Glen Innes Severn Council

Wattle Vale Quarry

Environmental Impact Statement

December 2016

Submission of Environmental Impact Statement

Prepared under the *Environmental Planning and Assessment Act 1979*, Section 78A		
Environmental Assessment prepared by	Name:	Ben Luffman
	Qualifications:	B.App.Sc. (Hons), Grad. Dip Urban and Regional Planning
	Address:	GHD Pty Ltd Level 3, 24 Honeysuckle Drive Newcastle NSW 2300
	In respect of:	Wattle Vale Quarry Project
Development Application	Applicant name:	Glen Innes Severn Council
	Applicant address:	265 Grey Street Glen Innes NSW 2370
	Land to be developed:	1296 Gwydir Highway, Matheson
	Lot no, DP/MPS, vol/fol etc:	Lot 1 of DP 728579 Lots 133 and 134 of DP 753274 Lots 249, 174, 253, 101, 175, 87 and 113 of DP 753319
Environmental Impact Statement	An Environmental Impact Statement is attached.	
Certificate	I certify that I have prepared the contents of this Environmental Impact Statement and to the best of my knowledge: • It is in accordance with the requirements of Part 4; • It contains all available information that is relevant to the Environmental Impact Statement; and • That the information contained in the Environmental Impact Statement is neither false nor misleading	
	Signature	
	Name	Ben Luffman
	Date	23/12/2016

Executive summary

Glen Innes Severn Council (GISC) proposes to construct and operate a new hard rock quarry (Wattle Vale Quarry) to extract up to 300,000 tonnes per annum (tpa) and 3,000 tonnes per day over 30 years, with a total disturbance area of approximately eight hectares (the Project). Wattle Vale Quarry will predominantly supply materials for use in public road construction and maintenance, but also provide a resource as required for the construction of nearby wind farm projects.

Site overview

The Project site is approximately 200 hectares in area and sits on undulating pasture land on the edge of the Waterloo Range, a low lying north-south belt of hills to the west of Glen Innes.

The majority of the Project site falls within land that has been cleared due to historical agricultural land uses, with some pasture improvement evident. Remnants of native vegetation are restricted to isolated mature trees and small patches of acacia regrowth.

The Project site is zoned RU1 (Primary Production), while the surrounding area is also predominately zoned RU1 (Primary Production) under *Glen Innes Severn Local Environmental Plan* (LEP) 2012. Land zoned E3 (Environmental Management) associated with the Gwydir Highway road corridor is located on the south-western, southern and south-eastern boundaries of the Project site. The Gwydir Highway traverses the Project site.

The surrounding area is sparsely populated. The closest residence lies approximately 1.5 km from the Project site.

Overview of the Project

The Project generally involves:

- Progressive installation of environmental controls including erosion and sediment control measures.
- Construction of the intersection with the highway and signage.
- Construction of fencing.
- Delineation of the site and stockpiling areas.
- Vegetation clearance, soil stripping and stockpiling.
- Construction of temporary drainage controls.
- Expanded quarry operations.
- Establish site office and weighbridge.
- Close and rehabilitate the quarry.

Statutory legislation

This EIS has been prepared in accordance with the provisions of the EP&A Act and addresses the Department of Planning and Environment (DP&E) Secretary's Environmental Assessment Requirements (SEARs) (no 1060) issued for the Project on 25 July 2016.

The Project is classified as designated development as defined in Schedule 3 of the EP&A Regulation, as it is an extractive industry with an intended capacity of more than 30,000 cubic metres of material per year and disturbing a total surface area of more than 2 hectares of land.

The Project is also integrated development, in accordance with Section 91 of the EP&A Act, as an EPL under the POEO Act and a Section 138 approval under the *Roads Act 1993* will be required. A water access licence under the *Water Management Act 2000* will also be required if the extraction intercepts groundwater.

The Project is also regional development as defined in Schedule 4A of the EP&A Act as it involves an extractive industry that is designated development. The JRPP will therefore be the consent authority for the Project, unless the Minister orders otherwise.

Consultation

Consultation with a range of government agencies and community stakeholders was undertaken for the EIS, to both inform the stakeholders of the project and to allow any issues of concern to be raised at an early stage of the planning process and incorporated into the EIS.

Land resources

The Project site occurs on rural land with a gentle slope ranging from 1,090 mAHD, leading to a ridge with an elevation of approximately 1,190 mAHD. The surrounding rural environment is undulating with surrounding plains having a general elevation of approximately 1,000 mAHD. The soils are generally not suitable for intensive agriculture without careful management.

The Project would change the topography of the site but as the site has limited uses, this is not considered to result in a significant impact on available land resources in the local area.

The Project will have minimal impact on adjacent existing agricultural activities, with the Project expected to coexist with the surrounding agricultural land uses in the locality.

Water resources

An intermittent unnamed tributary of Back Plain Creek runs through the Project site. The tributary only flows following rainfall events although there are a number of small farm dams located throughout the Project site that hold water. Back Plain Creek is a tributary of the Wellingrove Creek flowing into the Severn River to the north.

Groundwater is likely to be present within the fractured basalt rock aquifer near the base of the pit but groundwater may be intercepted by the quarry.

Modelling indicates some external water would be required for the operation of the Project but the external water use is expected to be less than the model indicates because water resources would be used more conservatively when the supply is limited. The external water would be sourced from other dams on the Project site or from the existing Glen Innes quarry.

The quality of water runoff would be managed in accordance with Landcom (2004).

The Project is not expected to impact on any of the NSW Aquifer Interference Policy minimal impact considerations.

Noise and vibration

Existing noise levels in the area surrounding the site are low and typical of a rural environment.

The highest predicted noise level for any receiver due to construction noise is approximately 22 dB(A) and 30dB(A) during operation. This is less than the background noise level recorded at each of the three monitoring locations, and is also less than the relevant noise criteria.

Since the existing traffic volumes along the wind farm access is less than ten per day, and the predicted noise exposure due to additional heavy vehicles from the Project is negligible, the Project is not expected to generate any road traffic noise impacts.

No operational vibration impacts are anticipated.

Air quality

The annual average wind speed is high at 4.1 m/s and predominately from the east-south east. There is limited information available on the air quality of the area, therefore, a default rural background daily average has been adopted.

An air quality assessment, prepared for the Project, has determined that dust would be the primary emission to air from the quarry with potential for off-site impact. Haul trucks and wind erosion generate the largest portions of dust emissions, however all values are comfortably within the impact assessment criterion for daily PM_{10} and dust deposition.

Biodiversity

The Project involves the establishment of a quarry on a property that has previously been cleared for cattle grazing. There are minor infestations of Blackberry (*Rubus fruticosus*) across parts of the Project site.

No threatened flora species were identified within the Project site, however, potential habitat for one threatened flora species, Austral Toadflax (*Thesium australe*), listed under the TSC Act and EPBC Act will be impacted by the Project. The Project will result in the clearing of 7.76 hectares of low condition Mountain Gum – Ribbon Gum Open Forest which is listed as a threatened ecological community under the TSC Act. An assessment of significance has been completed for the impacts to this species and TEC which determined that the Project is unlikely to result in a significant impact within the locality.

No threatened fauna species were identified within or directly adjacent to the Project site during field surveys. Habitat was identified for the Regent Honeyeater and the Swift Parrot. Assessments of significance were conducted for these species which determined that the Project is unlikely to result in a significant impact to these species within the locality.

No threatened biota listed under the FM Act are likely to occur in the Project site, or downstream of the study area.

Traffic and transport

The Project site is located on the Gwydir Highway which is a two-way, two-lane arterial road linking Glen Innes and Inverell. The Gwydir Highway will provide the main transport route to and from the site and has a posted speed limit of 100 km/h.

The traffic generated by the Project is expected to have minimal impact on Gwydir Highway traffic in terms of delay and safety for the following reasons:

- Negligible traffic increases due to the Project traffic.
- The temporary access will have full traffic control measures to increase the safety and efficiency of heavy vehicles.
- Ingress and egress movements.
- The access will operate with one (1) vehicle either entering or leaving at a time which will further reduce the likelihood of impacts to the Gwydir Highway.
- Heavy vehicle traffic is expected to be evenly distributed throughout the course of the day.

There are no pedestrian and cyclist measures to consider as the Project is located off the Gwydir Highway.

Heritage

A site investigation and search of the available databases did not reveal any location of heritage significance within the Project site.

Aboriginal community consultation was undertaken via the Glen Innes Local Aboriginal Land Council (LALC) which did not identify any knowledge of specific sites in the area of the proposed quarry, but did identify the potential for sites to occur within the Project site based on knowledge of archaeological values in similar landscapes across the Tablelands. The LALC indicated that camp sites were known further along Back Plain Creek (north of the Project site).

Everick (2016) consider Aboriginal objects, should they occur in the Project site, would consist of isolated artefacts and stone artefact scatters (open campsites), stone quarries and scarred trees.

Everick (2016) is of the opinion that the proposed works are unlikely to lead to harm to Aboriginal or non-Aboriginal objects.

Visual amenity

The topography combined with remnant vegetation largely screen views to most public and private locations. The locations identified with a view to or from the Project site are local residences and the Gwydir Highway.

The assessment has found that the landscape around the Project site, generally has a high visual absorption capacity due to the existing terrain and remnant vegetation. This high visual absorption capacity corresponds directly with the generally low significance of impact to views from the Project.

Waste management

The Project has the potential to generate waste from quarry activities and general site use but the types of waste generated are not expected to be in significant quantities.

All waste would be managed in accordance with the waste hierarchy where emphasis is placed upon reducing, re-using and recycling prior to disposal.

Hazards and risks

There are limited hazards and risks associated with the Project and most have been addressed in other sections of this EIS. However the Project site is identified as bushfire prone land. A bushfire risk assessment indicated the Project has limited bushfire risks, providing the identified mitigation measures are maintained.

Socio-economic

The Project is not located within close proximity to incompatible land uses, such as residential development.

The construction and operation of the Project will require a workforce of approximately eight full-time equivalent personnel. These employment opportunities will be made available to the labour pool of Glen Innes Severn LGA.

The Project will also support a burgeoning wind farm economy in the LGA and generate the need for goods and services thereby creating opportunities for business development in the Glen Innes region.

Conclusion

This EIS has been prepared in accordance with the provisions of the EP&A Act and addresses the SEARs.

The Project justification is robust because the Project responds to a recognised need for resources and provides a number of economic benefits. The EIS has demonstrated that the Project site is suitable for the proposed use, the Project is in the public interest and that it is consistent with the objects of the EP&A Act and the principles of ESD.

The EIS has documented the potential environmental impacts of the Project, considering both negative and positive impacts, and recommended management and mitigation measures to protect the environment, where required. Based on this, the environmental and community impacts are considered to be minimal and the Project benefits outweigh the negatives.

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1. Introduction

1.1 Project overview

Glen Innes Severn Council (GISC) proposes to construct and operate a hard rock quarry (Wattle Vale Quarry) to extract up to 300,000 tonnes per annum (tpa) and 3,000 tonnes per day (tpd) over 30 years, with a total disturbance area of approximately eight hectares (the Project). Wattle Vale Quarry will predominantly supply materials for use in public road construction and maintenance, but also provide a resource as required for the construction of nearby wind farm projects.

The site is owned by GISC and is approximately 212 hectares in size, located 13 kilometres west of Glen Innes (the Project site) (see Figure 1-1). The Project would fulfil an anticipated short and medium term demand for aggregate products for the construction of major wind farm projects in the region. In the longer term, the Project would provide a supply of aggregate products to the Glen Innes district to replace the existing quarry east of Glen Innes which has less than 10 years' capacity remaining.

GISC has recently submitted a development application (DA26/16-17) for the establishment of a smaller quarry in the same location as the Project. This proposal was for the extraction of up to 30,000 m^3 (75,000 tonnes) per annum, with a total disturbance area of less than 2 hectares. The intention of this proposal was to facilitate the commencement of extraction while the Project was being assessed.

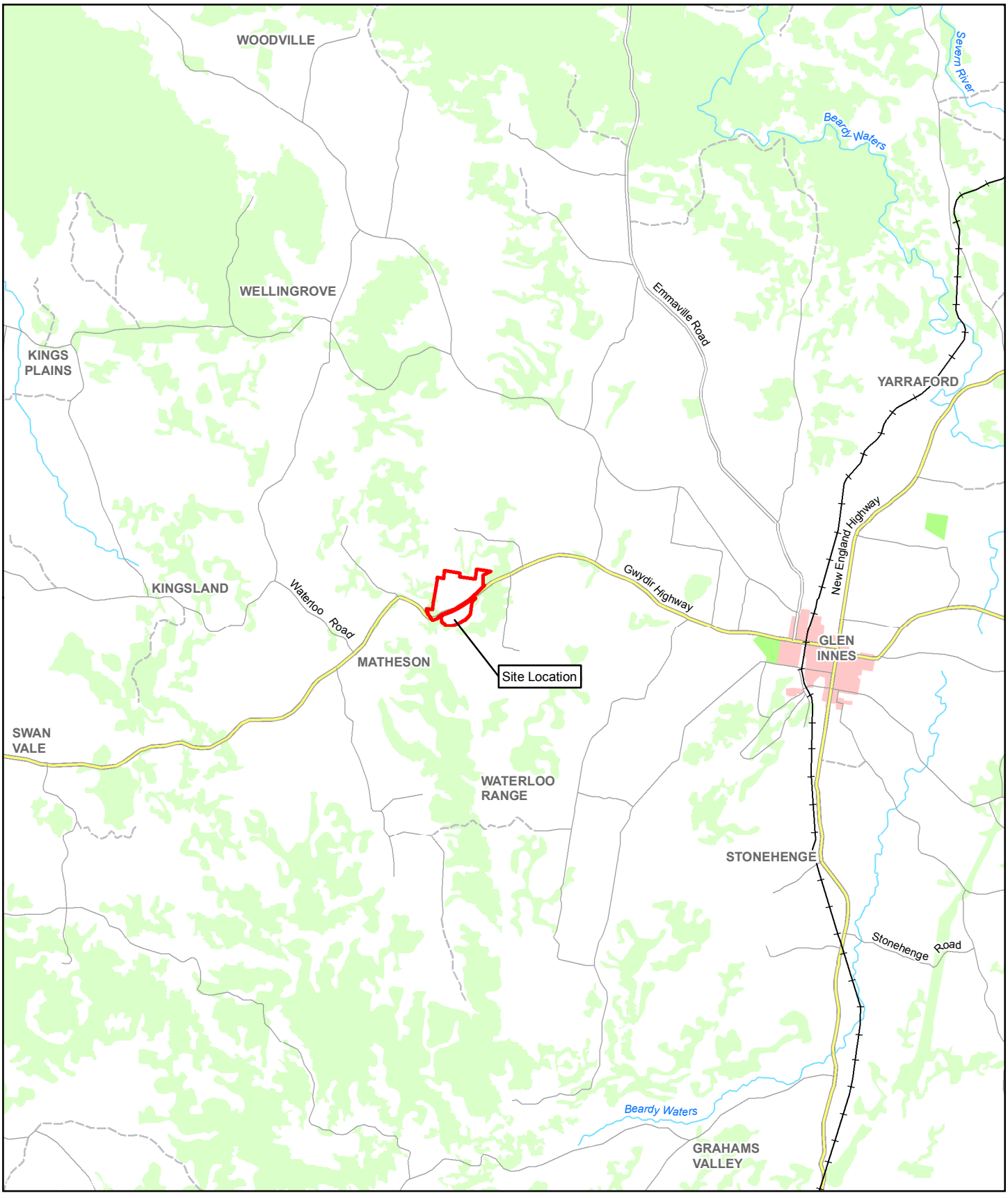
GHD Pty Ltd (GHD) has been engaged by GISC to prepare an Environmental Impact Statement (EIS) to support a development application for the Project under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act).

This EIS has been prepared in accordance with the provisions of the EP&A Act and addresses the Department of Planning and Environment (DP&E) Secretary's Environmental Assessment Requirements (SEARs) (no 1060) issued for the Project on 25 July 2016 (provided in Appendix A).

1.2 Project location

The Project site is located on Lot 1 of DP 728579, Lots 133 and 134 of DP 753274, and Lots 249, 174, 253, 101, 175, 87 and 113 of DP 753319 (refer to Figure 1.2). The proposed quarry pit is located within Lot 113 of DP 753319 only. Access to the proposed quarry is via a public road reserve, located along the southern boundary of Lot 113 of DP 753319.

The site is located at 1296 Gwydir Highway, Matheson which is within the Glen Innes Severn Local Government Area (LGA) in the Northern Tablelands region of NSW.



LEGEND

- Principal Road
- Secondary Road
- Minor Road
- Track
- Railway
- Watercourse
- Built Up Area
- Recreation
- Forest Or Shrub
- Project boundary

Paper Size A4

0 0.75 1.5 3 4.5 6

Kilometres

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

Glen Innes Severn Council
Wattle Vale Quarry
Environmental Impact Statement

Job Number 22-18380
Revision A
Date 03 Nov 2016

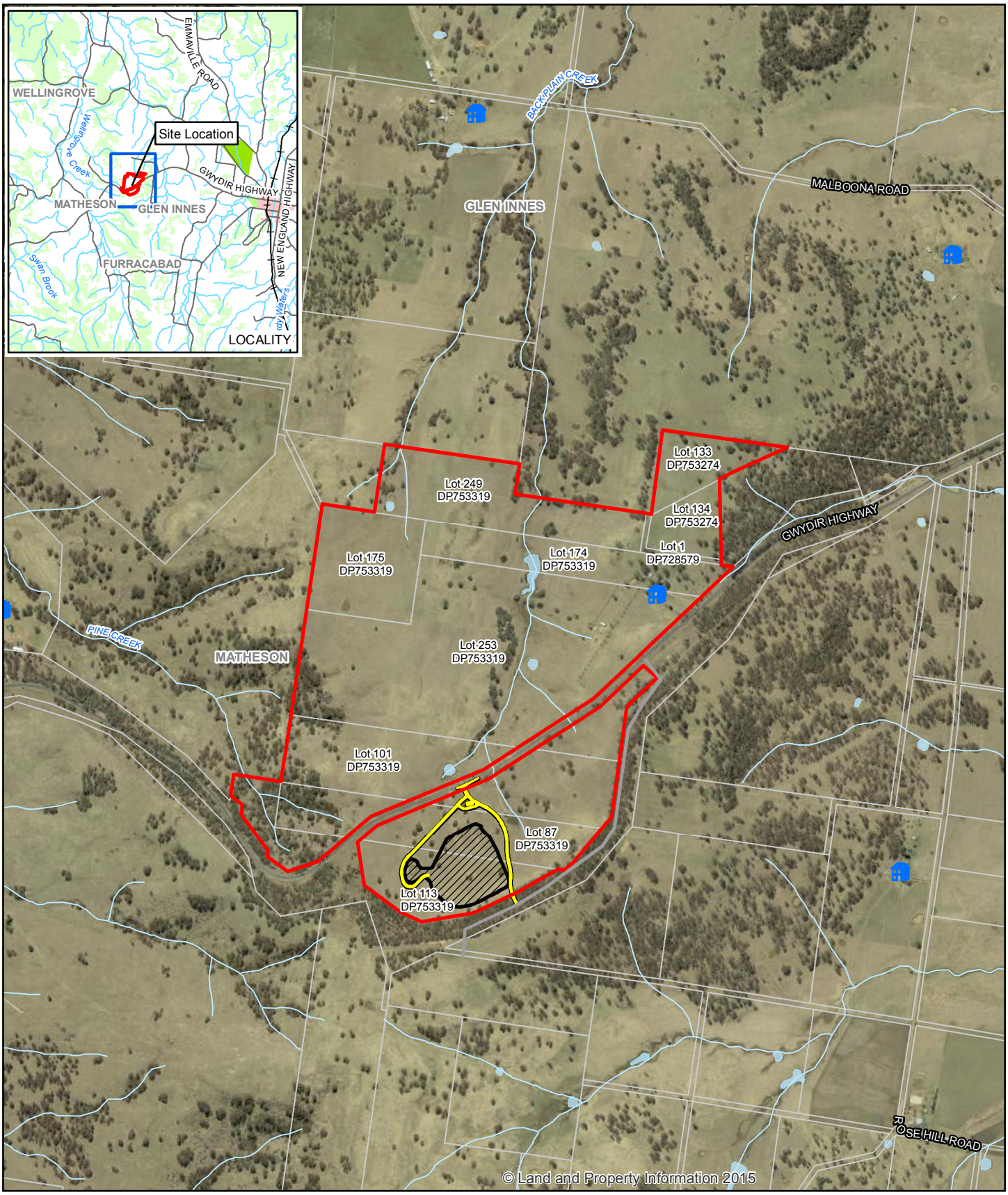
Site locality

Figure 1-1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\18380\GIS\Maps\Deliverables\SouthernQuarryEIS\2218380_SQEIS001_SiteLocality_A.mxd

Data source: Geoscience Australia: 250k Topographic Data Series 3, 2006. Created by: fmackay



LEGEND

- Project boundary
- Cadastre
- Watercourse
- Waterbody
- Disturbance area
- Site access
- Existing access
- Residences

Paper Size A4

0 80 160 320 480 640

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Glen Innes Severn Council
Wattle Vale Quarry
Environmental Impact Statement

Job Number 22-18380
Revision A
Date 14 Nov 2016

Site overview

Figure 1-2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\18380\GIS\Maps\Deliverables\SouthernQuarryEIS\2218380_SQEIS002_SiteOverview_A.mxd

Data source: LPI: DCDB & DTDB, 2012,Aerial Imagery, 2016; Geoscience Australia: 250k Topographic Data Series 3, 2006; GISSC: Quarry data, 2016. Created by: fmackay

1.3 Overview of the Project

The Project involves the establishment of a hard rock quarry and ancillary facilities on the Project site. In summary, the Project will include:

- Construction of an access road and intersection with the Gwydir highway including signage.
- Construction of fencing.
- Delineation of the site and stockpiling areas.
- Vegetation clearance, soil stripping and stockpiling.
- Construction of temporary drainage controls.
- Expanded quarry operations.
- Establishment of a site office and weighbridge.
- Decommissioning and rehabilitation of the quarry at closure.

1.4 About the proponent

The Project is being proposed by GISC. GISC is a local government organisation that manages the Glen Innes Severn LGA, an area of land covering 5,487 square kilometres, stretching from Deepwater in the north, Glencore in the south, the Gibraltar Range in the east, and Matheson in the west. GISC administers the Glen Innes Severn LGA on behalf of approximately 8,656 residents.

GISC is committed to working with the community to enhance and create a more sustainable environment for now and the future. This Project forms part of this overall commitment.

The contact details for GISC are:

Glen Innes Severn Council

265 Grey Street

Glen Innes NSW 2370

Phone: (02) 6730 2300

Fax: (02) 6732 3764

Website: http://www.gisc.nsw.gov.au/

1.5 Report purpose and structure

This EIS supports an application for development approval under Part 4 of the EP&A Act. It has been prepared in accordance with the requirements of Section 79C of the EP&A Act and the SEARs. The EIS provides:

- Details on the Project, including need and alternatives considered.
- An assessment of the potential key environmental impacts of the Project as identified by the SEARs.
- GISC's commitments in terms of measures to minimise and manage potential environmental impacts.

The EIS is structured as follows:

- Section 1 – Introduction
- Section 2 – Description of the site and surrounds

- Section 3 – Description of the Project
- Section 4 – Consideration of the legislative and policy requirements relating to the Project and the site
- Section 5 – Overview of the consultation completed to date and ongoing consultation to be completed for the Project
- Section 6 – Identification and prioritisation of key issues and risk assessment
- Section 7 – Assessment of the issues potentially impacted by the Project
- Section 8 – Summary of the environmental management and monitoring recommended for the Project
- Section 9 – Justification for the Project and how it addresses the objects of the EP&A Act and the principles of ecologically sustainable development
- Section 10 – Conclusion
- Section 11 – References for the report
- Section 12 – Terms and acronyms used in this report
- Appendices – Relevant additional information and specialist reports.

1.6 Definitions

For the purpose of this EIS, the following definitions apply:

- The 'Project' is the construction and operation of Wattle Vale Quarry to which the development application relates, as described in Section 0.
- The 'Project site' refers to the Lots / DPs relevant to the Project and is the development application area within which all activities for the Project are proposed (Lot 1 of DP 728579, Lots 133 and 134 of DP 753274, and Lots 249, 174, 253, 101, 175, 87 and 113 of DP 753319).
- The 'disturbance area' is the area that would be directly impacted by the Project.
- The 'locality' encompasses the area immediately surrounding the Project site, being the suburb of Matheson and the township of Glen Innes.

2. The site

2.1 Site history

The Project site predominantly consists of cleared land that is currently being used as pasture. The Project site includes a three-bedroom home and sheds, and is under occupation by the former owners for six months as a condition of the contract of sale.

There are no existing extractive industries on the Project site; however, there is a small roadside quarry on crown/council road reserve adjacent to the site that has not operated for some years.

2.2 Site overview

The Project site is approximately 212 hectares in area and sits on undulating pasture land on the edge of the Waterloo Range, a low lying north-south belt of hills to the west of Glen Innes (see Plate 2-1).

The majority of the Project site falls within land that has been cleared due to historical agricultural land uses, with some pasture improvement evident (e.g. presence of legumes such as *Trifolium* species). Remnants of native vegetation are restricted to isolated mature trees and small patches of acacia regrowth.

The Project site is zoned RU1 (Primary Production) under *Glen Innes Severn Local Environmental Plan* (LEP) 2012, as is the majority of the surrounding area. Land zoned E3 (Environmental Management) associated with the Gwydir Highway road corridor is located on the south-western, southern and south-eastern boundaries of the Project site. The Gwydir Highway traverses the Project site.

The surrounding area is sparsely populated. The closest residence lies approximately 1.5 km to the north-east of the Project site (refer to Section 2.3.5).

Plate 2-1 Southern portion of the Project site and proposed quarry location

2.2.1 The resource

Geotechnical investigations of the Project site were undertaken by SMEC at four locations, using non-invasive techniques. This identified two locations likely to provide suitable aggregate resources. Intrusive investigations of these two locations confirmed there is sufficient and suitable resource to warrant the establishment of an extractive industry on the Project site. A copy of the Resource Assessment is provided in Appendix B.

The resource consists of a variety of material including hard basalt, weathered basalt and tuff. An estimate of each is provided in The potential uses for these materials includes concrete aggregates associated with wind farm construction, road base and potentially unsealed road wearing course.

Table 2-1 Estimated volume of materials

Material	Volume (m^3)
Overburden	67,500
Extremely weathered basalt	218,000
Moderately to slightly weathered basalt	280,750
Slightly weathered to fresh rock	276,750
Tuff/Agglomerate	99,500
Total volume	942,500

2.2.2 Other proposed or consented activities

As mentioned in Section 1.1, GISC are in the process of applying for a 30,000 m^3 per year extraction industry in the same location as the Project. The smaller quarry is intended to provide material in the short-term while the Project would provide material in the long-term. Most aspects of the two proposals are the same, except for the annual extraction rate, depth of extraction and the area of the quarry pit which would increase to six hectares under the Project.

GISC have also entered into preliminary discussions with One Wind, the proponents of the Glen Innes Wind Farm, regarding the opportunity to establish a shared entrance to the quarry and the wind farm off Gwydir Highway. The shared access was part of the Glen Innes Wind Farm proposal (Application 07_0036) determined by the Minister of Planning in 2009.

2.3 Existing environment

2.3.1 Regional context

The Project site occurs in the Glen Innes Severn LGA in the New England area of NSW, approximately 13 kilometres west of Glen Innes. The LGA covers an area of approximately 5,487 km^2 and has a population of approximately 8,656 people.

The Glen Innes Severn LGA is primarily known for its agricultural enterprises, with the town of Glen Innes providing an important centre for livestock sales. Key industries in the region include wool, sheep, cattle, agriculture, viticulture, fossicking and tourism. Renewable energy is a growing industry in the region, with three wind farms and one solar farm having been recently approved.

2.3.2 Topography and catchments

The Project site occurs on land with a gentle slope ranging from 1,090 m Australian Height Datum (AHD), to a ridge with an elevation of approximately 1,190 m AHD. The surrounding environment is undulating, with surrounding plains having a general elevation of approximately 1,000 m AHD.

The proposed quarry occurs close to the top of a ridge at around 1,180 m AHD.

An unnamed tributary of Back Plain Creek runs through the Project site. Back Plain Creek is a tributary of the Wellingrove Creek, which flows into the Severn River to the north. A number of small farm dams are located throughout the Project site, including one which is immediately below the proposed quarry.

2.3.3 Geology and soils

Reference to the Grafton 1:250,000 Geology Series Sheet produced by the Geological Survey of NSW (1976) for the area indicates that the site is underlain by Tertiary-aged materials. The geology of the area is comprised of basalts and dolerites which are largely extrusive.

Soil landscape mapping of the Project site was undertaken at a reconnaissance level by the Department of the Environment, Climate Change and Water (DECCW) in 2009 as part of mapping for the draft *Reconnaissance Soil Landscape Mapping for the Border Rivers-Gwydir CMA* (DECCW, 2009). Four (4) soil landscapes are mapped as occurring within the Project site, described as the Newstead, Rumbee, Carters Mountain and Highlands soil landscapes. A summary of the characteristics of these soil landscapes is provided in Table 2-2 below.

Table 2-2 Soil landscapes of the Project site[1]

Soil landscape	Terrain	Soil profile types
Newstead (*north-eastern and eastern extents of the Proposal site*)	Erosional/colluvial, occurs on rolling simple to waning hillslopes.	The main soils are Brown Dermosols (Prairie Soils).
Rumbee (*Extraction area, haul roads and southern extent of the Proposal site)*	Vestigial, flat to gently undulating basalt plateaux and bench tops.	The main soils are Halpic Brown and Black Dermosols (Prairie Soils to Brown Earths).
Carters Mountain (*Extraction area and haul / access roads. Occurs throughout the Project site*)	Colluvial, occurs on steep to precipitous upper slopes and scarps of basalt.	The main soils are shallow Lithosolic Clastic Rudosols (Lithosols) and Brown Dermosols (Priarie Soils).
Highlands (*Northern extent of the Project site)*	Erosional/colluvial, occurs on the lower slopes and valley floors.	The main soils are Vertosols (Black Earths).

Source: LLS Northern Tablelands (n.d.).
Note 1: Soil mapping is noted to be in draft form and collected at reconnaissance level, with soil attributes and limitations used as a guide only.

2.3.4 Climate

The Glen Innes Severn area has a cool temperate climate, with mild to warm summer months and cold, windy winters with regular frosts and occasional snowfalls. The closest Bureau of Meteorology (BoM) weather station is located approximately 8.5 kilometres to the north-east of the Project site at the Glen Innes Airport Automatic Weather Station (AWS) (station 056243).

The region experiences an average maximum temperature of 20.3 °C and an average minimum temperature of 6.0 °C. On average, January is the hottest month, with an average maximum temperature of 26.2 °C, while July is the coldest month, with an average minimum temperature of -1.1 °C. The annual average relative humidity reading collected at 9.00 am from the Glen Innes Airport AWS is 74 per cent and at 3.00 pm the annual average is 51 per cent.

Rainfall data collected at the Station shows that November is the wettest month, with an average rainfall of 127.2 millimetres over an average of 9 rain days. The average annual rainfall is 879.9 millimetres, with an average of 78.5 rain days per year.

On an annual basis the prevailing winds follow a west / east-southeast axis. During summer the winds originate from an easterly direction, while during winter the prevailing winds originate from the east-southeast and west direction. Spring and autumn are a transition of these flows.

Table 2-3 presents the mean temperature and rainfall data from the Glen Innes Airport AWS, averaged from 1996 (when the weather station became operational) to 2016.

Table 2-3 Climate averages (mean) for Glen Innes Airport AWS

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Daily Maximum Temperature (°C)												
26.2	25.7	24.0	20.8	16.9	13.8	13.2	14.8	18.4	21.3	23.2	24.8	**20.3**
Daily Minimum Temperature (°C)												
12.8	12.8	10.8	6.7	2.0	0.3	-1.1	-0.9	2.5	5.5	9.2	11.3	**6.0**
Rainfall												
99.1	84.7	71.6	52.5	46.5	56.3	48.5	46.6	56.5	74.7	127.2	115.5	**879.9**
Rain days (number)												
8.6	7.3	6.1	4.1	4.6	5.9	5.9	5.5	5.3	6.5	9.0	9.7	**78.5**

Source: Bureau of Meteorology (2016), Climate averages for Station 056243; Commenced: 1996 – 2016, Latitude: 29.68 ºS; Longitude: 151.69 ºE.

2.3.5 Surrounding land uses

Land uses surrounding the Project site are associated with agricultural enterprises, with low connectivity of surrounding vegetation due to historical land clearing activities.

A sensitive receptor is defined as a location where people are likely to work or reside. This may include a dwelling, school, hospital, office or public recreational area. Nearby sensitive receptors in the vicinity of the Project site are rural-residential properties which include:

- A small hamlet 1.3 kilometres to the north of the Project site on Malboona Road.
- Individual farm properties:
  - 1.7 kilometres west at the entrance to Pitlochry Road
  - 1.5 kilometres east on Rose Hill Road
  - 2 kilometres north-east on Malboona Road
  - 2.3 kilometres east on the Gwydir Highway (refer to Figure 1-2).

The proposed Glen Innes Wind Farm is located to the immediate south of the Project site. The wind farm has a current project approval for the construction and operation of up to 25 wind turbines each with a potential capacity of 3 Megawatts (MW), to produce enough energy to power approximately 47,000 homes (One Wind, 2016). The wind farm is currently moving into the construction phase.

3. Description of the project

3.1 Overview

The Project involves a hard rock quarry, with an annual maximum extraction rate of 300,000 tpa and a maximum daily extraction rate of 3,000 tpd. The total area of disturbance is approximately 8 hectares which includes an extraction area of approximately 6 hectares. The primary purpose of the Project is to supply suitable aggregate resources for the construction of proposed wind farm projects in the area and GISC.

Project activities will be generally as follows:

- Progressive installation of environmental controls including erosion and sediment control measures.
- Construction of an intersection with the Gwydir Highway and signage.
- Construction of fencing.
- Delineation of the site and stockpiling areas.
- Vegetation clearance, soil stripping and stockpiling.
- Construction of temporary drainage controls.
- Expanded quarry operations.
- Establish site office and weighbridge.
- Close and rehabilitate the quarry.

3.2 Resources and demand

Geotechnical investigations of the Project site were undertaken by SMEC in April 2016 at four locations, using non-invasive techniques. This identified two distinct areas likely to provide suitable aggregate resources. Intrusive investigations of these two areas confirmed there is sufficient and suitable resource to warrant the establishment of an extractive industry on the Project site.

It is proposed to extract material from the southern of these two areas which has a total resource of 2.1 million tonnes.

The resource consists of a variety of material including hard basalt, weathered basalt and tuff. The potential uses for these materials includes concrete aggregates associated with wind farm construction, road base and potentially unsealed road wearing course.

The Project would fulfil an anticipated short and medium term demand for aggregate products for the construction of major wind farm projects in the region. The demand from the wind farms has been reported to be in the order of 300,000 tonnes plus during their construction. With limited quarries with approved extraction rates in the local area available to meet this demand, GISC intends to establish this quarry so the development of the wind farms is not jeopardised. In the longer term, the Project will provide a supply of aggregate products to the Glen Innes district to replace the existing quarry east of Glen Innes which has less than 10 years' capacity remaining.

3.3 Construction

The construction phase of the quarry would be relatively short (i.e. about 1 month). The main activity would be the construction of the Gwydir Highway intersection. Other activities would be:

- Progressive installation of environmental controls including erosion and sediment control measures.
- Vegetation clearance, soil stripping and stockpiling.
- Construction of temporary drainage controls.

A dozer, excavator and haul trucks are the main items of equipment likely to be required during construction. Other equipment may include:

- Roller
- Grader
- Water cart
- Compactor
- Light vehicles
- Hand tools.

3.4 Operation

The quarry operations would be carried out in stages and in response to demand.

Topsoil stripping would occur in stages prior to excavation. Generally areas would be stripped immediately prior to quarrying. Overburden would either be stockpiled for future rehabilitation works, or placed in final location as voids are created. The total area of the quarry would be stripped with excavation continuing to establish a quarry face of about 7 metres in width.

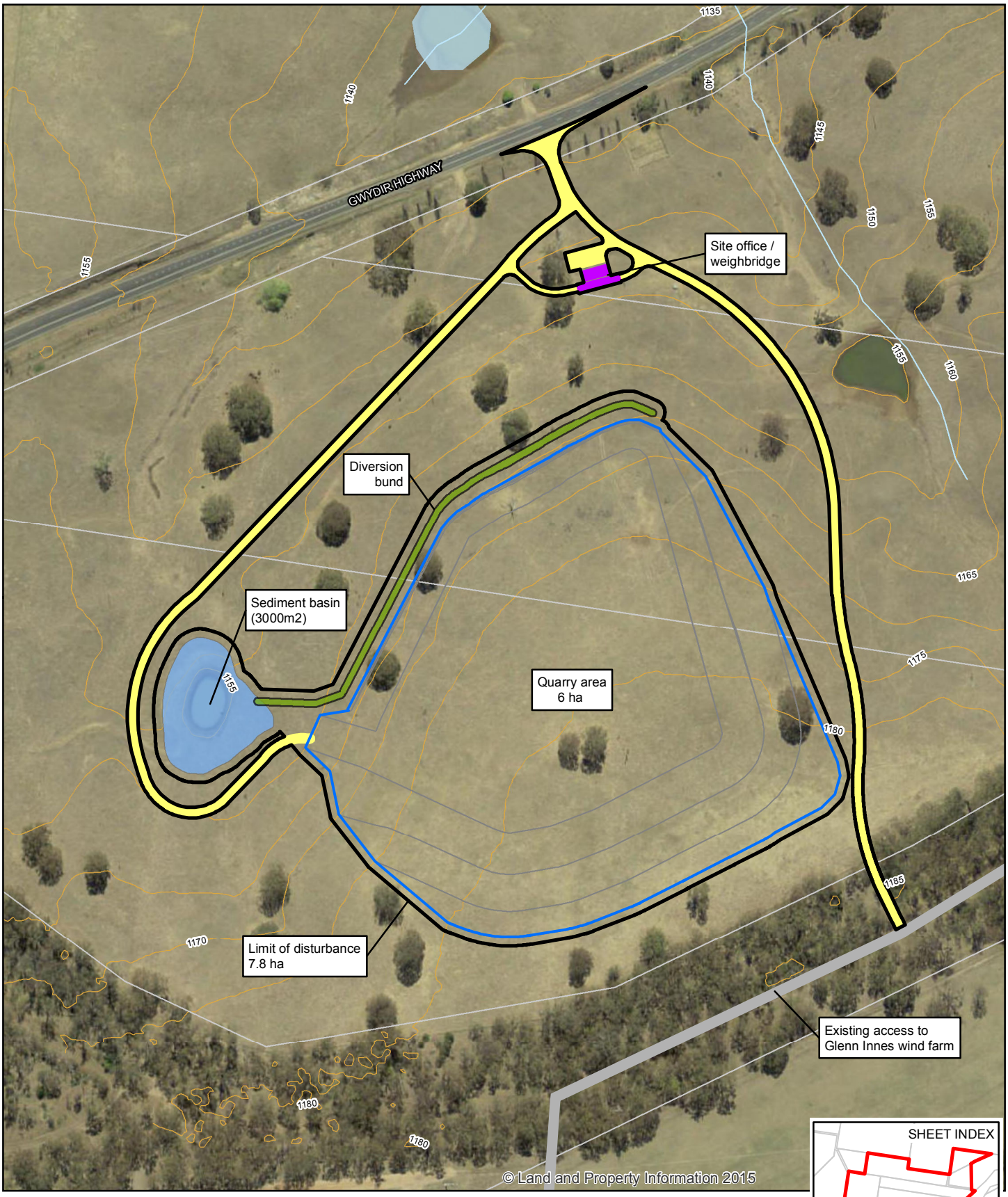
Excavation would commence on the western side of the disturbed area and continue in an easterly direction.

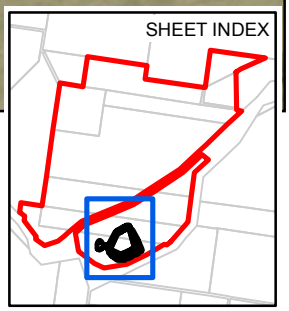
Once the first bench had been exhausted, a second 7-metre-wide bench would be established and the process would be repeated until the final depth of approximately 20 metres below the current ground level (i.e, 1,160 m AHD) is reached.

Outlines of the quarry layout, benches and sections are shown on Figure 3-1 to Figure 3-5. An estimate of the volume of material to be extracted from each bench is provided in Table 3-1.

Table 3-1 Bench volumes

Bench	Volume (m^3)	Tonnes
1	200,000	500,000
2	350,000	875,000
3	290,000	725,000
Total	840,000	2,100,000





LEGEND

- Project boundary
- Cadastre
- 5m contours
- Watercourse
- Waterbody
- Existing access
- Site access
- Site office / weigh bridge
- Basin (3000m2)
- Diversion bund
- Quarry pit
- Disturbance area

Paper Size A4

0 12.5 25 50 75 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Glen Innes Severn Council
Wattle Vale Quarry
Environmental Impact Statement

Job Number 22-18380
Revision A
Date 08 Nov 2016

Quarry Layout

Figure 3-1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI: DCDB & DTDB, 2012,Aerial Imagery, 2016; GISSC: Aerial Imagery / Quarry Data, 2016. Created by: fmackay, tmorton