WASTE MANAGEMENT TRANSFER STATION

KATOOMBA

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Blue Mountains City Council

Background

Waste Management is a major issue for most Local Government, particularly in urban areas where suitable areas for landfill are extremely scarce. Blue Mountains City Council has put a high priority in recent years into Waste Management and Recycling.

Up to the early 1990's the Mountains had 4 Waste Fill areas. Two sites (Blackheath and Lawson) were closed in the 80s and 90's and have been undergoing substantial remediation works during the last several years. Katoomba and Blaxland Waste Fill areas have continued operating. In the last 10 years Council has developed Blaxland to be the major land fill site for the region.

Katoomba has been operating as an open land fill site until this year. As it was reaching its planned capacity, and an extension of the fill area would have met sustained opposition from the community and environmental groups, it was decided to close the land fill operations and transfer all waste to Blaxland. To facilitate this and maintain cost-effective services, a Waste Transfer Station was to be constructed on the site. Waste would be delivered to the site; be sorted into recyclables and waste; and the waste would be compacted and baled and transported by truck to the Blaxland Waste land fill.

Concept Plans and some detailed design was undertaken by external consultants (GHD). These plans were used to submit the Development Approval with Council.

Subsequent to DA Approval it was decided that the Design and Survey Section of the Council would:

- *Refine the existing civil concept designs where it was identified that improvements for proposed works, or cost savings, could be identified, eg retaining walls, internal roads and produce final construction drawings*
- *Undertake new civil design works as required eg the car park areas, wash down bay and access road from Woodlands Road; and produce final construction drawings*
- *Assist GHD in their structural design of buildings and the major retaining wall in the Waste Drop-off Area by providing updated data, both survey and civil design amendments*
- *Install further survey control on site suitable for construction and carry out the site surveys for further design work and construction were to be carried*
- *Undertake all construction set-out works and construction checks, ending with a full work-as-executed plan of the site*
- *Undertake all cadastral survey work required. This included boundary set-outs in areas for construction and service connections and the Plan of Survey for the Substation installed on site.*

Initial earthworks and Clearing

The allowable construction footprint was clearly defined in the DA approval, and was the subject of community discussion, particularly by environmentally-focused groups. We marked out the defined development area and negotiated an extra 20 metre buffer and working area for woodchip stockpiles. This was necessary to avoid double handling of these stockpiles during construction. All vegetation removed on site for the development was chipped and stockpiled for final landscaping purposes.

Most of the topsoiI removed for construction was contaminated by previous landfill works and was deposited in the existing landfill. Clean topsoil was stockpiled in the buffer zone for re-use in final landscaping of the site.

Detail Survey and Site Control

The survey model of the site was obtained from Thiess, the previous landfill contractor. This was checked for currency of data and some extra detail survey was undertaken and merged into the survey model.

Initial survey control was of a low density as it was required only for normal landfill operations and reporting of volumes. This survey control was checked by survey as some of the marks were subject to movement as landfill settled over time.

This control was then used as a framework to set-out new control across the site in both strategic areas for use throughout the construction period (control marks to be protected) and close to areas of major construction for short term use (control marks were dispensable).

Detail Design

The concept designs had been completed by GHD and had obtained DA Approval. There was a substantial list of conditions set by Council through the DA Approval which needed to be incorporated in the final designs. BMCC undertook final construction design in civil areas (Roads, drainage, sediment and retardation basin, pathways, wash-down bay and major car park).

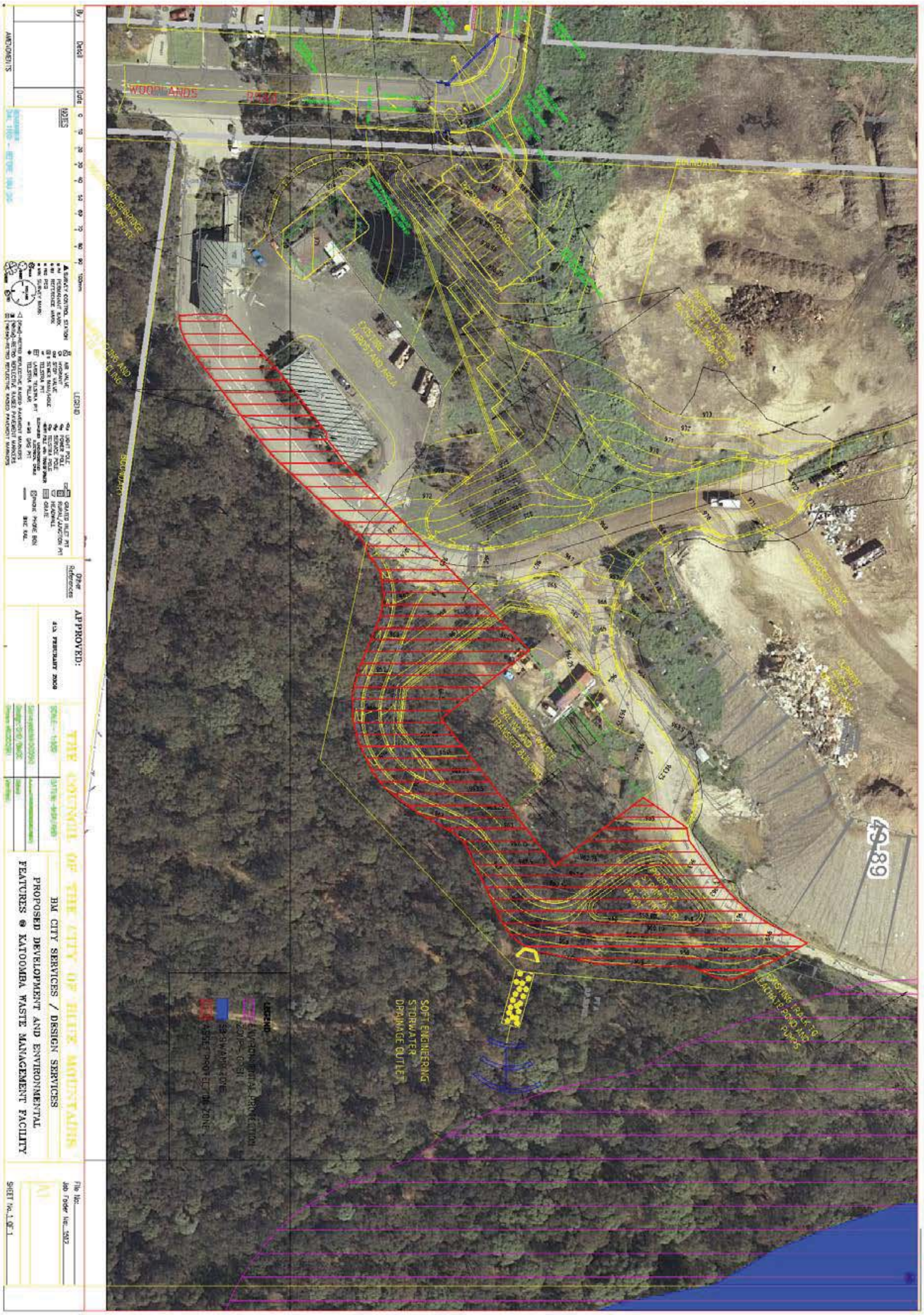
Internal Roads – final designs of the internal roads were amended a couple of times to take into account changes in other construction areas, particularly in the refinement of final levels.

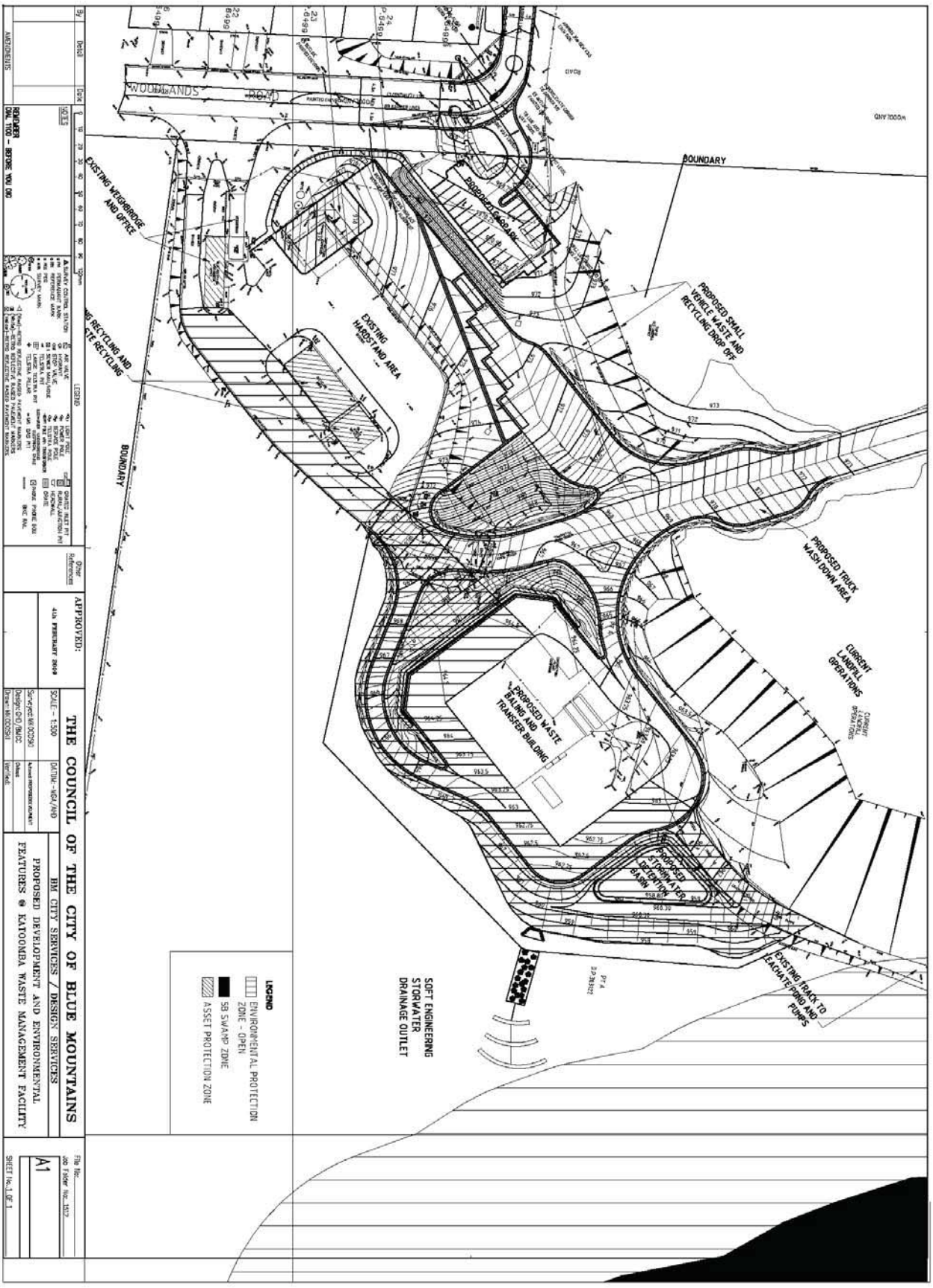
External Roads – the intersection of Woodlands Road and access to the car park were re-designed for safe and functional access to the site.

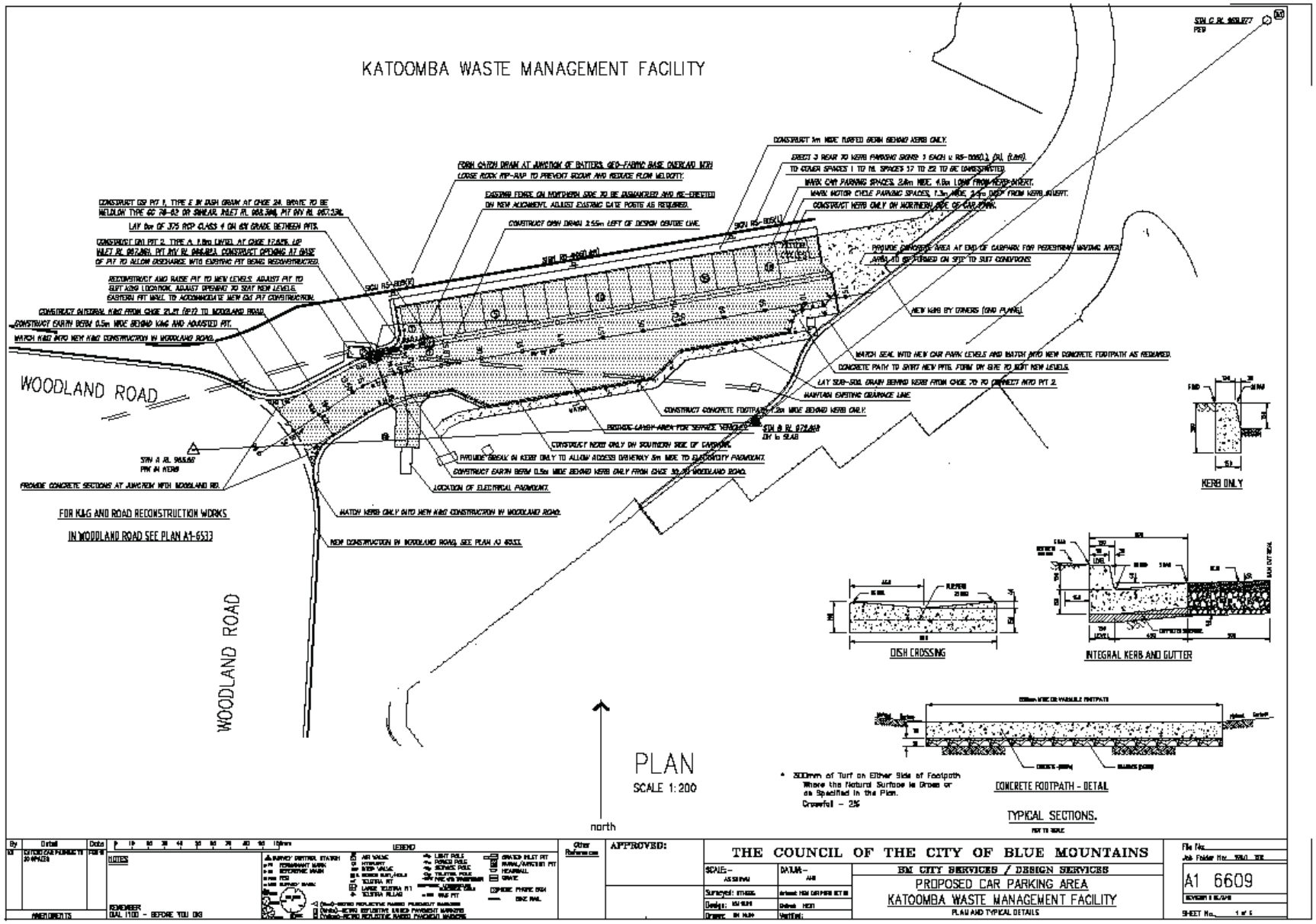
Drainage – all water off the site was accepted to be of a non-pristine nature and would carry high levels of sediment. As such, all storm water on this part of the site was directed through Interceptor Pits, a retardation and sedimentation basin and then through further filtration before release in the natural bush. The site, however, was considered to be separate to the existing land fill area with its contaminated leachates etc. The drainage and filtration ponds for this area continue to be maintained independently.

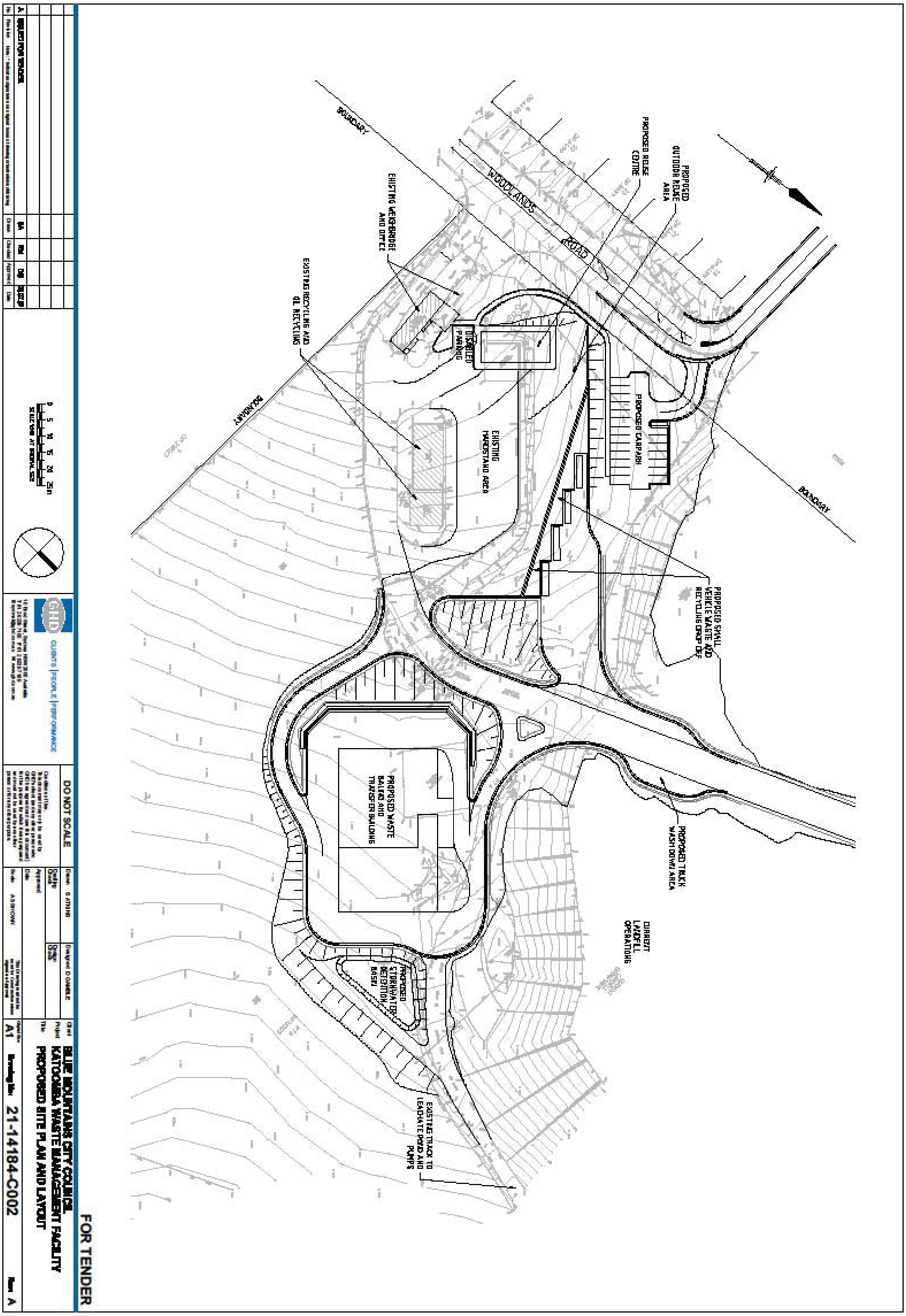
Sediment and Retardation Basin – was designed along rural dam-style configuration with a clay-impregnated fabric core in the wall. The dam was one of the first structures to be constructed and was a key element in control of sediment during the construction phase.

Car Park – was designed (and redesigned) four times as construction progressed as the available area varied with changing constraints, levels and gradients as construction proceeded – the car park needed to fit between the existing landfill (and its impervious membranes which needed to remain intact and maintain a specific depth of cover), and the new Waste Drop-off Area, as well as comply with accepted gradients and depth of cover over existing and new services and other infrastructure already installed. Being the last structure designed and built, everything else constructed on site impacted on the car park.


THE COUNCIL OF THE CITY OF BLUE MOUNTAINS
BM CITY SERVICES / DESIGN SERVICES
PROPOSED DEVELOPMENT AND ENVIRONMENTAL
FEATURES @ KATOOMBA WASTE MANAGEMENT FACILITY
APPROVED:
WOODLANDS ROAD
SOFT ENGINEERING STORMWATER DRAINAGE OUTLET
LEGEND
AMENDMENTS


BOUNDARY
PROPOSED SMALL VEHICLE WASTE AND RECYCLING DROP OFF
EXISTING HARDSTAND AREA
EXISTING WEIGHBRIDGE AND OFFICE
PROPOSED TRUCK WASH DOWN AREA
CURRENT LANDFILL OPERATIONS
PROPOSED WASTE BALING AND TRANSFER BUILDING
PROPOSED STORMWATER DETENTION BASIN
EXISTING TRACK TO LEACHATE POND AND PUMPS
SOFT ENGINEERING STORMWATER DRAINAGE OUTLET
LEGEND
ENVIRONMENTAL PROTECTION ZONE - OPEN
SB SWAMP ZONE
ASSET PROTECTION ZONE
THE COUNCIL OF THE CITY OF BLUE MOUNTAINS
BM CITY SERVICES / DESIGN SERVICES
PROPOSED DEVELOPMENT AND ENVIRONMENTAL FEATURES @ KATOOMBA WASTE MANAGEMENT FACILITY
APPROVED:
SCALE - 1:500
DATUM - MGA/AHD
A1


KATOOMBA WASTE MANAGEMENT FACILITY
WOODLAND ROAD
WOODLAND ROAD
FOR K&G AND ROAD RECONSTRUCTION WORKS
IN WOODLAND ROAD SEE PLAN A1-6533
NEW CONSTRUCTION IN WOODLAND ROAD, SEE PLAN A1 6533.
LOCATION OF ELECTRICAL PADMOUNT.
CONSTRUCT EARTH BERM 0.5m WIDE BEHIND KERB ONLY FROM CHGE 30.00 WOODLAND ROAD.
CONSTRUCT KERB ONLY ON SOUTHERN SIDE OF CARPARK.
CONSTRUCT CONCRETE FOOTPATH 1.2m WIDE BEHIND KERB ONLY.
MAINTAIN EXISTING DRAINAGE LINE.
CONCRETE PATH TO SUIT NEW PITS. FORM DRY SIDE TO SUIT NEW LEVELS.
MATCH SEAL INTO NEW CAR PARK LEVELS AND MATCH INTO NEW CONCRETE FOOTPATH AS REQUIRED.
NEW KERB BY OWNERS (END PLANS)
PROVIDE CONCRETE AREA AT END OF CARPARK FOR PEDESTRIAN WAITING AREA
AREA TO BE REVISED ON SITE TO SUIT CONDITIONS
CONSTRUCT KERB ONLY ON NORTHERN SIDE OF CAR PARK.
MARK MOTOR CYCLE PARKING SPACES, 1.3m WIDE, 2.5m DEEP FROM KERB ALIGNT.
MARK CAR PARKING SPACES, 2.6m WIDE, 4.8m LONG FROM KERB ALIGNT.
ERECT 3 REAR TO KERB PARKING SIGNS 3 EACH @ RS-0060.1 CAL (1.8m)
TO OTHER SPACES 1 TO 16, SPACES 17 TO 22 TO BE UNRESTRICTED
FORM CATCH DRAIN AT JUNCTION OF BATTERS, GEO-FABRIC BASE OVERLAID WITH LOOSE ROCK RIP-RAP TO PREVENT SCOUR AND REDUCE FLOW VELOCITY.
CONSTRUCT 1m WIDE TURFED DRAIN BEHIND KERB ONLY.
EXISTING FENCE ON NORTHERN SIDE TO BE DISMANTLED AND RE-ERECTED ON NEW ALIGNMENT. ADJUST EXISTING GATE POSTS AS REQUIRED.
CONSTRUCT DRAIN 2.55m LEFT OF DESIGN CENTRE LINE.
LAY 6m OF 375 RCP CLASS 4 ON 4% GRADE BETWEEN PITS.
RECONSTRUCT AND RAISE PIT TO NEW LEVELS. ADJUST PIT TO SUIT KERB LOCATION. ADJUST DRAINAGE TO SUIT NEW LEVELS. EASTERN PIT WALL TO ACCOMMODATE NEW OUT PIT CONSTRUCTION.
CONSTRUCT INTEGRAL KERB FROM CHGE 21.47 (PIT) TO WOODLAND ROAD.
CONSTRUCT EARTH BERM 0.5m WIDE BEHIND KERB AND ADJUSTED PIT.
MATCH KERB INTO NEW KERB CONSTRUCTION IN WOODLAND ROAD.
PROVIDE CONCRETE SECTIONS AT JUNCTION WITH WOODLAND RD.
PROVIDE GAP IN KERB ONLY TO ALLOW ACCESS DRIVEWAY 5m WIDE TO ELECTRICITY PADMOUNT.
PROVIDE CARSH AREA FOR SERVICE VEHICLES
PLAN
SCALE 1:200
north
KERB ONLY
DISH CROSSING
INTEGRAL KERB AND GUTTER
CONCRETE FOOTPATH - DETAIL
TYPICAL SECTIONS.
* 500mm of Turf on Either Side of Footpath Where the Natural Surface is Grass or as Specified in the Plan.
Crossfall – 2%
APPROVED:
THE COUNCIL OF THE CITY OF BLUE MOUNTAINS
BM CITY SERVICES / DESIGN SERVICES
PROPOSED CAR PARKING AREA
KATOOMBA WASTE MANAGEMENT FACILITY
PLAN AND TYPICAL DETAILS
A1 6609
NOTES
REMEMBER
DIAL 1100 – BEFORE YOU DIG
LEGEND
AMENDMENTS


FOR TENDER
DO NOT SCALE
BLUE MOUNTAINS CITY COUNCIL
KATOOMBA WASTE MANAGEMENT FACILITY
PROPOSED SITE PLAN AND LAYOUT
21-14184-C002
CLIENTS | PEOPLE | PERFORMANCE
PROPOSED OUTDOOR REUSE AREA
PROPOSED REUSE CENTRE
WOODLANDS ROAD
BOUNDARY
EXISTING WEIGHBRIDGE AND OFFICE
EXISTING RECYCLING AND OIL RECYCLING
PROPOSED CARPARK
EXISTING HARDSTAND AREA
PROPOSED SMALL VEHICLE WASTE AND RECYCLING DROP OFF
PROPOSED WASTE BALING AND TRANSFER BUILDING
PROPOSED TRUCK WASH DOWN AREA
CURRENT LANDFILL OPERATIONS
PROPOSED STORMWATER RETENTION BASIN
EXISTING TRACK TO LEACHATE POND AND PUMPS

Wash Down Bay – was relocated twice during construction to fit with changing onsite conditions. Its original location was moved for a more preferable location but then struck problems with the location of existing land fill and the protective membranes which had not been mapped correctly.

Services – Location of new Services were aligned originally to existing service and known site conditions. However some services and drainage had to be relocated due to the uncertain boundary of the existing land fill. In addition, subsoil drainage was upgraded as groundwater was infiltrating into the service trenches, particularly the underground power and telecom.

Retaining Walls – the concept design showed a substantial retaining wall between the Upper and Lower levels of the site and allied to the waste drop-off Area – this was up to 7 metre high. Due to redesigned levels of other site areas (primarily the access road to the drop-off area and the car park), this retaining wall was eliminated and a natural slope to a 1 metre high rock wall was attained. This had a huge improvement on the budget (approximately $500,000 saving) and streetscape, with the wall replaced by a landscaped and tree planted bank. A further $200,000 was saved in another location near the Baling and Waste Transfer building through replacing the engineered solution of retaining walls with soft landscaping features of a rock wall with landscaped banks behind. In the end, all retaining walls originally proposed were drastically reduced or eliminated, by varying the levels of the adjoining areas or by changing the footprint of the adjoining area to enable a soft-landscaping design.

Set-out survey

Set-out surveys were carried out as required throughout construction and took up a considerable period of time throughout the project. More complex set-outs included:

Retaining Walls – Most of retaining walls were fairly straight forward and only involved set-out marks on the footings. However, the concrete retaining wall at the Waste Drop-off Area (which was up to 3 metres high) presented particular difficulty, as the wall was to be built with the holding-down bolts for large steel shelters to be connected to the steel reinforcing in the wall and concreted insitu. These steel frames were pre-made and the tolerance for the holding-down bolts was minimal. The initial set-outs for the wall formwork were undertaken and the bolts then had to be set-out in space up to 3m high above the footing. The set-outs were done by placing 4 offset nails in the formwork cladding for the wall so that the centre of each of the set of 4 holding-down bolts could be established in space by direct stringing between marks. Templates for the set of holding-down bolts were then made and this was set-over the centre mark and fixed in place. Checks were made while the concrete was being poured to ensure that there was no movement on the bolts.

Baling and Waste Transfer Building – This was the major building constructed in the project and was designed around a 5 metre grid system to which all building design dimensions were related. These grids were marked on site and regularly checked for stability and accuracy. Most building set-outs were undertaken from the grid marks excepting, in particular, the holding-down bolts for the major structural columns. These were also poured insitu in the footings (again a quoted minimal tolerance) and were done in a similar fashion to the retaining wall using offset marks and templates. These were also accurately leveled so the column base plates were all set to the correct design level when placed over the bolts by crane. All the columns were placed by BBC method.

A particular problem was noted in the pouring of the major concrete slabs in the buildings and in the erection of the major steel beams. Construction happened to occur in winter and zero temperatures presented challenges with the pouring of the major concrete slabs and with the contraction of the major structural beams – it was bit cooler than where the beams were constructed in Sydney. The steel contractors managed it all in their stride.

The set-out for the major equipment which crushed the garbage and baled it into blocks, also needed great care. It had to be set-out precisely (again) to ensure that it fitted snugly over the holding bolts and was welded to preset steel plates in the concrete slab foundations.

Precast Panels – The exterior of the building was clad in precast panels. Because of the size of the panels, the expense of casting them off-site and trucking up the highway was prohibitive. These were poured on-site in moulds which were set out by survey and continually checked to ensure that the panels were being constructed to specification.

Re-Use Building – This was to house recycled goods where residents could browse unwanted goods and take home. Unfortunately some of the dimensions were vague or not defined and design changes, such as for prefabricated stairs would not fit the available space. We were then involved in design reviews of the buildings and dealing with architects to make some of

the elements of the building fit. Funnily enough once these stairs were sorted out and the retaining structural wall was built to the new dimensions, the stairs were then dropped in a subsequent on-site design change.

Roads, Wash Down bays and Drainage – Roads, was-down bays and drainage structures were set-out in the normal manner and constructed with little difficulty.

Problems with Building

Late in construction, or after completion and occupation, some major construction issues became apparent.

Northern Roofline – a major sag became visually apparent and needed to be analysed and repaired. Check surveys were undertaken to determine the nature of the problem – a roof beam was deforming, translating this deformation through to the external roof and guttering. The contractor eventually accepted liability and fixed the problem.

Western Awning – this awning also sagged after construction through inadequate bracing. This was also resurveyed to determine the size of the deformation, and the contractor accepted liability for this as well.

Disabled Ramp – access to the external ramp to the training room and offices in the building did not comply with the standards for disabled access. This needed some re-engineering including removal of part of the existing slab and re laying to different levels.

Work as Ex Survey

Two works-as-Ex Plans were prepared:

- A plan for the civil works on site such as roads, kerbs, car park, pathways, drainage and drainage ponds
- A plan for the buildings in major internal dimensions, compliance with standards, such as disabled access and all Services on-site.

During construction, the location and depths of all service trenches were surveyed as they were dug. After completion all surface works were surveyed. All data was merged into one model and the WAX drawings produced.

Cadastral Works

The site is a series of old Crown Portions and the base Title Surveys are old Crown Plans. Survey marks in this area were strictly limited. All plans in the area were either quite old, or compiled (before the guidelines were made and enforced).

Site boundaries along Road – As part of construction and location of services, the road boundaries were pegged. This was mainly fixed through adoption of marks a considerable distance up Woodlands Road, adoption of old posts and occupations across the road, and then checking for sufficient dimensions to properties along the access road to the west.

Plan of Survey for Sub Station – The development required the installation of a new Padmount Substation. This requires a Plan of Survey for the creation of the necessary easements to the guidelines required by the Electrical Authority. The Plan of Survey is underway. Even though the Easement for the substation is only 20 m^2 and the area of the site is 15ha and the Plan will involve a large area of residue by deduction, survey will be quite extensive due to the paucity of existing survey marks in the location.

Conclusion

This was a major project for Council which had many different facets for us. We were integrally involved in all survey works and civil design.

The project was successfully completed and the site is fully operational.

The only outstanding works is the Plan of Survey for the Padmount Substation.