LESEDI SOLAR PHOTOVOLTAIC PROJECT

Lesedi Solar Project Aquatic Assessment and Floodline Determination

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Date: June 2018
Ref: 303-00766/02

Lesedi Solar Photovoltaic Project

Aquatic Assessment Report and Floodline Determination

303-00766/02

June 2018

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Lesedi Solar Photovoltaic Project

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1 INTRODUCTION

1.1 Background Information

The Lesedi Solar Power Project (LSPP) (hereafter referred to as the Project Area) is situated about 25 km east of Postmasburg, south of the R385. The project uses Photovoltaic (PV) technology to supply electricity to the Eskom grid and consists of two adjacent sites straddling the railway line between Postmasburg and Lime Acres. The installed capacity of the Lesedi Project totals 75 MW-DC, but capacity is capped at 64 MW-DC. The two sites cover a combined total area of 140 hectares, which is leased from the land owner for the projects planned 20+ year operating life. Full commercial operation commenced in May 2014.

1.2 Scope of Report

The aquatic assessment report is comprised of two parts:

Part 1: Aquatic Specialist Study

- To provide feedback on the Aquatic Assessment site visit in May 2018
- To assess the potential impacts of the proposed development activity on the identified aquatic ecosystems
- To assess the potential water use licence applications applicable to the development
- Provide required supplementary information for the Water Use Licence (WUL)
- To provide the Department of Water and Sanitation (DWS) Risk Assessment Matrix

Part 2: Floodline Determination

- Calculate the 1:50 and 1:100 year flood peaks from the contributing catchment area of the local river
- Prepare the 1:50 and 1:100 year floodlines for the Lesedi PV Farm
- Determine whether the 1:50 and/or the 1:100 year floodline will inundate the sub-station area.

2 SITE DESCRIPTION

2.1 General Site Characteristics

The Lesedi Solar Power Project (LSPP) is situated about 25 km east of Postmasburg, south of the R385 (Figure 1).

2.2 Catchment

The project area is situated within the Orange River Catchment (Primary Catchment D) and within the quaternary catchment D73A. The episodic channel that flows through the LSPP area drains into the Groenwater Spruit to the north of the project area.

The catchment size, mean annual runoff and rainfall for the quaternary catchment are provided in the table below (Midgley *et al.*, 1990).

Table 1: Catchment data

Quaternary Catchment	Catchment Surface Area km^2	Mean Annual Precipitation (MAP) in mm	Mean Annual Run-off (MAR) in mm
D73A	3234.8	322.7	14.6

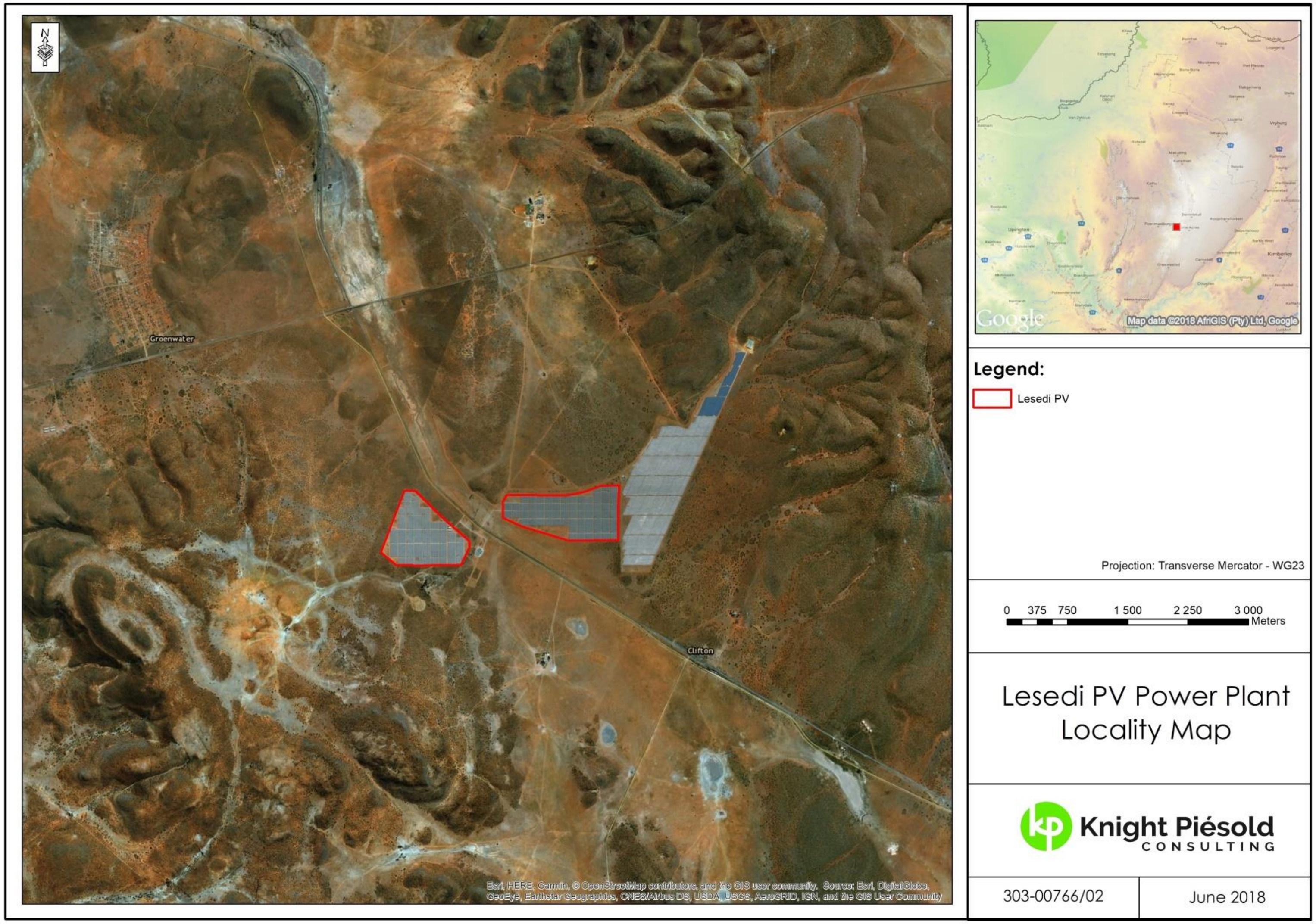

Figure 1: Lesedi Power Plant Locality

3 AQUATIC ASSESSMENT

3.1 Site Visit Feedback

A site visit to the project area was conducted on the 18th of May 2018. The site visit entailed the following:

- Identify and determine the nature of any natural aquatic systems
- Assess the impact and alteration associated with the constructed low level crossing
- Determine the proximity of the sub-station to the river, in particular relating to the 50- and 100-year flood events
- Investigate a culvert downstream of the secondary PV site.

The aim of the visit was to investigate the exact nature of the episodic river draining the area south west of the western PV site (Figure 2). This unnamed river drains into a small farm dam north of the railway line, through a number of newly refurbished culverts. In order to reach the Lesedi sub-station south of the river a low level crossing has been constructed to facilitate access to the Sub-station during high rainfall events, thus altering the river bed.

The closest approach of the river is about 40 m from the sub-station. The sub-station has its own drainage measure in place and water is channelled away from the sub-station through drainage structures.

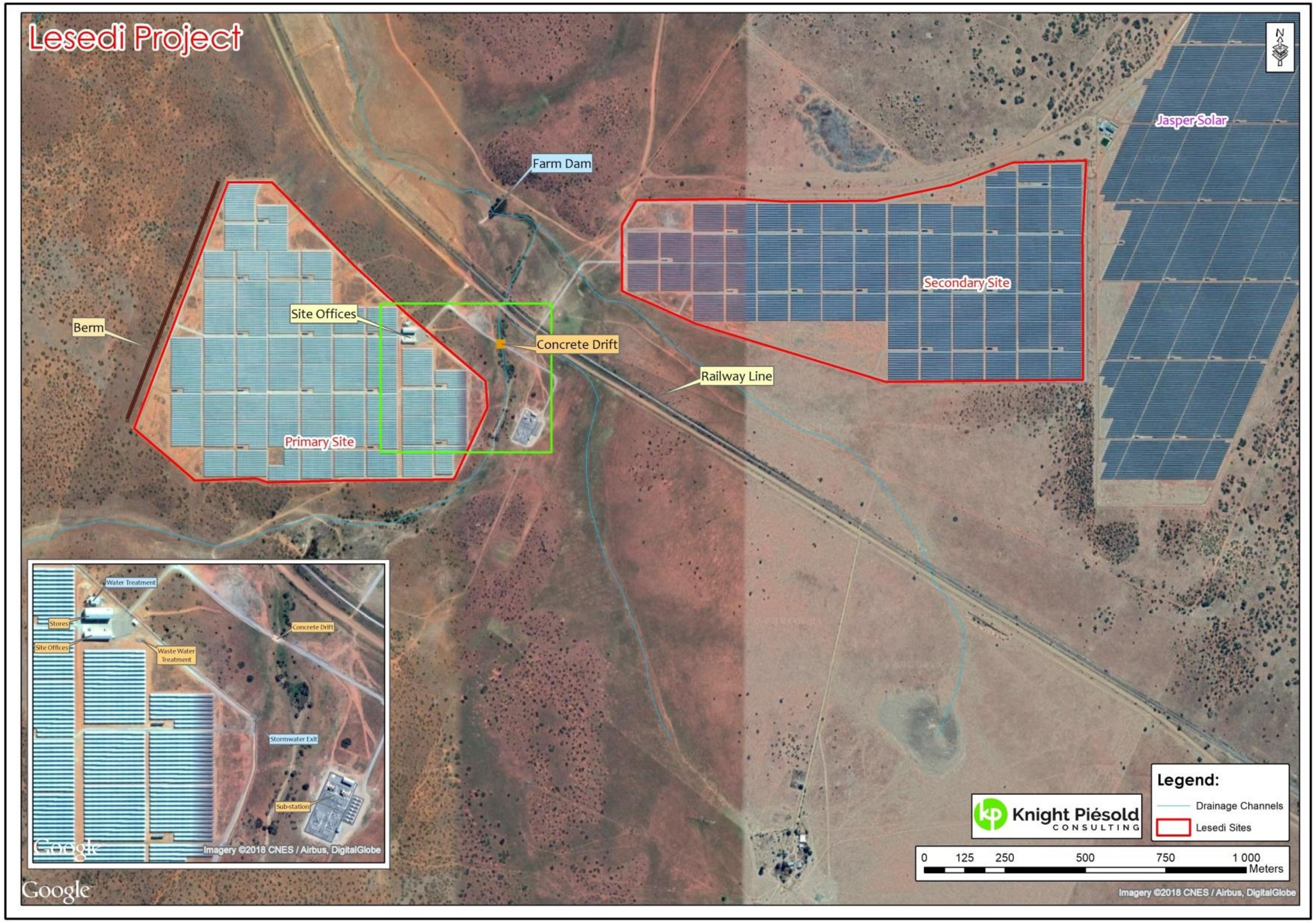

Figure 2: Project Area Layout

3.2 Aquatic System Delineation

An unnamed river located to the south of project area drains to the north-east of the project area. The unnamed river has clear river bed characteristics with cobbles and stone

dominating the river bed (Plate 1). Riparian vegetation and in-stream vegetation is dominated by grass as there is no constant flow of water within the channel. No water was visible within the channel as the river is classified as episodic, only flowing during rainfall events. The catchment receives very little rainfall with evaporation rates being higher than the rainfall per annum.

The river flows north-east where it leaves the project area through culverts that flow under the dirt road and electrified railway line. Routine maintenance on the culverts was observed during the site visit to ensure that water is not obstructed. The river flows through the culverts to a small farm dam located on the other side of the dirt road. The river does not form part of the primary or secondary river system within the catchment.

Plate 1: Typical stone river bed

Plate 2: Upstream view of river channel

3.3 Constructed Low Level Crossing

The sub-station (SS) is situated south of the drainage channel. Storm events are quite often associated with lightning and this causes the SS to trip on occasion. For this reason the need exists to access the SS during electrical storms. The concrete low level crossing was constructed during 2013, during the LSPP construction phase, to facilitate access to the SS. The drift is approximate 3 meters wide and does not cause any alteration in the nature of the stream flow, i.e. no obvious erosion related to the structure could be observed.

Plate 3: Constructed Drift

Plate 4: Upstream view of Concrete Drift

3.4 Water Use Licence

The construction of the drift through the identified river channel triggers a *Section 21 (c): impeding or diverting the flow of water in a watercourse* and *21 (i): altering bed, banks, course or characteristics of a watercourse* according to the National Water Act, 1998. Due to the nature of the aquatic system and the impacts associated with the development, the activity could be Generally Authorised by the Department of Water Affairs (DWS). In this regard a DWS 23 Risk Assessment Matrix was compiled on delineated aquatic systems. The Risk Matrix will assist DWS to determine if the activity can be Generally Authorised (GA) according to Notice 509 of 2016 (Government Gazette No. 40229).

3.4.1 DWS 23 Risk Assessment

Due to the nature of the aquatic system being episodic and not forming part of the primary or secondary drainage system of quaternary catchment D73A, it is the professional opinion of the author of this report that the constructed low level crossing can obtain a General Authorisation in terms of Section 21 of the National Water Act. Table 2 below presents a summary of the Risk Assessment. The prescribed risk matrix in term of Notice 509 is presented in Annexure A.

Table 2: Summary of Risk Assessment

Phase	Activity	Impact	Risk Rating
Operational	Concrete Drift	• Increase in-stream water velocity • Erosion of water course • Flow sediment equilibrium change	**Low**

The risk associated with the concrete low level crossing is rated as a *Low* significance due to the episodic nature of the river.

4 FLOODLINE DETERMINATION

The purpose of the floodline determination was to calculate the 1:50 and 1:100 year flood peaks from the contributing catchment area of the local river, and prepare the 1:50 and 1:100 year floodlines for the LSSP. In addition, the study served to determine whether the 1:50 and/or the 1:100 year floodline will inundate the sub-station area.

This section provides a summary of the floodline determination and the full report can be found in Annexure B.

The 1:50 and 1:100 year flood inundation lines were prepared using the HEC-RAS software. The primary input to HEC-RAS is the cross section information that describes the shape and slope of the streams and the channel roughness. The HEC-RAS section locations and position of the cross section at the sub-station is presented in Annexure B.

Cross sections were prepared using a 0.5 m contour interval LIDAR survey provided by the Client. The contours were used to define catchment areas, river flow paths and a surface model. Using ArcGIS 10.2.2 the necessary input files were created for hydrology calculations in HEC-RAS. The resultant export files were then re-imported into ArcGIS to generate the necessary 1:50 and 1:100 year flood inundation maps of the area. The 1:50 and 1:100 year floodlines are presented below in Figure 3.

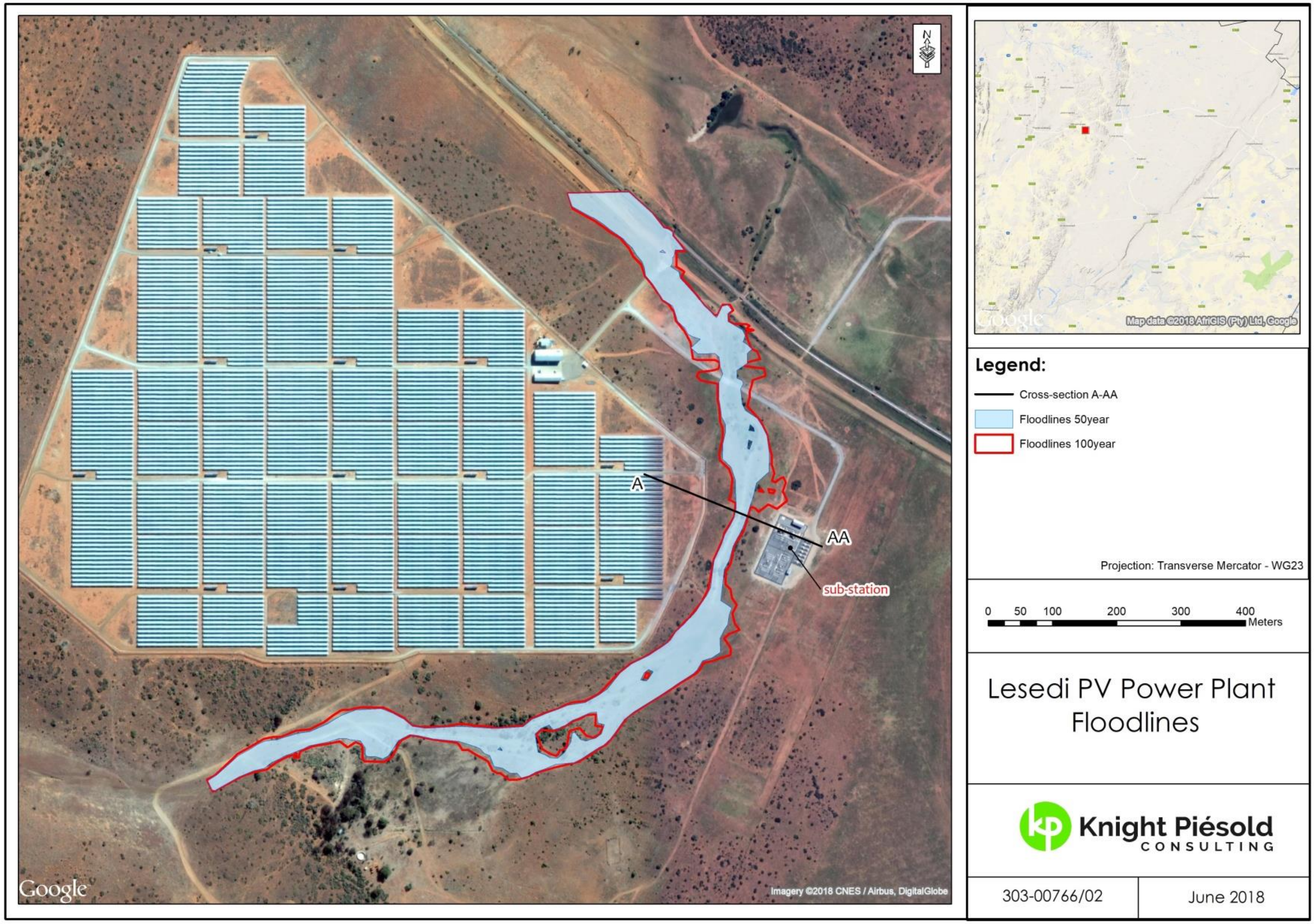

Figure 3: 1:50 and 1:100 year floodlines

An assessment of the river south of the LSSP was carried out in order to determine the extent of the floodlines along the PV Farm, but particularly at the sub-station south of the PV farm. The 1:50 and 1:100 year flood events were analysed and indicate the following:

- The hydraulic model results from HEC-RAS indicate that the PV farm is not threatened by the 50 or the 100 year flood events. It lies well above the level of a flooded river
- The natural ground level at the sub-station south of the PV farm lies marginally higher than the 100 year floodline. Therefore the sub-station is also not threatened by the 100 year flood.
- To further mitigate against flooding risk a terrace for the sub-station could be created, higher than the ground level, will improve the situation at the sub-station, creating a freeboard above the flood level.

5 CONCLUSION

The aquatic assessment and floodline determination for the associated infrastructure (sub-station and concrete drift) on the Lesedi PV farm the following can be concluded:

- The river on the southern part of the farm is episodic in nature
- The concrete low level crossing constructed has no significance impact on the river channel, flow and geomorphology of the system
- The sub-station is not threatened by the 1:50 and/or 1:100 year floodline.

6 REFERENCES

Department of Water Affairs. 1998. National Water Act. Act No 36 of 1998.

Department of Water and Sanitation, Notice 509 of 2016. General Authorisation in Terms of Section 39 of the National Water Act, 1998 (Act No 36 of 1998) for Water Uses as Defined in Section 21 (c) or Section 21 (i).

Midgley, D.C., Pitman, W.V., Middleton, B.J., 1990. *Surface Water Resources of South Africa.* WRC Report No 298/2.1/94

A
DWS RISK ASSESSMENT

ASPECTS AND IMPACT REGISTER/RISK ASSSESSMENT FOR WATERCOURSES INCLUDING RIVERS, PANS, WETLANDS, SPRINGS,DRAINAGE LINES

COMPILED BY: Knight Piesold (Pty) Ltd

Neal Neervoort (Pr.Sci.Nat 115316)

Nr.	Phases	Activity	Aspect	Impact	Severity: Flow Regime	Severity: Physico & Chemical (Water Quality)	Severity: Habitat (Geomorph+Vegetation)	Severity: Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures	Borderline LOW MODERATE Rating Classes	Type Watercourse
1	Operational Phase	Low Level Crossing	The low level crossingt will alter the natural topography with a hardened surface	Increase in-stream water velocity causing erosion Erosion of water course Flow sediment equilibrium change	1	1	1	1	1	1	1	3	1	1	5	1	**8**	**24**	**L**	Monitoring and maintenance on the concrete drift should be implemented during the life of the project to ensure that the drift does not impact on the receiving environment as no impact is envisaged on the current stream conditions or water quality.	-1	Unnamed River (Episodic system so no PES or Water quality could be obtained)

B

Floodline Calculation Report

Knight Piésold CONSULTING

Calculation Report

Client Name Lesedi Power Project **Page:** 1 **of** 23

Project Name: Lesedi PV floodline **Job No:** RI 303-00766/02

Calculation Title: Flood hydrology and Floodlines preparation for the 50 and 100 year flood

File No.:

Calculation is: ☐ Preliminary ☒ Final

Objective: Calculate the 1:50 and 1:100 year flood peaks from the contributing catchment areas and prepare the 1:50 and 1:100 year floodlines for the stream passing south of the Lesedi PV farm. Determine if the sub-station terrain will be inundated during the 50 year and the 100 year flood events.

Unverified assumptions requiring subsequent verification			
No.	**Assumption**	**Verified by**	**Date**
-	None	-	-

This section applies to computer generated calculations

Program Name/Number: HEC-RAS **Version:** 5.0.3

Program Name/Number: **Version:**

Evidence of or reference to computer program verification, if applicable:

- HEC-RAS cross section layout on Google Earth image in Appendix A.
- Hec-Ras cross section of a typical cross section in line with the sub-station.

Bases or reference thereto supporting application of the computer program to the physical problem:

- The HEC-RAS model is used to determine the flow depth in the river sections. This is necessary in determining the Floodlines.

Review and Approval						
Rev	Prepared by	Date	Verified by	Date	Approved by	Date
00	Gert Cloete	June 2018				

``

1. PURPOSE:

Calculate the 1:50 and 1:100 year flood peaks from the contributing catchment area of the local river, and prepare the 1:50 and 1:100 year floodlines for the Lesedi PV Farm. Determine whether the 1:50 and/or the 1:100 year floodline will inundate the sub-station area.

2. REFERENCES:

2.1 SANRAL. (Sept 2013). **Road Drainage Manual**. 6th Edition

2.2

3. PROCEDURE/METHODOLOGY OF DESIGN:

3.1 Determine Catchment Area
3.2 Determine longest flow path and average slope
3.3 Estimate the run-off co-efficient for the catchment
3.4 Calculate the return period flood peaks for the contributing catchment
3.5 Generate cross sections for the stream in vicinity of the project area
3.6 Input cross-sectional data into HEC-RAS Hydraulic model software program and determine flow depths in the stream
3.7 Generate mapping indicating the floodlines

4. APPENDICES TO CALCULATIONS

Appendix A	Catchment Area
Appendix B	HEC-RAS Cross sections and longitudinal profile
Appendix C	1:50 and 1:100 year floodlines
Appendix D	Cross section 405 with water levels at the sub-station

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5. CALCULATIONS

5.1 Flood Hydrology

5.1.1 Catchment

The catchment areas are shown in Figure 1 and **Appendix A**.

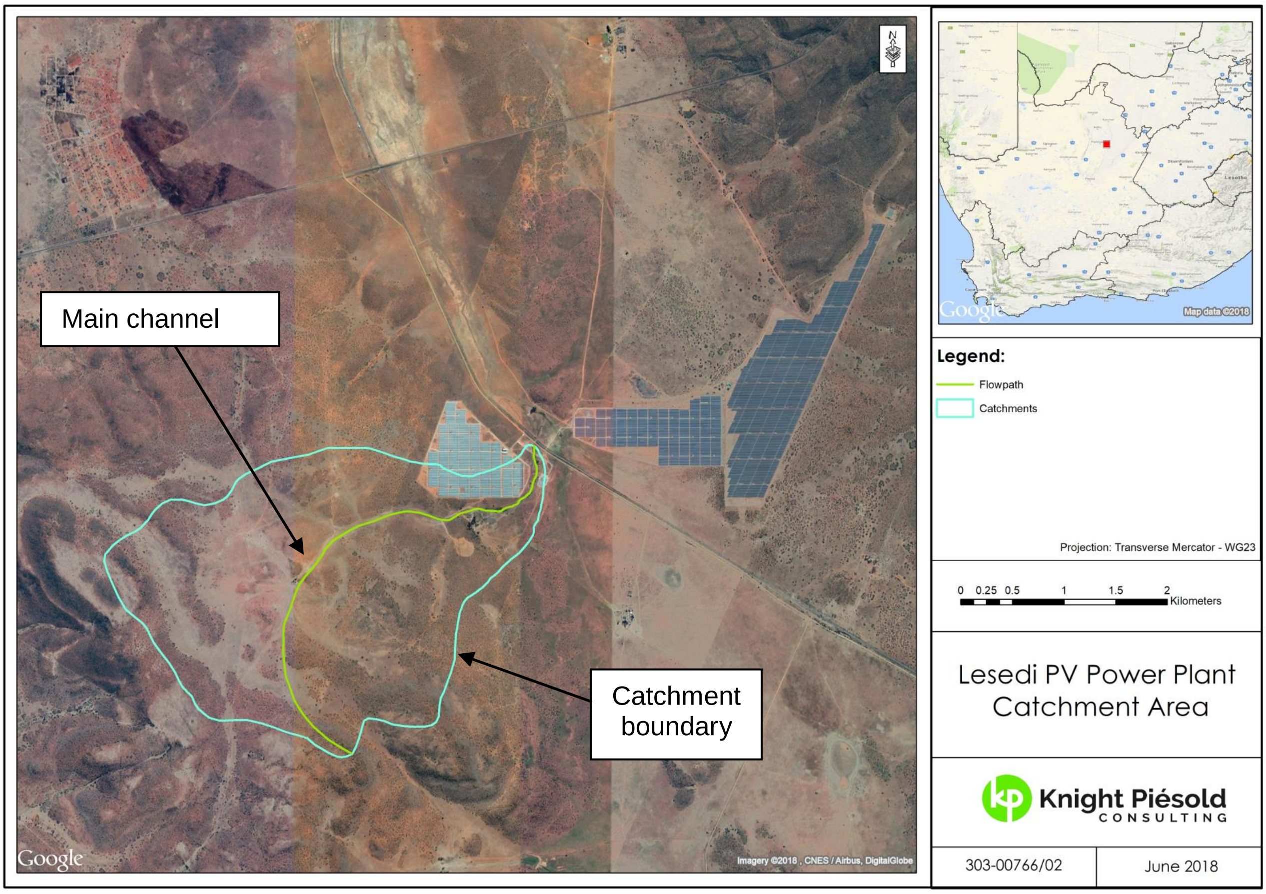

Figure 1 : Catchment Area

The catchment characteristics are summarised in Table 1 below.

Table 1 : Catchment Characteristics

	Side Catchment
Catchment area (km^2)	8.24
Longest Flow Path (km)	5.01
Average slope (m/m)	0.0157
Time of Concentration (hrs)	1.14
Land Use	Rural

The Time of Concentration for defined watercourse flow conditions uses the equation shown below:

$$T_c = \left(\frac{0.87L^2}{1000S_{av}} \right)^{0.385}$$

Where T_c = Time of Concentration (hrs)

``

L = Hydraulic length of catchment (km)
S = Average Catchment Slope (m/m)

The Time of Concentration for overland flow conditions uses the following equation:

$$T_C = 0.602\left(\frac{rL}{S^{0.5}}\right)^{0.467}$$

Where T_C = Time of Concentration (hrs)
L = Hydraulic length of catchment (km)
S = Average Catchment Slope (m/m)

The Side Catchment consists of a combination of overland flow and defined watercourse, whereas the Main Catchment only consists of a defined watercourse.

5.1.2 Rainfall

The average annual precipitation for the catchment area is 300 mm per annum.

Apart from the duration and return period, the intensity of rainfall is also related to the mean annual precipitation and to the rainfall region. The “depth-duration-frequency” relationship depicted in Figure 2 below was used to determine point rainfall, which is then converted to intensity by dividing point rainfall by the time of concentration.

5.1.3 Flood Peak Determination

Flood peaks are affected by the rainfall amount, land use, soil characteristics and the antecedent moisture conditions. The catchment area size is 8.24 km^2. Based on the size of the catchment the Rational Method was used in the analysis.

The Rational Method is usually recommended up to catchments with an area of approximately 15km^2. The formulation of this method as well as its inherent assumptions are discussed in the following sections.

5.1.3.1 Rational Method

The Rational Method is the most widely used method for determining flood peak discharges. The method assumes that the peak flow occurs when the entire watershed contributes to the flow at the catchment outlet and that the rainfall intensity is uniform over the catchment response time. As a consequence of these assumptions, the method is used only in small catchments (<15km^2). The basic form of the equation is:

$$Q = \frac{C.I.A}{3.6}$$

Where Q = Peak Flow (m^3/s)
C = runoff coefficient
I = Rainfall Intensity (mm/hr)
A = Catchment Area (km^2)

The runoff coefficient (C) is an integrated value representing the catchment characteristics influencing the rainfall runoff relationship. It reflects that part of the storm rainfall contributing to the peak flood runoff at the catchment outlet. The runoff coefficients are given in Table 2.

Table 2: Runoff coefficients

Catchment ID	Runoff coefficient, C
Catchment	0.28

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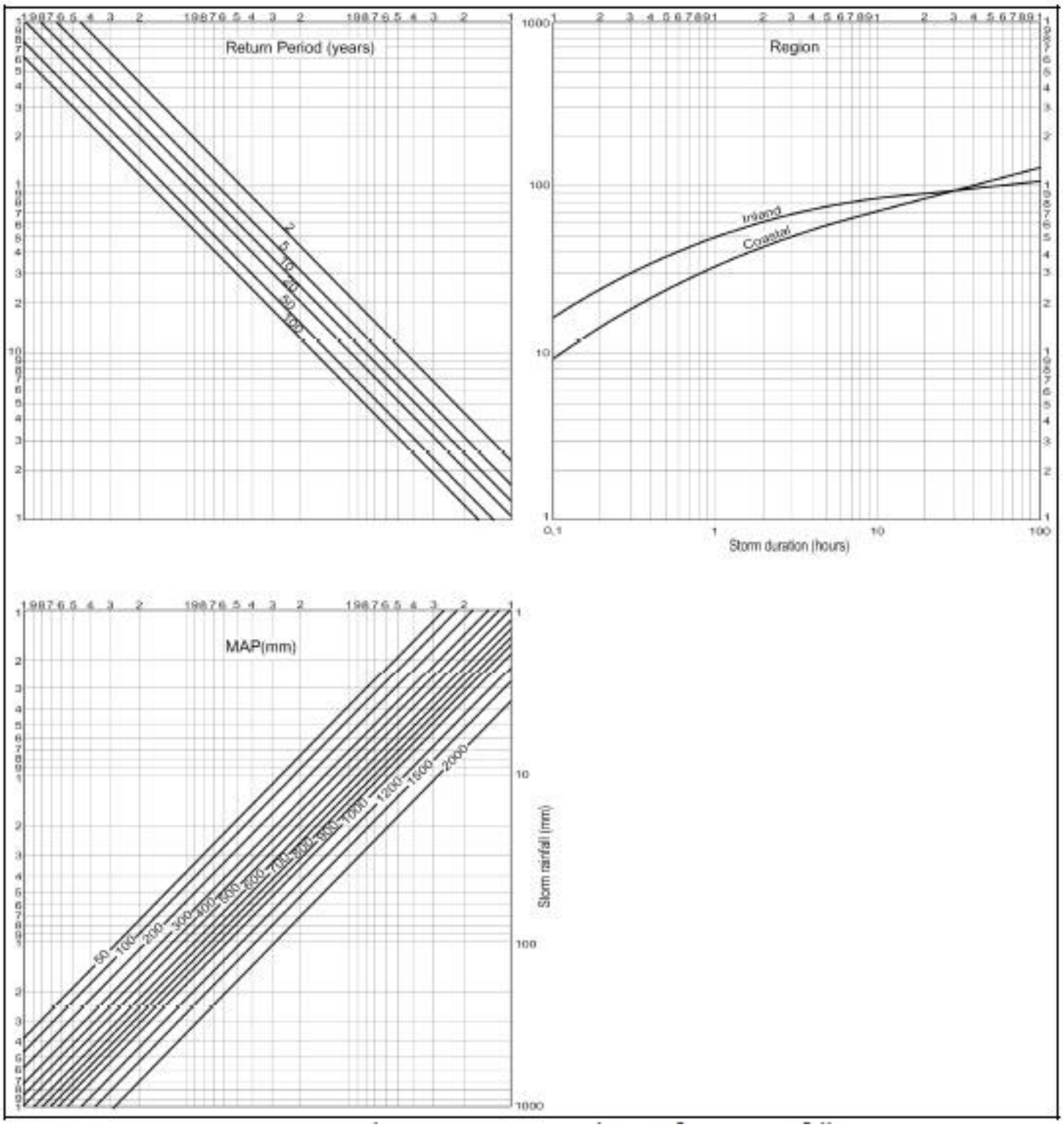

Figure 2: Depth-Duration-Frequency diagram for point rainfall (SANRAL)

5.1.3.2 Empirical Methods

Empirical methods are mostly based on simple correlations between peak flow rates and other catchment characteristics derived in order to establish general regional parameters.

These methods are based mainly on flow measurements at measuring stations covering catchments that are seldom smaller than $10km^2$ and usually larger than $100km^2$. Consequently these methods are only applicable to medium and large catchments.

5.1.3.2.1 Kovacs

Kovacs studied approximately 300 highest flood peaks observed in South Africa between 1894 and 1979. The information was processed using the Francou-Rodier relationship, and the five regional curves with confidence bands were compiled. The Francou-Rodier relationship, which is used to determine the regional maximum flood (RMF), is expressed by the equation:

``

$$Q_{RMF} = 10^6 \left(\frac{A}{10^8} \right)^{1-0.1K}$$

Where: Q_{RMF} = regional maximum flood peak flow rate (m^3/s)
K = regional constant (obtainable from the regional classification detailed in Figure 3.37 and simplified in Table 3.18 of the Drainage Manual)
10^6 = total world MAR (m^3/s)
10^8 = total world catchment area (km^2)

According to Kovacs a simple unorthodox analysis of the K-value and the representative return period of entirely independent flood peaks have provided coefficients which represent the 50 to 200 year peaks as fractions of RMF. These Q_T/Q_{RMF} ratios are provided in Appendix 3D (Tables 3D.1 and 3D.2) of the "Drainage Manual (2013)" and are dependent on the region as well as the effective catchment area.

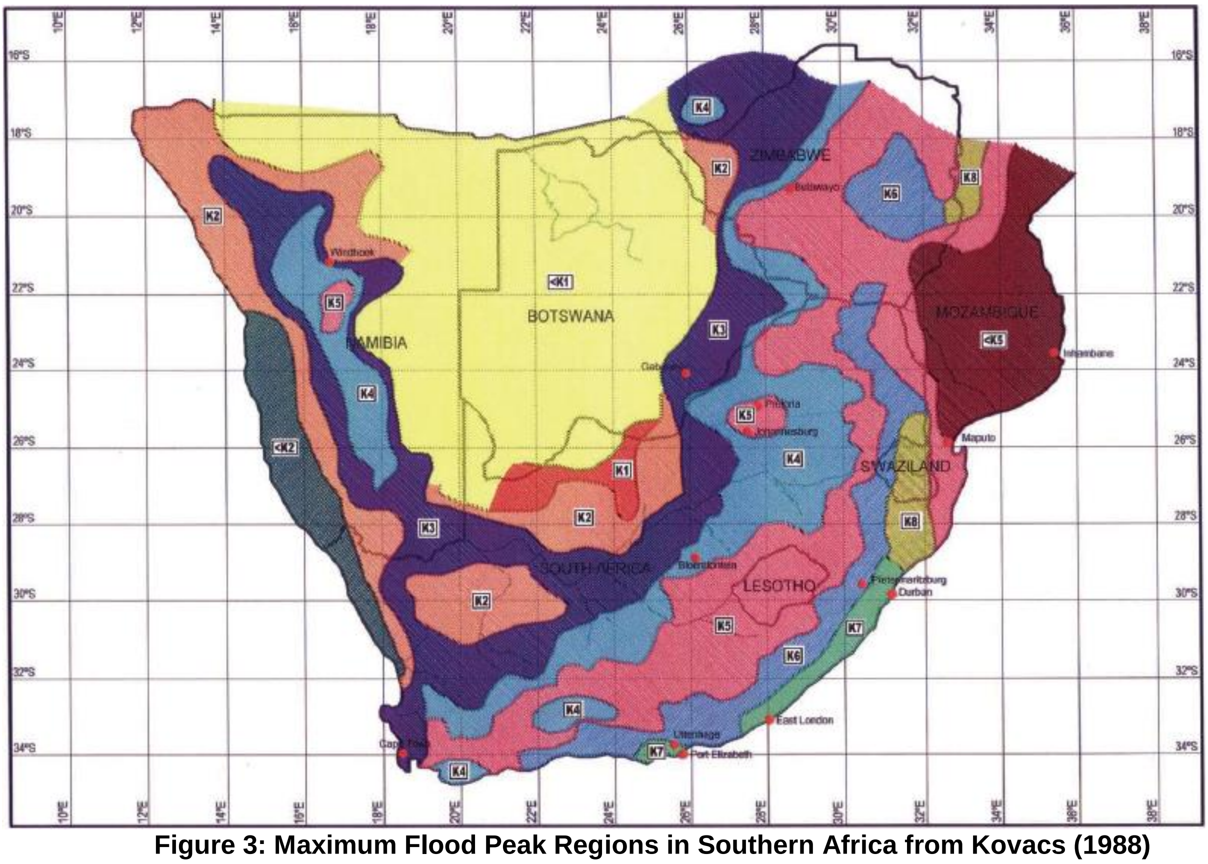

Figure 3: Maximum Flood Peak Regions in Southern Africa from Kovacs (1988)

According to Figure 3, the Lesedi PV Farm lies within region K2, which is associated with a regional constant of 3.4. Figure 4 makes provision for a catchment smaller than $10km^2$.

``

Region	Return period (years)	K_T	Effective catchment area - A_e (km^2)									
			≤ 10*	30*	100	300	1 000	3 000	10 000	30 000	100 000	300 000
K8 (5,6)	50	5,06	0,537	0,508	0,474	0,503	0,537	0,570	0,607			
	100	5,25	0,668	0,645	0,617	0,640	0,668	0,695	0,724			
	200	5,41	0,803	0,788	0,769	0,784	0,803	0,821	0,838			
K7 (5,4)	50	4,70	0,447	0,416	0,380	0,411	0,447	0,482	0,523			
	100	4,89	0,556	0,525	0,492	0,523	0,556	0,588	0,623			
	200	5,04	0,661	0,635	0,607	0,633	0,661	0,687	0,716			
K6 (5,2)	50	4,50	0,447	0,416	0,380	0,411	0,447	0,482	0,526	0,566		
	100	4,69	0,556	0,528	0,494	0,524	0,556	0,588	0,626	0,660		
	200	4,86	0,676	0,650	0,624	0,650	0,676	0,701	0,733	0,758		
K5 (5 - except in SW Cape)	50	4,30	0,447	0,416	0,380	0,411	0,447	0,482	0,525	0,567	0,617	
	100	4,48	0,550	0,521	0,488	0,517	0,550	0,582	0,619	0,657	0,699	
	200	4,64	0,661	0,636	0,608	0,633	0,661	0,687	0,718	0,748	0,780	
K5 (5 - G, H in SW Cape)	50	4,45	0,531	0,502	0,468	0,497	0,531	0,564				
	100	4,63	0,654	0,629	0,600	0,625	0,654	0,680				
	200	4,78	0,777	0,758	0,738	0,757	0,777	0,795				
K4 (4,6)	50	3,84	0,416	0,385	0,350	0,381	0,416	0,453	0,496	0,541	0,591	
	100	4,04	0,524	0,495	0,462	0,491	0,524	0,558	0,597	0,636	0,679	
	200	4,20	0,629	0,603	0,576	0,602	0,629	0,660	0,692	0,724	0,758	
K3 (4)	50	3,26	0,426	0,426	0,426	0,390	0,426	0,463	0,506	0,548	0,602	0,651
	100	3,50	0,562	0,562	0,562	0,529	0,562	0,595	0,631	0,666	0,710	0,749
	200	3,68	0,692	0,692	0,692	0,665	0,692	0,718	0,745	0,771	0,804	0,831
K2 (3,4)**	50	2,40	0,317	0,317	0,317	0,281	0,317	0,353	0,398	0,444	0,500	0,560
	100	2,66	0,428	0,428	0,428	0,391	0,428	0,463	0,506	0,549	0,598	0,651
	200	2,91	0,570	0,570	0,570	0,536	0,570	0,600	0,638	0,672	0,710	0,753

Table 3D.1: Q_T/Q_{RMF} ratios for different catchment areas in South Africa, Lesotho and Swaziland [(3.13)]

Note: * *Estimated ratios*

** *Ratios of this region may also be used in region* ***K1*** *(2,8)*

Figure 4: Q_T/Q_{RMF} ratios for different catchment areas in South Africa

5.1.4 Hydrology Results

Table 3 below represents the hydrology result. Usually the RMF method is relatively conservative and overestimates flood discharges. In this case however the RMF provided results similar in size to the Rational Method, and an average of the two methods is applied to the hydraulic flood model.

Table 3: Flood peaks for Main catchment

Catchment ID	Method	Flood Peaks (m^3/s)	
		Q_{50}	Q_{100}
Lesedi stream catchment	Rational	20.8	29.2
	Kovacs	22.7	30.6
	Recommended	**21.75**	**29.9**

5.2 Hydraulic Model

The hydraulic assessment of the watercourses was carried out using the US Army Corps of Engineers River Analysis System – HEC – RAS version 5.0.3. This system enables the computation of one – dimensional, two-dimensional, steady and unsteady flow river hydraulics, sediment transportation and water temperature analysis. However for this study, only the one-dimensional steady flow system was executed. For two-dimensional analyses, a detailed digital terrain model survey is required for the entire reach of river to be modelled.

5.2.1 Manning's n

Manning's n value is a measure of flow resistance along a watercourse. This value was selected based on the Google Earth images of the watercourse and images that were taken at the site. The computed Manning's n values were obtained from experimental data based on similar stream conditions.

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The assumed Manning's n values are summarised in Table 4.

Table 4: Watercourse Manning's n values

Reach	Manning's n value
Main watercourse	0.035
Flood Plains	0.04

5.2.2 Hydraulic model of the Lesedi PV Farm stream

Changes in the cross section and longitudinal slopes along a watercourse can cause the flow regime to oscillate back and forth from supercritical to subcritical flow. Consequently, in order to establish the hydraulics along the watercourse, a mixed flow regime was selected.

The 1:50 and 1:100 year flood events were used to assess the water profile characteristics along the watercourse. Refer to Figure 5. Flows along the watercourse are subcritical for most part of the reach and supercritical at isolated sections.

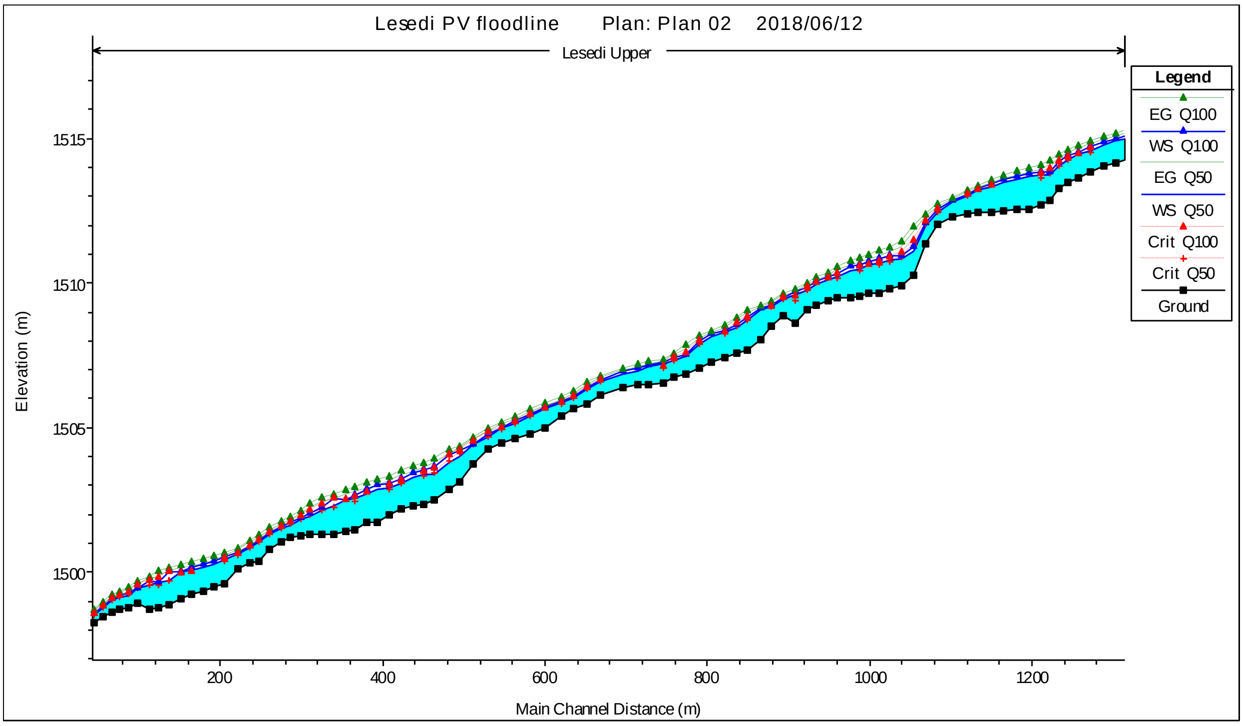

Figure 5: Long section of river profile during the 1:50 and 1:100 year flood

The surface water elevation fluctuates throughout the reach with the following average flow depth and velocity, refer to Table 5 below.

Table 5: Average flow depth and velocity along the reach

Return Period (yrs)	Average flow depth (m)	Average velocity (m/s)
50	0.74	1.75
100	0.84	1.88

``

5.3 Floodlines

The 1:50 and 1:100 year flood inundation lines were prepared using the HEC-RAS software. The primary input to HEC-RAS is the cross section information that describes the shape and slope of the streams and the channel roughness. The HEC-RAS section locations and position of the cross section at the sub-station is presented in **Appendix B**.

Cross sections were prepared using a 0.5 m contour interval LIDAR survey provided by the Client. The contours were used to define catchment areas, river flow paths and a surface model. Using ArcGIS 10.2.2 the necessary input files were created for hydrology calculations in HEC-RAS. The resultant export files were then re-imported into ArcGIS to generate the necessary 1:50 and 1:100 year flood inundation maps of the area. The 1:50 and 1:100 year floodlines are presented in **Appendix C**.

A cross section at the sub-station river profile, indicating flood water levels, is included in **Appendix D**.

``

The flow depths and velocities at cross-sections adjacent to the Lesedi PV Farm (River Stations 1408 to 42) have been summarised in Table 6.

Table 6: Flow Depths in the vicinity of the Site

River Station	T (yrs)	Q (m^3/s)	Channel Level (m)	Water Level (m)	Flow Depth (m)	Energy Level (m/m)	Flow Velocity (m/s)
1408	50	21.75	1514.74	1515.64	0.9	1515.89	2.24
1408	100	29.9	1514.74	1515.77	1.03	1516.06	2.4
1393	50	21.75	1514.48	1515.42	0.94	1515.64	2.11
1393	100	29.9	1514.48	1515.46	0.98	1515.83	2.72
1377	50	21.75	1514.4	1515.33	0.93	1515.5	1.86
1377	100	29.9	1514.4	1515.43	1.03	1515.66	2.15
1363	50	21.75	1514.36	1515.23	0.87	1515.39	1.8
1363	100	29.9	1514.36	1515.34	0.98	1515.54	2.06
1348	50	21.75	1514.32	1515.15	0.83	1515.28	1.66
1348	100	29.9	1514.32	1515.26	0.94	1515.42	1.88
1333	50	21.75	1514.29	1515.02	0.73	1515.17	1.8
1333	100	29.9	1514.29	1515.11	0.82	1515.31	2.05
1315	50	21.75	1514.18	1514.91	0.73	1515.03	1.59
1315	100	29.9	1514.18	1515.01	0.83	1515.16	1.79
1301	50	21.75	1514.05	1514.8	0.75	1514.93	1.6
1301	100	29.9	1514.05	1514.9	0.85	1515.05	1.77
1284	50	21.75	1513.84	1514.59	0.75	1514.76	1.85
1284	100	29.9	1513.84	1514.72	0.88	1514.9	1.91
1270	50	21.75	1513.66	1514.45	0.79	1514.6	1.78
1270	100	29.9	1513.66	1514.54	0.88	1514.74	2.03
1257	50	21.75	1513.51	1514.24	0.73	1514.45	2.09
1257	100	29.9	1513.51	1514.4	0.89	1514.58	1.92
1246	50	21.75	1513.28	1514.05	0.77	1514.28	2.22
1246	100	29.9	1513.28	1514.19	0.91	1514.42	2.25
1234	50	21.75	1512.88	1513.74	0.86	1514.07	2.59
1234	100	29.9	1512.88	1513.87	0.99	1514.23	2.72

``

River Station	T (yrs)	Q (m^3/s)	Channel Level (m)	Water Level (m)	Flow Depth (m)	Energy Level (m/m)	Flow Velocity (m/s)
1223	50	21.75	1512.7	1513.73	1.03	1513.92	2.01
1223	100	29.9	1512.7	1513.86	1.16	1514.08	2.15
1208	50	21.75	1512.57	1513.67	1.1	1513.79	1.6
1208	100	29.9	1512.57	1513.79	1.22	1513.95	1.79
1194	50	21.75	1512.55	1513.58	1.03	1513.71	1.63
1194	100	29.9	1512.55	1513.7	1.15	1513.85	1.78
1176	50	21.75	1512.5	1513.46	0.96	1513.58	1.61
1176	100	29.9	1512.5	1513.58	1.08	1513.7	1.57
1162	50	21.75	1512.47	1513.35	0.88	1513.46	1.45
1162	100	29.9	1512.47	1513.42	0.95	1513.55	1.68
1145	50	21.75	1512.43	1513.2	0.77	1513.28	1.24
1145	100	29.9	1512.43	1513.26	0.83	1513.35	1.34
1133	50	21.75	1512.4	1513.01	0.61	1513.11	1.36
1133	100	29.9	1512.4	1513.07	0.67	1513.18	1.48
1114	50	21.75	1512.29	1512.79	0.5	1512.86	1.19
1114	100	29.9	1512.29	1512.85	0.56	1512.94	1.3
1096	50	21.75	1512.01	1512.46	0.45	1512.6	1.63
1096	100	29.9	1512.01	1512.54	0.53	1512.68	1.69
1081	50	21.75	1511.38	1511.96	0.58	1512.24	2.33
1081	100	29.9	1511.38	1512.07	0.69	1512.36	2.41
1067	50	21.75	1510.26	1511.1	0.84	1511.73	3.51
1067	100	29.9	1510.26	1511.25	0.99	1511.92	3.63
1051	50	21.75	1509.9	1510.82	0.92	1511.22	2.79
1051	100	29.9	1509.9	1510.95	1.05	1511.43	3.08
1036	50	21.75	1509.83	1510.81	0.98	1511.04	2.1
1036	100	29.9	1509.83	1510.94	1.11	1511.23	2.36

``

River Station	T (yrs)	Q (m^3/s)	Channel Level (m)	Water Level (m)	Flow Depth (m)	Energy Level (m/m)	Flow Velocity (m/s)
1024	50	21.75	1509.67	1510.7	1.03	1510.91	2.02
1024	100	29.9	1509.67	1510.83	1.16	1511.09	2.29
1012	50	21.75	1509.63	1510.61	0.98	1510.79	1.9
1012	100	29.9	1509.63	1510.73	1.1	1510.96	2.15
999	50	21.75	1509.57	1510.48	0.91	1510.68	2.01
999	100	29.9	1509.57	1510.63	1.06	1510.84	2.08
989	50	21.75	1509.51	1510.41	0.9	1510.57	1.78
989	100	29.9	1509.51	1510.58	1.07	1510.72	1.72
973	50	21.75	1509.47	1510.23	0.76	1510.4	1.84
973	100	29.9	1509.47	1510.35	0.88	1510.53	1.89
960	50	21.75	1509.38	1510.11	0.73	1510.24	1.66
960	100	29.9	1509.38	1510.2	0.82	1510.35	1.74
947	50	21.75	1509.22	1509.96	0.74	1510.07	1.48
947	100	29.9	1509.22	1510.04	0.82	1510.16	1.53
935	50	21.75	1509.06	1509.77	0.71	1509.89	1.51
935	100	29.9	1509.06	1509.84	0.78	1509.97	1.63
920	50	21.75	1508.61	1509.62	1.01	1509.68	1.02
920	100	29.9	1508.61	1509.69	1.08	1509.75	1.12
906	50	21.75	1508.87	1509.43	0.56	1509.53	1.4
906	100	29.9	1508.87	1509.48	0.61	1509.6	1.55
890	50	21.75	1508.53	1509.19	0.66	1509.27	1.25
890	100	29.9	1508.53	1509.24	0.71	1509.34	1.41
877	50	21.75	1508.04	1509.06	1.02	1509.12	1.07
877	100	29.9	1508.04	1509.14	1.1	1509.21	1.14
861	50	21.75	1507.69	1508.74	1.05	1508.91	1.87
861	100	29.9	1507.69	1508.85	1.16	1509.02	1.86

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River Station	T (yrs)	Q (m^3/s)	Channel Level (m)	Water Level (m)	Flow Depth (m)	Energy Level (m/m)	Flow Velocity (m/s)
849	50	21.75	1507.57	1508.47	0.9	1508.7	2.14
849	100	29.9	1507.57	1508.58	1.01	1508.79	2.08
834	50	21.75	1507.43	1508.29	0.86	1508.39	1.46
834	100	29.9	1507.43	1508.35	0.92	1508.49	1.64
818	50	21.75	1507.28	1508.17	0.89	1508.23	1.13
818	100	29.9	1507.28	1508.24	0.96	1508.32	1.22
802	50	21.75	1507.08	1507.89	0.81	1508.04	1.72
802	100	29.9	1507.08	1508	0.92	1508.13	1.66
786	50	21.75	1506.85	1507.46	0.61	1507.71	2.22
786	100	29.9	1506.85	1507.55	0.7	1507.81	2.29
772	50	21.75	1506.76	1507.34	0.58	1507.45	1.49
772	100	29.9	1506.76	1507.4	0.64	1507.53	1.61
758	50	21.75	1506.53	1507.19	0.66	1507.25	1.08
758	100	29.9	1506.53	1507.27	0.74	1507.34	1.2
739	50	21.75	1506.5	1507.11	0.61	1507.16	1.05
739	100	29.9	1506.5	1507.18	0.68	1507.26	1.21
726	50	21.75	1506.51	1506.98	0.47	1507.08	1.39
726	100	29.9	1506.51	1507.05	0.54	1507.17	1.57
708	50	21.75	1506.39	1506.88	0.49	1506.93	1.1
708	100	29.9	1506.39	1506.94	0.55	1507.02	1.27
681	50	21.75	1506.12	1506.6	0.48	1506.69	1.38
681	100	29.9	1506.12	1506.66	0.54	1506.78	1.52
664	50	21.75	1505.84	1506.34	0.5	1506.44	1.43
664	100	29.9	1505.84	1506.4	0.56	1506.53	1.59
647	50	21.75	1505.66	1506.03	0.37	1506.15	1.53
647	100	29.9	1505.66	1506.09	0.43	1506.23	1.68

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River Station	T (yrs)	Q (m^3/s)	Channel Level (m)	Water Level (m)	Flow Depth (m)	Energy Level (m/m)	Flow Velocity (m/s)
633	50	21.75	1505.41	1505.85	0.44	1505.93	1.26
633	100	29.9	1505.41	1505.9	0.49	1506.01	1.43
612	50	21.75	1505.01	1505.65	0.64	1505.73	1.26
612	100	29.9	1505.01	1505.72	0.71	1505.81	1.4
594	50	21.75	1504.79	1505.4	0.61	1505.51	1.47
594	100	29.9	1504.79	1505.44	0.65	1505.59	1.72
576	50	21.75	1504.64	1505.15	0.51	1505.26	1.47
576	100	29.9	1504.64	1505.25	0.61	1505.35	1.45
559	50	21.75	1504.46	1504.97	0.51	1505.07	1.45
559	100	29.9	1504.46	1505	0.54	1505.16	1.82
541	50	21.75	1504.24	1504.7	0.46	1504.85	1.71
541	100	29.9	1504.24	1504.8	0.56	1504.93	1.69
524	50	21.75	1503.77	1504.41	0.64	1504.56	1.77
524	100	29.9	1503.77	1504.44	0.67	1504.65	2.16
507	50	21.75	1503.1	1504.02	0.92	1504.27	2.21
507	100	29.9	1503.1	1504.22	1.12	1504.34	1.66
493	50	21.75	1502.86	1503.82	0.96	1504.07	2.22
493	100	29.9	1502.86	1504.04	1.18	1504.19	1.81
475	50	21.75	1502.52	1503.38	0.86	1503.74	2.66
475	100	29.9	1502.52	1503.67	1.15	1503.92	2.23
462	50	21.75	1502.33	1503.39	1.06	1503.6	2
462	100	29.9	1502.33	1503.54	1.21	1503.77	2.12
449	50	21.75	1502.31	1503.29	0.98	1503.45	1.82
449	100	29.9	1502.31	1503.43	1.12	1503.62	1.93
436	50	21.75	1502.2	1503.09	0.89	1503.31	2.06
436	100	29.9	1502.2	1503.22	1.02	1503.48	2.23

``

River Station	T (yrs)	Q (m^3/s)	Channel Level (m)	Water Level (m)	Flow Depth (m)	Energy Level (m/m)	Flow Velocity (m/s)
421	50	21.75	1502	1502.91	0.91	1503.13	2.06
421	100	29.9	1502	1503.06	1.06	1503.3	2.19
406	50	21.75	1501.73	1502.88	1.15	1502.99	1.47
406	100	29.9	1501.73	1503.03	1.3	1503.16	1.62
392	50	21.75	1501.72	1502.69	0.97	1502.89	1.95
392	100	29.9	1501.72	1502.86	1.14	1503.07	2.03
378	50	21.75	1501.49	1502.54	1.05	1502.75	2.02
378	100	29.9	1501.49	1502.63	1.14	1502.92	2.39
367	50	21.75	1501.42	1502.48	1.06	1502.65	1.85
367	100	29.9	1501.42	1502.5	1.08	1502.81	2.45
352	50	21.75	1501.33	1502.3	0.97	1502.53	2.16
352	100	29.9	1501.33	1502.53	1.2	1502.65	1.74
337	50	21.75	1501.32	1502.15	0.83	1502.38	2.21
337	100	29.9	1501.32	1502.24	0.92	1502.54	2.6
323	50	21.75	1501.3	1501.92	0.62	1502.19	2.38
323	100	29.9	1501.3	1502.01	0.71	1502.33	2.66
311	50	21.75	1501.26	1501.82	0.56	1501.98	1.89
311	100	29.9	1501.26	1501.86	0.6	1502.1	2.32
299	50	21.75	1501.18	1501.62	0.44	1501.79	1.9
299	100	29.9	1501.18	1501.71	0.53	1501.88	1.96
287	50	21.75	1501.06	1501.54	0.48	1501.64	1.47
287	100	29.9	1501.06	1501.59	0.53	1501.72	1.71
273	50	21.75	1500.8	1501.3	0.5	1501.42	1.56
273	100	29.9	1500.8	1501.36	0.56	1501.5	1.71
259	50	21.75	1500.4	1501.03	0.63	1501.16	1.66
259	100	29.9	1500.4	1501.09	0.69	1501.24	1.79

``

River Station	T (yrs)	Q (m^3/s)	Channel Level (m)	Water Level (m)	Flow Depth (m)	Energy Level (m/m)	Flow Velocity (m/s)
248	50	21.75	1500.35	1500.84	0.49	1500.98	1.68
248	100	29.9	1500.35	1500.9	0.55	1501.06	1.82
233	50	21.75	1500.1	1500.63	0.53	1500.72	1.37
233	100	29.9	1500.1	1500.69	0.59	1500.81	1.53
217	50	21.75	1499.59	1500.43	0.84	1500.54	1.47
217	100	29.9	1499.59	1500.53	0.94	1500.64	1.54
205	50	21.75	1499.49	1500.26	0.77	1500.39	1.64
205	100	29.9	1499.49	1500.37	0.88	1500.52	1.7
191	50	21.75	1499.35	1500.18	0.83	1500.27	1.34
191	100	29.9	1499.35	1500.3	0.95	1500.41	1.47
176	50	21.75	1499.22	1500.06	0.84	1500.18	1.58
176	100	29.9	1499.22	1500.16	0.94	1500.32	1.8
163	50	21.75	1499.06	1500	0.94	1500.12	1.57
163	100	29.9	1499.06	1500.04	0.98	1500.23	2.03
149	50	21.75	1498.89	1499.73	0.84	1500	2.32
149	100	29.9	1498.89	1499.99	1.1	1500.13	1.8
136	50	21.75	1498.77	1499.67	0.9	1499.83	1.81
136	100	29.9	1498.77	1499.63	0.86	1499.99	2.75
125	50	21.75	1498.73	1499.54	0.81	1499.73	2.01
125	100	29.9	1498.73	1499.69	0.96	1499.82	1.81
111	50	21.75	1498.92	1499.46	0.54	1499.57	1.73
111	100	29.9	1498.92	1499.46	0.54	1499.67	2.46
99	50	21.75	1498.76	1499.19	0.43	1499.38	2.37
99	100	29.9	1498.76	1499.28	0.52	1499.44	2.23
88	50	21.75	1498.73	1499.14	0.41	1499.22	1.53
88	100	29.9	1498.73	1499.19	0.46	1499.28	1.71

River Station	T (yrs)	Q (m^3/s)	Channel Level (m)	Water Level (m)	Flow Depth (m)	Energy Level (m/m)	Flow Velocity (m/s)
79	50	21.75	1498.61	1499.02	0.41	1499.11	1.71
79	100	29.9	1498.61	1499.07	0.46	1499.17	1.85
68	50	21.75	1498.47	1498.77	0.3	1498.89	1.98
68	100	29.9	1498.47	1498.82	0.35	1498.95	1.97
56	50	21.75	1498.26	1498.54	0.28	1498.61	1.4
56	100	29.9	1498.26	1498.55	0.29	1498.68	1.87
42	50	21.75	1498.09	1498.2	0.11	1498.29	0.82
42	100	29.9	1498.09	1498.25	0.16	1498.35	1.05

6. CONCLUSIONS AND RECOMMENDATION

An assessment of river south of the Lesedi PV Farm was carried out in order to determine the extent of the floodlines along the PV Farm, but particularly at the sub-station south of the PV farm. The 1:50 and 1:100 year flood events were analysed.

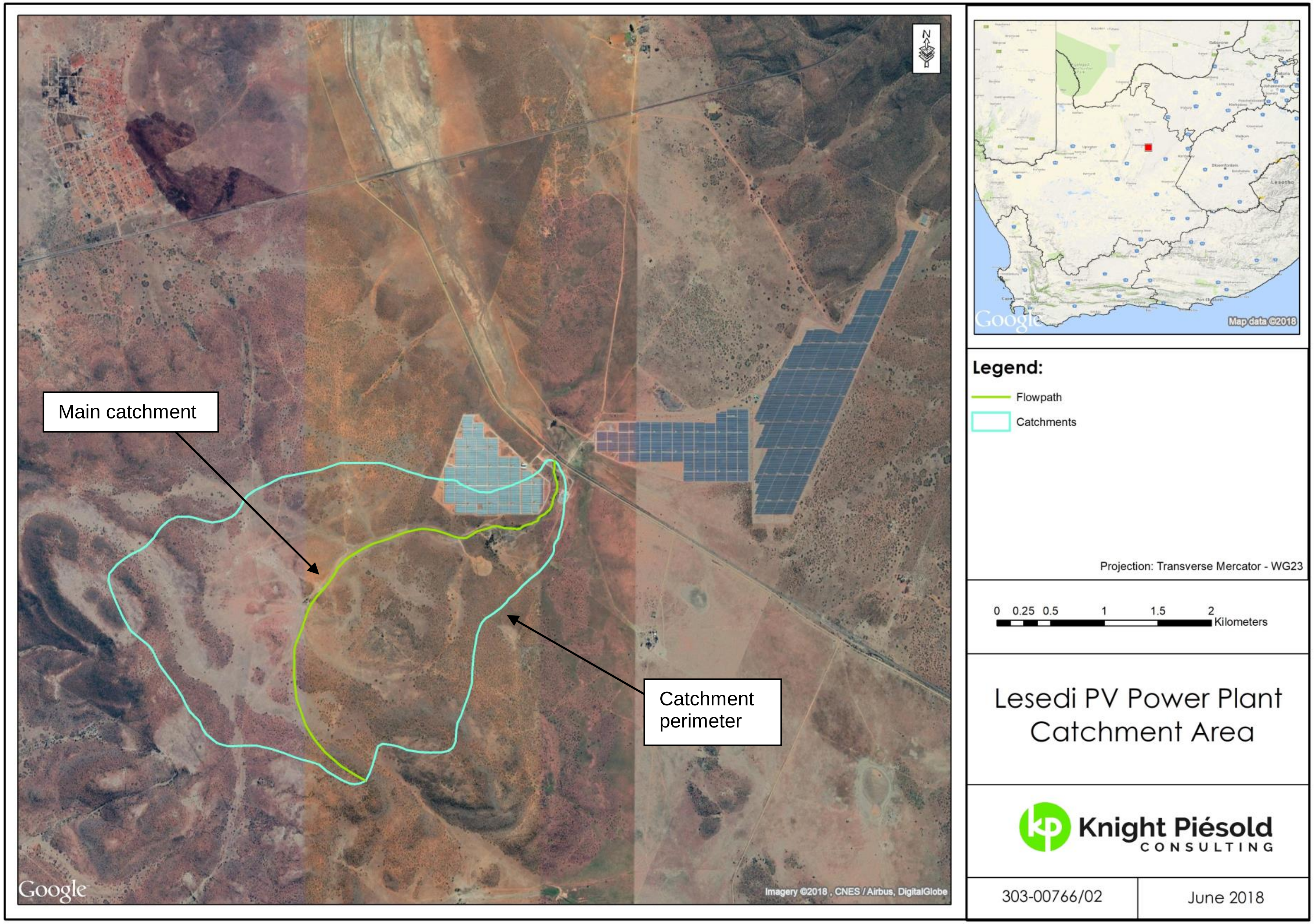
- The hydraulic model results from HEC-RAS indicate that the PV farm is not threatened by the 50 or the 100 year flood events. It lies well above the level of a flooded river.
- The natural ground level at the sub-station south of the PV farm lies marginally higher than the 100 year floodline. Therefore the sub-station is also not threatened by the 100 year flood.
- Creating a terrace for the sub-station, higher than the ground level, will improve the situation at the sub-station, creating a freeboard above the flood level.

``

APPENDIX A

Catchment Area

Client:	Lesedi Power Project			Computed by:	Gert Cloete
Project:	Lesedi PV Farm	Component:	Floodline analyses	Date:	12 June 2018
Job no.:	RI 303-00766/02	File no.:		Checked by:	
Title:	Flood hydrology and Floodlines preparation			Date:	



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APPENDIX B

HEC-RAS CROSS SECTIONS AND LONGITUDINAL PROFILES

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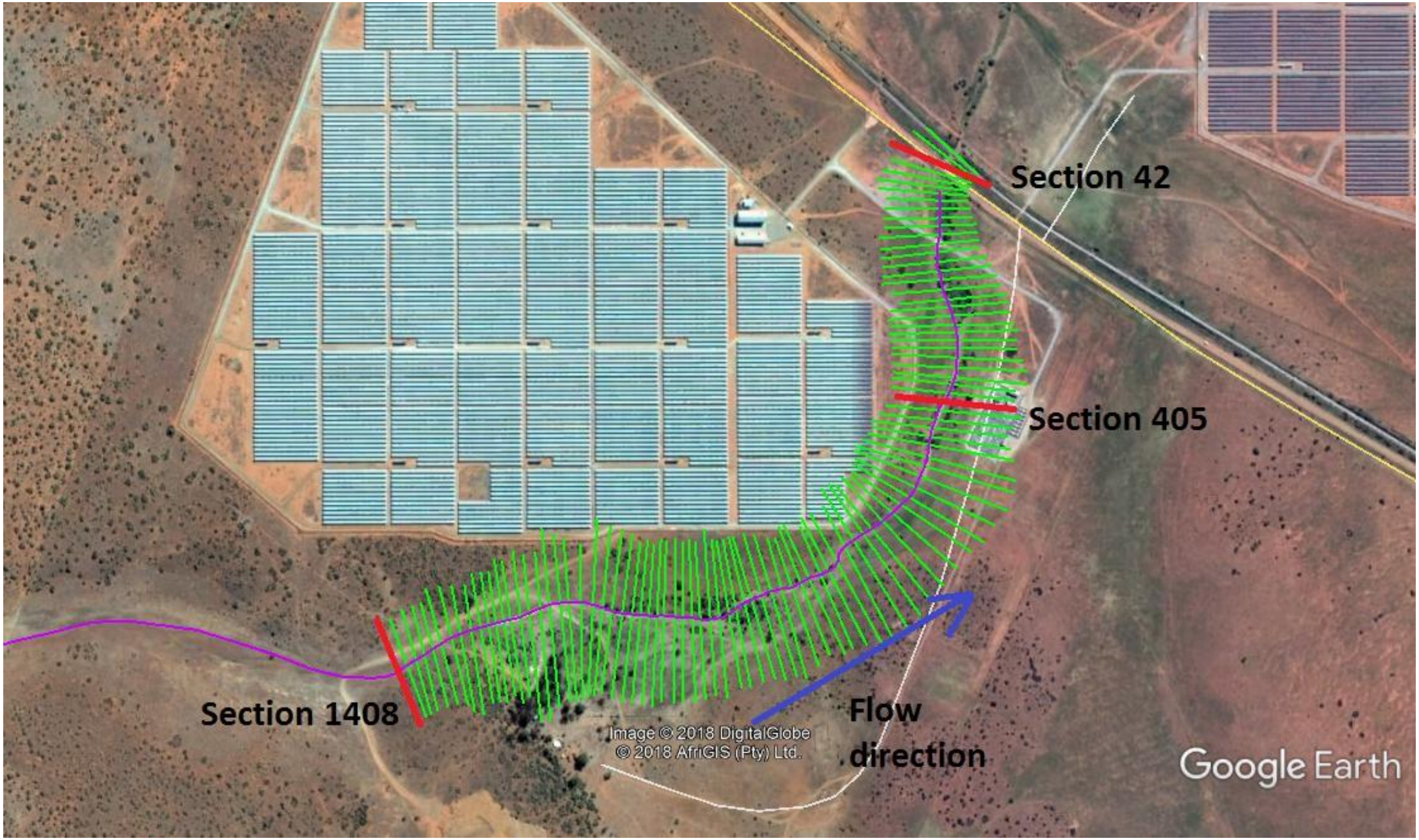
Section 42
Section 405
Section 1408
Flow
direction
Image © 2018 DigitalGlobe
© 2018 AfriGIS (Pty) Ltd.
Google Earth

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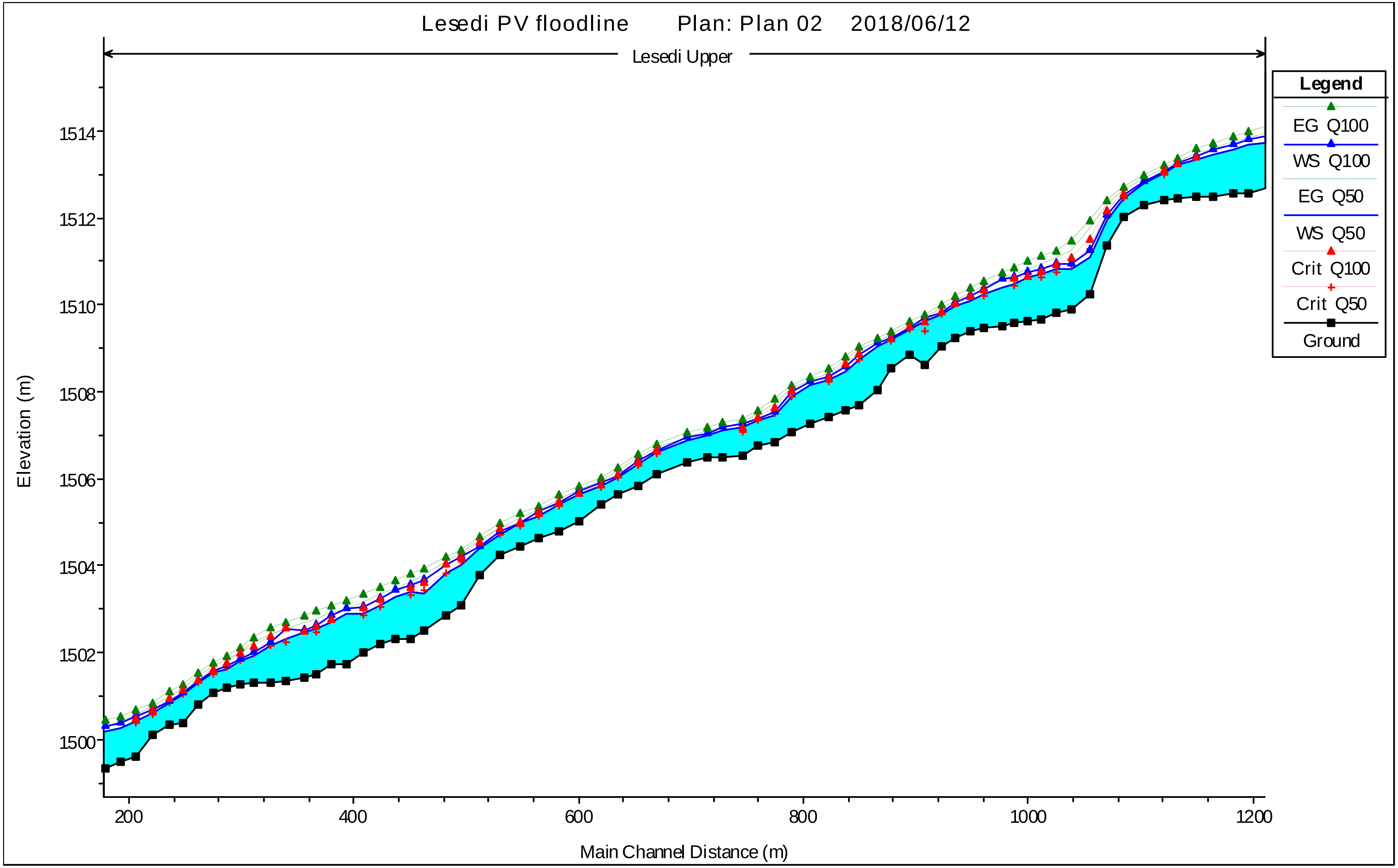

Lesedi PV floodline Plan: Plan 02 2018/06/12
Lesedi Upper
Legend
EG Q100
WS Q100
EG Q50
WS Q50
Crit Q100
Crit Q50
Ground
Elevation (m)
1500
1502
1504
1506
1508
1510
1512
1514
200
400
600
800
1000
1200
Main Channel Distance (m)

``

APPENDIX C

FLOODLINES

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The 1:50
floodline
Image © 2018 DigitalGlobe
© 2018 AfriGIS (Pty) Ltd.
Google Earth

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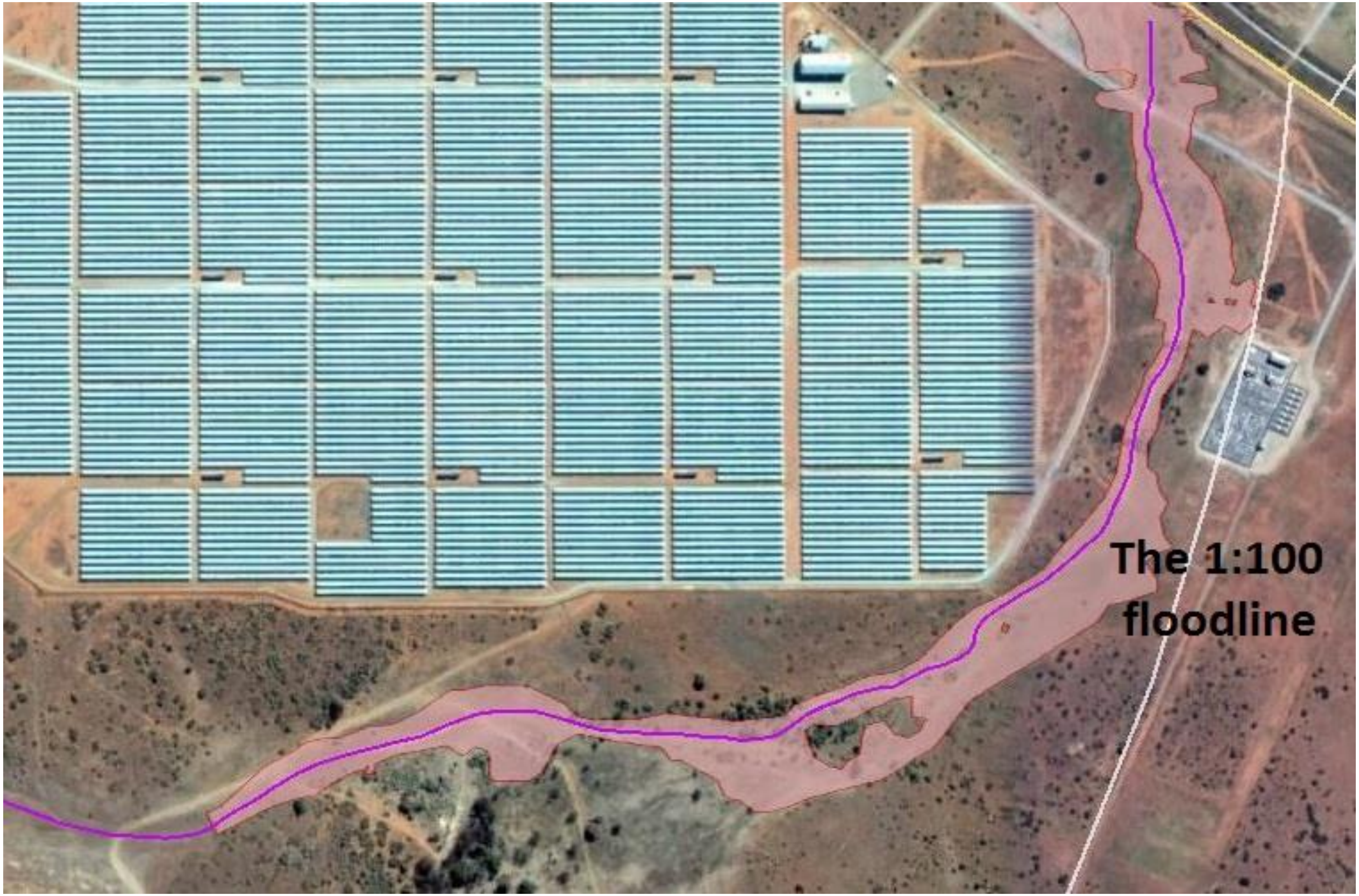

The 1:100 floodline

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APPENDIX D

HEC-RAS CROSS SECTION AT THE SUB-STATION

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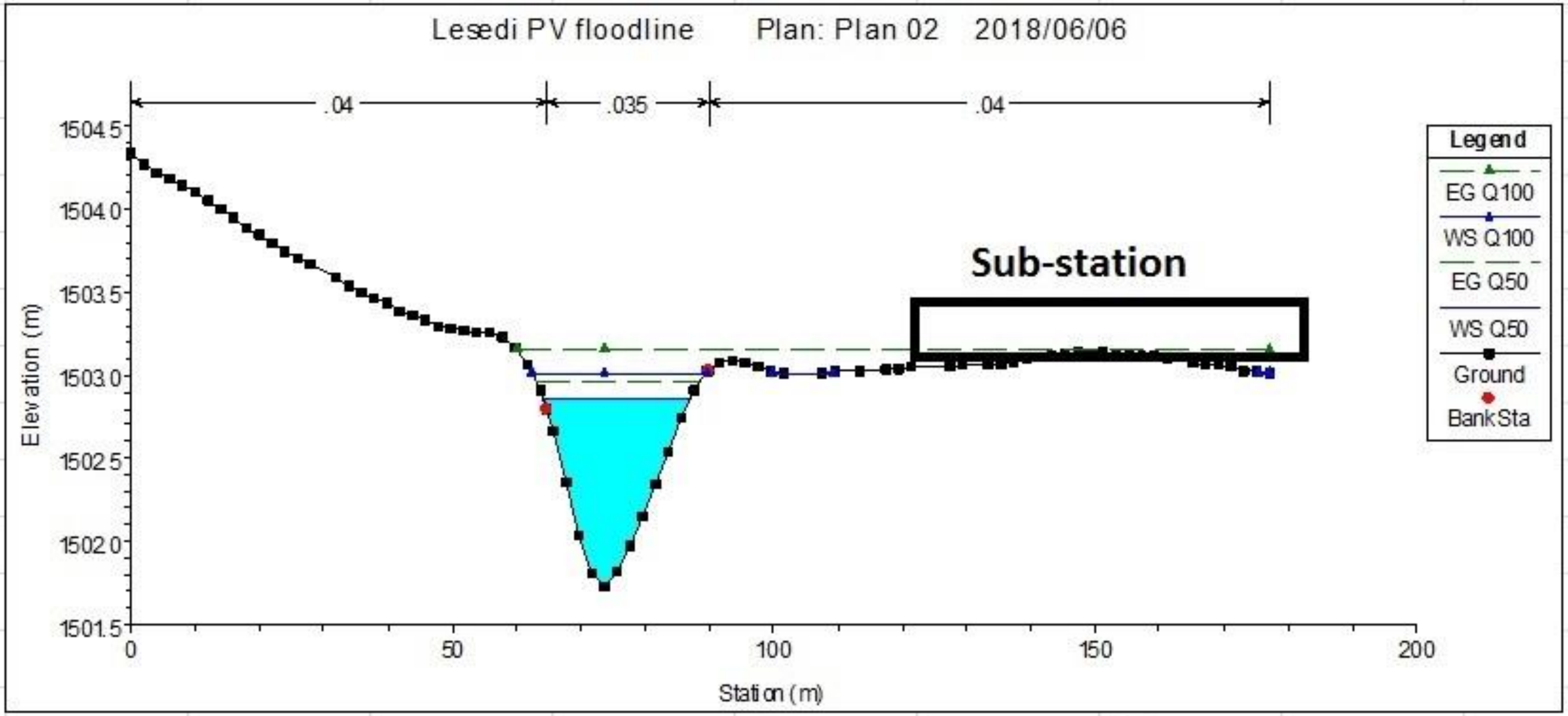
Cross section at Power-substation

River station 405 (Cross section no)



``

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

PH

Tracking no

ROUTE FORM

BRANCH: NORTHERN CAPE REGION

Reference No: 21/2/2/D173/19/1

Lesedi : OAK LEAF Hold INVESTMEST

REQUEST FOR SIGNATURE ON ~~ENGINEERING CHECKLIST OF PMG (PTY) LTD~~: ~~PALING MINE WATER USE LICENCE APPLICATION IN TERMS OF SECTION 40 OF THE NATIONAL WATER ACT (ACT NO.36 OF 1998) ON REMAINING EXTENT 0 ON FARMPALING 434, POSTMASBURG, NORTHERN CAPE~~

DRAFTING OFFICIAL		SUPERVISOR	
Name: Mr. G. Van Dyk Extension:8802 Office No.:A20		Name: Iketletso Lekalake Extension:8803 Office No.:A1	
Rank: Acting Director: I.E.	Date: 24 June 2021	Rank: Provincial Head Northern Cape	Date: 24 June 2021

Rank	Date	Initials	Office No		Rank	Date	Initials	Office No	
ASD:				▼	ASD:				▲
DD:				▼	DD:				▲
Acting D:	- 9 JUL 2021	[signature]	A20	▼	Acting D:				▲
Acting PH:				▼	PH:	13/7/2021 14.14	A18		▲

ASD/DD

ACTING D

ACTING PROVINCIAL HEAD

INSTRUCTIONS/REMARKS TO AUTHOR BY ACTING PROVINCIAL HEAD

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Enquiries: Ms I Lekalake
Telephone: 053 830 8803
Reference: SP 55302904

Mr. K Kgarane
Director: Water Services Support
Provincial Operations: Northern Cape

Dear Mr. K Kgarane

APPOINTMENT AS ACTING CHIEF DIRECTOR: PROVINCIAL OPERATIONS (NORTHERN CAPE)

I have pleasure in confirming your acting appointment as **Acting Chief Director: Provincial Operations** with effect from 12 – 15 July 2021 and 19 - 20 July 2021. You are appointed in terms of the Public Service Regulation 2016, Regulation 63 and you are required to perform the functions and duties and exercise delegations adhering to the post in line with the prescribed directions and instructions.

In this regard I wish to refer you to the Departmental Policy on the payments of acting allowance. Please bear in mind that you will not receive any acting allowance because the position is not vacant.

It is your responsibility to acquaint yourself with the functions, duties and delegations pertaining to the post. You will report directly to the **Deputy Director General: Provincial Coordination and International Cooperation.** Please note that your assignment to the post is without any change in your rank, salary or seniority.

If you accept the appointment unconditionally, please indicate accordingly and append your signature below in the space provided and return it to the Human Resources for record purposes and keep a copy.

I look forward to your support and co-operation in carrying out the duties and responsibilities assigned to this important post in the Department.

Yours faithfully

Lindiwe Lusenga
DEPUTY DIRECTOR GENERAL: PROVINCIAL COORDINATION AND INTERNATIONAL COOPERATION
DATE: 07/07/2021

I Mr. K. Kgarane accept/~~decline~~ appointment in the capacity indicated above.

Signature: ....
Name: Mr. ....OK. KGARANE
Rank: ..DIRECTOR........................
Date: 08/07/2021

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Enquiries: Ms I Lekalake
Telephone: 053 830 8803
Reference: SP 55302904

Mr. K Kgarane
Director: Water Services Support
Provincial Operations: Northern Cape

Dear Mr. K Kgarane

APPOINTMENT AS ACTING CHIEF DIRECTOR: PROVINCIAL OPERATIONS (NORTHERN CAPE)

I have pleasure in confirming your acting appointment as **Acting Chief Director: Provincial Operations** with effect from 12 – 15 July 2021 and 19 - 20 July 2021. You are appointed in terms of the Public Service Regulation 2016, Regulation 63 and you are required to perform the functions and duties and exercise delegations adhering to the post in line with the prescribed directions and instructions.

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Yours faithfully

Lindiwe Lusenga
DEPUTY DIRECTOR GENERAL: PROVINCIAL COORDINATION AND INTERNATIONAL COOPERATION
DATE: 07/07/2021

I Mr. K. Kgarane accept/~~decline~~ appointment in the capacity indicated above.

Signature: ....
Name: Mr. O.K. KGARANE
Rank: DIRECTOR..........................
Date: 08/07/2021

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Northern Cape Region, Private Bag X6101, Kimberley, 8301, 28 Central Road, Beaconsfield, Kimberley, 8801,
www.dws.gov.za

Enquiries: Ms. N. Feni
Email: feniN2@dws.gov.za

Tel: 0538367661
Fax: (053) 842 3258
File No: 27/2/2/C591/55/1

OAKLEAF INVESTMENT HOLDINGS 79 REF (PTY)
PO Box 35686
Menlo Park
Gauteng
0102

Attention: Dear Sir/Madam

CONFIRMATION OF GENERAL AUTHORISATION IN TERMS OF SECTION 39 OF THE NATIONAL WATER ACT, 1998 (ACT NO 36 OF 1998) FOR OAKLEAF INVESMENT HOLDING 79 REF (PTY) LTD ON PORTION OF THE FARM NO 469 IN QUARTERNARY CATCHMENT D73A, NORTHERN CAPE PROVINCE

Your request dated 21 January 2019 to be registered to Use Water in terms of General Authorisation (Notice No. 40229), dated 27 July 2016 and GA Notice No. 36206, dated 24 January 2013 refers.

The Department has evaluated the submitted document and hereby confirms that the water use (s) falls within the ambit of the General Authorisation no.40229 dated 27 July 2016 and General Authorisation Notice No. 36206, dated 24 January 2013 for Section 21 (f). Therefore, you may continue with the water uses as permissible in terms of Section 22 (1) (c), (i), & (f) of National Water Act.

CONFIRMATION OF GENERAL AUTHORISATION IN TERMS OF SECTION 39 OF THE NATIONAL WATER ACT, 1998 (ACT NO 36 OF 1998) FOR OAKLEAF INVESMENT HOLDINGSN79 REF (PTY) LTD IN QUETERNARY CATCHMENT D73A NORTHERN CAPE PROVINCE

Water use(s) registered:

Sub Section	Description as per act	Existing Authorisations	Applied for	GA Recommended or not Recommended
c	Impeding or diverting the flow of water in a watercourse.	X	X	Recommended
i	Changing the bed, banks, course or characteristics of a watercourse	X	X	Recommended
f	Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit		x	Recommended

Table 1: Details of the registered Water Use (s)

Water Use (s)	Purpose	Dimensions Length x Width x Depth	Property description	Co-ordinates
Section 21 (c) & (i)				
Concrete road crossing over a non-perennial tributary of the Groenwater Spruit	Road crossing provides access to the sub-station for the PV Plant.	Heigt:0.25 thick Width: 6 Length: 12	Remaining Extent of Farms 469	S-28°.18' 55.5" E 23°.21' 23.4"
Gravel road on the northern side of the Transnet Railway line, crossing a non-perennial tributary of the Groenwater Spruit	Road Crossing 1: to access the northern PV field from D3381	Heigt:0.5 Width: 6 Length: 13	Remaining Extent of Farms 469	S-28°.18' 49.5" E 23°.21' 31.0"
Tarred road on the southern side of the Transnet Railway Line, crossing a non-perennial tributary of the Groenwater Spruit	Road crossing 2: Access road to Lesedi Power Plant from D3381	Heigt:0.5 Width: 8 Length: 20	Remaining Extent of Farms 469	S 28°.18' 49.9" E 23°.21' 19.2"
Pylon 1 within the regulated are	Transmission pylon line	Heigt:13 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 52.3" E 23°.21' 33.5"

CONFIRMATION OF GENERAL AUTHORISATION IN TERMS OF SECTION 39 OF THE NATIONAL WATER ACT, 1998 (ACT NO 36 OF 1998) FOR OAKLEAF INVESMENT HOLDINGSN79 REF (PTY) LTD IN QUETERNARY CATCHMENT D73A NORTHERN CAPE PROVINCE

Pylon 2 within the regulated are	Transmission pylon line	Heigt:11 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 52.3" E 23°.21' 33.5"
Pylon No.3 (4 poles) within regulated area	Transmission pylon line	Heigt:2.2 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 54.1" E 23°.21' 32.4"
Pylon No.4 (4 poles) within regulated area	Transmission pylon line	Heigt:2.2 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 54.1" E 23°.21' 32.4"
Section 21 (f)				
Discharging effluent generated from the wastewater facility into the water resource.	Once the pumping chamber is full treated effluent is discharged into the tributary of Groenwater Spruit	Volume : 274 m^3/a	Remaining Extent of Farms 469	S 28°.18' 55.7" E 23°.21' 16.4"

Attached herewith are the Registration Certificate and a copy of the General Authorisation for ease of reference.

You are required to comply with the conditions of the General Authorisation.

Yours sincerely,

PROVINCIAL HEAD: NORTHERN CAPE
DATE: 13/07/2021

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Date: 24 June 2021	File No: 27/2/2/D173/18/1
To: The Provincial Head: Northern Cape	From: Ntombi. Feni

INTERNAL MEMO

APPLICATION FOR REGISTRATION OF WATER USE (S) IN RESPECT OF A GENERAL AUTHORISATION (GA) IN TERMS OF SECTION 39 OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998): OAKLEAF INVESTMENT HOLDING 79 RF (PTY) LDT FOR THE LESEDI PHOTOVOLTAIC POWER PLANT, PORTION OF THE FARM NO 469, IN NORTHERN CAPE.

1. Background

The Department of Water and Sanitation (hereto referred as a Department) received an application for registration of water use(s) in respect of a General Authorisation for Section 21 (c) & (i), (Government Notice No.40229) dated 27 July 2016, and for Section 21(f), GA Notice No. 36206, dated 24 January 2013 for the construction of the power generation facility. The project area is situated within the Lower Vaal River Catchment (Primary Catchment D), D73A Quaternary Catchment, to 32 kilometers east of Postmasburg, Northern Cape Province.

The Lesedi Photo Voltaic Power Plant was constructed as part of the Department of Energy Renewable Independent Producers Procurement Program (REIPPPP). As such, Lesedi PV Power Plant forms part of South Africa's critical infrastructure for renewable energy generation and contributes to the National Development Plan (NDP) and sustainable development goals for clean energy production. As part of the power generation facility the applicant constructed a Water Treatment Plant (WTP) and Wastewater Treatment Plant (WWTP), for the treatment of raw water required for the power generation activities and the effluent water generated by the onsite as well as internal and access road.

First the applicant was issued with the General Authorisation dated 21 January 2019 for Section 21 (c) & (i) water uses. The General Authorisation issued was for road crossing over the tributary of Groenwater Spruit and he further engage with the Department to apply for Section 21 (c), (i) & (f) water use activities for additional road crossing, pylons and discharge of effluent. The applicant intends to include two roads that crosses over riparian habitat of the episodic channel identified on the project site, pylons that will falls within riparian area of Groenwater Spruit and the Wastewater Treatment Plant discharged into the tributary of Groenwater Spruit.

The project site, Lesedi PV Power Project development footprint was split into northern and sourthern PV Field, due to Transnet rail and D3381 public road that traverse the property. The access road that tees off from D3381 has been used historically by the land owner to conduct his farming activities and is being used by the Jasper PV Project, as a point of access to their facility. The access road was upgraded during the Project's construction in 2014.

The road crossings (1 & 2) are shaped and compacted across the drainage line. For road crossing 1, no culverts are required because all flow within the drainage line will cross the compacted section and no impediment will be created. Road crossing 2, one culvert is installed at the T-junction with the D3381 to facilitate stormwater flow diverted off the D3381 road and from the watercourse. The objective of this road crossings water uses in terms of Section 21 (c) & (i) is to allow the Lesedi PV Power Plant Project to undertake its daily operation and maintenance function to allow the facility to generate power which is then evacuated to the national grid. The road crossing is approximately 5 meters wide and does not cause any alteration in the nature of the stream flow.

Overhead transmission lines run from the access gate of Lesedi North, to the Substation triggers Section 21(c) & (i) water use in terms of the National Water Act (Act no. 36 of 1998). There are four (4) set of pylons (1,2,3 & 4) falls within the rapirian areas of the Groenwater Spruit at the coordinates mentioned in table 2 below.

Lastly, the application involves section 21 (f) water uses where the liquid effluent generated from Wastewater Treatment Plant is discharge at the tributary of Groenwater Spruit on site once the pumping chamber is full. The maximum volume of wastewater discharged per year is approximately 274 m^3/a. Sewage sludge from the Wastewater Treatment Facility is periodically pumped from the tank, collected from the site and disposed of at a license facility by a duly authorized contractor.

For an ease management of existing and proposed General Authorisations, the applicant has requested the Department to consolidate the two (2) General Authorisations into one (1) Water Use Authorisation.

The applicant submitted the following documents:

(a) Pre-Application meeting presentation (30 September 2019).
(b) Completed DW Application forms for: DW755, DW758, DW763, DW768, DW781, DW901, DW902, DW766;
(c) ID Copy of the company's representatives;
(d) Company Registration Certificate;
(e) BBBEE Certificate
(f) Proof of payment of the R115.00 administration fee;
(g) Locality Map;
(h) Title Deed;
(i) Lease Agreement;
(j) Section 27(1) Motivation;
(k) Lesedi Solar Project Aquatic Assessment and Floodline determination;
(l) SARS; Tax Clearance Certificate;
(m) Letter of Authority: Resolutions written by the board of directors;
(n) Amendment of Notarial Lease Agreement
(o) General Authorisation signed date 25 February 2019
(p) Aquatic Assessment and Floodline Determination Report date June 2018
(q) Lesedi Solar Power Project: Dilution of Brine dated March 2019
(r) Final Environmental Impact Report date May 2011; and
(s) Section 27 Motivation Report, dated 3 December 2019

APPLICATION FOR REGISTRATION OF WATER USE (S) IN RESPECT OF A GENERAL AUTHORISATION (GA) IN TERMS OF SECTION 39 OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998): OAKLEAF INVESTMENT HOLDING 79 RF PYT LDT FOR THE LESEDI PHOTOVOLTAIC POWER PLANT, PORTION OF THE FARM NO 469, IN NORTHEN CAPE.

Table 1: Existing Water Use Activities, GA confirmation dated, 21 January 2019

Purpose	Purpose	Dimensions Length x Width x Depth	Property description	Co-ordinates
Section 21 (c) & (i)				
Concrete road crossing over a non-perennial tributary of the Groenwater Spruit	Road crossing provides access to the sub-station for the PV Plant.	Heigt:0.25 thick Width: 6 Length: 12	Remaining Extent of Farms 469	S-28°.18' 55.5" E 23°.21' 23.4"

Table 2: Proposed Water Use Activities

Water Use (s)	Purpose	Dimensions Length x Width x Depth	Property description	Co-ordinates
Section 21 (c) & (i)				
Gravel road on the northern side of the Transnet Railway line, crossing a non-perennial tributary of the Groenwater Spruit	Road Crossing 1: to access the northern PV field from D3381	Heigt:0.5 Width: 6 Length: 13	Remaining Extent of Farms 469	S-28°.18' 49.5" E 23°.21' 31.0"
Tarred road on the southern side of the Transnet Railway Line, crossing a non-perennial tributary of the Groenwater Spruit	Road crossing 2: Access road to Lesedi Power Plant from D3381	Heigt:0.5 Width: 8 Length: 20	Remaining Extent of Farms 469	S 28°.18' 49.9" E 23°.21' 19.2"
Pylon 1 within the regulated are	Transmission pylon line	Heigt:13 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 52.3" E 23°.21' 33.5"
Pylon 2 within the regulated area	Transmission pylon line	Heigt:11 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 52.3" E 23°.21' 33.5"
Pylon No.3 (4 poles) within regulated area	Transmission pylon line	Heigt:2.2 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 54.1" E 23°.21' 32.4"

APPLICATION FOR REGISTRATION OF WATER USE (S) IN RESPECT OF A GENERAL AUTHORISATION (GA) IN TERMS OF SECTION 39 OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998): OAKLEAF INVESTMENT HOLDING 79 RF PYT LDT FOR THE LESEDI PHOTOVOLTAIC POWER PLANT, PORTION OF THE FARM NO 469, IN NORTHEN CAPE.

Pylon No.4 (4 poles) within regulated area.	Transmission pylon line	Heigt:2.2 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 54.1" E 23°.21' 32.4"
Section 21 (f)				
Discharging effluent generated from the wastewater facility into the water resource.	Once the pumping chamber is full treated effluent is discharged into the tributary of Groenwater Spruit	Volume : 274 m^3/a	Remaining Extent of Farms 469	S 28°.18' 55.7" E 23°.21' 16.4"

2. Findings

The applicant has submitted the required documents and risk matrix assessment which was conducted by individual registered with the professional body (SACNASP). The water use (s) applied for registration is hereby confirmed to be falling within the ambit of the General Authorization, GA.

3. Signatures

3.1 Confirmation of GA

DIRECTOR: INSTITUTION ESTABLISHMENT
DATE: -9 JUL 2021

3.2 Confirmation approved and registration approved (letter signed) / not approved (letter not signed)

ACTING PROVINCIAL HEAD: NORTHERN CAPE
DATE: 13/07/2021

APPLICATION FOR REGISTRATION OF WATER USE (S) IN RESPECT OF A GENERAL AUTHORISATION (GA) IN TERMS OF SECTION 39 OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998): OAKLEAF INVESTMENT HOLDING 79 RF PYT LDT FOR THE LESEDI PHOTOVOLTAIC POWER PLANT, PORTION OF THE FARM NO 469, IN NORTHEN CAPE.

3.3 Registration of GA

MANAGER: WARMS
DATE:

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Part 2: WASTE DISCHARGE RELATED WATER USE IN TERMS OF SECTION 21(f) OF THE NATIONAL WATER ACT (ACT NO. 36 OF 1 8)

Section 21(f): discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.

1. GENERAL INFORMATION

Mark the applicable option(s) with an *X* and/or complete details where applicable/available.

1.1 Indicate the nature of this application:

☑ Licence ☒ Registration (only)

1.2 Have you already registered a water use with the Department of Water Affairs and Forestry

☒ Yes ☐ No

Registration number:

2	5	0	6	5	8	1	1

Water use number:

1.3 Indicate if Section 21(j) is applicable to this water use application:

Section 21(j): removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

☐ Yes ☒ No

Note: *If Yes was selected, ensure that a DW805 application form has been submitted.*

1.4 Do you have a licence permit or e emption for this waste discharge

(Issued in terms of the National Water Act (Act No. 36 of 1998), Water Act (Act No. 54 of 1956) or the Environmental Conservation Act (Act No. 73 of 1989))

☐ Yes ☒ No

Licence number:

RLA Reference

NRWU Licence Number

							/		

Exemption reference number:

RLA Business Unit

							/		

(NRWU = National Register of Water Use; RLA = Responsible Licensing Authority; WU = Water Use)

Declaration by applicant or waste discharger

Delete the words that are not applicable *I/we* Thigesh Veren Velen *(FULL NAME(S)) hereby declare that the information provided by me/us in this application form is, to the best of my/our knowledge, true and correct.*

[signature]		011 217 7420
Signature	Thumb print	Contact number during office hours
CEO		2020 / 01 / 16
Designation of signatory		Date (ccyy/mm/dd)

It is a criminal offence to provide information that is false or misleading.

2.5 Discharge to a Water Resource

2.5.1 Water use start & end date

When did/will this waste discharge start? (ccyymmdd) 20140527

When did/will this waste discharge end? (If applicable) (ccyymmdd) 20180704

2.5.2 The total volume of waste / wastewater discharged per year:

240 Cubic meters

2.5.3 The ma imum volume of waste / wastewater discharged on any given day:

2 Cubic meters

2.5.4 Monthly discharge pattern e pressed in:

☑ Cubic meters

OR

☐ Percentage (%) of total

OR

☐ Another unit of measure

If "Another unit of measure" was selected, specify the "unit of measure" to be applied to the monthly discharge pattern details:

	Minimum	Average	Maximum
January			30
February			
March		30	30
April		30	30
May			
June			30
July			30
August			
September		30	30
October		30	30
November			
December			30

Continued on next page

Quality Variable and unit of measurement	Average Intake Concentration	Maximum Anticipated Intake Concentration	Average Discharge Concentration	Maximum Anticipated Discharge Concentration
Calcium (mg/l)				
Chemical oxygen demand (mg/l)				
Chloride (mg/l)				
Chromium (mg/l)				
Chromium(vi) (mg/l)	<0.006		<0.006	
Cobalt (mg/l)				
Copper (mg/l) (dissolved copper)	0.037		0.015	
Cyanide (mg/l)				
Fluoride (mg/l)	0.3		0.5	
Iron (mg/l) (dissolved iron)	0.068		0.269	
Lead (mg/l) (dissolved lead)	<0.005		<0.005	
Lithium (mg/l)				
Magnesium (mg/l)				
Manganese (mg/l) (dissolved manganese)	0.003		0.007	
Mercury (mg/l) (dissolved mercury)	<0.001		<0.001	
Molybdenum (mg/l)				
Nickel (mg/l)				
Phenol (mg/l)				
Potassium (mg/l)				
Radionuclides (mg/l)				
Soap, oil or grease (mg/l)	<50		<50	
Sodium (mg/l)				
Sulphate (mg/l)				
Tin (mg/l)				
Total dissolved solids (mg/l)				
Total suspended solids (mg/l)	17		<10	
Total nitrogen (mg/l)				
Total phosphorus (mg/l)				
Uranium (mg/l)				
Vanadium (mg/l)				
Zinc (mg/l) (dissolved Zinc)	0.033		0.202	

3.2 Water resource (receiving the wastewater discharge) information

3.2.1 Name of the water resource receiving the wastewater discharge is:

Water is being discharged into the veld - not directly to a water resource. Closest water resource to the discharge point is the unnamed episodic tributary of the Groenwater Spruit.

3.2.2 Type of water resource receiving the waste or wastewater discharge:
(Mark only one box with an X)

- ☐ River or stream
- ☐ Wetland
- ☐ Government Water Scheme
- ☐ Lake
- ☐ Dam
- ☐ Marine
- ☐ Estuary
- ☑ Other (specify)

Veld area (approx. 403m)

3.2.3 Geographic location of the discharge point (use only one format):

Latitude	S 28 ° 18 ' 53 : 7 "	or	S . °	or	S ° . '
Longitude	E 23 ° 21 ' 13 : 9 "	or	E . °	or	E ° . '

Datum Type: ☑ Cape (Modified Clarke 1880) ☐ WGS-84

3.2.4 Reliability of water resource receiving the waste or wastewater discharge:
(Mark only one box with an X)

- ☐ Water always present
- ☑ Frequently dry
- ☐ Dry during certain seasons

3.2.5 Drainage Region Details:

Quaternary Drainage Region: D 7 3 A

4. LIST OF SUPPORTING TECHNICAL INFORMATION

4.1 Confirm that the following forms have been included in this application

DW901	☒ Yes	☐ No
DW902	☒ Yes	☐ No
DW905	☐ Yes	☐ No

4.2 Mark with an X if these documents have been submitted with this application

Environmental Impact Assessment (EIA)	☒
Environmental Management Programme (EMPR)	☒
Standard Environmental Management Programme	☐
Integrated Water and Waste Management Plan (IWWMP)	☐
Integrated Water Use Licence Application Report	☐
Report on Waste Water Quality (solute load, seasonal changes, etc.)	☒
Report on Industrial Process Generating Waste water	☐
Geohydrological Report	☐
Civil Designs	☒
Contingency Plan for Failures and Malfunctions of System	☐
Monitoring Programme(s)	☒
Topographical Map (1:50 000)	☐
National Water Act (Act No 36 of 1998) – Section 27 Evaluation	☒
DW760 NWA-Section 21(a)	☐
DW761 NWA-Section 21(b)	☐
DW762 NWA-Section 21(b)	☐
DW763 NWA-Section 21(c)	☒
DW764 NWA-Section 21(d)	☐
DW765 NWA-Section 21(e)	☐
DW766 NWA-Section 21(f)	☐
DW767 NWA-Section 21(g)	☐
DW768 NWA-Section 21(i)	☒
DW780 NWA-Section 21(h)	☐
DW805 NWA-Section 21(j)	☐
DW903	☐
DW904	☐
Other *(specify other documents submitted with this form)*	
D W	☐
D W	☐
D W	☐

5.4 Waste management scheme information

Waste scheme name (if applicable)

- If the Waste Scheme is applicable, provide WSMP (Waste Scheme Management Parameter Name)
- Specify the date from which this WSMP is applicable to this water use (ccyymmdd)

5.5 Late registration penalty

Is this a late registration? ☐ Yes ☐ No

If yes, mark with an X, the applicable penalty to be levied

☐ R300.00 **OR**

☐ 10% (ten percent) of the annual water use charge outstanding at the date of registration which ever is greater

Specify the penalty amount payable

☐ Waive penalty

Water Quality Management Assessment:

Surname

Initials

Position / Rank

Signature

Date (ccyymmdd)

File number *(i.e. Office Hardcopy Register File No)*

Water Use Register Number

Received by:

Surname

Initials

Position / Rank

Signature

Date (ccyymmdd)

Date stamp of receiving office

Captured on NRWU database

Captured by:

Surname

Initials

Signature

Quality Assurance Executed by:

Surname

Initials

Position / Rank

Signature

Date (ccyymmdd)

WATER USE LICENCE APPLICATION SUBMITTED ON BEHALF OF OAKLEAF INVESTMENT HOLDING 79 RF PTY LTD FOR THE LESEDI PV POWER PLANT

From Mpho Makhetha <mpho.makhetha@lesedipv.com>
To vandykG@dws.gov <vandykG@dws.gov>
Cc VanWykG@dws.gov.za <VanWykG@dws.gov.za>, FeniN2@dws.gov.za <FeniN2@dws.gov.za>, vanWykN3@dws.gov.za <vanWykN3@dws.gov.za>, Odwa Nkcitakalo <odwa@lesedipv.com>, mandy@carbenviro.co.za <mandy@carbenviro.co.za>, Thigesh Velen <thigesh.velen@lesedipv.com>, Zanele Thusi <zanele.thusi@lesedipv.com>, Deon Esterhuizen <deon@mdte.co.za>, Siphokazi Mqhushekile <Siphokazi@letsatsipv.com>
Date 2021-10-26 13:41

Lesedi Notification to DWS_Reg Cert Errors.pdf (~115 KB)

Dear Gawie

Lesedi would like to thank you for the GA and Water Registration Certificate received, however we'd like to notify your office of a number of errors on the registration records, please see attached correspondence.

Furthermore, we would also like to inquire about when we can expect to receive the authorization for effluent discharge?

Regards

Mpho Makhetha
Operations Manager

Office 6A, 6TH Floor, Sinosteel Plaza, 159 Rivonia Road, Sandton, Gauteng , 2191
Tel: 011 217 7420|Direct: 011 217 7423| Cell: 072 617 0795 | Fax: 086 596 1313 | P.O Box 651384, Benmore, 2010
Email: mpho.makhetha@lesedipv.com

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This electronic message and all contents contain information which may be privileged, confidential or otherwise protected from disclosure. The information is intended to be for the addressee(s) only. If you are not an addressee, any disclosure, copy, distribution or use of the contents of this message is prohibited. If you have received this electronic message in error, please notify the sender by reply e-mail and destroy the original message and all copies.

Department of Water Affairs and Sanitation
Regional Office: Northern Cape Region
Office: Lower Vaal: Northern Cape
Private Bag X6101, Kimberley 8300
28 Central Road, Beaconsfield, Kimberley

Email notification to: Acting Director: Institutional Establishment
Mr. Gawie Van Dyk Email: VanWykG@dws.gov.za
Ms. Ntombizanele Feni Email: FeniN2@dws.gov.za
Ms. Natalie van Wyk Email: vanWykN3@dws.gov.za

26 October 2021

Dear Sir

Registration Certificate: Government Notice Number 1352 to register for water use in terms of National Water Act No 36 of 1998. Registration Certificate No. 25065811.

Please refer to the Water Use Registration Certificate granted to Oakleaf Investment Holding 79 RF (Pty) Ltd, dated 25 August 2021 and received on 13 September 2021; for instream development activities (three access roads and powerlines across watercourses) at Lesedi Solar Facility, near Postmasburg in the Northern Cape.

We acknowledge receipt of the Registration Certificate, but would like to inform your office that a number of errors occur on the registration records. The activities applied for, and confirmed as correct in an email from Ms. Feni on 24 June 2021, are the correct ones (included below for convenience):

Existing Water Use Activities, GA confirmation dated, 21 January 2019

Purpose	Purpose	Dimensions Length x Width x Depth	Property description	Co-ordinates
Section 21 (c) & (i)				
Concrete road crossing over a non-perennial tributary of the Groenwater Spruit	Road crossing 1 provides access to the sub-station for the PV Plant.	Heigt:0.25 thick Width: 6 Length: 12	Remaining Extent of Farms 469	S-28°.18’ 55.5” E 23°.21’ 23.4’’

Proposed Water Use Activities

Water Use (s)	Purpose	Dimensions Length x Width x Depth	Property description	Co-ordinates
Section 21 (c) & (i)				
Gravel road on the northern side of the Transnet Railway line, crossing a non-perennial tributary of the Groenwater Spruit	Road Crossing 2: to access the northern PV field from D3381.	Heigt:0.5 Width: 6 Length: 13	Remaining Extent of Farms 469	S-28°.18' 49.5" E 23°.21' 31.0''
Tarred road on the southern side of the Transnet Railway Line, crossing a non-perennial tributary of the Groenwater Spruit.	Road crossing 3: access road to Lesedi Power Plant from D3381.	Heigt:0.5 Width: 8 Length: 20	Remaining Extent of Farms 469	S 28°.18' 49.9" E 23°.21' 19.2''
Pylon No.3 (4 poles, 13m high) within regulated area.	Transmission pylon line, affecting 16m length of the watercourse.	Heigt:2.2 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 54.1" E 23°.21' 32.4''
Pylon No.4 (4 poles, 11 m high) within regulated area.	Transmission pylon line, affecting 16m length of the watercourse.	Heigt:2.2 Width: 1 Length: 1	Remaining Extent of Farms 469	S 28°.18' 54.1" E 23°.21' 32.4''
Section 21 (f)				
Discharging effluent generated from the wastewater facility into the water resource.	Once the pumping chamber is full treated effluent is discharged into the tributary of Groenwater Spruit	Volume: 274 m^3/a	Remaining Extent of Farms 469	S 28°.18' 55.7" E 23°.21' 16.4''

We also kindly enquire about the progress made with granting authorization for discharging effluent?

Yours faithfully,

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Name: Thigesh Velen
Designation: Chief Executive Officer
For and on behalf of **Oakleaf Investment Holdings 79 (RF) Proprietary Limited**