Section 2

Description of the Proposal

PREAMBLE

This section describes the Proposal including:

- *the objectives of the Proposal;*
- *an overview of the Proposal and the approvals required;*
- *site establishment works to be undertaken;*
- *the proposed extraction and processing operations;*
- *the proposed transportation operations;*
- *management measures that would be implemented for water and waste;*
- *the proposed employment and economic contributions that would result; and*
- *proposed rehabilitation activities.*

The Proposal is described in sufficient detail to provide an overall understanding of the nature and extent of the activities proposed, how the various activities would be undertaken and to enable an assessment of the potential impacts on the surrounding environment. The level of detail provided is sufficient to enable a determination to be made as to the environmental impact of the Proposal.

Details of the safeguards and management measures that the Applicant and Operator propose to implement to minimise or negate the potential impacts on components of the local environment are provided in Section 4 of this document.

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2.1 Introduction

2.1.1 Objectives of the Proposal

The Applicant and Operator's objectives in constructing and operating the Proposal are as follows.

- To continue to provide a source of high-quality sand products to meet the needs of housing and construction markets in NSW and the ACT.
- To maximise the recovery of identified sand resources within the Approved and Proposed Extraction Areas.
- To consolidate and update the existing development approval to one that is consistent with current standards and community expectations.
- To develop and operate the Quarry in a manner that is environmentally responsible and complies with all statutory requirements.
- To create a final landform that is safe, stable, non-polluting and provides for a final land use of nature conservation and agriculture.
- Achieve the above objectives in a cost-effective manner to ensure the Proposal is viable.

2.1.2 Overview of the Proposal

The Proposal would comprise the following (**Figure 2.1**).

- Ongoing extraction of sand and limited volumes of overburden and interburden (clay and silt) within the remainder of the Approved Extraction Area and a 77ha proposed Extraction Area, producing up to 400,000t of sand products per year for a period of 20 years.
- Continued on-site screening, classifying and stockpiling of extracted material to produce a range of sand products using the existing Sand Classification Plant.
- Continued transportation of sand products to the Operator's customers using a combination of rigid vehicles and truck and dog combinations and existing Quarry Access Road and public transportation routes.
- Continued management and settlement of fines and process water using the existing and proposed Fines Settling Cells and Process Water Ponds.
- Establishment of ancillary infrastructure, including bunds and water management structures.
- Construction and rehabilitation of a final landform that would be safe, stable, non-polluting, and suitable for a future land use of nature conservation and agriculture.

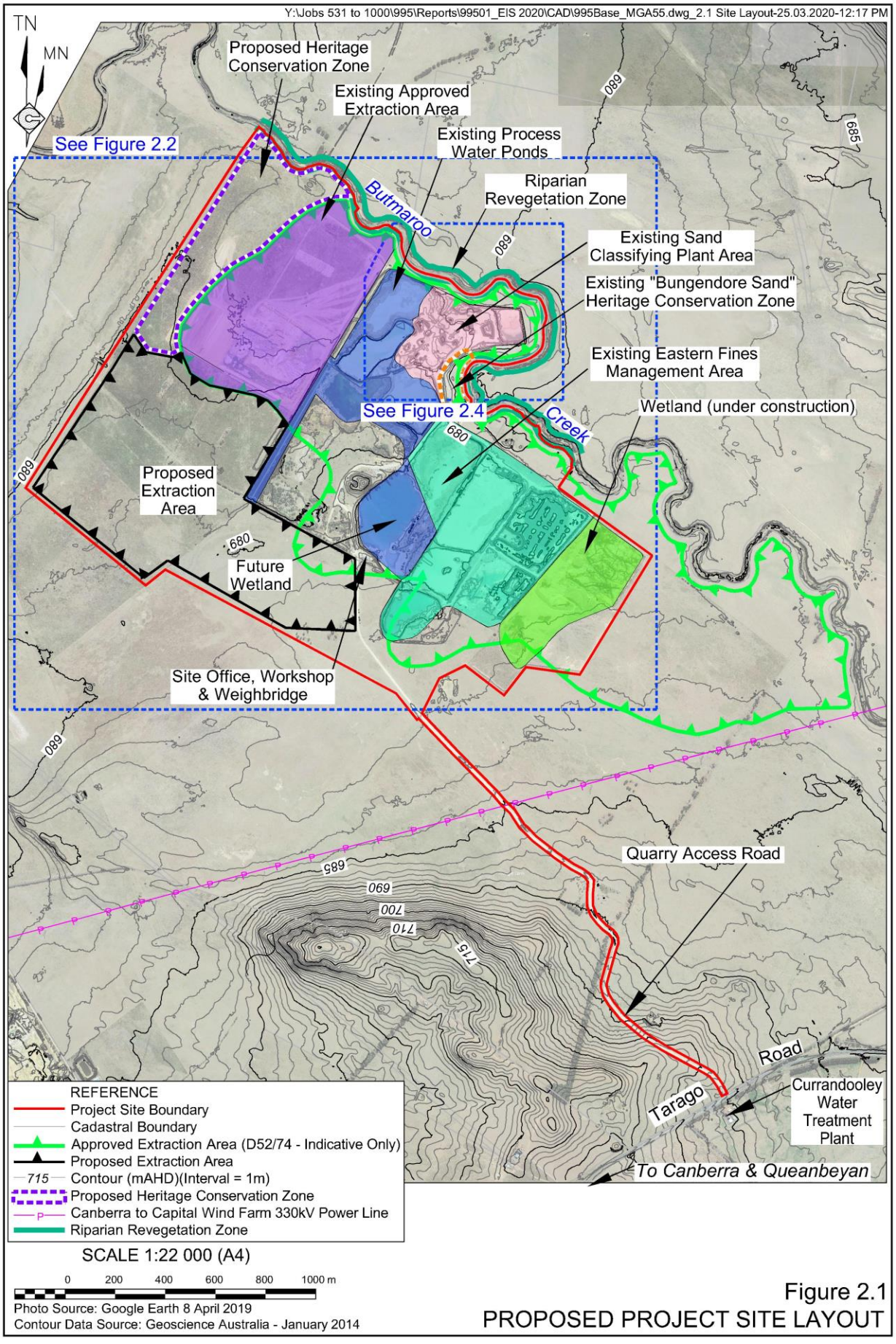

Figure 2.1
PROPOSED PROJECT SITE LAYOUT

2.1.3 Need for the Proposal

The need for the Proposal has been demonstrated by the Operator through the existing markets established for the sand products produced by the existing operation. Section 1.5.2 describes the operation of the existing Quarry. In summary, the Quarry has historically produced up to 300,000tpa of sand products which have been used for the construction of public, commercial and private infrastructure throughout the Queanbeyan-Palerang Local Government Area, the ACT and surrounds. The Operator estimates that it supplies over 50% of the washed sand products for ready mixed concrete suppliers in the above area.

2.2 Proposed Project Site Layout

Figure 2.1 presents the proposed Project Site layout. In summary, the Proposal would include the use and operation of the following components. The Proposal includes all existing and proposed infrastructure.

- An existing, approved Extraction Area.
- A proposed Extraction Area, including proposed Fines Settling Cells and Wetlands to be constructed following the completion of extraction operations.
- An existing, approved Sand Classifying Plant.
- An existing, approved Fines Management Area.
- A series of existing, approved Process Water Ponds.
- An existing, approved Quarry Access Road.
- A number of wetlands either under construction or proposed to be constructed.
- Ancillary infrastructure, including a site office, workshop, weighbridge, car parking areas and hardstands.

2.3 Site Establishment

2.3.1 Introduction

A range of site establishment and construction activities would be undertaken including the following.

- The marking out of all component areas to be disturbed with highly visible permanent markers.
- Progressive vegetation clearing and soil removal within the areas approved for disturbance.

These activities are described in more detail in the following sections.

2.3.2 Survey and Mark Out

Prior to the commencement of any ground-disturbing activities, the Operator would survey all areas of proposed disturbance, as well as the boundary of the approved E1 Extraction Area and proposed Heritage Conservation Zone. The boundaries of the active Extraction Areas, Fines Management Area and areas undergoing rehabilitation would be bunded with the bunds acting to prevent in advertent vehicular access and to prevent discharge of surface water to surrounding areas. The proposed Heritage Conservation Area would be fenced and signposted to prevent inadvertent disturbance.

All site personnel would be made aware of the approved areas of disturbance and the significance of not disturbing areas outside of the approved areas.

2.3.3 Vegetation Clearing

The Project Site has been subjected to extensive vegetation clearing as well as grazing and cropping activities over many years. EnviroKey (2020) undertook the biodiversity assessment for the Proposal and concluded that although the vegetation within the proposed Extraction Area is dominated by exotic species, it may technically be classified as Plant Community Type (PCT) 869 'Kangaroo Grass – Wallaby Grass – Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion'. Isolated trees within the proposed Extraction Area consist of three radiata pine trees as well as twelve planted English elms.

Larger vegetation would initially be felled and removed. Large woody debris would be placed as habitat elements within wetlands undergoing construction. Smaller debris would be mulched and used for rehabilitation purposes within the Project Site or elsewhere.

Groundcover vegetation would be removed along with the topsoil in order to maximise retention of the seed bank and nutrients within the soil. Concurrent removal of groundcover vegetation and topsoil would also minimise the potential for erosion of stockpiled or directly placed soil to occur.

2.3.4 Soil Stripping and Stockpiling

Section 4.11 presents a description of the soils within the Project Site. In summary, the Project Site soils comprise poorly drained soils of the Coopers soil landscape unit with a land and soil capability of Class 6 or soils only suitable for grazing and not suitable for cultivation.

The following soil stripping, stockpiling and management measures would be implemented.

- Strip soil from all areas of proposed disturbance, ensuring that sufficient soil is available for respread over the final landform of the Project Site.
- Soil would not be stripped during excessively wet or dry conditions in order to preserve the soil structure.
- Soil stockpiles would be constructed to a height no greater than 2m, with side slopes no more than 1:3 (V:H). Stockpiles would then be stabilised through the establishment of groundcover vegetation achieving a coverage equivalent to 60% within 10 days of establishment.

- Other than immediately prior to excavation for use in rehabilitation, machinery would not be permitted to drive on soil stockpiles.

2.4 Extraction Operations

2.4.1 Introduction

Processing operations would be undertaken in a similar manner to existing operations, namely using scrapers, excavators and haul trucks. This subsection presents information relating to the proposed extraction operations including design features, extraction sequence, extraction methods, equipment used and extraction rates.

2.4.2 Extraction Cell Design Features

Although subject to modifications based on localised geological conditions or the optimal locations of ramps etc, the following general design criteria would be adopted for each Extraction Cell.

- Operational face height ..... up to 10m
- Operational face angle 70º
- Final face angle (to be achieved through backfilling) ..... 18º or 1:3 (V:H)

Access to the extraction area would be provided by access ramp, the location of which would be adjusted as required. All extraction areas would be protected by bunds a minimum of half the height of the largest piece of equipment operating within the Extraction Area.

2.4.3 Extraction Sequence

Extraction would be undertaken in a staged manner. **Figure 2.2** presents the indicative extraction sequence for the Proposal. Section 2.5 presents a description of the proposed extraction method and Section 2.7.2.4 presents an indicative sequence for fines placement and settling operations.

In summary, extraction operations within the existing, approved Extraction Area would continue within Extraction Cell E1, with extraction proceeding from southwest to northeast. The Operator understands that the *in situ* material in the northeastern section of Extraction Cell E1 becomes increasingly silt and clay-rich. When the material becomes too poor quality to economically extract and process, extraction operations would move to Extraction Cell E2 within the proposed Extraction Area.

Following commencement of extraction operations within the proposed Extraction Area, extraction would progress generally in numerical order from Extraction Cell E2 to Extraction Area Cell E10. Typically, two Extraction Cells would operate concurrently, with one Cell nearing the end of its extraction life and the subsequent Cell at an early stage in its extraction life.

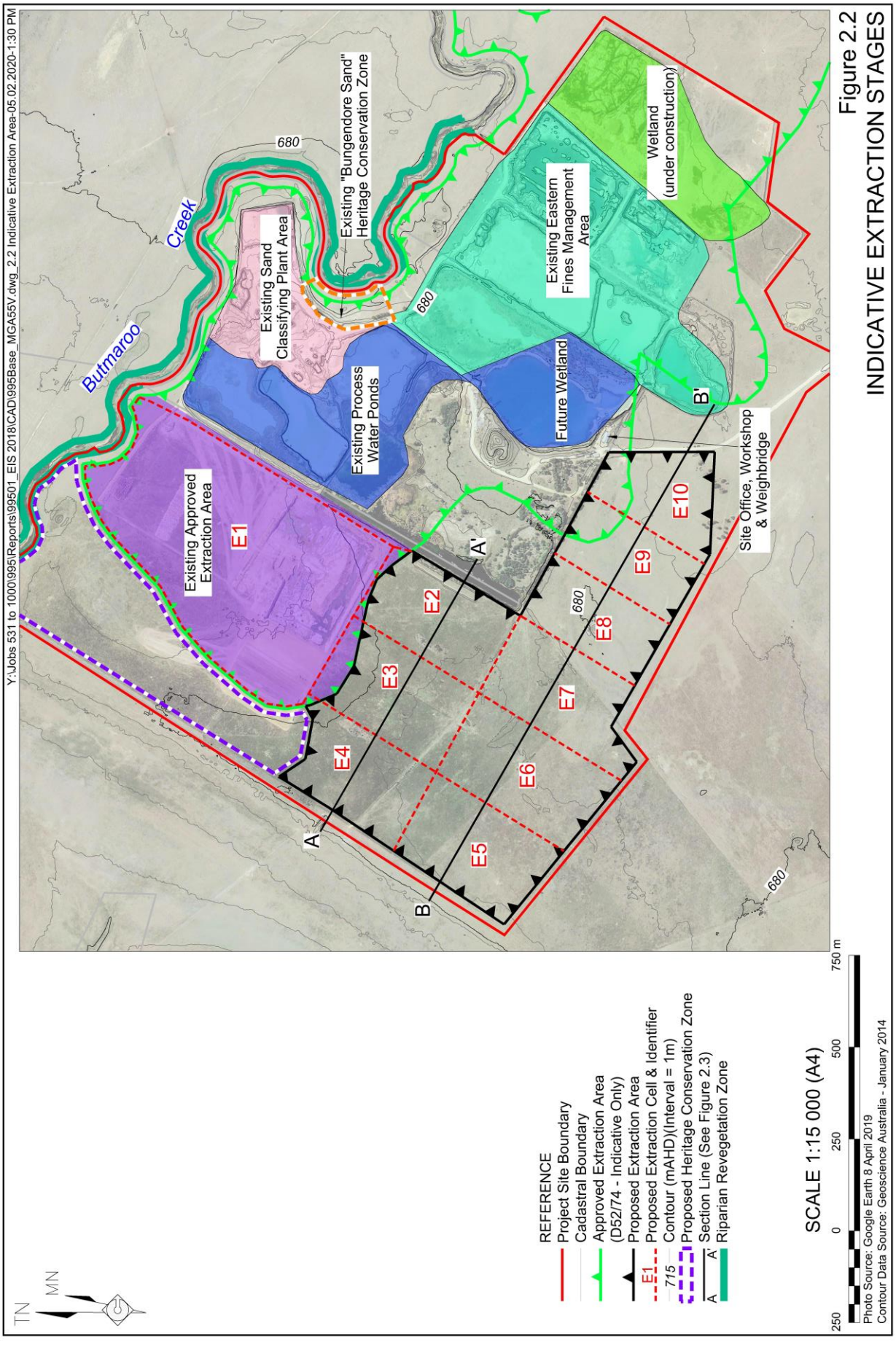
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Figure 2.2
INDICATIVE EXTRACTION STAGES
Butmaroo Creek
680
Existing Sand Classifying Plant Area
Existing "Bungendore Sand" Heritage Conservation Zone
Existing Process Water Ponds
Existing Eastern Fines Management Area
Wetland (under construction)
Future Wetland
Existing Approved Extraction Area
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
A
A'
B
B'
Site Office, Workshop & Weighbridge
TN
MN
REFERENCE
Project Site Boundary
Cadastral Boundary
Approved Extraction Area
(D52/74 - Indicative Only)
Proposed Extraction Area
E1 Proposed Extraction Cell & Identifier
715 Contour (mAHD)(Interval = 1m)
Proposed Heritage Conservation Zone
A A' Section Line (See Figure 2.3)
Riparian Revegetation Zone
SCALE 1:15 000 (A4)
250 0 250 500 750 m
Photo Source: Google Earth 8 April 2019
Contour Data Source: Geoscience Australia - January 2014

A barrier of *in situ* material would be remain between each completed Extraction Cell. This would permit appropriate water and fines management throughout the life of the Proposal. Where appropriate and safe to do so, the barriers may be removed, and the contained material processed and sold. Extracted barriers may be replaced with barriers comprising placed overburden[1] and/or interburden[2], ensuring maximum resource utilisation.

2.4.4 Extraction Operations

Extraction would be undertaken using standard dry extraction techniques. **Figure 2.3** presents a conceptual overview of the proposed extraction operations.

Overburden would continue to be removed in advance of sand extraction operations using either scrapers, front-end loaders or excavators, with the latter two supported by off-road haul trucks. This material would either be placed into surface stockpiles within the approved or proposed Extraction Area ready to be pushed back into the completed Extraction Area (**Plate 2.1**) or within completed sections of the current Extraction Cells ready to be shaped to form the proposed final landform (**Plate 2.2**).

Following the removal of overburden, the target sand resource would continue to be selectively extracted using an excavator and off-road haul trucks **(Plate 2.3**). Extracted material would continue to be transported to the Sand Classifying Plant for processing.

Interburden would continue to be separately extracted and placed in stockpiles on the floor of the Extraction Cell or transported to in-pit stockpiles ready to be shaped to form the proposed final landform **(Plate 2.3**).

Water accumulating within the Extraction Cell would comprise limited volumes of groundwater (see Section 4.6) as well as accumulated incident rainfall. This water would be managed through the construction of a series of trenches and sumps. Typically, water would be permitted to flow to a single point and would then be pumped from the active Extraction Cell to the Process Water Ponds.

2.4.5 Decommissioning of Completed Extraction Cells

Following completion of extraction operations within individual Extraction Cells, the cells would be decommissioned, with the process to be used dependent on the intended final use for the cell.

Extraction Cells to be used for fines settlement would be largely left unshaped. In-pit overburden stockpiles may be shaped to control fines deposition and to permit vehicular access to the Extraction Cell during fines settling operations. Fines settling procedures are described in Section 2.6

[1] Overburden is clay or silt-rich material unsuitable for processing that lies over layers of sand-rich material.
[2] Interburden is clay or silt-rich material unsuitable for processing that lies between layers of sand-rich material.

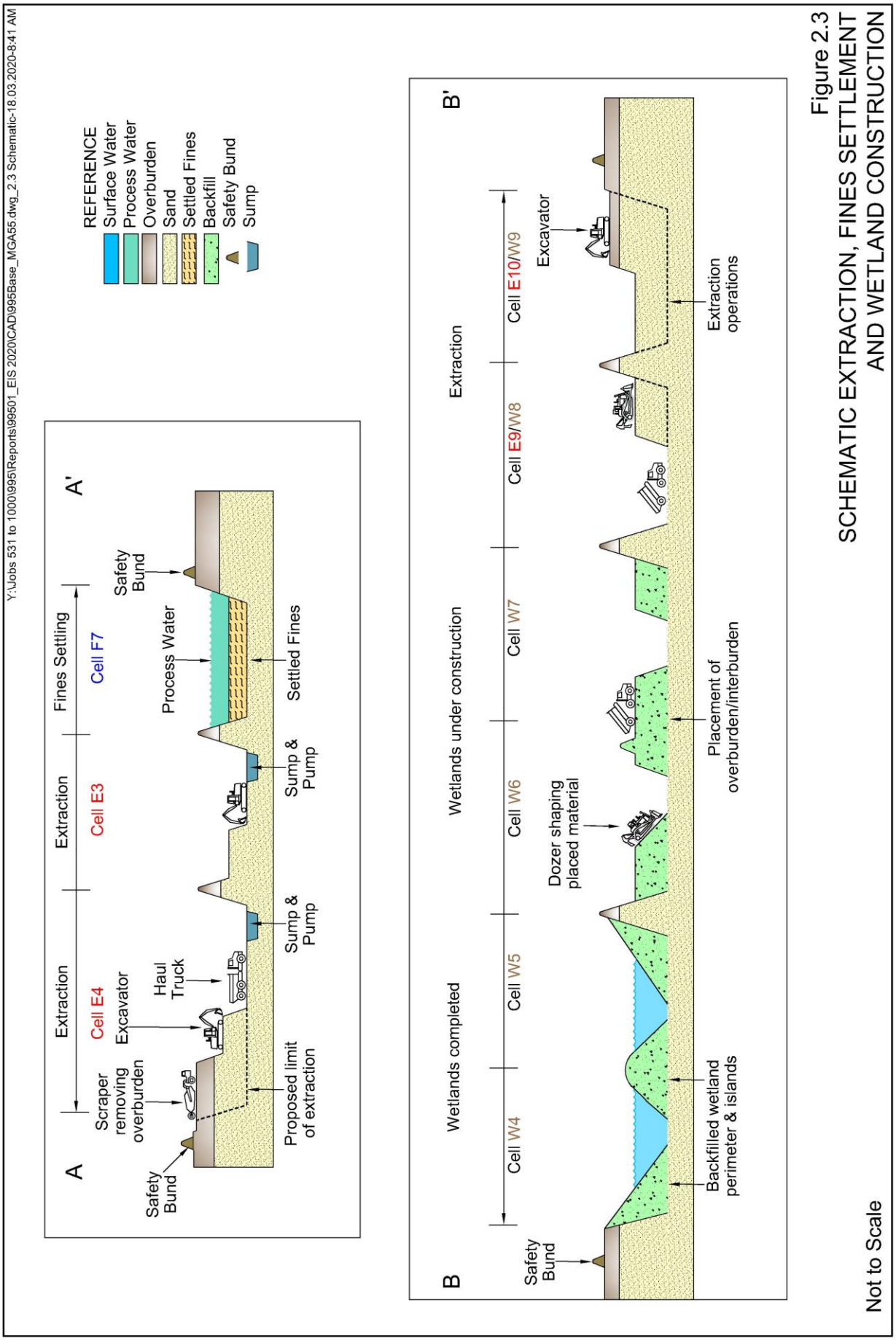
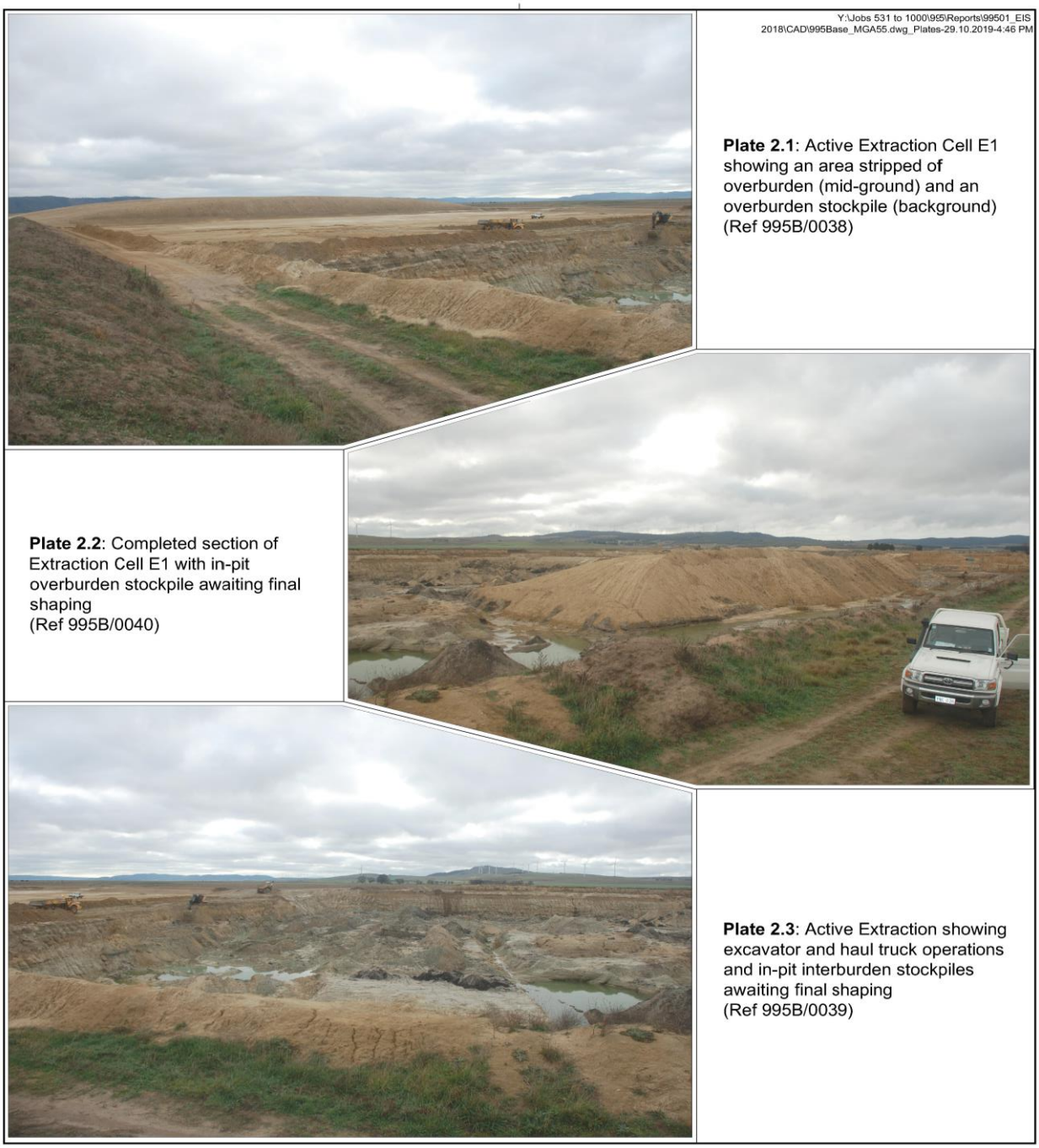


Figure 2.3
SCHEMATIC EXTRACTION, FINES SETTLEMENT AND WETLAND CONSTRUCTION



Extraction Cells to be used for wetlands would be shaped using stockpiled overburden and interburden to form islands and other habitat features for the final landform. The final walls of the cells would also be shaped to achieve a maximum slope of 1:3 (V:H) to ensure that the walls of the wetland are stable and will not erode once filled with water. Section 2.12 presents a description of the proposed final landform.

2.4.6 Extraction Rate

Up to 400,000t of sand products would be transported from the Project Site per year. However, the Operator notes that the maximum production rate would not be achieved in all years and the average production rate would be lower than 400,000t.

The Operator notes that the volume of material to be extracted to produce this quantity of sand products will depend on the quantity of silts and clay within the Extraction Cells. Previous experience is that each Extraction Cell contains between 20% and 30% of overburden and interburden. In addition, between 10% and 20% of the raw feed material is fines.

As a result, in order to produce the maximum proposed volume of sand products, namely 400,000tpa, the Operator anticipates that up to approximately 600,000t of material, comprising overburden, interburden and raw feed material would be extracted each year. Similarly, at a lower production rate of say 180,000t of sand products, approximately 270,000t of material would be extracted each year.

2.4.7 Extraction Equipment

Operations currently require the use of the following mobile plant. The Operator anticipates that the proposed extraction operations would continue to utilise the existing plant

- 4 x 30t to 35t capacity excavators.
- 5 x 25t capacity front-end loaders.
- 3 x 40t capacity haul trucks.
- 1 x bulldozer.
- 1 x grader.
- 1 x water cart.
- Various light vehicles.

In addition, the contract scrapers and other mobile plant may be used for extraction and/or rehabilitation operations.

2.5 Processing Operations

2.5.1 Introduction

Figure 2.4 presents the layout of the Sand Classifying Plant and Stockpile Area. Processing operations would be undertaken in a similar manner to existing operations, namely material would be stockpiled within the Raw Feed Stockpile Area and selectively blended and fed into the Sand Classifying Plant. The resulting sand and gravel products would be stockpiled within the Product Stockpile Area until transported from the Project Site. Coarse reject material would be managed as overburden as described in Section 2.4.4 while fines would be managed as described in Section 2.6.2.

2.5.2 Stockpiling of Extracted Material

Extracted material would be transported from the Extraction Area to the Raw Feed Stockpile Area and selectively stockpiled based on material characteristics. This material would be blended to produce a consistent feed material and would be loaded into a hopper and then the raw feed conveyor.

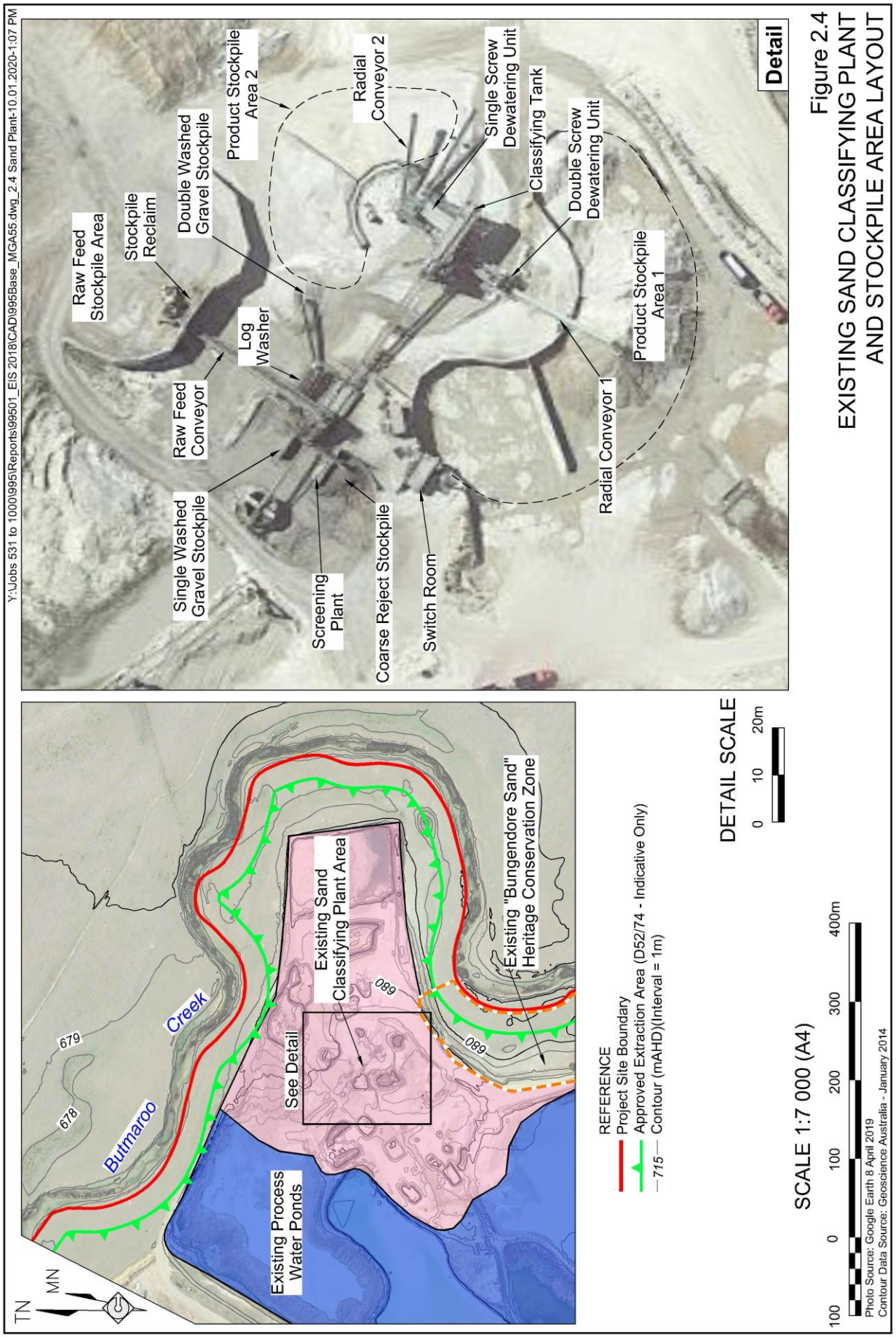


Figure 2.4
EXISTING SAND CLASSIFYING PLANT AND STOCKPILE AREA LAYOUT

Prior to handling stockpiled raw feed, the Operator would ensure that, if required, stockpiles and work areas have been watered down to prevent emission of unacceptable levels of dust during blending and loading operations.

2.5.3 Classifying Operations

Raw feed would be passed from the raw feed conveyor to a two-deck screen where water would be added. Classifying operations from this screen onwards would be a wet process and, therefore, not a source of dust emissions.

Oversize material, including lumps of clay, over size gravel and other material would be separated and transferred to the coarse reject stockpile. This material would be transported back to the Extraction Area for use in final landform construction.

Material passing the top screen, but not the lower screen, would be stockpiled as a single-wash gravel product. This material may be further processed using a log washer to produce a double washed gravel product.

Undersize material would be transferred to a classifying tank where the material would be agitated with water. This would separate the sand, silt and clay particles which would be allowed to settle progressively as the material moves through the tank. As a result, coarser material would settle closer to the inlet point and finer material would travel further through the tank towards the outlet. By varying the points along the tank where material is extracted, the Operator is able to produce a range of washed sand products. Sand material removed from the tank is dewatered using one of two screw dewatering units and stockpiled using one of two radial conveyors.

Material that is too fine to settle within the classifying tank would continue to be permitted to flow to a series of underground pipes and channels and would then be transferred to the Fines Management Area, with process water recovered as described in Section 2.6.3. This drainage network would also collect silt-laden water from other sections of the Classifying Plant.

2.5.4 Stockpiling of Sand and Gravel Products

Sand and gravel products would continue to be stacked adjacent to the classifying plant using conveyors. This material may be directly loaded into road-registered trucks using a front-end loader for transportation from the Project Site. Alternatively, this material would be transferred to secondary stockpiles pending future transportation.

The Operator would ensure that stockpiles, if required, are water down to prevent dust emissions during loading or transportation.

2.6 Fines and Water Management

2.6.1 Introduction

This subsection presents a description of the fines and process water management procedures that would continue to be implemented throughout the life of the Proposal, as well as a description of the operational water requirements, including a water balance, and measures that would be implemented to manage erosion and sedimentation within the Project Site. The supply of potable water is discussed in Section 2.7.

2.6.2 Fines Management

2.6.2.1 Introduction

The sand classifying process described in Section 2.5 uses water to remove clay and silt from the sand to achieve the required size grading. As a consequence, the water discharged from the Sand Classifying Plant contains high concentrations of particles as suspended solids in the water, referred to as "fines". This subsection describes the design features of the Fines Settling Cells, the operational procedures that would continue to be implemented during fines settling operations, the sequence of fine placement and the decommissioning of the Fines Settling Cells.

2.6.2.2 Fines Settling Cell Design Features

Fines would continue to be placed into completed existing or proposed Extraction Cells. As a result, the design of individual Fines Settling Cells would largely reflect the design of the relevant Extraction Cell. In summary, however, following general design criteria would be adopted for each Fines Settling Cell.

- Internal face angle..... 70º
- Internal bunding and fines control structures .....variable
- Inlet and outlet control..... typically pipes installed in the perimeter wall
- Safety bunding..... typically 1.5m to 2.0m high

2.6.2.3 Fines Settling Operations

The Operator would continue, to the extent practicable, to operate the fine settlement operations as a gravity fed process whereby fines-laden water from the Sand Classifying Plant would continue to be permitted to flow via one or more channels to active Fines Settling Cells (**Plate 2.4**) . The velocity of water within the channel would continue to be maintained to minimise settling of fines within the channel. The channel would be cleaned out as required, with removed fines placed within the Fines Settling Cells.

Fines-laden water would continue discharge into the initial Fines Settling Cell. The velocity of the water within the Cell would be substantially reduced, and suspended sediment would be permitted to settle. The Fines Settling Cell would gradually fill with fines, with the final elevation of the settled fines determined by the elevation of the outflow pipe from the Cell.

Overflow from the initial Fines Settling Cell would flow the one or more subsequent Cells. The water flowing from the initial Cell to the subsequent Cells would have some suspended sediment and further deposition of fines would be expected to occur within the subsequent Cells. Water with the majority of fines removed, would be pumped to the Process Water Pond as described in Section 2.6.2.

Once full, each Fines Settling Cell would either be bypassed or would continue to receive fines-laden water, with further settlement of fines prevented by the velocity of the water across the surface of the existing fines (**Plate 2.5**).

2.6.2.4 Fines Settling Sequence

Fines placement would be undertaken in a staged manner. **Figure 2.5** presents the indicative fines placement sequence for the Proposal. In summary, fines would continue to be placed within Fines Settling Cells F1, F2 and F3. Fines Settling Cell F6 currently receives clarified water, or water that is largely free of suspended sediment, from Fines Settling Cell F3.

Fines Settling Cells F1, F2 and F3 are currently at or near full capacity. As a result, the Operator anticipates bypassing these cells in the near future and commissioning Fines Settling Cells F4 and F5. Clarified water would continue to flow to Fines Settling Cell F6.

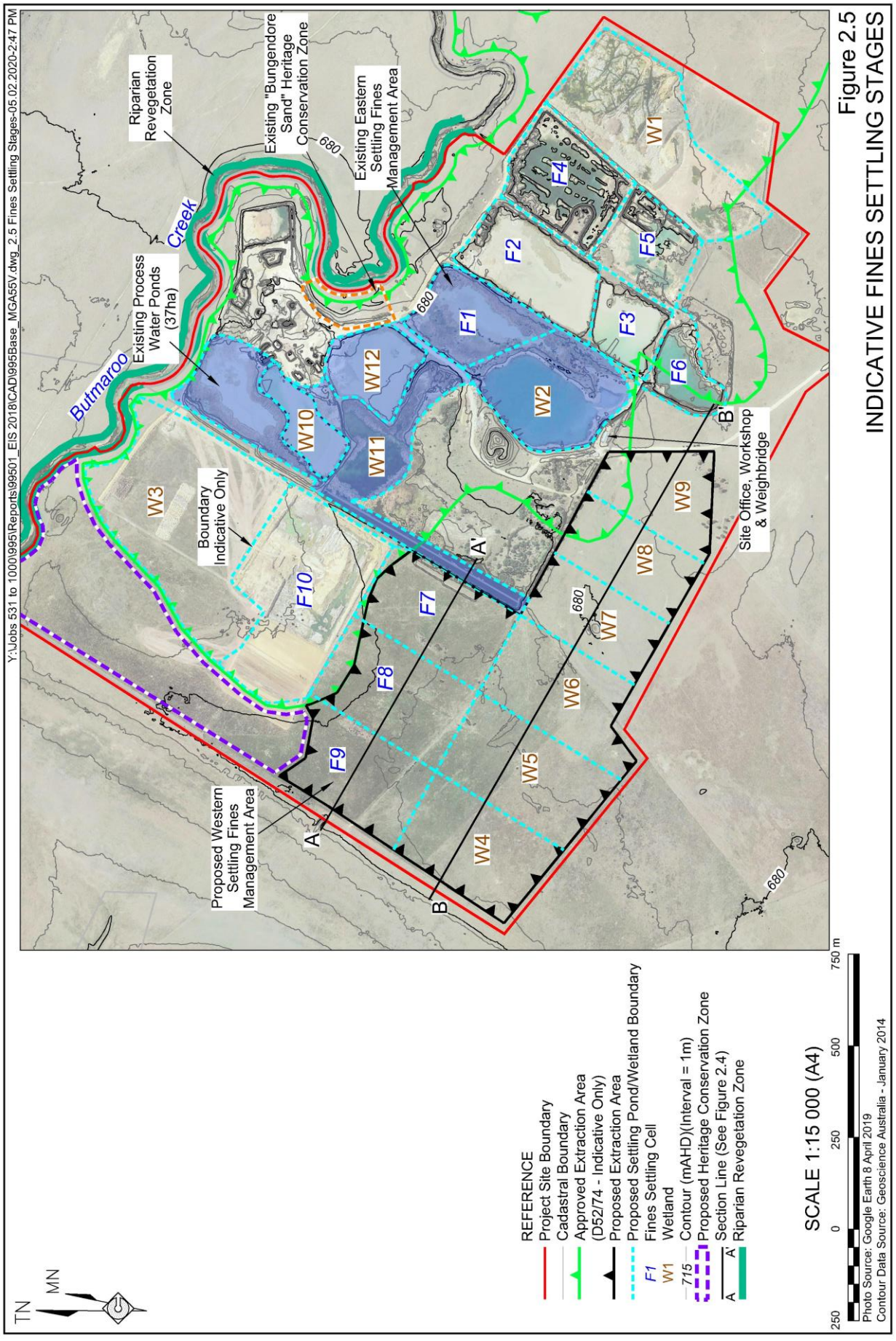


Figure 2.5
INDICATIVE FINES SETTLING STAGES

Once Fines Settling Cells F4 and F5, and possibly F6 reach full capacity, the Operator would decommission the existing Eastern Fines Settling Area and would commission the proposed Western Fines Settling Area comprising Fines Settling Cells F7, F8, F9 and F10. Fines Settling Cell F7 would receive fines-laden water from the Sand Classifying Plant, with clarified water flowing initially to Fines Settling Cell F10 from where it would be pumped to the Process Water Pond.

Once Fines Settling Cell F7 approaches capacity, fines-laden water would be diverted to Fines Settling Cell F8 and clarified water would continue to flow to Fines Settling Cell F10. Similarly, once Fines Settling Cell F8 approaches capacity, fines-laden water would be diverted to Fines Settling Cell F9 and clarified water would continue to flow to Fines Settling Cell F10. Fines Settling Cell F10 would be utilised only for fines placement if required at the end of the life of the Proposal.

The Operator notes that estimating the volume of fines to be placed and, as a result, how many Fines Settling Cells will be required is unlikely to be feasible for the following reasons.

- The proportion of fines in the sand to be processed can vary between 10% and 20% and as a result the final volume of fines to be placed may vary.
- The final volume available in each Fines Settling Cell for placement of fines will depend on the volume extracted. Should a high proportion of silt or clay-rich material be intersected during extraction, the available storage volume in each cell would be less because there would be more overburden and interburden placed within the cell. Conversely, should a high proportion of sand-rich material be intersected a greater storage volume would be available.

As a result, the Fines Settling Cells F8 to F10 may not be required for fines settling and may be converted to wetlands at the end of the life of the Proposal.

2.6.2.5 Decommissioning of Fines Settling Cells

Following completion of fines placement, Fines Settling Cells would be bypassed and decommissioned. Once bypassed, the Operator would allow the cells to dewater. It is the Operator's experience that during this process the surface of the cell will drop in the centre as contained water within the fines is released. As a result, the Operator may redirect fines-laden water to selected Fines Settling Cells following decommissioning to "top up" the cell with additional sediment.

Section 2.11 presents the proposed rehabilitation operations to be implemented progressively throughout the life of the Proposal, including for the decommissioned Fines Settling Cells. However, it is the Operator's experience that once decommissioned, the margins of Fines Settling Cells naturally revegetate, with the central section of each cell forming an intermittent shallow wetland.

Decommissioned Fines Settling Cells are typically unsuitable for vehicular traffic and the Operator would ensure that safety bunds installed during the life of the Proposal would remain in place following decommissioning.

2.6.3 Operational and Process Water

2.6.3.1 Introduction

The fines settlement process described in Section 2.6.2 results in water within the final Fines Settling Cell being largely free from suspended sediment. This water, referred to as process water, is reused within the Sand Classifying Plant, as well as for other extraction-related purposes within the Project Site. This subsection describes the management of process water, provides an indicative site water balance and a brief description of the erosion and sediment control measures that would be implemented to ensure that sediment-laden water is not permitted to be discharged from the Project Site.

2.6.3.2 Dewatering Operations

The Operator currently pumps water from the active Extraction Area to the Process Water Pond in order to ensure that the Extraction Area remains dry and suitable for the operation of mobile plant. Water removed from the Extraction Area comprises a combination of incident rainfall and groundwater seepage.

The Operator pumps water from the Extraction Area to the Process Water Ponds using a D150 3″ pump with a 2" line. The pump, when operating, pumps approximately 100L/minute and under average climatic conditions, operates for 18 hours per week and 48 weeks per year, pumping approximately 5.2ML of water per year. Under the current drought conditions. The pump typically operates for only 6 hours per week, pumping approximately 1.7ML per year.

2.6.3.3 Process Water Management and Uses

Clarified water from the final Fines Settling Cell would continue to be pumped to the existing Process Water Ponds. This water would be extracted from the Ponds using a pump located near the Sand Classifying Plant and recirculated through the Plant.

Additional water uses within the Project Site include dust suppression and irrigation of areas undergoing rehabilitation. Section 2.6.3.4 presents a site water balance describing each of these uses.

While the returned water from the Fines Settling Cells is largely free of suspended fines, limited quantities are likely to remain and will settle within the Process Water Ponds. As required, the Operator may clean out the Process Water Ponds using a floating dredge or long-armed excavator, with the resulting sediment-laden water pumped to the Fines Settling Cells.

2.6.3.4 Site Water Balance

Figure 2.6 presents a conceptual water cycle for the existing Quarry. An important characteristic of the Project Site water balance is the ability to pump water to and from the wetlands, allowing the Operator to manage water levels with the process water circuit and ensure that the Quarry is able to draw on additional water during dry periods, while ensuring that surge storage capacity exists during times of wet weather or reduced water consumption.

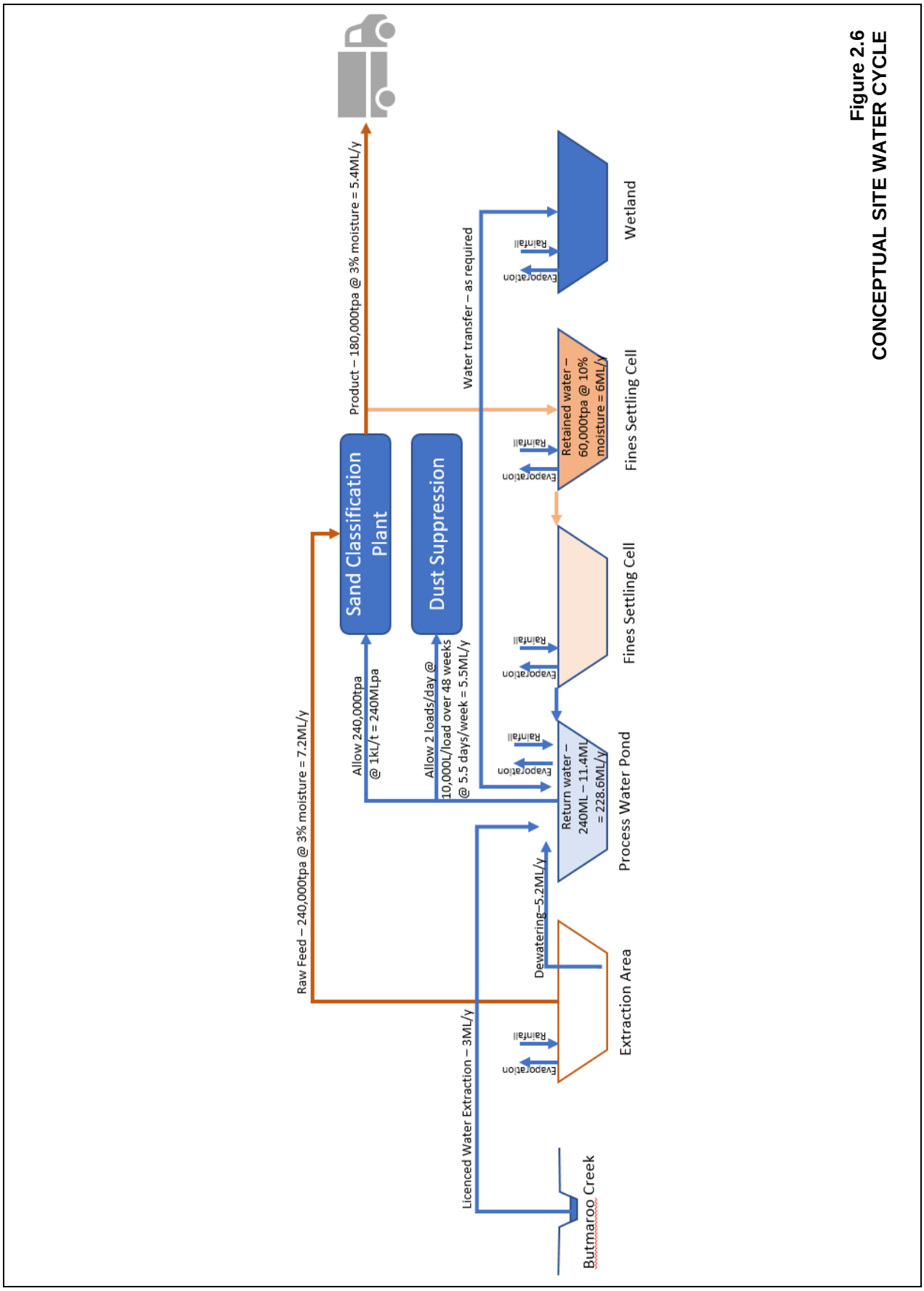


Figure 2.6
CONCEPTUAL SITE WATER CYCLE

Table 2.1 presents an overview of water inputs and outputs for the existing Quarry, excluding incident rainfall and evaporation. In summary, the water balance excluding these elements indicates a water deficit of approximately 1.5ML per year.

Table 2.1
Indicative Water Balance

Water Source/Destination	Explanation	Annual Estimate (ML/y)
Water Inputs		
Water extracted from Butmaroo Creek	Extracted under WAL33014	3.0
Dewatering of the active Extraction Area	See Section 2.6.3.2	5.2
Contained water in raw feed	Allow an average extraction rate of 240,000tpa @ 3% moisture	7.2
Return water from the Fines Settling Cells	Allow 240ML/y of process water, less 6ML of water retained with the fines and 5.4ML of water dispatched with product	228.6
	Total	**244.0**
Water Outputs		
Dust suppression	Allow an average of 2 loads per day for 48 weeks per year and 5.5 days per week at 10kL per load	5.5
Process water	Allow 240,000tpa of raw feed and approximately 1kL/t of feed processed	240
	Total	**245.5**

Notwithstanding this, it has been the Operator's experience since assuming responsibility for the Quarry in 1981 that any water any deficit or surplus is balanced by managing water levels within the Process Water Ponds, Fines Settling Ponds and Wetlands. In particular, during periods of higher than average rainfall, including the winter of 2016, the Operator permits water levels to rise, maximising the surface area available for evaporation. In 39 years of operation, the Operator has never been required to discharge water from site to reduce storage levels.

Similarly, during periods of lower than average rainfall, including during the second half of 2019, the Operator transfers water from the Wetlands and Fines Settling Ponds to the Process Water Ponds, thereby minimising evaporative losses and ensuring continued supply of water for processing operations. As a result, while the Operator has at times been required to reduce the rate of processing to account for reduced water availability, it has never ceased production as a result of inadequate water supply.

Finally, should a prolonged period of substantially higher than average rainfall occur during the life of the Quarry and sufficient onsite storage was not available for accumulated water, the Operator would allow the extraction area to fill with water and would not permit water to be discharged from site. Conversely, should a prolonged period of substantially lower than average rainfall occur during the life of the Quarry, the Operator would reduce or cease production.

2.6.4 Erosion and Sediment Control

The Proposal would continue to operate as a nil-discharge site, with a perimeter bund established to ensure that surface water is not permitted to flow from the Project Site to Butmaroo Creek or Lake George. Similarly, surface water would not be permitted to flow into disturbed sections of the Project Site from surrounding land. As a result, an Erosion and Sediment Control Plan would not be required.

The existing Quarry Access Road would be maintained in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 2C – unsealed roads* (DECC, 2008a). In particular, the Operator would ensure that roadside drainage would be installed and maintained in a manner that would ensure that sediment-laden water from the Quarry Access Road would be discharged to surrounding vegetated pasture and would not be permitted to flow to natural drainage.

2.7 Transportation

2.7.1 Introduction

Constructive Solutions Pty Ltd prepared a traffic assessment for the Proposal. The resulting report, referred to hereafter as Constructive Solutions (2020), is summarised in Section 4.3 and is presented in **Appendix 5**. This subsection describes the existing Quarry Access Road, site entrance and intersection, the existing transportation route and proposed vehicle types and movements. Section 4.3 provides a traffic impact assessment for the Proposal.

2.7.2 Quarry Access Road and Parking

The existing Quarry Access Road is an unsealed, two lane, all weather road. The road is currently and would continue to be used for light and heavy vehicle access to the Project Site (**Figure 2.1**). Water is applied as required to suppress dust emissions during transportation operations.

The Quarry Access Road would be sealed for a distance of 60m from the intersection with Tarago Road to prevent tracking of sediment onto the public road and subsequent entrainment of that material as air-borne dust.

Finally, parking would continue to be provided for all staff and visitors in the vicinity of the office and weighbridge.

2.7.3 Site Entrance and Intersection

The intersection of the Quarry Access Road and Tarago Road is a rural type access located within a 100km/h speed zone. The Site Access Road is currently sealed to an existing cattle grid which is set back approximately 30m from the edge line of Tarago Road.

The Site Intersection is generally in accordance with the dimensions for a rural property access to cater for articulated vehicles. Constructive Solutions (2020) recommend widening of the shoulders on Tarago Road to cater for future growth in non-Project traffic levels (**Figure 2.7**)

Sight distances at the intersection of the Site Access Road and Tarago Road are approximately 350m and >400m to the north and southwest respectively. Advanced truck warning signs are present on Tarago Road on both approaches to the Site Access Road.

2.7.4 Transportation Routes

All vehicles accessing the Project Site would do so via Tarago Road. Tarago Road is sealed and consists of two 3.5m wide lanes delineated by a centre line and edge lines. A 3m wide sealed shoulder approximately 100m long is located adjacent to the northbound lane on approach to the Site Access Road, however this shoulder is not currently used by vehicles turning left into the Project Site due to the presence of an unextended pipe culvert which Crosses Tarago Road immediately southwest of the Site Access Road entrance.

Figure 2.8 presents the existing and proposed transportation routes. In summary, the Operator anticipates that the proposed transportation routes would be largely consistent with the existing routes, with approximately 85% of material transported from the Project Site towards Queanbeyan via the Kings Highway. The remaining 15% of material would be transported either to the east via the Kings Highway or north via Tarago Road. No material would be transported to the west via Bungendore Road.

The Kings Highway is a State Road, namely a road that is managed and funded by Transport for NSW. Tarago and Braidwood Roads are Regional Roads, namely roads that are managed by the Queanbeyan-Palerang Regional Council and co-funded by Council and the Roads and Maritime Service.

2.7.5 Vehicle Types and Movements

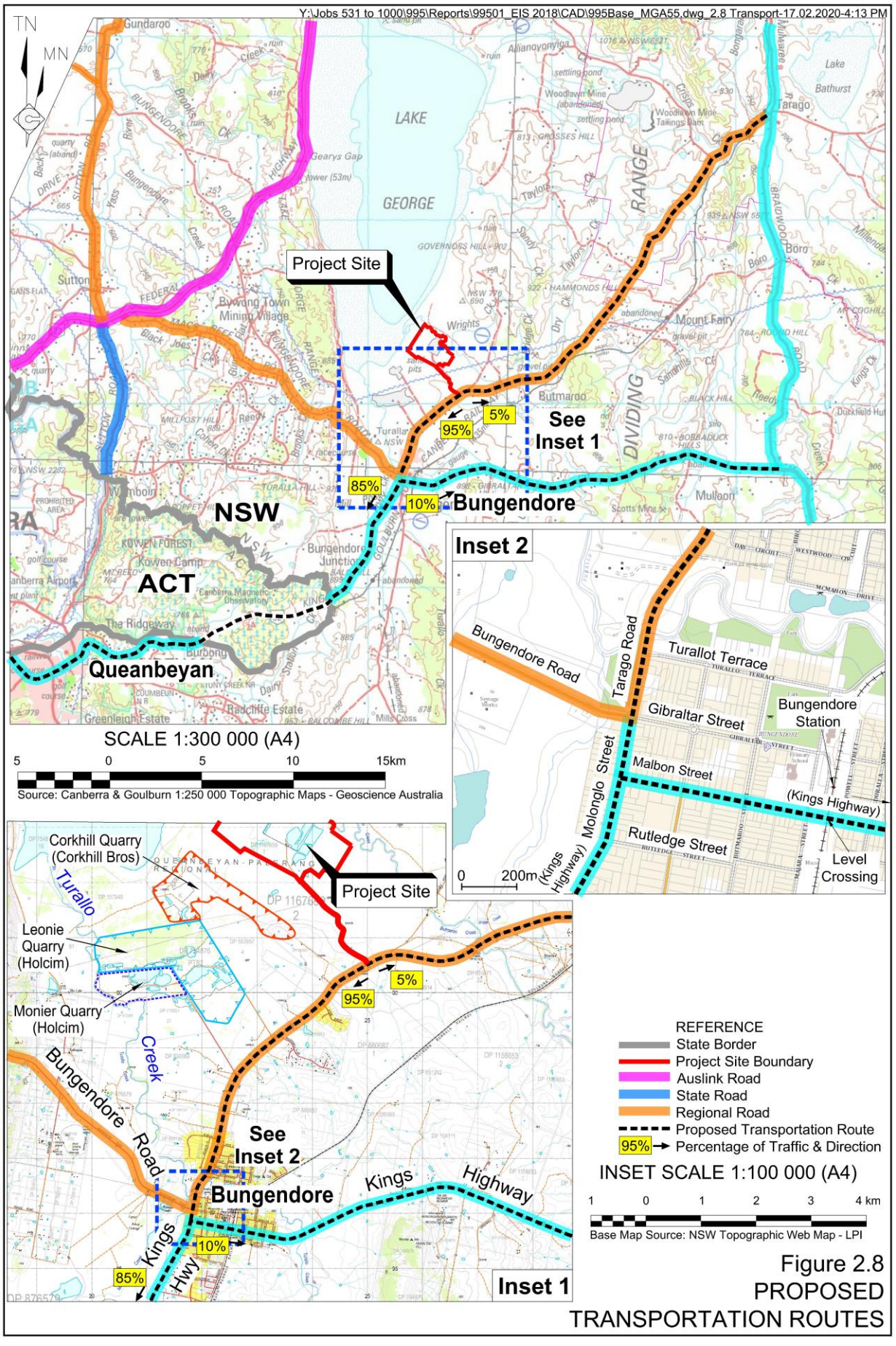
The Operator anticipates that a range of vehicles would be used to transport quarry products. However, the largest vehicles that would access the Project Site would be general mass limit vehicles. Notwithstanding this, the majority of vehicles currently accessing the Project Site are truck and 4-axle dog trailer (38t capacity) with smaller truck and dog and rigid trucks (12t to 33t capacity) also common. The Operator anticipates that this would continue throughout the life of the Proposal.

2.7.6 Rate of Transportation and Vehicle Movements

The Operator has operated the Quarry since 1982. Over that time the Operator has experienced substantial growth in the market for sand products within the Queanbeyan/ Palerang Local Government Area, ACT and surrounding areas, with the Quarry supplying a substantial proportion of the market for sand aggregates for pre-mixed concrete.

Figure 2.7
INDICATIVE INTERSECTION UPGRADE DESIGN

Source: Constructive Solutions Pty Ltd (2020)


Y:\Jobs 531 to 1000\995\Reports\99501_EIS 2018\CAD\995Base_MGA55.dwg 2.8 Transport-17.02.2020-4:13 PM
TN
MN
Project Site
See Inset 1
5%
95%
85%
10%
Bungendore
NSW
ACT
Queanbeyan
SCALE 1:300 000 (A4)
5 0 5 10 15km
Source: Canberra & Goulburn 1:250 000 Topographic Maps - Geoscience Australia
Inset 2
Bungendore Road
Tarago Road
Turallot Terrace
Gibraltar Street
Bungendore Station
Malbon Street
Molonglo Street
(Kings Highway)
Rutledge Street
Level Crossing
0 200m
Corkhill Quarry (Corkhill Bros)
Leonie Quarry (Holcim)
Monier Quarry (Holcim)
Turallo Creek
Project Site
See Inset 2
Bungendore Road
Kings Highway
Kings Hwy
Inset 1
REFERENCE
State Border
Project Site Boundary
Auslink Road
State Road
Regional Road
Proposed Transportation Route
95% Percentage of Traffic & Direction
INSET SCALE 1:100 000 (A4)
1 0 1 2 3 4 km
Base Map Source: NSW Topographic Web Map - LPI
Figure 2.8
PROPOSED
TRANSPORTATION ROUTES

The Operator proposes to transport up to 400,000tpa of sand products from the Project Site by road. This rate of transportation would, however, be limited to periods of high demand within the Queanbeyan/Palerang Local Government Area, ACT and surrounding areas.

The Operator anticipates the vehicle movements would occur over the life of the Proposal.

- An average of 30 to 35 laden movements per day.
- On occasion there would be a maximum of 70 laden movements per day.
- The maximum number of laden movements would be no more than 8 per hour.
- Employee light vehicle movements up to 20 movements or 10 return trips.

2.8 Amenities, Services and Facilities

2.8.1 Signage

The Operator would maintain the existing business identification sign at the Site Entrance stating:

- the name of the quarry and operator;
- contact details for the site supervisor and for lodging of complaints; and
- the approved hours of operations, including for heavy vehicles.

The sign would not be intended to act as "advertisement" as defined under the *Environmental Planning and Assessment Act 1979*.

2.8.2 Infrastructure and Amenities

The Operator would maintain the following existing infrastructure and amenities within the Project Site.

- Site Office and weighbridge.
- Workshop and storage shed.
- Lunchroom and amenity facilities, including a potable water supply and bathroom facilities serviced by pump out septic system certified by Council every 3 years.

Staff and visitor parking would be provided in the vicinity of the amenities.

2.8.3 Services

The Operator would maintain the following services within the Project Site.

- Communication: Mobile data and voice services and two-way radios would be used.
- Power: would continue to be supplied via the existing grid connection.

- Water: potable water would be transported to the Project Site and would be available within the lunchroom. Water for ablutions would be sourced from rain water collected and stored on site in tanks or from the Raw Water Dam.

2.8.4 Non-production Waste Management

The principal non-production waste that would be generated by the Proposal would include less than 50kg of general solid waste per week. The Operator would maintain an easily accessible rubbish bin, including an animal-proof lid, near the site office for all rubbish generated by employees/truck drivers and for any containers for consumables etc. A separate recycling bin would also be kept on site for the collection of recyclables. Collected waste would be delivered as required to an approved waste facility.

Any waste oil, oily rags and filters would be stored temporarily in a sealed container and removed from the site by a licensed waste oil contractor as required.

No waste would be accepted on site. The Operator is aware of requirements with respect to the notification, tracking, and disposal of waste.

2.9 Hours of Operation and Proposal Life

2.9.1 Hours of Operation

Table 2.2 presents the proposes hours of operation for the Proposal. The proposed operating hours reflect the existing operating hours for the Project Site.

Table 2.2
Proposed Hours of Operation

Activity	Monday to Friday	Saturday	Sunday
Site Establishment	6:00am – 5:00pm	6:00am – 2:00pm	-
Extraction	6:00am – 5:00pm	6:00am – 2:00pm	-
Processing	6:00am – 5:00pm	6:00am – 2:00pm	-
Loading and Transportation	6:00am – 5:00pm[1]	6:00am – 2:00pm	-
Rehabilitation	6:00am – 5:00pm	6:00am – 2:00pm	7:00am – 6:00pm[2]
Maintenance	6:00am – 5:00pm	6:00am – 2:00pm	7:00am – 6:00pm[2]
Note 1: The Operator would ensure that it consulted the operator of the school busses on Tarago Road between the Site Entrance and Bungendore during preparation of the Transportation Management Plan. Note 2: Low impact noise activities only.			
Source: Grantham Park Holdings Pty Limited			

2.9.2 Life of the Proposal

The Operator anticipates that the proposed activities would require approximately 20 years to complete. An additional two years would be required to complete rehabilitation operations.

The Operator notes that should further reserves of sand be identified a subsequent application may seek to further extend the Extraction Area or the life of the Proposal in accordance with the legislative requirements that may operate at that time.

2.10 Employment, Capital Cost and Economic Contribution

The Operator anticipates that between 10 and 12 people would be employed within the Project Site, with employment numbers determined by the extraction and production rates. It is anticipated that all operational personnel would reside in the Queanbeyan-Palerang Local Government Area.

In addition, the Operator notes that delivery of products from the Project Site would require a number of truck drivers who would access the Project Site on a regular or semi-regular basis. The Operator currently employs 6 personnel for this purpose, as well as contract drivers.

The Operator notes that all plant and equipment required for the Proposal is already in use for the existing quarrying operation. No additional plant or equipment would be required for the Proposal. However, as noted in Section 2.7.3, the intersection of the Quarry Access Road and Tarago Road would be upgraded to widen the shoulders on both sides of the road. An amount of $100,000 has been allocated for those works.

The Operator currently contributes approximately $7 million per year to the Queanbeyan-Palerang and ACT economy as follows.

- Wages (direct employees only)..... more than $900,000 per annum
- Consumables and contractors..... more than $5.9 million per annum

In addition, the Proposal would contribute to local, regional and State economies by providing competitively priced washed sand products for use in landscaping, concrete manufacture, and construction applications.

Finally, the Applicant and Operator would continue to support local community groups and organisations. Groups and organisations currently supported include the following.

- Bungendore Tigers Rugby League Club.
- Bungendore Rodeo.
- Jerrabomberra Rural Fire Brigade.
- Bungendore Rugby Football Club.
- Bungendore Public School

2.11 Site Decommissioning and Rehabilitation

2.11.1 Introduction

In the absence of future approvals to expand Quarry operations or extend the life of the Quarry, this subsection describes the site decommissioning and progressive rehabilitation activities that would be undertaken following completion of the identified extraction operations.

2.11.2 Quarry Development and Rehabilitation Plan

Following granting of development consent, and every 5 years thereafter, the Operator would prepare a *Quarry Development and Rehabilitation Plan*. The plan would describe:

- extraction and progressive rehabilitation operations completed during the preceding 5-year period;
- proposed extraction and progressive rehabilitation operations to be completed during the next 5-year period; and
- rehabilitation methods to be implemented, including an assessment of the success or otherwise of previous rehabilitation operations.

As rehabilitation of disturbed areas is expected to be undertaken progressively and rehabilitation progress would be tracked in successive *Quarry Development and Rehabilitation Plan* documents which would be provided to Council for approval, the Operator contends that no rehabilitation bond is required for the Quarry.

2.11.3 Rehabilitation Objectives

The following objectives have been adopted when developing the rehabilitation procedures for the Project Site.

- To produce a final landform that is safe, stable and non-polluting.
- To provide for a number of wetland habitats, including habitat elements such as islands and vegetation suitable for breeding habitat for birds and other threatened species.
- To provide for native grassland and open woodland habitat suitable for foraging by threatened and other species,
- To minimise disruption to existing drainage patterns, achieve a stable and functional drainage systems within the Project Site and prevent any detrimental impacts on water quantity and quality.
- To ensure that visual amenity from surrounding residences and vantage points is maintained.

2.11.4 Final Landform and Land Use

The proposed final landform would include the following (**Figure 2.9**). It is noted that the final landform presented in **Figure 2.9** is indicative only, with the proposed 5-yearly *Quarry Development and Rehabilitation Plan* to provide further clarity on the final landform as extraction operations progress.

- Areas of wetland, including habitat elements such as islands suitable for breeding habitat for birds and other threatened species. The landform design criteria for each wetland would include the following.
  - Internal slopes of 1:3 (V:H) above the water level and 1:5 (V:H) below the water level. Where internal slopes would be above the water levels, even if intermittently, they would be stabilised through the establishment of vegetation to ensure no excessive erosion or excessive risks to humans or animals.
  - Stabilised inflow and outflow channels to permit surface water flows to enter and exit the wetlands without eroding the constructed banks.
  - Suitable shallow water sections suitable for habitat for wading birds.
- Areas of grassland and open woodland habitat suitable for foraging habitat for threatened species. These areas would largely comprise backfilled fines settling cells, with a central area that would likely form a shallow depression with intermittent accumulation of water to ensure no external discharge of surface water.
- A reshaped Sand Classifying Plant area revegetated to a grassland or open woodland.

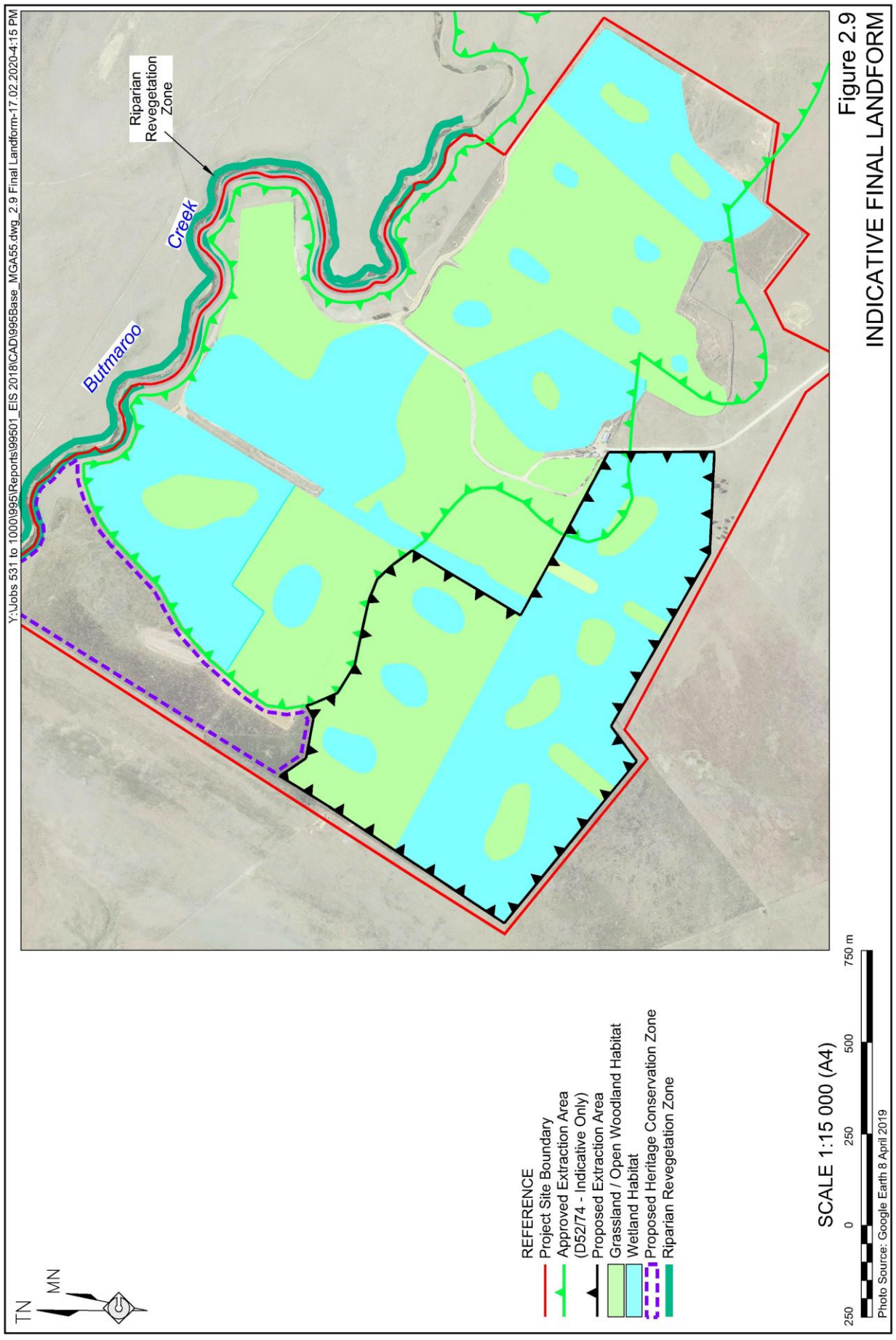
2.11.5 Final Land Use

The Applicant notes that in the absence of further development consent or the rezoning of land within the Project Site, the final land use must be permissible under Zone RU1 – Primary production under the Palerang LEP or the relevant planning instrument applicable at that time. As a result, the proposed final land use for the purpose of this document would be a mix of:

- agriculture, primarily grazing and/or cropping, in areas suitable for such operations; and
- nature conservation, including wetlands and grasslands, within areas of previous extraction operations.

2.11.6 Rehabilitation Methods and Procedures

The Operator would continue to implement rehabilitation of all extraction and fines settling cells as they are completed. The following describes the current and proposed rehabilitation methods and procedures that would continue to be implemented during progressive and final rehabilitation operations. **Plates 2.6** to **2.10** present views of progressive rehabilitation undertaken or in progress within the approved Extraction Area. Further information would be provided in the *Quarry Development and Rehabilitation Plan* to be prepared following the granting of development consent.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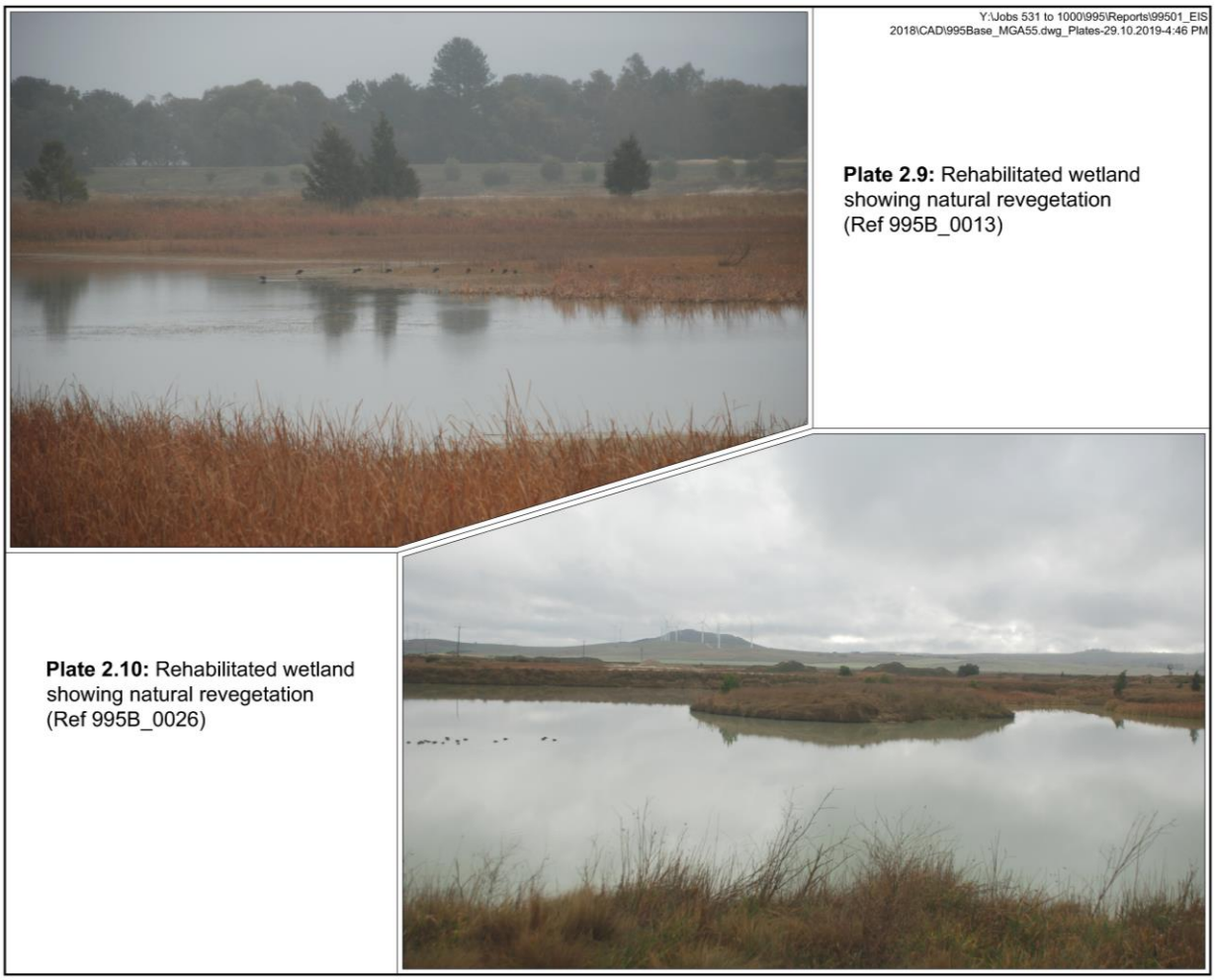
Riparian Revegetation Zone
Creek
Butmaroo
Figure 2.9
INDICATIVE FINAL LANDFORM
REFERENCE
Project Site Boundary
Approved Extraction Area (D52/74 - Indicative Only)
Proposed Extraction Area
Grassland / Open Woodland Habitat
Wetland Habitat
Proposed Heritage Conservation Zone
Riparian Revegetation Zone
SCALE 1:15 000 (A4)
250 0 250 500 750 m
Photo Source: Google Earth 8 April 2019
TN
MN

Infrastructure Decommissioning and Removal

Following completion of the Proposal and during final decommissioning, the Operator would implement the following.

- remove all fixed plant and mobile equipment, the weighbridge and all transportable buildings not required for the final land use. The workshop and storage shed would remain for use by landholder in managing the final landform and its surrounding agricultural operations.
- Remove any hardstand areas and roads not required for the final land use.



Final Landform Establishment

Following completion of extraction operations in each extraction cell intended for use as a wetland, the Operator would implement the following (**Plate 2.6**).

- Shape the floor and walls of the cell to ensure:
  - a generally flat floor;
  - internal slopes of 1:3 (V:H) above the water level and 1:5 (V:H) below the water level.
- Where adequate material exists, establish islands suitable for breeding habitat for threatened and other birds.
- Establish stabilised inflow and outflow channels suitable for the maximum likely flows likely to be experienced, taking into account the catchment of each wetland.

Following completion of fines placement operations in each fines settling cell, the Operator would divert fines-laden water from the cell and allow the fines to settle and dewater. If required, the Operator may "top up" the completed fines settling cell with additional fines to lift the surface of the final landform. Once fines placement has been completed it is unlikely that the surface of the fines settling cells would be suitable for operation of machinery or grazing by

large, hard hoofed animals such as cattle or sheep. As a result, if not already completed, the Operator would install a bund and fence around each fines settling cell to prevent inadvertent access by machinery or stock.

Finally, the Operator would reshape the Sand Classification Plant area to form a landform that would be consistent with the surrounding landforms.

Growth Medium Placement

Following progressive and final landform establishment, the Operator would remove topsoil and subsoil from the soil stockpiles or transfer such material directly from areas undergoing soil stripping operations. Areas to be covered would include all wetland areas that would be above the final water level as well as the reshaped Sand Classifying Plant area.

Completed fines settling cells would not be covered with topsoil as machinery would not be able to operate on the cells and the cells typically revegetate naturally without additional soil (**Plates 2.7** and **2.8**).

Ecosystem Establishment

Consistent with current rehabilitation practices, the proposed final land form, with the exception of the Sand Classifying Plant area, would be permitted to revegetate naturally (**Plates 2.7** to **2.10**).

Sand Classifying Plant area would be seeded with a mix of native pasture species and stock would be excluded until the vegetation has been suitable established to allow light grazing.

Rehabilitation Maintenance

Rehabilitation maintenance operations would be limited to eradicating noxious and other weeds within the Project Site. Targeted weed spraying would be undertaken as required.

2.12 Alternatives Considered

2.12.1 Introduction

The SEARs require a consideration of alternatives considered and rejected during preparation of the application for development consent. This subsection presents a range of alternatives considered by the Applicant and Operator before deciding upon the Proposal as proposed.

It is noted that the Applicant and Operator have operated a sand extraction operation within the Project Site since 1975. As a result, many of the alternatives that may otherwise have been considered, such as alternative processing or extraction methodologies, alternative production rates or final landforms, were not considered because the existing operation has been optimised over many years and the existing processes, equipment and/or infrastructure have dictated the nature of the Proposal.

2.12.2 Alternative Extraction Area

The Applicant and Operator considered extending the proposed Extraction Area to the northeast of the proposed Extraction Area and northwest of the approved Extraction Area (**Figures 2.1** and **2.2**). However, the Heritage Assessment identified that an area of Aboriginal heritage significance, namely the Woodduck PAD (see Section 4.8) existed in that area. As a result, and in consultation with the Aboriginal community, the Applicant and Operator determined that that area should be the subject of a Heritage Offset Area and protected. As a result, that area was excluded from the proposed Extraction Area.

2.12.3 Alternative Extraction Sequence Final Landform

The Applicant and Operator considered a different arrangement for the backfilled Fines Settling Cells and Wetlands. In particular, the Applicant and Operator considered extracting the sand resource in the reverse order, namely from Extraction Cell E10 to E2 (**Figure 2.2**). This would have resulted in the order of fines placement being reversed and the backfilled Fines Settling Cells being located within Extraction Cell E10 to E7, or on the outer perimeter of the Project Site. Given that the Fines Settling Cells are unlikely to be suitable for access by machinery or large stock, it was determined that locating these cells in the central section of the Project Site, surrounded on three sides by wetlands, would minimise safety and other risks associated with the final landform.

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