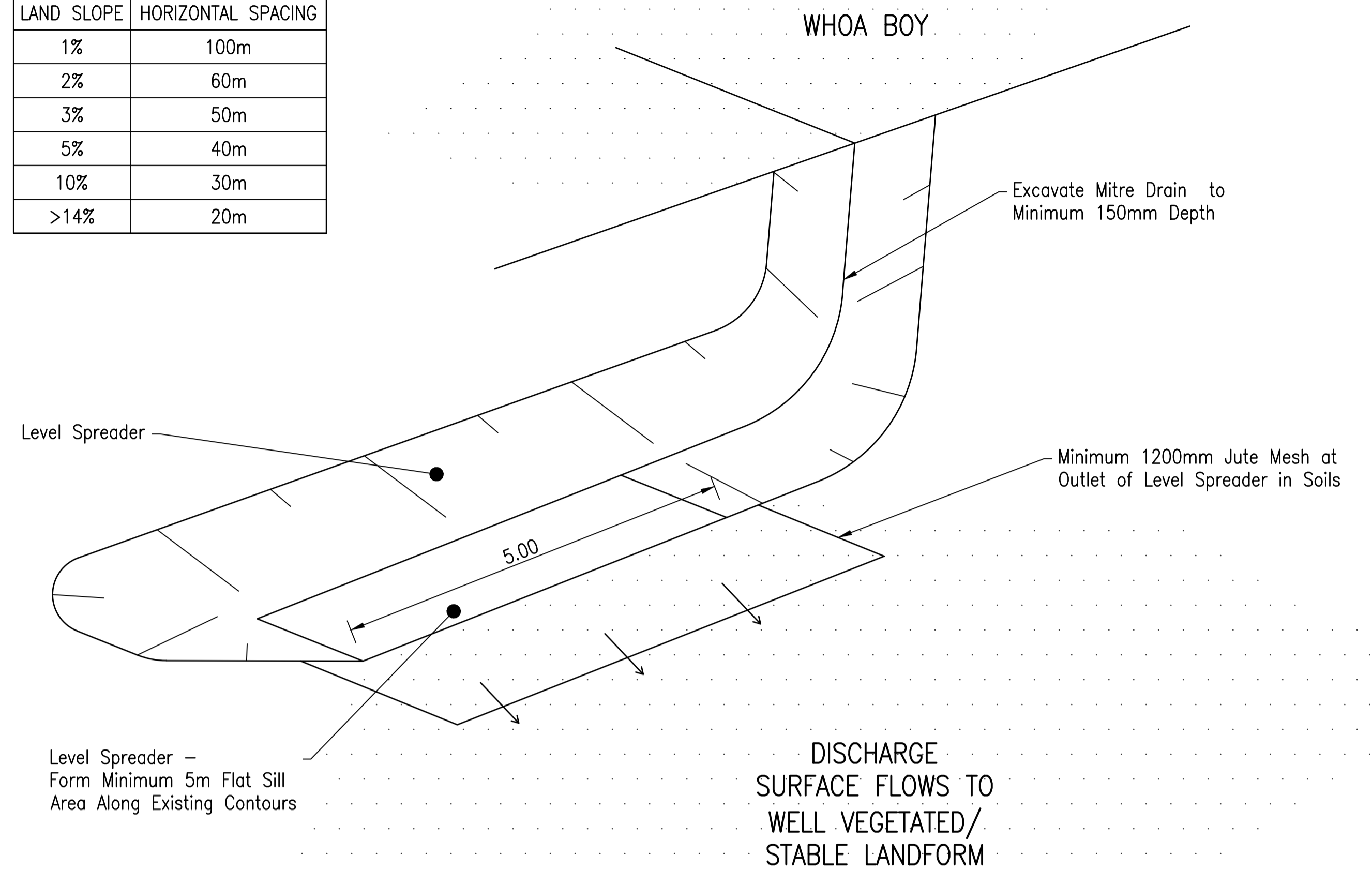


**WHOA BOY LAYOUT PLAN**  
Scale 1:100m

**TYPICAL WHOA BOY SPACING**

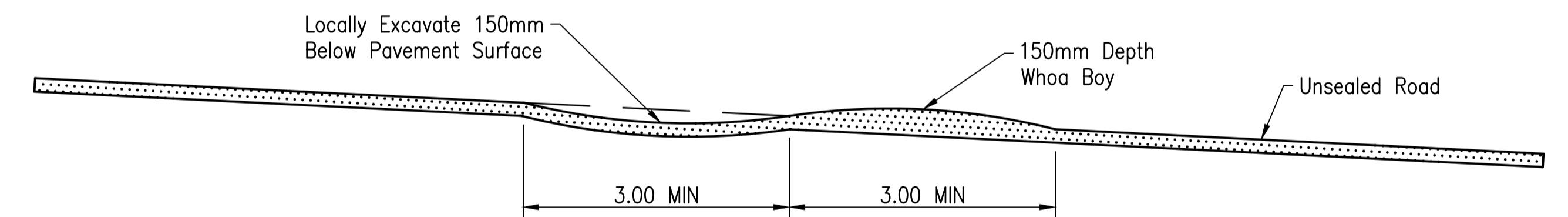
LAND SLOPE	HORIZONTAL SPACING
1%	100m
2%	60m
3%	50m
5%	40m
10%	30m
>14%	20m



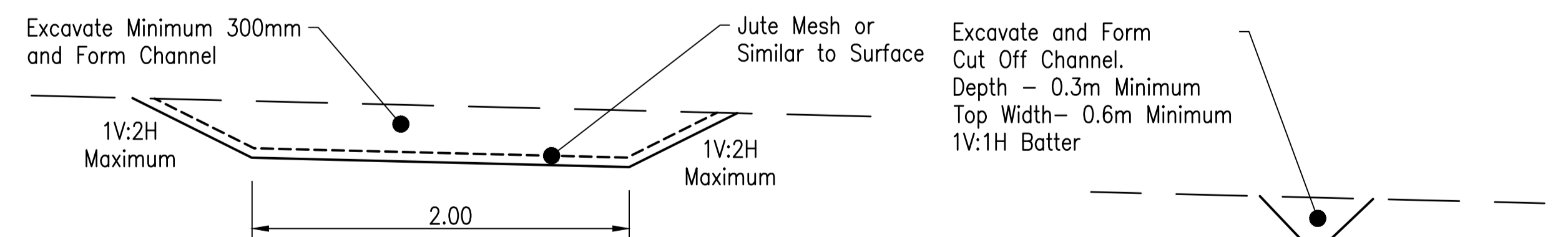
**MITRE DRAIN/ LEVEL SPREADER TYPICAL PLAN**  
Scale 1:50m

**ROAD EROSION AND SEDIMENT CONTROL NOTES:**

- All Erosion and Sediment Control Measures to be in Accordance with the Best Practice Erosion and Sediment Control Guidelines, IECA, 2008.
- Works for Access Roads shall be Undertaken in the Following Sequence:
  - Install Stabilised Site Access
  - Install Cut Off Channels to Divert External Catchment Flows to all Low Points, Gullies and Watercourses
  - Construct Rock Rip Rap Crossings at Low Points, Gullies and Watercourses
  - Construct Whoa Boys and Associated Mitre Drains and Level Spreaders at Required Spacings
- Controls Affected by Works are to be Re-established Prior to the Completion of each days work.
- The Contractor is to Stabilise all Disturbed Areas as soon as Final Levels are Reached.
- Dust Control Measures shall be Implemented Continuously during Construction Works to the Satisfaction of the Superintendent and Council.
- Topsoil Shall be Spread and Stabilised as Soon as Possible, Disturbed Areas shall be left with a Scarified Surface to Encourage Water Infiltration and Assist in Keying in Topsoil.
- All Trees to be Retained Unless Approved for Removal by the Superintendent.
- Topsoil Stockpiles shall not Exceed 2m in Height and Batter Slopes to be 1V:3H Maximum.
- All Access to Site is to be Via the Stabilised Site Access. Site Shall be Fully Fenced to Prevent Access From Other Areas.
- The Contractor Shall Maintain a Log Book Detailing:
  - Records of All Rainfall
  - Condition of Erosion and Sediment Control Measures
  - Any Additional Remedial Works Required
- The Contractor Shall at all times Restrict Construction Equipment Movement to the Essential Construction Areas. The Contractor shall not Extend Land Disturbance Beyond 2m from the Edge of any Essential Construction Activity.



**WHOA BOYS/ CROSS BANKS TYPICAL SECTION**  
Scale 1:50m

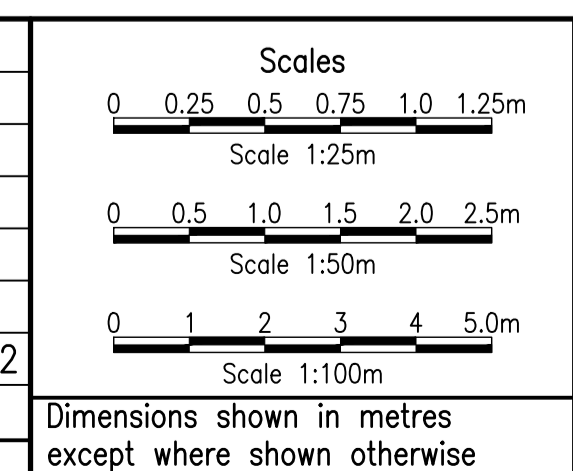


**DIVERSION DRAIN TYPICAL SECTION (SOILS)**  
Scale 1:25m

**DIVERSION DRAIN TYPICAL SECTION (ROCK)**  
Scale 1:25m

Last Modified: 1- Dec 01, 2022 - 2:31pm

Rev	Revision Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22

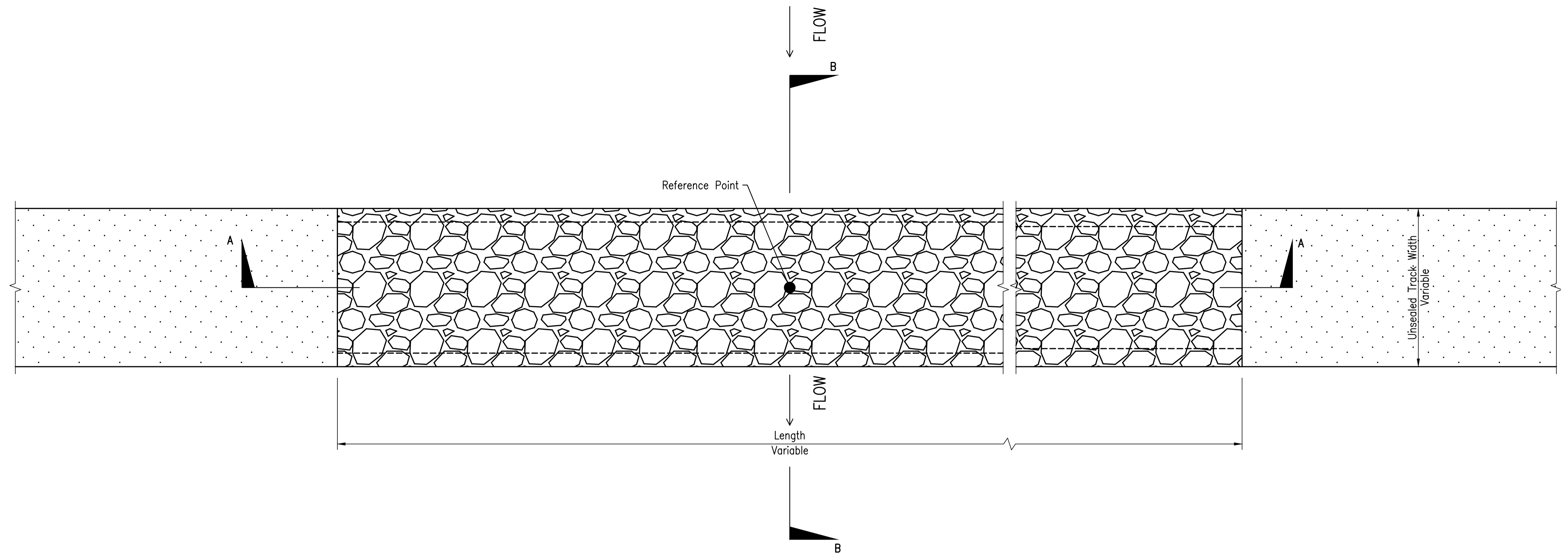


Client

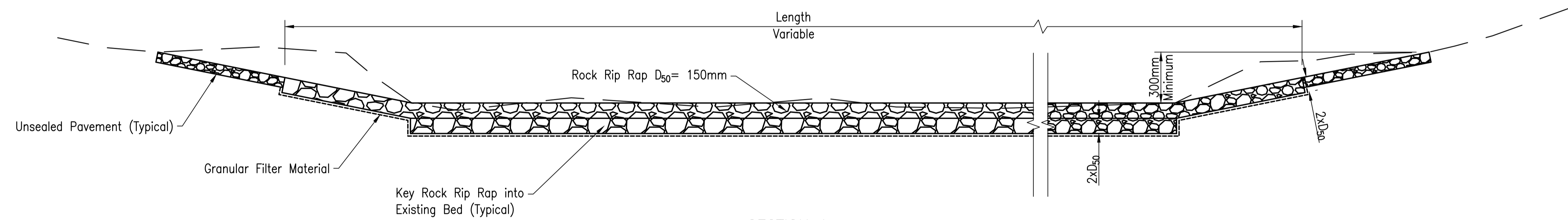
Copyright: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title					
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL TYPICAL ROAD DETAILS SHEET 1 OF 2					
Drawn	ENGINEERING CERTIFICATION (RPEQ)				
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO.	DATE
Designed					
M.HAUSFELD					

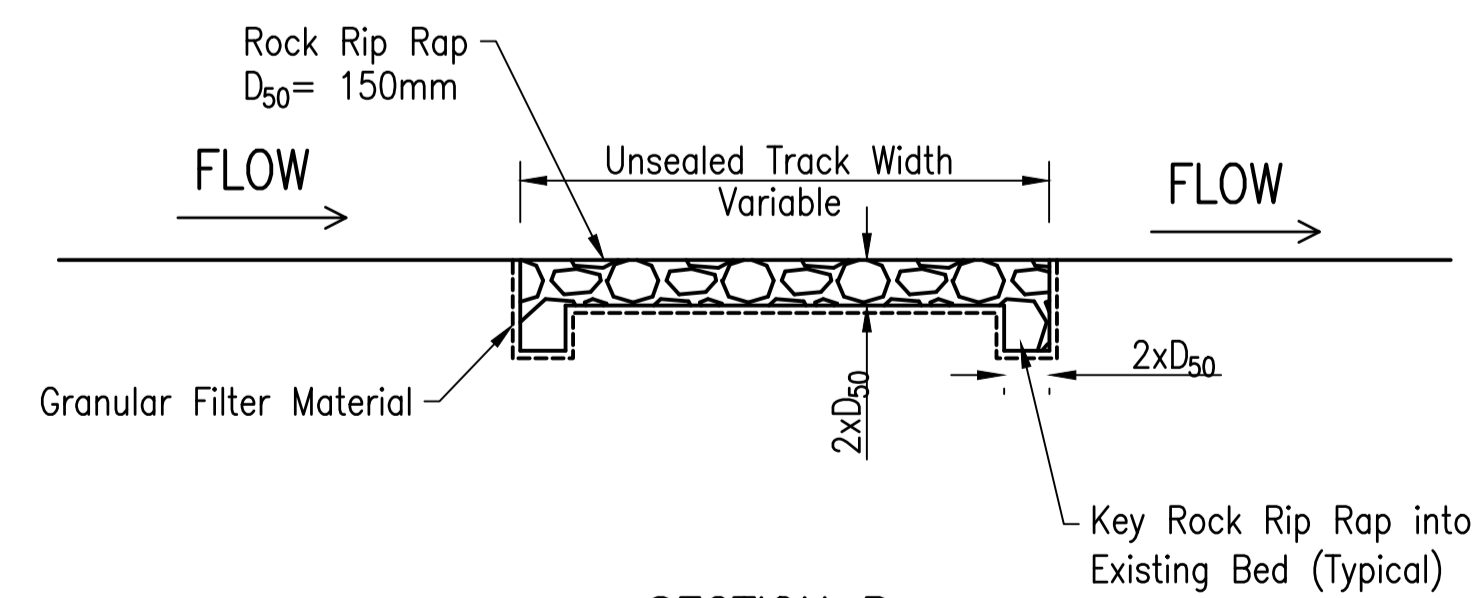
Job No.	WTS-002
Drawing No.	SKC005
Revision	A
Series Number	1 OF 2



**PLAN**  
 AT GRADE WATERCOURSE/ CREEK/ GULLY CROSSINGS  
 Scale 1:50m



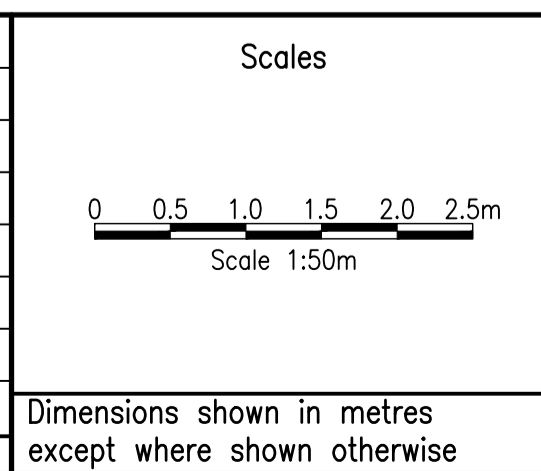
**SECTION A**  
 Scale 1:50m



**SECTION B**  
 Scale 1:50m

Last Modified: 1: Dec 01, 2022 - 1:27pm

A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22
Rev	Revision Description	Certification	Date



Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

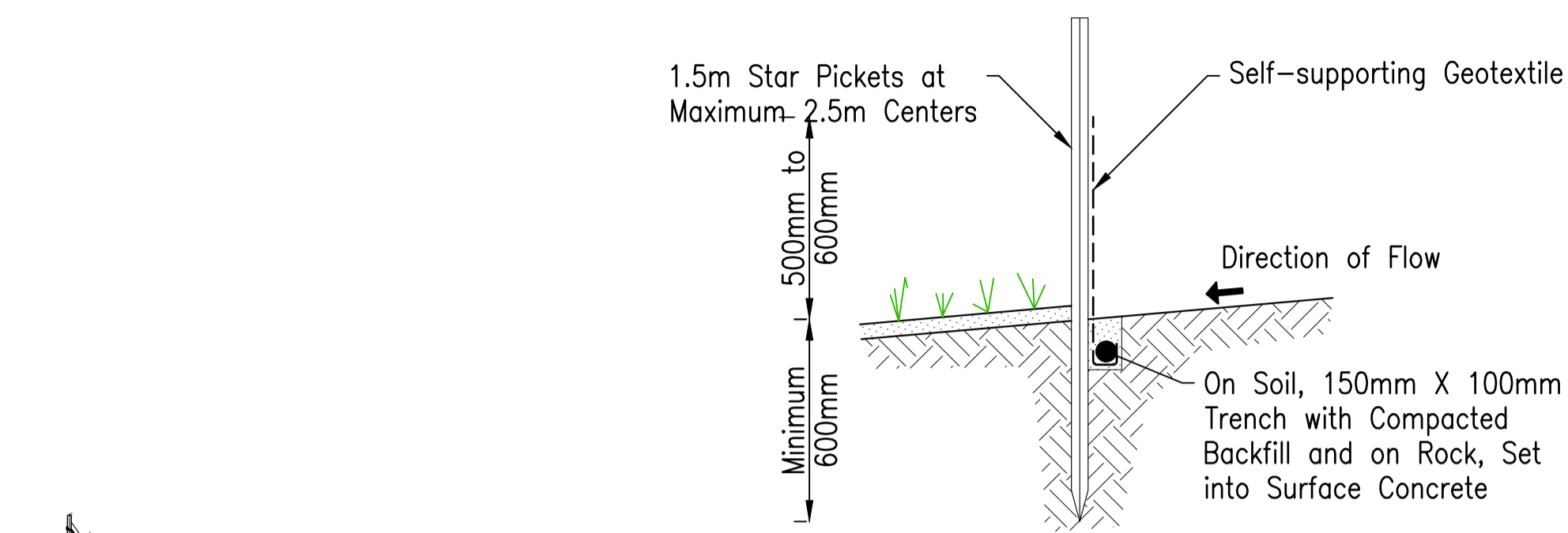
Title				
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL TYPICAL ROAD DETAILS SHEET 2 OF 2				
Drawn	ENGINEERING CERTIFICATION (RPEQ)			
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO. DATE
Designed				
M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC006
Revision	A
Series Number	2 OF 2

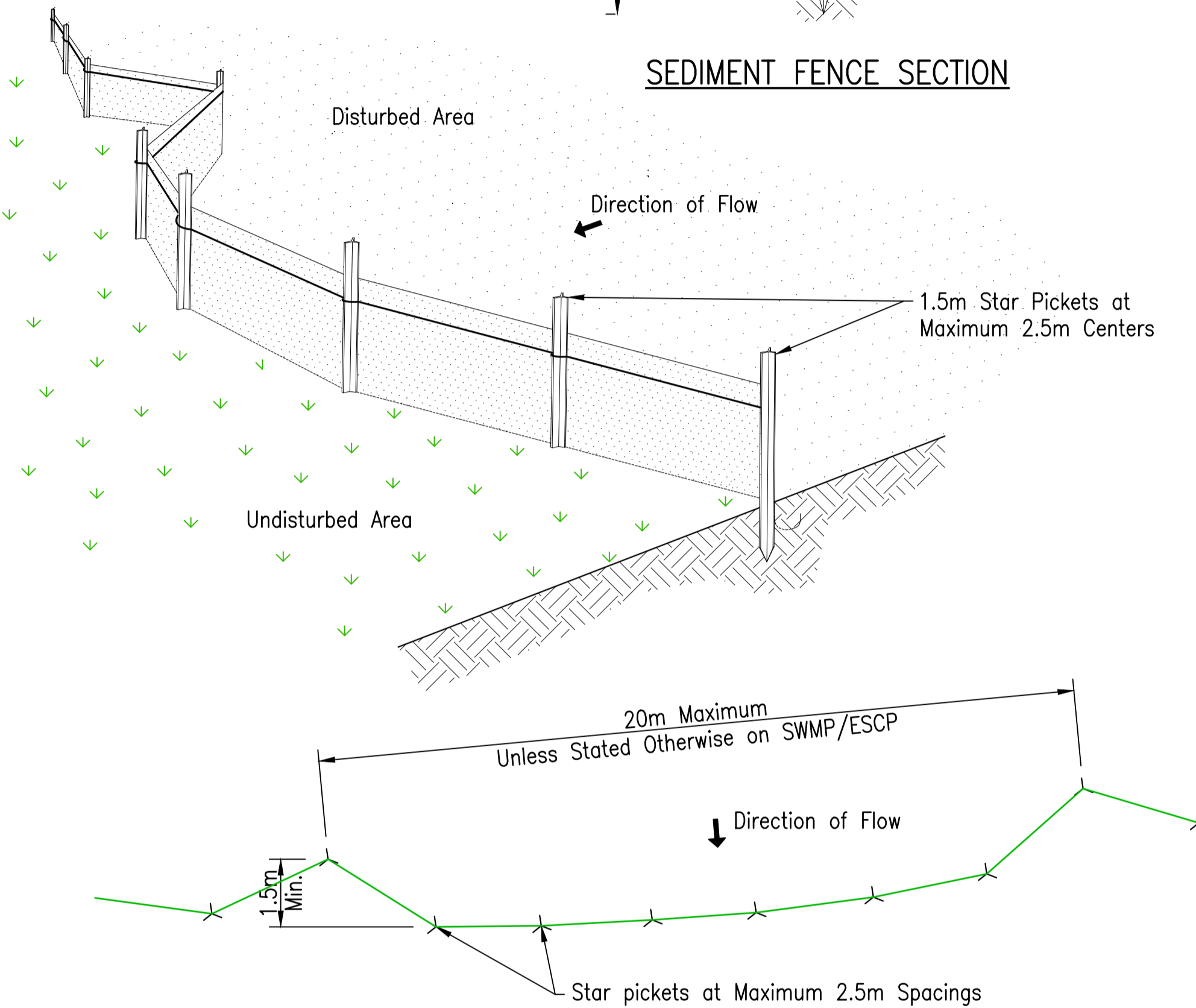
**EROSION AND SEDIMENT CONTROL NOTES:**

- All Erosion and Sediment Control Measures to be in Accordance with the Best Practice Erosion and Sediment Control Guidelines, IECA, 2008.
- Works for Infrastructure Expansion Footprints shall be Undertaken in the Following Sequence:
  - Install Stabilised Site Access
  - Construct Clean Water Diversion Channels and Level Spreaders where External Catchments Discharge to the Site
  - Construct Dirty Water Channels/ Bunds
  - Construct Sediment Basins and Sediment Weirs
  - Install all Sediment Fencing
  - Locate Stockpile Locations and Install Sediment Fences on Downstream sides
  - Topsoil and Rehabilitate Bulk Earthwork Areas Immediately upon Completion
  - Rehabilitate the Site
  - Decommission Sediment Basins and Sediment Weirs and Remove Erosion and Sediment Control Measures once Surfaces are Stabilised to the Satisfaction of the Superintendent

This Sequence is to be Reviewed in Context of Staging of Works, However, Must Achieve all Environmental Requirements.
- Controls Affected by Works are to be Re-established Prior to the Completion of each days work.
- The Contractor is to Stabilise all Disturbed Areas as soon as Final Levels are Reached.
- Dust Control Measures shall be Implemented Continuously during Construction Works to the Satisfaction of the Superintendent and Council.
- Topsoil Shall be Spread and Stabilised as Soon as Possible, Disturbed Areas shall be left with a Scarified Surface to Encourage Water Infiltration and Assist in Keying in Topsoil.
- All Trees to be Retained Unless Approved for Removal by the Superintendent.
- Topsoil Stockpiles shall not Exceed 2m in Height and Batter Slopes to be 1V:3H Maximum.
- All Access to Site is to be Via the Stabilised Site Access. Site Shall be Fully Fenced to Prevent Access From Other Areas.
- The Contractor Shall Maintain a Log Book Detailing:
  - Records of All Rainfall
  - Condition of Erosion and Sediment Control Measures
  - Any Additional Remedial Works Required
- The Contractor Shall at all times Restrict Construction Equipment Movement to the Essential Construction Areas. The Contractor shall not Extend Land Disturbance Beyond 2m from the Edge of any Essential Construction Activity.



**SEDIMENT FENCE SECTION**

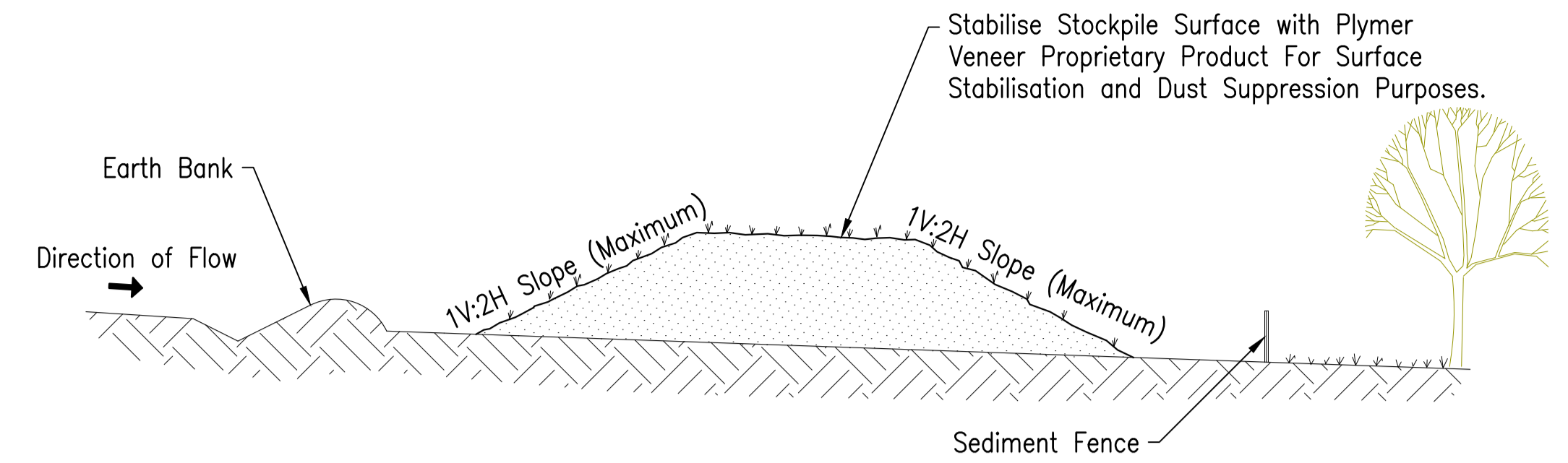


**SEDIMENT FENCE PLAN**

**SEDIMENT FENCE CONSTRUCTION NOTES:**

- Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
- Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
- Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
- Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
- Join sections of fabric at a support post with a 150-mm overlap.
- Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

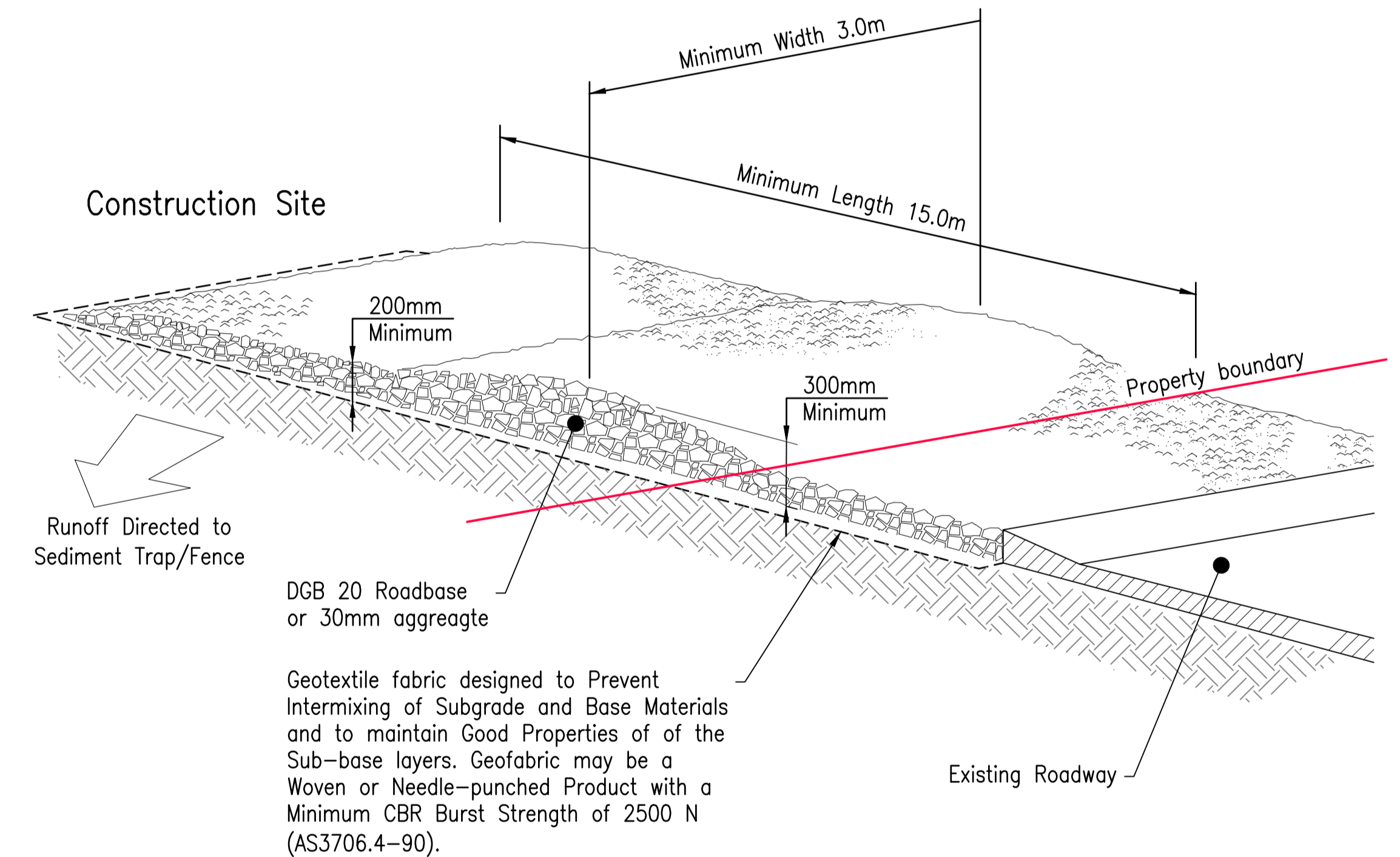
**SEDIMENT FENCE DETAIL**  
N.T.S



**STOCKPILES CONSTRUCTION NOTES:**

- Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
- Construct on the contour as low, flat, elongated mounds.
- Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
- Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
- Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

**STOCKPILES DETAIL**  
N.T.S



**STABILISED SITE ACCESS CONSTRUCTION NOTES:**

- Strip the topsoil, Level the Site and Compact the Subgrade.
- Cover the Area with Woven or Needle-punched Geotextile.
- Construct at 200mm Thick Pad over the Geotextile using available Road base or 30mm Aggregate.
- Ensure the Structure is a Minimum of 15.0m Long or to Building Alignment and at least 3.0m Wide.
- Where a Sediment Fence Joins onto the Stabilised Access, Construct a hump in the Stabilised Access to Divert Water to the Sediment Fence.

**STABILISED SITE ACCESS DETAIL**  
N.T.S

Last Modified :- Dec 01, 2022 - 1:27pm

Rev	Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22

Scales

Dimensions shown in metres except where shown otherwise

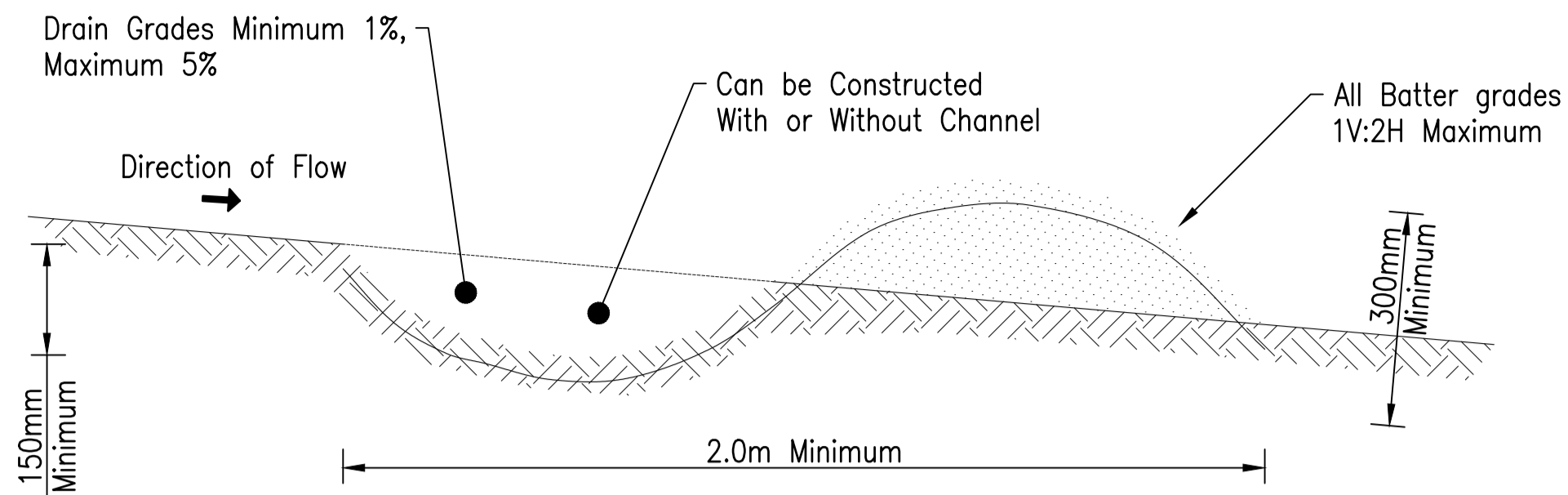


Client

Copyright: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title					
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL EROSION AND SEDIMENT CONTROL DETAILS SHEET 1 OF 2					
ENGINEERING CERTIFICATION (RPEQ)					
ENG. AREA	NAME	SIGNATURE	NO.	DATE	
M.SMITH					
Designed					
M.HAUSFELD					

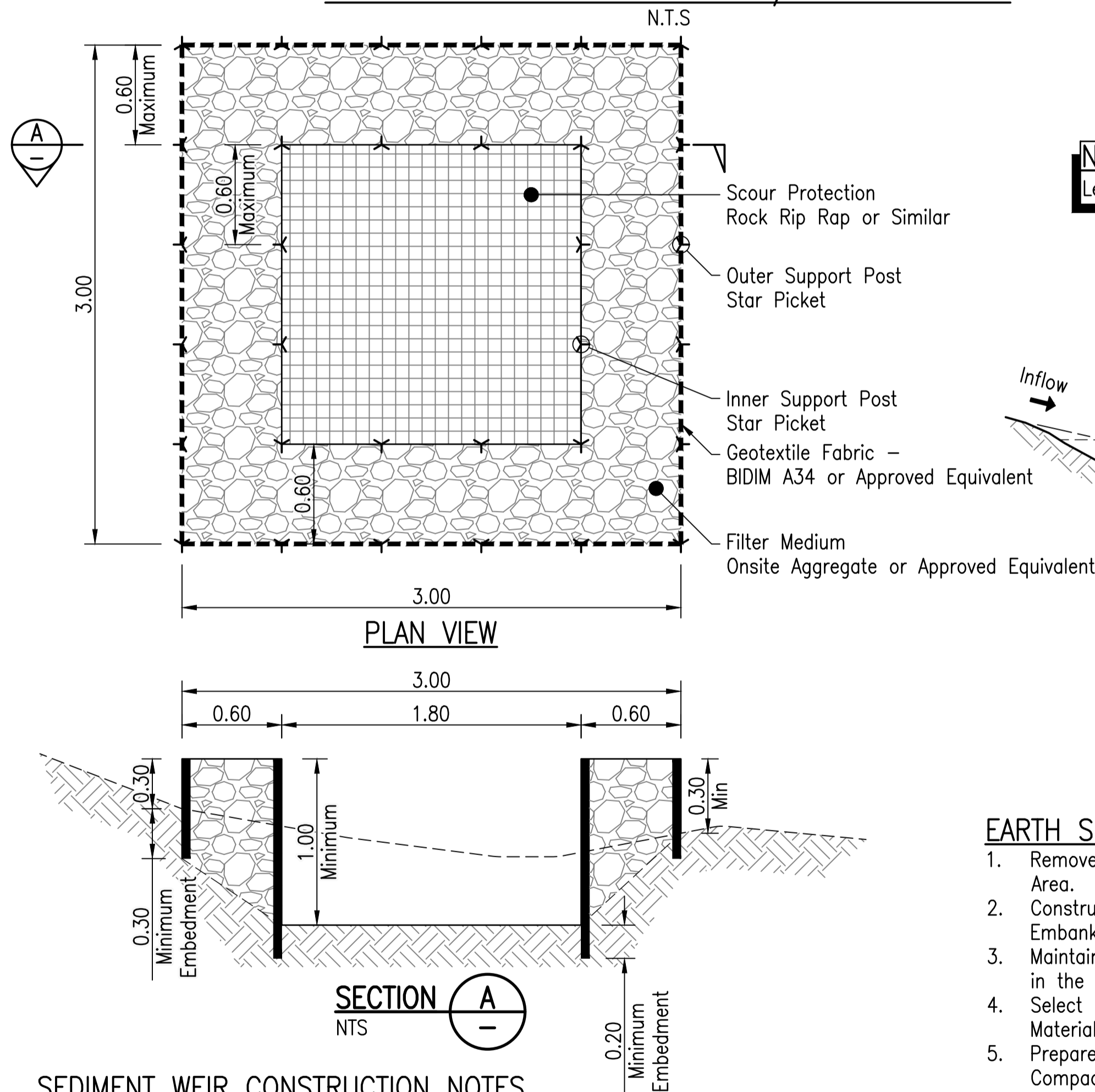
Job No.	WTS-002
Drawing No.	SKC007
Revision	A
Series Number	1 OF 2



**DIRTY WATER CATCHMENT CHANNEL/ BUNDING CONSTRUCTION NOTES:**

1. Build with Gradients Between 1% and 5%.
2. Avoid removing trees and Shrubs if Possible – Work around them.
3. Ensure the Structures are Free of Projections or other Irregularities that Could Impede Water Flow.
4. Build the Drains with Circular, Parabolic or Trapezoidal Cross Sections, not V Shaped.
5. Ensure Banks are Properly Compacted to Prevent Failure.
6. Complete Permanent or Temporary Stabilisation Within 10 Days of Construction.

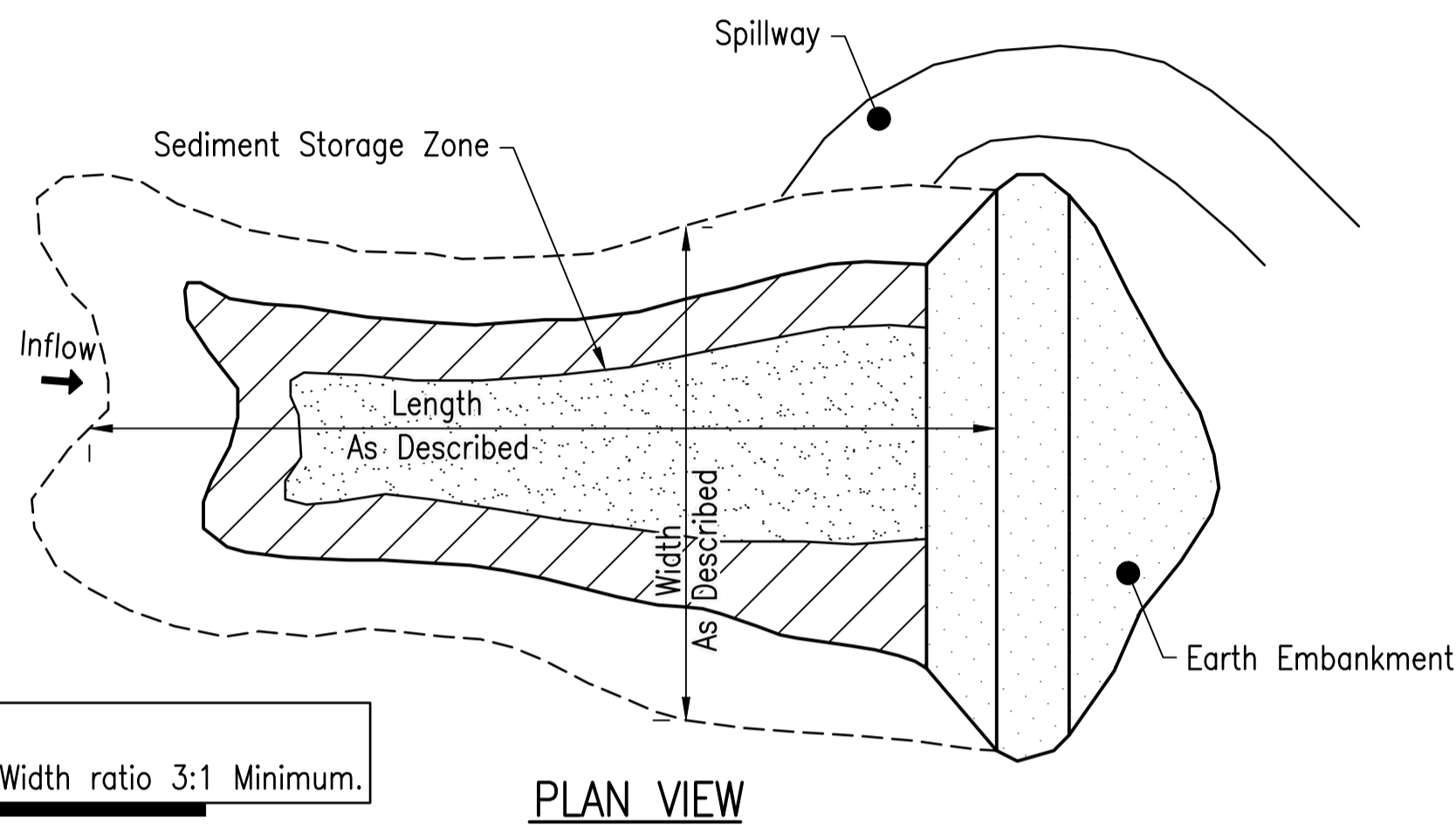
**DIRTY WATER CATCHMENT CHANNEL/ BUNDING DETAIL**



**SEDIMENT WEIR CONSTRUCTION NOTES**

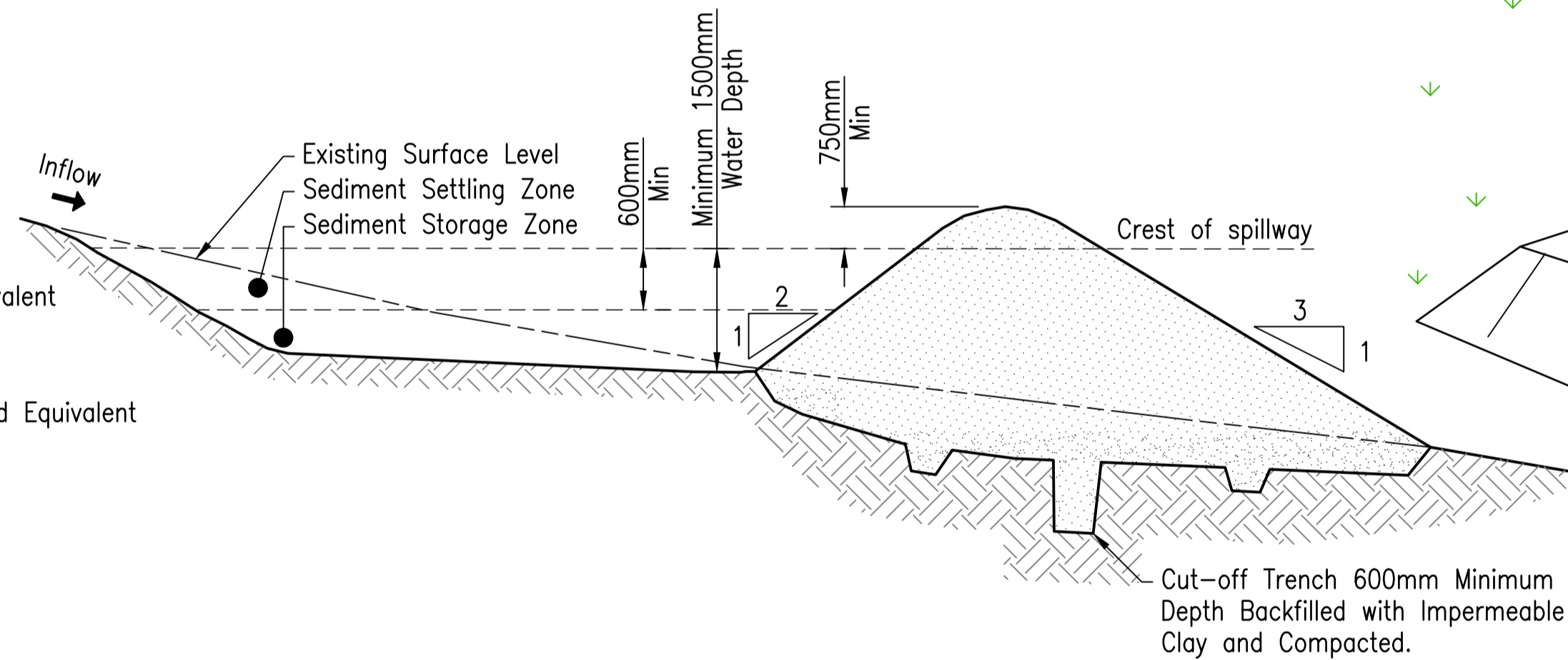
1. Remove all Vegetation and Topsoil in Footprint.
2. Excavate to Depths and Widths Required.
3. Form Sediment Weir Utilising Star Pickets, Aggregate and Geotextile.
4. Rehabilitate Following Decommissioning.

**SEDIMENT WEIR DETAIL**  
N.T.S



**NOTE:**  
Length/ Width ratio 3:1 Minimum.

**PLAN VIEW**

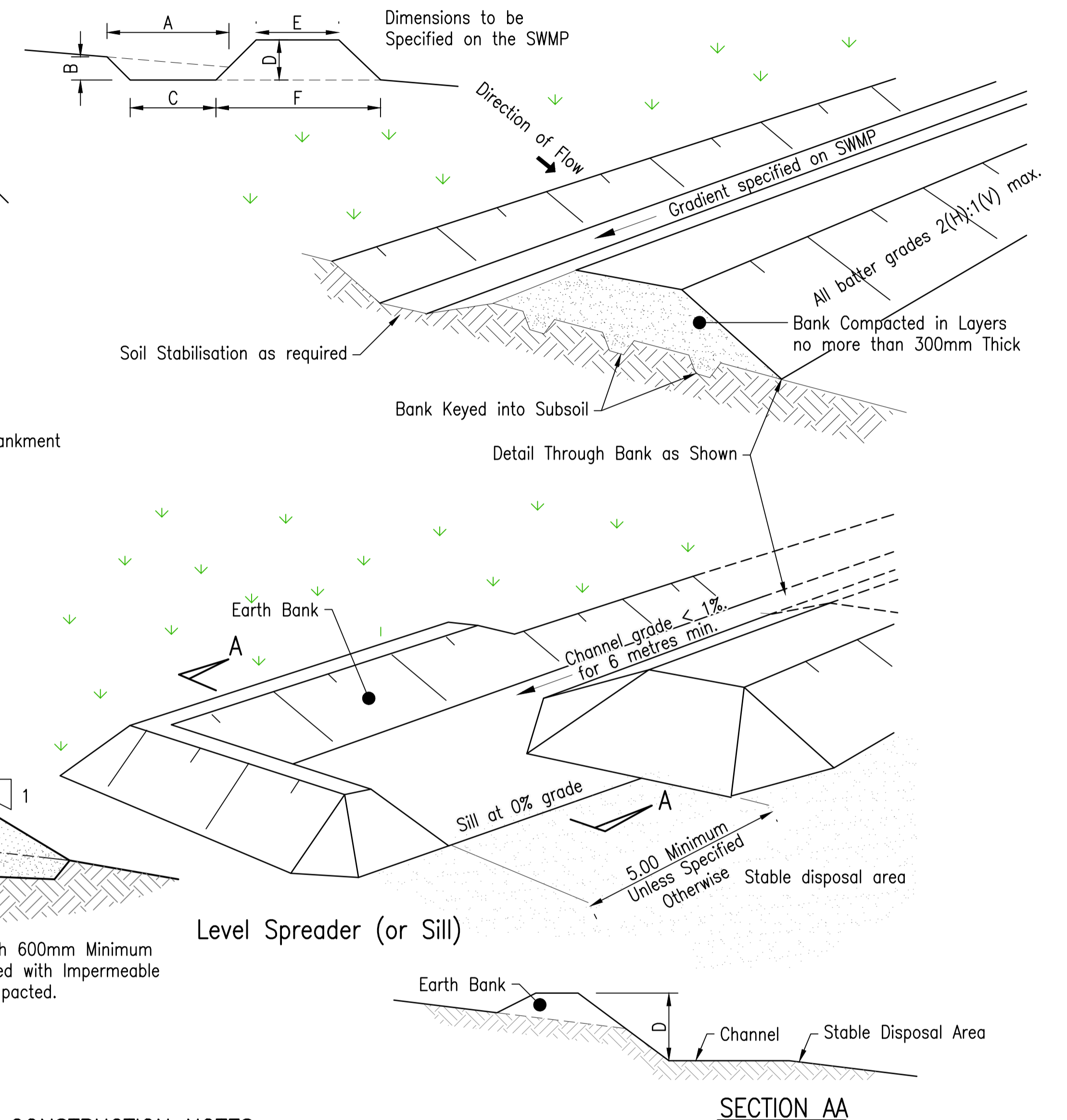


**CROSS SECTION**

**EARTH SEDIMENT BASIN CONSTRUCTION NOTES**

1. Remove all Vegetation and Topsoil from Under the Dam Wall and From Within the Storage Area.
2. Construct a Cut-off Trench 500mm Deep and 1,200mm Wide Along the Centreline of the Embankment Extending to a Point on the Gully Wall Level with the Riser Crest.
3. Maintain the Trench Free of Water and Recompact the Materials with Equipment as Specified in the SWMP to 95% Standard Proctor Density.
4. Select Fill Following the SWMP that is Free of Roots, Wood, Rock, Large Stone or Foreign Material.
5. Prepare the Site Under the Embankment by Ripping to at least 100mm to help bond Compacted Fill to the Existing Substrate.
6. Spread the Fill in 100mm to 150mm Layers and Compact it at Optimum Moisture Content Following the SWMP.
7. Construct the Emergency Spillway.
8. Rehabilitate the Structure Following the SWMP.

**EARTH SEDIMENT BASIN DETAIL**  
N.T.S



**CHANNEL/ BUNDING DETAIL (LARGE)**  
N.T.S

**CONSTRUCTION NOTES**

1. Construct at the gradient specified on the ESCP or SWMP, normally between 1 and 5 percent
2. Avoid removing trees and shrubs if possible – work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V-shaped, at the dimensions shown on the SWMP.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction following Table 5.2 in Landcom (2004).
7. Where discharging to erodible lands, ensure they outlet through a properly constructed level spreader.
8. Construct the level spreader at the gradient specified on the ESCP or SWMP, normally less than 1 percent or level.
9. Where possible, ensure they discharge waters onto either stabilised or undisturbed disposal sites within the same subcatchment area from which the water originated. Approval might be required to discharge into other subcatchments.

Last Modified :- Dec 01, 2022 - 2:30pm

Rev	Revision Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22

Dimensions shown in metres except where shown otherwise
---

Scales

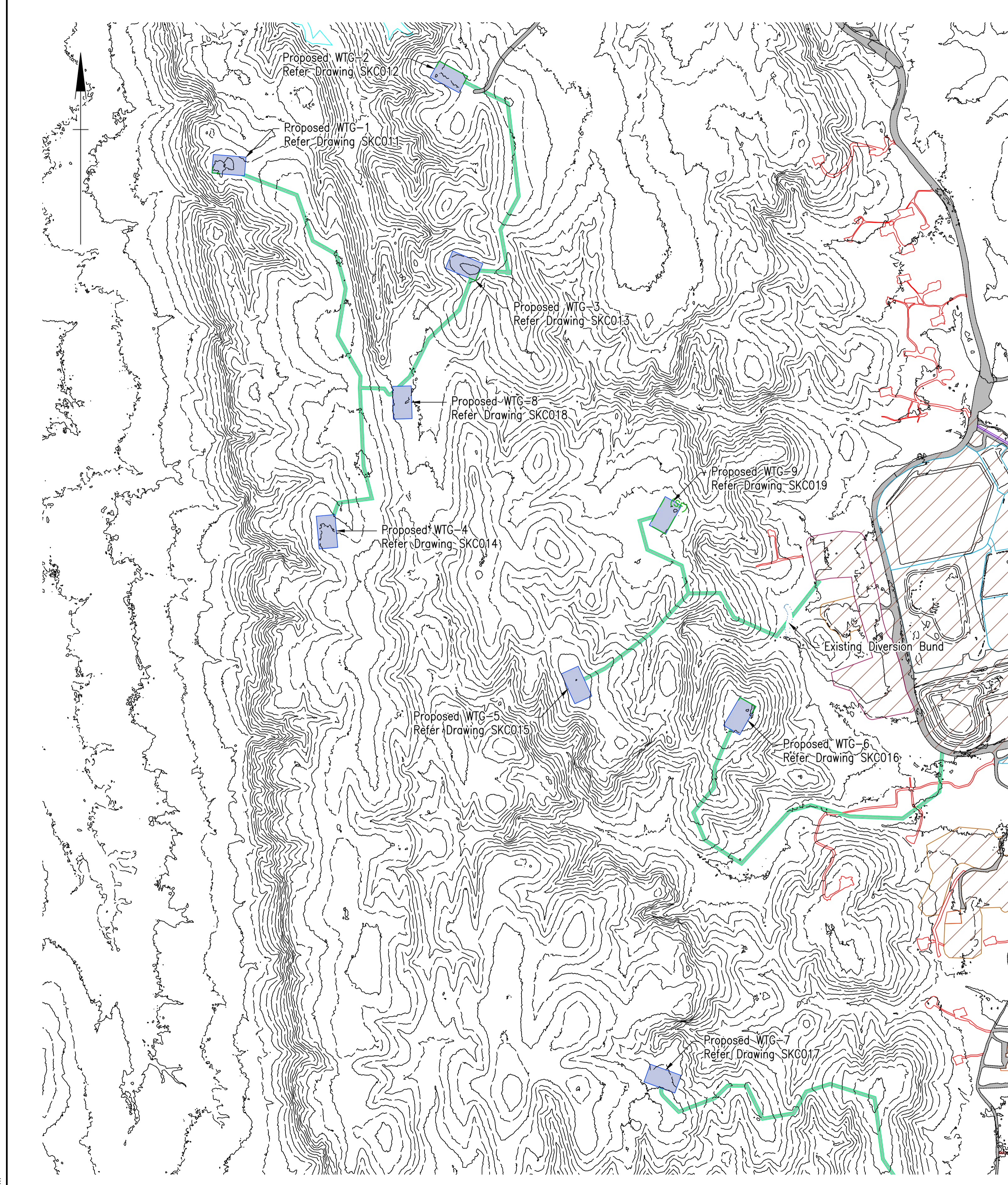
Client

**COPYRIGHT:**  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title <b>DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL EROSION AND SEDIMENT CONTROL DETAILS SHEET 2 OF 2</b>					
Drawn M.SMITH	ENGINEERING CERTIFICATION (RPEQ)				
	ENG. AREA	NAME	SIGNATURE	NO.	DATE
Designed M.HAUSFELD					

Job No.	<b>WTS-002</b>
Drawing No.	<b>SKC008</b>
Revision	<b>A</b>
Series Number	<b>2 OF 2</b>

Last Modified: 1: - Dec 01, 2022 - 1:45pm



**FEATURES LEGEND:**

- 210m Major Existing Surface Contour
- Minor Existing Surface Contour
- Existing Roadways
- Existing Mine Infrastructure
- Existing Drill Pads
- Existing Powerline Corridor
- Proposed Investigation Tracks
- Proposed Wind Turbine Hard Stand

**EROSION CONTROL LEGEND:**

- (SF) Proposed Sediment Fence
- Proposed Clean Water Diversion Channels (Direction Shown)
- Proposed Dirty Water Catchment Channel/Bunding (Direction Shown)
- Proposed Dirty Water Catchment Area
- Proposed Whoa boys and Turnouts
- Proposed Rock Scour Protection
- Proposed Sediment Basin Extents
- Proposed Sediment Weir
- Proposed Level Spreader
- Existing Overland Flow (Clean)
- Existing Overland Flow (Dirty)

**EROSION AND SEDIMENT CONTROL NOTES:**

1. All Erosion and Sediment Control Measures to be in Accordance with the Best Practice Erosion and Sediment Control Guidelines, IECA, 2008.
2. Works for Infrastructure Expansion Footprints shall be Undertaken in the Following Sequence:
  - 2.1. Install Stabilised Site Access
  - 2.2. Construct Clean Water Diversion Channels and Level Spreaders where External Catchments Discharge to the Site
  - 2.3. Construct Dirty Water Channels/ Bunds
  - 2.4. Construct Sediment Basins and Sediment Weirs
  - 2.5. Install all Sediment Fencing
  - 2.6. Locate Stockpile Locations and Install Sediment Fences on Downstream sides
  - 2.7. Topsoil and Rehabilitate Bulk Earthwork Areas Immediately upon Completion
  - 2.8. Rehabilitate the Site
  - 2.9. Decommission Sediment Basins and Sediment Weirs and Remove Erosion and Sediment Control Measures once Surfaces are Stabilised to the Satisfaction of the Superintendent

This Sequence is to be Reviewed in Context of Staging of Works, However, Must Achieve all Environmental Requirements.
3. Works for Access Roads shall be Undertaken in the Following Sequence:
  - 3.1. Install Stabilised Site Access
  - 3.2. Install Cut Off Channels to Divert External Catchment Flows to all Low Points, Gullies and Watercourses
  - 3.3. Construct Rock Rip Rap Crossings at Low Points, Gullies and Watercourses
  - 3.4. Construct Woah Boys and Associated Mitre Drains and Level Spreaders at Required Spacings
4. Controls Affected by Works are to be Re-established Prior to the Completion of each days work.
5. The Contractor is to Stabilise all Disturbed Areas as soon as Final Levels are Reached.
6. Dust Control Measures shall be Implemented Continuously during Construction Works to the Satisfaction of the Superintendent and Council.
7. Topsoil Shall be Spread and Stabilised as Soon as Possible, Disturbed Areas shall be left with a Scarified Surface to Encourage Water Infiltration and Assist in Keying in Topsoil.
8. All Trees to be Retained Unless Approved for Removal by the Superintendent.
9. Topsoil Stockpiles shall not Exceed 2m in Height and Batter Slopes to be 1V:3H Maximum.
10. All Access to Site is to be Via the Stabilised Site Access. Site Shall be Fully Fenced to Prevent Access From Other Areas.
11. The Contractor Shall Maintain a Log Book Detailing:
  - 11.1. Records of All Rainfall
  - 11.2. Condition of Erosion and Sediment Control Measures
  - 11.3. Any Additional Remedial Works Required
12. The Contractor Shall at all times Restrict Construction Equipment Movement to the Essential Construction Areas. The Contractor shall not Extend Land Disturbance Beyond 2m from the Edge of any Essential Construction Activity.

Scales	N.T.S				
Client					
Title	DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WIND TURBINE LOCATION KEY PLAN				
Drawn	M.SMITH	ENGINEERING CERTIFICATION (RPEQ)			
ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision
Designed	M.HAUSFELD				A
Rev	Revision Description	Certification	Date	Series Number	
				1 OF 10	

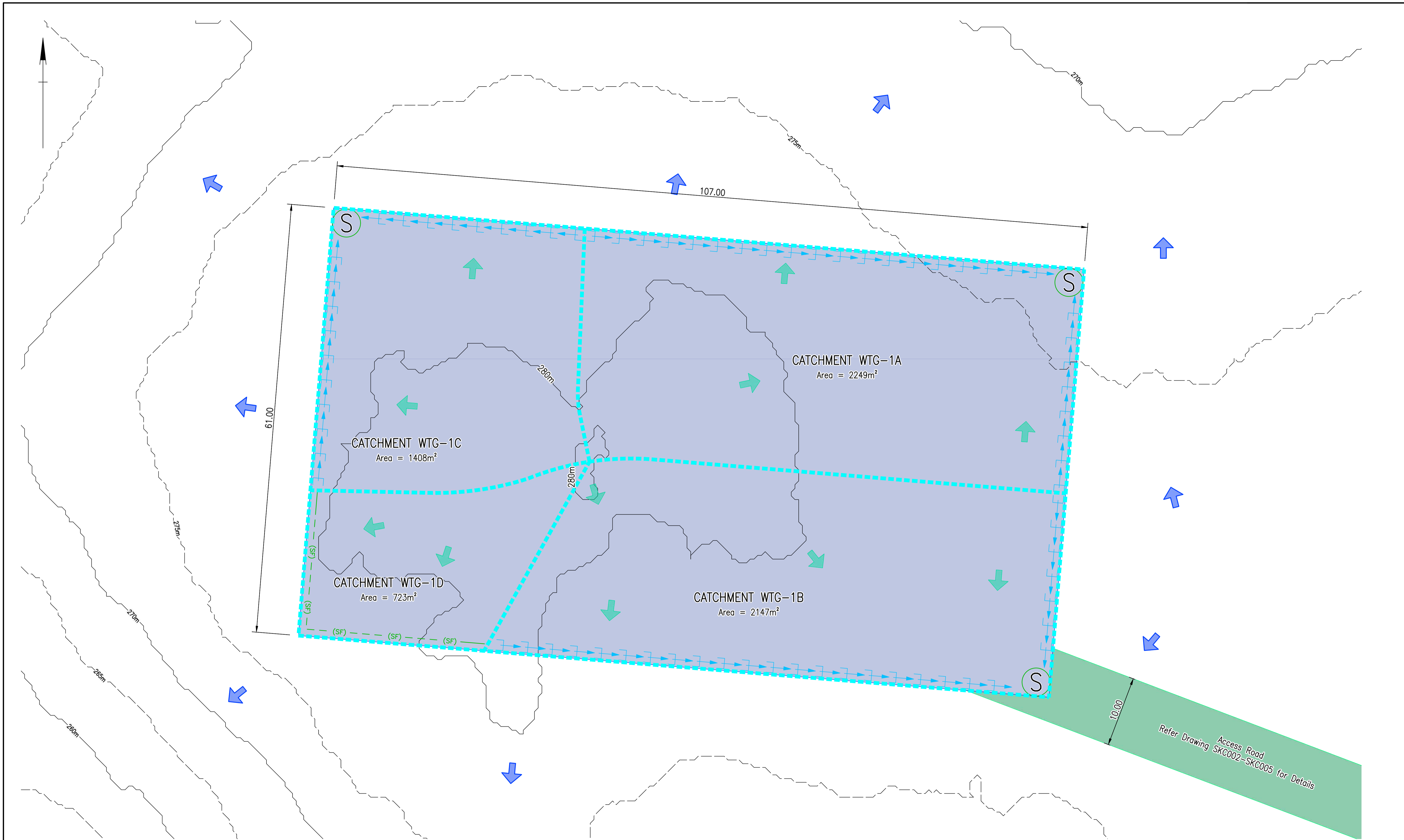
Dimensions shown in metres except where shown otherwise



Client  
  
 WULGURU TECHNICAL SERVICES  
 COPYRIGHT: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title	DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WIND TURBINE LOCATION KEY PLAN				
Drawn	M.SMITH	ENGINEERING CERTIFICATION (RPEQ)			
ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision
Designed	M.HAUSFELD				A
Rev	Revision Description	Certification	Date	Series Number	
				1 OF 10	

Job No.	WTS-002
Drawing No.	SKC010
Revision	A
Series Number	1 OF 10



WTG-1 PLAN  
Scale 1:250m

Last Modified: 1: Dec 01, 2022 - 1:28pm

A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22
Rev	Revision Description	Certification	Date

Scales	
Scale 1:250m	
Dimensions shown in metres except where shown otherwise	



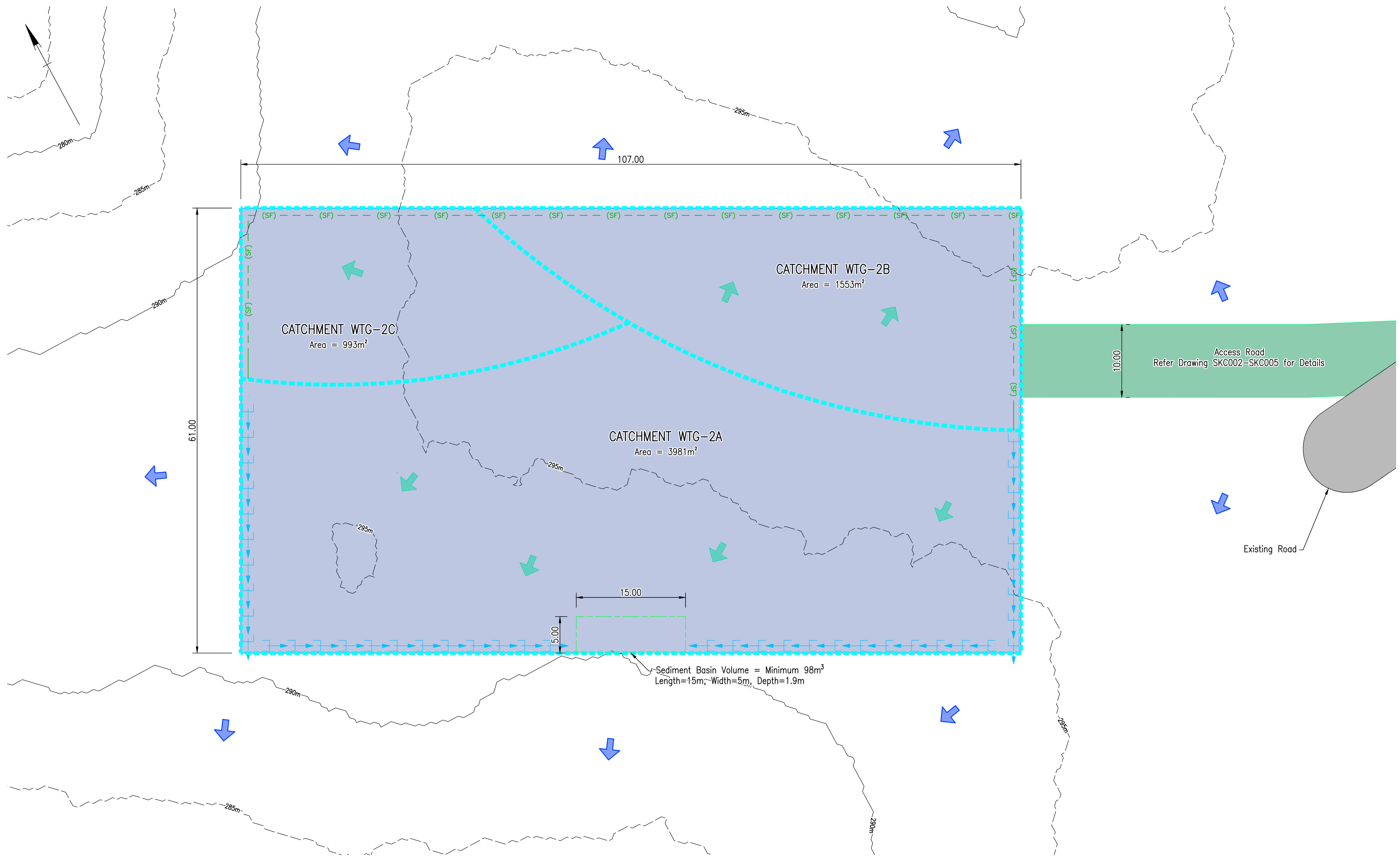
Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title				
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WTG-1 FOOTPRINT				
Drawn	ENGINEERING CERTIFICATION (RPEQ)			
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO. DATE
Designed				
M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC011
Revision	A
Series Number	2 OF 10



WTG-2 PLAN  
Scale 1:250m

Last Modified: 1: Dec 01, 2022 - 1:29pm

Rev	Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22

Scales	
Scale 1:250m	



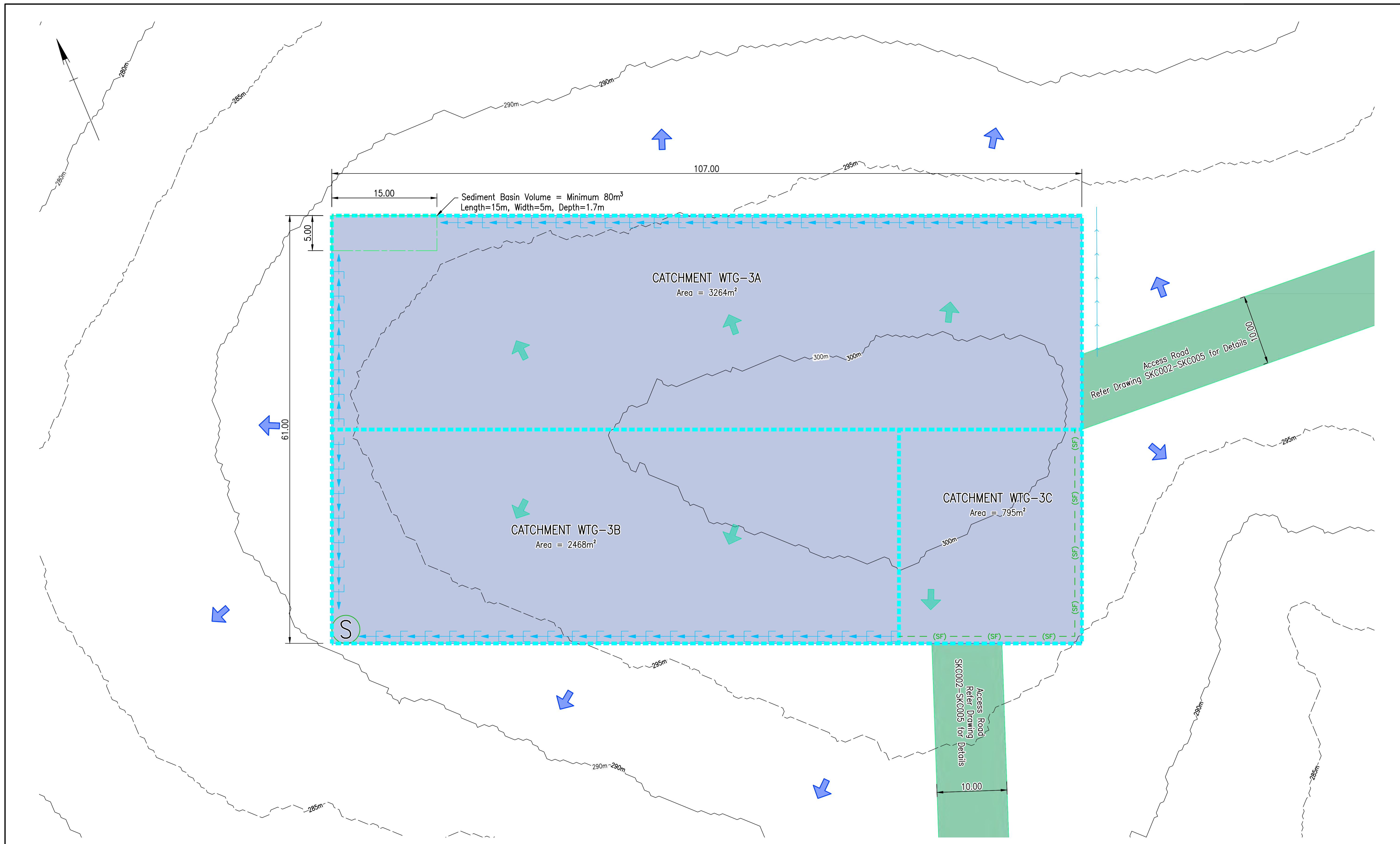
Client

**WULGURU TECHNICAL SERVICES**

**COPYRIGHT**  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title				
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WTG-2 FOOTPRINT				
Drawn	ENGINEERING CERTIFICATION (RPEQ)			
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO. DATE
Designed				
M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC012
Revision	A
Series Number	3 OF 10



WTG-3 PLAN  
Scale 1:250m

Last Modified :- Dec 01, 2022 - 1:29pm

A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22
Rev	Revision Description	Certification	Date

Scales	
Scale 1:250m	

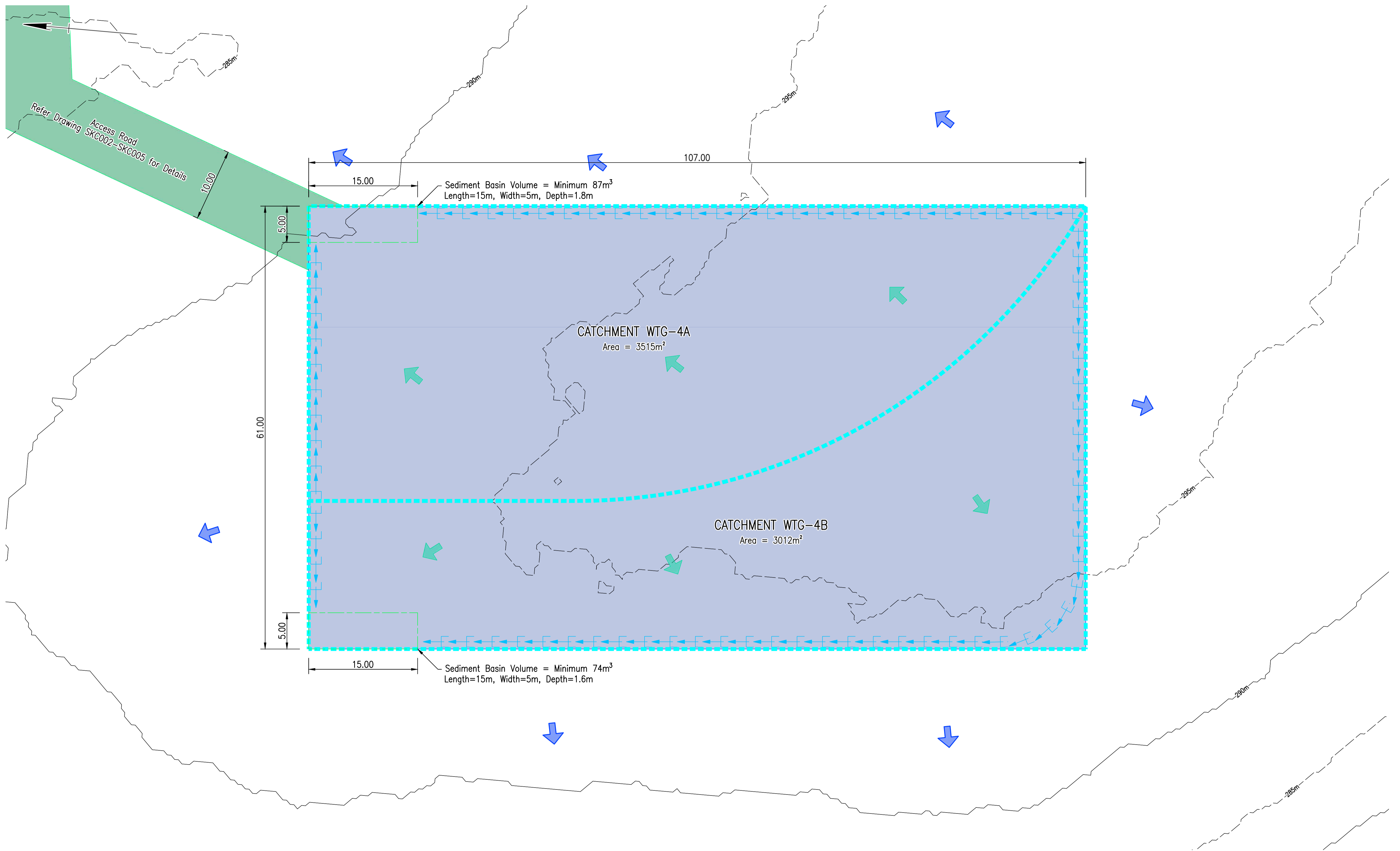
Client

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title				
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WTG-3 FOOTPRINT				
Drawn	ENGINEERING CERTIFICATION (RPEQ)			
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO. DATE
Designed				
M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC013
Revision	A
Series Number	4 OF 10





WTG-4 PLAN  
Scale 1:250m

Last Modified :- Dec 01, 2022 - 1:30pm

Rev	Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22

Scales	
Scale 1:250m	



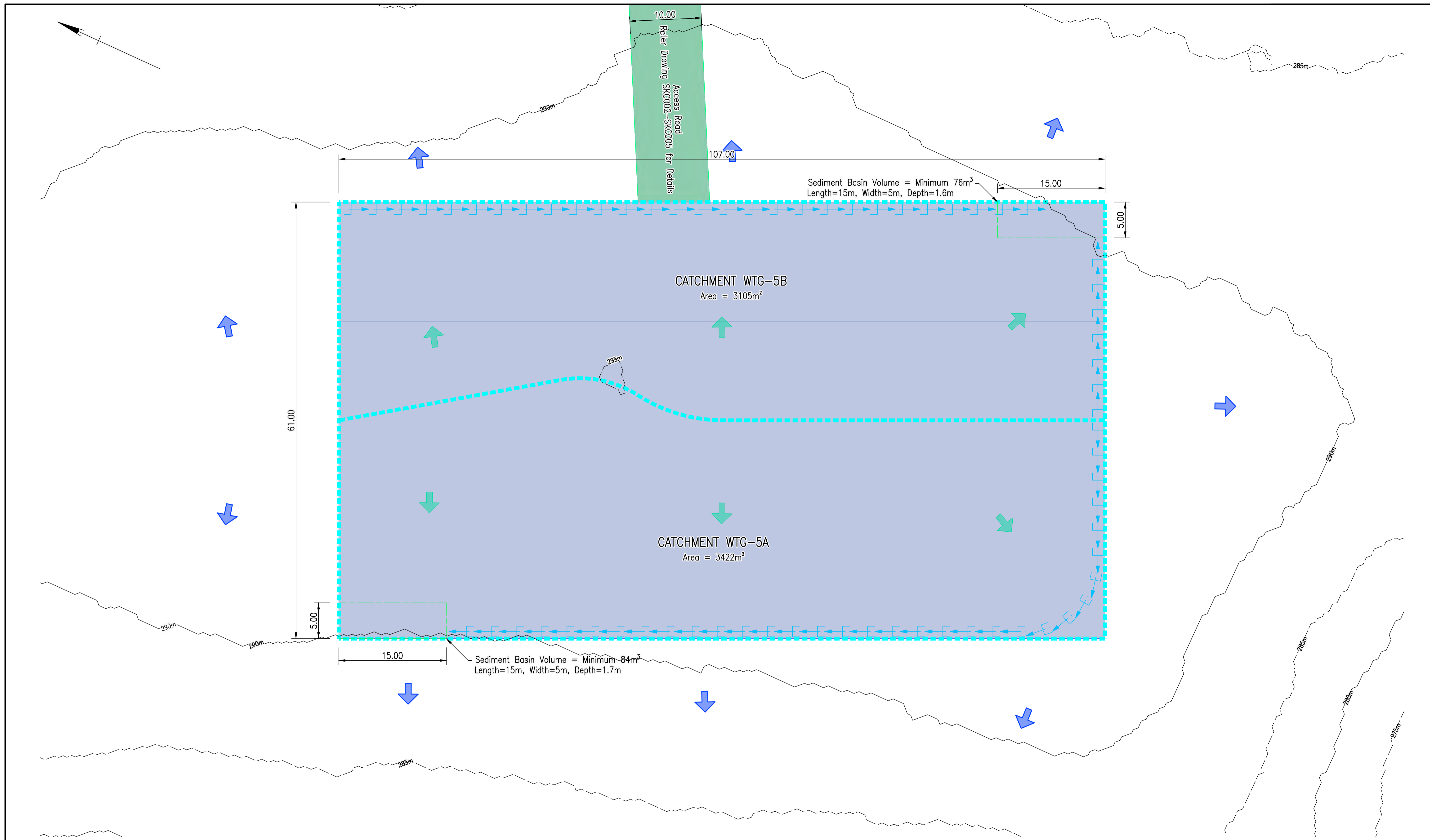
Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title		ENGINEERING CERTIFICATION (RPEQ)			
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WTG-4 FOOTPRINT		ENG. AREA	NAME	SIGNATURE	NO.
Drawn	M.SMITH	DATE			
Designed	M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC014
Revision	A
Series Number	5 OF 10



**WTG-5 PLAN**  
Scale 1:250m

Last Modified: 1: Dec 01, 2022 - 1:30pm

A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22
Rev	Revision Description	Certification	Date

Scales	
Scale 1:250m	
Dimensions shown in metres except where shown otherwise	



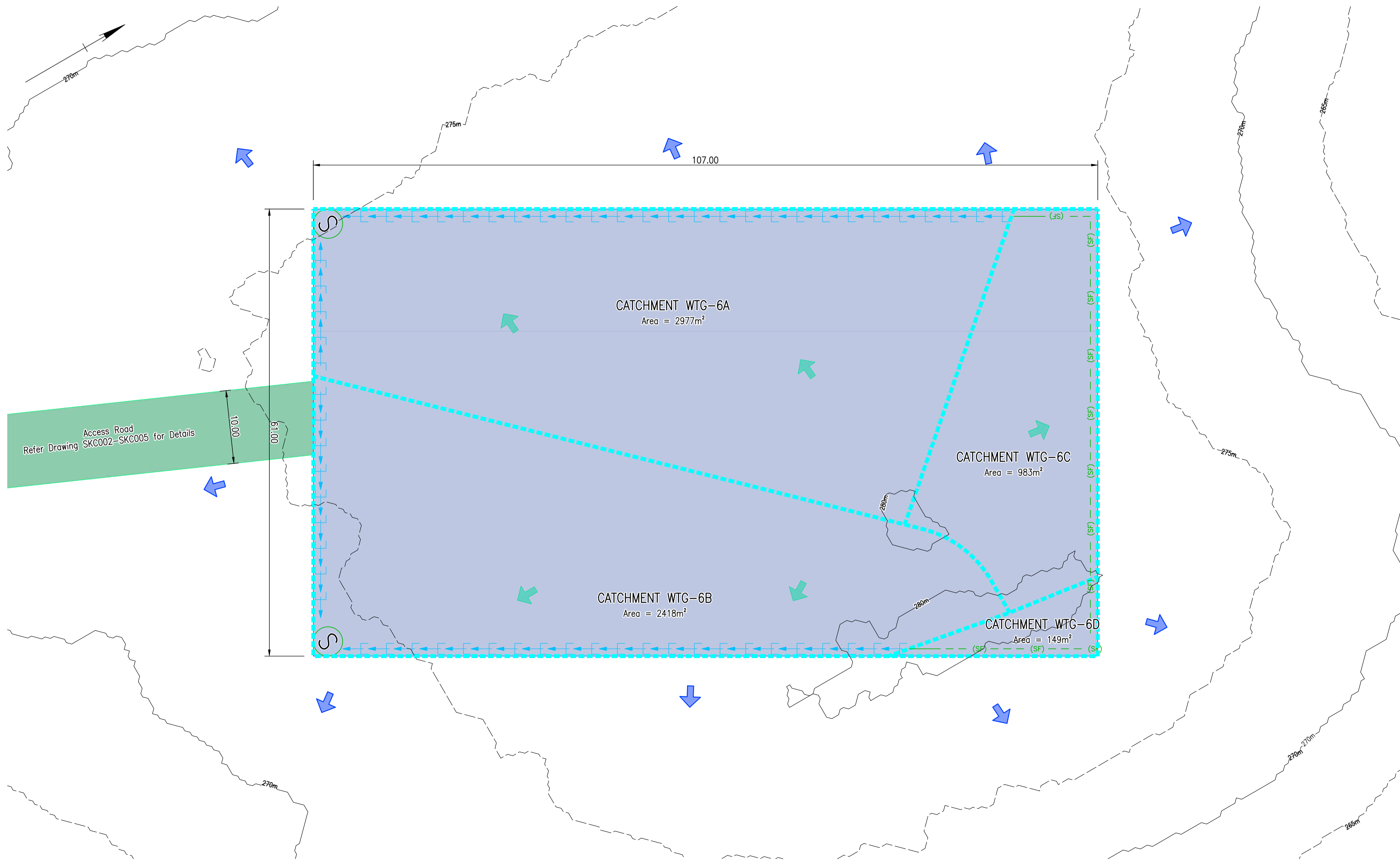
Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title					
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WTG-5 FOOTPRINT					
Drawn	ENGINEERING CERTIFICATION (RPEQ)				
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO.	DATE
Designed					
M.HAUSFELD					

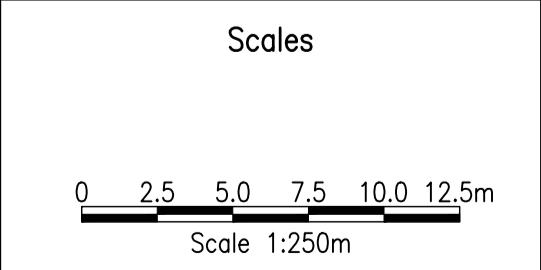
Job No.	WTS-002
Drawing No.	SKC015
Revision	A
Series Number	6 OF 10



WTG-6 PLAN  
Scale 1:250m

Last Modified: 1: Dec 01, 2022 - 1:31pm

A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22
Rev	Revision Description	Certification	Date



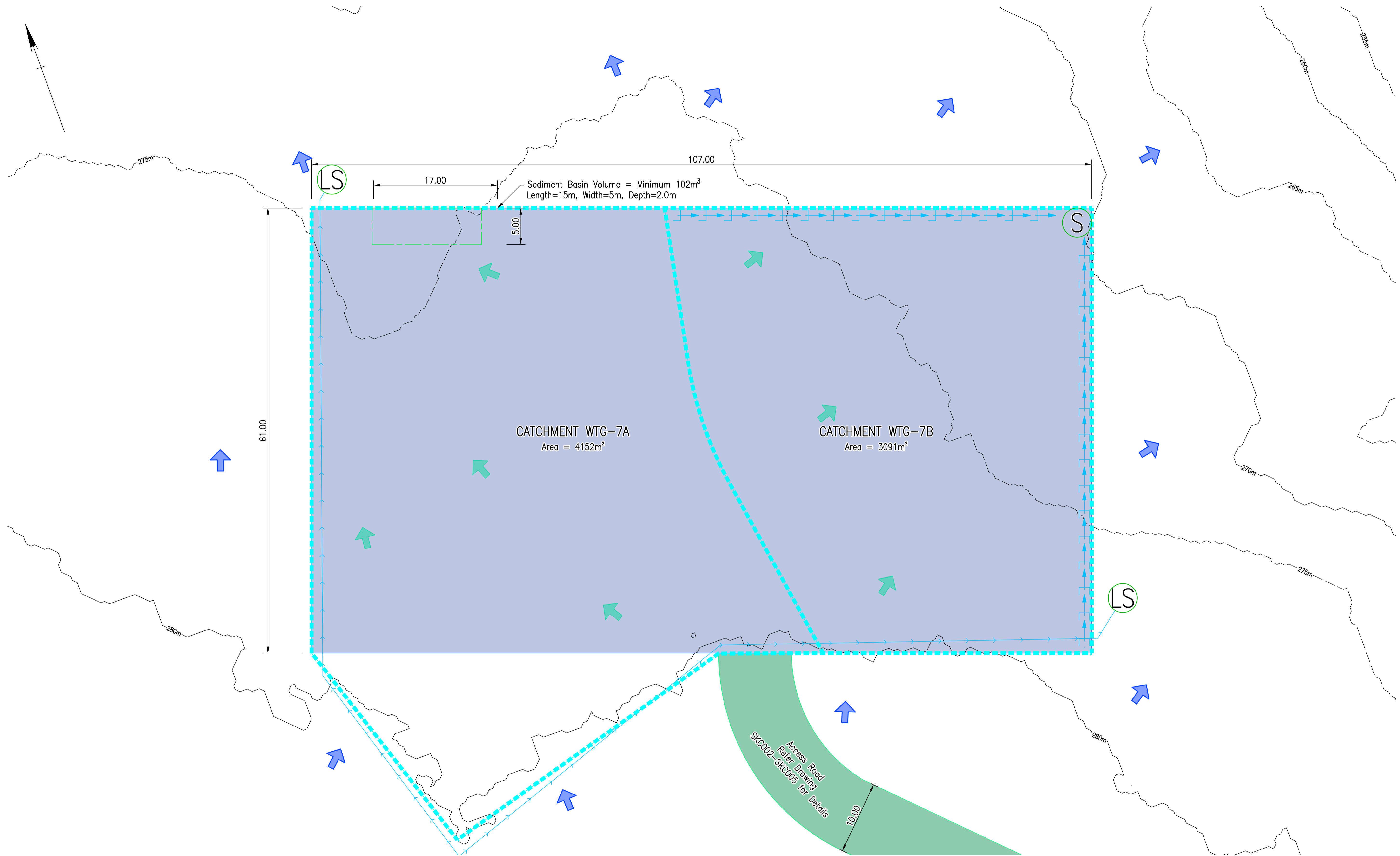
Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title		DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WTG-6 FOOTPRINT			
Drawn	ENGINEERING CERTIFICATION (RPEQ)				
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO.	DATE
Designed					
M.HAUSFELD					

Job No.	WTS-002
Drawing No.	SKC016
Revision	A
Series Number	7 OF 10



WTG-7 PLAN  
Scale 1:250m

Last Modified: - Dec 01, 2022 - 2:32pm

Rev	Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22

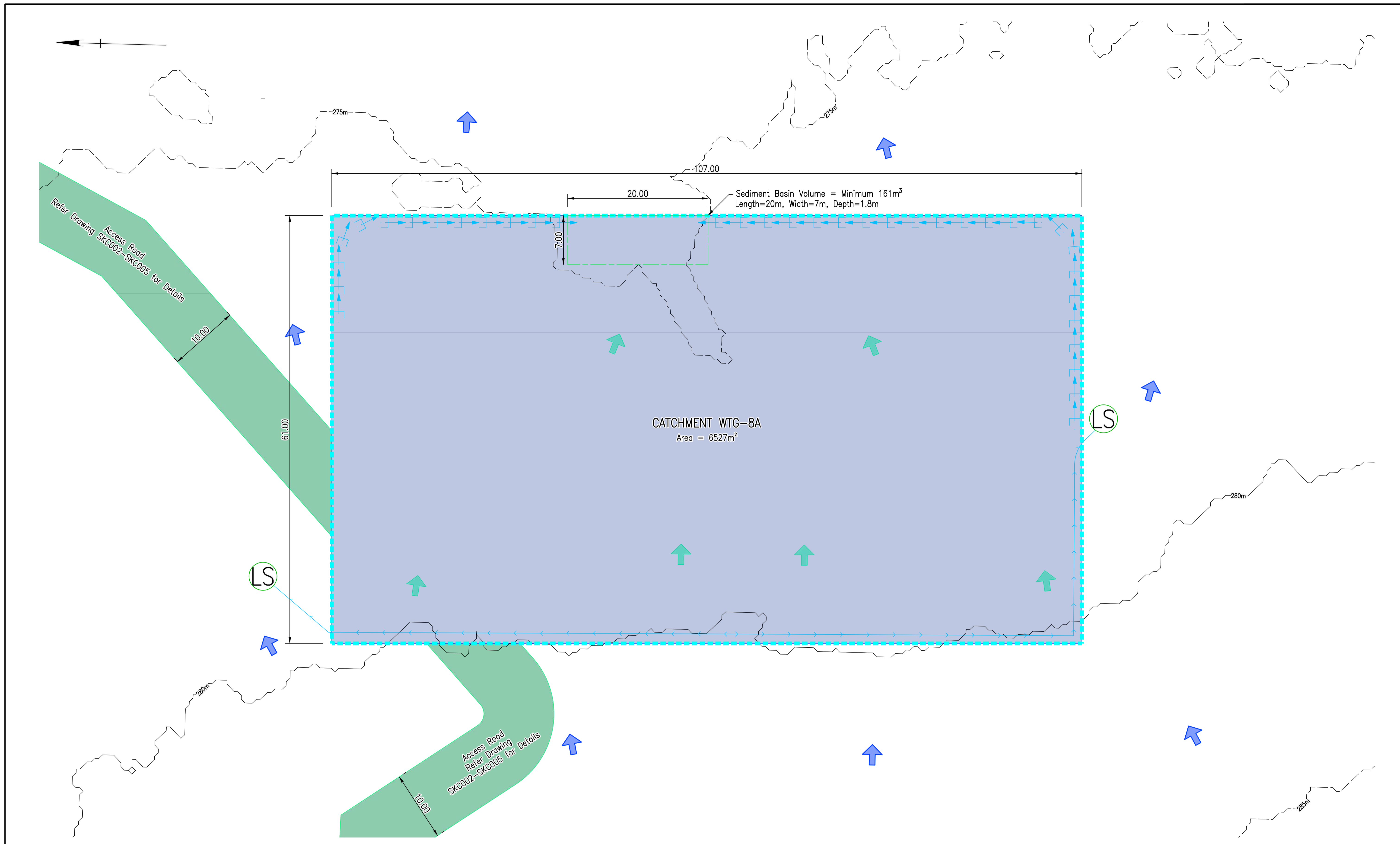
Scales	
Scale 1:250m	

Client

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title		ENGINEERING CERTIFICATION (RPEQ)			
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WTG-7 FOOTPRINT		ENG. AREA	NAME	SIGNATURE	NO.
Drawn	M.SMITH	DESIGNED	M.HAUSFELD	DATE	

Job No.	WTS-002
Drawing No.	SKC017
Revision	A
Series Number	8 OF 10



WTG-8 PLAN  
Scale 1:250m

Last Modified: 1: Dec 01, 2022 - 1:32pm

A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22
Rev	Revision Description	Certification	Date

Scales	
Scale 1:250m	



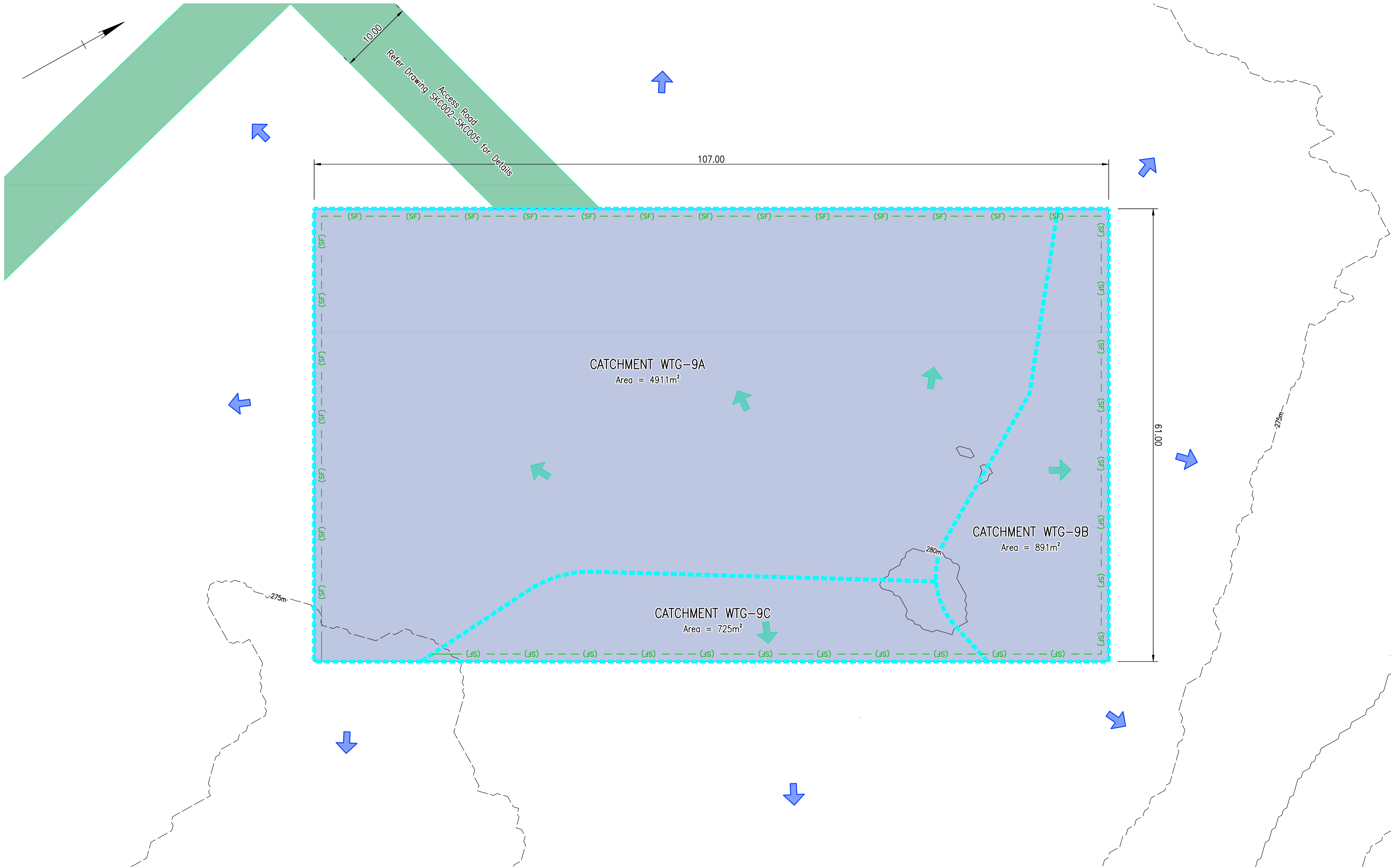
Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title		DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WTG-8 FOOTPRINT			
Drawn	M.SMITH	ENGINEERING CERTIFICATION (RPEQ)			
Designed	M.HAUSFELD	ENG. AREA	NAME	SIGNATURE	NO. DATE

Job No.	WTS-002
Drawing No.	SKC018
Revision	A
Series Number	9 OF 10



WTG-9 PLAN  
Scale 1:250m

Last Modified: 1: Dec 01, 2022 - 1:32pm

Rev	Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22

Scales	
Scale 1:250m	



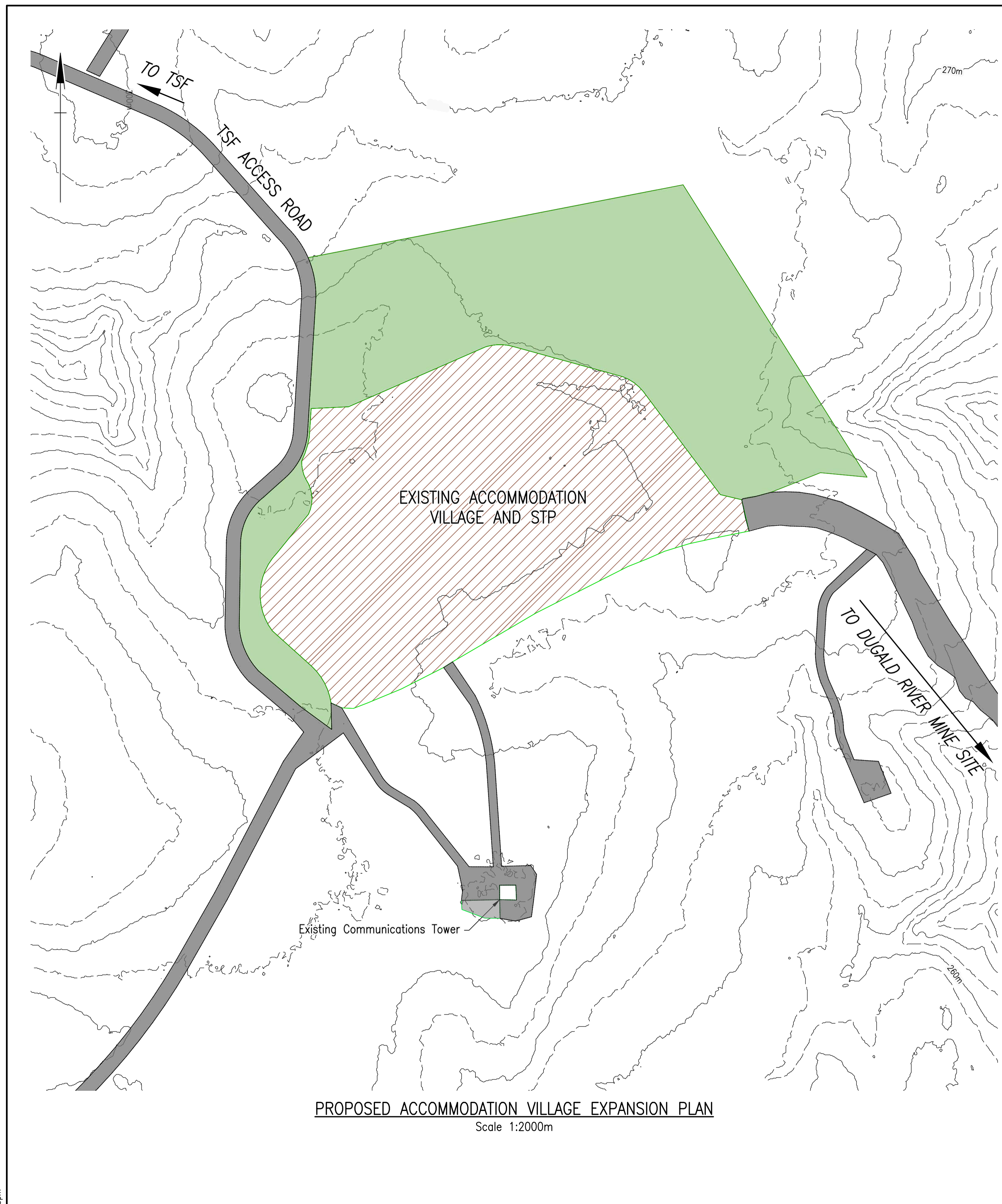
Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title		ENGINEERING CERTIFICATION (RPEQ)			
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL WTG-9 FOOTPRINT		ENG. AREA	NAME	SIGNATURE	NO.
		DATE			
Drawn	M.SMITH				
Designed	M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC019
Revision	A
Series Number	10 OF 10



**FEATURES LEGEND:**

- Existing Surface Contour
- Existing Roadways
- Existing Village Accommodation Area
- Proposed Village Expansion Area

**EROSION CONTROL LEGEND:**

- Proposed Sediment Fence
- Proposed Clean Water Diversion Channels (Direction Shown)
- Proposed Dirty Water Catchment Area
- Proposed Dirty Water Catchment Channel/Bunding (Direction Shown)
- Proposed Whoa boys and Turnouts
- Proposed Sediment Basin Extents
- Proposed Sediment Weir
- Proposed Level Spreader
- Existing Overland Flow (Clean)
- Existing Overland Flow (Dirty)

**EROSION AND SEDIMENT CONTROL NOTES:**

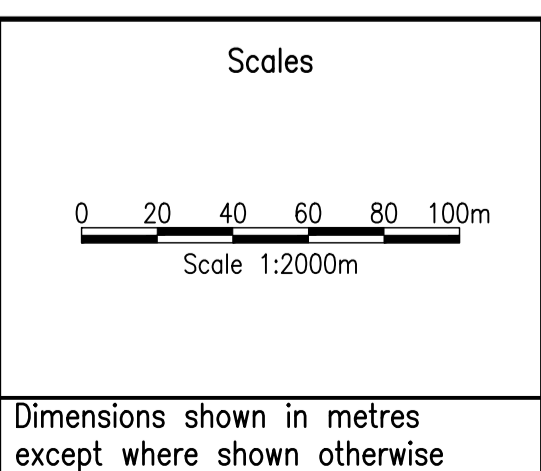
1. All Erosion and Sediment Control Measures to be in Accordance with the Best Practice Erosion and Sediment Control Guidelines, IECA, 2008.
2. Works for Infrastructure Expansion Footprints shall be Undertaken in the Following Sequence:
  - 2.1. Install Stabilised Site Access
  - 2.2. Construct Clean Water Diversion Channels and Level Spreaders where External Catchments Discharge to the Site
  - 2.3. Construct Dirty Water Channels/ Bunds
  - 2.4. Construct Sediment Basins and Sediment Weirs
  - 2.5. Install all Sediment Fencing
  - 2.6. Locate Stockpile Locations and Install Sediment Fences on Downstream sides
  - 2.7. Topsoil and Rehabilitate Bulk Earthwork Areas Immediately upon Completion
  - 2.8. Rehabilitate the Site
  - 2.9. Decommission Sediment Basins and Sediment Weirs and Remove Erosion and Sediment Control Measures once Surfaces are Stabilised to the Satisfaction of the Superintendent

This Sequence is to be Reviewed in Context of Staging of Works, However, Must Achieve all Environmental Requirements.
3. Works for Access Roads shall be Undertaken in the Following Sequence:
  - 3.1. Install Stabilised Site Access
  - 3.2. Install Cut Off Channels to Divert External Catchment Flows to all Low Points, Gullies and Watercourses
  - 3.3. Construct Rock Rip Rap Crossings at Low Points, Gullies and Watercourses
  - 3.4. Construct Whoa Boys and Associated Mitre Drains and Level Spreaders at Required Spacings
4. Controls Affected by Works are to be Re-established Prior to the Completion of each days work.
5. The Contractor is to Stabilise all Disturbed Areas as soon as Final Levels are Reached.
6. Dust Control Measures shall be Implemented Continuously during Construction Works to the Satisfaction of the Superintendent and Council.
7. Topsoil Shall be Spread and Stabilised as Soon as Possible, Disturbed Areas shall be left with a Scarified Surface to Encourage Water Infiltration and Assist in Keying in Topsoil.
8. All Trees to be Retained Unless Approved for Removal by the Superintendent.
9. Topsoil Stockpiles shall not Exceed 2m in Height and Batter Slopes to be 1V:3H Maximum.
10. All Access to Site is to be Via the Stabilised Site Access. Site Shall be Fully Fenced to Prevent Access From Other Areas.
11. The Contractor Shall Maintain a Log Book Detailing:
  - 11.1. Records of All Rainfall
  - 11.2. Condition of Erosion and Sediment Control Measures
  - 11.3. Any Additional Remedial Works Required
12. The Contractor Shall at all times Restrict Construction Equipment Movement to the Essential Construction Areas. The Contractor shall not Extend Land Disturbance Beyond 2m from the Edge of any Essential Construction Activity.

**PROPOSED ACCOMMODATION VILLAGE EXPANSION PLAN**  
Scale 1:2000m

Last Modified: 1: Dec 01, 2022 - 1:45pm

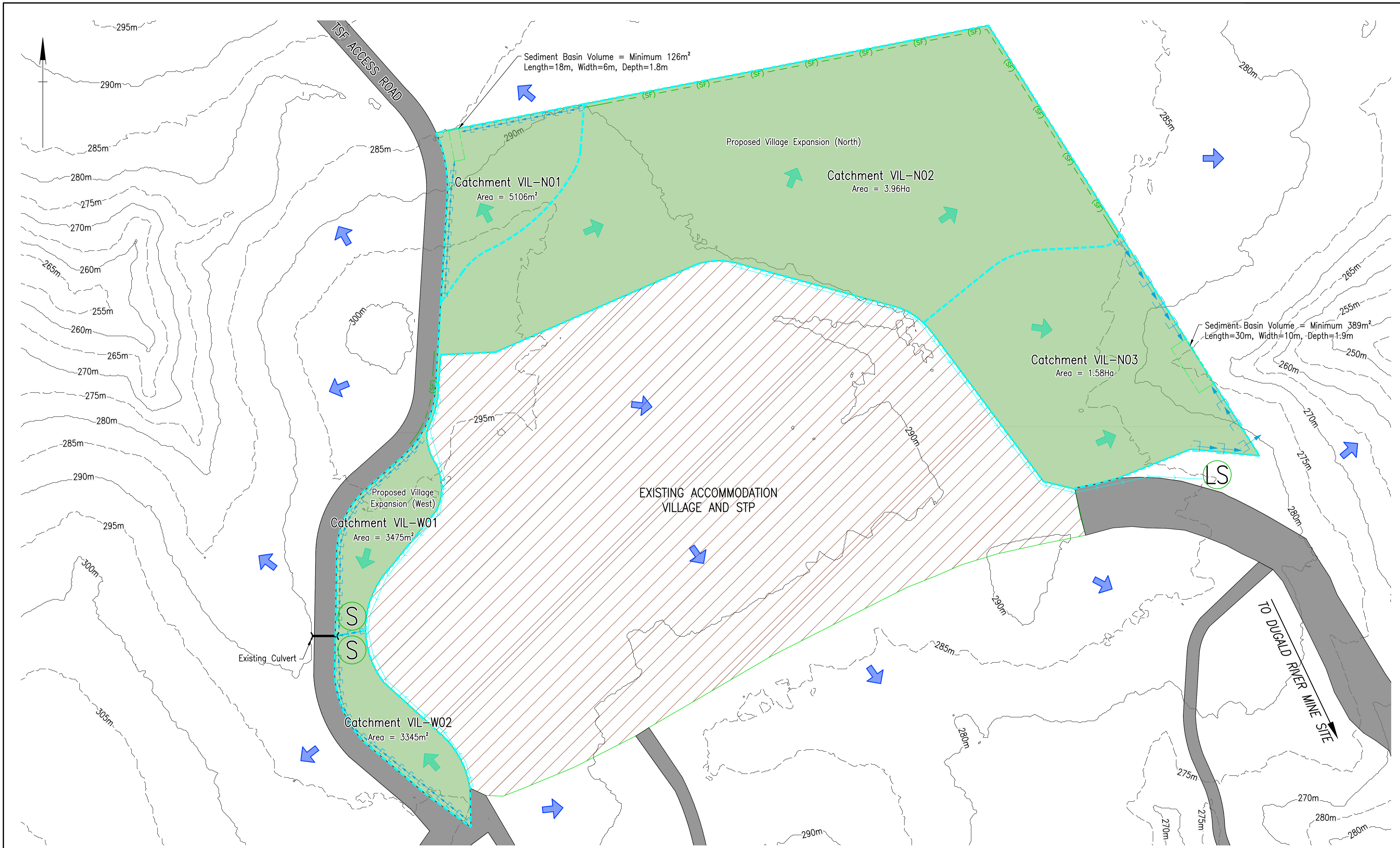
Rev	Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22



Client

**COPYRIGHT:**  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

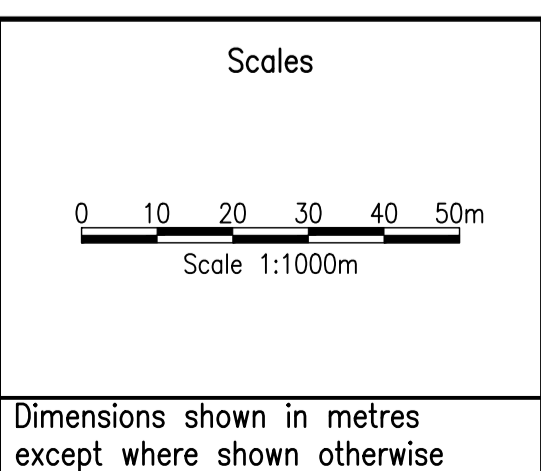
Title					Job No.	WTS-002
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL ACCOMMODATION VILLAGE EXPANSION OVERVIEW					Drawing No.	SKC020
Drawn	ENGINEERING CERTIFICATION (RPEQ)				Revision	A
M.HAUSFELD	ENG. AREA	NAME	SIGNATURE	NO.	DATE	
Designed					Series Number	1 OF 2
M.SMITH						



PROPOSED ACCOMMODATION VILLAGE EXPANSION PLAN  
Scale 1:1000m

Last Modified: - Dec 01, 2022 - 2:30pm

Rev	Revision Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22



Client

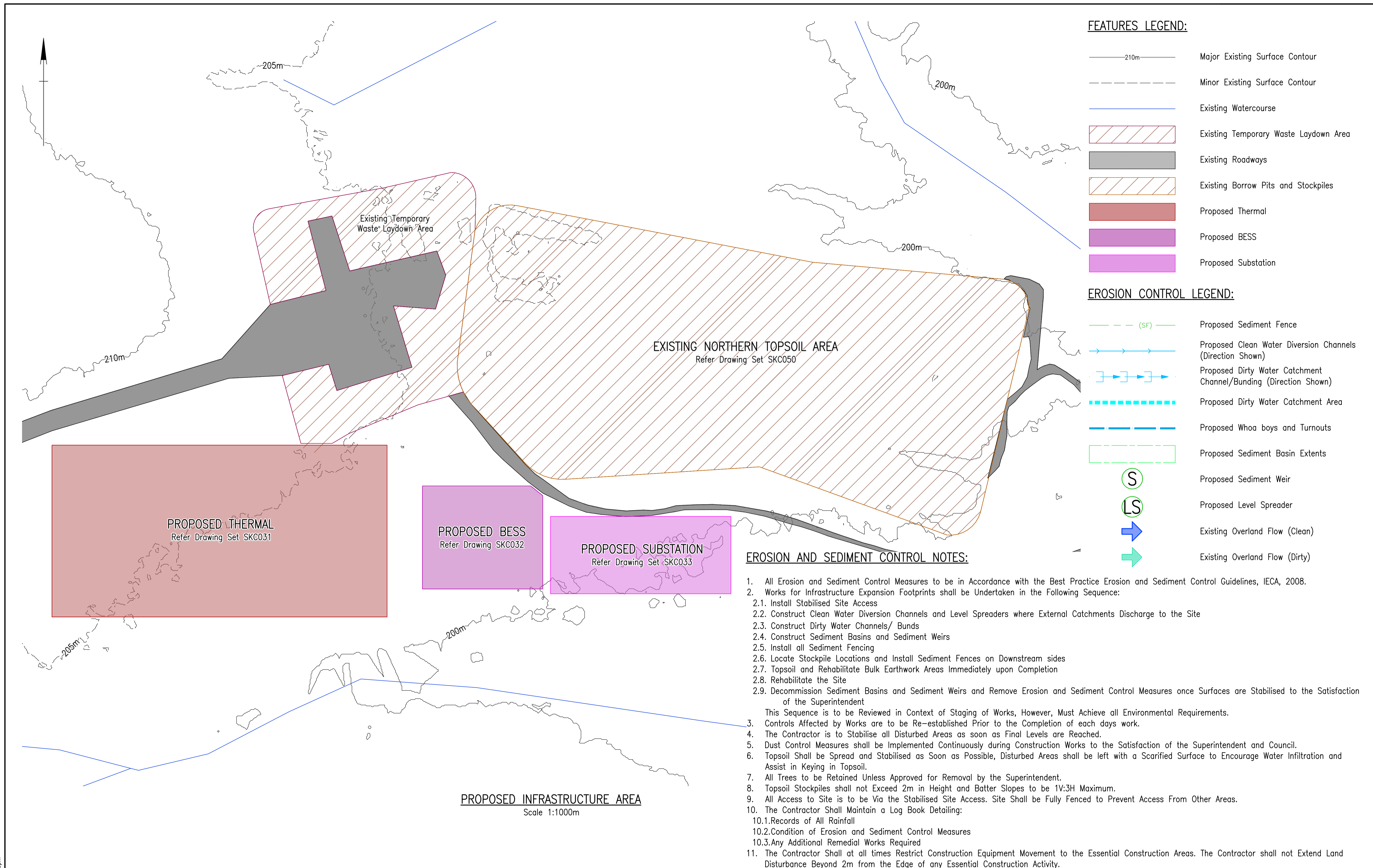
WULGURU TECHNICAL SERVICES

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title		ENGINEERING CERTIFICATION (RPEQ)			
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL ACCOMMODATION VILLAGE EXPANSION DETAILS		ENG. AREA	NAME	SIGNATURE	NO. DATE
Drawn	M.SMITH				
Designed	M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC021
Revision	A
Series Number	2 OF 2





- FEATURES LEGEND:**
- 210m Major Existing Surface Contour
  - Minor Existing Surface Contour
  - Existing Watercourse
  - Existing Temporary Waste Laydown Area
  - Existing Roadways
  - Existing Borrow Pits and Stockpiles
  - Proposed Thermal
  - Proposed BESS
  - Proposed Substation

- EROSION CONTROL LEGEND:**
- Proposed Sediment Fence
  - Proposed Clean Water Diversion Channels (Direction Shown)
  - Proposed Dirty Water Catchment Channel/Bunding (Direction Shown)
  - Proposed Dirty Water Catchment Area
  - Proposed Whoa boys and Turnouts
  - Proposed Sediment Basin Extents
  - Proposed Sediment Weir
  - Proposed Level Spreader
  - Existing Overland Flow (Clean)
  - Existing Overland Flow (Dirty)

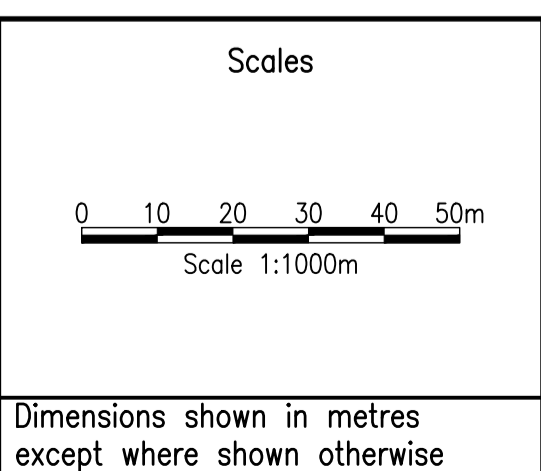
**EROSION AND SEDIMENT CONTROL NOTES:**

1. All Erosion and Sediment Control Measures to be in Accordance with the Best Practice Erosion and Sediment Control Guidelines, IECA, 2008.
2. Works for Infrastructure Expansion Footprints shall be Undertaken in the Following Sequence:
  - 2.1. Install Stabilised Site Access
  - 2.2. Construct Clean Water Diversion Channels and Level Spreaders where External Catchments Discharge to the Site
  - 2.3. Construct Dirty Water Channels/ Bunds
  - 2.4. Construct Sediment Basins and Sediment Weirs
  - 2.5. Install all Sediment Fencing
  - 2.6. Locate Stockpile Locations and Install Sediment Fences on Downstream sides
  - 2.7. Topsoil and Rehabilitate Bulk Earthwork Areas Immediately upon Completion
  - 2.8. Rehabilitate the Site
  - 2.9. Decommission Sediment Basins and Sediment Weirs and Remove Erosion and Sediment Control Measures once Surfaces are Stabilised to the Satisfaction of the Superintendent
3. Controls Affected by Works are to be Re-established Prior to the Completion of each days work.
4. The Contractor is to Stabilise all Disturbed Areas as soon as Final Levels are Reached.
5. Dust Control Measures shall be Implemented Continuously during Construction Works to the Satisfaction of the Superintendent and Council.
6. Topsoil Shall be Spread and Stabilised as Soon as Possible, Disturbed Areas shall be left with a Scarified Surface to Encourage Water Infiltration and Assist in Keying in Topsoil.
7. All Trees to be Retained Unless Approved for Removal by the Superintendent.
8. Topsoil Stockpiles shall not Exceed 2m in Height and Batter Slopes to be 1V:3H Maximum.
9. All Access to Site is to be Via the Stabilised Site Access. Site Shall be Fully Fenced to Prevent Access From Other Areas.
10. The Contractor Shall Maintain a Log Book Detailing:
  - 10.1. Records of All Rainfall
  - 10.2. Condition of Erosion and Sediment Control Measures
  - 10.3. Any Additional Remedial Works Required
11. The Contractor Shall at all times Restrict Construction Equipment Movement to the Essential Construction Areas. The Contractor shall not Extend Land Disturbance Beyond 2m from the Edge of any Essential Construction Activity.

**PROPOSED INFRASTRUCTURE AREA**  
Scale 1:1000m

Last Modified: 1: - Dec 01, 2022 - 1:46pm

Rev	Revision Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22

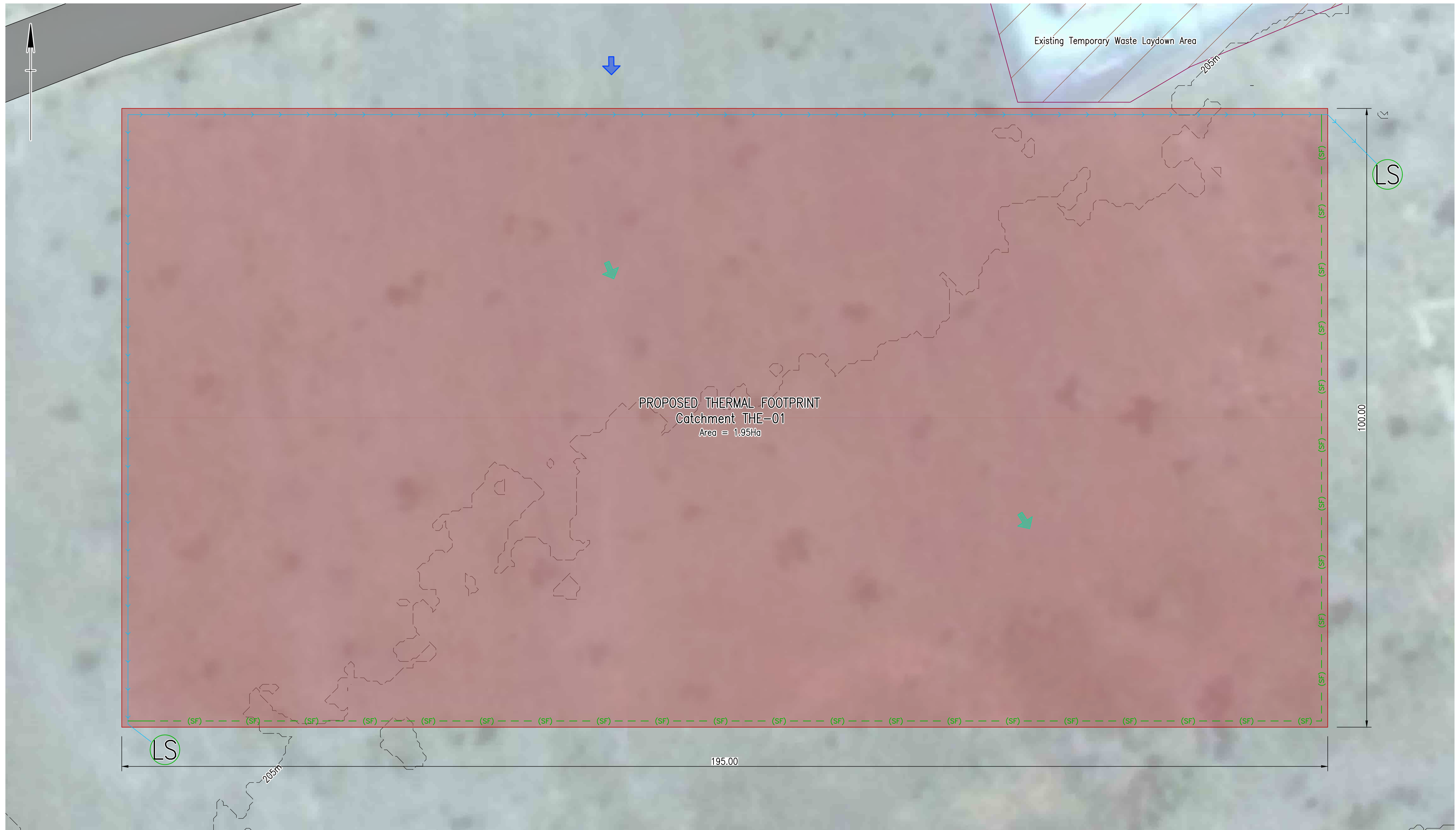


Client

WULGURU TECHNICAL SERVICES

COPYRIGHT: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title					Job No.	
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL PROPOSED THERMAL, BESS AND SUBSTATION INFRASTRUCTURE					WTS-002	
Drawn					Drawing No.	
M.SMITH					SKC030	
ENGINEERING CERTIFICATION (RPEQ)					Revision	
ENG. AREA	NAME	SIGNATURE	NO.	DATE	A	
Designed					Series Number	
M.HAUSFELD					1 OF 3	



PROPOSED WINDFARM THERMAL FOOTPRINT  
Scale 1::300m

Last Modified :- Dec 01, 2022 - 1:34pm

A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22
Rev	Revision Description	Certification	Date

Scales
Scale 1:300m
Dimensions shown in metres except where shown otherwise



Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title				
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL PROPOSED THERMAL INFRASTRUCTURE				
Drawn	ENGINEERING CERTIFICATION (RPEQ)			
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO. DATE
Designed				
M.HAUSFELD				

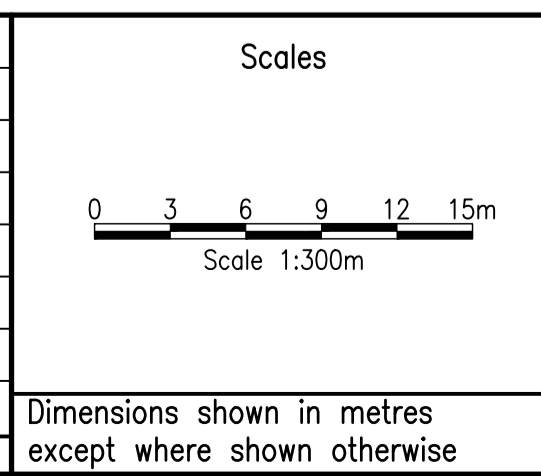
Job No.	WTS-002
Drawing No.	SKC031
Revision	A
Series Number	2 OF 3



**PROPOSED BESS AND SUBSTATION FOOTPRINT**  
Scale 1:300m

Last Modified: 1: Dec 01, 2022 - 1:35pm

Rev	Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22



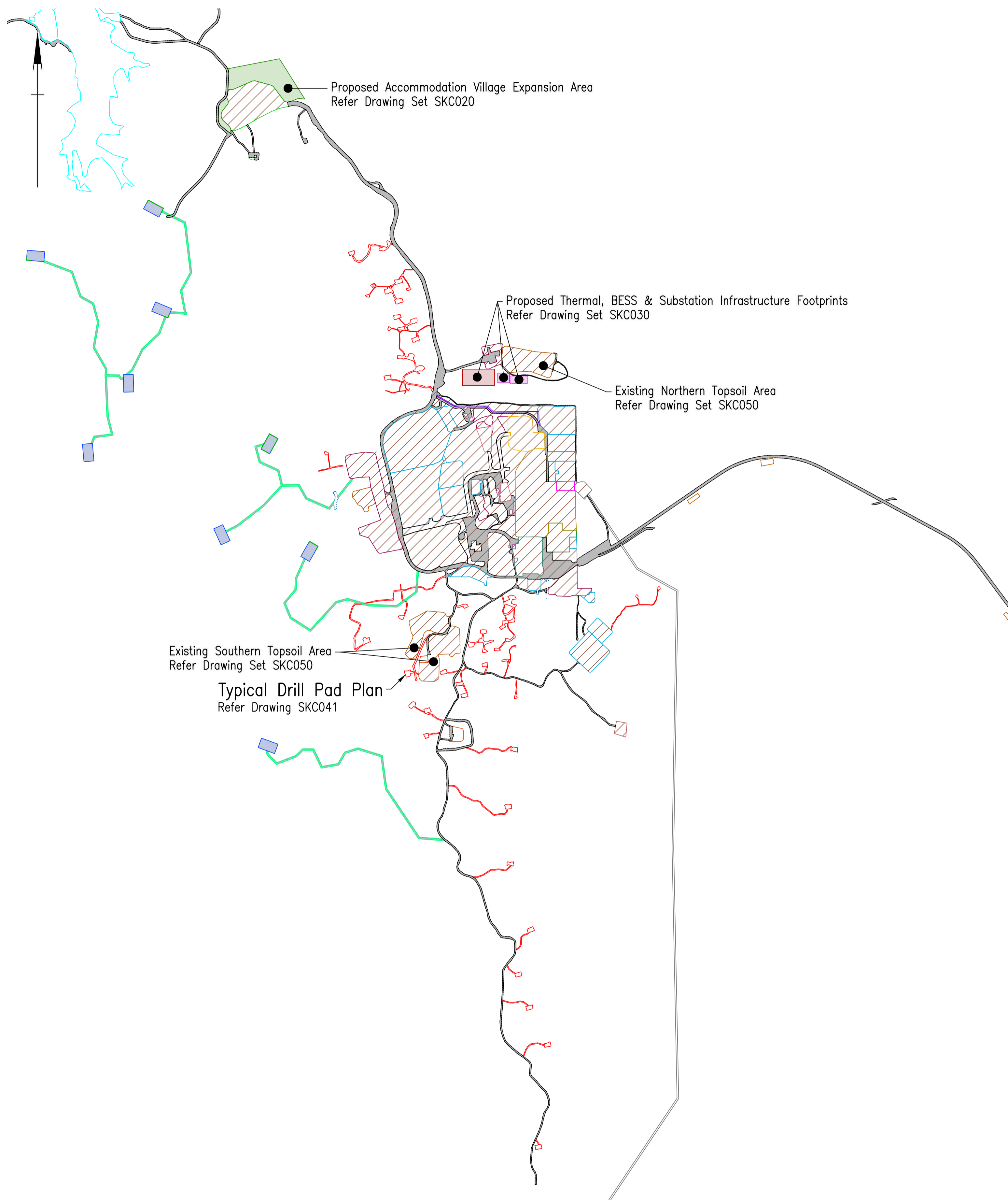
Client

**WULGURU TECHNICAL SERVICES**

**COPYRIGHT**  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title				
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL PROPOSED BESS/SUBSTATION INFRASTRUCTURE				
Drawn	ENGINEERING CERTIFICATION (RPEQ)			
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO. DATE
Designed				
M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC032
Revision	A
Series Number	3 OF 3



**FEATURES LEGEND:**

- 210m Major Existing Surface Contour
- Minor Existing Surface Contour
- Existing Mine Infrastructure
- Haulroads
- Existing Investigation Drill Pads and Tracks
- Existing Powerline Corridor
- Proposed Investigation Tracks
- Proposed Wind Turbine Hard Stand

**EROSION CONTROL LEGEND:**

- Proposed Sediment Fence
- Proposed Clean Water Diversion Channels (Direction Shown)
- Proposed Dirty Water Catchment Channel/Bunding (Direction Shown)
- Proposed Dirty Water Catchment Area
- Proposed Whoa boys and Turnouts
- Proposed Sediment Basin Extents
- Proposed Sediment Weir
- Proposed Level Spreader
- Existing Overland Flow (Clean)
- Existing Overland Flow (Dirty)

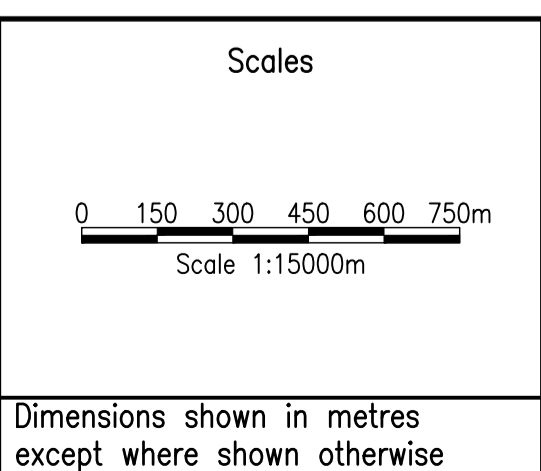
**EROSION AND SEDIMENT CONTROL NOTES:**

1. All Erosion and Sediment Control Measures to be in Accordance with the Best Practice Erosion and Sediment Control Guidelines, IECA, 2008.
2. Works for Infrastructure Expansion Footprints shall be Undertaken in the Following Sequence:
  - 2.1. Install Stabilised Site Access
  - 2.2. Construct Clean Water Diversion Channels and Level Spreaders where External Catchments Discharge to the Site
  - 2.3. Construct Dirty Water Channels/ Bunds
  - 2.4. Construct Sediment Basins and Sediment Weirs
  - 2.5. Install all Sediment Fencing
  - 2.6. Locate Stockpile Locations and Install Sediment Fences on Downstream sides
  - 2.7. Topsoil and Rehabilitate Bulk Earthwork Areas Immediately upon Completion
  - 2.8. Rehabilitate the Site
  - 2.9. Decommission Sediment Basins and Sediment Weirs and Remove Erosion and Sediment Control Measures once Surfaces are Stabilised to the Satisfaction of the Superintendent

This Sequence is to be Reviewed in Context of Staging of Works, However, Must Achieve all Environmental Requirements.
3. Works for Access Roads shall be Undertaken in the Following Sequence:
  - 3.1. Install Stabilised Site Access
  - 3.2. Install Cut Off Channels to Divert External Catchment Flows to all Low Points, Gullies and Watercourses
  - 3.3. Construct Rock Rip Rap Crossings at Low Points, Gullies and Watercourses
  - 3.4. Construct Woah Boys and Associated Mitre Drains and Level Spreaders at Required Spacings
4. Controls Affected by Works are to be Re-established Prior to the Completion of each days work.
5. The Contractor is to Stabilise all Disturbed Areas as soon as Final Levels are Reached.
6. Dust Control Measures shall be Implemented Continuously during Construction Works to the Satisfaction of the Superintendent and Council.
7. Topsoil Shall be Spread and Stabilised as Soon as Possible, Disturbed Areas shall be left with a Scarified Surface to Encourage Water Infiltration and Assist in Keying in Topsoil.
8. All Trees to be Retained Unless Approved for Removal by the Superintendent.
9. Topsoil Stockpiles shall not Exceed 2m in Height and Batter Slopes to be 1V:3H Maximum.
10. All Access to Site is to be Via the Stabilised Site Access. Site Shall be Fully Fenced to Prevent Access From Other Areas.
11. The Contractor Shall Maintain a Log Book Detailing:
  - 11.1. Records of All Rainfall
  - 11.2. Condition of Erosion and Sediment Control Measures
  - 11.3. Any Additional Remedial Works Required
12. The Contractor Shall at all times Restrict Construction Equipment Movement to the Essential Construction Areas. The Contractor shall not Extend Land Disturbance Beyond 2m from the Edge of any Essential Construction Activity.

Last Modified :- Dec 01, 2022 - 1:46pm

Rev	Revision Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22



Client

COPYRIGHT: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title					
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL INVESTIGATION DRILL PAD AND TRACKS LOCATION KEY PLAN					
Drawn	ENGINEERING CERTIFICATION (RPEQ)				
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO.	DATE
Designed	M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC040
Revision	A
Series Number	1 OF 3



EXISTING INVESTIGATION DRILL PAD AND TRACKS FOOTPRINT  
Scale 1:250m

Last Modified: 1- Dec 01, 2022 - 1:35pm

A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22
Rev	Revision Description	Certification	Date

Scales	
Scale 1:250m	
Dimensions shown in metres except where shown otherwise	



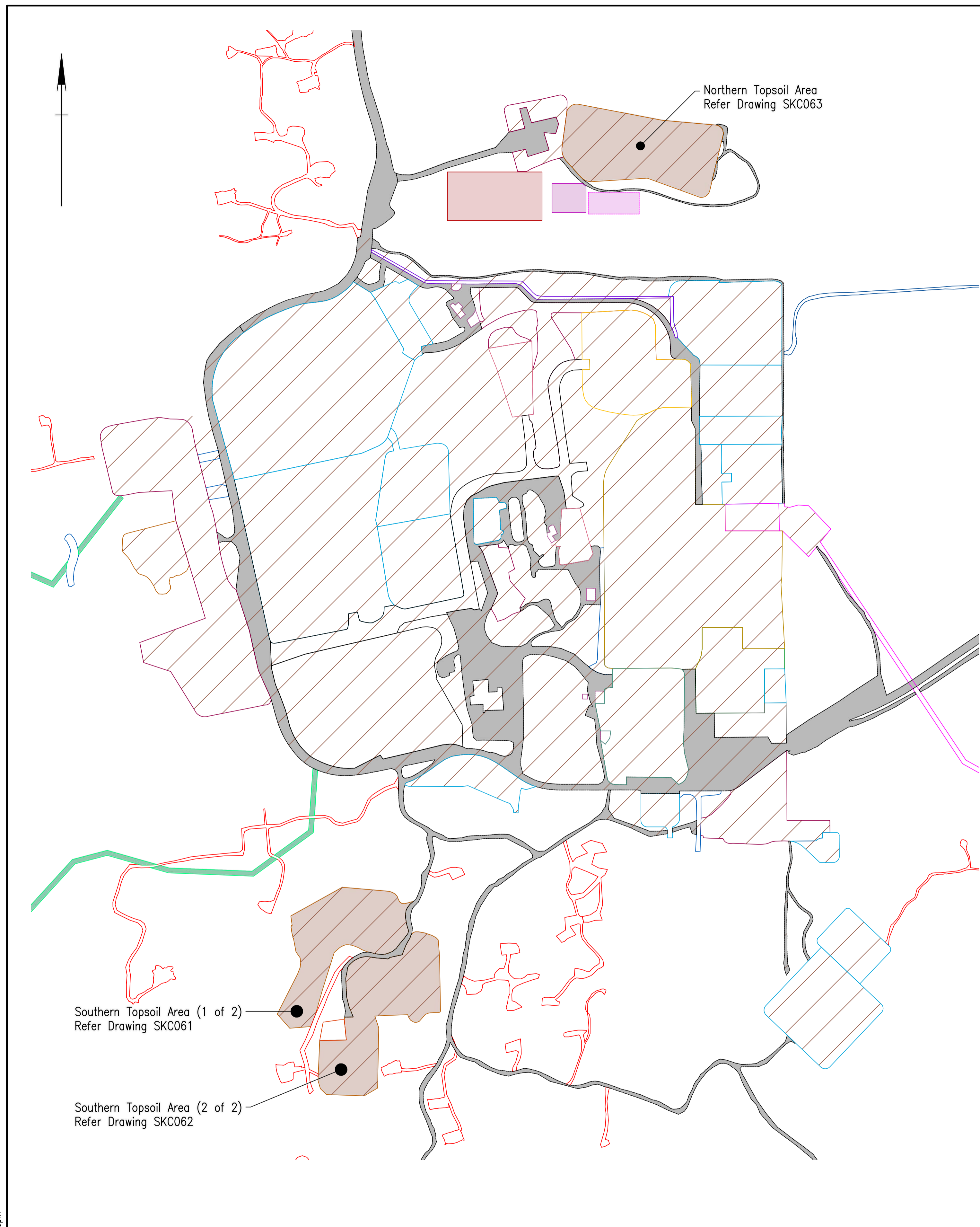
Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title				
<b>DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL TYPICAL EXISTING INVESTIGATION DRILL PAD AND TRACKS</b>				
Drawn	ENGINEERING CERTIFICATION (RPEQ)			
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO. DATE
Designed				
M.HAUSFELD				

Job No.	WTS-002
Drawing No.	SKC041
Revision	A
Series Number	2 OF 3



**FEATURES LEGEND:**

- Existing Roadways
- Existing Mine Infrastructure
- Existing Topsoil Area
- Existing Drill Pads
- Existing Powerline Corridor
- Proposed Investigation Tracks (Drawing Set SKC000)
- Thermal Location (Drawing Set SKC040)
- Bess Location (Drawing Set SKC040)
- Substation Location (Drawing Set SKC040)

**EROSION CONTROL DEVICES LEGEND:**

- Proposed Sediment Fence
- Proposed Clean Water Diversion Channels (Direction Shown)
- Proposed Dirty Water Catchment Channel/Bunding (Direction Shown)
- Proposed Dirty Water Catchment Area
- Proposed Whoa boys and Turnouts
- Proposed Sediment Basin Extents
- Proposed Sediment Weir
- Proposed Level Spreader
- Existing Overland Flow (Clean)
- Existing Overland Flow (Dirty)

**EROSION AND SEDIMENT CONTROL NOTES:**

1. All Erosion and Sediment Control Measures to be in Accordance with the Best Practice Erosion and Sediment Control Guidelines, IECA, 2008.
2. Works for Infrastructure Expansion Footprints shall be Undertaken in the Following Sequence:
  - 2.1. Install Stabilised Site Access
  - 2.2. Construct Clean Water Diversion Channels and Level Spreaders where External Catchments Discharge to the Site
  - 2.3. Construct Dirty Water Channels/ Bunds
  - 2.4. Construct Sediment Basins and Sediment Weirs
  - 2.5. Install all Sediment Fencing
  - 2.6. Locate Stockpile Locations and Install Sediment Fences on Downstream sides
  - 2.7. Topsoil and Rehabilitate Bulk Earthwork Areas Immediately upon Completion
  - 2.8. Rehabilitate the Site
  - 2.9. Decommission Sediment Basins and Sediment Weirs and Remove Erosion and Sediment Control Measures once Surfaces are Stabilised to the Satisfaction of the Superintendent

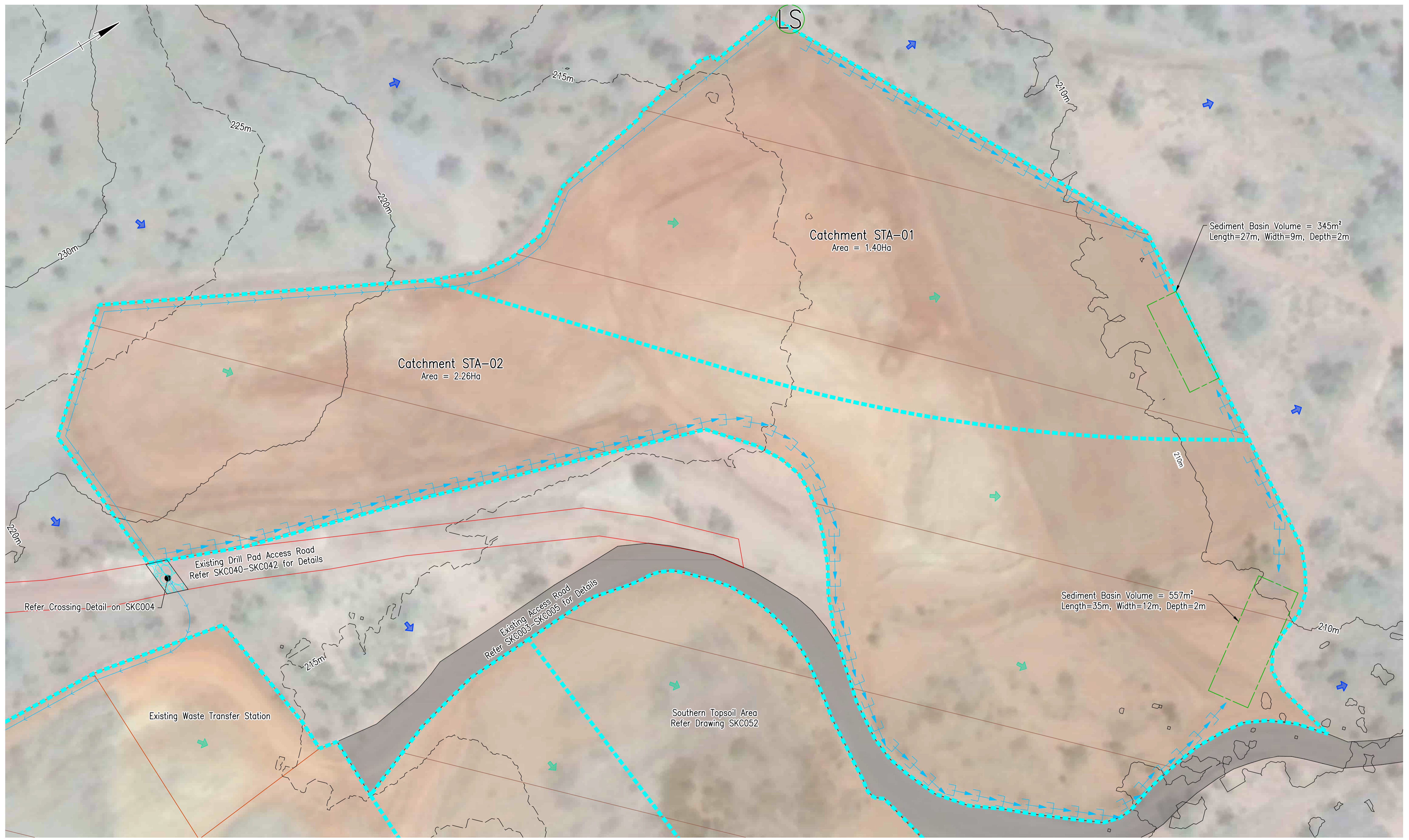
This Sequence is to be Reviewed in Context of Staging of Works, However, Must Achieve all Environmental Requirements.
3. Works for Access Roads shall be Undertaken in the Following Sequence:
  - 3.1. Install Stabilised Site Access
  - 3.2. Install Cut Off Channels to Divert External Catchment Flows to all Low Points, Gullies and Watercourses
  - 3.3. Construct Rock Rip Rap Crossings at Low Points, Gullies and Watercourses
  - 3.4. Construct Woah Boys and Associated Mitre Drains and Level Spreaders at Required Spacings
4. Controls Affected by Works are to be Re-established Prior to the Completion of each days work.
5. The Contractor is to Stabilise all Disturbed Areas as soon as Final Levels are Reached.
6. Dust Control Measures shall be Implemented Continuously during Construction Works to the Satisfaction of the Superintendent and Council.
7. Topsoil Shall be Spread and Stabilised as Soon as Possible, Disturbed Areas shall be left with a Scarified Surface to Encourage Water Infiltration and Assist in Keying in Topsoil.
8. All Trees to be Retained Unless Approved for Removal by the Superintendent.
9. Topsoil Stockpiles shall not Exceed 2m in Height and Batter Slopes to be 1V:3H Maximum.
10. All Access to Site is to be Via the Stabilised Site Access. Site Shall be Fully Fenced to Prevent Access From Other Areas.
11. The Contractor Shall Maintain a Log Book Detailing:
  - 11.1. Records of All Rainfall
  - 11.2. Condition of Erosion and Sediment Control Measures
  - 11.3. Any Additional Remedial Works Required
12. The Contractor Shall at all times Restrict Construction Equipment Movement to the Essential Construction Areas. The Contractor shall not Extend Land Disturbance Beyond 2m from the Edge of any Essential Construction Activity.

Southern Topsoil Area (1 of 2)  
Refer Drawing SKC061

Southern Topsoil Area (2 of 2)  
Refer Drawing SKC062

Last Modified: 1: Dec 01, 2022 - 1:46pm

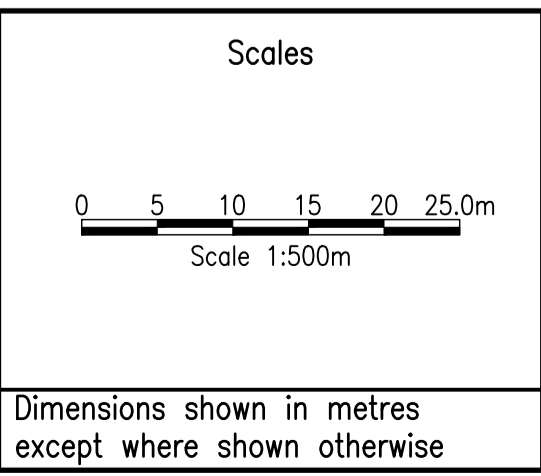
		Scales				Title				Job No.	WTS-002	
		 Scale 1:5000m				DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL TOPSOIL AREAS KEY PLAN				Drawing No.	SKC050	
						ENGINEERING CERTIFICATION (RPEQ)				Revision	A	
A		DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22	Drawn		M.SMITH	ENG. AREA	NAME	SIGNATURE	NO.	DATE
Rev		Revision Description	Certification	Date	Designed		M.HAUSFELD					
				Dimensions shown in metres except where shown otherwise		<small>COPYRIGHT: The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.</small>				Series Number	1 OF 4	



SOUTHERN TOPSOIL AREA PLAN  
Scale 1:500m

Last Modified: 1: Dec 01, 2022 - 1:37pm

Rev	Revision Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22

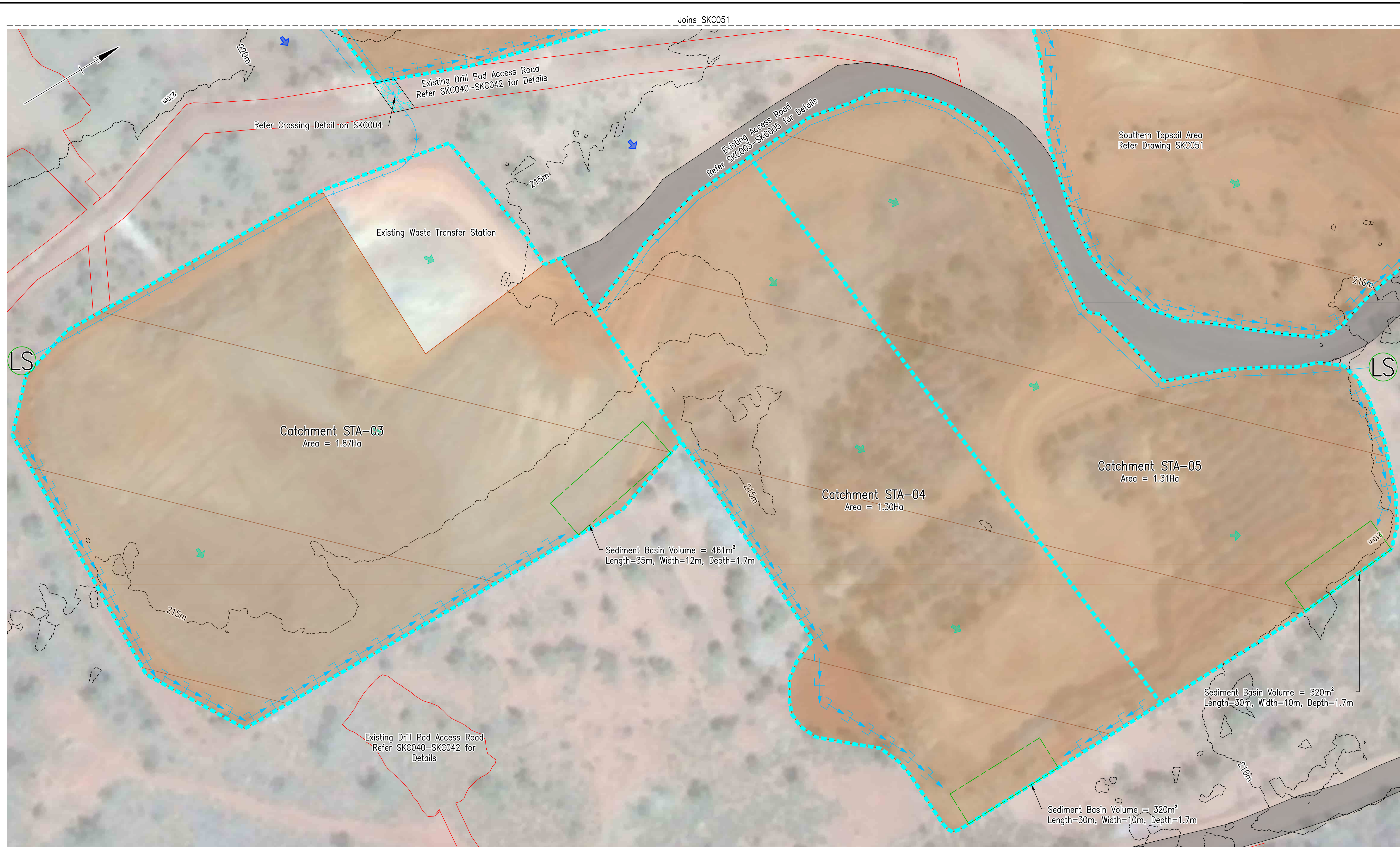


Client

**WULGURU TECHNICAL SERVICES**

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

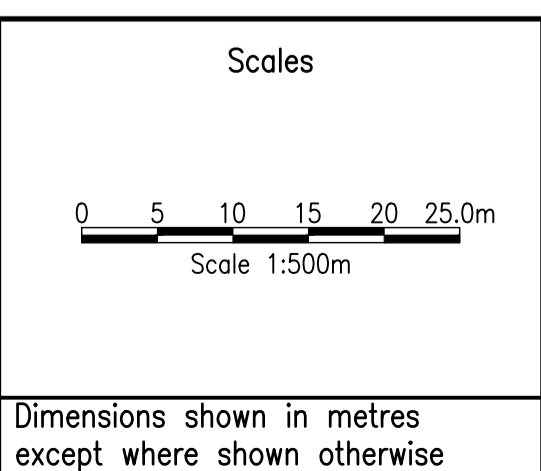
Title					Job No.	
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL SOUTHERN TOPSOIL AREA SHEET 1 OF 2					WTS-002	
					Drawing No.	
ENGINEERING CERTIFICATION (RPEQ)					Revision	
Drawn	ENG. AREA	NAME	SIGNATURE	NO.	DATE	A
M.SMITH						
Designed	Series Number					2 OF 4
M.HAUSFELD						



**SOUTHERN TOPSOIL AREA PLAN**  
Scale 1:500m

Last Modified: 1- Dec 01, 2022 - 1:38pm

Rev	Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22



Client

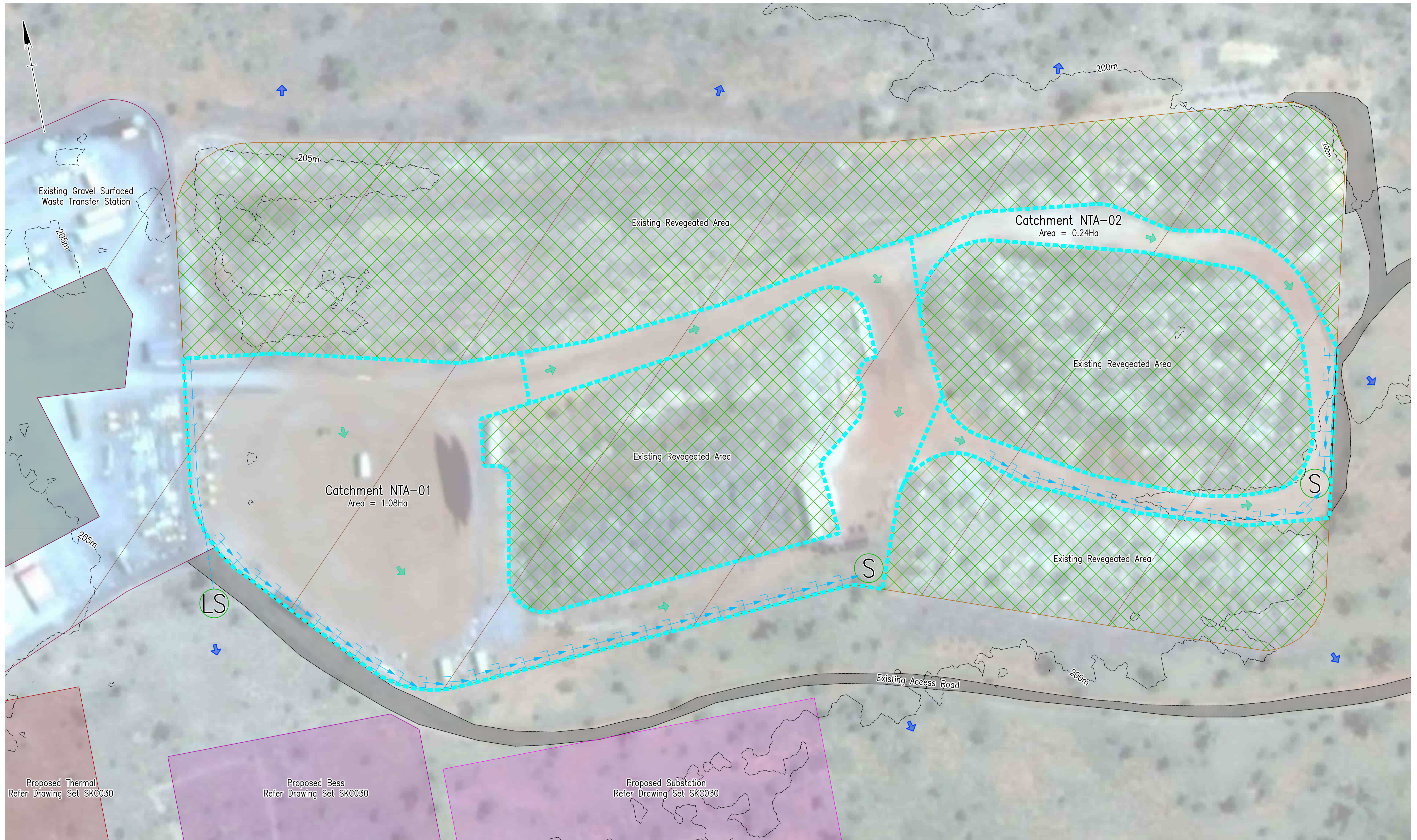
**WULGURU TECHNICAL SERVICES**

COPYRIGHT  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title					
DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL SOUTHERN TOPSOIL AREA SHEET 2 OF 2					
ENGINEERING CERTIFICATION (RPEQ)					
ENG. AREA	NAME	SIGNATURE	NO.	DATE	
Drawn M.SMITH					
Designed M.HAUSFELD					

Job No.	WTS-002
Drawing No.	SKC052
Revision	A
Series Number	3 OF 4

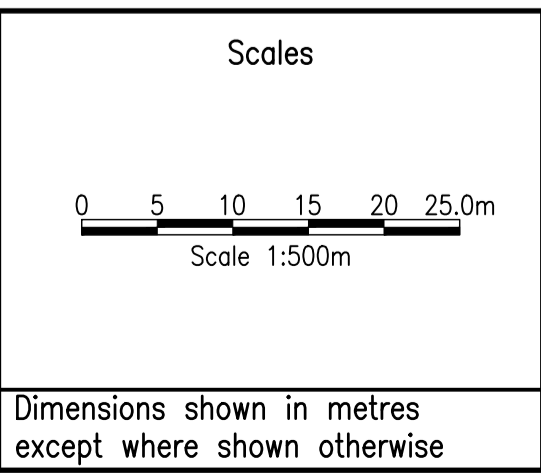




**BORROW PIT AND STOCKPILE B PLAN**  
Scale 1:500m

Last Modified :- Dec 01, 2022 - 1:38pm

Rev	Revision Description	Certification	Date
A	DRAFT FOR CLIENT REVIEW	M.HAUSFELD	01/12/22



Client

**WULGURU TECHNICAL SERVICES**

**COPYRIGHT**  
The contents and information contained in this document are the copyright of Civil-IQ Pty Ltd. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by Civil-IQ Pty Ltd.

Title				
<b>DUGALD RIVER MINE EROSION AND SEDIMENT CONTROL NORTHERN TOPSOIL AREA</b>				
Drawn	ENGINEERING CERTIFICATION (RPEQ)			
M.SMITH	ENG. AREA	NAME	SIGNATURE	NO. DATE
Designed				
M.HAUSFELD				

Job No.	<b>WTS-002</b>
Drawing No.	<b>SKC053</b>
Revision	<b>A</b>
Series Number	<b>4 OF 4</b>

# Appendix F– ESCP Calculations



**Rainfall Factor**

Determined from E3.2 in IECA guidelines

$$R = 164.74 \times 1.1177^S \times S^{0.6444}$$

S = 2 year 6 hour storm

$$S = 11$$

$$R = 2624.422$$

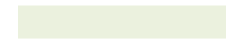
R  
P (default)  
C (default)

2624.42	RUSLE = K x R x P x C x LS
1.3	
1.00	

From Table 3.1 - Soil Loss Classes (IECA 2008)

Soil Loss Class	Soil Loss Rate	Erosion Risk
	(t/ha/yr)	
1	0 to 150	Very Low
2	151 to 225	Low
3 to 4	226 to 500	Moderate
5 to 6	501 to 1500	High
7	above 1500	Extremely High

Catchment ID	Catchment Size	Slope	Length	K Factor	Ls	C Factor	Soil Loss Rate	Soil Erosion Hazard	Soil Loss Class
	Area (ha)						%		
WTG-1A	0.22	20	40.0	0.030	4.32	1.00	442	Moderate	3 to 4
WTG-1B	0.21	20	40.0	0.030	4.32	1.00	442	Moderate	3 to 4
WTG-1C	0.14	20	40.0	0.030	4.32	1.00	442	Moderate	3 to 4
WTG-2A	0.40	20	40.0	0.030	4.32	1.00	442	Moderate	3 to 4
WTG-2B	0.16	1	80.0	0.030	0.19	1.00	19	Very Low	1
WTG-3A	0.33	20	40.0	0.030	4.32	1.00	442	Moderate	3 to 4
WTG-3B	0.25	20	40.0	0.030	4.32	1.00	442	Moderate	3 to 4
WTG-4A	0.35	17	30.0	0.030	2.67	1.00	273	Moderate	3 to 4
WTG-4B	0.30	17	30.0	0.030	2.67	1.00	273	Moderate	3 to 4
WTG-5A	0.34	12	60.0	0.030	3.02	1.00	309	Moderate	3 to 4
WTG-5B	0.31	12	60.0	0.030	3.02	1.00	309	Moderate	3 to 4
WTG-6A	0.30	5	80.0	0.030	1.19	1.00	122	Very Low	1
WTG-6B	0.24	5	80.0	0.030	1.19	1.00	122	Very Low	1
WTG-7A	0.42	10	60.0	0.030	2.31	1.00	236	Moderate	3 to 4
WTG-7B	0.31	7	60.0	0.030	1.24	1.00	127	Very Low	1
WTG-8A	0.65	8	60.0	0.030	1.70	1.00	174	Low	2
WTG-9A	0.49	1	80.0	0.030	0.19	1.00	19	Very Low	1
VIL-W01	0.35	5	80.0	0.030	1.19	1.00	122	Very Low	1
VIL-W02	0.33	5	80.0	0.030	1.19	1.00	122	Very Low	1
VIL-N01	0.51	15	80.0	0.030	4.61	1.00	472	Moderate	3 to 4
VIL-N02	3.96	2.5	80.0	0.030	0.65	1.00	67	Very Low	1
VIL-N03	1.58	15	80.0	0.030	4.61	1.00	472	Moderate	3 to 4
THE-01	1.95	1	80.0	0.045	0.19	1.00	29	Very Low	1
BESS-01	0.42	1	80.0	0.045	0.19	1.00	29	Very Low	1
SS-01	0.47	1	80.0	0.045	0.19	1.00	29	Very Low	1
STA-01	1.40	2.5	80.0	0.045	0.65	1.00	100	Very Low	1
STA-02	2.26	2.5	80.0	0.045	0.65	1.00	100	Very Low	1
STA-03	1.87	3.5	80.0	0.045	0.91	1.00	140	Very Low	1
STA-04	1.30	2.5	80.0	0.045	0.65	1.00	100	Very Low	1
STA-05	1.31	2.5	80.0	0.045	0.65	1.00	100	Very Low	1
NTA-01	1.08	1.5	80.0	0.045	0.41	1.00	63	Very Low	1
NTA-02	0.24	1.5	80.0	0.045	0.41	1.00	63	Very Low	1



From Table 4.4.7 (IECA 2008) - Best practice land clearing and rehabilitation requirements

Erosion Risk Rating	Soil Loss Rate (t/ha/yr)	Advanced land clearing allowed (wks work)	Max No. Of Days for stabilisation	Minimum Cover (%)	Stage constructoin of Batters > 6H to 1V	Stabilisation of stockpiles
Very Low	0 to 150	8	30	60		
Low	151 to 225	8	30	70		
Moderate	226 to 500	6	20	70	Yes	
High	501 to 1500	4	10	75	Yes	Yes
Very High	above 1500	2	5	80	Yes	Yes

All cases - All practical steps must be taken to apply Erosion and Sedimentation Controls and stabilise works prior to anticipated rainfall

From Table B1 Appendix B (IECA 2018) - Sediment control standard (default) based on soil loss rate

Area Limit (m <sup>2</sup> )	Soil Loss Rate (t/ha/yr)			Soil Loss Rate (t/ha/month)		
	Type 1	Type 2	Type 3	Type 1	Type 2	Type 3
250	N/A	N/A	All	N/A	N/A	All
1000	N/A	N/A	All	N/A	N/A	All
2500	N/A	>75	75	N/A	>6.25	6.25
>2500	>150	150	75	>12.5	12.5	6.25
>10000	>75	N/A	75	>6.25	N/A	6.25

From Table 4.5.2 (IECA 2008) - Sediment control based on erosivity and rainfall

Area Limit (m <sup>2</sup> )	Soil Loss Rate (t/ha/yr)			Soil Loss Rate (t/ha/month)		
	Type 1	Type 2	Type 3	Type 1	Type 2	Type 3
250	N/A	N/A	All	N/A	N/A	All
1000	N/A	N/A	All	N/A	N/A	All
2500	N/A	>60	60	N/A	>30	30
>2500	>100	100	60	>45	45	30

## 1. Sediment Basins

Site Name: Dugald Mine Site Expansion

Site Location: Cloncurry, QLD

Precinct/Stage: WTG Areas

Date: 29/11/2022

Other Details: SHEET 1

Site area	Sub-catchment or Name of Structure						
	WTG-2A	WTG-3A	WTG-4A	WTG-4B	WTG-5A	WTG-5B	WTG-7A
Total catchment area (ha)	0.40	0.33	0.35	0.30	0.34	0.31	0.42
Disturbed catchment area (ha)	0.4	0.3	0.4	0.3	0.3	0.3	0.4

### Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	D	D	D	D	D	D	D
% sand (fraction 0.02 to 2.00 mm)							
% silt (fraction 0.002 to 0.02 mm)							
% clay (fraction finer than 0.002 mm)							
Dispersion percentage							
% of whole soil dispersible	0	0	0	0	0	0	0
Soil Texture Group	D	D	D	D	D	D	D

### Rainfall data

Design rainfall depth (no of days)	5	5	5	5	5	5	5
Design rainfall depth (percentile)	80	80	80	80	80	80	80
x-day, y-percentile rainfall event (mm)	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Rainfall R-factor (if known)	2624	2624	2624	2624	2624	2624	2624
IFD: 2-year, 6-hour storm (if known)	11	11	11	11	11	11	11

### RUSLE Factors

Rainfall erosivity (R-factor)	2624	2624	2624	2624	2624	2624	2624
Soil erodibility (K-factor)	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Slope length (m)	20	20	30	30	60	60	60
Slope gradient (%)	20.0	20.0	17.0	17.0	12.0	12.0	10.0
Length/gradient (LS-factor)	2.6	2.6	2.7	2.7	3.0	3.0	2.3
Erosion control practice (P-factor)	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Ground cover (C-factor)	1	1	1	1	1	1	1

### Sediment Basin Design Criteria (for Type D/F basins only. Leave blank for Type C basins)

Put an X here to use 50% of water zone							
Storage (soil) zone design (months)	2	2	2	2	2	2	2
Cv (Volumetric runoff coefficient)	0.69	0.69	0.69	0.69	0.69	0.69	0.69

### Calculations and Type D/F Sediment Basin Volumes

Soil loss rate (t/ha/yr)	261	261	273	273	309	309	236
Soil loss class	3	3	3	3	3	3	3
Soil loss (m <sup>3</sup> /ha/yr)	201	201	210	210	238	238	182
Basin storage (soil) volume (m <sup>3</sup> )	33	27	29	25	28	25	34
Basin settling (water) volume (m <sup>3</sup> )	65	54	58	49	56	51	68
Sediment basin total volume (m <sup>3</sup> )	98	80	87	74	84	76	102

### Typical Sizing

Length	15	15	15	15	15	15	15
Width	5	5	5	5	5	5	5
Ratio	3	3	3	3	3	3	3
Area	75	75	75	75	75	75	75
Depth of sediment zone	0.4	0.4	0.4	0.3	0.4	0.3	0.5
Depth of settling zone	0.9	0.7	0.8	0.7	0.7	0.7	0.9
Internal batter slope	2	2	2	2	2	2	2
Check basin storage (soil) volume (m <sup>3</sup> )	33	27	29	25	28	25	34
Check basin settling (water) volume (m <sup>3</sup> )	65	54	58	49	56	51	68
Check sediment basin total volume (m <sup>3</sup> )	98	80	87	74	84	76	102
Weir height (m)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Freeboard (m)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Check total depth (m)	1.9	1.7	1.8	1.6	1.7	1.6	2.0

## 1. Sediment Basins

Site Name: Dugald Mine Site  
 Exoansion  
 Site Location: Cloncurry, QLD  
 Precinct/Stage: WTG Areas  
 Date: 29/11/2022  
 Other Details: SHEET 2

Site area	Sub-catchment or Name of Structure							
	WTG-8A	VIL-N01	VIL-N03	STA-01	STA-02	STA-03	STA-04	STA-05
Total catchment area (ha)	0.65	0.51	1.58	1.40	2.26	1.87	1.30	1.30
Disturbed catchment area (ha)	0.7	0.5	1.6	1.4	2.3	1.9	1.3	1.3

### Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	D	D	D	D	D	D	D	D
% sand (fraction 0.02 to 2.00 mm)								
% silt (fraction 0.002 to 0.02 mm)								
% clay (fraction finer than 0.002 mm)								
Dispersion percentage								
% of whole soil dispersible	0	0	0	0	0	0	0	0
Soil Texture Group	D	D	D	D	D	D	D	D

### Rainfall data

Design rainfall depth (no of days)	5	5	5	5	5	5	5	5
Design rainfall depth (percentile)	80	80	80	80	80	80	80	80
x-day, y-percentile rainfall event (mm)	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Rainfall R-factor (if known)	2624	2624	2624	2624	2624	2624	2624	2624
IFD: 2-year, 6-hour storm (if known)	11	11	11	11	11	11	11	11

### RUSLE Factors

Rainfall erosivity (R-factor)	2624	2624	2624	2624	2624	2624	2624	2624
Soil erodibility (K-factor)	0.03	0.03	0.03	0.045	0.045	0.045	0.045	0.045
Slope length (m)	60	80	80	80	80	80	80	80
Slope gradient (%)	8.0	15.0	15.0	2.5	2.5	3.5	2.5	2.5
Length/gradient (LS-factor)	1.7	4.6	4.6	0.7	0.7	0.9	0.7	0.7
Erosion control practice (P-factor)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Ground cover (C-factor)	1	1	1	1	1	1	1	1

### Sediment Basin Design Criteria (for Type D/F basins only. Leave blank for Type C basins)

Put an X here to use 50% of water zone								
Storage (soil) zone design (months)	2	2	2	2	2	2	2	2
Cv (Volumetric runoff coefficient)	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69

### Calculations and Type D/F Sediment Basin Volumes

Soil loss rate (t/ha/yr)	174	472	472	100	100	140	100	100
Soil loss class	2	3	3	1	1	1	1	1
Soil loss (m <sup>3</sup> /ha/yr)	134	363	363	77	77	107	77	77
Basin storage (soil) volume (m <sup>3</sup> )	54	42	130	115	186	154	107	107
Basin settling (water) volume (m <sup>3</sup> )	107	84	259	230	371	307	213	213
Sediment basin total volume (m <sup>3</sup> )	161	126	389	345	557	461	320	320

### Typical Sizing

Length	20	18	30	27	35	35	30	30
Width	7	6	10	9	12	12	10	10
Ratio	3	3	3	3	3	3	3	3
Area	133	108	300	243	408	408	300	300
Depth of sediment zone	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4
Depth of settling zone	0.8	0.8	0.9	0.9	0.9	0.8	0.7	0.7
Internal batter slope	2	2	2	2	2	2	2	2
Check basin storage (soil) volume (m <sup>3</sup> )	54	42	130	115	186	154	107	107
Check basin settling (water) volume (m <sup>3</sup> )	107	84	259	230	371	307	213	213
Check sediment basin total volume (m <sup>3</sup> )	161	126	389	345	557	461	320	320
Weir height (m)	0.9	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Freeboard (m)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Check total depth (m)	2.4	1.8	1.9	2.0	2.0	1.7	1.7	1.7

## **APPENDIX P: Noise Impact Assessment (AECOM, 2023)**



21 November 2023

Commercial-in-Confidence

Daniel Bales  
 MMG Dugald River Pty Ltd

Dear Daniel,

**Dugald River Mine Wind Farm  
 Construction, Operational and Decommissioning Predicted Noise Levels**

**1.0 Introduction**

AECOM Australia Pty Ltd (AECOM) has been engaged by MMG Dugald River Pty Ltd (MMG) to provide preliminary noise levels associated with the Construction, Operational and Decommissioning phase of the Dugald River Wind Farm (the Project).

The predicted noise levels presented in this letter are preliminary and were prepared to provide general information to MMG to inform next steps for engagement with the Department of Environment & Science.

**2.0 Predicted Noise Levels**

Predicted noise levels associated with the Construction, Operational and Decommissioning phase of the Project are presented in this letter.

Only one noise sensitive land use receptor has been identified in this study, Receptor R03, residential property.

Predicted noise levels are presented in this letter using the  $L_{Aeq}$  descriptor. The  $L_{Aeq}$  represent the time averaged A-weighted equivalent continuous sound pressure level. As sound levels usually vary over time, this measure converts the varying levels to an equivalent constant level of sound.

The applicable noise limits stated in the Environmental Authority (EA) for Dugald River Mine use the  $L_{Aeq,adj,15min}$  descriptor. This descriptor means an A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character, that within a 15 minute period has the same mean square sound pressure of a sound that varies with time.

**2.1 Construction Phase**

Construction noise contours were calculated for two typical construction scenarios, as described below:

- Construction Scenario 1 – Earthworks
- Construction Scenario 2 – Turbine Installation

Typical construction equipment and sound power levels (SWL) have been applied as follows:

**Table 1 Construction noise modelling scenarios and equipment**

Scenario	Equipment	Number of	Overall SWL $L_{Aeq}$ , dB(A) <sup>1</sup>
Scenario 1 (Earthworks)	Cat D9 Dozer	2	108
	Soil Compactor	1	106
	12t Pad foot rollers	2	101
	30t Excavator	3	103
	45t Excavator	1	107
	30t Dump trucks	4	109
	15kL Watercarts	3	93
	Cat 14m Grader	1	112

Scenario	Equipment	Number of	Overall SWL L <sub>Aeq</sub> , dB(A) <sup>1</sup>
Scenario 2 (Turbine Installation)	600t Crawler crane	1	103
	220t All terrain crane	1	105
	25t Franna crane	1	105
	4t Telehandler	1	104
	85ft EWP	1	85
	Flatbed truck (delivery)	2	106
	4wd utes	3	90
	Pressure washer	1	90
	Diesel generator (for lighting)	1	100
	Electrical torque tool	2	104
	Lighting towers	2	93

Location of wind turbines and sensitive receiver were extracted from document titled “*Dougald River IPP Reference Design General Arrangement*”, drawing No. 0016-EGA-3120-E-0001-0, revision 0, dated 19 September 2023.

**2.1.1 Assumptions**

- Construction scenarios assumes worst case where all construction equipment would be operating simultaneously.
- Construction would be undertaken sequentially one wind turbine at a time, i.e. not concurrently.
- Construction equipment noise sources modelled at 2.0 metres above ground level.
- Noise contours calculated at 1.5 metres above ground level.

The Construction Phase predicted noise contours, A-weighted L<sub>Aeq</sub> sound pressure levels (SPL), are presented in Appendix A.

**2.2 Operational Phase**

AECOM was engaged by MMG to undertake a noise impact assessment for the Project in July 2023. The noise impact assessment was prepared in accordance with the State Code 23 Wind Farm Development Planning Guidelines (Planning Guideline), dated February 2022.

AECOM report titled “*Dugald River Mine Wind Farm Noise Impact Assessment*”, reference report 60698169-ACRP-0001, revision 1, dated 21 July 2023 (AECOM Wind Farm Noise Impact Assessment Report), presents the Project’s operational noise contours in Appendix C.

The operational noise contours presented in the AECOM Wind Farm Noise Impact Assessment Report represent highest noise levels from the Project.

The AECOM Wind Farm Noise Impact Assessment Report is appended to this letter in Appendix B.

**2.3 Decommissioning Phase**

Noise levels associated with Decommissioning Phase of the Project are assumed to be equivalent to the noise levels associated with Construction Scenario 2 (Turbine Installation). Refer to Appendix A for predicted noise contours.

Yours faithfully



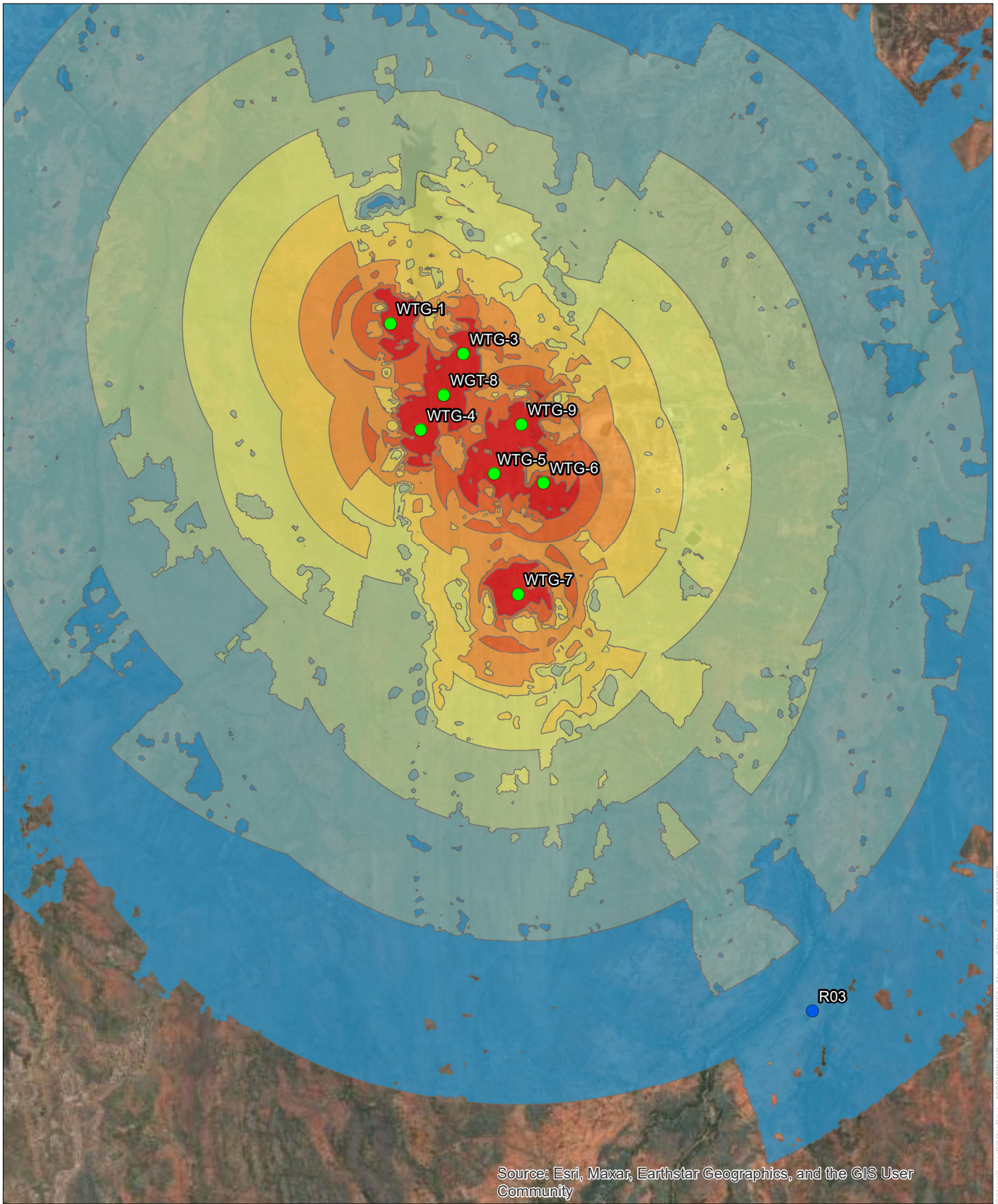
Patrick Martinez  
Technical Director - Acoustics  
patrick.martinez@aecom.com

Mobile: +61 431 257 229

cc: Dane Nobel (AECOM)

# Appendix A

## Construction Phase Noise Contours



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

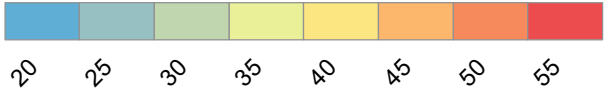
C:\Users\licare2\OneDrive - AECOM\WAH\Projects\MAG\Site\_Map.mxd Date Saved: 20/11/2023

Dugald River Wind Farm - Construction Scenario 1 -  $L_{Aeq}$

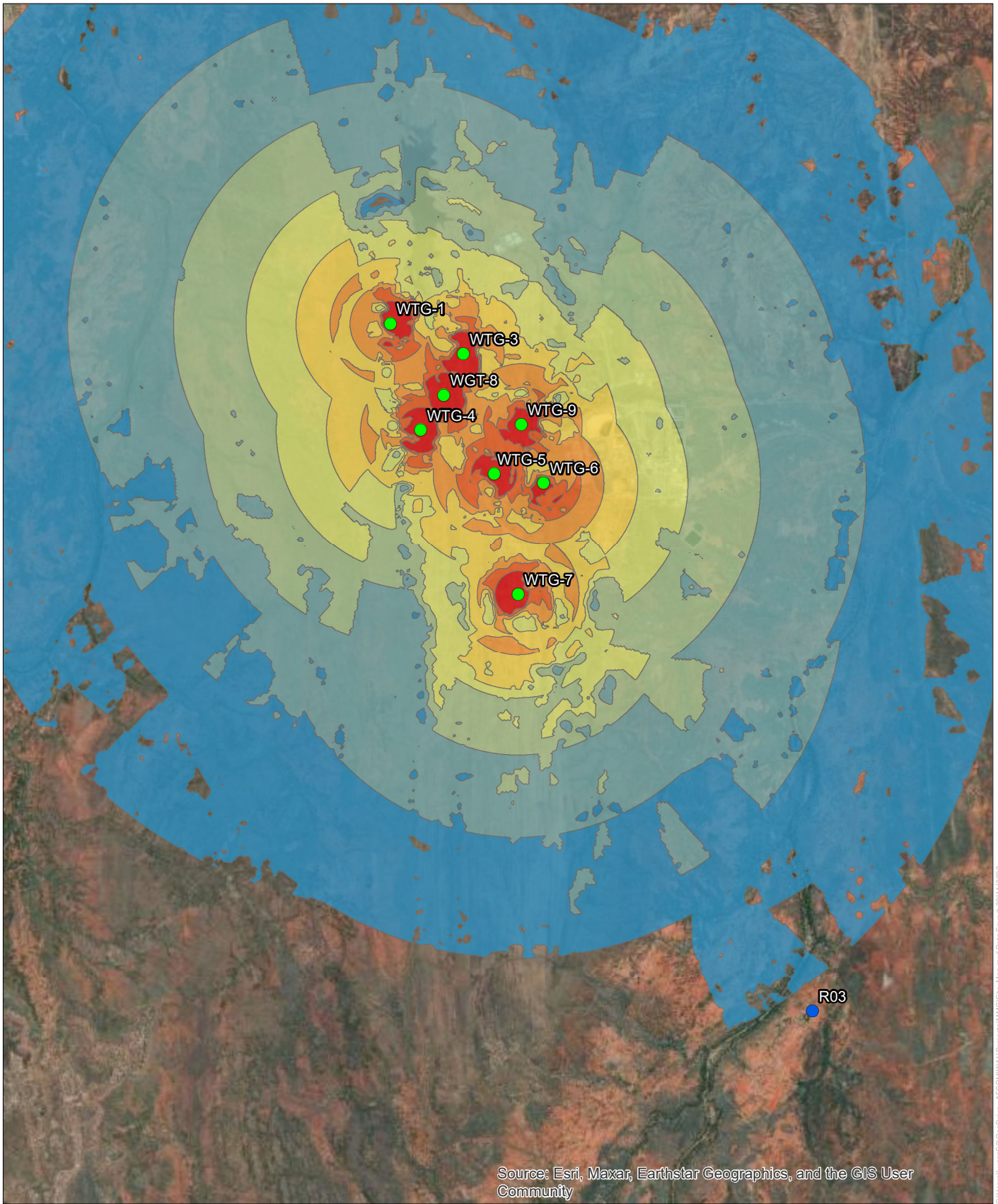


- Noise Sensitive Receptor
- Turbine Locations

Sound Pressure Level,  $L_{Aeq}$  dB(A)



Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).  
 The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)  
 Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content in accordance with section 5 of the Copyright Licence. AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.  
 Source:



Dugald River Wind Farm - Construction Scenario 2 -  $L_{Aeq}$



- Noise Sensitive Receptor
- Turbine Locations

Sound Pressure Level,  $L_{Aeq}$  dB(A)



Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons Attribution 4.0 Australia licence © Department of Customer Service 2020, (Digital Cadastral Database and/or Digital Topographic Database).

The terms of Creative Commons Attribution 4.0 Australia License are available from <https://creativecommons.org/licenses/by/4.0/legalcode> (Copyright Licence)

Neither AECOM Australia Pty Ltd (AECOM) nor the Department of Customer Service make any representations or warranties of any kind about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with section 5 of the Copyright Licence). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.

Source:

C:\Users\Lucas\OneDrive - AECOM\WAH Projects\MMG\Site\_Map.mxd Date Saved: 20/11/2023

# Appendix **B**

AECOM Wind Farm  
Noise Impact  
Assessment Report

# Dugald River Mine Wind Farm

## Noise Impact Assessment

21-Jul-2023  
Dugald River Mine Wind Farm

# Dugald River Mine Wind Farm

## Noise Impact Assessment

Client: MMG Dugald River Pty Ltd

ABN: 19 083 405 556

### Prepared by

**AECOM Australia Pty Ltd**

Turrbal and Jagera Country, Level 8, 540 Wickham Street, PO Box 1307, Fortitude Valley QLD 4006, Australia

T +61 7 3056 4800 www.aecom.com

ABN 20 093 846 925

21-Jul-2023

Job No.: 60698169

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

© AECOM Australia Pty Ltd (AECOM). All rights reserved.



AECOM has prepared this document for the sole use of the Client and for a specific purpose, each as expressly stated in the document. No other party should rely on this document without the prior written consent of AECOM. AECOM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the Client's description of its requirements and AECOM's experience, having regard to assumptions that AECOM can reasonably be expected to make in accordance with sound professional principles. AECOM may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.



## Quality Information

Document Dugald River Mine Wind Farm  
 Ref 60698169  
 Date 21-Jul-2023  
 Originator Omar Al-Busaidi  
 Reviewer Tim Osborne

### Revision History

Rev	Revision Date	Details	Approved	
			Name/Position	Signature
A	05-Jul-2023	Draft	Tim Osborne Team Leader - Acoustics	
1	21-Jul-2023	Final	Tim Osborne Team Leader - Acoustics	

## Table of Contents

Executive Summary	i
1.0 Introduction	1
2.0 Noise Criteria	2
2.1 Acoustic Amenity	2
2.2 Operational Noise Limits	2
2.3 Construction Noise and Vibration	3
3.0 Wind Farm Operational Noise Modelling	5
4.0 Wind Farm Operational Noise Levels	7
4.1 Wind Farm Noise	7
4.2 Cumulative Impacts	8
5.0 Wind Farm Construction Noise and Vibration	9
6.0 Conclusion	10
Appendix A	
Acoustic Terminology	A
Appendix B	
Project Aerial View	B
Appendix C	
Noise Contour Plots	C
Appendix D	
Predicted Noise Levels vs Criteria	D
Appendix E	
Wind Turbine Locations	E
Appendix F	
Sensitive Receptor Locations	F
Appendix G	
Wind Turbine Setback Distances	G

## Executive Summary

AECOM has been engaged by MMG Dugald River Pty Ltd (MMG) to undertake a noise impact assessment for the development of a wind farm located at MMG Australia's Dugald River mine located approximately 65 km to the north-west of Cloncurry in North West Queensland.

This report presents a noise impact assessment for the Dugald River Mine Wind Farm (the Project) in support of a development application. The project involves the construction and operation of eight wind turbines.

The assessment was conducted in accordance with the State Code 23: Wind farm development (State Code 23) of the State Development Assessment Provisions (SDAP), version 3.0, effective 18 February 2022 and the State Code 23 Wind Farm Development Planning Guidelines (Planning Guideline), dated February 2022.

A computational noise model was created to predict the noise levels from the operation of the Project at the three sensitive receptors. The final project design may change the positions of the turbines due to micro-siting, and the turbine make and model may change. This assessment has been based on the Goldwind 6.0MW, GW165 turbine.

Based on the results of the noise predictions, the noise emissions from the Project are expected to comply with the requirements of State Code 23 at all host and non-host sensitive receptors.

No other new or proposed wind farm developments have been identified within the vicinity of the Project, and cumulative impacts from mining activities associated with the existing Dugald River Mine are not expected to be problematic for achieving compliance with State Code 23.

The Planning Guideline outlines requirements for a construction management plan, which includes noise and vibration impact control measures to minimise noise and vibration impacts at sensitive receptors. Management and mitigation measures to reduce noise and vibration impacts associated with construction of the Project could include management of construction hours, consultation where required, site management practices and potential plant and equipment mitigation measures.

## 1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by MMG Dugald River Pty Ltd (MMG) to undertake a noise impact assessment for the proposed Dugald River Mine Wind Farm (the Project) within the Mining Lease Area of Dugald River Mine.

Dugald River Mine is located approximately 65 km to the north-west of Cloncurry in North West Queensland. The Project involves the construction and operation of eight wind turbines.

This report presents the noise impact assessment for the Project in support of a development application. The assessment was conducted in accordance with State Code 23: Wind farm development (State Code 23) of the State Development Assessment Provisions (SDAP), version 2.4, effective 16 November 2018 and the State Code 23: Wind Farm Development Planning Guidelines (Planning Guideline), dated February 2022.

The acoustic terminology used in this report is summarised in Appendix A.

## 2.0 Noise Criteria

### 2.1 Acoustic Amenity

The acoustic amenity performance outcomes listed in State Code 23 were used in this assessment. The acoustic amenity performance outcomes, as per State Code 23, are presented in Table 1.

Table 1 Extract from Table 23.1 of State Code 23

Performance Outcomes	Acceptable Outcomes
<b>PO10</b> Development is sited and designed to protect the amenity of existing or approved <b>sensitive land uses</b> on <b>non-host lots</b> from acoustic impacts.	<b>A10.1</b> A separation distance of at least 1500 metres is achieved between <b>wind turbines</b> and existing or approved <b>sensitive land uses</b> on <b>non-host lots</b> .  OR <b>A10.2</b> Where <b>wind turbines</b> are proposed within 1500 metres of existing or approved <b>sensitive land uses</b> on <b>non-host lots</b> , written agreements ( <b>deeds of release</b> ) from all affected <b>non-host lot</b> owners are provided accepting the reduced setback.
<b>PO11</b> The predicted acoustic level at all noise affected existing or approved <b>sensitive land uses</b> on <b>host lots</b> does not exceed the criteria stated in table 23.2.	No acceptable outcome is provided.
<b>PO12</b> The predicted acoustic levels at all noise affected existing or approved <b>sensitive land uses</b> on <b>non-host lots</b> does not exceed the criteria stated in table 23.3.	No acceptable outcome is provided.
<b>PO13</b> Construction activities associated with the development avoid, or minimise and mitigate, adverse impacts on <b>environmental values, water quality objectives</b> , amenity local transport networks and road infrastructure.	No acceptable outcome is provided.

One non-host lot sensitive receptor, Receptor R03, has been identified in this assessment. The smallest separation distance of the wind turbines from Receptor R03 is 5,732 m, which satisfies the minimum 1,500 m separation distance stated in Acceptable Outcome A10.1. The site plan showing the separation distance and a table of the eight wind turbine separation distances from Receptor R03 are provided in Appendix G.

### 2.2 Operational Noise Limits

State Code 23 outlines acoustic amenity criteria for both host and non-host lots, where a host lot is defined as a parcel of land that accommodates any part of a wind farm development, and non-host lot is defined as a lot no part of which is used for wind farm or part of a wind farm. The criteria applicable for these are outlined in Table 2 and Table 3.

Table 2 Table 23.2 from the State Code 23 (host lots)

Noise description	Acoustic level does not exceed
The outdoor (free-field) night-time (10pm to 6am) A-weighted equivalent acoustic level ( $L_{Aeq}$ ),	1. 45dB(A), or 2. The background noise ( $L_{A90}$ ) by more than 5dB(A);

Noise description	Acoustic level does not exceed
assessed at all noise affected existing approved <b>sensitive land uses</b>	whichever is the greater, for wind speed from <b>cut-in</b> to rated power of the <b>wind turbine</b> and each integer wind speed in between referenced to <b>hub height</b> .

Table 3 Table 23.3 from the State Code 23 (non-host lots)

Noise description	Acoustic level does not exceed
The outdoor (free-field) night-time (10pm to 6am) A-weighted equivalent acoustic level ( $L_{Aeq}$ ), assessed at all noise affected existing or approved <b>sensitive land uses</b> .	<ol style="list-style-type: none"> <li>35dB(A);</li> <li>the background noise (<math>L_{A90}</math>) by more than 5dB(A);</li> </ol> whichever is the greater, for wind speed from <b>cut-in</b> to rated power of the <b>wind turbine</b> and each integer wind speed in between referenced to <b>hub height</b> .
The outdoor (free-field) day-time (6am to 10pm) A-weighted equivalent acoustic level ( $L_{Aeq}$ ), assessed at all noise affected existing or approved <b>sensitive land uses</b> .	<ol style="list-style-type: none"> <li>37dB(A), or</li> <li>The background noise (<math>L_{A90}</math>) by more than 5dB(A);</li> </ol> whichever is the greater, for wind speed from <b>cut-in</b> to rated power of the <b>wind turbine</b> and each integer wind speed in between referenced to <b>hub height</b> .

A free-field night-time A-weighted equivalent acoustic level ( $L_{Aeq}$ ) of 45 dB(A) or background noise ( $L_{A90}$ ) plus 5 dB (whichever is greater) should not be exceeded at these locations, as per State Code 23.

For all the sensitive land uses on non-host lots where landowners have not entered a commercial agreement with the wind farm proponent, a free-field night-time A-weighted equivalent acoustic level ( $L_{Aeq}$ ) of 35 dB(A) or background noise ( $L_{A90}$ ) plus 5 dB (whichever is greater) is applied.

Background noise monitoring has not been undertaken, as it is not necessarily required to demonstrate compliance with State Code 23. As such, the minimum outdoor (free-field) noise limits for host and non-host lots have been used for this assessment and are summarised in Table 4.

Table 4 Project Noise Limits

Receptor Type	Noise Limits $L_{Aeq}$ dB(A)	
	Day (6am – 10pm)	Night (10pm – 6am)
Host lots	-	45
Non-host lots	37	35

## 2.3 Construction Noise and Vibration

Performance outcome PO13 for construction management is outlined in Table 23.2.1 of the State Code 23. The Planning Guideline specifies that a construction management plan is to be prepared by a suitably qualified person, identifying potential construction impacts and the proposed measures to be undertaken to avoid, manage, and mitigate the identified impacts.

This plan will include the following:

- Description and locations of sensitive land uses that may be affected by noise, vibration, and dust emissions from the construction work.
- Description of the activities and equipment likely to generate noise, vibration, and dust emissions.

- Description of the noise, vibration, and dust impact control measures to be implemented to minimise noise, vibration, and dust impacts at sensitive uses.
- Description of the methods to be used to monitor performance and receive, record, and respond to complaints.

Construction noise and vibration management from the construction of the Project is discussed further in Section 5.0.

### 3.0 Wind Farm Operational Noise Modelling

A three-dimensional computer noise model of the Project site was created in the acoustic modelling software package SoundPLAN Version 8.2, to predict operational noise levels for the Project. Environmental noise predictions were carried out using the algorithms from ISO 9613.2:1996 *Acoustics – Attenuation of Sound during propagation outdoors – Part 2: General method of calculation* and UK Institute of Acoustics - *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise* (2013), (IoA Wind turbines 2013) as implemented within the SoundPLAN software package and allowed by the Planning Guideline.

The following data was used to create the computer noise model:

- 10m ground contours from the Queensland Spatial Catalogue QSpatial have been used in the assessment. Given the separation distance between the wind turbines and the three sensitive receptors, as well as the relative flatness of the land between the wind turbines and the receptors, 10m contours have been deemed sufficient for the purpose of this assessment.
- Proposed Project layout containing eight wind turbines, dated 30 September 2022. The final layout is subject to change due to micro-siting during the detailed design phase. A single noise modelling scenario, based on the operation of eight wind turbines, has been developed.
- Three sensitive receptors have been identified within the vicinity of the Project. Two of the sensitive receptors are located within the Dugald River Mine mining leases, and one is a neighbouring residential property to the south. The receptors are described as follows:
  - Receptor R01: Dugald River Mine accommodation camp
  - Receptor R02: Dugald River Mine fly-camp and administration area
  - Receptor R03: Residential property on Land Parcel 92SP303378

An aerial view of the Project showing the location of the turbines and sensitive receptors is provided in Appendix B. Geographic coordinates of the turbines and sensitive receptors can be found in Appendix E and Appendix F, respectively.

The following parameters were entered in the SoundPLAN noise model, in accordance with the Planning Guideline:

- Atmospheric conditions at 10°C temperature and 70% relative humidity.
- 50% acoustically hard ground and 50% acoustically soft ground (0.5 ground factor).
- Barrier attenuation of no greater than 2 dB(A).
- 4 metre receptor height, as specified in the Planning Guideline when using ISO 9613.2 for conducting noise predictions.
- The model incorporates a 3 dB(A) correction where a concave ground profile exists between a wind turbine and a receptor where  $h_m \geq 1.5 \cdot \frac{|h_s - h_r|}{2}$  as outlined in the Planning Guideline.
- Goldwind's 6.0MW, GW165 turbine model was chosen as the indicative model with which to complete the assessment. 1/3 octave sound power data was provided by Goldwind at hub height wind speed for from 12-14m/s. The worst-case noise scenario was used to complete the assessment; a hub height wind speed of 12m/s produced the greatest noise levels for the specified turbine model. The reference sound power level and spectrum, as entered in the model, is presented in Table 5. The sound power spectra used in modelling (20 Hz - 10 kHz) extends beyond the minimum sound power level reporting requirement between 63 Hz to 4 kHz stated in the Planning Guideline.
- The overall sound power levels for each integer wind speed from 6m/s to 12m/s are presented in Table 6.



- Based on the GW165 turbine model, the wind turbines were entered in the noise model at a hub height of 130 metres above ground level with a rotor diameter of 165 metres.

**Table 5 GW165/5.6MW Sound power level spectrum (12m/s)**

1/3 octave frequency band (Hz) sound power level, in dB(A)														Overall dB(A)
20	25	31	40	50	63	80	100	125	160	200	250	315	400	
64.6	68.8	72.7	78.1	83.2	86.2	90.2	92.5	95.1	98.2	99.5	100.6	101.8	101.6	
500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	
101.0	100.3	99.4	98.8	97.3	94.0	89.6	85.3	80.6	73.9	66.2	63.9	63.3	62.3	<b>110.5</b>

**Table 6 Estimated overall sound power levels of GW165-6.0 MW at each integer wind speed from 6m/s - 12m/s**

Wind speed at hub height (m/s)	Noise Level dB(A)
6.0	102.2
7.0	105.6
8.0	108.0
9.0	109.5
10.0	110.3
11.0	110.3
12.0	110.5

The intent of State Code 23 is that compliance will be confirmed by the successful contractor once the final turbine type and layout is known.

No penalty for tonality was applied (0.0 dB penalty) in the noise model. The Planning Guideline states that:

*“A correctly operating wind turbine may exhibit sound with tonal characteristics. These characteristics can be minimised or avoided by careful design and/or mitigation measures. Wind farm developers should avoid the installation of wind turbines which exhibit sound with tonal characteristics by specifying the supply of wind turbines from a manufacturer which guarantees that the supplied wind turbines will not exhibit tonal characteristics at residences.”*

Additionally, the Planning Guideline states that amplitude modulation has been taken into account in determining the noise criteria, and therefore no additional penalty or assessment of amplitude modulation has been applied. The Planning Guideline states that:

*“Amplitude Modulation (AM) is an expected characteristic of wind turbine noise (commonly described as a ‘swish’). Enhanced amplitude modulation (EAM) has been reported from a limited number of wind farms on limited occasions. Considerable research has been conducted and is ongoing to determine and fully understand the sources of amplitude modulation generation and the conditions which may enhance amplitude modulation to a level which is considered by receptors to be an adverse noise characteristic. Current international research is aimed at defining and measuring EAM further so that suitable assessment standards can be developed, if necessary.”*

## 4.0 Wind Farm Operational Noise Levels

### 4.1 Wind Farm Noise

The predicted wind farm noise levels for the eight primary wind turbines are presented in Table 7. The noise levels are predicted for each integer wind speed between 6m/s and 12m/s.

Table 7 presents forecast receptor noise levels for the operation of the primary wind turbines at each integer wind speed between 6m/s and 12m/s.

**Table 7 Predicted wind farm noise levels – Primary wind turbine locations (eight wind turbines)**

Receptor ID	Noise limit dB(A)	Turbine integer wind speed (m/s)	Predicted noise level $L_{Aeq}$ dB(A)
R01	Night – 45	6	33
		7	37
		8	39
		9	40
		10	41
		11	41
		12	41
R02	Night – 45	6	31
		7	35
		8	37
		9	39
		10	39
		11	39
		12	40
R03	Night – 35 Day – 37	6	16
		7	19
		8	21
		9	23
		10	24
		11	24
		12	24

The highest predicted noise level at a host lot receptor is 41 dB(A)  $L_{Aeq}$  at R01, which complies with the 45 dB(A)  $L_{Aeq}$  night noise limit. The highest predicted noise level at a non-host lot receptor is 24 dB(A)  $L_{Aeq}$  at R03, which complies with the 35 dB(A)  $L_{Aeq}$  night noise limit. Therefore, noise emission levels are predicted to comply with the noise requirements of State Code 23 for all receptors.

A map showing noise contours for the 12m/s turbine integer wind speed operation is provided in Appendix C. It is noted that the noise contour map is generated based on a grid of calculations which are interpolated to generate contours. The single point calculations shown above should be referred to for specific noise levels at each receptor.

Appendix D presents plots of the forecast noise levels against the criteria at each of the receptors.

## 4.2 Cumulative Impacts

No other new or proposed wind farm developments have been identified within the vicinity of the Project that are likely to result in combined or successive noise impacts with the Project.

Mining operation noise may contribute to cumulative noise levels at the sensitive receptors. The EA conditions for Dugald River Mine include operational mining noise limits, with the most stringent noise limit being 30 dBA  $L_{Aeq}$  during the night (10pm to 7am). Even if Dugald River Mine were to produce noise levels up to their night noise limit of 30 dBA  $L_{Aeq}$ , combined with the predicted highest wind farm noise level of 24 dBA  $L_{Aeq}$  at Receptor R03, this would still comply with the 35 dBA  $L_{Aeq}$  State Code 23 night noise limit. Therefore, cumulative noise impacts are not expected to be problematic with respect to compliance with State Code 23.

## 5.0 Wind Farm Construction Noise and Vibration

The Planning Guideline outlines requirements for a construction management plan, which includes noise and vibration impact control measures to minimise noise and vibration impacts at sensitive receptors.

This report addresses construction noise and vibration in general terms. Specific details of the construction methodology and equipment are not known at this early stage of the Project.

It is anticipated that the construction work may include excavation, rock hammering, drilling, bulldozing, crushing and screening, concrete batching and, subject to geotechnical conditions, possible blasting. Noise will be generated by mobile plant such as excavators, bulldozers, mobile cranes and the movement of heavy vehicles.

There is no legislation in Queensland that specifically sets construction noise limits. For construction activity in Queensland, the *Environmental Protection Act 1994* states that:

*“A person must not carry out building work in a way that makes an audible noise –*

- a. On a business day or Saturday, before 6:30am or after 6:30pm; or*
- b. On any other day, at any time.”*

Thus, noise from construction activity is generally controlled through limiting the hours of operation, and through application of best practice management techniques.

A number of ‘good practice’ management and mitigation measures have been outlined below to reduce noise and vibration impacts associated with construction of the Project and to minimise the likelihood of adverse impacts to sensitive receptors:

- Management of construction hours to avoid or minimise noise impacts to sensitive receptors.
- Limitation of construction hours for noisy activities to Monday to Saturday where practicable.
- Construction work out of hours to be assessed on a case by case basis and the work program assessed against the noise impact on nearest residencies.
- Consultation with sensitive receptors and/or Council where warranted to communicate plans for construction works.
- Site management practices to minimise noise emission, including designated entry/exit points, equipment operational practices to minimise noise (e.g. avoid leaving equipment idling, minimise amount of reversing, training/induction for workers).
- Example measures to reduce noise emissions from construction plant include fitting exhaust mufflers, using reversing alarms that emit a broadband noise (e.g. white noise) rather than a beep, maintaining plant in good working order and following industry standard construction methodologies.

## 6.0 Conclusion

A noise impact assessment has been undertaken for the proposed wind farm at Dugald River Mine. Eight wind turbines are currently proposed for the wind farm. Noise emissions from operation of the Project have been predicted at the three sensitive receptors.

The final project design may change the positions of the turbines due to micrositing, and the turbine make and model may change. This assessment has been based on the Goldwind 6.0MW, GW165 turbine.

The smallest separation distance of the wind turbines from Receptor R03 satisfies the minimum 1,500 m separation distance stated in Acceptable Outcome A10.1. The predicted noise emission levels are provided in tabular format in Section 4.1 and as noise contours in Appendix C. The predicted wind farm noise levels comply with the State Code 23 noise criteria at the surrounding sensitive receptors.

As outlined in Section 4.2, no other new or proposed wind farm developments have been identified within the vicinity of the Project, and cumulative impacts from mining activities associated with the existing Dugald River Mine are not expected to be problematic for achieving compliance with State Code 23.

Construction noise and vibration is addressed in Section 5.0. A construction management plan can include noise and vibration impact control measures to minimise noise and vibration impacts at sensitive receptors as outlined in the Planning Guideline. Example management and mitigation measures have been outlined in Section 5.0 to reduce noise and vibration impacts associated with construction of the Project, including management of construction hours, consultation where required, site management practices and potential plant and equipment mitigation measures.

# Appendix A

## Acoustic Terminology

## Appendix A Acoustic Terminology

Ambient Sound	The totally encompassing sound in a given situation at a given time, composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Attended Measurement	Measurements that are attended by a person and measured with a sound level meter.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of everyday sounds; 30 dB(A) A quiet library or in a quiet location in the country 45 dB(A) Typical office space. Ambience in the city at night 60 dB(A) City centre at lunch time 70 dB(A) The sound of a car passing on the Street 80 dB(A) Loud music played at home 90 dB(A) The sound of a truck passing on the Street 100 dB(A) The sound of a rock band.
dB(A)	A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds are not perceived to be as loud as high frequency sounds of the same dB level. The sound level meter replicates the human response of the ear by using an electronic filter which is called the “A” filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is assessed using the “A” filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Impulsiveness	Noise that comprises distinct impulses in the noise (bangs, clicks, clatters, or thumps) etc.
Intermittent	Stopping and starting at irregular intervals.
$L_{Amax}$	The A-weighted maximum sound pressure level measured over a given period.
$L_{Aeq}$	The A-weighted “equivalent noise level” is the summation of noise events that are integrated over a selected period of time.
$L_{Aeq,10min}$	The energy-averaged level of the total noise measured without adjustment for the character of the noise (e.g. tonal or impulsive), over a period of 10 minutes.
$L_{max}$	Maximum noise level of the measurement period.
$L_{10}$	Noise level exceeded for 10% of the measurement period. The $L_{10}$ represents the intrusive noise level and is often used to represent traffic/music noise.
$L_{90}$	Noise level exceeded for 90% of the measurement period. This represents the background noise level excluding nearby sources.
$L_{w(A)}$	A ‘Weighted’ sound power level, measured in dB(A)
Tonality	A characteristic of noise, describing a sound that contains a perceptible pitch or tone. As a general rule, a prominent tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjoined bands by 5 dB or more.

# Appendix B

## Project Aerial View



## Appendix B Project Aerial View

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

www.aecom.com

DATUM GDA 1994, PROJECTION MGA ZONE 54

metres

1:40,000 (when printed at A3)

**Legend**

- Sensitive Receptor
- Wind Turbine (primary)
- Wind Turbine (potential)

DISCLAIMER: Map is to be read in conjunction with the Report 60663430-AC-LR-001

**Dugald River Wind Farm  
Turbine Layout and Sensitive Receptor Locations**

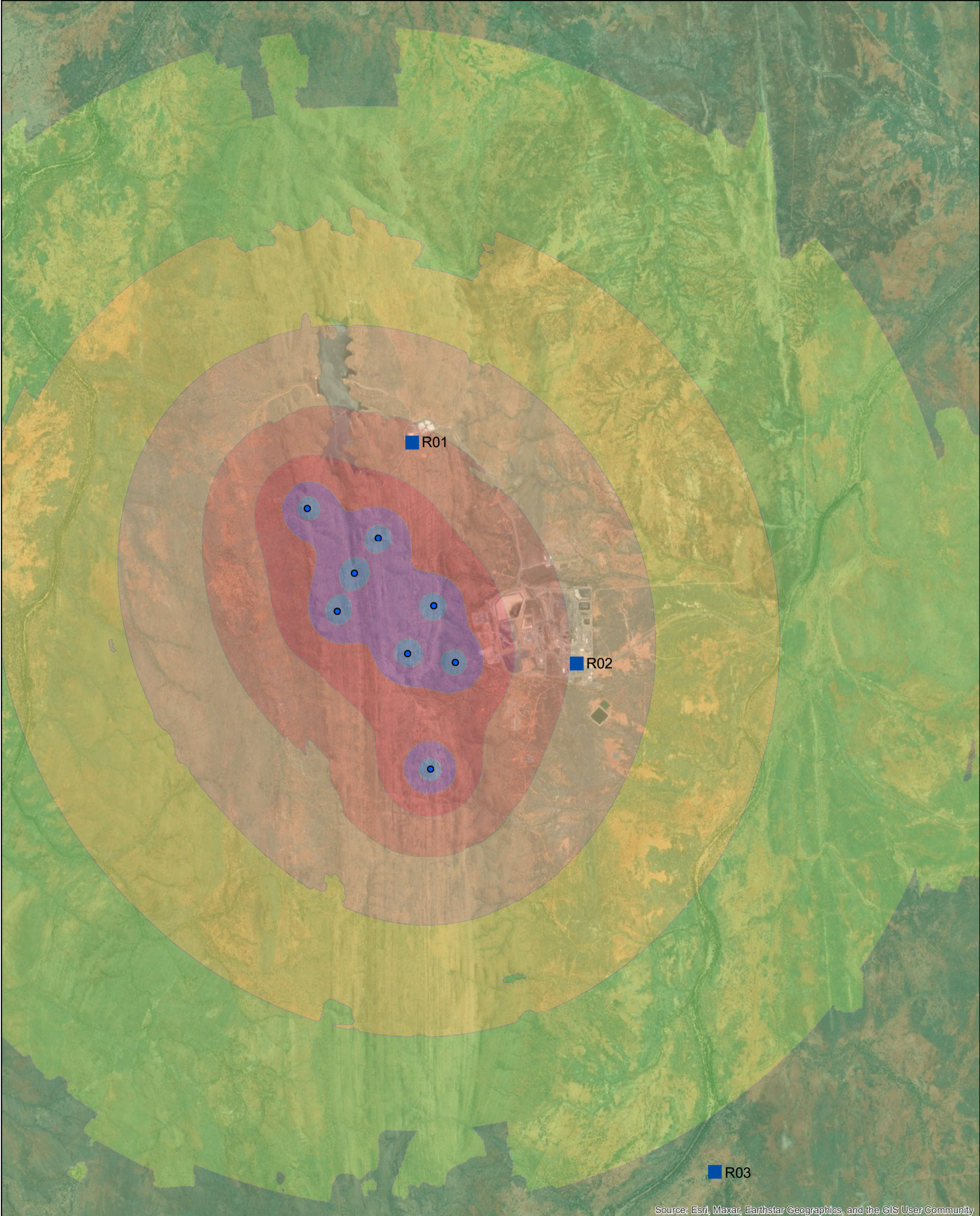
PROJECT ID 60698169 CREATED BY OB LAST MODIFIED 08 - 05 Jul 2023 VERSION: 01	<p><b>Figure</b></p> <p><b>Appendix B - 01</b></p>
---	--

# Appendix C

## Noise Contour Plots

## Appendix C Noise Contour Plots

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

www.aecom.com

DATUM GDA 1994, PROJECTION MGA ZONE 54

metres

1:40,000 (when printed at A3)

**Legend**

**Grid Noise Contours**  
L<sub>Aeq</sub> 10min dB(A) Noise Levels at 4m above ground

- 0 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60

- Sensitive Receptor
- Wind Turbine (primary)

DISCLAIMER: Map is to be read in conjunction with the Report 60663430-AC-LR-001

**Dugald River Wind Farm  
Primary Wind Turbines Only  
L<sub>Aeq</sub> 10min Noise Contour Map  
(Reference Winds Speed: 12m/s at Hub Height)**

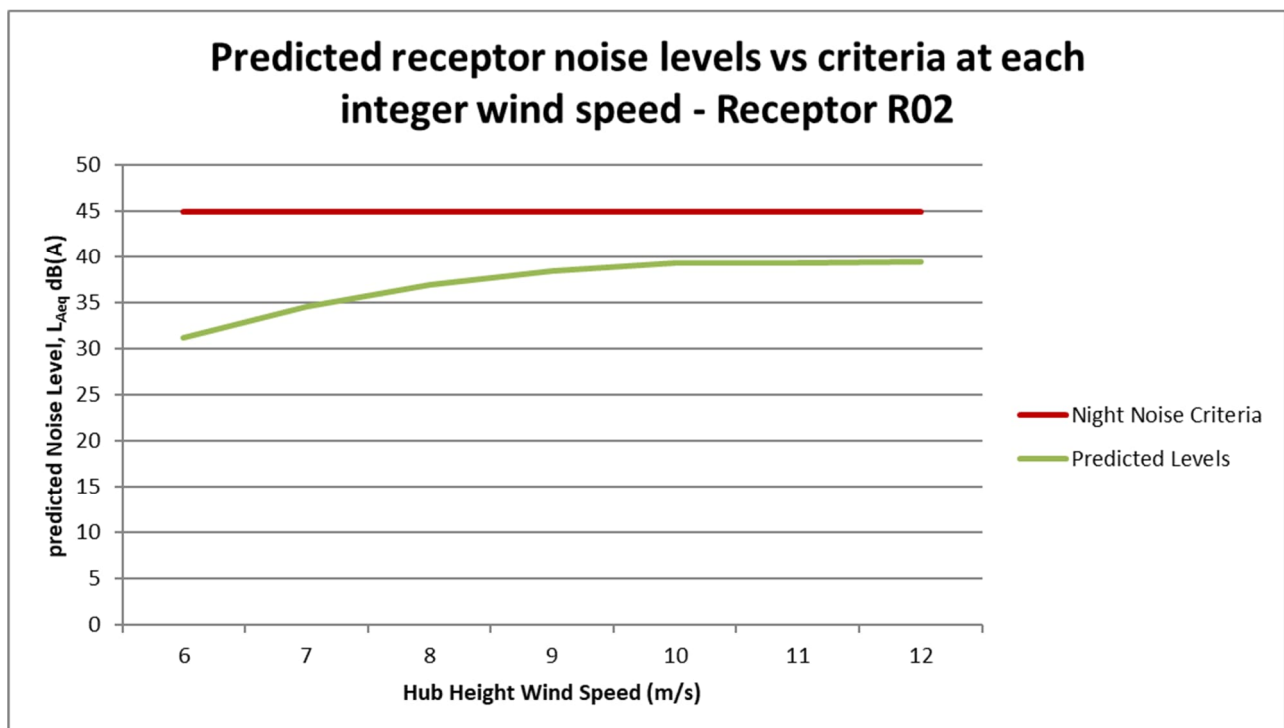
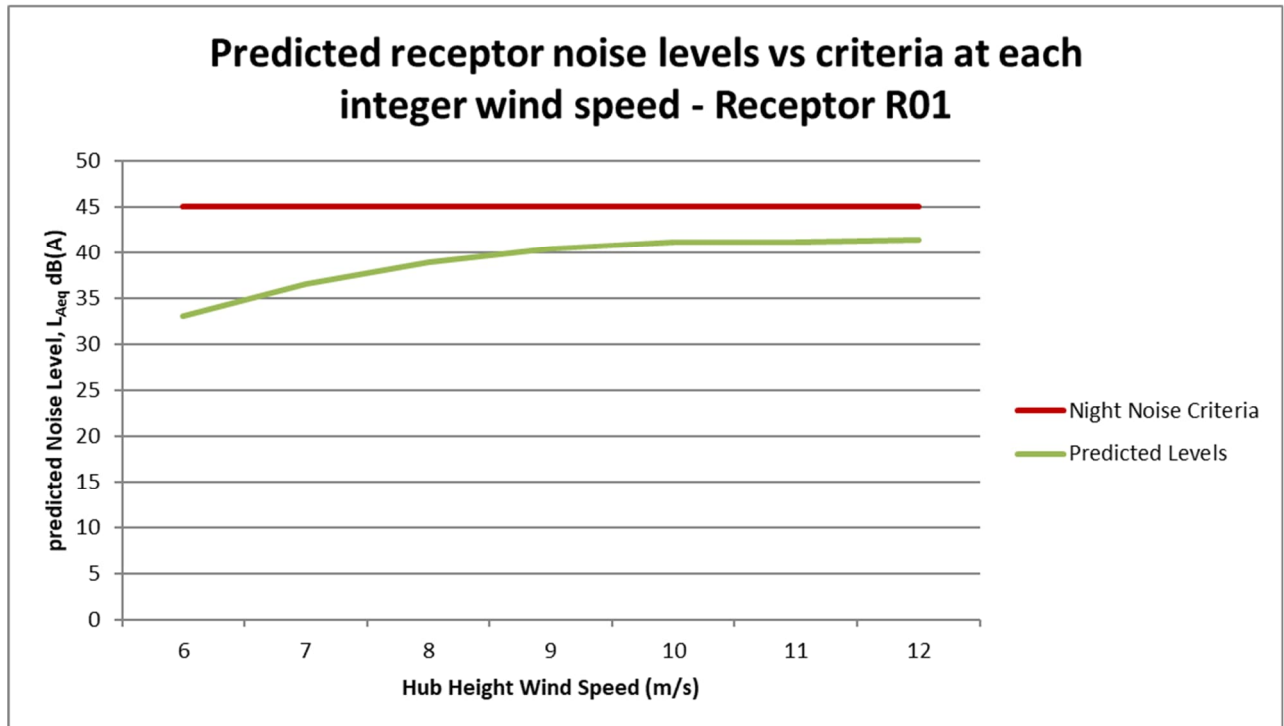
PROJECT ID	60698169
CREATED BY	OB
LAST MODIFIED	OB - 03 Jul 2023
VERSION:	01

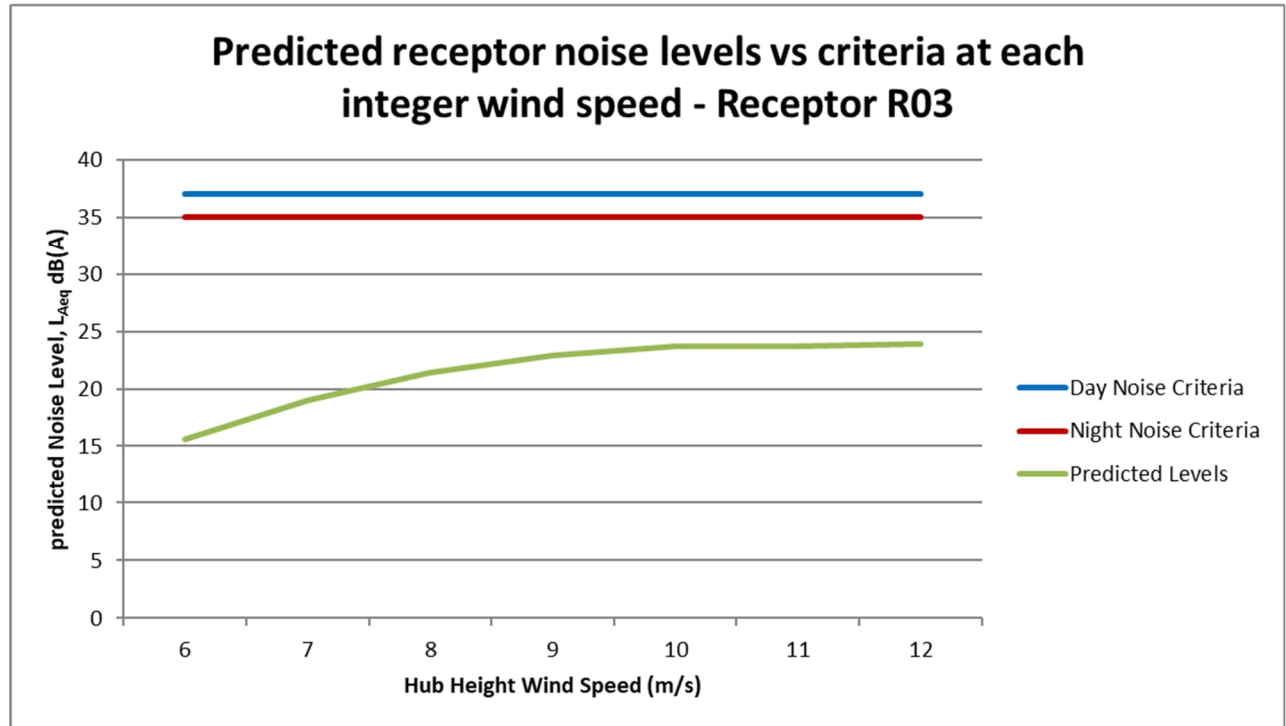
Figure  
**Appendix C - 01**

# Appendix D

## Predicted Noise Levels vs Criteria

## Appendix D Predicted Noise Levels vs Criteria







# Appendix E

## Wind Turbine Locations

## Appendix E Wind Turbine Locations

The assessed primary wind turbine locations are presented in Table 8.

**Table 8 Wind Turbine Locations**

Turbine Number	GDA 1994 MGA Zone 54	
	Easting	Northing
WTG-01	408926	7762060
WTG-03	409752	7761721
WTG-04	409275	7760871
WTG-05	410095	7760377
WTG-06	410651	7760276
WTG-07	410363	7759030
WTG-08	409475	7761311
WTG-09	410399	7760933

# Appendix F

## Sensitive Receptor Locations

## Appendix F Sensitive Receptor Locations

The sensitive receptor locations considered in this assessment are presented in Table 9.

**Table 9 Sensitive Receptor Locations**

Receptor ID	GDA 1994 MGA Zone 54	
	Easting	Northing
R01	410144	7762838
R02	412060	7760264
R03	413668	7754347

# Appendix G

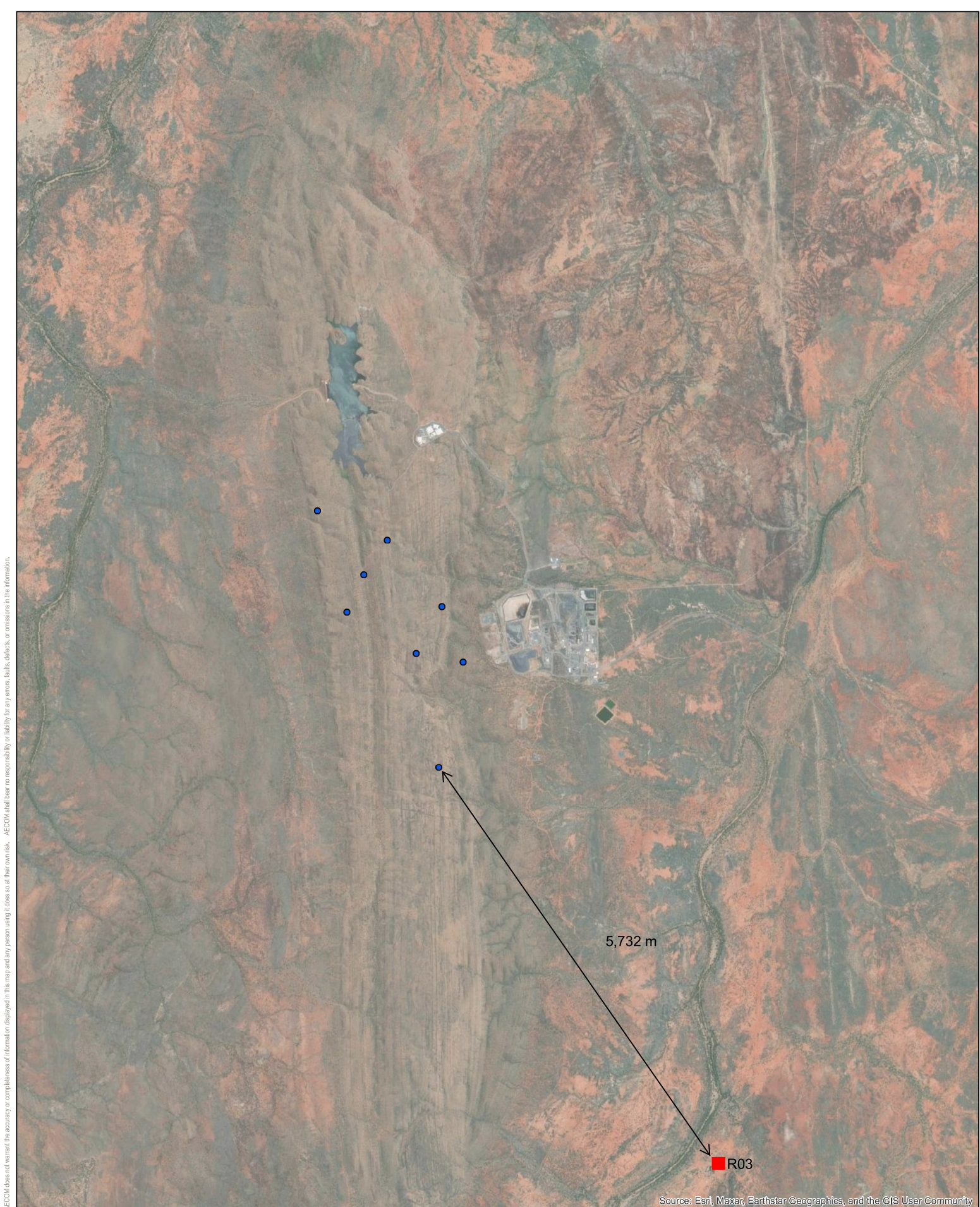
## Wind Turbine Setback Distances

## Appendix G Wind Turbine Setback Distance

The setback distances for all eight wind turbines from the non-host sensitive receptor R03 are presented in Table 10.

**Table 10 Wind Turbines Setback Distances from Receptor R03**

Turbine Number	GDA 1994 MGA Zone 54		Separation Distance to R03 (m)
	Easting	Northing	
WTG-01	408926	7762060	9054
WTG-03	409752	7761721	8349
WTG-04	409275	7760871	7865
WTG-05	410095	7760377	7009
WTG-06	410651	7760276	6652
WTG-07	410363	7759030	5732
WTG-08	409475	7761311	8129
WTG-09	410399	7760933	7353



AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

www.aecom.com

DATUM GDA 1994, PROJECTION MGA ZONE 54

metres

1:40,000 (when printed at A3)

**Legend**

- Receptor R03
- Wind Turbine

DISCLAIMER: Map is to be read in conjunction with the Report 60663430-AC-LR-001

**Dugald River Wind Farm  
Turbine Setback Distance from Receptor R03**

PROJECT ID 60698169	Figure
CREATED BY OB	Appendix G - 01
LAST MODIFIED OB - 13 Jul 2023	
VERSION: 01	