REPORT NO. LOCALITY NO. TASK NO. P WMA 15/N40/00/2517/1 N400/02 EC 003/2018(EC)

SURVEY SERVICES : SOUTHERN OPERATIONS (NATIONAL WATER RESOURCE INFRASTRUCTURE)

COERNEY DAM CONTOUR SURVEY



May 2018





Department: Water and Sanitation **REPUBLIC OF SOUTH AFRICA**

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TASK: COERNEY DAM CONTOUR SURVEY

LOKALITEIT No. TAAK No. N400 EC 003/2018 EC

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COERNEY DAM

CONTOUR SURVEY

REQUEST

A request was received from Aurecon, consultants appointed to do a study of additional storage to supprt the Algoa Water Supply System, to do contour surveys of the Proposed Upper Sceepersvlakte- and Coerney dams.

LOCALITY

The area of the survey is situated in the Lower Sundays River valley in the vacinity of Sunlands, close to the excisting Scheepersvlakte Dam.

TASK REFERENCES

Loc. no. Task. no.	N400 EC 003/2018 EC		
Latitude	33° 26' 43.2"	(S)	(X-Co-ord)
Longitude	25° 37' 27.3"	(E)	(Y-Co-ord)

SURVEY INFORMATION

Contours from excisting 1 meter Contour Plans from 1977, that was compiled from Arial Photography for the design of the Lower Sundays River Government Water Scheme was regenerated up to the 110m contour value.

Method: Origional plans were scanned in color and imported into ArcMap10. In ArcMap10 the images of the plans were georefernced to eliminate possible distortion caused by scanning.

The georeferneced images were printed to PDFcreator and saved as images. The images were cropped on the outer gridlines of each plan and saved to be used in Model Maker.

Final images were imported into the CAD environment of Model Maker, with the function where the images comers can be dragged to coordinates. Contours were regenerated by digitising points on full contours and creating a triangle model to regenerate contours.

9 test section were surveyed in the field to compare the digitised data to the actual ground data and results were very good.

The test sections were surveyed with GPS-RTK from new control points.

The position of damwall was used, with a 1 : 3 upstream slope to create a dam basin for Area/Volume calculations.

Capacity table was calculated in Model Maker with the Cut-and-Fill method, because contours made small islands in the valley of the basin. Normal Dam Volume Method don't accommodate islands.

Survey inputs:

GPS Static was used to fix 7 new control points, CN3, CN5, CN6, CN7, CN8, CN10 and CN11from excisting photocontrol points PC100, PC102 and PC103.

The test sections were surveyed with GPS-RTK from new control points.

All Co-ordinates is based on WGS84 Lo25°

Heights based on 1976 DW's (HAMSL)

Accuracy:

All surveys comply to a Class B accuracy. All surveys were done GPS

Calculations:

Calculations were done with Trimble Business Centre. Final Contours and sections were done with Model Maker.

Comment:

More 75% of the dam basin is covered in dense bush which made it impossible to use ground based survey methods to do a topgraphical survey by foot.

The method of digitising contours from historic 1m contour maps were the only alternative options availlable at the time.

LIDAR was the only other option available at a cost of R150 000 per dam, with no guarantee that it will provide any better result.

The contour plans generated from Arial Photography is very accurate and was always used by Department of Water Affairs to plan, calculate and design dams or other waterworks.

Proposed Coerney Dam Survey Control Points

Heights based on	MHASL 1976 DW's		Coordinates: WGS84	1 Lo25°
Point	Y-Coord	X-Coord	R.L	Comment
CH150	-57989.90	3703396.17	106.96	BM
PC100	-56844.12	3702479.48	129.67	lp12
PC102	-57840.07	3702771.73	111.00	lp12
PC103	-58621.67	3703076.22	79.18	lp12
CN3	-57779.88	3702694.01	115.43	lp16
CN5	-57509.71	3702316.85	111.69	lp16
CN6	-57410.99	3701683.04	106.58	lp16
CN7	-58353.03	3701411.70	136.91	lp16
CN8	-58491.30	3700642.19	132.22	lp16
CN10	-57062.76	3699816.07	123.40	lp16
CN11	-57552.89	3699692.10	128.69	lp16
LPC	-58152.95	3702169.72	97.45	lpc12

Proposed Coerney Dam Capacity Table

Contour(m)	Area(m ²)	Bruto Volume(m ³)	Netto Volume(m ³)	Comment						
82	1647	145.58								
83	13825	6934.66								
84	33627	30238.27								
85	54075	73188.16								
86	83030	141726.31	0.00	Lowest Outlet						
87	120156	242706.76	100980.45							
88	169884	388146.01	246419.70							
89	202897	574495.83	432769.52							
90	242487	796299.12	654572.81							
91	301769	1067480.07	925753.76							
92	360971	1400116.25	1258389.94							
93	407714	1784073.39	1642347.09							
94	455926	2215413.59	2073687.28							
95	512644	2698374.14	2556647.83							
96	568751	3238609.86	3096883.55							
97	627833	3836869.26	3695142.96							
98	697894	4498328.05	4356601.74							
98.8	763467	5083316.19	4941589.88	FSL						
99	779060	5237571.24	5095844.94							
100	853342	6052703.38	5910977.07							
101	938907	6946322.94	6804596.63							
102	1031201	7930242.30	7788515.99							
103	1119257	9005248.80	8863522.49							
103.8	1200377	9932648.03	9790921.72	NOC						
104	1223078	10174962.82	10033236.51							

Proposed Coerney (<u>Dam</u>
Centre Line Don Wall	Image: Test Section Postions -58513.72 3702305.69 Sec1 Left 1 -58140.48 3702665.35 Sec1 CL
CNL -58452.61 3702364.58 Wall Left CNBC -58253.56 3702556.38 BC Left CNCLC -58135.12 3702658.07 CL Curve CNEC -58002.70 3702740.72 EC Right CNR -57948.39 3702770.43 Wall Right Addition of the second se	-57884.06 3702805.62 Sec1 Right -58404.88 3702059.03 Sec2 Left -57567.11 3702317.89 Sec2 Right -58393.04 3702027.11 Sec3 Left -57466.92 3702240.15 Sec3 Right -58370.44 3701981.55 Sec4 Left -57471.29 3702093.08 Sec4 Right -58144.52 3701663.39 Sec5 Left -57326.06 3701697.49 Sec5 Right -58188.09 3701369.51 Sec6 Left -57885.42 3701296.86 Sec6 Right -58188.22 3700655.84 Sec7 Left 7 -58026.55 3700681.85 Sec7 CL -57758.89 3700675.60 Sec7 Right -58469.71 3700408.94 Sec8 Left -58268.34 3700144.53 Sec8 Right -57837.64 3700256.50 Sec9 Left 9 -57817.25 3700444.66 Sec9 CL -57689.81 3700530.71 Sec9 Right
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