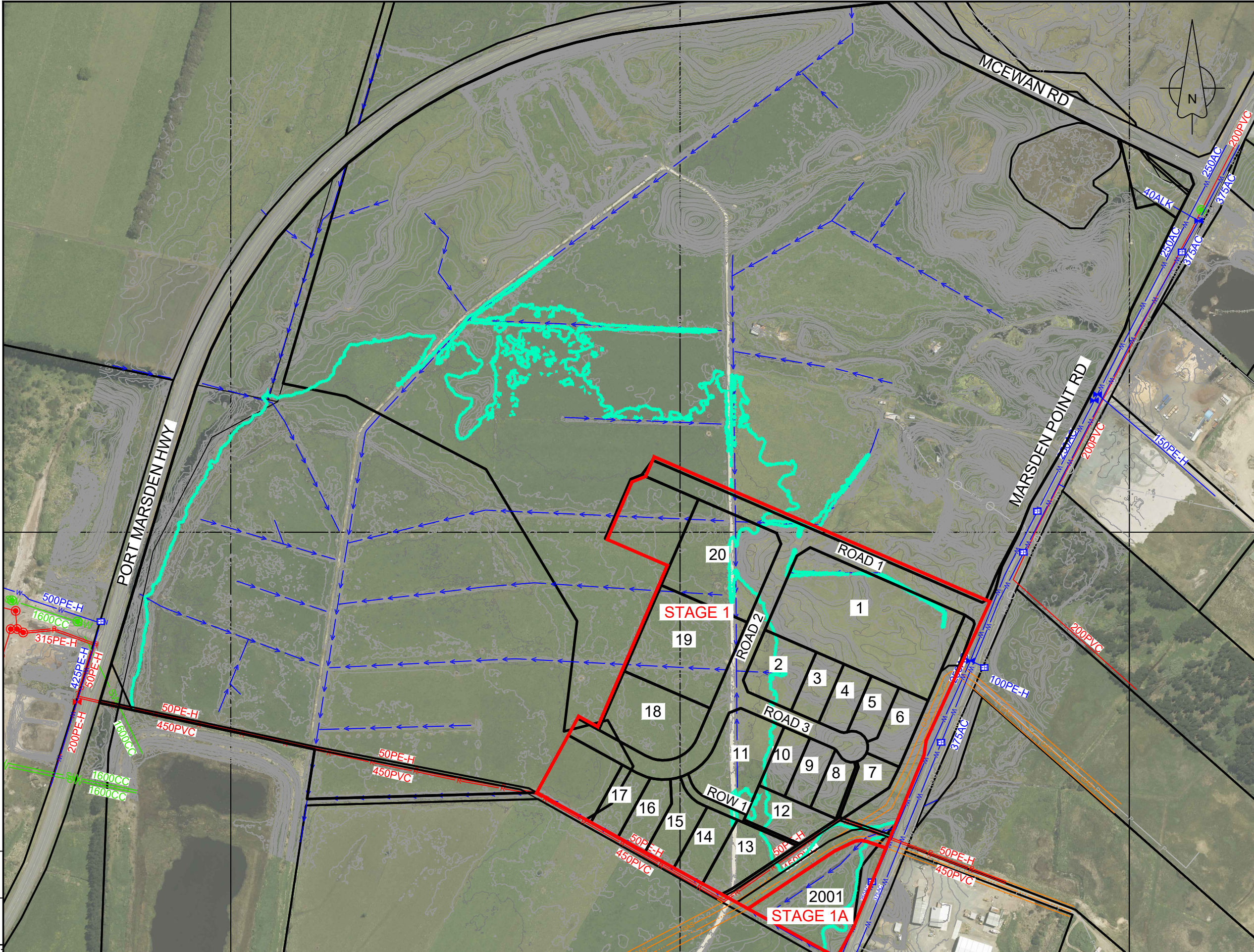
PROJECT REF: P0318

SCHEDULE OF DRAWINGS		
SHEET #	TITLE	REV
RC000	COVER SHEET	C
RC010	EXISTING SITE PLAN - OVERVIEW	C
RC011	EXISTING SITE PLAN - SHEET 1	C
RC100	PROPOSED CONCEPT SCHEME PLAN - OVERVIEW	C
RC101	PROPOSED CONCEPT SCHEME PLAN - SHEET 1	C
RC200	FILLING WITHIN RIVER HAZARD ZONE - 100 YEAR FLOOD EXTENT (RL4.19m)	C
RC205	CUT TO COUNTER FLOOD DISPLACEMENT	C
RC210	BULK EARTHWORKS - PEAT/UNSUITABLE MATERIAL STRIP	C
RC215	BULK EARTHWORKS - CUT TO FILL	C



500
400
300
200
100
0
SCALE 1:10000

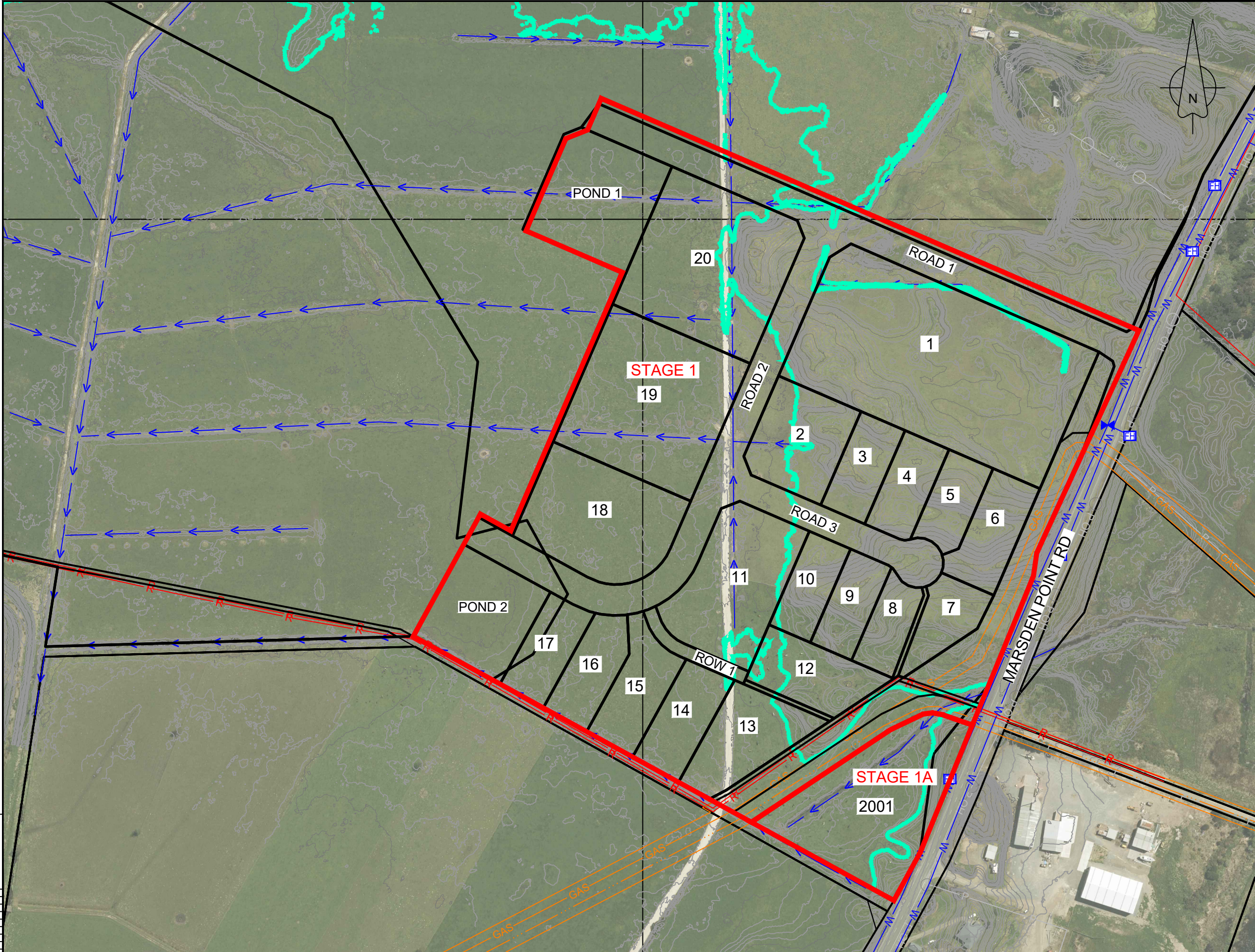
C	CONSTRUCTION ISSUE	10-08-2022	PROJECT DETAILS	TITLE	DATE CREATED	DRAWN	DESIGNED	APPROVED
B	2ND ISSUE	20-09-2021	HKRS HOLDINGS LTD DEVELOPMENT OF BREAM BAY BUSINESS HUB - STAGE 1 RESOURCE CONSENT ENGINEERING PLANS	COVER SHEET	07/09/2021	AP	AP	--
A	1ST ISSUE	07-09-2021			VECTA REF NO	SCALE	STATUS	
REV.	REVISION DETAILS	DRAWN APP.			P0318	1:10000 @ A3	FOR CONSTRUCTION	
					DWG NUMBER	RC000	REVISION	
							C	



- NOTES:
1. AERIAL PHOTOGRAPH SOURCED FROM LINZ.
 2. LIDAR 2018 DATA SOURCED FROM NORTHLAND REGIONAL COUNCIL.
 3. EXISTING CONTOURS AT 200mm INTERVALS.

LEGEND:	
	POWER & FIBRE OVERHEAD
	POWER UNDERGROUND
	FIBRE DUCT
	EXISTING WATER
	EXISTING SW
	EXISTING SS
	SW MH
	CESSPIT
	SS MH
	FIRE HYDRANT
	VALVE
	POLE & PILLAR
	GAS AND RNZ CORRIDOR
	RIVER HAZARD ZONE 100 YEAR FLOOD EXTENT (4.19m)
	DRAINS

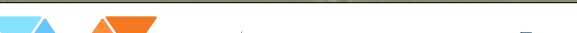
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	B	2ND ISSUE	20-09-2021					VECTA REF NO	SCALE	STATUS		
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www.vecta.co.nz			REV.	REVISION DETAILS	DRAWN	APP.	RC010		C			

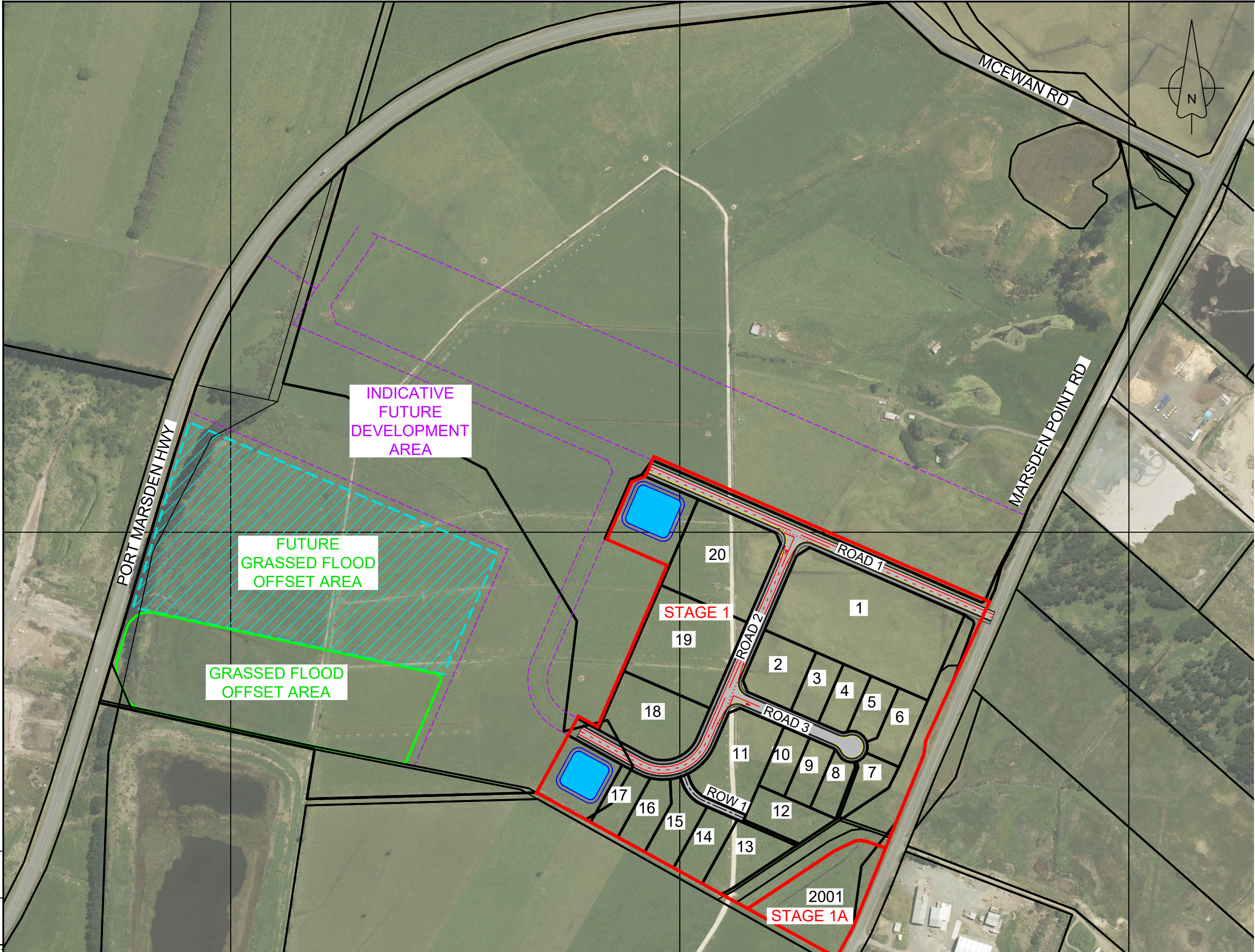


- NOTES:
1. AERIAL PHOTOGRAPH SOURCED FROM LINZ.
 2. LIDAR 2018 DATA SOURCED FROM NORTHLAND REGIONAL COUNCIL.
 3. EXISTING CONTOURS AT 200mm INTERVALS.

LEGEND:

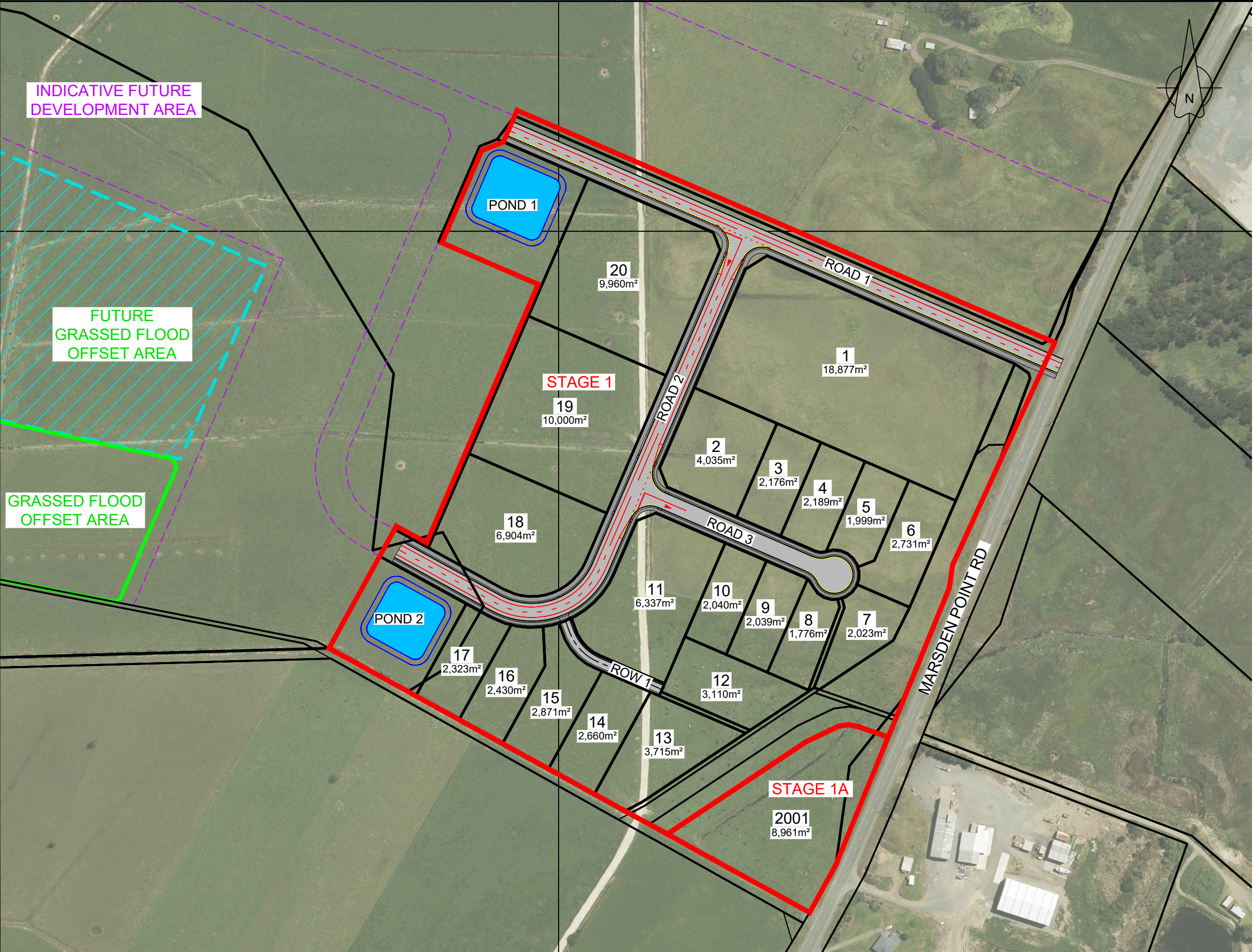
- P OH — POWER & FIBRE OVERHEAD
- P — POWER UNDERGROUND
- FIBER DT — FIBRE DUCT
- W — EXISTING WATER
- SW — EXISTING SW
- SS — EXISTING SS
- SW MH
- CESSPIT
- SS MH
- FIRE HYDRANT
- VALVE
- POLE & PILLAR
- GAS — GAS AND RNZ CORRIDOR
- RIVER HAZARD ZONE 100 YEAR FLOOD EXTENT (4.19m)
- DRAINS

	C	CONSTRUCTION ISSUE	10-08-2022	PROJECT DETAILS	HKRS HOLDINGS LTD DEVELOPMENT OF BREAM BAY BUSINESS HUB - STAGE 1 RESOURCE CONSENT ENGINEERING PLANS	TITLE	EXISTING SITE PLAN SHEET 1	DATE CREATED	DRAWN	DESIGNED	APPROVED		
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	B	2ND ISSUE	20-09-2021					AP	--	VECTA REF NO	SCALE	STATUS	
			AP					--	P0318	1:2500 @ A3	FOR CONSTRUCTION		
A	1ST ISSUE	07-09-2021	AP					--	DWG NUMBER	REVISION			
		AP	--						RC011	C			
www.vecta.co.nz		REV.	REVISION DETAILS	DRAWN	APP.								



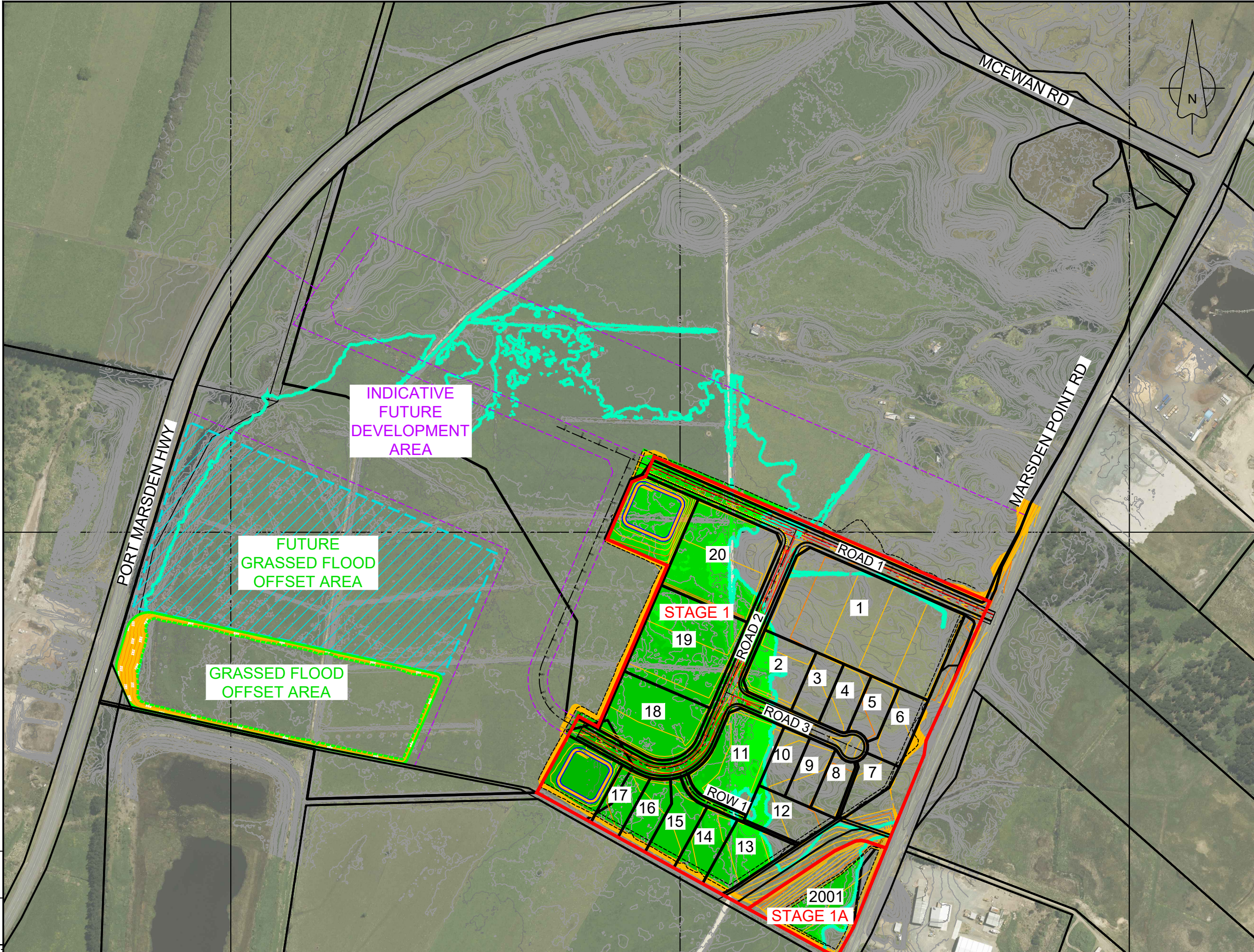
- NOTES:
1. AERIAL PHOTOGRAPH SOURCED FROM LINZ.
 2. DESIGN CONTOURS AT 200mm INTERVALS.
 3. FUTURE DEVELOPMENT AREA SHOWN INDICATIVE ONLY.

	C	CONSTRUCTION ISSUE	10-08-2022	PROJECT DETAILS	HKRS HOLDINGS LTD DEVELOPMENT OF BREAM BAY BUSINESS HUB - STAGE 1 RESOURCE CONSENT ENGINEERING PLANS	TITLE	PROPOSED CONCEPT SCHEME PLAN OVERVIEW	DATE CREATED	DRAWN	DESIGNED	APPROVED	
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			AP					--	P0318	1:4000 @ A3	FOR CONSTRUCTION	
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		AP	--			RC100	C					
www.vecta.co.nz			REV.	REVISION DETAILS	DRAWN	APP.						



- NOTES:
1. AERIAL PHOTOGRAPH SOURCED FROM LINZ.
 2. DESIGN CONTOURS AT 200mm INTERVALS.
 3. FUTURE DEVELOPMENT AREA SHOWN INDICATIVE ONLY.

 www.vecta.co.nz	C	CONSTRUCTION ISSUE	10-08-2022	PROJECT DETAILS HKRS HOLDINGS LTD DEVELOPMENT OF BREAM BAY BUSINESS HUB - STAGE 1 RESOURCE CONSENT ENGINEERING PLANS	TITLE PROPOSED CONCEPT SCHEME PLAN SHEET 1	DATE CREATED	DRAWN	DESIGNED	APPROVED	
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			AP			--	P0318	1:2500 @ A3	FOR CONSTRUCTION	
	A	1ST ISSUE	07-09-2021				DWG NUMBER	REVISION		
	REV.	REVISION DETAILS	DRAWN	APP.		RC101		C		
			AP	--						



- NOTES:
1. AERIAL PHOTOGRAPH SOURCED FROM LINZ.
 2. LIDAR 2018 DATA SOURCED FROM NORTHLAND REGIONAL COUNCIL.
 3. FUTURE DEVELOPMENT AREA SHOWN INDICATIVE ONLY TO SHOW WHY FLOOD DISPLACEMENT CUT AREA WAS CHOSEN.

VOLUME NOTES:

VOLUME DISPLACEMENT FROM EXISTING GROUND LEVEL TO RL4.19m WITHIN STAGE 1 = 39,140m³

VOLUME DISPLACEMENT AREA WITHIN STAGE 1 = 71,810m²

DEPTH RANGE KEY				
Lower_value	Upper_value			Colour
0	to	.25	m	
.25	to	.5	m	
.5	to	1	m	
1	to	2	m	

- LEGEND:
- RIVER HAZARD ZONE
 - 100 YEAR FLOOD EXTENT (4.19m)
 - EX CONTOURS MAJOR (0.2m)
 - EX CONTOURS MINOR (1.0m)
 - DESIGN CONTOURS MAJOR (0.2m)
 - DESIGN CONTOURS MINOR (1.0m)

	C	CONSTRUCTION ISSUE	10-08-2022	PROJECT DETAILS	HKRS HOLDINGS LTD DEVELOPMENT OF BREAM BAY BUSINESS HUB - STAGE 1 RESOURCE CONSENT ENGINEERING PLANS	TITLE	FILLING WITHIN RIVER HAZARD ZONE 100 YEAR FLOOD EXTENT (RL4.19m)	DATE CREATED	DRAWN	DESIGNED	APPROVED		
			AP					--	07/09/2021	AP	AP	--	
	B	2ND ISSUE	20-09-2021					AP	--	VECTA REF NO	SCALE	STATUS	
	A	1ST ISSUE	07-09-2021					AP	--	P0318	1:4000 @ A3	FOR CONSTRUCTION	
										DWG NUMBER	REVISION		
www.vecta.co.nz			REV.	REVISION DETAILS	DRAWN	APP.	RC200		C				



- NOTES:
1. AERIAL PHOTOGRAPH SOURCED FROM LINZ.
 2. LIDAR 2018 DATA SOURCED FROM NORTHLAND REGIONAL COUNCIL.
 3. DEPTH CONTOURS SHOWN AT 1.0m INTERVALS.
 3. FUTURE DEVELOPMENT AREA SHOWN INDICATIVE ONLY.

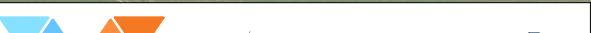
BULK EARTHWORKS VOLUMES:
UNSUITABLE CUT VOLUME = 80,600m³.

- VOLUME NOTES:**
1. UNSUITABLE DEPTH CALCULATED OFF 100m GRID CPT DATA AND IS INFERRED BETWEEN TESTS.
 2. UNSUITABLE MATERIAL VOLUME BASED ON COMPARISON BETWEEN EXISTING LIDAR 2018 TO ASSUMED UNSUITABLE DEPTHS.
 3. VOLUMES BASED ON SOLID MEASURE.
 4. TOPSOIL DEPTH NOT TAKEN INTO ACCOUNT.

DEPTH RANGE KEY				
Lower_value	Upper_value		Colour	
-3	to	-2	m	
-2	to	-1	m	
-1	to	-.5	m	
-.5	to	-.25	m	
-.25	to	0	m	

LEGEND:

— RIVER HAZARD ZONE
100 YEAR FLOOD EXTENT (4.19m)

 www.vecta.co.nz	C	CONSTRUCTION ISSUE	10-08-2022	PROJECT DETAILS HKRS HOLDINGS LTD DEVELOPMENT OF BREAM BAY BUSINESS HUB - STAGE 1 RESOURCE CONSENT ENGINEERING PLANS	TITLE BULK EARTHWORKS PEAT/UNSUITABLE MATERIAL STRIP	DATE CREATED	DRAWN	DESIGNED	APPROVED	
			AP			--	07/09/2021	AP	AP	--
	B	2ND ISSUE	20-09-2021							
	A	1ST ISSUE	07-09-2021							
			AP			--	VECTA REF NO	SCALE	STATUS	
	REV.	REVISION DETAILS	DRAWN	APP.		P0318	1:2500 @ A3	FOR CONSTRUCTION		
						DWG NUMBER	RC210		REVISION	
								C		



- NOTES:
1. AERIAL PHOTOGRAPH SOURCED FROM LINZ.
 2. LIDAR 2018 DATA SOURCED FROM NORTHLAND REGIONAL COUNCIL.
 3. DEPTH CONTOURS SHOWN AT 1.0m INTERVALS.
 4. DESIGN CONTOURS SHOWN AT 0.2m INTERVALS.
 3. FUTURE DEVELOPMENT AREA SHOWN INDICATIVE ONLY.

BULK EARTHWORKS VOLUMES:
CUT = 43,900m³
FILL = 134,150m³
FILL TO REPLACE UNSUITABLES = 80,600m³

THEREFORE TOTAL FILL REQUIRED = 170,850m³

TOTAL EARTHWORKS AREA WITHIN STAGE 1 = 130,800m²

- VOLUME NOTES:**
1. VOLUME BASED ON COMPARISON BETWEEN EXISTING LIDAR 2018 TO SUBGRADE DESIGN LEVEL.
 2. VOLUMES BASED ON SOLID MEASURE.
 3. PAVEMENT DEPTH ALLOWED FOR.
 4. TOPSOIL RESPREAD OVER LOTS OF 300mm ALLOWED FOR.

DEPTH RANGE KEY				
Lower_value	Upper_value		Colour	
-6	to	-5	m	
-5	to	-4	m	
-4	to	-3	m	
-3	to	-2	m	
-2	to	-1	m	
-1	to	-.5	m	
-.5	to	-.25	m	
-.25	to	0	m	
0	to	.25	m	
.25	to	.5	m	
.5	to	1	m	
1	to	2	m	
2	to	3	m	
3	to	4	m	
4	to	5	m	
5	to	6	m	

LEGEND:
RIVER HAZARD ZONE
100 YEAR FLOOD EXTENT (4.19m)

 www.vecta.co.nz	C	CONSTRUCTION ISSUE	10-08-2022	PROJECT DETAILS HKRS HOLDINGS LTD DEVELOPMENT OF BREAM BAY BUSINESS HUB - STAGE 1 RESOURCE CONSENT ENGINEERING PLANS	TITLE BULK EARTHWORKS CUT TO FILL	DATE CREATED 07/09/2021	DRAWN AP	DESIGNED AP	APPROVED --
	B	2ND ISSUE	20-09-2021			VECTA REF NO P0318	SCALE 1:2500 @ A3	STATUS FOR CONSTRUCTION	
	A	1ST ISSUE	07-09-2021			DWG NUMBER	REVISION		
	REV.	REVISION DETAILS	DRAWN			APP.	RC215		
						C			