

## **CHAPTER 6 : BILL OF QUANTITIES**

## CHAPTER 6 BILL OF QUANTITIES

PROJEK:					
BILL NO 10: ENVIRONMENTAL PROTECTION WORKS					
ITEM NO	DESCRIPTION OF WORKS	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	<b><u>NON - PHYSICAL WORKS</u></b>				
10.1	<b><u>ENVIRONMENTAL IMPACT ASSESSMENT (EIA)</u></b>				
10.1.1	Preparation, submission and approval of EIA Report by environmental consultant registered with Department Of Environment (DOE)	sum			
10.2	<b><u>ENVIRONMENTAL MANAGEMENT PLAN (EMP)</u></b>				
10.2.1	Preparation, submission and approval of EMP by environmental consultant registered with DOE including :-	sum			
	(i) Erosion and Sediment Control Plan				
	(ii) Flora Management Plan *				
	(iii) Wildlife Management Plan *				
10.3	<b><u>ENVIRONMENTAL OFFICER (E.O.)</u></b>				
10.3.1	Provision of a full time E.O. for environmental management works only, through out the contract period for the implementation of EMP and/or JKR EMS : MS ISO 14001	sum			
10.4	<b><u>ENVIRONMENTAL MONITORING, AUDIT AND TRAINING</u></b>				
10.4.1	<b><u>Environmental Monitoring</u></b>				
	i) <u>Water Quality Monitoring</u>				
	a) Conduct monthly river/stream/other water bodies* water quality monitoring as specified and as shown on drawing for the following parameters or as directed by the S.O./P.D.* through out the contract period :-	sum			
	1. Turbidity;				
	2. pH;				
	3. Total Suspended Solids (TSS);				
	4. Biochemical Oxygen Demand (BOD);				
	5. Chemical Oxygen Demand (COD);				
	6. Dissolved Oxygen (DO);				
	7. Oil & Grease;				
	8. E. Coli;				
	9. Ammoniacal Nitrogen (NH3-N)				
	<b>Carried to Collection</b>				
	<b><u>NON – PHYSICAL WORKS</u></b>				

10.4	<b><u>ENVIRONMENTAL MONITORING, AUDIT AND TRAINING (cont'd)</u></b>				
10.4.1	<b><u>Environmental Monitoring (cont'd)</u></b>				
	<b><u>i) Water Quality Monitoring (cont'd)</u></b>				
	b) Conduct monthly water quality monitoring of the effluent discharge at accommodation, workshop and canteen area as specified for the following parameters or as directed by the S.O./P.D.* through out the contract period :-	sum			
	1. Turbidity;				
	2. pH;				
	3. Total Suspended Solids (TSS);				
	4. Biochemical Oxygen Demand (BOD);				
	5. Chemical Oxygen Demand (COD);				
	6. Dissolved Oxygen (DO);				
	7. Oil & Grease;				
	8. E. Coli;				
	9. Ammoniacal Nitrogen (NH3-N)				
	c) Conduct monthly water quality monitoring at discharge outlet of silt trap, sediment pond, sediment basin as specified for Total Suspended Solid (TSS) or as directed by the S.O./P.D.* through out the contract period.	sum			
	<b><u>ii) Air Quality Monitoring</u></b>				
	Conduct quarterly air quality monitoring for Total Suspended Particulates (TSP) for 24-hour period including wind velocity and direction as specified or as directed by the S.O./P.D.* through out the contract period.	sum			
	<b><u>iii) Noise Monitoring</u></b>				
	Conduct quarterly noise monitoring (12 hours average) including Leq, L10 and L90 as specified or as directed by the S.O./P.D.* through out the contract period.	sum			
	<b><u>iv) Vibration Monitoring</u></b>				
	Conduct vibration monitoring as specified or as directed by the S.O./P.D.* through out the contract period .	sum			
	<b>Carried to Collection</b>				
	<b><u>NON – PHYSICAL WORKS (cont'd)</u></b>				

10.4	<b><u>ENVIRONMENTAL MONITORING, AUDIT AND TRAINING (cont'd)</u></b>				
10.4.1	<b><u>Environmental Monitoring (cont'd)</u></b>				
	<b><u>v) Environmental Quality Report</u></b>				
	Preparation of five (5) copies (per month) of the following report through out the contract period :-				
	a) Monthly environmental quality report	sum			
10.4.2	<b><u>Environmental Audit</u></b>				
	i) Conduct quarterly audit as specified including preparation of five (5) copies of Environmental Monitoring and Audit Report (per audit) through out the contract period	sum			
	ii) Conduct closure audit prior to issuance of certificate of practical completion including preparation of five (5) copies of the report	no	1		
10.4.3	<b><u>Training</u></b>				
	i) Local Training				
	Conduct environmental training on site for JKR personnel once a year.	no			
	ii) Transfer of Technology for Environment				
	Allow JKR personnel to acquire the transfer of technology.	PS	50,000		
	<b><u>PHYSICAL WORK</u></b>				
10.5	<b><u>DUST AND MUD CONTROL</u></b>				
10.5.1	<b><u>Water Bowser Truck</u></b>				
	Provision, operation and maintenance of bowser truck including operator, pumping of water, water tank and other necessary equipments as specified for carrying out water spraying along haul/access roads, existing roads and near settlements or as directed by the S.O./P.D	no			
	<b>Carried to Collection</b>				
	<b><u>PHYSICAL WORK (cont'd)</u></b>				
10.5	<b><u>DUST AND MUD CONTROL (cont'd)</u></b>				

10.5.2	<b><u>Tyre Washing Facilities</u></b>				
	<b><u>i) Portable Water Jet</u></b>				
	Provision, operation and maintenance of portable water jet including operator, water tank and other necessary equipments as specified for carrying out cleaning of vehicle tyres at various exits of the worksites or as directed by the S.O./P.D	no			
	<b><u>ii) Wash Trough</u></b>				
	Construction and maintenance of wash trough including excavation, backfill and disposal of surplus materials, formwork, reinforcement, hardcore and placement of aggregate layer as specified and shown in the drawing or as directed by the S.O./P.D.*	no			
10.5.3	<b><u>Water Sprinkler</u></b>				
	Provision and maintenance of water sprinkler for controlling dust at quarry/ batching plant as directed by S.O./P.D.*	no			
10.6	<b><u>EROSION CONTROL</u></b>				
10.6.1	<b><u>Natural Control</u></b>				
	<b><u>Creepers</u></b>				
	Planting and maintenance of creepers until fully established as specified or as directed by the S.O./P.D.*				
	I) Centrosema Pubescens	m <sup>2</sup>			
	II) Ficus Pumila	m <sup>2</sup>			
	III) Parthenocissus Himalayana	m <sup>2</sup>			
	IV) ..... (any other suitable species)	m <sup>2</sup>			
	<b>Carried to Collection</b>				
	<b><u>PHYSICAL WORK (cont'd)</u></b>				
10.6	<b><u>EROSION CONTROL (cont'd)</u></b>				

10.6.2	<b><u>Artificial Control</u></b>				
	<b><u>Proprietary Products</u></b>				
	Allow a Provisional Sum of Ringgit _____ for the supply, installation and maintenance of proprietary products to be used and expended as directed by the S.O./P.D.* in part or whole or entirely omitted	PS			
10.7	<b><u>SEDIMENT CONTROL</u></b>				
10.7.1	<b><u>Silt Fence</u></b>				
	i) Construction of 1.0m high silt fence including non-woven geotextile and wooden post with dimension as specified and shown in the drawing or as directed by the S.O./P.D.*	m			
	ii) Maintenance of silt fence as specified or as directed by the S.O./P.D.*	m			
10.7.2	<b><u>Sand Bags</u></b>				
	i) Supply and lay gunny sack (or equivalent) filled with sand as specified and shown in the drawing or as directed by the S.O./P.D.*	no			
	ii) Maintenance of sand bags as specified or as directed by the S.O./P.D.*	no			
10.7.3	<b><u>Silt Trap and Sediment Basin</u></b>				
	i) Gabion cage with rock fill and geotextile including excavation, jointing, backfilling and disposal of surplus materials as specified and shown in the drawing or as directed by the S.O./P.D.*				
	a) 1.0m x 1.0m x 1.0m gabion	no			
	b) 2.0m x 1.0m x 1.0m gabion	no			
	c) 2.0m x 1.0m x 0.5m gabion	no			
	d) 2.0m x 1.0m x 0.3m gabion	no			
	ii) Sand bedding for silt traps	m <sup>3</sup>			
	iii) Stone filling at outlet	m <sup>3</sup>			
	iv) 300 mm thick mortared rip-rap	m <sup>2</sup>			
	v) Excavation to form silt trap	m <sup>3</sup>			
	<b>Carried to Collection</b>				
	<b><u>PHYSICAL WORK (cont'd)</u></b>				
	<b><u>SEDIMENT CONTROL (cont'd)</u></b>				
	vi) Maintenance as specified or as directed				

	by the S.O.				
	a) silt trap	sum			
	b) sedimentation basin	sum			
	vii) Provision and maintenance of temporary earth drain	m <sup>3</sup>			
10.7.4	<b><u>Gabion Wall</u></b>				
	i) Construction of 1.0m x 1.0m x1.0m gabion cage with rock fill, sand bed and geotextile including excavation, jointing, backfilling and disposal of surplus materials as specified and shown in the drawing and as directed by the S.O./P.D.*	no			
	ii) Maintenance of gabion wall as specified or as directed by the S.O./P.D.*	no			
10.7.5	<b><u>Check Dam</u></b>				
	i) Construction of check dam using rocks as specified and as shown in the drawing or as directed by the S.O.	m <sup>3</sup>			
	ii) Maintenance of check dam as specified or as directed by the S.O./P.D.*	no			
10.7.6	<b><u>Silt Curtain</u></b>				
	i) Installation of silt curtain including non-woven geotextile and floats as specified and as shown in the drawing or as directed by the S.O./P.D.*	m <sup>2</sup>			
		m <sup>2</sup>			
	ii) Maintenance of silt curtain as specified or as directed by the S.O./P.D.*				
10.8	<b><u>TOPSOIL PROTECTION</u></b>				
10.8.1	Provision and maintenance of plastic sheeting to immediately cover topsoil stockpile for turfing and landscaping	m <sup>2</sup>			
10.8.2	Construction of 1.0m high silt fence including non-woven geotextile and wooden post with dimension as specified and shown in the drawing or as directed by the S.O./P.D.*	m			
	<b>Carried to Collection</b>				
	<b>PHYSICAL WORK (cont'd)</b>				
10.9	<b><u>FUEL SPILLAGE MANAGEMENT</u></b>				

10.9.1	<b><u>Containment Bund for Bulk Fuel Tank</u></b>				
	Construct impervious concrete base as per drawing to contain 110% volume of stored fuel including grease trap	no			
10.10	<b><u>WASTE MANAGEMENT</u></b>				
10.10.1	<b><u>Scheduled Waste Disposal</u></b>				
	i) Construction of storage shed to temporary house scheduled wastes as specified and as shown in the drawing	sum			
	ii) Disposal of scheduled waste to designated and approved premises	sum			
10.10.2	<b><u>Grease Trap</u></b>				
	Provision and maintenance of grease traps at kitchen areas, kongsi and workshop	no			
10.11	<b><u>MANAGEMENT OF DISPOSAL SITE FOR SURPLUS MATERIAL</u></b>				
10.11.1	<b><u>Earthworks</u></b>				
	<u>Protective Vegetation for Erosion Control</u>				
	Plant and maintain until fully establish as specified or as directed by the S.O./P.D.*				
	i) Closed turfing	m <sup>2</sup>			
	ii) Hydroseeding with fibromat or equivalent	m <sup>2</sup>			
	iii) Vertiver Z	m			
	iv) Creepers	m <sup>2</sup>			
10.11.2	<b><u>Drainage</u></b>				
	i) <u>Embankment Sump Outlet</u>				
	Reinforced concrete class 25/20 embankment sump outlet including excavation, concrete, reinforcement, leveling, blinding, formworks, RCP, backfilling and all incidentals necessary as shown in Drawings or as directed by the S.O./P.D.*				
	<b>Carried to Collection</b>				
	<b><u>PHYSICAL WORK (cont'd)</u></b>				
	<b><u>MANAGEMENT OF DISPOSAL SITE FOR SURPLUS MATERIAL (cont'd)</u></b>				



	a) Sump Type S3 internal size 400mm x 600mm x 700mm depth	no			
	b) .....	no			
	<b>ii) Drains</b>				
	Reinforced insitu concrete class 25/20 in drains at any inclination including excavation, junction, reinforcement, formworks where necessary, joints, stepping, backfilling and disposal of surplus material and all incidental necessary as specified and as shown in Drawings or as directed by the S.O./P.D.*				
	a) Toe Drain Along Toe of Embankment				
	- 450mm invert width, 450mm deep	m			
	- 600mm invert width, 600mm deep	m			
	b) Berm Drain Along Berm of Embankment				
	- 400mm deep	m			
	c) Embankment Shoulder Block Drain	m			
	- 300mm half round concrete drain				
	d) Slope Drain Down Embankment Slope (Spillway)				
	- 600mm invert width, 500mm deep	m			
10.11.3	<b><u>Retaining Wall</u></b>				
	Construction and maintenance of gabion retaining wall inclusive of geotextile filter and sand drainage blanket and necessary works as specified and as shown in Drawings or as directed by S.O./P.D.*				
	i) 2.0m x 1.0m x 1.0m gabion	no			
	ii) 2.0m x 1.0m x 0.5m gabion	no			
	iii) 2.0m x 1.0m x 0.3m gabion	no			
	<b>Carried to Collection</b>				
	<b><u>PHYSICAL WORK (cont'd)</u></b>				
10.12	<b><u>NOISE CONTROL</u></b>				
10.12.1	<b><u>Noise Barrier</u></b>				

	Supply and install noise barrier of .....type at specified locations as directed by the S.O./P.D.*	m <sup>2</sup>			
10.13	<b><u>FLORA MANAGEMENT</u></b>				
10.13.1	Conduct Flora Survey as specified.	no	2		
10.13.2	Relocate, transport and maintain trees with conservation value of girth 300mm and below :				
	i) to nearby sites approved by forester or botanist	no			
	ii) to arboretum	no			
10.14	<b><u>WILDLIFE MANAGEMENT</u></b>				
10.14.1	Conduct Fauna Survey as specified.	no	2		
10.14.2	Allow a Provisional Sum of Ringgit _____ to translocate wildlife to sites approved by Jabatan Perhilitan to be used and expended as directed by the S.O./P.D.* in part or whole or entirely omitted	PS			
	<b>Carried to Collection</b>				