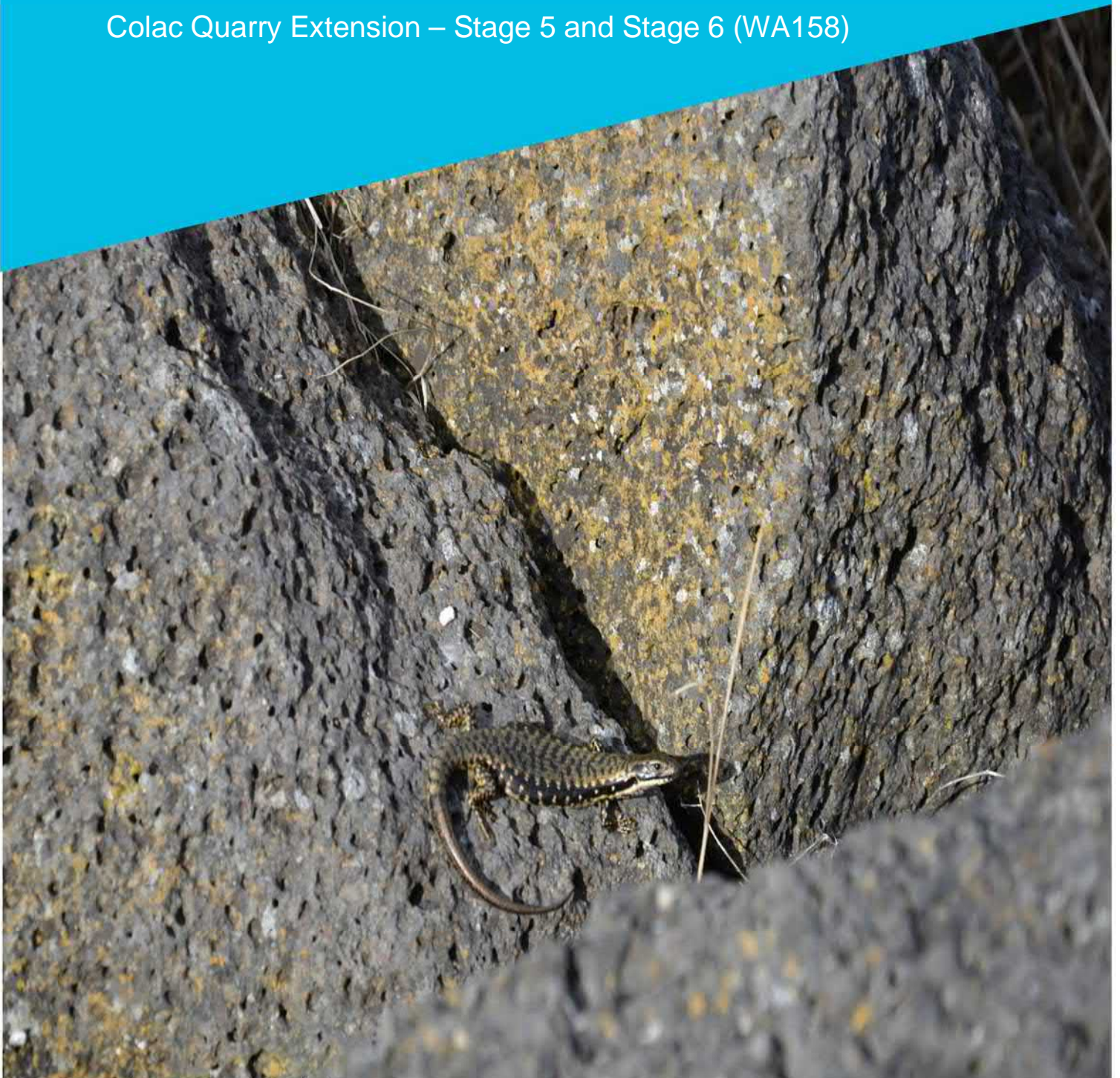


Attachment D

EPBC Act Offset Strategy and Management Plan

Corangamite Water Skink EPBC Act Offset Strategy & Management Plan

Colac Quarry Extension – Stage 5 and Stage 6 (WA158)



Corangamite Water Skink EPBC Act Offset Strategy & Management Plan

Colac Quarry Extension, WA158, 75-95 Potters Road, Ondit, Victoria

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Quality Information

Document Corangamite Water Skink EPBC Act Offset Strategy & Management Plan

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Reviewed by Chris White

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1.0 Introduction

Colac Quarry is located at 75 – 95 Potters Road, Ondit, approximately 1.5 kilometres north of Lake Colac, Victoria (**Figure 1 - Appendix A**). The site has been in operation as a basalt quarry since 1972. Currently Holcim (Australia) Pty Ltd (Holcim) are the site operator and owner and are extracting basalt rock from the approved extraction limit within Work Authority 158 (WA158). Holcim plan to expand its quarry operations under WA158 into two additional areas referred to as Stage 5 (including two sub areas- Stage 5a and Stage 5b) and Stage 6 (see **Figure 2 - Appendix A**). These areas are in an unquarried portion of the property east of the former quarry pit and will allow for a contiguous extraction area with the other approved extractions areas within the quarry.

Although unintended, the existence and operation of the quarry has substantially increased the extent of habitat available for the Lake Colac population of Corangamite Water Skink *Eulamprus tympanum marnieae*. This species is listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), endangered in the Action Plan for Australian Reptiles (Cogger et al.1993), threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act) and is critically endangered in Victoria (DSE 2013).

Extraction of rock and inundation of disused quarry pits created optimal conditions for the Corangamite Water Skink, allowing the population to expand from the margins of Lake Colac. Suitable areas of habitat are those with fractured and jumbled large rocks with some shrub cover adjacent to water bodies (Peterson and Robertson 2011). Corangamite Water Skinks were first observed within Colac Quarry in 2005 (Biosis 2018).

Although creation of additional pits in Stage 5 and Stage 6 will ultimately further increase the extent of habitat available for the population, expanding the quarry into Stage 5 and Stage 6 will reduce the area of occupancy of the population by up to 430 lineal metres based on areas supporting individuals during the 2019/20 season (Biosis, 2020) plus 50 lineal metres of sub-optimal habitat (not adjacent to water) previously occupied by Corangamite Water Skink (record from 2005).

A reduction in the area of occupancy of the population has the potential to significantly impact the Corangamite Water Skink population. As such, to compensate for (or offset) the loss of habitat, new habitat will be created within the Colac Quarry to achieve a 'no net loss' of habitat. Creation of habitat within Colac Quarry is the Offset Strategy proposed in Section 4.0. Measures to achieve this offset are outlined in the Offset Management Plan in Section 5.0.

The offset assessment guide provided in **Appendix B** indicates that more than 90% offset is achieved through the direct offset proposed.

2.0 Summary of impact to be offset

Direct losses of habitat that will occur as a result of the expansion of the existing quarry into Stage 5 and Stage 6 are shown in **Figure 2 – Appendix A** and comprise:

- Approximately 100 lineal metres of suitable habitat on the margin of a small dam in Stage 5.
- Approximately 50 lineal metres of suitable habitat on the northern wall of Basin 5 of the former northern quarry pits¹ Although the habitat is in an area with an existing approval to extract, the removal of the wall to gain access to the resources in Stage 6 will be undertaken as part of the Stage 6 works. Habitat on the northern wall of Basin 5 is therefore accounted for as part of the Stage 6 losses.

¹The northern pits are former quarried areas which have become inundated since quarrying ceased and now function as water storage for current operations. Some of the margins of the northern pits have residual rock jumbles left when quarrying ceased. These rock areas adjacent to water provide habitat for Corangamite Water Skink.

- Approximately 50 lineal metres of sub-optimal habitat at the top of the northern wall of Basin 5 where Corangamite Water Skink was historically recorded that will also be lost to gain access to the resources in Stage 6. This area is not adjacent to water and the species has not been observed in that location since the first monitoring season in 2005 (Biosis, 2017) but has been included in the calculation of habitat loss to account for the previous known occurrence of the species at that location.

Indirect impacts on habitat are anticipated to occur on the margin of the northern pits as a result of a predicted increase in the water level due to dewatering Basin 5 into the northern pits (required to access the resource in Stage 6) and ongoing dewatering of Stage 5 and Stage 6 into the northern pits during quarrying operations. Dewatering is conservatively estimated to result in a maximum predicted water level rise of just over 2 m from the historic reported maximum level of 115.8 mAHD in September 2016 to 118 mAHD within the former northern pits. Water levels will increase incrementally and gradually inundate important microhabitat (shoreline rocks).

The increments will be as follows:

- Initial increase of 0.1m following dewatering Basin 5 (single event).
- Increase of 0.4 m for Stage 6 ONLY once the groundwater table is intersected.
- Increase of 0.6 m for Stage 5 (Stage 5a and Stage 5b combined) ONLY once Stage 5 commences and the groundwater table is intersected.
- Addition of a buffer of 1 m has been applied to the increases detailed above. This provides a conservative estimate and accounts for uncertainty in the model.

The extent of habitat that may be inundated has not been quantified but an indication of the relative suitability of the margins of the basins for Corangamite Water Skink may be inferred from the location of records post-2016 (after the last water level rise) which are considered a proxy for current site conditions. It is assumed that the locations where the Corangamite Water Skink were recorded pre-2016 are no longer suitable given the historic rise in water levels in the northern pits.

In order to estimate the extent of habitat that may be indirectly lost through the predicted water level rise, the post-2016 records have been assigned a 25 m buffer along the shoreline either side of the record (Figure 2 – Appendix A). The 25m buffer was chosen to cover potential habitat in the vicinity of the record and to incorporate an extent that exceeds the home range of the species ('mostly <10m²') as reported in Peterson and Robertson (2011). The records plus buffer represent approximately 430 lineal metres (0.215 hectares equivalent) of the margin of the northern pits (excluding Basin 5 as this is accounted for in the direct habitat loss above).

3.0 Objectives

This document has been prepared to outline the offset package for the proposed Stage 5 and Stage 6 extension of Colac Quarry. It has two components:

- Offset Strategy which describes the offset site, outlines surveys undertaken and provides a justification of how the offset package meets the objectives of the EPBC Act Environmental Offset Policy.
- Offset Management Plan which outlines the outcomes to be achieved, how the offset will be secured, managed and monitored and responsibilities and timing for implementation of management and monitoring actions. It draws on the measures outlined in the Corangamite Water Skink Management Plan for Stage 5 and Stage 6 (AECOM, 2020) with a focus on the actions relevant to achieving offsets for the Corangamite Water Skink.

Creation of habitat is expected to be successful as an offset. Confidence of success is supported when considered that other habitat created within Colac Quarry has been successfully colonised by Corangamite Water Skink. This colonisation has been demonstrated by annual population monitoring.

4.0 Offset Strategy

This offset strategy has been prepared to provide:

- A description of the offset site including location, size, condition and environmental values.
- Details of the surveys undertaken in accordance with the survey guidelines used to confirm the presence of the protected matter at the offset site.
- Details of the quality of the offset site and habitat characteristics for the protected matter.
- Details of on-going threats to the protected matter at the offset site.
- A comparison of the environmental values as compared to the impact site.

4.1 Offset site description

Offsets are proposed to be achieved in the northern pits area of the Colac Quarry property and within the pits formed by extraction of Stage 5 and Stage 6.

The northern pits refer to Basins 1 – 4 and Basin 6 (**Figure 1 – Appendix A**). Basins 1- 4 were the original quarry extraction area approved under Extractive Industry Licences (EIL39, EIL 680) granted in 1972 and 1974 respectively, and subsequently consolidated under the quarry work authority WA158. Basin 6 was formed during extraction of an area approved in 1997 under EIL 1607. The northern pits flooded once extraction was completed and the basins now function as water storage for the quarry.

The offset will comprise:

- A minimum of 340 lineal metres of New habitat created on the margins of the northern pits in areas where Corangamite Water Skink have not been recorded previously and that are feasible for habitat creation work. This new habitat creation will cover 240 lineal metres for the direct and indirect loss of habitat associated with Stage 6 and 100 lineal metres for direct loss of habitat associated with Stage 5.
- A minimum of 420 lineal metres of additional habitat will be created during rehabilitation of the face of the new pit formed in Stage 6 prior to groundwater being reached in Stage 5 to offset the indirect loss of habitat associated with dewatering Stage 5.

The offset habitat will be designed and installed such that rocks extend beyond the expected maximum water level of 118mAHD, with a minimum contiguous extent of 25 lineal metres along the shoreline.

- An indication of areas for habitat creation to replace habitat to be lost in Stage 5 and Stage 6 is provided in **Figure 2 - Appendix A**. The figure also shows additional habitat to be created as part of implementing the *Corangamite Water Skink Management Plan for Stage 5 and Stage 6* (AECOM, 2021) composed of:
 - 150 lineal metres of new habitat adjacent to existing habitat to mitigate water level increase
 - 250 lineal metres of new habitat created during rehabilitation of the new faces of Stage 5 and Stage 6 which is not included as offset given it will be completed in the rehabilitation phase, and not prior to stage excavation and dewatering.

All habitat will be created in areas that will not be subject to future quarry disturbance.

Creation of habitat within the quarry environs offers the Corangamite Water Skink population an opportunity which many other populations do not have, and that is the availability of alternate refugia to Lake Colac. Availability of alternative habitat provides insurance against population decline.

4.2 Surveys undertaken

Monitoring of Corangamite Water Skink has been undertaken by Biosis Pty Ltd within the Colac Quarry property since 2005. Survey in 2005/06 was initially completed to provide a comprehensive understanding of the distribution of the species within, and adjacent to, Colac Quarry as part of an

impact assessment for the Southern Development Area (SDA) extension. A ten-year annual monitoring program commenced in 2008 and concluded in 2018 as part of the approval conditions for the SDA. An additional monitoring event was undertaken in 2019/20 to provide an update on the Corangamite Water Skink population within the quarry to inform the assessment of impacts for Stage 5 and Stage 6 and to maintain continuity of monitoring data in anticipation of monitoring continuing as part of the Stage 5 and Stage 6 conditions of approval.

Monitoring involves a visual search of habitat using binoculars. The method has been adopted in the *Survey guidelines for Australia's threatened reptiles* (DSEWPaC 2011) which state that 'Given...the likely sensitivity of the preferred sheltering sites to disturbance, it is recommended that likely suitable habitat (for example, rock piles) be searched by observation using binoculars to detect the presence of the species.' (p41).

The results of the population monitoring at Colac Quarry from 2005 to 2020 are shown in Table 1.

Table 1 Records of Corangamite Water Skink at Colac Quarry (from Biosis 2020)

Spring-summer survey season	Number of Corangamite Water Skink observed					
	Flooded former quarry	Created habitat (in Basin 6)	Southern Development Area	Retained / augmented habitat in SDA	Southern Farm Area	Total
2005/06*	22	Not created	7	Not created	7	36
2008/09	Not assessed	Not created	0	Not created	Not assessed	-
2009/10	17	0	0	0	Not assessed	17
2010/11	9	0	0	0	0	9
2011/12	17	0	0	0	0	17
2012/13	25	0	0	0	0	25
2013/14	21	0	0	0	0	21
2014/15	36	0	0	0	0	36
2015/16	22	1	0	0	0	23
2016/17	4	1	7	0	0	12
2017/18	3	1	2	0	0	6
2019/20**	8	4	0	0	1	13

*Survey in 2005/06 was undertaken as part of the impact assessment for the SDA extension. The ten-year monitoring program commenced in 2008/09.

**Monitoring was not completed in 2018/19 as the ten-year monitoring period had concluded (Biosis 2018). An additional monitoring event was undertaken in 2019/20 to inform the assessment of impacts and to maintain continuity of monitoring data in anticipation of ongoing monitoring continuing as part of the commitments for Stage 5 and Stage 6.

4.3 Quality of the offset site and habitat for Corangamite Water Skink

The northern pits of Colac Quarry provide optimal habitat opportunities for Corangamite Water Skink. Rocky environments adjacent to water in this area have supported the species through all monitoring periods since 2008. Deep rock jumbles with multiple crevices that abut the water's edge are the best microhabitat for Corangamite Water Skinks (Peterson and Robertson, 2011; Biosis, 2017).

Areas for new habitat creation are described in Section 4.1 and in Section 5.2 and are shown in **Figure 2 – Appendix A**. The locations have been selected to avoid areas where Corangamite Water

Skink have been recorded previously and areas of steep terrain which are not feasible for habitat creation works. All habitat will be created in areas that will not be subject to future quarry disturbance.

As is often (though not always) the case with offset principles, achieving offsets as close as physically possible to the site of the proposed losses is good ecological practice. This is particularly true for the Corangamite Water Skink which is otherwise quite restricted in its habitation extent, defining the quarry as a refugia of sorts. The creation of compensatory habitat on site will continue to ensure that the site provides a suitable refugia for the species.

The effectiveness of habitat creation can be inferred from the long-term population monitoring results that created habitat can be successful in supporting Corangamite Water Skink. The capacity of created habitat within Colac Quarry to support Corangamite Water Skink and succeed as an offset is demonstrated by:

- The establishment and ongoing presence of a population of Corangamite Water Skink in habitat that was artificially created by the quarry on the margins of the former northern pits (Basins 1-6). It is unknown how long it took Corangamite Water Skink to colonise the quarry originally as survey did not occur until 2005 which was 33 years after the quarry began operating in 1972. The quarry has created an extensive area of habitat that was not previously available to the population of Corangamite Water Skink on the margins of Lake Colac. Extraction of the northern pits formed an optimal combination of habitat features when rock jumbles were left in situ and the pits subsequently inundated. More recent extraction of other areas of the quarry (pre-2008 and the SDA) has continued to create potential habitat opportunities and areas which are now holding water have been colonised by Corangamite Water Skink (Figure 3 – Attachment A).
- Observations of Corangamite Water Skink in habitat created specifically for the species in Basin 6 in 2008. Corangamite Water Skink were first recorded in February 2016 (2015/16 monitoring season) and have been recorded there each year of monitoring since (see Table 1) (Biosis, 2018; 2020). In 2019/20, 30% of the known population within the quarry occurred in the created habitat in Basin 6.
- More recent records of Corangamite Water Skink in the pre-2008 quarry area to the south of new Stage 5. This habitat was not specifically created for the Corangamite Water Skink but quarrying activity in that area has formed habitat for the species. Quarrying was completed in the area before, or soon after, 2008 and Corangamite Water Skink were first recorded in the 2016/17 monitoring season (Biosis, 2018).
- The use of drystone walls historically constructed on the farm properties adjacent to Lake Colac (Biosis, 2017).

These examples of Corangamite Water Skink occupying habitat created in and around the quarry indicates that the species can and do adapt to changing environments and would be capable of recovering from habitat loss provide supplementary habitat is created. Habitat creation within the quarry to offset the loss of habitat is therefore considered likely to succeed in offsetting the residual impacts of the proposed action.

4.4 On-going threats to Corangamite Water Skink at the offset site

Threats to Corangamite Water Skink identified in the national recovery plan (Peterson and Robertson 2011) relate loss and fragmentation of habitat and processes that degrade habitat which include weed invasion, use of chemicals, predation by introduced animals (foxes, cats) and grazing.

Loss and fragmentation are not considered threats to the offset as all habitat will be created in areas that will not be subject to future quarry disturbance.

Processes that could degrade the created habitat include:

- Weed invasion of created habitat which could decrease the amount of suitable basking sites through excessive shading and reduce the capacity for planted native species to establish. Although high shrub cover is recognised as one of the features of microhabitat selectively occupied by Corangamite Water Skink (Peterson and Robertson 2011), the preference is for that cover to be provided by native Tree Violets *Melicytus dentatus* s.s., Black Wattle *Acacia mearnsii* / Blackwood *A. melanoxylon* and Sweet Bursaria *Bursaria spinosa*.

- Grazing of created habitat by European Rabbit *Oryctolagus cuniculus* and European Hare *Lepus europaeus* leading to greater exposure and therefore a reduction in suitability of the habitat.
- Water level change in the northern pits could inundate habitat. Created habitat has been designed to account for the predicted water level rise associated with the proposed action.

Processes which could impact on Corangamite Water Skink occupying the created habitat include:

- Predation by Red Fox *Vulpes vulpes* and cats *Felis catus*. The proposed action is not likely to provide additional harbour for foxes or cats and are therefore not likely to exacerbate the risk of predation.
- Pathogens and diseases, although not a threat identified by the *National Recovery Plan for the Corangamite Water Skink* (Peterson and Robertson 2011). The introduction and spread of pathogens will be avoided. This is because there will be no introduction of earth or rock from outside the property, water is kept onsite in the water storage area and water from the water storage is used for dust suppression so no water from external sources is used on the site. The mechanisms by which pathogens or disease could be introduced to the site are therefore avoided.

Measures to monitor, manage and/or reduce these risks to Corangamite Water Skink in the habitat to be created are outlined in the Offset Management Plan (Section 5.0).

4.5 Environmental values compared to the impact site

The northern pits are a more extensive and permanent water body than the dam in Stage 5. Created habitat offers the opportunity to establish more complex rock jumbles than those that were left behind incidentally at the completion of quarrying activity on Basin 5 (Stage 6). As such, the created habitat may be of greater value in the longer-term in providing optimal habitat conditions (rock jumbles adjacent to water) for Corangamite Water Skink than the habitat currently provided by the impact site (Stage 5 and Stage 6).

Existing habitat that will be lost



Plate 1- Habitat occupied by Corangamite Water Skink in Stage 5 expansion area (dam)



Plate 2- Stage 6: view of Corangamite Water Skink habitat on southern edge (northern wall of Basin 5)

Offset habitat



Plate 3- Habitat creation on Basin 1, view north from eastern bank (foreground) to the northern bank (background)



Plate 4- Habitat creation area on east side of Basin 6 to the north of area of habitat created along the southern margin in 2008 (viewed from the western side of Basin 6)

4.6 Alignment with the EPBC Act Environmental Offsets Policy

The proposed offsets (habitat creation) align with the EPBC Act Environmental Offsets Policy as they:

- Maintain the viability of the Corangamite Water Skink through provision of habitat within an environment which may become an important refuge for the population if Lake Colac recedes or dries out permanently. Habitat within Colac Quarry may therefore assist in mitigating for impact of the prolonged drying of wetlands predicted to occur with climate change. This is recognised as a significant threat to Corangamite Water Skink in the national recovery plan (Peterson and Robertson 2011).
- Achieve direct and tangible offsets through the physical creation of habitat.
- Are proportionate to the residual impacts as they achieve a net gain of habitat (Table 2).
- Have a high likelihood of being effective based on past experience at the site.
- Are governed by the Corangamite Water Skink Management Plan (Attachment C) which provide transparent actions which need to be achieved. The Corangamite Water Skink Management Plan has formed part of the work plan variation and compliance with the commitments will be required as part of Approval under the *MRSD Act 1990*.

Table 2 Residual impact of habitat loss versus compensation (offset)

	Extent
Total residual habitat loss	480 lineal metres (0.24 hectares equivalent)
Habitat creation to compensate:	760 lineal metres (0.38 hectares equivalent)
Balance	+280 lineal metres (0.14 hectares equivalent)

5.0 Offset Management Plan

5.1 Objective

To construct new Corangamite Water Skink habitat along the edges of existing former quarry extraction areas to compensate for the loss of habitat associated with the proposed action to extract resources from Stage 5 and Stage 6.

5.2 Habitat creation

Habitat creation is important as existing habitat within the quarry is likely (or is known) to be currently occupied by Corangamite Water Skink. The species is territorial (Peterson and Robertson, 2011) and therefore animals to be salvaged from Stage 5 and Stage 6 and released into an existing population are unlikely to survive antagonistic encounters with current occupants. Corangamite Water Skinks are known to colonise artificial habitat as evidenced by the natural colonisation of habitat inadvertently created around the edges of the former quarry and habitat created as part of implementing the SDA extension (Biosis Research 2010; AECOM 2020).

Optimal areas of habitat are those with fractured and jumbled large rocks with some shrub cover adjacent to water bodies (Peterson and Robertson 2011). These areas are of particular value as the exposed rocks provide basking sites and the crevices provide protection from predators and humid conditions which provide protection from desiccation (Biosis Research 2006). The species occupies small home ranges thought to be <10m² (Peterson and Robertson 2011). Consideration of this home range size has informed the specifications for the created habitat.

5.2.1 Location

Suitable areas for habitat creation on the margins of the northern pits are shown in Figure 2 – Appendix A and have been selected based on:

- areas where suitable rocky habitat does not already exist on the margin,
- habitat that will not be impacted by future quarry operational requirements, and
- habitat where the former quarry pit is inundated.

5.2.2 Extent

Creation of new habitat will comprise:

- A minimum of 340 lineal metres of new habitat installed such that rocks extend beyond the expected final water level, with a minimum contiguous extent of 25 lineal metres along the shoreline. An indication of areas for habitat creation to replace habitat to be lost in Stage 5 (100 lineal metres) and Stage 6 (240 lineal metres) is provided in **Figure 2 - Appendix A** and comprises areas on the:
 - Eastern margin of Basin 6
 - Southern margin of Basin 4
 - Eastern margin of Basin 4
 - Bund between Basin 1 and Basin 3.
 - A minimum of 420 lineal metres of additional habitat during rehabilitation of the faces of the new pit formed in Stage 6.

5.2.3 Timing

New habitat creation (offsets) will be implemented prior to the impact arising from the extension. Timing for achieving offsets is based on the timing of impacts. As the impacts are staged, the creation of habitat (offset) will also be staged. Offsets (habitat creation) will occur at least 9 months prior to the impact occurring (and incorporate one full spring-summer season prior to Stage 5 and Stage 6 extraction commencement). This timeframe will allow for vegetation to establish and appropriate invertebrate prey to colonise the habitat and will allow a survey for Corangamite Water Skink to occur

during the spring-summer survey period prior to quarrying in the Stage 5 and Stage 6 extension commencing.

Table 3 Residual habitat loss and offsets for Stage 5 and Stage 6

Residual impact	Loss extent	Offset extent	Timing
Direct habitat loss			
Stage 6 (first stage)	50 lineal metres plus 50 lineal metres (sub-optimal)	100 lineal metres	9 months prior to commencement of Stage 6
Stage 5 (after Stage 6)	100 lineal metres	100 lineal metres	9 months prior to commencement of Stage 5
Indirect habitat loss*			
Stage 6 and Stage 5	280 lineal metres	140 lineal metres	Prior to commencement of Stage 6.
		420 lineal metres	Rehabilitation of Stage 6 prior to groundwater being reached in Stage 5.
Total			
Both stages	480 lineal metres	760 lineal metres	

*Inundation leading to indirect habitat loss will be gradual and will occur incrementally over the course of the work: initial increase of 0.1m with dewatering Basin 5 and increases of 0.4 m for Stage 6 (total of 0.5 m contribution by Stage 6) followed by an increase of 0.6 m for Stage 5 (Stage 5a and Stage 5b combined), ONLY once the groundwater table is intersected in each stage. As such, half of the additional offset required for indirect loss will be completed prior to commencement of Stage 6 and the other half will be completed as part of the rehabilitation of Stage 6 that will occur prior to the extraction of Stage 5 being deep enough to intersect the water table and dewatering commencing (i.e. before the addition of water from Stage 5 to the northern pits).

5.2.4 Design

Created habitat design will follow the description in Biosis Research (2007) and schematic in Figure 3 below which includes:

- Use rock overburden from quarry operation (mix of some soil and mostly rock)
- Create piles that are:
 - Minimum 25 lineal metre sections along the water edge spaced intermittently.
 - Minimum width of 5 metres:
 - Extending approximately 1.5 metres into the water.
 - Extending approximately 3.5 metres out of the water (Basin 4, Basin 6, Stage 6 rehabilitation) or approximately 1 metre above the 118mAHD water level on the bund between Basin 1 and Basin 3.
 - Average of 1 metre height of rock pile above ground surface level.
 - Comprised of a variety of rock sizes to create a high proportion of rock crevices as refugia for the skinks
- Revegetate water body margins adjacent to the created outcrop with appropriate semi-aquatic plants including:
 - Marsh Club-rush *Bolboschoenus medianus*
 - Common Reed *Phragmites australis*

- Sharp Club-sedge *Schoenoplectus pungens*
- Water Ribbon *Triglochin procerum*
- Southern Water-ribbons *Cycnogeton alcockiae*
- Revegetate inland margins of created habitat with appropriate shrub species at:
 - a rate of 400 plants per hectare and
 - a ratio of 3 Tree Violets *Melicytus dentatus* s.s. to 0.5 Black Wattle *Acacia mearnsii* and Blackwood *A. melanoxylon* to 0.5 Sweet Bursaria *Bursaria spinosa*.

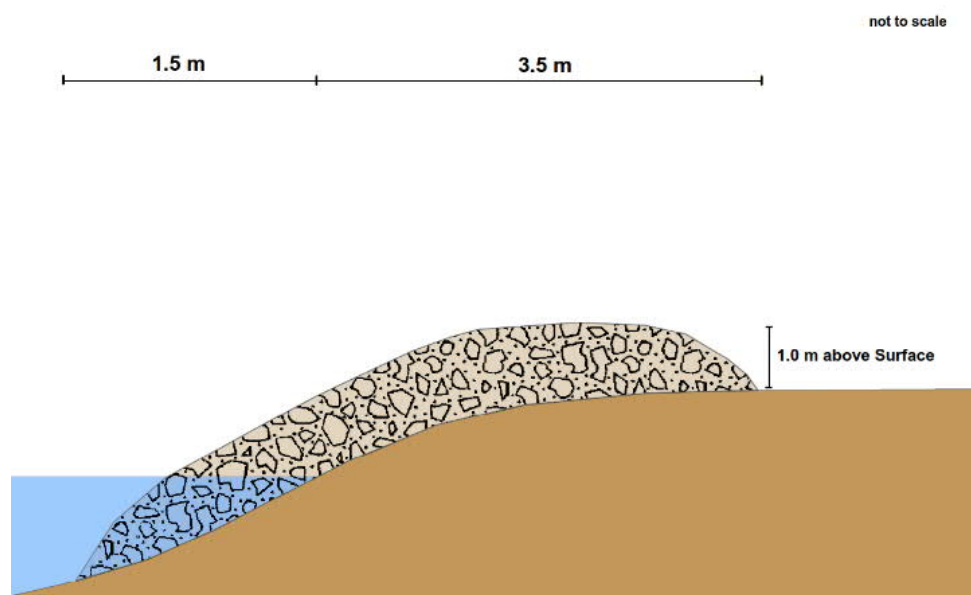


Figure 3 Conceptual drawing of habitat creation

- Allow for the maximum predicted water levels of the former quarry pit environment following bunding and dewatering of Basin 5 and dewatering Stage 5 and 6 during operation.

5.3 Management and monitoring

5.3.1 Corangamite Water Skink population

The Corangamite Water Skink population at Colac Quarry will continue to be monitored annually until 10 years post habitat creation (offset) is achieved.

Monitoring will be undertaken through a visual search of habitat using binoculars. This method is consistent with the monitoring undertaken at Colac Quarry since 2005 (Biosis 2018) and will allow for comparison of monitoring results over time. The method has been adopted in the *Survey guidelines for Australia's threatened reptiles* (DSEWPac 2011) which state that 'Given...the likely sensitivity of the preferred sheltering sites to disturbance, it is recommended that likely suitable habitat (for example, rock piles) be searched by observation using binoculars to detect the presence of the species.' (p41).

Monitoring will include conducting surveys each year in the following areas:

- A reference site, supporting a known population of the Corangamite Water Skink at Meredith Park on the northern shore of Lake Colac (surveyed on each day of survey to ascertain that Corangamite Water Skinks were active on the day).
- Margins of the former (flooded) quarry including the basin area that supplies water to the quarry processing facility on the western side of the study area.
- Created habitat on the southern shore of the former quarry.
- Habitat created as part of implementing this Offset Management Plan and the Corangamite Water Skink Management Plan – Stage 5 and Stage 6 (Attachment B).

It is anticipated that Corangamite Water Skink will be observed in created habitat within 7-8 years of establishment based on monitoring of previously created habitat within the quarry (Table 1). As such failure to detect the species prior to this will not be considered to indicate that management actions are not effective.

5.3.2 Water levels

Water levels in the northern pits will be monitored to ensure they do not exceed the predicted maximum of 118 mAHD. The following measures will be implemented:

- Monthly monitoring of water levels based on the water level gauge in the northern pits during Stage 5 and Stage 6 operations.
- Setting of a trigger level of 117 mAHD for the Quarry Operator to initiate an evaluation of the rate of groundwater dewatering and remaining pit life of Stage 5 and Stage 6.
- Review of water management measures if the evaluation predicts that water levels may exceed the predicted maximum of 118 mAHD.
- Implementation of alternative water management measures approved under existing operations if water levels in the northern pits may exceed 118mAHD. These measures include:
 - Temporarily cease dewatering in the Stage 5 and/or Stage 6 pits if increase in water levels is related to high rainfall events.
 - Irrigation of land within the quarry.
 - Placement of water into other areas of the quarry where extraction has been completed, such as the SDA, to maximise habitat opportunities for Corangamite Water Skink. Placement of additional water into the SDA must be consistent with the objectives in the approved End Use Plan (Biosis, 2017) and rehabilitation stage reached in the SDA.

5.3.3 Weeds, pest animals and pathogens

Measures to manage weeds and pest animals will be implemented to:

- Prevent the introduction of weeds and pathogens.
- Manage the spread of weeds or pathogens within Colac Quarry.

Introduction of weeds or pathogens

The mechanisms by which weeds and pathogens could be introduced to the site are avoided through existing management measures which include:

- no introduction of earth or rock from outside the property
- machinery already operating within the quarry undertaking the works
- water kept onsite in the water storage area
- water from the water storage used for dust suppression so no water from external sources is used on the site.

Spread of weeds or pathogens

The spread of any weeds, pests or disease within the site will be managed through the controls identified in the Flora and Fauna Existing Conditions and Impact Assessment report (AECOM 2020a). Those controls are also captured within the risk management plan submitted as part of the Work Plan Variation, November 2020 which will form part of the compliance requirements for the extension. The following controls, as extracted from the risk management plan submitted as part of the Work Plan Variation, will be implemented:

- Eradicate or manage declared noxious weeds or established pest animals present on quarry activity areas.
- Limit vegetation clearing and surface disturbance activities to the minimum required operationally.

- Control shrub weeds annually (during late spring) with the aim of eliminating shrub weeds and any regrowth.
- Engage appropriately licensed personnel to:
 - Control CaLP Act listed shrub weeds to minimise shading of basking sites and allow native plants to establish and persist. Use spot spraying of pesticides to reduce detrimental impacts to Corangamite Water Skink. Use hand pulling or grubbing with hand tools where herbicide application will adversely impact on Corangamite Water Skink or their habitat.
 - Control rabbits and hares to reduce damage to created habitat (e.g. grazing of plantings and/or warrens occupying microhabitat for Corangamite Water Skink). Mechanical destruction of warrens should not be undertaken in areas of known Corangamite Water Skink habitat.
- Control introduced predators such as foxes and cats.
- Stockpile and manage soils from areas with noxious weed infestations separately to other soils to avoid cross contamination.
- Mitigate vermin management by removing waste, rubbish, etc. using a licensed contractor.
- Inspect all areas annually to assess the health of the vegetation and to check for weed infestation and damage from pest animals or diseases.
- Annually prepare internal report for site management to identify if operational areas have emerging weed or pest animal issues that require management intervention.
- Report observations of weed infestations or pests to the Environment Manager if rehabilitation areas have emerging issues that require management intervention as part of greater site management.

5.4 Protection

Offset areas will be protected while the quarry is in operation through clear demarcation using measures such as star picket and wire fence or earth bund between quarry areas and created habitat.

Habitat created for Stage 5 and Stage 6 will be protected in perpetuity through a Section 173 (s173) agreement on title under the *Planning and Environment Act 1987*.

The s173 agreement will be in place in 2021 as part of the required Colac Otway Shire Council planning approvals.

5.5 Responsibilities

The Quarry Operator will be responsible for implementing the measures outlined in this Corangamite Water Skink EPBC Act Offset Management Plan and the Corangamite Water Skink Management Plan for Stage 5 and Stage 6 (AECOM 2021).

5.6 Review

Review of management will be undertaken as part of ongoing population monitoring by a qualified specialist and as part of the quarry environmental review process for weed and pest management and water management.

Corangamite Water Skink population and habitat monitoring report will be produced on an annual basis. This report will summarise the findings of monitoring, list management actions undertaken, summarise any incidents logged (should any occur) and make recommendations for future monitoring and management activities.

Annual reports will be submitted to DELWP to ensure objectives of the offsets strategy and management plan are being met and provide oversight and guidance on any potential management revisions.

5.7 Implementation

Table 4 Summary of actions, timing, responsibility, performance targets and reporting requirements

Action	No.	Action description	Timeframe	Timing	Duration	Responsibility	Performance target	Means of monitoring performance	Follow up action if target not met
Habitat creation	1	Create new habitat in the northern pits to offset direct and indirect habitat loss for Stage 6	Pre-commencement	At least 9 months prior to commencement of Stage 6 incorporating a full spring-summer season.	Once	Quarry Operator	240 lineal metres created	Habitat monitoring and reporting (Action 6 and Action 13)	Create additional habitat to achieve 240 lineal metres
	2	Create new habitat in the northern pits to offset direct habitat loss for Stage 5	Pre-commencement	At least 9 months prior to commencement of Stage 5 incorporating a full spring-summer season	Once	Quarry Operator	100 lineal metres created	Habitat monitoring and reporting (Action 6 and Action 13)	Create additional habitat to achieve 100 lineal metres.
	3	Create habitat on the terminal face of Stage 6 to offset indirect habitat loss for Stage 5	Rehabilitation	Completed as part of rehabilitation on completion of extraction prior to groundwater being reached in Stage 5.	Once	Quarry Operator	420 lineal metres created	Habitat monitoring and reporting (Action 6 and Action 13)	Create additional habitat to achieve 420 lineal metres.
	1-3						Population number remains within 50% of the count in the previous year.	Population monitoring and reporting (Action 5 and Action 14)	As per Action 11.
	4	Protect all areas of created CWS habitat	Pre-commencement	Prior to quarrying	Once	Quarry Operator	Habitat protected from quarrying activities through clear demarcation.	Habitat monitoring and reporting (Action 6 and Action 13)	Review habitat protection measures if habitat is not protected from quarry activities. Implement additional or different measures if required.
Monitoring	5	Monitor the Corangamite Water Skink population in Colac Quarry	Operation	Annually in Spring/Summer	Ongoing from 2020 until ten years after habitat creation (offset) completed.	Suitably qualified ecological consultant on behalf of Quarry Operator	Population number remains within 50% of the count in the previous year.	Population monitoring and reporting (Action 5 and Action 14)	Review numbers in the context of the overall Lake Colac population and prevailing climatic conditions that year if numbers drop below historic range. Conduct additional monitoring to confirm if individuals overlooked during the survey. Review quarry operations, habitat protection and management measures in consultation with DELWP if contextual review suggests a reduction in population is restricted to the quarry environment and is not attributed to a change in climate.

Action	No.	Action description	Timeframe	Timing	Duration	Responsibility	Performance target	Means of monitoring performance	Follow up action if target not met
	6	Monitor condition of the created habitat	Operation	At time of population monitoring (Action 5)	Ten years after habitat creation (offset) completed.	Suitably qualified ecological consultant on behalf of Quarry Operator	Condition and integrity of habitat is maintained. At least 10% cover native shrubs	Habitat monitoring and reporting (Action 6 and Action 13)	Supplementary planting Weed control (Action 7 and Action 10) Pest control (grazing pressure)
	7	Monitor water levels in the northern pits	Operation	Monthly	Until dewatering of Stage 5 and Stage 6 ceases	Quarry Operator	Water level in the northern pits does not exceed 118mAHD. To meet this target, an interim target of 117 mAHD has been set.	Water level gauging as part of quarry operation	If water levels exceed 117 mAHD, initiate an evaluation of rate of groundwater dewatering and remaining Stage 5/6 pit life. Review of water management measures if evaluation predicts water levels may exceed 118 mAHD. Liaise with DELWP if water levels exceed 117m AHD and during review of water management measures. Implement alternative water management measures if water levels in the northern pits may exceed 118mAHD (refer to Section 5.3.2).
	8	Monitor weeds in created habitat	Operation and into rehabilitation phase	Annually	Ten years from Stage 5 / Stage 6 extraction commencement	Suitably qualified ecological consultant on behalf of Quarry Operator	<10% cover woody weeds < 20 % cover CALP Act listed weeds No new CaLP Act listed weeds	Habitat monitoring and reporting (Action 6 and Action 13)	Control weeds (Action 10)
	9	Monitor pest animals within quarry	Operation and into rehabilitation phase	Annually	Ten years from Stage 5 / Stage 6 extraction commencement	Quarry Operator	No discernible increase in pest animal numbers No additional pest animals established on the site.	Habitat monitoring and reporting (Action 6 and Action 13)	Control pest animals (Action 11)
Management	10	Inspect and maintain measures protecting retained and created habitat	Operation	Bi-annually	Ten years from Stage 5 / Stage 6 extraction commencement	Quarry Operator	Habitat protection measures as established in Action 4 remain in place.	Habitat monitoring and reporting (Action 6 and Action 13)	Reinstate protective measures if damaged.
							No incidents of accidental entry by personnel or equipment	Incident log (Action 15)	Review protective measures in the event of an incident.
	11	Control weeds in created habitat	Operation	Quarterly	Ten years from Stage 5 / Stage 6 extraction commencement	Quarry Operator	<10% cover woody weeds < 20 % cover CALP Act listed weeds	Habitat monitoring and reporting (Action 8 and Action 13)	Review weed control measures.

Action	No.	Action description	Timeframe	Timing	Duration	Responsibility	Performance target	Means of monitoring performance	Follow up action if target not met
							No new CaLP Act listed weeds established (a species will be considered established if it has greater than 1% cover).	Habitat monitoring and reporting (Action 8 and Action 13)	Review quarry activities to determine source of infestation.
							Maintain a log of weed control events and methods undertaken.	Management log (Action 15)	Implement log and documentation requirements if log not maintained.
	12	Control pest animals within quarry	Operation	Annually - March/April	Ten years from Stage 5 / Stage 6 extraction commencement	Quarry Operator	Pest animal control completed if monitoring identifies it is required.	Habitat monitoring and reporting (Action 9 and Action 13)	Review pest animal control measures.
							Maintain a log of pest animal control events and numbers of pest animals managed	Management log (Action 15)	Implement log and documentation requirements if log not maintained
Reporting	13	Corangamite Water Skink population and habitat monitoring	Operation	Annually	Ongoing from 2020 until ten years post completion of habitat creation (offset)	Suitably qualified ecological consultant on behalf of Quarry Operator	Report produced annually and provided to DELWP within one month of final report issue	Complete report and provide to DELWP within one month of identification of absence of report.	
							Submit records of Corangamite Water Skink to the Victorian Biodiversity Atlas.	Submit records to the Victorian Biodiversity Atlas within one month of identification of records not lodged.	
	14	Population monitoring program	Operation	After 10-years (2031) and at conclusion of monitoring program	Periodic	Suitably qualified ecological consultant on behalf of Quarry Operator	Report produced at 10 years and at completion of monitoring program. Provided to DELWP within one month of final report issue.	Complete report and provide to DELWP within one month of identification of absence of report.	
							Habitat creation commitments have been met and population has persisted at the site. / remained within 50% of the known population.	Liaise with DELWP regarding the need for contingency measures.	
15	Maintain a log of all incidents and management activities	Operation	Annually.	Until cessation of population monitoring.	Quarry Operator	Log of incidents to be maintained and to be available for inclusion in above reporting requirements.	Implement log and documentation requirements if log not maintained		

6.0 References

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- Biosis 2017. Holcim Quarry Colac: Biodiversity management for site and end use plan. Report for Holcim (Australia) Pty Ltd – Colac Quarry. Author: Garvey, N. Biosis Pty Ltd, Melbourne.
- Biosis 2018. Holcim (Australia) Quarry, Colac: Review of ten years of monitoring Corangamite Water Skinks. Report for Holcim Australia Pty Ltd (Colac Quarry). Author: Smales, I. Biosis Pty Ltd, Melbourne. Project no. 27292.
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- DSE 2013. Advisory List of Threatened Vertebrate Fauna in Victoria – 2013. Victorian Government Department of Environment and Primary Industries, Melbourne.
- DSE 2003. *Flora and Fauna Guarantee Act 1988* Action Statement No. 142. Corangamite Water Skink *Eulamprus tympanum marnieae*. Prepared by Peter Robertson, P. (Wildlife Profiles P/L), Melbourne. Garry Peterson (La Trobe University) and Kim Lowe (Biodiversity & Natural Resources Division, Department of Sustainability and Environment). Victorian Government Department of Sustainability and Environment East Melbourne.
- Peterson, G. and Robertson, P. 2011. National Recovery Plan for the Corangamite Water Skink *Eulamprus tympanum marnieae*. Victorian Government Department of Sustainability and Environment, Melbourne.

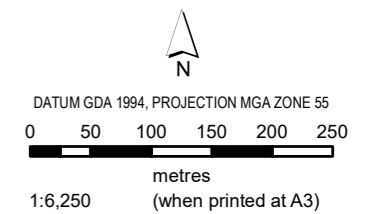
Appendix A

Figures

Appendix A Figures

Figure 1 Site layout, Work Authority WA158, Colac Quarry

Figure 2 Corangamite Water Skink potential impact and mitigation



- LEGEND**
- Work Authority Area - WA158
 - Stages 5 and 6 Extraction Areas
 - Haul Road
 - Bund/ water control barrier RL120
 - Stockpile Area
 - Approved Limit of Extraction
 - Approved Disturbance Boundary
 - Contours mAHD
 - Watercourse
 - Waterbody

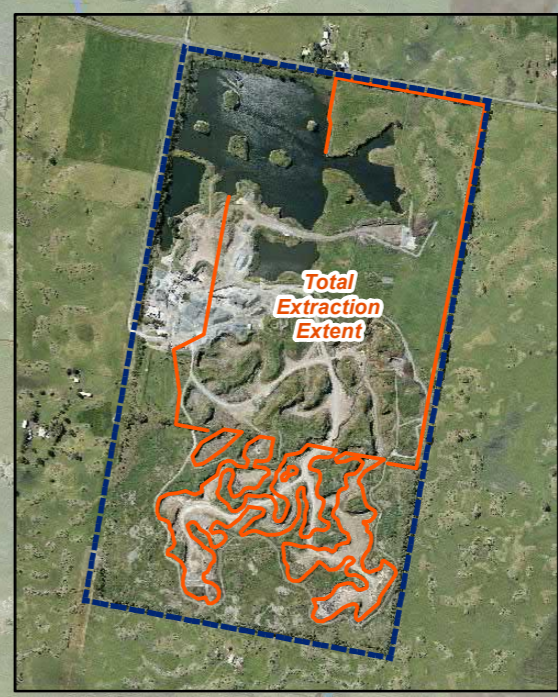
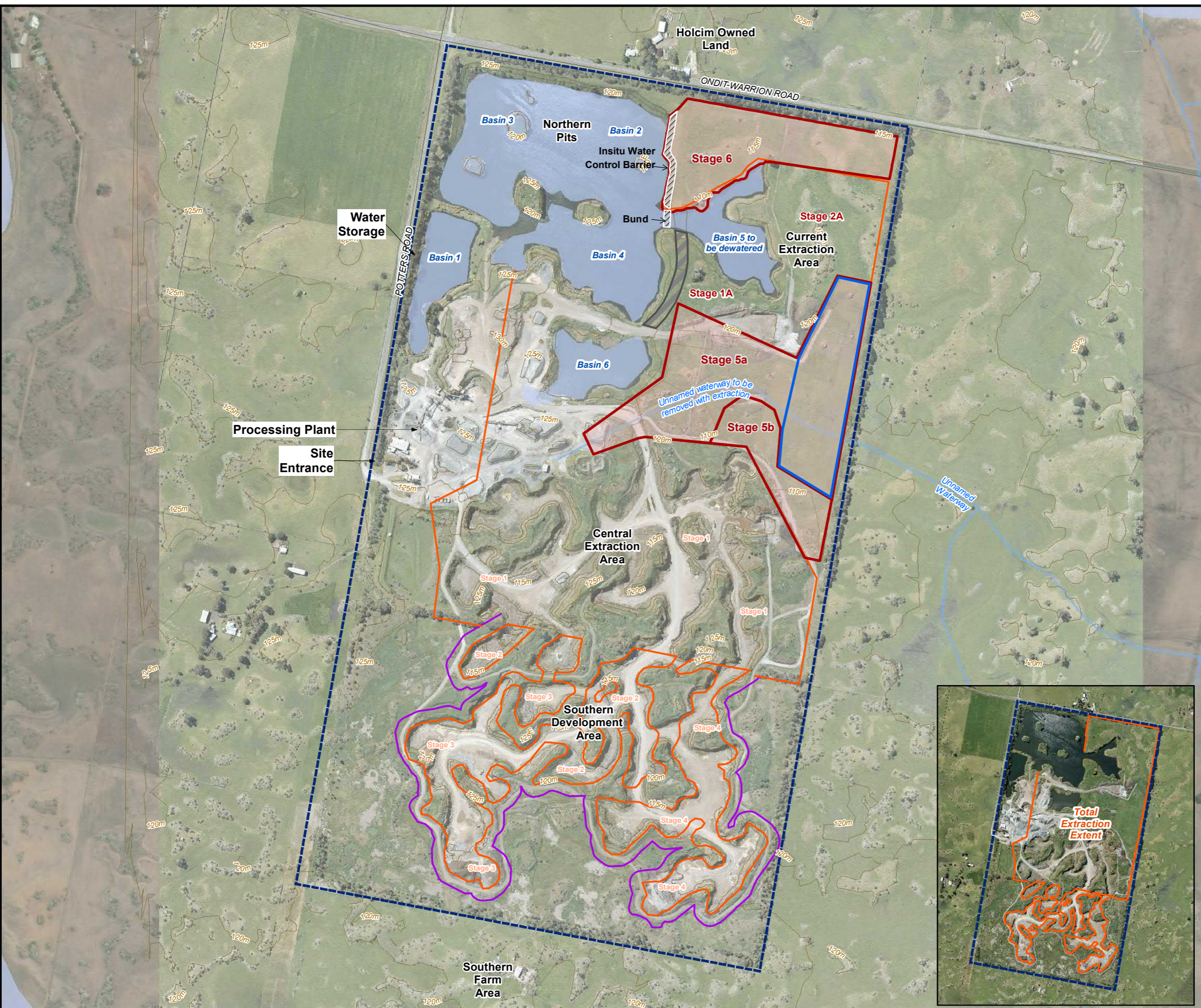
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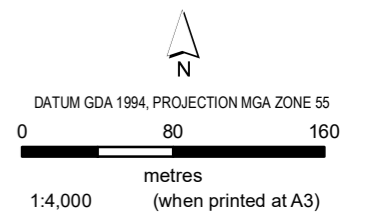
SITE LAYOUT

Holcim (Australia) Pty Ltd
 Colac Quarry - WA158
 75-95 Potters Road, Ondit, VIC

Figure
F1



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- LEGEND**
- Work Authority Area - WA158
 - Stages 5 and 6
 - Haul Road
 - Proposed Bund RL120
 - Approved Limit of Extraction
 - Approved Disturbance Boundary
 - Contours mAHD
 - Contour 118mAHD
 - Watercourse
- Corangamite Water Skink**
- Suitable Habitat (Stage 5 & 6)
 - Sub-optimal Habitat with historic record (Stage 5&6)
 - Pre-2016 Occupied Habitat (with buffer on CWS record)
 - Post-2016 Occupied Habitat (with buffer on CWS record)
 - Habitat Created 2008 for SDA
 - Habitat Offset created for habitat loss (to extent above 118mAHD)
 - Habitat Offset to be created during rehabilitation (indicative)
 - Supplementary Habitat Created to mitigate Water Level Increase

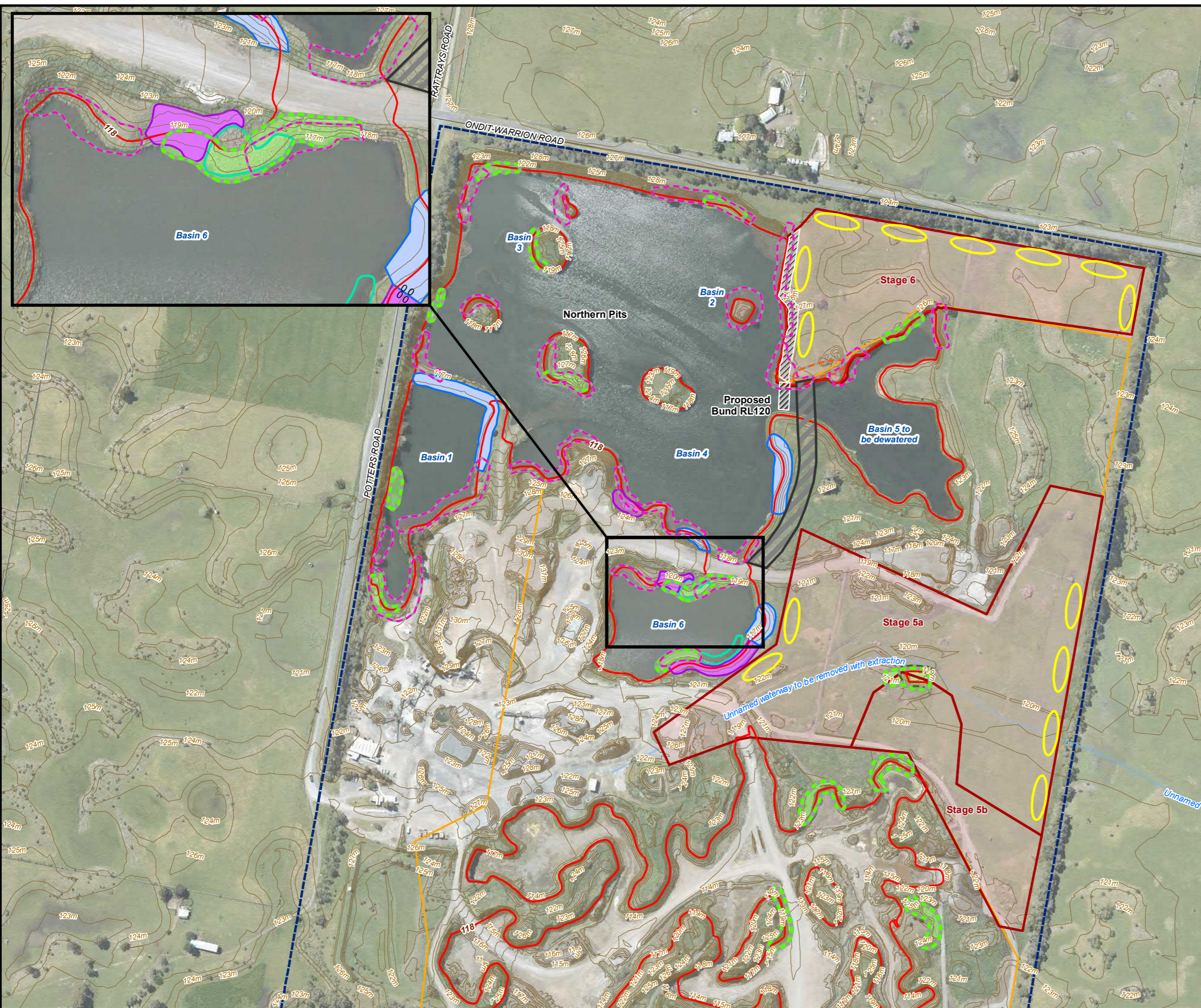
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**CORANGAMITE WATER SKINK
 POTENTIAL IMPACT
 AND MITIGATION**

Holcim (Australia) Pty Ltd
 Colac Quarry - Flora and Fauna
 Assessment
 75-95 Potters Road, Ondit, VIC

Figure
F2



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Appendix B

Offset Assessment

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Corangamite Water Skink
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
<i>Ecological communities</i>						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species habitat</i>						
Area of habitat	Yes	Lineal metres of optimal habitat converted into hectare equivalent (480 lineal metres x 5m width, divided by 10000)	Area	0.24	Hectares	Preliminary documentation prepared for EPBC 2019/8530 and Flora and Fauna Existing Conditions & Impact Assessment; Colac Quarry Stage 5 and Stage 6 Extension (AECOM 2021)
			Quality	8	Scale 0-10	
			Total quantum of impact	0.19	Adjusted hectares	
<i>Threatened species</i>						
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Birth rate e.g. Change in nest success	No					
Mortality rate e.g. Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator																														
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source														
<i>Ecological Communities</i>																														
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Risk of loss (%) with offset																						
					Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0																						
					Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)																						
<i>Threatened species habitat</i>																														
Area of habitat	Yes	0.19	Adjusted hectares	Creation of 760 lineal metres (0.38 hectares equivalent) rock jumbles adjacent to water in areas of Colac Quarry not subject to ongoing quarrying	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	0.38	Risk of loss (%) without offset	50%	Risk of loss (%) with offset	10%	Raw gain	0.15	Confidence in result (%)	90%	Adjusted gain	0.14	Net present value	0.11	% of impact offset	0.18	95.27%	Minimum (90%) direct offset requirement met?	Yes	Cost (\$ total)		Information source		
					Future area without offset (adjusted hectares)	0.2	Future area with offset (adjusted hectares)	0.3																						
					Time until ecological benefit	8	Start quality (scale of 0-10)	1	Future quality without offset (scale of 0-10)	1	Future quality with offset (scale of 0-10)	8	Raw gain	7.00	Confidence in result (%)	80%	Adjusted gain	5.60	Net present value	5.09										
<i>Threatened species</i>																														
Number of features e.g. Nest hollows, habitat trees	No																													
Condition of habitat Change in habitat condition, but no change in extent	No																													
Birth rate e.g. Change in nest success	No																													
Mortality rate e.g. Change in number of road kills per year	No																													
Number of individuals e.g. Individual plants/animals	No																													

Summary							
Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost (\$)		
					Direct offset (\$)	Other compensatory measures (\$)	Total (\$)
Birth rate	0				\$0.00		\$0.00
Mortality rate	0				\$0.00		\$0.00
Number of individuals	0				\$0.00		\$0.00
Number of features	0				\$0.00		\$0.00
Condition of habitat	0				\$0.00		\$0.00
Area of habitat	0.192	0.18	95.27%	Yes	\$0.00	#DIV/0!	#DIV/0!
Area of community	0				\$0.00		\$0.00
					\$0.00	#DIV/0!	#DIV/0!

