

Wetlands Method Statement

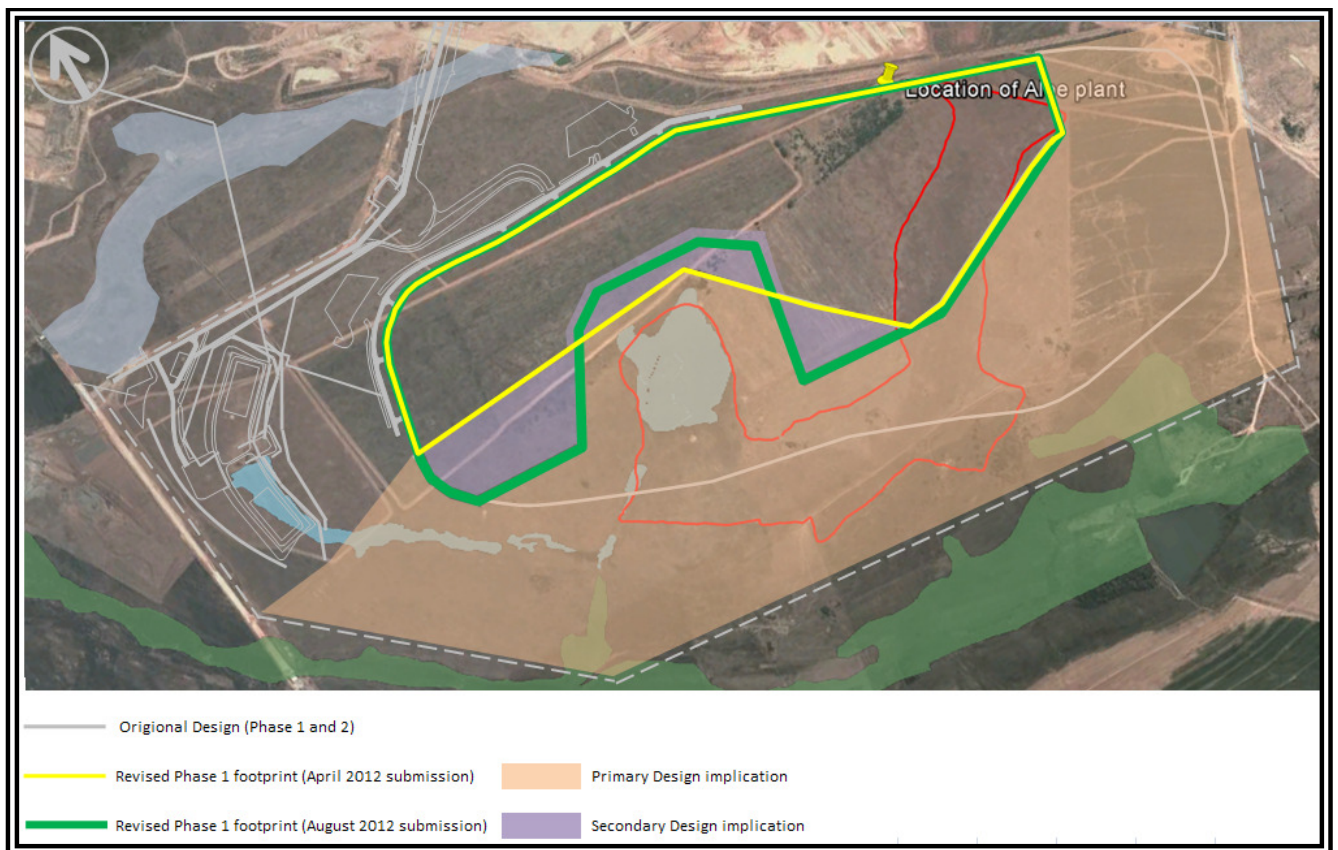
Kusile Power Station – Combustion Waste Terrace

I. Scope

This Construction Method Statement’s scope has been limited to activities of which the design remained the same in all the various proposals to date.

Subsequent supplementary submissions that have design implications are explicitly excluded from this Method Statement. Design, drawings and method statements for the areas defined as “Primary design implication” and “Secondary design implication” will therefore have to be agreed at a later date with the Regional Chief Director: Mpumalanga, Department of Water Affairs, Private Bag X11259, Nelspruit, 1200 hereafter referred to as “The Regional Head”. The impacted areas are shown in Figure 1.

Figure 1



II. Design Responsibility

The design of the Combustion Waste Terrace is rather complex with various Consultants and Sub-Consultants involved as shown in Figure 2. The linear services activities described below are examined in detail later.

Material Handling equipment in the ARMCO culvert and Radial Stacker areas (Bateman Africa scope) is excluded herein and will be agreed with The Regional Head separately.

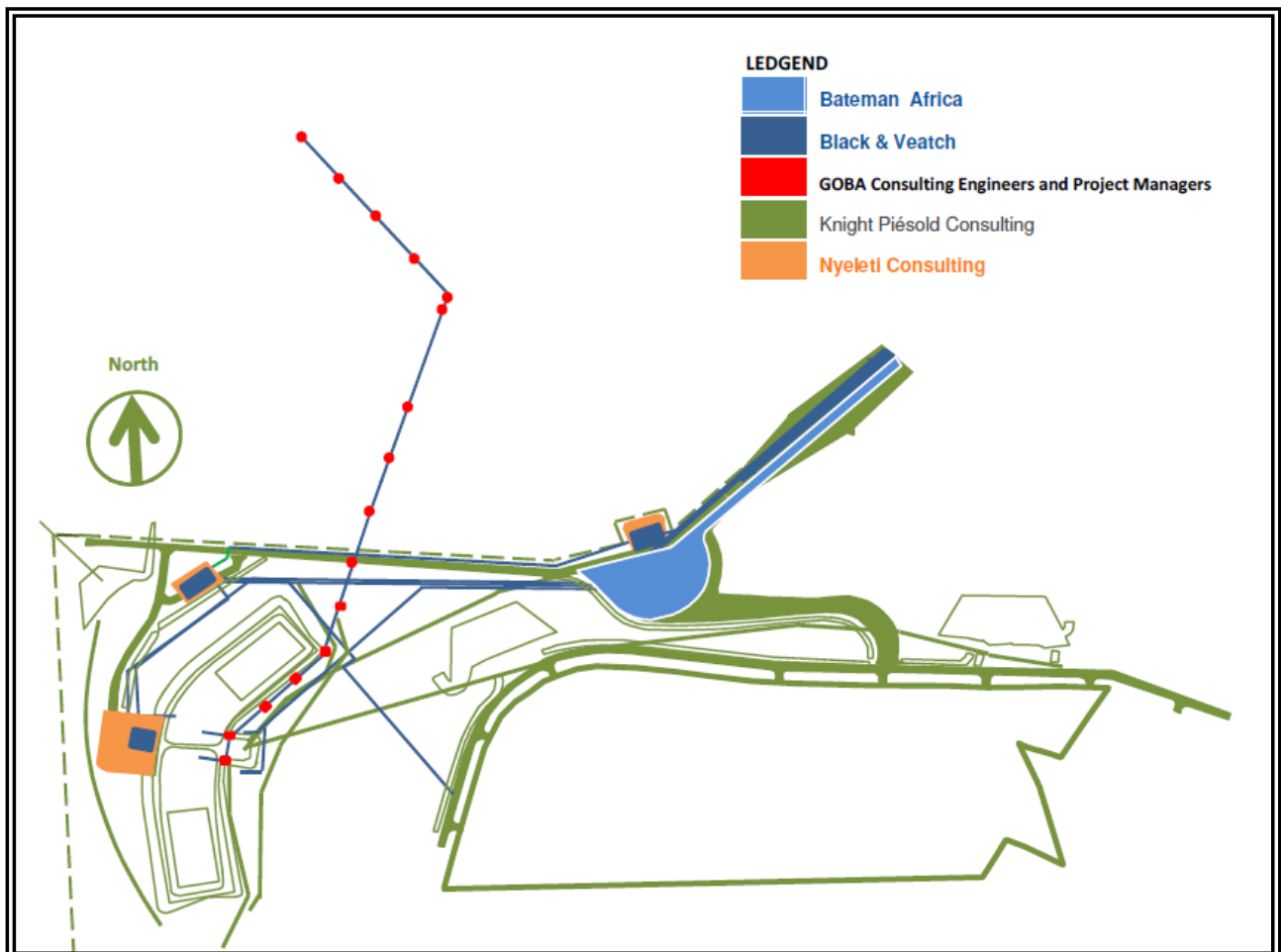
Black & Veatch designed road 1 (over ARMCO culvert) and other linear services; 525 pipe with Junction Boxes 949/ 950 (ADDD to SDD), 110/160 diameter pipes(Workshop Terrace to the Power Block), 315 diameter pipe (Ash Dump Dirty Dam to Power Block) and electrical cable routes (Pump Station to Power Block).

Goba Consulting Engineering and Project Managers designed Junction Boxes JB951 to JB965.

Nyaleti Consulting designed the Sub-Station, Workshop and Pump Station buildings.

All remainder design work done by Knight Piésold Consulting.

Figure 2 – Design Responsibilities



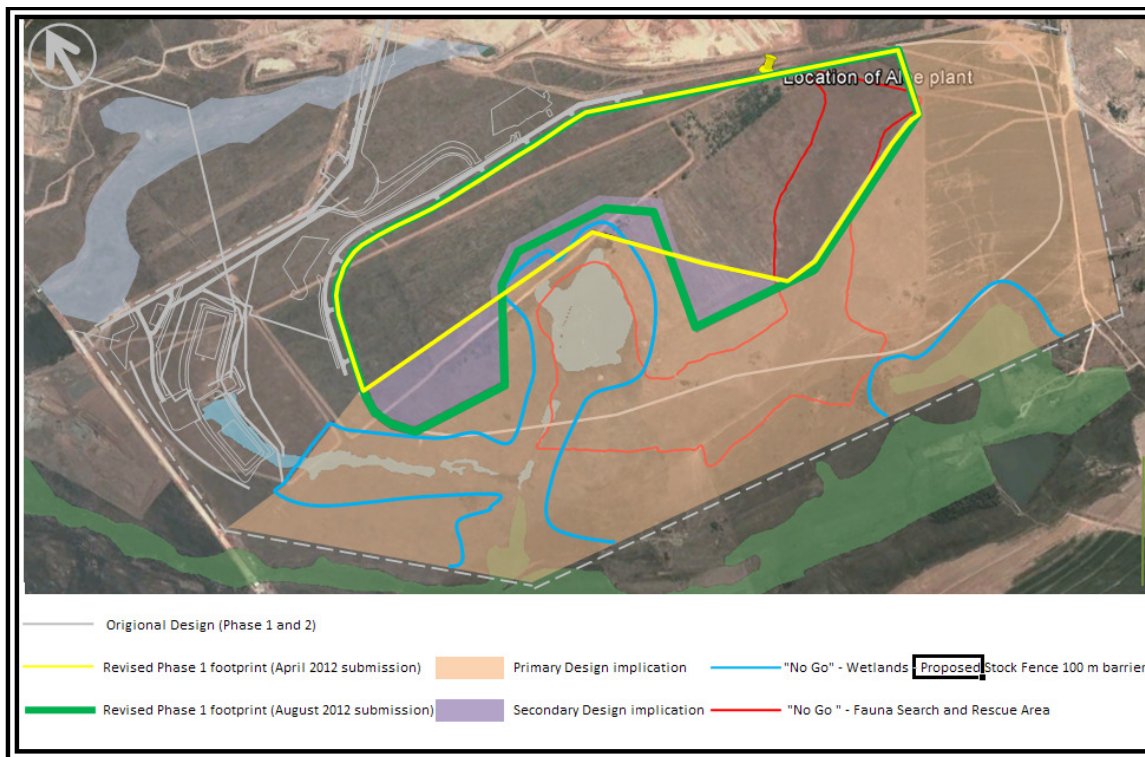
III. Specialist Studies

Various Environmental Specialist activities were undertaken within the area.

Zitholele Consulting and their associate Golder Associates performed a flora “Search and Rescue” survey within the site. They identified and mapped a number of plants to be rescued within the wetlands and the area demarcated in red (refer Figure 3) below. The identified plants can only be relocated to the Kusile nursery during the spring/ early summer.

In addition to communicating the conditions of the authorization to all employees, sub-consultants, contractors etc, the Project secure the Wetland “no-go” area, in a “belts and braces” approach, with the installation of a 1,2 meter high stock fence along the 100 meter barrier line around the defined wetlands as shown in the sketch below. This action will prevent indiscriminate driving through wetlands while still allowing the migration of natural flora and small fauna.

Figure 3



Zitholele Consulting also performs the onsite water monitoring regime.

Subsequent to the receipt of the 21 (c), (g) and (i) licence Wetland Consulting Services conducted a wetland study within the pan area. A drawing incorporating the recommendations of said report has been included.

IV. Construction Contractor Responsibility

The current Construction Contractor package split (shown in Figure 5) is in the process of being modified to simplify central point of accountability as shown in Figure 6.

Figure 5- Current Package Scope

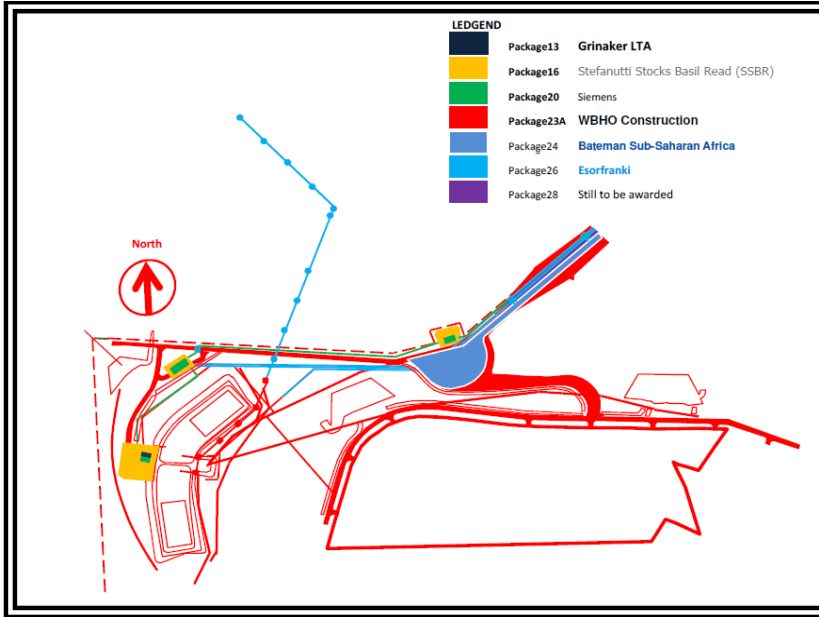
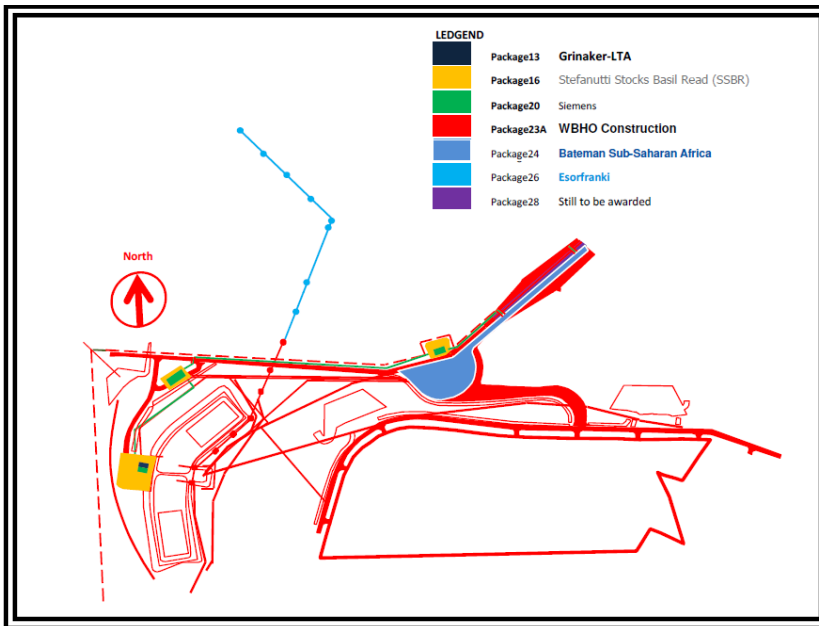


Figure 6 – Proposed Package Scope



Package 26 Constructing Contractor’s the only contractor within the current scope split specializing in piling activities and therefore retains the scope of work outside the permanent fence.

V. Access Control

It is imperative to construct the permanent fence as soon as possible along the perimeter of the 10 year Combustion Waste Terrace to control unauthorized access to site. The package 23A Constructing Contractor, WBHO Construction, control access to the site until Take Over when control reverts to the Project. Access to site (for authorized employees and their contractors) can be obtained through access gates subject to compliance to access requirements.

VI. Programme

Activities within a watercourse are listed in Table 2 and depicted in Figure 4 below. Months of seasonal low flows (September/ October months) have been taken into consideration in the schedule. The Project also took into consideration the removal of protected flora hence the planned start date of some activities delayed till 2 November 2012. Due to the complexity and duration of activities, activities could also not be confined to the months of seasonal low flow.

Figure 4 – Wetlands



Table 2 - Programme

Description	Start		End		Programme	
	Co-ordinate (S)	Co-ordinate (E)	Co-ordinate (S)	Co-ordinate (E)	Start	Finish
WC Road 5	25.92516111	28.90941111	25.92607500	28.90856389	02-Nov-12	30-May-14
WC ADDD	25.93525556	28.89856389	25.93213056	28.89731667	02-Nov-12	30-May-14
WC SDD ADDD	25.92313611	28.90218889	25.92478056	28.90147778	26-Apr-13	06-Nov-13
WC PAN	25.93450000	28.90995278	25.93443611	28.91273056	No activity	No activity
WC F1	25.94204444	28.90268333	25.94370000	28.90594722	02-Nov-12	02-Feb-13
WC F2	25.94504444	28.92217500	25.94531111	28.92513889	02-Nov-12	02-Feb-13

VII. Limits of Disturbance

Limit of disturbance are defined as shown in Table 3 below for package 23A and extended to the North for package 26 as shown in Table 4.

Table 3

Description	Co-ordinate (S)	Co-ordinate (E)
Armco'	25.924225	28.90934167
JB 956'	25.92724722	28.90069167
ADDD HDPE'	25.92733333	28.89430556
PF2'	25.92772222	28.89433333
PF1'	25.93622222	28.89522222
PF10'	25.94334722	28.90403056
PF9'	25.94613889	28.92783333
PF8'	25.93677778	28.93161111

Table 4

Description	Co-ordinate (S)	Co-ordinate (E)
JB 956'	25.92724722	28.90069167
JB 960'	25.92296111	28.90250000
LD SDD'	25.92066944	28.89942500

VIII. ACTIVITIES

Activities were assessed for the following impacts after consulting the drawings listed in each sub-section;

Alteration of flow regimes

Deterioration of water quality

Disturbance of riparian or instream habitat

A. ROAD 5 – ARMCO

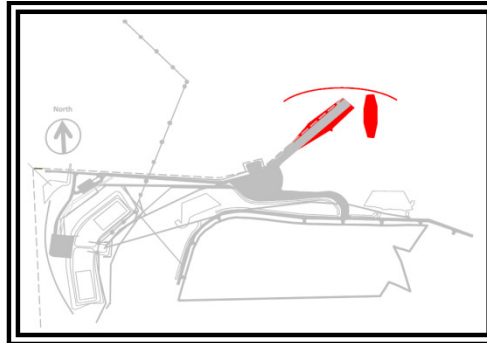


Table 5 – ARMCO drawings

Description	Drawing number
Ash Dump Access Embankment Culvert: General Arrangement	K5406-036
Ash Dump Access Embankment Culvert: Concrete layout and Details 1/2	K5406-094
Ash Dump Access Embankment Culvert: Concrete layout and Details 2/2	K5406-095
Coal stock Yard Stream Diversion Surface Channel to Ash Dump Culvert Layout	K5406-102

Methodology

Process	Materials and Equipment	On / Off site Transport	Movement of Materials on site	Method and Storage of Material
Deviation of stream - Excavation	360° Excavator, Tipper trucks	Equipment will access the site from the North of the stream (not traverse through the stream from the South).	360° Excavator will excavate from West to East (Downstream to Upstream), Excavated material will be trucked away by tipper trucks	Materials will not be stockpiled on site (Sidecast) and will be spoiled at approved dumping sites of the Project
Deviation of stream - Installation of Pipe	360° Excavator, Tipper trucks, Hi-ab Flatbed truck, Compactor/ Rollers	Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at least > 100 meter away from wetlands.	Suitable material will be imported from elsewhere on site, pipe bedding installed and on completion of pipe installation backfilled with suitable material from elsewhere on site	Only sufficient material, to be used during that day, will be temporary stockpiled on site within servitude
Deviation of stream - Deviation of Stream	360° Excavator, Tipper trucks	Equipment will be refuelled at filling depot (trucks etc.) and at least	360° Excavator will excavate from West to East (Downstream to Upstream), Excavated material will be trucked away by tipper trucks	Materials will not be stockpiled on site (Sidecast) and will be spoiled at approved dumping sites of the Project

		100 m away from wetlands (Excavator/ rollers)		
Temporary Embankment - Excavation			360° Excavator can excavate North to South or South to North. Excavated material will be trucked away by tipper trucks	
Temporary Embankment - Filling	Dumprock, Pioneer, Fill,360° Excavator, Tipper trucks, Compactor/ Rollers		Dumprock/ Pioneer (as and when required) will be imported and fill sources from elsewhere on site.	Only sufficient material, to be used during that day, will be temporary stockpiled on site.
Excavation of permanent works	360° Excavator, Tipper trucks	Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at least > 100 meter away from wetlands. Equipment will be refuelled at filling depot (trucks etc.) and at least 100 m away from wetlands (Excavator/ rollers/ water pumps)	360° Excavator will excavate and excavated material will be trucked away by tipper trucks	Materials will not be stockpiled on site (Sidecast) and will be spoiled at approved dumping sites of the Project
Installation of Subsoil drain	360° Excavator, Tipper trucks, water pump		Pioneer (as and when required) will be imported and fill sources from elsewhere on site. Water will be returned to the steam (downstream) through a siltnet	
Backfilling of permanent works				
Installation of a temporary crane pad (as and when required if unsuitable founding conditions encountered)	Dumprock, Pioneer, Fill,360° Excavator, Tipper trucks, Compactor/ Rollers		Dumprock/ Pioneer (as and when required) will be imported and fill sources from elsewhere on site.	Only sufficient material, to be used during that day, will be temporary stockpiled on site within servitude.
Installation of ARMCO Culvert	Crane/ Hi-ab Flatbed truck		Installation will be done in sections from East to West and level or below original stream invert level to prevent upstream damming	Material will be stored within reach of the crane within servitude
Construct Wing wall Bases	Formwork (wood or steel shutters)	Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at	Manual installation by skilled workers / may be assisted by crane	Stacked and stored within the servitude
	Steel Reinforcing		Manual installation by skilled workers	Stacked and stored within the servitude
	Ready-mix Concrete		Direct Discharge / chute	Off Site

Construct Wing wall Walls	Formwork (wood or steel shutters)	least > 100 meter away from wetlands. Equipment will be refuelled at filling depot (trucks etc.) and at least 100 m away from wetlands (Excavator/ rollers/ water pumps)	Manual installation by skilled workers / may be assisted by crane	Stacked and stored within the servitude
	Steel Reinforcing		Manual installation by skilled workers	Stacked and stored within the servitude
	Ready-mix Concrete, truck, crane or pump		Crane & bucket / piped	Off Site
Construct ARMCO Liner	Formwork (wood or steel shutters)		Manual installation by skilled workers	Stacked and stored within the servitude
	Ready-mix Concrete, truck, crane or pump		Crane & bucket / piped	Off Site
Redirect FLOW THROUGH CULVERT	360° Excavator, Tipper trucks		360° Excavator will block temp pipe entrance with soil	N/A
Removal of Temporary Works			360° Excavator will excavate temp embankment and then from West to East (Downstream to Upstream), Excavated material will be trucked away by tipper trucks	Materials will not be stockpiled on site (Sidecast) and will be spoiled at approved dumping sites of the Project
Backfilling of permanent works			Dumprock, Pioneer, Fill,360° Excavator, Tipper trucks, Compactor/ Rollers	Dumprock/ Pioneer (as and when required) will be imported and fill sources from elsewhere on site.
Stabilization of Subbase	Cement ,Motor Grader Recycler(optional), rollers, Watercarts		Grader/ Recycler mix cement into layerworks Watercarts provide moisture during processing and curing period	Only sufficient material, to be used during that day, may be temporary stockpiled on site within servitude
Base Coarse	Base coarse, Motor Grader , rollers, Watercarts	Grader process layerworks Watercarts provide moisture during processing	On Site	
Prime/ Wearing Coarse	Prime, Bearcat, Handpump / Apshalt, paver, tippers, rollers	Bearcat spray Base at required applied rate/ Handpump spreading for small areas, Paver spreads asphalt and rollers compact	Off Site	
Prime	Prime, Bearcat, Handpump	Bearcat spray Base at required applied rate/ Handpump spreading for small areas	Off Site	

B. Ash Dump Dirty Dam (ADDD)

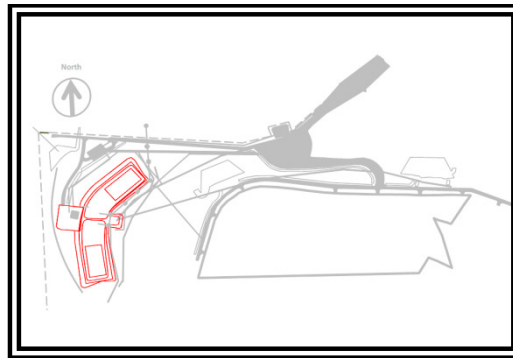


Table 6 – ADDD drawings

Description	Drawing number
Ash Dump No 1 Dirty dam Setting out Drawing for Dam	K30300098/06-280
Ash Dump No 1 Dirty dam Typical Sections	K30300098/06-281
Ash Dump No 1 Dirty dam Typical Sections	K30300098/06-282
Ash Dump No 1 Dirty dam Compartment 1 Inlet General Arrangement	K30300098/06-283
Ash Dump No 1 Dirty dam Compartment 1 Outlet General Arrangement	K30300098/06-284
Ash Dump Dirty dam Spilway 1 Outlet GA and Typical details	K30300098/06-285
Ash Dump Dirty dam Spilway 2 Outlet GA and Typical details	K30300098/06-286
Ash Dump Dirty dam Compartment no 1 Energy Dissipator No 1 General Arrangement & Details	K30300098/06-287
Ash Dump Dirty dam Leakage detection sump General Arrangement & Details	K30300098/06-288
Ash Dump No 1 Dirty dam Compartment 2 Inlet General Arrangement	K30300098/06-289
Ash Dump No 1 Dirty dam Compartment 2 Outlet General Arrangement	K30300098/06-290
Ash Dump Dirty dam Setting Out of Drains	K30300098/06-291
Ash Dump Dirty dam Compartment 1 Basin Division Walls & Details	K30300098/06-295
Ash Dump Dirty dam Compartment 2 Basin Division Walls & Details	K30300098/06-296
Ash Dump Dirty dam Compartment 1 GA - Floor slab and Joint layout	K30300098/06-297
Ash Dump Dirty dam Compartment 2 GA - Floor slab and Joint layout	K30300098/06-298
Ash Dump Dirty dam Compartment no 1 Energy Dissipator No 3 General Arrangement & Details	K30300098/06-400
Ash Dump Dirty dam Compartment no 2 Energy Dissipator No 4 General Arrangement & Details	K30300098/06-402
Ash Dump Dirty dam Compartment no 2 Energy Dissipator No 2 General Arrangement & Details	K30300098/06-404
Ash Dump No 1 Pump Station Terrace Retaining Wall Plan and Details	K30300098/06-405
Ash Dump No 1 Dirty Dam to Pump Station pipe longsections & Setting out	K30300098/06-406
Safety Rope Detail	K30300098/06-472

Methodology

Process	Materials and Equipment	On / Off site Transport	Movement of Materials on site	Method and Storage of Material
Excavation of a cut off trench South side	360° Excavator, Tipper trucks	Equipment will access the site from the North of the hillside seep (not traverse through the wetland from the South). Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at least > 100 meter away from wetlands. Equipment will be refuelled at filling depot (trucks etc.) and at least 100 m away from wetlands (Excavator/ rollers)	360° Excavator will excavate from South to North. Excavated material will be trucked away by tipper trucks	Materials will not be stockpiled on site (Sidecast) and will be spoiled at approved dumping sites of the Project
Excavate Compartment 1,2 JB05 and pump station terrace	360° Excavator, Tipper trucks			
Construct Drain under liner	Geotextile, Pioneer, Fill,360° Excavator, Tipper trucks, Flatbed truck, Compactor/ Rollers	Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at least > 100 meter away from wetlands. Equipment will be refuelled at filling depot (trucks etc.) and at least 100 m away from wetlands (Excavator/ rollers)	Compact selected layer.TLB or telescopic handler will off load the geotextile and using a spreader bar, spread the geotextile. 19 mm washed stone placed in the geotextile and geotextile closed on top	Only sufficient material, to be used during that day, will be temporary stockpiled on site within servitude.
Install Liner System incl cuspated sheet	Geotextile, HDPE Liner, Cuspated sheet Fill,360° Excavator, Tipper trucks, Flatbed truck, Compactor/ Rollers		TLB or telescopic handler will off load the material and using a spreader bar, spread the sheets and then welded in situ by skilled workers	
Construct Concrete liner and Energy Discipators/ Junction Boxes	Formwork (wood or steel shutters)		Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at least > 100 meter away from wetlands. Equipment will be refuelled at filling depot (trucks etc.) and at least 100 m away from wetlands (Excavator/ rollers/ water pumps)	
	Steel Reinforcing (Mesh & dowels)	Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at least > 100 meter away from wetlands. Equipment will be refuelled at filling depot (trucks etc.) and at least 100 m away from wetlands (Excavator/ rollers/ water pumps)	Manual installation by skilled workers	Stacked and stored within the site
	Ready-mix Concrete, Mixer truck, floats		Direct Discharge/ chute/ Pump or Crane and bucket dependant on reach	Off Site

C. Drain pipe from ADDD to SDD

The designers considered the option of crossing at the ARMCO Culvert and Access Road. Neither alternative proved to be feasible due to elevation constraints between structures. The slope along invert of the 525 mm diameter pipe is only, on average, only a minimal 0.6 % basically because the SDD is fixed and the ADDD can't be moved due to other consideration of other gravity lines upstream.

This linear service has the potential to form a preferential flow path along the pipe invert/ bedding material because the service direction is perpendicular to the contour line. The risk of a preferential flow path is further mitigated by 17 manholes of either 1500mm x 1500 mm in situ placed concrete or 1800 diameter manhole precast rings spaced along the route forming barriers around the pipe.

Surface slope along the Southern leg's around 1,5 % and the Northern leg < 1,0%. The solid blue lines depict sidecast stockpiled material upstream of the excavation. The arrows indicate direction of surface flow.

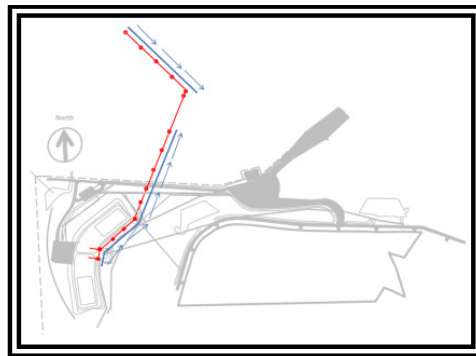


Table 7 – 525 Diameter pipe ADDD to SDD drawings

Description	Drawing number
Terrace Underground Facilities - Site Plan - Area 87	146838-OUXC-S3387
Terrace Underground Facilities - Site Plan - Area 86	146838-OUXC-S3386
Terrace Underground Facilities - Site Plan - Area 85	146838-OUXC-S3385
Terrace Underground Facilities - Site Plan - Area 91	146838-OUXC-S3391

Methodology

Process	Materials and Equipment	On / Off site Transport	Movement of Materials on site	Method and Storage of Material
Excavation of pipe trench	360° Excavator, Tipper trucks	Equipment will access the site from the downstream end Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at least > 100 meter away from	360° Excavator will excavate in sections from direction South (Southern leg) or visa versa. Excavated material will be sidecast outside the 100 meter buffer zone or trucked away by tipper trucks	Materials will be stockpiled on site (sidecast) on the upstream side of the trench and excess can be spoiled at approved dumping sites of the Project

Pipe Bedding	Bedding material, 360° Excavator, Tipper trucks	wetlands. Equipment will be refuelled at filling depot (trucks etc.) and at least 100 m away from wetlands (Excavator)	360° Excavator will place material in sections from direction South (Southern leg) or visa versa. Stockpiled material will be placed downstream outside the 100 meter buffer zone	Materials will be stockpiled on site (sidecast) on the upstream side of the trench and excess can be spoiled at approved dumping sites of the Project
Pipe installation	Concrete pipes,360° Excavator or mobile crane, Flatbed trucks		Pipes will be delivered to site by supplier and stockpiled downstream of the trench.	Pipes will be delivered to site by supplier and stockpiled downstream of the trench.
Construct Junction Boxes walls	Formwork (wood or steel shutters)		Manual installation by skilled workers / may be assisted by crane	Stacked and stored within the servitude
	Steel Reinforcing		Manual installation by skilled workers	Stacked and stored within the servitude
	Ready-mix Concrete		Direct Discharge / chute	Off Site
Construct Junction Boxes and walls	Formwork (wood or steel shutters)		Manual installation by skilled workers / may be assisted by crane	Stacked and stored within the servitude
	Steel Reinforcing		Manual installation by skilled workers	Stacked and stored within the servitude
	Ready-mix Concrete, truck, crane or pump		Crane & bucket / piped	Off Site
Backfilling of permanent works	Fill ex excavation,360° Excavator, Tipper trucks, Compactor/ Rollers		fill sources from sidecast on site.	fill sources from sidecast next to trench. Excess spoiled at approved dump site

The design includes the wetland crossing above grade. The foundation design currently calls for 40 piles. The loading on the piles is extremely small (in construction terms). The project also crossed this wetland twice before and reasonably expect to find suitable founding conditions relatively near the surface /shallow. The Project expects that this can be done with light equipment and will conduct trail pit excavations to confirm basically following the same method described below (excluding constructing the pile).

Process	Materials and Equipment	On / Off site Transport	Movement of Materials on site	Method and Storage of Material
Piling excavation	Bobcat /mini excavator/ Tractor with auger	Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at least > 100	Pile borings will be sidecast , picked up on a daily basis and spoiled outside the 100 meter buffer zone trucked away by	Materials will not be stockpiled overnight and will be spoiled at approved dumping sites of the Project

		meter away from wetlands. Equipment will be refuelled at filling depot (tractors etc.) and at least 100 m away from wetlands (excavator, water pumps)	tipper trucks	
Piling	Steel Reinforcing		Manual installation by skilled workers	Stacked and stored within the servitude
	Ready-mix Concrete, bobcat (or simmilar light equipment)		Direct Discharge / chute	Off Site
Construct Pile caps / Foundations	Formwork (wood or steel shutters)		Manual installation by skilled workers / may be assisted by crane	Stacked and stored within the servitude
	Steel Reinforcing		Manual installation by skilled workers	Stacked and stored within the servitude
	Ready-mix Concrete, bobcat (or similar light equipment)		Direct Discharge / chute	Off Site
Rehabilitation	Tractor with disc harrow or plough		Disc or plough with contours to loosen soil compacted through plant movement and reinstate wetland banks	N/A
Rehabilitation	Seeds, seed spreader		Disc or plough with contours to loosen soil compacted through plant movement correcting preferential flow paths along equipment tracks and reinstate wetland banks	Harvest seeds in this area in 2012/ store in a cool dry place for use in 2013 season

D. Fencing F1 and F2

Description	Drawing number
Ash Dump No 1 General Arrangement Plan	K30300098/06-201
SECURITY FENCE DOUBLE SWING ACCESS GATE	0UYX-S3916
SECURITY FENCE POST CONCRETE BASES AND	0UYX-S3916A
SECURITY FENCE ACCESS GATE POSTS	0UYX-S3916B
SECURITY FENCE DETAILS OF POSTS AND STRUTS	0UYX-S3916C
SECURITY FENCE WELDMESH TERMINATION AND	0UYX-S3916D
SECURITY FENCE ACCESS GATE	0UYX-S3916E
SECURITY FENCE OVERHANG BRACKETS	0UYX-S3916F
SECURITY FENCE SINGLE SWING ACCESS GATE	0UYX-S3916G
SECURITY FENCE GATE POST FOUNDATIONS	0UYX-S3916H
SECURITY FENCE SINGLE SWING GATE KEEP DETAILS	0UYX-S3916J

Methodology

Process	Materials and Equipment	On / Off site Transport	Movement of Materials on site	Method and Storage of Material
Auger excavation	Bobcat /mini excavator/ Tractor with auger	Equipment will use predetermined haul route. Equipment will be stored overnight at camps or at least > 100 meter away from wetlands. Equipment will be refuelled at filling depot (tractors etc.) and at least 100 m away from wetlands (excavator, water pumps)	Pile borings will be sidecast , picked up on a daily basis and spoiled outside the 100 meter buffer zone trucked away by tipper trucks	Materials will not be stockpiled overnight and will be spoiled at approved dumping sites of the Project
Concrete to Straining posts	Ready-mix Concrete, bobcat (or similar light equipment)		Direct Discharge / chute	Off Site
Rehabilitation	Tractor with disc harrow or plough		Disc or plough with contours to loosen soil compacted through plant movement and reinstate wetland banks	N/A
Rehabilitation	Seeds, seed spreader		Disc or plough with contours to loosen soil compacted through plant movement correcting preferential flow paths along equipment tracks and reinstate wetland banks	Harvest seeds in this area in 2012/ store in a cool dry place for use in 2013 season

E. Linear Services- ADDD Downstream Collection Drain

Concentrated flows occur typically along Linear Services. Stormwater contamination (mainly turbidity) can also occur.

ADDD Downstream v-drain collect stormwater from the ADDD work area and channel the water to the silt retention pond where the flow's attenuated and debris collected in the silt retention dam as shown. SO1 to SO2 slopes at 4.4 % and 1.2 % between SO2 and SO3. The drain's to be grassed once shaped.

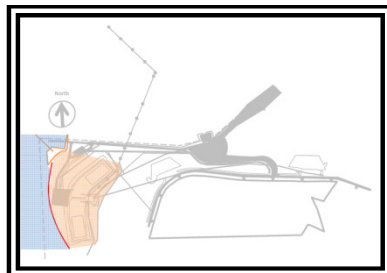


Table 8 – ADDD Downstream Storm Water Control

Description	Drawing number
Ash Dump No 1 Dirty Dam Setting out of Drains	K30300098/06-291
Ash Dump No 1 Stormwater Diversion /Collection Channels Typ sections and details (Cross section R)	K30300098/06-219
Ash Dump Dirty dam Construction Stormwater Management G.A.	K30300098/06-215

F. Linear Services- Workshop/ Pumpstation Collection Drain

This is supplemented by the Workshop v-drain; “CD-EF” slopes at 0.68% and “XW-P15” at 0.40% This drain’s to be grassed once shaped.

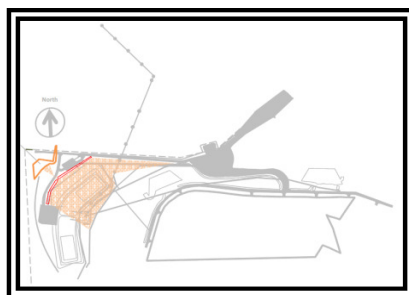


Table 9 – Workshop/ Pump Station Storm Water Control

Description	Drawing number
Ash Dump No 1 Workshop Terrace General Arrangement & Typ details	K30300098/06-217
Ash Dump No 1 Pumpstation General Arrangement & Typ details	K30300098/06-218
Ash Dump No 1 Stormwater Diversion /Collection Channels Typ sections and details (Cross section B)	K30300098/06-219

G. Linear Services- Temporary Drain

1a1/ 1a2 temporary v-drain collect stormwater from the 1a1/ 1a2 work area and channel the water to the silt retention pond E1 where the flow’s attenuated and debris collected as shown. The design includes gabion trench breakers at 50 meter centres and erosion blankets. In the approximately 1460 meter checked only 5 points may exceed the 2% slope; chainage 740m / 2.4%, 840m / 2.7%, 868m/ 2.08 %, 884/ 2.06% and 1200m 2.08%. This will be verified in the field and additional berms provided where required.

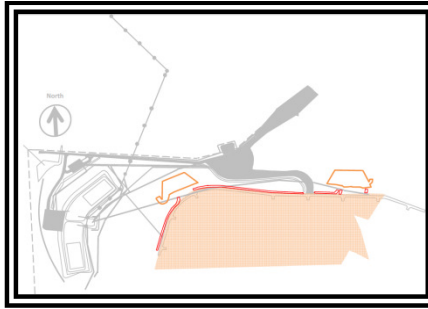


Table 10 – Area 1a1 Temporary Storm Water Control

Description	Drawing number
Dirty Water Drains Plan and profile Sheet 1	K30300098/06-235
Dirty Water Drains Plan and profile Sheet 2	K30300098/06-236
Ash Dump No 1 Construction Phase Stormwater management GA and Details	K30300098/06-216

H. Linear Services- Radial Stacker Access Road Drain

RSAR v-drain collect stormwater from the area South of the access road mainly to manage water not to run down the Radial stacker embankment. The v-drain slopes on average at about 4 %.

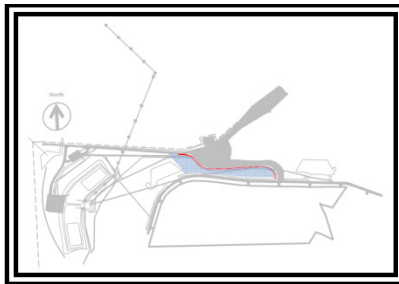


Table 11 – RS Storm Water Drain

Description	Drawing number
Ash Dump No1 Perimeter Access Road - Access from Radial Stacker	K30300098/06-349

I. Linear Services- ADDD Upstream Drain

ADDD Upstream v-drain divert stormwater away from the ADDD Only the first 50 meter and the last 50 meter slope at 4.25 % the average over the length of the v-drain is 0.5%. Drain to be grassed once shaped.

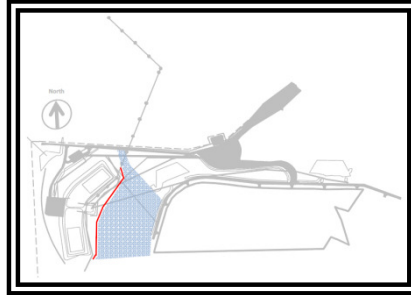


Table 12 – ADDD Upstream Storm Water Drain

Description	Drawing number
Ash Dump No 1 Dirty Dam Setting out of Drains	K30300098/06-291
Ash Dump No 1 Dirty Dam Typical sections (Cross section E)	K30300098/06-218

J. Linear Services- Dirty Water Pipe from Radial Stacker

Linear Services other than Stormwater Drainage structures include

The 1365 Concrete pipe slope at 0.42 % towards the ADDD in a closed system. Construction methodology will be similar to the 525 diameter pipe described earlier.

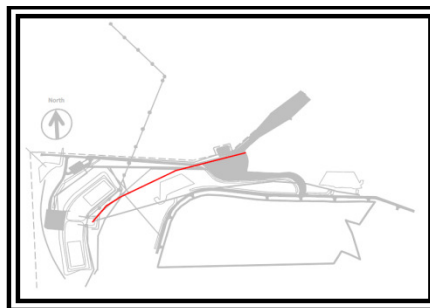


Table 13– 1365 mm Diameter drain line between RS and ADDD

Description	Drawing number
Ash Dump No1 Dirty Water Pipes Plan and Profile Sheet 3	K30300098/06-252

K. Linear Services- Dirty Water Drain from 1a1/1a2

The 2400 Concrete pipe slope at 0.42 % towards the ADDD in a closed system. Construction will be similar to the 525 diameter pipe described earlier.

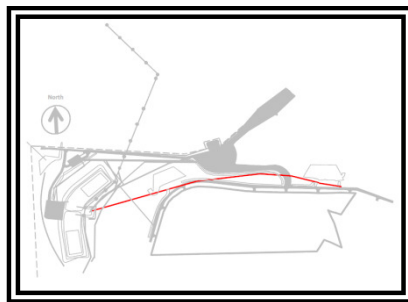


Table 14 – 2400 mm Diameter drain line between AD and ADDD

Description	Drawing number
Ash Dump No1 Dirty Water Pipes Plan and Profile Sheet 2	K30300098/06-251

L. Linear Services- 315 uPVC Pipeline

Shallow services form part of the scope. Construction concerns are similar to the deep dirty drains from an Environmental perspective. Shallow services include

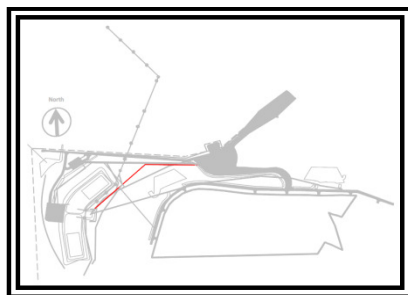


Table 15 – 315 uPVC pipeline

Description	Drawing number
Terrace Underground Facilities - Site Plan - Area 87	146838-OUXC-S3387
Terrace Underground Facilities - Site Plan - Area 86	146838-OUXC-S3386
Terrace Underground Facilities - Site Plan - Area 85	146838-OUXC-S3385
Terrace Underground Facilities - Site Plan - Area 83	146838-OUXC-S3383

M. Linear Services- Irrigation Pipeline

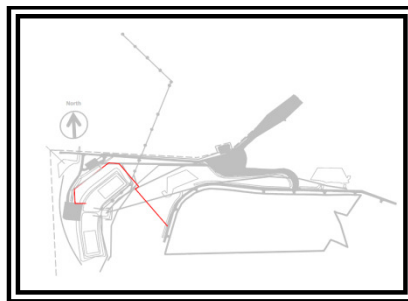


Table 16 – Irrigation pipeline.

Manifold at the dam omitted for clarity

Description	Drawing number
Terrace Underground Facilities - Site Plan - Area 87	146838-OUXC-S3387
Terrace Underground Facilities - Site Plan - Area 86	146838-OUXC-S3386
Terrace Underground Facilities - Site Plan - Area 84	146838-OUXC-S3384

N. Linear Services- 110 and 160 mm uPVC Pipelines

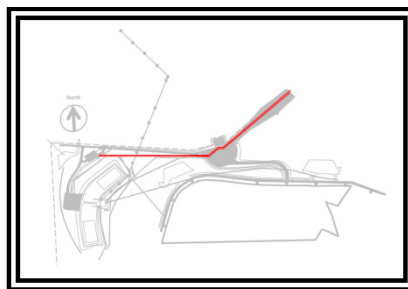


Table 17 - 110 / 160 diameters uPVC pipeline.

Description	Drawing number
Terrace Underground Facilities - Site Plan - Area 88	146838-OUXC-S3388
Terrace Underground Facilities - Site Plan - Area 86	146838-OUXC-S3386
Terrace Underground Facilities - Site Plan - Area 85	146838-OUXC-S3385
Terrace Underground Facilities - Site Plan - Area 83	146838-OUXC-S3383
Terrace Underground Facilities - Site Plan - Area 82	146838-OUXC-S3382

O. Linear Services- Cable Route

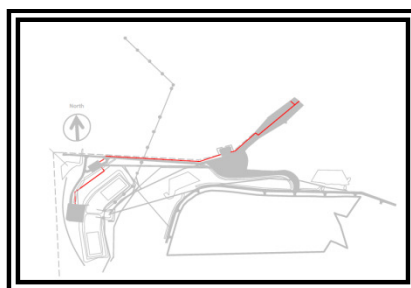


Table18 - . Electric Cable route.

Description	Drawing number
Terrace Underground Facilities - Site Plan - Area 87	146838-OUXC-S3387
Terrace Underground Facilities - Site Plan - Area 86	146838-OUXC-S3386
Terrace Underground Facilities - Site Plan - Area 84	146838-OUXC-S3384

IX. Environmental Management Strategy

A. Environmental Impact Management

The impacts relevant to the construction of the crossings are:

- Alteration of flow regimes, including but not limited to:
 - ~ Concentrated flows
 - ~ Temporary river diversions
- Deterioration of water quality (mainly turbidity), including but not limited to:
 - ~ Sedimentation
 - ~ Accidental spills (hydrocarbons, other hazardous chemicals)
 - ~ Contamination via stormwater runoff

- Disturbance of riparian and instream habitat (i.e. changes to the physical structure of the watercourses as well as vegetation), including but not limited to:
 - ~ Erosion
 - ~ Soil compaction
 - ~ Damage to vegetation
 - ~ Alien species establishment (operational phase?)

Measures to manage these impacts will be implemented as set out in Table 4.

Table 18: Mitigation Measures

Aspects and Measures	Report Reference	Page
Environmental awareness training for contractors		
Delineating and sign posting of maximum impact footprints and work areas		
Location of construction camps	Environmental Management Plan for the Eskom Kusile Power Station Project	P12
Washing and maintenance of equipment (away from watercourses)		
Waste management		
Storage of material (outside watercourses)		
Emergency preparedness plans for accidental spills	Environmental Management Plan for the Eskom Kusile Power Station Project	P15
Erosion and sediment management and containment ~ Berms	Environmental Management Plan for the Eskom Kusile Power Station Project	P7, 19

Aspects and Measures	Report Reference	Page
~ Sediment traps		
~ Use of machinery		
Stormwater runoff management	Environmental Management Plan for the Eskom Kusile Power Station Project	P7
~ Prevention of concentrated flows and maintenance of diffuse flows (diversion of stormwater into vegetated buffer zones before entering watercourses)		
~ Trench breakers		
Maintaining downstream flows during construction of crossings	Environmental Management Plan for the Eskom Kusile Power Station Project	P7, 13
~ Location and management of instream diversions		
Rehabilitation of work areas	Environmental Management Plan for the Eskom Kusile Power Station Project	P13, 14, 15
~ Timing		
~ Indigenous seed mixes		
~ Soil compaction		
~ Alien vegetation control		

B. Monitoring and Review Strategy

Monitoring and reporting will be undertaken as set out in the reports listed in Table 4. Specific provisions are set out in Table 5 below.

Table 19: Monitoring and Review Measures

Measures	Report Reference	Page
Monitoring of and reporting on compliance		
Steps for non-compliance with specifications (specifically environmental damage)		
Reporting of incidents (refer Section 19 and 20 of the National Water Act)		

X. Declarations

A. Design Engineer (KPC)

The work described in this Work Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm.

Signed

Print Name

Date

B. Site Manager (23A)

I understand the contents of the Work Method Statement and the scope of works required from me.

Signed

Print Name

Date

C. Environmental Officer (23A)

The works described in this Work Method Statement are approved.

Signed

Print Name

Date

XI. Declarations

A. Design Engineer (B&V)

The work described in this Work Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm.

Signed

Print Name

Date

B. Site Manager (26)

I understand the contents of the Work Method Statement and the scope of works required from me.

Signed

Print Name

Date

C. Environmental Officer (26)

The works described in this Work Method Statement are approved.

Signed

Print Name

Date

XII. Reference Documents

Reference documents excluding the drawings listed in each section above, attached to the submission;

Description	Reference Number	Date
Water Use Licence (Included under tab O)	B01533	20 June 2012
Ecohydrological Assessment of the Wetland Catchment within the Proposed Eskom Kusile Ash Dump Facility (included under tab PQ)	689-2011	July 2012
Ecohydrological Assessment of the Wetland Catchment within the Proposed Eskom Kusile Ash Dump Facility Summary Report (included under tab R)	689-2011	July 2012
EMP amendment of section 6.3.5 and 6.2.2 of the Standard Environmental Specification for the Construction Environmental management Plan (EMP): Project Bravo	12/12/20/807	7 May 2009