EIS.

HANSON TWEED SAND PLANT EXPANSION
PHASE 5 TO PHASE 11

PREPARED FOR
Hanson Construction Materials Pty Ltd

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Environmental Impact Statement

Hanson Tweed Sand Plant Expansion Phase 5 to Phase 11

This report has been prepared by:
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This report has been prepared for:
Hanson Construction Materials Pty Ltd

Document Control

Issue	Date	Description	Prepared By	Checked By
A	08/03/2021	WIP Draft for Project Team Input	LN	-
B	10/03/2021	WIP Draft for Project Team Input	LN	-
C	15/03/2021	Final WIP Draft for Project Team Review	LN	DG
D	28/03/2021	Draft	LN	DG
E	30/03/2021	EIS Submission	LN	LN

Preliminaries

Declaration

Submission of Environmental Impact Statement
Prepared under Division 5.1 of the *Environmental Planning and Assessment Act 1979*

Environmental Impact Statement prepared by:

Name: Mr. Lance Newley
Qualification: Bachelor of Built Environment (URP)
Address: Zone Planning Group Pty Ltd
1638 Tweed Street, Burleigh Heads QLD 4220

Proposed Development:

Hanson Tweed Sand Plant Expansion Phase 5 to Phase 11

Address of the land in respect of which the development application is being made:

The land to which the Hanson Tweed Sand Plant Expansion Phase 5 to Phase 11 development application relates is identified as:

Lot & Plan	Property Address
Lot 22 DP1082435	Crescent Street, Cudgen
Lot 23 DP1077509	Crescent Street, Cudgen
Lot 494 DP720450	Crescent Street, Cudgen
Lot 1 DP1250570	355 Cudgen Road, Cudgen
Lot 2 DP1192506	355 Cudgen Road, Cudgen
Lot 3 DP1243752	355 Cudgen Road, Cudgen
Lot 51 DP1166990	273 Pacific Motorway, Chinderah
Lot 50 DP1056966	273 Pacific Motorway, Chinderah
Unnamed Road Reserve*	-

The project also includes enabling works within the follow land:

Lot 51 DP1056966	Tweed Valley Way, Chinderah
Pacific Hwy / Tweed Valley Way Interchange Road Reserve	-

** Unnamed Road Reserve is located between Lot 2 DP1192506, Lot 1 DP1250570 & Lot 22 DP1082435*

Description of the development:

Hanson Construction Materials Pty Ltd is seeking to expand the existing Hanson Tweed Sand Plant. The expansion would access a sand resource of 30-35 million tonnes and provide production and transport of a maximum 950,000 tonnes of sand per annum (market driven). Material import of a maximum of 60,000 tonnes per annum. Project life is 30 years (market driven) spanning seven extraction phases. Sand material would continue to be extracted via dredge to a variable depth (20m below ground level nominal) with onsite material processing. Operations would be undertaken 24 hours seven days a week.

Environmental Impact Statement:

An environmental impact statement is attached addressing all matters in accordance with Division 5.1 of the *Environmental Planning and Assessment Act 1979.*

Declaration

I certify that I have prepared the contents of this environmental impact statement in response to the Secretary's environmental assessment requirements dated 17/12/2019 and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*. To the best of my knowledge the information contained in the environmental impact statement is not false or misleading.

Signature:

Name: Lance Newley

Date: 30/03/2021

Glossary

TERM	MEANING
Approved methods	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW.
Fines	Concentrated sulfidic material that is generated after fine-textured material has been hydraulically separated from coarse-textured material during dredging or hydrocycloning operations.
Hanson	Hanson Construction Materials Pty Ltd.
Overburden	Rock of soil overlying a mineral deposit, archaeological site, or other underground feature.
PM_{10}	Particulate matter with a diameter less than 10 micrometres.
$PM_{2.5}$	Particulate matter with a diameter less than 2.5 micrometres.
Reinterred	To inter or bury again.

Abbreviations

ABBREVIATION	MEANING
ABLP	Australian Bay Lobster Producers Ltd
ABN	Australian Business Number
ACHA	Aboriginal Cultural Heritage Assessment
ACHMP	Aboriginal Cultural Heritage Management Plan
ACN	Australian Company Number
AEMR	Annual Environmental Monitoring Report
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALC	Agricultural Land Classification
ALCA	Agricultural Land Capability Assessment
ANC	Acid Neutralising Capacity
ANZECC	Australian and New Zealand Environment Conservation Council
AQIA	Air Quality Impact Assessment
ASI	Area of Social Influence
ASSA	Acid Sulfate Soils Assessment
ATP	ATP Consulting Engineers
AUL	Auxiliary Left-turn Treatment
BAM	Biodiversity Assessment Method
BC Act	Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BES	Burchills Engineering Solutions
BGL	Below Ground Level
BOAMS	Biodiversity Offsets and Agreement Management System
BoM	Bureau of Meteorology

ABBREVIATION	MEANING
BSAL	Biophysical Strategic Agricultural Land
BSAL	Biophysical Strategic Agricultural Land
CCC	Community Consultative Committee
CHR	Channelised Right-turn
CLSP	Cudgen Lakes Sand Plant
CNA	Construction Noise Assessment
CNMP	Construction Noise Management Plan
CoPC	Contaminants of Potential Concern
Db	Decibel
DCoC	Drive Code of Conduct
DCP	Development Control Plan
DCP	Dynamic Cone Penetrometer
DO	Dissolved Oxygen
DoAWE	Department of Agriculture, Water and the Environment
DPIE	Department of Planning, Industry and Environment
DSI	Detailed Site Investigation
EIA	Economic Impact Assessment
EPA	Environment Protection Authority
EPAR	Environmental Planning & Assessment Regulation
EPBC	Environment Protection and Biodiversity Conservation
EPI	Environmental Planning Instrument
EPL	Environmental Protection License
FRAP	Flood Response Assessment Plan
G&S	Gilbert & Sutherland
GDE	Groundwater Dependent Ecosystem
GMA	Groundwater Management Area
GVA	Gross Value Added
GWA	Groundwater Assessment
ha	Hectare
HTSP	Hanson Tweed Sand Plant
IAL	Important Agricultural Land
JWA	JWA Ecological Consultants
LALC	Local Aboriginal Land Council
LGA	Local Government Area
LIIEMA	Landscape Institute for Environmental Management and Assessment
LSC	Land and Soil Capability
M1	Pacific Highway
mbgl	Metres Below Ground Level
ML	Megalitre
MNES	Matters of National Environmental Significance
NCRP	North Coast Regional Plan 2036

ABBREVIATION	MEANING
NGER Act	National Greenhouse and Energy Reporting Act 2007
NHRMC	National Health and Medical Research Council
NSW	New South Wales
OEH	Office of Environment and Heritage
ONIA	Operational Noise Impact Assessment
PCT	Plant Community Type
PMST	Protected Matters Search Tool
POEA Act	Protection of the Environment Administration Act 1991
POEO Act	Protection of the Environment Operations Act 1997
PSI	Preliminary Site Investigation
RAP	Remediation Action Plan
RBL	Rating Background Levels
RL	Relative Level
RLMP	Rehabilitation Landscape Management Plan
RMS	Road & Maritime Services
SEAR'S	Secretary's Environmental Planning Requirements
SEPP	State Environmental Planning Policy
SEQ	South East Queensland
SES	State Emergency Service
SIA	Social Impact Assessment
SLS	Scenic Landscape Strategy
SSD	State Significant Development
SWA	Surface Water Assessment
TAPM	The Air Pollution Model
TBCS	Tweed Brunswick Coastal Sands
TECs	Threated Ecological Communities
TIA	Traffic Impact Assessment
TLEP	Tweed Local Environmental Plan
TLSPS	Tweed Local Strategic Planning Statement
TMP	Traffic Management Plan
TPA	Tonnes per annum
TSC	Tweed Shire Council
TSP	Total Suspended Particles
VCB	Visual Catchment Boundary
VENM	Virgin Excavated Natural Material
VIA	Visual Impact Assessment
WAD	Works Authorisation Deed
WAL	Water Access License
WSP	Water Sharing Plan
ZLA	Zone Landscape Architecture

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Executive summary

The project is the expansion of the existing Hanson Tweed Sand Plant (HTSP). The project name is Hanson Tweed Sand Plant Expansion Phase 5 to Phase 11.

The HTSP and the project site are located at Cudgen NSW 2487 within the Tweed LGA. Regionally, HTSP is located 8.5 kilometres south of the New South Wales/Queensland state border; 1.5km west of the coastal suburb of Kingscliff NSW 2487; 14 kilometres north east of the rural town of Murwillumbah NSW 2484; and 23 kilometres north of the Tweed LGA / Byron LGA boundary.

Locally, HTSP and the project site is positioned between the Pacific Highway (M1) and Tweed Valley Way interchange to the north and west; Tweed Coast Road to the east and Cudgen Road / Cudgen Plateau to the south.

The sand plant has operated since 1983, with Hanson acquiring and operating the sand plant since 2007. HTSP Phase 4 is currently operational on part of the project site and is estimated to have 6 to 10 years of resource remaining (depending on market conditions). The existing HTSP extraction footprint is approximately 46ha and production and transport are a maximum of 500,000 tonnes per annum. Material extraction is via dredge with a variable depth (20m below ground level nominal).

The proposed Phase 5 to Phase 11 expansion would access a sand resource of 30-35 million tonnes and provide production and transport of a maximum 950,000 tonnes per annum (market driven). The proposed expansion footprint is approximately 190ha. This would result in a total footprint for HTSP of approximately 236ha. The sand resource will continue to be extracted via dredge to a variable depth (20m below ground level nominal). Onsite processing will continue. The project life is 30 years (market driven) spanning seven extraction phases.

Phase 5 of the project will include completing any Phase 4 extraction that is yet to be completed and the re-extraction of the Phase 1 to 4 areas to ensure project depth has been achieved and to establish the proposed final lake bank profiles throughout these locations.

The project will provide new private haulage road with connection to the Tweed Valley Way / M1 Interchange. The existing HTSP Phase 1 to 4 haulage route of Altona Road / Crescent Street / Tweed Coast Road will be abandoned, removing all HTSP vehicles from local roads. The existing site buildings and wash plant will remain in use during Phases 5 and 6. The site buildings and wash plant will be relocated to an alternative position onsite from Phase 7 onwards.

The operating hours for extraction, processing, loading and dispatch of trucks, and maintenance are proposed to be 24 hours, seven days a week.

The site will be subject to progressive rehabilitation resulting in a naturalised final landform. Total rehabilitation area is approximately 20 hectares or nearly 10% of the site.

The project site contains a regionally significant construction resource with HTSP producing high quality sands for supply to the concrete and construction industry. Demand and economic analysis indicate an upward trend for material supply that is being fueled by regional population growth (both Northern NSW and South East Queensland (SEQ)), major infrastructure pipeline and material exports to Queensland. HTSP is strategically placed to meet these predicted demand trends and provide a significant local and regional economic benefit.

A review of HTSP's current extraction limit (500,000 tonnes per annum) against this upward demand trend indicates that the extraction limit will become a constraint to meeting demand (on a trend basis) by 2030. In contrast, an extraction limit of 950,000 tonnes per annum will remove this constraint while also providing sufficient headroom to meet peak demand spikes and to replace and/or supplement alternate fine sand sources within the region if necessary.

The objectives of the project are to:

- Increase the extraction capacity of HTSP in an environmentally, socially, and economically sustainable way.
- Increase the transportation capacity of HSTP in an environmentally, socially, and economically sustainable way.
- Secure long term local and regional construction material supply.
- Provide capacity to address construction material demand spikes.
- Achieve optimal use of a regionally significant resource.

The project will enable continued extraction of a resource that is in high demand and which supports the construction industry. The project will deliver economic benefits to both NSW and Tweed regions, will support local economic activity and employment through both the construction and operational phases. The economic and social impact analysis of the project demonstrates that it will be socio-economically beneficial to NSW and Local Tweed community.

To address the Secretary's Environmental Assessment Requirements and analysis and assess the project potential impacts the following studies and detail have been completed / prepared.

- Surface Water Assessment
- Ground Water Assessment
- Flood & Stormwater Report
- Flood Response Plan
- Soil and Water Management Plan
- Operational Noise Impact Assessment
- Construction Noise Assessment
- Air Quality Assessment
- Biodiversity Development Assessment Report
- Concept Rehabilitation and Landscape Management Plan
- Aboriginal Cultural Heritage Assessment
- Traffic Impact Assessment
- Acid Sulfate Soils Assessment
- Preliminary Site Investigation
- Agricultural Land Assessment
- Geotechnical Report
- Landform Sections
- Visual Impact Assessment
- Social Impact Assessment
- Economic Impact Assessment

The findings of these studies and detail indicate the project will not result in significant residual impacts on most environmental aspects, including amenity impacts associated with noise and air quality. Similarly, the project is not anticipated to result in significant social impacts as assessed with the social impact assessment.

The project will have residual impacts on:

- Terrestrial biodiversity. This will result from the progressive loss of 3.66ha of vegetation. This vegetation loss will be offset in accordance with NSW policy, with credits being calculated in accordance with the BAM method. This offsetting will have the benefit of protecting areas of similar native vegetation communities into perpetuity. This 3.66ha loss will also be offset via the progress rehabilitation of approximately 20ha of land on the project site.

- Pre-development groundwater flows. Localised and minor changes to pre-development groundwater flow regimes will occur in the vicinity of the extraction lakes. These changes will however be largely contained within the development footprint.

- Pre-development groundwater elevation. Changes to groundwater elevation are predominantly contained within the development footprint, occurring within the northern and southern sections of the extraction footprint (Lot 51 on DP1166990 and Lot 1 on DP1250570 respectively) as follows:

    - A maximum 0.5m lowering of the water table in the northern portion of the expansion area. The impact is predominantly contained within the expansion footprint, however a decrease in groundwater elevation of up to 0.3 m is predicted within a small portion of the lands outside the northern perimeter of Lot 51 on DP1166990.
    - In the southern extent of the site the steady-state model indicates a maximum 1.0 m lowering of the groundwater table predominantly within the expansion footprint. This impact reduces to a maximum of 0.5 m of drawdown outside of the site boundary to the west of Lot 1 on DP1250570.
    - A drawdown of up to 0.5 m is predicted to occur within a small portion of the Low Potential GDE, which is mapped on the southern boundary of the expansion footprint west of Lot 1 on DP1250570.

- Local hydraulic regime. Minor changes in the local hydraulic regime are caused by a loss in conveyance storage through the inclusion of bunding around the proposed extraction lakes. The bunding around the lakes prevents external catchment runoff from entering the lakes frequently, flood events are permitted to overtop into the extraction lakes. The extent of the change is within the 'no change' modelling tolerance of the Tweed Shire Council floodplain management strategy.

- Agricultural Land. The project will result in the progressive permanent loss of Agricultural Land. Assessment of the agricultural capability of the land indicates it is marginal. Groundwater modelling indicates this capability will continue to decline as groundwater levels rise and inundation from sea level rises due to climate change impede drainage and waterlog soils. I.e., the Agricultural land will be lost in any event.

- Visual Amenity. The Project will result in a change to the existing landscape character and on completion of extraction works and subsequent final rehabilitation phases, the Project Site will present as a natural lake bordered by a significant vegetation to its perimeter. This change in landscape character would not adversely impact key significant landscape features of the locality.

Assessment of the project against the matters for consideration under the Environmental Planning and Assessment Act 1979 demonstrates the project:

- Is permissible with consent.
- Is consistent with the objects of the Act.
- Is generally consistent with relevant EPI's.
- Is generally consistent with strategic and forward planning strategies applicable to the locality and region.
- Has considered and been formulated consistent with the principles of Ecologically Sustainable Development.
- Most project impacts can be addressed with appropriate mitigation measures.
- Residual impacts are largely contained within the development footprint and impact to adjoining sensitive receivers is minimal; and
- Is the highest and best use of the site.

The proposal is suitable and in the public interest when considered holistically as:

- It efficiently meets the project needs and objectives.
- The project has been formulated on a precautionary approach to analysis, assessment and management of impacts and risks to the environment.
- The project mitigation measures are based on long-term site data that demonstrate the proposed mitigations measures work on the site in real world scenarios.
- It does not result in social and inter-generational equity issues.

- Biodiversity and ecological impacts are appropriately offset.
- HTSP's current environmental management approach has proven effective over time with respect to risk reduction, hazard mitigation and protection of the receiving environment.
- HTSP is committed to achieving a stable landform with water quality at the site within an acceptable range to facilitate a wide range of end use scenarios.
- The proposed environmental management plans incorporate the intent of the precautionary principle. Implementation of the monitoring and management measures specified in these management plans will allow these goals to be achieved.

The project is warranting of support and development consent can be granted.

Section 1 – Introduction

1.0 Introduction

This section provides an overview of project including the project objectives, project & site history, interaction of the project with adjoining major project developments, discussion of alternatives considered, and detail of where the SEAR's items are addressed within this EIS.

1.1 Project Overview

The project is the expansion of the existing Hanson Tweed Sand Plant (HTSP). The project name is Hanson Tweed Sand Plant Expansion Phase 5 to Phase 11.

The HTSP and the project site are located at Cudgen NSW 2487 within the Tweed LGA. Regionally, HTSP is located 8.5 kilometres south of the New South Wales/Queensland state border; 1.5km west of the coastal suburb of Kingscliff NSW 2487; 14 kilometres north east of the rural town of Murwillumbah NSW 2484; and 23 kilometres north of the Tweed LGA / Byron LGA boundary. **Figure 1** and Appendix A1 identifies the location of the project amongst these regional reference points.

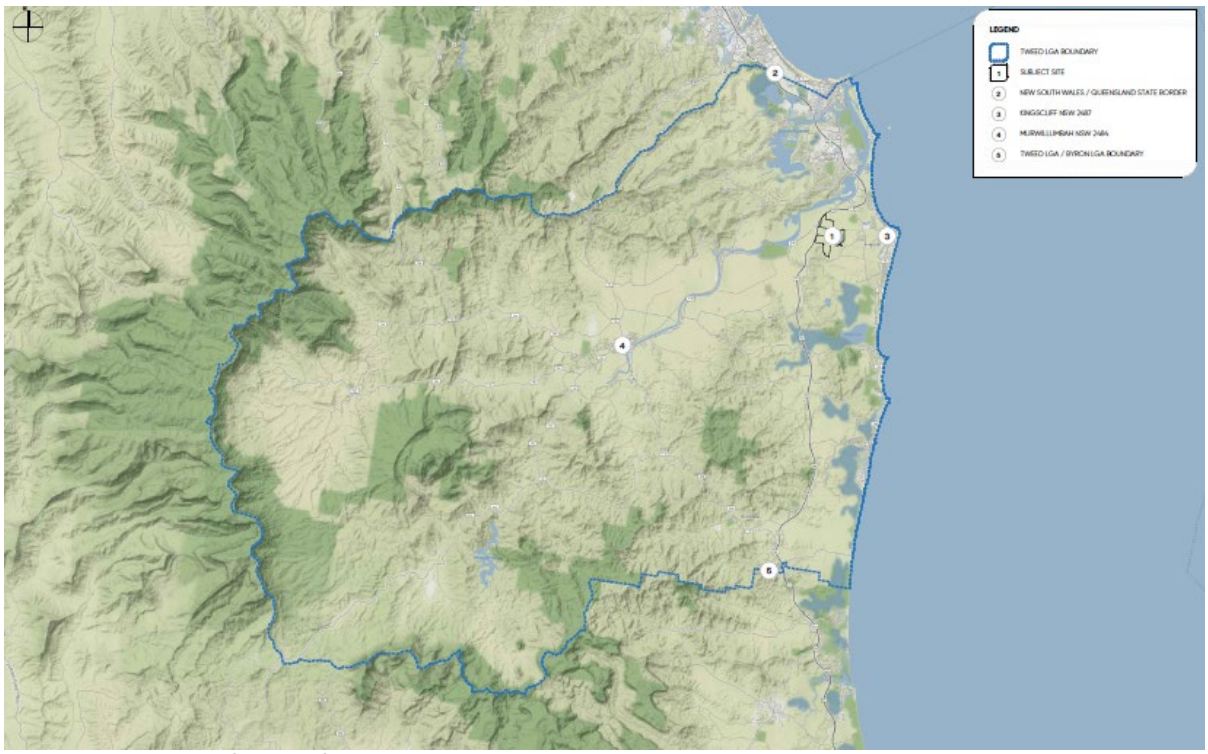


Figure 1: Site Location (Regional)

Locally, HTSP and the project site is positioned between the Pacific Highway (M1) and Tweed Valley Way interchange to the north and west; Tweed Coast Road to the east and Cudgen Road / Cudgen Plateau to the south. **Figure 2** and Appendix A2 identifies the location of the project amongst these local landmarks and uses.

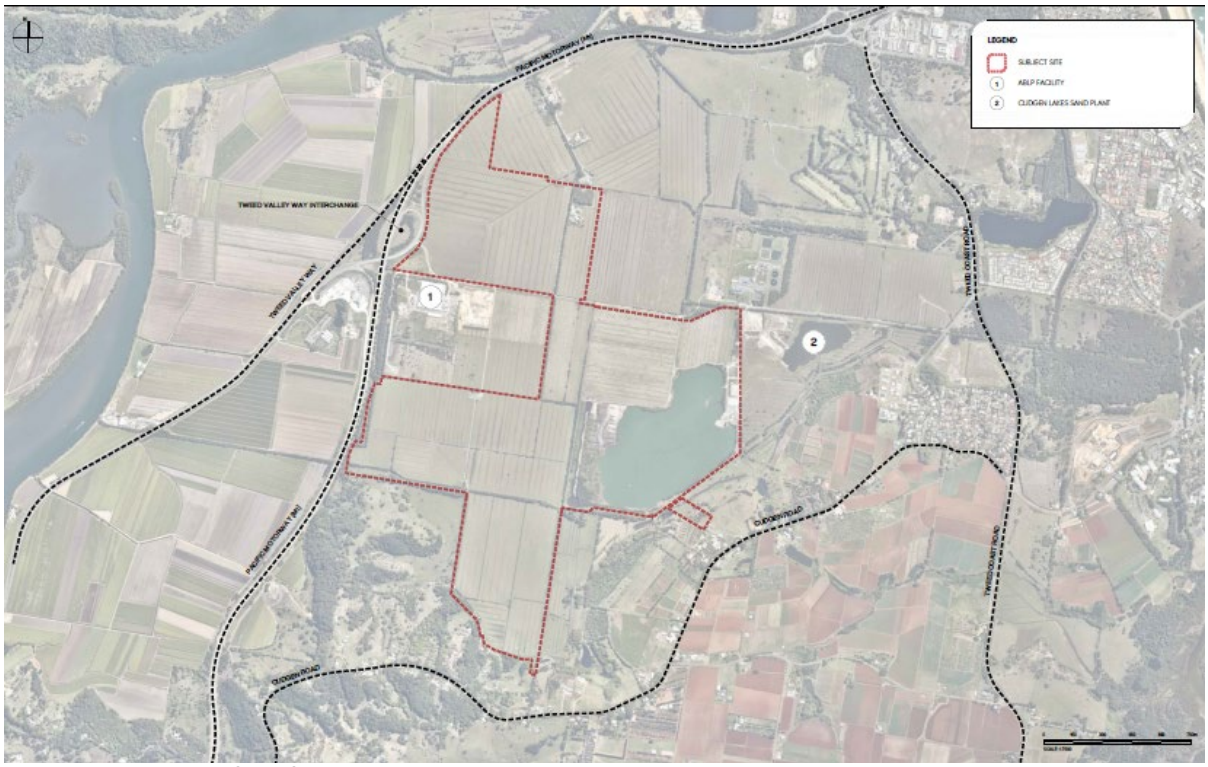


Figure 2: Site Location (Local)

The sand plant has operated since 1983, with Hanson acquiring and operating the sand plant since 2007. HTSP Phase 4 is currently operational on part of the project site and is estimated to have 6 to 10 years of resource remaining (depending on market conditions). The existing HTSP extraction footprint is approximately 46ha and production and transport are a maximum of 500,000 tonnes per annum. Material extraction is via dredge with a variable depth (20m below ground level nominal).

The proposed Phase 5 to Phase 11 expansion would access a sand resource of 30-35 million tonnes and provide production and transport of a maximum 950,000 tonnes per annum (market driven). The proposed expansion footprint is approximately 190ha. This would result in a total footprint for HTSP of approximately 236ha. The sand resource will continue to be extracted via dredge to a variable depth (20m below ground level nominal). Onsite processing will continue. The project life is 30 years (market driven) spanning seven extraction phases.

Figure 3 and Appendix A3 identifies the existing HTSP extraction footprint and the proposed expansion footprint.

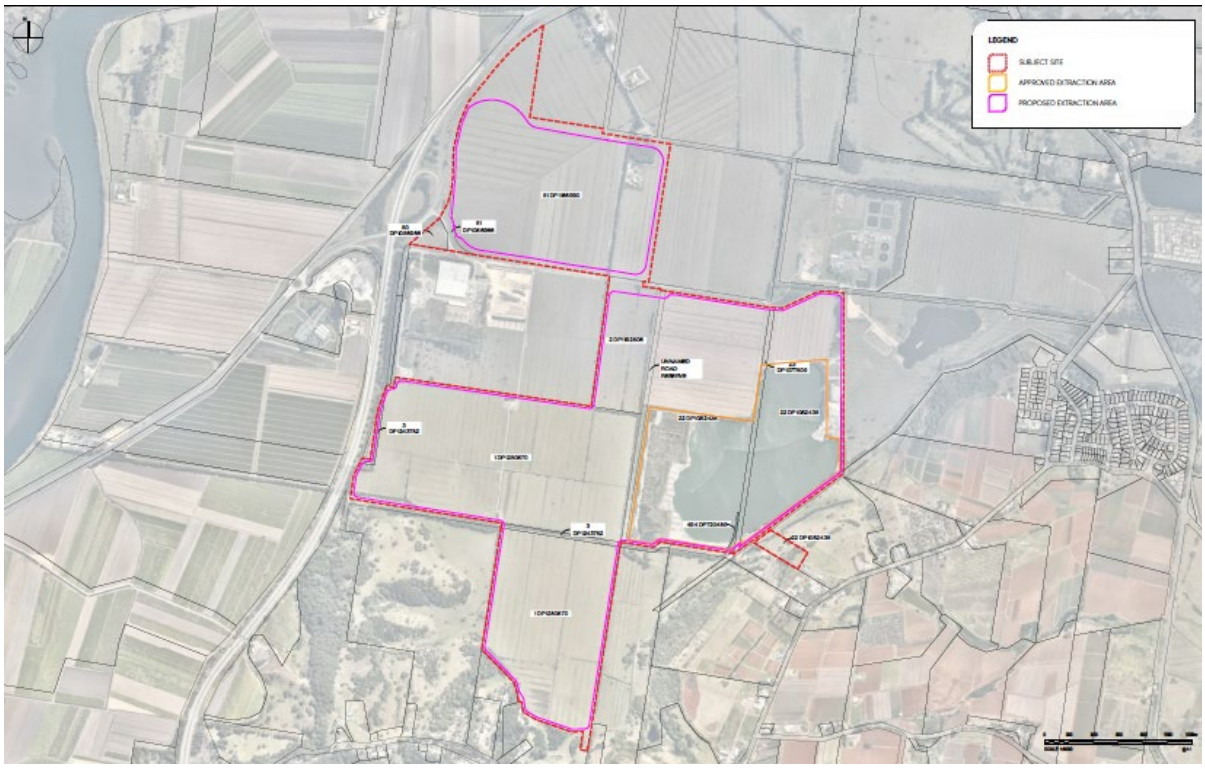


Figure 3: Existing & Proposed HTSP Footprint

Phase 5 of the project will include completing any Phase 4 extraction that is yet to be completed and the re-extraction of the Phase 1 to 4 areas to ensure project depth has been achieved and to establish the proposed final lake bank profiles throughout these locations.

The project will provide new private haulage road with connection to the Tweed Valley Way / M1 Interchange. The existing HTSP Phase 1 to 4 haulage route of Altona Road / Crescent Street / Tweed Coast Road will be abandoned, removing all HTSP vehicles from local roads. The existing site buildings and wash plant will remain in use during Phases 5 and 6. The site buildings and wash plant will be relocated to an alternative position onsite from Phase 7 onwards.

The operating hours for extraction, processing, loading and dispatch of trucks, and maintenance are proposed to be 24 hours, seven days a week.

The site will be subject to progressive rehabilitation resulting in a naturalised final landform. Total rehabilitation area is approximately 20 hectares or nearly 10% of the site.

1.2 Project Objectives

The project objectives are to:

- Increase the extraction capacity of HTSP in an environmentally, socially, and economically sustainable way.
- Increase the transportation capacity of HSTP in an environmentally, socially, and economically sustainable way.
- Secure long term local and regional construction material supply.
- Provide capacity to address construction material demand spikes.

- Achieve optimal use of a regionally significant resource.

1.3 Project & Site History

The sand plant has operated since 1983, with Hanson acquiring and operating the sand plant since 2007. HTSP is currently operating on part of the project site with Phase 1 to 4 either completed or currently under extraction. Phase 4 is estimated to have 6 to 10 years of resource remaining (depending on market conditions). The following section provides a summary of historic and current development consents, current licenses, and current operational limits.

1.3.1 Historic & Existing HTSP Approvals & Licenses

The development approvals that have facilitated HTSP Phase 1 to 4 are summarised in **table 1.**

Table 1: HTSP Development Approval Summary

EXTRACTION PHASE	APPROVAL NUMBER
Phase 1	• T4/2562
Phase 2	• DA0041/2001
Phase 3 & 4	• DA 152-6-2005

Approvals T4/2562 and DA0041/2001 have been surrendered and HTSP is currently operating under DA152-6-2005 MOD 1, refer Section 1.3.2.

HTSP currently operates under Environmental Protection License (EPL) 11453. This EPL authorises sand extraction activities at the site. The EPL contains provisions that govern:

- The scale and nature of activities that are permitted on the subject site.
- Discharges to air, water, and application to land.
- Limit conditions for pollution of waters, load limits and concentration limits.
- Monitoring and recording conditions.
- Reporting conditions.

HSTP holds several Water Access Licenses (WAL) and holds a 109ML water allocation within the North Coast Coastal Sands Groundwater Source Water Sharing Plan (WSP). These licenses are summarised in **table 2**.

Table 2: HTSP Water License Summary

LICENSE NUMBER	LICENSE DETAILS
WAL 38106	Approval number: 30WA319538 Water supply works Excavation – Groundwater Lot 22//1082435
WAL 38097	Approval number: 30CA319526 Water supply works, water use Excavation – Groundwater Lot 22//1082435
30BL207198	Monitoring bores (MB8a, MB8b, MB9a, MB9b, MB10a, MB10b, MB11a, MB11b)
30BL179685	Monitoring bores

The location of HTSP monitoring bores is identified within the Ground Water Assessment (GWA) included under Appendix C.

1.3.2 HTSP Phase 4 Operations & Modification 1

HTSP is currently extracting Phase 4 in accord DA 152-6-2005 MOD 1. DA 152-6-2005 MOD 1 is the most recent development approval for HTSP and was issued by DPIE (then DOP) on 20 August 2018. This amendment facilitated an increase in the number of allowable truck movements to and from HTSP per day and increased the annual extraction rate to 500,000 tonnes per annum.

As part of DA 152-6-2005 MOD 1, relevant government agencies and stakeholders were consulted to determine the key issues and how these maybe avoided or mitigated. Issues raised related to the proposed truck numbers, access via Altona Road and the intersection at Crescent Street and Tweed Coast Road. These issues were resolved through consent conditions requiring upgrades to the relevant roads and intersections prior to additional truck movements occurring.

The number of loads despatched from HTSP was initially limited to 10 truck movements in any hour, prior to completion of the above-mentioned road upgrades. The upgrades were subsequently completed by HTSP, enabling an increase to 18 laden trucks from the site in any hour.

1.3.2.1 Existing HTSP Operating Hours

HTSP operations are currently limited as summarised in **table 3**:

Table 3: Existing HTSP Operating Hours

ACTIVITY	PERMISSIBLE HOURS
Operations (excluding loading and dispatch of trucks)	• 7am to 5pm Monday to Friday • 7am to 4pm Saturday • At no time on Sundays or public holidays
Loading and dispatch of trucks	• 7am to 5pm Monday to Friday • 7am to 12pm Saturday • At no time on Sundays or public holidays
Maintenance	• May be conducted at any time, provided that these activities are not audible at any privately-owned residence

1.3.2.2 Existing Noise Limits

HTSP noise limits which are not to be exceeded at any residence on privately-owned land are summarized in **table 4.**

Table 4: Existing HTSP Noise Limits

RECEIVER	DAY $L_{AEQ\ (15MINUTE)}$
Any residences on privately owned land	40

The existing HTSP operating requirements permit entering into 'noise agreements' with any relevant landowner to exceed these limits. HTSP currently has two noise agreements with adjoining property owners.

1.3.3 Relationship to other major projects and/or developments

Two major projects / developments directly adjoin the project site. These projects are identified as the Cudgen Lakes Sand Plant (CLSP) and the ABLP facility. The location of these developments in relation to the project site is identified in **Figure 2**. The details of these developments are summarised below:

1.3.3.1 Cudgen Lakes Sand Plant

The CLSP occupies approximately 67ha of land and is located on Lot 2 DP216705 directly to the east of the project site. CLSP was established under major project approval MP05_0103B, with the most recent version of this approval, MP05_0103B MOD2 approved 22 January 2019. Operations are permitted until 31 December 2047 with an approved maximum extraction depth of 20m below ground level.

The CLSP can extract a maximum of 650,000 cubic metres of extractive material from the site in any year. Transport of the materials is limited to a maximum of 300,000 tonnes of materials transported by road per year, with the remaining extracted material to be pumped via pipelines to nearby development sites for filling purposes.

Figure 4 below illustrates the current approved boundaries of CLSP and the associated pipeline corridors. Sites identified for filling are show in aqua.

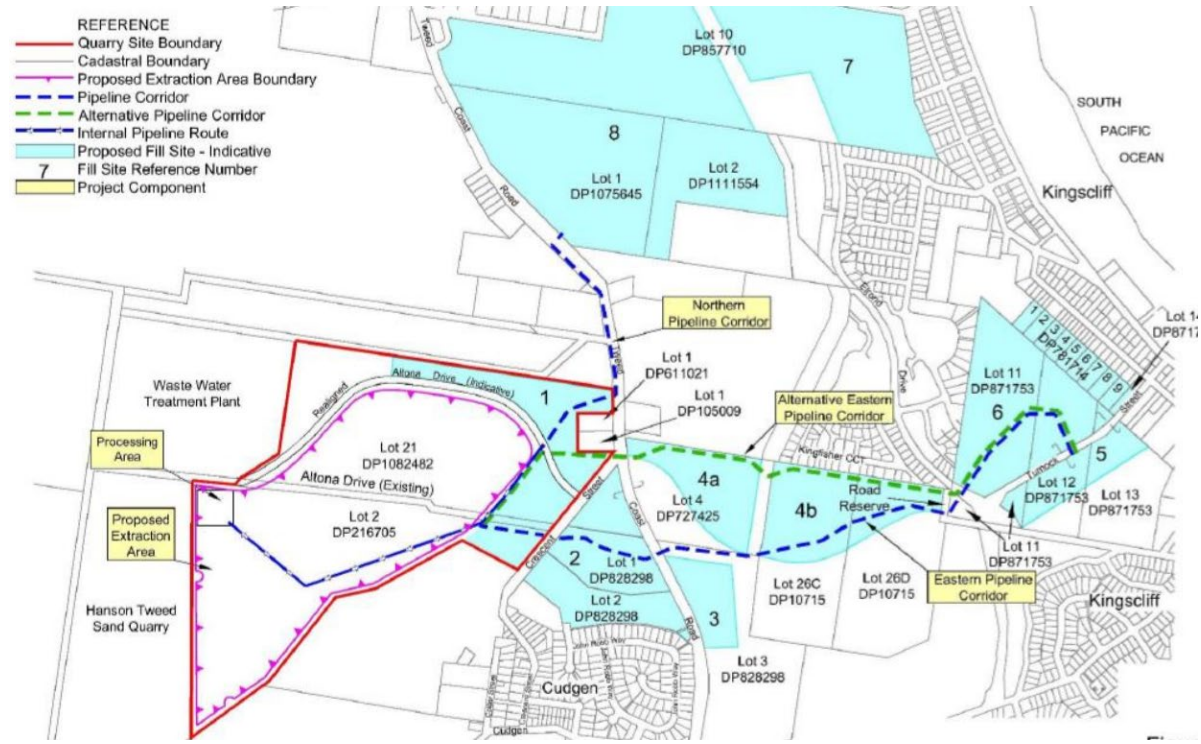


Figure 4: Approved Cudgen Lakes Sand Plant Boundaries & Associated Pipelines

CLSP operations are currently limited as summarised in **table 5**:

Table 5: CLSP Operating Hours

ACTIVITY	PERMISSIBLE HOURS
Site establishment, dry processing, product transport by road, VENM receipts, other quarrying operations not specified	• 7am – 6pm Monday to Friday • 7am – 1pm Saturday • At no time Sunday or Public holidays
Sand extraction by dredging and pumping to the processing plant, wet processing	• 7am – 10pm Monday to Friday • 7am – 4pm Saturday

	• At no time Sunday or Public holidays
Sand extraction by dredging and pumping to fill sites	• 7am – 6.30pm Monday to Friday • 7am – 1pm Saturday • At no time Sunday or Public holidays
Operation of dredge to fill pipeline with water or pipeline flushing	• 6.30am – 7pm Monday to Friday • 6.30am – 1.30pm Saturday • At no time Sunday or Public holidays
Maintenance (if inaudible at neighbouring residences)	• Any day

The number of truck movements for CLSP was initially limited to 9am and 3pm daily for up to four laden trucks per hour and 10 laden trucks per day. Upon completion of road upgrades to Altona Road and the intersection at Crescent Street and Tweed Coast Road referenced in Section 1.3.2, 12 trucks from the site in any hour is permitted.

The latest modification requires that no vehicles are to access the site from Crescent Street through the Cudgen Village whereby all access to and from the site is to be via Tweed Coast Road.

CLSP noise restrictions which are not to be exceeded at any residence on privately-owned land are summarized in **table 6.**

Table 6: CLSP Noise Limits

RECEIVER	DAY AND EVENING $L_{AEQ\ (15MINUTE)}$ DB(A)	SHOULDER $L_{AEQ\ (15MINUTE)}$ DB(A)
Residences on privately owned land	47	44

1.3.3.2 Australian Bay Lobster Producers Facility

The ABLP facility is located to the west of, and partly encompassed by the project site. The ABLP facility is a commercial aquaculture operation which breeds and produces Bay Lobster (Thenus Spp.).

ABLP was established under SSD approval DA282-11-2004-i, with the most recent version of this approval, DA282-11-2004-i MOD 2 approved 23 September 2013. The ABLP facility will include three 'farm buildings' with the first established and operating, once all stages are complete the proposal will occupy 45ha and be able to produce approximately 3228 tonnes of product a year.

The ABLP process involves pumping clean seawater from Dreamtime Beach in Kingscliff for use in growing operations. Spent seawater is then conveyed back to Council's Sewage Treatment Plant at West Kingscliff for discharge. The approval for the ABLP facility included requirements for upgrade of Melaleuca Road for access to the Tweed Valley Way / M1 Interchange.

This access is located on Lot 51 DP1056966 and is proposed for further upgrades as part of the project.

ABLP operations are currently limited as summarised in **table 7**:

Table 7: Approved ABLP Operating Hours

DAY	PERMISSIBLE HOURS
Monday to Friday	• 7am – 6pm
Saturday	• 8am – 1pm

Sunday & public holidays	• Nil

The ABLP approval is currently subject to modification application identified as DA282-11-2004-i MOD 4. The modification application comprises of eight components relating to the update of the consent to support the evolving operational requirements of the ABLP facility and future development including the addition of an onsite caretaker's residence. This modification is still under assessment by DPIE.

1.3.3.3 Other Major Projects

Several additional major projects exist within the TLGA. These include:

- Tweed Valley Hospital
- Kings Forest
- Cobaki Lakes
- Area E (Altitude Aspire)
- Casuarina Town Centre (Final Stage); and
- The Rise Terranora

While located within the same LGA, the project has no direct linkage to, or influence upon these major projects. These major projects however represent significant future demand for construction material resources.

1.4 Rationale for the project and why it is important

The project site contains a regionally significant construction resource with HTSP producing high quality sands for supply to the concrete and construction industry. Demand and economic analysis indicate an upward trend for material supply that is being fueled by regional population growth (both Northern NSW and South East Queensland (SEQ)), major infrastructure pipeline and material exports to Queensland. HTSP is strategically placed to meet these predicted demand trends and provide a significant local and regional economic benefit.

A review of HTSP's current extraction limit (500,000 tonnes per annum) against this upward demand trend indicates that the extraction limit will become a constraint to meeting demand (on a trend basis) by 2030.

In contrast, an extraction limit of 950,000 tonnes per annum will remove this constraint while also providing sufficient headroom to meet peak demand spikes and to replace and/or supplement alternate fine sand sources within the region if necessary. The following sections broadly summarise the findings of the Economic Assessment included under Appendix Q. Refer Appendix Q for detailed discussion of the sand market profile and demand.

1.4.1 Sand Demand

Construction materials demand and supply are closely aligned. This reflects the fact that extractive industries generally do not produce materials for stockpiling and instead, only produce in response to market demand through contracts. This means that historical production levels are in fact an indicator of the level of demand for each product. Similarly, demand is influenced by several contributing factors including:

- Regional population growth.
- Major infrastructure projects.
- "Export" demand.

These are discussed in Sections 1.4.1.1 through 1.4.1.3.

1.4.1.1 Regional Population-based demand

From 2008 to 2018, the market demand for sand has fluctuated and the HTSP has averaged an annual extraction rate of 240,000 tonnes. Utilising historical extraction data and recent Tweed and Gold Coast LGA population estimates and projections, a population-based demand rate for sand in the Tweed region has been calculated. Based on this population-based demand rate the demand for sand from HTSP will increase from an average of 240,000 tonnes between 2008 and 2018 to over >300,000 tonnes by 2028 and over 392,000 tonnes by 2041.

This is a conservative-base estimate of demand in the Tweed and Gold Coast LGA's only.

1.4.1.2 Major Infrastructure Projects

The Tweed and Gold Coast region has a strong pipeline of major infrastructure works over the next five years. The pipeline is dominated by transport projects which has been a focus for the Queensland State Government in response to the rapidly growing population in the SEQ region.

Key funded projects include:

- Tweed Valley Hospital expansion ($582m)
- Pacific Motorway M1 South Segments ($629m)
- Gold Coast Light Rail Stage 3A – Broadbeach to Burleigh ($500m)
- Gold Coast Runway Upgrades ($100m)

Key unfunded projects include:

- Varsity Lakes to Elanora Rail Extension ($470m)
- Gold Coast Desalination Plant Expansion ($300m)
- Jabiru Island Bridges Duplication – Stage 4 ($102m)

Given the pipeline of major infrastructure projects in the Tweed and Gold Coast LGA's, the level of demand for construction sand will inevitably increase as the projects move into the construction stage.

1.4.1.3 Exports to Queensland

A review of data from Hanson on production and sales from the HTSP confirms the principal role of the plant in supplying or "exporting" sand to the Queensland market. In recent years, the share of product which has been exported has varied between 82% and 90%. Previously, shares of product destined for local markets has reached as high as 20% (or more than 50,000 tonnes annually), reflecting the importance of sand production from the HTSP in supporting regional construction activity.

1.4.2 HTSP Demand Projections

Based on the above factors (regional demand, major infrastructure projects and interstate exports) demand for sand at HTSP will increase by an average of 25,000 tonnes per year over the assessment period, up to a maximum of 950,000 tonnes per year (based on the proposed maximum annual production cap). This demand profile is regarded as a trend scenario and does not factor in seasonal or cyclical peaks in demand.

1.4.3 Impact of Current and Proposed Extraction Limits

A review of current (500,000 tonnes per annum) extraction cap indicates that this cap will become a constraint to meeting demand (on a trend basis) by 2030. In contrast, increasing the extraction cap to 950,000 tonnes per annum will remove this constraint while also providing the plant with capacity to meet peak demand spikes.

A review of this relationship however does highlight the potential risks of above trend growth or spikes in demand particularly between 2025 and 2030. This could result in demand exceeding supply, causing price and supply risks for local and regional construction sectors and infrastructure projects. This supports the need for the allowance for expanded sand production in the short-term, particularly given the lead times for securing access to the resource for major projects.

1.5 Alternatives

1.5.1 Do Nothing

Sand extracted from HTSP is used in the Northern Rivers (predominately Tweed) and SEQ. As discussed in Section 1.4, demand for sand material is increasing and trends show existing production caps at HTSP will become an issue in meeting demand in the period between 2025 – 2030 (Refer Economic Impact Assessment under Appendix Q).

The do-nothing option was discounted as it does not achieve the project objectives and will have a negative impact upon supply of an essential construction material to a market with high demand. If the project does not proceed the HTSP will exhaust its current extraction allowance in 6 to 10 years, removing a significant supply source. This would likely lead to price spikes and supply risks for local and regional construction sectors and infrastructure projects.

1.5.2 Alternative Locations

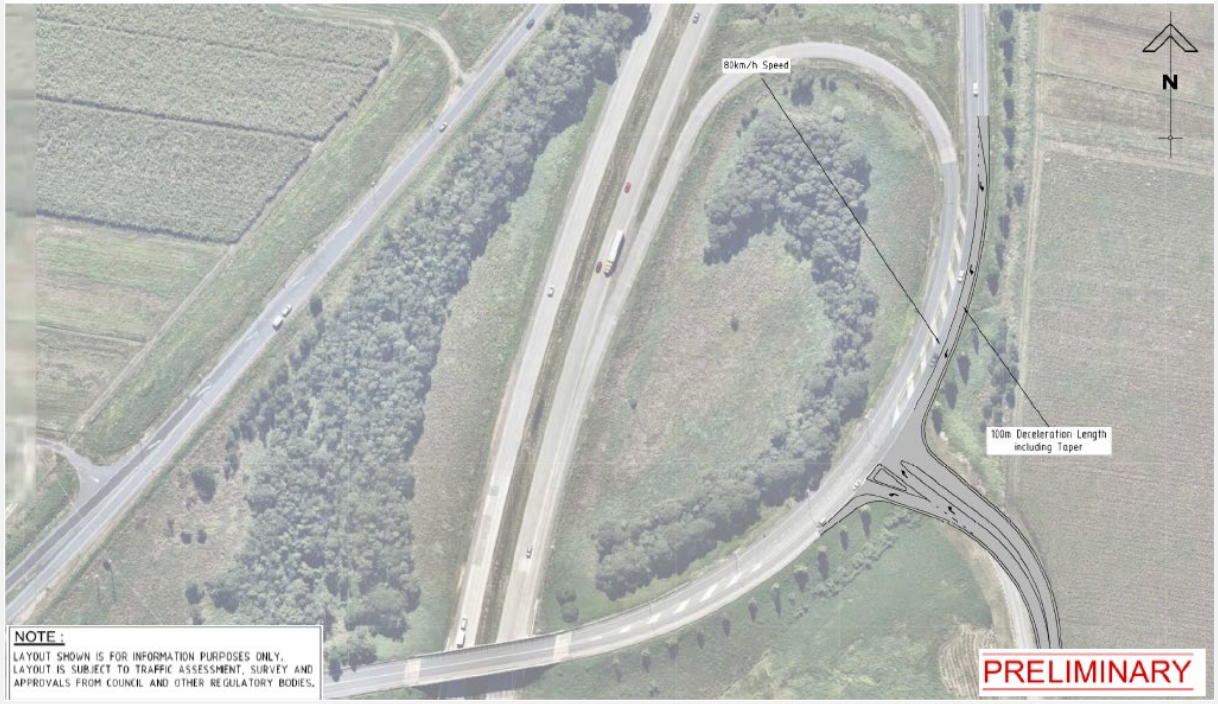
The sites' location and the quality of the sand resource are two elements which simply are not present together in another location. The subject site is favourably located adjacent major transport infrastructure, is land which has limited ecological value due to historically disturbance through land use, is comprised of marginal Agricultural Land (Refer Agricultural Land Assessment under Appendix M) and due to the impacts of climate change will continue to decline in its agricultural viability.

The alternative location option was discounted as it does not achieve the project objectives and the quality of the sand product in this location is not reproduced in other locations.

1.5.3 Alternative Project Design

While the project is based heavily on the approaches and management measures that have been proven effective on the site via Phase 1 to 4 operations, various options were considered when compiling the preferred project design. The primary area of options analysis focused on site access. **Table 8** below outlines three of the four options considered in relation to site access and the RMS feedback on these initial options.

Table 8: Access Option Analysis

OPTION NUMBER	RMS FEEDBACK
OPTION 1 	• It is understood under this option that heavy vehicles will be proposed to egress left out. • The AUL and CHR deceleration lanes will need to meet Austroads requirements for the posted speed limit, grade, and geometry for the target design vehicle/s. • Modelling will need to demonstrate adequate storage for vehicles turning right into the development under future conditions; demand management under a TMP & DCoC may be required to manage arrivals and mitigate any potential for queuing of right turning vehicles. • Vehicles entering Tweed Valley Way need to meet speed differential for through traffic under posted speed limit. Discussion highlighted that this option is likely to have an unacceptable impact on safety and efficiency of the interchange under peak conditions due to entry speed of laden vehicles merging onto Tweed Valley Way.

OPTION NUMBER	RMS FEEDBACK
OPTION 2  	• It is understood under this option that heavy vehicles will be proposed to egress left out. • The AUL and CHR deceleration lanes will need to meet Austroads requirements for the posted speed limit, grade, and geometry for the target design vehicle/s. • Modelling will need to demonstrate adequate storage for vehicles turning right into the development under future conditions; demand management under a TMP & DCoC may be required to manage arrivals and mitigate any potential for queuing of right turning vehicles. • Vehicles entering Tweed Valley Way need to meet speed differential for through traffic under posted speed limit. • The CHL acceleration lane necessitates a significant investment in bridge duplication with potential for impacts on the M1 during construction. Discussion highlighted that the level of investment required for this option may not provide a significant improvement in entry speed of laden vehicles merging onto Tweed Valley

OPTION NUMBER	RMS FEEDBACK
	Way, and that similar to option 1, this option is also likely to have an unacceptable impact on safety and efficiency of the interchange.
OPTION 3 	• Proposed roundabout treatment necessitates a lower speed environment with subsequent impacts on the efficiency of the interchange and the potential for queuing on the southbound on-ramp and Tweed Valley Way overbridge. • This option lowers the speed of all vehicles to accommodate entry speed of trucks. • Meeting discussed merit of dual circulating lanes and dedicated turn lanes to accommodate developmenttraffic. Option 3 was not supported by RMS during discussions due to impacts on safety and efficiency of the interchange.

Following consultation with RMS, the above 3 options were discounted and Option 4 which is the preferred access option presented in this EIS was selected.

1.6 Secretary's Environmental Assessment Requirements

As required by the Environmental Planning and Assessment Regulation 2000 (EPAR), Schedule 3, Clause 3(1) the Planning Secretary's Environmental Assessment Requirements (SEAR's) for the project were sought and received on the 17/12/2019. This EIS has been prepared in accord with these requirements. Where each of the requirements is addressed within this EIS or supporting technical study is summarised in **table 9**.

Table 9: SEAR's Summary Table

REQUIREMENT	LOCATION IN EIS	
GENERAL REQUIREMENTS	**REPORT / EIS**	**TECHNICAL STUDY**
The environmental impact statement (EIS) for the development must be prepared in accordance with the requirements of clauses 6 and 7 of schedule 2 of the *environmental planning and assessment regulation 2000*.		
In particular, the EIS must include:		
• **A stand-alone executive summary.**	Preliminaries	-
• **A full description of the development, including:**	Section 3.0	-
- **the resource to be extracted, including the amount, type, and composition.**	Appendix A14	Appendix N2
- **the site layout and extraction plan, including cross-sectional plans.**	Section 3.0	-
- **the production process and processing activities, including the inflow and out-flow of materials and points of discharge to the environment.**	Section 3.0	-
- **surface infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process).**	Section 6.8	Appendix E – Soil & Water Management Plan
- **a waste (overburden, rejects, tailings etc) management strategy.**	Section 6.1	Appendix E – Soil & Water Management Plan
- **a water management strategy.**	Section 6.14	Appendix H2 – Concept Rehabilitation & Landscape Management Plan
- **a rehabilitation strategy to apply during, and after completion of, extraction operations, and a proposed final use of the site; and**		

REQUIREMENT	LOCATION IN EIS	
- **the likely interactions between the development and any existing, approved or proposed development in the vicinity of the site.**	Section 1.3.3	Appendix B – Surface Water Assessment Appendix C – Ground Water Assessment Appendix G – Air Quality Assessment Appendix F1 – Operational Noise Impact Assessment Appendix J – Traffic Impact Assessment
• **A strategic justification of the development focusing on site selection and the suitability of the proposed sites.**	Section 4.0 through Section 8.0	Appendix B – Surface Water Assessment through Appendix Q – Economic Impact Assessment
• **A list of any approvals that must be obtained before the development may commence.**	Section 4.5	-
• **An assessment of the likely impacts of the development on the environment, focussing on the key issues identified below, including:** - **a description of the existing environment likely to be affected by the development, using sufficient baseline data.** - **an assessment of the likely impacts of all stages of the development, including any cumulative impacts, taking into consideration any relevant laws, environmental planning instruments, guidelines, policies, plans and industry codes of practice.** - **a description of the measures that would be implemented to avoid, minimise, mitigate and/or offset the likely impacts of the development, and an assessment of:**	Section 6.0	Appendix B – Surface Water Assessment through Appendix Q – Economic Impact Assessment

REQUIREMENT	LOCATION IN EIS	
O whether these measures are consistent with industry best practice and represent the full range of reasonable and feasible mitigation measures that could be implemented. O the likely effectiveness of these measures; and O whether contingency measures would be necessary to manage any residual risks; and - a description of the measures that would be implemented to monitor and report on the environmental performance of the development.		
• A consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS;	Section 7.0	-
• Consideration of the development against all relevant environmental planning instruments (including part 3 of the *state environmental planning policy (mining, petroleum production and extractive industries) 2007)*.	Section 4.3	-
• The reasons why the development should be approved, having regard to: - Relevant matters for consideration under the *environmental planning and assessment act 1979*, including the objects of the Act. - the biophysical, economic, and social impacts of the project, including the principles of ecologically sustainable development. - the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses. - feasible alternatives to the development (and its key components), including the consequences of not carrying out the development; and	Section 4.0 through Section 8.0	Appendix B – Surface Water Assessment through Appendix Q – Economic Impact Assessment
• A signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.	Preliminaries	-
While not exhaustive, attachment 1 contains a list of some of the environmental planning instruments, guidelines, policies and plans that may be relevant to the environmental assessment of this development.		
In addition to the matters set out in schedule 1 of the *environmental planning and assessment regulation 2000*, the development application must be accompanied by a signed report from a suitably qualified expert that includes an accurate estimate of the capital investment value (as defined in clause 3 of the *environmental planning and assessment regulation 2000*) of the development, including details of all the assumptions and components from which the capital investment value calculation is derived.	Section 3.2	Appendix T – Economic Impact Assessment

REQUIREMENT	LOCATION IN EIS	
KEY ISSUES	REPORT / EIS	TECHNICAL STUDY
Water – including:		
- a detailed site water balance, including a description of site water demands, water disposal methods (inclusive of volume and frequency of any water discharges), water supply infrastructure and water storage structures.	Section 6.1	Appendix B – Surface Water Assessment
- identification of any licensing requirements or other approvals under the *water act 1912* and/or *water management act 2000*;	Section 4.5	Appendix C – Ground Water Assessment
- demonstration that water for the construction and operation of the development can be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of any relevant water sharing plan (WSP);	-	Appendix C – Ground Water Assessment
- a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant WSP or water source embargo;	-	Appendix C – Ground Water Assessment
- a detailed assessment of potential flooding impacts;	Section 6.1.3	Appendix D1 – Flood & Stormwater Report
- an assessment of the likely impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives, and paying particular attention to potential flood-related nutrient transfers, including algal blooms;	Section 6.1	Appendix B – Surface Water Assessment Appendix C – Ground Water Assessment Appendix D1 – Flood & Stormwater Report
- an assessment of proposed interactions with groundwater, and the likely impacts of the development on aquifers, watercourses, riparian land, water-related infrastructure, and other water users; and	Section 6.1.2	Appendix C – Ground Water Assessment
- a detailed description of the proposed water management system (including sewage), water monitoring program and other measures to mitigate and manage surface and groundwater impacts.	Section 6.1	Appendix E – Soil & Water Management Plan

REQUIREMENT	LOCATION IN EIS	
Noise – including:		
- **a detailed assessment of the likely construction, operational and offsite transport noise impacts of the development in accordance with the *interim construction noise guideline*, *NSW noise policy for industry* and the *NSW road noise policy* respectively and having regard to the *voluntary land acquisition and mitigation policy*.**	Section 6.2	Appendix F1 – Operational Noise Impact Assessment Appendix F2 – Construction Noise Assessment
- **reasonable and feasible mitigation measures to minimise noise emissions; and**	Section 7.0	Appendix F1 – Operational Noise Assessment Appendix F2 – Construction Noise Assessment
- **monitoring and management measures, in particular real-time and attended noise monitoring;**	Section 7.0	Appendix F1 – Operational Noise Impact Assessment Appendix F2 – Construction Noise Assessment
Air quality – including:		
- **a detailed assessment of potential construction and operational impacts, in accordance with the *approved methods for the modelling and assessment of air pollutants in NSW,* and with a particular focus on dust emissions including pm2.5 and pm10, and having regard to the *voluntary land acquisition and mitigation policy*;**	Section 6.3	Appendix G – Air Quality Assessment
- **dust and other emissions generated from blasting, processing, operational activities and transportation of quarry products;**	-	Appendix G – Air Quality Assessment
- **reasonable and feasible mitigation measures to minimise dust and emissions; and**	Section 7.0	Appendix G – Air Quality Assessment
- **monitoring and management measures, in particular, real-time air quality monitoring;**	Section 7.0	Appendix G – Air Quality Assessment

REQUIREMENT	LOCATION IN EIS	
Biodiversity – including:		
- **accurate predictions of any vegetation clearing on site;**	Section 2.6.6	Appendix H1 – BDAR
- **a detailed assessment of the likely biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems, undertaken in accordance with the *biodiversity assessment method* and documented in a biodiversity development assessment report; and**	Section 2.6.6	Appendix H1 – BDAR
- **a strategy to offset any residual impacts of the development in accordance with the offset rules under the *biodiversity offsets scheme*;**	Section 2.6.6	Appendix H1 – BDAR
Heritage – including:		
- **an assessment of the potential impacts on aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with relevant aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage; and**	Section 6.5.1	Appendix I – Aboriginal Cultural Heritage Assessment
- **identification of historic heritage in the vicinity of the development and an assessment of the likelihood and significance of impacts on heritage items, having regard to the relevant policies and guidelines listed in attachment 1;**	Section 2.7.2	Appendix I – Aboriginal Cultural Heritage Assessment
Traffic & transport – including:		
- **accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products;**	Section 6.6	Appendix J – Traffic Impact Assessment
- **a detailed assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and state road network (as identified above), including a road safety audit; and**	-	Appendix J – Traffic Impact Assessment
- **a description of the measures that would be implemented to mitigate any impacts, including concept plans of any proposed upgrades, developed in consultation with the relevant road and rail authorities;**	Section 7.0	Appendix J – Traffic Impact Assessment
Land resources – including:		
- **a detailed assessment of potential impacts on soils and land capability (paying particular attention to potential acid sulphate soils, erosion and land contamination) and the proposed mitigation, management and remedial measures.**	Section 6.7	Appendix K – Acid Sulfate Soils Assessment Appendix L – Preliminary Site Investigation

REQUIREMENT	LOCATION IN EIS	
- an assessment of the agricultural impacts of the development, paying particular attention to any identified areas of strategic agricultural land;	Section 6.7.2	Appendix M – Agricultural Land Assessment
- potential impacts on landforms (topography), paying particular attention to the long term geotechnical stability of any new landforms (such as overburden dumps, bunds etc); and	Section 6.7.3	Appendix N1 - Geotechnical Report Appendix N2 – Landform Sections
- the compatibility of the development with other land uses in the vicinity of the development in accordance with the requirements in clause 12 of *state environmental planning policy (mining, petroleum production and extractive industries)* 2007, paying particular attention to the agricultural land use in the region;	Section 6.0	Appendix M – Agricultural Land Assessment
Waste – including estimates of the quantity and nature of the waste streams that would be generated or received by the development and any measures that would be implemented to minimise, manage or dispose of these waste streams;	Section 6.8	Appendix E – Soil & Water Management Plan
Hazards – including an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks and the transport, handling and use of any hazardous or dangerous goods;	Section 6.9	Appendix D2 – Flood Response Plan
Visual – including an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, including any new landforms and potential lighting impacts;	Section 6.10	Appendix O – Visual Impact Assessment
Social – including: - a detailed assessment of the potential social impacts of the development that builds on the findings of the social impact assessment scoping report, in accordance with the social impact assessment guideline for *state significant mining, petroleum production and extractive industry development*, paying particular consideration to: o How the development might affect people's way of life, community, access to and use of infrastructure, services and facilities, culture, health and wellbeing, surroundings, personal and property rights, decision-making systems, and fears and aspirations; o The principles in section 1.3 of the guideline; and o The review questions in appendix d of the guideline;	Section 6.11	Appendix P – Social Impact Assessment
Economic – including: - a detailed assessment of the likely economic impacts of the development, paying particular attention to: o The significance of the resource.	Section 6.12	Appendix Q – Economic Impact Assessment

REQUIREMENT	LOCATION IN EIS	
○ The costs and benefits of the project; identifying whether the development as a whole would result in a net benefit to NSW, including consideration of fluctuation in commodity markets and exchange rates; and ○ The demand on local infrastructure and services;		
Cumulative impacts – including an assessment of likely cumulative impacts of the proposed quarry operating in combination with other established quarries in the locality, paying particular attention to likely impacts on water resources, land capability and potential implications for strategic land use planning in the region; and	Section 6.13	Appendix B – Surface Water Assessment through Appendix Q – Economic Impact Assessment
Rehabilitation – including: - the proposed rehabilitation strategy for the site having regard to the key principles in the *strategic framework for mine closure*, including: ○ Rehabilitation objectives, methodology, monitoring programs, performance standards and proposed completion criteria. ○ Nominated final land use, having regard to any relevant strategic land use planning or resource management plans or policies; and ○ The potential for integrating this strategy with any other rehabilitation and/or offset strategies in the region.	Section 6.14	Appendix H2 – Concept Rehabilitation and Landscape Management Plan
CONSULTATION	**REPORT / EIS**	**TECHNICAL STUDY**
During the preparation of the EIS, you must consult with relevant local, state and commonwealth government authorities, service providers, aboriginal stakeholders, community groups and affected landowners. In particular, you must consult with: - affected landowners. - community groups. - the community consultative committee established for the existing Tweed Sand Quarry (DA 152-6-2005); - Tweed Shire Council. - biodiversity conservation division within the department. - the heritage branch within the department of premier and cabinet. - environment protection authority. - division of resources and geoscience within the department. - the crown lands, water, and department of primary industries areas within the department. - north coast local land services. - NSW Health.	Section 5.0	Appendix P – Social Impact Assessment

REQUIREMENT	LOCATION IN EIS
- **Water NSW.** - **Roads and Maritime Services; and** - **NSW Rural Fire Service.** **The EIS must:** • **Describe the consultation process used and demonstrate that effective consultation has occurred.** • **Describe the issues raised by public authorities, service providers, community groups and landowners.** • **Identify where the design of the development has been amended and/or mitigation proposed in response to issues raised; and** • **Otherwise demonstrate that issues raised have been appropriately addressed in the assessment.**	
FURTHER CONSULTATION AFTER 2 YEARS	
If you do not lodge a development application and EIS for the development within 2 years of the issue date of these requirements, you must consult further with the planning secretary in relation to the preparation of the EIS.	The SEAR's were issued 17/12/2019. The EIS has been prepared and lodged within 2 years of this date.

1.7 Structure of the EIS

This EIS is formulated into a single volume comprising a main report that describes the project in the context of the existing environment, the planning framework, key environmental issues, potential impacts, proposed mitigation measures and residual impacts; and supporting mapping and technical studies as appendices. The structure of the EIS is summarised in **table 10**.

Table 10: EIS Structure

SECTION	DESCRIPTION
Preliminary	• Provides: - EIS Declaration. - Glossary & Abbreviations; and - Executive Summary.
1 – Introduction	• Provides an overview of project, subject site, site history, applicant/proponent details.
2 - Project site	• Provides a detailed discussion of the project site.
3 - Project description	• Provides a detailed discussion of the project.
4 - Strategic and statutory context	• Provides a summary of the strategic and statutory context of the project; and • Provides commentary on the project's compliance.
5 - Engagement	• Provides summary of the project's engagement and community consultation.
6 - Environmental impact assessment	• Provides assessment of the project's environmental impact and summarises the findings of the project's technical studies.
7 - Mitigation measures	• Provides summary of the project's mitigation measures and ongoing monitoring measures.
8 - Evaluation & conclusion	• Provides project evaluation and conclusion.
Appendices	• Provides a copy of the Project Figures.

- Provides a copy of completed searches that are not associated with a technical study; and
- Provides a copy of Project Technical Studies.

This EIS is informed by the technical studies in the appendices and summarises these documents. The technical studies have been provided by the project team consisting of the following:

- Hanson Construction Materials.
- Gilbert & Sutherland.
- OSKA Consulting Group.
- Vaxa Group.
- ATP Consulting Engineers
- Burchills Engineering Solutions.
- Everick Heritage
- JWA Ecological Consultants
- Katestone Environmental
- Pacific Geotechnical
- RPS Group
- Zone Landscape Architecture.

The technical assessment reports have been separately authored by appropriately qualified persons.

1.8 Applicant / Proponent Details

The project applicant / proponent is Hanson Construction Materials Pty Ltd. Applicant details are summarised in **table 11**.

Table 11: Proponent Particulars

ELEMENT	PARTICULAR
Name:	Hanson Construction Materials Pty Ltd
Postal address:	PO Box 1636, TOOMBUL QLD 4012
ABN	90 009 679 734
ACN	009 679 734
Nominated contact	Mr. Murray Graham Development Manager
Nominated contact details	murray.graham@hanson.com.au Mob: 0417 641 012 Office: 07 3246 5554

Section 2 – Project Site

2.0 Project Site

This section provides a detailed description of the project site and its surrounds, its attributes and regulatory mapping that is applicable.

2.1 Location & Regional Context

The HTSP and the project site are located at Cudgen NSW 2487 within the Tweed LGA. The regional context and local location of the project site is discussed within Section 1.1.

2.2 Legal Description, Ownership & Size

The project site comprises eight allotments and one unnamed road reserve. Enabling works are required in one additional allotment and two road reserves. The legal description, registered owners / controlling authority (at the time of EIS lodgment) and the area of land associated with each are summarised in **table 12.**

Table 12: Project Site Legal Property Description, Owner/ Controlling Authority, and Land Size Summary

PROPERTY DESCRIPTION	OWNER / CONTROLLING AUTHORITY	LOT / LAND SIZE
PROJECT SITE		
Lot 22 DP1082435	Hanson Construction Materials Pty Ltd	74.56ha
Lot 23 DP1077509	Hanson Construction Materials Pty Ltd	2.552ha
Lot 494 DP720450	Hanson Construction Materials Pty Ltd	0.104ha
Lot 1 DP1250570	Cudgen Land Pty Ltd	90ha
Lot 2 DP1192506	Cudgen Land Pty Ltd	11.12ha
Lot 3 DP1243752	Cudgen Land Pty Ltd	1.612ha
Lot 51 DP1166990	Andrew Noel Brinsmead	55.13ha
Lot 50 DP1056966	Andrew Noel Brinsmead	1.094ha
Unnamed road reserve	Tweed Shire Council	~2.077485ha
ENABLING WORKS		
Lot 51 DP1056966	Roads and Traffic Authority of NSW	0.7690ha
Pacific Highway / Tweed Valley Way Interchange Road Reserve	RMS / Tweed Shire Council*	N/A

** The RMS is the roads authority for the Pacific Highway and Tweed Shire Council is the roads authority for Tweed Valley Way. See Section 2.2.5 of the Traffic Impact Assessment under Appendix J for diagram showing the road classifications and demarcation of road authority responsibilities.*

The location of the above allotments and road reserves are show in **Figure 5** and Appendix A4.

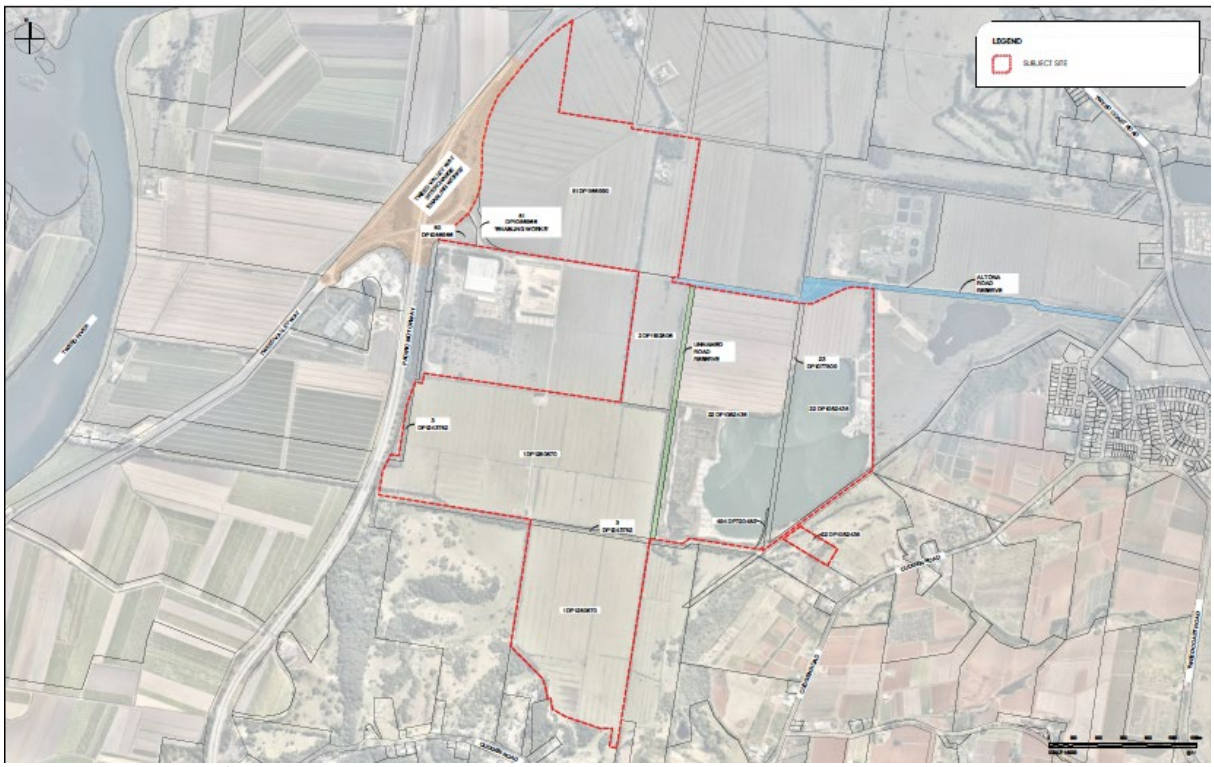


Figure 5: Project Site / Enabling Works Lot & Plan Location

2.2.1 Unnamed Road Reserve

The project site encompasses a piece of unnamed road reserve. This piece of unnamed road reserve is located between Lot 2 DP1192506, Lot 1 DP1250570 & Lot 22 DP1082435. The location of this piece of road reserve is identified in **Figure 5** and Appendix A4.

As this area is not associated with an enabling work for the project or either owned by or under contract to Hanson; A Road Closure and Purchase Application has been prepared and lodged with TSC. This application is currently being assessed with the relevant regulatory processes being undertaken. The piece of the unnamed road reserve proposed for closure and purchase is identified in **Figure 6** and Appendix A5.

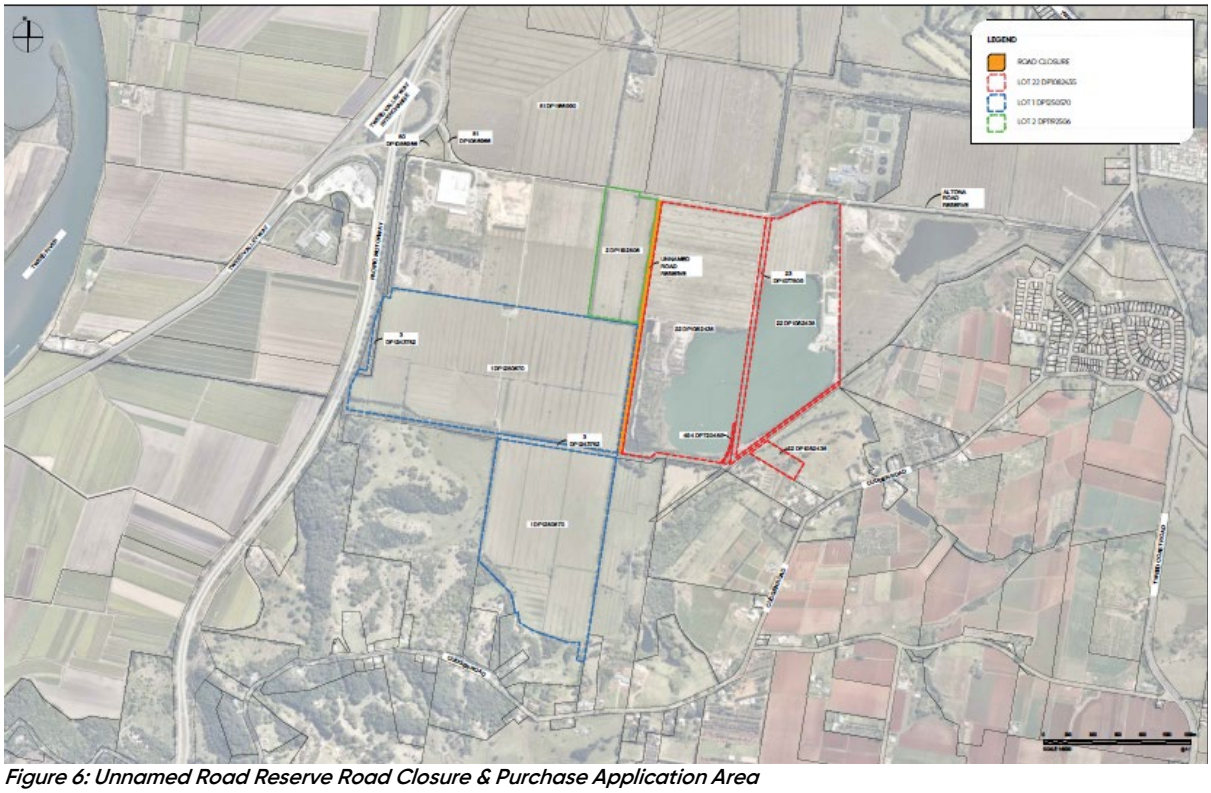


Figure 6: Unnamed Road Reserve Road Closure & Purchase Application Area

2.3 Zoning

The project site is zoned RU1 Primary Production and RU2 Rural Landscape under the provisions of the Tweed Local Environmental Plan (TLEP) 2014. The lots and road reserves where enabling works are required are zoned RU1 Primary Production and SP2 Classified Road. The zoning of each allotment and road reserve is summarised in **table 13**.

Table 13: Project Site Zoning Summary

PROPERTY DESCRIPTION	OWNER / CONTROLLING AUTHORITY
PROJECT SITE	
Lot 22 DP1082435	RU1 Primary Production
Lot 23 DP1077509	RU1 Primary Production
Lot 494 DP720450	RU1 Primary Production
Lot 1 DP1250570	RU1 Primary Production / RU2 Rural Landscape
Lot 2 DP1192506	RU1 Primary Production
Lot 3 DP1243752	RU1 Primary Production
Lot 51 DP1166990	RU1 Primary Production
Lot 50 DP1056966	RU1 Primary Production
Unnamed road reserve	RU1 Primary Production
ENABLING WORKS	

Lot 51 DP1056966	RU1 Primary Production
Pacific Highway / Tweed Valley Way Interchange Road Reserve	SP2 Classified Road

The zoning associated with the project site and the enabling works land is identified in **figure 7** and Appendix A6.

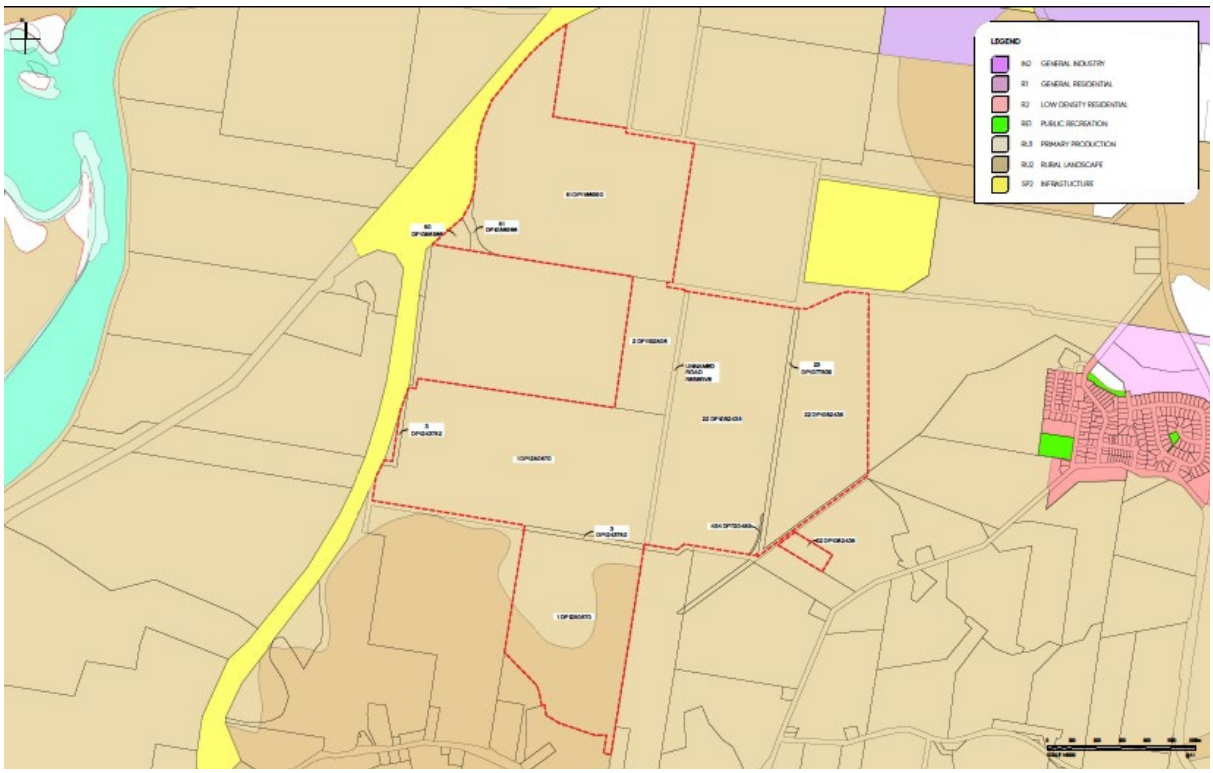


Figure 7: Zoning Plan

2.4 Existing Site Operations

Existing site operations are discussed in Section 1.3.

2.5 Services

Site is predominately clear of services; however, the following services have been identified on or traversing the site.

- Water and Sewer pipelines running from the ABLP facility to the Tweed Shire Council Kingscliff WWTP. These services run through Lot 2 DP1192506 into the Altona Road Reserve;
- Nextgen Cable and conduits running along the edge of the M1 road reserve against Lot 51 DP1166990, Lot 51 DP1056966 and Lot 50 DP1056966
- Optus Cable that appears to run from the north and terminate at the northern most extent of Lot 51 DP1166990

Refer Appendix A7 for copy of Services Diagrams.

2.6 Biophysical Factors

2.6.1 Climate

The climate statistics from the closest Bureau of Meteorology (BoM) weather station to HTSP, Coolangatta Airport (10km south), is summarised in **table 14**.

The northern NSW region is classed as having a subtropical climate with warm summers and no distinct dry season. This is shown in the Coolangatta Airport data (1999-2020) with December to February being the warmest months with a mean maximum temperature of 27-29°C.

Rainfall occurs all year round and averages 1,500 mm per year and 155 rain days. Whilst the number of rain days is consistent throughout the year, rainfall is more frequent and heavier in summer and spring compared to winter.

Table 14: Climate statistics from BoM Coolangatta Airport (1999 -2020)

CLIMATE SUMMARY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
MEAN MAXIMUM TEMPERATURE (°C)	28.5	28.3	27.4	25.5	23.2	21.1	20.7	21.6	23.4	24.6	26	27.4	24.8
MEAN MINIMUM TEMPERATURE (°C)	21	20.9	19.8	17	13.9	11.4	10.2	10.4	13.3	15.9	18.1	19.7	16
MEAN DAILY SOLAR EXPOSURE MJ/(M*M)	24	21	19	16	13	12	13	16	20	22	24	24	19
MEAN RAINFALL (MM)	160	185	186	158	130	137	71	57	39	89	118	145	1480
MEAN NUMBER OF DAYS OF RAIN	14	16	18	16	15	13	10	8	8	10	12	14	155

2.6.2 Noise

The subject site is adjoined by a number of noise generating uses and activities. These uses and activities include the M1, Tweed Coast Road, TSC WWTP, ABLP & CLSP. Existing background noise levels are outlined and discussed in detail within Operational Noise Impact Assessment under Appendix F1. The location of these noise generating uses and activities are identified in **Figure 2** and Appendix A2. Noise sensitive receivers is discussed in Section 2.8.

2.6.3 Air quality

The existing environment in the Cudgen area is influenced by climatic conditions of the region and local natural and anthropogenic activities. Emission sources of dust (particulate matter) are mainly diffuse sources such as road transport (motor vehicles), intensive agriculture (sugar cane farming) and HTSP & CLSP.

The Cape Byron Power Station at Condong Sugar Mill is the only significant point source of air pollutants in the region. It is located 12 km southwest of the project site on the Tweed River.

There are no ambient air quality or meteorological monitoring stations located in the Cudgen area. Variations in dusts levels can be expected during cane production and harvesting, after long periods without rainfall and during short-term events such as bushfires and dust storms. Background air quality is outlined and discussed in detail under Appendix G.

2.6.4 Topography & Drainage

Local topographic mapping indicates that the elevation of the property is uniform, with an average Relative Level (RL) of 1.0 metres Australian Height Datum (AHD). The site's slopes level (<1%) to very gently inclined (1-3%). The project site abuts the Cudgen Plateau to the south, where elevations rise steeply to approximately 38m AHD.

2.6.4.1 Regional Drainage

The project site is located within the lower reaches of the Tweed River Floodplain. The headwaters of the Tweed River begin near Kunghur NSW 2484, approximately 50 km southwest of Chinderah NSW 2487 and generally flow in a north-easterly direction. Numerous rivers, creeks and tributaries feed into the Tweed River, including the Oxley River approximately 5 km southwest of Murwillumbah NSW 2484, and the Rouse River west of Tumbulgum NSW 2490.

The Tweed River discharges into the Pacific Ocean at the Tweed River mouth, immediately east of Tweed Heads NSW 2485. The tidal influence of the Pacific Ocean extends just upstream of Murwillumbah NSW 2484.

Regional drainage is discussed in detail within the Flood & Stormwater Report under Appendix D1.

2.6.4.2 Local Drainage

The site is located within the Tweed Valley Floodplain. Most runoff from the site passively infiltrates through the highly permeable sandy soils. Any remaining runoff is currently diverted towards the on-site extraction areas or conveyed to a network of agricultural drains.

During high intensity rainfall events, the site becomes inundated and peak discharges may potentially flow toward the agricultural drainage lines constructed along the northern, southern and western property boundaries. These drains convey runoff from the surrounding agricultural properties through flood gates to the Tweed River.

The floodplain is crisscrossed by a network of interconnecting agricultural drains and flood gates which convey water from the floodplain to the Tweed River. The main drain through the catchment flows westwards from Tweed Coast Road parallel to Altona Road. The drain then turns northwards adjacent to the HTSP site before discharging into the Tweed River through culverts under the M1 and Chinderah Bay Drive.

These culverts have flood gates installed on the River side, under Chinderah Bay Drive. Other minor drains run east-west and north-south across the floodplain and generally discharge into the western drain. The floodplain is subject to inundation from both local catchment floods as well as Tweed River overbank floods.

Local drainage is discussed in detail within the Flood & Stormwater Report under Appendix D1.

2.6.5 Environmental setting (Sensitive Receivers)

The site is located 550m south east of the Tweed River proper and 85m from an associated tidal tributary. The site is separated from the Tweed River by the M1. More broadly the site is located approximately 2km from the Stotts Island Nature Reserve and 3km from the Cudgen Nature Reserve. The location of these items is identified in **figure 8** and Appendix A8.

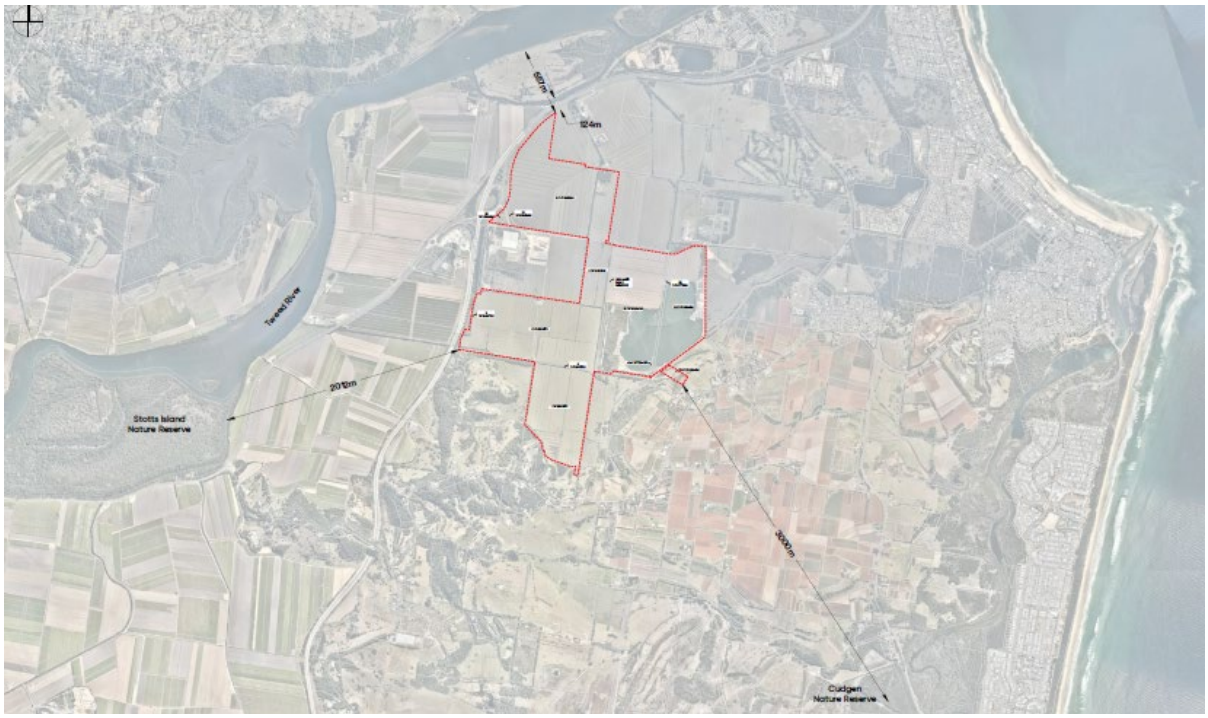


Figure 8: Surrounding Sensitive Receivers Natural

Wetland mapped under State Environmental Planning Policy (Coastal Management) 2018 occur approximately 1 – 1.5 km to the north, east south and west of the Subject site. The location of these items is identified in **figure 9** and Appendix A8**.** The north-western most corner of Lot 51 DP1166990 is mapped in the 'Coastal Environmental Area' and 'Coastal Use Area' under this policy. The location of the project site in relation to the 'Coastal Environment Area' and 'Coastal Use Area' mapping is identified in **figure 10** and Appendix A8**.**

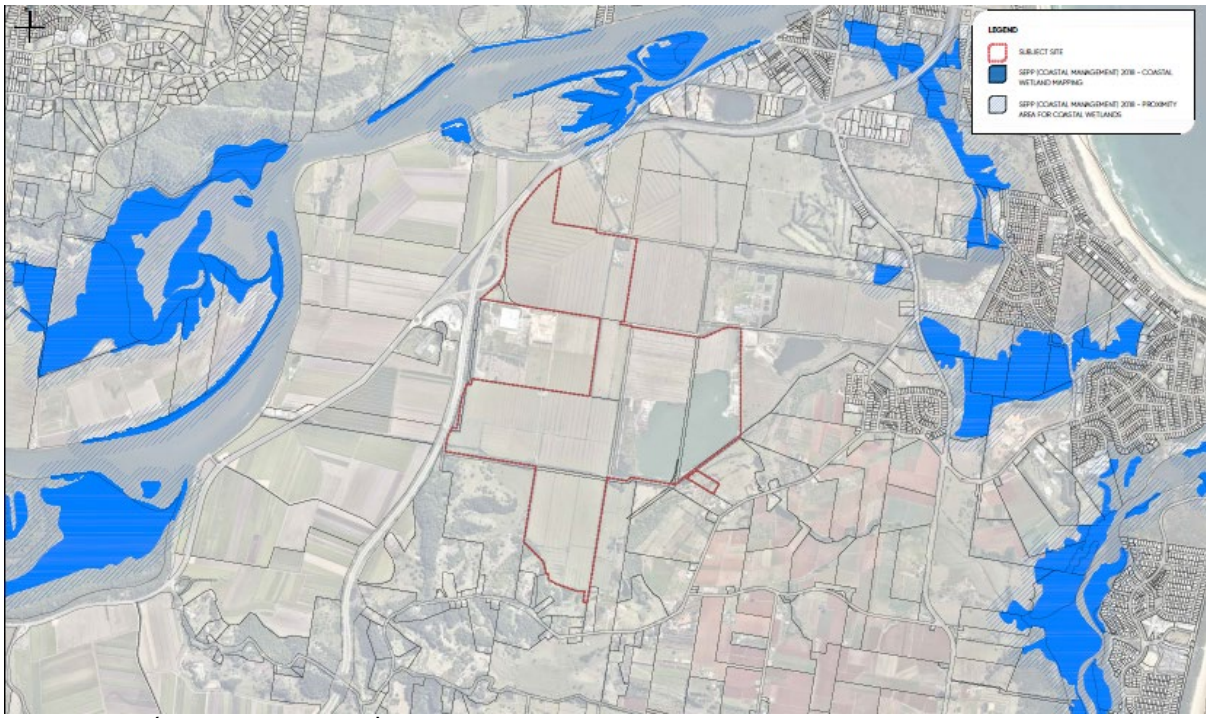


Figure 9: SEPP (Coastal Management) 2018 – Wetland Mapping

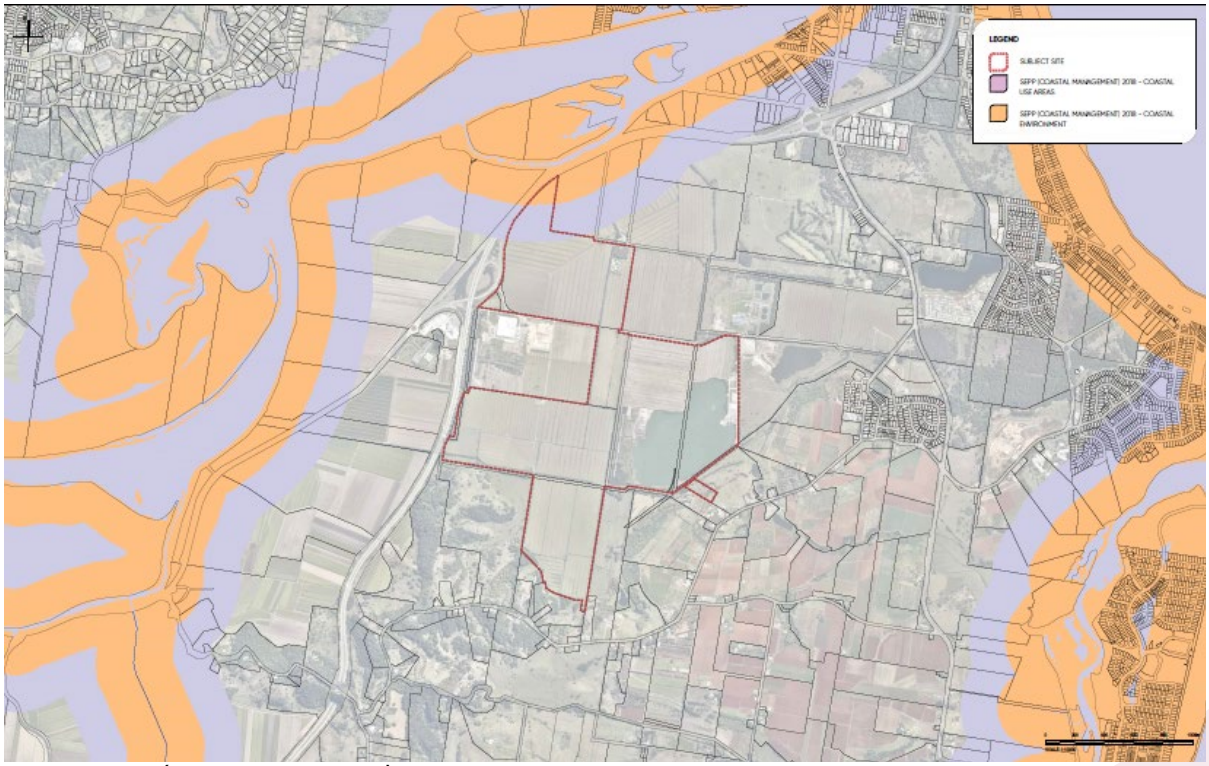


Figure 10: SEPP (Coastal Management) 2018 – Coastal Environment & Coastal Use Area

Groundwater Dependent Ecosystems (GDE) are mapped within the locality and on the periphery of the project site boundary. The GDE's on the periphery of the site are identified as a small patch of 'high potential GDE' on the north eastern corner of Lot 51 DP1166990 and patches of 'low potential GDE' on the south western boundary of Lot 1 DP1250570. The location of these items is identified in **figure 11** and Appendix A8.

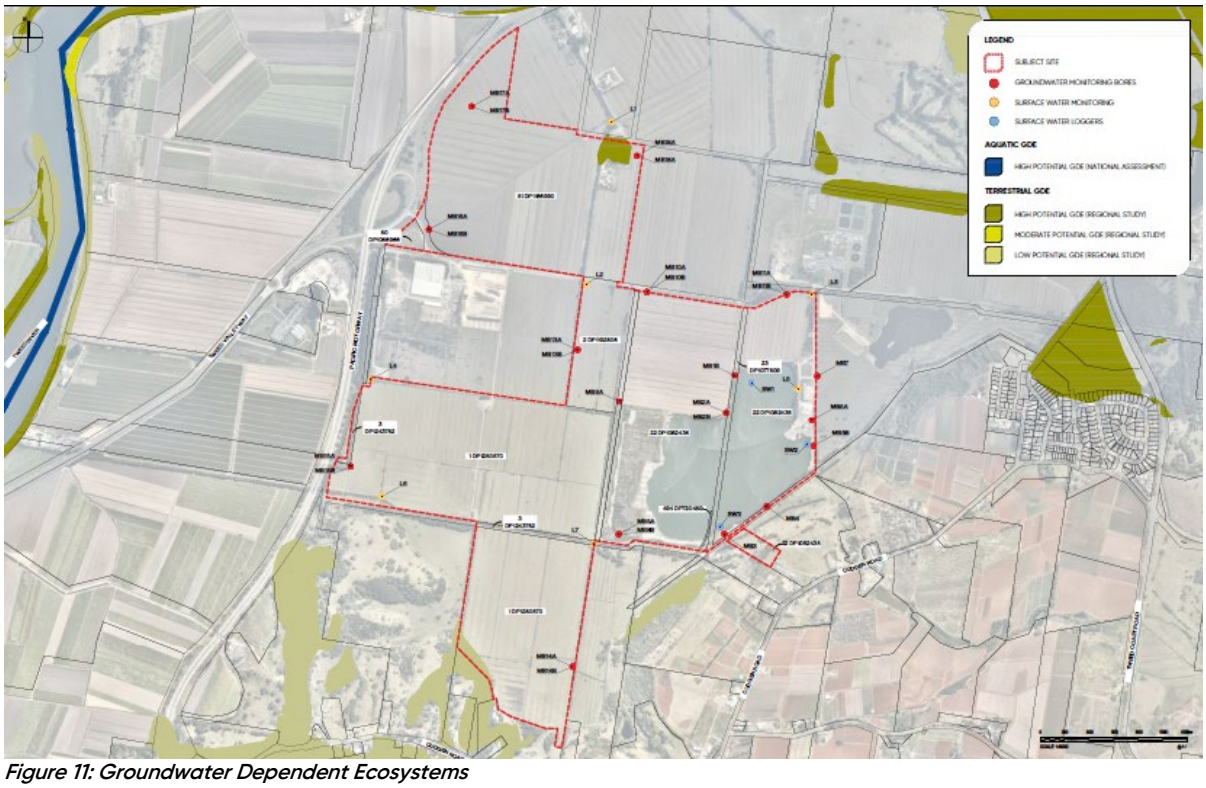


Figure 11: Groundwater Dependent Ecosystems

2.6.6 Biodiversity

2.6.6.1 Flora

Ecological Assessment indicates the site contains 6 Vegetation Zones. These zones are identified as:

- Vegetation Zone 1: Mid-high swamp sclerophyll forest (Casuarina glauca) to 18m (PCT 1235)
- Vegetation Zone 2: Mid-high regenerating swamp sclerophyll forest (Casuarina glauca) +/- Mangroves (Avicennia marina) to 5-10m (PCT 1235)
- Vegetation Zone 3: Tall swamp sclerophyll forest (Melaleuca quinquenervia, Cinnamomum camphora) to 22m (PCT 1064)
- Vegetation Zone 4: Tall rushland/reedland (Typha orientalis) to 2m (PCT 780, derived)
- Vegetation Zone 5: Tea tree plantation
- Vegetation Zone 6: Pasture grasses

The location of these vegetation zones is identified in **figure 11** and within the BDAR included under Appendix H1. For detail discussion of the existing ecological values of the project site see Appendix H1.

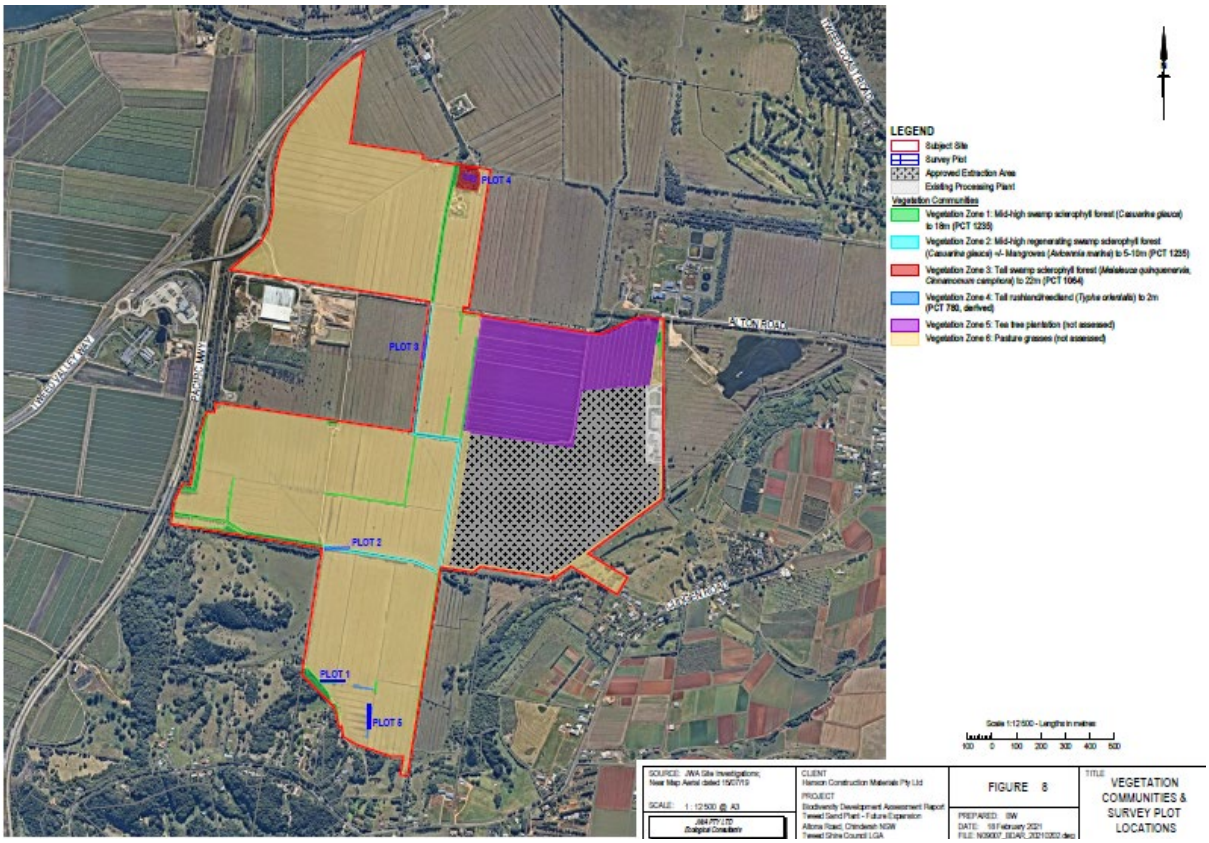


Figure 12: Existing Vegetation Zones

2.6.6.2 Fauna

Ecological Assessment indicates no threatened amphibians, reptiles or bird species have been recorded on the site. At the time of completing this EIS the analysis of Anabat data is ongoing and as such the precautionary principle has been applied and it has been assumed certain threatened mammal species are present on the project site. For detail discussion of the existing ecological values of the project site see Appendix H1.

2.6.7 Agricultural Land

The project site either wholly or partly is identified as 'regionally significant farmland' under the Northern Rivers Farmland Protection Project or 'Biophysical Strategic Agricultural Land' under SEPP (Mining, Petroleum Production and Extractive Industries) 2007. The location of the project site in relation to this mapping is identified in **figure 13**, **figure 14** and Appendix A9.

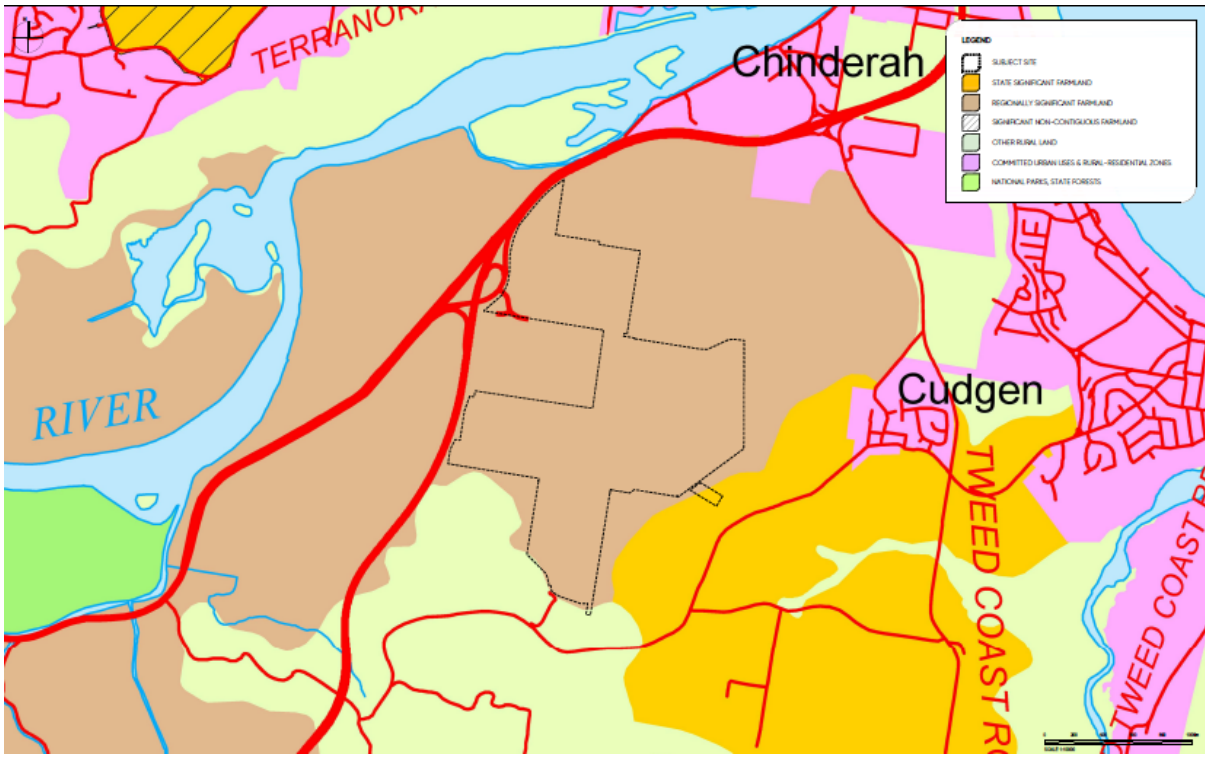


Figure 13: Northern Rivers Farmland Protection Project Mapping

Figure 14: Biophysical Strategic Agricultural Land Mapping

2.6.8 Bushfire

Most of the site is not identified as bushfire prone land. There is however patches of vegetated land on the periphery of the site that is mapped as bushfire prone. The location of the project site in relation to land mapped as bushfire prone is identified in **figure 15** and Appendix A18.

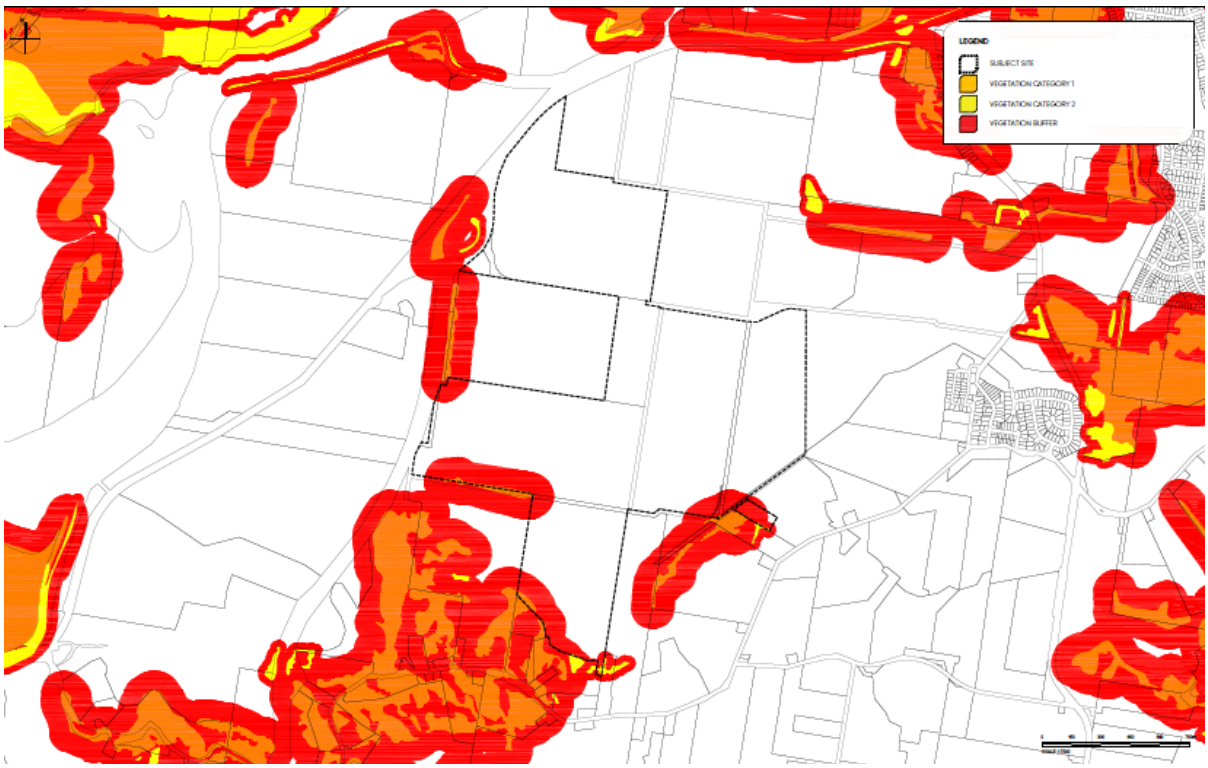


Figure 15: Bushfire Prone Land Mapping.

2.7 Cultural Factors

2.7.1 Aboriginal Cultural Heritage

Tweed Shire Council's Aboriginal Cultural Heritage Management Plan (ACHMP) indicates an area within the project site as a '*Aboriginal Place of Heritage Significance',* comprising the extraction pond in the eastern portion of Lot 22 DP1082435. This mapping applies to the Crescent Street Aboriginal site (#04-2-0109) which has previously been removed under a care and control order.

The southern extent of the Project Area (Lot 1 DP1250570) adjoins an area of hill slopes identified as an area of '*Predictive Aboriginal Cultural Heritage.'* The location of these items is identified in **figure 16** and Appendix A10.

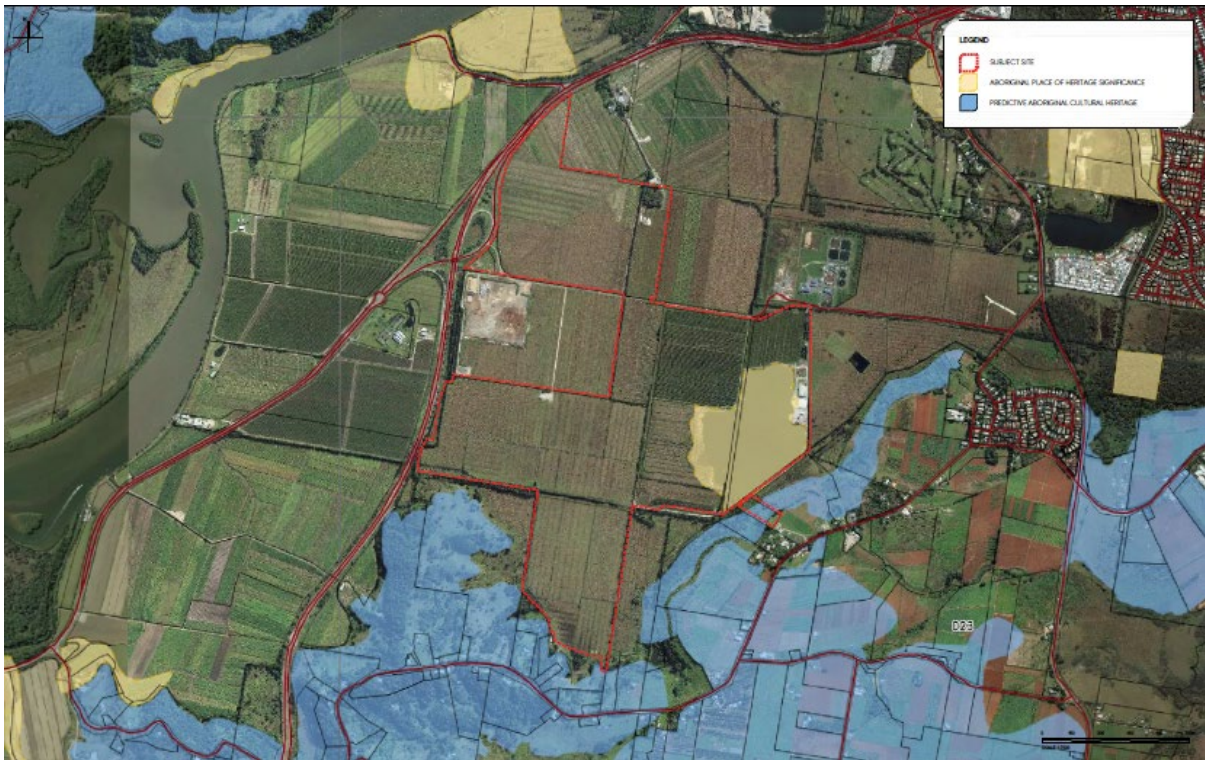


Figure 16: Aboriginal Cultural Heritage Mapping.

2.7.2 Other Heritage

Three items of local heritage are identified within proximity of the project site. These items are mapped under the TLEP 2014. These items are identified as the Chinderah Cemetery, Cudgen Dry Stone Walls, and Cudgen War Memorial cenotaph and are summarised in **table 15**.

Table 15: TLEP 2014 Items of Local Heritage Summary

ITEM NUMBER	ITEM NAME	ADDRESS	SIGNIFICANCE
I13	Chinderah Cemetery	Tweed Coast Road	Local
I22	Dry Stone Walls	463 Cudgen Road, 501 Cudgen Road	Local
I23	War memorial cenotaph and public-school rolls	11 Collier Street	Local

The location of these items of local heritage are identified in **figure 17** and Appendix A11.

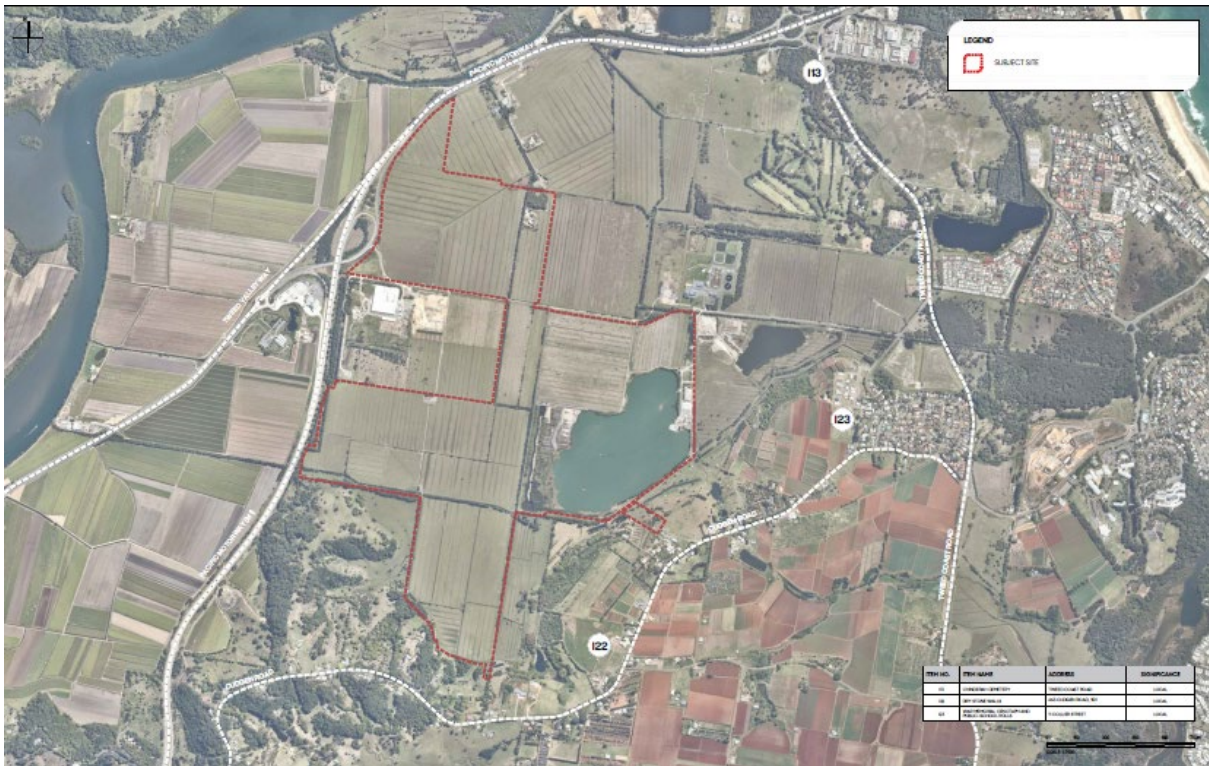


Figure 17: Location of Local Heritage Items

2.8 Surrounding Land Uses

Directly adjoining the bounds of the site, the nearest sensitive receptors consist of residential dwellings. These dwellings average between 200-300m from the subject land. An exception to this is the dwelling located on Lot 3 DP616805, this dwelling is approximately 30m from the bounds of the site. The location of the allotments which directly adjoin the boundary of the subject site and approximately location of dwellings located on these allotments are identified in **figure 18** and Appendix A12**.**

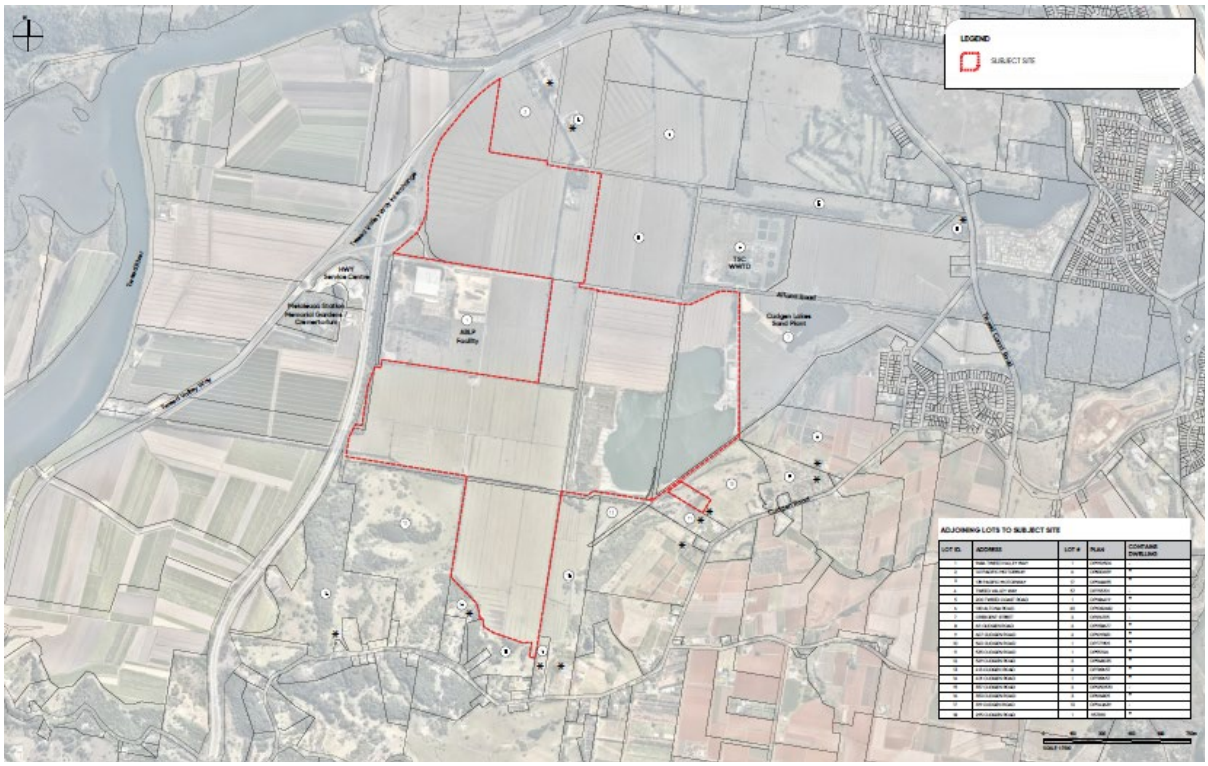


Figure 18: Surrounding Sensitive Receivers - Dwellings

It is noted that additional 'sensitive receivers' as applicable to the 'key issues' for the project are identified within the technical reports where relevant. For sensitive receives applicable to the relevant 'key issues' refer to the technical reports contained within the Appendices.

Directly adjoining non-residential land uses are discussed in Section 1.3.3.

The site contains a dwelling house on Lot 51 DP1166990.

Section 3 – Project Description

3.0 Project Description

This section provides a summary and detail description of the Project.

3.1 Project Title

Hanson Tweed Sand Plant Expansion Phase 5 to Phase 11

3.2 Capital Investment Value

Capital Investment Value (CIV) of the project is 12 million. CIV is discussed within Economic Impact Assessment under Appendix Q.

3.3 Project Description / Key Characteristics Summary

The project is the expansion of the existing HTSP. The project would access an available sand resource of approximately 30-35 million tonnes and provide production and transport of a maximum 950,000 tonnes per annum (market driven). Project life would be 30 years (market driven) spanning seven extraction phases.

The project would operate 24 hours, seven days a week. To achieve the intended maximum extraction rates the use of Altona Road and Tweed Coast Road as a haulage route will be abandoned. Connection to the Tweed Valley Way / M1 Interchange for operational access and haulage would be provided in its place.

The project would initially utilise the existing wash plant and stockpile area currently located on the eastern boundary of Lot 22 DP1082435; as extraction phases progress, the wash plant and stockpile area would be relocated to match operational requirements and appropriately manage the project's interaction with nearby sensitive receptors. This position would be at the northern end of Lot 2 DP1192506.

Rehabilitation and creation of 'habitat' would progressively occur across the phases. Hanson would retain ownership of the site following completion of sand extraction and any proposed subsequent use of the site would be decided via the appropriate consultative, application and regulatory processes in place at that time.

A snapshot of the project and summary of the key characteristics of the project are summarised in **table 16**.

Table 16: Key Project Characteristics

ELEMENT	PARTICULAR
CIV	$12 million
Sand resource	30-35 million tonne
Project life	30 years (market driven)
Extraction rate	950,000 TPA (market driven)
Transport rate	950,000 TPA (market driven)
Extraction depth	A variable depth (20m below ground level nominal)
Extraction limit	10m (min) from project site boundaries
Importation rate	60,000 TPA
Operating hours	24 hours, 7 days a week
Maximum haulage truck size	25m B-Double

ELEMENT	PARTICULAR
Vegetation removal	~3.66ha
Rehabilitation area	~20ha

3.4 Extraction Phasing

Seven extraction phases are proposed. The general arrangement of these extraction phases is identified in **figure 19** and Appendix A13.

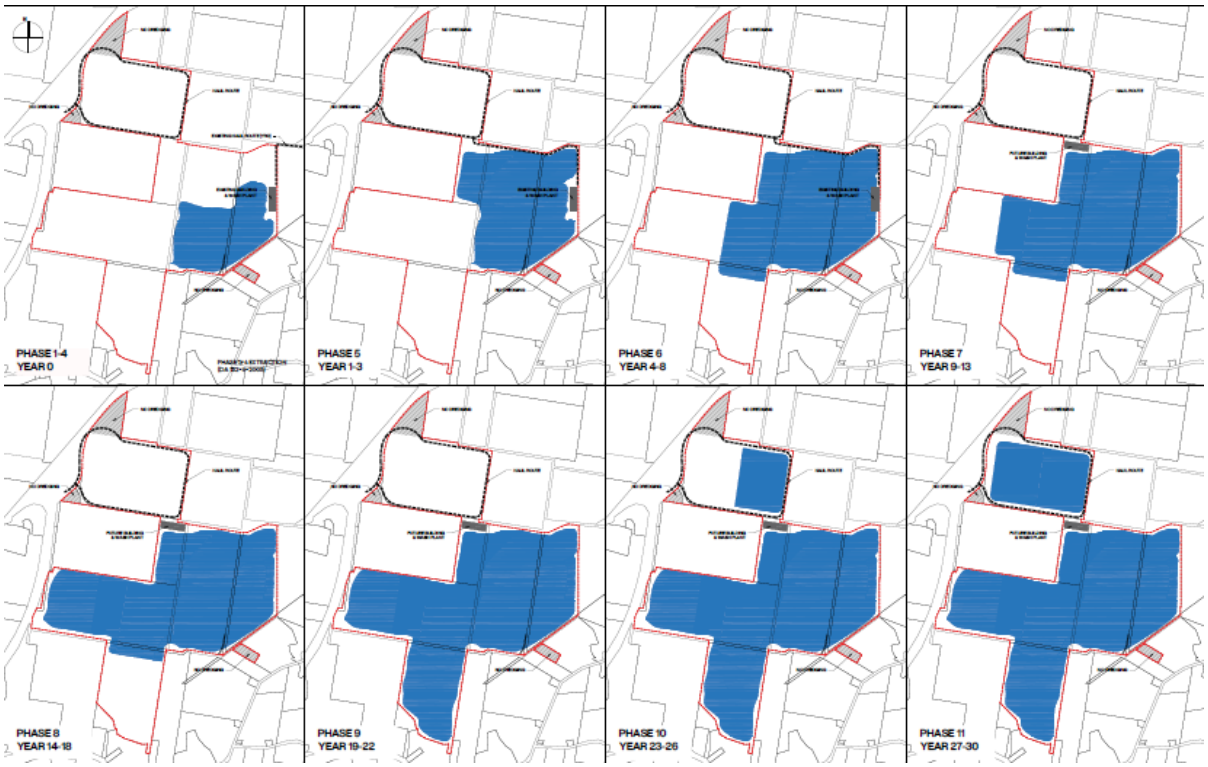


Figure 19: Extraction Phases

Flexibility is sought with regards to the order of extraction phasing, depending on Hanson operational requirements and market demand, the ability to undertake extraction across the phases in a non-sequential manner is proposed.

3.4.1 Completion of Phase 4 Extraction / Continued Operation under DA 152-6-2005 MOD 1

Phase 5 will include the completion of any Phase 4 extraction that is not completed prior to commencing operations under a project approval for Phase 5 to Phase 11. HTSP would continue to operate under DA 152-6-2005 MOD 1 until such time as extraction operations under an approval for Phase 5 to Phase 11 could occur. Once all pre-requisites for Phase 5 to 11 extraction to occur are complete, it is anticipated that DA 152-6-2005 MOD 1 would be surrendered.

3.4.2 Phase 1 to Phase 4 Re-extraction

Phase 5 will include the re-extraction of the Phase 1 to 4 areas to ensure a variable depth (20m below ground level nominal) has been achieved across these areas and to establish the proposed final lake bank profiles throughout these areas.

3.5 Site Layout

The proposed site layout for the project is identified in **figure 20** and Appendix A14.

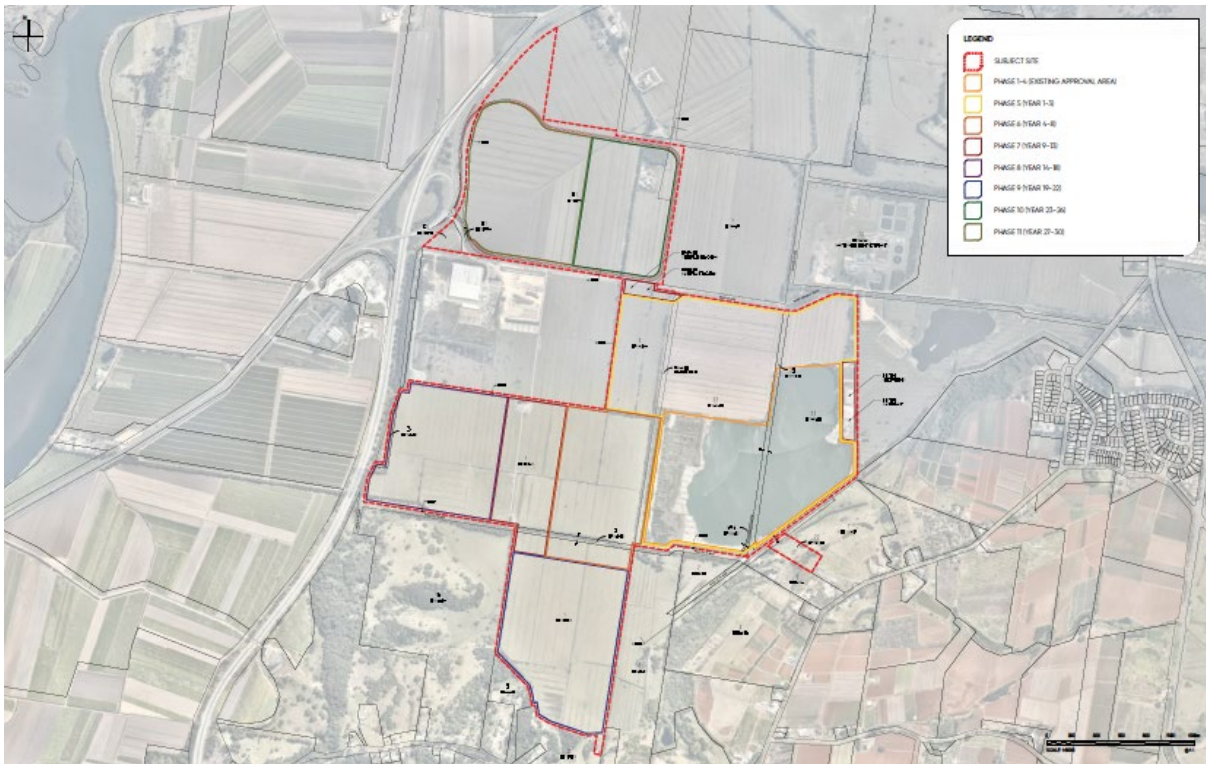


Figure 20: Site Layout

3.5.1 Lighting

The project seeks approval for 24 hours, seven days per week operations (see section 3.6) and as a result lighting will be required. The site would only be illuminated to the extent required to facilitate operational requirements. Lighting will be designed in accord with AS4282:2019 - Control of the obtrusive effects of outdoor lighting. Site lighting will be confined to the site buildings and wash plant area.

3.6 Operating Hours / Periods

The project proposes to operate 24 hours, seven days. Operating hours are summarized in the **table 17**.

Table 17: Proposed Operating Hours

ELEMENT	HOURS
Extraction & Processing	• 24 hours, 7 days a week
Haulage	• 24 hours, 7 days a week
Maintenance	• 24 hours, 7 days a week

24 hours operations will be grouped into 'day', 'evening' and 'night' periods as summarized in **table 18**.

Table 18: Proposed Operating Periods

TIME OF DAY	HOURS
Day	• 7:00am to 6:00pm
Evening	• 6:00pm to 10:00pm
Night	• 10:00pm to 7:00am

3.7 Access / Service Vehicles

To achieve the intended 950,000 tonnes per annum extraction rate, the use of Altona Road, Crescent Street and Tweed Coast Road as a haulage route (as currently approved under DA 152-6-2005 MOD 1) will be abandoned. Connection to the Tweed Valley Way / M1 interchange is proposed in its place.

The project will utilise any truck size up to a 25m B-double for haulage.

Access to the project site is proposed via a left turn from the southbound Tweed Valley Way off-ramp at the existing ABLP access intersection. Egress from the project site is proposed via an internal haulage road providing an acceleration lane commencing within the project site and then connecting to the Tweed Valley Way / M1 interchange. This access strategy is demonstrated in **figure 21**.

Figure 21: Access Concept: Proposed Vehicle Routes

The Haulage road will be located predominately on Lot 51 DP1166990. The internal haulage road will be a private road with no public access. There is to be no through connection facilitated from Altona Road to the Tweed Valley Way / M1 interchange as part of the project.

To facilitate access the proposal includes upgrades works (enabling works) to the adjoining road network in the form of:

- An acceleration lane and merge to the Tweed Valley Way / M1 interchange.
- Upgrades to the existing ABLP priority intersection including widening and a new left turn auxiliary.
- Upgrades to Tweed Valley Way Roundabout including lane widening.

These proposed upgrades are shown conceptually in **figure 22**, **figure 23** and **figure 24** below. For detailed discussion of these upgrades see Traffic Impact Assessment under Appendix J.

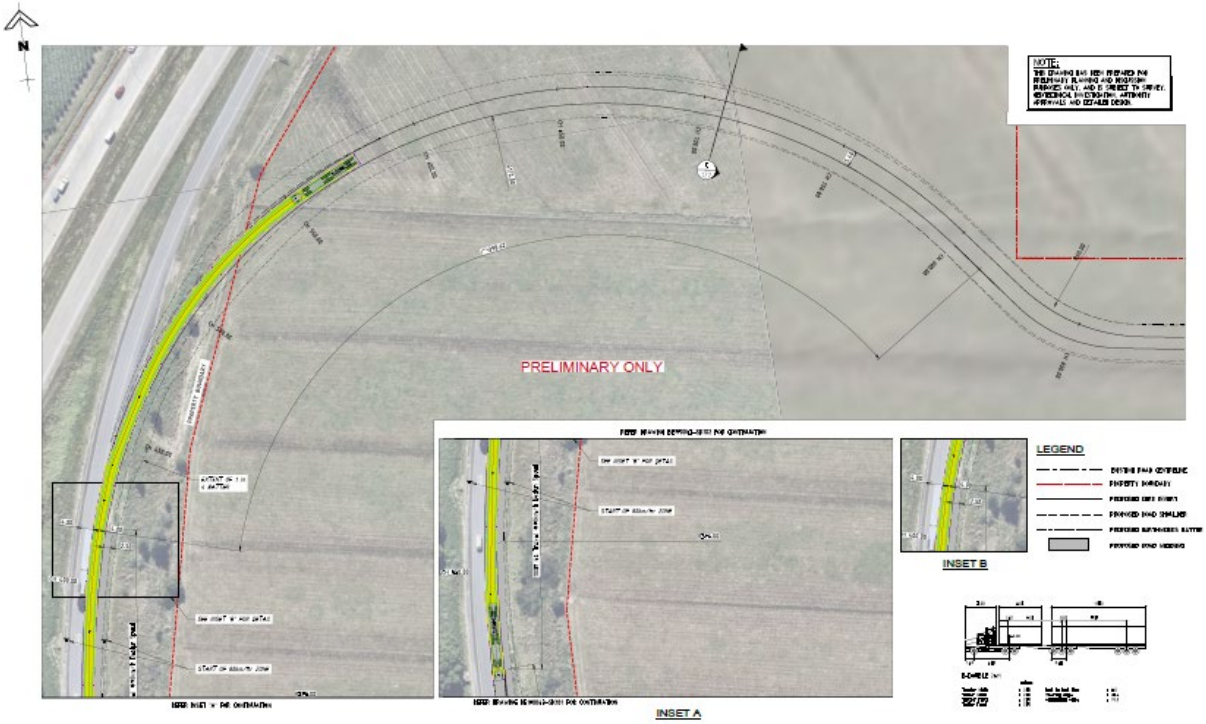


Figure 22: Access Concept: Tweed Valley Way / M1 Acceleration Lane & Merge

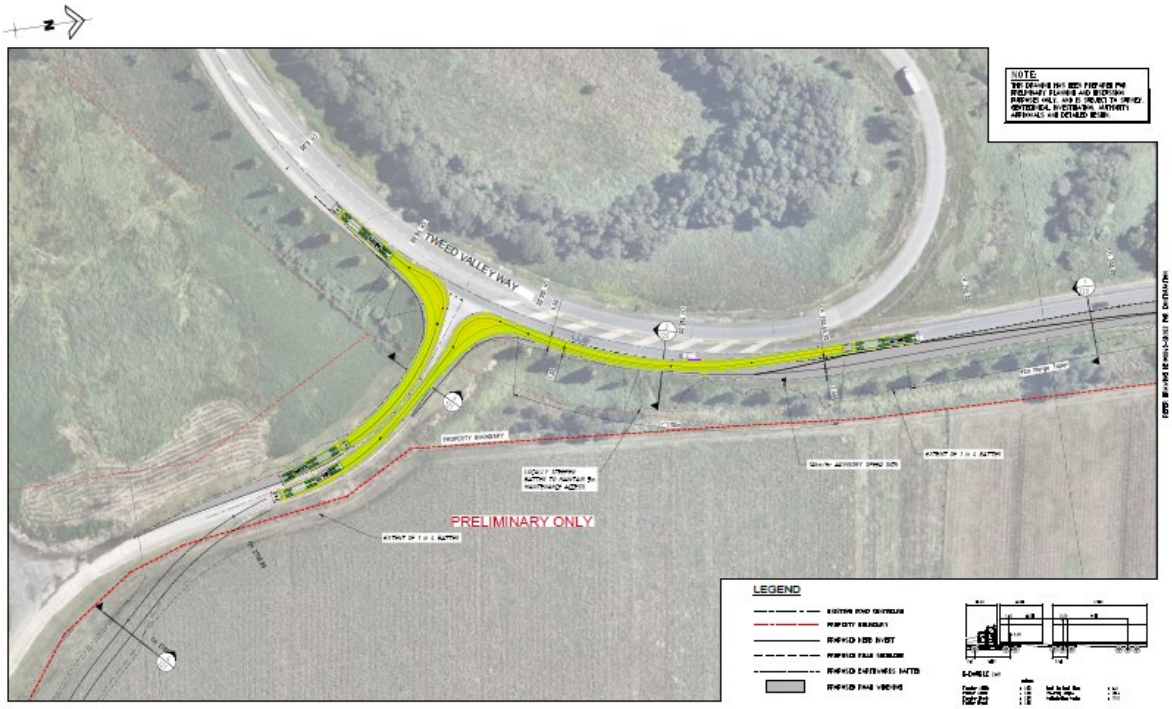


Figure 23: Access Concept: ABLP Priority Intersection Upgrades

Figure 24: Access Concept: Tweed Valley Way Roundabout Lane Widening

Phase 5 & 6 will utilise a small section of 'temporary' internal haulage route leading from the existing wash plant area connecting to the proposal haulage road located on lot 51 DP1166990. This portion of temporary internal haulage route will not be sealed. The temporary portion of the internal haulage route is identified in **figure 25** outlined in red dash.

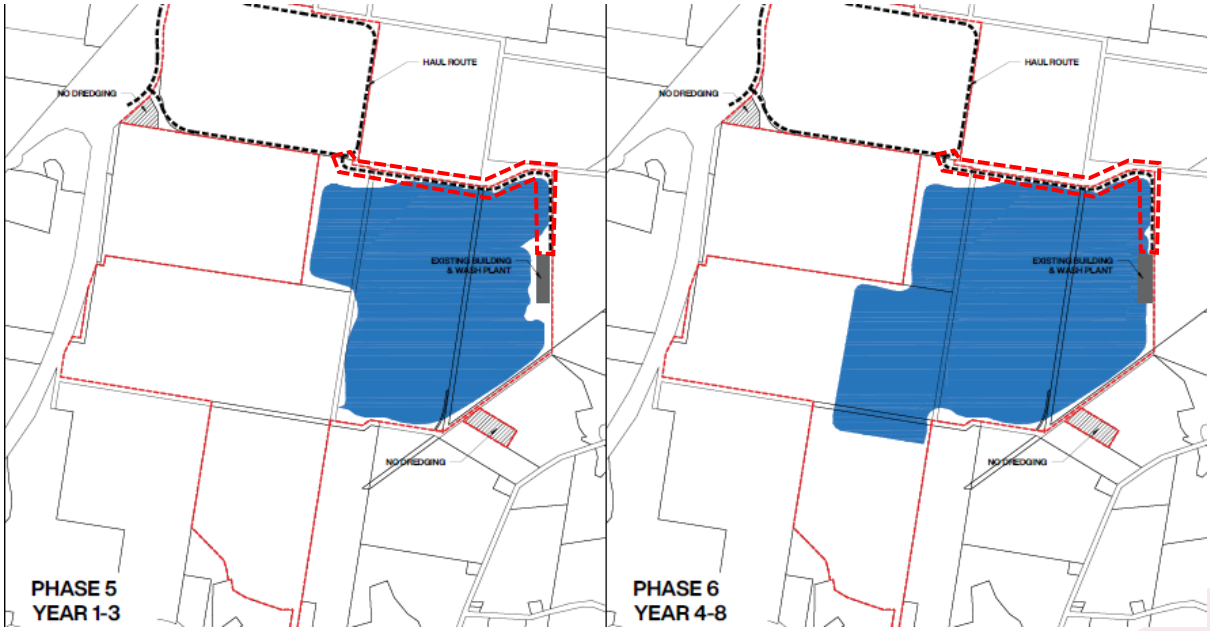


Figure 25: Temporary Portion of Haulage Route

3.8 Final Landform / Rehabilitation

Rehabilitation and establishment of a final landform is to occur progressively as extraction progresses. A conceptual final landform is identified in **figure 26** and Appendix A15. Proposed rehabilitation phasing is identified in **figure 27** and Appendix A16**.** At project completion, the rehabilitation area will comprise approximately 20ha (almost 10% of the site area).

Figure 26: Concept Final Landform Plan

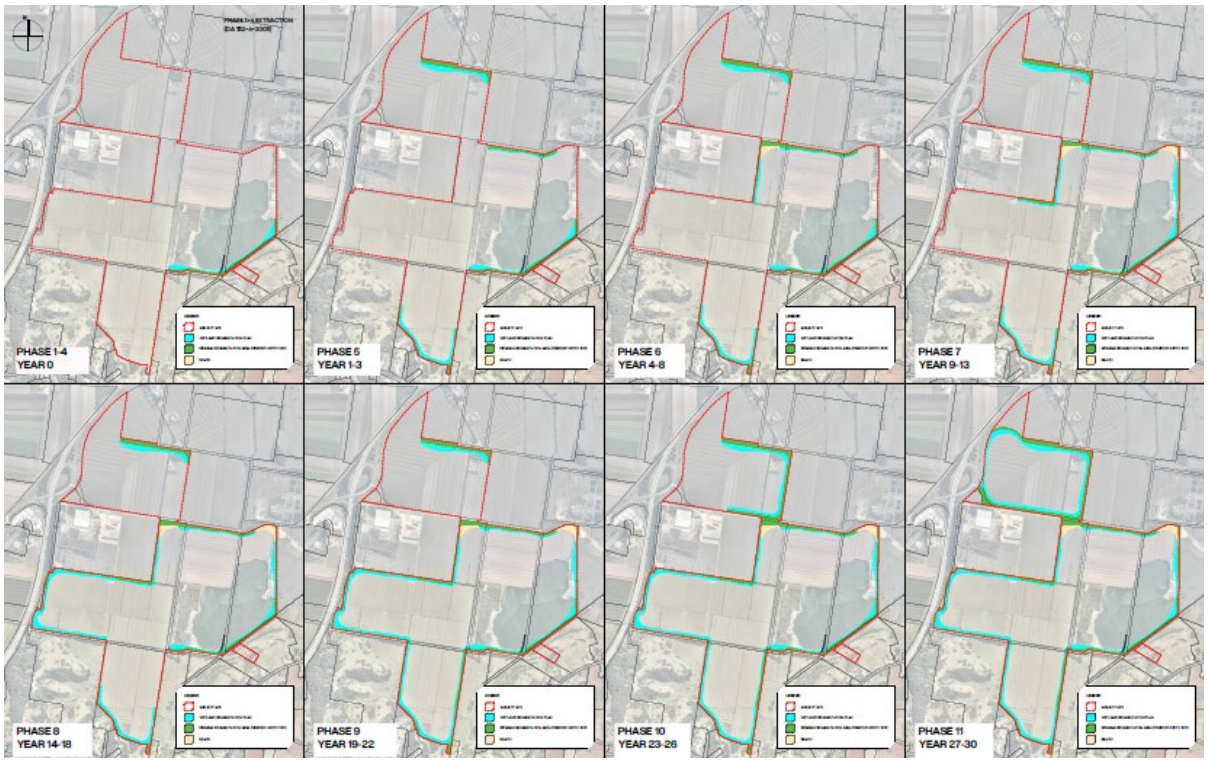


Figure 27: Rehabilitation Phases

The rehabilitation works will deliver three types of rehabilitation areas as follows:

- Wetland rehabilitation areas – primarily assisted natural regeneration of water plants/macrophytes around the fringes of the lake.
- Riparian rehabilitation areas – providing a variable width (minimum 10m wide) vegetated buffer around the perimeter of the subject site; and
- Open space areas – consisting of landscaped and grassed areas.

Following the completion of sand extraction in each phase, banks of the extraction lake will be graded to the appropriate levels (see Section 3.10) and stabilised where necessary. The banks and batters within and adjacent to the extraction lakes are to be non-uniform and exhibit an undulating surface (including areas of deep water) to maximise habitat diversity and mimic natural landform variance. The final form of lake banks will vary from gently inclined sandy 'beach' areas and wetlands to steeper banks reinforced with vegetation, floating wetlands and/or placed rock (or similar).

Detailed discussion of the progressive rehabilitation and establishment of final landform is provided in the Concept Rehabilitation and Landscape Management Plan under Appendix H2.

3.9 End Use

Hanson would retain ownership of the site following completion of sand extraction and any proposed subsequent use of the site would be decided via the appropriate consultative, application and regulatory processes in place at that time.

To ensure the broadest range of potential use options would be available upon completion of sand extraction, the project proposes to achieve several performance criteria as summarised in **table 19:**

Table 19: End Use / Rehabilitation Performance Criteria

FEATURE	OBJECTIVE
All areas of the site affected by the development	• Safe • Hydraulically and geotechnically stable, including the dredge pond margins (particularly where subject to regular wind and wave action) • Non-polluting • Fit for the intended post extraction land use(s) • Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land
Surface infrastructure	• Decommissioned and removed, unless otherwise agreed by the Secretary
Dredge pond and final lake	• Perimeter of dredge pond landscaped and vegetated using native tree and understory species. • Natural looking bank design with curved lake boundaries, with a variety of bank treatments (e.g., beaches, wetlands) providing a variety of habitats. • Minimise the extent and persistence of algal blooms • Water quality fit for the intended post extraction land use(s)

These performance criteria will be implemented through the preparation of a Rehabilitation Management Plan.

3.10 Extraction Lake Profiles

The project will utilise a range of extraction lake batter profiles to ensure long term lake bank stability. These lake bank profiles are described as:

- Section A1 – Reinforced embankment and gentle slope 1:4 then 1:3 adjacent to 15m setback and acceleration lane and merge to M1.
- Section A2 - Reinforced embankment and gentle slope 1:4 then 1:3 adjacent to the haul road and M1 combo.
- Section B – reinforced embankment and 1:3 slope adjacent to the haul road.
- Section C – adjacent to the southern M1 area and the end of Phase 9, 1:3 slope for wave action as these would be the areas taking long wind reach wave action.
- Section D – gabion wall section 1:3 slope for wave action and areas protruding into water body (i.e., lake corners) as well as to allow close to edge depth of water.
- Section E – sand only with 1:3 slope for possible beach type area close to the northern two corners of the south lake.

These profiles are identified in Appendix N2.

3.11 Staff

Current operations require three full time staff onsite. Additional onsite staff maybe required as production increases to the maximum of 950,000 tonnes per annum.

The project would require Hanson to expand their offsite staff numbers as the increased extract and associated increase in haulage would require additional truck drivers. A total of 18 jobs would be supported through the operational phase of the development (direct and first round supply chain).

3.12 Material Import

The project will import 60,000 tonnes per annum of Virgin Excavated Natural Material (VENM) including rock for the purposes of backfilling, armoring lake edges and rehabilitation works. This material would be imported via incoming truck movements.

3.13 Interim Agricultural Use / Agistment

Until an extraction phase comes online, the project would maintain existing agricultural use on the property. This use currently comprises predominately cattle grazing plus a small area of tea tree cultivation in the part of the project site identified as Phase 5. The land will be leased back for agistment as appropriate. This agistment process would require ongoing adjustment to site fencing as phases of extraction progress.

3.14 Waste Management

The project would not introduce any additional waste streams or generating activities. Existing waste streams on site include 'general waste', effluent (staff toilets), small quantities of lubricants and hydraulic fluids, fines materials from sand processing and overburden. These materials are currently managed appropriately as part of Phase 1 to 4 operations and it is proposed that these management measures continue to be applied.

3.14.1 Overburden

The extraction areas are topped with material containing organic matter to a depth varying between 300mm and 500mm. This overburden material would be progressively stripped from the active extraction phase as required to allow sand extraction. This material would be utilised as part of site rehabilitation and habitat creation. Any overburden material that cannot be utilised would be removed from the project site.

3.14.2 Fines

Fines materials will continue to be reinterred within the extraction lakes. This will be undertaken in accord with the Soil and Water Management Plan under Appendix E.

3.14.3 Effluent

Effluent from site offices will be disposed in via onsite effluent disposal system. This will be undertaken in accord with the Soil and Water Management Plan under Appendix E.

3.14.4 General Waste

General waste will be stored onsite in a medium sized skip and removed by licensed contractor. The volumes of general waste are minimal. This will be undertaken in accord with the Soil and Water Management Plan under Appendix E.

3.14.5 Lubricants & Hydraulic Fluid

Waste Lubricants & Hydraulic Fluid are stored in waste oil drums and collected by licensed contractor. The volumes of waste lubricants and hydraulic fluid is minimal. This will be undertaken in accord with the Soil and Water Management Plan under Appendix E.

3.15 Machinery Servicing

Machinery and equipment servicing / repair currently occurs onsite as part of Phase 1 to 4 operations. Facilities for this purpose form part of the existing onsite buildings and processing plant. The project would maintain these existing activities. These facilities would be relocated with the wash plant during Phase 7.

3.16 Consumables Storage

The project requires the storage of a small number of consumables, these include diesel, engine oils and hydraulic fluids. The quantities to be stored onsite as part of the project are summarised in **table 20.**

Table 20: Consumable Storage Summary

MATERIAL	QUANTITY
Diesel	• 12,000lt (in self bunded tank system)
Engine Oil	• 1 X 205lt drum
Hydraulic Fluid	• 1 X 205lt drum

These items are stored separately and in appropriate storage vessels or in appropriate bunded areas.

3.17 Construction Activities

Construction activities associated with the project and their timing are summarised in **table 21**.

Table 21: Construction Activities Summary

PHASE	CONSTRUCTION ACTIVITY
5	• Access construction (Tweed Valley Way / M1 Interchange connection) • Progressive overburden stripping • Progressive rehabilitation and final landform establishment • Agricultural fencing
6	• Progressive overburden stripping • Progressive rehabilitation and final landform establishment • Agricultural fencing
7	• Relocation of site buildings & wash plant • Progressive overburden stripping • Progressive rehabilitation and final landform establishment • Agricultural fencing

8	• Progressive overburden stripping • Progressive rehabilitation and final landform establishment • Agricultural fencing
9	• Progressive overburden stripping • Progressive rehabilitation and final landform establishment • Agricultural fencing
10	• Start new lake • Progressive overburden stripping • Progressive rehabilitation and final landform establishment • Agricultural fencing
11	• Progressive overburden stripping • Final rehabilitation and landform establishment

Construction activities would generally be limited to standard (daytime) construction hours as defined by the NSW interim Construction Noise Guideline. Subject to detailed future construction planning the project may require 'out of hours work' as part of haulage road and access upgrade construction, specifically during works to connect the haulage road to the Tweed Valley Way / M1 interchange and when undertaking upgrades to the Tweed Valley Way Roundabout (see section 3.7). Construction Noise is to be managed in accord with the Construction Noise Assessment under Appendix F2.

3.17.1 Enabling Works

Of the construction works identified within Section 3.17, the only activity considered an enabling work is the access and associated road upgrade construction. These works would be undertaken prior to commencing extraction. Refer Section 3.5.1 for discussion of ongoing extraction while enabling works are completed.

3.18 Decommissioning Activities

Decommissioning activities associated with the project and their timing are summarised in **table 22**:

Table 22: Decommissioning Activities Summary

PHASE	DECOMMISSIONING ACTIVITY
5	• None
6	• Existing site buildings & wash plant
7	• None
8	• None
9	• None
10	• Dwelling House on Lot 51 DP1166990
11	• Site buildings & wash plant • Haulage road (Tweed Valley Way / M1 Interchange connection) *

** decommissioning of the operations and haulage access to be decided in consultation with the Secretary as part of End Use considerations.*

Decommissioning activities would generally be limited to standard (daytime) construction hours as defined by the NSW interim Construction Noise Guideline.

Section 4 – Strategic & Statutory Context

4.0 Strategic & Statutory Context

4.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation (EPBC) Act 1999 is the primary environmental legislation at the Federal level. The EPBC Act is administered by the Commonwealth Department of Agriculture, Water and the Environment (DoAWE), and provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined under the EPBC Act as Matters of National Environmental Significance (MNES).

The EPBC Act 1999 confers jurisdiction over actions that have a significant impact on the environment where the actions affect, or are taken on, Commonwealth land. An action that has, will have or is likely to have a significant impact on a MNES or Commonwealth land, may not be undertaken without prior approval from the Commonwealth Minister, as provided under Part 9 of the EPBC Act 1999.

The Protected Matters Search Tool (PMST) is managed by DoAWE and is used to identify MNES near or potentially impacted by a development. A 10 km radius of the site was searched for MNES in March 2021. Results of this search are summarised in **table 23** and Appendix A17. This data, combined with local knowledge and records and further technical studies where relevant, has been used to assess whether the project will have, or is likely to have, a significant impact upon a MNES or on Commonwealth land.

Table 23: Matters of National Environmental Significance Summary

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE	COMMENTARY
World heritage properties	There are no world heritage properties in the search radius.
National heritage places	There are no national heritage properties in the search radius.
Wetlands of international importance (listed under the RAMSAR convention)	There are no wetlands of internal importance listed under the RAMSAR convention in the search radius.
Listed threatened species and ecological communities	There are four Threated Ecological Communities (TECs) recorded in the search area, these are identified as: • Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland (endangered). • Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (critically endangered) • Lowland Rainforest of Subtropical Australia (critically endangered) • Subtropical and Temperate Coastal Saltmarsh (vulnerable) 101 threatened species have been previously recorded in the search radius. Vegetation Zone 1, Zone 2 and Zone 3 (refer Section 2.6.6.1 and Appendix H1) are considered representative of Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland (endangered). Potential impacts of the project on these listed TECs have been assessed within Appendix H1.

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE	COMMENTARY
	No TECs will be significantly impacted by the project.
Migratory species protected under international agreements	81 migratory species have been previously recorded in the search radius. Potential impacts of the project on these listed migratory species have been assessed within Appendix H1. No migratory species will be significantly impacted by the project.
Commonwealth marine area	There are no Commonwealth marine areas in the search radius.
The great barrier reef marine park	The Great Barrier Reef Marine Park is not in the search radius.
Nuclear actions (including uranium)	There are no nuclear actions in the search radius.
A water resource, in relation to coal seam gas development and large coal mining development	This is not applicable to the project.

The project will not have, nor is it likely to have, a significant impact upon a MNES or on Commonwealth land.

4.2 National Greenhouse and Energy Report Act 2007

The Commonwealth National Greenhouse and Energy Reporting (NGER) Act 2007 provides a single national framework for the reporting and dissemination of information about the greenhouse gas emissions, greenhouse gas projects, and energy use and production of corporations. It makes registration and reporting mandatory for corporations whose energy production, energy use or greenhouse gas emissions meet specified thresholds.

Hanson triggers the threshold for reporting under the NGER Act 2007, and reports energy use and greenhouse gas emissions from its operations, including the HTSP.

The project is anticipated to generate minimal quantities of greenhouse gas emissions due to the selected extraction methodology, minimal use of electricity for the site depot, and the efficient use of fuels at the site. The proposed 24/7 operations of the project enable transportation of materials around peak traffic, further reducing fuel usage and greenhouse gas emissions.

Regardless, Hanson will continue to monitor and report energy use and greenhouse gas emissions associated with the project in accord with its obligations under the NGER Act 2007.

4.3 Environmental Planning & Assessment Act 1979

The EP&A Act 1979 provides the statutory framework for planning approval and environmental assessment in NSW. Implementation of the EP&A Act 1979 is the responsibility of the Minister for Planning and Public Spaces, statutory authorities, and local councils. It contains two parts that impose requirements for planning approval or environmental assessment being Part 4 Development Assessment and Consent and Part 5 Infrastructure and Environmental Assessment.

Part 4 of the EP&A Act 1979 is the part applicable to the project and provides for control of 'development' that requires development consent from the relevant consent authority. Division 4.7 of Part 4 of the EP&A Act 1979

provides for the assessment of SSD where the Minister for Planning and Public Spaces (or delegate) or the Independent Planning Commission is the consent authority. Refer Section 4.3.1 for discussion of SSD criteria.

4.3.1 State Significant Development Criteria

Clause 8 of SEPP (State and Regional Development) 2011 identifies that certain developments are declared to be SSD for the purposes of Section 4.36 of the EP&A Act 1979. A development is SSD if it meets the following requirements:

(a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and
(b) the development is specified in Schedule 1 or 2.

The project meets the definition of 'Extractive Industry' (refer section 4.2.4.3). 'Extractive Industry' is permissible with consent on the site under both the TLEP 2014 and SEPP (Mining, Petroleum Production and Extractive Industries) 2007. The proposal is not identified as exempt development, complying development, permissible without consent or prohibited development.

Under Schedule 1 of *State Environmental Planning Policy (State and Regional Development (2011)*, development for the purpose of 'Extractive Industry' that meets any of the following is identified as SSD.

(a) extracts more than 500,000 tonnes of extractive materials per year, or
(b) extracts from a total resource (the subject of the development application) of more than 5 million tonnes, or
(c) extracts from an environmentally sensitive area of State significance.

The project will extract 950,000 tonnes per annum from a total resource of between 30 and 35 million tonnes. The project meets both Schedule 1 Clause 7(1)(a) and (b) and is SSD.

4.3.2 Objects of the Act

The objects of the EP&A Act 1979 are specified in Section 1.3 of the Act and seek to promote the management and conservation of natural and artificial resources, while also permitting appropriate development to occur. The consistency of the project with the objects of the Act is considered in **table 24**.

Table 24: Objectives of the EP&A Act 1979

OBJECTIVES OF THE EP&A ACT 1979	CONSISTENCY OF THE PROJECT
(A) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the state's natural and other resources,	The project will enable the expansion of a long established and operating extractive industry that will contribute $99.4M (9.4M GVA construction & 3.0M per year operational) to the NSW economy and maintain employment for 18 people (direct and first round supply chain) during operations and 43 people during construction. The Social Impact Assessment (SIA) prepared for the project indicated there are low social impacts associated with the proposed expansion of HTSP. Based on communication and consultation undertaken in early 2021 there is little interest and concern associated with the current operations and this proposal. The changes and identified impacts can be monitored, with mitigations

OBJECTIVES OF THE EP&A ACT 1979	CONSISTENCY OF THE PROJECT
	applied as needed to ensure the ongoing social and economic welfare of the community. The project has been assessed by a range of specialist's consultants and where necessary appropriate management and mitigation measures identified to ensure environmental conservation. On balance the project will result in a net environmental benefit when undertaken in accord with the commitments and mitigation measures outlined within the EIS, see Section 7; and will promote the social and economic welfare of the community.
(B) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	The project is consistent with the principles of Ecologically Sustainable Development (ESD) as outlined in Section 4.3.3.
(C) to promote the orderly and economic use and development of land,	The orderly and economic use of land is best served by development which is permissible under the relevant Environmental Planning Instruments (EPI) and generally in accordance with planning controls. The project comprises a permissible development which is consistent with the statutory controls and strategic planning directions. As detailed in this EIS, the project will result in positive economic impacts through continued employment and contribution of $99.4M (9.4M GVA construction & 3.0M per year operational) to the NSW economy. Potential environmental risks associated with the project have been subject to thorough and rigorous specialist assessment, including subsequent refinement of project parameters to either avoid or minimise impact or result in beneficial outcomes. As demonstrated in this EIS, all noise and air emissions generated by the project would comply with relevant assessment criteria at all times of operation. Traffic generated by the project would not result in detrimental impact to the surrounding arterial road network. Appropriate mitigation measures and management strategies have been proposed to reduce any adverse residual environmental and social impacts. The proposal is consistent with an orderly and economic use of land.

OBJECTIVES OF THE EP&A ACT 1979	CONSISTENCY OF THE PROJECT
(D) to promote the delivery and maintenance of affordable housing,	Not applicable to the project.
(E) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	A detailed Biodiversity Development Assessment Report (BDAR) (see Appendix H1) has been completed to assess the project biodiversity impacts. Despite the progressive loss of 3.66ha of vegetation communities the proposal will achieve a net environmental benefit. A biodiversity offset strategy has been formulated to ensure compensatory measures are employed including monetary contribution to the NSW Biodiversity Offset Scheme and progressive site rehabilitation in the order of a total rehabilitation area of ~20ha. A residual risk of indirect impacts to biodiversity remains. However, the project has provided all possible and necessary measures to ensure the risk is as low as practicable.
(F) to promote the sustainable management of built and cultural heritage (including aboriginal cultural heritage),	There are no items of Aboriginal or non-Aboriginal heritage present within the project site nor is the project likely to adversely impact any such items located off the project site. A specialist consultant has assessed the presence of and potential impacts on Aboriginal cultural heritage, as described in Section 6.1.5.1 and 'other heritage' within this EIS at Section 6.1.5.2. Detailed site assessment indicates the project is unlikely to impact Aboriginal Cultural Heritage. Management measures will be implemented to ensure the protection of unidentified objects. The project site is well separated from 'other heritage' and will have no impact upon these items.
(G) to promote good design and amenity of the built environment,	Specialist consultants have assessed potential noise and air quality, as described in Section 6.1.2. The project has been designed in a manner which aims to avoid the potential for impacts in the first instance and management measures are proposed to mitigate and manage residual impacts, where necessary. The project will not impact upon the adjoining built environment.
(H) to promote the proper construction and maintenance of buildings, including the	All built structures for the project would comply with relevant building standards and be built to

OBJECTIVES OF THE EP&A ACT 1979	CONSISTENCY OF THE PROJECT
protection of the health and safety of their occupants,	ensure the health, well-being, and safety of site personnel. Existing buildings at the site depot / wash plant will be maintained for Phase 5 and Phase 6 and new facility constructed for Phase 7 onwards. Site consumables (potentially hazardous substances) stored onsite will be managed and stored in accordance with relevant legislation.
(I) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the state,	The TLEP 2014 aims to make local environmental planning provisions for land in the Tweed LGA in accordance with Section 3.31 of the EP&A Act 1979. In doing so, the NSW State Government promotes the assessment and approval of environmental planning and development at the local government level. The project is subject to the provisions of Part 4 of the EP&A Act 1979, and the Minister for Planning and Public Spaces is the consent authority. Despite the power to grant development consent be vested with the NSW State Government, TSC, as local government authority, has been regularly consulted throughout the planning phase of the project and preparation of this EIS, refer to Section 5.0.
(J) to provide increased opportunity for community participation in environmental planning and assessment.	As outlined in Section 5.0, Hanson has consulted with government agencies, the local community, and other stakeholders. Consultation is ongoing and further community involvement will occur through public notification of this EIS.

4.3.3 Ecologically Sustainable Development

One of the objects in Section 1.3 of the EP&A Act 1979 is "to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment".

Section 1.4 (Definitions) of the EP&A Act 1979 defers to the NSW Protection of the Environment Administration Act 1991 (POEA Act) for a definition of ESD. Section 6.2(2) of the POEA Act defines ESD as:

> *ecologically sustainable development requires the effective integration of social, economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:*
>
> *a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*

i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
ii. an assessment of the risk-weighted consequences of various options,

b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

c) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

d) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services, such as:

i. polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
ii. the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
iii. environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The following sections set out how the project aligns with the principles of ESD and how these principles have been incorporated into the design of the project.

4.3.3.1 Precautionary principle

Where there are threats of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent such damage. As described in this EIS, the HTSP has operated in the locality since 1983 with Hanson operating the site since 2007. This long-term history of the operation has given a well-established baseline of data relating to noise, air quality, surface and groundwater, etc; and what mitigation measures and approaches function effectively as part of site operations over a significant period.

This extensive baseline data has been used by the technical specialist to predict the environmental impacts of the project and formulate where required the projects mitigation measures.

As highlighted in this EIS,

- Despite the progressive loss of 3.66ha of vegetation communities, compensatory measures would be implemented in the form of a biodiversity offset strategy and onsite rehabilitation. On balance the project will result in a net environmental benefit when undertaken in accord with the commitments and mitigation measures.
- HTSP's current environmental management approach has proven effective over time with respect to risk reduction, hazard mitigation and protection of the receiving environment.
- HTSP is committed to achieving a stable landform with water quality at the site within an acceptable range to facilitate a wide range of end use scenarios.
- The proposed environmental management plans incorporate the intent of the precautionary principle. Implementation of the monitoring and management measures specified in these management plans will allow these goals to be achieved.

Where relevant all specialist studies have applied the pre-cautionary principle in their assessment and recommendations.

4.3.3.2 Inter-generational equity

Inter-generational equity is the concept that the present generation should ensure the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

As described in Section 6.1.1 and 6.1.3, the project will not have significant impacts on surface and groundwater availability or quality or air quality. Therefore, the project will not detract from future generation's access to and equal enjoyment of water or air.

The project will result in the loss of agricultural land. As described in Section 6.1.7.2 the land currently has a low agricultural land classification and due to the impacts of climate change will see its agricultural capacity continue to reduce as time progresses. Given the lands existing marginal classification and the trend of reducing agricultural capacity due to climate change, the 'loss' of the agricultural capacity will occur regardless of the project and will not impact inter-generational equity.

The project will have an impact upon vegetation communities on the site. However, biodiversity offsets will be provided to compensate for these impacts and progressive site rehabilitation will be undertaken. The biodiversity offsets are being implemented through relevant NSW systems and will be secured in perpetuity. The project will also deliver ~20ha of onsite rehabilitation. On balance the project will result in a net environmental benefit when undertaken in accord with the commitments and mitigation measures.

4.3.3.3 Conservation of biological diversity and ecological integrity

This is the concept that conservation of biological diversity and ecological integrity should be a fundamental consideration.

As described in Section 6.1.4, the project will progressively remove 3.66ha of native vegetation and result in associated impact. However, biodiversity offsets will be provided to compensate for these impacts, which will assist in the conservation of biodiversity and ecological integrity for other areas of native vegetation within NSW.

Further, onsite rehabilitation will be progressively undertaken. The proposed onsite rehabilitation offers the potential to increase local biodiversity through creation of both terrestrial and aquatic habitat. The rehabilitation strategy has been devised using similar principles applied to the current successful rehabilitation strategies for HTSP Phase 1 to Phase 4 and on balance will result in a net environmental benefit.

4.3.3.4 Improved valuation, pricing, and incentive mechanisms

This is the concept that environmental factors should be included in the valuation of assets and services. It is difficult to assign a monetary value to the environment of a locality, given the lack of precedence and guidelines in the valuation of environmental resources not considered for commercial use. A monetary value could not be placed against the greatest proportion of environmental attributes which may be affected. The approach taken on the project was to manage environmental impacts by identifying appropriate safeguards to mitigate adverse environmental effects and take up environmental enhancement opportunities and include the cost of implementing these safeguards in the total proposal cost.

Cost benefit analysis (CBA) was used to estimate the economic benefit of the project to NSW, which is in Appendix Q and summarised in Section 6.1.12. It is noted that the costs of water extraction, installation of additional site infrastructure, the loss of agricultural land and biodiversity offsets / rehabilitation were included in the capital and operating costs of the project.

Other environmental aspects such as noise, air quality and visual impacts to sensitive receivers were not costed as there will not be any residual impacts related to these aspects, however as described above the cost of associated mitigation measures have been factored in.

4.3.4 Environmental Planning Instruments & Other Policies

4.3.4.1 North Coast Regional Plan 2036

Although the North Coast Regional Plan (NCRP) 2036 is silent on Cudgen, the plan outlines the direction the region is seeking to take. Specifically, the NCRP 2036 outlines the following broad narrative for Tweed Shire.

> *'The Tweed Shire is the gateway between the North Coast of New South Wales and South East Queensland, and is the fastest growing area in the region.*
>
> *Tweed Heads is a regional city continuing to develop and integrate with South East Queensland and its 'twin town' of Coolangatta. Tweed residents will continue to access high-quality services and facilities from both sides of the NSW-Queensland border. Local services and facilities are provided at Kingscliff, Casuarina, Cabarita, Pottsville and Murwillumbah.*
>
> *The coastal settlements of the Tweed Shire have experienced some of the strongest growth on the North Coast. The popularity of the Tweed Coast is expected to continue into the future, particularly as opportunities for greenfield housing on the Gold Coast become more limited. Kingscliff will be an important centre in this regard and will service the growth of the Tweed Coast's network of villages.*
>
> *The Tweed is recognised for its iconic natural environment and contains the Mt Warning Caldera, World Heritage listed rainforests and dramatic mountain ranges. This environment, and the Tweed's proximity to the nationally significant tourist area of the Gold Coast, will support ongoing growth in the tourism industry.*
>
> *Regional priorities*
>
> - Manage and support growth in Tweed Heads.
> - Foster stronger alignment and integration with South East Queensland and adjoining local government areas such as Byron, Ballina and Lismore.
> - Deliver housing and jobs growth in Tweed Heads, Murwillumbah and Pottsville.
>
> *Economy and employment*
>
> - Foster the growth of knowledge-based, education and health-services industries within the Southern Cross University and The Tweed Hospital precincts.
> - Maximise opportunities associated with the growth of South East Queensland.
> - Promote economic diversification and business, industrial and aviation-industry employment growth by leveraging opportunities related to the Gold Coast Airport.
> - Deliver new employment and business park opportunities at Kingscliff, Pottsville and Murwillumbah.
> - Identify opportunities to expand nature-based, adventure and cultural tourism places and enhance visitor experiences associated with areas such as the Wollumbin, Mebbin, Mount Jerusalem and Nightcap national parks.
>
> *Housing*
>
> - *Deliver housing in Kingscliff, Cobaki, Bilambil, Terranora, and Kings Forest, and explore additional Greenfield opportunities at Dunloe Park in Pottsville.*
> - *Enhance housing diversity by increasing the number of homes in Tweed Heads, Kingscliff, Cobaki, Kings Forest and Dunloe Park.*

In addition, the NCRP 2036 contains several directions and actions for implementation of sustainable development in the North Coast Region. Of relevance to the site and project are directions 11 and 13.

Direction 11 of the Plan is to 'Protect and enhance productive agricultural land'. The project site is either wholly or partly identified as 'regionally significant farmland' under the Northern Rivers Farmland Protection Project or 'Biophysical Strategic Agricultural Land' under SEPP (Mining, Petroleum Production and Extractive Industries) 2007.

However, the plan also includes criteria for assessing the suitability of important farmland for non-agricultural land uses. The Important Farmland Interim Variation Criteria are identified in **table 25:**

Table 25: Important Farmland Interim Variation Criteria (Source: North Coast Regional Plan 2036)

IMPORTANT FARMLAND INTERIM VARIATION CRITERIA	
LAND MAY BE SUITABLE FOR USES OTHER THAN FARMLAND IF:	
AGRICULTURAL CAPABILITY	• The land is isolated from other important farmland and is not capable of supporting sustainable agricultural production
LAND USE CONFLICT	• The land use does not increase the likelihood of conflict and does not impact on current or future agricultural activities in the locality
INFRASTRUCTURE	• The delivery of infrastructure (utilities, transport, open space, communications and stormwater) required to service the land is physically and economically feasible at no cost to State and Local Government
ENVIRONMENT AND HERITAGE	• The proposed land uses do not have an adverse impact on areas of high environmental value, and Aboriginal or historic heritage significance
AVOIDING RISK	• Risk associated with physically constrained land are identified and avoided, including: - Flood prone; - Bushfire-prone; - Highly erodible; - Severe slope; and - Acid sulfate soils.

The lands Agricultural viability has been assessed within Section 6.1.7.2 and Appendix M. As demonstrated the land has a low Agricultural capability and due to the impacts of climate change will continue to decline in agricultural capacity over time.

Direction 13 of the Plan is for the 'Sustainable Management of Natural Resources' and notes the following:

> *'…it is important that these resources are not affected or sterilised by the encroachment of sensitive land uses, and that mining activities are undertaken sensitively to minimise negative impacts on the environment, significant agricultural land, neighbouring businesses and the community. Planning for these activities will help to avoid potential land use conflicts.'*

Action 13.2 of the plan provides the following goal:

> *Plan for the ongoing productive use of lands with regionally significant construction material resources in locations with established infrastructure and resource accessibility.*

The proposed expansion of HTSP is in line with the intent of Direction 13 and Action 13.2. The project site has been assessed as marginal agricultural land which will continue to decline in productive capacity due to climate change; the proposal is anticipated to avoid land use conflicts as the proposal will not introduce a new land use into the locality or a land use that would prevent on going agricultural activities in the broader locality.

The project is consistent to the intent of the NCRP 2036.

4.3.4.2 State Environmental Planning Policies

The relevant SEPP's which have been considered in relation to the project are summarised in **table 26**.

Table 26: SEPP Consideration / Compliance Summary

STATUTORY CONTEXT	CONSIDERATIONS	LOCATION IN EIS
SEPP 33 – Hazardous and Offensive Development	SEPP 33 requires consideration of whether the proposal is a 'potentially hazardous industry'. The project stores minimal quantities of diesel, engine oil and hydraulic oil on the subject site. The proposal is not considered to 'potentially hazardous' as defined by the SEPP	• Section 6.1.9 of the EIS.
SEPP 55 – Remediation of Land	Historical uses and activities on the land have the potential to be contaminating. A PSI has been prepared to assess the project site suitability for the proposed land use.	• Section 6.1.7.4 of the EIS. • Appendix L – Preliminary Site Investigation.
SEPP (Coastal Management) 2018	The north-western most corner of Lot 51 DP1166990 is mapped in the 'Coastal Environmental Area' and 'Coastal Use Area' under this policy. Refer **figure 10** and Appendix A8 for the location of land mapped under this policy. The project site does not include land mapped as any of the following: • Coastal Wetlands. • Land in Proximity to Coastal Wetlands. • Littoral Rainforest. • Land in Proximity to Littoral Rainforest. The policy requires that development consent must not be granted to development on land in the 'Coastal Environmental Area' and the 'Coastal Use Area' unless the consent authority has considered Clause 13 and Clause 14 of the policy, respectively. The proposal has been designed to avoid impacts relating to the items identified in Clause 13 and 14. Development consent can be granted.	• Section 6.1.1, Section 6.1.5.1 and Section 6.1.10 of the EIS. • Appendix C – Ground Water Assessment. • Appendix B – Surface Water Assessment. • Appendix D1 – Flood & Stormwater Assessment. • Appendix I – Aboriginal Cultural Heritage Assessment. • Appendix O – Visual Impact Assessment.
SEPP (Infrastructure) 2007	The site has frontage and proposes access to a classified road (M1). Sand extraction will also be adjacent the associated road reserve. Clause 101 of the policy requires the consent authority to consider the safety,	• Section 6.1.6 of the EIS. • Appendix J – Traffic Impact Assessment.

STATUTORY CONTEXT	CONSIDERATIONS	LOCATION IN EIS
	efficiency, and ongoing operation of classified roads. Clause 104 of the policy requires traffic generating development of certain types and sizes to be referred to Roads and Maritime Services for comment. The proposal will not unacceptably impact the adjoining road network.	
SEPP (Mining, Petroleum Production and Extractive Industries) 2007	The proposal is defined as an 'Extractive Industry' and as such the policy is applicable. Clause 7 of the policy establishes that the proposal is 'permissible with consent'. Part 3 of the policy outlines matters for consideration including as applicable to the project: • Clause 12 Compatibility of proposed mine, petroleum production or extractive industry with other land uses • Clause 12A Consideration of voluntary land acquisition and mitigation policy • Clause 14 Natural resource management and environmental management • Clause 15 Resource Recovery • Clause 16 Transport • Clause 17 Rehabilitation The project has been designed with consideration of these clauses and items of consideration. The proposal is consistent with these provisions.	• Section 6.0 & 7.0 of the EIS • Appendix M – Agricultural Land Assessment. • Appendix C – Ground Water Assessment. • Appendix B – Surface Water Assessment. • Appendix D1 – Flood & Stormwater Assessment. • Appendix H2 – Concept Rehabilitation & Landscape Management Plan. • Appendix H1 – Biodiversity Development Assessment Report. • Appendix J – Traffic Impact Assessment.
SEPP (Primary Production and Rural Development) 2019	This policy does not raise any implications in relation to the permissibility of the project. Part 5 Division 4 of this policy requires that all development consider the effects on oyster aquaculture. The proposal will not impact water quality and as such will not impact oyster aquaculture in the locality.	• Appendix C – Ground Water Assessment. • Appendix B – Surface Water Assessment. • Appendix D1 – Flood & Stormwater Assessment.

STATUTORY CONTEXT	CONSIDERATIONS	LOCATION IN EIS
SEPP (State and Regional Development) 2011	The policy identifies development that is considered either State Significant or Regional Development. The project exceeds the triggers for 'extractive industry' identified in Schedule 1 and is State Significant Development, refer Section 4.3.1. This policy does not identify any statutory approval factors to be considered.	• Section 4.3.1.

4.3.4.3 Tweed Local Environmental Plan 2014

The site and project are located within the TLGA. The TLEP 2014 is the principal Local EPI regulating land use within the TLGA. Under this plan most of the site is zoned RU1 Primary Production with a small portion of Lot 1 DP 1250570 being zoned RU2 Rural Landscape. The sites zoning is discussed in Section 2.3.

The objectives and Land Use Table of the RU1 Primary Production and RU2 Rural Landscape Zones are as follows:

Zone RU1 Primary Production

1 Objectives of zone

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To protect prime agricultural land from the economic pressure of competing land uses.*

2 Permitted without consent

Environmental protection works; Extensive agriculture; Home occupations; Intensive plant agriculture

3 Permitted with consent

Agricultural produce industries; Animal boarding or training establishments; Aquaculture; Bed and breakfast accommodation; Boat launching ramps; Boat sheds; Cellar door premises; Dual occupancies (attached); Dwelling houses; Environmental facilities; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Group homes; Helipads; Home-based child care; Home businesses; Home industries; Industrial retail outlets; Intensive livestock agriculture; Jetties; Open cut mining; Plant nurseries; Roads; Roadside stalls; Rural workers' dwellings; Turf farming; Water recreation structures; Water storage facilities

4 Prohibited

Any development not specified in item 2 or 3

And

Zone RU2 Rural Landscape

1 Objectives of zone

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To maintain the rural landscape character of the land.*
- *To provide for a range of compatible land uses, including extensive agriculture.*
- *To provide for a range of tourist and visitor accommodation-based land uses, including agri-tourism, eco-tourism and any other like tourism that is linked to an environmental, agricultural or rural industry use of the land.*

2 Permitted without consent

Environmental facilities; Environmental protection works; Extensive agriculture; Home occupations; Intensive plant agriculture

3 Permitted with consent

Airstrips; Animal boarding or training establishments; Aquaculture; Bed and breakfast accommodation; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cellar door premises; Cemeteries; Community facilities; Crematoria; Depots; Dual occupancies (attached); Dwelling houses; Eco-tourist facilities; Educational establishments; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Funeral homes; Garden centres; Group homes; Helipads; Home-based child care; Home businesses; Home industries; Hostels; Industrial retail outlets; Industrial training facilities; Information and education facilities; Intensive livestock agriculture; Jetties; Kiosks; Landscaping material supplies; Markets; Open cut mining; Places of public worship; Plant nurseries; Recreation areas; Recreation facilities (major); Recreation facilities (outdoor); Restaurants or cafes; Roads; Roadside stalls; Rural industries; Rural supplies; Rural workers' dwellings; Signage; Timber yards; Transport depots; Truck depots; Turf farming; Veterinary hospitals; Water recreation structures; Water supply systems; Wharf or boating facilities

4 Prohibited

Any development not specified in item 2 or 3

The project is an 'Extractive Industry' which is defined as follows:

> ***extractive industry*** *means the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunnelling or quarrying, including the storing, stockpiling or processing of extractive materials by methods such as recycling, washing, crushing, sawing or separating, but does not include turf farming.*
> ***Note.***
>
> *Extractive industries are not a type of* ***industry****—see the definition of that term in this Dictionary.*

Extractive Industries are permitted with consent in both the RU1 Primary Production & RU2 Rural Landscape Zones.

The project is generally consistent with the stated objectives of the RU1 Primary Production and RU2 Rural Landscape zones. Assessment of the subject site demonstrates the land is not 'prime agricultural' land but rather marginal land that due to its location and the impact of climate change, will be subject to ongoing reduction its agricultural capacity. The project does not fragment other agricultural land nor introduce a land use that conflicts with or would prevent the ongoing use of other Agricultural lands in the locality.

The enabling works for the project are best defined as 'Road' which is defined as

> ***road*** *means a public road or a private road within the meaning of the Roads Act 1993, and includes a classified road.*

The use of road is permissible with consent in the RU1 Primary Produce and SP2 Infrastructure Zones.

The matters for consideration under the TLEP 2014 and where these are addressed in the EIS are summarised in **table 27**.

Table 27: TLEP 2014 Consideration / Compliance Summary

STATUTORY CONTEXT	CONSIDERATIONS	LOCATION IN EIS
TLEP 2014	Part 7 of the plan outlines matters for consideration including as application to the project: • Clause 7.1 Acid Sulfate Soils • Clause 7.2 Earthworks • Clause 7.3 Flood Planning • Clause 7.6 Stormwater Management The project has been designed with consideration of these clauses and items of consideration. The proposal is consistent with these provisions.	• Section 6.0 of the EIS • Appendix K – Acid Sulfate Soils Assessment. • Appendix C – Ground Water Assessment. • Appendix B – Surface Water Assessment. • Appendix D1 – Flood & Stormwater Assessment. • Appendix N1 – Geotechnical Report • Appendix N2 – Landform Sections

4.3.4.4 Tweed Local Strategic Planning Statement – 2020

The Tweed Local Strategic Planning Statement (TLSPS) 2020 brings together the community vision and goals in the Community Strategic Plan 2017-2027 (see section 4.3.4.5) and aligns those with the vision and goals in the NCRP 2036. Thereby it allows TSC to plan for a future Tweed to meet the community's expectations and achieve the Tweed's wider expected role within NSW.

In the words of TSC, the projected population growth and corresponding need for development in the Tweed over the next 20 years is significant. Much of this growth is likely to be concentrated in the new urban release areas of Cobaki Lakes, Kings Forest and Dunloe Park. These growth areas span Tweed's coastal range from north to south and have been in the planning for over two decades. This coastal concentration of growth adjacent to existing urban areas will augment the Tweed's already diverse urban communities, however it may lead to lower population growth and demand for development in some of the Tweed's rural areas.

Relevant to the rationale and importance of the project (see section 1.4); the natural values and beauty of the North Coast environment, combined with yearlong warm climate, is highly valued by its residents and is attractive to migrants seeking lifestyle change, particularly in their retirement phase of life. These attributes also sustain a thriving tourism and lifestyle economy. This population demand generates the need for construction material supplies.

Within the statement TSC also observes the importance of the SEQ and Gold Coast economies to future social and economic opportunities within the Tweed Shire. There is important interplay between the regions with 23% of workers travelling to work in Gold Coast and SEQ, with 17% of Tweed's workforce living on the Gold Coast/ SEQ.

As demonstrate in Economic Impact Assessment under Appendix Q, the project will provide a direct net benefit with the NSW and Tweed economies through resource export to SEQ and the Gold Coast.

The project is generally consistent with the Tweed Local Strategic Planning Statement.

4.3.4.5 Tweed Shire Community Strategic Plan 2017-2027

The Tweed Shire Community Strategic Plan 2017-2027 is the overarching, visionary document in Council's Integrated Planning and Reporting Framework, which is part of TSC's hierarchy of planning. The plan translates the community's key priorities and aspirations into long-term strategic goals guiding the future direction of Tweed Shire. Environmental protection and stronger communities were leading concerns identified during community engagement to create the plan.

TSC has a custodial role in developing the Plan, while realising its long-term strategic goals is a shared responsibility between TSC, the community and other Government and Non-Government entities.

The plan includes community aspirations and Council intentions following extensive community consultation. There is acknowledgement the region will grow and is under current growth pressure. Of the policy positions and initiatives within the strategic plan, the following elements are most relevant in relation to the project:

1.1 Natural resource management

- *Lead and engage the community to enhance awareness and improve sustainable management of the environment*
- *Provide for appropriate public access and use of natural areas*

1.2 Asset protection

- *Ensure adequate stormwater drainage infrastructure is provided with new development*

1.4 Managing community growth

- *Enable economic opportunities for productive and employment-generating land uses*
- *Plan for well-located and connected centres to meet the business, health and social needs of the community - Protect and manage the Tweed's unique character and world heritage scenic landscapes*
- *Protect and enhance productive farmland*

2.2 Engagement

- *Communicate and engage with the community, government and business groups on important matters affecting the Tweed*

3.1 People

- *Protect public health and community safety*
- *Provide more opportunities for people in the Tweed to work*

3.2 Places

- *Provide places, spaces and facilities for the sporting, recreation, leisure and cultural pursuits of locals and visitors*

3.3 Moving around

- *Provide a safe, connected and efficient regional transport network*
- *Design, construct and maintain a safe and efficient local transport network*

The project will assist to deliver these outcomes through its design (removing heavy vehicles form local road), the economic benefits it will deliver to the NSW and Tweed economies and additional employment opportunities it will provide.

4.3.4.6 Kingscliff Locality Plan (2017)

The Kingscliff Locality Plan (KLP) was adopted by Tweed Shire Council on 4th June 2020. The KLP provides a 30-year vision and planning framework to guide the future growth and expansion of the Kingscliff Locality. The Kingscliff locality includes Cudgen and the majority of the HTSP area of social influence.

From the Kingscliff Locality Plan '*The study area also includes Cudgen Village given the proximity and strong historic relationship with Kingscliff the need to more holistically consider the broader locality context, particularly in relation to land-use, desired future character and traffic management considerations*.'

The very detailed plan provides guidance on all elements of sustainable community creation, including themes relevant to the project. These include:

- The rural character and landscape values in this locality.
- Importance of farmland/ hinterland, rural views with respect to scenic amenity.
- The future of the region should retain current network of villages.
- Desire for the hinterland to retain working agricultural farms.
- State significant farmland exists to the south of the site on the red soil Cudgen plateau.
- Need for future development to be supported by ecological studies to drive protection of important environment values and rehabilitation opportunities.
- Importance of construction to future economic opportunities and job creation.
- The need to increase depth and diversity within the local economy.
- Support for aquaculture (which is in vicinity of the HTSP proposal, but not impacted).
- Recognition of historic sand mining in the district (and at the HTSP site).
- Increasing density needs to be supported by more 'green'/ open space and recreational infrastructure.

The project is generally consistent with the identified long term development intent for the locality and includes elements beneficial to the implementation and achievement of the stated intent. These elements include the proposed removal of heavy vehicles from Tweed Coast Road, providing on going employment opportunities and support of the construction industry. The project will not prevent the development of the locality as outlined within TSC forward planning documents.

4.3.4.7 Tweed Shire Rural Land Strategy 2020-2036

The Rural Land Strategy seeks to balance the sometimes-competing desires of the rural community for security in operation of legitimate agricultural enterprises, protect the environment and important extractive resources, provide income generating opportunities without the need to work off farm, and provide greater housing opportunities without destroying the character of the Tweed.

A part of the strategy is to protect agricultural land and support its productive use. The intent of the strategy is to ensure existing and future agricultural production on rural land is facilitated and encouraged through the planning framework, and land capable of agricultural use is protected. The strategy seeks to protect the scenic landscape and development does not adversely impact the amenity or desired future character of the locality.

A principle of the strategy is extractive industries are protected and land use conflict minimised. The policy intent is for extractive industry sites and operations to be protected by appropriate zoning where necessary to service local resource needs.

Expansion of HTSP is considered generally consistent with the intent of the strategy and as demonstrated in this EIS does not result in the loss of what can be classified as 'prime' agricultural land, does not introduce land use conflict which would prevent on going agricultural and other pursuits in the broader locality and will through the mitigation measures to be implemented, not have a detrimental impact upon visual and other amenity of the area.

4.3.4.8 Tweed Shire Economic Development Strategy (2014)

The Tweed Shire Economic Development Strategy (2014) identifies a variety of ways the Tweed can grow its economy, particularly to optimise employment participation and reduce economic disadvantage. Extractive industries aren't referenced within the strategy; however, the strategy discusses the need to diversify the economy and is more focused on new economic opportunities.

Expansion of HTSP is considered generally consistent with the intent of the strategy to provide and support a diverse economy and range of employment opportunities.

4.4 Biodiversity Conservation Act 2016

The Biodiversity Conservation (BC) Act 2016 is part of the NSW legislative framework that deals with land management and biodiversity conservation. The project SEAR's have identified the need to assess the projects biodiversity impacts in accordance with the Biodiversity Assessment Method (BAM). A BDAR has been prepared in accordance with the BAM method and is contained under Appendix H1. The project is consistent with the assessment requirements of the BC Act 2016.

4.5 Other approvals and licences

The other approvals and licenses that will be required by the project are summarised in **table 28**.

Table 28: Summary of Approvals and Licenses required

ACT	APPROVAL / LICENSE	COMMENT
Protection of The Environment Operations Act 1997	Environment Protection License to authorise carrying out of scheduled activities at any premises (excluding any activity described as a "waste activity" but including any activity described as a "waste facility").	The project involves a scheduled activity as defined under the POEO Act 1997 and will require an EPL.
Roads Act 1993	S138 Approval to: • erect a structure or carry out a work in, on or over a public road, or • dig up or disturb the surface of a public road, or • remove or interfere with a structure, work or tree on a public road, or • pump water into a public road from any land adjoining the road, or • connect a road (whether public or private) to a classified road	The proposal requires enabling works within public road reserves and proposes to connect a private road to a classified road. Approval from both RMS and TSC will be required for different elements of the enabling works under Section 138 of the Roads Act 1993. It is also anticipated the RMS will require a Works Authorisation Deed to be obtained.
Water Management Act 2000	A WAL will be required.	The project will require an additional water allocation under the North Coast Coastal Sands Groundwater Source WSP and an additional WAL for the expansion area.
Local Government Act 1993	An approval to operate a system of sewerage management will be required.	An approval to install and operate an effluent disposal system will be required as part of relocating the site buildings and wash plant as part of Phase 7 of the project.

Section 5 – Engagement

5.0 Engagement

The project has been subject to a range of initial engagements including 'scoping consultation', post SEAR's public authority consultation and post SEAR's community consultation. These activities are discussed in Sections 5.1 to 5.5 below:

5.1 DA 152-6-2005 MOD 1

As summarised in Section 1.3.2 HTSP has been subject to recent approval modification. As part of DA 152-6-2005 MOD 1, relevant government agencies and stakeholders were consulted to determine the key issues and how these maybe avoided or mitigated. Issues raised related to the proposed truck numbers, access via Altona Road and the intersection at Crescent Street and Tweed Coast Road.

These consultations, the assessment undertaken by DPIE and public submissions received and addressed as part of DA 152-6-2005 MOD 1 have informed the early project scope and project development.

The issues identified (particularly those contained with the public submissions) in DA 152-6-2005 MOD 1 have been utilised as a start point to incorporate impact avoidance within the projects design.

5.2 Scoping Consultation

As part of project scoping and in preparation for seeking the project SEAR's, consultation with public authorities occurred. This consultation is summarised in **table 29**:

Table 29: Scoping Consultation Summary

CONSULTATION TYPE	ENTITY	DATE
Meeting (virtual)	DPIE	16th August 2019
Meeting (virtual)	RMS	23rd September 2019
Written communication	TSC	1st November 2019
Meeting (virtual)	EPA	21st October

With exception of the discussions with the EPA, formal minutes or correspondence was either prepared or received. For reference refer Attachment 10, Attachment 11 and Attachment 12 of the scoping report for copies of consultation minutes or correspondence from the DPIE, RMS and TSC respectively. The scoping report can be accessed on the DPIE website at the following link: https://www.planningportal.nsw.gov.au/major-projects/project/25926

5.3 Post SEAR's Consultation

As part of preparing this EIS, ongoing consultation with public authorities occurred. This consultation is summarised in **table 30**:

Table 30: Post SEAR's Consultation Summary

CONSULTATION TYPE	ENTITY	DATE
Pre-Lodgment Meeting (virtual)	TSC	2nd December 2020
Meeting (in person)	TSC Councilor	11th December 2020

CONSULTATION TYPE	ENTITY	DATE
	Mr. Warren Polglaze	
Meeting (virtual)	DPIE	20th January 2021

Formal minutes of the pre-lodgement meeting with TSC were received and are included under Appendix A19.

5.4 Community Consultation

The project reviewed the guidance from the NSW Government in preparing the communications and stakeholder engagement strategy and built upon the initial engagement strategy identified within the project scoping report (refer Section 5.2 for link to the scoping report). Details of the EIS communications and engagement strategy are outlined in detail within the Social Impact Assessment under Appendix P.

As the potential impacts associated with the project are localised and the project site has limited interface with residents, the project team elected to undertake targeted local communications; however considerable effort was undertaken to inform and involve a broad range of local stakeholders. Communication was distributed through a targeted letterbox drop across the project catchment as defined by the 'Area of Social Influence' (ASI) which was determined through the Social Impact Assessment. The ASI is discussed in detail within the Social Impact Assessment under Appendix P.

In total over 400 letters were dropped into local letterboxes by the community engagement consultants. This information was supplemented with phone calls and emails. The project team dropped a second round of letters to immediate neighbours to further advise of opportunities to discuss the project.

In addition to the letter box drop, email and phone correspondence; a notice was included in the Cudgen Public School newsletter promoting the opportunity to be involved, and the project was discussed at the school P&C. This was initiated following briefing of the Principal and P&C President (parent and local resident) by project representatives.

The HTSP Community Consultative Committee (CCC) was also informed about the project and encouraged to make comment, including completing the community survey.

In response to this proactive communication, the project team received returned contact and held discussions with 12 local stakeholders. In total the project held 2 meetings, 5 phone conversations, received 5 surveys and 4 emails. The sentiment, content, and number of responses within the returned context is summarised in **table 31.**

Table 31: Summary of Community Consultation Feedback

SENTIMENT / ISSUES RAISED	NUMBER OF RESPONSES
Positive	
• **No impact**	7
• **Proximity to new lakes/ operational area no concern**	4
• **Professionally managed operation**	3
• **Beneficial traffic solution**	3
• **Professional trained drivers**	3

SENTIMENT / ISSUES RAISED	NUMBER OF RESPONSES
• Positive opportunity for future recreation which does not currently exist	4
• Necessity of sand for concrete production and the construction industry	4
Neutral	
• Interested in justification 24/7-hour operations	2
• Interested in whether Cudgen would see more traffic, inc. Heavy traffic	2
• General interest - extent of lakes	3
• Query about the extent and effect of landscaping/ rehabilitation	3
• Request to consider cumulative impacts in studies and operations	1
• Request for third party to access intended private haul road	1
Negative	
• Potential impacts to visual amenity	2
• Potential concern about noise	2
• Potential light at night from truck movements	2

How the sentiment / issues raised through community consultation has been addressed in summarised in **table 32**

Table 32: Summary of Response to Community Consultation Feedback

SENTIMENT / ISSUES RAISED	RESPONSE
Positive	
• No impact	-
• Proximity to new lakes/ operational area no concern	-
• Professionally managed operation	Through the range of mitigation and operational measure outlined within this EIS commitment to the continuation of a 'professionally managed operation' of the site.
• Beneficial traffic solution	-
• Professional trained drivers	Through the preparation of an Operational Traffic Management Plan and a Driver Code of Conduct the existing high driver training standards that are specific to the operation of the site will be maintained.
• Positive opportunity for future recreation which does not currently exist	Through commitment to preparation of Rehabilitation Management Plan for the site and

SENTIMENT / ISSUES RAISED	RESPONSE
	obtaining the proposed performance criteria (outlined in section 3.3.3) this future opportunity is secured
• **Necessity of sand for concrete production and the construction industry**	-
Neutral	
• **Interested in justification 24/7 hour operations**	24/7 operations are an essential strategy to minimise road impacts and help reduce greenhouse gas emissions. 24/7 operations deliver flexibility for haulage to be schedule around road congestion and peak usage times. Refer Traffic Impact Assessment under Appendix J.
• **Interested in whether Cudgen would see more traffic, inc. Heavy traffic**	The project will remove all HTSP vehicles from local roads. Refer Traffic Impact Assessment under Appendix J.
• **General interest - extent of lakes**	The maximum extent of extraction and concept final landform is identified in Section 3.5 and Section 3.8.
• **Query about the extent and effect of landscaping/ rehabilitation**	A Concept Rehabilitation and Landscape Management Plan has been prepared. See Appendix H2.
• **Request to consider cumulative impacts in studies and operations**	Cumulative Impacts have been considered as part of the proposal. Cumulative impact is discussed within Section 5.1.13.
• **Request for third party to access intended private haul road**	The proposal will provide a haulage road located on private property. Due to safety and operational issues with non HTSP vehicles traversing an active extraction site. This request cannot be accommodated by the project.
Negative	
• **Potential impacts to visual amenity**	A Visual Impact Assessment has been prepared. See Appendix O. The Project will result in a change to the existing landscape character and on completion of extraction works and subsequent final rehabilitation phases, the Project Site will present as a natural lake bordered by a significant vegetation to its perimeter. This change in landscape character would not adversely impact key significant landscape features of this landscape unit. The final lake and vegetation will integrate into the existing visual character of the area.
• **Potential concern about noise**	An Operational Noise Impact Assessment and Construction Noise Assessment has been prepared. See Appendix F1 and Appendix F2 respectively. Noise mitigation measures as summarised in section 7.0 are to be implemented to maintain noise levels within allowable criteria.

SENTIMENT / ISSUES RAISED	RESPONSE
• **Potential light at night from truck movements**	All site lighting is to be designed and installed in accord with AS4282:2019 Control of the obtrusive effects of outdoor lighting.

5.5 Specific Issue Consultation

As part of the preparation of a number of the technical assessment reports which are contained within the appendices, specific issue consultation was undertaken. These consultations, where they occurred are summarised within the technical reports.

5.6 Continuation of stakeholder engagement

As outlined within the Social Impact Assessment (see Appendix P), all communication channels utilised during community consultation remain open and can be utilised to contact the project team at any time.

The EIS will be placed on public exhibition to allow for government agencies, organisations, interest groups, stakeholders, and community members to review the EIS, seek clarification from the applicant and project team on the content of the EIS and provide written submissions if required.

Ultimately the existing HTSP Community Consultative Committee will continue to operate.

Section 6 – Environmental Impact Assessment

6.0 Environmental Impact Assessment

This EIS has reviewed and assessed a range of issues as identified within the SEAR's. As identified within the SEAR's all matters have been identified as 'Key Issues' with no 'Other Issues' or 'Scoping Issues' being identified. The following section provide a summary of the technical studies and discusses the 'Key Issues'.

6.1 Water

6.1.1 Surface Water

Hanson commissioned Gilbert & Sutherland Pty Ltd (G&S) to prepare a Surface Water Assessment (SWA). This section summarises the finding of the SWA included in Appendix B. For full assessment of Surface Water issues refer Appendix B.

Methodology

An ongoing program of surface water quality compliance monitoring has been undertaken at HTSP since 2001, resulting in a comprehensive data set for the site. Building on the existing water quality monitoring program, a further eight rounds of surface water monitoring were conducted across the proposed expansion area between March and October 2020, to establish baseline conditions and determine similarities and differences between the expansion area and current HTSP site.

Assessment

To provide context for the current water quality performance of the HTSP site, surface water results were also compared with a selection of relevant guidelines including the;

- Tweed River Water Quality Objectives,
- ANZECC Water Quality Guidelines and
- NHRMC Recreation Water Quality Guidelines for primary contact recreation.

pH
The long-term median for pH of surface waters within the TSP Lake is 8.34. This value marginally exceeds the Tweed River Water Quality Objective of 8.0 but complies with the ANZECC 2000 criteria for primary contact recreation of 6.5 to 8.5.

Elevated pH results such as these can result from a variety of contributing factors, including the inherent acid neutralising capacity of the carbonate-rich materials within the strata at TSP, as well as algal growth which consumes carbon and produces hydroxide during photosynthesis thus increasing the pH of surface waters.

Dissolved oxygen
Dissolved oxygen (DO) concentrations within the HTSP lake remain above the Tweed River, ANZECC and NHRMC Guideline minimums of 6.0 mg/L. As a constituent measure of waterbody health, DO at concentrations observed within the extraction lake are ideal for supporting normal aquatic ecosystem function.

Low DO concentrations were observed within agricultural drains located across the expansion footprint reflecting the no-flow conditions observed during monitoring events. These conditions favour high water temperatures, algal growth and decomposition of organic matter leading to poorly oxygenated environments that are characteristics of shallow drainage channels such as these.

Metals

Metal-rich surface waters (Al, Fe) commonly result from the disturbance of acid sulfate soils, where the oxidation of pyrite in disturbed soils increases the solubility of these metals. Negligible concentrations of metals were detected within the surface waters of the HTSP lake and within the agricultural drains throughout the expansion site. Long term median levels within the HTSP lake remain compliant with the ANZECC performance criteria for aquatic ecosystem protection and primary contact recreation.

Nutrients
Long-term median results for total nitrogen and total phosphorus recorded within the HTSP lake exceed the Tweed River and ANZECC water quality objectives.

The dredging process can result in the release of nutrients or other toxicants contained within pore waters into the dredge lake with resulting water quality issues such as algal blooms. Long term groundwater monitoring of the existing HTSP site and recent monitoring within the expansion area has recorded elevated nutrient levels within the site's groundwater environment likely related to the historic agricultural uses of the land.

Elevated nutrient levels have been recorded within the HTSP lake although due to dilution from rainfall inflows, the levels are substantially lower than within the groundwater environment and are similar to those recorded within the nearby Tweed River.

Faecal coliforms
Bacteriological analyses of surface waters indicated low levels of faecal coliforms and enterococci, consistent with performance criteria for primary contact recreation.

The water quality recorded at the HTSP site has remained largely stable over time. The soil and water management practices implemented at the site to date have proven successful in maintaining and in some instances improving water quality within the extraction lake. With continued implementation of existing soil and water management practices it is anticipated that existing water quality at the site will be maintained long-term.

Site water balance
A surface water balance model was developed for the site and verified against continuously monitored lake water levels over a 7-month period in 2020. The water balance was subsequently used to estimate the anticipated hydrological behaviour of the lake for each future phase of the development.
The model results indicate that:

- The median southern lake level for the currently approved phases of the development (Phases 1-4) is estimated to be RL 0.40 mAHD, providing 0.60 m freeboard to the overtopping level of 1.00 mAHD.
- The median lake level will increase to 0.67 mAHD, when the external catchment comes online in Phase 6.
- The median southern lake level is then expected to reduce gradually as the lake area expands, stabilising at 0.58 mAHD in the long term (Phase 9 onwards), providing 0.42 m freeboard.
- The median level in the north lake is estimated to be 0.37 mAHD in the long term, providing 0.63m freeboard.
- For the currently approved phases of the development (Phases 1-4), discharge from the southern lake is estimated to occur in 18% of years which equates to once every 5-6 years.
- Discharge frequency is estimated to increase to 58% of years (more than once every 2 years) when the southern external catchment comes online in Phase 6.
- Long term, discharge from the southern lake is estimated to occur in approximately 43% of years (or once every 3-4 years).
- For those years where discharge from the southern lake does occur, there is an average of 11 to 13 days discharge per year that actively discharge would occur.
- Discharge from the northern lake is estimated to occur less frequently, in 5% of years when works commence and 10% of years long term. In these years, discharge would occur for on average 6 to 7 days and always when the southern lake is also discharging.

- Overtopping of the southern lake bund is rare and estimated to occur in less than 2 percent of years long term, and for a single day only each time.
- The northern lake is not anticipated to overtop its bund (excluding the influence of regional flooding).
- Discharge volumes from the overall site represent a small proportion (1.7 to 12.2%) of surface inflows across all phases of the project and 6.7% long term once extraction is complete.
- Evaporative losses, on average, are less than surface water inflows. These losses amount to between 67% and 82% of total surface water flows (rainfall and runoff) entering the southern lake, and 88 to 89% of flows entering the northern lake.
- Both lakes act as groundwater recharge windows with average net recharge volumes increase over the duration of the project in conjunction with expansion of the lake area.

Surface water discharges to receiving environment – flood events

The existing HTSP operation and the expansion area are located within the Tweed River floodplain and the site is subject to regular inundation during high rainfall events. To avoid flooding impacts on neighbouring lands this condition would be maintained at the site and flood waters would not be prevented from flowing across the subject lands.

The low velocities of flood waters traversing the site limits the potential for soil erosion or scour of banks and bunding and records of impacts from previous floods at the existing HTSP site indicate that lake banks, bunding and operational areas have not required remediation following these events.

Flood waters entering the subject site during regional floods originate from the Tweed River catchment which includes large areas of agricultural lands. Flood waters, particularly those containing runoff from agricultural lands are usually highly turbid and nutrient rich. Conversely, long term monitoring of waters contained within the HTSP lake indicate low turbidity water and comparatively low nutrient concentrations (median Total Nitrogen of 625 μg/L and a median of 40μg/L for Total Phosphorus).

Flood waters enter the subject lands at low velocities thus minimising mixing with the waters within the lake. The potential for mixing is further reduced by the density differential between the relatively fresh, lower-density floodwaters and the higher density brackish waters of the lake. The relationship is such that the lower-density floodwaters will float on-top of the denser lake waters with a degree of mixing at the interface.

Given the poor quality of waters entering the subject site during flood events, the limited opportunity for mixing and the comparable (if not higher quality) water within the HTSP extraction lake it is unlikely that discharges from the HTSP site would result in a negative impact on the receiving environment in these conditions.

Post extraction water quality

Hanson will retain ownership of the site following completion of sand extraction and any proposed subsequent use of the site will be decided via the appropriate consultative, application and regulation processes in place at that time.

A comprehensive Soil and Water Management Plan has been prepared for the site and includes commitments to monitoring and management of surface and groundwaters at the site to ensure the existing water quality is maintained and where possible improved throughout the course of the development. Commitments are also included for the continuation of water quality monitoring post cessation of extraction.

Specific goals for end-use water quality would be determined at an appropriate juncture in the future as the ultimate end-use of the site is defined.

Mitigation Measures

Surface water will be managed in accordance with the measures prescribed in the Soil and Water Management Plan included under Appendix E. This management plan outlines monitoring regimes and mitigation measures for the management of impacts to surface and groundwaters.

6.1.2 Ground Water

Hanson commissioned G&S to prepare a Groundwater Assessment (GWA). This section summarises the finding of the GWA included in Appendix C. For full assessment of Ground Water issues refer Appendix C.

Methodology

An ongoing program of groundwater quality compliance monitoring has been undertaken at the HTSP site since 2001, resulting in a comprehensive data set for the site. Building on the existing water quality monitoring program, a further eight rounds of groundwater monitoring were conducted across the proposed expansion area between March and October 2020, to establish baseline conditions and determine similarities and differences between the expansion area and current HTSP site.

For the baseline monitoring program, samples were recovered from 15 groundwater monitoring bores within the current operations area at HTSP, in addition to 12 groundwater monitoring bores throughout the expansion footprint to determine the existing groundwater conditions at the site. The location of these monitoring bore and the discussion of existing environment as it relates to ground water is identified in GWA in Appendix C.

Assessment

To provide context for the current water quality performance of the HTSP site, surface water results were also compared with a selection of relevant guidelines including the:

- Tweed River Water Quality Objectives,
- ANZECC Water Quality Guidelines and
- NHRMC Recreation Water Quality Guidelines for primary contact recreation.

Results obtained for shallow groundwater within the existing and proposed site area demonstrate long-term median values generally comply with the Tweed River Water Quality Objectives, ANZECC Water Quality Guidelines and NHRMC Recreation Water Quality Guidelines for primary contact recreation. The exceptions to this are:

- Iron, which currently exceeds the performance criteria at a small number of monitoring locations; and
- Nutrients (total nitrogen, total phosphorous), with recorded exceedances of performance criteria within the expansion area groundwaters.

Results obtained for deep groundwater within the HTSP site also demonstrate median values that generally comply with the Tweed River Water Quality Objectives, ANZECC Water Quality Guidelines and NHRMC Recreation Water Quality Guidelines for primary contact recreation, with the exceptions being:

- Ammonia, with recorded exceedances of performance criteria; and
- Nutrients (total nitrogen, total phosphorous), with recorded exceedances of performance criteria within the expansion area groundwaters.

Groundwater licencing requirements
The existing HTSP and proposed expansion area are located within the Tweed Brunswick Coastal Sands (TBCS) of the Tweed Coastal Sands Groundwater Management Area (GMA). Environmental water is accessed via licensed entitlements through the North Coast Coastal Sands Groundwater Source Water Sharing Plan (WSP).

HTSP currently holds an allocation of 109ML/yr in the TBCS source for groundwater interference/take commensurate with the scale of its existing operation. Expansion of the operation and the proposed increase in extraction rate will necessitate an application for an additional WAL and volumetric share within the TBCS of approximately 340ML. As HTSP currently holds an allocation of 109ML, a further 231ML would need to be purchased and licenced for the project.

Groundwater modelling
Given the nature of the site soils and groundwater characteristics observed to date, the most likely potential impacts on groundwater as a result of the project are:

- Localised and minor changes to pre-development groundwater flow regimes in the vicinity of the lake that will be largely contained within the development footprint.
- Changes to groundwater elevation as a result of the proposed expansion. These are predominantly contained within the development footprint, occurring within the northern and southern sections of the extraction footprint (Lot 51 on DP1166990 and Lot 1 on DP1250570 respectively) as follows;
    - There is a maximum 0.5 m lowering of the water table in the northern portion of the expansion area. The impact is predominantly contained within the expansion footprint, however a decrease in groundwater elevation of up to 0.3 m is predicted within a small portion of the lands outside the northern perimeter of Lot 51 on DP1166990.
    - In the southern extent of the site the steady-state model indicates a maximum 1.0 m lowering of the groundwater table predominantly within the expansion footprint. This impact reduces to a maximum of 0.5 m of drawdown outside of the site boundary to the west of Lot 1 on DP1250570.

Groundwater level changes resulting from the development are not predicted to cause impacts within proximity to any of the known registered bores.

Impacts to GDE's are predicted to be minimal. A drawdown of up to 0.5 m is predicted to occur within a small portion of the Low Potential GDE, which is mapped on the southern boundary of the expansion footprint west of Lot 1 on DP1250570. Ground-truthing of the presence and extent of this GDE and consideration of its sensitivity to groundwater drawdown of this magnitude is provided in the BDAR included under Appendix H1.

The model predicts that the groundwater level throughout the expansion area and throughout the model domain will increase by a minimum of 0.1 m up to a maximum of 1.0 m. As anticipated by TSC's Climate Change Policy, the predicted sea-level rise will exacerbate tidal inundation and impede the site's drainage leading to increased waterlogging of soils.

Mitigation Measures

Groundwater will be managed in accordance with the measures prescribed in the Soil and Water Management Plan included under Appendix E. This management plan outlines monitoring regimes and mitigation measures for the management of impacts to surface and groundwaters.

6.1.3 Flooding / Stormwater

Hanson commissioned Burchills Engineering Solutions (BES) to prepare a Flood and Stormwater Report. This section summarises the findings of the Flood & Stormwater Report included in Appendix D1. For full assessment of Flooding and Stormwater issues refer Appendix D1.

Methodology

The Flood and Stormwater Assessment has focused on the local runoff from the subject site and its external catchments as well as the regional flooding at the site caused by the Tweed River. To assess stormwater and flooding issues the following has been undertaken:

- Review of the subject site to determine the existing local hydrologic/hydraulic conditions for the local and regional drainage system.
- Assessment of the proposed expansion and determine changes to the hydrologic regime.
- The existing and proposed development has been modelled using XPSTORM which is hydraulic link-node model. All hydrological events were simulated in the system to determine the peak flows, water levels and flood timing at the site.

- Develop a two-dimensional hydraulic model to assess the changes in regional flood behaviour across the study area because of the proposed expansion. TUFLOW hydraulic modelling software being the chosen platform.

The existing environment as it relates to stormwater and flooding including assessment of existing stormwater catchments is discussed in the Flood and Stormwater Report in Appendix D1.

Assessment

Stormwater
It is proposed that the majority of runoff from external catchments be conveyed around the proposed lakes to the specified discharge points at the M1. A small stormwater catchment to the south east of the site will be accepted into the extraction lakes. The rainfall that falls on the existing and proposed lakes will be largely detained within the lakes up to RL 1 mAHD, at which point overflow will be discharged to the existing drainage lines via controlled overflow weirs. Peak flow assessment for local storm events has shown the proposed expansion of the sand plant will maintain peak discharges at the Legal Point of Discharge for major storm events and create some minor increases for minor storm events.

Minor changes in the local hydraulic regime are caused by a loss in conveyance storage through the inclusion of bunding around the proposed lakes. The bunding around the lakes prevents external catchment runoff from entering the lakes frequently, major events are permitted to overtop into the lakes. It is also anticipated that the changes to the local hydraulic behaviour around the site will not cause an adverse hydraulic condition.

Phase 7 of the project will relocate the washdown and processing facility. As the current layout and details of this facility are unknown, an additional stormwater management plan will need to be prepared at the appropriate time.

Flooding
Using the endorsed Tweed River Flood Model, an assessment was carried out to investigate the potential flood impacts caused by the proposal. Flood behaviour at the site for flood events up to and including the 1% AEP can be categorized as flood storage rather than conveyance.

During events with higher flood waters (such as the 0.2% AEP event), flooding at the subject site changes to serve a conveyance purpose as large volumes of water overtop the M1 and water is pushed towards the townships of Kingscliff and Chinderah. The Designated flood Level (1% AEP event flood level) for the subject site is 3.22 mAHD.

Council has adopted general development guidelines as part of their floodplain management strategy. These guidelines are based on the works undertaken by BMT WBM as part of their original investigations into flooding along the Tweed River and acceptable limits of hydraulic impacts on the floodplain. The flood impact assessments undertaken as part of the HTSP project, have been targeted to meet these same development assessment criteria as outlined below:

- A 'no change' modelling tolerance of 30mm.
- Increase of peak flood levels of +35mm limit for existing urban zoned areas; and
- Increase of peak flood levels of +100mm limit for existing rural zoned areas in the floodplain.

A flood impact assessment considering flooding in the existing and proposed conditions has been completed, all changes in flood level caused by the proposed development are within the allowable limit set by Tweed Shire Council (35mm) the following scenarios were assessed and the results of which are described:

- Development Phase 7 – Flood improvement for the 20% and 5% AEP events, impacts in the range of 10-20mm for the 1% and 0.2% AEP events in the Kingscliff township area.

- Development Phase 9 – Flood improvement for the 20% and 5% AEP events, impacts in the range of 10-20mm for the 1% AEP in the Kingscliff township area, impacts in the range of 20-30mm for the 1% AEP + Climate Change event 0.2% AEP over the Kingscliff and Chinderah area.
- Development Phase 11 (Ultimate) – Flood improvement for the 20% and 5% AEP events, no significant change to flood conditions in the 1% AEP, impacts in the range of 20-30mm for the 1% AEP + Climate Change event 0.2% AEP over the Kingscliff and Chinderah area

Mitigation Measures

Lake bund invert levels are not to exceed a height of 1.75m AHD for Lake 1 (Phases 10 and 11) and 1.3m AHD for Lake 2 (Phases 5 through 9).

6.2 Noise

6.2.1 Operational Noise

Hanson commissioned ATP Consulting Engineers (ATP) to prepare an Operational Noise Impact Assessment (ONIA). This section summarises the finding of the ONIA included under Appendix F1. For full assessment of Operational Noise issues refer Appendix F1.

Methodology

Noise monitoring was carried out at the nearest noise sensitive places using automated noise loggers to obtain information about the existing background noise levels during the day, evening, and night-time periods. The Rating Background Levels (RBL) were calculated based on the background noise levels when there were no dredging operations taking place at the HTSP.

As per the NSW EPA *Noise Policy for Industry*, the intrusiveness, amenity, and maximum noise level criteria were determined based on the results of the background noise monitoring, the methodology for which is presented in Section 3 of the ONIA (see Appendix F1). The existing environment as it relates to operation noise is discussed in the ONIA in Appendix F1.

Assessment

It is proposed that the project trigger levels, as per Table 3.5 of the ONIA, be adopted as the new Operational Noise Criteria for the HTSP. It is important to note that special consideration is given to private haulage roads under the NSW EPA *Noise Policy for Industry*. To this end, the use of the proposed private haulage road has been assessed separately, against project amenity noise level criteria, which are presented in Table 3.4 of the ONIA (see Appendix F1).

Detailed noise propagation modelling was carried out to assess potential noise impacts from the future operation of the HTSP on the nearest noise sensitive land uses over the proposed 30-year project life.

In the 3D noise propagation model, all proposed activities at the site were considered, including dredging activities (dredge and booster), shoreline processing (water pump, wash plant and loader) and truck movements (haulage route, dispatch of loaded trucks from the plant). The results of the noise propagation modelling indicate that without noise control measures, there is a potential for noise impacts on the nearest noise sensitive receptors from the operation of the extended HTSP as per various planned phases of expansion.

The noise impacts on the nearest noise sensitive receptors are associated with the use of the dredge, the booster and the wash plant, mainly during night-time operations, and when the dredge is operated at locations nearest to the sensitive receptors. To protect the noise amenity at the nearest noise sensitive places

(mainly residential dwellings), it is recommended to attenuate noise from the dredge, the booster and the wash plant.

Recent noise attenuation works have been carried out on the dredge at the existing HTSP, including:

- Installation of a new exhaust silencer;
- Installation of an acoustic enclosure to the engine bay;
- Installation of acoustic louvres to the ventilation openings at the front and rear walls of the engine room;
- Acoustic lagging added to the external high-pressure line; and
- Acoustic upgrade to the engine room maintenance doors adjacent to the suction pipe.

The noise levels associated with the dredge, after the installation of the noise attenuation works, were assessed during the attended noise measurements carried out on 21 August 2020. The operational noise modelling was carried out considering the attenuated noise levels, assessed at the nearest noise sensitive receptors to the proposed expansions considering the proposed continuous operation, daytime, evening, and night-time.

The dredge as it operates now, is sufficiently attenuated to operate during daytime for all phases barring phase 9, as well as evening for phase 8 and 11, and night for phase 8. Should the existing dredge be further acoustically upgraded, it may expand its operations further.

However, under some scenarios (e.g., operating during evening or night time within close proximity to some receivers), the level of noise reduction required is not practicable with the current dredge. Therefore, in these scenarios it is recommended that the existing dredge may need to be replaced with a quieter dredge.

The maximum allowable dredge noise levels to achieve compliance with the noise criteria during daytime, evening and night-time for each project phase are presented in Table 5.1 of the ONIA (see Appendix F1).

Based on the operational noise level requirements for the dredge presented in Table 5.1 of the ONIA (see Appendix F1), the following five options for levels of noise attenuation are proposed in order to comply with the applicable noise criteria during different operating scenarios:

- Option 1 – Existing dredge – Existing dredge, which currently achieves a sound pressure level of 90dB(A), 97dB(C) or 97dB(Z) measured at a 3-metre setback, and 80dB(A), 87dB(C) or 87dB(Z) measured at a 10-metre setback.
- Option 2 – Existing dredge with acoustic upgrades – Existing dredge, with additional acoustic upgrades to achieve a sound pressure level of not more than 86dB(A), 93dB(C) or 93dB(Z) measured at a 3-metre setback, and no more than 76dB(A), 83dB(C) or 83dB(Z) measured at a 10-metre setback.
- Option 3 – Dredge 1 – Dredge noise levels attenuated to achieve a sound pressure level of not more than 78dB(A), 85dB(C) or 85dB(Z) measured at a 3-metre setback, and no more than 68dB(A), 75dB(C) or 75dB(Z) measured at a 10-metre setback.
- Option 4 – Dredge 2 – Dredge noise levels attenuated to achieve a sound pressure level of not more than 74dB(A), 81dB(C) or 81dB(Z) measured at a 3-metre setback, and no more than 64dB(A), 71dB(C) or 71dB(Z) measured at a 10-metre setback.
- Option 5 – Dredge 3 – Dredge noise levels attenuated to achieve a sound pressure level of not more than 70dB(A), 77dB(C) or 77dB(Z) measured at a 3-metre setback, and no more than 60dB(A), 67dB(C) or 67dB(Z) measured at a 10-metre setback.

A summary of the abovementioned options for levels of noise attenuation for the dredge, as they relate to the project phases and periods, is presented in Table 5.2 of the ONIA (see Appendix F1).

Based on the information presented in Tables 5.1 and 5.2 of the ONIA (see Appendix F1), for the existing dredge to be able to operate during the evening period for phases 5, 6, 7 and 10, additional acoustic upgrades will be required to achieve a minimum 4dB noise attenuation (i.e., Option 2). After these upgrades, it is not expected

that further significant improvement could be achieved with the existing dredge, and a replacement dredge would be required to operate under more stringent conditions.

For any dredge to be able operate in the daytime period during project phase 9, a level of noise attenuation corresponding to Option 3 will be required, as a minimum. Further levels of noise attenuation (Options 4 and 5) will allow for expanded operations into evening and night-time period for phase 9.

The results of the operational noise modelling indicate that during the night-time period, when the booster is positioned within proximity to the nearest noise sensitive receptors, a minor exceedance of the noise criteria may occur.

An assessment of the existing noise attenuation works installed on the booster has been undertaken and these have been deemed to be state of the art and sufficient for most operational scenarios. Because the booster is always located between the dredge and the processing plant, the noise impacts from the booster can be readily managed by appropriate positioning. Therefore, it is recommended that maximum distance is maintained between the booster and the nearest noise sensitive receptors during daytime, evening, and night-time periods.

The results of the operational noise modelling indicate night-time period operation of the existing wash plant has the potential to cause minor exceedance of the noise criteria at the nearest noise sensitive receptors along Cudgen Road.

To ensure the night-time period operation of the wash plant does not impact the noise amenity at the nearest noise sensitive receptors it is recommended that a partial acoustic enclosure be installed around the wash plant motor, enclosing it on the south-east and south-west sides. Following design specifications are required for the acoustic enclosure:

- The enclosure is to be constructed using a material with minimum surface density of 15kg/m^2 (e.g., timber palings with minimum thickness of 22mm, fibre cement sheeting with minimum thickness of 12mm, or aerated concrete);
- The height of the enclosure is to be minimum 0.3m above the top of the wash plant motor, with returns along the south-east and south-west sides of the wash plant motor.
- The enclosure should be free of any gaps.
- If the walls of the enclosure are constructed of timber palings, planks should have minimum 35mm overlap; and
- The enclosure should be of durable construction.

To ensure ongoing compliance with the proposed Operational Noise Criteria (i.e., the project trigger levels, as per Table 3.5 of the ONIA), annual attended compliance noise monitoring must be carried out at the nearest noise sensitive receivers (i.e., private residences or privately owned land).

Furthermore, attended compliance noise monitoring must be carried out at the nearest noise sensitive receivers following the commencement of dredging activities in new project phase areas.

Noise generated by the development is to be measured in accordance with the *NSW Noise Policy for Industry 2017*.

Provided the recommended noise control measures are fully implemented at detailed design and construction, there are no further acoustic constraints on the establishment of the proposed expanded operations of the HTSP.

Mitigation Measures

Noise Generated by site operations will not exceed the following at the locations:

Location	Period	Project trigger level $L_{Aeq,adj,15min}$, dB(A)
Noise sensitive places to the east, and to the south-east (north of intersection between Cudgen Road and Plantation Road) *(zoned as RU1 and R2)*	Day	**42**
	Evening	**42**
	Night	**38**
Noise sensitive places to the south and south-west (south of intersection between Cudgen Road and Plantation Road) *(zoned as RU1)*	Day	**41**
	Evening	**41**
	Night	**38**
Noise sensitive places to the north at significant setback from Pacific Motorway *(zoned as RU1)*	Day	**42**
	Evening	**42**
	Night	**38**
Noise sensitive places to the north and west within proximity to Pacific Motorway *(zoned as RU1)*	Day	**46**
	Evening	**46**
	Night	**38**
School classroom	Noisiest 1-hour period when in use	**38**
Active recreation area (e.g. school playground)	When in use	**53**

However, these noise criteria will not apply if the applicant has an agreement with any impacted landowner to exceed the noise criteria, and the applicant has advised the Department in writing of the terms of this agreement.

Dredge noise levels will not exceed:

		Sound power level			Sound pressure level at 3m			Sound pressure level at 10m		
		dB(A)	dB(C)	dB(Z)	dB(A)	dB(C)	dB(Z)	dB(A)	dB(C)	dB(Z)
Phase 5	**Day**	108	115	115	90	97	97	80	87	87
	Evening	104	111	111	86	93	93	76	83	83
	Night	94	101	101	76	83	83	66	73	73
Phase 6	**Day**	108	115	115	90	97	97	80	87	87
	Evening	104	111	111	86	93	93	76	83	83
	Night	88	95	95	70	77	77	60	67	67
Phase 7	**Day**	108	115	115	90	97	97	80	87	87
	Evening	107	114	114	89	96	96	79	86	86
	Night	99	106	106	81	88	88	71	78	78
Phase 8	**Day**	108	115	115	90	97	97	80	87	87
	Evening	108	115	115	90	97	97	80	87	87
	Night	108	115	115	90	97	97	80	87	87
Phase 9	**Day**	96	103	103	78	85	85	68	75	75
	Evening	93	100	100	75	82	82	65	72	72
	Night	88	95	95	70	77	77	60	67	67

Phase 10	Day	108	115	115	90	97	97	80	87	87
	Evening	106	113	113	88	95	95	78	85	85
	Night	94	101	101	76	83	83	66	73	73
Phase 11	Day	108	115	115	90	97	97	80	87	87
	Evening	108	115	115	90	97	97	80	87	87
	Night	101	108	108	83	90	90	73	80	80

Appropriate dredge upgrades will be undertaken to achieve the noise levels that are required for the relevant phase and operating time prior to commencing dredging in that phase and/or time period.

At all times booster pumps will be positioned at the maximum distance possible from noise sensitive receptors during daytime, evening, and nighttime operations.

A partial acoustic enclosure is to be installed around the existing wash plant motor to enclose it on its south-east and south-west sides prior to operating the existing wash plant during the nighttime period. Following design specifications are required for the acoustic enclosure:

- The enclosure is to be constructed using a material with minimum surface density of 15kg/m^2 (e.g., timber palings with minimum thickness of 22mm, fibre cement sheeting with minimum thickness of 12mm, or aerated concrete);
- The height of the enclosure is to be minimum 0.3m above the top of the wash plant motor, with returns along the south-east and south-west sides of the wash plant motor.
- The enclosure should be free of any gaps.
- If the walls of the enclosure are constructed of timber palings, planks should have minimum 35mm overlap; and
- The enclosure should be of durable construction.

A Noise Management Plan will be developed and implemented.

6.2.2 Construction Noise

Hanson commissioned ATP to prepare a Construction Noise Assessment (CNA). This section summarises the finding of the CNA included under Appendix F2. For full assessment of Construction Noise issues refer Appendix F2.

Methodology

A 3D model of the site and surroundings was developed using SoundPLAN noise propagation software considering the construction activities associated with the planned expansion of the HSTP over a 30-year period relative to the nearest noise sensitive places. The calculations were carried out as per the procedures specified in the International Standard ISO9613 (*Acoustics – Attenuation of sound during propagation outdoors*).

The existing environment as it relates to construction noise is discussed in the ONIA in Appendix F1.

Assessment

Based on the results of the construction noise propagation modelling, considering nine scenarios accounting for construction of the haulage road, construction of the new processing facilities, and clearing works over the 30-year planning horizon as the HTSP expands its operations, the following is concluded:

- In general, all proposed works will be carried out within standard construction hours.
- During construction of the haulage road, there is potential exceedance of the lower limit noise criteria at 271 Pacific Highway. The exceedance is associated with operation of the road grader, asphalt paver and tip truck along the haulage road alignment closest to the dwelling.
- During clearing works in preparation for Phase 9 there is potential exceedance of the lower limit noise criteria at 353 Cudgen Road. The exceedance is associated with operation of the body truck used to remove waste from site at the southernmost section of the expansion.
- The predicted noise levels have never exceeded the "highly affected" noise limit of 75dB(A) $L_{Aeq,15min}$ specified in the *Interim Construction Noise Guideline*.

Construction noise management and mitigation measures are recommended to minimise the noise impacts at the noise sensitive receptors which, because of their proximity to various construction sites, may be affected by noise during multiple stages of HTSP expansion.

Mitigation Measures

The measures outlined within Section 6 of the CNA are to be implemented as part of Construction Activities onsite.

A Construction Noise Management Plan will be developed and implemented. This Construction Noise Management Plan will be consistent with the Construction Noise Assessment prepared by ATP Consulting Engineers dated February 2021.

6.3 Air Quality

Hanson commissioned Katestone Environmental Pty Ltd (Katestone) to prepare an Air Quality Impact Assessment (AQIA). This section summarises the finding of the AQIA included under Appendix G. For full assessment of Air Quality issues refer Appendix G.

Methodology

The AQIA has used a dispersion modelling approach conducted in accordance with the EPA's Approved Methods. A site-specific meteorological data file for 2019 has been generated using the TAPM and CALMET meteorological models and local meteorological measurements. The meteorological modelling has accounted for local terrain and land use features of the region. The full methodology is discussed in Section 3 of the AQIA.

Assessment

The existing environment in the Cudgen area is influenced by climatic conditions of the region and local natural and anthropogenic activities. Emission sources of dust (particulate matter) are mainly diffuse sources such as road transport (motor vehicles), intensive agriculture (sugar cane farming) and HTSP & CLSP. The Cape Byron Power Station at Condong Sugar Mill is the only significant point source of air pollutants in the region. It is located 12 km southwest of Tweed Sand Plant on the Tweed River.

There are no ambient air quality or meteorological monitoring stations located in the Cudgen area. Variations in dust levels can be expected during cane production and harvesting, after long periods without rainfall and

during short-term events such as bushfires and dust storms. In the vicinity of HTSP, are a number of sensitive receptors. A map of sensitive receptors considered in the AQIA is shown in Figure 5 of the AQIA.

For full discussion of the existing environment as it relates to Air Quality refer AQIA under Appendix G.

Dust (as TSP, PM_{10}, $PM_{2.5}$ and deposition rate) from the proposed HTSP expansion has been considered in the AQIA. The CALPUFF dispersion model has been used to predict ground-level concentrations of dust as a result of two stages of the development of the proposed Tweed Sand Plant expansion, Phase 1-6 and Phase 7-11. A cumulative assessment that includes addition of ambient backgrounds has been conducted. The results of the dispersion modelling have been assessed against the relevant impact assessment criteria in NSW.

The results of the AQIA show the following:

TSP

- Annual average ground-level concentrations of HTSP are predicted to comply with the relevant impact assessment criterion at the nearest sensitive receptors for the HTSP in isolation and with background levels for both assessment stages of the development.

PM_{10}

- Maximum 24-hour average ground-level concentrations of PM_{10} were predicted to comply with the impact assessment criterion at the nearest sensitive receptors for the HTSP in isolation for both assessment stages of the development.
- For the cumulative assessment of 24-hour average concentrations of PM_{10}, a level 2 (contemporaneous) assessment was conducted, which shows the following:
    - For Phase 1-6, the HTSP is predicted to contribute to between one and three additional days that exceed the impact assessment criterion at sensitive receptors R5 – R15, which are to the immediate southeast of the existing washplant.
    - Of these receptors, R11 is the closest to the HTSP (300m) and predicted the greatest number of additional exceedances of the 24-hour average impact assessment criterion for PM_{10} (3). The maximum contribution of HTSP to an exceedance at R11 is 12% compared to background.
    - For Phase 7-11, the HTSP is predicted to contribute one additional day that exceeds the impact assessment criterion at sensitive receptors R9 – R12, which are to the immediate southeast of the site boundary.
    - Of these receptors, R11 is the closest to the site and the maximum contribution of HTSP to an exceedance at R11 is 8% compared to background.
- The Approved Methods requires that a proponent demonstrate that a proposed development does not result in additional exceedances of the impact assessment criteria at sensitive receptors. Hanson will ensure compliance with the air quality criterion is achieved in practice through a proactive and reactive management strategy, whereby, watering will be increased and/or certain operations will cease during periods of elevated dust risk. Key features of this strategy will be managed using the proposed dust monitoring program and weather forecasts.
- Annual average ground-level concentrations of PM_{10} were predicted to comply with the impact assessment criterion at the nearest sensitive receptors for the Tweed Sand Plant in isolation and including background for both stages of the development.

$PM_{2.5}$

- Maximum 24-hour average ground-level concentrations of $PM_{2.5}$ are predicted to comply with the impact assessment criterion at the nearest sensitive receptors for the HTSP in isolation for both stages of the development.
- A level 2 (contemporaneous) assessment 24-hour average concentrations of $PM_{2.5}$ was conducted, which shows that the HTSP is predicted to result in no additional days that exceed the impact assessment criterion for both assessment stages of the development.
- Annual average ground-level concentrations of $PM_{2.5}$ were predicted to comply with the impact assessment criterion at the nearest sensitive receptors for the HTSP in isolation and including background for both stages of the development.

Dust deposition

- Annual average dust deposition rates are predicted to comply with the impact assessment criterion at the nearest sensitive receptors for the Tweed Sand Plant in isolation and including background levels for both stages of the development.

Overall, the contribution of the proposed HTSP expansion to air pollutant levels in the region is low compared to background. On a small number of occasions there is potential for HTSP operations combined with background to result in elevated concentrations of PM_{10}. On these occasions, the contribution of HTSP is small (less than 12%) and background air quality dominates.

Mitigation Measures

It is proposed to implement a proactive and reactive strategy that includes real time PM_{10} monitoring and ongoing use of weather forecasts to ensure that Hanson can effectively manage operations, through increased watering or ceasing operations, during times of elevated dust risk, which will ensure that no additional exceedances occur due to the expansion.

6.4 Biodiversity

Hanson commissioned JWA Ecological Consultants (JWA) to prepare a Biodiversity Development Assessment Report (BDAR). This section summarises the finding of the BDAR included under Appendix H1. For full assessment of Biodiversity Issues refer Appendix H1.

Methodology

The findings of this BDAR are based on detailed vegetation assessments and targeted threatened flora and fauna surveys completed in August and October 2020, and in January 2021.

The ecological assessment involved a two-stage approach to ensure an appropriate level of assessment was undertaken. Firstly, a desktop review was undertaken to highlight any potential conservation significant vegetation communities, any potential habitat for threatened flora or fauna, and any ecologically sensitive areas on site. Secondly, using the results from the desktop review field surveys of flora, fauna and habitat were completed.

Detailed assessments of the composition, structure and function of site vegetation were completed on the 27th August and the 27th October 2020 utilising the Biodiversity Assessment Method (DPIE 2020). The assessments were completed respectively by one (1) suitably qualified person and accredited assessor under the accreditation scheme prepared under Section 6.10 of the *Biodiversity Conservation Act 2016* (BC Act).

Targeted surveys for threatened flora and fauna species were also completed onsite on the 27th August and 27th October 2020, and between the 26th – 28th January 2021. No threatened flora species listed within schedules of the BC Act or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were recorded from the impact area. At the time of writing the results from the data collected via Anabat Express ultrasonic bat detector units were still being analysed by an expert in echolocation call identification. The precautionary principle has been applied and the Southern Myotis (*Myotis macropus*), which is provided with suitable habitat, has therefore been assumed to be present.

The existing environment as it relates to Biodiversity is discussed in the BDAR in Appendix H1.

Assessment

A number of measures to avoid and mitigate impacts on existing flora, fauna and habitat values of the site have been discussed. The proposed development will however result in unavoidable impacts on 3.66 ha of native vegetation. These impacts are not considered to be serious or irreversible.

Due to the long-term nature of the proposed expansion, the BDAR has been prepared to provide overarching offsetting requirements associated with the project on a phase-by-phase basis. Prior to the commencement of sand extraction within each phase, a phase specific BDAR (or assessment in line with the relevant legislation at that time) will be prepared to accurately assess impacts and offset obligations.

Impacts to the degraded area of PCT 780 (Vegetation Zone 4) are not required to be offset with regards to ecosystem credits or species credits as the vegetation integrity score of this vegetation is below those set out in Paragraphs 10.3.1.1 and 10.3.2.1 of the BAM respectively.

A total of 61 ecosystem credits and 56 species credit have been calculated as applicable for the unavoidable loss of site vegetation as follows:

<u>Ecosystem credits</u>

- PCT 1235 - Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion = 46 credits
- PCT 1064 - Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion = 15 credits

<u>Species credits</u>

- Southern Myotis (*Myotis macropus*) = 56 credits

In accordance with the requirements of the NSW Biodiversity Offsets Scheme, proponents have two primary ways that they can satisfy their offset credit obligation:

1. They can identify and purchase the required 'like for like' credits in the market and then retire those credits via the OEH Biodiversity Offsets and Agreement Management System (BOAMS).

Or

2. They can use the Offsets Payment Calculator to determine the cost of their credit obligation and transfer this amount to the Biodiversity Conservation Fund via OEH BOAMS. The responsibility for identifying and securing the offset obligation would then be transferred to the Biodiversity Conservation Trust.

These credits will need to be purchased or retired as an offset for the removal of site vegetation prior to each phase of the development.

Mitigation Measures

The project will generally be located in areas which have historically been cleared or otherwise disturbed by clearing impacts.

The proposed development will be constructed in a manner sensitive to areas of retained habitat on adjoining land and designed in a manner that reduces associated indirect impacts. Prior to the commencement of sand extraction works within each phase, a phase specific BDAR (or assessment in line with the relevant legislation at that time) will be prepared to accurately assess impacts, avoidance and mitigation measures, and offset obligations.

A construction personnel induction program shall be developed by the Proponent to highlight the presence of significant vegetation and habitat values adjacent to the site. The general induction of all construction personnel will cover such matters as:

- Areas adjacent to the site in which significant vegetation and habitat values occur.
- Threats to significant vegetation and habitat values associated with construction activities.
- Requirement to report any incidents within the significant vegetation and habitat areas, and actions required; and
- Requirements of any relevant Management Plans, particularly protocols for vegetation clearing and measures to protect all other native vegetation.

During construction activities, temporary high visibility fencing will be erected to assist in the protection of vegetation to be retained from all construction activities by restricting access from machinery and contractors. This fencing will be erected in accordance with Australian Standard 4970-2009 Protection of Trees and any additional requirements of a Vegetation Management Plan to be prepared by a suitably qualified ecologist. Temporary signage will be provided along all temporary fencing during the construction phase stating, "Environmental Protection Zone – No Unauthorised Entry".

No machinery, rubbish or spoil will be stored within retained vegetation during the construction phase of the development. Vehicle/equipment wash-down areas or access tracks will not be located in or immediately adjacent to retained vegetation.

Vegetation will be inspected for fauna by a suitably qualified ecologist immediately prior to the commencement of clearing/earthworks. Any fauna detected within proposed clearing areas will be relocated to suitable habitat outside of the subject site. Consideration will be given to appropriate release times and locations for specific fauna groups and a record kept of all species encountered/relocated.

A soil and water management plan will be developed and implemented. This soil and water management plan will be consistent with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.

A Rehabilitation Management Plan will be developed and implemented. This plan will be consistent with the concept rehabilitation and landscape management plan prepared by JWA Ecological Consultants dated February 2021 and will:

(a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary.
(b) be prepared in consultation with DPIE, Council and OEH.
(d) include a detailed final landform concept plan showing the final lake and bank design.
(e) describe how the rehabilitation of the site would achieve the above performance criteria.
(f) describe the short, medium, and long-term measures that would be implemented to:
    - rehabilitate and stabilise the site; and
    - manage the restored vegetation and wetland habitat established on the site.
(g) include detailed performance and completion criteria for the rehabilitation and stabilisation of the site (including appropriate water quality criteria);
(h) include a detailed description of the measures to be implemented on the site to:
    - enhance existing vegetation and increase littoral and terrestrial habitat potential.
    - control terrestrial and aquatic pests and weeds.
    - control erosion.
    - control access; and
    - reduce the visual impacts of the development.
(i) include a vegetation clearance protocol.
(j) include a program to monitor, independently audit and report on the effectiveness of the measures in paragraph (f) above, and progress against the detailed performance and completion criteria in paragraph (g) above; and

(k) include a Long-Term Management Strategy which:
- defines the objectives and criteria for TSP closure and post-extraction management.
- describes the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and
- describes how the performance of these measures would be monitored over time.

(l) describe the potential risks to successful rehabilitation and/or revegetation, including a description of the contingency measures that would be implemented to mitigate these risks; and

(m) detail who is responsible for monitoring, reviewing, and implementing the plan.

Rehabilitation monitoring

Monitoring and reporting is critical in ensuring the continuing success of restoration works and will be carried out for the duration of project in accordance with the requirements of the Concept RLMP. To assess the success of rehabilitation works, vegetation assessments will be completed by a suitably qualified ecologist using plot-based vegetation surveys (transects and quadrats) and photo point monitoring. In addition, the rehabilitation team will also maintain records of works completed. The methodology to be used to monitor the rehabilitation works is outlined in the Concept RLMP.

To assess the suitability of the extraction lakes and Rehabilitation Areas for terrestrial and aquatic fauna, assessments of biological indicators (fish, birds, and macroinvertebrates) will also be undertaken by suitably qualified persons using the methodology outlined in the Concept RLMP.

Monitoring of birds will be completed annually. Monitoring of fish and macroinvertebrates will be monitored at the end of each extraction phase.

Water quality monitoring

Water quality in the extraction lake will be monitored on a biannual basis in accordance the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.

Reporting

An Annual Rehabilitation Monitoring Report will be prepared which discusses the results of the monitoring of retained vegetation and rehabilitation areas against the Monitoring Performance Criteria identified in the Concept RLMP. Each Annual Rehabilitation Monitoring Report will be included in the Annual Environmental Monitoring Report (AEMR) which is submitted to the DPIE as part of the current sand extraction licencing requirements.

6.5 Heritage

6.5.1 Aboriginal Cultural Heritage

Hanson commissioned Everick Heritage to prepare an Aboriginal Cultural Heritage Assessment (ACHA). This section summarises the finding of the ACHA included under Appendix I. For full assessment of Aboriginal Cultural Heritage issues refer Appendix I.

Methodology

The methods used for this assessment are in compliance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (Heritage NSW 2010) ('CoPAI') and all relevant legislation as described in Section 2 of the ACHA. The assessment complies with the accepted methodology for undertaking a Due Diligence Assessment under the *National Parks and Wildlife Act 1974* ('NPW Act').

In accordance with the relevant administrative and legislative standards for NSW, the methods employed in the ACHA assessment included:

- A search of relevant heritage registers.
- A review of environmental resources for the region.
- A review of relevant archaeological and ethnographic studies for the region.
- A site inspection to be conducted with representatives of the Tweed Byron Local Aboriginal Land Council ('LALC').
- Assessments of archaeological and cultural heritage significance; and
- Report on findings and recommended management strategies.

Refer Section 1.1 of the ACHA for full discussion of methodology. The existing environment as it relates to Aboriginal Cultural Heritage is discussed in the ACHA in Appendix I.

Assessment

The Project Area is located within land subject to the following types of disturbance:

- initial vegetation clearing.
- European farming practices including agricultural drainage.
- cattle grazing.
- sand extraction; and
- cultivation of sugar cane and tea-tree.

By any measure of disturbance, the proposed expansion area of the HTSP is highly if not totally disturbed. The terrain bears no resemblance to its pre-European state where original soil profiles have been mixed and low rises that may have existed have been levelled for broad scale cultivation. It is unlikely that there are any intact soil profiles within the plough zone which can be estimated at approximately 30-40cm.

The destructive impacts to Aboriginal sites of clearing/logging and long-term cultivation may well destroy the original structure or integrity of an Aboriginal archaeological site, however the contents of the site particularly stone artefacts will be retained albeit in a horizontal or vertically displaced condition.

As a result of the desktop study, field inspection and Aboriginal community consultation, the following was determined.

- No Aboriginal objects were identified during the site inspections and the Project Area was determined to have been subject to significant historical ground disturbance.

- No linear dune features with a greater potential to contain Pleistocene or subsurface Aboriginal cultural materials were identified within the Project Area.

- One (1) Indigenous cultural heritage site is mapped within the Project Area. This site was a low-density stone artefact scatter (Crescent Street 1 #04-2-0109) which has been removed under a Care and Control agreement. This site is mapped within the Tweed Sand Plant extraction pond.

- The hills beyond the southern extent of the Project Area (Lot 1 DP1250570) have been designated by the TSCACHMP as having the potential to contain subsurface deposits of 'significant' Aboriginal heritage. Spur lines and hills comprise the volcanic basalt soils of the Cudgen Duranbah hills to the east and southeast of the Project Area; thus, it is possible that Aboriginal sites would be found in this context. However, while it is known that the Cudgen hills were a source of red ochre for Aboriginal people, Aboriginal occupation sites or resource sites have not been found in these hills. Surveys around this area did not find any Aboriginal places or objects.

- Ground surface visibility within the majority of the Project Area was notably low, with exposures only present in highly disturbed drains.

Having consideration for the outcomes of the survey it is reasonable to conclude that the proposed expansion of the HTSP will not impact on Aboriginal objects. As such additional community consultation and archaeological investigation will not be required.

Mitigation Measures

Recommendation 1: Aboriginal Objects Find Procedure

It is recommended that if suspected Aboriginal material has been uncovered because of development activities within the Project Area:

- work in the surrounding area is to stop immediately.
- a temporary fence is to be erected around the site, with a buffer zone of at least 10 metres around the known edge of the site.
- an appropriately qualified archaeological consultant is to be engaged to identify the material.
- if the material is found to be of Aboriginal origin, the Aboriginal community is to be consulted in a manner as outlined in the Heritage NSW guidelines: *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010); and
- should the works be deemed to have harmed the Aboriginal objects Heritage NSW should be notified immediately via the EPA Enviro Hotline.

Recommendation 2: Aboriginal Human Remains

Although it is unlikely that Aboriginal Human Remains will be located at any stage during earthworks within the Project Area, should this event arise it is recommended that all works must halt in the immediate area to prevent any further impacts to the remains. The site should be cordoned off and the remains themselves should be left untouched. The nearest Police Station (Kingscliff), the Tweed Byron LALC and the Heritage NSW Regional Office (Coffs Harbour) are all to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and the Heritage NSW should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.

It is also recommended that in all dealings with Aboriginal Human Remains, workers or contractors should use respectful language, bearing in mind that they are the remains of Aboriginal people rather than scientific specimens.

6.5.2 Historic heritage in vicinity

As discussed within Section 2.7.2 there are three items of local heritage in proximity to the site. These items are sufficiently separated from the project site to avoid impact upon these items. The project will have no off-site impacts that could impact these items.

6.6 Traffic & Transport

Hanson commissioned BES to prepare a Traffic Impact Assessment (TIA). This section summarises the finding of the TIA included under Appendix J. For full assessment of Traffic & Transport issues refer Appendix J.

Methodology

The TIA has been prepared in accordance with the Austroads *Guide to Traffic Management* Part 12, the complementary Roads and Maritime Supplement and RTA Guide to Traffic Generating Developments. Refer Section 1 of the TIA for full discussion of methodology.

Assessment

Existing traffic surveys are available on the site and Tweed Shire Council Transport reporting on future traffic volume forecasts were also adopted in the analysis. In addition, specific targeted traffic survey volumes, vehicle classification and speed surveys in addition to peak hour intersection surveys were carried out to compliment and update the available information. All new surveys were completed in early March 2020 pre COVID -19 and represent the normal situation. The speed surveys identified that the advisory speed of 75km/hr is exceeded by average speeds of 87km/hr which considerably affects the acceleration length for the laden trucks.

The current daily heavy vehicle percentage of 9.5% on the Tweed Valley Way off-ramp is expected to increase marginally in 2041 considering the growth in background traffic and the future Tweed Valley Way 2041 volumes including growth in current heavy vehicle and light vehicle trips. Traffic growths at the rate of 1.6% per annum as agreed with Tweed Shire Council were adopted for the analysis of the intersection at the Australian Bay Lobster Producers Limited (ABLP) property. The growth rate is consistent with the medium growth scenario adopted for Tweed Shire Transport planning.

The design vehicle for the project is 25m B-Double truck. The preferred site access strategy is contained in Appendix A of the TIA. Egress from the site involves an acceleration lane and merge onto the Tweed Valley Way off-ramp. Ingress to the site involves use of the existing ABLP priority intersection including a new left turn auxiliary lane. Right turn out and right turn in will be banned for the HTSP trucks at the ABLP intersection.

For future access onto the Tweed Valley Way off-ramp, trucks are required to accelerate from 40km/hr to 67km/hr at 0.4% grade over an available distance of 618m along the internal haul road to the end of acceleration lane at the Tweed Valley Way off-ramp. 540 metres is the required acceleration distance based on the higher simulated grade of 1.0% hence the acceleration lane length provided is conservative and above the absolute requirement. An additional merge distance of 90 metres is provided. The merge between the outbound haul route and Tweed Valley Way occurs before the start of the increase in the vertical gradient up to the M1 overpass level and before the 75km/hr advisory speed sign and within the 80km/hr speed zone. A run-out area is available at the end of the merge before the start of the left turn auxiliary lane into the ABLP / HTSP Intersection.

Actual recorded speeds are higher as per the traffic survey data and have been considered in the calculations. The deceleration lane length of 100 metres including merge is provided for the auxiliary left turn lane into the ABLP 'T' intersection. HTSP destinations involve 95% delivery trips travelling north and 5% south.

The SIDRA software capacity analysis identified an excessive Level of Service (LOS) for vehicles travelling from the south in the future that will not be able to turn right into the ABLP property access and instead as part of the Code of Conduct, are required to continue along the M1 to the Tweed Coast Road interchange further north for a U turn to approach the intersection from the north using the left turn auxiliary lane. Similarly, any HTSP vehicles leaving use the Service Centre roundabout for a U turn to access the M1 northbound and southbound on-ramp.

Assessment of the impact on public transport (public and school bus routes) and consideration for alternative transport modes such as walking and cycling recommended access from the existing Tweed Coast Road as part of the Tweed Shire Council bus services and active transport infrastructure following the completion of the end use.

Tweed Valley Way roundabout is designed to cater for a 25m B-Double heavy vehicles. However, swept path analysis of the U-turn movement at this roundabout identified that modifications to the roundabout island are required. To ensure road safety, it is proposed to provide additional signage with advisory safe turning speed for trucks maneuvering roundabout in addition to a slight modification to the inside circulating lane.

Mitigation Measures

Altona Road / Crescent Street / Tweed Coast Road will not be utilised for Haulage.

Direct access to Tweed Valley Way Pacific Highway Interchange in the form of an acceleration lane and merge will be provided.

Upgrades to the existing ABLP priority intersection including a new left turn auxiliary will be provided.

Upgrades to Tweed Valley Way Roundabout in the form of lane widening will be provided.

HTSP must not transport more than 950,000 tonnes of extractive material from the site in any financial year.

An Operational Traffic Management Plan / Driver Code of Conduct will be developed and implemented.

6.7 Land Resources

6.7.1 Acid Sulfate Soils

Hanson commissioned G&S to prepare an Acid Sulfate Soils Assessment (ASSA). This section summarises the finding of the ASSA included under Appendix K. For full assessment of Acid Sulfate Soil issues refer Appendix K.

Methodology

An acid sulfate soil investigation was undertaken within the proposed expansion area from April to November 2020. Pacific Geotech Pty undertook the soil investigation using a combination of cased auger drilling (initial boreholes MB13A to MB18A) and vibracore drilling (AS1 to AS44). Refer ASSA under Appendix K for discussion of the drilling locations.

A total of 50 boreholes were drilled throughout the expansion area including six groundwater monitoring wells (sampled for ASS purposes) and forty-four dedicated ASS boreholes. Total depth within each bore reached one metre below the full depth of the sand resource approximately 20 mbgl. All soil logging and sample collection was undertaken by qualified G&S staff.

For discussion of the existing environment as it relates to Acid Sulfate Soils refer Appendix K.

Assessment

Extensive drilling has been conducted in the immediate vicinity of the proposed expansion area including at the existing HTSP site, the neighbouring lands to the east (Gales Holdings) and a number of locations within the separate ABLP and CLSP owned properties. These historic investigations have shown the sand resource to be highly consistent and these findings are supported by the results of the ASSA.

At each borehole, samples were recovered at the surface and at depth intervals of 0.5 m (and every change in soil stratum) to the full depth of the soil profile drilled. A total of 1597 samples were recovered, with all samples sealed in plastic geological sampling bags and frozen prior to being forwarded to ALS Laboratories for field screening (pH_{Field} and pH_{Fox} testing) and analysis via the Chromium Suite (Method 22B).

Field oxidised pH results ranged from 1.2 up to 7.1 with an average result of 4.8. A total of 365 samples returned a pH_{Fox} of < 3 with the vast majority of samples also exhibiting a pH drop of greater than 1 unit from the pH_F result. These results provide a strong indication of the presence of sulfides throughout the site.

Based on the field screening results, a total of 476 samples were then selected for further laboratory analysis via the Chromium Suite at a rate of approximately one sample per five field samples.

For interpretation of the Chromium Suite results, the ASSMAC Guidelines stipulate an Action Threshold of 0.03%S for projects where more than 1000 tonnes of material is to be disturbed. Of the 476 samples analysed, a total of 366 samples returned a %S value of greater than 0.03%S.

Acid Neutralising Capacity (ANC) levels varied throughout the samples analysed ranging from 0.02 % $CaCO_3$ up to 15.4% $CaCO_3$ with an average level of 2.75% $CaCO_3$. These high (ANC) concentrations in comparison to the materials' acid generating potential (i.e. SCR% results) indicate that the material is essentially self-neutralising, as demonstrated by the Net Acidity results which averaged 0.14% $CaCO_3$ with approximately 67% of results less than the 0.3 %S Action Threshold.

In order to calculate the total volume of ASS materials within the extraction footprint ASS modelling was undertaken using CivilCad 3D. The Net Acidity %S results from the Chromium Suite were used to classify the soils into the following six categories, ranging from materials which require no treatment to materials which would require extensive treatment:

Category 1 materials would generally be too costly for traditional lime treatment and therefore would be left in-situ or (depending on position in the soil profile) reinterred at depth below the watertable. Category 2 to 5 materials may require treatment. Category 6 materials would require no treatment.
The results of the modelling showed the majority of materials to be extracted (~76%) are Category 6 materials, requiring no lime treatment.

Of the remaining Category 1 to 5 materials, Category 1 made up 0.022%; Category 2 materials 0.465%; Category 3 materials 1.923%; Category 4 materials 6.994% and Category 5 materials 14.386%.

Given the high degree of similarity between the material currently being extracted by HTSP and that within the proposed expansion area, the existing approved approach to ASS Management will also be adopted for operations within the proposed expansion area. This methodology has proven successful over the life of the HTSP operations with stable pH levels maintained in the lake and no evidence of the occurrence of acidic reactions in the insitu material surrounding the lake, the reinterred fines or the sands exported from the site.

Topsoils and overburden (material above the groundwater table) will be progressively removed via dry-excavation methods in advance of the extraction face. These materials will be analysed and, where required, treated through the addition of lime to neutralise any Net Acidity.

The sand resource contains a percentage of PASS fines which will be removed from the sand through the use of a hydrocyclone. The separated fines would then be returned to the dredge lake via a dedicated fines return system and released into the water column to achieve a final deposition depth of at least eight metres below the water surface. This process will achieve long-term management of the fines by placing them in a stable, low oxygen environment, thus preventing ongoing disturbance and minimising opportunities for oxidation.

Monitoring of extracted sands has been undertaken consistently at the site since at least 2006. Results of this sampling have been highly consistent over time reflecting the efficiency of the hydraulic separation method. No lime treatment of extracted sands has been required at the site owing to the high ratio of acid neutralising capacity (ANC) compared to its acid generating potential (AGP) within this sand resource.

Given the similarities between the resource at the existing HTSP site and within the expansion area the success of the hydraulic separation and fines reinterment methodology is anticipated to continue for the expansion area.

Water quality monitoring would occur on a regular basis within the extraction lake and include vertical profile monitoring within the vicinity of the fines reinterment location to ensure dissolved oxygen levels remain suitable for the long term stability of the fines.

Mitigation Measures

Acid Sulfate Soils will be managed in accordance with the measures prescribed in the Soil and Water Management Plan included under Appendix E. This management plan outlines monitoring regimes and mitigation measures for the management of Acid Sulfate Soils.

6.7.2 Agricultural Land

Hanson commissioned G&S to prepare an Agricultural Land Capability Assessment (ALCA). This section summarises the finding of the ALCA included under Appendix M. For full assessment of Agricultural Land issues refer Appendix M.

Methodology

The proposed expansion area covers lands that had been used originally for sugar cane production, but in more recent times cattle grazing. As the project will result in the permanent loss of these lands, an ALCA of the site is required to address the Secretary's Environmental Assessment Requirements (SEARs). To that end the following has been undertaken:

- An Agricultural Land Capability Assessment (ALCA) within the proposed expansion area.
- An assessment of the adjacent land uses and potential land uses to inform a land use conflict assessment.
- A land use conflict assessment, including defining agricultural buffer requirements for the proposal.
- An estimate of the likely impacts of climate change.

Assessment

The assessment described in the ALCA evaluates the suitability of the site for future agricultural use. It also aims to determine whether the development is likely to have a significant impact on any likely preferred uses of land in the vicinity of the development (including any cumulative impacts). The assessment also identifies any ways in which the development may be incompatible with any of those existing, approved or preferred uses for the adjoining land.

Soil characterisation
To sample and characterise the site soils, a drilling program was undertaken from 14 September to 6 November 2020. This included the drilling of soil cores to 1.2 mBGL at five observation locations, in addition to the soils information gathered from 20 deeper boreholes (approximately 20 mBGL) constructed as part of a separate Acid Sulfate Soil Investigation.

The soil sampling and classification comprised laboratory analysis and interpretation of results. The results were used to assess and classify the site against the following agricultural land use mapping resources in NSW:

- Land and Soil Capability mapping (LSC)
- Biophysical Strategic Agricultural Land mapping (BSAL)
- Agricultural Land Classification (ALC)
- Important Agricultural Land (IAL)
- Regional Farmland Mapping.

The following soil orders (or types) were identified:

- Tenosols – The soils at the site generally fall within the Tenosol soil type, which are soils exhibiting only weak pedologic organisation apart from the A horizons. The soil order encompasses a rather diverse range of soils, which are nevertheless widespread in many parts of Australia.

- Podosols – These are soils which possess either a Bs horizon (visible dominance of iron compounds) a Bhs horizon (organic-aluminium and iron compounds) or a Bh horizon (organic-aluminium compounds). There horizons may occur singly in a profile or in combination.

Land and soil capability
Based on the findings of the ALCA, the majority of the expansion area has poorly to imperfectly drained soils that exhibit waterlogging – typically between two to greater than three months of the year. The land and soil classification of these parts of the landscape ranges from Class 5 (moderate to low capability) to Class 6 (low capability). The land associated with the mapped BSAL had similar waterlogging characteristics (LSC class 5-6) but was subject to soil structure decline (LSC rating 4) and poor buffering capacity (LSC rating 4). As such the remainder of the site was classified as 'Class 5-6'.

Although the land and soil outcomes suggests a low capability, such land in this location has the potential to be used as a sugar production area (with installation of suitable drainage) or used for specialist estate crops, such as a tea tree oil plantation.

Biophysical Strategic Agricultural Land (BSAL)
The NSW Government has undertaken regional scale mapping of Biophysical Strategic Agricultural Land (BSAL) in the Tweed Shire. The current BSAL mapping included a portion to the north of the existing operational site. The area was mapped as having moderately high soil fertility under the SEED mapping. The Strategic Agricultural Land Map under the SEPP (Mining, Petroleum Production and Extractive Industries) 2007 also showed the mapped area of BSAL.

The BSAL land was assessed using the NSW Government *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (2013). The total area of contiguous mapped BSAL is less than 9 ha and as such does not fulfil the minimum size criteria of greater than 20ha. The site was also assessed as moderately low fertility (fertility ranking 2) based on its Australian Soil Classification of bleached orthic tenosol (or grey orthic tenosol) with light sandy textured horizons. In addition, the land and soil capability of Class 5-6 is not consistent with the BSAL classification for land and soil capability classes 1, 2 or 3.

Agricultural land classification
The agricultural suitability classification for the site was found to be class 3 to 4 based on the land's imperfect to poor drainage.

NSW DPI is currently undertaking a mapping program across NSW to assist in the recognition of important agricultural land with an expected completion date of November 2020 (at the date of this report). The overall scope of this report addresses the mapping outcomes of the IAL mapping.

Under various North Coast Region Plan and Strategy documents, the site is identified as important farmland, albeit limited in potential to sugar cane and estate crops such as tea tree oil plantations. Similarly, the Northern Rivers Farmland Protection Project mapped the site as regionally significant farmland based on it sugar cane potential.

Climate change impacts
This report also evaluated the site's long-term capability to support agricultural production in the context of climate change. The TSC Climate Change Management Policy, version 1.0 adopts a sea level rise of 0.4 m by 2050 and 0.9 m by 2100 (above 1990 mean sea levels), as well as an increase in the frequency and depth of tidal inundation of low-lying lands and poor drainage in low lying areas.

The proposed expansion area is a low-lying coastal floodplain and is currently subject to tidal inflows from the Tweed River for part of the site. The predicted sea-level rise will exacerbate tidal inundation and impede the site's drainage, leading to increased waterlogging and salinisation of soils. As time progresses, the site (and indeed adjacent land uses on the same landform) will degrade further with a consequent reduced capacity to support agricultural production.

Surrounding agricultural land use
The Land Use Conflict Risk Assessment found that the adjacent agricultural land uses, and any potential land use will not impact the proposed development.

Mitigation Measures

Until an extraction phase comes online, the project would maintain cattle grazing and agistment.

6.7.3 Landform and Stability

Hanson commissioned Pacific Geotechnical to prepare a Geotechnical Report. This section summarises the finding of the Geotechnical Report included under Appendix N1. For full assessment of Geotechnical issues refer Appendix N1. For copies of the proposed lake bank profiles refer Appendix N2.

Methodology

The geotechnical investigation comprised the drilling and sampling of 5 boreholes to depths of between 28.5m to 50m, using an IH800 drilling rig and a combination of 100mm solid flight augers and washboring techniques. Additionally, 6 boreholes were drilled to depths of 1.5m for the pavement investigation using a Compac 018 drilling rig and solid flight auger techniques. Dynamic Cone Penetrometer (DCP) testing was conducted adjacent to the shallow boreholes.

The soil classification descriptions and field tests were carried out in general accordance with Australian Standards AS 1726 Geotechnical Site Investigations and AS 1289 Methods of Testing Soils for Engineering Purposes. Refer Geotechnical Report under Appendix N1 for full discussion of the methodology and existing conditions.

Assessment

An assessment of the geotechnical stability of the proposed lake batters that are adjacent to Tweed Valley Way and the Pacific Highway was undertaken to determine a long term factor of safety and suitable revetment profile.

The selection of parameters for use in stability analysis has been based on the interpretation of the results of the field and laboratory testing from the investigation and the results of earlier investigations across the Hanson Tweed Sand Plant and in the immediate area. The adopted strength profiles are identified table 2 of the Geotechnical report under Appendix N1.

Conditions for Analysis
Two conditions are considered possible critical conditions from a geotechnical stability perspective (total stress and effective stress) and have been analysed for the soil profile developed and a number of loading conditions. Both the total stress and effective stress cases have been analysed.

A minimum factor of safety of 1.3 is typically considered acceptable for the total stress situation (short term) and 1.5 is generally considered acceptable for the effective stress (long term) case, for the adopted soil parameters and loading conditions.

Method of Analysis
The stability assessment has been carried out using the "G Slope" computer program developed by Mitre Software Corporation. This program allows the use of Bishop's Modified Method and Janbu's Simplified Method applied to circular, composite and fully specified failure surfaces.

Failure conditions are analysed by dividing the failure body into a number of vertical slices. The forces acting on each slice are evaluated, and the equilibrium of the entire failure body is determined by assessing the forces on all the slices.

A factor of safety is computed for each failure surface considered. A minimum factor of safety for the section under analysis is found by analysing a large number of potential failure surfaces.

Stability Results
A surcharge load of 5kPa for the proposed haul road for a distance of 2m from the top of the bank for a distance of the length of the edge was adopted and 10kPa surcharge adopted for the highway. It has been assumed that the water level in the lake will be maintained at a minimum level of RL0m, following dredging of the lake.

For both the total and effective stress analysis for the adopted lake profiles, a global factor of safety in excess of 1.5 occurs.

It is likely that some minor slumping of the upper-level loose sands will occur with some of the above profiles prior to the placement of the revetment/protection rock but this will not impact on the overall global stability of the batter profile. Options to stabilise the upper-level soil profile below the water could include the installation of a rock protection layer of the completion of batter profiling (say 500mm thick with a suitable geofabric under) or further flattening of the batter profile to 6H:1V.

Consideration could be given to maintaining a 2m bench at approximately RL-4m as a construction measure to prevent over-excavation of the upper-level batter slope during the dredging of the lower-level sands.

Risk Assessment
A risk assessment has been undertaken to determine the potential risk associated with the proposed long-term batter profiles (refer Geotechnical Assessment under Appendix N1 for full discussion of risk assessment)

The most significant degree of risk involves the impact of additional loads being applied to the top of the embankment slope or over dredging of the sand batter during the dredging operation resulting in steeper batter profiles than those designed. This should be controlled through the strict control and management of development adjacent to the revetment slope to ensure that additional loading does not further impact on the global stability of the revetment profile and monitoring of the dredging and continued underwater surveying during the dredging operation, together with the implementation of a bench in the batter profile.

The likelihood of risk to the development as a consequence of failure of the batter has been assessed as Low provided suitable treatment methods and profile have been adopted.

It is therefore considered that the proposed batter profile indicated in Figure 4 is acceptable in the long term from a geotechnical perspective.

Mitigation Measures

It is recommended that the following site preparation and earthworks procedures be carried out during development.

- All earthworks' operations should be carried out in general accordance with AS 3798-2007 "Guidelines on Earthworks for Commercial and Residential Developments".
- All topsoil (i.e. soil containing organic matter) and soils containing deleterious matter should be stripped from the construction area at the commencement of the earthworks operation.
- The use of a bridging layer may be required to improve trafficability across the site. Subject to the subgrade performance at the time of bulk earthworks. The bridging layer is likely to be a minimum 400mm thick and the use of a suitable woven geofabric may assist in minimising the required layer thickness.
- Imported fill should be of fair to good quality with a minimum Soaked CBR value of 10%, a maximum Iss=1.0% and a maximum particle size of 75mm.

- All filling should be undertaken in layer thicknesses of approximately 250mm (or as appropriate for the compaction equipment being used). Fill should be compacted to a minimum dry density ratio of 98% Standard in accordance with AS1289 5.1.1.
- Field density testing should be carried out to check the standard of compaction achieved and the placement moisture content. The frequency and extent of testing should be as per guidelines in AS.3798-2007.
- All earthworks' operations should be performed under Level 1supervision, in general accordance with the requirements of AS3798 and should be certified as controlled fill by the testing authority.

6.7.4 Land Contamination

Hanson commissioned G&S to prepare a Preliminary Site Investigation (PSI). This section summarises the finding of the PSI included under Appendix L. For full assessment of Land Contamination issues refer Appendix L.

Methodology

The PSI has been prepared in consideration and generally consistent with the following:

- Tweed Shire Council's Contaminated Land Policy (Version 1.1).
- NSW EPA Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (EPA, 2011).
- NSW EPA Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015) NSW DUAP/EPA Managing Land Contamination Planning Guidelines SEPP 55 – Remediation of Land (DUAP/EPA 1998).

The PSI includes a review of previous assessments undertaken on the site, a review of historic aerial photography, site inspections and interviews with past and current owners.

Assessment

The following potentially contaminating activities/contaminants were found to be associated with the site:

Lot 51 DP1166990

Treed area

- Demolition waste including bricks, timber, concrete and metal.
- Other wastes including old tyres, various empty chemical drums and oil containers, scrap metal including old cars, white goods and an outboard motor, a boat, soil stockpiles and general rubbish.

Other areas

- Evidence of demolition waste including concrete slabs.
- Two soil stockpiles containing bricks and some bonded ACM.
- Large, vegetated stockpile of potentially imported soil.

Additional

- possible buried asbestos concrete pipes used as part of the historic drainage across the site.

Lot 2 DP 1192506 and Lot 1 DP1250570

The historical assessment and site inspection identified no obvious Contaminants of Potential Concern (CoPC) apart from:

- several stockpiles of imported soil and rock rubble.
- a cattle pen/stockyard with imported gravel base and empty disused drum of endectocide.

- other soil stockpiles and;
- an empty above ground fuels storage tank (AST).

Lot 22 DP1082435 and Lot 23 DP1077509

The historical assessment and site inspection identified no obvious CoPC apart from historical herbicide and pesticide use associated with the growing of *Melaleuca alternifolia* (tea tree).

It is recommended that further detailed inspection/assessment of the site be undertaken on a lot by lot basis prior to the proposed expansion works. This would include a soil sampling program to sample any of the identified potential areas of contamination including soil stockpiles within all lots, soils within the rows and headers of the currently cropped tea tree on Lot 22 DP1082435 and Lot 23 DP1077509, the current cattle pen/stockyard and surrounds and AST on Lot 1 DP1250570; and the treed area and surrounds on Lot 51 DP1166990.

The identified wastes within the treed area on Lot 51 DP1166990 in particular would require further assessment and removal prior to undertaking a detailed assessment of the underlying soils.

Future progress
The potentially contaminating activities/potential contaminants associated with the site are typical of land where agricultural activities have historically been undertaken and were limited to small areas of the site as identified on Drawing 12035-416 of Appendix 1 of the PSI.

In many instances, remediation requirements are likely to be straightforward and simply require the removal of identified wastes with selected areas also requiring soil testing. These activities would be undertaken in accordance with an approved RAP and scheduled to occur on a lot by lot basis prior to the commencement of extraction within the relevant allotments. This staged approach is supported by State Environmental Planning Policy (SEPP) 55 which provides that detailed assessments need not be undertaken immediately following the preliminary investigation but should be undertaken prior to commencement of the new land use. It is proposed that detailed investigations, preparation of the RAP and any subsequent remediation of the identified areas could reasonably form a condition of approval for the proposed expansion.

Mitigation Measures

A detailed site investigation (DSI) would be undertaken to inform the preparation of a Remediation Action Plan (RAP) for the relevant areas of the site. Remediation will be undertaken in accordance with the RAP on a lot-by-lot basis prior to extraction within that allotment.

6.8 Waste

Assessment

The project would not introduce any additional waste streams or generating activities. Existing waste streams on site include 'general waste', effluent (staff toilets), small quantities of lubricants and hydraulic fluids, fines materials from sand processing and overburden. These materials are currently managed appropriately as part of Phase 1 to 4 operations and it is proposed that these management measures continue to be applied.

Mitigation Measures

Waste will be managed in accordance with the measures prescribed in the Soil and Water Management Plan included under Appendix E.

6.9 Hazards

6.9.1 Flood

Hanson commissioned BES to prepare a Flood Response Assessment Plan (FRAP). This section summarises the finding of the FRAP included under Appendix D2. For full assessment of Flooding Safety issues refer Appendix D2.

Methodology

The development site is identified as being flood prone by mapping contained within the Tweed Shire Council's Development Control Plan (DCP) 2008. The FRAP addresses the flood risks associated with the site and provides a strategy for the management of the facility during a flood event. This plan developed in accordance with the provisions of the TLEP 2014 and the TDCP 2008.

Assessment

Hydraulic modelling has identified that the subject site and surrounding streets will be affected by a combination of fluvial flooding in Tweed River catchment and storm tide surges during extreme weather events and that the site and the surrounding road network are subject to hazardous flooding during major weather events.

Weather forecasts and flood warnings issued by the Bureau of Meteorology and the New South Wales State Emergency Service (SES) will determine when evacuation should occur. The monitoring of BoM forecasts and SES warnings by the site manager / flood warden will form a key component of the management strategy.

Using the information in this report and the identified risk factors, the site manager (in conjunction with facility owner) will devise a specific emergency management procedure manual which will outline roles and responsibilities, evacuation routes, and management actions to facilitate and manage the closure of the facility and the orderly evacuation of all operational staff.

The trigger for the implementation of evacuation strategies shall be when the Bureau of Meteorology or Flood Warnings are issued for Moderate to Severe flooding within the lower Tweed River Catchment or when the SES issue Warnings and Evacuation orders.

The preferred response is for the cessation of all site activities and the immediate evacuation of staff off site to a safe place of shelter (home or Council emergency shelter). All staff shall be required to be offsite prior to the inundation of the surrounding road network by flood waters which can be expected to occur approximately 6 hours after the commencement of the 1% AEP event. The safe, early evacuation of the site will also ensure that no undue burdens are placed on emergency services as a result of the development.

The Site Manager shall ensure that the emergency response measures included within the Flood Response Action Plan are implemented in full.

Mitigation Measures

To ensure that all measures detailed within this document are implemented in full, it is recommended that a condition of approval be implemented requiring the development of a concise Operational Flood Emergency Evacuation Plan for the Tweed Sand Plant facility.

6.9.2 Bushfire

Most of the site is not identified as bushfire prone land. There are however patches of vegetation land on the periphery of the site that is mapped as bushfire prone. The Rural Fires Act 1997 and Associated Planning for Bushfire Protection 2019 do not identify the project as a development type that must be considered for bushfire risk.

As discussed in Section 3.13, the site will be subject to ongoing cattle agistment. This process will be utilised to ensure the site is kept in a typically maintained rural state (i.e., maintained paddocks)

6.9.3 Consumables

SEPP 33 requires consideration of whether the proposal is a 'potentially hazardous industry'. The project stores minimal quantities of diesel, engine oil and hydraulic oil on the subject site. The proposal is not considered to 'potentially hazardous' as defined by the SEPP. All consumables will be stored onsite in accord with the relevant standards.

Mitigation Measures

- All liquid storage (other than water) is to be in vessel compliant with the relevant Australian Standards.
- All liquid storage (other than water) is to be protected by bunding or other containment in accordance with relevant Australia Standards.

6.10 Visual

Hanson commissioned Zone Landscape Architecture (ZLA) to prepare a Visual Impact Assessment (VIA). This section summarises the finding of the SIA included under Appendix P. For full assessment of Social Impact refer Appendix P.

Methodology

Tweed Shire Council has been actively developing the Scenic Landscape Strategy (SLS) since 2016. The initial exercise undertaken was the mapping and assessment of the prominent landscape character types and significant public viewing locations in the region. This exercise led to the development of the draft SLS.

Council endorsed the public exhibition of the draft SLS and supporting policies, including draft amendments to the Tweed Development Control Plan 2008 and draft Council Policy Statement. Industry consultation and public exhibition feedback submissions closed on Wednesday 19 June 2019. This strategy is under review with Implementation pending as of date of this report. The VIA acknowledges the relevance of the SLS.

Key visual catchment zones have been identified through both topographic and photographic studies and with reference to the SLS interactive mapping. This mapping tool prototype has been developed by Tweed Shire Council for the purposes of exhibiting the spatial data and mapping associated with the draft Scenic Landscape Strategy.

The potential visual impact of The Project on the identified visual catchments have been assessed and evaluated against recognized visual assessment principals as determined by the Institute of Environmental Management & Assessment and described by the Landscape Institute for Environmental Management and Assessment (LIIEMA).

Assessment

Visual Catchment

The Project Site is located almost entirely within a single Visual Catchment Boundary (VCB). This is due to the Project Site being located within a large expanse of relatively flat land with a similar elevation to that of the Project Site. The catchment is bounded to the north by a minor rise in topography associated with the Pacific Motorway (~3-4m AHD) and the low laying Tweed River to its immediate north. The primary VCB to the north of The Project Site is defined by Terranora Road and associated ridgeline (referenced as Prominent Ridgeline 2). The VCB is bounded to the south by a ridgeline generally associated with Cudgen Rd and McPhail Avenue (Cudgen Plateau).

The operational infrastructure required by the Project is minor and the expansion of the HTSP (Phase 5-11) will require the same type, scale and quantity of infrastructure as the existing approved Phases 1-4. The site buildings and wash plant (extents of which are approximately 50m x 20m located within a cleared area of approximately 60 x 250m) will remain in use during Phases 5 and 6. This existing infrastructure will be relocated to an alternative position on site from Phase 7 onwards. This infrastructure does not present as a significant feature of The Project and was not visible from the assessed KVP.

The existing TSP extraction area is located within a separate VCB due to the decreased elevation of this area relative to the surrounding landform. The expansion of the sand extraction area will reduce the elevation of the Project Site to generally align with the landform and elevation of the existing TSP extraction area. Analysis of Visual Catchment Boundaries indicate that the sand extraction works (that will lower the ground level of the Project Site) will likely further decrease any potential views from locations within the large expanse of flat land that surrounds the Project Site.

Scenic Amenity

An evaluation of the area of interest (AOI) has been undertaken to determine its scenic amenity and landscape character in order to assess the potential impact of The Project and the ability of the landscape to accommodate any changes. This has been determined through site analysis and with reference to the Tweed Shire Council Scenic Landscape Strategy (SLS). The SLS categorises the TSC region into Landscape Character Units (LCU) and defines a landscape's character as the distinctive, recognisable and consistent pattern of physical elements within a landscape, which give a setting its sense of place and makes one landscape different from another.

The existing Project Site over which the expansion is proposed presents as open pasture grazing lands. Prior to 1950 the site was used primarily for cattle grazing with additional uses including sugarcane production until the mid 1980's. At the time of the inspections undertaken (November 2020) the proposed expansion areas supported cattle, had good grass coverage and were well grazed.

The SLS Scenic Quality Assessment notes the physical attributes as of the Project Site (agricultural landuse, formally mapped as LCU: Sugar Cane) as:

> *A regimented pattern of the rectilinear fields that create a strong yet agreeable contrast to the adjoining and enclosing wooded ridgelines which separate (the agricultural landuse) within adjoining catchments scattered rural homesteads, farm buildings and access roads.*

The Project will result in a change to the existing landscape character, with the resulting landscape will maintaining many of these key scenic quality attributes:

- A vegetated buffer around the perimeter of the lakes will vary in width and consist of locally occurring native species to provide ecological (and visual) continuity to the existing regimented pattern of the rectilinear fields and bands of trees that traverse the landscape.

- On completion of extraction works and subsequent final rehabilitation phases, the Project Site will present as a large natural lake bordered by a significant vegetation to its perimeter. The vast horizontal spatial scale of the waterbody will draw the viewers eye to the river, forested hills and ridgelines in the background.

- The lake will sit within an existing regimented rectilinear landscape formed by the surrounding large scale rural lots featuring sparsely scattered farm buildings, sheds and dwellings. Lots are defined by drainage and cropping lines and reinforced by trees planted as wind breaks to the surrounding cadastral boundaries.

- The varying width of the lake edge and associated perimeter vegetation will create a naturalistic variance to the waterbody whilst remaining visually consistent with the surrounding rectilinear landscape character of the region. The perimeter vegetation will soften the lake edge and present as a visual extension to the bands of existing vegetation that frame the large-scale rural lots surrounding the Project Site.

- During operational phases, the primary appearance of The Project will be the gradual expansion of the extraction area which will present as a flat plain within the landscape. Rehabilitation works will be completed on a stage-by-stage basis following completion of sand extraction works within each phase resulting in the gradual extension of the existing bands of trees that traverse the landscape.

Key Vantage Points

Thirteen Key Vantage Points (KVP) have been selected within the defined Area of Interest. Five Key Vantage Points were selected based on Priority Viewing Situations as identified through Tweed Shire Council's Scenic Landscape Strategy mapping. The balance KVP were identified through topographic and photographic studies, and through detailed desktop analysis and viewshed mapping. In selecting and verifying all KVP, emphasis was placed on sensitive receptors such as areas of existing residential development within a proximity to the subject site and areas determined to be located within the visual catchment of The Project. Verification of these KVP's was made through site inspections and photographs recorded for each viewing situation.

The potential visual impact of The Project has been assessed and evaluated against recognized visual assessment principals as described by the Landscape Institute for Environmental Management and Assessment (LIIEMA). This assessment process evaluates predicted impacts according to their significance as a function of the magnitude of the impact and the sensitivity of the receptor, and rates this impact in level of significance from; Not Significant, Minor Significance, Moderate Significance, High Significance to Major Significance.

Of the 13 KVP investigated as part of this assessment;

- 6 (40%) were determined to have nil impact with no clear line of sight to the Project Site,
- 2 (14%) were determined as having an impact determined as Not Significant.
- 3 (21%) were determined as having an impact determined to be of Moderate to Minor Significance.
- 2 (14%) were determined as having an impact determined to be of Moderate to High Significance.

Vantage Points along Terranora Road were determined as having an impact determined to be of Moderate to Minor Significance. The increase of this predicted impact from 'minor' to 'moderate' is a direct result of the perceived sensitivity of the receptor due to its residential nature. It is noted however that these receptors are at a significant distance (approximately 2.0km) from the Project Site with expansive views across the Tweed Shire. This significant field of view would greatly reduce the visual prominence of the Project Site when viewed from this location.

From the Terranora Road KVP the Tweed River presents as a dominant foreground feature with the landscape transitioning to rectilinear fields and scattered dwellings with the developed urban areas of Kingscliff and Cudgen on the horizon. On completion of extraction works, the Project Site will present as a large natural lake and provide a visual connection to the Tweed River and other existing waterbodies (primarily as a result of existing sand extraction projects) dotted within the landscape.

Key Vantage Points determined as having an impact of Moderate to High Significance were limited to large rural residential lots located on the elevated Cudgen Plateau. This is a result of the significant elevation of this vantage point and its proximity to the Project Site.

From KVP's located along this plateau the proposed lake will be a dominant feature within the landscape. The lake will provide a visual connection to the Tweed River and other areas of water visible within the landscape. The existing waterbody associated with Cudgen Sands extraction works is also visible from this KVP. Prominent Ridgeline 02 (generally aligned with Terranora Road) provides a vegetated backdrop and encloses views to the north.

Summary of Impact

The predicted visual impacts associated with the proposed expansion of the HTSP have generally been found to be of Minor Significance with views of the Project Site limited to areas of significant elevation with expansive views across the Tweed Shire.

Whilst the Project will result in a change to the visual amenity, the changes will be gradual over the course of 30 years. The progressive rehabilitation throughout this time frame will ensure the gradual extension of perimeter vegetation (undertaken on a staged basis on the completion of each expansion phase) that will visually connect to the existing bands of trees that traverse the landscape. This vegetated buffer will vary in width and consist of locally occurring native species to provide ecological (and visual) continuity to the existing regimented pattern of the landscape.

On completion of extraction works and rehabilitation phases, the Project Site will present as a large natural lake bordered by a significant vegetation to its perimeter. The varying width of the lake edge and associated perimeter vegetation will create a naturalistic variance to the waterbody whilst remaining visually consistent with the existing rectilinear landscape character of the region.

Mitigation Measures

The visual amenity outcomes of the proposal are linked to projects progressive rehabilitation and establishment of final landform. Site rehabilitation is to be completed in accord with the Concept Rehabilitation & Landscape Management Plan under Appendix H2.

6.11 Social

Hanson commissioned Vaxa Group to prepare a Social Impact Assessment (SIA). This section summarises the finding of the SIA included under Appendix P. For full assessment of Social Impact refer Appendix P.

Methodology

The SIA has been prepared in accordance with the NSW Government guideline for social impact assessment for state significant mining, petroleum and extractive industry development projects. Stakeholder engagement and desktop studies informed the preparation of the TSP SIA. This included discussions with near neighbours, communications with the existing Community Consultative Committee and other local stakeholders including the local primary school.

In early 2021, the project team distributed information about the project and the opportunity to be involved. There was only moderate response from the community, however local discussions generated rich anecdotal data which informed the SIA.

Several TSC reports were referenced, including strategies built upon significant community consultation. The research and consultation created a robust social baseline for the Cudgen community and surrounds to reference potential changes and impacts from an expanded HTSP operation.

For discussion of the existing environment including the area of social influence as it relates to Social Impact refer Appendix P.

Assessment

Site context – high level overview:
HTSP has limited residential interface and the majority of the community appear to be unaware of the existing plant operations. There are no public sand sales from this site and therefore minimal community interface. Altona Road is a minor road and TSP operates quite discretely. Anecdotally, residents driving on or living near Tweed Coast Road notice the heavy vehicle movements from current operations, and they would prefer less vehicle movements. Hanson maintains a complaint register, with no complaints received for the past three years. Consultation undertaken confirms low community concern about the proposal with stakeholders explaining that they do not expect to experience impacts.

Important community values:
From research and consultation, it is evident the Cudgen community value and are protective of their rural and village lifestyle and have close connection with Tweed's natural environment and scenery. They also value a viable and sustainable agriculture industry, as part of the area's local character and economy. Residents are wary of over-development, including greater densities and building heights. These features are described within the SIA.

The purpose of the SIA is to understand:

- The extent of change associated with the proposal
- The type and duration of this change
- Whether change confers impacts or potential benefits (compared to the values described above).

In the case of impacts, mitigations are nominated from the technical studies associated with the issue or a social impact treatment perspective.

Increase in extraction footprint and operational hours:
A key change with potential to impact the community to some extent, is the proposed increase in operational hours. Hanson is seeking approval to operate on a 24/7 basis in response to market demand, particularly driven by large scale construction projects. Sand extraction would include dredging and pumping sand from the base of the lake, sand washing and stockpiling, and loading and transporting sand in heavy vehicles.

Noise related to night operations is expected to be generally within set limits, although the project is close to the Pacific Motorway where there is significant ambient night noise from frequent vehicle movements. Night operations would only take place in response to market demand.

The proposed extraction footprint means Hanson's operations will be closer to residential properties on Cudgen Road at around Phase 9 which would be in approximately 19-22 years from project commencement (See phasing map following). Hanson has opportunity to commence planting and establishing vegetation screening leading into this phase as a mitigation.

It is anticipated at approximately year 2043 specific, considerate construction and operational methodologies will need to be applied, along with noise monitoring, and other mitigations (as proposed in the EIS). This would also need to include ongoing stakeholder engagement as to the effectiveness of these mitigations.

Consultation revealed some minor concern about 24-hour operations.

Amenity change and loss of land
A distinct change is the creation of water bodies across the rural floodplain landscape as material (primarily sand) is extracted. The eventual amenity change will be significant; however, the change will be slow and take place over an estimated 30 years.

There isn't any specific data available as to how this gradual amenity change could generate material social change, apart from some minor concern expressed about change of rural values. This change does not seem to reduce specific values such as scenery, especially as the project is relatively distant to most properties and is located in a cleared floodplain.

Hanson is planning to progressively rehabilitate and landscape the site during and following sand extraction to create lake edges which appear natural and suited to the landscape. Some local residents explained they would prefer to see water bodies, and this would provide greater recreational opportunities.

In context, a water body has been created from the existing extraction since the 1980s and there is no evidence this amenity change has conferred any negative social impact. Actual social impacts from the amenity change therefore seem low and there are good prospects for beneficial community use of the rehabilitated land and water bodies at the end of the project. This appears to be a reasonable 'trade-off' if there are future concerns and issues about visual amenity change.

The proposal will remove the potential for future conventional agricultural use at this location, which may be considered as cumulative loss of potentially productive agricultural land. However, there has not been intensive agricultural use of the land for at least a decade, and therefore there is no social change. The site has been professionally assessed as 'marginally productive' (Agricultural Land Assessment, Gilbert & Sutherland, 2021) with diminishing prospects due to climate change. The Cudgen Plateau land which is known to be higher value agricultural land is to the south of the site and not impacted by this proposal.

Of note, the project will not interfere with the nearby ABLP site, or their expansion plans, as demonstration of continuity of productive agribusiness use in this locality. Protection of this business is important to local stakeholders.

Mitigation Measures

Measures to mitigate social impact are identified within the specific issue.

6.12 Economics

Hanson commissioned RPS to prepare an Economic Impact Assessment (EIA). This section summarises the finding of the EIA included under Appendix Q. For full assessment of Economic Impact refer Appendix Q.

Methodology

The Economic Impact Assessment has assessed:

- The significance of the resource – its contribution to regional production over the next 30 years and potential to address any emerging supply gaps and shortages in the market.
- The costs and benefits of the project – in the form of a quadruple bottom line cost benefit assessment.
- The project will generate a net benefit to NSW – based on the results of the net present values and benefit cost ratios as well as the contributions to Gross Regional Product.
- The demand on local infrastructure and services – namely road transport infrastructure associated with product distribution; and
- The economic impact due to the loss of agricultural land – based on an alternative use, as valued in the cost benefit assessment.

Assessment

Demographic and Socio-Economic Profile

- The Tweed region has a population of 97,000 in 2019, having increased at an average annual rate of 1.2% over the last decade. The population is projected to grow to 109,487 people by 2031 at an average annual rate of 0.8% over the next decade.
- There is a significant aging population in the LGA with over 30% the population aged 65+ years compared to the NSW benchmark share of 17%. Share of population aged 65+ years is expected to continue to grow to 31% by 2036.
- In 2016, the Tweed LGA ranked in the 5th Decile within NSW in the IRSAD. The median weekly household income was $679 compared to the state average of $891.
- The unemployment rate was most recently recorded at 3.8% in March 2020, compared to the state average of 4.6%.

Local Area Labour Assessment

- Kingscliff-Fingal Head SA2 is home to both the Tweed Sand Plant and over 15,100 residents.
- The area is home to a diverse labour force, which includes a higher proportion of residents working in the construction sector than both the Tweed and NSW labour forces.
- The Gold Coast features prominently as an employment destination for many Tweed and Kingscliff-based construction workers, with over 800 Tweed construction workers travelling to the Gold Coast – this accounts for 1 in every 5 construction workers living in the Tweed LGA.

Sand Market Profile and Demand

- The Queensland market saw a significant rise in sand demand in 2019, reaching the highest level since 2008.
- There is only a small number of sand plants and resources to the south of Brisbane, with the Tweed Sand Plant currently playing an important role servicing both the Gold Coast and northern NSW markets.
- Demand for sand is expected to be supported by three factors:
  - Regional population growth;
  - Major infrastructure projects in South East Queensland and Northern NSW; and
  - Export demand into Queensland (namely South East Queensland).

Economic Impact Assessment

- RPS has assessed the expenditure based economic impacts and contributions of the proposed expansion project using regionalised input-output economic multipliers.
- Adjustments have been made to address methodological concerns and criticisms through the use of a regionalised (NSW and Tweed) model and the presentation of simple economic multipliers only.

- The results show that during the Construction/Establishment phase of the expansion, the project will generate $21.6m in output, $5.7m in Income, 43 jobs (direct and in first round supply chains) and $9.4m in Gross Value Added for NSW.
- Operational activity (post expansion at full production capacity) will generate $6.3m in economic output, $1.7m in incomes, 18 jobs (direct and in first round supply chains) and $3.0m in Gross Value Added annually for NSW.
- Tweed LGA will capture the lion's share of impacts on the NSW economy, accounting for 92.4% of Construction phase GVA and 89.9% of Operational Phase GVA.

Cost Benefit Assessment

- RPS has undertaken a cost benefit assessment of the Tweed Sand Plant expansion in line with TPP17-03 NSW Guide to Cost Benefit Analysis.

- A cost of capital approach has been adopted (i.e. excluding operational costs except expansion linked maintenance) and revenues have been excluded through the use of Gross Value Added estimates on all economic benefits.

- Consideration has been given to the indirect cost of the loss of agricultural output on the subject site.

- Additionally, a range of benefits have been assessed including:
  - Construction/Establishment Phase Supply Chains
  - Export Values (Gross Value Added)
  - Share of the GVA of Construction Activity Supported in NSW by the Resource.
  - Residual Resource Value (Gross Value Added)

- The results of the assessment indirect a net present value ranging from $24.0m over 20 years at 10% to $91.3m at 3%.

- Similarly, the benefit cost ratios of the expansion exceeds 2.0 under all scenarios – ranging from 2.9 under 10% to 6.3 under 3%.

- A sensitivity test increasing the NSW share of sand plant production from 5% to 20% (i.e., reducing export shares to 80%), resulted in a marginal increase in BCRs across all discount rates, confirming that the economic contributions of the sand produced at the plant are similar whether it is used as a local construction material input or exported.

- This reflects the increasingly integrated nature of the Tweed economy with that of the Gold Coast – an integration which is identified as a critical opportunity for the region in the Tweed Regional Plan.

Conclusions

- The expansion of the Tweed Sand Plant represents a significant opportunity for the Tweed and NSW economy to leverage local, regional and interstate population, development and infrastructure investment and growth to increase exports while ensuring the security of supply of critical local construction materials for the Tweed LGA.

- The expansion of the Plant and the establishment of an increased extraction cap will address short-term resource availability issues expected to emerge later this decade, while also providing local employment, establishment and operational phase supply chain benefits for local businesses and indirectly support the region's construction workforce.

- The project is expected to generate a positive benefit cost ratio across all discount rates and produce a positive net present value contribution to the Tweed and NSW economies.

- The resources available on the subject site will continue to be available for extraction post the assessment period of this economic evaluation. However, at a future point, the resource will become exhausted and the Tweed Sand Plant will cease to function.

- The current commitment of Hanson is for the full environmental rehabilitation of the site and its retention for use for a potential range of commercial and/or recreational activities. The nature and viability of these potential end uses will be examined in further detail closer to the end date of the extraction operations and may be subject to additional planning approvals to support further employment generating economic opportunities on the site.

6.13 Cumulative Impact

Despite the project being in proximity to other extractive land uses there will be no significant cumulative risks because of the proximity of the project to these operations. All technical assessments of the potential impacts of the project, have where relevant, considered the cumulative impacts of the development combined with existing activities in the area thereby assessing the cumulative impacts of the project.

Other land uses near HTSP, including other extractive industries, will be subject to hazard related consent and EPL conditions. As such, hazards and risks associated with these facilities are likely to be managed in an environmentally responsible manner and in accordance with relevant legislation and standards, thereby minimising the potential for cumulative impacts from the project combined with nearby facilities.

6.14 Rehabilitation

Hanson commissioned JWA to prepare a Concept Rehabilitation and Landscape Management Plan (CRLMP). This section summarises the finding of the CRLMP included under Appendix H2. For full assessment of proposed site rehabilitation refer Appendix H2.

Methodology

Due to the long-term nature of the proposed development this CRLMP has been prepared to provide overarching requirements for the restoration and management of site following the completion of sand extraction works. The CRLMP establishes responsibilities and procedures for the progressive rehabilitation of the site following completion of sand extraction works, including the stabilising/reprofiling of banks, planting methods, control of weeds and monitoring requirements.

Assessment

Rehabilitation works on the site will cover approx. 20 ha (almost 10% of the site area) and will be completed on a stage-by-stage basis following completion of sand extraction works within each phase. Prior to the commencement of rehabilitation works within each phase, a phase specific Rehabilitation and Landscape Management Plan (RLMP) will be prepared to provide site specific guidance for the rehabilitation and management of the land to be restored. The phase specific Rehabilitation and Landscape Management Plans will be consistent with the strategies outlined in this report and/or current best practice methods.

Mitigation Measures

A Rehabilitation Management Plan will be developed and implemented. This plan will be consistent with the concept rehabilitation and landscape management plan prepared by JWA Ecological Consultants dated March 2021 and will:

(a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary.
(b) be prepared in consultation with DPIE, Council and OEH.
(d) include a detailed final landform concept plan showing the final lake and bank design.
(e) describe how the rehabilitation of the site would achieve the above performance criteria.
(f) describe the short, medium, and long-term measures that would be implemented to:
- rehabilitate and stabilise the site; and
- manage the restored vegetation and wetland habitat established on the site.

(g) include detailed performance and completion criteria for the rehabilitation and stabilisation of the site (including appropriate water quality criteria);
(h) include a detailed description of the measures to be implemented on the site to:
- enhance existing vegetation and increase littoral and terrestrial habitat potential.
- control terrestrial and aquatic pests and weeds.
- control erosion.
- control access; and
- reduce the visual impacts of the development.

(i) include a vegetation clearance protocol.
(j) include a program to monitor, independently audit and report on the effectiveness of the measures in paragraph (f) above, and progress against the detailed performance and completion criteria in paragraph (g) above; and
(k) include a Long-Term Management Strategy which:
- defines the objectives and criteria for HTSP closure and post-extraction management.
- describes the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and
- describes how the performance of these measures would be monitored over time.

(l) describe the potential risks to successful rehabilitation and/or revegetation, including a description of the contingency measures that would be implemented to mitigate these risks; and
(m) detail who is responsible for monitoring, reviewing, and implementing the plan.

Section 7 – Mitigation Measures

7.0 Mitigation Measures

A wide range of mitigation measures to prevent or minimise environmental impacts which may be generated by the project have been detailed throughout this EIS and the supporting technical studies. Implementation of these measures would be necessary to minimise impacts and maximise positive outcomes on the physical, social and economic environments of the local area and wider region due to the proposed development.

Table 33 provides summary of the potential impact, mitigation measure and any residual impacts associated with the proposal.

Table 33: Summary of Potential Impacts, Mitigation Measures & Residual Impacts

ISSUE	POTENTIAL IMPACT	APPROACH	RESIDUAL IMPACT
		WATER	
Water (Ground)	Changes to pre-development groundwater flow regimes.	<u>Management Plan</u> • A soil and water management plan will be developed and implemented. This soil and water management plan will be consistent with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021. <u>Monitoring and Reporting</u> • Monitoring and report will be undertaken in accord with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.	• Localised and minor changes to pre-development groundwater flow regimes in the vicinity of the extraction lake that will be largely contained within the development footprint.
Water (Ground)	Changes to ground water elevation.	<u>Management Plan</u> • A soil and water management plan will be developed and implemented. This soil and water management plan will be consistent with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021. <u>Monitoring and Reporting</u> • Monitoring and report will be undertaken in accord with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.	• Changes to groundwater elevation. These are predominantly contained within the development footprint, occurring within the northern and southern sections of the extraction footprint (Lot 51 on DP1166990 and Lot 1 on DP1250570 respectively) as follows: o There is a maximum 0.5m lowering of the water table in the northern portion of the expansion area. The impact is predominantly contained within the expansion footprint, however a decrease in groundwater elevation of up to 0.3 m is predicted within a small portion of the lands outside the northern perimeter of Lot 51 on DP1166990. o In the southern extent of the site the steady-state model indicates a maximum 1.0 m lowering of the groundwater table predominantly within the expansion footprint. This impact reduces to a maximum of 0.5 m of drawdown outside of the site boundary to the west of Lot 1 on DP1250570. • Impacts to GDE's are predicted to be minimal. A drawdown of up to 0.5 m is predicted to occur within a small portion of the Low Potential GDE, which is mapped on the southern boundary of the expansion footprint west of Lot 1 on DP1250570.
Water (Ground)	Groundwater quality degradation with potential exceed of relevant criteria of Tweed River Water Quality Objectives, ANZECC Water Quality Guidelines and NHRMC Recreation Water Quality Guidelines.	<u>Management Plan</u> • A soil and water management plan will be developed and implemented. This soil and water management plan will be consistent with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021. <u>Monitoring and Reporting</u> • Monitoring and report will be undertaken in accord with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.	• Minor exceedance of Iron within shallow groundwater at a small number of monitoring locations. • Nutrients (total nitrogen, total phosphorous), with recorded exceedances of performance criteria within both shallow and deep groundwater through the expansion area; and • Ammonia within deep groundwater.
Water		<u>Management Plan</u>	

<table>
<tr><th>ISSUE</th><th>POTENTIAL IMPACT</th><th>APPROACH</th><th>RESIDUAL IMPACT</th></tr>
<tr><td>(Surface)</td><td>Surface water quality degradation with potential exceed of relevant criteria of Tweed River Water Quality Objectives, ANZECC Water Quality Guidelines and NHRMC Recreation Water Quality Guidelines.</td><td>• A soil and water management plan will be developed and implemented. This soil and water management plan will be consistent with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.

<u>Prescriptive Measure</u>

• External stormwater catchments are to be accepted into or diverted around the extraction lakes to specified discharge points. These diversions (bunding & channel realignment) are to be consistent with the Flood and Stormwater Assessment prepared by Burchills Engineering Solutions dated February 2021.

<u>Mitigation Measures</u>

• A stormwater management plan is to be developed and implemented for the future Phase 7 wash plant.

<u>Monitoring and Reporting</u>

• Monitoring and report will be undertaken in accord with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.</td><td>• The long-term median for pH of surface waters within the TSP Lake is 8.34. This value marginally exceeds the Tweed River Water Quality Objective of 8.0 but complies with the ANZECC 2000 criteria for primary contact recreation of 6.5 to 8.5.

• Long-term median results for total nitrogen and total phosphorus recorded within the HTSP lake exceed the Tweed River and ANZECC water quality objectives.</td></tr>
<tr><td>Water (Surface)</td><td>Change to the regime of surface water discharge to receiving environments</td><td><u>Management Plan</u>

• A soil and water management plan will be developed and implemented. This soil and water management plan will be consistent with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.

<u>Prescriptive Measure</u>

• Extraction lake overflow points are to be established adjacent designated discharge points. These overflow points are to be consistent with the Flood and Stormwater Assessment prepared by Burchills Engineering Solutions dated February 2021.

<u>Monitoring and Reporting</u>

• Monitoring and report will be undertaken in accord with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.</td><td>• Discharge frequency is estimated to increase to 58% of years (more than once every 2 years) when the southern external catchment comes online in Phase 6.

• Long term, discharge from the southern lake is estimated to occur in approxima+tely 43% of years (or once every 3-4 years).</td></tr>
<tr><td>Water (Flooding)</td><td>Displacement of floodwaters and adverse changes to flood characteristics of the locality.</td><td><u>Prescriptive Measure</u>

• Lake bund invert levels are not to exceed a height of 1.75m AHD for Lake 1 (Phases 10 and 11) and 1.3m AHD for Lake 2 (Phases 5 through 9).</td><td>• Minor changes in the local hydraulic regime are caused by a loss in conveyance storage through the inclusion of bunding around the proposed extraction lakes. The bunding around the lakes prevents external catchment runoff from entering the lakes frequently, flood vents are permitted to overtop into the extraction lakes.</td></tr>
<tr><td colspan="4">NOISE</td></tr>
<tr><td>Noise (Operation)</td><td>Increase in noise levels at sensitive receivers, with potential exceedance of criteria during operation</td><td><u>Performance criteria</u>

• Noise Generated by site operations will not exceed the following at the locations:

<table>
<tr><th>Location</th><th>Period</th><th>Project trigger level $L_{Aeq,adj,15min}$, dB(A)</th></tr>
<tr><td rowspan="3">Noise sensitive places to the east, and to the south-east (north of intersection between Cudgen Road and Plantation Road)
(zoned as RU1 and R2)</td><td>Day</td><td>42</td></tr>
<tr><td>Evening</td><td>42</td></tr>
<tr><td>Night</td><td>38</td></tr>
<tr><td rowspan="2">Noise sensitive places to the south and south-west (south of intersection between Cudgen Road and Plantation Road)</td><td>Day</td><td>41</td></tr>
<tr><td>Evening</td><td>41</td></tr>
</table>
</td><td>• The results of the operational noise modelling indicate that during night-time, when the booster is positioned within proximity to the nearest noise sensitive receptors, a minor exceedance of the noise criteria may occur.</td></tr>
</table>

ISSUE	POTENTIAL IMPACT	APPROACH	RESIDUAL IMPACT

(zoned as RU1)	Night	**38**
Noise sensitive places to the north at significant setback from Pacific Motorway *(zoned as RU1)*	Day	**42**
	Evening	**42**
	Night	**38**
Noise sensitive places to the north and west within proximity to Pacific Motorway *(zoned as RU1)*	Day	**46**
	Evening	**46**
	Night	**38**
School classroom	Noisiest 1-hour period when in use	**38**
Active recreation area (e.g. school playground)	When in use	**53**

However, these noise criteria will not apply if the applicant has an agreement with any impacted landowner to exceed the noise criteria, and the applicant has advised the Department in writing of the terms of this agreement.

Mitigation Measures

- Dredge noise levels will not exceed:

		Sound power level			Sound pressure level at 3m			Sound pressure level at 10m		
		dB(A)	dB(C)	dB(Z)	dB(A)	dB(C)	dB(Z)	dB(A)	dB(C)	dB(Z)
Phase 5	Day	108	115	115	90	97	97	80	87	87
	Evening	104	111	111	86	93	93	76	83	83
	Night	94	101	101	76	83	83	66	73	73
Phase 6	Day	108	115	115	90	97	97	80	87	87
	Evening	104	111	111	86	93	93	76	83	83
	Night	88	95	95	70	77	77	60	67	67
Phase 7	Day	108	115	115	90	97	97	80	87	87
	Evening	107	114	114	89	96	96	79	86	86
	Night	99	106	106	81	88	88	71	78	78
Phase 8	Day	108	115	115	90	97	97	80	87	87
	Evening	108	115	115	90	97	97	80	87	87
	Night	108	115	115	90	97	97	80	87	87
Phase 9	Day	96	103	103	78	85	85	68	75	75
	Evening	93	100	100	75	82	82	65	72	72
	Night	88	95	95	70	77	77	60	67	67
Phase 10	Day	108	115	115	90	97	97	80	87	87
	Evening	106	113	113	88	95	95	78	85	85
	Night	94	101	101	76	83	83	66	73	73
Phase 11	Day	108	115	115	90	97	97	80	87	87
	Evening	108	115	115	90	97	97	80	87	87
	Night	101	108	108	83	90	90	73	80	80

Appropriate dredge upgrades will be undertaken to achieve the noise levels that are required for the relevant phase and operating time prior to commencing dredging in that phase and/or time period.

- At all times booster pumps will be positioned at the maximum distance possible from noise sensitive receptors during daytime, evening, and night-time operations.

<table>
<tr><th>ISSUE</th><th>POTENTIAL IMPACT</th><th>APPROACH</th><th>RESIDUAL IMPACT</th></tr>
<tr><td></td><td></td><td>

A partial acoustic enclosure is to be installed around the existing wash plant motor to enclose it on its south-east and south-west sides prior to operating the existing wash plant during the night-time period. Following design specifications are required for the acoustic enclosure:

The enclosure is to be constructed using a material with minimum surface density of 15kg/m^2 (e.g., timber palings with minimum thickness of 22mm, fibre cement sheeting with minimum thickness of 12mm, or aerated concrete);
The height of the enclosure is to be minimum 0.3m above the top of the wash plant motor, with returns along the south-east and south-west sides of the wash plant motor.
The enclosure should be free of any gaps.
If the walls of the enclosure are constructed of timber palings, planks should have minimum 35mm overlap; and
The enclosure should be of durable construction.

<u>Management Plan</u>

A Noise Management Plan will be developed and implemented.

<u>Monitoring and Reporting</u>

Annual attended compliance noise monitoring to be carried out at the nearest noise sensitive receivers (private residences or privately owned land).

</td><td></td></tr>
<tr><td>Noise (Construction)</td><td>Increase in noise levels at sensitive receivers, with potential exceedance of criteria during construction</td><td>
<u>Mitigation Measures</u>

The measures outlined within Section 6 of the CNA are to be implemented as part of Construction Activities onsite.

<u>Management Plan</u>

A Construction Noise Management Plan will be developed and implemented. This Construction Noise Management Plan will be consistent with the Construction Noise Assessment prepared by ATP Consulting Engineers dated February 2021.

<u>Monitoring and Reporting</u>

Noise monitoring should be undertaken on receipt of a noise complaint at an appropriate location near the origin of the complaint in accordance with the requirements of Australian Standard AS1055-2018 (Description and measurement of environmental noise) or any other noise monitoring methodology agreed with the regulatory authorities. If the results of noise monitoring indicate exceedance of the noise limits, appropriate noise mitigation measures should be implemented to reduce the noise levels.

</td><td>

During construction of the haulage road, there is potential exceedance of the lower limit noise criteria at 271 Pacific Highway. The exceedance is associated with operation of the road grader, asphalt paver and tip truck along the haulage road alignment closest to the dwelling.
During clearing works (overburden stripping) in preparation for Phase 9 there is potential exceedance of the lower limit noise criteria at 353 Cudgen Road. The exceedance is associated with operation of the body truck used to remove waste from site at the southernmost section of the expansion.

</td></tr>
<tr><td colspan="4">AIR QUALITY</td></tr>
<tr><td>Air Quality</td><td>Increase in dust and particulate matter, with potential exceedance of criteria</td><td>
<u>Performance Criteria</u>

Particulate matter emissions generated by the development will not cause exceedance of the following criteria at any residence on privately-owned land:

<table>
<tr><th>Pollutant</th><th>Averaging Period</th><th>Criterion</th></tr>
<tr><td rowspan="2">Particulate matter < 10 µm (PM_{10})</td><td>Annual</td><td>[a,c] 25 µg/m^3</td></tr>
<tr><td>24-hour</td><td>[b] 50 µg/m^3</td></tr>
<tr><td rowspan="2">Particulate matter < 2.5 µm ($PM_{2.5}$)</td><td>Annual</td><td>[a,c] 8 µg/m^3</td></tr>
<tr><td>24-hour</td><td>[b] 25 µg/m^3</td></tr>
</table>
</td><td>

There remains potential for cumulative 24-hour average concentrations of PM_{10} to exceed the impact assessment criterion. A PM_{10} monitoring program will be established so that site operations can effectively manage any potential elevated PM_{10} levels.

</td></tr>
</table>

<table>
<tr><th>ISSUE</th><th>POTENTIAL IMPACT</th><th>APPROACH</th><th>RESIDUAL IMPACT</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Total suspended particulates (TSP)</td><td>Annual</td><td colspan="2">[a,c] 90 µg/m³</td></tr>
<tr><td>Deposited dust [d]</td><td>Annual</td><td>[b] 2 g/m²/month</td><td>[a] 4 g/m²/month</td></tr>
<tr><td colspan="4">Notes:
[a] Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).
[b] Incremental impact (i.e. incremental increase in concentrations due to the development on its own).
[c] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary).
[d] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3590.10.1:2003 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.</td></tr>
</table>
<u>Mitigation Measures</u>

• The permanent haulage road is to be sealed.
• The Phase 5 & Phase 6 temporary internal haulage rote will not be sealed.
• Loaded trucks are to be covered always except when loading / unloading.

<u>Management Plan</u>

• An Air Quality Management Plan will be developed and implemented. This plan will be consistent with the Air Quality Assessment prepared by Katesone Environmental dated February 2021 and will:
a) Be prepared by suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary.
b) Be prepared in consultation with the EPA.
c) Describe the measures to be implemented to ensure:
i. compliance with the air quality criteria.
ii. best practice management is being employed; and
iii. air quality impacts are minimised during adverse meteorological conditions and extraordinary events.
d) describe the air quality management system in detail; and
e) include an air quality monitoring program that:
i. is capable of evaluating the performance of the development against the air quality criteria.
ii. adequately supports the air quality management system.
iii. includes a protocol for determining any exceedances of the air quality criteria.
iv. includes continuous PM10 monitoring.

<u>Monitoring and Reporting</u>

• An air quality monitoring program will be developed and will include the following:

o Continuation of the existing HTSP dust deposition monitoring on a monthly basis at the four locations, namely: northern boundary, eastern boundary, southern boundary and south-western boundary (Figure 6).
o As the HTSP operations expand into the new area, a dust deposition site should be installed to the northwest in proximity to sensitive receiver R2 (refer Appendix G) and on the western boundary.
o A continuous PM10 monitor, using a light scattering technique, should be installed to the south / southeast of the existing washplant with elevated levels triggering dust management actions. Dust management actions include determining if winds are from the plant to receptors (see meteorological monitoring), increased water application, limiting certain operations and ceasing operations.</td><td></td></tr>
<tr><td colspan="4">BIODIVERSITY</td></tr>
</table>

ISSUE	POTENTIAL IMPACT	APPROACH	RESIDUAL IMPACT
Biodiversity	Direct Impacts • Removal of 3.66ha of vegetation Potential Indirect Impacts • Alteration to drainage and hydrological regimes in the study area and adjacent areas; • Decline in water quality entering adjacent waterway areas (e.g. sediment load, pH, influx of pollutants, nutrient loading); • Potential impacts on groundwater. Given the nature of the site soils and groundwater characteristics observed to date, the most likely potential impacts on groundwater as a result of the development are (G&S 2021a): - Localised and minor changes to pre-development groundwater flow regimes in the vicinity of the lake that will be largely contained within the development footprint; and - Changes to groundwater elevation as a result of the proposed expansion. These are predominantly contained within the development footprint,	**Mitigation Measures** • The project will generally be in areas which have historically been cleared or otherwise disturbed by clearing impacts. • The proposed development will be constructed in a manner sensitive to areas of retained habitat on adjoining land and designed in a manner that reduces associated indirect impacts. Prior to the commencement of sand extraction works within each phase, a phase specific BDAR (or assessment in line with the relevant legislation at that time) will be prepared to accurately assess impacts, avoidance and mitigation measures, and offset obligations. • A construction personnel induction program shall be developed by the Proponent to highlight the presence of significant vegetation and habitat values adjacent to the site. The general induction of all construction personnel will cover such matters as: - Areas adjacent to the site in which significant vegetation and habitat values occur. - Threats to significant vegetation and habitat values associated with construction activities. - Requirement to report any incidents within the significant vegetation and habitat areas, and actions required; and - Requirements of any relevant Management Plans, particularly protocols for vegetation clearing and measures to protect all other native vegetation. • During construction activities, temporary high visibility fencing will be erected to assist in the protection of vegetation to be retained from all construction activities by restricting access from machinery and contractors. This fencing will be erected in accordance with Australian Standard 4970-2009 Protection of Trees and any additional requirements of a Vegetation Management Plan to be prepared by a suitably qualified ecologist. Temporary signage will be provided along all temporary fencing during the construction phase stating "Environmental Protection Zone – No Unauthorised Entry". • No machinery, rubbish or spoil will be stored within retained vegetation during the construction phase of the development. Vehicle/equipment wash-down areas or access tracks will not be located in or immediately adjacent to retained vegetation. • Vegetation will be inspected for fauna by a suitably qualified ecologist immediately prior to the commencement of clearing/earthworks. Any fauna detected within proposed clearing areas will be relocated to suitable habitat outside of the subject site. Consideration will be given to appropriate release times and locations for specific fauna groups and a record kept of all species encountered/relocated. **Management Plan** • A soil and water management plan will be developed and implemented. This soil and water management plan will be consistent with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021. • A Rehabilitation Management Plan will be developed and implemented. This plan will be consistent with the concept rehabilitation and landscape management plan prepared by JWA Ecological Consultants dated March 2021 and will: (a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary. (b) be prepared in consultation with DPIE, Council and OEH. (d) include a detailed final landform concept plan showing the final lake and bank design. (e) describe how the rehabilitation of the site would achieve the above performance criteria. (f) describe the short, medium, and long-term measures that would be implemented to: • rehabilitate and stabilise the site; and • manage the restored vegetation and wetland habitat established on the site. (g) include detailed performance and completion criteria for the rehabilitation and stabilisation of the site (including appropriate water quality criteria); (h) include a detailed description of the measures to be implemented on the site to: • enhance existing vegetation and increase littoral and terrestrial habitat potential. • control terrestrial and aquatic pests and weeds. • control erosion. • control access; and • reduce the visual impacts of the development. (i) include a vegetation clearance protocol. (j) include a program to monitor, independently audit and report on the effectiveness of the measures in paragraph (f) above, and progress against the detailed performance and completion criteria in paragraph (g) above; and (k) include a Long-Term Management Strategy which: • defines the objectives and criteria for HTSP closure and post-extraction management.	• There remains progressive removal of 3.66ha of vegetation.

ISSUE	POTENTIAL IMPACT	APPROACH	RESIDUAL IMPACT
	occurring within the northern and southern sections of the extraction footprint; • Increased opportunity for weeds to become established. Invasive landscape species may escape to adjacent areas of native vegetation; • Increased light, noise and activity may cause reclusive species to move away from habitat edges; • Increased risk of rubbish dumping, creation of walking tracks and associated impacts within adjacent native vegetation communities.	• describes the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and • describes how the performance of these measures would be monitored over time. (l) describe the potential risks to successful rehabilitation and/or revegetation, including a description of the contingency measures that would be implemented to mitigate these risks; and (m) detail who is responsible for monitoring, reviewing, and implementing the plan. <u>Monitoring and Reporting</u> *Rehabilitation monitoring* • Monitoring and reporting is critical in ensuring the continuing success of restoration works and will be carried out for the duration of project in accordance with the requirements of the Concept RLMP. To assess the success of rehabilitation works, vegetation assessments will be completed by a suitably qualified ecologist using plot-based vegetation surveys (transects and quadrats) and photo point monitoring. In addition, the rehabilitation team will also maintain records of works completed. The methodology to be used to monitor the rehabilitation works is outlined in the Concept RLMP. • To assess the suitability of the extraction lakes and Rehabilitation Areas for terrestrial and aquatic fauna, assessments of biological indicators (fish, birds, and macroinvertebrates) will also be undertaken by suitably qualified persons using the methodology outlined in the Concept RLMP. Monitoring of birds will be completed annually. Monitoring of fish and macroinvertebrates will be monitored at the end of each extraction phase. *Water quality monitoring* • Water quality in the extraction lake will be monitored on a biannual basis in accordance the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021. *Reporting* • An Annual Rehabilitation Monitoring Report will be prepared which discusses the results of the monitoring of retained vegetation and rehabilitation areas against the Monitoring Performance Criteria identified in the Concept RLMP. Each Annual Rehabilitation Monitoring Report will be included in the Annual Environmental Monitoring Report (AEMR) which is submitted to the DPIE as part of the current sand extraction licencing requirements.	
HERITAGE			
Heritage (Aboriginal Cultural)	Potential exists for unknown items of Aboriginal Cultural Heritage to be present or unknown Aboriginal human remains to be present.	<u>Prescriptive measures</u> • Unexpected finds procedures will be implemented if suspected Aboriginal material is uncovered. These procedures will include: a) work in the surrounding area is to stop immediately. b) a temporary fence is to be erected around the site, with a buffer zone of at least 10 metres around the known edge of the site. c) an appropriately qualified archaeological consultant is to be engaged to identify the material. d) if the material is found to be of Aboriginal origin, the Aboriginal community is to be consulted in a manner as outlined in the Heritage NSW guidelines: Aboriginal Cultural Heritage Consultation Requirements for Proponents (Heritage NSW 2010). e) should the works be deemed to have harmed the Aboriginal objects Heritage NSW should be notified immediately via the EPA Enviro Hotline; and f) The Tweed Byron LALC will be engaged to support the implementation of the Aboriginal Object Find Procedure. • Unexpected finds procedures will be implemented if Aboriginal Human Remains are uncovered. These procedures will include: a) all works must halt in the immediate area to prevent any further impacts to the remains. b) The site should be cordoned off and the remains themselves should be left untouched. The nearest Police Station, the Tweed Byron LALC and the Heritage NSW Regional Office (Coffs Harbour) are all to be notified as soon as possible. c) If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and Heritage NSW should be consulted as to how the remains should be dealt with.	• There remains potential for unknown items of Aboriginal Cultural Heritage to be present.

ISSUE	POTENTIAL IMPACT	APPROACH	RESIDUAL IMPACT
		d) Work may only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.	
Heritage (Other)	As discussed within Section 2.7.2 there are three items of local heritage in proximity to the site. These items are sufficiently separated from the project site to avoid impact upon these items. The project will have no off-site impacts that could impact these items.	-	-
TRAFFIC & TRANSPORT			
Traffic & Transport	Increase in vehicle movements on local road network including Pacific Highway, Altona Road and Tweed Coast Road.	<u>Prescriptive Measure</u> • Altona Road / Crescent Street / Tweed Coast Road will not be utilised for Haulage. • Direct access to Tweed Valley Way Pacific Highway Interchange in the form of an acceleration lane and merge will be provided. • Upgrades to the existing ABLP priority intersection including a new left turn auxiliary will be provided. • Upgrades to Tweed Valley Way Roundabout in the form of lane widening will be provided. • HTSP must not transport more than 950,000 tonnes of extractive material from the site in any financial year. • ABLP Property priority intersection to be used as left in access only for the TSP traffic. • Exit only access is to be obtained via the Tweed Valley Way off-ramp including the new acceleration lane. • Truck haulage route to be in accordance with Figure 7.6 of the TIS under Appendix J. <u>Management Plan</u> • An Operational Traffic Management Plan / Driver Code of Conduct will be developed and implemented.	-
LAND RESOURCE			
Land Resources (Contamination)	Areas of potential contamination have been identified on site and my impact the site suitability for the proposed land use.	<u>Prescriptive Measures</u> • a DSI to inform the preparation of a RAP will be undertaken. Remediation will be undertaken in accordance with the RAP on a lot-by-lot basis prior to extraction within that allotment.	-
Land Resources (Acid Sulfate Soils)	Exposure of Acid Sulfate Soils to receiving environments	<u>Prescriptive Measures</u> • Topsoil's and overburden will be analysed and where required, treated through the addition of lime to neutralise net acidity. • Fines material shall be discharged into the dredge lake at a depth of greater than 3 meters below the surface water level and shall achieve a final deposition depth of at least 8 metres below the water surface level.	-

ISSUE	POTENTIAL IMPACT	APPROACH	RESIDUAL IMPACT
		<u>Management Plan</u> • A soil and water management plan will be developed and implemented. This soil and water management plan will be consistent with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021. <u>Monitoring and Reporting</u> • Monitoring and report will be undertaken in accord with the Draft Soil and Water Management Plan prepared by Gilbert and Sutherland dated February 2021.	
Land Resources (Agricultural Land)	The loss of Agricultural Land.	<u>Prescriptive Measures</u> • Until an extraction phase comes online, the project would maintain cattle grazing and agistment.	• There remains a progressive loss of Agricultural Land.
Land Resources (Landform and Stability)	The creation of unstable lake banks and associated impact to surrounding land and infrastructure	<u>Prescriptive Measures</u> • All earthworks' operations should be carried out in general accordance with AS 3798-2007 "Guidelines on Earthworks for Commercial and Residential Developments". • All topsoil (i.e. soil containing organic matter) and soils containing deleterious matter should be stripped from the construction area at the commencement of the earthworks operation. • The use of a bridging layer may be required to improve trafficability across the site. Subject to the subgrade performance at the time of bulk earthworks. The bridging layer is likely to be a minimum 400mm thick and the use of a suitable woven geofabric may assist in minimising the required layer thickness. • Imported fill should be of fair to good quality with a minimum Soaked CBR value of 10%, a maximum Iss=1.0% and a maximum particle size of 75mm. • All filling should be undertaken in layer thicknesses of approximately 250mm (or as appropriate for the compaction equipment being used). Fill should be compacted to a minimum dry density ratio of 98% Standard in accordance with AS1289 5.1.1. • Field density testing should be carried out to check the standard of compaction achieved and the placement moisture content. The frequency and extent of testing should be as per guidelines in AS.3798-2007. • All earthworks' operations should be performed under Level 1supervision, in general accordance with the requirements of AS3798 and should be certified as controlled fill by the testing authority. <u>Monitoring and Reporting</u> • Underwater survey of bater profiles is to be undertaken.	• Potential exists for application of additional loads being applied to the top of the embankment slope or over dredging of sand batters during operations
WASTE			
Waste	Waste streams generated by the proposal can impact the environment	<u>Prescriptive Measure</u> • Effluent (from staff amenities) is to be disposed of onsite via an onsite effluent disposal system. The system is to be installed / operated in accord with any requirement of an EPL and S68 Approval under the Local Government Act 1993. • All liquid storage (other than water) is to be protected by bunding or other containment in accordance with relevant Australia Standards. • General and Liquid Waste is to be collected and transported by appropriately licensed waste contractor to a facility with the correct permits for handling and processing the waste form. • Fines material shall be discharged into the dredge lake at a depth of greater than 3 meters below the surface water level and shall achieve a final deposition depth of at least 8 metres below the water surface level. • Overburden is to be reused onsite to the extent practical.	-

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<tr><td colspan="4">HAZARD</td></tr>
<tr><td>Hazards (Flood)</td><td>The site is flood prone and operations on site represent a potential risk to life and property during extreme flood events.</td><td><u>Management Plan</u>
A Flood Response Assessment plan will be developed and implemented. This plan will be consistent with the Flood Response Assessment plan prepared by Burchills Engineering Solutions dated February 2021.</td><td>-</td></tr>
<tr><td>Hazard (Bushfire)</td><td>Most of the site is not identified as bushfire prone land. There are however patches of vegetation land on the periphery of the site that is mapped as bushfire prone. The Rural Fires Act 1997 and Associated Planning for Bushfire Protection 2019 do not identify the project as a development type that must be considered for bushfire risk.</td><td><u>Prescriptive Measure</u>
The site will be subject to ongoing cattle agistment to ensure paddocks are kept in a maintained state.</td><td>-</td></tr>
<tr><td>Hazards (Consumables)</td><td>Exposure of incorrectly stored consumable to receiving environments</td><td><u>Prescriptive Measures</u>
All liquid storage (other than water) is to be in vessel compliant with the relevant Australian Standards.
All liquid storage (other than water) is to be protected by bunding or other containment in accordance with relevant Australia Standards.</td><td>-</td></tr>
<tr><td colspan="4">VISUAL</td></tr>
<tr><td>Visual</td><td>The project will change the established landscape character with potential negative impact to visual quality</td><td><u>Performance Criteria</u><table><tr><th>Feature</th><th>Objective</th></tr><tr><td>All areas of the site affected by the development</td><td>Safe
Hydraulically and geotechnically stable, including the dredge pond margins (particularly where subject to regular wind and wave action)
Non-polluting
Fit for the intended post-mining land use(s)
Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land</td></tr><tr><td>Surface Infrastructure</td><td>Decommissioned and removed, unless otherwise agreed by the Secretary</td></tr></table></td><td>The project will result in a permanent change to the established landscape character.</td></tr>
</table>

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<tr><td>Dredge Pond and Final Lake</td><td>• Perimeter of dredge pond landscaped and vegetated using native tree and understory species.
• Natural looking bank design with curved lake boundaries, with a variety of bank treatments (e.g., beaches, wetlands) providing a variety of habitats.
• Minimise the extent and persistence of algal blooms
• Water quality fit for the intended post-mining land use(s)</td></tr>
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<u>Management Plan</u>

A Rehabilitation Management Plan will be developed and implemented. This plan will be consistent with the concept rehabilitation and landscape management plan prepared by JWA Ecological Consultants dated March 2021 and will:

(a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary.
(b) be prepared in consultation with DPIE, Council and OEH.
(d) include a detailed final landform concept plan showing the final lake and bank design.
(e) describe how the rehabilitation of the site would achieve the above performance criteria.
(f) describe the short, medium, and long-term measures that would be implemented to:
• rehabilitate and stabilise the site; and
• manage the restored vegetation and wetland habitat established on the site.
(g) include detailed performance and completion criteria for the rehabilitation and stabilisation of the site (including appropriate water quality criteria);
(h) include a detailed description of the measures to be implemented on the site to:
• enhance existing vegetation and increase littoral and terrestrial habitat potential.
• control terrestrial and aquatic pests and weeds.
• control erosion.
• control access; and
• reduce the visual impacts of the development.
(i) include a vegetation clearance protocol.
(j) include a program to monitor, independently audit and report on the effectiveness of the measures in paragraph (f) above, and progress against the detailed performance and completion criteria in paragraph (g) above; and
(k) include a Long-Term Management Strategy which:
• defines the objectives and criteria for HTSP closure and post-extraction management.
• describes the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and
• describes how the performance of these measures would be monitored over time.
(l) describe the potential risks to successful rehabilitation and/or revegetation, including a description of the contingency measures that would be implemented to mitigate these risks; and
(m) detail who is responsible for monitoring, reviewing, and implementing the plan.</td><td></td></tr>
<tr><td colspan="4">SOCIAL</td></tr>
<tr><td>Social</td><td>• Interaction with heavy vehicles on local roads
• Construction dust
• Operational dust
• Construction and operation noise
• Change to the visual landscape (Visual amenity)
• Cost legacies at end of the project</td><td>• Measures to mitigate social impact are identified within the specific issue.</td><td>• Residual impacts are identified within the specific issue</td></tr>
</table>

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<tr><th>ISSUE</th><th>POTENTIAL IMPACT</th><th>APPROACH</th><th>RESIDUAL IMPACT</th></tr>
<tr><td colspan="4">ECONOMIC</td></tr>
<tr><td>Economic</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="4">CUMULATIVE IMPACTS</td></tr>
<tr><td>Cumulative Impacts</td><td>Despite the project being in proximity to other extractive land uses there will be no significant cumulative risks because of the proximity of the project to these operations. All technical assessments of the potential impacts of the project, have where relevant, considered the cumulative impacts of the development combined with existing activities in the area thereby assessing the cumulative impacts of the project.

Other land uses near HTSP, including other extractive industries, will be subject to hazard related consent and EPL conditions. As such, hazards and risks associated with these facilities are likely to be managed in an environmentally responsible manner and in accordance with relevant legislation and standards, thereby minimising the potential for cumulative impacts from the project combined with nearby facilities.</td><td>• Measures to mitigate cumulative impact are identified within the specific issue.</td><td>-</td></tr>
<tr><td colspan="4">REHABILITATION</td></tr>
<tr><td>Rehabilitation</td><td>At the completion of extraction, the site is left in a negative legacy state.</td><td><u>Performance Criteria</u>
<table><tr><th>Feature</th><th>Objective</th></tr><tr><td>All areas of the site affected by the development</td><td>• Safe
• Hydraulically and geotechnically stable, including the dredge pond margins (particularly where subject to regular wind and wave action)
• Non-polluting
• Fit for the intended post-mining land use(s)
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ISSUE	POTENTIAL IMPACT	APPROACH	RESIDUAL IMPACT

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(f) describe the short, medium, and long-term measures that would be implemented to:
- rehabilitate and stabilise the site; and
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(g) include detailed performance and completion criteria for the rehabilitation and stabilisation of the site (including appropriate water quality criteria);
(h) include a detailed description of the measures to be implemented on the site to:
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- control terrestrial and aquatic pests and weeds.
- control erosion.
- control access; and
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(i) include a vegetation clearance protocol.
(j) include a program to monitor, independently audit and report on the effectiveness of the measures in paragraph (f) above, and progress against the detailed performance and completion criteria in paragraph (g) above; and
(k) include a Long-Term Management Strategy which:
- defines the objectives and criteria for HTSP closure and post-extraction management.
- describes the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and
- describes how the performance of these measures would be monitored over time.

(l) describe the potential risks to successful rehabilitation and/or revegetation, including a description of the contingency measures that would be implemented to mitigate these risks; and
(m) detail who is responsible for monitoring, reviewing, and implementing the plan.

Section 8 – Evaluation & Conclusion

8.0 Evaluation & Conclusion

The project will enable continued extraction of a resource that is in high demand and which supports the construction industry. The project will deliver economic benefits to both NSW and Tweed regions, will support local economic activity and employment through both the construction and operational phases. The economic and social impact analysis of the project demonstrates that it will be socio-economically beneficial to NSW and Local Tweed community.

The project will not result in significant residual impacts on most environmental aspects, including amenity impacts associated with noise and air quality. Similarly, the project is not anticipated to result in significant social impacts as assessed with the social impact assessment.

The project will have residual impacts on:

- Terrestrial biodiversity. This will result from the progressive loss of 3.66ha of vegetation. This vegetation loss will be offset in accordance with NSW policy, with credits being calculated in accordance with the BAM method. This offsetting will have the benefit of protecting areas of similar native vegetation communities into perpetuity. This 3.66ha loss will also be offset via the progress rehabilitation of approximately 20ha of land on the project site.

- Pre-development groundwater flows. Localised and minor changes to pre-development groundwater flow regimes will occur in the vicinity of the extraction lakes. These changes will however be largely contained within the development footprint.

- Pre-development groundwater elevation. Changes to groundwater elevation are predominantly contained within the development footprint, occurring within the northern and southern sections of the extraction footprint (Lot 51 on DP1166990 and Lot 1 on DP1250570 respectively) as follows:

    - A maximum 0.5m lowering of the water table in the northern portion of the expansion area. The impact is predominantly contained within the expansion footprint, however a decrease in groundwater elevation of up to 0.3 m is predicted within a small portion of the lands outside the northern perimeter of Lot 51 on DP1166990.
    - In the southern extent of the site the steady-state model indicates a maximum 1.0 m lowering of the groundwater table predominantly within the expansion footprint. This impact reduces to a maximum of 0.5 m of drawdown outside of the site boundary to the west of Lot 1 on DP1250570.
    - A drawdown of up to 0.5 m is predicted to occur within a small portion of the Low Potential GDE, which is mapped on the southern boundary of the expansion footprint west of Lot 1 on DP1250570.

- Local hydraulic regime. Minor changes in the local hydraulic regime are caused by a loss in conveyance storage through the inclusion of bunding around the proposed extraction lakes. The bunding around the lakes prevents external catchment runoff from entering the lakes frequently, flood events are permitted to overtop into the extraction lakes. The extent of the change is within the 'no change' modelling tolerance of the Tweed Shire Council floodplain management strategy.

- Agricultural Land. The project will result in the progressive permanent loss of Agricultural Land. Assessment of the agricultural capability of the land indicates it is marginal. Groundwater modelling indicates this capability will continue to decline as groundwater levels rise and inundation from sea level rises due to climate change impede drainage and waterlog soils. I.e. the Agricultural land will be lost in any event.

- Visual Amenity. The Project will result in a change to the existing landscape character and on completion of extraction works and subsequent final rehabilitation phases, the Project Site will present

as a natural lake bordered by a significant vegetation to its perimeter. This change in landscape character would not adversely impact key significant landscape features of the locality.

Assessment of the project against the matters for consideration under the Environmental Planning and Assessment Act 1979 demonstrates the project:

- Is permissible with consent.
- Is consistent with the objects of the Act.
- Is generally consistent with relevant EPI's.
- Is generally consistent with strategic and forward planning strategies applicable to the locality and region.
- Has considered and been formulated consistent with the principles of Ecologically Sustainable Development.
- Most project impacts can be addressed with appropriate mitigation measures.
- Residual impacts are largely contained within the development footprint and impact to adjoining sensitive receivers is minimal; and
- Is the highest and best use of the site.

The proposal is suitable and in the public interest when considered holistically as:

- It efficiently meets the project needs and objectives.
- The project has been formulated on a precautionary approach to analysis, assessment and management of impacts and risks to the environment.
- The project mitigation measures are based on long-term site data that demonstrate the proposed mitigations measures work on the site in real world scenarios.
- It does not result in social and inter-generational equity issues.
- Biodiversity and ecological impacts are appropriately offset.
- HTSP's current environmental management approach has proven effective over time with respect to risk reduction, hazard mitigation and protection of the receiving environment.
- HTSP is committed to achieving a stable landform with water quality at the site within an acceptable range to facilitate a wide range of end use scenarios.
- The proposed environmental management plans incorporate the intent of the precautionary principle. Implementation of the monitoring and management measures specified in these management plans will allow these goals to be achieved.
- The economic and social impact analysis of the project demonstrates that it will be socio-economically beneficial to NSW and Local Tweed community.

The project is warranting of support and development consent can be granted.