

**PROPOSED MODIFICATION TO THE NORTHERN EXTENSION
LANDFILL AT EASTERN CREEK WASTE & RECYCLING CENTRE**

WSN ENVIRONMENTAL SOLUTIONS

JULY 2010

**ENVIRONMENTAL ASSESSMENT
SUBMISSIONS REPORT**



**Proposed Modification to the
Northern Extension Landfill At
Eastern Creek Waste & Recycling Centre**

**WSN Environmental Solutions
Environmental Assessment – Submissions Report**

July 2010

Prepared for WSN Environmental Solutions

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ABBREVIATIONS

ADC	Alternative Daily cover
AWT	Alternative Waste Technology
CAC	Community Advisory Committee
CPW	Cumberland Plain Woodland
DA	Development Application
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DoP	Department of Planning
DWE	Department of Water and Energy
EA	Environmental Assessment
EEC	Endangered Ecological Community
<i>EP&A Act</i>	<i>Environmental Planning & Assessment Act</i>
EP&A Regulation	Environmental Planning & Assessment Regulation
<i>EPBC Act</i>	<i>Environment Protection and Biodiversity Conservation Act</i>
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
GREC	Global Renewables Eastern Creek Pty Ltd
GRL	Global Renewables Limited
GTAs	General Terms of Approval
LEMP	Landfill Environmental Management Plan
LRP	Landscape Rehabilitation Plan
LTP	Leachate Treatment Plant
m	Metres
MBT	Mechanical Biological Treatment
Mt	Million tonnes
NOW	NSW Office of Water (part of DECCW)
SEPP	State Environmental Planning Policy
SOP	Standard Operating Procedure

tpa	Tonnes per Annum
TR	Technical Report
<i>TSC Act</i>	<i>Threatened Species Conservation Act</i>
UR-3R	Urban Resource – Reduction, Recovery & Recycling
WRC	Waste & Recycling Centre
WSN	WSN Environmental Solutions
WSPT	Western Sydney Parklands Trust

1. INTRODUCTION AND BACKGROUND

1.1 THE PROPOSAL

The Waste Recycling and Processing Corporation trading as WSN Environmental Solutions (WSN) has prepared an Environmental Assessment (EA) for a proposed modification to the Eastern Creek Stage 2 Northern Extension Landfill at the Eastern Creek Waste & Recycling Centre (WRC).

The site of the Northern Extension Landfill is located on Eastern Creek Stage 2 within the WRC and is situated to the east of Eastern Creek. The land is described as Lot 11 within DP 1058722. It is owned by the Department of Planning and is leased to WSN for a period of 20 years commencing 5 June 2002. The site is comprised of areas on which landfilling has been completed (Cells 1, 2 and 3 also known as the Southern Cell or Southern Extension) and areas of current landfilling (Cells 4, 6 and 7) known as the Northern Extension. Infrastructure associated with landfilling is located on the site, including a leachate treatment plant, power generation plant, stormwater dams, a leachate storage dam, workshop and access roadways.

In summary, the proposed modification includes:

1. Increasing the landfill capacity of Cells 4, 6 and 7 (ie the Northern Extension) from 2.9 Million tonnes to approximately 3.5 Million tonnes;
2. Excavation of the area between Cells 4 and 6 (to be called Cell 5) and landfilling with approximately 1 Million tonnes of waste. This would set the total Northern Extension tonnage at 4.5 Million tonnes;
3. Prior to any work being undertaken on Cell 5, a drainage channel is to be constructed to divert runoff from the existing drainage line which runs from a culvert under Ferrers Road through the area to Eastern Creek;
4. Increasing the approved waste disposal rate:
 - (a) From 500,000 tonnes to a maximum of 550,000 tonnes per annum from 1 July 2010 to 30 June 2011; and
 - (b) From 350,000 tonnes to a maximum of 550,000 tonnes per annum, from 1 July 2011 to 30 June 2014; and
5. Extending the cessation date for acceptance of putrescible waste at the site from 30 June 2014, to 30 June 2017 and disposing of a maximum of 550,000 tpa during this time.

The proposed modification, through an increase of 1.6 Million tonnes, would increase the landfill capacity of Eastern Creek Stage 2 to approximately 7.5 Million tonnes. This figure represents 4.5 Million tonnes in the Northern Extension and approximately 3 Million tonnes in the Southern Extension.

1.2 EXHIBITION OF THE ENVIRONMENTAL ASSESSMENT

An EA for the Proposal was prepared in accordance with Part 3A of the *Environmental Planning and Assessment (EP&A) Act 1979*. The EA was placed on public exhibition by the Department of Planning (DoP) for the period Thursday 3 June 2010 until Monday 21 June 2010. Copies of the EA were available at:

- Department of Planning (Head Office);

- Nature Conservation Council of NSW; and
- Blacktown City Council.

A copy of the EA was also made available on the DoP website. The DoP provided WSN with copies of the six submissions received during the exhibition period.

1.3 STATUTORY CONTEXT

Development consent for the Northern Extension Landfill was granted by the Minister for Infrastructure and Planning on 3 June 2005 under Part 4 of the *EP&A Act*.

The Department of Planning advised that on 15 January 2010, approval was given for the 2005 Development Consent (DA 271-6-2003-i) for the Northern Extension to the Eastern Creek WRC to be treated as a Part 3A approval for the purposes of modification under Section 75 of the *EP&A Act*.

When considering a project to which Part 3A of the *EP&A Act* applies, after the exhibition of an EA, Section 75H(5) of the *EP&A Act* requires that copies of submissions received as a result of the exhibition of the EA be provided by the Director-General to the Proponent. Section 75H(6) of the Act identifies that the Director-General may require the proponent to submit to the Director-General:

- (a) a response to the issues raised in those submissions;
- (b) a preferred project report that outlines any proposed changes to the project to minimise its environmental impact; and
- (c) any revised statement of commitments.

This Submissions Report including a revised Statement of Commitments will be submitted to the Director-General of the DoP, thereby fulfilling the WSN's requirements under Section 75(H) (6) of the *EP&A Act*. There are no proposed changes to the project consequently no Preferred Project Report has been required.

The Minister, after receipt of an Assessment Report from the Director-General, will subsequently give or refuse to give approval for the carrying out of the project under Section 75J of the *EP&A Act*.

1.4 STRUCTURE OF THE SUBMISSIONS REPORT

This document has been prepared at the request of the Director-General of the DoP dated 7 July 2010, pursuant to Section 75H(6) of the *EP&A Act* following the exhibition of the EA for the proposed modification. It includes identification of, and WSN's response to, issues raised in public submissions (refer Section 2), commentary in relation to recent changes to the revised SEPP Infrastructure 2007, a revised Statement of Commitments (refer Section 4) and comments on proposed General Terms of Approval (GTAs) (refer Section 5).

2. CONSIDERATION OF SUBMISSIONS

2.1 RESPONDENTS

Six submissions were received during public exhibition of the EA. Each submission was reviewed individually and the issues raised were identified. Table 2.1 identifies the respondents to the EA and identifies the sections within this report or the EA where the respondent's issues are addressed. Submissions were received from:

- Western Sydney Parklands Trust;
- Sydney Dragway;
- RTA;
- Blacktown City Council;
- Department of Environment, Climate Change and Water (DECCW); and
- NSW Office of Water (part of DECCW).

**Table 2.1
Summary of Submissions**

Respondent	Issues Raised	Response
Western Sydney Parklands Trust	Vegetation Management <ul style="list-style-type: none"> • Supportive of approach • Method used for vegetation offsets may be a direct vegetation offset agreement or Biobanking Scheme 	<ul style="list-style-type: none"> • Noted.
	Landscape Plan and Interface of Development with Ferrers Road and Parklands <ul style="list-style-type: none"> • Proposed landscape planting on Ferrers Road should be completed as a priority and managed to maintain a visual standard and appropriate interface for visitors passing through the Parklands 	<ul style="list-style-type: none"> • Refer Revised Statement of Commitments (Section 4.5)
	Future Site Management <ul style="list-style-type: none"> • A management plan for post landfill completion should be prepared in consultation with the WSPT to ensure appropriate future use as parklands space 	<ul style="list-style-type: none"> • Refer Revised Statement of Commitments (Section 4.5)
Sydney Dragway	Not in opposition to proposed expansion	<ul style="list-style-type: none"> • Noted
	Liaison with Site Management <ul style="list-style-type: none"> • A senior Environmental Manager should be nominated to liaise on a regular basis with the Dragway to ensure appropriate measures are in place to mitigate impacts of odour, dust and litter on the Dragway 	<ul style="list-style-type: none"> • Refer Revised Statement of Commitments (Section 4.2)
	Vegetation Offsets <ul style="list-style-type: none"> • Propose that consideration be given to using land on the south west of the dragway adjacent to the water pipeline 	<ul style="list-style-type: none"> • Refer Revised Statement of Commitments (Section 4.4)
RTA	No issues raised	No response required
Blacktown City Council	Stormwater Management <ul style="list-style-type: none"> • Design of the proposed diversion channel should be reviewed to consider maintenance of low flow replenishment of the creek system • Approval should be sought from DECCW in relation to the creek diversion and proposed outlet structure to Eastern Creek • Creek diversion and detention basin should be modelled to ensure there is adequate capacity to convey 1 in 100 year flood flow 	<ul style="list-style-type: none"> • Refer Section 2.2 and Appendix A • Noted • Section 6.2.3 and TR5 of the EA includes modelling which confirms that there is adequate capacity

Respondent	Issues Raised	Response
	Environmental Health and Management <ul style="list-style-type: none"> Noise mitigation strategy needs to be in place Odour impacts need to be considered Thorough investigation required to ensure no contamination impacts by surface water and leachate 	<ul style="list-style-type: none"> Refer Sections 6.2, 6.3, 6.6 6.7, 7.2, 7.3 and 8 of EA and Revised Statement of Commitments (refer Section 4.2)
	Maintenance of Landscaping <ul style="list-style-type: none"> Improved landscaping and associated maintenance is required on the screening mounds along Ferrers Road; and Additional screening is required along Ferrers Road opposite Cell 5 	<ul style="list-style-type: none"> Refer Revised Statement of Commitments (Section 4.5)
	Previous Comments <ul style="list-style-type: none"> Drainage and Flooding – Assessment required of hydrological and ecological impact due to relocation of drainage line Engineering Assessment – Dam Safety Report required 	<ul style="list-style-type: none"> Technical Report No 6 – Addendum 2, Section 6.2.3 and Section 6.4 of EA. Refer Section 4.2 and Section 8 of EA and Section 4.2 of Revised Statement of Commitments
Department of Environment, Climate Change and Water	Limit Conditions <ul style="list-style-type: none"> Amended EPL Conditions nominated in relation to Pollution of Waters, Noise, and Operating Conditions 	<ul style="list-style-type: none"> Noted and agreed
	Monitoring <ul style="list-style-type: none"> Discharge points for landfill gas, groundwater, surface waters and dust will be varied as appropriate 	<ul style="list-style-type: none"> Noted and agreed
	LEMP <ul style="list-style-type: none"> Prior to commencement of construction of the Cell an updated LEMP must be submitted 	<ul style="list-style-type: none"> Refer Statement of Commitments(Section 4.2)
	Construction Requirements <ul style="list-style-type: none"> Requirements specified in relation to Design of Cell 5, Construction Quality Assurance and commencement of disposal of waste into the new Cell 	<ul style="list-style-type: none"> Noted and agreed
	EPL and LEMP <ul style="list-style-type: none"> Variation must be sought prior to commencement of activities 	<ul style="list-style-type: none"> Noted and agreed
	Biodiversity and Aboriginal Heritage <ul style="list-style-type: none"> Magnitude of proposed vegetation offset is satisfactory A number of legal mechanisms are acceptable for providing the offset The nature and extent of the offset is to be assessed using the Biobanking Assessment Method Offset Requirements specified including draft GTA 	<ul style="list-style-type: none"> Noted Noted Noted Refer Statement of Commitments (Section 4.4) and Section 5

Respondent	Issues Raised	Response
NSW Office of Water	Drainage Channel Diversion <ul style="list-style-type: none"> • Low flow pipes should only be a temporary measure • Final design should mimic a natural watercourse and hence not comprise a low flow pipe/high flow channel 	<ul style="list-style-type: none"> • Refer Section 2.2 and Appendix A
	Riparian land along the tributary of Eastern Creek <ul style="list-style-type: none"> • DoP needs to determine whether an environmental corridor connection to CPW east of Ferrers Road is necessary • If necessary, then recommends a 50m riparian corridor is provided either side of the creek and the proposed detention basin is vegetated with local riparian vegetation and functions as a creek with low flows • If not necessary, then recommends the riparian width can be reduced, consistent with current DA condition 4.6 	<ul style="list-style-type: none"> • Refer Section 2.2 and Appendix A
	Riparian land along Eastern Creek <ul style="list-style-type: none"> • Recommends a 50m riparian zone apply, with any proposed works or structures located outside the corridor 	<ul style="list-style-type: none"> • Refer Section 4.5.2 of EA
	Groundwater <ul style="list-style-type: none"> • If proposal is likely to intercept groundwater, then need to discuss with NOW whether a licence under the Water Act 1912 is required 	<ul style="list-style-type: none"> • Noted
	Draft Statement of Commitments regarding Groundwater <ul style="list-style-type: none"> • Groundwater Monitoring results should be provided to NOW of an annual basis • If, in response to the monitoring results, management measures are required these should be agreed with NOW • A licence for any new groundwater monitoring installations should be obtained from NOW prior to commencement of any drilling 	<ul style="list-style-type: none"> • Refer Revised Statement of Commitments (Section 4.2)
	<ul style="list-style-type: none"> • GTAs identified 	<ul style="list-style-type: none"> • Refer Section 5

2.2 RESPONSES TO ISSUES RAISED

In summary the key aspects raised in submissions relate to:

- Landfill operations;
- Diversion of the drainage channel;
- Proposed vegetation offsets; and
- Site landscaping and rehabilitation.

2.2.1 Landfill Operations

WSN operates in accordance with its existing Environment Protection Licence (EPL No 5272) which includes the requirement for a Landfill Environmental Management Plan (LEMP). The existing LEMP will be updated to take account of the proposed modification if approval is obtained. DECCW has identified the need to vary the EPL if consent is obtained for the proposed modification. Specific requirements have been identified in relation to Limit Conditions associated with pollution of waters, noise and operation conditions. In addition construction requirements have also been identified.

With respect to landfill operations the need was identified to enhance management of impacts associated with noise, odour and litter. In particular the Sydney Dragway requested that a specific Operations Manager be nominated for direct consultation with the Dragway which is located to the east of the site. This requirement has been included in the Statement of Commitments (refer Section 4).

NOW has also requested that groundwater monitoring results are reported to NOW on an annual basis and that WSN implement appropriate management measures consistent with the monitoring program. Once more detailed project information on any likely groundwater interceptions is available NOW will determine the need or otherwise for a water licence. These requirements have been included in the Statement of Commitments (refer Table 4.2, Section 4).

2.2.2 Diversion of Drainage Channel

Blacktown City Council and NOW have both expressed the view of the need to maintain a low flow along the surface of the proposed diverted drainage channel. In addition the need to maintain the low flow pipes at the end of the life of the landfill has also been queried. AECOM has prepared a report to address these issues and is included as Appendix A to this report.

With respect to the design of the proposed diversion channel there are a number of existing site constraints including:

- Partly completed Cell 4 to the north of the proposed diversion channel;
- Completed Southern Cell to the south of the proposed diversion channel;
- Transmission tower located within the Integral Energy Transmission Easement between Cell 4 and the Southern Cell;
- Ferrers Road located adjacent to the eastern boundary of Eastern Creek Stage 2; and
- Grades between the proposed detention basin to the proposed discharge point at Eastern Creek meaning that the site is generally flat.

These constraints are discussed in more detail in Appendix A.

The current concept design has 2 x 900 mm diameter pipes conveying the 20 year ARI peak design flow and the diversion channel conveying any excess flow up to the 100 year ARI event including freeboard.

If both pipes were to be removed from the system the entire 100 year ARI event would need to be contained within the diversion channel. Appendix A provides details of the changes to the design that would result with a more engineered/less ecologically sustainable type, such as concrete, to achieve the channel capacity. Appendix A also considers the option of removing one only pipe with a similar outcome predicted in terms of a more engineered outcome.

Consideration has also been given to the potential to use both the channel and pipes for low flow as well as at times of high flow (refer Appendix A). If this option was to be considered as part of the final design it is likely that a pumping arrangement would be required to maintain the flow to the channel from the detention basin. WSN considers that there would be ongoing maintenance and security issues which would deem this option unviable.

As outlined in the EA, once rehabilitation of the final landform has been completed and the landfill mounds are stable the drainage channel will be rehabilitated in accordance with the final agreed design, developed at the time in consultation with the relevant government authorities and the land owner. The design of the channel included within the EA has been in recognition of the long term future use of the site as part of the Western Sydney Parklands.

2.2.3 Proposed Vegetation Offsets

The WSPT and DECCW are supportive of the approach proposed by WSN in relation to vegetation offsets. DECCW has provided a draft GTA and WSN is in general agreement with it, however it would like the timeframe for securing the agreement extended to 9 months, not 6 (see Section 5). The Sydney Dragway has nominated an area on the southern section of the dragway site as an offset area. This area is considered less preferable to the WSPT option.

2.2.4 Site Landscaping and Rehabilitation

The WSPT and Blacktown City Council both highlighted the need to improve the standard of landscaping on the buffer mounds adjacent to Ferrers Road. WSN has committed to additional works adjacent to Ferrers Road as part of the modification (refer Section 4.5).

NOW has requested that consideration be given to a 50m riparian buffer adjacent to Eastern Creek and along the diverted drainage channel. The current consent requires a 40m buffer along Eastern Creek and the facility is designed and operated accordingly, with some infrastructure located between the 40m and 50m marks (eg workshop, main leachate dam, etc). As explained in Section 2.2.2 and Appendix A, a 50m buffer is not achievable along the proposed drainage line due to existing spatial constraints.

3. REVISED SEPP (INFRASTRUCTURE) 2007

3.1 BACKGROUND

The Department of Planning has advised of revisions to the Infrastructure 2007 State Environmental Planning Policy (SEPP) in relation to mandatory considerations for determining applications for landfill facilities under Part 3A and Part 4 of the *EP&A Act*.

On 7 July 2010 criteria in clause 123 of the SEPP were amended. These criteria must be considered by consent authorities when assessing and determining applications for landfill facilities. The previous criteria included an examination of justifiable demand. In accordance with the Director General's Requirements the previous criteria were addressed in Section 3.5 of the EA.

The new criteria shift the emphasis to increased waste recovery and other improved environmental outcomes. The DoP Planning Circular PS10-016 of 12 July 2010 stipulates that the new criteria apply to all applications under assessment and therefore must be considered before any determination is made. The criteria consequently apply to the proposed modification.

This section of the Submissions Report addresses these criteria as they apply to the modification. The new criteria are:

- (a) Whether there is a suitable level of recovery of waste, such as by using alternative treatment or the composting of food and garden waste, so that the amount of that waste is minimised before it is placed in the landfill;
- (b) Whether the development:
 - i Adopts best practice landfill design and operation; and
 - ii Reduces the long term impacts of the disposal of waste, such as greenhouse gas emissions or the offsite impact of odours, by maximising landfill gas capture and energy recovery; and
- (c) If the proposal relates to a new or expanded landfill:
 - i Whether the land on which the development is located is degraded land such as a disused mine site; and
 - ii Whether the development is located so as to avoid land use conflicts, including whether it is consistent with any regional planning strategies or locational principles included in the publication *EIS Guideline : Landfilling* (Department of Planning, 1996) as is in force from time to time; and
- (d) Whether transport links to the landfill are optimised to reduce the environmental and social impacts associated with transporting waste to the landfill.

3.2 CRITERION A

- (a) *Whether there is a suitable level of recovery of waste, such as by using alternative treatment or the composting of food and garden waste, so that the amount of that waste is minimised before it is placed in the landfill;*

The information required by this criterion is presented in Section 3.3 of the EA. This section of the Submissions Report presents an updated summary of that EA section and addresses specifically the waste streams received at the Eastern Creek WRC.

3.2.1 Overview of WSN Operations

WSN is a provider of waste, recycling and resource recovery services. Based in New South Wales, it manages approximately 70 per cent of Sydney's household waste and recyclables.

Its operations include:

- Australia's largest network of 12 recycling and processing facilities, including two advanced waste treatment facilities that process household waste;
- The biggest producer of landfill gas to energy in Australia (generating enough baseload power for 40,000 households);
- Processing 400,000 tonnes of recyclables into commodity streams and 150,000 tonnes of compost per year;
- Four modern landfills; and
- Waste collection and management for local government as well as for business.

In accordance with the targets identified in WARRS 2007, WSN is committed to providing environmentally sound and sustainable waste management solutions that improve resource recovery and reduce quantities of waste being disposed to landfill. This is achieved by:

- Implementing household collection services that utilise a three bin, source separation system;
- Using various Alternative Waste Technology (AWT) processes; and
- Separating and recovering various materials via materials recovery facilities.

WSN is a leader in facilitating the change away from traditional waste disposal to sustainable resource recovery solutions. This is in line with the aims and objectives set down by the NSW Waste Avoidance and Resource Recovery Strategy 2007, including the 66% resource recovery target for municipal waste.

WSN recovers over 500,000 tonnes of resources each year and generates enough renewable energy to power 40,000 homes, through its network of transfer stations, highly engineered landfills, Material Recycling Facilities (MRFs), garden organics processing activities and AWTs that process MSW.

While continuing to be a landfill operator, landfilling of MSW now accounts for less than 50% of WSN's profits.

The demand for AWT processing from local councils within the Sydney region has gained momentum in the last two years in support of State Waste targets. Executing the AWT strategy for waste processing is a critical piece of WSN's future.

WSN pioneered the shift from landfilling MSW to resource recovery by offering customers access to Sydney's first AWT facility at Eastern Creek in September 2004. This facility currently processes approximately 10% of Sydney's waste.

Since then, WSN has stepped up resource recovery operations with the establishment of the Macarthur Resource Recovery Park. This is Australia's largest fully integrated waste processing site. It includes an ArrowBio AWT facility designed to process 90,000 tonnes of MSW and divert approximately 70% of this waste from landfill.

It is widely accepted that the most appropriate waste processing methodology for MSW and biowaste is Mechanical Biological Treatment (MBT). WSN's intention is to deliver more such facilities across the network to continue the transition to sustainable waste management for local councils as well as the commercial sector. WSN has recently obtained consent for a new AWT at Lucas Heights.

WSN also operates the Greenstep program, providing integrated waste management solutions for businesses to help the commercial sector meet high waste diversion targets by integrating collection and disposal via the WSN network of resource recovery facilities.

While WSN's AWT approach is a key component of its resource recovery strategy, these facilities are complemented by other essential waste processing activities that aid in achieving State Waste Targets.

In excess of 20% of material received across the network is diverted from landfill each year, due to resource recovery activities undertaken by WSN. This is equivalent to over 500,000 cubic metres of landfill space.

WSN operates MRFs at Chullora, Macarthur Resource Recovery Park (Narellan) and Moruya. Over 130,000 tonnes of material from the council kerbside collections of 450,000 households are processed annually by these facilities, with baled product sold to downstream recyclers for manufacture into new products.

To aid in glass recovery, WSN has established Recycled Glass Solutions, a glass fines processing plant, located at WSN's Chullora site. This is a joint venture between WSN and Australian Glass Technologies. The facility produces good quality screened material suitable for redirecting to appropriate markets including sandblasting, manufacture of building materials and water filtration applications from glass fines that would otherwise have been disposed in landfill.

WSN receives and processes over 250,000 tonnes of garden organics annually, from 615,000 kerbside collections as well as drop offs from householders and small businesses. The materials are used either as biofuel to produce green energy or processed into compost and mulch product for agricultural and horticultural markets.

At Macarthur Resource Recovery Park, WSN operates Sydney's first in vessel composting facility for the processing of garden organics. WSN's strategy is to develop additional enclosed composting capacity for garden and food organics processing, assisting those Councils considering optional food collection services.

WSN's transfer station network and landfill infrastructure is a key component of its resource recovery and resource conservation activities. The transfer station network provides an effective solution for inner city waste management, which significantly reduces vehicle movements while also providing waste streaming and resource recovery solutions.

New infrastructure has been built at these facilities to process dry waste separately from mixed waste to aid the recovery of resources, particularly metals, clean timber and cardboard. Over 40,000 tonnes of material is diverted from landfill each year.

WSN also supports the State Waste Strategy objective of reducing litter and illegal dumping, through the provision of resident drop off facilities at all sites. As well as receiving mixed wastes and recycling material, the collection of potentially hazardous wastes; gas cylinders, sump oil, vehicle batteries and paint is provided and where possible, recycled.

WSN works to maximise recycling and resource recovery but anything that cannot be recovered or recycled is disposed of responsibly and safely at one of four landfills in the Sydney region.

WSN's landfills are carefully designed to minimise the amount of space used, maximise the lifetime of the landfill and limit environmental and social impacts. Innovation includes using biocovers, such as at the Jacks Gully landfill site, where digestate from the adjacent AWT facility is utilised as final cover. Alternative Daily Cover produced by the UR-3R facility is applied at the Eastern Creek Landfill. Biogas produced at landfills is collected and used to generate renewable energy which is exported to the NSW Energy Grid.

Across the network, WSN has installed capacity of 43.43 Megawatts, equivalent to the energy use of over 40,000 homes. 95% of this capacity is from landfills. Through its green electricity production from landfills, WSN avoided 290 kt CO_{2-e} of greenhouse gas emissions during the last year, a 44% improvement on the previous year. Gas capture for energy production significantly offsets the impact of fugitive landfill gases.

The proposed modification to the Eastern Creek Northern Extension landfill is an integral component of WSN's strategy to deliver sustainable resource recovery solutions.

While disposal is at the bottom of the waste hierarchy, as MSW processing is rolled out in Sydney, landfills have taken on two roles:

- The disposal of residual material following any resource recovery activities; and
- Acting as an interim solution until such time that sufficient processing capacity is available to divert MSW from landfill.

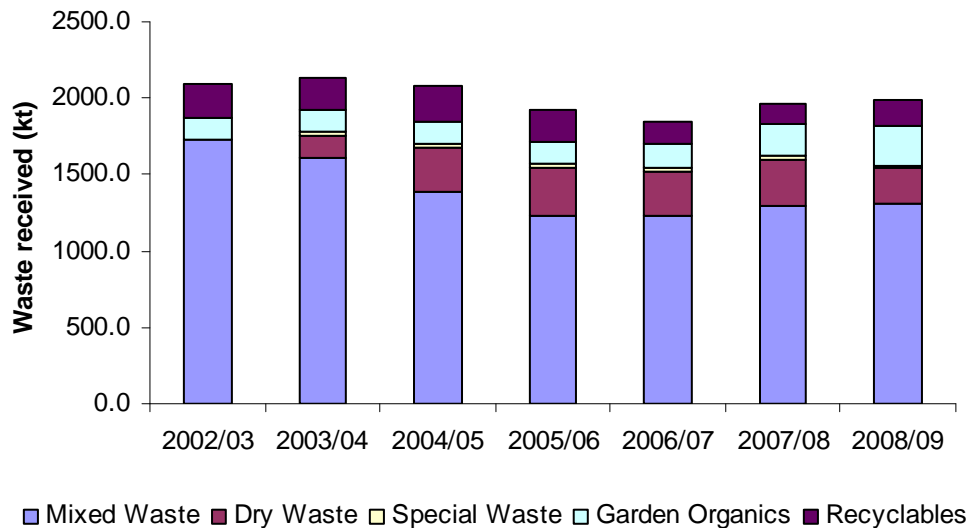
No processing system for MSW or any other feedstock can achieve a 100% landfill diversion performance. MRFs and garden organics processing facilities have a residual waste stream, as do AWTs. This waste all requires appropriate landfill disposal.

WSN is committed to an AWT delivery strategy but it will take many years before there are a sufficient number of processing alternatives available to the entire Sydney metropolitan area, covering both municipal and commercial sectors. A challenge relating to the establishment of more AWTs in Sydney is for more Councils and technology service providers to enter into long term contracts that see guaranteed tonnes provided for processing. The AWTs in turn need to be able to deliver the targeted rates of recovery and be economically sustainable. Consequently landfills will be essential for the disposal of Sydney's waste for many years to come. WSN's Eastern Creek landfill extension will be engineered to best practice standards and have the ability to capture gas for energy production. There will be many and varied resource recovery and beneficial reuse initiatives undertaken upstream of landfilling. These include:

- Household source separation of dry recyclables and garden/food organics for kerbside collection; and
- C&I waste recycling and recovery programs undertaken by both large and small businesses.

The following information is drawn from WSN Annual Report for 2008/09. The bar charts show the trend in wastes received and recovered and the landfill space consumed over the period 2002-09. Specific information is provided in Graphs 1 to 8 with a summary under each graph describing changes between 2007/08 and 2008/09.

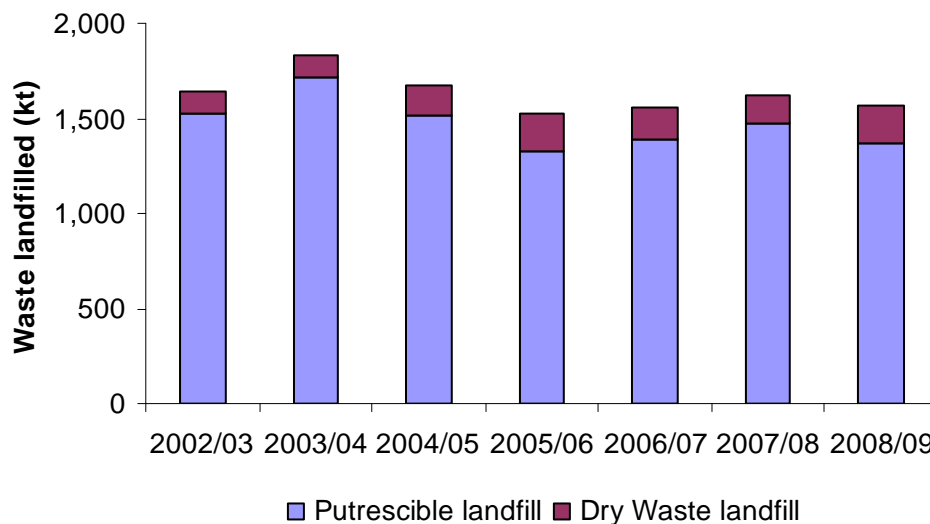
Graph 1 - Total waste received by WSN by waste type (tonnes)



Results Summary

- Total solid waste and recyclables received in 08/09 – 1,990,248 tonnes;
- 1.1% increase in total volume compared to the previous year;
- 28.4% growth in greenwaste receipts;
- 0.3% growth in mixed waste;
- 25.3% growth in recyclables receipts; and
- 19.9% reduction in dry waste receipts.

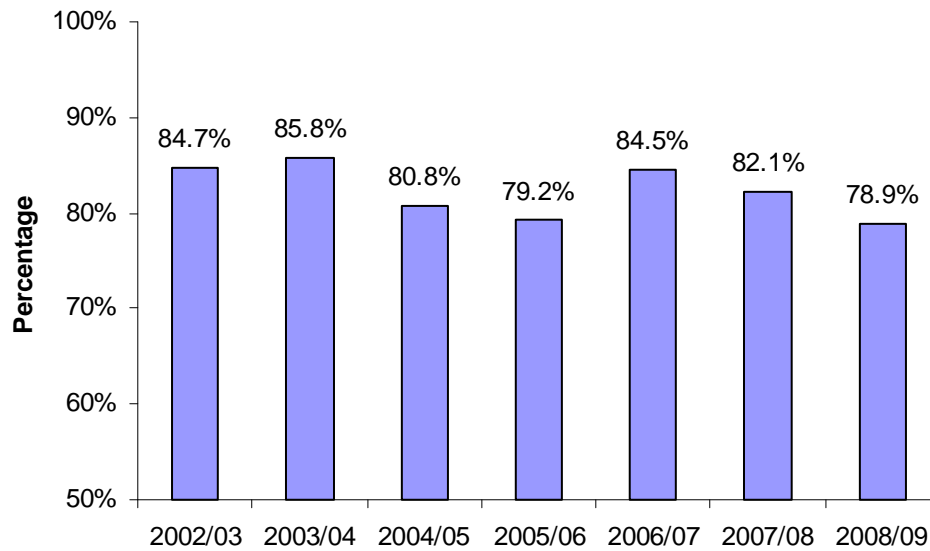
Graph 2 - Total waste landfilled by WSN by landfill type (tonnes)



Results Summary

- Total solid waste disposed to landfill in 08/09 was 1,571,013 tonnes;
- 2.8% decrease in total volume compared to the previous year;
- 7.4% decrease in volume to putrescible landfill compared to the previous year; and
- 45.6% increase in volume to dry waste landfill compared to the previous year.

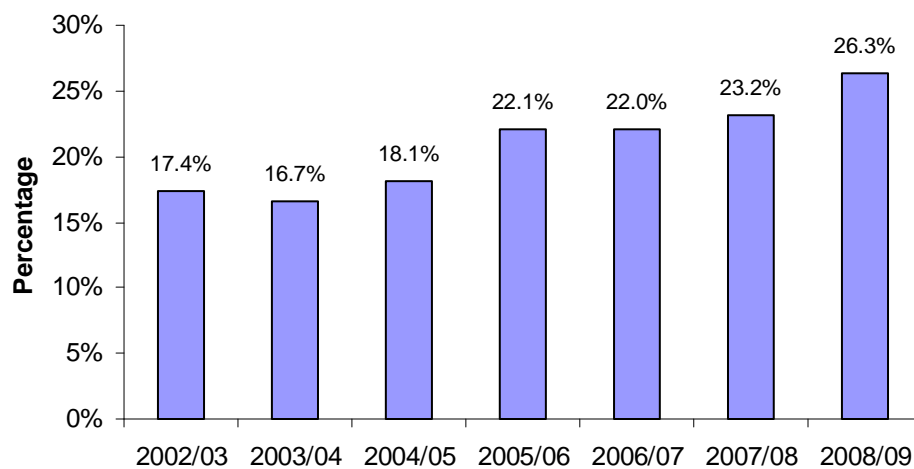
Graph 3 - Total waste received by WSN disposed to landfill (%)



Results Summary

- 78.9% of all waste received in 08/09 was disposed of to landfill compared with 82.1% in the previous year.

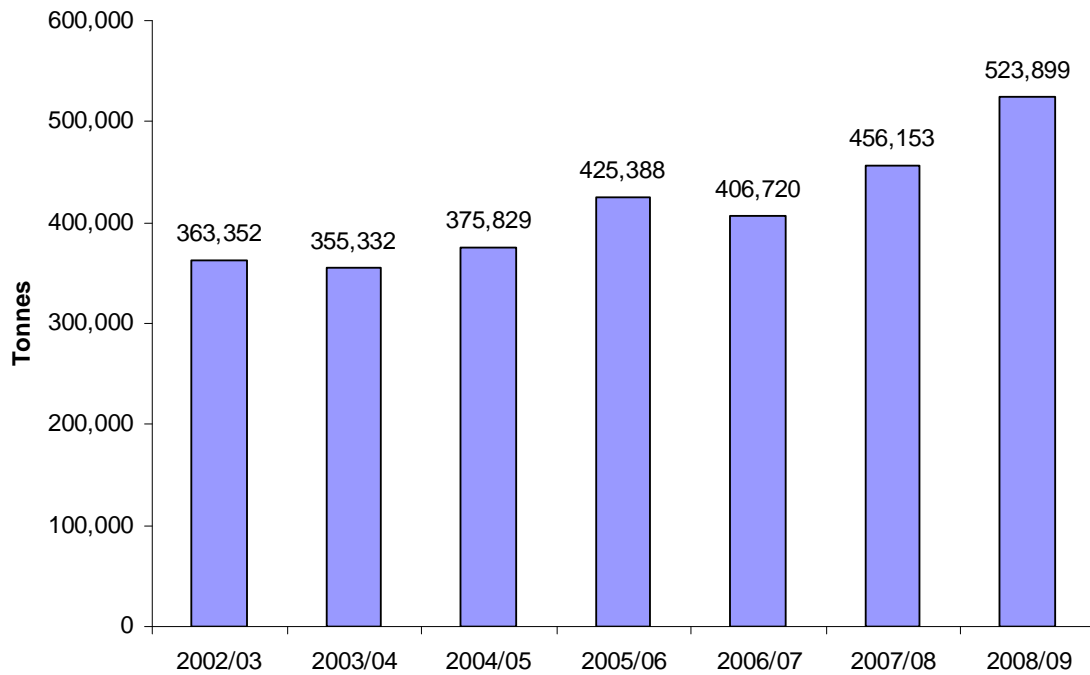
Graph 4 - Total waste received by WSN – recycled, reused, recovered (%)



Results Summary

- A 13.6% increase in resource recovery in 08/09 compared to the previous year; and
- Increase resulting primarily from a 20% increase in recovered greenwaste and a 25% increase in captured methane.

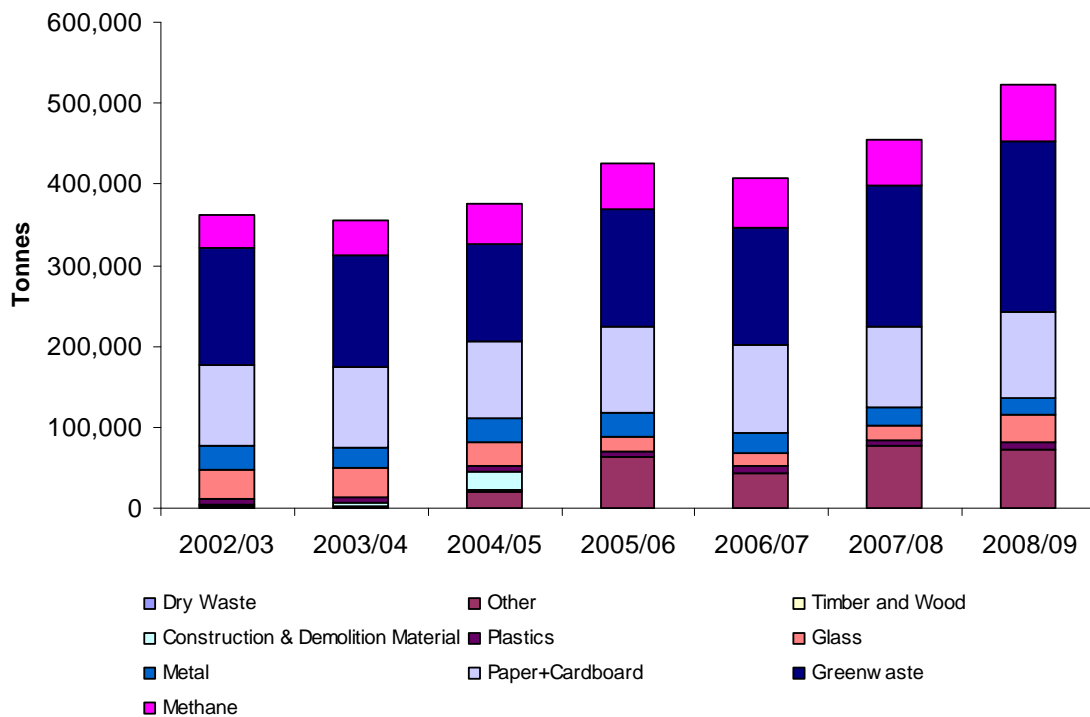
Graph 5 – Resources recovered by WSN (tonnes)



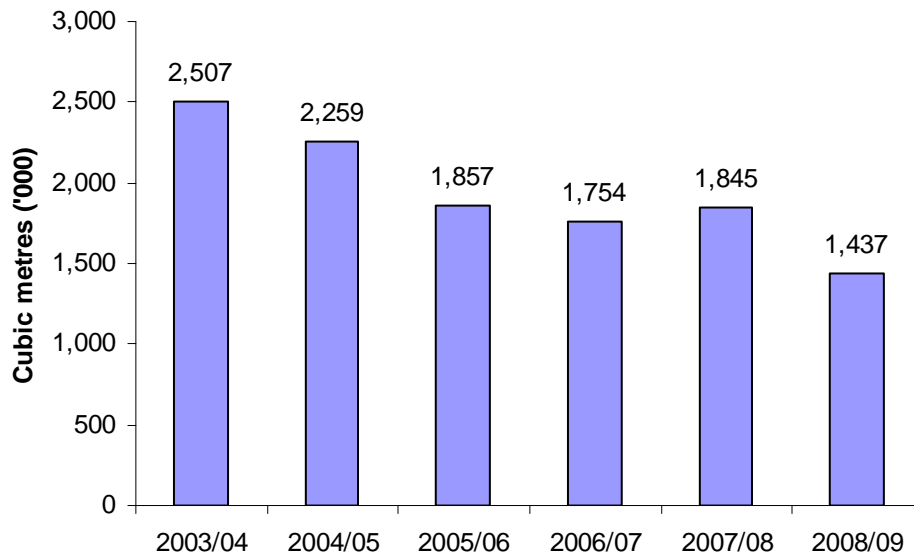
Results Summary

- 523,899 tonnes of waste and energy recovered in 08/09 a 14.9% increase on the previous year; and
- Increase resulting primarily from a 20% increase in recovered greenwaste and a 25% increase in captured methane.

Graph 6 – Types of resources recovered by WSN (tonnes)



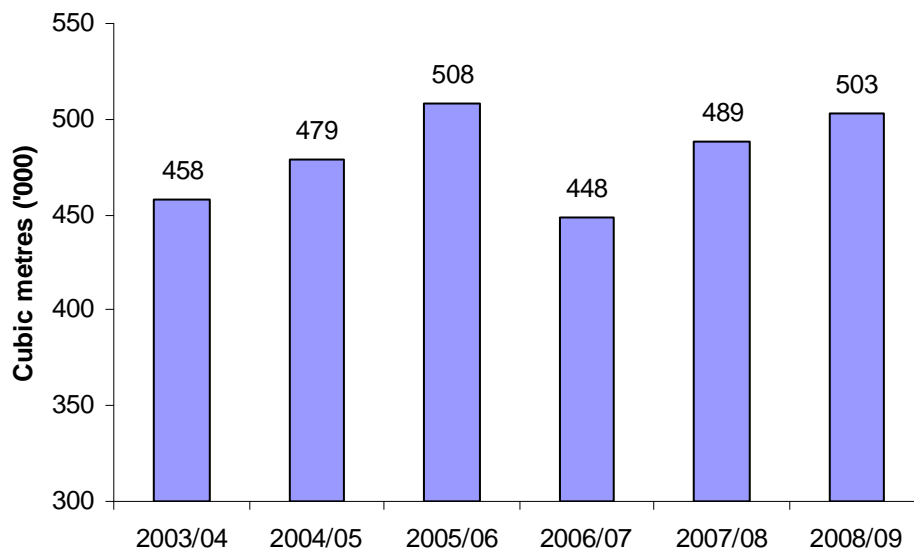
Graph 7 – WSN landfill space consumed (cubic metres)



Results Summary

- 1,437,179 cubic metres of landfill space was consumed in 08/09; and
- This was a 22.1% reduction on the previous year, arising from a 9.7% improvement in the space utilisation rate and a 7.4% reduction in waste landfilled.

Graph 8 – WSN landfill space saved by resource recovery (cubic metres)



Results Summary

- An estimated 503,074 cubic metres of landfill space was saved in 08/09 through resource recovery; and
- A 3% increase in comparison to 2007/08.

3.2.2 Eastern Creek WRC Operations

The Eastern Creek WRC is one of the largest waste management facilities in Sydney and plays a major role in WSN's network of WRCs and transfer stations. The Eastern Creek Stage 2 Landfill disposes of nearly 50% of all wastes received within the network and through its current approvals provides the flexibility for managing Sydney's waste management needs. In 2009/10 it disposed of approximately 540,000 tonnes of waste. Aside from the routine MSW and C&I waste streams, the landfill also provides:

- Disposal for residual materials from the AWT facilities sited at Eastern Creek (UR-3R) and at Macarthur (ArrowBio) that process MSW;
- Disposal for the Class 1 wastes from any of Sydney's three AWTs during emergency situations such as technical breakdowns; and
- A destination for the beneficial use of approximately 50,000 tonnes of Alternative Daily Cover (ADC) product generated by the UR-3R facility. ADC is a replacement for earthen cover material.

The following information for the financial year 2009/10 provides indicative tonnes for the various waste streams disposed of at the Eastern Creek WRC.

Municipal Solid Waste

Direct

The Eastern Creek Landfill accepted approximately 220,000 tonnes of MSW. This waste included:

- MSW delivered via WSN waste collection trucks (160,000 tonnes)

Predominantly this comes from nine local government areas with another seven Councils being the source of minor tonnages; and

- *MSW to landfill via WSN transfer stations (60,000 tonnes).*

Indirect

In addition to the MSW received above, the Eastern Creek WRC also received approximately 80,000 tonnes of discarded material that had first been accepted by an AWT, either the UR-3R facility or the ArrowBio Facility (at Macarthur Resource Recovery Park).

It should be noted that waste generated by the householder is subject to variable source separation and recovery efforts before collection, including kerbside collection of dry recyclables and garden organics.

Commercial and Industrial Solid Waste

The Eastern Creek Landfill accepted approximately 220,000 tonnes of C&I waste. This waste included solid wastes arising from commercial, industrial and government entities not collected as MSW, but does not contain Listed Waste, Hazardous Waste or Radioactive Waste. This waste is often the residual generated by multiple C&I businesses, after implementation of source separation programs, especially for paper, cardboard, timber and steel.

Drop Off Wastes and Recyclables

The Small Vehicle Drop-Off facility at Eastern Creek WRC results in approximately 20,000 tonnes of waste being landfilled after separation of recyclables. Self delivered material via small vehicles (eg cars with trailers, utilities, small trucks) allows customers to place both recyclable and non-recyclable wastes into receptacles. Separate recovery bins are provided for each of three colours of glass containers, aluminium cans, PET bottles, paper and cardboard, scrap metal, and car batteries.

Garden Organics

Approximately 50,000 tonnes of garden organics is processed annually at Eastern Creek WRC. Approximately 60% of this material is sourced from local Councils. The balance comes from householders and small commercial operators such as landscape gardeners. A minimal 250 tonnes is landfilled which is generally rubbish contamination in the green waste.

3.3 CRITERION B (i)

(b) *Whether the development:*

i. *Adopts best practice landfill design and operation*

WSN operates three Class 1 landfills in Sydney, including Eastern Creek WRC and prides itself in being an Australian leader in the adoption of best practice design and operation of this type of waste management facility. See Section 4 of the EA for details regarding the various design elements to be adopted for the Eastern Creek WRC proposed additional capacity.

Design and Implementation

Landfill infrastructure works have been designed and implemented as part of the Northern Extension landfill operations on Eastern Creek Stage 2. Measures include construction of a screening bund along the Ferrers Road fence line, construction of clean water diversion bunds and construction of dirty water drains with drainage outlets to existing stormwater catchment dams. All infrastructure works, including the stormwater and leachate holding dams have been sized and designed based on a water balance study undertaken by leading design consultants within the waste industry. The works comply with relevant Australian standards.

In addition, landfill waste cells within the Northern Extension have been designed and constructed in accordance with the relevant 'Benchmark Techniques of the Solid waste landfill Environmental guidelines; NSW EPA, January 1996' or in accordance with alternative measures, with equivalent or better performance, approved by DECCW. Operations at the site are regulated under an EPL and all operational, monitoring and rehabilitation activities are carried out in accordance with a Landfill Environmental Management Plan (LEMP), approved by DECCW.

Waste landfill cells also incorporate key features such as a well graded cell floor base to a depth approved by geotechnical consultant, engineered leachate barrier system along the base and walls of the cells (approximate 0.9 to 1.0m thick compacted clay liner), leachate collection and conveyance system comprised of collection pipes (herring bone) and 300mm aggregate layer covered with a woven geotextile membrane at the base draining to a fully automated leachate collection sump/ riser at the lowest point, bioreactor leachate injection system (during waste filling), a progressive landfill gas collection system and an approved landfill capping system to comply with bench mark techniques.

Landfill Design, Implementation and Operational Resources

WSN utilises several multi skilled, trained and experienced landfill operators. A Site Supervisor, under the direction of a Facility Centre Manager supervises the daily operations on the landfill at all times when open for receipt of waste. Design, implementation and landfill operation at the Eastern Creek WRC is supported by the following experienced personnel under the direction of General Manager- Landfill Operations including:

- Landfill Technical Manager (planning /design/compliance/ DECCW approvals);
- Project Manager (project delivery, CQA, safety/environmental compliance); and
- Landfill Planner (filling sequencing plans, compaction rate, capacity calculations).

Waste Separation and GPS Assisted Waste Compaction

WSN maintains the active tipping face area so that it is trafficable and safe in all weather conditions. WSN uses an excavator on the tipping face to sort and separate steel and other valuable commodities from the waste streams. GPS assisted Caterpillar 826G Compactors are used to compact the waste in horizontal layers of not more than 650mm thickness, to achieve the total compacted lift height of 3 m. By using the GPS assisted compaction system, WSN is able to achieve effective waste density greater than 0.95 tonnes per cubic metre or better. (Equivalent air space utilisation rate values closer to world best practice value of 1 m³/tonne of waste). Three classes of cover material are used; daily cover (minimum 150 mm over the waste prior to ceasing operations at the end of each day). Intermediate cover of 300 mm is used to close off a cell that will not receive additional lifts of waste for more than 30 days. Final cover includes 600 mm of clay sealing layer and a 500mm to 1.0m of vegetation layer which is applied when waste is filled to the final approved profile.

Environmental and OHS Performance

WSN Environmental Solutions manages its environmental and OHS performance on-site through its Corporate Integrated Management System (IMS). The WSN IMS is structured on the requirements of AS/NZS 4801:2001 and AS/NZS 14001:1996 and contains Policies, Procedures, Management Plans, Emergency Response Plans, Standard Operating Procedures (SOP's) and Forms.

3.4 CRITERION B(ii)

(b) *Whether the development:*

- Reduces the long term impacts of the disposal of waste, such as greenhouse gas emissions or the offsite impact of odours, by maximising landfill gas capture and energy recovery;*

Consistent with the adoption of best practice landfill design and operation, and the application of government regulatory controls, WSN provides a landfill at Eastern Creek that reduces the long term impacts of the disposal of waste, including greenhouse gas emissions and the offsite impact of odour.

As described in Section 4 of the EA, decomposition of organic material in a landfill generates landfill gas, which typically consists of 45 - 60% methane, 40-60% carbon dioxide and traces of non-methanogenic organic compounds (typically less than 1%). If not controlled, the organic substances can cause odour nuisance and escaping landfill gas will contribute to the greenhouse effect and can reduce oxygen content in the final landfill cover layers and limit plant growth. Typically, gas generation commences following six months of waste placement.

The design and implementation of the landfill gas management system at Eastern Creek 2 has been undertaken by Landfill Management Service Limited (LMS) which has a Joint Venture contract with WSN for gas management on the site.

The goals of on-site landfill gas management include:

- Preventing landfill gas emissions into the atmosphere;
- Preventing subsurface off-site migration;
- Minimising odorous emissions associated with landfill gas; and
- Recovery of energy from the gas.

There are four main management strategies for the control and extraction of landfill gas for the development. They are:

- Landfill gas extraction wells are progressively installed into the waste to control gas migration. Some overlap of the radius of influence is allowed for extraction wells located at the border perimeter of the landfill, to assist effective control;
- Inter-well spacing is equal to or less than twice the estimated radius of influence;
- Landfill gas condensate is collected and recirculated into the landfill; and
- Combustion of the landfill gas for electricity generation with backup flaring for landfill gas in excess of the power station processing capacity.

The WRC adopts current best practice for gas management. It operates at greater than 75% capture efficiency of landfill gas, with the captured gas processed through the landfill gas to electricity power station. On the closed Eastern Creek 1 site 5.1 MW of capacity is installed, while on the Eastern Creek 2 site WSN has installed seven (7) 1.1MWh gas to power generation units. It is estimated that, based on landfilling at 550,000 tpa approximately 72,000MWh of electricity per annum will be produced. Currently the site is producing approximately 54,000MWh of electricity production per annum.

The landfill gas extraction and flaring/power generation system is expected to meet the following performance criteria:

- Methane concentrations in the subsurface landfill gas monitoring wells located around the perimeter of the landfill are maintained below 1.25% (vol/vol);
- Methane concentrations in atmospheric emissions are kept below 500 ppm;
- Emissions from flares or gas engines meet regulatory criteria;
- No unacceptable odours are emitted from the site; and
- There are no odour complaints from neighbours.

3.5 CRITERION C(i)

(c) If the proposal relates to a new or expanded landfill:

- i Whether the land on which the development is located is degraded land such as a disused mine site;*

The investigations undertaken for the Environmental Impact Statement (EIS) prepared for the Eastern Creek WRC Eastern Extension (Waste Service NSW 2000) and for the modification of the Eastern Creek Stage 2 (Waste Service NSW 2003) found the area of Eastern Creek Stage 2 to be degraded due to past and existing agricultural uses chiefly cattle and horse grazing. Following assessment for the Northern Extension Landfill, the Southern Landfill cell has been completed and Cells 4, 6 and 7 developed. Infrastructure associated with the landfilling activities has been constructed chiefly in the area between the cells and the Eastern Creek riparian zone. Since the 2000 EIS, Ferrers Road has been relocated to run adjacent to the cells. As a result the area has been highly disturbed.

The ecological assessment of the Cumberland Plain Woodland community in the area now proposed as Cell 5 was found in the 2003 EIS to be disturbed by grazing and other activities with an understorey dominated by weed species. The flora and fauna investigations conducted for the EA (refer Section 6.4 of the EA) found that there had been further disturbance of the woodland area with weed and exotic species invasions and overuse by the large Ibis population.

Inspections by officers of the DoP and DECCW in 2010 have identified further disturbance within the Cell 5 area which has been the subject of correspondence between the Departments and WSN.

3.6 CRITERION C(ii)

(c) If the proposal relates to a new or expanded landfill:

- ii. Whether the development is located so as to avoid land use conflicts, including whether it is consistent with any regional planning strategies or locational principles included in the publication EIS Guideline : Landfilling (Department of Planning, 1996) as is in force from time to time;*

The 2003 EIS reviewed the site suitability in the context of the EIS Guidelines (DoP 1996). This section presents an updated summary of the findings.

The *EIS Guidelines for Landfilling* set out site selection principles.

- Location has been identified in any Strategic Waste Management Plan.

The then Western Sydney Waste Area included provision to divert a proportion of waste to the Eastern Creek WRC in the future, although it was anticipated that overall volumes included would be progressively reduced from current levels as the strategies outlined in the then Regional Waste Plan when implemented. Those plans were updated in the Waste Avoidance and Resource Recovery Strategy in 2003 and subsequently in the Waste Avoidance and resource Recovery Strategy report in 2006. The Eastern Creek WRC was included in the strategies and in the reviews undertaken by Tony Wright for the DoP.

- Land Use is Permissible.

The site of Eastern Creek Stage 2 is included in SEPP 29 and SEPP (Western Sydney Parklands) 2009. As such the landfilling operations are permissible with consent.

- Avoidance of Environmentally Sensitive Areas.

Table 1 of the Guidelines lists the environmentally sensitive areas to be avoided. Table 3.1 addresses these issues as they relate to the Eastern Creek WMC.

Table 2 of the Guidelines sets down appropriate separation distances from certain land uses. The nearest residence was approximately 1 km from the western edge of the landfill. The existing areas which have been landfilled on the Eastern Creek WRC site would act as a buffer between the landfilling activities and the residence which is located along Wallgrove Road. Since 2003 the residence has been removed and the nearest residences are located further from the site.

**Table 3.1
Environmentally Sensitive Areas**

Areas to be Avoided	Objective	Compliance Status
<p>A site within 250 m of an area of significant environmental or conservation value identified under relevant legislation or environmental planning instruments, including:</p> <ul style="list-style-type: none"> • National parks, marine national parks; • Historic and heritage areas, buildings or sites protected under the <i>Heritage Act 1977</i> or <i>National Parks and Wildlife Act 1974</i> (NPW Act) or area on the Register of the National Estate; • Any nature reserves for environmental protection, eg. aquatic, marine, nature, karst; • Areas covered by a conservation agreement or identified as critical habitat under the <i>Threatened Species Conservation Act 1995</i>; • Wilderness area identified or declared under the <i>Wilderness Act 1987</i>; • World Heritage Areas; • Areas mapped under SEPP 14 – <i>Coastal Wetlands</i>, SEPP 26 – <i>Littoral Rainforest</i>; • Areas zoned under a LEP or REP for environmental protection purposes, eg. high conservation, scenic, cultural or heritage; • Other areas protected under the NPW Act, <i>Crown Lands Act 1989</i>, <i>Fisheries Administration Act</i> or any other legislation. 	<p>To avoid the risk of damaging areas of high environmental value</p>	<p>Presence of degraded Cumberland Plain Woodland in Cell 5 area with the proposed establishment of off-sets. Otherwise complies.</p>
<p>Sites within an identified sensitive location within a drinking water catchment, including:</p> <ul style="list-style-type: none"> • Any lands dominated or mapped as 'special areas' under the Sydney Water Regulation; • Lands within 3 km from the top water level of the following storages: Wingecarribee Reservoir, Fitzroy Falls Reservoir and the Tallowa Dam; • Any lands dominated as Special Areas (or similar wording) by local water supply authorities or in the vicinity of a groundwater bore used for drinking water. 	<p>To negate the risk of polluting drinking water should failure of the landfill occur</p>	<p>Complies</p>
<p>Sites within 250 m:</p> <ul style="list-style-type: none"> • Of a residential zone; • Of a dwelling, school or hospital not associated with the facility. 	<p>To protect the amenity of residential areas</p>	<p>Complies</p>
<p>Sites located:</p> <ul style="list-style-type: none"> • In or within 40 m of a permanent or intermittent waterbody (including rivers, lakes, bays or wetlands); • In an area overlaying an aquifer which contains drinking water quality groundwater which is vulnerable to pollution (consult DLWC for criteria to determine the vulnerability of groundwater). 	<p>To protect groundwater and surface water resources.</p>	<p>Complies</p>
<p>Sites located:</p> <ul style="list-style-type: none"> • Within a karst region (either protected under the NPW Act or not); • With substrate which are prone to land slip or subsidence. 	<p>To avoid sites with unsuitable substrata.</p>	<p>Complies</p>
<p>Sites within a floodway which may be subject to washout during a major flood event. Councils should be consulted for information about local flooding characteristics. A major flood event is</p>	<p>To avoid landfill washout risk if</p>	<p>Complies</p>

Areas to be Avoided	Objective	Compliance Status
considered to be a 1 in 100 year event.	a significant flood event was to occur.	

- Compatible Use with Nearby Land Use.

Initial site investigations indicated the site was suitable for a landfill.

Investigations undertaken for the EIS indicated the site was suitable for landfilling in terms of the criteria set out in Table 3 of the *EIS Guidelines for Landfilling*. These are described in Table 3.2.

**Table 3.2
Suitability of Landfill Site**

DUAP Criteria for Suitability of the Landfill Site	Compliance with Criteria
Operational Requirements	Landfill design incorporates the appropriate landfill liner, landfill gas collection system, leachate collection system and capping.
Geological and Soils Assessment	No geological constraints for landfill development. Soils in landfill site are not suitable for agricultural purposes.
Hydrological Assessment – Groundwater and Surface Water	Groundwater not utilised for agricultural usage. No waterbodies in the vicinity of the landfill site.
Topographic and Meteorological Assessment	No topographic constraints for landfill development. Suitable meteorological conditions.
Flora and Fauna Assessment	Removal of Cumberland Plain Woodland and establishment of off-sets
Transport Issues	Complies
Community Issues	Site is located more than 1 km from nearest residential area.
Cumulative Issues	No significant cumulative impacts.

3.7 CRITERION D

- (d) *Whether transport links to the landfill are optimised to reduce the environmental and social impacts associated with transporting waste to the landfill.*

The Eastern Creek WRC is in an established location in Western Sydney. It services the waste disposal needs of both local government and the commercial and industrial sectors. In addition, it services WSN's transfer station network. This network provides an effective solution for inner city waste management which significantly reduces waste vehicle movements. Local residents and small businesses have the ability to use the Small Vehicle Drop-Off Area and Recycling Shed.

The location of the Eastern Creek WRC at the motorway junction of the M7 and M4 and at what is effectively the geographic centre of Sydney provides excellent transport access for western, southern and northern regions of Sydney, Sydney City and the Inner West and the WSN transfer station network. Its easy accessibility means shorter travel times, saves fuel and reduces greenhouse gas emissions from waste transportation.

4. REVISED STATEMENT OF COMMITMENTS

4.1 INTRODUCTION

The EA identified a range of environmental outcomes and management measures that would be required to avoid or reduce environmental impacts associated with the construction and operation of the proposed modification.

After consideration of the issues raised in submissions to the exhibition of the EA, the draft Statement of Commitments (refer to Chapter 8 of the EA) has been revised. Should the project be approved, the revised commitments will guide the subsequent phases of the development.

4.2 LANDFILL ENVIRONMENTAL MANAGEMENT

WSN will continue to manage the landfilling and associated activities described in this EA in accordance with the Eastern Creek WRC LEMP as described in Section 7 of the EA. Table 4.1 provides a summary of the existing commitments included within the LEMP which will be maintained during activities associated with the proposed modification. The table includes additional commitments associated with the proposed modification. All modified Conditions of Consent, EPL requirements and proposed mitigation measures arising from the modification including additional monitoring requirements will be incorporated in the LEMP. WSN will comply with these conditions and requirements.

In addition to these existing commitments WSN will nominate a senior manager who will be the direct point of contact for liaison with the Sydney Dragway with respect to management of dust, odour and litter.

4.3 DRAINAGE CHANNEL DIVERSION

As a result of the proposed landfilling of Cell 5, the surface drainage which currently flows through the Cell 5 area will be diverted to flow between Cell 4 and the completed Southern Cell. The design of the drainage channel is described in Section 4.2.9 of the EA, Technical Report No 2 of the EA and Appendix A of this report. Once rehabilitation of the final landform has been completed and the landfill mounds are stable, the drainage channel will be rehabilitated in accordance with the final agreed design, developed at the time in consultation with the relevant government authorities and the land owner. Section 4.5.2 of the EA describes the proposed revegetation and rehabilitation of the drainage channel.

WSN will commit to the construction, rehabilitation and management of the channel through the implementation of a Drainage Channel Management Plan which will be attached as an Appendix to the LEMP. DECCW requirements in relation to the drainage channel will be incorporated in this plan. Table 4.2 provides a summary of the commitments.

**Table 4.1
Summary of Commitments – Landfill Environmental Management Plan**

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
Dust Management	<ul style="list-style-type: none"> • Preventing air pollution • Preventing degradation of local amenity 	<ul style="list-style-type: none"> • Controlling vehicle speeds • Trucks entering and departing the site shall be covered at all time, except during loading and unloading • Maintaining clay and shale stockpiles in a condition that minimises wind-blown dust • Maintaining green waste stockpiles and processing operations in a manner that minimises wind-blown dust • Regular sweeping of sealed roads • Regular watering of areas that have the potential to generate dust • Restricting vehicle movements to specified routes in unsealed areas • Operation of a wheel wash facility to remove mud from transport vehicles • Areas to be exposed for more than 30 days are stabilised by way of grass seeding or other suitable method • Restricting access to and progressively rehabilitating unvegetated areas 	<ul style="list-style-type: none"> • Ensure all staff are aware of the air pollution requirements and regulations on site • Restrict vehicle movements to specified routes in unsealed areas and ensuring posted vehicle speed limits are observed • Continuous watering of unsealed roads with a water cart during dry and/or windy conditions, less frequently in less adverse conditions. During summer months, additional sprinkler systems will be used along haul roads when required • Dusty wastes treated as special wastes • Ensure greenwaste processing, bricks and concrete crushing have appropriate dust control systems • Site inspection (as required) by WSN to check for excessive dust levels • On site monitoring (dust deposition and total suspended particles) 	<ul style="list-style-type: none"> • Expected maximum level of dust deposition shall not exceed 4 g/m² per month as an annual mean for total insoluble solids 	<ul style="list-style-type: none"> • Extension of current practices to Cell 5 excavation, channel diversion works and landfilling and to additional filling of Cells 6 and 7

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
		<ul style="list-style-type: none"> All haul roads on site used for the Northern Extension shall be sealed to within 200metres of the outer boundary of the landfill cells 			
Groundwater Management	<ul style="list-style-type: none"> Ensuring that the groundwater is not degraded below its naturally occurring state Ensuring that the groundwater gradient is not altered such that adverse effects eventuate. Using natural geology of the site, clay barrier and liner to minimise the possibility of leachate entering the groundwater system 	<ul style="list-style-type: none"> Using natural geology of the site, clay barrier and liner to minimise the possibility of leachate entering the groundwater system Monitoring leachate levels within the waste cells to ensure they do not rise above the design level of the clay liners Monitoring groundwater levels to ensure that they do not rise to such a level that they might affect the regional groundwater flow, and in particular the groundwater flow towards Prospect Reservoir 	<ul style="list-style-type: none"> Regular monitoring is undertaken around the waste cells to ensure that the groundwater quality is not being compromised by the facility and that groundwater levels do not rise to such a level that they might affect the regional groundwater flow, and in particular the groundwater flow towards Prospect Reservoir 	<ul style="list-style-type: none"> To maintain current groundwater quality and levels 	<ul style="list-style-type: none"> Results of groundwater monitoring will be reported to NOW annually Any revised management measures considered appropriate in response to the monitoring results will be agreed with NOW WSN will discuss with NOW whether a licence is necessary to authorise future groundwater monitoring installations
Landfill Gas Management	<ul style="list-style-type: none"> Preventing landfill gas emissions into the atmosphere 	<ul style="list-style-type: none"> Landfill gas extraction wells are progressively installed into the waste to control gas migration, some overlap of the radius of influence is 	<ul style="list-style-type: none"> Ensure odour control and management requirements are met 	<ul style="list-style-type: none"> No detectable subsurface off-site migration of landfill gas above 1.25% 	<ul style="list-style-type: none"> Installation of landfill gas extraction wells into Cells 6 and 7

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
	<ul style="list-style-type: none"> Preventing subsurface off-site migration Minimising odorous emissions associated with landfill gas Recovery of energy from the landfill gas. 	<ul style="list-style-type: none"> allowed for extraction wells located at the border perimeter of the landfill, to assist effective control Inter-well spacing is equal to or less than twice the estimated radius of influence Landfill gas condensate is collected and recirculated into the landfill 	<ul style="list-style-type: none"> Ensure that procedure for drilling and excavation of new wells has been followed and appropriate records have been kept Electricity Generation Plant has been operated at designated capacity Flares operational at all times and appropriate records kept Odour hot spots recorded and appropriate action taken Extension and modification of existing landfill gas system Gas extraction system fully operational and functioning at capacity 	<ul style="list-style-type: none"> methane (v/v) Surface emissions of landfill gas below threshold levels of 500 parts per million (v/v) of methane Thermal oxidation should have greater than 98% destruction efficiency for non-methane organic compounds prior to emission to atmosphere 	<ul style="list-style-type: none"> Installation of landfill gas extraction wells into Cell 5 Progressive extension of the gas collection and management system to Cells 4-7 & expansion of the Gas-to-Power Generation Plant as required
Leachate	<ul style="list-style-type: none"> Preventing pollution of groundwater by leachate Preventing pollution of surface water by leachate Preventing degradation of local amenity 	<ul style="list-style-type: none"> Using a compacted clay liner as the leachate barrier system Compaction of waste and daily covering with low permeability material to minimise water percolation Grading of the landfill surface to minimise ponding and hence infiltration Leachate dams are constructed to specifications to ensure adequate capacity All leachate discharging from the active areas of the site is collected by the 	<ul style="list-style-type: none"> Ensure adequate storage capacity within leachate dams. Record storage dam level, quantities transferred to and from the dam Ensure leachate treatment system is working satisfactorily Inspect for leachate seepage Ensure all treated leachate (and stormwater) has been disposed off appropriately Record volume of stormwater removed to sedimentation dams Ensure bund wall / wall liner and floor liner at base of first 	<ul style="list-style-type: none"> To maintain current groundwater quality 	<ul style="list-style-type: none"> Implementation of the leachate management strategy in Cell 5 Modification to the leachate collection and conveyance system to collect leachate from the base of Cell 5 Storage of leachate in the existing leachate storage dam

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
		<p>leachate collection system to minimise the potential for contamination of surface water and groundwater</p> <ul style="list-style-type: none"> • Any water that has been in contact with waste is managed as leachate • Leachate seeps are rectified as soon as practicable • The creation of perched water tables is avoided wherever possible by using rip lines to allow percolation through waste • Operation of a leachate treatment plant to enable excess treated leachate to be disposed to sewer 	<p>lift is in place within disposal area</p> <ul style="list-style-type: none"> • Tipping area maintained appropriately • Ensure leachate drainage line has been placed on the liner / inside edge of the bund wall surrounded by aggregate • Ensure leachate risers have been fitted and connected to the leachate lines • Ensure current filling lift generally drains towards nearest leachate sump • Ensure aggregate has been placed around the leachate lines, over the entire base of the cell floor (300mm thick) and riser in accordance with requirements • Ensure that the thickness of daily cover / liner / final capping have been checked as appropriate • Ensure that the inspection of leachate dams and risers have been checked for drainage/levels • Ensure that access, haul roads, and ramps have been constructed and maintained to manage and separate surface water flows 		<p>and treatment in the LTP to discharge to sewer</p> <ul style="list-style-type: none"> • Cells 4-7 to be operated as bio-reactor landfilling with leachate re-injection systems

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
Litter Control	<ul style="list-style-type: none"> • Preventing surface water contamination • Preventing visual pollution • Preventing degradation of local amenity 	<ul style="list-style-type: none"> • Continuous waste compaction and daily covering of all waste • Temporary mobile fencing near the working face to catch any windblown litter • A 2m high chainwire litter collection fence is in place on top of the screening bund along the Ferrers Road boundary. • Regular litter patrols • Operation of wheel wash facility to remove any mud and litter from transport vehicles • Trucks transporting material from the premises are covered and tailgates are securely fixed • Installation of flexible floating booms on sedimentation dams • Implementation of a customer awareness campaign including signs and handouts • All loads to be covered during transport within the site. 	<ul style="list-style-type: none"> • Continuous waste compaction and daily covering of all waste • Installation of temporary litter fencing near working face • Site inspection and litter collection in key areas: <ul style="list-style-type: none"> - Ferrers Rd between water pipeline and Eastern Creek Raceway - Wallgrove Rd between water pipeline and Old Wallgrove Rd - Truck wash bay - General site and boundary fences - Main entrance road 	<ul style="list-style-type: none"> • On and off site to be free of wind-blown litter from site activities 	<ul style="list-style-type: none"> • Extend litter control measures to Cell 5 and additional landfilling of Cells 6 and 7 • Proactive liaison with Sydney Dragway
Noise	<ul style="list-style-type: none"> • Preventing noise pollution • Preventing degradation of local amenity 	<ul style="list-style-type: none"> • Construction of noise attenuation bunds to minimise the noise levels experienced off-site resulting 	<ul style="list-style-type: none"> • Site inspections for excessive noise in the following areas: <ul style="list-style-type: none"> - Fixed and mobile 	<ul style="list-style-type: none"> • Noise from the operation of the WRC must comply with the noise 	<ul style="list-style-type: none"> • Construct an external bund wall for Cell 5 aligned with the

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
		<p>from site operations</p> <ul style="list-style-type: none"> Plant operations would be within the period of one hour before and one hour after normal operating hours. If short term extenuating circumstances occur where landfilling hours are extended, close neighbours and relevant authorities will be informed Existing plant and equipment is operated and maintained to avoid excessive noise No equipment is approved by WSN for use on site unless it complies with noise emission limits All items of plant are fitted with silencers and engine covers as specified by relevant regulations and guidelines No activities associated with the development (including site preparation works) after 4pm on any day on which an event, attended by members of the general public, is occurring at the Dragway 	<p>machinery</p> <ul style="list-style-type: none"> Vicinity of working face Wallgrove Road Ferrers Road Truck wash bay <ul style="list-style-type: none"> Site inspections to ensure noise control measures are being implemented on site Quarterly noise monitoring on site Ensure all plant and machinery complies with applicable noise regulations including the EPL Ensure all staff are aware of the noise requirements and regulations on-site Ensure that staff and employees are not exposed to excessive noise levels (refer to General Site Environment SOP) Noise assessments to be carried out by acoustician 	<p>criteria specified in the EPL</p>	<p>existing Cells</p> <ul style="list-style-type: none"> Above ground level cell filling will commence against the bund wall and move westward As filled area rises above ground level new bund walls will be constructed behind which filling will take place from east to west Erect a timber screening fence along Ferrers Road adjacent to Cell 5 prior to cell construction Proactive liaison with Sydney Dragway
Odour Management	<ul style="list-style-type: none"> Preventing degradation of local amenity Preventing landfill gas emissions 	<ul style="list-style-type: none"> Covering odorous wastes as soon as possible after delivery Daily covering of all waste 	<ul style="list-style-type: none"> Site inspection for odour in key parts of the site <ul style="list-style-type: none"> Fixed and mobile 	<ul style="list-style-type: none"> No verifiable odour complaints from adjacent residential, 	<ul style="list-style-type: none"> Extension of current odour management practices to Cell

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
	<ul style="list-style-type: none"> Achieving no detectable odours at the site boundary. Gas flaring / on-site power generation activities 	<ul style="list-style-type: none"> Ensuring that the active tipping face does not exceed 1,250m² at any time and 250m² on weekends Application of odour-neutralising sprays when required Installation and operation of a wheel-washing facility for trucks leaving the site to minimise the transport of potentially odorous clay particles onto adjacent roads Installation and operation of a landfill gas collection and flaring system, and a gas-to-electricity power station Ensuring that the leachate storage dam is maintained in a condition that minimises the emission of odours, through regular monitoring. If issues are identified, management techniques for effluent dams will be applied Installation and operation of a weather station that monitors wind speed and wind direction to allow correlation of odour complaints with weather conditions and assist in rectifying the problem 	<ul style="list-style-type: none"> machinery - Small vehicle drop-off area - Working face - Truck wash bay - Wallgrove Rd frontage - Ferrers Road • Application of odour-neutralising spray • Recording of gas reading if excessive odour is detected at the boundary of the site or neighbouring properties • Odour assessments recorded, maintained and held on-site as part of the Daily Operations Checklist • Correlation of odour complaints with meteorological data • Odorous Special Waste tipped and covered with an immediate cover of VENM / general waste of a minimum 300 thickness 	<ul style="list-style-type: none"> commercial or recreational areas or motorists along the M4, M7 and Ferrers Road 	<ul style="list-style-type: none"> 5 operations and additional filling of Cells 6 and 7 • Installation of an advanced odour neutralising system on the existing fenceline adjacent to the operational cells, to enhance odour performance • Proactive liaison with Sydney Dragway
Pest, Vermin and Noxious	<ul style="list-style-type: none"> To minimise sources of food and habitat 	<ul style="list-style-type: none"> Waste is compacted and covered daily to minimise 	<ul style="list-style-type: none"> Immediate reporting of any observed pest or dangerous 	<ul style="list-style-type: none"> No evidence of any outbreak of 	<ul style="list-style-type: none"> Implementation of current

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
Weed Control	<ul style="list-style-type: none"> To adequately control any pests, vermin and noxious weeds 	<p>possible food sources and habitats</p> <ul style="list-style-type: none"> If insect infestations are detected in incoming waste or within the WRC, they are treated immediately with a suitable biodegradable pesticide Bird control, including acoustic deterrents and explosive charges, is employed on a regular basis to discourage feeding and roosting of birds (particularly silver gulls) on the landfill The WRC is inspected annually by a registered pest exterminator and appropriate action is taken as recommended in the resulting report Significant weed growth is controlled through the application of a biodegradable herbicide Surfaces are graded to minimise ponding and subsequent insect infestations Progressive rehabilitation of the site incorporates provision for the initial establishment of ground cover to minimise erosion and weed infestation 	<p>animals infestations</p> <ul style="list-style-type: none"> Pests, including seagulls (particularly Silver Gulls), ibis and rats should be controlled when observed Immediate treatment of incoming wastes noted to have pest infestations Site inspection for pests, vermin and weeds Site inspections for pests and vermin by licensed contractor Ensure any noxious weeds identified or suspected are properly identified and controlled Participate in relevant scientific studies, for example Ibis control. 	pests, vermin or noxious weeds	practices in Cell 5 landfilling and additional filling of Cells 6 & 7

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
Surface Water Management	<ul style="list-style-type: none"> • Preventing pollution of surface waters by leachate • Preventing pollution of surface waters by sediments • Minimising surface water infiltration into the landfill, and subsequent leachate generation • Preventing soil erosion 	<ul style="list-style-type: none"> • Stormwater volume reduction through the diversion of “clean” runoff around the waste cells. Runoff from Ferrers Road and the Dragway is directed between Cell 4 and Cell 6 and to the north of Cell 7 • Disturbed area runoff is diverted to a series of perimeter grass lined ‘dirty’ water drains which in run into sedimentation dams • Reduction in the volume of “dirty” stormwater through the progressive rehabilitation of completed areas and decommissioning of stormwater drains • Irrigation of stormwater retained in the sedimentation dams prior to release into Eastern Creek • Chemical treatment of stormwater retained in sedimentation dams prior to release into Eastern Creek • Minimising the erosion of external surfaces through the use of mulch and cover crops • Minimising the volume of stormwater requiring chemical treatment from stockpile areas through the irrigation of retained 	<ul style="list-style-type: none"> • De-silt sedimentation dams and traps. • Maintain all drainage channels and sediment traps in areas of fill. • Check and dewater excavation area (during rainfall). • Drains discharging water into sedimentation dams are grass lined • Ensure separate collection and treatment of runoff from active landfill areas and stockpiles • Install channel protection measures on landfill batters • Maintain / desilt sump adjacent to wheel wash facility • Check for failure of surface water infrastructure • Conduct water quality monitoring • Areas to be exposed for more than 30 days are stabilised by way of grass seeding or other suitable method • Report on surface water monitoring 	<ul style="list-style-type: none"> • Less than 50 mg/L of total suspended solids to receiving waters during pumped discharges from sedimentation dams • Less than 0.9 mg/L of ammonia 	<ul style="list-style-type: none"> • Extend existing dish drains and bund walls around Cell 5 to divert clean runoff • Extend perimeter dirty and clean water drains across Cell 5 • Collection of stormwater runoff from Cells 6 & 7 in existing Dam 203/4 and from Cells 4 & 5 in existing Dam 202 • Extension of maintenance of the existing drainage and dams • Preparation of Dam Safety Report on the proposed detention basin and submission to the NSW Dam Safety Committee

Aspect	Environmental Goals and Principles	Management Strategies	Activities	Performance Indicators/Targets	Additional Commitments
		<p>stormwater onto stockpiles to minimise fugitive dust emissions</p> <ul style="list-style-type: none"> • Reduction in the volume of retained stormwater through on-site re-use. Treatment will be minimised by using the poorest quality water acceptable for each task • Sedimentation dams are to act as gross pollutant traps to assist in removing litter from stormwater before it enters Eastern Creek 	<ul style="list-style-type: none"> • Clean litter from floating litter booms in sedimentation dams 		

**Table 4.2
Statement of Commitments Diversion of Drainage Channel**

Commitment	Construction	Operation	Rehabilitation
Prior to any works commencing on Cell 5, a detention basin and drainage channel will be established to divert runoff from the existing drainage line which runs from the culvert on Ferrers Road through the area to Eastern Creek.	√		
The proposed detention basin will be planted with native riparian species as identified on the Drainage Channel Landscape Plan.	√		√
Revegetation of the diverted drainage channel batters will commence upon completion of the surrounding stages of the landfill mounds (Southern Cell and Cell 4 mounds), including revegetation of the base of the landfill mounds and along the edges of the roads. Revegetation work will aim to reconstruct a representative native plant community found in nearby creek lines.			√
Once rehabilitation of the final landform has been completed and the landfill mounds are stable the drainage channel will be rehabilitated in accordance with the final agreed design, developed at the time in consultation with the relevant government authorities and the land owner. It will be based on the design described in Section 4.5.2 of the EA. The design will facilitate vehicle access by Integral Energy.			√
The constructed diversion channel is of variable depth and width, consistent with slope and transmission line easement constraints. It will be designed to appropriately manage the velocities and flows likely to be received. The 1:3 sloped batters of the drainage channel will be spread with a soil layer (100mm of topsoil) and then sown with a cover crop to assist stabilisation, prior to being revegetated with local species. Vegetation planting will be designed to take into account the saline and dispersive clays.	√		
A meander and a pool riffle system will be incorporated into the alignment of the drainage channel to assist in dissipating hydraulic energy and thus reducing the potential for erosion. Varied cross-sections and the pool riffle system (constructed of rocks, logs, etc) will be incorporated in the bed alignment of the drainage channel. This provides roughness that dissipates hydraulic energy, and also creates a variety of riverine habitats for native fauna.			√
Before water is discharged from the drainage channel into Eastern Creek, it will flow through an energy dissipating structure and then the riparian zone. The buffer zones will be planted with deep-rooted perennial vegetation including quick-growing native trees and shrubs representative of the vegetation community existing along Eastern Creek in this locality.	√	√	√
Reed beds will be established at points along the drainage channel. These beds will help to dissipate hydraulic energy as well as act as a natural filter for runoff entering Eastern Creek.			√

4.4 BIODIVERSITY VEGETATION OFFSETS

In order to offset the removal of an area of Cumberland Plain Woodland within the area of Cell 5, WSN commits to the implementation of biodiversity vegetation offsets. These offsets will be implemented in accordance with a Biodiversity Vegetation Offsets Plan to be incorporated in the LEMP.

In relation to Cumberland Plain Woodland offsets WSN commits to:

- The proposed offsets are to be based on removal of 3 ha of highly modified Cumberland Plain Woodland as described in Section 6.4 of the EA and Technical Report No 6. The actual size and ecosystem value of the vegetated area will be determined by use of the biobanking assessment calculator; and
- On-going consultation with DECCW in relation to their requirements to ensure they are incorporated in the agreements.

The basis for the offsets is described in Section 6.4 of the EA. DECCW has indicated it is satisfied with the magnitude of offset indicated in Section 7 of the EA. In addition, DECCW has recommended that the offset be assessed using the Biobanking Assessment Method. Consistent with the draft DECCW GTA (refer Section 5), WSN as part of development of the offset package will consult with DECCW and DoP in relation to the nature and extent of the offset.

WSN has an in principle agreement with WSPT to attempt to secure an offset area within the Trust's land.

As discussed in Section 6.4.2 of the EA, a survey for *Pimelea spicata* will be undertaken during the known flowering period of this species before any on ground works are undertaken.

4.5 SITE REHABILITATION

WSN has prepared a LRP and Landscape Masterplan for Eastern Creek Stage 2. WSN commits to the implementation of these plans over the course of landfilling, capping and rehabilitation of the landfill cells. The measures set out in the LRP and illustrated in the Landscape Masterplan have been designed to ensure that in the longer term the rehabilitated site maintains consistency with the broad rural character of the Western Sydney Parklands.

A number of the works and measures set out in the plans are specific to the activities proposed in the modification. These include:

- The construction of a timber screening fence along the Ferrers Road boundary at the location of the detention basin and diverted drainage channel and the planting of tree and shrub species along the site boundary. These works will be undertaken in association with the construction of the detention basin and drainage diversion channel. On-going monitoring and maintenance will be undertaken to ensure a good visual outcome in terms of views from Ferrers Road;
- The establishment and maintenance of additional trees and screening shrubs on the screening mounds along the north and eastern boundaries along Ferrers Road to prevent views of the landfill operations from the road. On-going monitoring and maintenance will be undertaken to ensure a good visual outcome in terms of views from Ferrers Road;
- Seed collected for native species will be in accordance with the LRP and as far as possible will be sourced locally;

- The implementation of revegetation works along the diverted drainage channel batters and the adjoining edges of Cells 4 and 5 and the Southern Cell, and the rehabilitation of the drainage channel at the completion of landfilling. As described in Section 8.3 of the EA this commitment will also be incorporated in the Drainage Channel Diversion Management Plan to be attached as an Appendix to the LEMP;
- The Site Closure Plan will include measures to ensure site rehabilitation is maintained in accordance with the commitments included in the LRP and Site Master Plan

5. PROPOSED GENERAL TERMS OF APPROVAL

Table 5.1 provides a summary of the GTAs requested in relation to the proposed modification and WSN's response.

**Table 5.1
Draft General Terms of Approval**

Agency	GTA	Comment
DECCW	<p>Develop an offset package, in consultation with DECCW, consistent with the Principles for the Use of Biodiversity Offsets in NSW to be submitted for the approval of the Director General, within 6 months of the date of the Minister's approval under Part 3A:</p> <ul style="list-style-type: none"> • The offset site shall be secured using a legal mechanism that will prevent its future clearance; • The offset package shall demonstrate the agreement and commitment of the landholder at the offset site; • The offset package shall include a plan for the future management of the offset site; • The management plan shall indicate what revegetation and bush regeneration activities need to be undertaken within the offset site and the timeframe for which they need to be undertaken; • The management plan shall indicate the budget required for those activities; and • The offset package shall demonstrate how the required budget is to be secured. 	Agreed in principle; seek the timeframe to be extended to 9 months instead of 6.
NOW		
1.	A riparian zone consisting of local native plant species shall be established and maintained in and adjacent to Eastern Creek and the tributary of Eastern Creek that is located on the site, for its entirety within the site.	A 40m riparian zone will be maintained along Eastern Creek as per the current consent. See Appendix A and Section 2.2 for the situation regarding the Eastern Creek tributary to be diverted.
2.	The extent of the riparian zones is to be measured horizontally landward from the top of the bank of the watercourses. The width of the riparian zones is to be a minimum of 50 metres on both sides of Eastern Creek and a minimum of 50 metres on both sides of the tributary of Eastern Creek.	A 40m riparian zone will be maintained along Eastern Creek as per the current consent. The tributary of Eastern Creek is proposed to be diverted via a channel through the relatively narrow confines of the space between the Southern Cell and Cell 4. Hence a 50m riparian zone is not feasible. See Section 2.2 for details.
3,	All works and disturbance areas associated with the proposal (with the exception of any environmental protection works) must be located outside the riparian zones and must not compromise the riparian zones in any way.	See response to (2) above
4.	The diverted tributary of Eastern Creek must be rehabilitated to emulate a stable natural stream system that behaves as, and has the appearance of natural system of the area.	The proposed design includes the retention of the low flow pipes due to the constraints outlined in Appendix A and Section 2.2.
5.	A Vegetation Management Plan for site rehabilitation is to be prepared that demonstrates protection of any remnant local native vegetation at the site and the	The remnant vegetation on Cell 5 is to be cleared, with suitable offsets implemented.

Agency	GTA	Comment
	restoration of the riparian zone to a state that is reasonably representative of the natural ecotone of the protected water systems. To achieve sound naturalized watercourse and long term riparian area stabilisation and management by the enhancement/emulation of the native vegetation of the subject area.	See above for proposed arrangements regarding the diverted drainage channel. The proposed design includes the retention of the low flow pipes due to the constraints outlined in Appendix A and Section 2.2.
6.	Seed and propagule sources are to be from local botanical provenance (regarded as from as close as possible)and from the same general habitat (same soil types, distance from watercourse, exposure, etc)	Agreed
7.	The riparian vegetation must be maintained for a minimum period of at least two years after final planting	Agreed
8.	The riparian vegetation must be monitored for a minimum of two years commencing after final planting and will include weed control monitoring and the establishment of locally indigenous riparian vegetation (comprising both natural regeneration and/or planting)	Agreed
9.	All watercourses affected by the proposal must be maintained and monitored for a minimum period of at least two years or until they are identified as stable by an independent suitably qualified certifier	Agreed
10.	Erosion and sediment control measures are to be implemented prior to any works commencing at the site and must be maintained for as long as necessary after the completion of works, to prevent sediment and dirty water entering the waterways. These control measures are to follow relevant management practices as outlined in the Landcom manual "Managing Urban Stormwater: Soils and Construction – Volume 1 " (4 th Ed 2004) – the Blue Book.	Agreed

APPENDIX A

15 July 2010

Warwick Giblin
Project Director
WSN Environmental Services

BY EMAIL

Dear Warwick

**EC2 Cell 5 EA – Tributary diversion concept design
Modification Application to Ministerial Consent No. DA271-6-2003-I MOD 4 for Eastern Creek Waste and Recycling Centre located off Wallgrove Road, Eastern Creek.**

Blacktown City Council has responded to the Environmental Assessment with concerns regarding the proposed works required for the un-named creek diversion in their correspondence dated 22 June 2010 (File No. MC-10-81). This letter addresses Council's concerns.

Council's response includes suggestions requiring the creek diversion design to include frequent low flow replenishment to the diversion creek by removing one or both of the low flow pipes from the system. This letter includes discussion of the following points:

- 1) The site's limitations
- 2) Option to remove both pipes from system, including calculation of increased channel size and sketches of cross sections.
- 3) Option to remove one pipe from system, including calculation of increased channel size and sketches of cross sections.
- 4) Option to make use of both the channel and pipes at all times.

1.0 Site limitations

There are several physical limitations to the site of the diversion creek. These are presented of the attached sketch, hand-marked and titled, "Sketch of Limitations."

1. Partly completed Cell 4.
The diversion creek cannot encroach on the partially complete Cell4 as any disturbance of the cell's liner may result in leachate contamination.
2. Completed Southern Cell.
The diversion creek cannot encroach on the completed southern cell as any disturbance of the cell's liner and/or cap may result in leachate contamination. Additionally the cap for this cell has been in place for many years already.
3. Transmission Tower
The diversion creek crosses into the Integral Energy Transmission Easement. The transmission tower adjacent the works requires 4 metres clearance. Additionally Integral Energy require 24-hour vehicular access in case of emergency works.
4. Ferrers Road site boundary
The site is bordered by Ferrers Road to the east.
5. Grades from the Detention Basin to Eastern Creek.

The site is generally flat from the proposed detention basin to the discharge point at Eastern Creek. The falls are less than one per cent, and if flow is not maintained, stagnation may occur. Also, the diversion creek engineering design is dominated by three levels: at the detention pond; under Western Access Road; and at Eastern Creek. These levels are to some extent fixed and the resulting flat site provides for an inflexible design of the creek invert levels.

6. Depth of pipes

Linked to the design being set in a generally flat site, it is necessary that the pipes have minimal cover in order for both pipes and creek to physically discharge at Eastern Creek. Such cover would be of the order of 300-500mm thick, generally considered the minimum cover for such pipes in this situation. The lack of substantial cover over the pipes may cause problems if the diversion creek is deepened while still retaining one or more pipes. Any changes to the creek and pipes requires redesigning the inlet to the diversion creek from the detention basin and remodelling of the system to ensure that minimum freeboard at Ferrers Road is retained.

2.0 Remove both pipes from system

The current concept design has 2 x 900mm diameter pipes conveying the 20 year ARI peak design flow from the detention basin to the culvert under the Western Access Road and the diversion creek (channel) conveying any excess flow up to the 100 year ARI event including freeboard.

If both pipes are removed from the system, it is required that the entire 100 year ARI storm be contained within the diversion creek. New channel cross-sections at section 1, 2 and 3 were calculated to demonstrate this change. The channel invert levels at those sections had to remain close to the current levels to retain grades to Eastern Creek. (Refer to point 5 in section 1.0) Therefore the maximum depth of water in those sections had to remain close to the current. The overall width of the channel had to also remain the same. (Refer to points 1 to 4 in section 1.0).

The following table summarises the requirements of the diversion creeks:

Channel capacity requirements			
	Current capacity of:		Required capacity
	Pipes	Channel	Channel
	20 year ARI	100 - 20 year ARI ¹	100 year ARI
Section	m ³ /s	m ³ /s	m ³ /s
1 and 2	3.21	5.23	8.44
3	3.21	5.08	8.29
Average	3.2	5.2	8.3

¹ Channel capacity includes freeboard. It is excluded from the results to keep the calculations simple.

Refer to the attached hand sketches on "Modifications Remove Both Pipes" for changes to each of the channel sections to achieve the required capacity. These changes are summarised in the following table.

Channel changes						
	Current dimensions			Required dimensions		
	Depth ¹	Overall width ²	Batter slope	Depth ¹	Overall width ²	Batter slope
Section	m	m		M	m	
1 and 2	0.5	9.0	1V:4H	0.55	9.0	1V:0.5H
3	0.6	8.0	1V:4H	0.6	8.0	1V:0.5H

¹ Depth is the top of channel level minus channel invert level. ² Overall width of the channel refers to the width of base and batters.

The depth has slightly increased at section 1 and 2 but the significant change to the channel section is the steeper batter slopes.

Batter slopes of 1 in 0.5 will not have adequate protection against erosion in a natural or vegetated channel. In order to prevent erosion the channel would need to change to a more engineered/less ecologically sustainable type, such as concrete, to achieve increase in channel capacity.

3.0 Remove one pipe from system

If one of the 900mm diameter pipes are removed from the system the channel would be required to carry the 100 year ARI minus approximately half of the 20 year ARI.

Channel capacity requirements				
	Current capacity of:		Required capacity	
	Pipes	Channel	Pipe	Channel
	20 year ARI	100 - 20 year ARI	½ x20 year ARI	100 - ½ x20 year ARI
Section	m ³ /s	m ³ /s	m ³ /s	m ³ /s
1 and 2	3.21	5.23	1.61	6.83
3	3.21	5.08	1.61	6.68
Average	3.2	5.2	1.6	6.8

New diversion creek cross sections at section 1, 2 and 3 have been calculated. As previously, the invert levels, depth of water and width of the channel at those sections had to remain close to the current.

Sketches of these new cross sections are attached, see "Modifications Remove One Pipe" and the changes are summarised in the following table.

Channel changes						
	Current dimensions			Required dimensions		
	Depth ¹	Overall width ²	Batter slope	Depth ¹	Overall width ²	Batter slope
Section	m	m		m	m	
1 and 2	0.5	9.0	1V:4H	0.5	9.0	1V:1H
3	0.6	8.0	1V:4H	0.6	8.0	1V:2H

¹ Depth is the top of channel level minus channel invert level. ² Overall width of the channel refers to the width of base and batters.

Batter slopes do not need to be as steep as for removing both pipes, however slopes of 1 in 2 and steeper will be subject to erosion in a naturalised creek and the channel would need to be changed to a more engineered type. Also steeper sides will provide further risk to site safety and may cause potential problems for Integral Energy access.

If the channel surface is changed to concrete, the capacity of the channel increases considerably due to the increase in flow velocity. In the case of a concrete channel, it would be more economical to adjust the batters back to 1 in 4.

4.0 Use of both channel and pipes at all times

This scenario would make use of the above-ground channel and the pipes at low flow as well as at times of high flow. The mainly flat grade of the site means that the pipes need a frequent flow of water to prevent siltation and removing some of this flow to the channel would increase the likelihood of siltation, increasing maintenance. A low flow of water in the channel may lead to stagnation.

Additionally, the concept design uses only gravity and the rising water level in the detention basin to put water first into the pipes and then via a spillway into the channel. If water is to be put into the channel at low flow times, then it is likely that some form of electrical and mechanical pumping arrangement would be required to raise the water 2metres vertically to the spillway of the channel. This would also require additional maintenance.

5.0 Other Considerations

Steeper sides to the creek design may provide further risk to site safety and may cause potential problems for Integral Energy access.

Vegetation other than grasses may provide debris which could potentially block the channel at the culvert under the Western Access Road. Grass alone would be unlikely to provide any such problem.

It is necessary to keep water in the pipes to prevent silting which means the pipes should be the primary route for moving water from the detention basin. Reversing the design such that the pipes took the less frequent, but larger flow, would not be reliable in preventing siltation of the pipes. At the same time the frequent low flows will tend to move slowly in the quite flat and natural channel and therefore the channel would be prone to stagnation.



The current concept design is a low-maintenance design, with only trash screens that would need regular clearing. No electrical or mechanical systems are required.

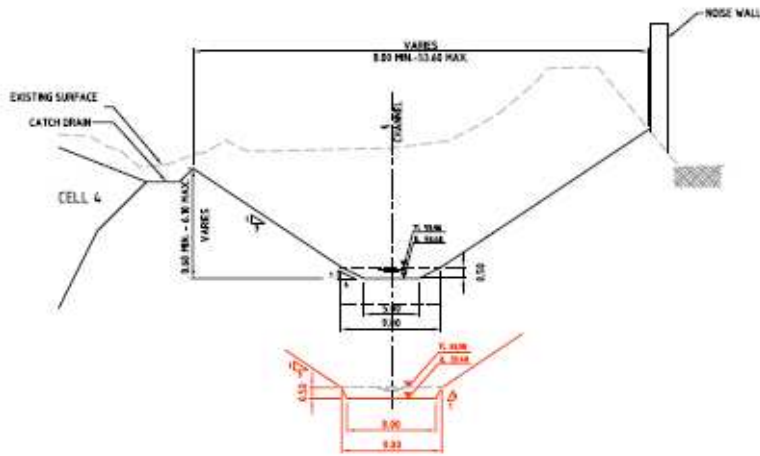
We hope this information has satisfactorily addressed Council's concerns. However if further discussion is required, please do not hesitate to contact Lee Sellick or Lucy Blacker on 8295 1151.

Yours sincerely

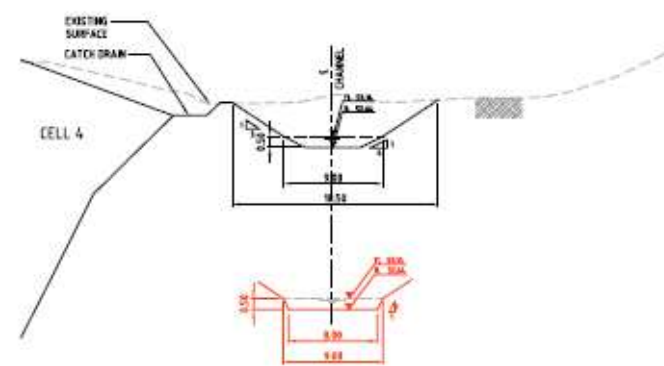
A handwritten signature in black ink, appearing to read "Lee Sellick".

Lee Sellick
Associate Director
lee.sellick@aeacom.com

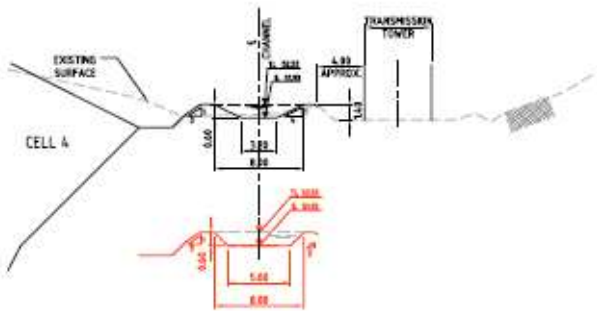
Direct Dial: +61 2 8295 3865+61 2 8295 1151
Direct Fax: +61 2 9262 5060



SECTION 1
H 1:200
V 1:100



SECTION 2
H 1:200
V 1:100



SECTION 3
H 1:200
V 1:100

NOTES:

1. ALL DIMENSIONS IN METRES UNL.D.
2. EXISTING SURFACE AND CELL 4 EXTENT IS AS PER SURVEY EAST TO SLOPE SUPPLIED 20056211
3. CHANNEL IS TO BE GRASS LINED.
4. WATER DEPTH VARIES 0.5m - 0.6m (TYP) DURING 100 ARI RAIN EVENT.

PRELIMINARY CONCEPT DESIGN

Copyright Hensel Australia Pty Ltd

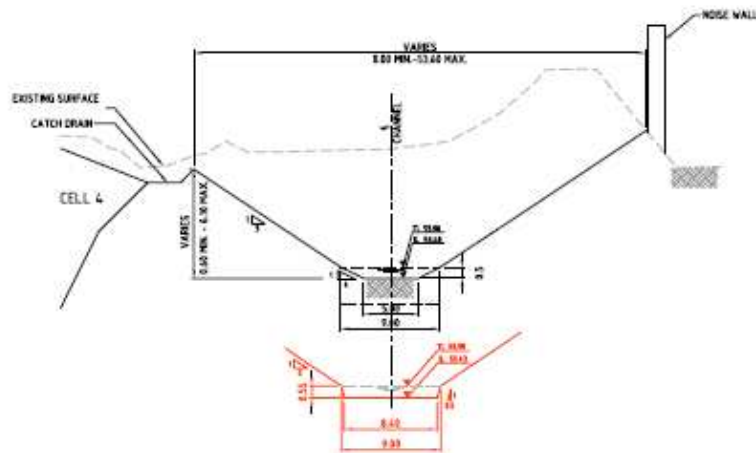
This drawing is confidential and shall only be used for the purposes of this project.

No.	Date	Description	Appr.
1			
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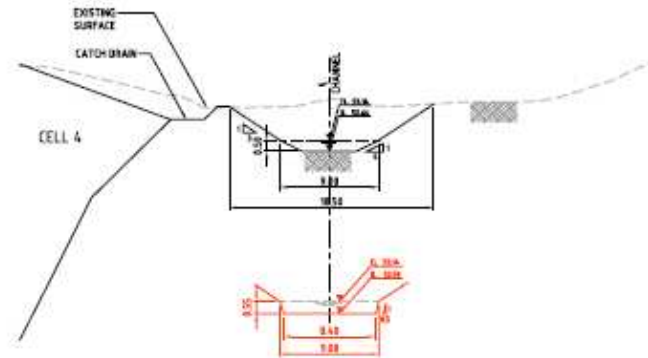


REVISION	BY	DATE	DESCRIPTION
01	ES	15/01/2019	ISSUED FOR INFORMATION
02	ES	15/01/2019	ISSUED FOR INFORMATION
03	ES	15/01/2019	ISSUED FOR INFORMATION
04	ES	15/01/2019	ISSUED FOR INFORMATION

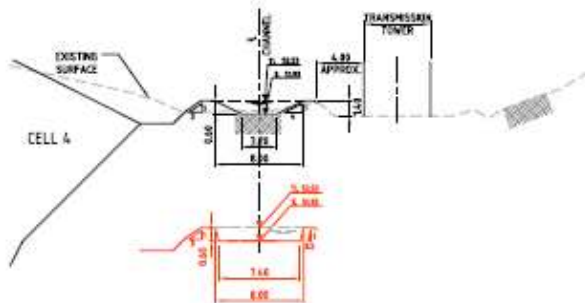
EASTERN CREEK LANDFILL - NORTHERN CELLS	
STREAM DIVERSION CHANNEL TYPICAL SECTIONS MODIFICATIONS REMOVE ONE PIPE	
SKETCH	20010705-SK-029



SECTION 1
H 1:200 SK-018
V 1:100



SECTION 2
H 1:200 SK-018
V 1:100



SECTION 3
H 1:200 SK-018
V 1:100

NOTES:

1. ALL DIMENSIONS IN METRES U.N.D.
2. EXISTING SURFACE AND CELL 4 EXTENT IS AS PER SURVEY EAST TO END OF SURVEY 2004/0211.
3. CHANNEL IS TO BE GRASS LINED.
4. WATER DEPTH VARIES 0.5m - 0.6m (TYP.) DURING 100 ANR RAIN EVENT.

PRELIMINARY CONCEPT DESIGN

Geowater (Pty) Ltd.

This drawing is confidential and shall only be used for the purposes of this contract.

NO.	DATE	DESCRIPTION	BY
1	15/08/2011	ISSUED FOR APPROVAL	LD
2	22/08/2011	ISSUED FOR APPROVAL	LD



DATE	BY	DESCRIPTION
15/08/2011	LD	ISSUED FOR APPROVAL
22/08/2011	LD	ISSUED FOR APPROVAL

AECOM

Geowater (Pty) Ltd. A.S. 22/08/2011

wgn

ENVIRONMENTAL SOLUTIONS

EASTERN CREEK LANDFILL - NORTHERN CELLS	
STREAM DIVERSION CHANNEL TYPICAL SECTIONS MODIFICATIONS REMOVE BOTH PIPES	
File: SKETCH	Date: 20010705-SK-028