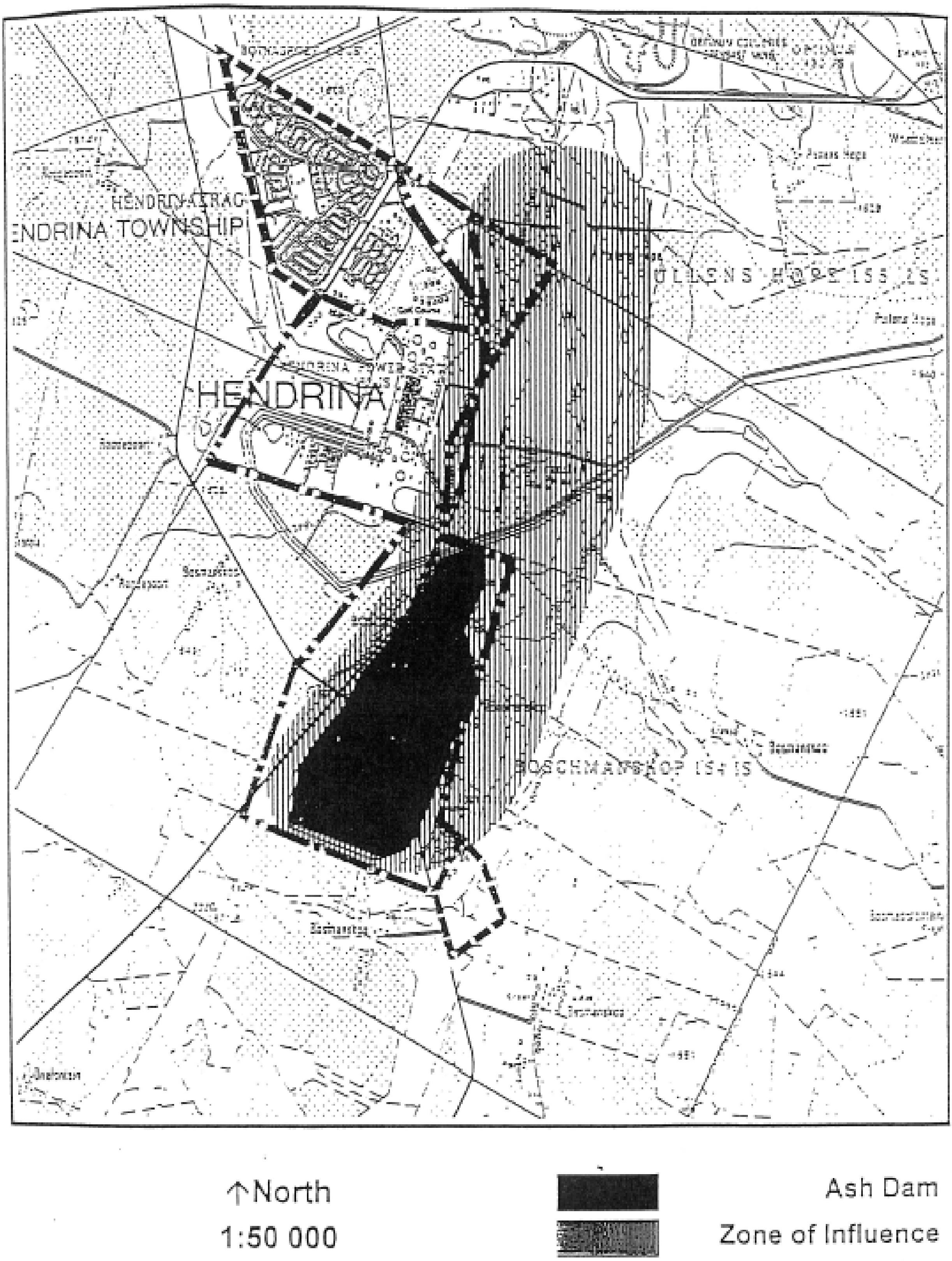


Figure 2.8 Zone of Influence for Current Heights

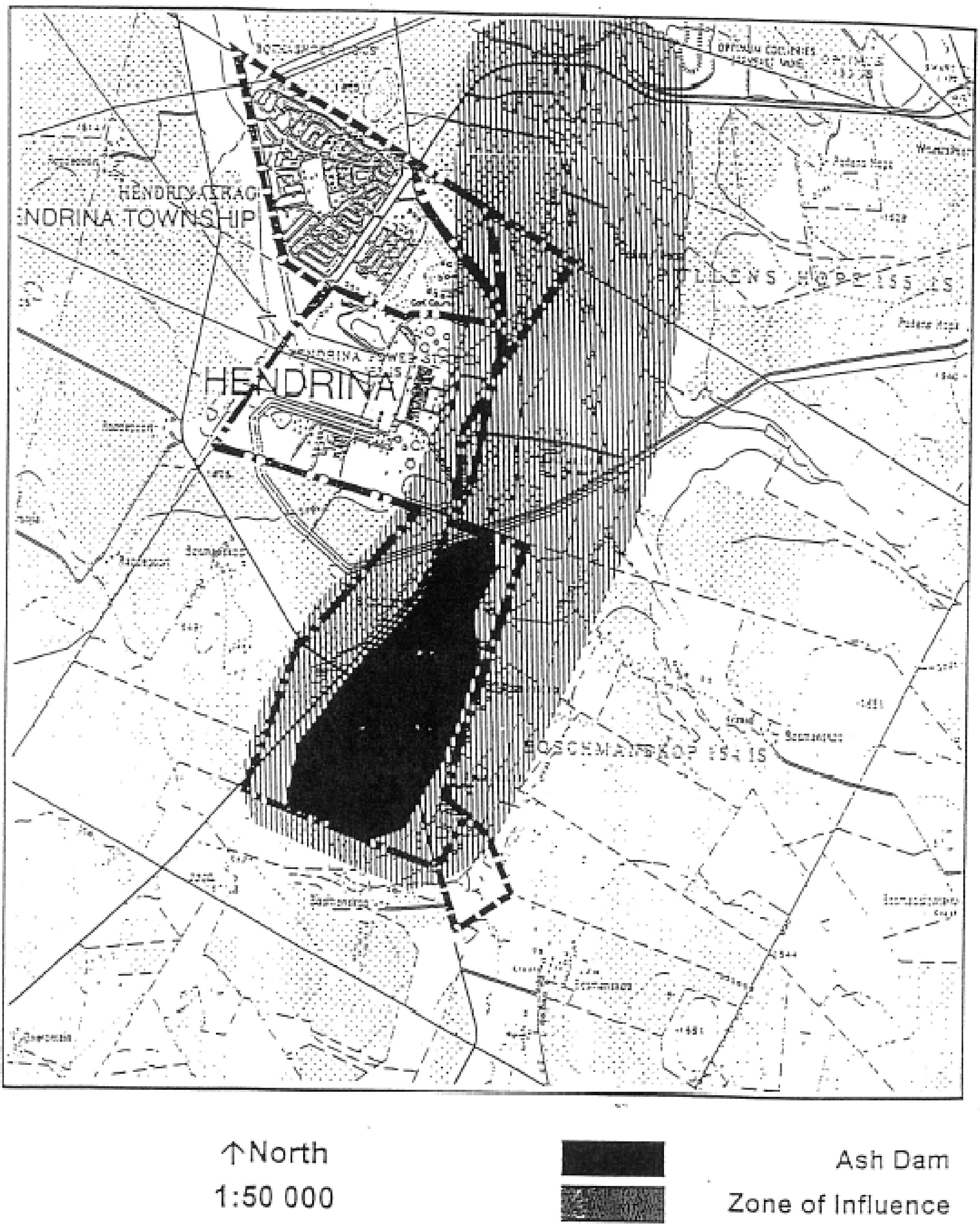


Figure 2.9 Zone of Influence for Final Height

3. OPERATION OF THE ASH DAM

3.1 COMMENCEMENT OF OPERATIONS

The main objectives during the initial placement of ash shall be:

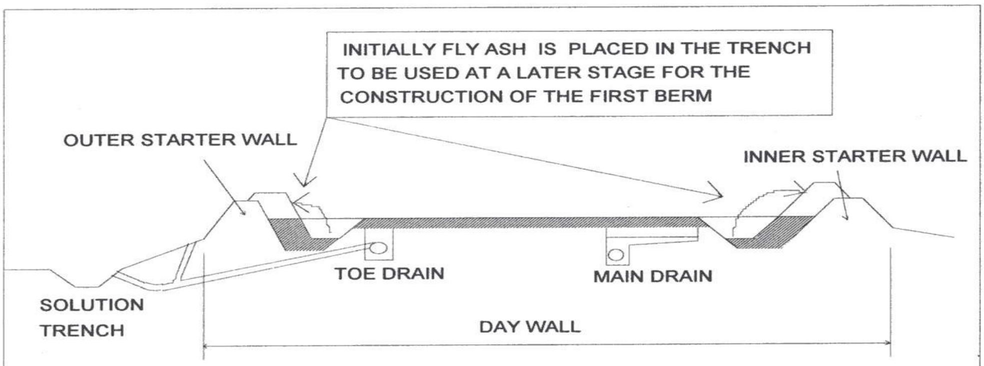
• To cover all of the main and ancillary filter drains with a layer of coarse ash without
washing away the top layer of the filter drains.

• To raise the daywall as quickly as possible.

• To train the operations staff to build the ash dam in a controlled and safe manner.

3.1.1 STARTER WALLS

To enable ash to be placed and contained within the required boundaries of the daywall, starter walls must be built. These are made by taking earth from the surrounding area and forming an earth wall against which ash can be placed. See figures 3.1 and 3.2.



SECTION THROUGH ASH DAM INDICATING CONSTRUCTION OF THE FIRST ASH BERMS

Figure 3.1

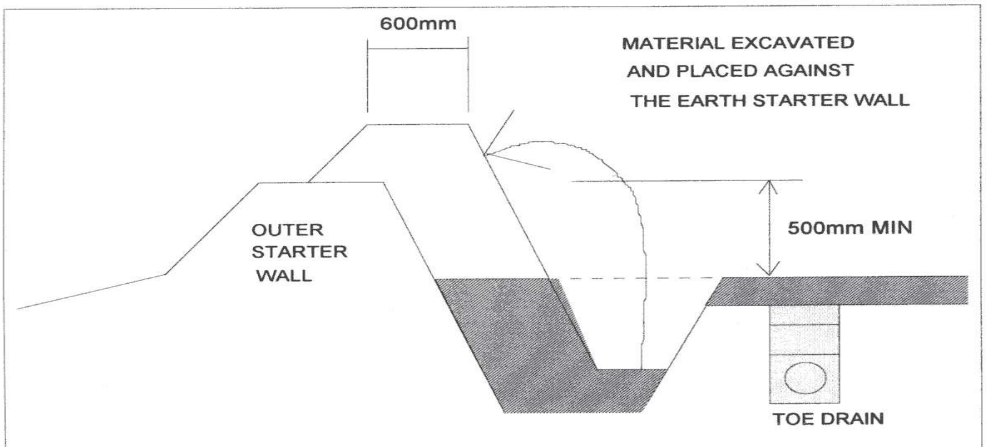


Figure 3.2 CONSTRUCTION OF FIRST BERM AND STEP

3.1.2 THE INITIAL COVERING OF THE MAIN FILTER DRAIN

The initial method of covering the main and toe drains with ash is very important. The prime objective in covering these filter drains is to ensure they are covered with coarse ash to prevent the top layer of the filter drain from being eroded by the initial slurry flow. Care must be taken during the first few deposition and during excavating for the first wall building sequences not to penetrate this protective layer.

3.1.3 INITIAL DEPOSITION OF FLY ASH ON THE DAYWALL

The prime objective in the initial deposition of fly ash on the daywall is to ensure that the daywall rises rapidly in the early stages so that a freeboard of at least 0.5 m or preferably 1.5m above the night paddock is achieved and maintained. The freeboard must also not be less than 500mm above the 1:100 yr. maximum flood level
(See figure 3.3).

The pool level must be maintained at a level, which is at least 1.5 m below the lowest point inside the daywall.

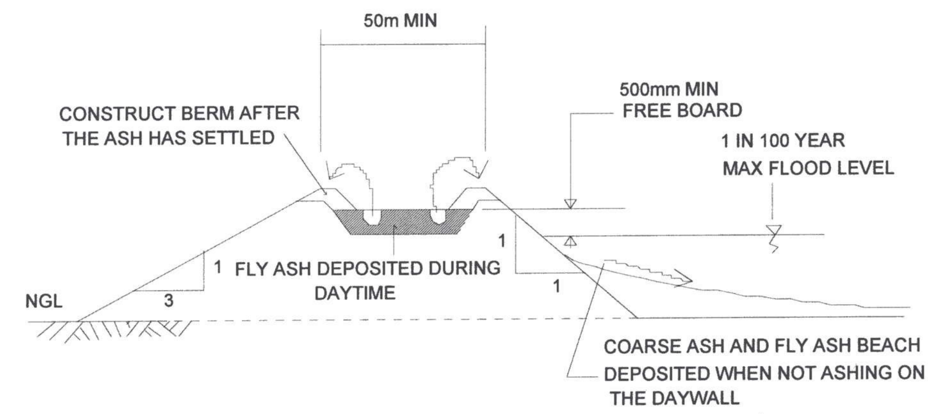


Figure 3.3 **METHOD OF WALL BUILDING**

The daywall must be built using fly ash only. The small berms that have to be built to provide capacity for the next deposition of slurry shall be built with ash that is just dry enough to work with. This criteria will ensure that the pozzolanic action (cementing action) available in the fly ash takes place, thus reducing the future erodability of the side slope of the ash dam by both wind and water. If the ash is too dry, the chemical bonding will not take place and the wall will be much weaker and more permeable.

Sludge from the power station may not be mixed with fly ash that is intended for use in daywall construction.

A competent backactor machine operator will be able to build 250 m of these berms in 8 hours. Compaction with a small vibratory roller will improve the pozzolanic bonding and reduce the permeability of the sides of the ash dam thereby reducing it's erodability. Compaction however, offers little improvement to the stability of the outer slopes of the ash dam and there seems to be an advantage in compacting internal berm of the daywall since it is soon covered by ash, and should an erosion failure occur no serious damage will be caused.

The crest width of the small berms shall not be more than 600 mm, as wider steps are unnecessary and increase the cost of running the backactor per ton of ash deposited considerably. Wider steps require more labour and also result in greater wear on the vibratory roller. Only if the erodability of the ash increases such that the berms are in danger of being breached, should an increase in berm crest width be considered.

The optimum height of the step is a function of the size of the vibratory roller and the type of ash, and has to be determined on site. The berm must however be at least 500mm above the final level of the placed ash to allow for sufficient freeboard during high intensity storm conditions.

3.2 NORMAL OPERATION OF THE ASH DAM

In any wall building operation it is essential to ensure that:

• The correct wall building procedures are being followed.

• Adequate access for operation and rehabilitation is provided.

• There is enough freeboard at all times – at least 1m between the maximum operating level of the impoundment and the overtopping level of the daywall.

• Planning and preparation for the step-in's are carried out timeously.

• The total amount of wall building is optimized.

3.2.1 WALL BUILDING

The correct wall building procedures are as follows:

- **The daywall must be built using fly ash only.**

- The small daywall berms that have to be built to provide the capacity for the next deposition of slurry should be built with ash that has been deposited 24 hours earlier. This criteria will ensure that some pozzolanic action (cementing action) inherent in the fly ash will take place, thereby increasing the strength of the berms and reducing their erodability.

- The daywall berms should be 500 mm high and 500 mm wide at the crest. Cross walls must be constructed at regular intervals along the daywall to contain a single day's ash. (see Figure 3.4). Extra width is not necessary and will only increase the cost of the wall building operation. A competent operator should be able to build more than 250m of small (500 mm high by 500 mm wide) daywall berms in 8 hours.
- Compacting by means of a small vibratory roller will improve the pozzolanic strength of the walls on the outer sides of the ash dam, thereby reducing the erodability of the ash dam. Compaction of the outer wall berms has very little effect on the overall stability of the ash dam. There is therefore no reason to compact the internal berms of the daywall, unless this is required from the operations perspective, as these walls will be covered with ash within a short time.

As the level of the ash dam increases, the daywall width will reduce to a point where the volume of ash required to fill the daywall, paddock is too small to allow practical operation. At this point it is necessary to step the daywalls in on top of the coarse ash night paddock. It is important to plan the step-ins at least 1.5m (vertically), in order to maintain the recommended freeboard, and then to set out their exact positions. Typical sections showing how the step-ins will occur are shown in figure 3.5 and 3.6.

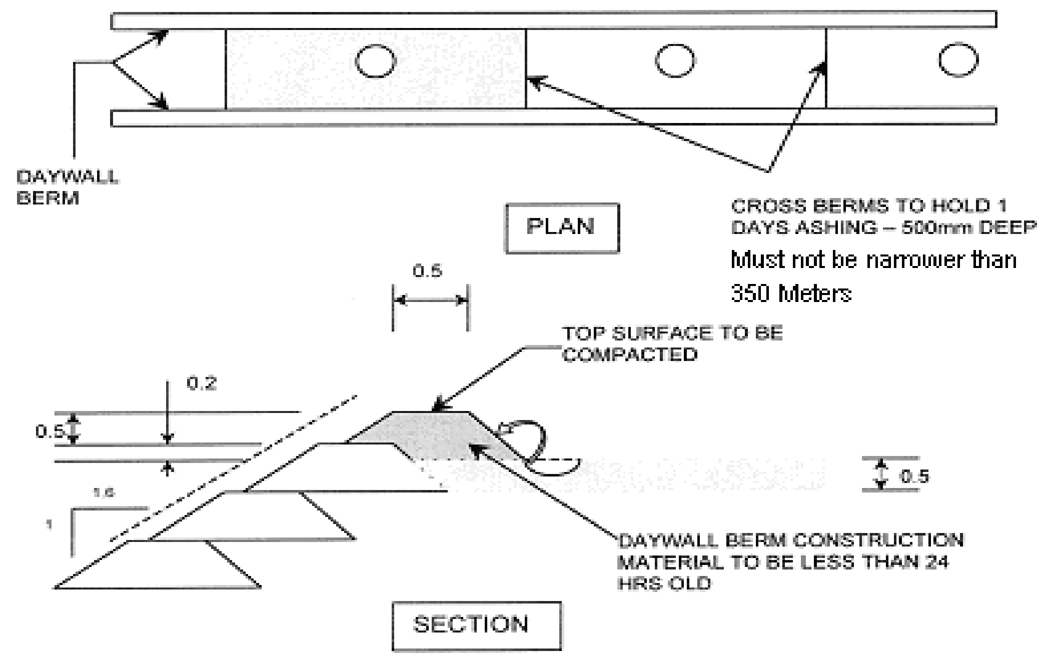


FIGURE 3.4

The daywall width varies initially with a width of 90m at its base. Generally the daywall step-in occurs when the daywall width has reduced to 42m. The step-in of the inner wall widens the daywall base width to approximately 90m once again. Inner wall step-ins are also tied in with the step-in of the outer wall to create an outer wall step-in of 8m. Outer wall step-in occur after each 10m rise. The two reasons for the outer wall step-ins are to reduce the overall outer wall slope to 1:3.8 and allow for construction of access roads on and around the ash dam.

The procedure for forming the inner wall step-ins is as follows:

- Reduce the freeboard within the basin area to 1m prior to the establishment of the new inner paddock wall.
- Construct the new stepped-in inner wall 48m into the night-paddock, 90m in from the crest of the outer daywall. This stepped

in wall can either be constructed to about 0.5m above the level of the top of the daywall (to the same height as the outer daywall crest berm) in a single operation using a medium sized hydraulic excavator.

- Deposit ash in the stepped-in area by breaking through the inner wall of the daywall and allowing the fly ash to flow into the widened daywall paddock area. Construct the new widened paddock according to normal construction procedures until the new paddock area is level with the existing daywall.
- On the outside face of the step-in 8m from the outer step-in and access road and continue building the daywall until the required 1.5m freeboard has been achieved.
- Continue with normal ash dam operation or construction operation methods until the daywall is closer to 42m wide then repeat the first four steps.

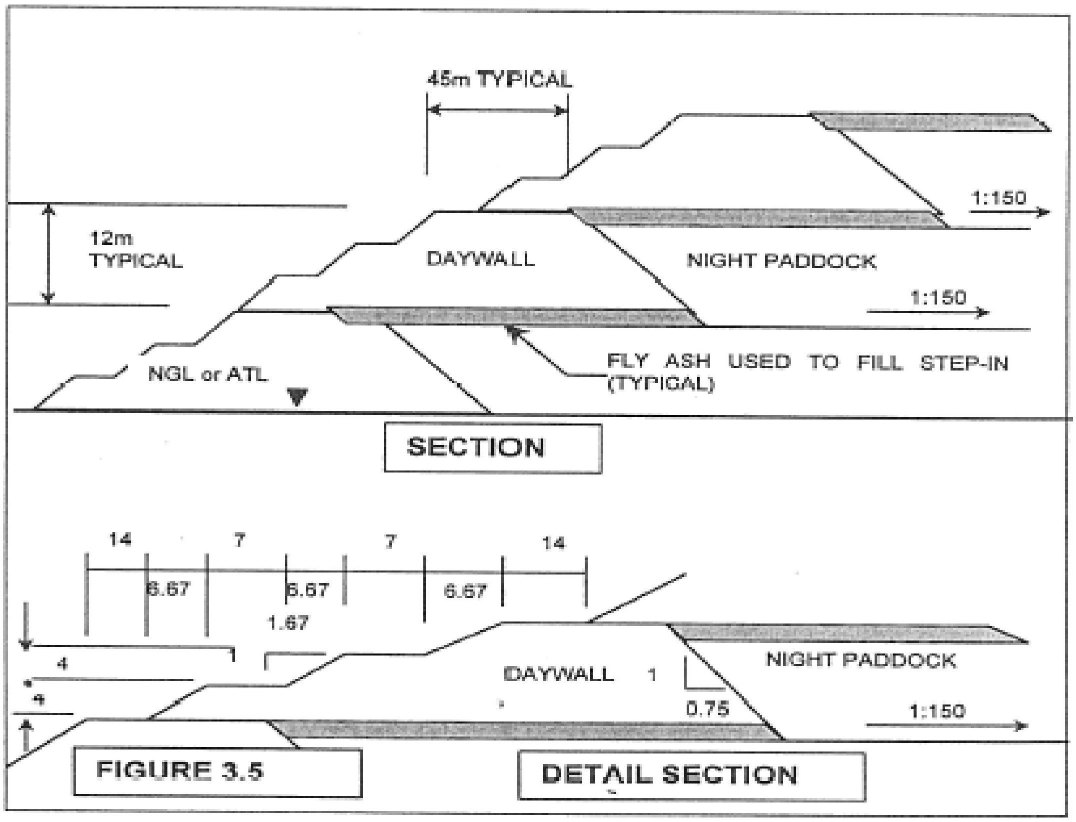


Figure 3.5

The procedure for forming the outer wall step-in is as follows:

- After each 10m rise the daywall, step the outer wall in by 8m by constructing the outer wall berm 8m from the outer crest of the daywall.
- Continue with normal daywall construction operations as per the recommended construction methods.

This procedure will ensure that there is always sufficient capacity for daytime slurry operations and allow adequate access onto the ash dam. The number of walls built to control and guide ash flow shall be kept to a minimum as the cost of operating the ash dam is almost directly proportional to the cost of wall building. The 8m roadways as described above shall be covered with a 150 mm layer of ferricrete gravel wearing course to reduce dust blow-off. They shall also be sloped inwards with a drainage channel or take down chute leading the water down to the next roadway as shown in figure 3.6. This will reduce the amount of water running down the slopes and thereby minimise soil erosion.

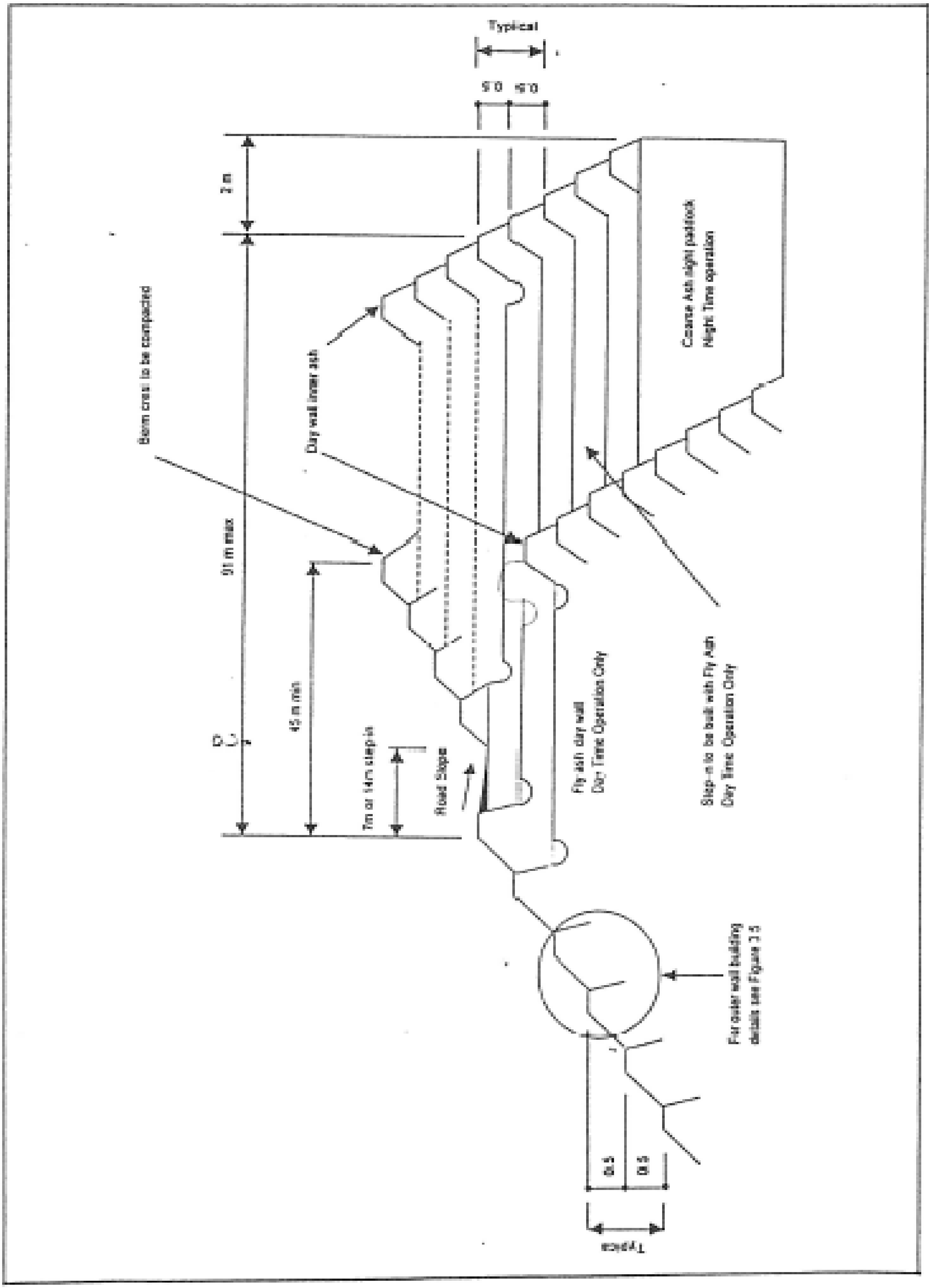

Typical
0.5
0.5
2 m
91 m max
45 m min
7m or 14m step in
Road Slope
Berm crest to be compacted
Day wall inner ash
Coarse Ash night paddock
Night Time operation
Fly ash day wall
Day Time Operation Only
Step-in to be built with Fly Ash
Day Time Operation Only
For outer wall building details see Figure 3.5

Figure 3.6

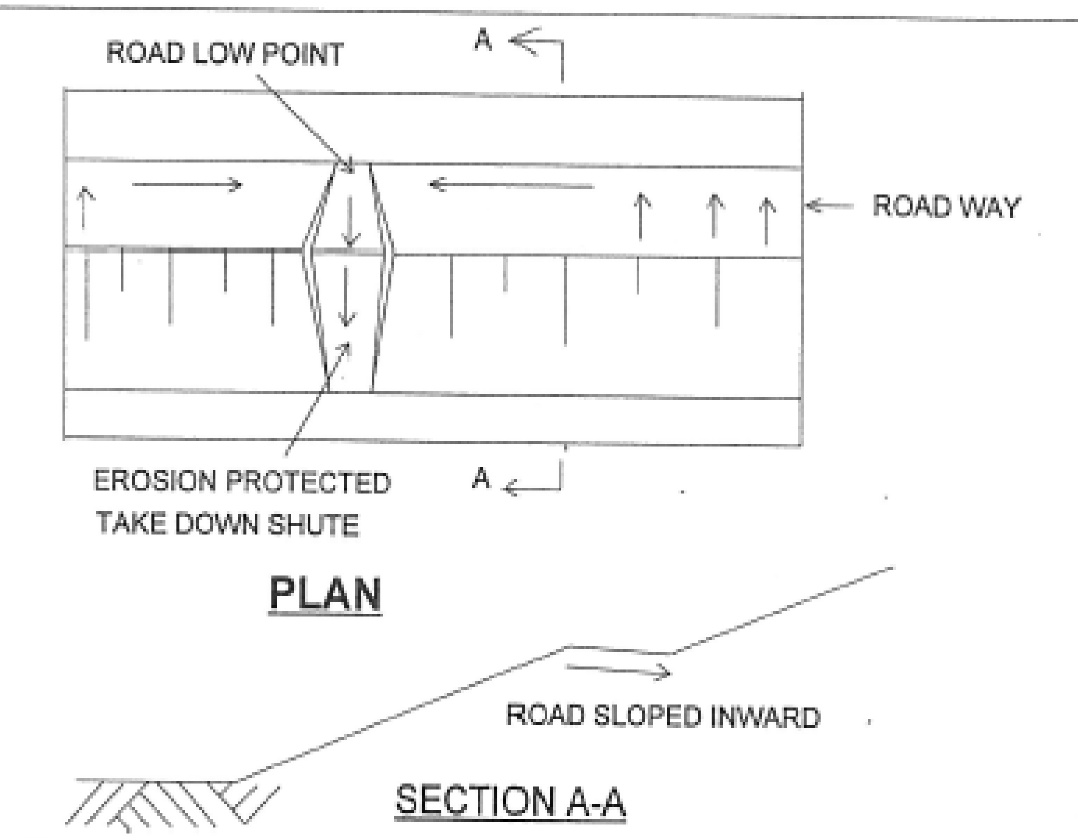


Figure 3.7

3.2.2 ASH DISCHARGE PIPES ON THE ASH DAM

The ash delivery pipes start at the ash pump bays at the power station. Four 300 mm diameter mild steel ash delivery pipes transport the ash slurry to the ash dams. The pipes are susceptible to corrosion due to the chemical composition of the ash slurry. In order to make sure that the pipes corrode evenly throughout their inner circumferences, the pipes have to be mechanically rotated every 6 to 8 months.

Ash discharge is controlled by a series of valves just after the take-offs. The discharge pipes may be buried in the daywall in order to protect them and to allow vehicular access on and around the ash dam.

3.2.3 CONTROL OF THE POOL ON TOP OF THE ASH DAM

The prime objective in the control of the pool, on top of the ash dam, is to ensure that the pool is kept local to the decant tower inlet, and to ensure that the minimum freeboard of the maximum level of the water after a 1:100 yr 24hr storm plus at least 0.5m or at least l,5m total freeboard is maintained at all times. During severe rainfall periods the size of the pool could increase considerably but should be reduced as quickly as the penstocks and return water dams will allow. The excess storm water must however be managed in such a way as to maximize the evaporation from the ash dam and to reduce the amount of surplus water in the AWRD.

Legislation (The National Water Act - Act 36 of 1998 and Regulation R287 / 4989 / 20.2.1976) requires the minimum storage capacity of the system to be based on the normal operating water plus the average monthly rainfall less the gross mean monthly evaporation plus 1:100 year 24hr storm capacity plus 0,5 meter dry freeboard.
Daywalls shall be constructed in such a way that the ash dam will always have sufficient capacity for normal ash disposal operations plus the average monthly rainfall less the gross mean monthly evaporation plus a 1:100 year 24hr storm plus at least 0.5m of dry freeboard at the lowest point on the daywall.

To avoid excessive silting of the silt trap and ash water return dams, water should ideally only be drawn off the pool during the day while slurry is being deposited on the daywall. If the power station is being operated at full load, fly ash will be deposited for 9 hours during the normal day shift, from 07h00 to 16h00, and coarse ash will be deposited for approximately 14 hours during the normal night shift, from l5hOO to 05h00.

The decant water will be drawn off the pool by means of penstocks, or in the case of penstock failure by pumping. When the permanent penstock becomes operational the temporary penstock decant towers must either be raised to well above the current level of the ash or closed off and grouted to prevent them from causing erosion or piping related problems later in the life of the ash dam.

It is important to note that storage of excess power station dirty water and storm water on the ash dam is considered to be poor practice and should be avoided at all times.

3.2.4 FILTER DRAINS

Main filter drains are have been installed in both Ash Dam 4 and Ash Dam *5.* Elevated filter drains have been installed for Ash Dam 2 during 2000. New elevated filter drains are being installed for ash dam 3 during 2002. Filter drains are provided inlunder the ash dam in order to drain water from the ash dam to keep the phreatic surface or internal water table as low as possible, thus improving the stability of the outer slopes of the dam.

The filter drains are therefore a very important part of the ash dam and special attention must be paid to the protection and maintenance of the drains. The main drain must be covered with a layer of coarse ash prior to the deposition of fly ash onto it. This will stop the ingress of fly ash and dust into the drains and will prevent vegetation from growing in the drain material and will protect the drain pipes from excessive vehicle loading.

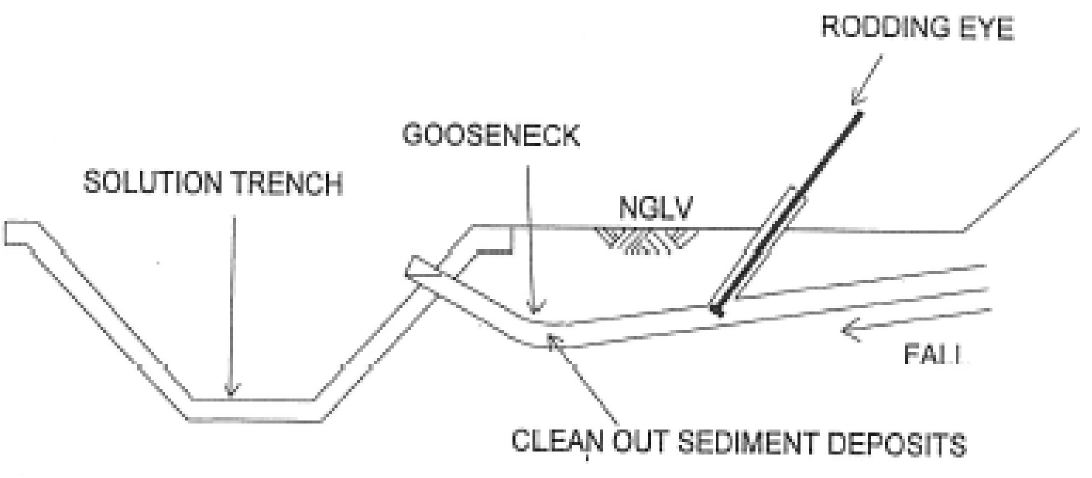


Figure 3.8

No vehicles shall be allowed into the bounds of the ash dam, before the filters are covered by a minimum of 300mm of ash, except for the backactor and the vibratory roller, or when a driver has been informed where he may or may not drive. The wheel load from a truck could break a filter drain pipe causing an early failure of the filter drain.

A water trap or *gooseneck* has been provided in the filter drain outlet pipes to reduce the formation of calcium carbonate in the filter drains and to prevent rodents from making nests in the filter drain pipes thereby causing blocking of the pipes. A rodding eye has been provided upstream of the *gooseneck* to facilitate the cleaning of sediments or other blockages. The rodding shall be carried out once every 3 months, or more often if any drains appear to be blocked. The Contractor measures and records the seepage flow at every drain outlet at three monthly intervals. Trending of this data will provide earlier warning of filter deterioration.

3.2.5 PENSTOCKS

Presently there are three main penstock systems on the Ash Dam 4, and one on Ash Dam *5*. The single penstock inlets on Ash Dam 5 were designed to be used until the ash dam reaches a level at which water will flow into the permanent or main penstock inlets, after which the main penstock will be used. A new penstock has been installed for Ash Dam 2 during 2001. The water from both Ash Dams 4&5 discharges by gravity to AWRDs 6&7 and is then pumped to AWRDs 6 & 7 and then pumped to AWRDs 1,2 & 3 to be stored for re-use in slurrying new ash when necessary. The AWRDs are also used to attenuate excess stormwater during time of high rainfall. (See drawing nos. *0.15/344401* sheets 3 to 5 for details of Ash Dam *5* penstock and drawing nos. 0.15/15720 to 0.15/15721 and *0.15/15727* for details of the Ash Dam 4 penstocks and drawing no. 015/34579 sheet 4 for details of Ash Dam s penstock).

Pre-cast concrete rings of diameter 750mm are used on Ash Dam 4, while 700mm steel penstocks are used on Ash Dam 2 & *5* because of their improved strength. (See drawing no. 0.15/344401 sheet 12 for details). Penstock rings are placed one on top of each other to form the decant tower as the level of the ash rises. They are also used to control the amount of water being drawn off the ash dam.

Before the end of each day additional penstock rings must be placed on the decant tower to prevent water and ash being drawn into the decant tower during the night. In the morning the rings must be removed in order to enable water to be drawn off the ash dam. It must be borne in mind that, unless unavoidable, no water should be drawn off the pool while slurry is being run into the night paddock. After severe storms it might be necessary to draw water off the ash dam while slurrying into the inner paddock but this occurrence should be the exception rather than the rule. The water level over the penstock ring should never be more than 160 mm as this will cause pressure surges in the pipe, which could dislodge the penstock rings. Excess stormwater must be decanted from the ash dam within 4 to 5 days.

The *pool* level may rise between 850mm and *1750mm* during a 1:100 year storm event (see section 2.12). The true value depends on the pool area and the leaching slope close to the penstock. The *Contractor* must keep enough penstock rings in stock to cater for at least 1500mm rise in the pool level. The details for the permanent penstock rings with a wall thickness of 20 mm are shown in figure 3.9. These rings are expensive and the *Contractor* may use a much lighter set of penstock rings to cater for the 1500mm rise in pool level during a major rainstorm. The penstock rings are not free issue items and the *Contractor* remains responsible for purchasing and maintaining adequate stock levels.

The steel penstock rings are fabricated from grade 300W steel and are corrosion protected with Plascon's epoxy tar coating system consisting of one primer coat of Plascon Epoxy Tar EPD 100, one intermediate coat of Plascon Epoxy Tar EPD 112 and one top coat of Plascon Epoxy Tar EPD 100. Each coat of paint is at least 100 microns thick.

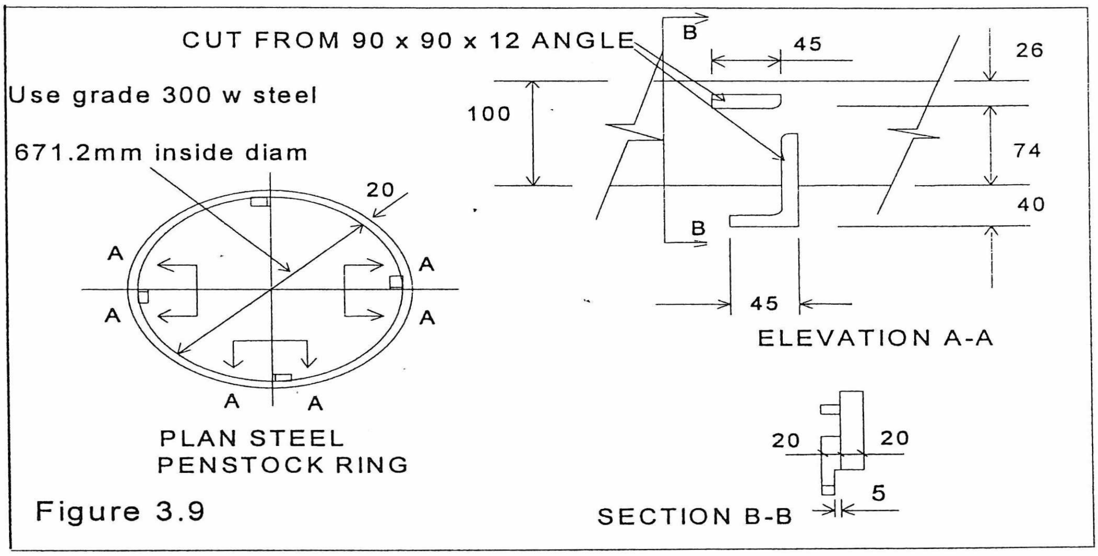


Figure 3.9

The outside of the decant tower is to be double wrapped using a geotextile to prevent piping of the fine ash particles through the joints between successive rings. See figure 3.10. Failure to do this can cause cavity formation, which could lead to a penstock failure.

It is extremely dangerous to place or remove penstock rings without a safety belt. A number of fatalities have occurred specifically in the area of the decant tower at various disposal dams. The safety harness shall be attached to the catwalk column or balustrade, and shall always be worn when working in the vicinity of the penstock inlets. It is therefore imperative to adhere to strict safety measures such as the ones listed below:

These measures are as follows:

•There must always be at **least** two **people** working together when placing or removing penstock rings.

- The **walkway and gantries must be well constructed and maintained** and adequate kick boards and handrails must be provided.

- A substantial working **platform must be constructed** around the penstock intakes to provide the operators with adequate space to store penstock rings as well as adequate working space while lifting and placing rings. Alternatively if a pontoon is used it must be adequate in terms dimensions, stable against overturning under all working conditions and be filled with a durable closed cell foam material which will render it unsinkable.
- The walkway and **working platform elevation must be maintained well above the maximum water level.**
- Safety **harnesses must be supplied** to all staff working in the vicinity of the penstock inlet, walkways and working platforms and thus should always be worn. Where a pontoon is used, life jackets must be worn by all personnel aboard at all times.
- **Placing and lifting penstock rings should be done during daylight hours.** If it is imperative that rings are placed or removed at night there must always be two people working together and sufficient lighting must be provided.

Decommissioning of the penstock must be carried out once it is no longer needed. This involves grouting up the decant tower by lowering a plug down to the bottom of the tower and then pouring a sand cement grout down to fill the tower. If the penstock tower is to remain above the surface of the ash dam after decommissioning, the top of the penstock must be properly sealed, preferably by welding a metal plate or grid over the opening.

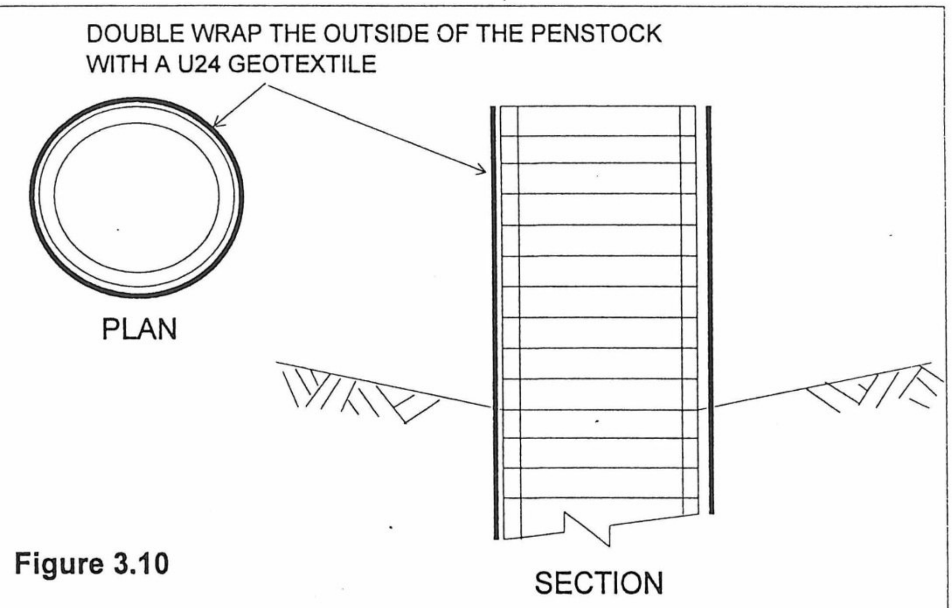


Figure 3.10

3.2.6 STORMWATER MANAGEMENT

Management of stormwater on the ash dams is a critical part of the operation of the ash dam facility. Poor management of water on the ash dam could result in the failure of the impoundment. The volume of stormwater retained on the ash dam must be kept to a minimum at all times. Excess stormwater must be drained from the ash dam within 4 to *5* days.

3.2.7 SOLUTION TRENCH

A seepage water trench has been provided around the ash dams into which the filter drains discharge and the drains on step-ins of the outer wall discharge. Water collected in the western solution trench of Ash Dam 4 joins with the western solution trench of Ash Dam 5 and flows around Ash Dam 1 , 2 & 3 to discharge in AWRD's 4 & 5. Water collected in the southern and eastern solution trench of Ash Dam 4 drains into AWRD's 6 & 7, while the seepage water trench at east of Ash Dam 5 drains into the existing seepage water trench east of Ash Dam 3 which discharges into AWRD 4 & 5. Regular inspections and maintenance will be necessary to insure optimum utilisation the solution trenches.

A regular monthly inspection of the solution trench shall be carried out to determine whether the trench has become choked by sediment or vegetation, or has been seriously eroded. Any damage shall be repaired as soon as possible. Grass and weeds growing through the concrete joints of the concrete lining shall be removed as soon as possible. Any trench crossings shall not encroach into the trench where the flow can be obstructed. Any seepage of water through the soil into the trench shall be noted, recording both the approximate flow rate and the location. The Project Manager must be notified of any such events. Any increase in the wetted area and/or. flow from the toe of the ash darn is to be treated as an early indication that the filter drains are malfunctioning. The *Contractor* shall cut the vegetation between the solution trench and the ash dam toe once a month during the growing season.

3.2.8 ROADS

Roads must be maintained according to the original design and construction specification. This includes cross slopes, road bed and wearing surface material, layer thickness and compaction of the layers. The roads must be kept in a condition acceptable to the Project Manager at all times. Ponding of water on the road surface after a rainstorm shall not be permitted.

3.2.9 WALKWAY TO PENSTOCK

Figures 3.11 and 3.12 show the recommended walkway construction to be used for access to the penstock decant towers. The structure must be able to carry the load from several people carrying penstock rings. It must also be able to support the horizontal forces on hand rails for balustrades as set out in the SABS 0160 loading code. This will ensure adequate support for the safety harnesses worn by personnel when adding or removing penstock rings.

The walkway platform will have to be raised regularly to ensure that the platform is never less than 0,5 m above the pool, preferably never less than 1,Om. In addition the minimum height above the pool shall be such that adequate access will remain possible after a major rain storm.

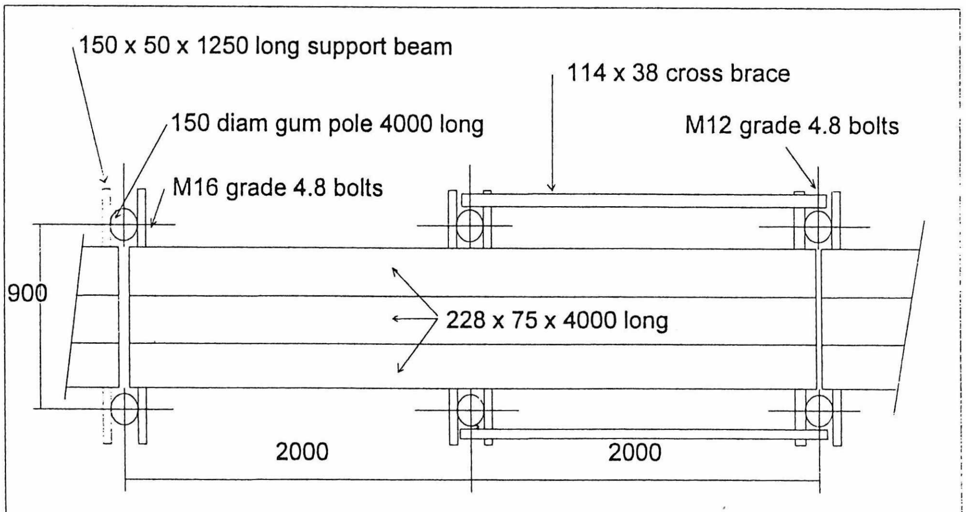


Figure 3.11 PLAN VIEW TYPICAL WALKWAY

Timber used for the walkway is to be kept in good repair at all times. A walkway constructed from structural steel may also be used, but a timber structure is usually far easier to raise and is therefore preferred.

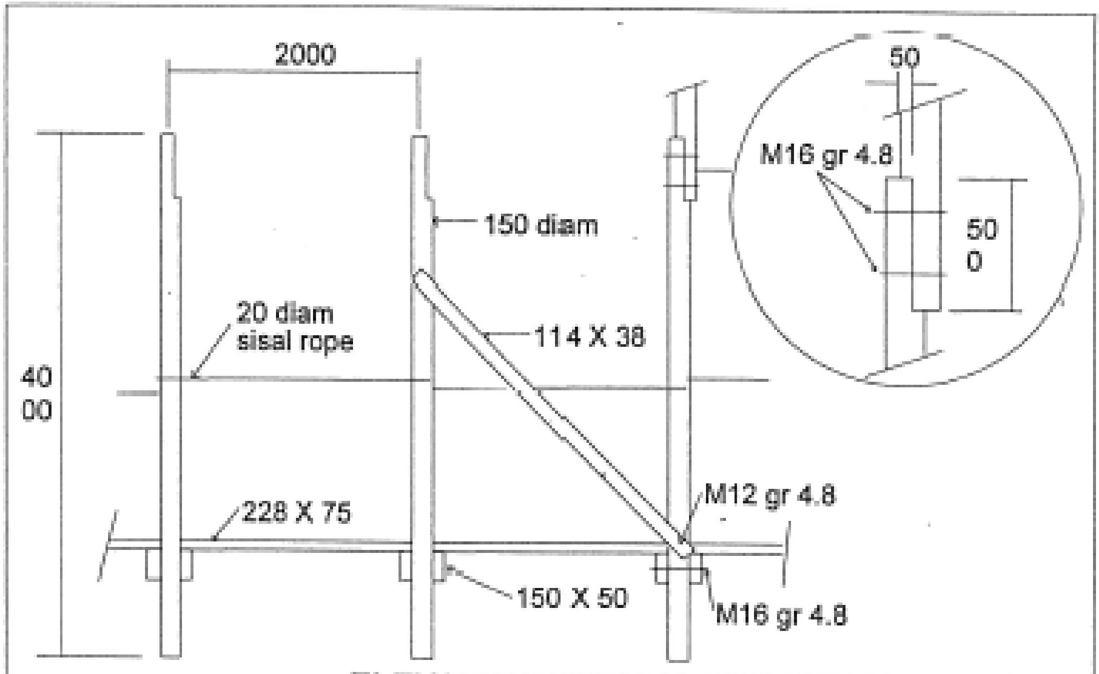


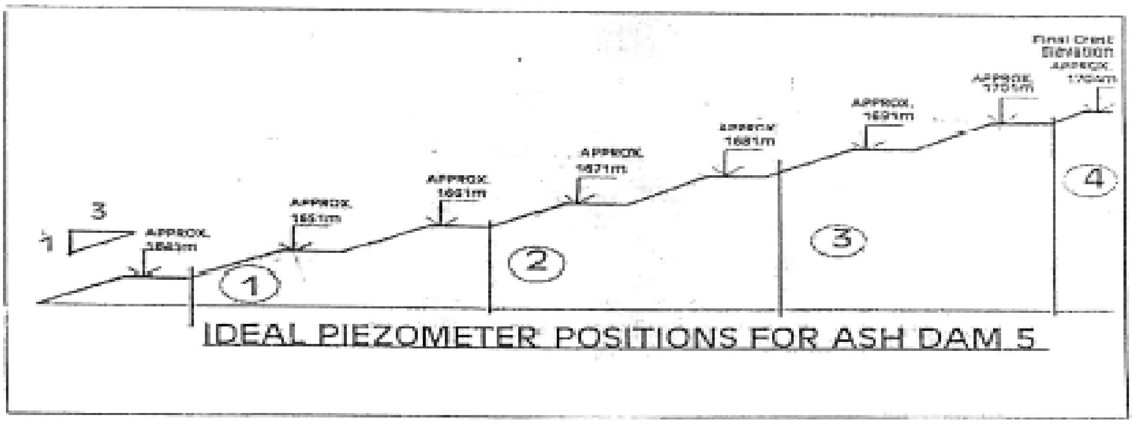
Figure 3.12 ELEVATION TYPICAL WALKWAY

3.2.10 PIEZOMETERS

Piezometers are used to monitor the position of the water table within the wall of the dam. It is perhaps more economical to install the piezometers during the early stages of the ash dam and to extend them as the dam rises, rather than to drill holes and install them at a later stage. The piezometers will also tend to be far more reliable if installed in the early stages of the ash dam.

In 1995 sixteen (16) piezometers were installed in the outer wall of the Ash Dam 4 by Geomechanics a drilling contractor after the original instruments were damaged. Figures 3.13 and 3.14 overleaf show the approximate positions of the piezometers on the wall of Ash Dam 4 and positions piezometers on the Ash Dam 5 wall. Piezometers are usually installed in sets, usually in a straight line on every second terrace of the outer wall of the ash dam. They are required to monitor the level of level of the water table in the outer slopes of the dam. The situation becomes more serious when the phreatic surface reaches the outer surface of the ash dam and water starts seeping out through the wall.

Figure 3.13


3
1
APPROX.
APPROX.
1651m
APPROX.
1661m
APPROX.
1671m
1681m
APPROX.
1691m
APPROX.
Final Crest
Elevation
APPROX.
1
2
3
4
IDEAL PIEZOMETER POSITIONS FOR ASH DAM 5

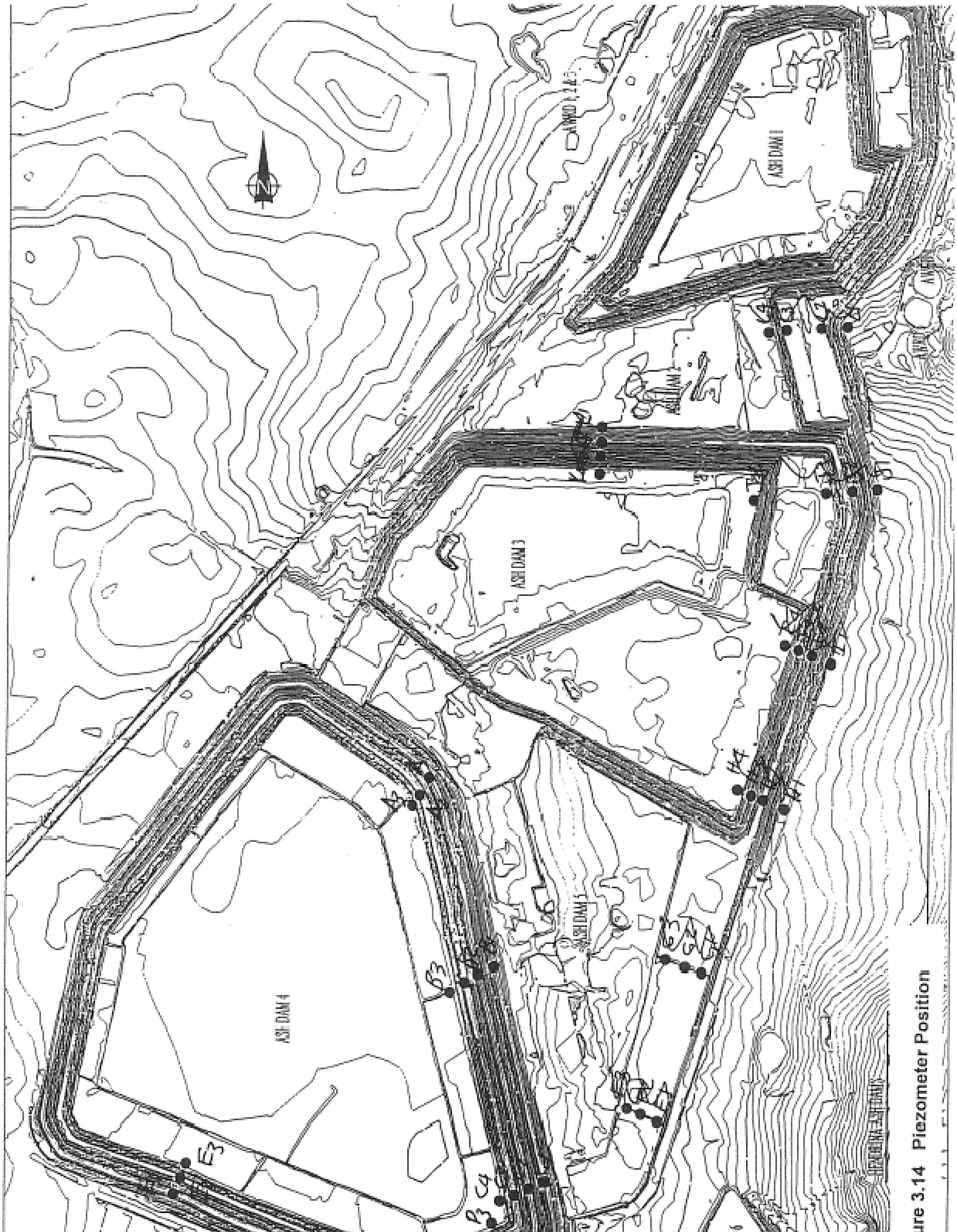


Figure 3.14 Piezometer Position

leave as is

All future piezometer installations are to follow as far as possible the relative positions as shown in the cross section in Figure 3.13 & 3.15. Piezometers shall be read on a monthly basis. However weekly readings shall be taken when the pool is closer than 200m from the crest of the outer daywall.

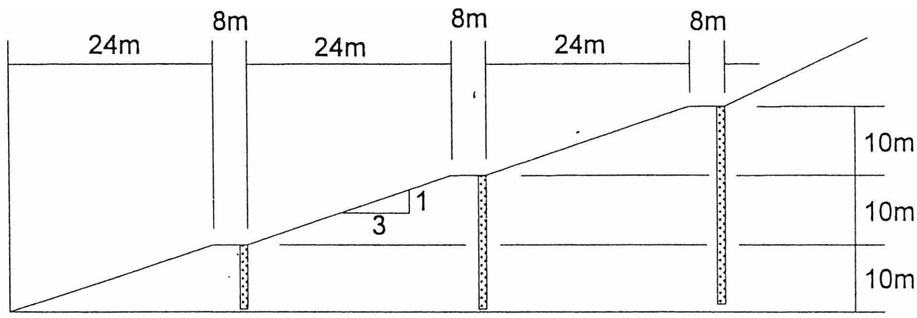


Figure 3.15 PROPOSED FUTURE PIEZOMETER POSITIONS

The Project Manager is to be provided with a set of all piezometer readings. Any increased risk due to a rising phreatic surface, shall be communicated immediately to the Project Manger.

Figure 3.16 shows some typical details for the installation of a piezometer. The 300mm square by 300mm deep concrete block is only to be installed after the wall has reached the final level at this specific position. Galvanised steel pipe sections are also only required for the top 3 metres of the piezometer, the remaining sections may consist of PVC piping provided that suitable couplings, between the two types of material are available. This is to reduce the risk of damaging the piezometer during the normal operation of the dam. Special caution shall also be exercised when topsoil for rehabilitation is placed in the vicinity of a piezometer. The piezometer tip, shown in detail A, can also be a proprietary porous ceramic or plastic tip. The augured hole for the piezometer is to be thoroughly washed with water until the water flowing from the hole is clear prior to installing the piezometer. The following installation procedure is recommended:

- Lower the porous tip into position, about 200mm from the bottom of the hole.
- Pour a sand mixture down the hole until the tip is covered to a depth of 300mm. The sand shall have a D10 of between 0.1mm and 0.7mm.
- Seal off the sand layer using bentonite balls using a ring punner.
- Seal the remainder of the hole by pouring course ash grout down the hole.

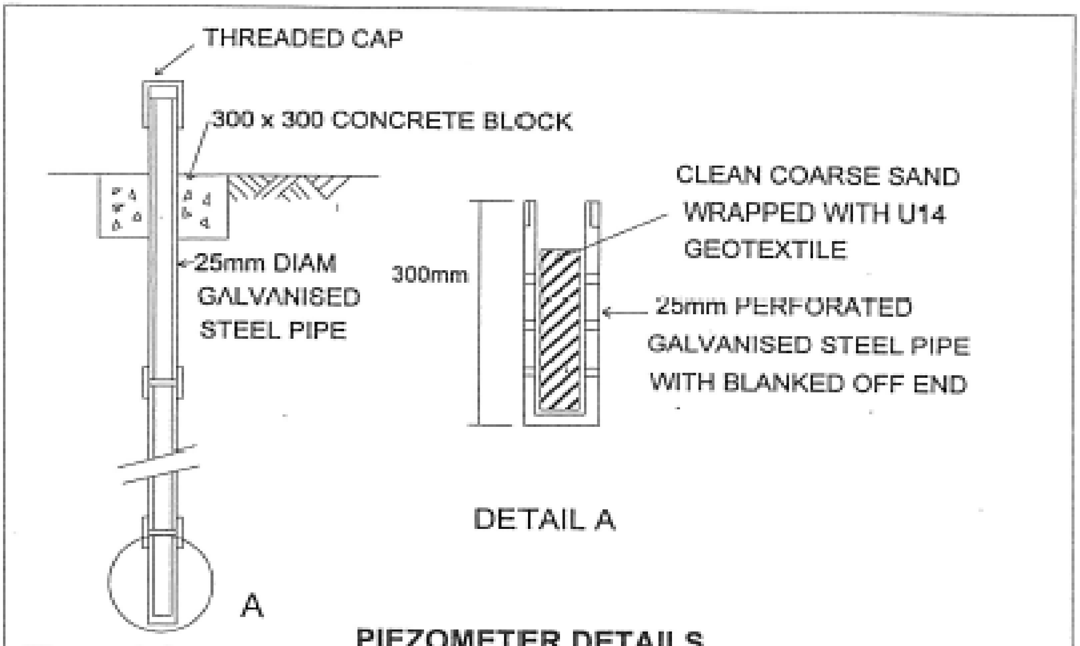


Figure 3.16 PIEZOMETER DETAILS

3.2.11 RAINFALL

Measurement of rainfall at the ash dam is essential as there often appears to be local differences in rainfall between the power station terrace and ash dam area. The Contractor shall record all the rain falling on this area. The Project Manager must agree to the position(s) for the rain gauges. Rainfall figures will help in the correlation of the changes in level of the water table in the ash dam area and in the rise in the pool level. This will assist in confirming the run-off factor of 0.95 currently being used for the ash dam.

3.2.12 ASH DAM OFFICE

The Contractor shall maintain the facility to the satisfaction of the Project Manager

3.3 EMERGENCY PROCEDURE

The following situations are to be treated as emergency situations and the Contractor must deal with these in accordance with the relevant sections of the O&M Manual.

3.3.1 INADEQUATE FREEBOARD

The Contractor immediately informs the Project Manager and the Responsible Professional Engineer when the level difference between the lowest point on the daywall and the decant pool level is less than 1.5 m. The inadequate freeboard could be caused by a storm, malfunctioning penstocks, blocked drains or pipes, etc. The root of the problem must be established and corrected in order for any remedial measures to be effective.

3.3.2 INADEQUATE DISTANCE BETWEEN THE EDGE OF THE POOL AND THE DAM WALL.

The Contractor immediately informs the Project Manager and the Responsible Professional Engineer when the pool moves closer than 200 m from the edge of the dam crest. The position of the pool can be controlled using the ash delivery points and the discharge of ash slurry from the daywall into the night paddock selectively ashing more in the areas where the pool is found to encroach until the pool return to the desired position.

3.3.3 INADEQUATE STORAGE CAPACITY IN THE AWR-DAM

The Contractor immediately informs the Project Manager and the Responsible Professional Engineer when the water level in the ash water return dam exceeds 1534 m.a.m.s.l. The required actions are described in section 4.2.1.

3.3.4 POLLUTED WATER SPILLAGE

The Contractor immediately informs the Project Manager and the Environmentalist on the station of any incident where polluted water from the ashing facility spilled into the environment.

3.3.5 PENSTOCK FAILURE

The Contractor immediately informs the Project Manager when a penstock fails. Ash Dam 4 has three penstocks and it provides a short term alternative ashing area with its own penstocks in the event of a malfunction of the penstock on Ash Dam 5, allowing the installation of a new low-cost penstock on top of Ash Dam 5. Conversely, the penstock on Ash Dam 5 has been sized to discharge the supernatant water from both Ash Dam 5 & 5 in the event that all penstocks of Ash Dam 4 become unusable.

3.3.6 SLOPE FAILURE

The Contractor immediately informs the Project Manager and the Responsible Professional Engineer when a slope failure occurs on the dam.